GENERAL INFORMATION

Basic Engine Measuring Techniques - Overview

BASIC MEASURING TECHNIQUES

BASIC ENGINE MEASUREMENTS

During the course of engine repairs some basic engine measurements are required to verify engine diagnosis as well as to complete proper repairs. These measurements are made by precision measuring tools such as micrometers, Vernier calipers, cylinder bore gauges and dial indicators.

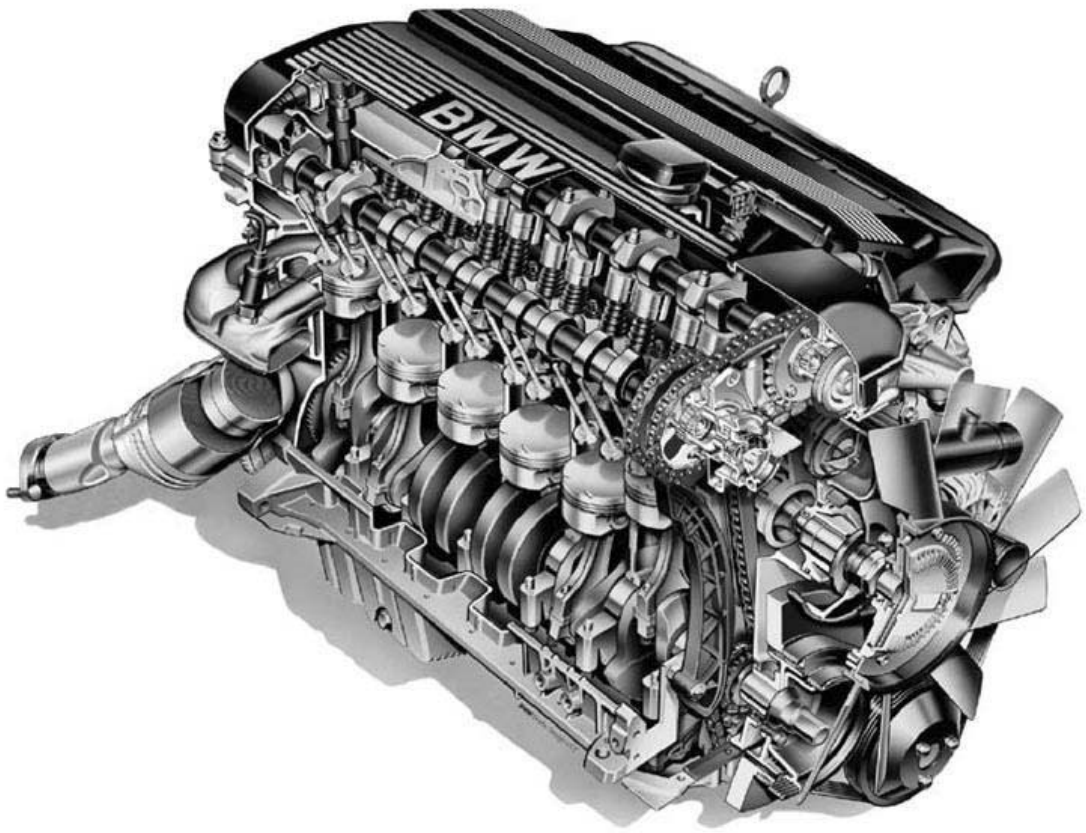

Fig. 1: Sectional View Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

Also, a working knowledge of the metric system is also a vital skill that is needed by the technician. All BMW engine measurements consist of metric specifications. Some of the routine engine measurements performed include:

- Valve Guide Wear (Tilt Angle K)

- Cylinder Bore Measurements (Taper and Out-of-Round)
- Cylinder Head Warpage and Thickness
- Axial and Radial Endplay Measurements (Crankshaft/Camshaft etc).

Among all of the skills possessed by a modern technician, basic measuring techniques are perhaps the most overlooked and least used. This is why it is important to review these skills from time to time as a refresher.

Also, it is necessary to access technical data to obtain the proper specifications for these measurements. This course is designed to review measuring techniques to assist in engine diagnosis.

Vernier Measurement

The Vernier scale is used on various measuring tools such as the Vernier caliper and the Depth Gauge. The Vernier scale can be used with Fractional (US) and Metric systems. For the purposes of this training module we will always refer to the Metric Vernier scale.

The Vernier scale consists of a fixed scale and a sliding scale. The fixed scale is divided with graduations in 1 millimeter increments. The sliding scale has 10 graduations in increments of .5.

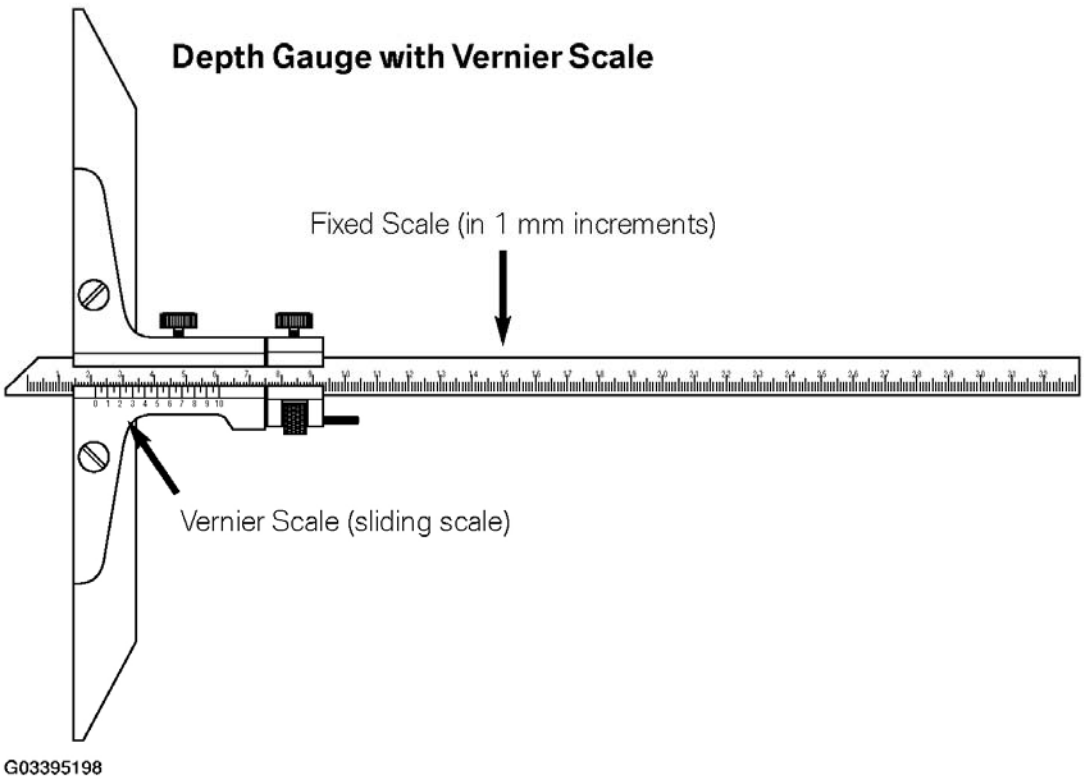

Fig. 2: Identifying Depth Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

In order to read a measurement, use the zero mark on the left end of the vernier scale to use as a guide to read a measurement on the fixed scale.

In the example shown at the right, the zero mark is resting between 26 and 27 mm. Therefore the base measurement is 26 mm.

Next, the decimal measurement must be taken. For this, find a line on the Vernier that most closely matches any line on the fixed scale.

Using the example drawing, the "4" on the Vernier scale is lining up directly with a line on the fixed scale.

Combining the previous reading with this reading, the result would be 26.4 mm.

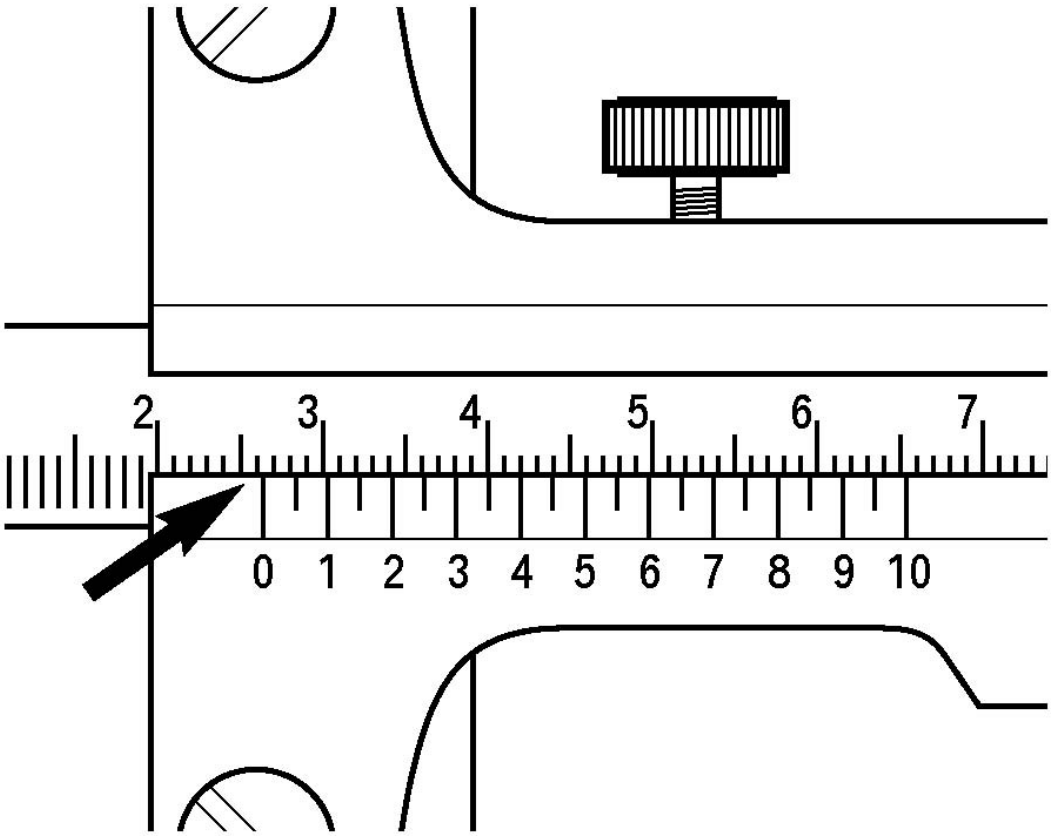

Fig. 3: Locating Vernier Scale Reading
Courtesy of BMW OF NORTH AMERICA, INC.

The designations on the Vernier scale are in increments of .5. For example, if a reading on the Vernier scale falls on the .5 (i.e. 2.5, 3.5 etc) designation this would indicate 5/100th's of a millimeter.

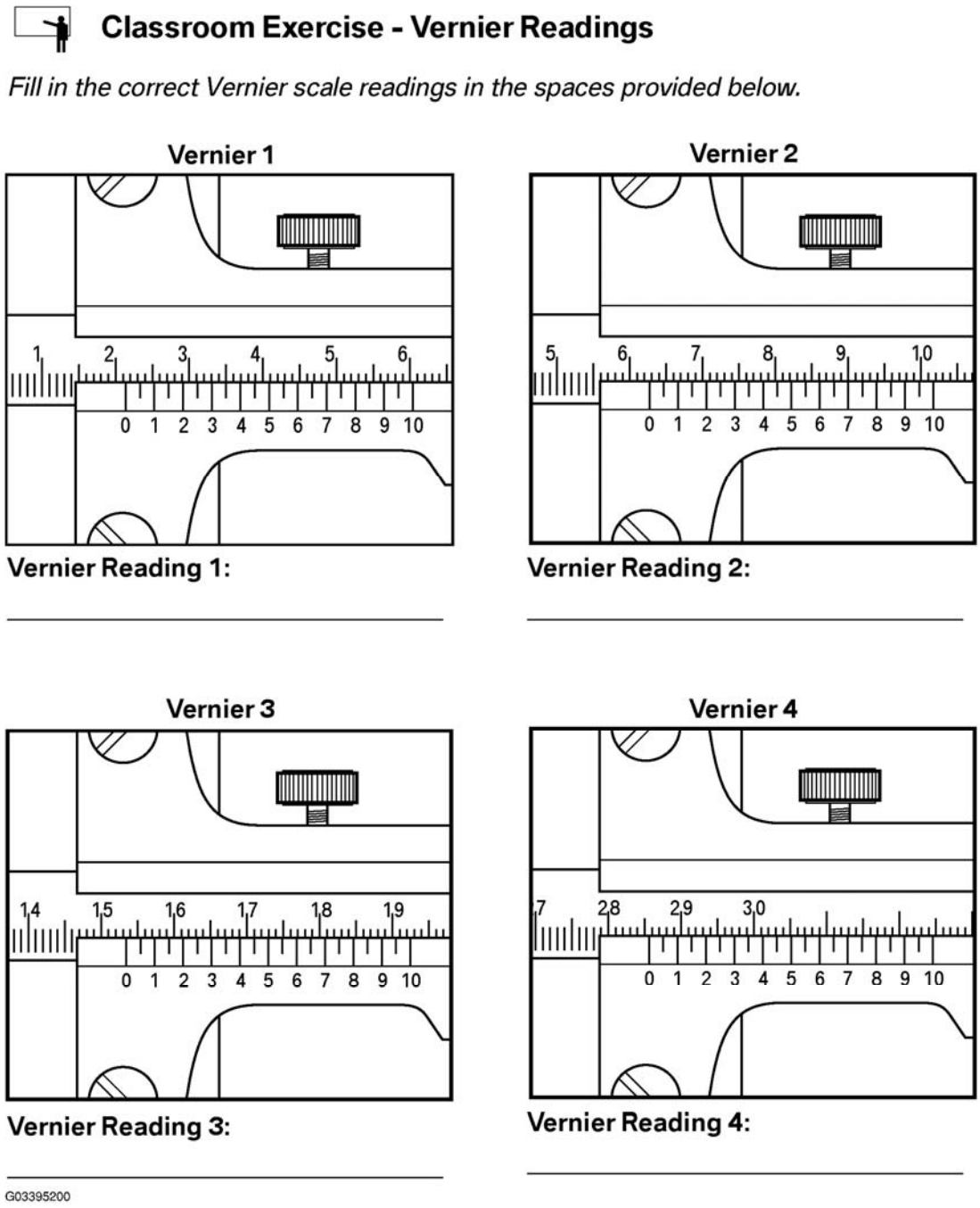

Fig. 4: Identifying Vernier Scale Reading
Courtesy of BMW OF NORTH AMERICA, INC.

Micrometer Measurements

Another valuable measuring tool is the micrometer, which can be used for measurements such as bearing journal diameter, cylinder head thickness, valve shim thickness and brake rotor thickness etc. Micrometers also come in configurations for inside measurements as well.

The micrometer scale comes in both fractional and metric varieties. We will cover only the metric micrometer scale in this course.

First you must familiarize yourself with the construction of the micrometer in order to understand how measurements are made.

Metric Micrometer Construction

The micrometer is constructed of a few basic parts. The actual item to be measured is placed between the anvil and the spindle. The micrometer can be adjusted to the approximate size using the thimble. The thimble should only be used for the coarse adjustment. In order to make the actual measurement, the micrometer should only be turned using the ratchet (a.k.a. the friction stop). Do not attempt to make a measurement using the thimble. This will give an inaccurate measurement and ultimately damage the micrometer.

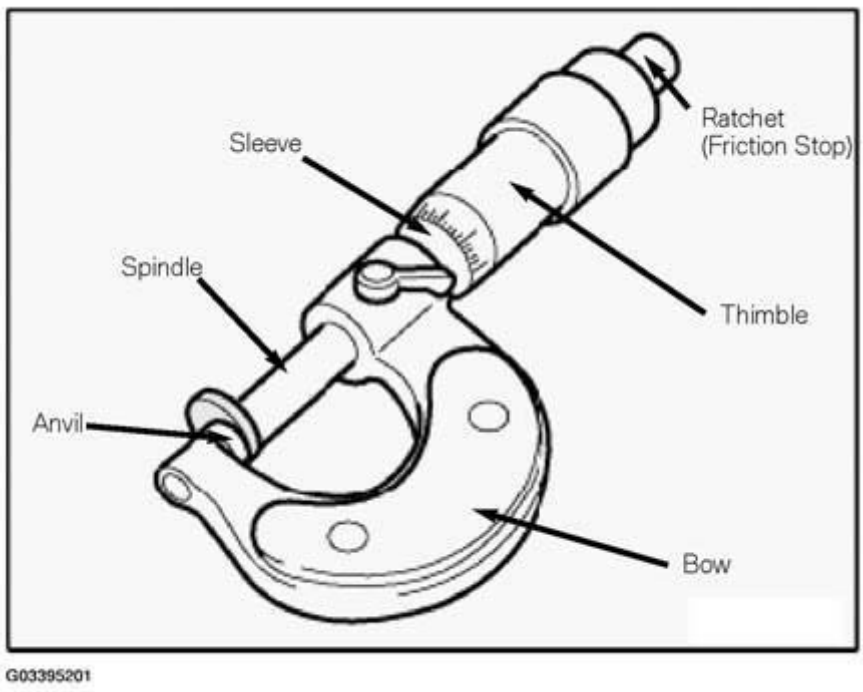

Fig. 5: Identifying Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

Micrometers are available in various sizes for outside as well as inside measurements. The more common variation is the outside micrometer. They are usually available in 25 millimeter increments such as 0-25 mm, 25-50 mm, 50-75 mm etc..

The metric micrometer can measure in increments of one hundredth of a millimeter (.01mm). One hundredth of a millimeter is equal to 0.0003937 inch which is less than one thousandth of an inch.

The measurement area of the micrometer consists of the sleeve scale and the thimble scale. The sleeve scale is used to read whole and half millimeters. The thimble scale (which rotates) reads in hundredths (.01) of a

millimeter from zero to fifty. Two complete revolutions of the thimble equals one millimeter.

On the sleeve scale, each scale mark above the center line indicates whole millimeters. Below the center line, half of a millimeter (or .5mm) increments are indicated.

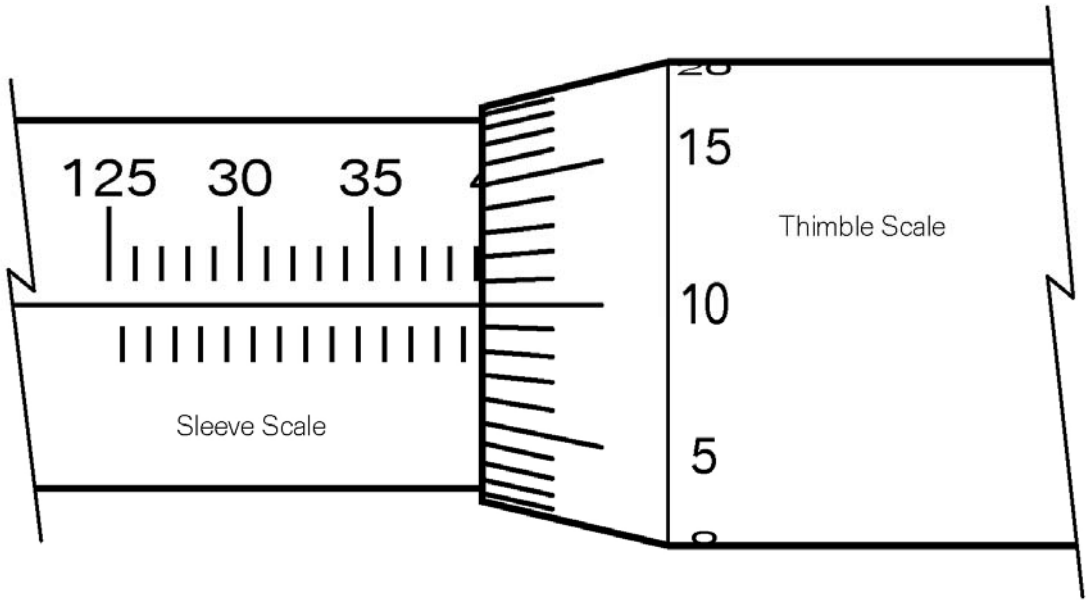

Fig. 6: Identifying Micrometer Reading
Courtesy of BMW OF NORTH AMERICA, INC.

Using the example shown above, the micrometer is a 125-150mm micrometer. To read this micrometer, first take the basic reading from the sleeve scale. The thimble is past the 139 mm mark. Therefore the reading is a least 139 mm. Next, look at the thimble scale and note the reading on the centerline. The "10" on the thimble scale is lined up with the centerline. This indicates a reading of .10 mm. If you add the two readings; 139 + .10 = 139.10 mm.

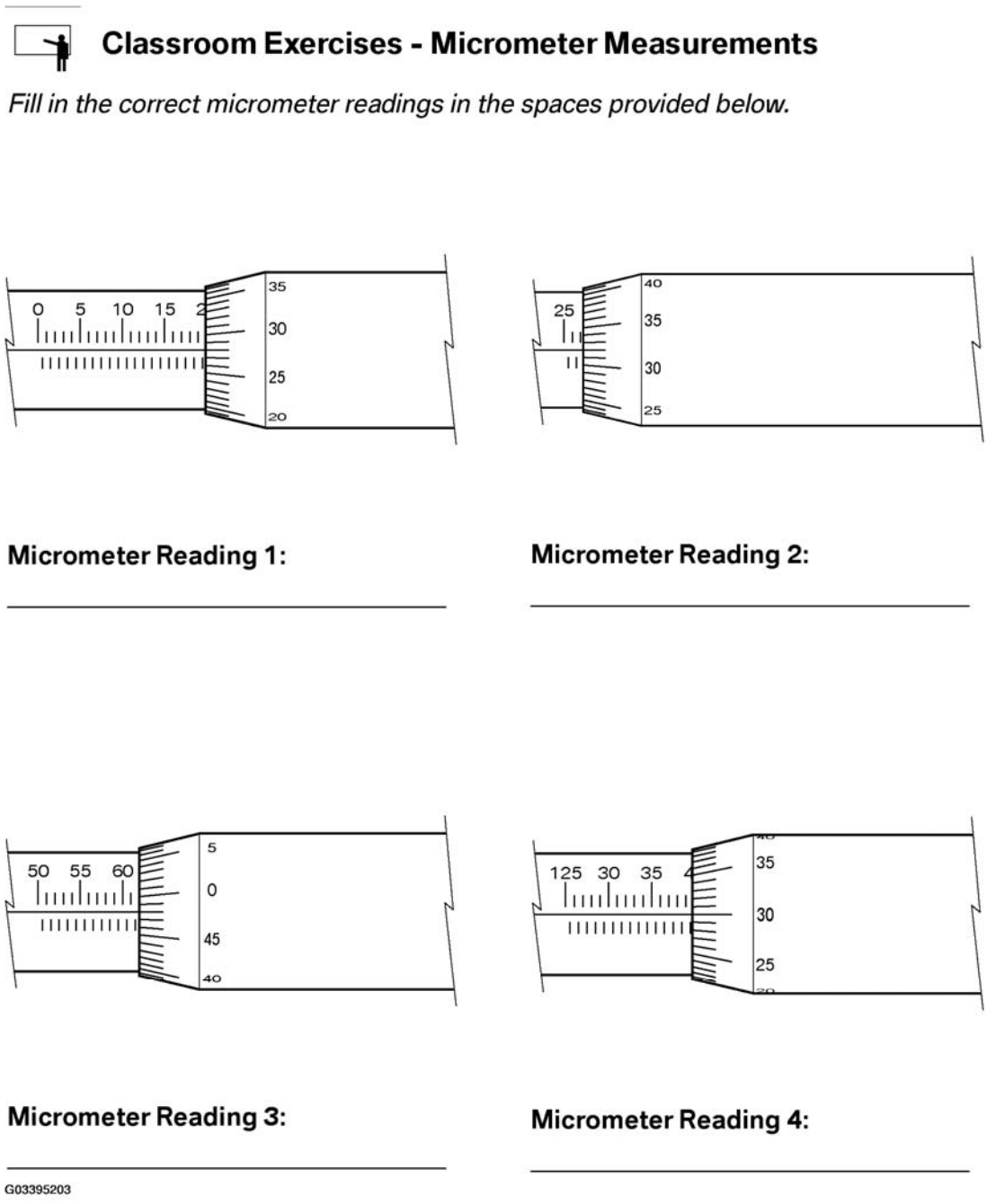

Fig. 7: Identifying Correct Micrometer Reading
Courtesy of BMW OF NORTH AMERICA, INC.

Dial Indicator Measurements

The dial indicator is used to measure the travel or movement of a specific item. It can also be used to measure axial and radial runout. In engine measurement applications, the dial indicator can be used to measure valve guide wear, axial movement of the crankshaft (thrust), and runout of flywheels and harmonic balancers.

First, it is important to familiarize yourself with Dial Indicator construction. The face of the dial indicator consists of a moveable bezel which is also attached to the large measuring scale. This allows the tool to be brought to the "zero point" when needed.

The main measuring device is the contact point. The contact point (1) is placed against the object to be measured. Usually, the contact point is rounded or has a ball bearing. This allows for a more accurate measurement.

The measuring face of the dial indicator consists of 2 scales. The smaller scale is for the "coarse" measurement which is in graduations of 1 millimeter. One revolution of the small scale is 10 millimeters.

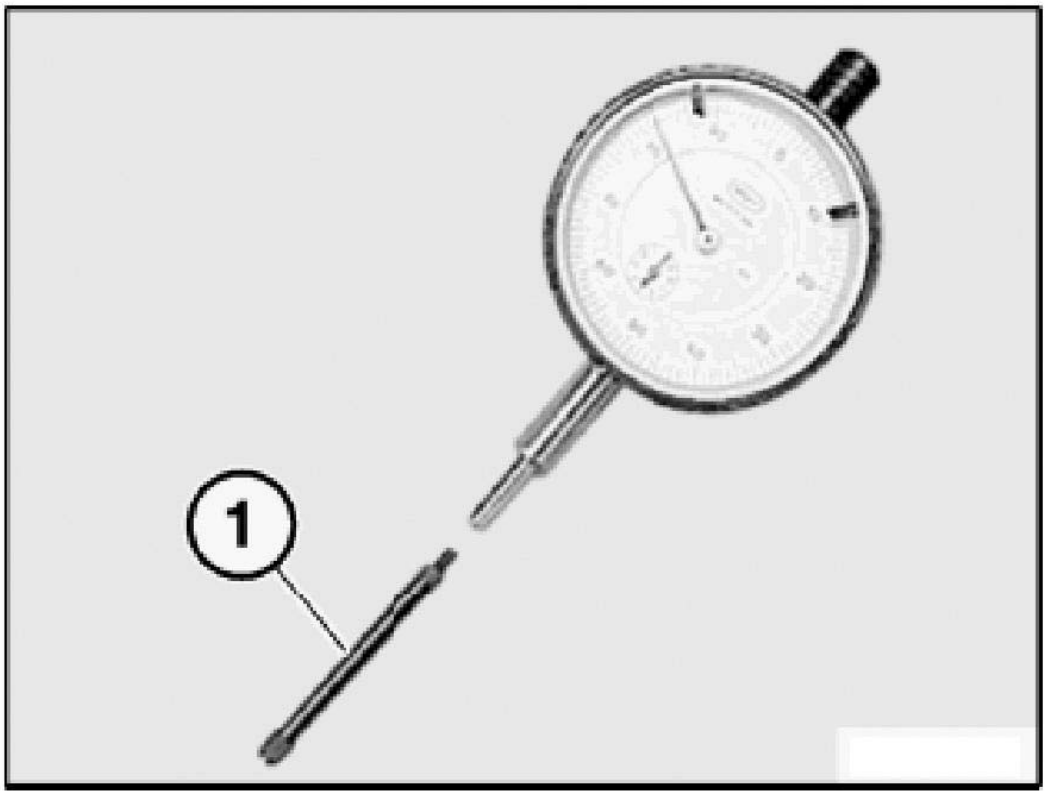

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Fig. 8: Identifying Dial Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

The large scale is in graduations of .01 millimeter and the scale goes from zero to one hundred. Therefore, one revolution of the large scale is one millimeter.

The dial indicator also needs to be held in place when taking a measurement. This requires a stand or base. Depending upon the application, these stands can be a clamp type, magnetic or a threaded base.

When taking a measurement, place the contact point on the object to be measured. The dial indicator must be pre-loaded slightly to prevent the measurement from bottoming out.

When reading the scale, be sure to "zero" the dial indicator first. If the readings to be taken are less than 1 millimeter, you do not need to use the small scale. If the readings are larger than 1 millimeter, be sure to factor the small scale into your measurement.

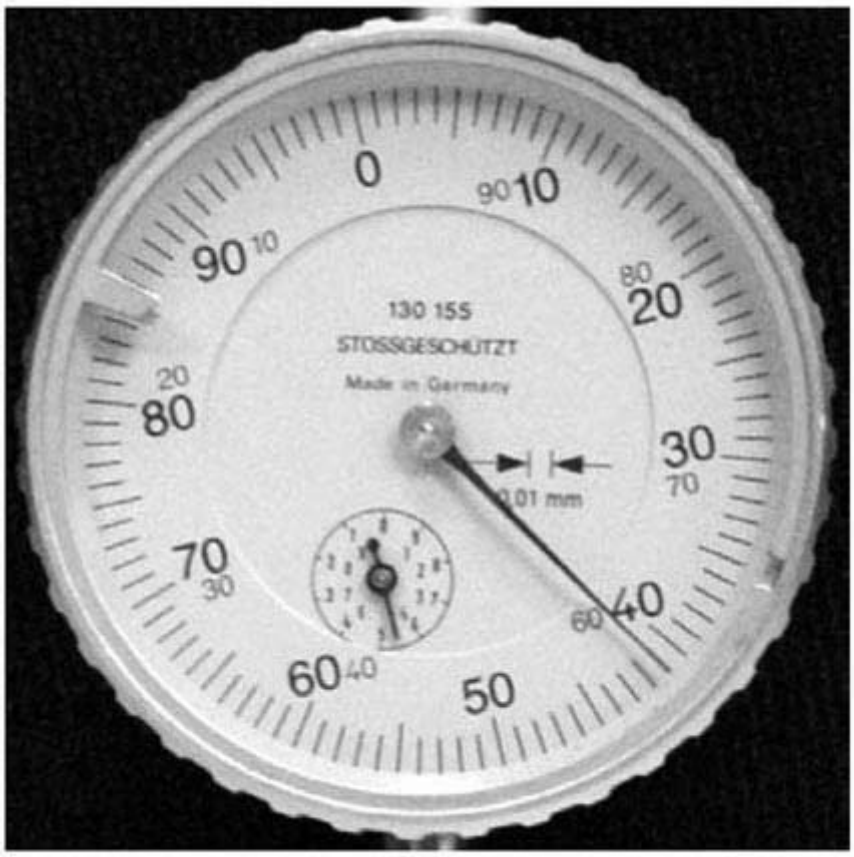

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Fig. 9: Identifying Dial Indicator Reading
Courtesy of BMW OF NORTH AMERICA, INC.

Examples Of Dial Indicator Measurements

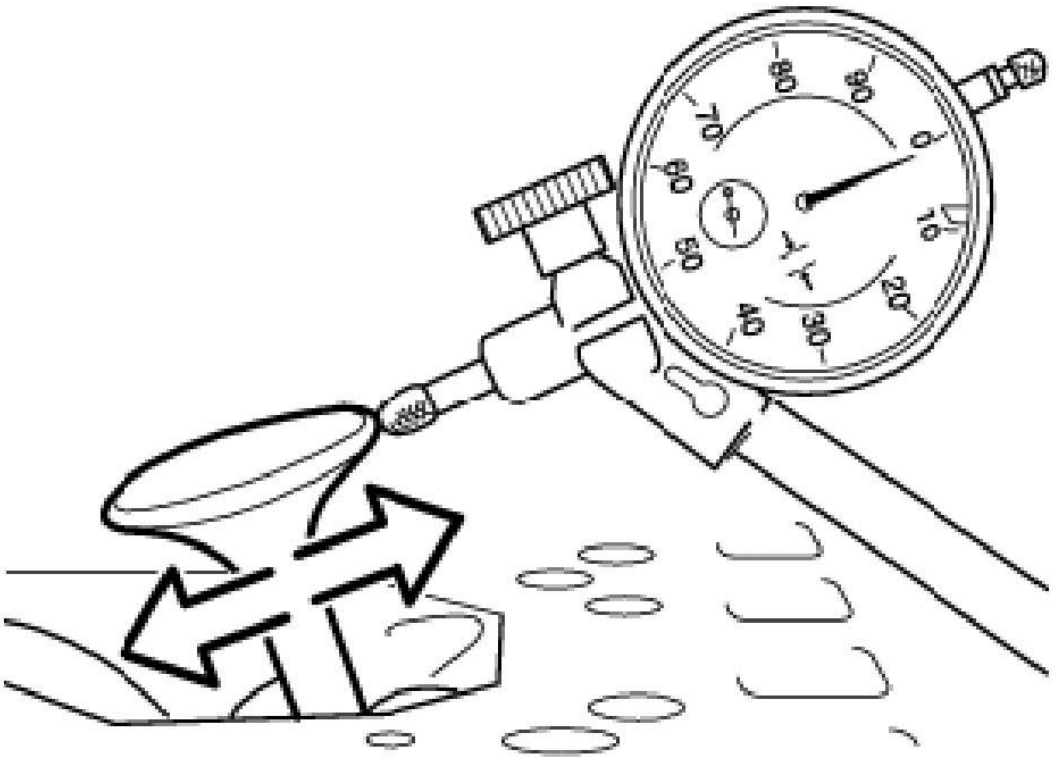

Fig. 10: Measuring Valve Guide Wear - Tilt Angle "K" Using Dial Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

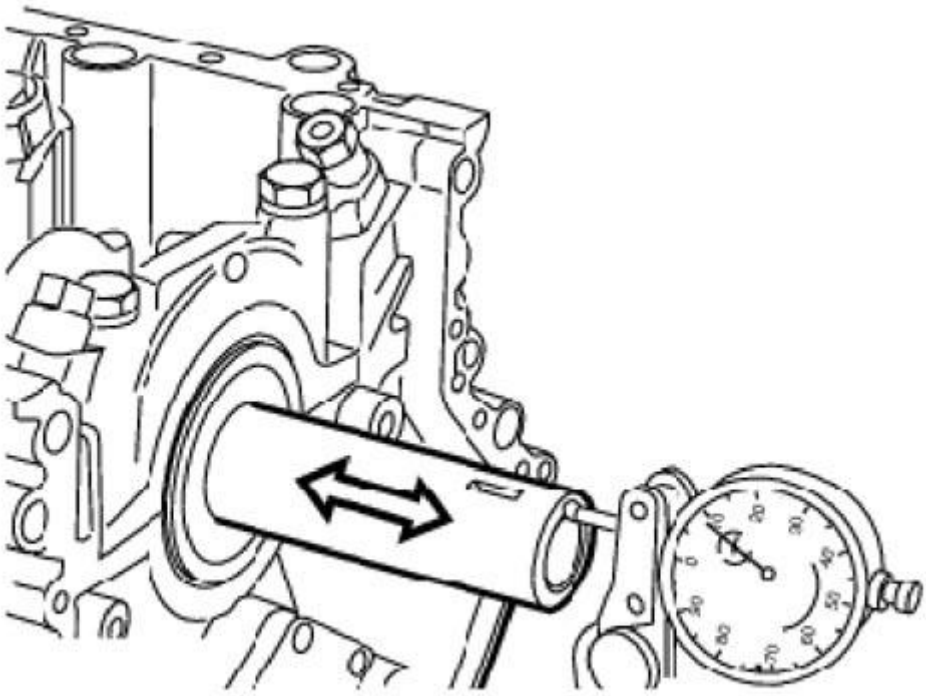

Fig. 11: Measuring Crankshaft Endplay - Axial Using Dial Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

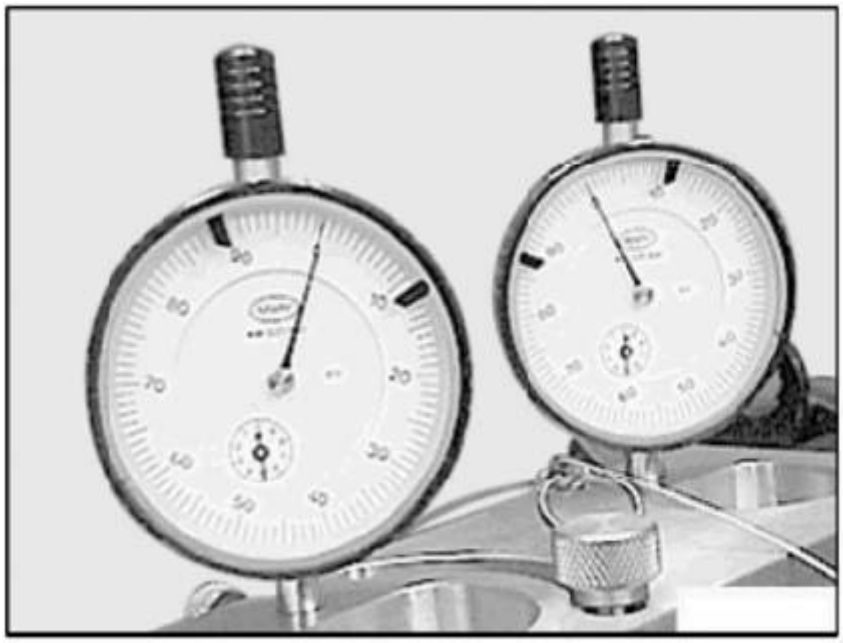

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Fig. 12: Measuring S62 Engine - Basic Throttle Setting Using Dial Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

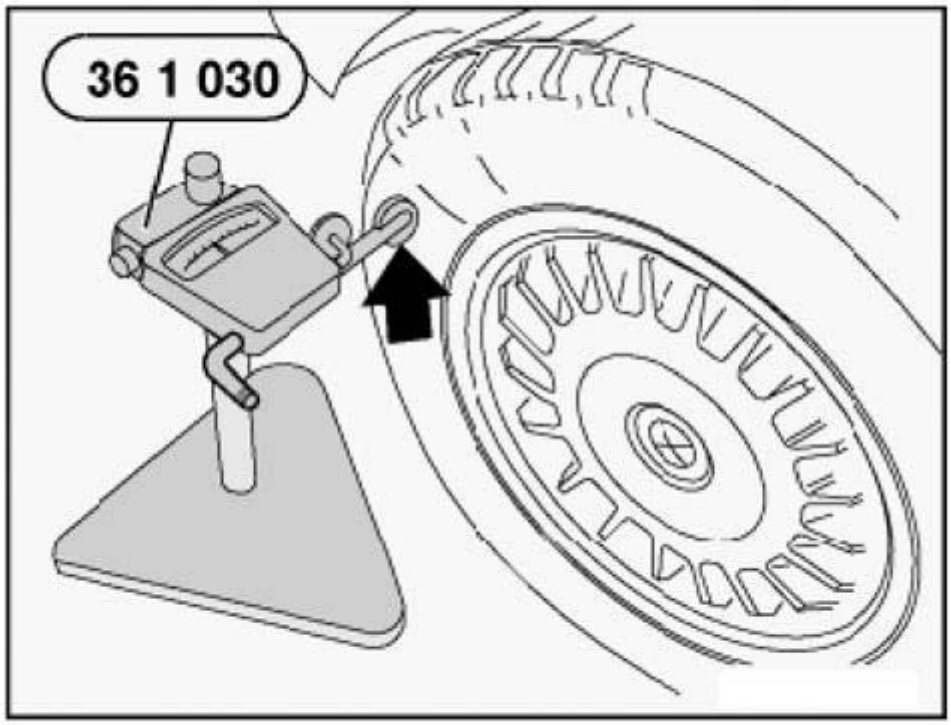

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Fig. 13: Measuring Wheel Runout - Axial Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Classroom Exercise - Dial Indicator Measurements

Compare the dial indicator readings, and determine the total travel. Record your results below in the spaces provided.

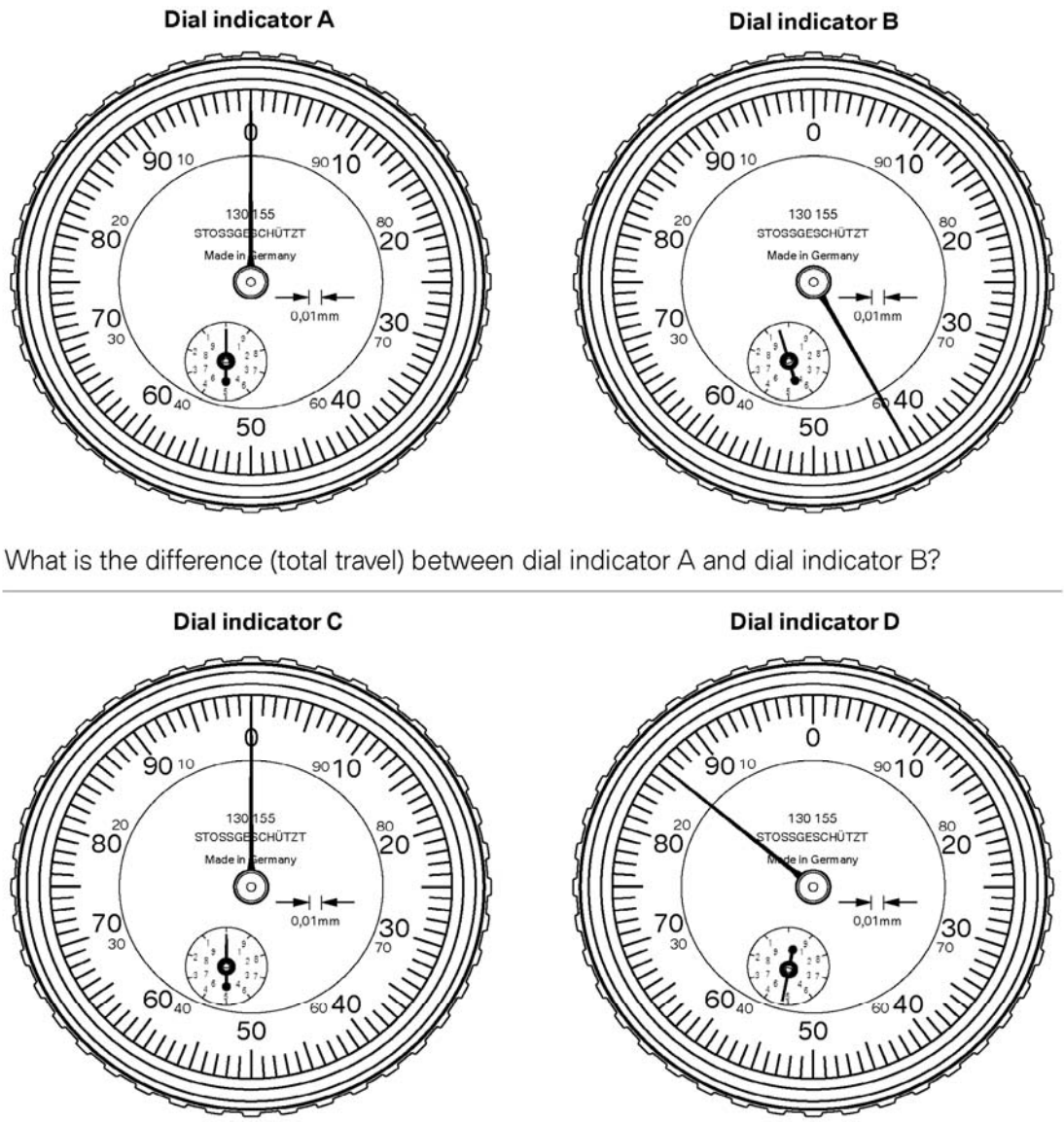

Fig. 14: Identifying Correct Dial Indicator Reading
Courtesy of BMW OF NORTH AMERICA, INC.

ADDITIONAL ENGINE MEASUREMENTS

During engine repair procedures it is sometimes necessary to assess engine wear to make determinations on

parts replacement. Also, some engine measurements are needed to verify a previous diagnosis.

For example, a cylinder leakdown test could indicate a cylinder sealing concern. Once the engine is disassembled, it would be necessary to verify this condition by checking the piston and piston ring condition. If OK, the next step would be to determine the condition of the cylinder bore. At this point, the cylinders should be checked for taper (conicity) and for out-of-round. The correct measurements could mean the difference between just replacing the rings and/or pistons or replacing the engine block. This is why it is necessary to make accurate measurements when needed.

Some of the other routine engine measurements include:

- Cylinder head warpage
- Cylinder head thickness (on some applications)
- Piston rings - end gap and axial clearance
- Cylinder bore - including out-of-round and taper

Cylinder Head Measurement

If a repair requires removal of the cylinder head, a few basic measurements can be performed to save time and unnecessary machine shop costs. If an engine has been overheated or has an internal or external fluid leakage (coolant/oil), it is a good idea to check the cylinder head for warpage.

This can be done by using a commercially available machinists straight edge and a feeler gauge. by sliding the feeler gauge under the straight edge in various locations, it can determine if there are any low spots or warpage. Usually, the specification is about .05 mm.

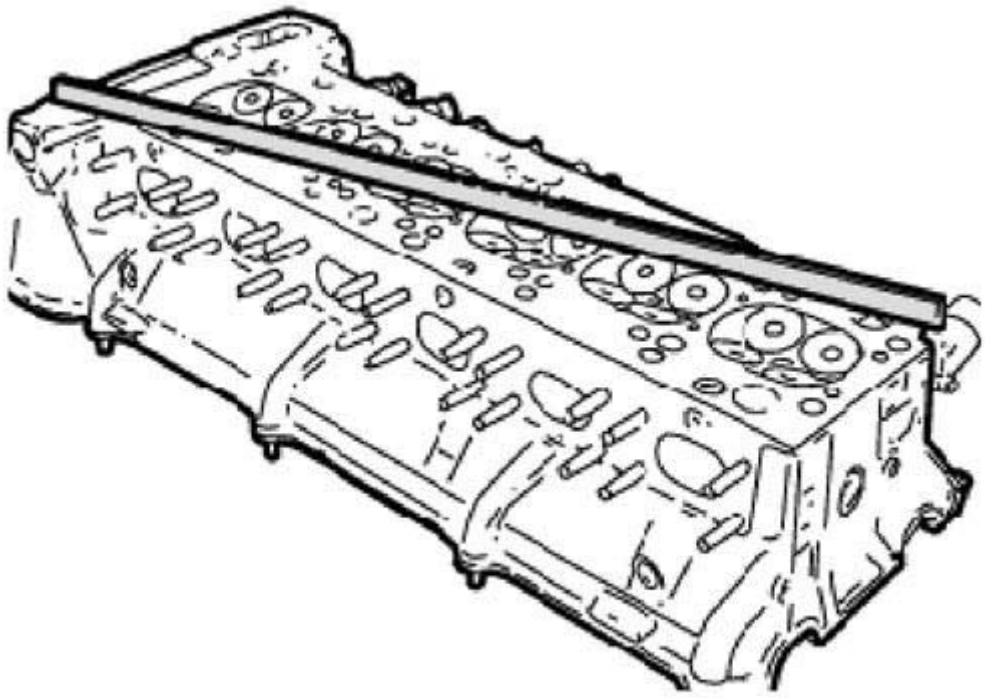

Fig. 15: Identifying Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Also, check to see if the cylinder head has a specification for machining limit. If so, it may be possible to have the cylinder head re-surfaced. Depending on the amount of material removed during the machining process, it may be necessary to install a thicker head gasket. There are some "service" head gaskets available through the part s department.

The cylinder head can be checked for minimum thickness. This is done using a micrometer or a vernier caliper. This is not possible on all engines, the example shown is a 6-cylinder (M52TU/M54).

If the minimum thickness is not met, the head will need to be replaced.

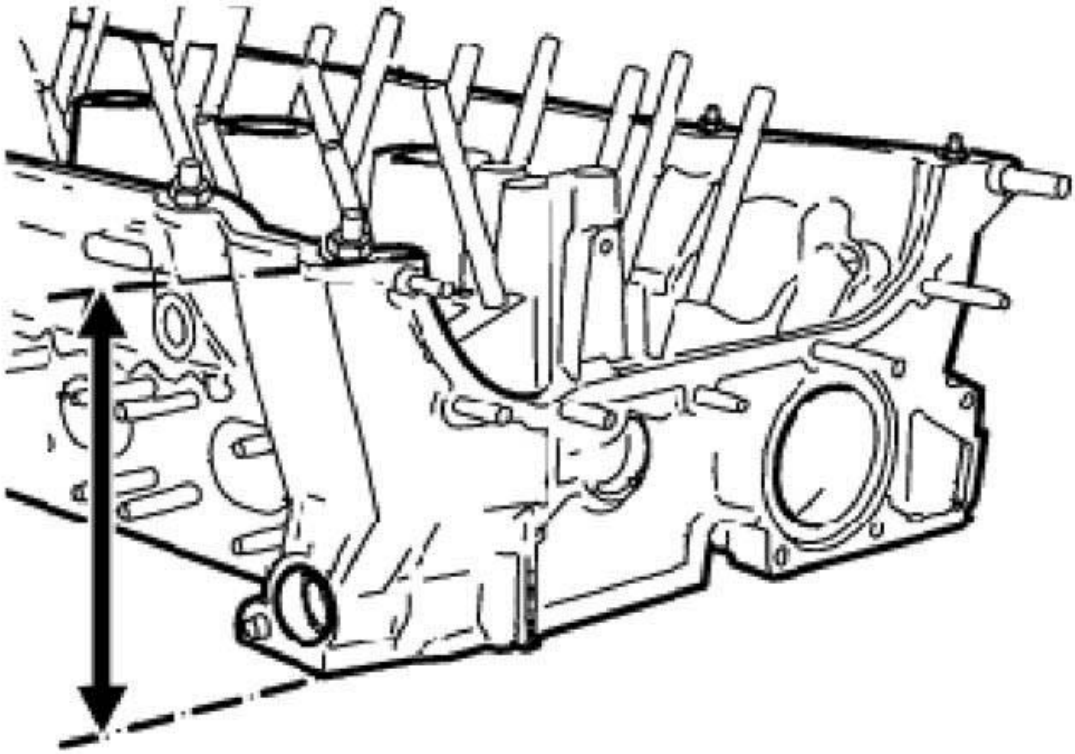

Fig. 16: Measuring Thickness Of Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Piston Measurements

When replacing pistons and/or piston rings, there are some basic measurements that need to be made. When fitting a piston to a cylinder bore, the piston diameter should be checked to ensure a proper fit.

The piston diameter is measured using a micrometer. The measurement is taken at a specified point (A) which is 90 degrees from the piston pin axis. Each engine has a specific location to measure piston diameter. For example, the illustration below shows measuring Point A. The specification for this engine (N62) is 18 mm. So the piston diameter is measured 18 mm from the bottom of the piston skirt.

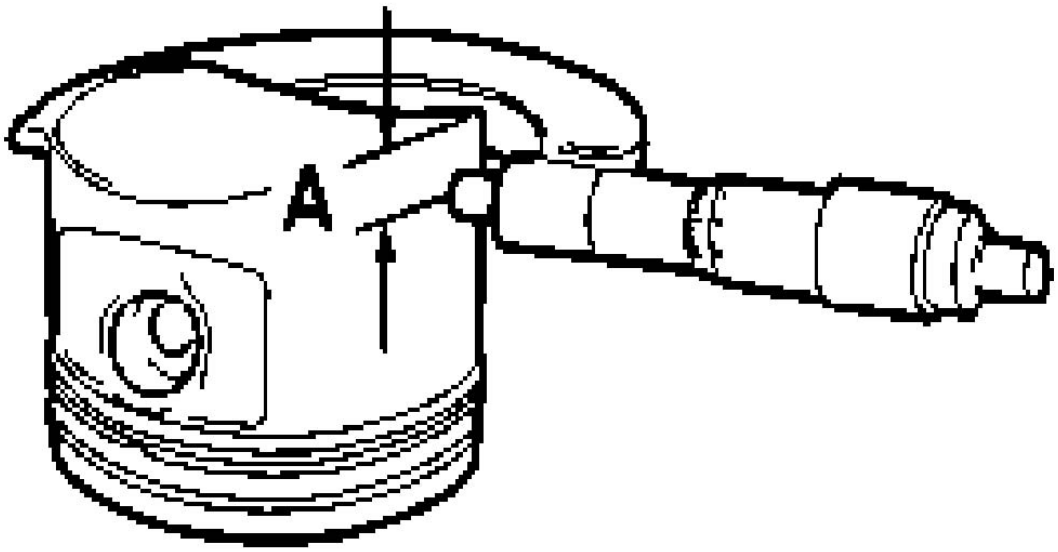

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Fig. 17: Measuring Piston Diameter Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

The piston diameter, when subtracted from the cylinder bore equals the cylinder wall to piston clearance. If the clearance measurement obtained is not correct, re-check your readings.

Piston Ring Measurements

There are some important specifications to check when installing piston rings. One of the measurements in axial clearance. Axial clearance is the distance between the piston ring and ring land. This prevents the rings from binding in the ring land at operating temperature. Axial clearance is measured using a feeler gauge.

Also the piston ring end gap has to be checked. This measurement is checked using a feeler gauge.

This clearance is critical in order to prevent the end gaps from contacting each other when the engine is at operating temp.

When installing the piston rings, always stagger the end gaps as per the repair instructions.

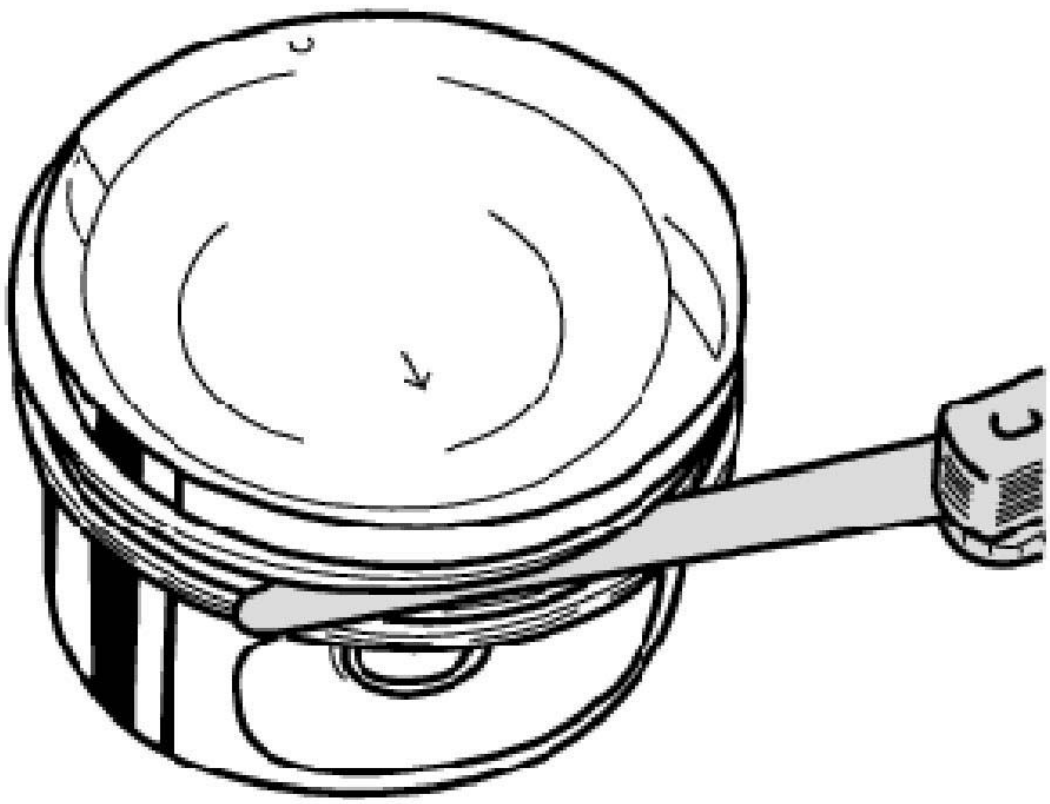

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Fig. 18: Measuring Piston Ring Gap Using Feeler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

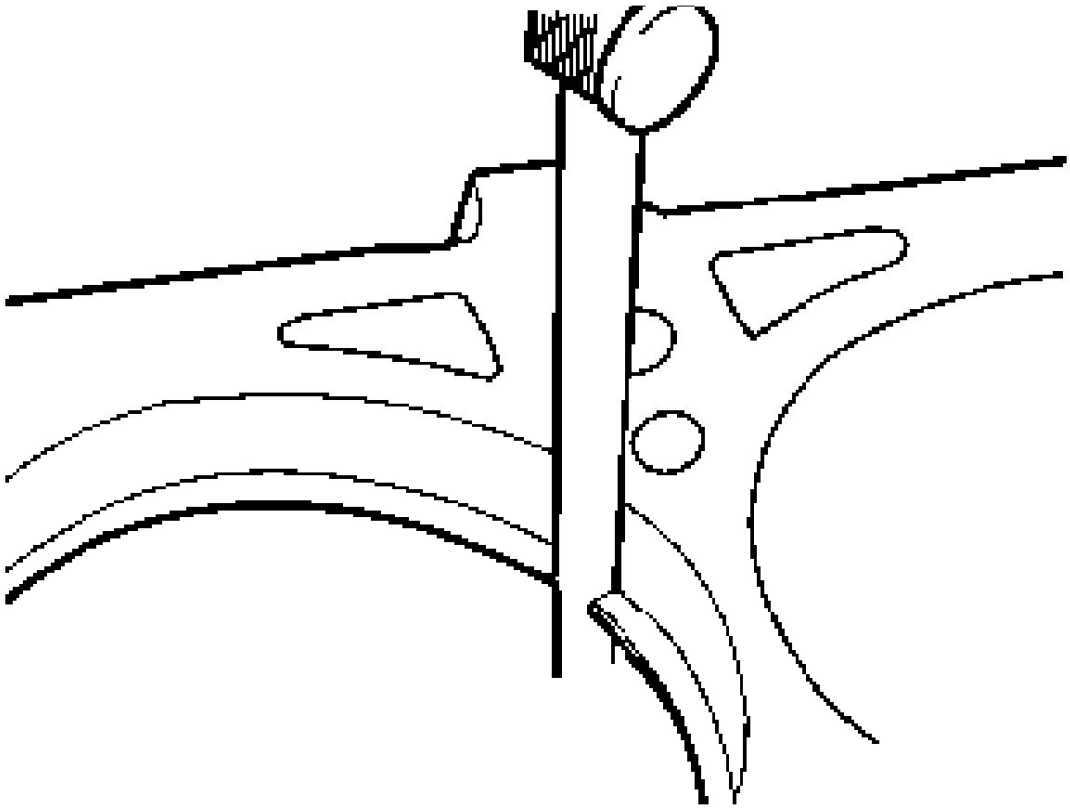

Fig. 19: Measuring Piston Ring End Gap Using Feeler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Cylinder Bore

In order for the cylinder bore to be considered acceptable, it must not be excessively tapered or out-of-round. Once the cylinder has been checked for obvious damage and the surface finish is OK, the integrity of the bores must be verified. If cylinder wear is suspected, it must be checked using the proper cylinder bore gauge.

Each cylinder must be checked at three position in the bore - top, middle and bottom. Also there must be two opposing dimensions that should be checked. The difference between the top and bottom measurements will indicate the taper of the bore. The opposing dimensions will indicate the out-of-round specification.

If these measurements are out of specification, the cylinder bore must be re-finished or overbored. New pistons and rings must be fitted as well.

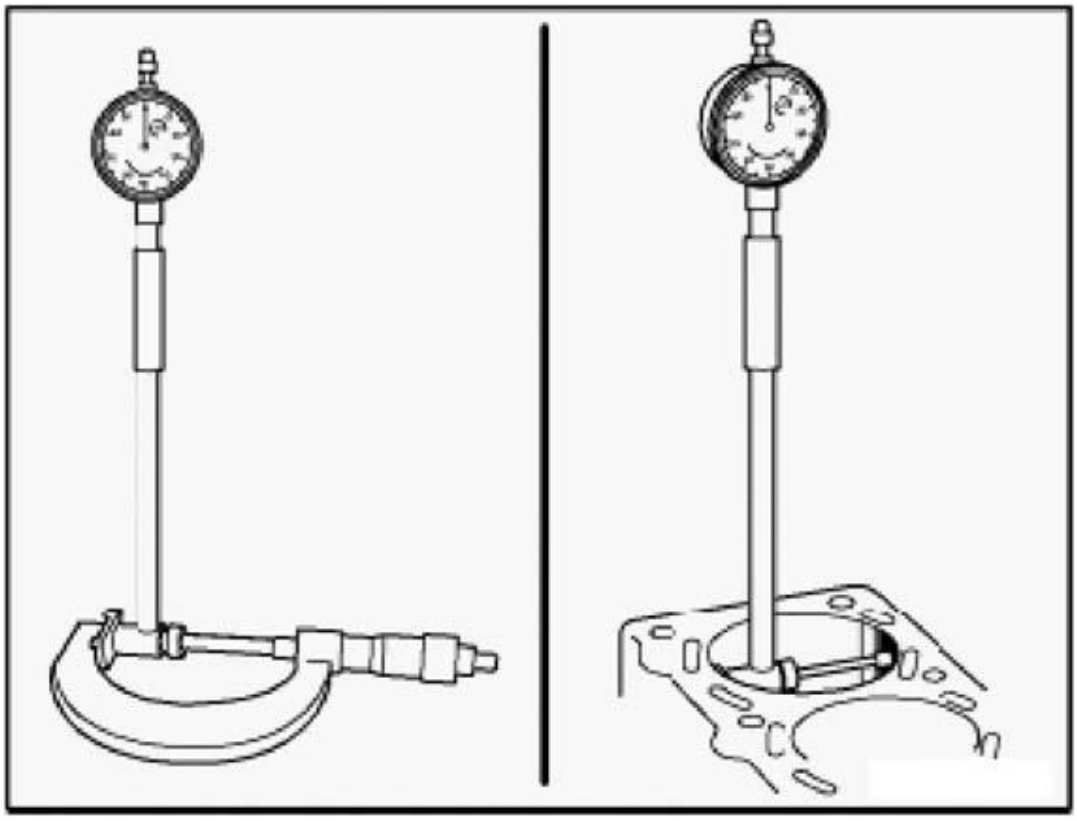

Fig. 20: Checking Cylinder Bore Using Cylinder Bore Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

METRIC SYSTEM

The unit of length, and the basis for all other metric units of measurement is the meter. The meter (1 meter), as a point of reference, is slightly longer that a yard (39.37 inches).

The divisions of a meter are hundredths and thousandths. One hundredth of a meter is called a centimeter, and is equal to .3937 inch or about half the diameter of a nickel.

One thousandth of a meter is called a millimeter. The small marks between the centimeter increments are each one millimeter, or one tenth of a centimeter. And as a point of reference, a standard paper clip is about one millimeter thick.

Metric System Denominations

Throughout the metric system, common to all units of measurement, are prefixes which designate multiples or fractions of the unit.

For automotive applications, the most common prefixes are centi; designating one-hundredth; milli; for one thousandth and kilo- for one thousand.

There are letters uniformly used throughout the system to label the divisions or multiples of each unit of measurement. The letter "m" represents milli, "c' is for centi and "k" is for kilo. These are then combined with the letter representing the unit of measurement.

For example, mm is millimeter, cm is centimeter and km is kilometer. The same applies to liter which is the unit of volume and gram which is the unit of weight.

One kilogram is equal to one thousand grams which is equal to 2.2 pounds. All metric measurements are directly related. For example, one thousand cubic centimeters, or 10cm x 10cm x 10cm of water weighs one kilogram. The volume of those one thousand cc's is one liter.

Metric Reference Chart

METRIC REFERENCE CHART

Weight			
1 kilogram	= 1 kg	= 1000 grams	= 1000 g
1 hectogram	= 1 hg	= 100 grams	= 100 g
1 dekagram	= 1 dag	= 10 grams	= 10 g
1 gram	= 1g		
1 decigram	= 1dg	= .1 gram	= 0.1 g
1 centigram	= 1 cg	= 0.01 gram	= 0.01 g
1 milligram	= 1 mg	= 0.001 gram	= 0.001 g
Length			
1 kilometer	= 1 km	= 1000 meters	= 1000 m
1 hectometer	= 1 hm	= 100 meters	= 100 m
1 dekameter	= 1 dam	= 10 meters	= 10 m
1 meter	= 1m		
1 decimeter	= 1dm	= .1 meter	= .1 m
1 centimeter	= 1 cm	= 0.01 meter	= 0.01 m
1 millimeter	= 1 mm	= 0.001 meter	= 0.001 m
Volume			
1 kiloliter	= 1 kl	= 1000 liters	= 1000 l
1 hectoliter	= 1 hl	= 100 liters	= 100 l
1 dekaliter	= 1 dal	= 10 liters	= 10 l
1 liter	= 1l		
1 deciliter	= 1dl	= .1 liter	= .1 l
1 centiliter	= 1 cl	= 0.01 liter	= 0.01 l
1 milliliter	= 1 ml	= 0.001 liter	= 0.001 l

Metric System Conversion Charts

METRIC SYSTEM CONVERSION CHARTS

Linear Measure to Metric	**Linear Measure (Metric) to English**
1 inch = 2.54 cm	1 mm = 0.03937 inch
12 inches = 1 foot = 30.48 cm	1 cm = 0.39 inch
3 feet = 1 yard = 0.91 m	1 m = 39.37 inch
5.5 yards = 1 rod = 5.03 m	1 km = 0.62 miles
5280 feet = 1 mile = 1.61 km	-
Square Measure to Metric	**Square Measure (Metric) to English**
1 in^2 = 6.45 cm^2	1 mm^2 = 0.002 in^2
144 in^2 = 1 ft 2 = 0.09 m^2	1 cm^2 = 0.16 in^2
9 ft^2 = 1 yd^2 = 0.84 m^2	1 m^2 = 1549 in^2
640 acres = 1mi^2 = 2.59 km^2	1 km^2 = 0.39 mi^2 = 247.10 acres
Cubic Measure to Metric	**Cubic Measure (Metric) to English**
1 in^3 = 16.39 cm^3	1 mm^3 = 0.000061 in^3
1728 in^3 = 1 yd^3 = 0.76 m^3	1 cm^3 = 0.061 in^3
27ft^3 = 1 yd^3 = 0.76 m^3	1 m^3 = 35.32 ft^3
	1 km^3 = 0.24 mi^3
Liquid Measure to Metric	**Liquid Measure (Metric) to English**
1.81 in^3 = 1 fluid oz. = 30 ml	1 ml = 0.03 fluid oz = 0.061 in^3
1 pint = 0.47	l 1000 cm^3 = 1 l = 61.02 in^3 = 1.06 qt
57.75 in^3 = 1 quart = 0.95 l	1 ft^3 water = 62.5 lb
231 in^3 = 1 gal = 3.79 l = 0.0038 m^3	
1 ft^3 = 7.48 gal = 28.35 l	
Weights to Metric	**Weight (Metric) to English**
1 0z = 28.35 g	1 g = 0.035 oz
1 lb = 453.59 g	1 kg = 2.20 lb
1 lb = 0.45 kg	1 metric ton = 1000 kg = 1.102 tons = 2205 lb
1 ton = .91 metric ton	
Temperature to Metric	**Temperature to Fahrenheit**
F = 9/5C +32	C = 5/9 (F-32)

Pressure Conversion Chart

PRESSURE CONVERSION CHART

Bar	**kPa**	**psi**	**in.Hg.**
6.0	600	87.0	
5.9	590	85.5	
5.8	580	84.0	
5.7	570	82.5	

5.6	560	81.0	
5.5	550	79.0	
5.4	540	78.5	
5.3	530	77.0	
5.2	520	75.5	
5.1	510	73.5	
5.0	500	72.5	
4.9	490	71.0	
4.8	480	69.5	
4.7	470	68.0	
4.6	460	66.5	
4.5	450	65.5	
4.4	440	64.0	
4.3	430	62.5	
4.2	420	61.0	
4.1	410	59.5	
4.0	400	58.0	
3.9	390	56.5	
3.8	380	55.0	
3.7	370	53.5	
3.6	360	52.0	
3.5	350	51.0	
3.4	340	49.5	
3.3	330	48.0	
3.2	320	46.5	
3.1	310	45.0	
3.0	300	43.5	
2.9	290	42.0	
2.8	280	40.5	
2.7	270	39.0	
2.6	260	37.5	
2.5	250	36.5	
2.4	240	35.0	
2.3	230	33.5	
2.2	220	32.0	
2.1	210	30.5	
2.0	200	29.0	
1.9	190	27.5	
1.8	180	26.0	
1.7	170	24.5	
1.6	160	23.0	
1.5			

	150	22.0	
1.4	140	20.5	
1.3	130	19.0	
1.2	120	17.5	35.90
1.1	110	16.0	32.91
1.0	100	14.5	29.92
0.9	90	13.0	26.93
0.8	80	11.5	23.94
0.7	70	10.0	20.94
0.6	60	9.0	17.95
0.5	50	7.5	14.96
0.4	40	6.0	11.97
0.3	30	4.5	8.98
0.2	20	3.0	5.98
0.1	10	1.5	2.99
0.0	0	0.0	0.0

INTRODUCTION

The new Z4, successor to the E85 Z4 Roadster and E86 Z4 Coupe, is the first BMW Roadster to have a retractable hardtop. With its long engine compartment lid, large wheel apertures, long wheelbase and squat overhang it features all typical elements of a BMW Roadster. The vehicle's manufacturing has been moved from Spartanburg, South Carolina to the Regensburg, Germany plant.

These features are further enhanced by the flat front section, the pronounced shoulder line and rear end. In addition, the engine compartment lid that extends over the wheel arches, the large BMW radiator grill, the side gills, the black A-pillar, the contoured roof and rear lights with innovative light technology further cement the characteristic accents.

The two-piece, electrohydraulically operated retractable hardtop made of lightweight aluminum panels takes approximately 20 seconds to open or close fully automatically. The compact stowage of the roof elements in the luggage compartment allows for a flat, Roadster-characteristic rear design and a luggage compartment volume between 180 and 310 liters (6.3 and 10.9 cubic feet). Large window areas together with the heated glass rear window provide an optimum all-round field of view.

All models are equipped with Efficient Dynamics measures and thus no compromise has been made in terms of acceleration, performance and fuel economy. At launch in May 2009, the E89 is offered as tow model variants.

Z4 sDrive35i - N54B30O0 (300 hp/300 lb-ft)

Z4 sDrive30i - N52B30O1 (255 hp/220 lb-ft)

Both model variants come standard with a manual 6 speed transmission but if the automatic transmission option is desired, two transmissions are available. For the Z4 sDrive30i, there is the familiar GA6HP19Z (TU) transmission. For the Z4 sDrive35i, the sports automatic with double clutch (DCT) GS7D36SG transmission that was first utilized in the fourth generation M3 is available.

The new BMW Z4 is equipped with a three level dynamic driving control as standard. This allows the driver to change the accelerator pedal characteristics, gearshift program and shift speed of the optional automatic gearbox, DSC response and the optional adaptive M running gear with the touch of a button.

Head and elbow clearance as well as ease of entry have been greatly improved compared to the predecessor model. The low seat position near the rear axle creates the typical ride experience of a BMW Roadster.

Fig. 1: Identifying Complete Vehicle (BMW E89 Model)
Courtesy of BMW OF NORTH AMERICA, INC.

Fig. 2: Identifying Interior Of E85
Courtesy of BMW OF NORTH AMERICA, INC.

Changes when compared to the E85:

- Improved interior and comfort
- Retractable hardtop
- Bi-xenon as standard (fog lights discontinued)
- Through-loading facility
- Wheelbase increased by +146 mm (5.75")

- Standard "wheels optional 19" wheels
- Optional adaptive M running gear
- Optional sports automatic transmission with double clutch (only on Z4 sDrive35i)
- Cruise control with brake intervention
- Dynamic driving control
- CIC (with navigation)

BODY

The following are some important design objectives in the development of the E89 body:

- Harmonious overall impression with extended proportions, coupe-inspired roof line and flat rear end
- Remote controlled, fully automatic retractable hardtop with load help function
- Through-loading capability for carrying skies or a golf bag regardless of top position
- More and easier-to-use storage compartments in the vehicle interior as well as a rear storage area behind the seats
- Greatly improved all-round vision (rear side windows) and a larger rear window
- Compelling impression (driver-orientated), top-quality appearance and functionality of the interior
- Distinctly reduced noise level at higher speeds

Comparison of Body Components

The new Z4 has been designed with very few components actually used from the previous model. The illustration below identifies the components used in both generation Z4.

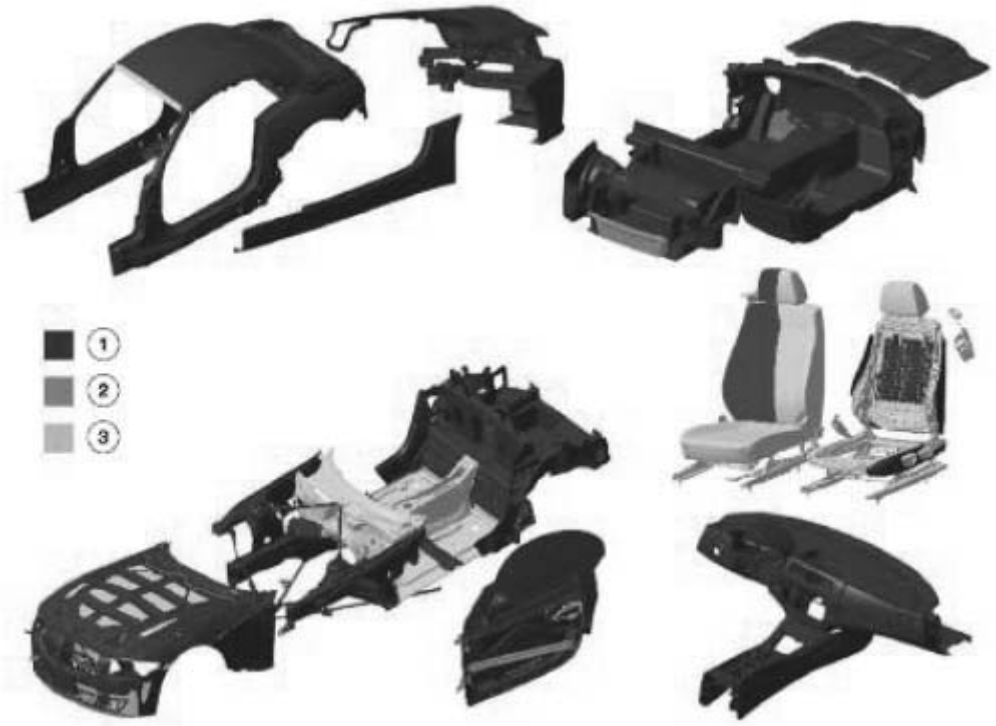

Fig. 3: Comparison Of E85/E89 Body Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	New components (newly developed)
2	Common parts
3	Modified components (developed with minimum expenditure)

Dimensions

The E89 has grown compared to the E85. The width is now 1790 mm (+9 mm).

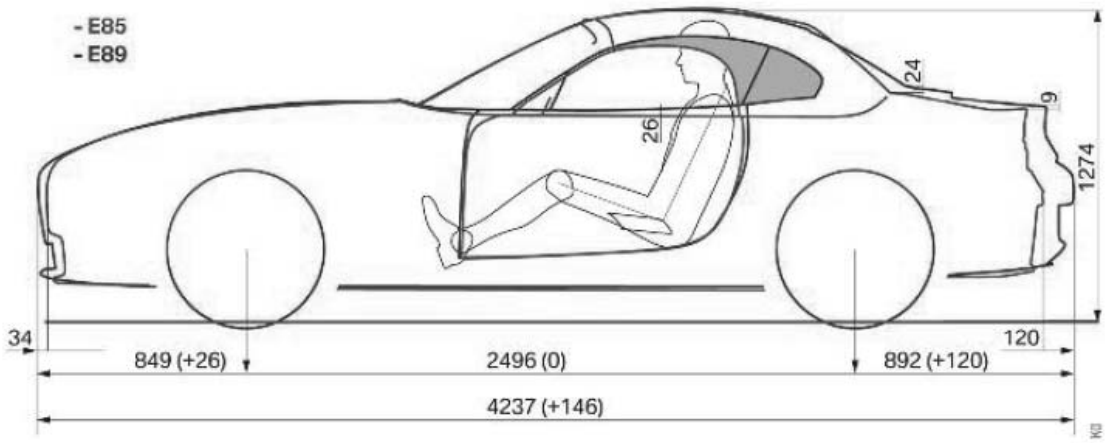

Fig. 4: Identifying Garage Dimensions E85/E89
Courtesy of BMW OF NORTH AMERICA, INC.

BASIC MEASURING TECHNIQUES

Model: All

BASIC ENGINE MEASUREMENTS

During the course of engine repairs some basic engine measurements are required to verify engine diagnosis as well as to complete proper repairs. These measurements are made by precision measuring tools such as micrometers, Vernier calipers, cylinder bore gauges and dial indicators.

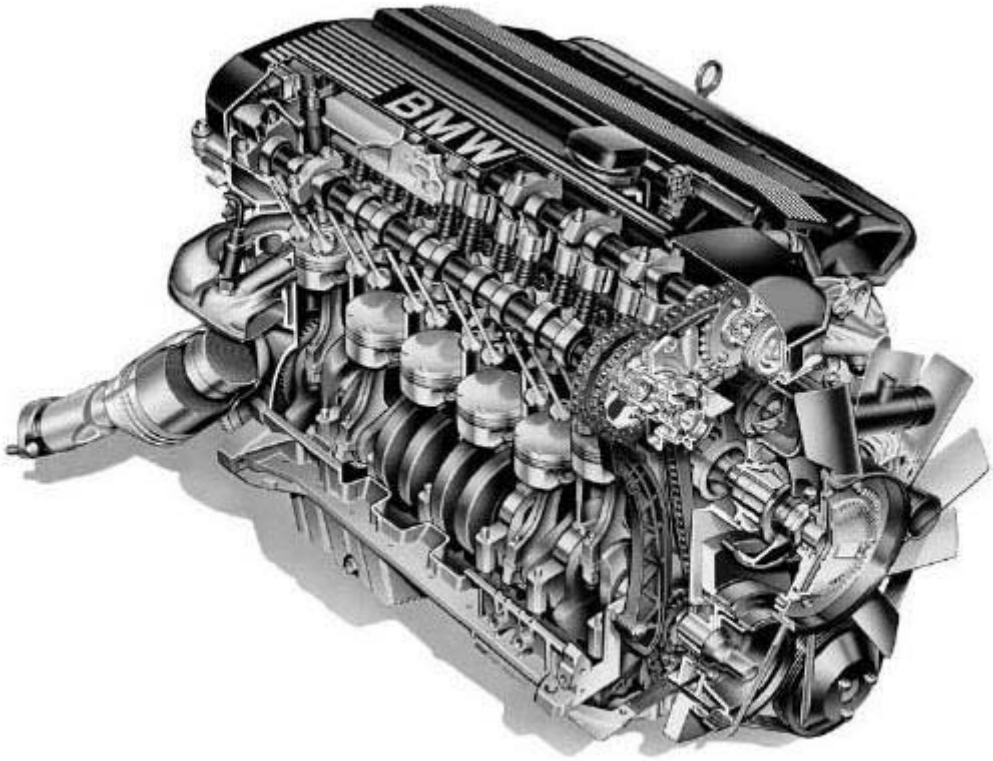

Fig. 1: Identifying Basic Engine Measurements
Courtesy of BMW OF NORTH AMERICA, INC.

Also, a working knowledge of the metric system is also a vital skill that is needed by the technician. All BMW engine measurements consist of metric specifications. Some of the routine engine measurements performed include:

- Valve Guide Wear (Tilt Angle K)
- Cylinder Bore Measurements (Taper and Out-of-Round)
- Cylinder Head Warpage and Thickness

- Axial and Radial Endplay Measurements (Crankshaft/Camshaft etc).

Among all of the skills possessed by a modern technician, basic measuring techniques are perhaps the most overlooked and least used. This is why it is important to review these skills from time to time as a refresher.

Also, it is necessary to access technical data to obtain the proper specifications for these measurements. This course is designed to review measuring techniques to assist in engine diagnosis.

Vernier Measurement

The Vernier scale is used on various measuring tools such as the Vernier caliper and the Depth Gauge. The Vernier scale can be used with Fractional (US) and Metric systems. For the purposes of this training module we will always refer to the Metric Vernier scale.

The Vernier scale consists of a fixed scale and a sliding scale. The fixed scale is divided with graduations in 1 millimeter increments. The sliding scale has 10 graduations in increments of .5.

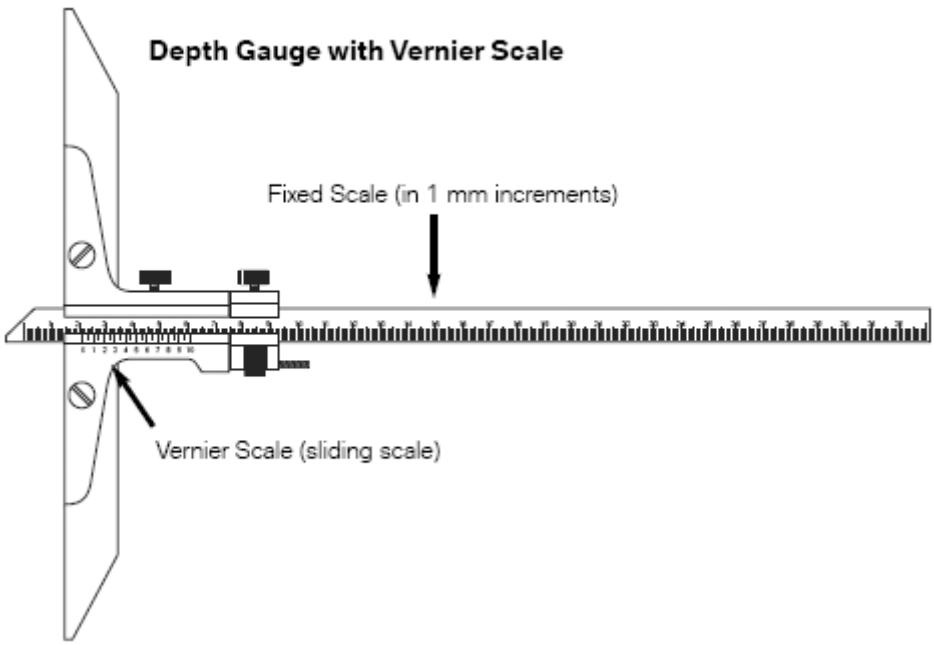

Fig. 2: Identifying Depth Gauge With Vernier Scale
Courtesy of BMW OF NORTH AMERICA, INC.

In order to read a measurement, use the zero mark on the left end of the vernier scale to use as a guide to read a measurement on the fixed scale.

In the example shown at the right, the zero mark is resting between 26 and 27 mm. Therefore the base measurement is 26 mm.

Next, the decimal measurement must be taken. For this, find a line on the Vernier that most closely matches any line on the fixed scale.

Using the example drawing, the "4" on the Vernier scale is lining up directly with a line on the fixed scale.

Combining the previous reading with this reading, the result would be 26.4 mm.

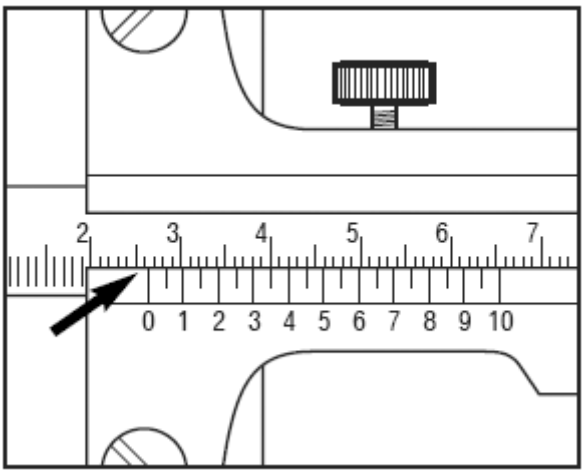

Fig. 3: Identifying Read Measurement, Zero Mark On Left End Of Vernier Scales
Courtesy of BMW OF NORTH AMERICA, INC.

The designations on the Vernier scale are in increments of .5. For example, if a reading on the Vernier scale falls on the .5 (i.e. 2.5, 3.5 etc) designation this would indicate 5/100th's of a millimeter.

MIcrometer Measurements

Another valuable measuring tool is the micrometer, which can be used for measurements such as bearing journal diameter, cylinder head thickness, valve shim thickness and brake rotor thickness etc. Micrometers also come in configurations for inside measurements as well.

The micrometer scale comes in both fractional and metric varieties. We will cover only the metric micrometer scale in this course.

First you must familiarize yourself with the construction of the micrometer in order to understand how measurements are made.

Metric Micrometer Construction

The micrometer is constructed of a few basic parts. The actual item to be measured is placed between the anvil and the spindle. The micrometer can be adjusted to the approximate size using the thimble. The thimble should only be used for the coarse adjustment. In order to make the actual measurement, the micrometer should only be turned using the ratchet (a.k.a. the friction stop). Do not attempt to make a measurement using the thimble. This will give an inaccurate measurement and ultimately damage the micrometer.

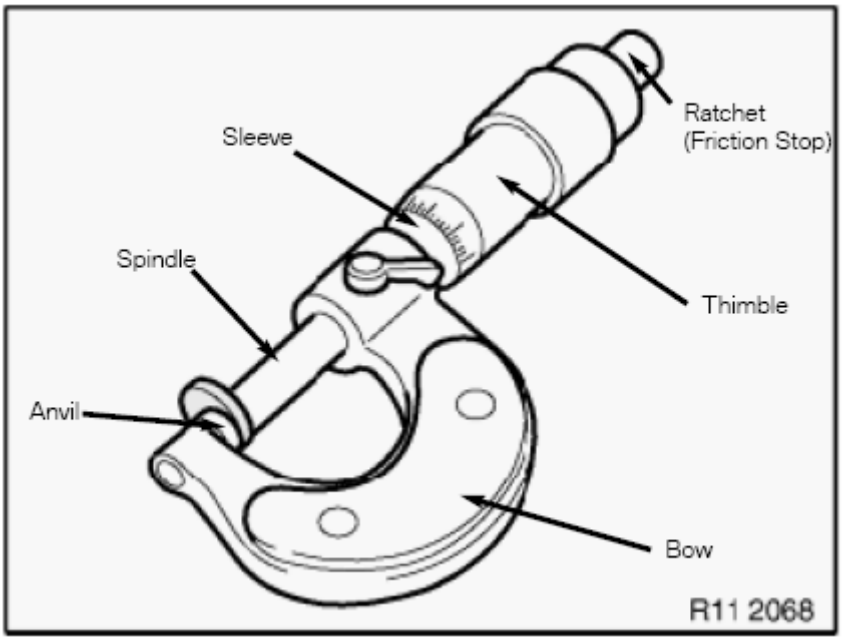

Fig. 4: Identifying Metric Micrometer Construction And Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

Micrometers are available in various sizes for outside as well as inside measurements. The more common variation is the outside micrometer. They are usually available in 25 millimeter increments such as 0-25 mm, 25-50 mm, 50-75 mm etc.

The metric micrometer can measure in increments of one hundredth of a millimeter (.01mm). One hundredth of a millimeter is equal to 0.0003937 inch which is less than one thousandth of an inch.

The measurement area of the micrometer consists of the sleeve scale and the thimble scale. The sleeve scale is used to read whole and half millimeters. The thimble scale (which rotates) reads in hundredths (.01) of a millimeter from zero to fifty. Two complete revolutions of the thimble equals one millimeter.

On the sleeve scale, each scale mark above the center line indicates whole millimeters. Below the center line, half of a millimeter (or .5mm) increments are indicated.

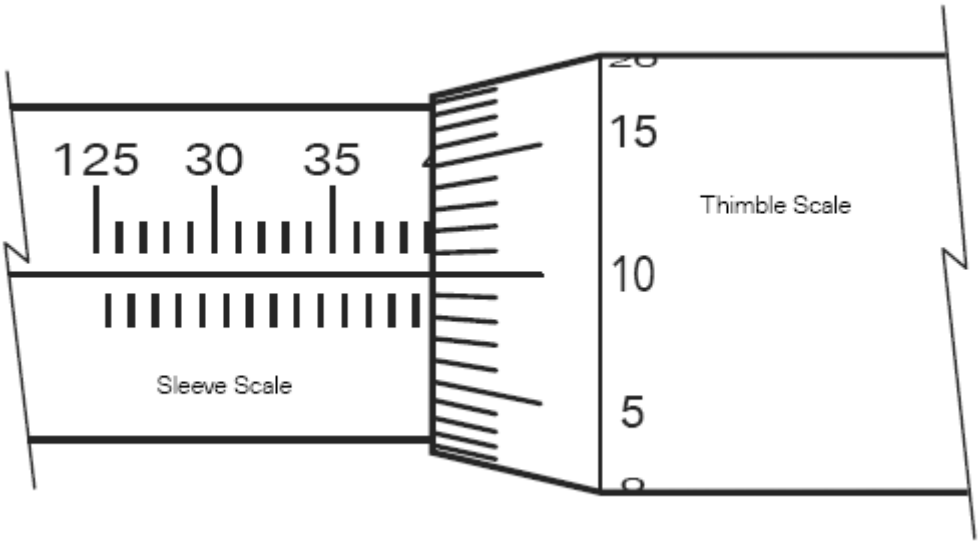

Fig. 5: Identifying Sleeve Scale
Courtesy of BMW OF NORTH AMERICA, INC.

Using the example shown above, the micrometer is a 125-150mm micrometer. To read this micrometer, first take the basic reading from the sleeve scale. The thimble is past the 139 mm mark. Therefore the reading is a least 139 mm. Next, look at the thimble scale and note the reading on the centerline. The "10" on the thimble scale is lined up with the centerline. This indicates a reading of .10 mm. If you add the two readings; 139 + .10 = 139.10 mm.

Dial Indicator Measurements

The dial indicator is used to measure the travel or movement of a specific item. It can also be used to measure axial and radial runout. In engine measurement applications, the dial indicator can be used to measure valve guide wear, axial movement of the crankshaft (thrust), and runout of flywheels and harmonic balancers.

First, it is important to familiarize yourself with Dial Indicator construction. The face of the dial indicator consists of a moveable bezel which is also attached to the large measuring scale. This allows the tool be be brought to the "zero point" when needed.

The main measuring device is the contact point. The contact point (1) is placed against the object to be measured. Usually, the contact point is rounded or has a ball bearing. This allows for a more accurate measurement.

The measuring face of the dial indicator consists of 2 scales. The smaller scale is for the "coarse" measurement which is in graduations of 1 millimeter. One revolution of the small scale is 10 millimeters.

The large scale is in graduations of .01 millimeter and the scale goes from zero to one hundred. Therefore, one revolution of the large scale is one millimeter.

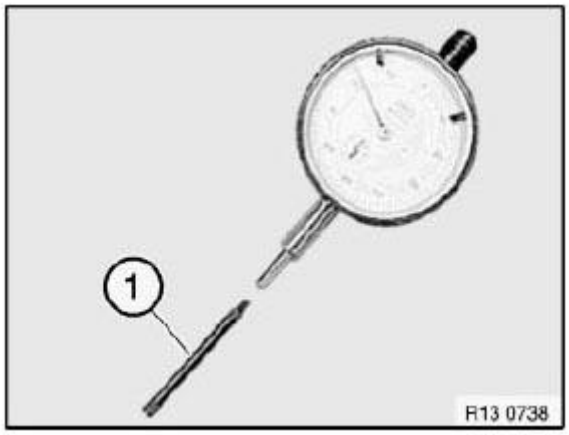

Fig. 6: Identifying Device Is Contact Point
Courtesy of BMW OF NORTH AMERICA, INC.

The dial indicator also needs to be held in place when taking a measurement. This requires a stand or base. Depending upon the application, these stands can be a clamp type, magnetic or a threaded base.

When taking a measurement, place the contact point on the object to be measured. The dial indicator must be pre-loaded slightly to prevent the measurement from bottoming out.

When reading the scale, be sure to "zero" the dial indicator first. If the readings to be taken are less than 1 millimeter, you do not need to use the small scale. If the readings are larger than 1 millimeter, be sure to factor the small scale into your measurement.

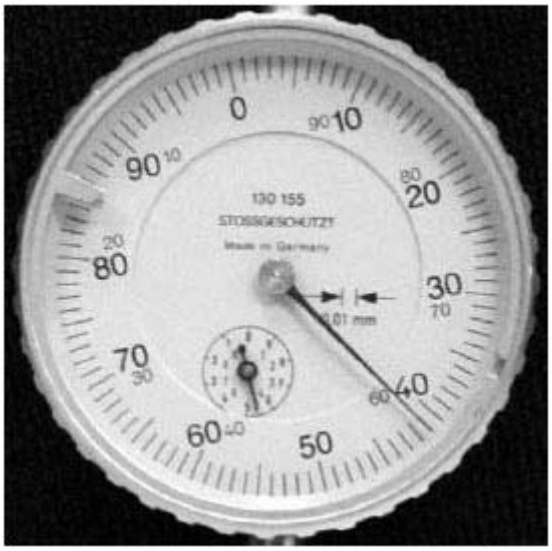

Fig. 7: Identifying Dial Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

Examples of Dial Indicator Measurements

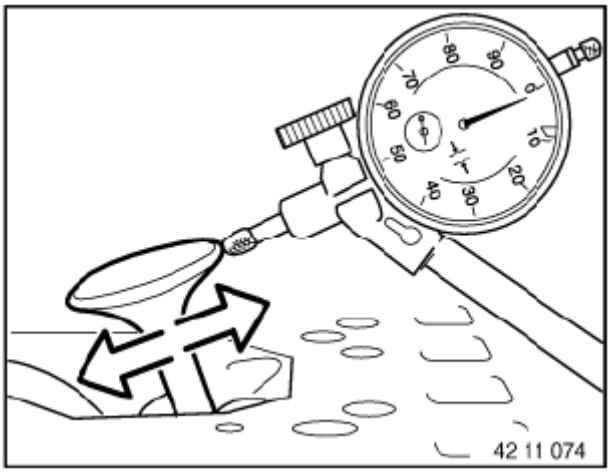

Fig. 8: Identifying Valve Guide Wear - Tilt Angle (K)
Courtesy of BMW OF NORTH AMERICA, INC.

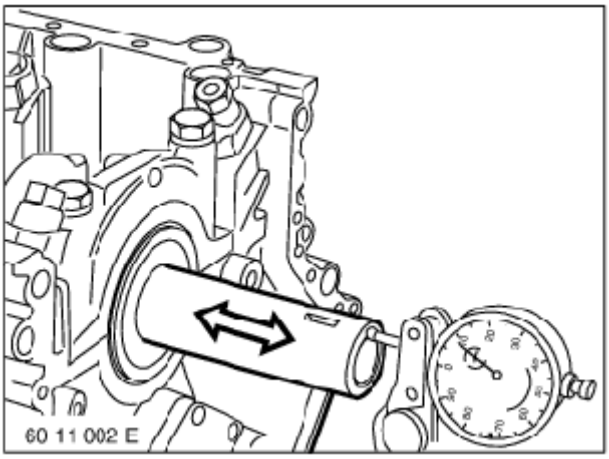

Fig. 9: Identifying Crankshaft Endplay - Axial
Courtesy of BMW OF NORTH AMERICA, INC.

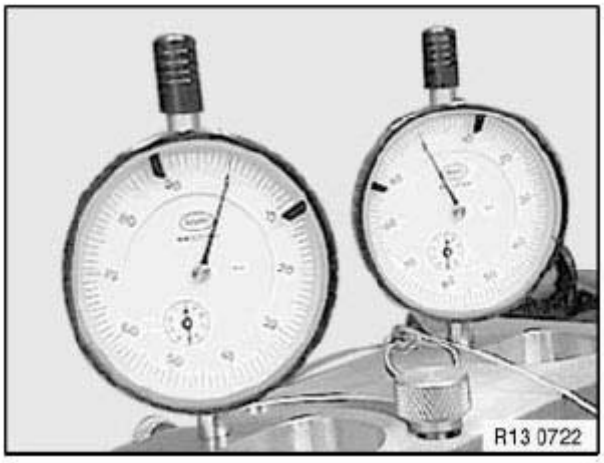

Fig. 10: Identifying S62 Engine - Basic Throttle Setting
Courtesy of BMW OF NORTH AMERICA, INC.

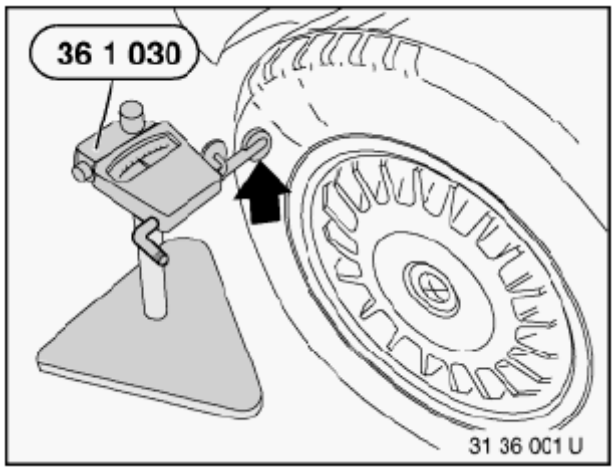

Fig. 11: Identifying Wheel Runout - Axial
Courtesy of BMW OF NORTH AMERICA, INC.

ADDITIONAL ENGINE MEASUREMENTS

During engine repair procedures it is sometimes necessary to assess engine wear to make determinations on parts replacement. Also, some engine measurements are needed to verify a previous diagnosis.

For example, a cylinder leakdown test could indicate a cylinder sealing concern. Once the engine is disassembled, it would be necessary to verify this condition by checking the piston and piston ring condition. If OK, the next step would be to determine the condition of the cylinder bore. At this point, the cylinders should be checked for taper (conicity) and for out-of-round. The correct measurements could mean the difference between just replacing the rings and/or pistons or replacing the engine block. This is why it is necessary to make accurate measurements when needed.

Some of the other routine engine measurements include:

- Cylinder head warpage
- Cylinder head thickness (on some applications)
- Piston rings - end gap and axial clearance

* Cylinder bore - including out-of-round and taper

Cylinder Head Measurement

If a repair requires removal of the cylinder head, a few basic measurements can be performed to save time and unnecessary machine shop costs. If an engine has been overheated or has an internal or external fluid leakage (coolant/oil), it is a good idea to check the cylinder head for warpage.

This can be done by using a commercially available machinists straight edge and a feeler gauge. by sliding the

feeler gauge under the straight edge in various locations, it can determine if there are any low spots or warpage. The specifications for warpage are found in WebTIS under Technical Data. Usually, the specification is about .05 mm.

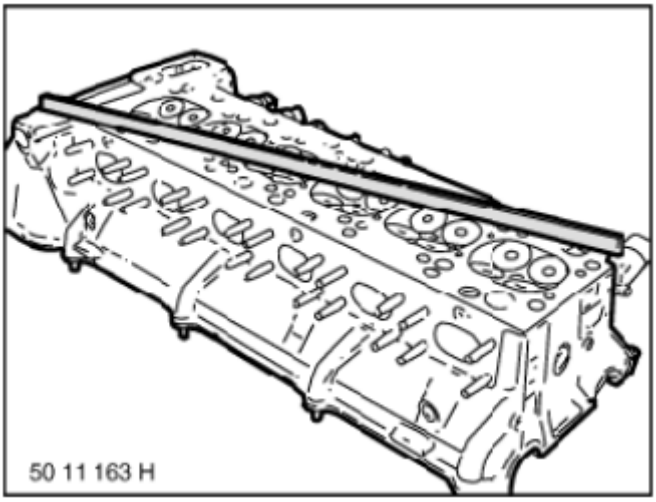

Fig. 12: Checking Cylinder Head Warpage
Courtesy of BMW OF NORTH AMERICA, INC.

Also, check to see if the cylinder head has a specification for machining limit. If so, it may be possible to have the cylinder head re-surfaced. Depending on the amount of material removed during the machining process, it may be necessary to install a thicker head gasket. There are some "service" head gaskets available through the part s department.

The cylinder head can be checked for minimum thickness. This is done using a micrometer or a vernier caliper. This is not possible on all engines, the example shown below is a 6-cylinder (M52TU/M54).

If the minimum thickness is not met, the head will need to be replaced.

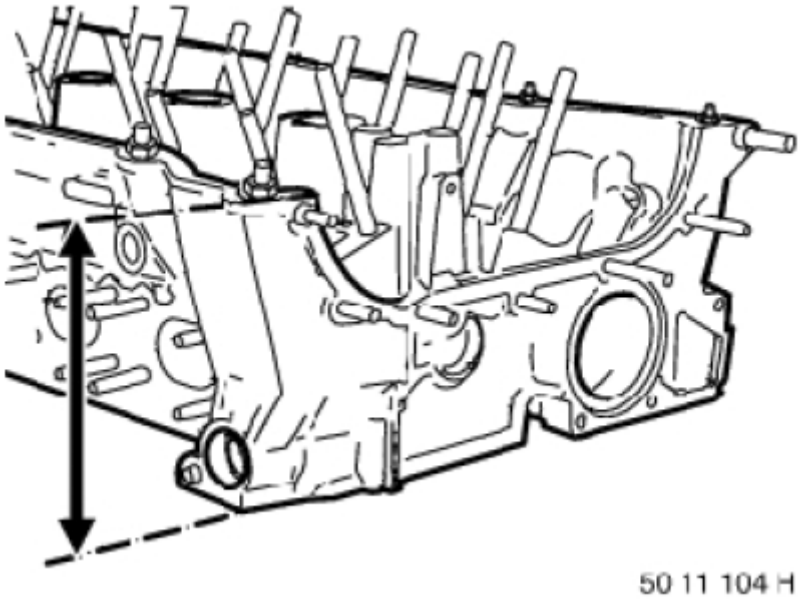

Fig. 13: Identifying Cylinder Head Minimum Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

Piston Measurements

When replacing pistons and/or piston rings, there are some basic measurements that need to be made. When fitting a piston to a cylinder bore, the piston diameter should be checked to ensure a proper fit.

The piston diameter is measured using a micrometer. The measurement is taken at a specified point (A) which is 90 degrees from the piston pin axis. Each engine has a specific location to measure piston diameter. For example, the illustration below shows measuring Point A. The specification for this engine (N62) is 18 mm. So the piston diameter is measured 18 mm from the bottom of the piston skirt.

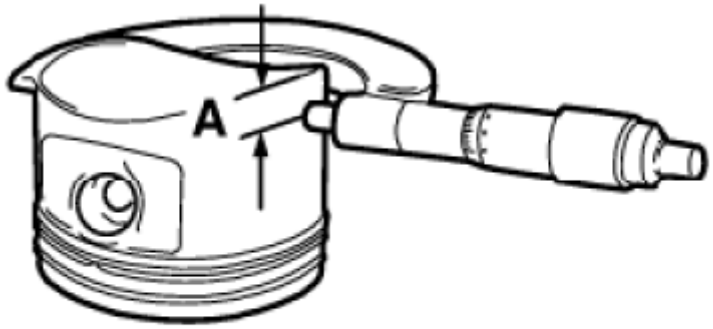

Fig. 14: Checking Piston Diameter Is Measured Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

The piston diameter, when subtracted from the cylinder bore equals the cylinder wall to piston clearance. If the clearance measurement obtained is not correct, re-check your readings.

Piston Ring Measurements

There are some important specifications to check when installing piston rings. One of the measurements in axial clearance. Axial clearance is the distance between the piston ring and ring land. This prevents the rings from binding in the ring land at operating temperature. Axial clearance is measured using a feeler gauge.

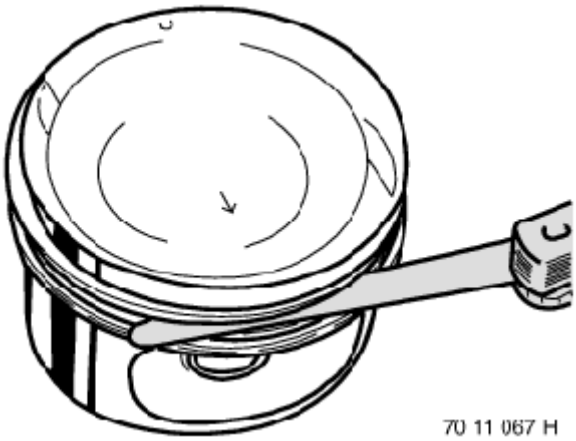

Fig. 15: Checking Piston Ring Of Feeler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Also the piston ring end gap has to be checked. This measurement is checked using a feeler gauge.

This clearance is critical in order to prevent the end gaps from contacting each other when the engine is at operating temp.

When installing the piston rings, always stagger the end gaps as per the repair instructions.

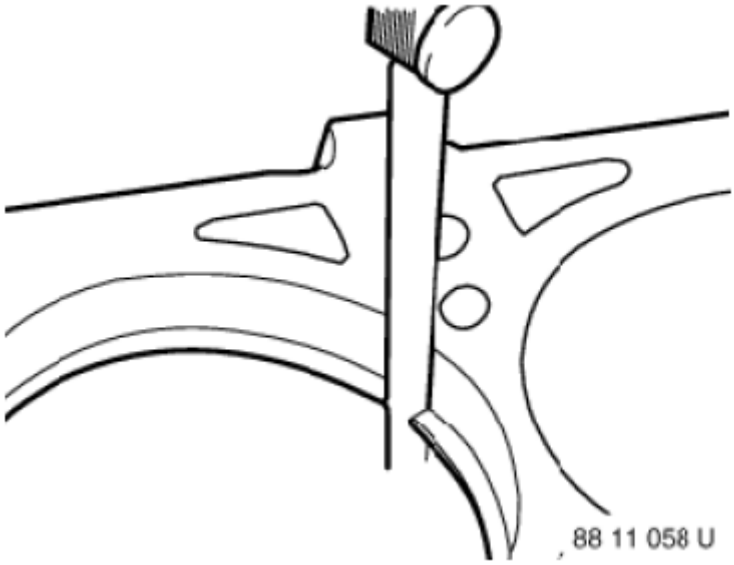

Fig. 16: Identifying Piston Ring End Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Cylinder Bore

In order for the cylinder bore to be considered acceptable, it must not be excessively tapered or out-of-round. Once the cylinder has been checked for obvious damage and the surface finish is OK, the integrity of the bores must be verified. If cylinder wear is suspected, it must be checked using the proper cylinder bore gauge.

Each cylinder must be checked at three position in the bore - top, middle and bottom. Also there must be two opposing dimensions that should be checked. The difference between the top and bottom measurements will indicate the taper of the bore. The opposing dimensions will indicate the out-of-round specification.

If these measurements are out of specification, the cylinder bore must be re-finished or overbored. New pistons and rings must be fitted as well.

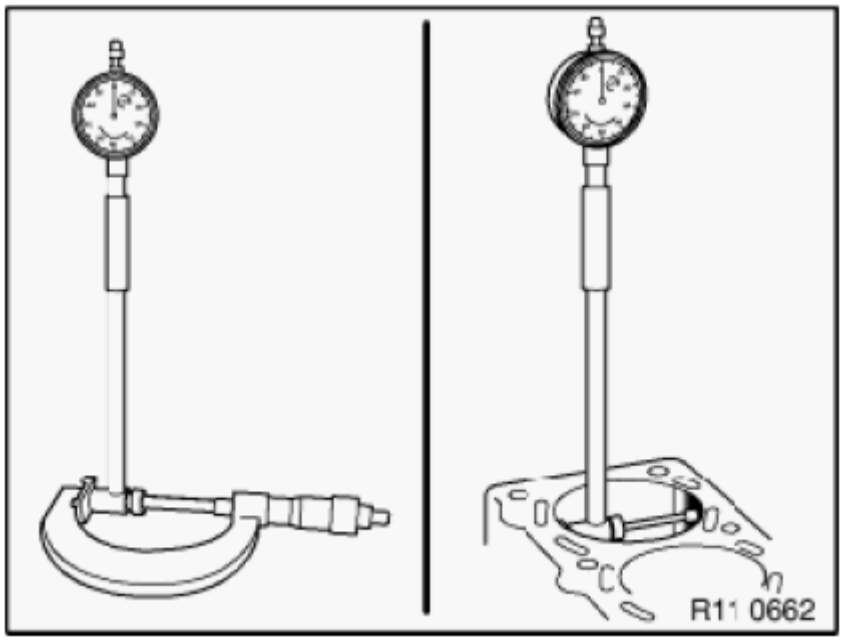

Fig. 17: Measuring Proper Cylinder Bore Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

METRIC SYSTEM

All BMW specifications are metric. Therefore, a thorough knowledge of those areas on the metric system which apply to BMW vehicles is vital to a BMW Service Technician.

The unit of length, and the basis for all other metric units of measurement is the meter. The meter (1 meter), as a point of reference, is slightly longer that a yard (39.37 inches).

The divisions of a meter are hundredths and thousandths. One hundredth of a meter is called a centimeter, and is equal to .3937 inch or about half the diameter of a nickel.

One thousandth of a meter is called a millimeter. The small marks between the centimeter increments are each one millimeter, or one tenth of a centimeter. And as a point of reference, a standard paper clip is about one millimeter thick.

Metric System Denominations

Throughout the metric system, common to all units of measurement, are prefixes which designate multiples or fractions of the unit.

For automotive applications, the most common prefixes are centi; designating one-hundredth; milli; for one thousandth and kilo-for one thousand.

There are letters uniformly used throughout the system to label the divisions or multiples of each unit of measurement. The letter "m" represents milli, "c' is for centi and "k" is for kilo. These are then combined with the letter representing the unit of measurement.

For example, mm is millimeter, cm is centimeter and km is kilometer. The same applies to liter which is the unit of volume and gram which is the unit of weight.

One kilogram is equal to one thousand grams which is equal to 2.2 pounds.

All metric measurements are directly related. For example, one thousand cubic centimeters, or 10cm x 10cm x 10cm of water weighs one kilogram. The volume of those one thousand cc's is one liter.

Metric Reference Chart

METRIC REFERENCE CHART

Weight			
1 kilogram	= 1 kg	= 1000 grams	= 1000 g
1 hectogram	= 1 hg	= 100 grams	= 100 g
1 dekagram	= 1 dag	= 10 grams	= 10 g
1 gram	= 1g		
1 decigram	= 1dg	= .1 gram	= 0.1 g
1 centigram	= 1 cg	= 0.01 gram	= 0.01 g
1 milligram	= 1 mg	= 0.001 gram	= 0.001 g
Length			
1 kilometer	= 1 km	= 1000 meters	= 1000 m
1 hectometer	= 1 hm	= 100 meters	= 100 m
1 dekameter	= 1 dam	= 10 meters	= 10 m
1 meter	= 1m		
1 decimeter	= 1dm	= .1 meter	= .1 m
1 centimeter	= 1 cm	= 0.01 meter	= 0.01 m
1 millimeter	= 1 mm	= 0.001 meter	= 0.001 m
Volume			
1 kiloliter	= 1 kl	= 1000 liters	= 1000 l
1 hectoliter	= 1 hl	= 100 liters	= 100 l
1 dekaliter	= 1 dal	= 10 liters	= 10 l
1 liter	= 1l		
1 deciliter	= 1dl	= .1 liter	= .1 l
1 centiliter	= 1 cl	= 0.01 liter	= 0.01 l
1 milliliter	= 1 ml	= 0.001 liter	= 0.001 l

Metric System Conversion Charts

METRIC SYSTEM CONVERSION CHARTS

Linear Measure to Metric	Linear Measure (Metric) to English
1 inch = 2.54 cm	1 mm = 0.03937 inch
12 inches = 1 foot = 30.48 cm	1 cm = 0.39 inch
3 feet = 1 yard = 0.91 m	1 m = 39.37 inch

5.5 yards = 1 rod = 5.03 m	1 km = 0.62 miles
5280 feet = 1 mile = 1.61 km	
Square Measure to Metric	**Square Measure (Metric) to English**
1 in^2 = 6.45 cm^2	1 mm2 = 0.002 in^2
144 in^2 = 1 ft^2 = 0.09 m^2	1 cm^2 = 0.16 in^2
9 ft^2 = 1 yd^2 = 0.84 m^2	1 m^2 = 1549 in^2
640 acres = 1mi^2 = 2.59 km^2	1 km^2 = 0.39 mi^2 = 247.10 acres
Cubic Measure to Metric	**Cubic Measure (Metric) to English**
1 in^3 = 16.39 cm^3	1 mm^3 = 0.000061 in^3
1728 in^3 = 1 yd^3 = 0.76 m^3	1 cm^3 = 0.061 in^3
27ft^3 = 1 yd^3 = 0.76 m^3	1 m^3 = 35.32 ft^3
	1 km^3 = 0.24 mi^3
Liquid Measure to Metric	**Liquid Measure (Metric) to English**
1.81 in^3 = 1 fluid oz. = 30 ml	1 ml = 0.03 fluid oz = 0.061 in^3
1 pint = 0.47 l	1000 cm^3 = 1 l = 61.02 in^3 = 1.06 qt
57.75 in^3 = 1 quart = 0.95 l	1 ft^3 water = 62.5 lb
231 in^3 = 1 gal = 3.79 l = 0.0038 m^3	
1 ft^3 = 7.48 gal = 28.35 l	
Weights to Metric	**Weight (Metric) to English**
1 0z = 28.35 g	1 g = 0.035 oz
1 lb = 453.59 g	1 kg = 2.20 lb
1 lb = 0.45 kg	1 metric ton = 1000 kg = 1.102 tons = 2205 lb
1 ton = .91 metric ton	
Temperature to Metric	**Temperature to Fahrenheit**
F = 9/5C +32	C = 5/9 (F-32)

Pressure Conversion Chart

PRESSURE CONVERSION CHART

Bar	kPa	psi	in.Hg.
6.0	600	87.0	
5.9	590	85.5	
5.8	580	84.0	
5.7	570	82.5	
5.6	560	81.0	
5.5	550	79.0	
5.4	540	78.5	
5.3	530	77.0	
5.2	520	75.5	

5.1	510	73.5	
5.0	500	72.5	
4.9	490	71.0	
4.8	480	69.5	
4.7	470	68.0	
4.6	460	66.5	
4.5	450	65.5	
4.4	440	64.0	
4.3	430	62.5	
4.2	420	61.0	
4.1	410	59.5	
4.0	400	58.0	
3.9	390	56.5	
3.8	380	55.0	
3.7	370	53.5	
3.6	360	52.0	
3.5	350	51.0	
3.4	340	49.5	
3.3	330	48.0	
3.2	320	46.5	
3.1	310	45.0	
3.0	300	43.5	
2.9	290	42.0	
2.8	280	40.5	
2.7	270	39.0	
2.6	260	37.5	
2.5	250	36.5	
2.4	240	35.0	
2.3	230	33.5	
2.2	220	32.0	
2.1	210	30.5	
2.0	200	29.0	
1.9	190	27.5	
1.8	180	26.0	
1.7	170	24.5	
1.6	160	23.0	
1.5	150	22.0	
1.4	140	20.5	
1.3	130	19.0	
1.2	120	17.5	35.90
1.1	110	16.0	32.91
1.0			

	100	14.5	29.92
0.9	90	13.0	26.93
0.8	80	11.5	23.94
0.7	70	10.0	20.94
0.6	60	9.0	17.95
0.5	50	7.5	14.96
0.4	40	6.0	11.97
0.3	30	4.5	8.98
0.2	20	3.0	5.98
0.1	10	1.5	2.99
0.0	0	0.0	0.0

STARTING SYSTEMS

Model: All

Production Date: All

PURPOSE OF STARTING SYSTEM

The purpose of the starting system is to convert chemical energy stored in the battery into electrical energy, then into mechanical energy in the starter motor. This mechanical energy is then transferred through gears and drives from the starter motor to the engine flywheel.

After the transfer and conversion of all this energy the engine flywheel begins to rotate.

The rotation must be of sufficient speed to allow the engine to form the combustible air-fuel mixture required for starting. It must be maintained during initial combustion long enough until the engine can sustain operation.

To accomplish this a starter or cranking motor is used.

The starting system consists of the following components:

- Battery.
- Ignition Switch.
- Starter Motor Assembly.
- EWS (if equipped).
- Starter Safety Switch.
- Cables and Wiring Harness.

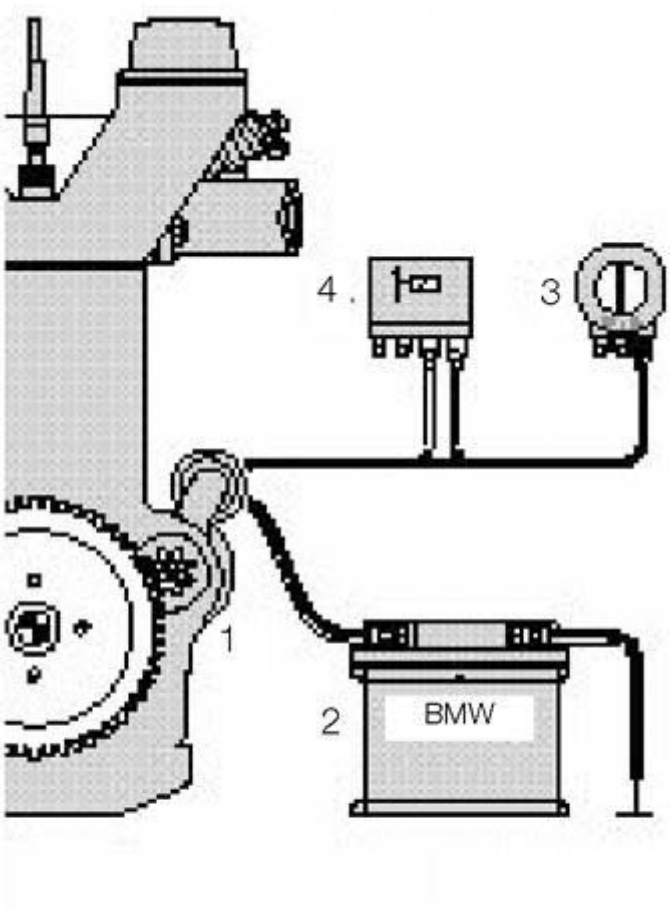

Fig. 1: Identifying Starting System
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM COMPONENTS

Battery

The Battery is the primary EMF source in the automobile. The automotive battery is an electromechanical device that provides the potential difference (voltage). The battery does not store electrical energy. It stores chemical energy that is converted to electrical energy as it discharges.

All energy for starting the car is drawn from the battery. State-of-charge, and capacity of the battery are important factors in the ability of the engine to start, especially in cold and harsh conditions.

Ignition Switch

The Ignition Switch provides a request to the starting system to engage the starter motor. This request is handled differently depending on the year of the vehicle and particular systems the vehicle is fitted with.

In non EWS systems the ignition switch provided power directly to the starter solenoid or a starter relay. Beginning with EWS I the start request (KL50) is passed to an Immobilizer control module or an EWS module (EWS II/III).

On vehicles with one touch starting the KL50 signal is passed to the DME.

Starter Motor Assembly

The Starter Motor Assembly is a DC motor which uses the interaction of magnetic fields to convert electrical energy into mechanical energy.

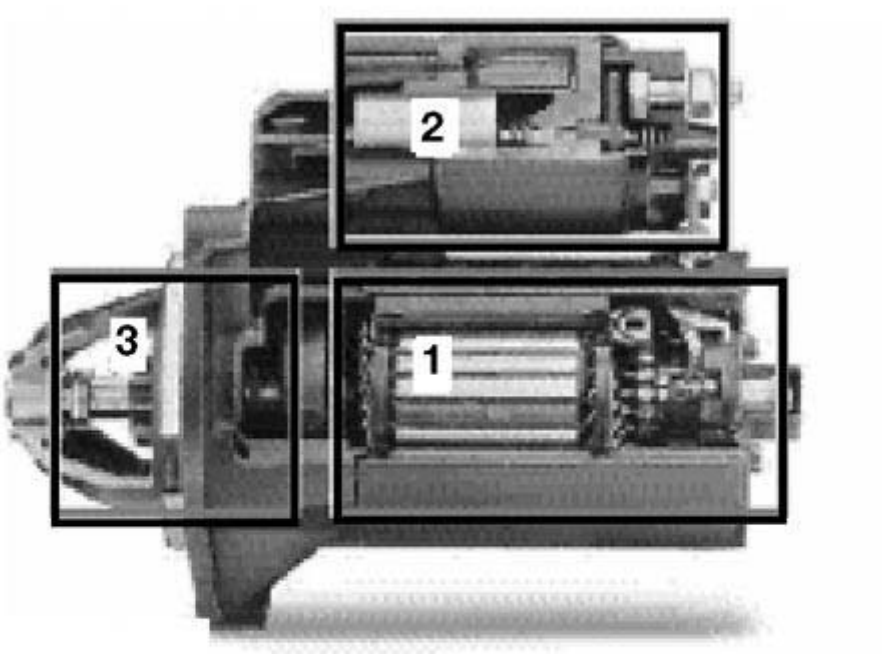

Fig. 2: Identifying Starter Motor Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Electric Starter Motor

The Starter Motor provides the mechanical energy to rotate the engine through a direct or a gear reduction drive.

- Armature Shaft (1)
- Armature Winding (2)
- Armature Stack (3)
- Commutator (4)
- Poles Shoes (5)
- Field Coil (6)
- Carbon Brushes (7)
- Brush Holder (8)

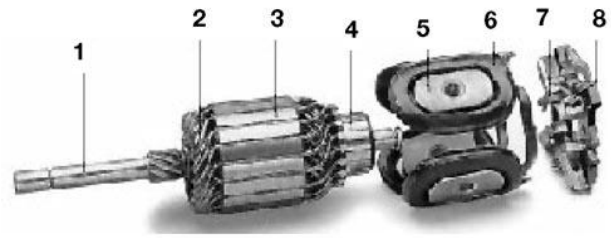

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Fig. 3: Identifying Major Components Of Starter Motor
Courtesy of BMW OF NORTH AMERICA, INC.

Armature

The Armature assembly is comprised of the armature shaft, armature winding, armature stack and commutator. Thin iron stampings are laminated together to form the stack or core. The slots on the outside of the laminations hold the armature windings. The windings loop around the core and are connected to the commutator. Each commutator segment is insulated from the adjacent segments. The commutator may have up to 30 segments. A steel shaft is insert in the center hole of the laminations with the commutator insulated from the shaft.

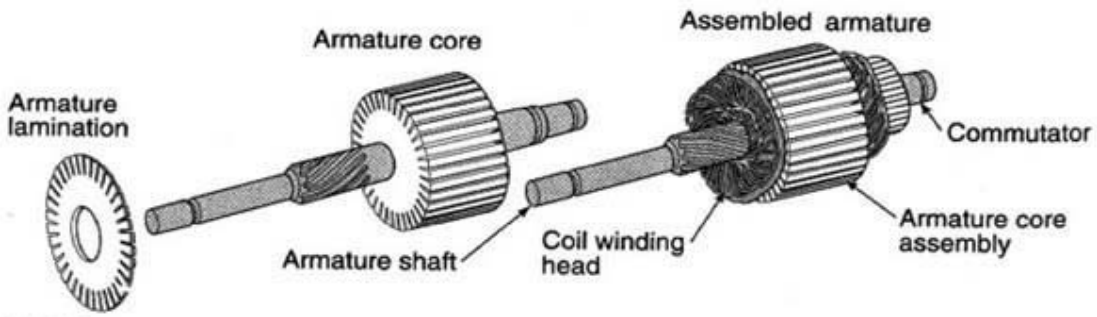

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Fig. 4: Expanded View Of Armature Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Field Coils

There are two types of field coils:

- Electromagnetic.
- Permanent magnet.

Electromagnetic

Wire ribbons or coils wrapped around a pole shoe, attached to the inside of the starter housing. The iron pole shoes and the iron starter housing work together to increase and concentrate the strength of the field coils. When current flows thought the field coils strong electromagnetic fields with North and South poles are created.

Permanent

Multiple permanent magnets manufactured from an alloy of boron, neodymium and iron are positioned in the starter housing. Use of permanent magnets allow for the elimination of the field circuit and windings and realize a 50% weight savings.

Brushes

Brushes are electrically conductive sliding contacts, usually made of copper and carbon. The brushes make contact with the commutator and as the starter begins to rotate the brushes reverse the flow of current to the armature. Starter brushes carry the full flow of current through the motor.

Solenoid

The Solenoid assembly is an integral part of the starter and is actually a combined relay and engagement solenoid.

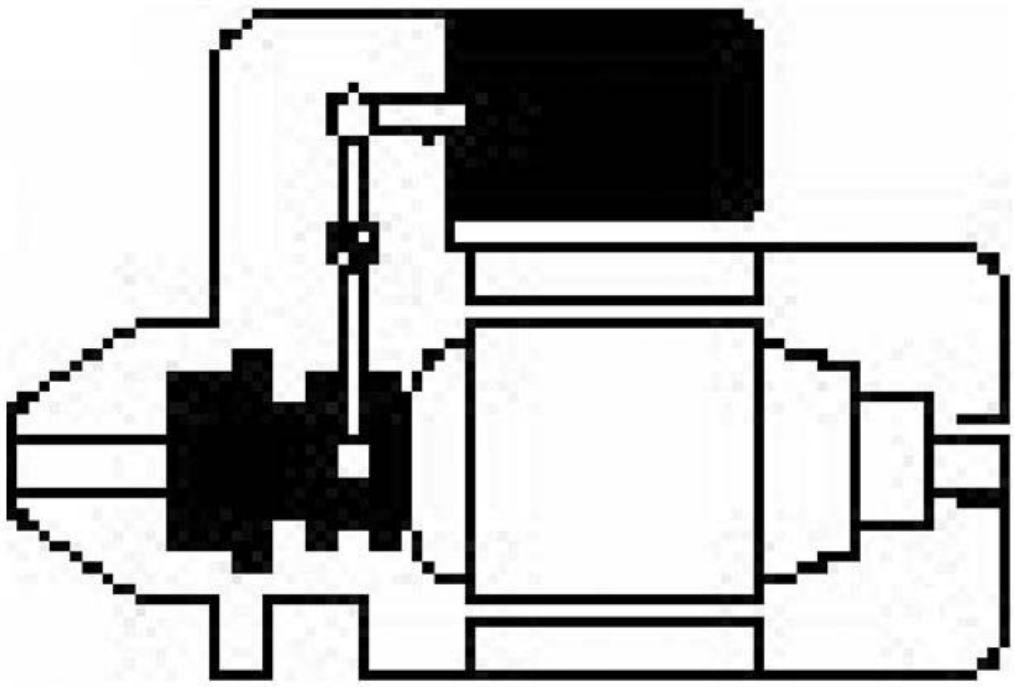


Fig. 5: Identifying Solenoid Switch And Pinion Engaging Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Solenoid switch and pinion engaging drive.

The solenoid has two functions:

- Pushing the pinion forward so that it engages in the ring gear of the engine.
- Closing the moving contact, providing the main current path for the starter.

The solenoid has two windings.

- Pull-in winding.
- Holding-in winding.

Both windings are used to draw in the plunger and engage the pinon, only the hold-in winding is used to hold the plunger in position.

Pinion Engaging Drive

The starter's end shield assembly contains the Pinion Engaging Drive with pinion, overrunning clutch, engagement lever and spring. The drive mechanism is responsible for coordinating the thrust motion of the solenoid switch and the rotary motion of the electric starter motor and transferring them to the pinion.

The starter engages the ring gear on the flywheel by means of the pinion. A high conversion ratio of pinion teeth to flywheel teeth (between 10:1 and 15:1) make it possible to overcome the high cranking resistance of the engine using a relatively small but high speed starter motor.

As soon as the engine starts and accelerates past cranking speed, the pinion must automatically demesh in order to protect the starter. For this reason, the starter incorporates an overrunning clutch.

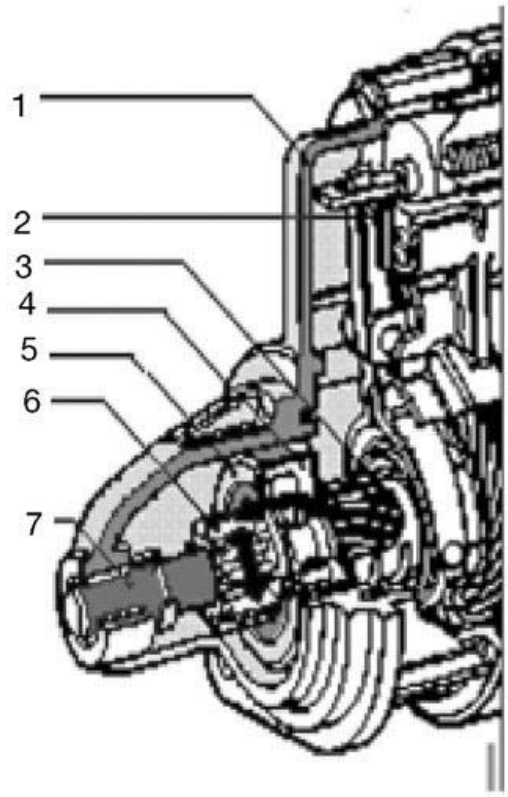
STARTER DRIVES

Conventional Drive

In a Conventional Drive starter the pinion gear is located directly on the armature shaft.

The pinion and overrunning clutch form the driver assembly.

The driver assembly rides on a helical spline on the armature shaft so that when the driver is thrust by the solenoid, a combined axial and rotary motion occurs which greatly facilitates the meshing of the pinion.



1. Drive End Shield
2. Engaging Lever
3. Meshing Spring
4. Driver
5. Roller Type Overrunning Clutch
6. Pinion
7. Armature Shaft

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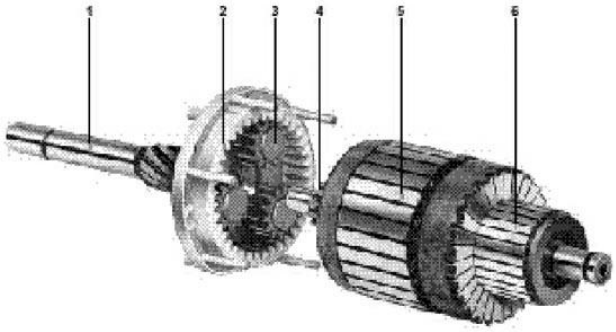
Fig. 6: Identifying Conventional Drive Starter Pinion Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Gear Reduction Drive

In their design and function, Gear Reduction Drives are much the same as conventional drive starters. The main difference in the gear reduction drive starter is a planetary gear set added between the field frame and the drive end shield. This design allows for the use of smaller and lighter starters.



1. Planetary-Gear Carrier Shaft with Helical Spline.
2. Internal Gear (Ring Gear).
3. Planet Gears
4. Sun Gear on Armature Shaft
5. Armature
6. Commutator

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Fig. 7: Identifying Gear Reduction Drive
Courtesy of BMW OF NORTH AMERICA, INC.

OVERRUNNING CLUTCH

In all starter designs the rotary motion is transmitted via an Overrunning Clutch. The overrunning clutch allows the pinion to be driven by the armature shaft (or planetary gear set), however it breaks the connection between the pinion and the armature shaft as soon as the accelerating engine spins the pinion faster than the starter.

The overrunning clutch is located between the starter motor and the pinion and prevents the starter motor armature from being accelerated to an excessive speed when the engine starts.

1. Clutch Cover
2. Pinion
3. Driver with Clutch Shell
4. Roller R-ace
5. Roller
6. Pinion Shaft
7. Coil Spring

a Direction of Rotation for Clutch Locking Action

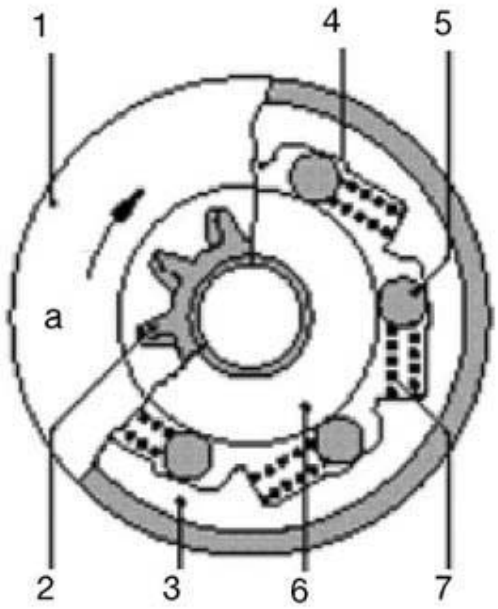

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Fig. 8: Identifying Overrunning Clutch Components
Courtesy of BMW OF NORTH AMERICA, INC.

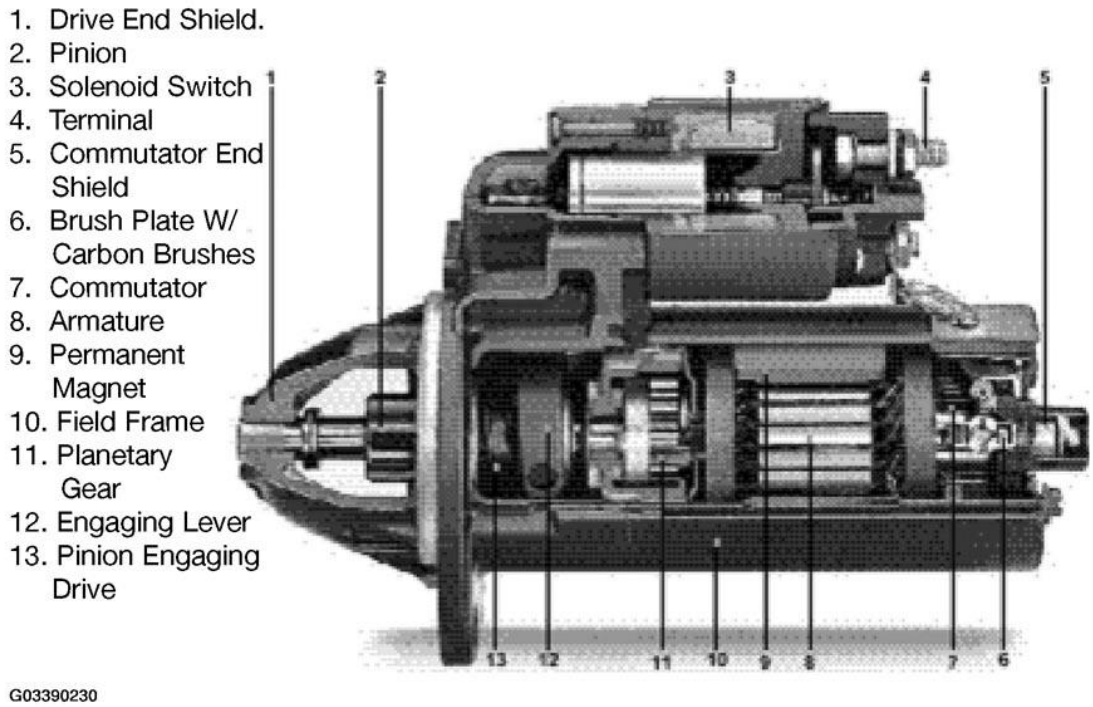

Fig. 9: Cross Sectional View Of Starter Motor
Courtesy of BMW OF NORTH AMERICA, INC.

Fully assembled permanent magnet gear reduction starter.

EWS

The EWS system(s) is designed to provide electronic anti-theft protection for the vehicle through the use of coded keys and coded data communication between the EWS and the engine control module. The starter and engine control module are locked out until a properly coded key is recognized and the proper code is established between the EWS and the engine control modules.

Starter Safety Switch

The Starter Safety Switch is part of the transmission range switch on automatic transmission vehicles and a clutch switch on manual transmission vehicles (beginning MY 1997). The purpose of the switch is to prevent engine start-up with the vehicle in gear or the clutch not depressed. On vehicles with EWS, this signal is sent directly to the EWS module for processing.

Cable and Wiring Harness

Cables to the starter from the battery must carry large amounts of current. The wiring harness from the ignition switch and/or EWS carry little current as they are control signals to a relay or starter solenoid. Minimum voltage drop in starter cables is necessary to ensure sufficient starter speed and torque.

PRINCIPLE OF OPERATION

Electric Starter Motor

The Electric Starter Motor converts electrical current into rotary motion. In doing so it converts electrical energy into mechanical energy. The interaction of two magnetic fields produce this rotational force.

The field coils (either electromagnetic or permanent) located in the housing produce magnetic flux lines. Within the stationary field coils is the armature, a loop of wire (a conductor) with one end connected to B+, the other to B-. When current is applied to the armature flux lines circle the loop in one direction on one side and in the opposite direction on the other side. The interaction of the flux lines on the armature and the flux lines from the field coil cause the armature to rotate.

The armature will only rotate to the point where the magnetic force is equal on both sides. (Armature 90° to magnetic flux lines of field) For the armature to continue to rotate, the polarity or direction of current flow must be reversed.

Through the brushes and the commutator, the current flow is reversed as the magnetic forces become equal, causing the armature to continue to rotate.

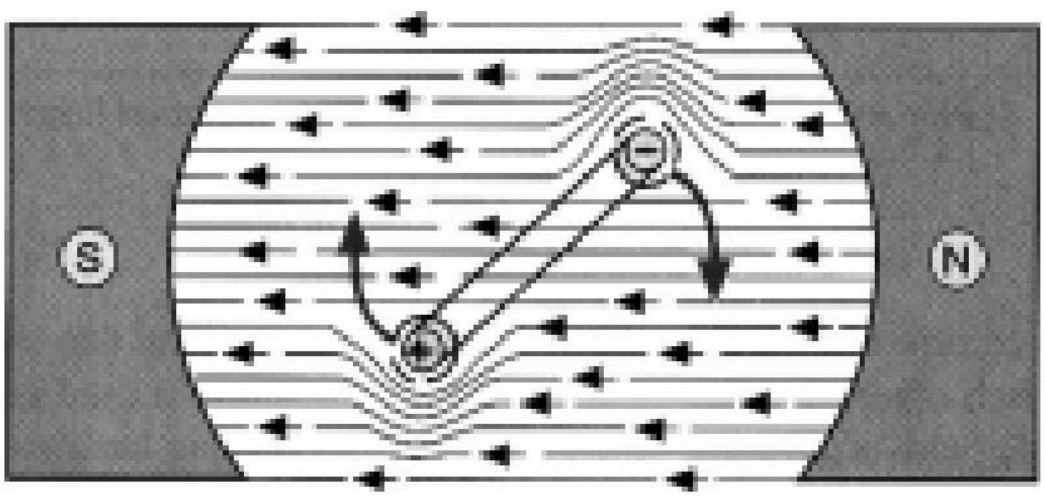

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Fig. 10: Identifying Magnetic Flux Lines
Courtesy of BMW OF NORTH AMERICA, INC.

This constant reversal of current flow in the armature provides continual rotation.

Direction of rotation is determined using **Flemings Left Hand Rule.**

- Point your First finger in the direction of the magnetic Field (from N to S).
- Rotate your hand about that finger until your second finger points in the direction of the Current

(conventional current, from + to -).

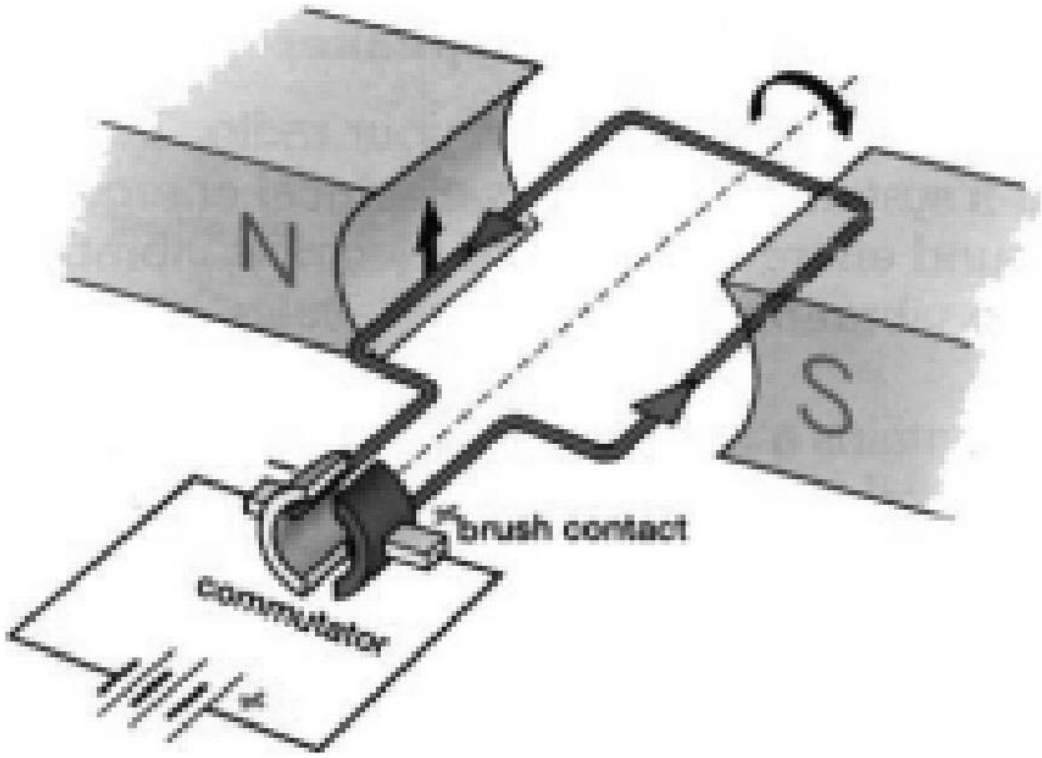

Fig. 11: Identifying Magnetic Field
Courtesy of BMW OF NORTH AMERICA, INC.

Loop symbolizes force out of magnetic field.

- Then your thumb points in the direction of the Movement of the wire.

To increase the force on the wire (armature) do one of the following:

- Use a larger current.
- Use a stronger magnetic field.
- Use a greater length of wire in the field.

To increase torque and speed in the starter motor, more windings in the armature are added, and the field has more pairs of magnets (either permanent or electromagnetic).

Flemings left hand rule:

The basic law of motors, the direction of force on a wire that is carrying current when it is in a magnetic field.

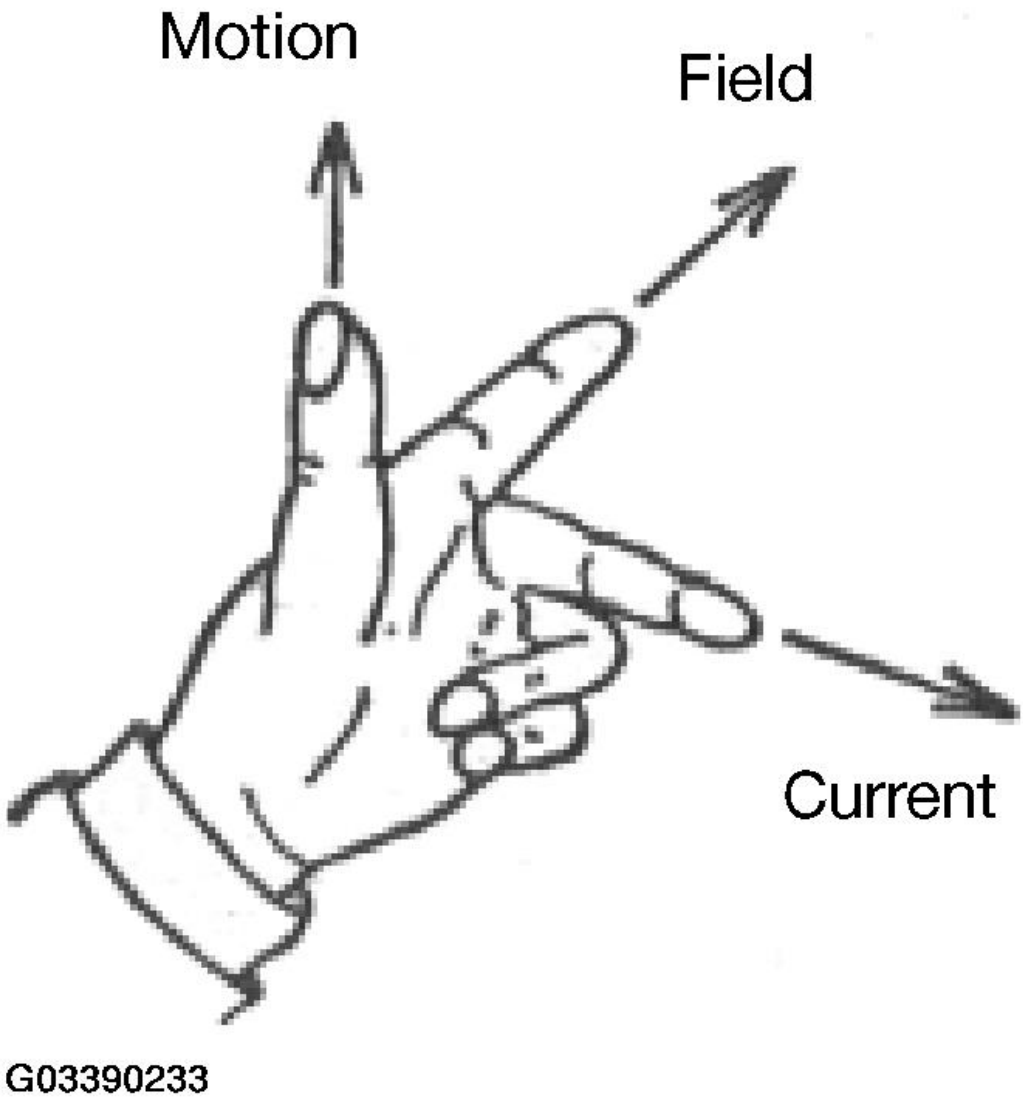

Fig. 12: Illustrating Flemings Left Hand Rule
Courtesy of BMW OF NORTH AMERICA, INC.

MOTOR WINDINGS

Torque and speed of the starter motor is dependent on the wiring of the field coils (electromagnetic coils).

There are three types of Motor Windings:

- Shunt Wound.
- Series Wound.
- Compound.

Shunt Wound Motors

In Shunt Wound Motors, the field coil is connected in parallel with the armature. The shunt motor does not decrease its torque as speed increases. Shunt motors do not produce high torque.

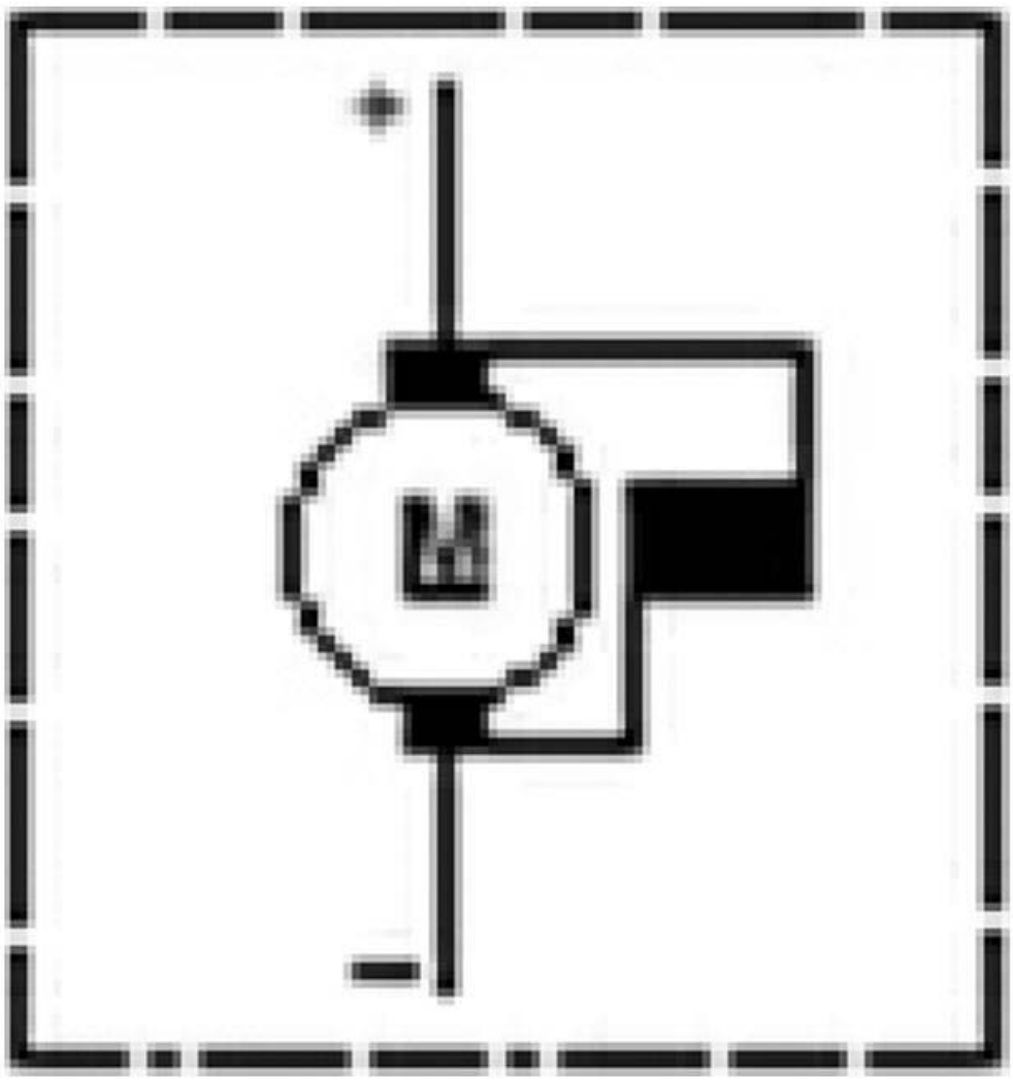

Fig. 13: Identifying Shunt Wound Motors
Courtesy of BMW OF NORTH AMERICA, INC.

Series Wound Motors

In Series Wound Motors, the field coil is in series with the armature.

The current flows to the field windings, then to the brushes, commutator, and armature back again to the ground side brush. A series wound motor will develop maximum torque output at the time of initial start, then as motor

speed increases, torque falls off rapidly due to the CEMF.

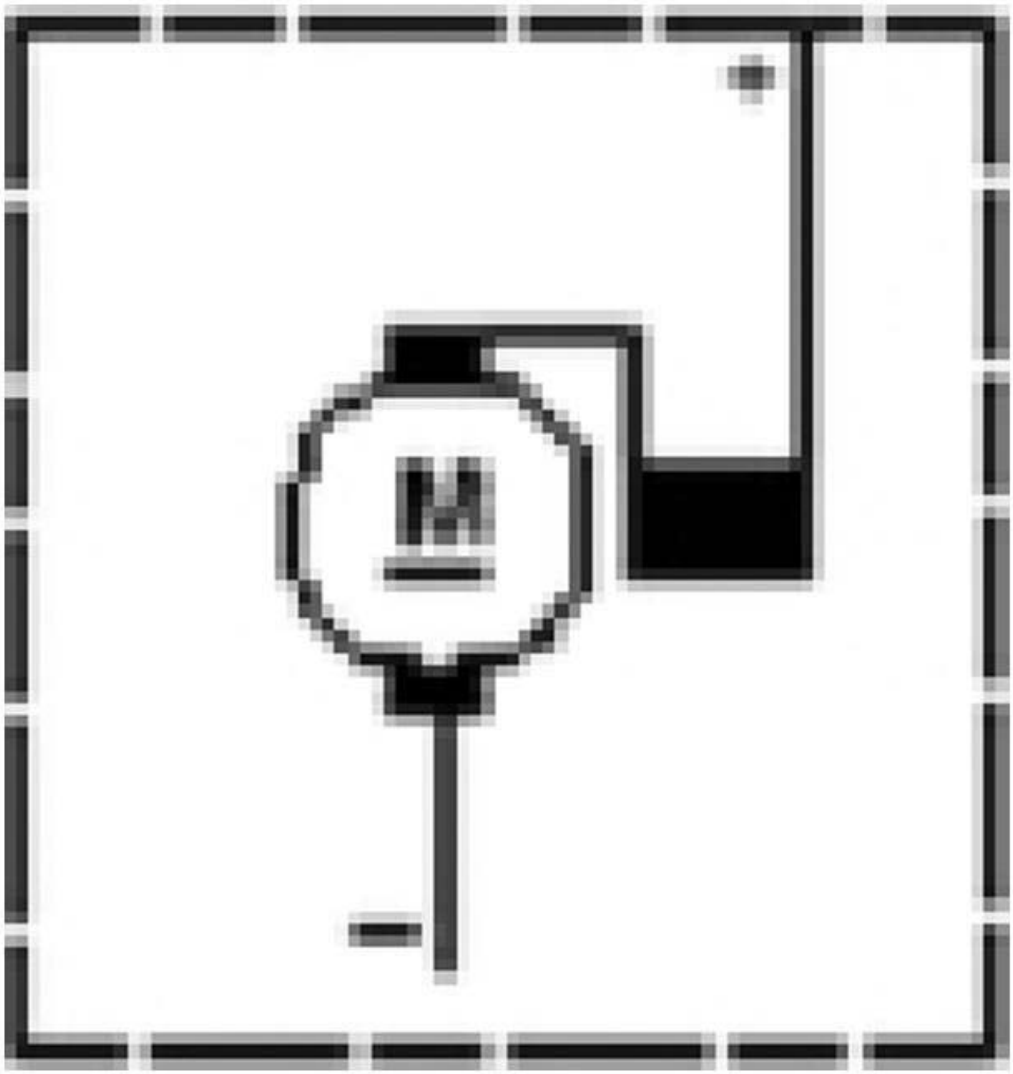

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Fig. 14: Identifying Series Wound Motors
Courtesy of BMW OF NORTH AMERICA, INC.

Compound Wound Motors

Compound Wound Motors have some of the field coils wired in series to the armature and some in parallel. This configuration allows the compound motor to develop good starting torque and constant operating speed.

CEMF:

Counter Electromotive Force.

The voltage produced in the starter motor itself through electromagnetic induction.

This voltage acts against the supply voltage from the battery.

Motors must be designed to control the CEMF for optimum operation.

Permanent Magnet Motors

Permanent Magnet Motors eliminate all wiring to the field coils. The magnetic field is generated by the permanent magnet without the need for winding and pole shoes. The magnets use flux-concentrating pieces to direct the magnetic field.

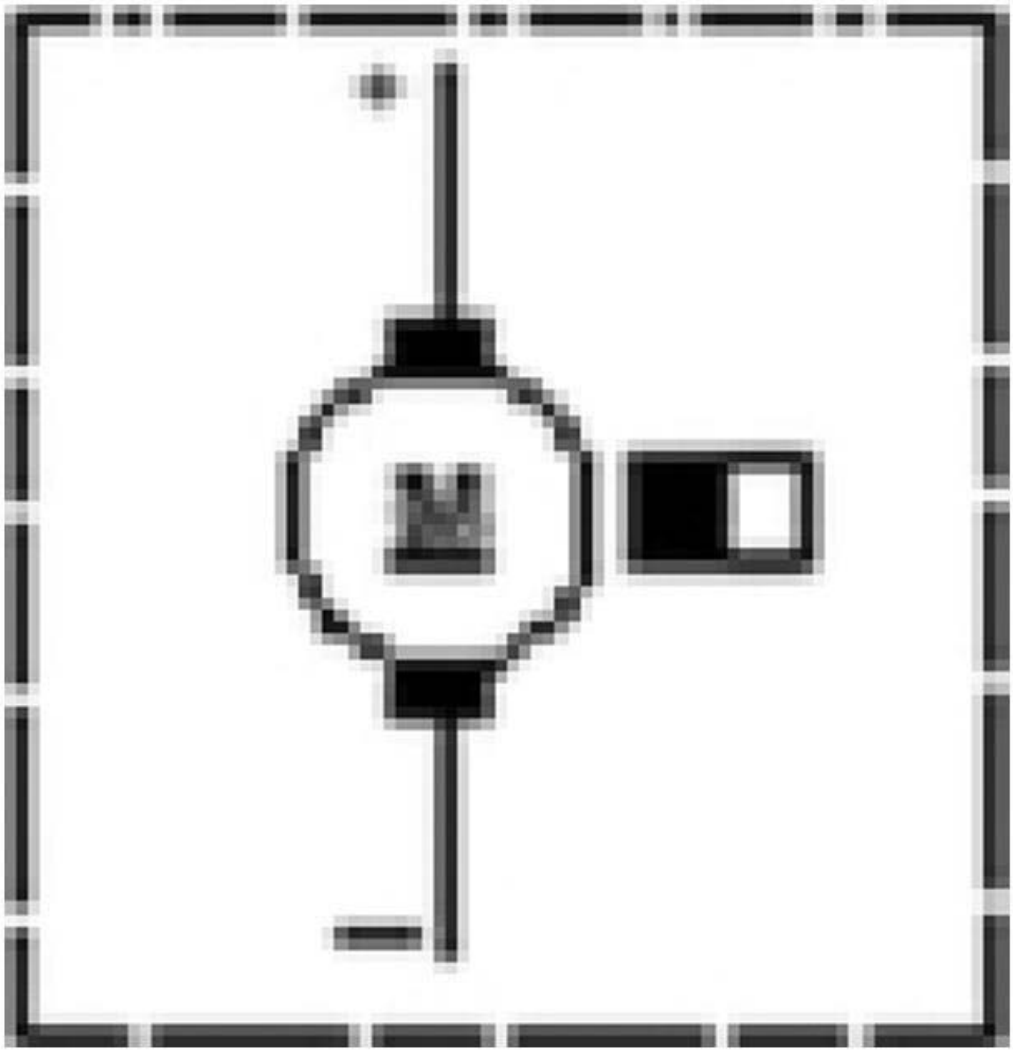

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Fig. 15: Identifying Permanent Magnet Motors
Courtesy of BMW OF NORTH AMERICA, INC.

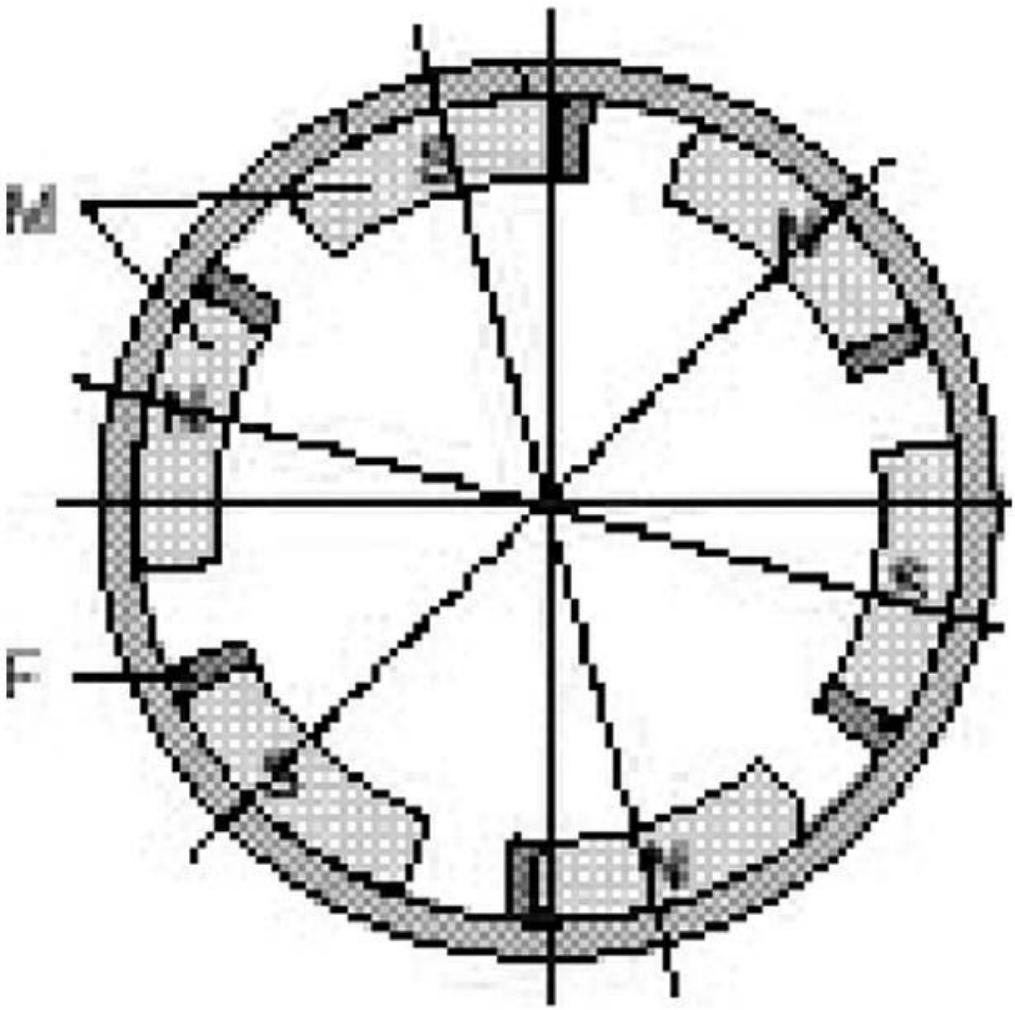


Fig. 16: Identifying Permanent Magnets With Flux Concentrating Pieces
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of permanent magnets (M) with flux concentrating pieces (F).

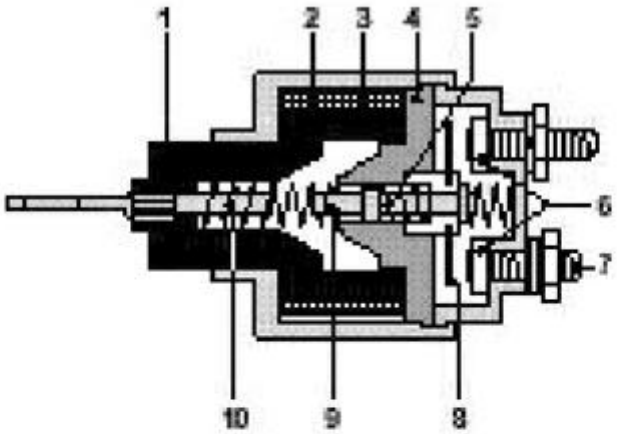
SOLENOID

The Solenoid performs the following functions:

- Pull the pinion to engage the flywheel.

- Hold the pinion engaged with the flywheel during starting rotation.
- Complete the electrical circuit from the battery to the brushes of the starter.
- Cause the pinion to retract from the flywheel.

Two windings are used to pull and hold the pinion engaged to the flywheel.



1. Armature (relay)	2. Pull-in winding
3. Hold-in winding	4. Solenoid armature
5. Contact spring	6. Contacts
7. Terminal	8. Moving contact
9. Switching pin	10.Return spring

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Fig. 17: Identifying Solenoid Components
Courtesy of BMW OF NORTH AMERICA, INC.

Pull-In Winding- The stronger of the two windings, used to pull the pinion into engagement. This winding is released when the starter circuit is completed.

Hold-In Winding- Used to help the pull-in winding move the pinion initially, then holds the pinion engaged to the flywheel.

Signal 50 is received at the solenoid, energizing both windings. The windings cause the armature to be drawn into the coils, pressing on a spring, causing the moving contacts to close. The pull-in winding is released, the starter begins to turn. When signal 50 is released, the power is lost to the hold-in winding, spring pressure forces the armature out of the coil, the moving contacts are opened and the pinion returns to the rest position.

Workshop Hint:

The starter motor does not begin to spin until after the pinion is engaged in the flywheel.

This aids in the meshing of the pinion and flywheel

Workshop Hint:

Battery voltage is critical.

The combination of the pull-in winding and the hold-in winding may have sufficient power to engage the pinion. When the moving contacts are completed and the increased load of the starter motor is added to the system, low voltage will cause the hold-in winding to release the pinion. If signal 50 is still present the pull-in winding will again assist in pulling the pinion into engagement and the cycle starts over again. This gives the "clicking" noise from the starter.

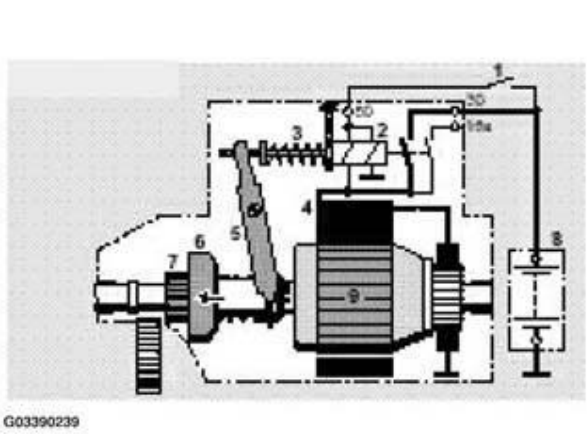
Pinion Drive

The Pinion Drive gear is attached to the roller-type overrunning clutch which is splined via a helical shaft to the starter armature. At rest the spring pressure in the overrunning clutch wedge rollers between the pinion shaft and the clutch hub race. This locks the pinion to the clutch. During start-up the clutch and pinion rotate as one.

As the engine speed exceeds starter speed, the pinion pushes the rollers, against the spring pressure, into a wider area. This movement of the rollers allow the pinion to turn independently of the starter armature, not causing the armature to overspeed.

When the solenoid windings are released the clutch assembly is pulled away from the flywheel through spring pressure.

Phases of Starter Operation



1. Start Request Signal (KL50)
2. Solenoid Switch
3. Return Spring
4. Field Windings
5. Engaging Lever
6. Overrunning Clutch
7. Pinion
8. Battery
9. Armature

Fig. 18: View Of Starter At Rest
Courtesy of BMW OF NORTH AMERICA, INC.

Starter at rest, no current supplied.

Pull-in and hold-in winding energized.

Pinion tooth meets gap in ring gear and meshes.

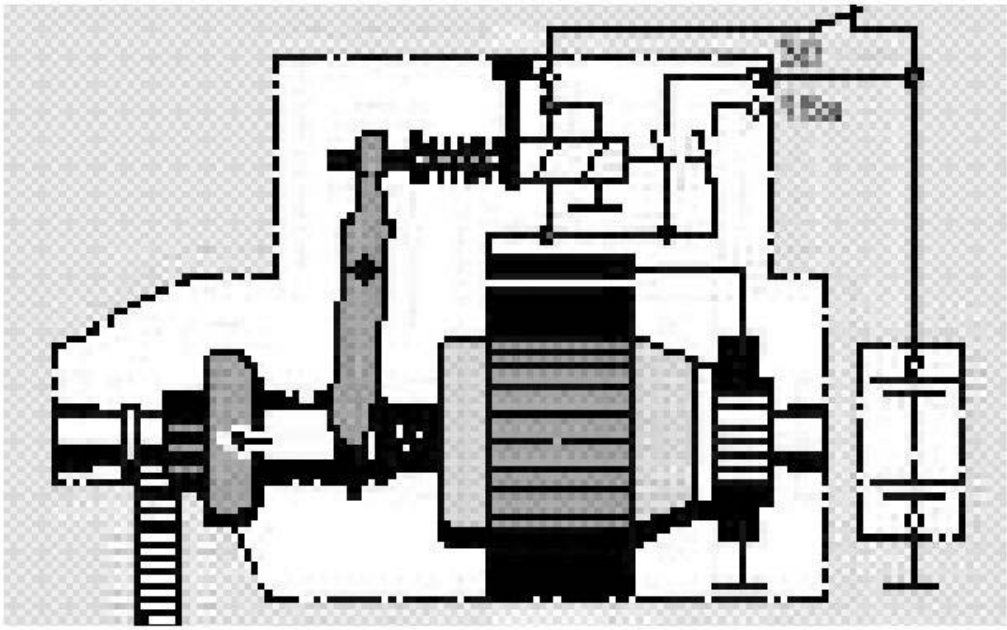


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Fig. 19: Identifying First Phase Of Starter Operation
Courtesy of BMW OF NORTH AMERICA, INC.

Starter position just before Main current is switched on.

Engaging lever in end position.

Pull-in winding released.

Pinion meshed.

Main current flows.

Engine is rotated.

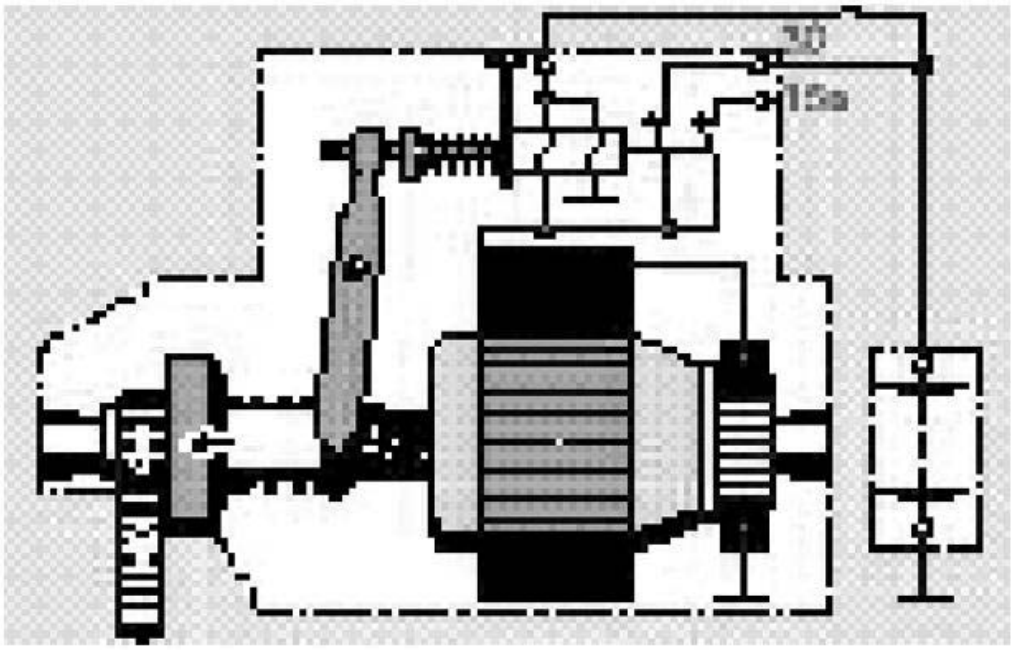

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Fig. 20: View Of Starter Operation
Courtesy of BMW OF NORTH AMERICA, INC.

Engine is cranked.

Diagnostic Connector (DLC) Locations

DOMESTIC CARS

CHRYSLER GROUP LLC

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

CHRYSLER GROUP LLC - DOMESTIC CARS

Application	Connector Location
Acclaim	
1989-90	Under Left Side Of Dash
1991-92	On Left Front Fender Panel, Near Shock Tower
1993-94	Near Battery
1995	Behind Left Side Of Dash, Near Fuse Block
Aries, Caravelle, Dynasty, E Class, Executive Sedan, LeBaron Sedan, New Yorker, Reliant, Town & Country, 400 & 600	
1984-85	On Left Fender Apron, Behind Battery (2.2L Only)
1986-87	On Front Of Right Shock Tower (2.2L & 2.5L Only)
1988-89	On Left Fenderwell
1990	Under Left Side Of Dash
1991-92	On Left Front Fender Panel, Near Shock Tower
1993 (Except New Yorker)	Near Battery
1993 (New Yorker)	On Left Fender Panel Near PCM
Avenger (1995-00)	Under Center Of Dash, Near Center Console
Breeze, Cirrus & Stratus (1995)	Left Of Steering Column, On BCM
Charger, Horizon, Omni, Rampage, Scamp & Turismo	
1985-89	
2.2L Carbureted	On Left Fender Apron
2.2L Turbo	On Front Of Right Shock Tower
Concorde, Intrepid, LHS, New Yorker, Vision & 300M	
1993-95	Behind Left Side Of Dash
1996-97	Under Left Side Of Dash, Near Center Console
Daytona	

1984-87	On Front Of Right Shock Tower
1988-89	On Left Fenderwell
1990-92	On Left Front Fender Panel, Near Shock Tower
1993	On Left Front Inner Fender Or Under Steering Column
Dynasty	
1990	Under Left Side Of Dash
1991-93	On Left Fender Panel, Near SBEC/PCM
Fifth Avenue	
1990	Under Left Side Of Dash
1991-93	On Left Fender Panel Near SBEC/PCM
Horizon & Omni (1989-90)	Under Left Side Of Dash
Imperial	
1981-83	CCC Connector Left Of Air Cleaner
1990	Under Left Side Of Dash
1991-93	On Left Fender Panel Near SBEC/PCM
LeBaron Coupe & Convertible	
1985-87	On Right Front Shock Tower
1988-89	On Left Fenderwell
1990-92	On Left Front Fender Panel, Near Shock Tower
1993	On Left Front Inner Fender Or Under Steering Column
1994	Near Battery
1995	Behind Left Side Of Dash, Near Fuse Block
Lancer	
1985-87	On Right Front Shock Tower
1988-89	On Left Fenderwell
Laser	
1990-94	Above Left Kick Panel, Near Fuse Block
1995	Under Left Side Of Dash, Near Center Console
Monaco & Premier	
1990	On Right Front Fender Panel
1991-92	On Left Fender Panel, Next To SBEC
Neon (1995)	Under Headlight Switch, Under Left Side Of Dash
Shadow	
1985-87	On Right Front Shock Tower
1988	On Left Fenderwell
1989	Under Dash, To Right Of Steering Column

1990	On Left Fender Front Panel, Near SBEC
1991-92	On Left Front Fender Panel, Near Shock Tower
1993-94	Near Battery
Spirit & Sundance	
1985-87	On Right Front Shock Tower
1989-90	Under Left Side Of Dash
1991-92	On Left Front Fender Panel, Near Shock Tower
1993-94	Near Battery
1995	Behind Left Side Of Dash, Near Fuse Block
Talon	
1990-94	Above Left Kick Panel, Near Fuse Block
1995-98	Under Left Side Of Dash, Near Center Console

FORD MOTOR CO.

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

FORD MOTOR CO. - DOMESTIC CARS

Application	Connector Location
Bobcat & Pinto	On Center Of Right Fender Apron
Capri	
1980-85	On Center Of Left Front Fender Apron
1986	On Left Rear Corner Of Engine Compartment
Continental	
1984-89	On Right Rear Corner Of Engine Compartment
1990-91	On Right Rear Corner Of Firewall, On Electronic Assembly Cover
1992	On Right Fender Apron
1993-94	VIP Connectors (2) On Right Rear Of Engine Compartment, On PCM Cover
Contour & Mystique	
1995	On Left Rear Corner Of Engine Compartment
Cougar & Thunderbird	
1982-90	On Left Fender Apron
1991	On Rear Of Right Front Fender Panel
1992	Front Of Right Shock Tower
1993	2 Connectors In Right Rear Corner Of Engine Compartment

1994	On Right Side Of Engine Compartment & Below Glove Box
1995	
3.8L	On Right Side Of Engine Compartment & Below Glove Box
4.6L	Behind Right Side Of Dash, Below Glove Box
1996	Lower Right Side Of Dash, Below Glove Box
Crown Victoria, Grand Marquis & Lincoln Town Car	
1983 & 1987	On Right Fender Apron
1985-86 & 1988-90	On Left Fender Apron
1992	On Left Front Fender Panel
1993-94	On Top Of Left Front Wheelwell
Escort, EXP, Lynx & Tracer	
1985-90	On Right Fender Apron Near Firewall
1991	On Left Rear Of Engine Compartment
1992	On Right Rear Of Engine Compartment, Near Cowl
1993-95	On Left Side Of Firewall
LTD & Marquis	
1983	On Left Fender Apron
1984-86	On Left Rear Corner Of Engine Compartment
Mark VII	
1984-87	On Right Rear Corner Of Engine Compartment
1988-90	Front Of Right Fender Apron
1991	On Right Side Of Engine Compartment, Near Thermactor Solenoids
Mark VIII	
1993-96	On Top Of Left Wheelwell
Mustang	
1980-85	On Center Of Left Front Fender Apron
1986-91	On Left Rear Corner Of Engine Compartment
1992	On Left Shock Tower, Near Ignition Coil
1993	2 Connectors On Right Front Strut Tower
1994-95	Behind Right Front Strut Tower & Right Of Steering Column
Probe	
1991-92	On Left Rear Corner Of Engine Compartment
1993	DLC - Behind Left Side Of Dash; STI Connector - On Left Inner Fender Panel
1994-95	On Left Front Inner Fender Panel
Sable & Taurus	
1986-87 (3.0L Only)	Near Alternator
1988-90	
2.5L	On Engine Harness Near PCV Hose
3.0L	On Right Rear Corner Of Engine Compartment

1991	On Right Rear Corner Of Engine Compartment, On ECA Cover
1992	On Right Rear Corner Of Engine Compartment, Below MAP Sensor
1993-95	Right Rear Of Engine Compartment
Tempo & Topaz	
1984-92	On Right Rear Corner Of Engine Compartment
1993-94	In Engine Compartment, On Left Strut Tower

GENERAL MOTORS

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

GENERAL MOTORS - DOMESTIC CARS

Application	Connector Location
Allante	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
Bonneville (1980-81)	ECU Connector On Upper Right Kick Panel
Brougham (1987-92)	Bottom Center Of Instrument Panel
Camaro & Firebird (1980)	Diagnostic Ground Lead Connector On Right Shroud Above ECM
Caprice Classic	
1980-81	ECU Connector On Upper Right Kick Panel
1982-88	Under Center Of Instrument Panel
Catalina	ECU Connector On Upper Right Kick Panel
Cavalier (1982-88)	On Side Of Fuse Block
Cimarron	On Side Of Fuse Block
Century	Under Left Of Dash Ashtray
Corvette (1980-83)	In Center Console, Under Ashtray
Custom Cruiser	
1980-81	ECU Connector On Upper Right Kick Panel
1982-88	Under Center Of Instrument Panel
DeVille (1981-88)	Enter Diagnostic Mode By Pressing OFF & WARMER Buttons On Instrument Panel
Delta 88	ECU Connector On Upper Right Kick Panel
Eldorado (1981-88)	Enter Diagnostic Mode By Pressing OFF & WARMER Buttons On Instrument Panel
Electra (1980-81)	ECU Connector On Upper Right Kick Panel
Estate Wagon	ECU Connector On Upper Right Kick Panel
Fiero	Under Ashtray Or Cigar Lighter Panel Within Center Console
Firenza	On Side Of Fuse Block

Fleetwood (1981-88)	Enter Diagnostic Mode By Pressing OFF & WARMER Buttons On Instrument Panel
Fleetwood Brougham	On Bottom Center Of Dash, Near Ashtray
Impala (1982-88)	Under Center Of Instrument Panel
LeMans	ECM Connector On Right Kick Panel Or Under Left Side Of Dash
LeSabre (1980-81)	ECU Connector On Upper Right Kick Panel
LeSabre Wagon (1982-88)	Under Center Of Instrument Panel
Monza	Under Right Side Of Dash
Ninety-Eight (1980-81)	ECU Connector On Upper Right Kick Pane
Nova	Behind Right Strut Tower
Parisienne	Under Center Of Instrument Panel
Reatta	
1988-92 (MFI)	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
1991-93	Above Parking Brake Pedal
Riviera	
1980-85 (Carbureted)	Under Left Or Center Of Dash
1986-92 (MFI)	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
Safari	Under Center Of Instrument Panel
Seville (1981-88)	Enter Diagnostic Mode By Pressing OFF & WARMER Buttons On Instrument Panel
Skyhawk	Under Right Side Of Dash
Starfire	Under Right Side Of Dash
Sunbird	On Side Of Fuse Block, Under Right Side Of Dash
Toronado	
1980-85 (Carbureted)	Under Left Or Center Of Dash
1986-92 (MFI)	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
Trofeo	
1988-92 (MFI)	Enter Diagnostic Mode By Pressing OFF & WARM Buttons On Instrument Panel
1991-93	Above Parking Brake Pedal
2000	On Side Of Fuse Block

DOMESTIC LIGHT TRUCKS & VANS

CHRYSLER GROUP LLC

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

CHRYSLER GROUP LLC - DOMESTIC LIGHT TRUCKS & VANS

Application	Connector Location
Caravan, Grand Caravan, Grand Voyager, Mini Ram Van, Town & Country, & Voyager	
1984-92	On Left Side Fender Apron
1993	On Left Fender Front Fender Panel, Near SBEC
1994-95	On Wiring Harness, On Center Of Firewall
Dakota	
1987-88	On Right Side Fender Apron
1989	On Left Side Of Firewall
1990-92	On Right Side Of Firewall
1993-95	On Right Rear Corner Of Engine Compartment
Jeep	
Cherokee (1992-95)	On Left Front Fender Apron, Behind Air Cleaner
Comanche	On Left Front Fender Apron, Behind Air Cleaner
Grand Cherokee & Wagoneer	
1993-95	
PCM	On Right Rear Of Engine Compartment, Near PCM
TCM	Behind Left Side Of Instrument Panel
Wrangler (1992-95)	On Left Side Of Firewall, Near PCM
Pickup & Ramcharger	
1985-90	On Left Side Of Firewall
1991-93	On Left Front Fender Panel, Next To SBEC/PCM
1995 Pickup	On Right Side Of Firewall
Ram Wagon & Van	
1985-90	On Left Side Of Firewall
1991-95	On Center Of Firewall, Near SBEC/PCM

FORD MOTOR CO.

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

FORD MOTOR CO. - DOMESTIC LIGHT TRUCKS & VANS

Application	Connector Location
Aerostar	
1986-90	On Left Front Fender
1991	Near Starter Relay
1992	On Left Front Inner Fender Panel
1993-95	On Left Side Of Firewall

Bronco	
1982-85	
6-Cylinder	On Left Front Fender
V8	On Right Inner Fender Panel
1986-87	On Right Front Fender, Near Starter Relay
1988-92	On Left Fender Apron
1993-95	2 Connectors In Left Rear Of Engine Compartment, On Bracket
1996-	Below Glove Box
Bronco II	
1983-85	On Right Front Inner Fender Panel (2.3L Only)
1986-90	On Right Front Fender Apron
Excursion	Behind Center Of Dash
Explorer & Mountaineer (1991-94)	On Right Rear Of Engine Compartment, Near A/C-Heater Blower
Pickup	
1982-85	
6-Cylinder	On Left Front Fender
V8	On Right Inner Fender Panel
1986-87	On Right Front Fender, Near Starter Relay
1988-92	On Left Fender Apron
1993-95	2 Connectors In Left Rear Of Engine Compartment, On Bracket
1996-	Below Center Of Instrument Panel
Pickup (F250 Heavy Duty & F350)	Under Right Side Of Dash
Ranger	
1983-85	On Right Front Inner Fender Panel (2.3L Only)
1986-90	On Right Front Fender Apron
1991	Behind Engine Compartment Fuse/Relay Block
1992	On Left Front Inner Fender Panel
1993-95	On Rear Of Engine Compartment Fuse/Relay Block
Van	
1986-92	On Right Fender Apron
1993-95	On Left Front Corner Of Engine Compartment
1996	
5.8L (49 State, Over 8600 GVW) & 7.5L (Except Calif.)	On Left Front Corner Of Engine Compartment

All Others	Under Left Side Of Dash
1997-98	
Diesel	Under Left Side Of Dash
All Others	Left Front Corner Of Engine Compartment
Villager (1993)	On Left Side Of Engine Compartment, Below Coolant Reservoir

GENERAL MOTORS

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

GENERAL MOTORS - DOMESTIC LIGHT TRUCKS & VANS

Application	Connector Location
Astro & Safari Van (1986-87)	Under Left Corner Of Cowl
"S" & "T" Series Blazer, Bravada, Envoy, Jimmy, Pickup & Sonoma	
1982-85	
1.9L	Under Left Side Of Dash, Behind ECM
2.0L & 2.8L	Under Ashtray
2.5L	Under Left Side Of Dash
1986-87	Under Ashtray
Van ("G" Series) (1982-87)	Under Driver's Seat

IMPORTED CARS & TRUCKS

ACURA

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

ACURA - IMPORTED CARS & TRUCKS

Application	Connector Location
Integra	
1991-93	Behind Right Kick Panel
1994-97	Behind Glove Compartment
1998-02	Behind Right Side Of Center Console
Legend	
1991-93	Under Right Side Of Dash, Above PGM-FI ECU/PCM
1994-95	Behind Glove Compartment
NSX (1997-01)	Under Glove Compartment

SLX	Behind Lower Left Corner Of Dash, Behind Cover
Vigor	
1992-93	Under Right Side Of Dash, Near Center Console
1994	Behind Glove Compartment
2.2CL & 2.3CL	In Front Of Shift Lever, Behind Ashtray
2.5TL	In Front Of Shift Lever, Behind Ashtray
3.0CL	In Front Of Shift Lever, Behind Ashtray
3.2TL & 3.5RL	In Front Of Shift Lever, Behind Ashtray

AUDI

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

AUDI - IMPORTED CARS & TRUCKS

Application	Connector Location
A4	
1996	Next To Rear Ashtray
1997-01 (1.8L Turbo)	Behind Cover, Under Left Side Of Steering Column
1997-99 (2.8L V6)	Under Cover, Next To Rear Ashtray
1997-	Under Left Side Of Dash, Behind Cover
A6	
1995	Under Ashtray, In Front Storage Compartment Of Center Console
1996-97	Under Cover, Next To Parking Brake Handle
Cabriolet	
1994-96	In Fuse/Relay Block, On Left Side Of Dash
1997-98	Under Ashtray, At Rear Of Center Console
Coupe GT, 4000S & 4000S Quattro	In Fuse Socket, On Fuel Pump Relay
80	In Fuse Socket, On Fuel Pump Relay
90	
1988-92	In Fuse Socket, On Fuel Pump Relay
1993	In Main Fuse/Relay Block, On Plenum Tray
1994-95	In Fuse/Relay Block, On Left Side Of Dash
100	
1989-91	Under Left Side Of Dash
1992-94	In Auxiliary Relay Station No. 1, On Left

	Rear Of Engine Compartment
5000CS Quattro, 5000CS Turbo & 5000S	In Fuse Socket, On Fuel Pump Relay

BENTLEY

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

BENTLEY - IMPORTED CARS & TRUCKS

Application	Connector Location
1996-00	
All Models	In Glove Compartment
2001-04	
Arnage	Below Left Side Of Dash
2001-	
Azure Convertible	In Glove Compartment
Continental	In Glove Compartment

BMW

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

BMW - IMPORTED CARS & TRUCKS

Application	Connector Location
Z3	Behind Cover, On Right Side Of Center Console
Z4 & Z8	Under Left Side Of Dash, Left Of Steering Column, Behind Cover
318 & 325	
1991	On Bracket, Above Thermostat Housing
1992-95	On Right Rear Of Engine Compartment
1996	Under Left Side Of Dash, Behind Panel Labeled OBD
330	Behind Cover, On Right Side Of Center Console
524t	On Top Rear Of Engine
525i & 535i	
1990-91 (Black 20-Pin Connector)	Left Rear Corner Of Engine Compartment

1992-95	Outside Of Engine Compartment Fuse/Relay Block
528e	On Intake Manifold Bracket, Behind Thermostat Housing
635CSi	On Bracket, Next To Fuse/Relay Block
735i	
1986-87	On Bracket, On Top Of Engine
1988-92	On Right Side Of Engine Compartment, On Shock Tower
740 & 750	Under Left Side Of Dash, Behind Panel Labeled OBD
740i & 740iL (1993-01)	Behind Cover On Lower Left Corner Of A/C Control Panel
750iL	Behind Cover On Lower Left Corner Of A/C Control Panel

DAIHATSU

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

DAIHATSU - IMPORTED CARS & TRUCKS

Application	Connector Location
Charade	At Upper Section Of Transmission
Rocky	On Right Front Fender Panel

CHRYSLER GROUP LLC

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

CHRYSLER GROUP LLC - IMPORTED CARS & TRUCKS

Application	Connector Location
Colt & Summit	
1986-87	Above Inside Of Glove Compartment
1988	On Left Rear Corner Of Engine Compartment
1989-98	Under Left Side Of Dash, Near Fuse/Relay Block
Colt Vista	
1987	Behind Glove Compartment

1988-89	Under Left Side Of Dash, Near Hood Release Handle
1990-96	Under Right Side Of Dash
Conquest & Starion	Behind Glove Compartment
Expo	Under Left Side Of Dash, Near Fuse/Relay Block
Medallion	On Left Side Of Firewall
Pickup	Under Left Side Of Dash, Near Fuse/Relay Block
Ram-50	Under Left Side Of Dash, Near Fuse/Relay Block
Sigma	In Glove Compartment
Stealth	
1991-98	Under Left Side Of Dash, On Fuse/Relay Block
1999	Under Left Side Of Dash, Left Of Center Console
Summit Wagon	Under Right Side Of Dash
Vista Wagon	Under Right Side Of Dash

FERRARI

FERRARI - IMPORTED CARS & TRUCKS

Application	Connector Location
All Models	
1996-	Behind Left Side Of Dash

FORD MOTOR CO.

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

FORD MOTOR CO. - IMPORTED CARS & TRUCKS

Application	Connector Location
Aspire	
1994-95	On Left Rear Corner Of Engine Compartment
1996-97	Under Left Side Of Dash
Capri	
1991	Behind Right Side Of Dash, Behind Glove Compartment
1992	
1.3L	On Left Rear Corner Of Engine

	Compartment
1.6L	On Right Rear Corner Of Engine Compartment
1993-94	On Right Rear Corner Of Engine Compartment
Festiva	
1992-93	
1.3L	On Left Rear Corner Of Engine Compartment
1.6L	On Right Rear Corner Of Engine Compartment
Merkur XR4Ti	On Right Front Fender Apron, Near Battery
Scorpio	On Right Rear Corner Of Engine Compartment
Tracer	On Left Rear Corner Of Engine Compartment

GENERAL MOTORS

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

GENERAL MOTORS & GEO - IMPORTED CARS & TRUCKS

Application	Connector Location
LeMans	Behind Right Kick Panel, Above ECM
Metro	
1989-95	Under Left Side Of Dash, Near Fuse Block
1996	Under Right Side Of Dash, Near Center Console
1997-01	Under Left Side Of Dash
Prizm & Prizm LSi	
1989-95	On Left Front Strut Tower
1996-02	Under Left Side Of Dash
Spectrum	Under Right Side Of Dash, Above A/C-Heater Blower Motor
Sprint	On Left Front Shock Tower, Near Battery
Storm	
1990-91	Behind Right Side Of Dash, Above A/C-Heater Blower Motor
1992-93	Behind Right Kick Panel
Tracker	
1989-95	Under Left Side Of Dash, Near Fuse Block
1996	In Engine Compartment, Near MAP Sensor
1997-	Under Left Side Of Dash

HONDA

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

HONDA - IMPORTED CARS & TRUCKS

Application	Connector Location
Accord	
1990-95	Behind Right Side Of Dash, Above Kick Panel
1996-97	Behind Ashtray In Center Console
Civic (1992-95)	Behind Right Side Of Dash, Near PGM-FI ECM
Civic Del Sol	
1992-95	Behind Right Side Of Dash, Near PGM-FI ECM
1996-97	Under Removable Cover On Right Side Of Center Console
CR-V	Behind Passenger Side Of Center Console
Element	
2003-11	Above Gas Pedal, Below Fuse Block
Insight (2010-11)	Below Left-of-Center Of Dash
Odyssey	
1995	Behind Right Side Of Dash, Above Kick Panel
1996-98	Behind Passenger Side Of Center Console
Passport (1995)	Behind Left Kick Panel
Prelude	
1992-95	Behind Center Console
1996	Under Beverage Holder In Center Console
1997-02	Under Removable Cover On Right Side Of Center Console
S2000	Behind Right Side Of Center Console

HYUNDAI

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

HYUNDAI - IMPORTED CARS & TRUCKS

Application	Connector Location
Accent (1995)	In Coin Box
Sonata	
1989	Under Left Side Of Dash, In Fuse Block
1990	
W/Passive Seat Belt Restraints	In Fuse Block

W/O Passive Seat Belt Restraints	On Lower Left Of Steering Column

INFINITI

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

INFINITI - IMPORTED CARS & TRUCKS

Application	Connector Location
G20 (1993-95)	In ECCS Control Unit, Behind Center Console
I30 (1995)	Beside Fuse Box
J30	
1993	Under Left Side Of Dash
1994-95	In ECM, Behind Right Kick Panel
1996-98	Under Left Side Of Dash
M30	Under Left Side Of Dash, Near Fuse Block
Q45	
1990-93	Under Left Side Of Dash, Near Fuse Block
1994-95	In ECM, Behind Right Kick Panel

ISUZU

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

ISUZU - IMPORTED CARS & TRUCKS

Application	Connector Location
Amigo & Pickup	
1986-89	Under Left Side Of Dash
1990-95	Behind Left Kick Panel, Near ECM
1998-00	Lower Left Corner Of Dash, Behind Small Cover
Hombre	Under Lower Left Side Of Dash, Behind Cover
Impulse	
1986-89	Under Left Side Of Dash, Above ECU
1990-92	Behind Right Kick Panel
1993-95	Behind Left Kick Panel, Near ECM
I-Mark	Behind Right Side Of Dash, Above A/C-Heater Blower Motor
Oasis	Behind Right Side Of Center Console

Rodeo	
1991-95	Behind Left Kick Panel
1996-	Lower Left Side Of Dash, Behind Small Cover
Stylus	Behind Right Kick Panel
Trooper & Trooper II	
1986	Under Left Side Of Dash
1987-91	Under Center Console
1992	
DOHC	Behind Center Of Dash, Right Of Steering Column
SOHC	Under Left Side Of Dash
1993-95	Under Left Side Of Dash, Right Of Steering Column
1996-02	Lower Left Side Of Dash, Behind Small Cover
VehiCROSS	Under Left Side Of Dash

JAGUAR

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

JAGUAR - IMPORTED CARS & TRUCKS

Application	Connector Location
XJR (1995-97)	Near Center Console
XJS	
1992	On Left Rear Trunk Wheel Arch, Behind Trim Panel
1993-94	Under Battery Tray, On Right Front Of Luggage Compartment
1995-96	Near Center Console
XJ6	
1992	On Left Rear Of Engine Compartment
1993-94	Under Battery Tray, On Right Front Of Luggage Compartment
1995-97	Under Left Side Of Dash, Near Center Console
XJ12	Near Center Console

KIA

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

KIA - IMPORTED CARS & TRUCKS

Application	Connector Location
Sephia	
1994	On Center Of Firewall
1995 & 1996	
1.6L	Under Center Of Dash, Mounted On Floorboard
2.0L	Under Right Side Of Dash, Near Kick Panel
Sportage	
1994	On Center Of Firewall
1995 & 1996	
1.6L	Under Center Of Dash, Mounted On Floorboard
2.0L	Under Right Side Of Dash, Near Kick Panel

LAND ROVER

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

LAND ROVER - IMPORTED CARS & TRUCKS

Application	Connector Location
Defender 90	Behind Fuse Cover, In Center Of Console
Range Rover	Under Right Side Of Dash, In Footwell

LEXUS

NOTE: **This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.**

LEXUS - IMPORTED CARS & TRUCKS

Application	Connector Location
ES Series	
1990-91	
DLC	Near Left Shock Tower

Total Diagnostic Communication Link Connector	Under Left Side Of Dash
1992-94	
DLC No. 1	On Bracket, Behind Right Front Strut Tower
DLC No. 2 & 3	Under Left Side Of Dash
1995-97	In Fuse Box At Lower Left Of Dash
GS Series	
1990-95	
DLC No. 1	On Bracket, On Top Of Engine
DLC No. 2	Under Left Side Of Dash
1996-00	In Fuse Box At Lower Left Of Dash
LS Series	
1990-94	
DLC No. 1	On Bracket, On Top Of Engine
DLC No. 2	Under Left Side Of Dash
1995-00	In Fuse Box At Lower Left Of Dash
SC Series	
1992-95	
DLC No. 1	On Bracket, Behind Right Front Strut Tower
DLC No. 2 & 3	Under Left Side Of Dash
1996-00	In Fuse Box At Lower Left Of Dash

MAZDA

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

MAZDA - IMPORTED CARS & TRUCKS

Application	**Connector Location**
B-Series	
1987-88	On Right Front Fender Apron
1989-93	
Engine Control Check Connector (Black 6-Pin)	Near Windshield Washer Motor
Trouble Codes Connector (Green 1-Pin)	Near Black 6-Pin Connector (Engine Control)
1994-95	On Right Front Fender Panel
Miata (1990-95)	On Left Rear Of Engine Compartment, Near Master Cylinder
MPV (1989-95)	
Engine Control Unit (Green 6-Pin & 1-Pin	On Left Side Of Engine Compartment, Near

Connectors)	Inner Fender Panel
MX-3	Mounted On Bracket, On Left Front Strut Tower
MX-6 & 626	
1988	Behind Left Front Shock Tower
1989	On Left Front Corner Of Engine Compartment
1990-91	At ECU Connector Terminal
1992	On Left Rear Corner Of Engine Compartment
1993	On Side Of Fuse/Relay Block, Near Battery
1994-95	On Left Front Fender Apron
Navajo	
1991-93	On Right Rear Corner Of Engine Compartment
1994-95	On Right Front Fender Panel
Protege	
1987-89	On Passenger's Footwell (Left Foot Area)
1990-95	On Left Side Of Firewall, Near Wiper Motor
RX7	
1986-88 (3 Check Connectors)	At Left & Right Corners Of Engine Compartment
1989-91 (Green 6-Pin Connector)	Behind Ignition Coil
1993-95	On Bracket, On Left Front Strut Tower
323	
1986-88	Front Left Of Engine Compartment, Near Ignition Coil
1989 (Green 6-Pin & Green 1-Pin Connectors)	On Left Side Of Firewall
1990-95	On Left Side Of Firewall, Near Wiper Motor
929	
1989	Near Air Cleaner
1990-91 (Green 6-Pin Connector)	In Left Front Corner Of Engine Compartment
1992-93	Mounted On Air Cleaner Housing
1994-95	On Left Front Strut Tower

MERCEDES-BENZ

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

MERCEDES-BENZ - IMPORTED CARS & TRUCKS

Application	Connector Location
C-Class (1994)	On Right Rear Of Engine Compartment

E-Class	
1994-97	On Right Rear Of Engine Compartment
G-Class	Under Left Side Of Dash, Behind Cover
ML-Class	Under Left Side Of Dash, Behind Cover
S-Class	
140 Platform (1994-99)	On Right Rear Of Engine Compartment
190 Series	
1986-87	On Left Rear Of Engine Compartment
1988-93	
All Models	In Engine Compartment, On Left Front Fender
California (OBD)	On Right Side Of Firewall, Near Battery
1994	On Right Rear Of Engine Compartment
260E	
1987	On Left Front Fender Apron, Next To Ignition Control Module
1988-89	
All Models	In Engine Compartment, On Left Front Fender
California (OBD)	On Right Side Of Firewall, Near Battery
300 Series	
1986-87	On Left Front Fender Apron, Next To Ignition Control Module
1988-92	
All Models	In Engine Compartment, On Left Front Fender
California (OBD)	On Right Side Of Firewall, Near Battery
1993	
Except 300E	Left Fender Apron
300E	Right Rear Corner Of Engine Compartment
1994-95 (All Models)	On Right Rear Of Engine Compartment
400 & 500 Series	
1993	
12-Pin Connector	On Rear Of Left Front Inner Fender Panel
38-Pin (Impulse Readout)	In Module Box, On Right Rear Of Engine Compartment
1994-95	On Right Rear Of Engine Compartment
420SEL & 560 Series (Except 2.2L)	
1986-89	
All Models	In Engine Compartment, On Left Front Fender

California (OBD)	On Right Side Of Firewall, Near Battery
1990-91	In Engine Compartment, On Left Front Fender
560 Series (2.2L)	On Lower Left Side Of Engine Connector

MITSUBISHI

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

MITSUBISHI - IMPORTED CARS & TRUCKS

Application	Connector Location
Diamante (1992-98)	Under Left Side Of Dash, Near Fuse/Relay Block
Expo	Under Left Side Of Dash, Near Fuse/Relay Block
Montero	
1986-88	Left Rear Corner Of Engine Compartment
1989-91	Behind Glove Compartment
Pickup	Under Left Side Of Dash, Near Fuse/Relay Block
Raider	
1987-88	Left Rear Corner Of Engine Compartment
1989	Behind Glove Compartment
3000GT	
1991-98	Under Left Side Of Dash, On Fuse/Relay Block
1999	Under Left Side Of Dash, Left Of Center Console

NISSAN

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

NISSAN - IMPORTED CARS & TRUCKS

Application	Connector Location
Altima	
1993-94	On Driver-Side Of Center Console, Above Accelerator Pedal
1995-96	Below Fuse Box

Maxima	
1989-94	Under Left Side Of Dash
1995-96	Below Fuse Box
NX & Sentra	Under Left Side Of Dash, Near Fuse Block
Pulsar NX	
1986	Above Right Side Of Dash, Below Wiper Motor
1987	Above Steering Column
Quest (1993-95)	
CONSULT Tester Connector	On Driver-Side Of Center Console, Above Accelerator Pedal
Self-Test Connector	Located Near Starter
Stanza	Below Center Of Dash, Near Center Console
Van	On Right Side Of Engine Compartment, Behind Fuel Filter
200SX (1995-96)	Below Fuse Box
240SX	
1991-94	Under Left Side Of Dash, Below Fuse Block
1995-96	In Glove Box
300ZX (1990)	Near Parking Brake

PEUGEOT

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

PEUGEOT - IMPORTED CARS & TRUCKS

Application	Connector Location
505 Series	On Lower Left Side Of Engine Connector

PORSCHE

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

PORSCHE - IMPORTED CARS & TRUCKS

Application	Connector Location
911 Series	
1992-95	In Passenger's Footwell
1996	Left Side Of Center Console

928S	Top Front Of Engine
944 Series	On Left Side Of Engine Compartment

RENAULT

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

RENAULT - IMPORTED CARS & TRUCKS

Application	Connector Location
Sportwagon	
Engine Diagnostic	On Center Of Firewall
Fuel Injection Diagnostic	Right Rear Of Engine Compartment, Behind Airflow Meter

ROLLS-ROYCE

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

ROLLS-ROYCE - IMPORTED CARS & TRUCKS

Application	Connector Location
All Models	
1996-00	In Glove Compartment
2001-	Under Left Side Of Dash

SAAB

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

SAAB - IMPORTED CARS & TRUCKS

Application	Connector Location
900 Series	
1986-90	In Front Of Fuse/Relay Panel
1991-93	Under Back Seat, On Right Side
1994	
Convertible	Under Rear Seat
Hatchback	Under Steering Column
All Others	Under Right Front Seat

9000 Series	
1990	On Left Side Of Engine Compartment
1991-92	Under Passenger's Seat
1993	On Left Of Firewall
1994-95	Under Right Front Seat

SUBARU

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

SUBARU - IMPORTED CARS & TRUCKS

Application	Connector Location
Brat, Coupe, Hatchback, Sedan & Wagon	
1987	
Read Memory Connector	Under Left Side Of Dash, Next To MFI/SMFI Control Unit
Test Mode Connector	
MFI	On Left Side Of Dash, Next To MFI Control Unit
Sequential MFI	On Left Side Of Firewall
1988-89	On Left Side Of Dash, Next To ECU
Forester	Under Left Side of Dash, Behind Cover
Justy	
1987-88	
Read Memory Connector (Factory)	On Right Front Fender, Near Strut Tower
Test Mode Connector	On Driver-Side Kick Panel Or ECU
1989-95	
Read Memory Connector (Factory)	Under Left Side Of Dash
Test Mode Connector	On Driver-Side Kick Panel Or ECU
Legacy	
1990-94	
Check Connector (Black Connector)	Behind Right Side Of Steering Column, Near Heater Case
Diagnostic Connector (Black 4-Pin Connector)	Behind Right Side Of Steering Column, Near Heater Case
Read Memory Connector (Black Connector)	Behind Knee Panel, Right Of Steering Column
Select Monitor Connector (Yellow Connector)	Behind Right Side Of Steering Column, Near Heater Case
Test Mode Connector (Green Connector)	Behind Knee Panel, Right Of Steering Column

1995-	Under Left Side Of Dash, Behind Cover
Loyale	
1990-91	
MFI (5-Pin Connector)	In Front Of ECU
SMFI (Yellow 9-Pin & Black 13-Pin Connectors)	Near Brake Booster
1992-95	
Diagnostic Check Connector (Yellow 9-Pin & Black 13-Pin Connectors)	Behind Brake Booster
Diagnostic Read-Memory Connector (2-Single Wire Connectors)	Behind Left Front Strut Tower
Outback & Outback Sport	Under Center Of Dash
SVX	
1992-96	Under Left Side Of Dash
1997	Right Of Steering Column, On Center Console

SUZUKI

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

SUZUKI - IMPORTED CARS & TRUCKS

Application	Connector Location
Esteem (1995)	Near Battery
Samurai	
1986-90	Under Right Side Of Dash, Behind Glove Compartment
1991-92	On Right Side Of Firewall
1993-95	Under Left Side Of Dash, In Fuse Block
Sidekick & X90	
1989-91	Under Left Side Of Dash, In Fuse Block
1992-93	
ALDL Connector	Under Left Side Of Dash
Engine Connector	Under Left Side Of Dash, Near Fuse Block
1994-96	In Engine Compartment, Near Battery
Swift	
1989-91	Under Left Side Of Dash, In Fuse Block
1992	
ALDL Connector	Under Left Side Of Dash

Diagnostic Test Terminal	In Fuse Block
1993-95	Under Left Side Of Dash, In Fuse Block

TOYOTA

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

TOYOTA - IMPORTED CARS & TRUCKS

Application	Connector Location
Camry	
1983-90	Next To Brake Master Cylinder
1991	Near Left Front Shock Tower
1992-95	
4-Cylinder	Near Wiper Motor
V6	Under Left Side Of Dash
Celica	
1983-84	Next To Battery
1985-95	Behind Left Front Shock Tower
Celica Supra	Rear Of Battery, Near Relay Panel (2-Pin Connector)
Corolla	
Front Wheel Drive	
1987	Side Of Left Front Shock Tower (2-Pin Connector)
1988-94	Behind Left Front Shock Tower
Rear Wheel Drive	
1985-86	Side Of Right Front Shock Tower (2-Pin Connector)
1987	Right Rear Corner Of Engine Compartment
Cressida	
1988-93	
Check Connector	On Left Front Shock Tower
Total Diagnostic Communication Link Connector	Under Left Side Of Dash
Land Cruiser (1988-94)	Near Wiper Motor
MR2	
1986-90	Near Airflow Meter
1992-95	On Right Rear Of Engine Compartment, Near MAP Sensor
Paseo (1992-95)	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery

Pickup	
1984-86	Near Ignition Coil, Near Master Cylinder (2-Pin Connector)
1987-90	Right Front Inner Fender Panel, Near Relay Block
1992-94	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
Previa	
1992-93	Under Front Of Driver's Seat
1994	
Except Supercharged	Under Center Console, Near Parking Brake Lever
Supercharged	Under Cover, On Top Center Of Instrument Panel
1995-97	On Top Center Of Instrument Panel
RAV4	Under Dash, Near Center Console
Starlet	
1981-82	On Instrument Panel Fuse Block, On Top Of Dash
1983-84	Right Rear Of Engine Compartment
Supra	
1986-90	Rear Of Battery, Near Relay Panel
1991-92	On Left Front Shock Tower
1993-94	
DLC No. 1	On Right Side Of Firewall
DLC No. 2	Under Left Side Of Dash, Near Kick Panel
Tacoma & T100	
1993	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
1994-95	
Except OBD-II DLC	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
OBD-II DLC	Under Left Side Of Dash
Tercel	
1987-90	In Engine Compartment, Next To Master Cylinder
1991-94	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery
1995-98	Near Steering Column
Van	Near Airflow Meter
4Runner	
1985-86	Near Ignition Coil, Next To Master Cylinder (2-Pin Connector)

1987-95	On Side Of Engine Compartment Fuse/Relay Block No. 2, Near Battery

VOLKSWAGEN

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

VOLKSWAGEN - IMPORTED CARS & TRUCKS

Application	Connector Location
Cabrio	
1996	In Center Console, Below Tachometer
1997-02	On Center Dash, Behind Panel Near Ashtray
Corrado	Under Center Console Trim Plate
Fox	Under Center Console, Near Shift Lever
Golf	
1993	On Center Of Dash, Below A/C-Heater Control Knobs
1994	Under Center Console
1998-03	In Center Console
Golf III 2.0L	
1995-96	Below A/C-Heater Control Panel
1997-98	On Center Dash, Behind Panel Adjacent To Ashtray
GTI	
1993	On Center Of Dash, Below A/C-Heater Control Knobs
1994	Under Center Console
GTI 2.8L	On Center Dash, Behind Panel Adjacent To Ashtray
Jetta	
1993	On Center Of Dash, Below A/C-Heater Control Knobs
1994	Under Center Console
Jetta III 2.0L	
1995-96	Below A/C-Heater Control Panel
1997-98	On Center Dash, Behind Panel Adjacent To Ashtray
Jetta/Jetta III 2.8L	On Center Dash, Behind Panel Adjacent To Ashtray
New Beetle	Lower Part of Dash, In Front Of Shift Lever

Passat	
1992-94	Under Center Console, Forward Of Shift Lever
1995-97	On Center Dash, Behind Panel Near Ashtray

VOLVO

NOTE: This table provides a quick reference for self-diagnostic connector locations, when available from manufacturer, that ARE NOT located at the lower left side of the dash, as mandated in 1996 by the Federal government.

VOLVO - IMPORTED CARS & TRUCKS

Application	Connector Location
C30	Under Left Center Of Dash
C70	Behind Cover, Below Parking Brake Lever
S40	Under Left Center Of Dash
S70	Behind Cover, Below Parking Brake Lever
S90	Behind Cover, Below Parking Brake Lever
V40	Under Left Center Of Dash
V70 (1997-00)	Behind Cover Below Parking Brake Lever
V90	Behind Cover, Below Parking Brake Lever
240	
1986-92	Left Rear Corner Of Engine Compartment
1993	Behind Left Front Strut Tower
740 & 760	
1986-92	
Ignition System	On Left Front Fender Apron
Fuel Injection (1990-92 Only)	Left Rear Corner Of Engine Compartment
780	On Left Front Fender, Behind Air Cleaner Housing
850	
1993	On Center Console, Forward Of Shift Lever & Near ECM
1994-95	
Non-Turbo	On Right Front Strut Tower
Turbo	Behind Cover, Forward Of Shift Lever
1996-97	Behind Cover, Forward Of Shift Lever
940	
1991-93	
Ignition System	On Left Front Fender Apron
Fuel Injection	Left Rear Corner Of Engine Compartment

1994-95	Behind Left Front Strut Tower
960	
1992-95	On Left Front Strut Tower
1996	In Center Console, To Right Of Parking Brake Lever
1997	Behind Cover, Forward Of Shift Lever

BUZZERS, RELAYS & TIMERS

BUZZERS, RELAYS & TIMERS LOCATION

Component	Location
Auxiliary Direction Indicators Relay (K441)	Right side of luggage compartment. See **Fig. 112**.
Electric Vacuum Pump Relay (K213)	Right rear of engine compartment. See **Fig. 111**.
Gun Mount Relay (K424)	Right side of luggage compartment. See **Fig. 112**.
Hardtop Driver Unit Relay 1 (K18363a)	Behind battery. See **Fig. 77**.
Hardtop Driver Unit Relay 2 (K18364a)	Behind battery. See **Fig. 78**.
SCR System Load Relay (K2085)	Right rear of engine compartment. See **Fig. 113**.
Transceiver Relay (K411)	Right side of luggage compartment. See **Fig. 112**.
WT Relay (K6319)	Left rear of engine compartment. See **Fig. 76**.

CIRCUIT PROTECTION DEVICES

CIRCUIT PROTECTION DEVICES LOCATION

Component	Location
E Box	Left rear of engine compartment.
Engine Electronics Fuse Carrier (A8682)	Left rear of engine compartment. See **Fig. 32**.
Fuse Box (A400 & A404)	Right side luggage compartment. See **Fig. 24**.
Fuse Carrier - Rear (A46)	In luggage compartment. See **Fig. 114**.
Junction Box (A4010)	Right side of dash. See **Fig. 28**.

CONTROL UNITS

CONTROL UNITS LOCATION

Component	Location
Accelerator Pedal Module (A234a)	On accelerator pedal bracket. See **Fig. 23**.
Active Steering (A467)	Behind left front wheelwell. See **Fig. 26**.
Basic Deployment Control Module (A482)	Right rear of luggage compartment. See **Fig. 27**.
Car Access System (A149a)	Under left side of dash. See **Fig. 15**.
Comfort Access Control Module (A215)	Right rear of luggage compartment. See **Fig. 22**.
Convertible Top Module (A96a)	Right rear of luggage compartment. See **Fig. 10**.
Crash Safety Module (A12a)	Rear of center console. See **Fig. 3**.
DME Control Module (A6000)	Right rear of engine compartment. See **Fig. 30**.
Driver's Seat Heating Module (A187a)	Under driver's seat. See **Fig. 20**.
Driver's Seat Module (A187)	Under driver's seat. See **Fig. 21**.
Dynamic Stability Control (DSC) (A65)	Left side of engine compartment. See **Fig. 6**.

EDC Electronic Damper Control (A80a)	Left rear of engine compartment. See **Fig. 7**.
Electronic Power Steering (EPS) (A60233)	On steering rack assembly. See **Fig. 35**.
Footwell Module (A4011)	Under left side of dash. See **Fig. 29**.
Fuel Pump Control (EKPS) (A13663)	Right side of luggage compartment. See **Fig. 33**.
Independent/Auxiliary Heating Control Module (A14)	Left front of engine compartment. See **Fig. 4**.
Longitudinal Dynamics Management (A14282)	Under left side of dash. See **Fig. 118**.
Multi-Drive Sliding Sunroof (A14102)	Center rear of roof. See **Fig. 117**.
Multiple Restraint System Control Module (A12)	Front of center console. See **Fig. 2**.
Navigation System (A112a)	Right rear of luggage compartment. See **Fig. 11**.
Park Distance Control (PDC) (A81a)	Right rear of luggage compartment. See **Fig. 8**.
Parking Brake Control Module (A164a)	Right rear of luggage compartment. See **Fig. 16**.
Passenger's Seat Heating Module (A186a)	Under passenger's seat. See **Fig. 19**.
Seat Module - Passenger (A186)	Under passenger seat. See **Fig. 115**.
Tire Pressure Control (RDC) (A85a)	Right rear luggage compartment. See **Fig. 9**.
Tone Sequence Control Module (A409)	Left rear of luggage compartment. See **Fig. 37**.
Transfer Box Control Unit (A70006)	On transmission. See **Fig. 119**.
Transmission Control (A7000a)	On transmission assembly. See **Fig. 31**.
Transmission Control DKG (A70020)	On transmission assembly. See **Fig. 36**.

MOTORS

MOTORS LOCATION

Component	Location
Air Distribution Flap Motor (M150)	On HVAC unit. See **Fig. 148**.
Auxiliary Water Pump (M37)	Left side of engine compartment.
Blower Motor	On HVAC assembly.
Convertible Top Unlocking Motor (I01209)	Center front of convertible top. See **Fig. 136**.
Defrosting Flap Motor (M35a)	Right side of HVAC assembly. See **Fig. 145**.
Diagnosis Module For Tank Leakage (M119a)	Under left rear of vehicle. See **Fig. 147**.
Driver's Window Motor	In driver's door.
E-Box Fan (M6506)	Left rear of engine compartment. See **Fig. 76**.
Electric Coolant Fan (M6035)	Lower right front of engine. See **Fig. 79**.
Footwell Flap Motor (M31)	Left side of HVAC assembly. See **Fig. 144**.
Fresh Air/Recirculated Air Flap Motor (M111)	Right side of HVAC assembly.
Front Stratification Flap Motor (M4729)	Left side of HVAC unit. See **Fig. 144**.
Fuel Filler Flap Central Locking Drive (M16)	Right rear quarterpanel. See **Fig. 143**.
Hard Top Drive (M101a)	Behind battery. See **Fig. 146**.
Headlamp Washer Pump (M7)	On washer fluid reservoir. See **Fig. 142**.
Mixing Flap Motor - Left (M153)	Left side of HVAC unit. See **Fig. 144**.
Mixing Flap Motor - Right (M154)	Right side of HVAC unit. See **Fig. 145**.

Passenger's Window Motor	In passenger door.
Radiator Shutter Driver (M1997)	Behind center of front fascia. See **Fig. 149**.
Ventilation Flap Motor (M38)	Right side of HVAC assembly. See **Fig. 145**.
Windshield Washer Pump (M4)	On washer fluid reservoir. See **Fig. 142**.
Wiper Motor	Left rear of engine compartment.

SENDING UNITS & SENSORS

SENDING UNITS & SENSORS LOCATION

Component	Location
Acceleration Sensor (Left Front) (B6249)	Front of left front strut, on chassis. See **Fig. 60**.
Airbag Sensor (Left "B" Pillar) (A173)	Base of left "B" pillar. See **Fig. 17**.
Airbag Sensor (Left Door) (B78)	Top front of left door. See **Fig. 53**.
Airbag Sensor (Left Front) (B10508)	Left front of engine compartment. See **Fig. 62**.
Airbag Sensor (Right "B" Pillar) (A174)	Base of right "B" pillar. See **Fig. 18**.
Airbag Sensor (Right Door) (B79)	Top front of right door. See **Fig. 54**.
Airbag Sensor (Right Front) (B10509)	Right front of engine compartment. See **Fig. 63**.
Air Mass Sensor (B6207b)	On air intake duct. See **Fig. 127**.
Automatic Air Recirculation Sensor (B414)	Right rear of engine compartment. See **Fig. 56**.
Battery Temperature Sensor (B895)	On battery positive terminal. See **Fig. 14**.
Brake Pad Wear Sensor (Left Front) (B16a)	On left front wheel hub assembly. See **Fig. 121**.
Brake Pad Wear Sensor (Right Rear)	On right rear wheel hub assembly.
Condensation Sensor	Center of headliner.
Coolant Temperature Sensor (B8)	Right side of engine compartment. See **Fig. 38**.
Crankshaft Position/RPM Sensor (B6203)	Left rear of engine. See **Fig. 57**.
Double Knock Sensor (B62400)	Left side of engine. See **Fig. 67**.
Driving Lights/Rain Sensor (B57)	Top center of windshield. See **Fig. 124**.
Eccentric Shaft Sensor (B60213)	Right side of engine. See **Fig. 128**.
Engine Coolant Temperature Sensor (B6236)	Right front of engine. See **Fig. 58**.
Evaporator Temperature Sensor (B14a)	On HVAC assembly. See **Fig. 39**.
Exhaust Camshaft Sensor (B6224)	Right front of engine. See **Fig. 42**.
Exhaust Temperature Sensor 3 (B62203)	Left rear of engine. See **Fig. 66**.
Fogging Sensor (B100)	Top center of windshield. See **Fig. 124**.
Footwell Temperature Sensor (B109a)	On HVAC assembly. See **Fig. 55**.
Fuel Tank Sensor (Left Half Tank) (B25a)	Top left side of fuel tank. See **Fig. 122**.
Hall Sensor - Roof Shell 2 Packed (I01243)	Right roof shell 2 hinge. See **Fig. 141**.
Hall Sensor 1.1 (I01203)	Near right convertible top hinge. See **Fig. 137**.
Hall Sensor 9 (B6229)	Left rear of luggage compartment. See **Fig. 1**.
Intake Camshaft Sensor (B6214)	Right front of engine. See **Fig. 42**.
Intake Pipe Pressure Sensor (M6239)	Left rear of engine. See **Fig. 59**.
Intake Temperature Boost Pressure Sensor (B6583)	Left rear of engine. See **Fig. 61**.

Interior Movement Detector (A121b)	Center of roof. See **Fig. 116**.
Low Beam/Rain Sensor	Behind inside rear view mirror.
Microwave Sensor - Driver's Door (B14143) (Passenger's Door - B14144 Similar)	In respective front door. See **Fig. 64**.
Oil Quality Sensor (B62540)	Bottom rear of oil pan. See **Fig. 68**.
Outside Temperature Sensor (B21)	Left front corner of vehicle. See **Fig. 43**.
Oxygen Sensor (Before Catalytic Converter) (B62101)	Right side of engine. See **Fig. 65**.
Oxygen Sensor 2 (Before Catalytic Converter) (B62201)	Right side of engine. See **Fig. 65**.
Rear Acceleration Sensor (B48)	Right rear luggage compartment. See **Fig. 51**.
Ride Height Sensor (B42b)	Behind right front axle. See **Fig. 45**.
Right Front Accelerator Sensor (B41)	Front of right front wheelwell. See **Fig. 44**.
Seat Occupation Recognition (A113)	Under passenger's seat. See **Fig. 12**.
Secondary Air Hot Film Air Mass Sensor (B6206)	Right front of engine. See **Fig. 126**.
Siren W/Tilt Alarm Sensor (A14147)	Front of left front wheelwell. See **Fig. 34**.
Solar Sensor (B66)	Top center of dash. See **Fig. 125**.
Steering Torque Sensor (I01096)	On steering rack assembly. See **Fig. 135**.
Ultrasonic Sensors - Front (4)	In front bumper fascia.
Ultrasonic Sensors - Rear (4)	In rear bumper fascia.
Ventilation Temperature Sensor (B62)	On HVAC assembly. See **Fig. 52**.
Wheel Electronics - Front Left, Front Right, Rear Left & Rear Right (B43b, B47b, B45b & B44b)	On respective wheel assembly. See **Fig. 123**.
Wheel Speed Sensor - Front Right (B1) (Front Left - B2 Similar)	On respective front wheel hub assembly. See **Fig. 120**.

SOLENOIDS & SOLENOID VALVES

SOLENOIDS & SOLENOID VALVES LOCATION

Component	Location
Damper Valves (Left/Right Front, Left/Right Rear)	On respective shock absorber.
Evaporative Emission Valve (Y6120)	Left rear of engine. See **Fig. 81**.
Exhaust ANOS Solenoid Valve (Y6276)	Right front of engine. See **Fig. 58**.
Intake VANOS Solenoid Valve (Y6275)	Right front of engine. See **Fig. 42**.
Radiator Shutter Solenoid	Below center of front grille.
Retractable Hardtop Valve 1 (I01254)	Behind battery. See **Fig. 71**.
Retractable Hardtop Valve 2 (I01255)	Behind battery. See **Fig. 72**.
Retractable Hardtop Valve 3 (I01256)	Behind battery. See **Fig. 73**.
Servotronic Valve (B15a)	Right front of engine. See **Fig. 40**.

SWITCHES

SWITCHES LOCATION

Component	Location
Air Distribution Microswitch (Y715)	Under left side of dash.
Brake Fluid Level Switch (B18a)	On brake fluid reservoir. See **Fig. 41**.
Brake Light Switch	On brake pedal bracket.
Coolant Level Switch	Right front of engine.
Hood Contact Switch	Right front of engine compartment.
Micro Switches 4.1 (I01200) & 4.2 (I01201)	On convertible top unlocking motor. See **Fig. 136**.
Microswitch - Roof Package Down (I01240)	Right side of convertible roof compartment. See **Fig. 138**.
Microswitch - Roof Shell 2 Closed (Left) (I01242)	Left roof shell 2 hinge. See **Fig. 140**.
Microswitch - Roof Shell 2 Closed (Right) (I01241)	Right roof shell 2 hinge. See **Fig. 139**.
Oil Pressure Switch (B6231)	Rear of engine. See **Fig. 49**.
Park/Neutral Position Switch	On gear selector.
Washer Fluid Level Switch (S136a)	On washer fluid reservoir. See **Fig. 142**.

MISCELLANEOUS

MISCELLANEOUS LOCATION

Component	Location
Active Cruise Control (A114a)	Under right front grille. See **Fig. 13**.
Amplifier (A18)	Rear luggage compartment. See **Fig. 5**.
Blower Output Stage	Center right of dash.
Bluetooth Antenna	Under left end of dash.
Digital Tuner Antenna (I01260)	Center front of roof. See **Fig. 74**.
Digital Tuner II Antenna (I01261)	Right end of rear bumper. See **Fig. 75**.
Electric Steering Lock	Under steering column.
Emergency Antenna	Center console.
Exhaust Flap	Left rear of engine compartment.
Fender Aerial (Rear)	Center of rear bumper.
Generator - Driver Belt Tensioner (G12) & Passenger Belt Tensioner (G13)	Under respective front seat. See **Fig. 132**.
Generator - Driver Knee Airbag (G30a)	Under left side of dash. See **Fig. 133**.
Generator - Passenger Knee Airbag (G31a)	Under right side of dash. See **Fig. 134**.
Generators - Driver's Airbag (G5)	In steering wheel. See **Fig. 130**.
Generators - Passenger Airbag (G6)	Right side of dash. See **Fig. 131**.
GPS Antenna	Center of headliner.
Heated Spray Nozzles - Left (E51a) & Right (E52a)	Rear of engine hood. See **Fig. 129**.
Horn (H2c)	Left front corner of engine compartment. See **Fig. 43**.
Horn 2 (H3c)	Left front corner of engine compartment. See **Fig. 43**.

Inner Antenna	Front center console.
Interference Suppression Capacitor (Ignition Coil) (I01046)	Top left of engine. See **Fig. 70**.
Jump Start Terminal Point (G6430)	Left rear of engine compartment. See **Fig. 69**.
Radiator Shutter Drive Unit	Center of front grille.
RDC Transmitter (Left Front) (B43a)	Rear of left front wheelwell. See **Fig. 46**.
RDC Transmitter (Left Rear) (B45a)	Rear of left rear wheelwell. See **Fig. 48**.
RDC Transmitter (Right Front) (B47a)	Rear of right front wheelwell. See **Fig. 50**.
RDC Transmitter (Right Rear) (B44a)	Rear of right rear wheelwell. See **Fig. 47**.
Satellite Receiver (N47)	Left rear of luggage compartment. See **Fig. 80**.
VICS Antenna (A460)	Center of headliner. See **Fig. 25**.

CONNECTORS

CONNECTORS LOCATION

Component	Location
X609 (Black, 15 Pin)	Center of luggage compartment. See **Fig. 107**.
X624 (Black, 6 Pin)	Passenger's door. See **Fig. 108**.
X1265 (Black, 1 Pin)	Center of rear window. See **Fig. 105**.
X6500 (Black, 2 Pin)	Center console. See **Fig. 109**.
X6506 (Natural, 2 Pin)	Right rear of engine compartment. See **Fig. 110**.
X10497 (Blue, 6 Pin)	Right side of luggage compartment. See **Fig. 106**.

GROUNDS

GROUNDS LOCATION

Component	Location
X164	Below left front strut tower. See **Fig. 84**.
X166	Below right front strut tower. See **Fig. 85**.
X170	Below left front strut tower. See **Fig. 84**.
X173	Front of left footwell. See **Fig. 83**.
X217	Front of left footwell. See **Fig. 83**.
X219	Right kick panel. See **Fig. 89**.
X490	Right kick panel. See **Fig. 82**.
X498	Right front of luggage compartment. See **Fig. 90**.
X1091	Below steering column. See **Fig. 86**.
X1108	Front of left footwell. See **Fig. 83**.
X1441	Right front of center console. See **Fig. 96**.
X1703	Below left front strut tower. See **Fig. 84**.
X3313	Left front of luggage compartment. See **Fig. 91**.
X5991	Right front of luggage lid. See **Fig. 92**.

X5992	Right front of luggage lid. See **Fig. 92**.
X6176	Top right side of engine. See **Fig. 95**.
X6454	Left rear of engine compartment. See **Fig. 94**.
X6478	Center right of dash. See **Fig. 93**.
X10012	Right kick panel. See **Fig. 82**.
X10237	Center right of dash. See **Fig. 87**.
X13016	Left front of luggage compartment. See **Fig. 88**.

SPLICES

SPLICES LOCATION

Component	Location
X181	Left kick panel. See **Fig. 99**.
X1019	Left kick panel. See **Fig. 99**.
X1179	Center right of dash. See **Fig. 102**.
X1362	Under left end of dash. See **Fig. 103**.
X1991	Center of dash. See **Fig. 104**.
X1992	Center of dash. See **Fig. 104**.
X6038	Left rear of engine compartment. See **Fig. 98**.
X6356	Left rear of engine compartment. See **Fig. 97**.
X6357	Left rear of engine compartment. See **Fig. 97**.
X19515	Front of driver's door. See **Fig. 101**.
X19516	Front of passenger's door. See **Fig. 100**.

COMPONENT LOCATION GRAPHICS

NOTE: **Figures may show multiple component locations. Refer to appropriate table for proper figure references.**

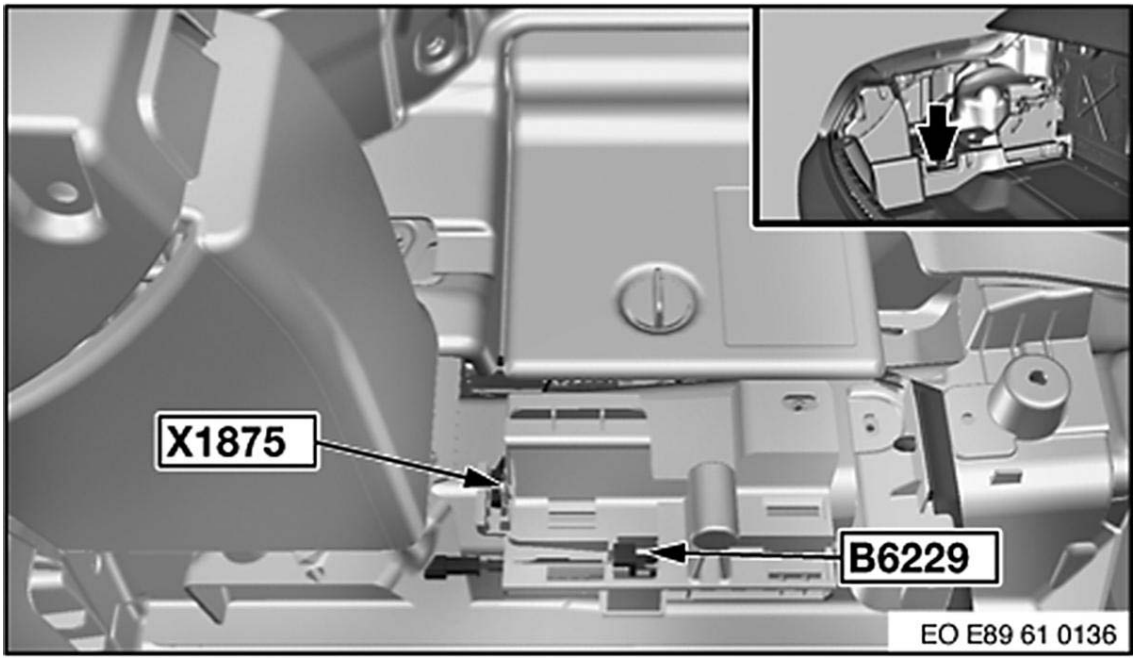


Fig. 1: Left Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

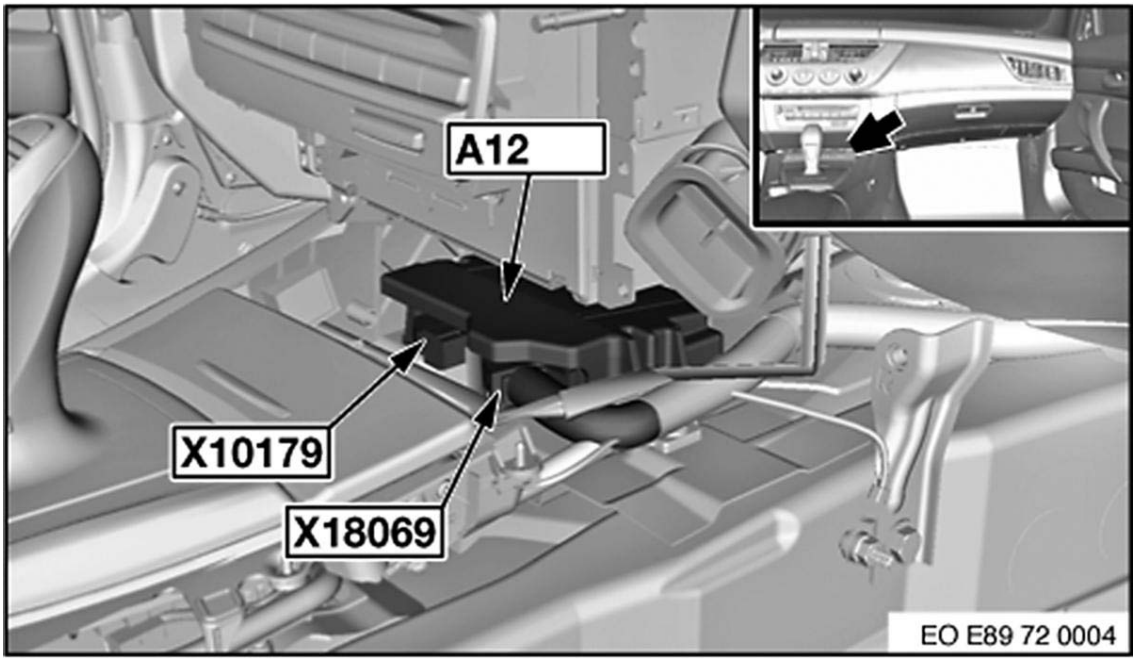


Fig. 2: Front Of Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

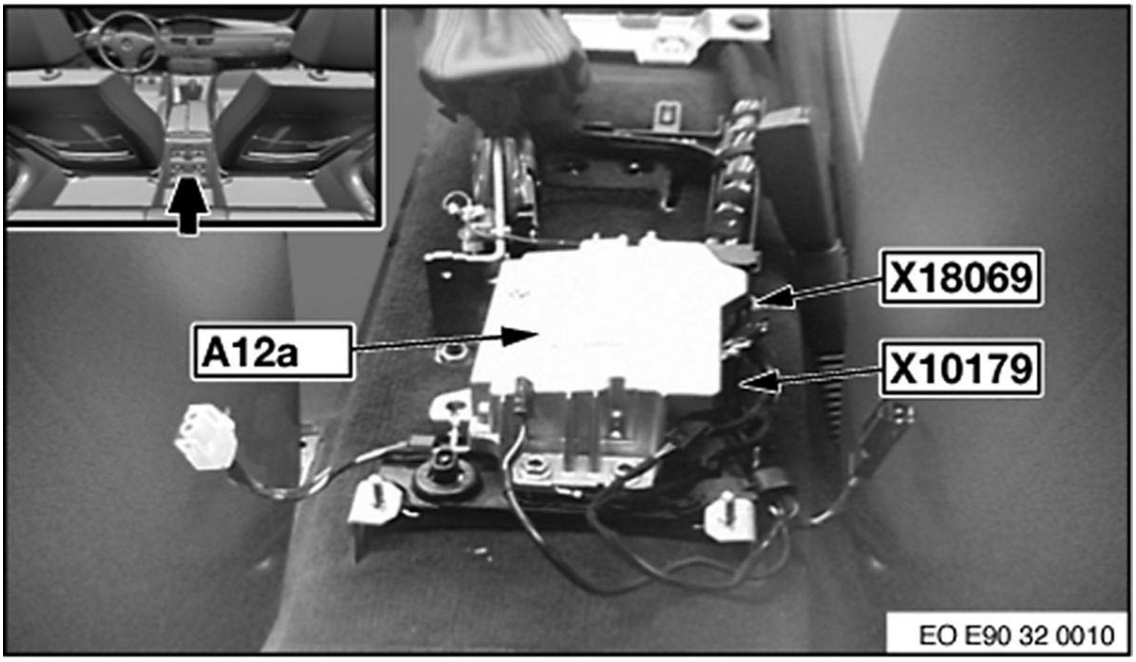


Fig. 3: Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

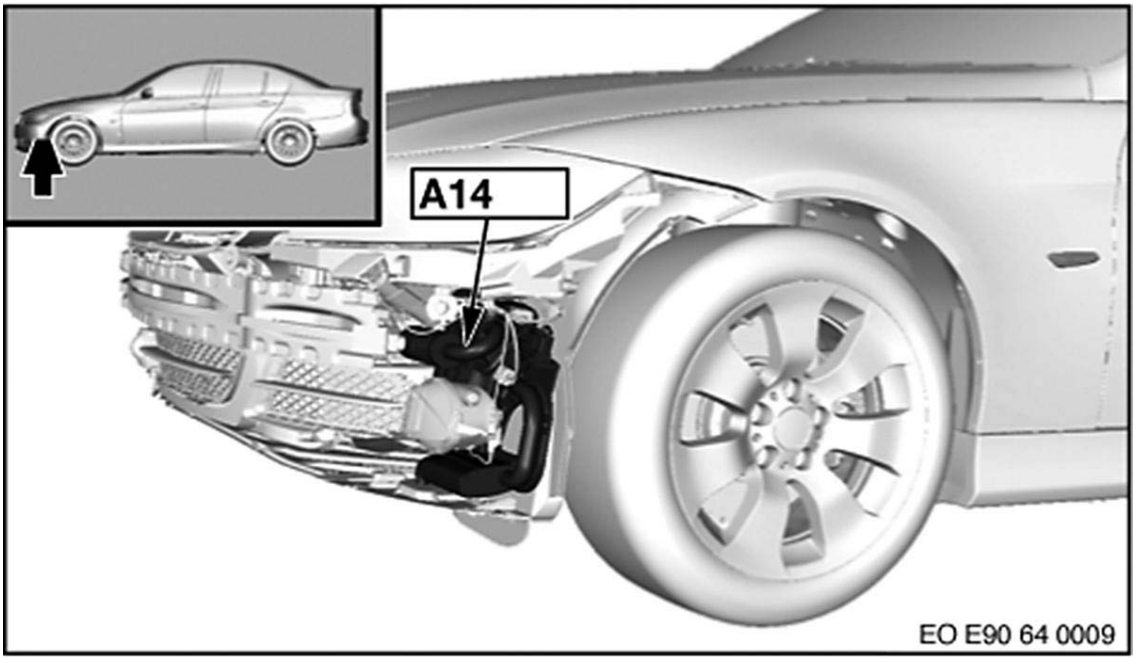


Fig. 4: Left Front Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

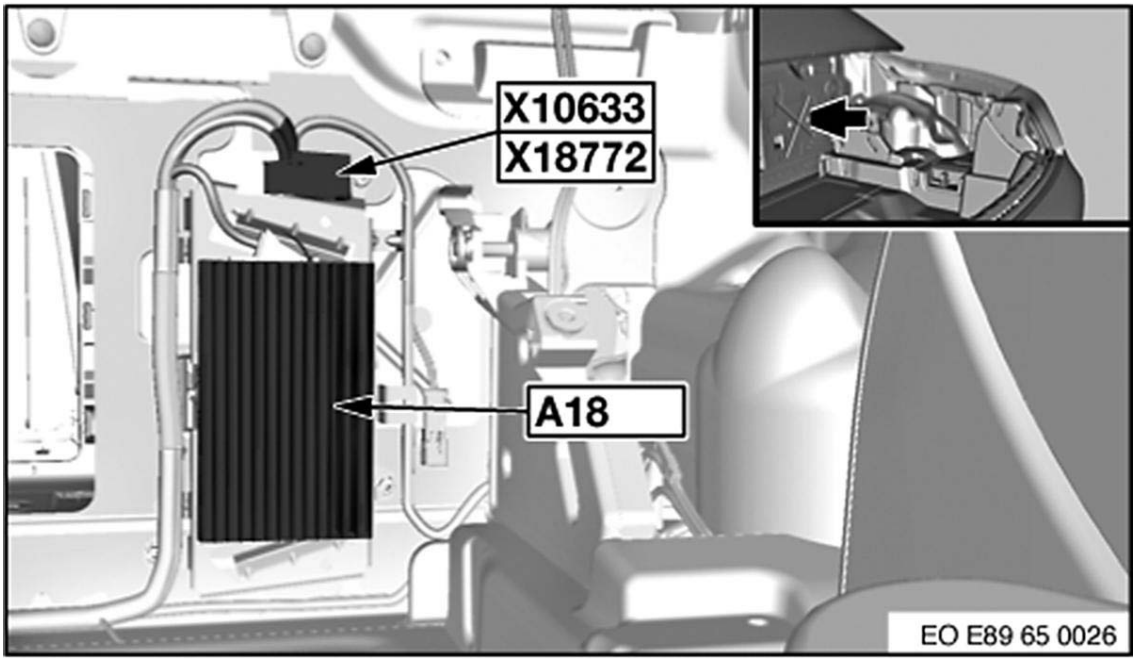


Fig. 5: Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

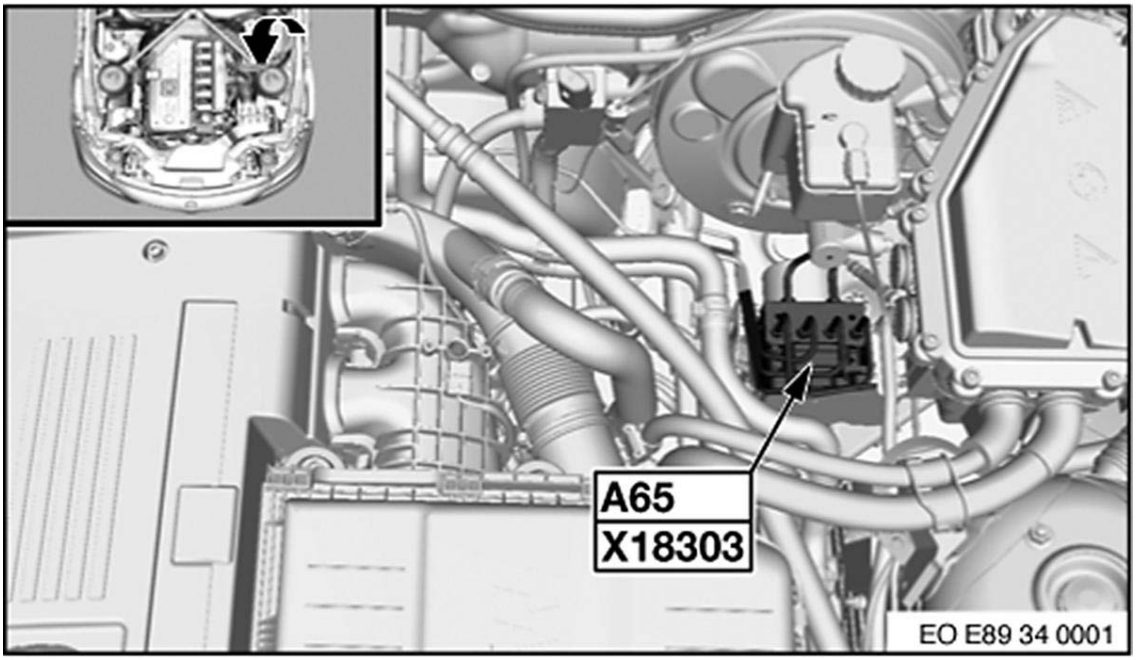


Fig. 6: Left Side Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

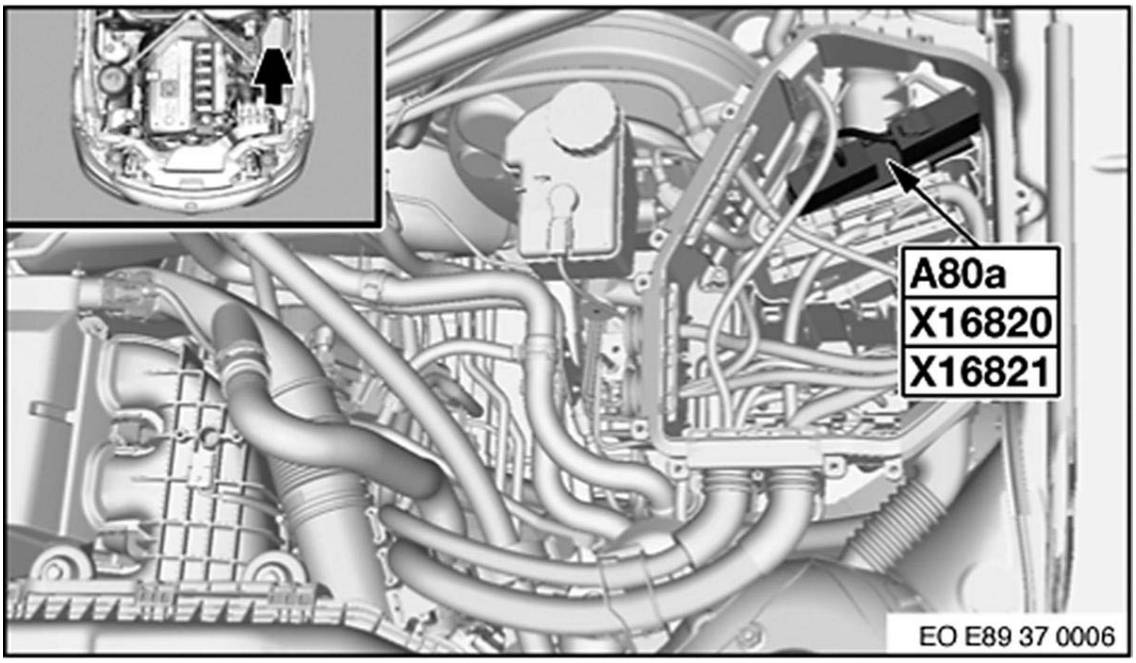


Fig. 7: Left Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

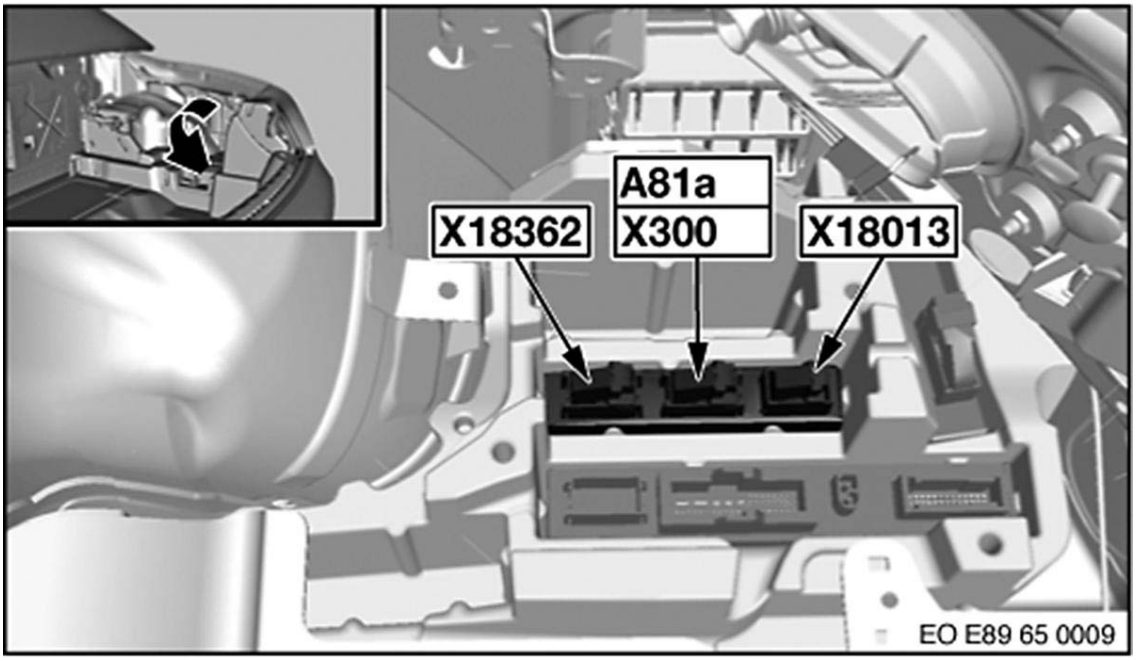


Fig. 8: Right Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

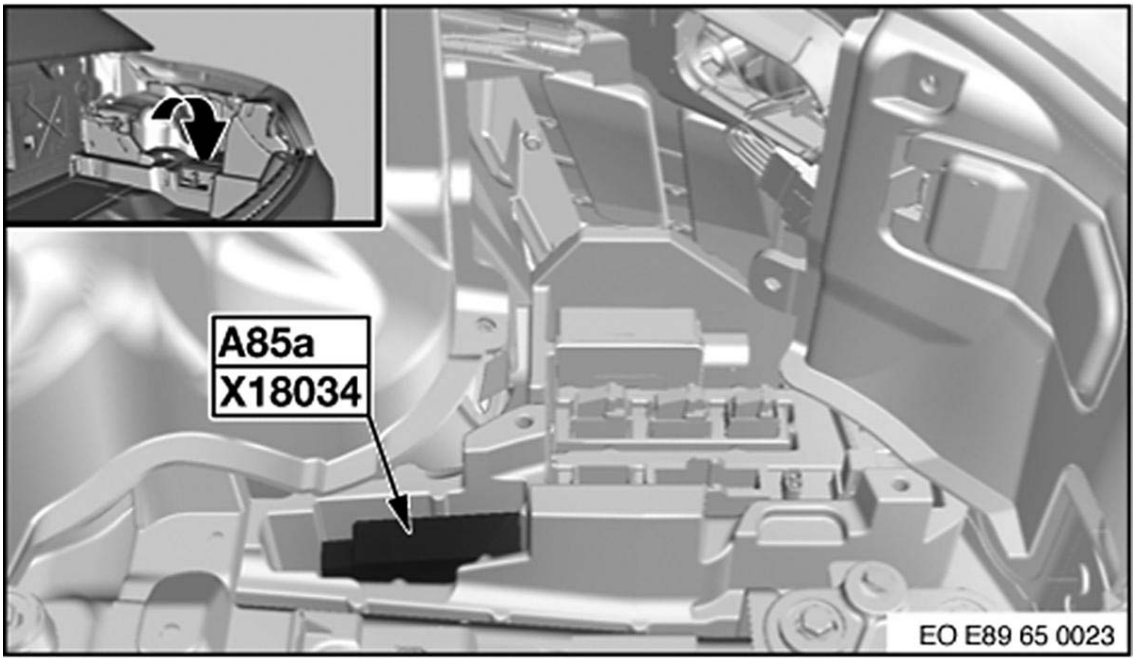


Fig. 9: Right Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

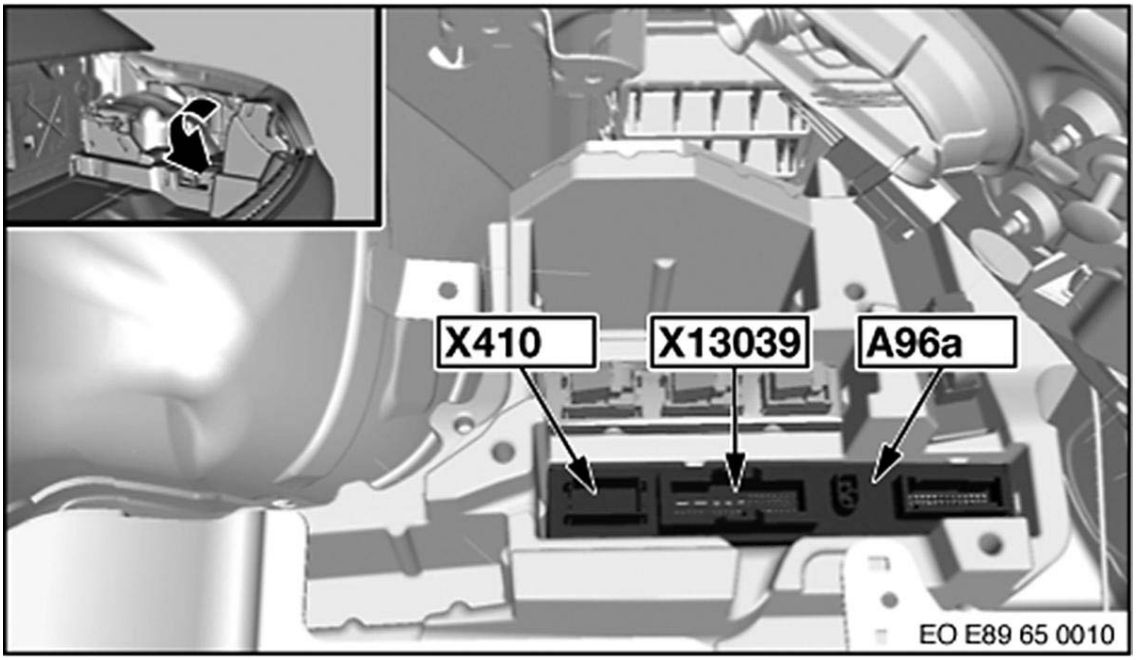


Fig. 10: Right Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

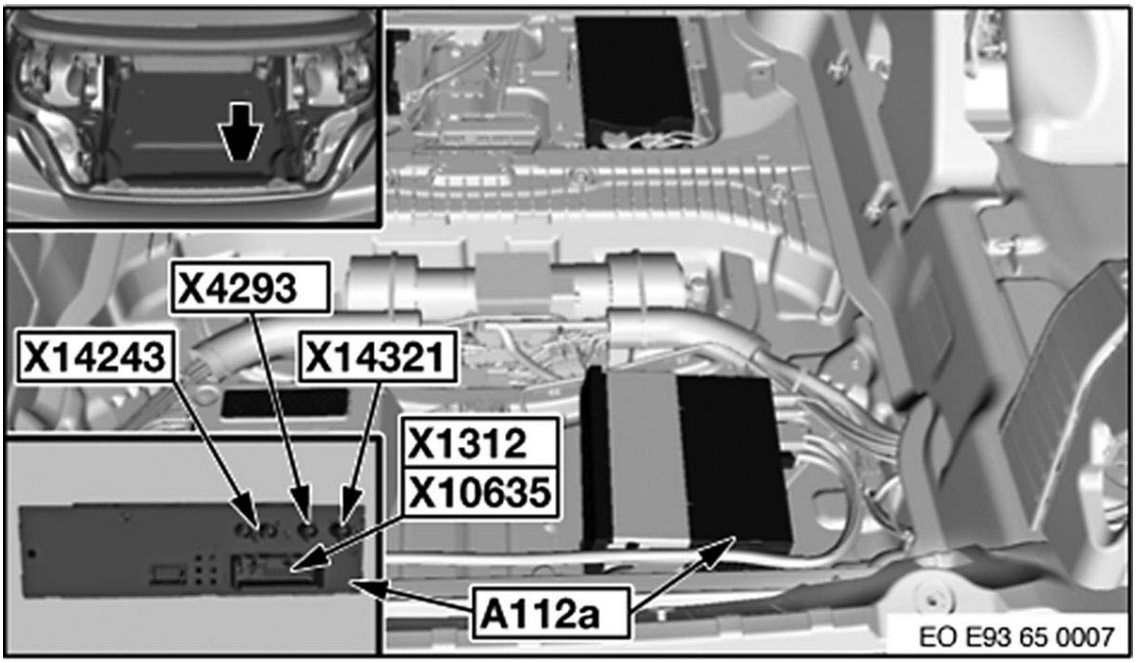


Fig. 11: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

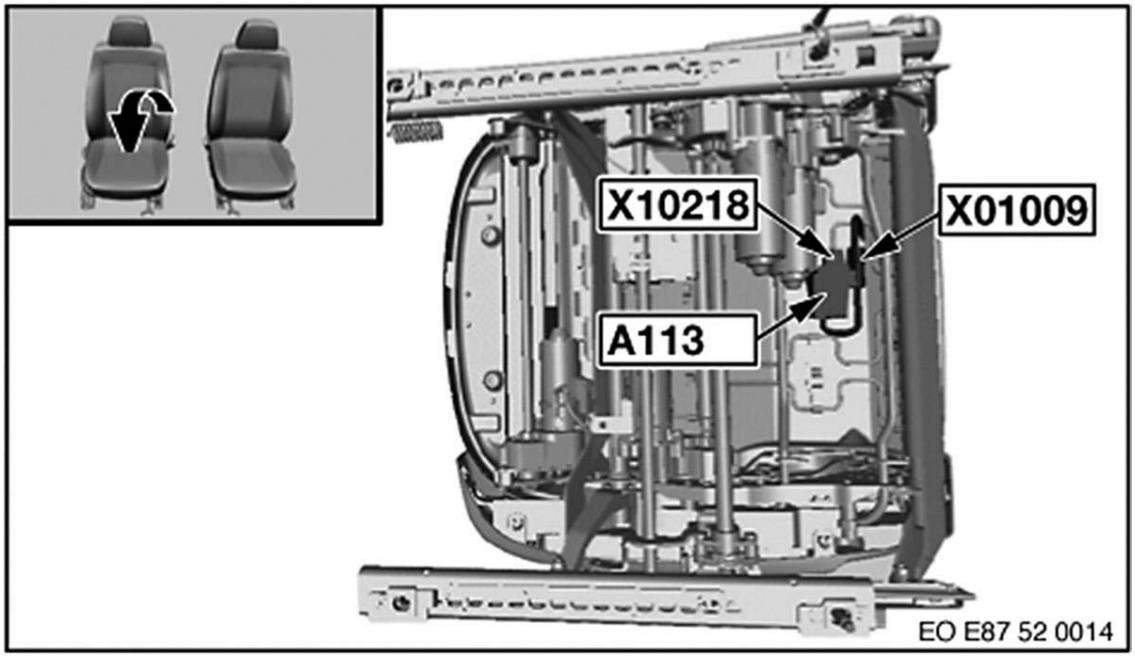


Fig. 12: Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

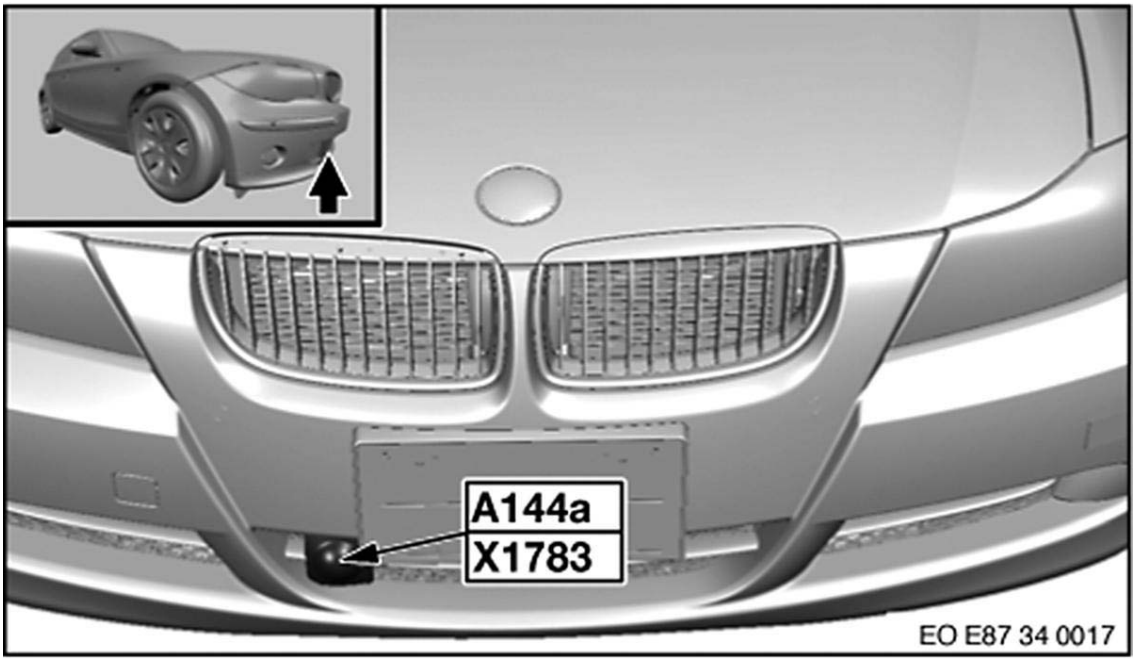


Fig. 13: Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

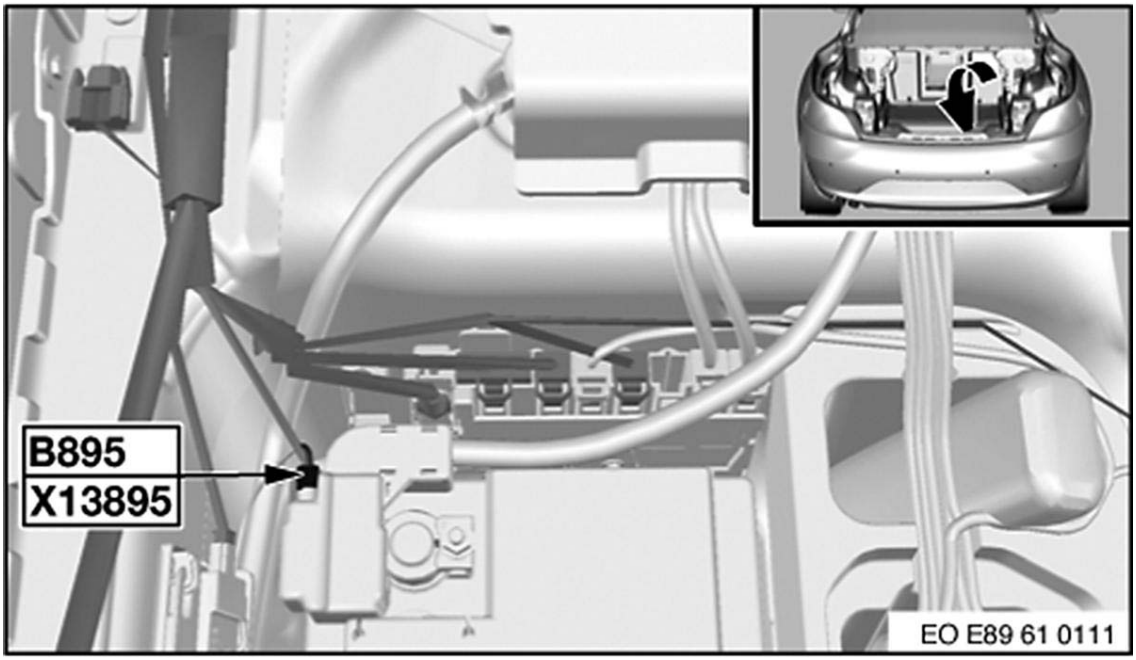


Fig. 14: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

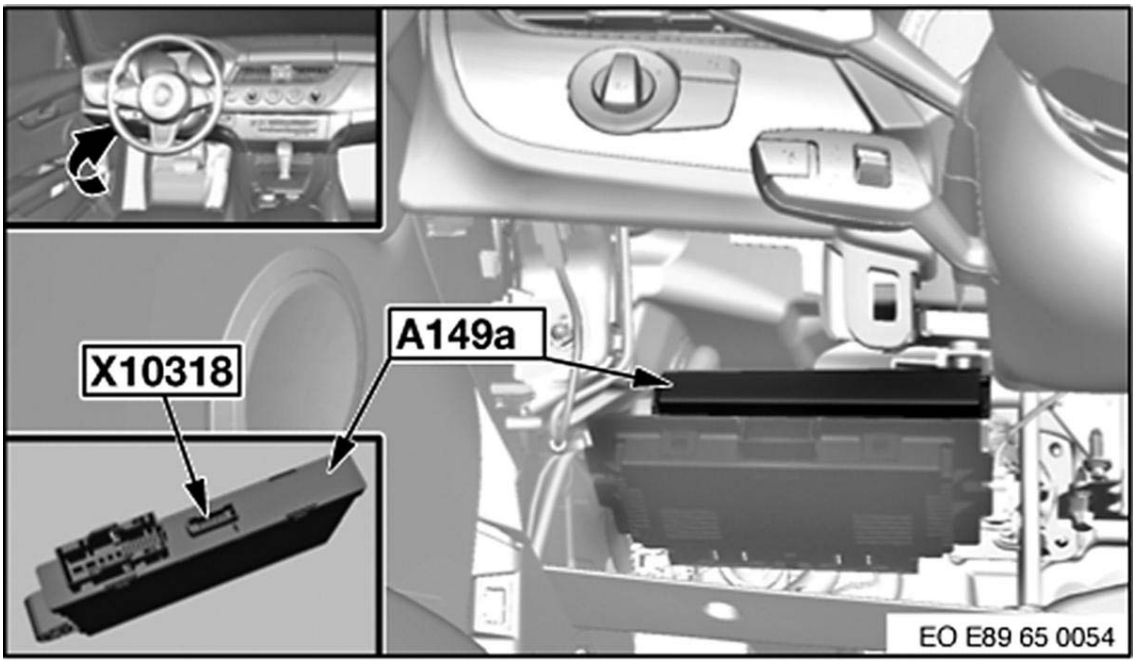


Fig. 15: Under Left Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

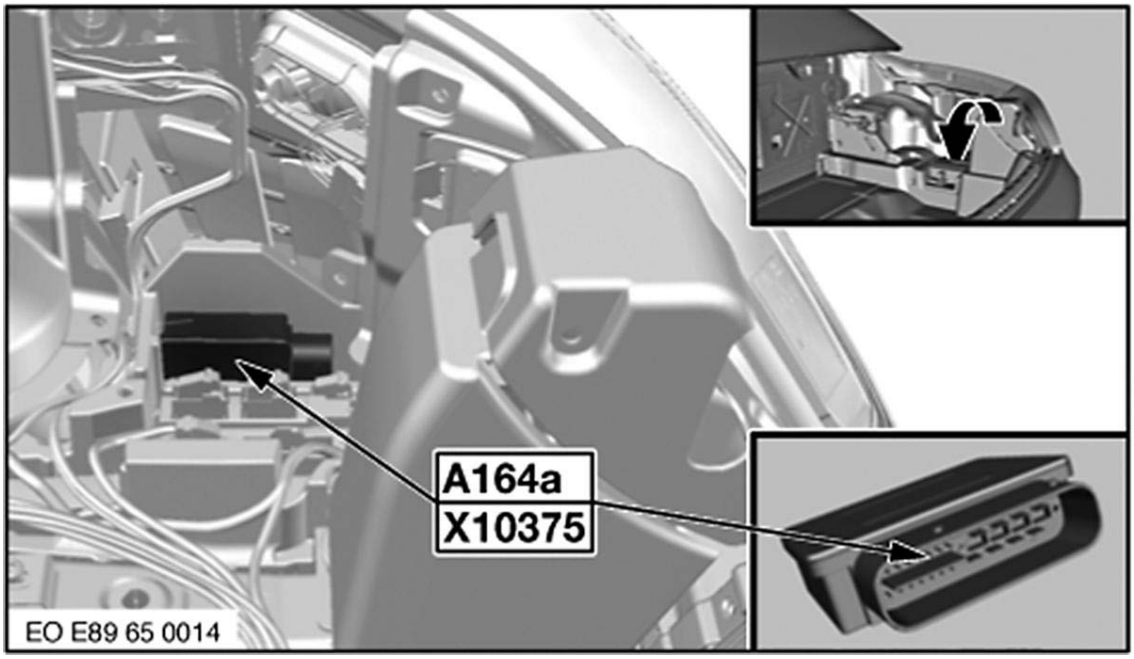


Fig. 16: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

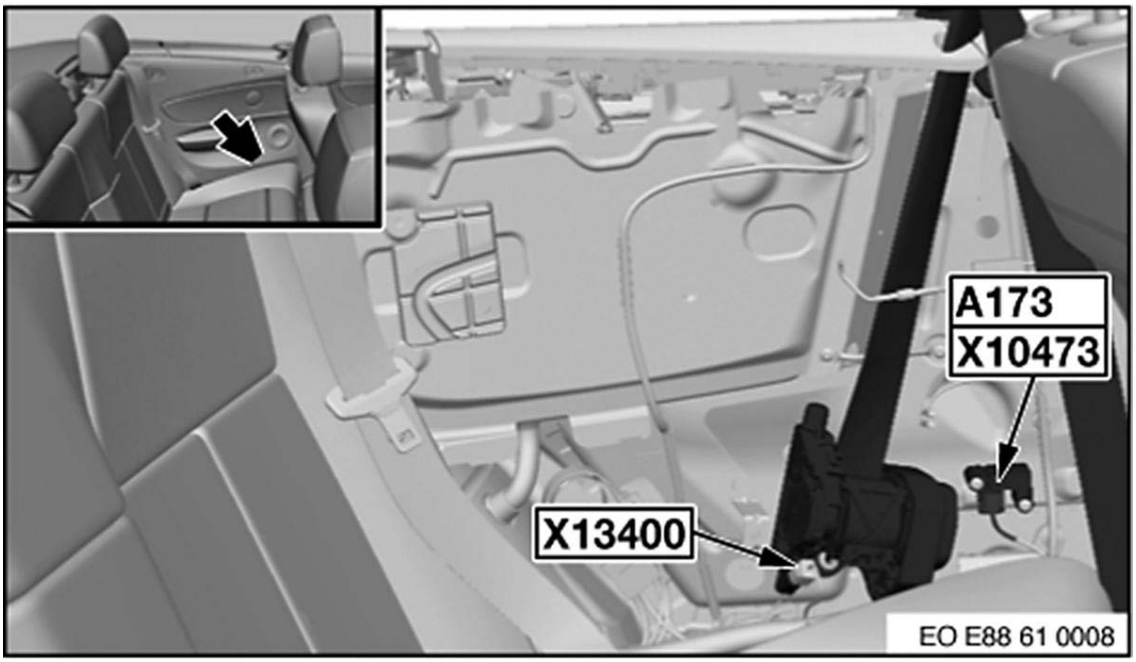


Fig. 17: Left "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

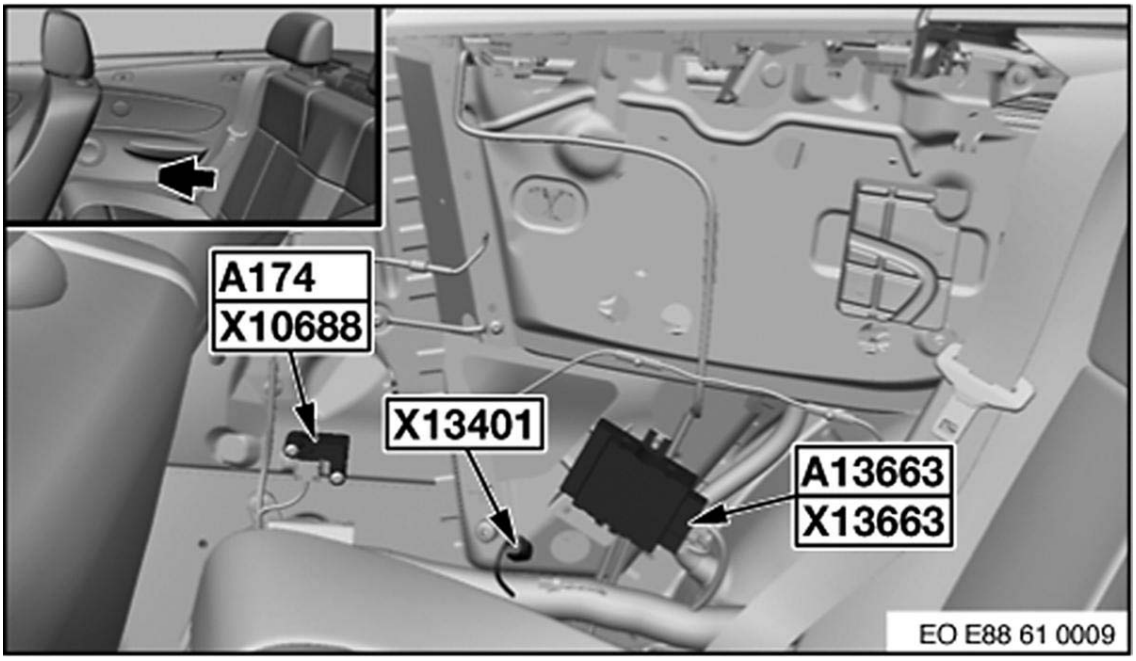


Fig. 18: Right "B" Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

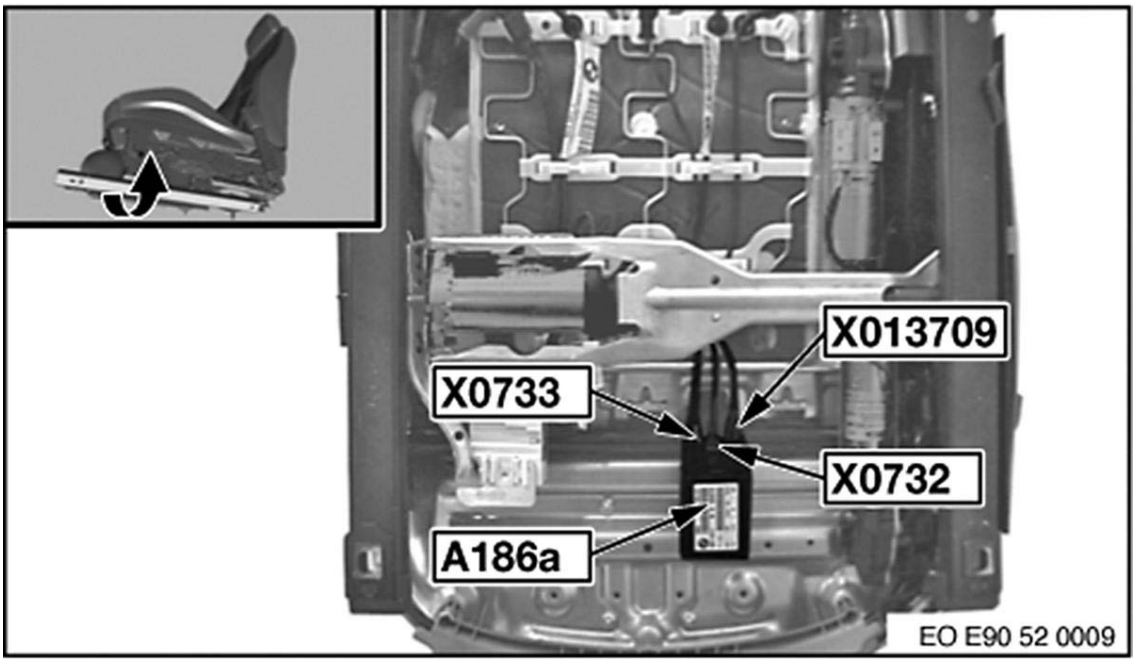


Fig. 19: Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

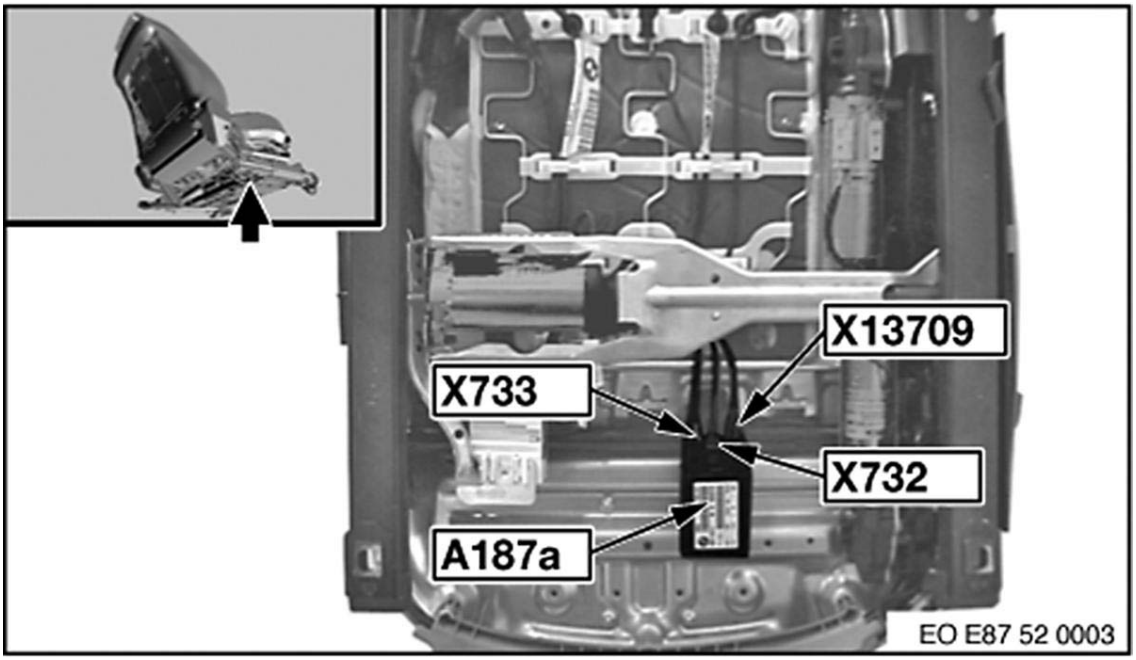


Fig. 20: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

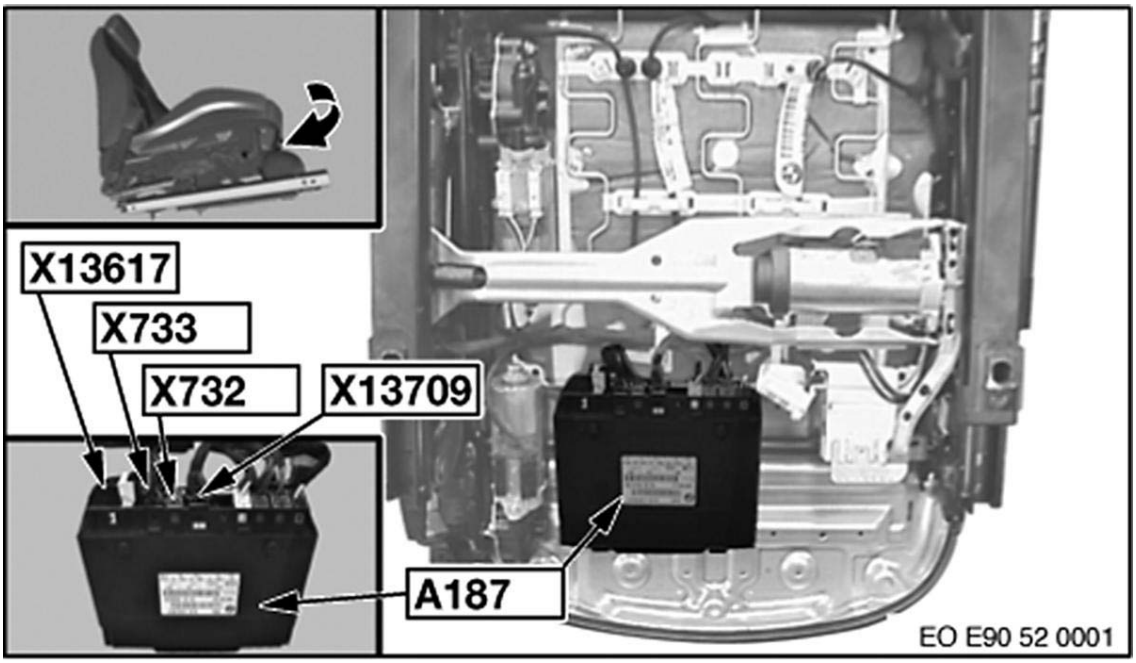


Fig. 21: Driver's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

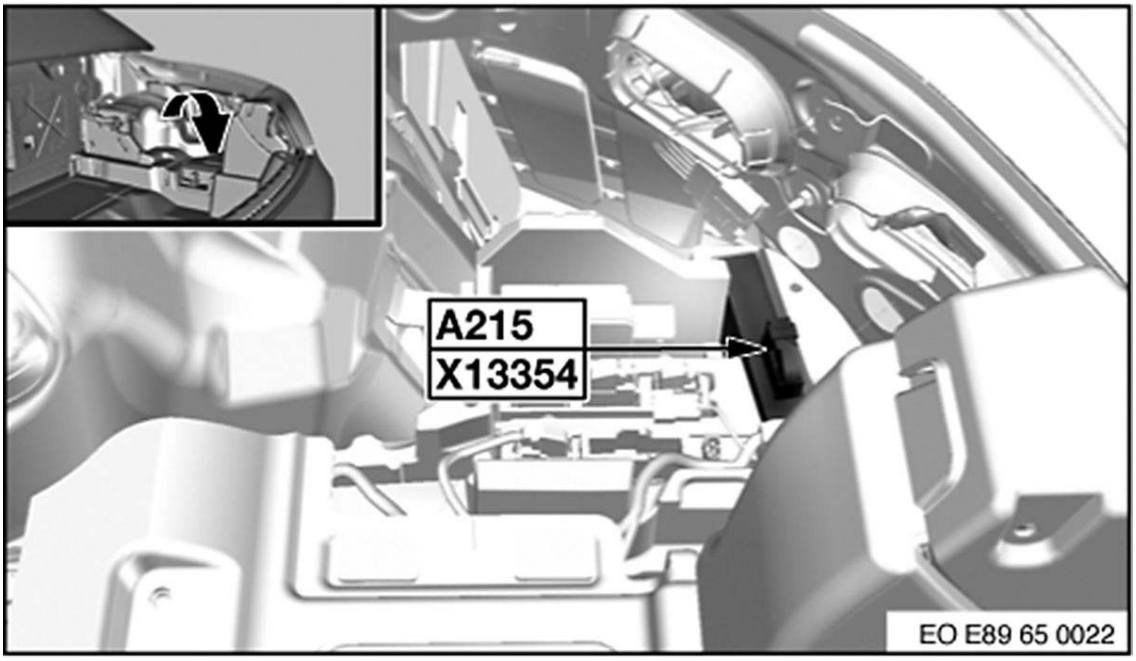


Fig. 22: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

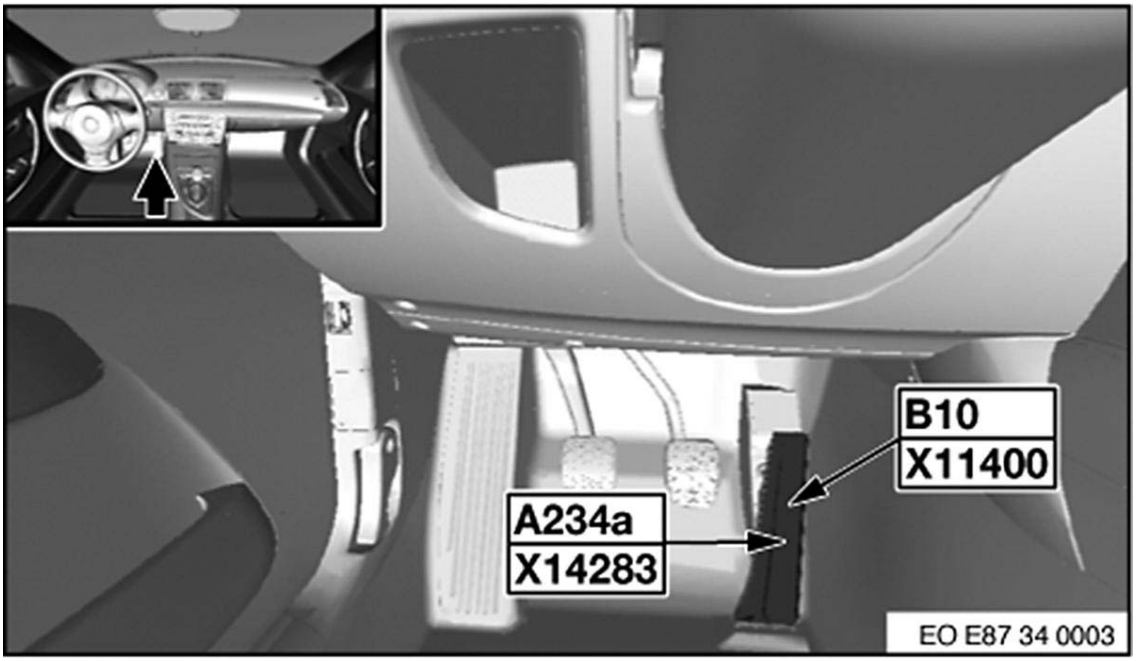


Fig. 23: Driver's Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

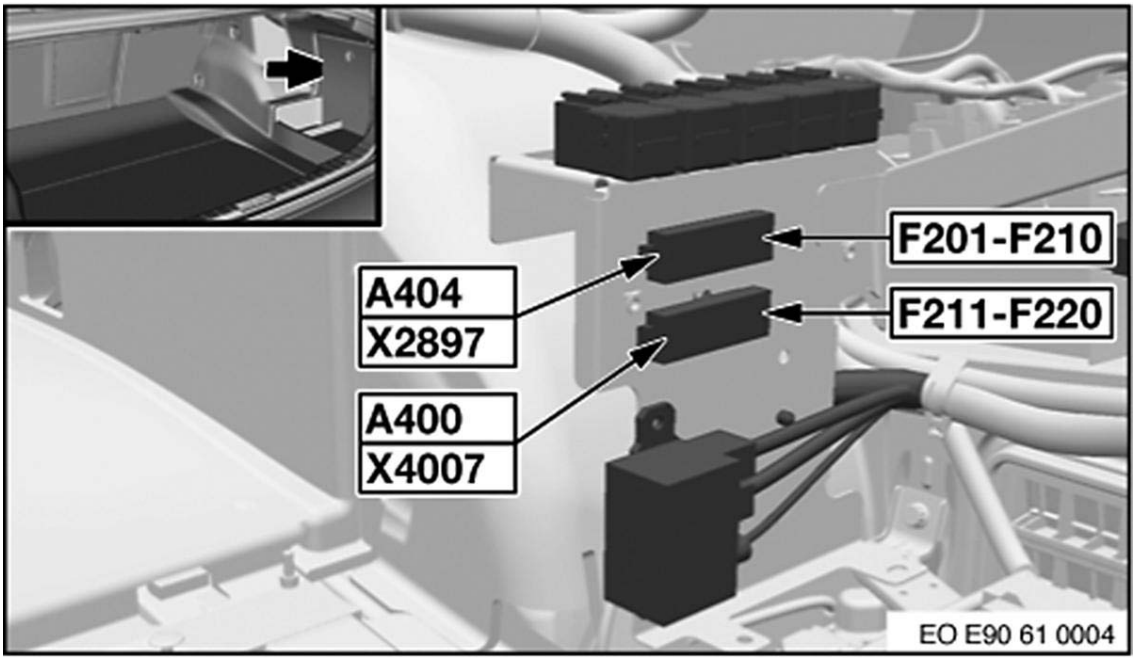


Fig. 24: Right Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

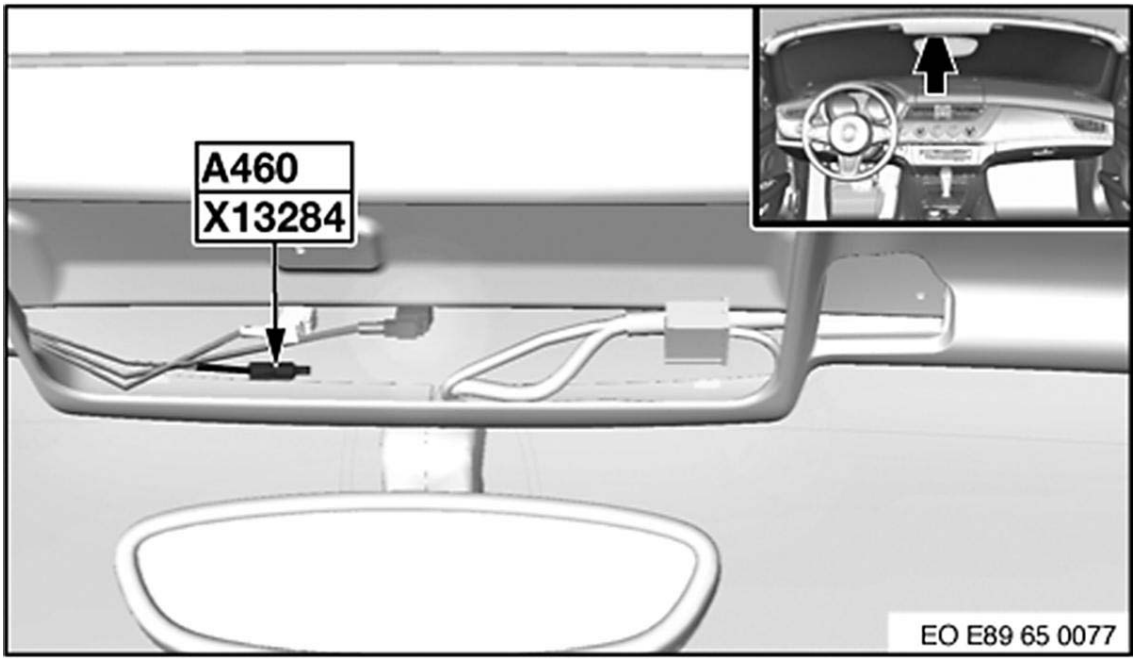


Fig. 25: Headliner
Courtesy of BMW OF NORTH AMERICA, INC.

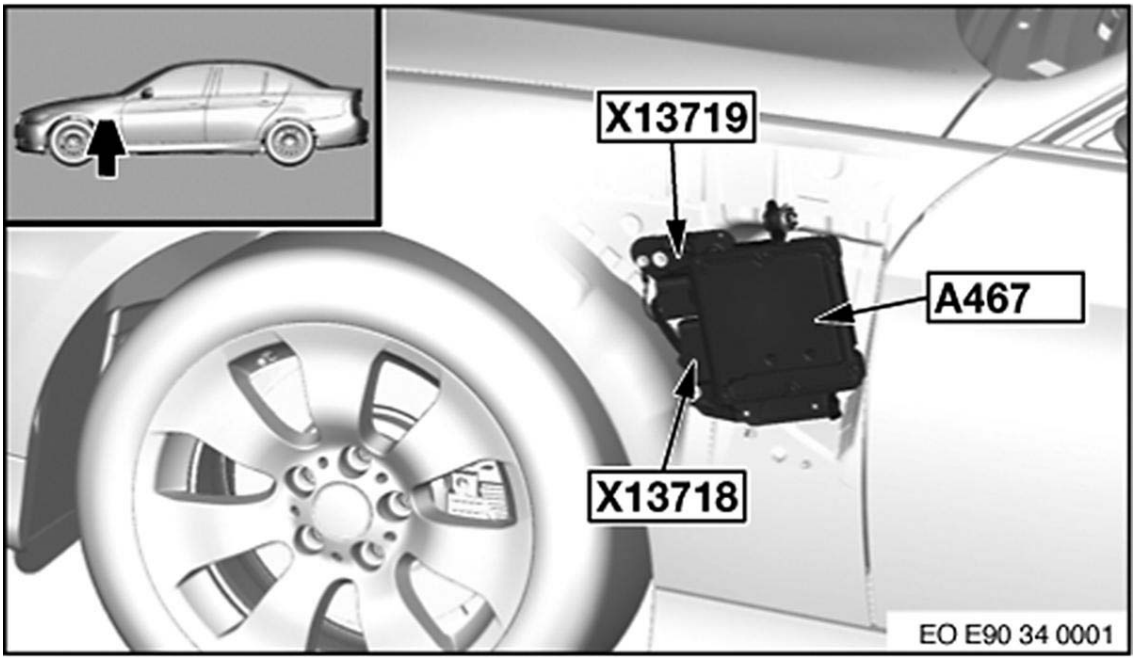


Fig. 26: Left Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

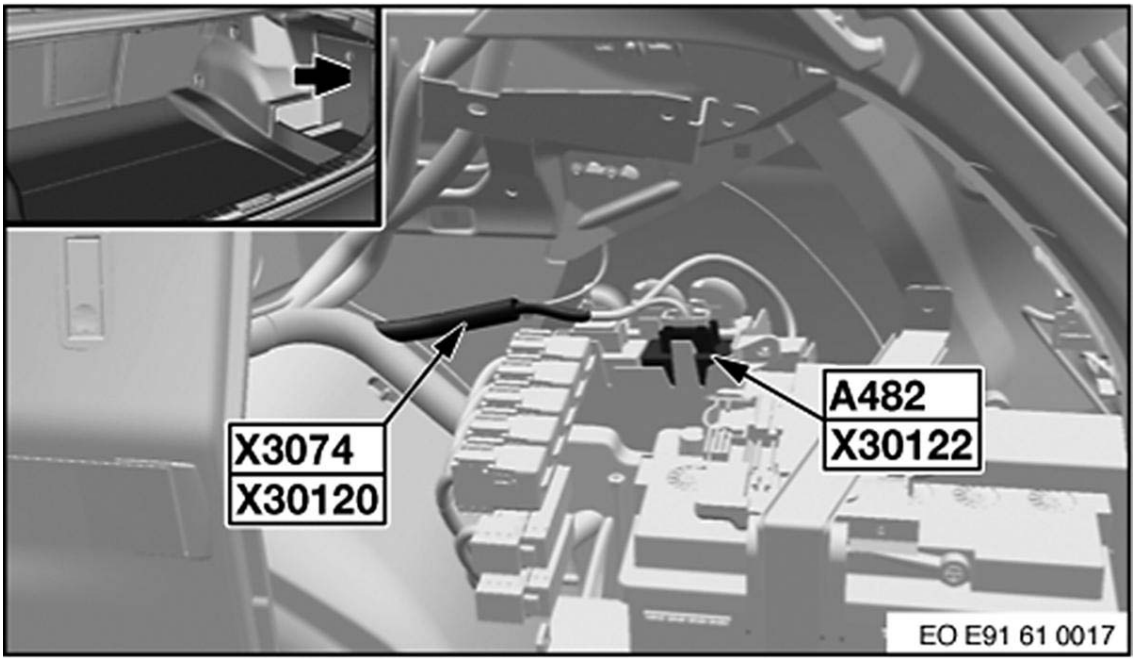


Fig. 27: Right Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

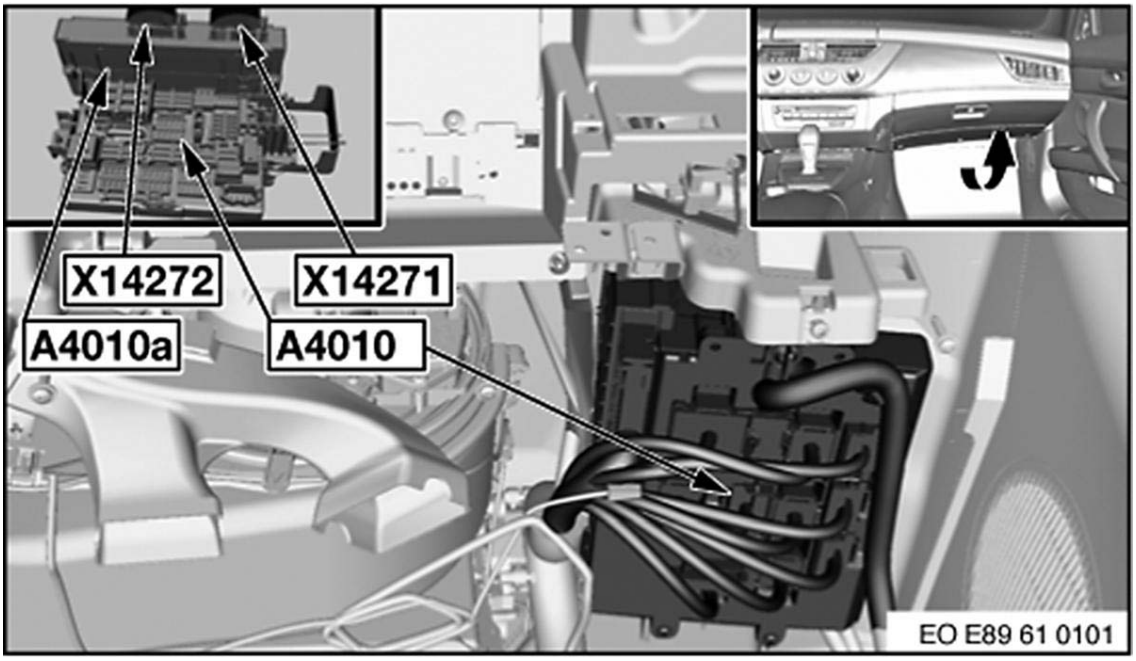


Fig. 28: Right Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

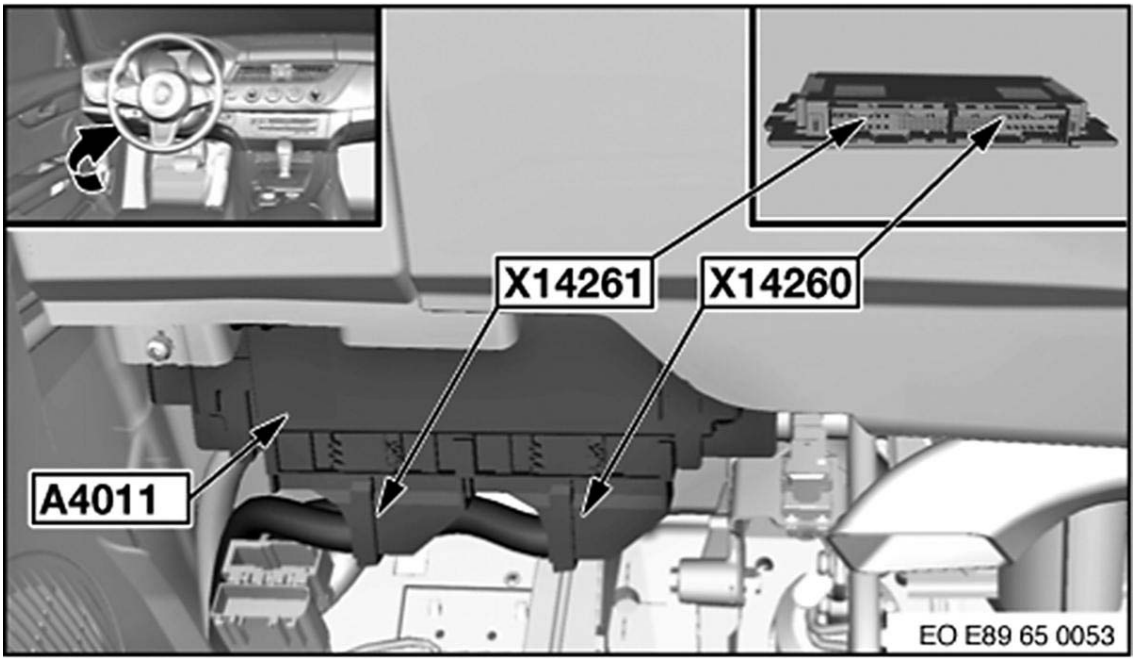


Fig. 29: Left Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

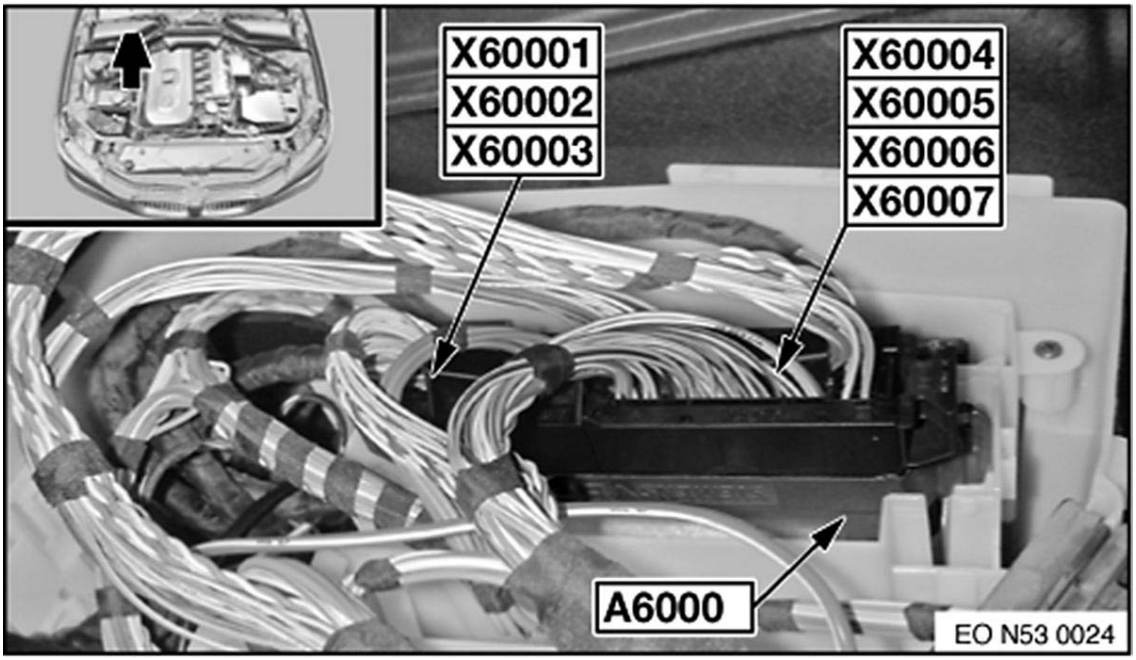


Fig. 30: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

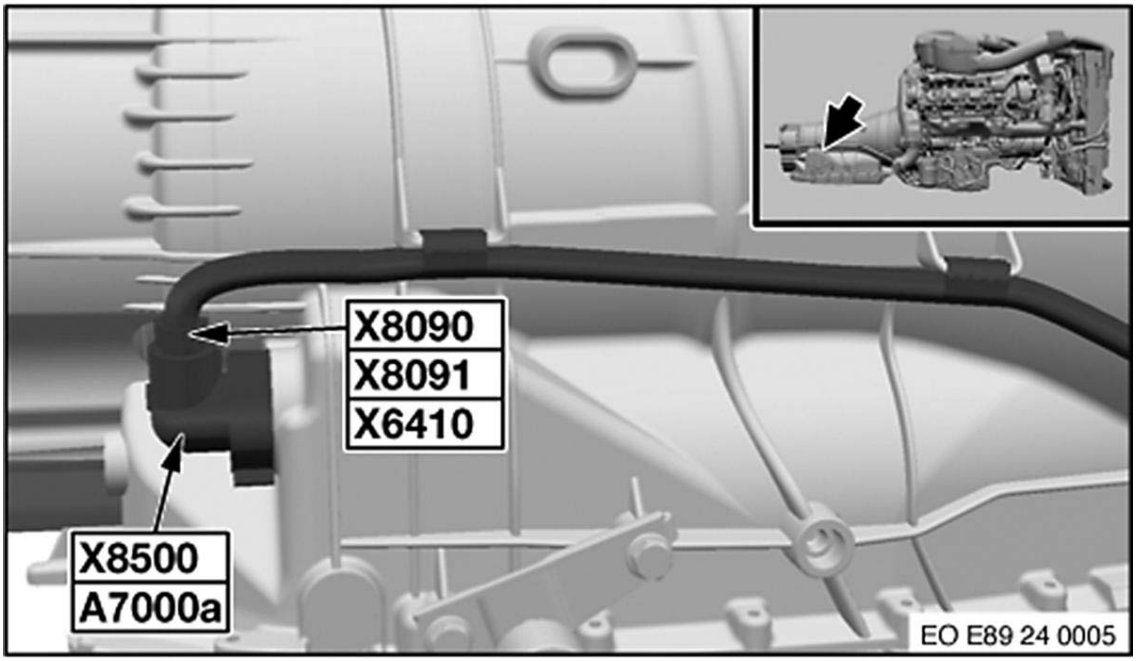


Fig. 31: Transmission Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

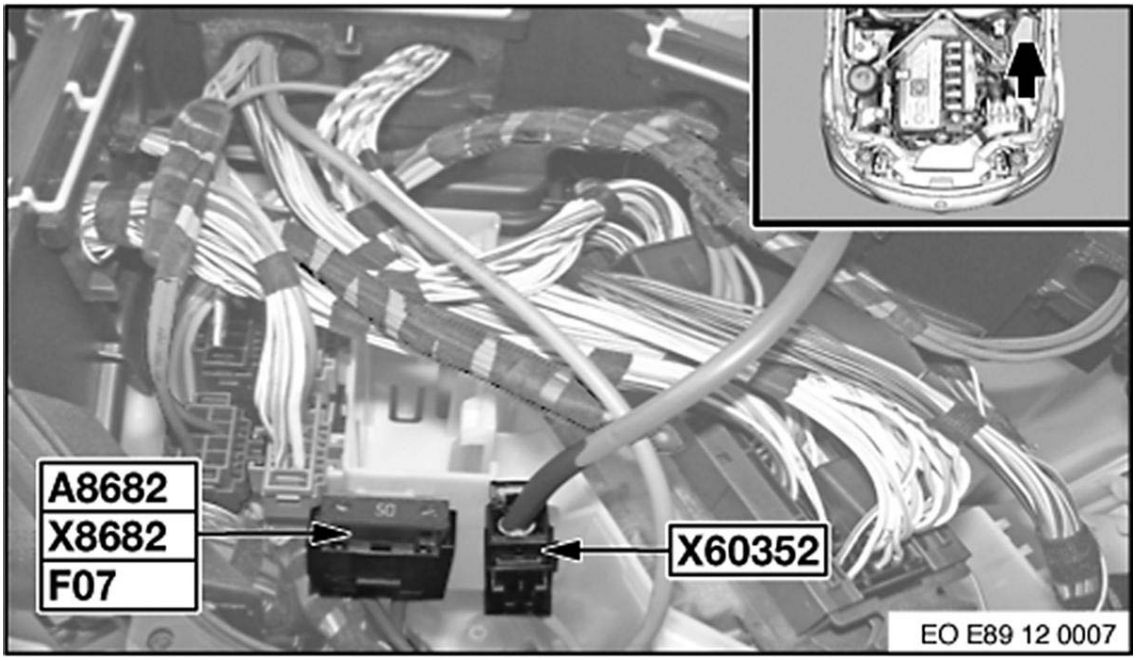


Fig. 32: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

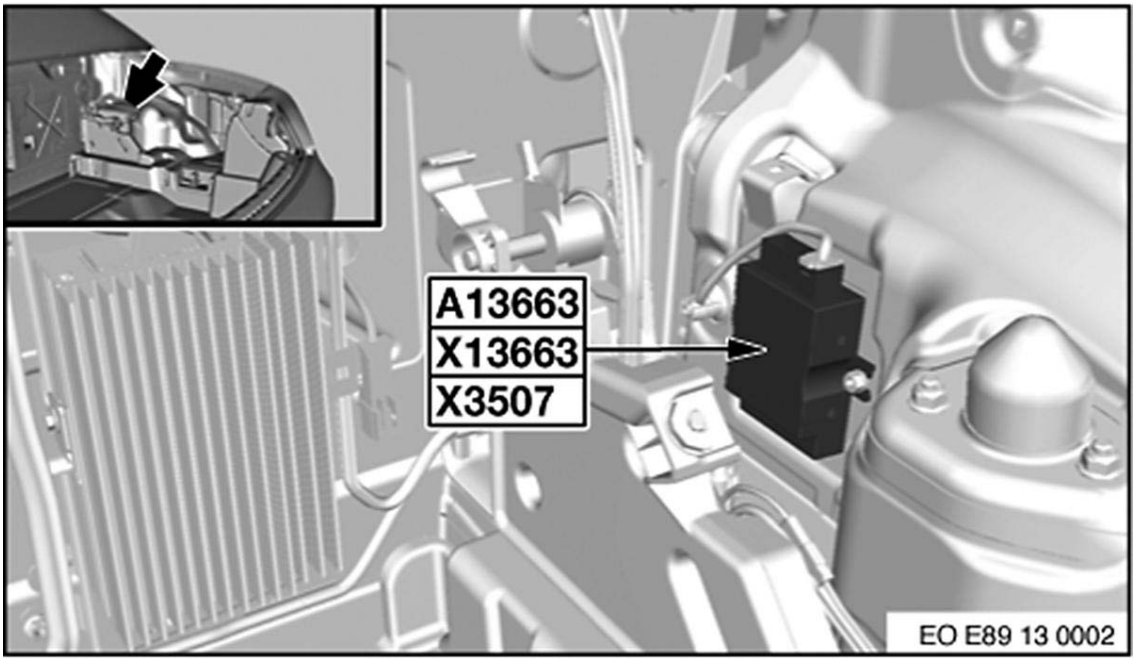


Fig. 33: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

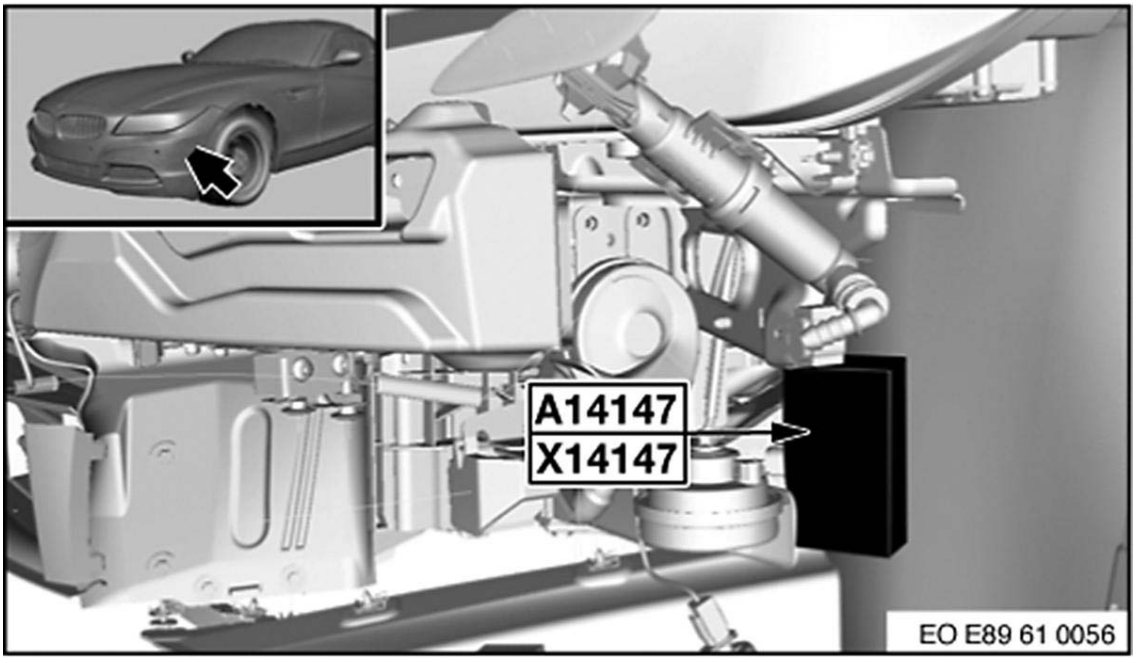


Fig. 34: Left Front Corner Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

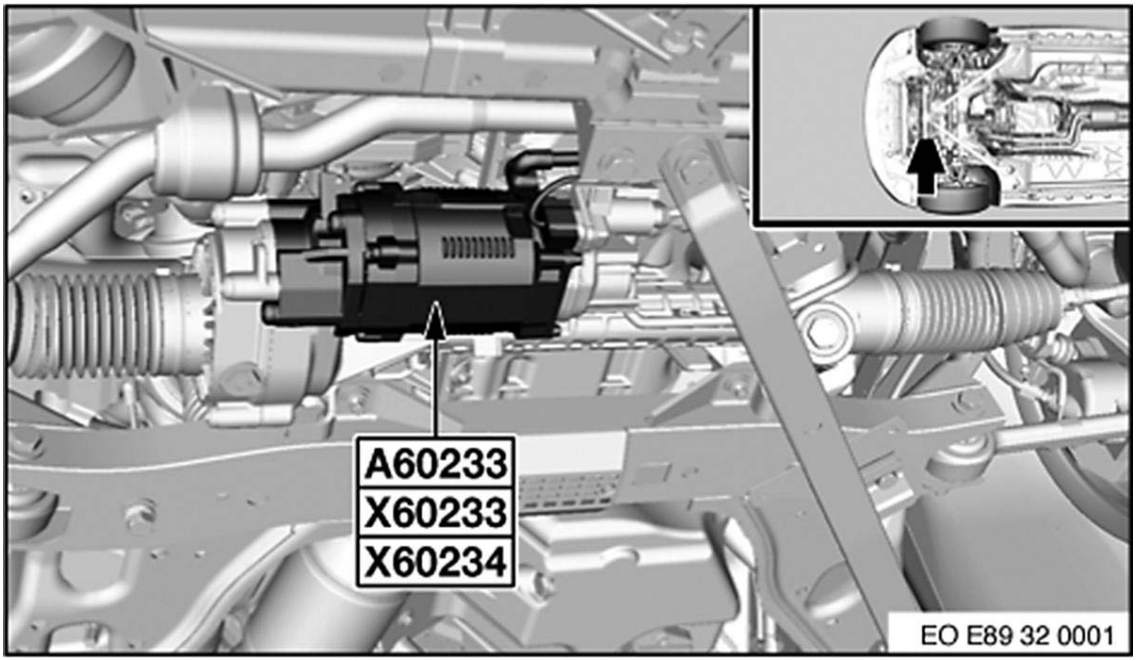


Fig. 35: Steering Rack Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

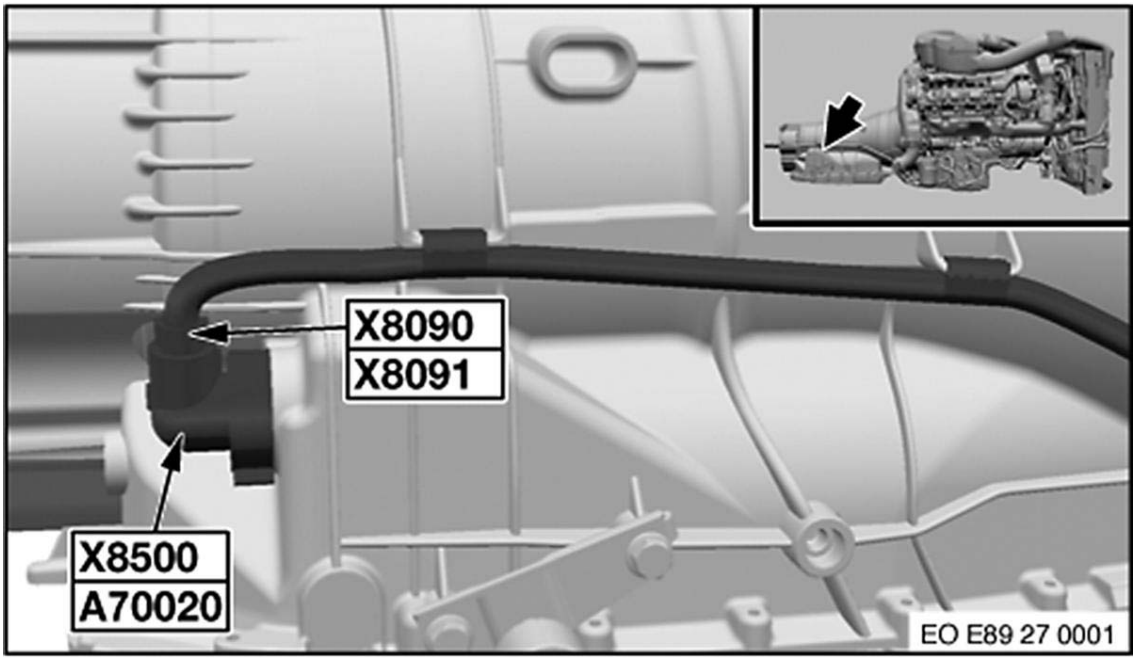


Fig. 36: Transmission Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

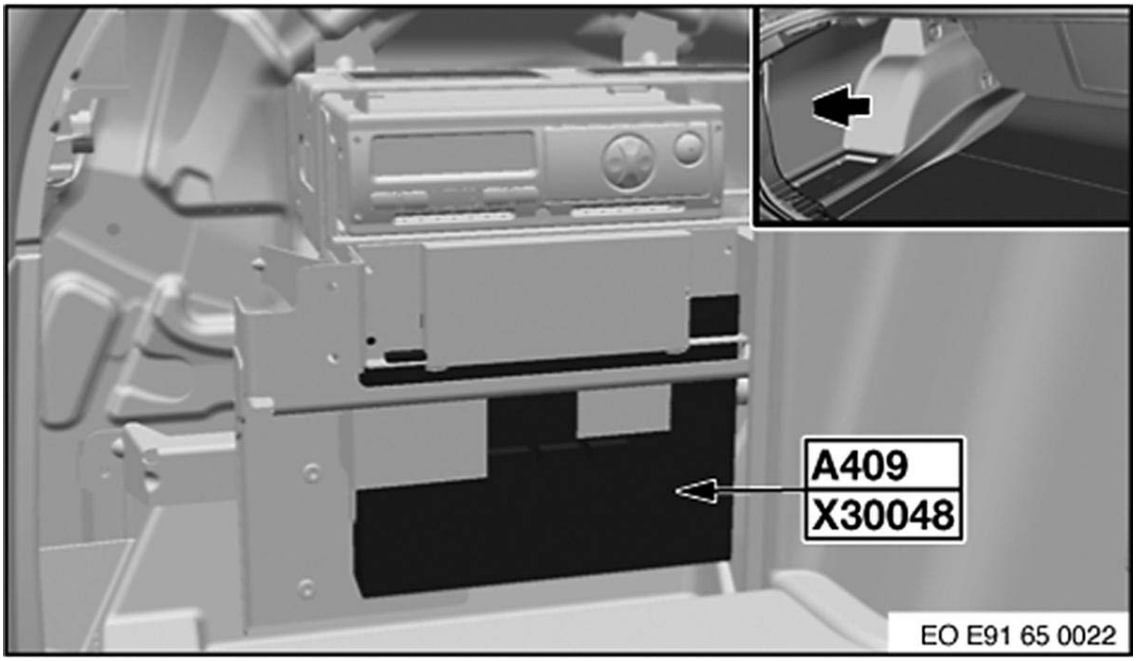


Fig. 37: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

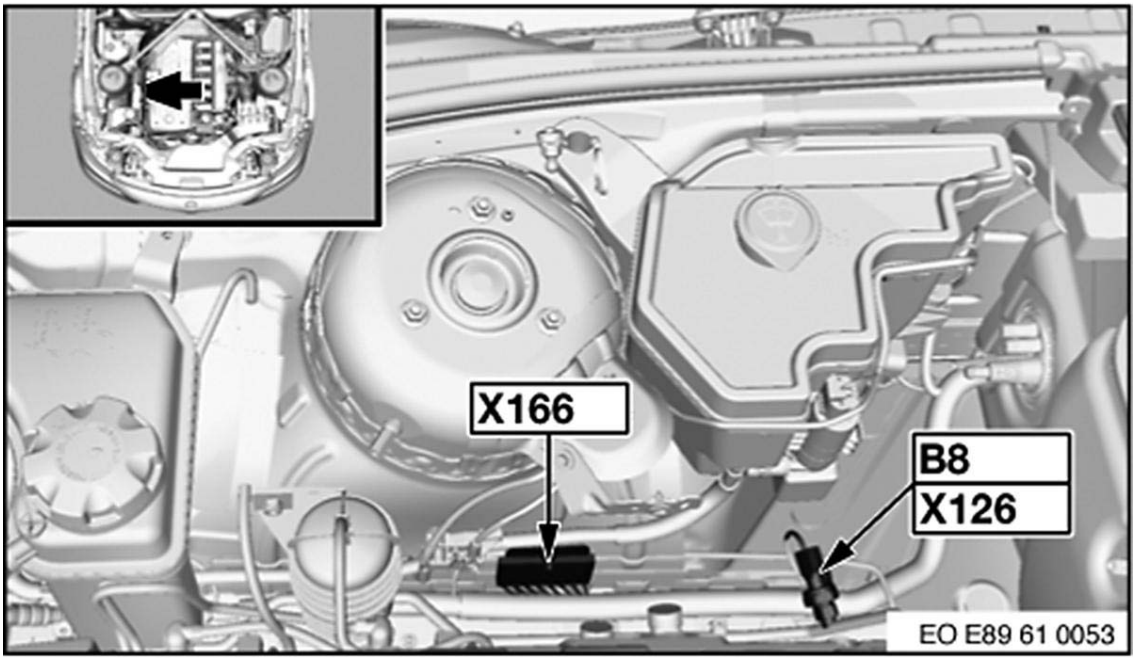


Fig. 38: Right Side Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

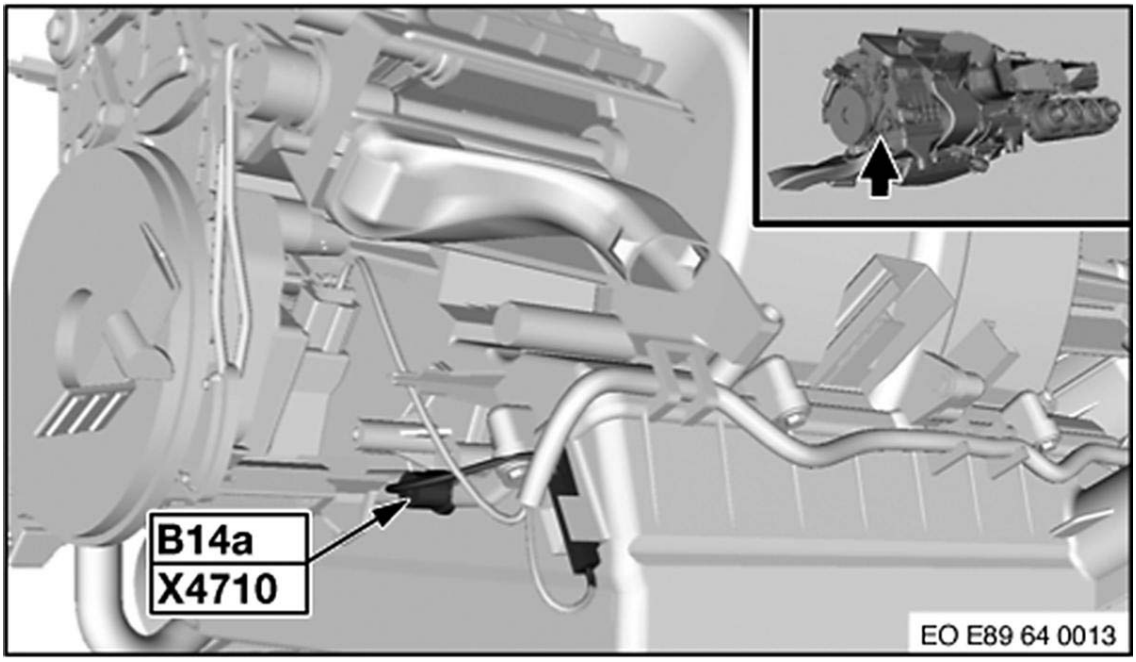


Fig. 39: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

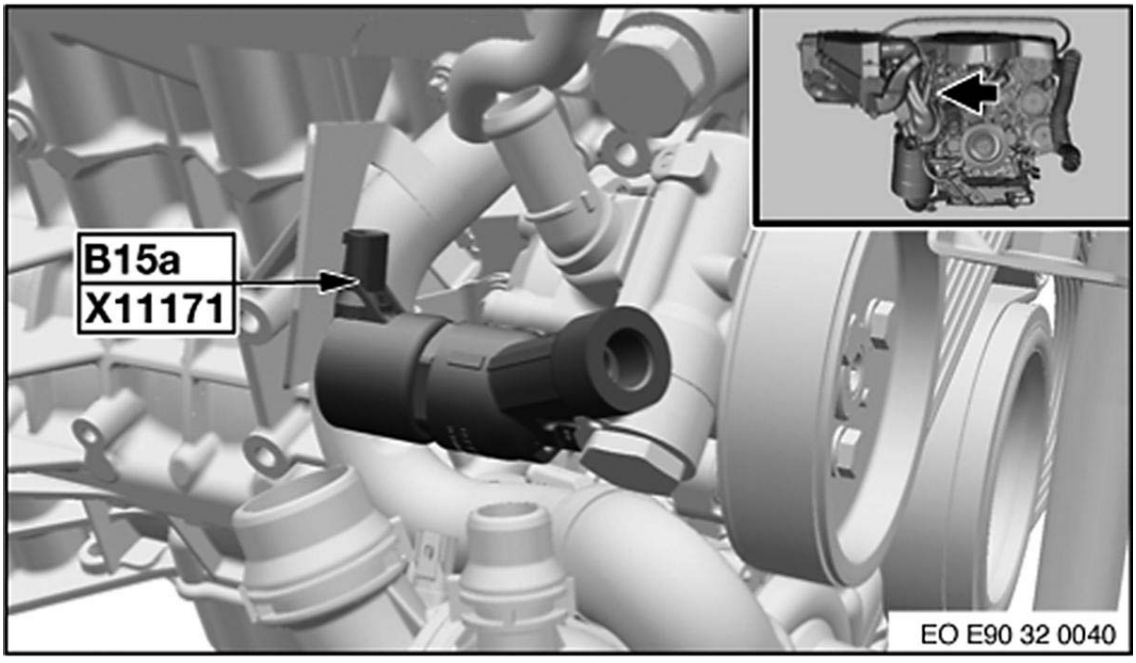


Fig. 40: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

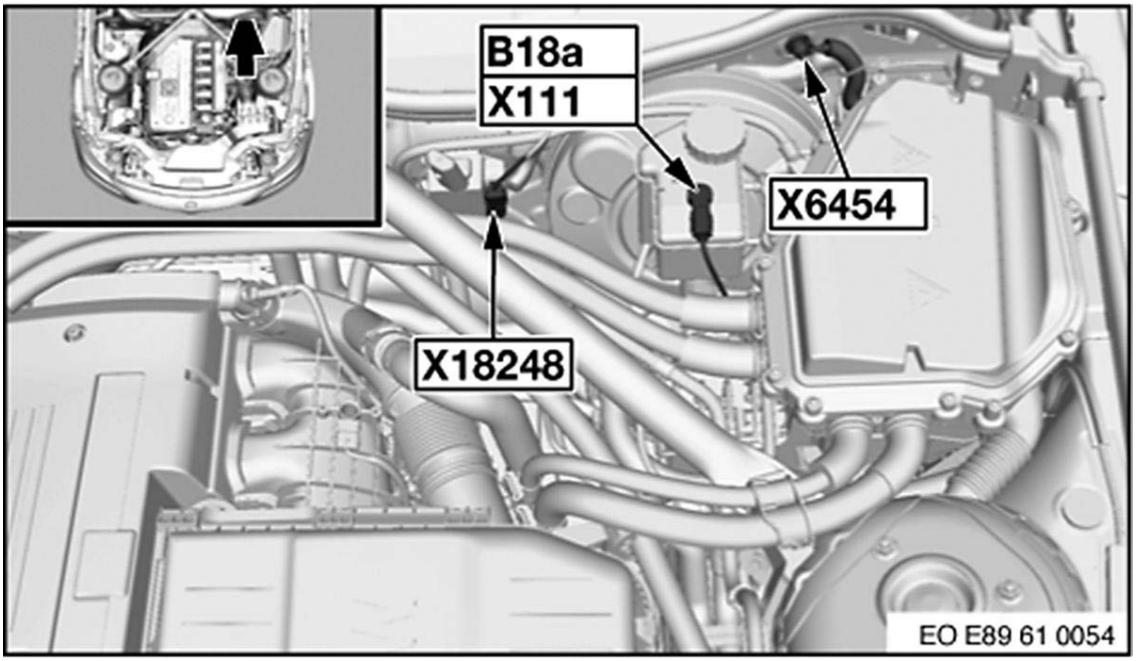


Fig. 41: Left Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

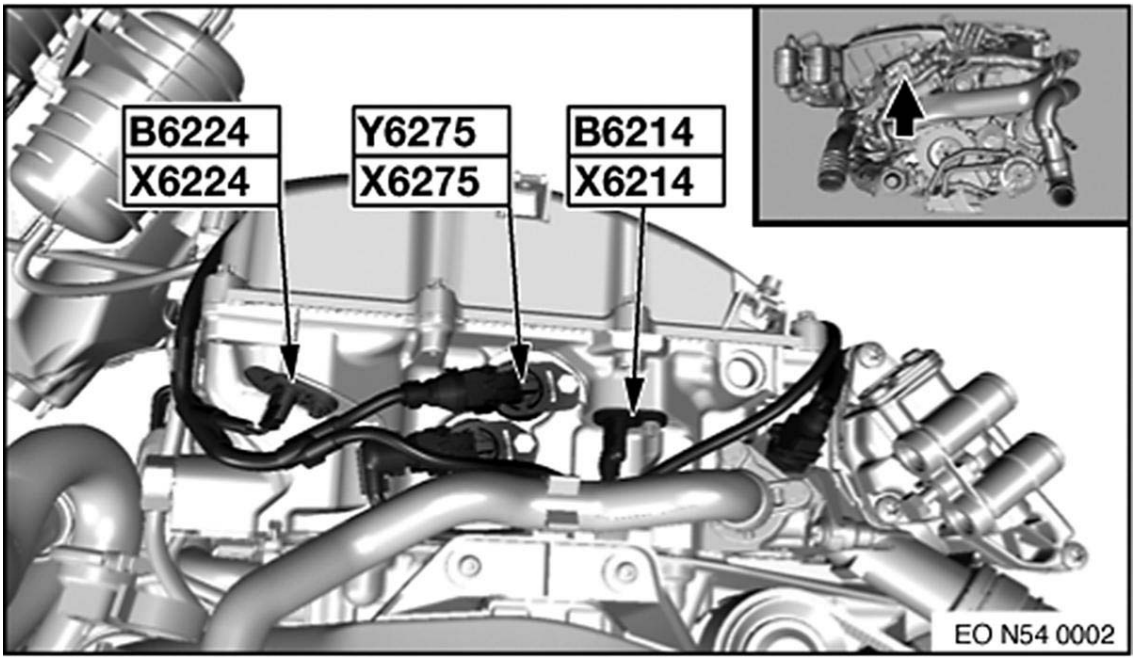


Fig. 42: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

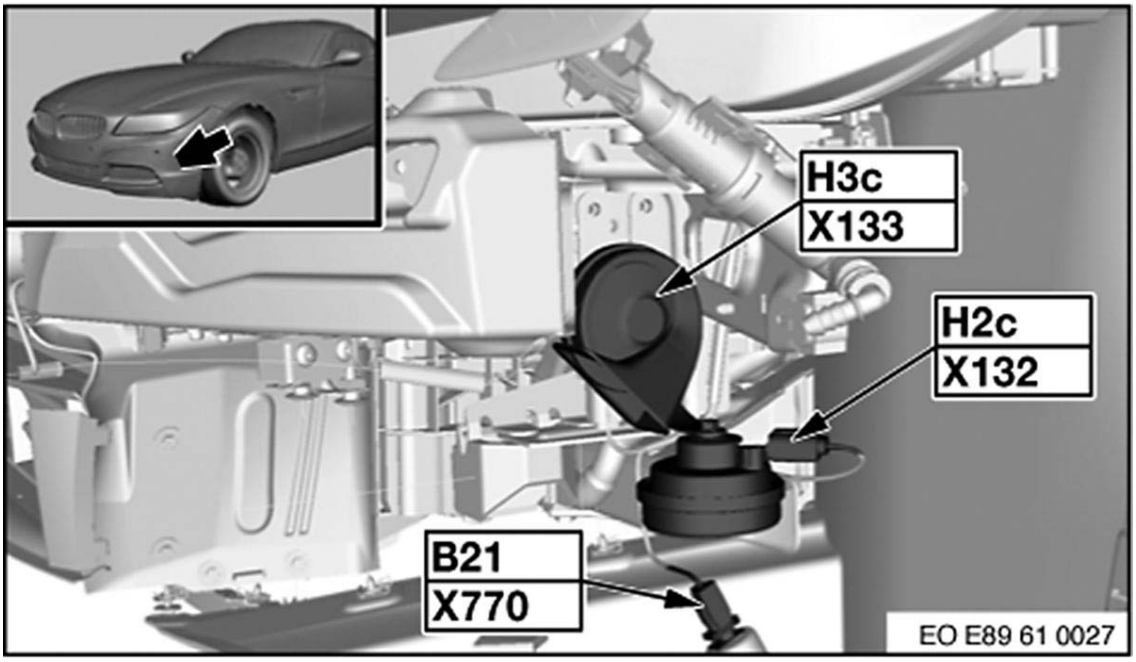


Fig. 43: Left Front Corner Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

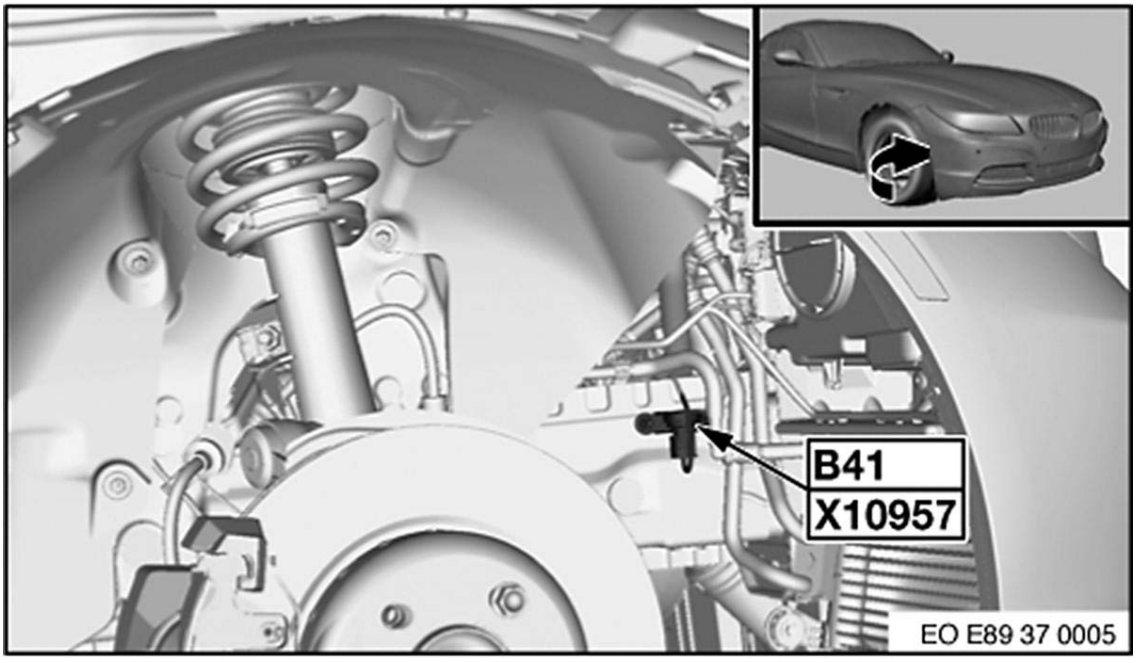


Fig. 44: Right Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

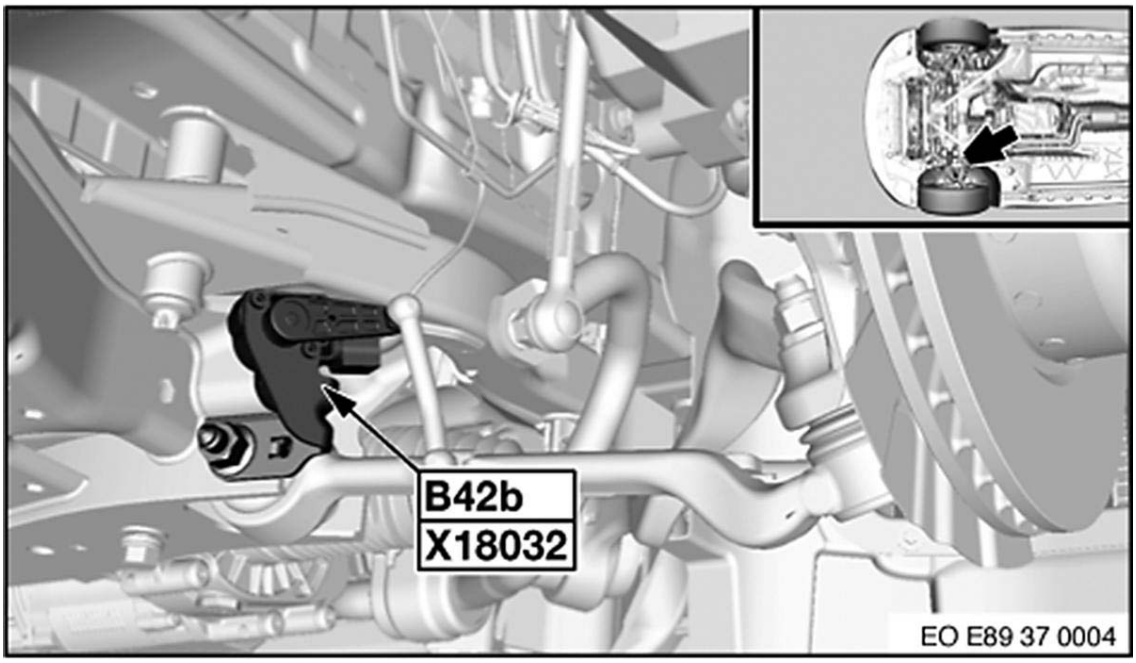


Fig. 45: Lower Right Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

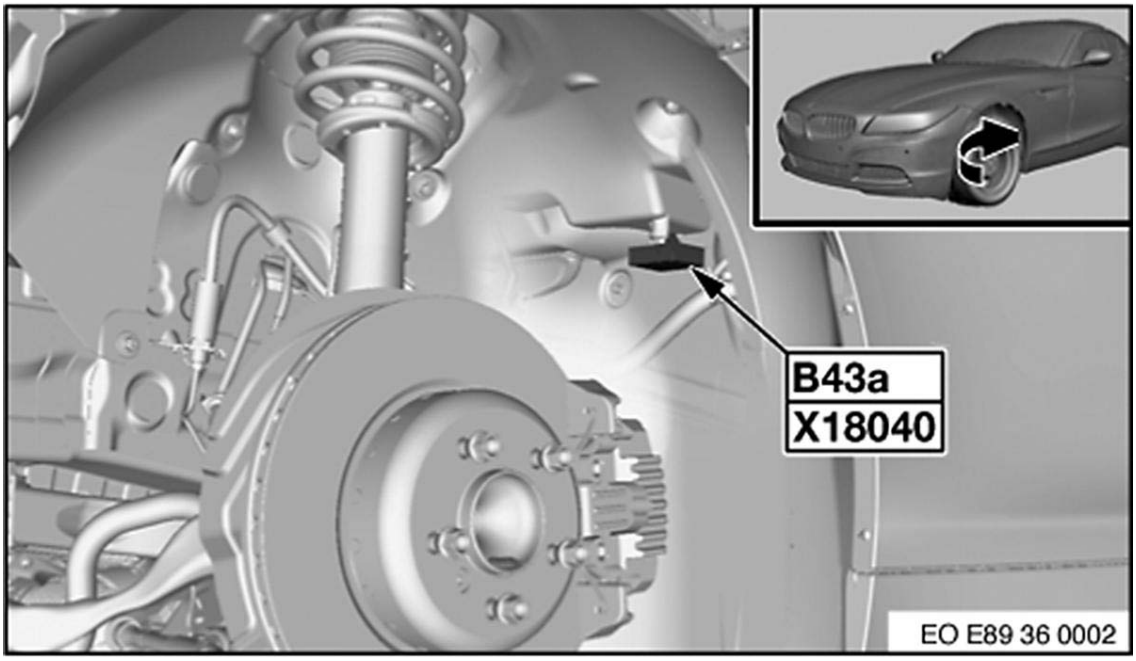


Fig. 46: Left Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

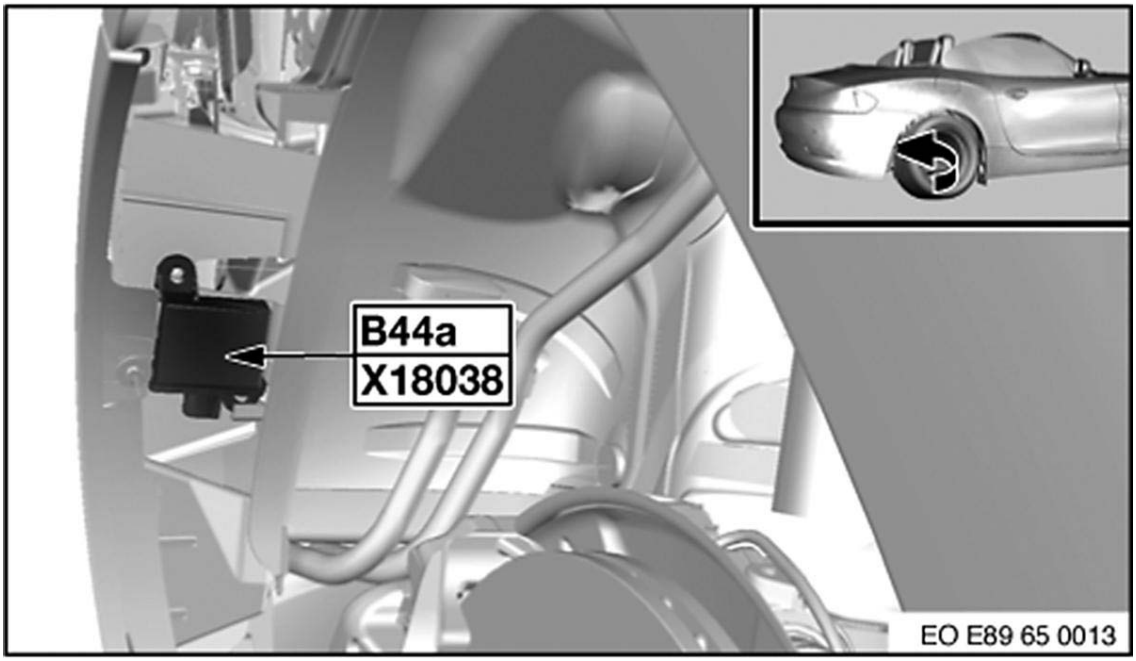


Fig. 47: Right Rear Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

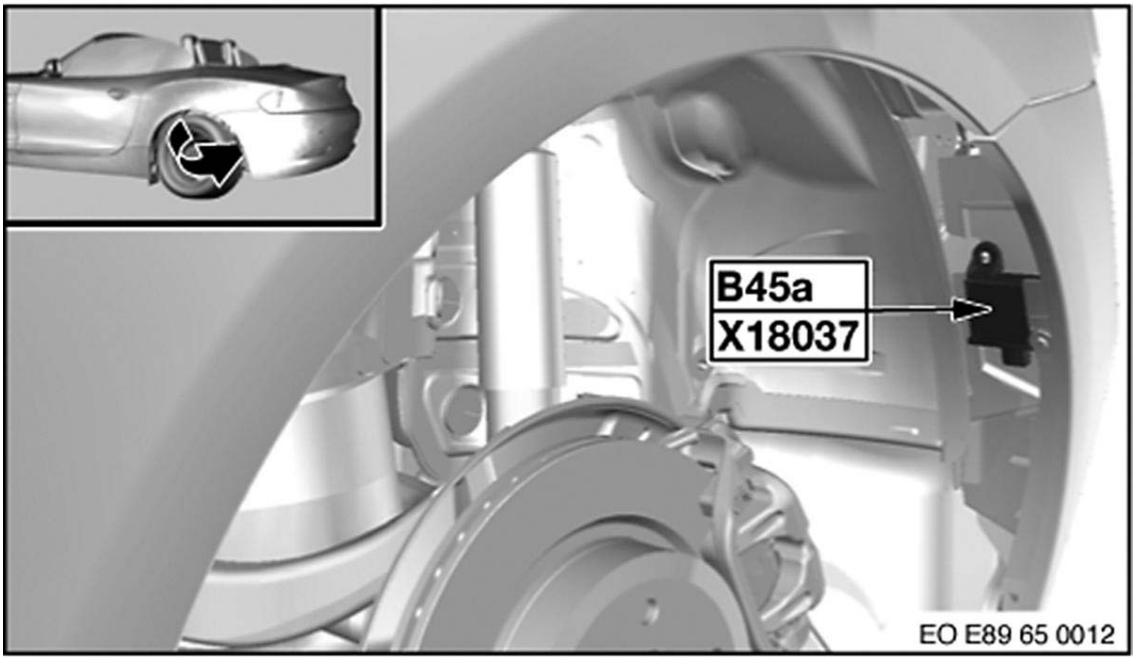


Fig. 48: Left Rear Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

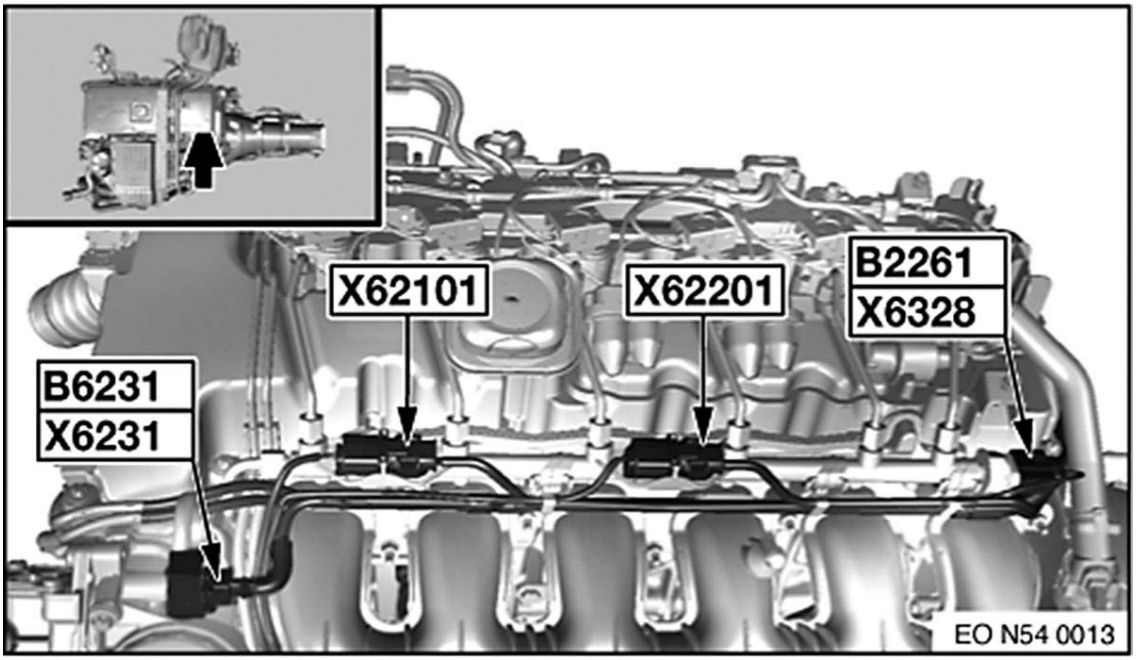


Fig. 49: Rear Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

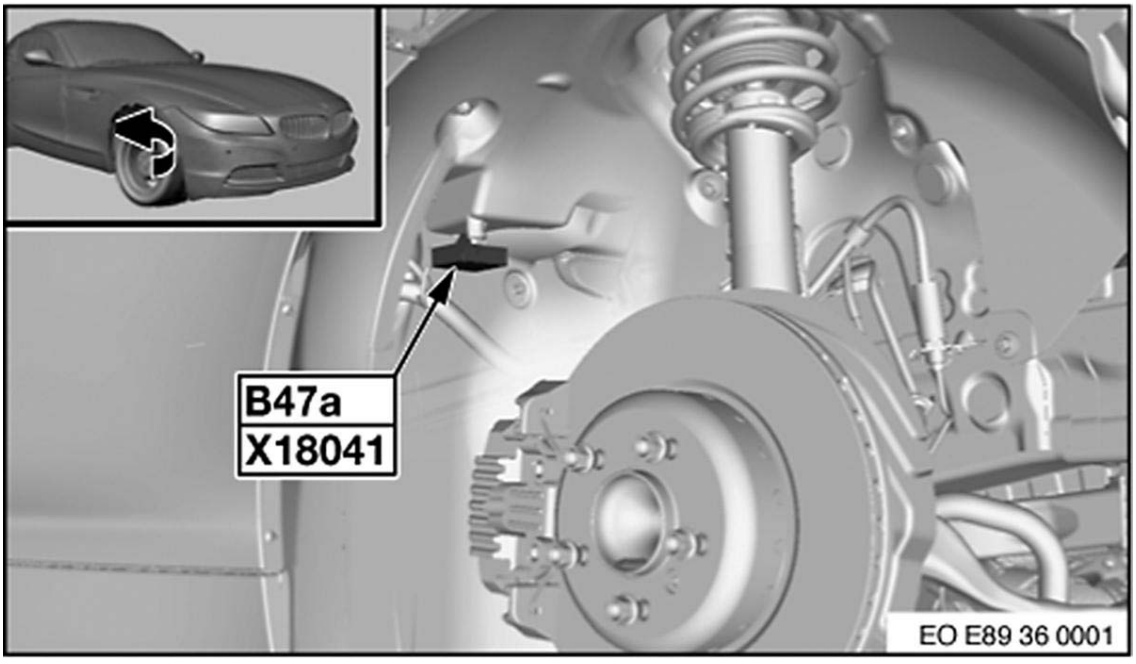


Fig. 50: Right Front Wheelwell
Courtesy of BMW OF NORTH AMERICA, INC.

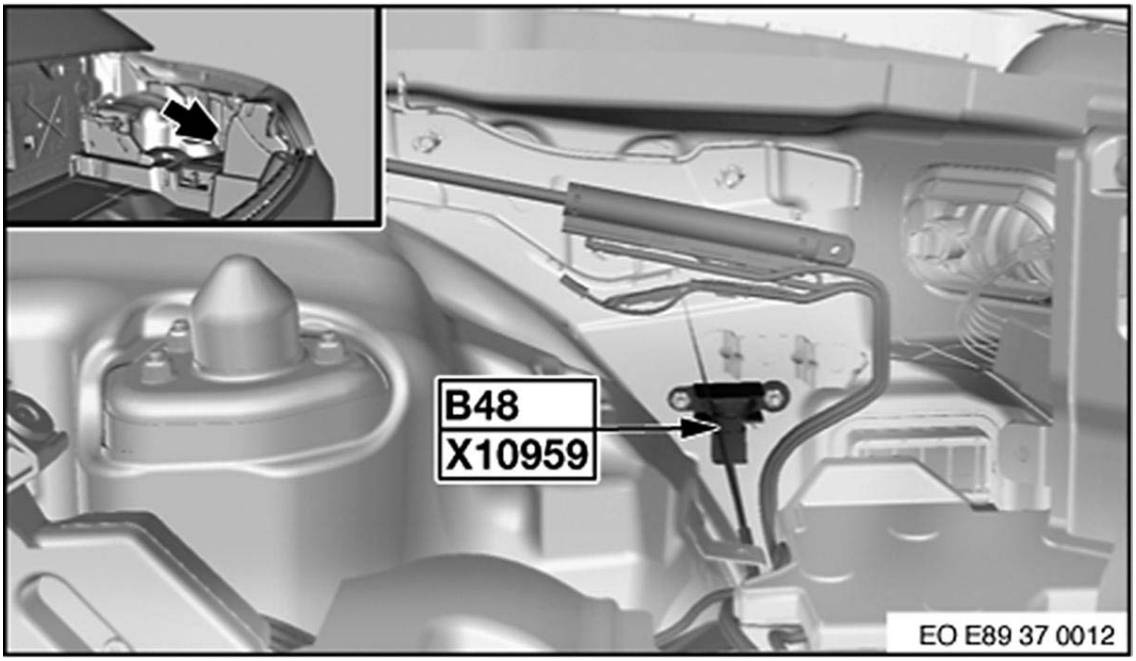


Fig. 51: Right Rear Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

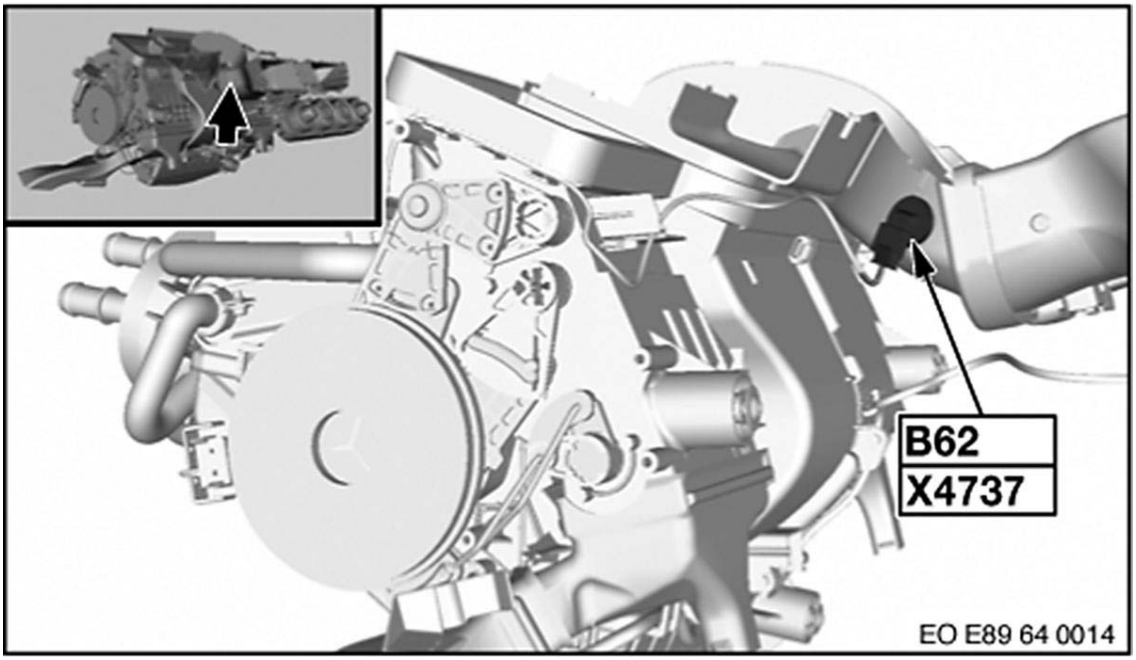


Fig. 52: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

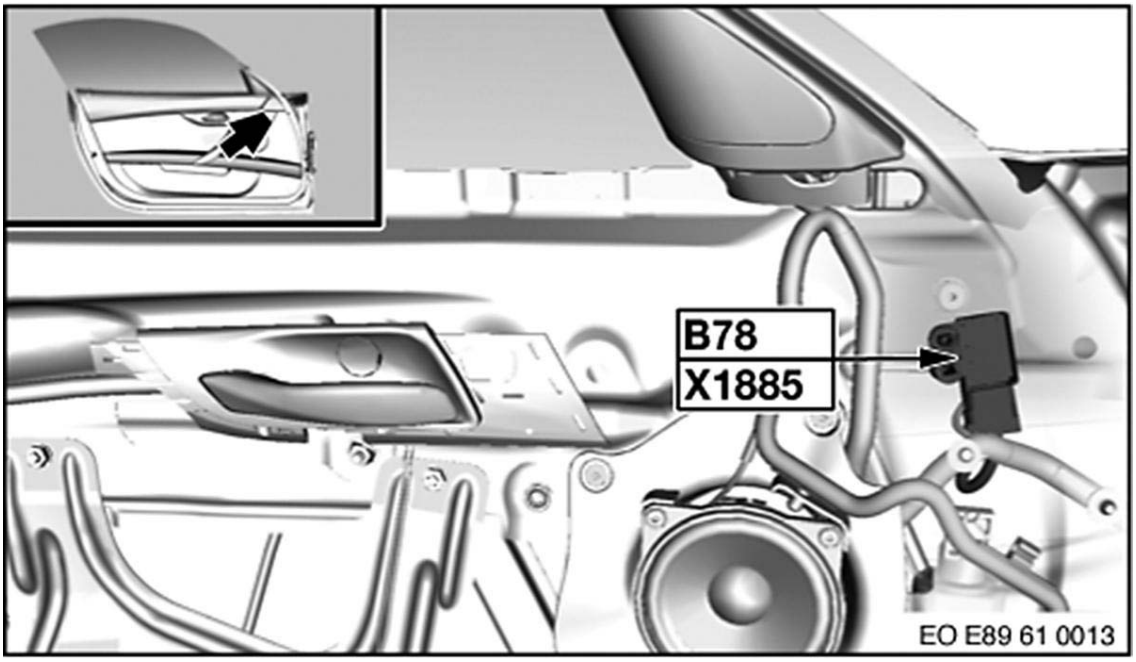


Fig. 53: Left Door
Courtesy of BMW OF NORTH AMERICA, INC.

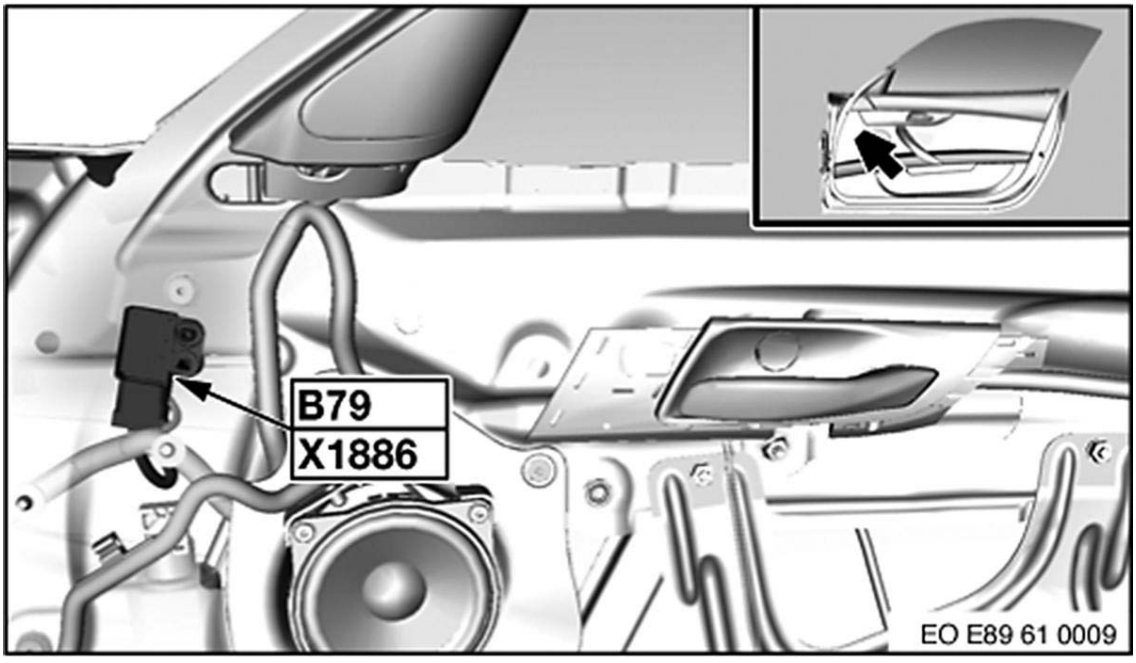


Fig. 54: Right Door
Courtesy of BMW OF NORTH AMERICA, INC.

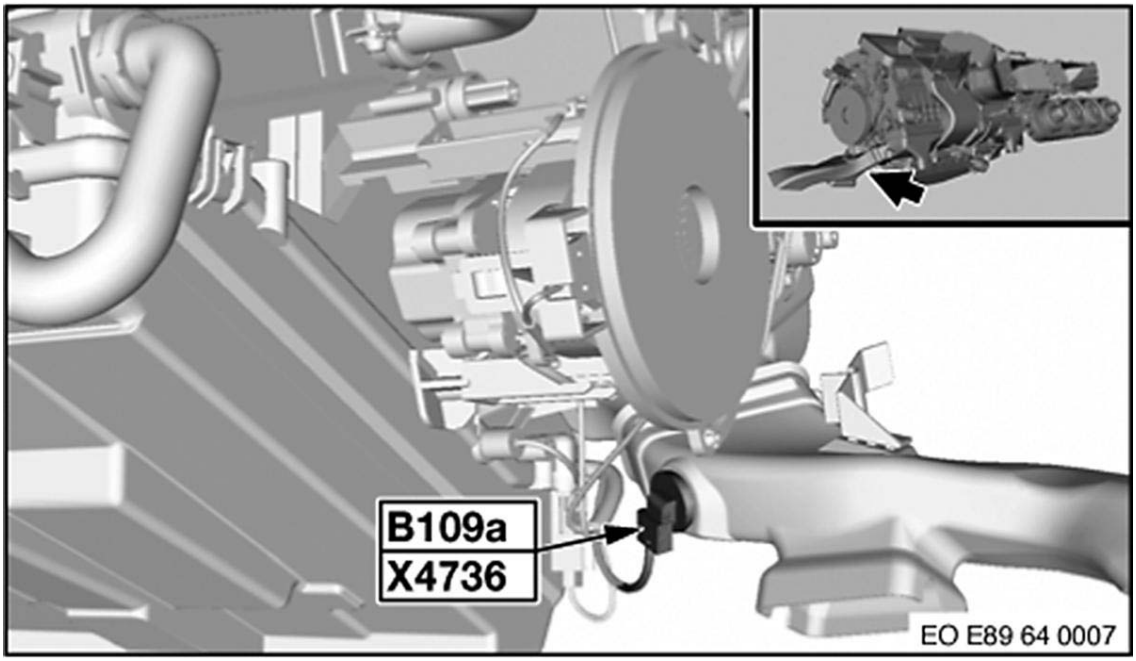


Fig. 55: HVAC Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

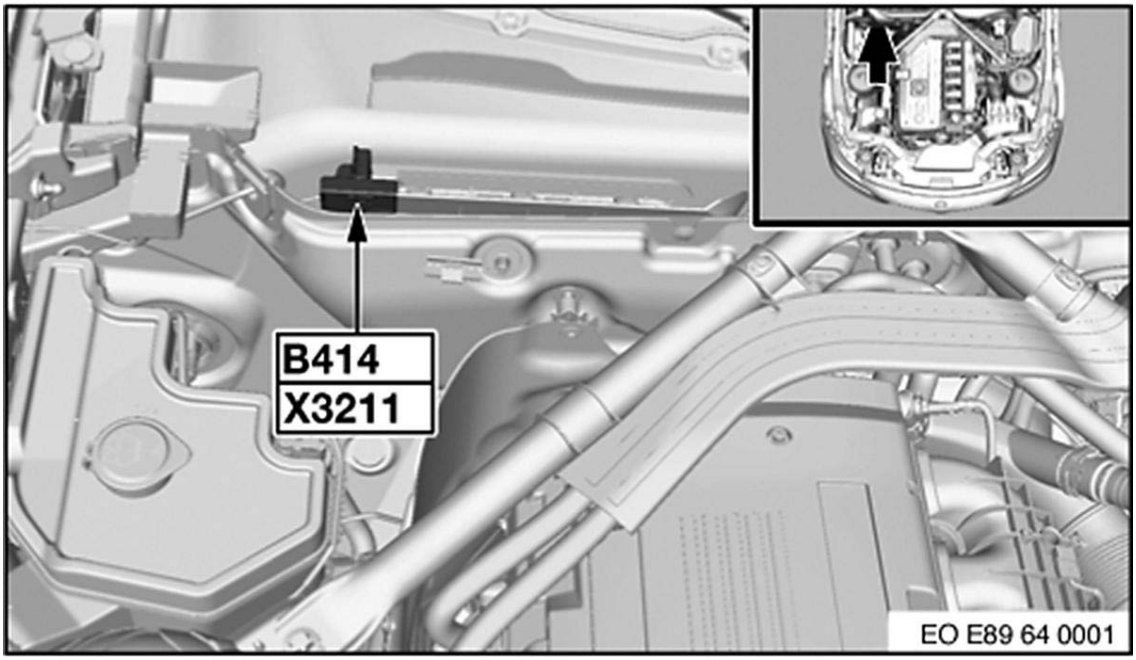


Fig. 56: Right Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

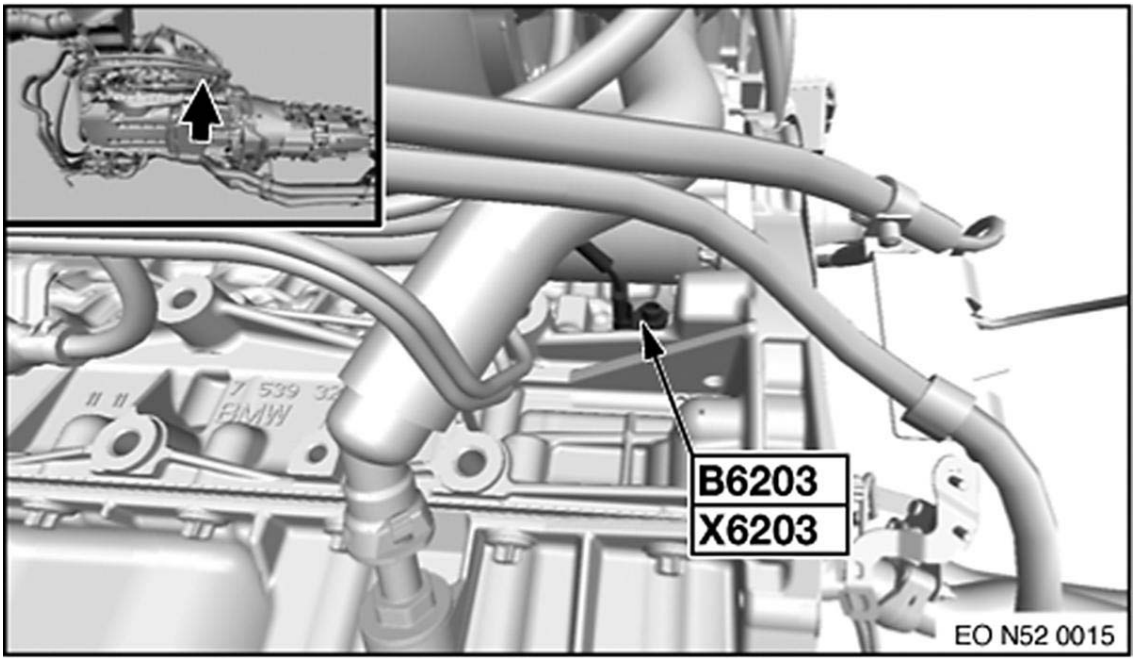


Fig. 57: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

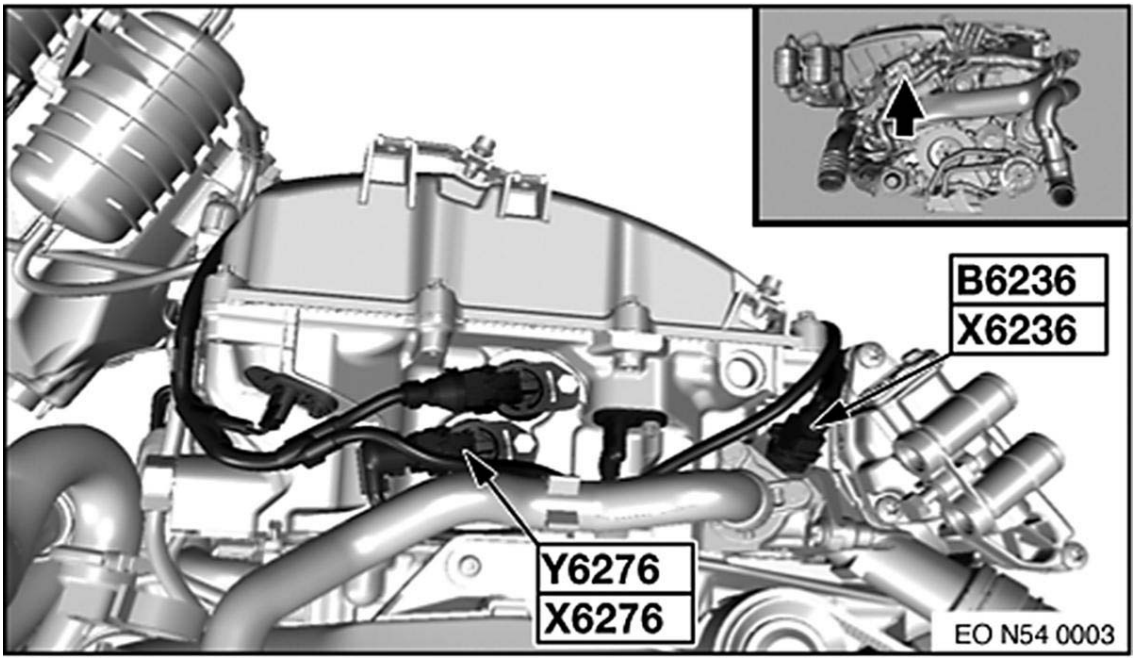


Fig. 58: Front Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

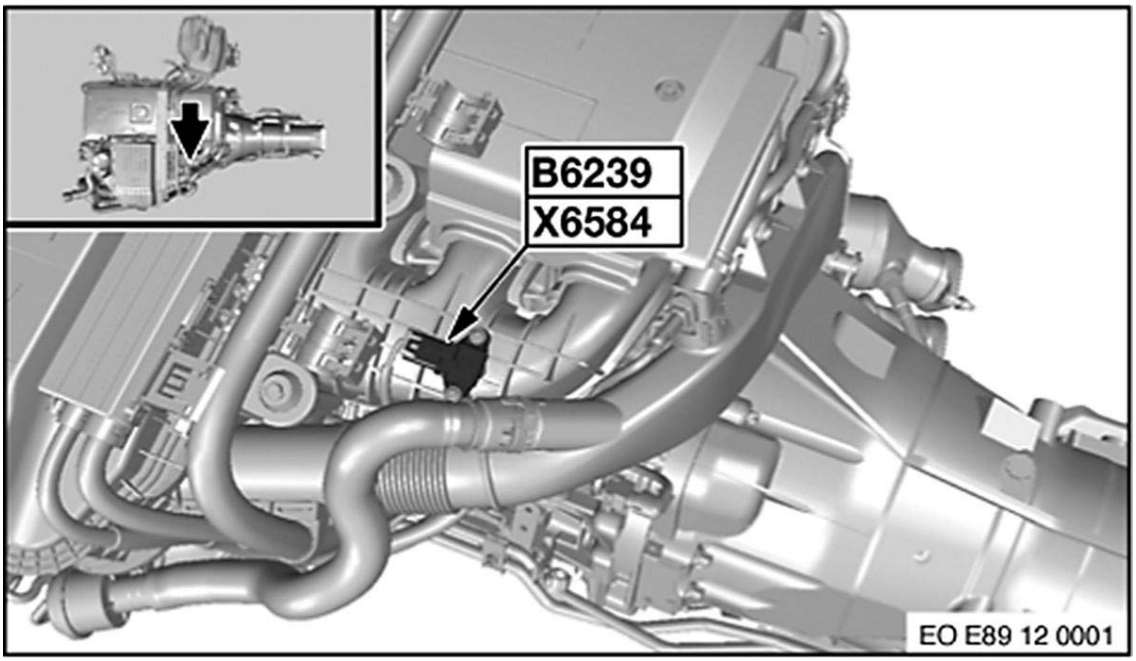


Fig. 59: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

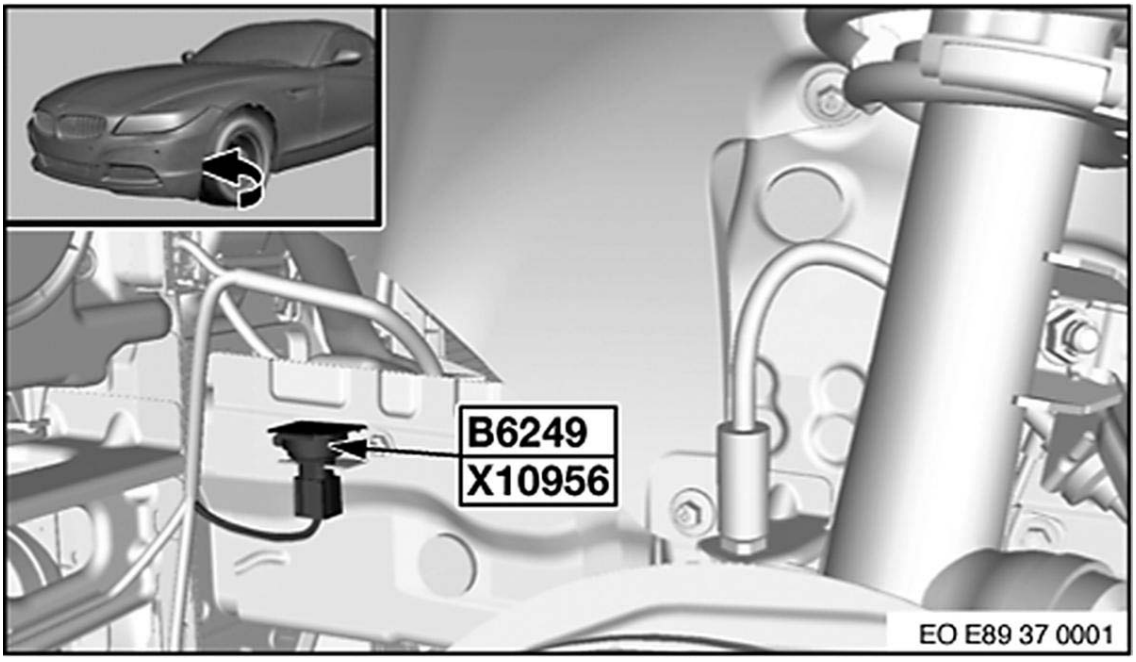


Fig. 60: Left Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

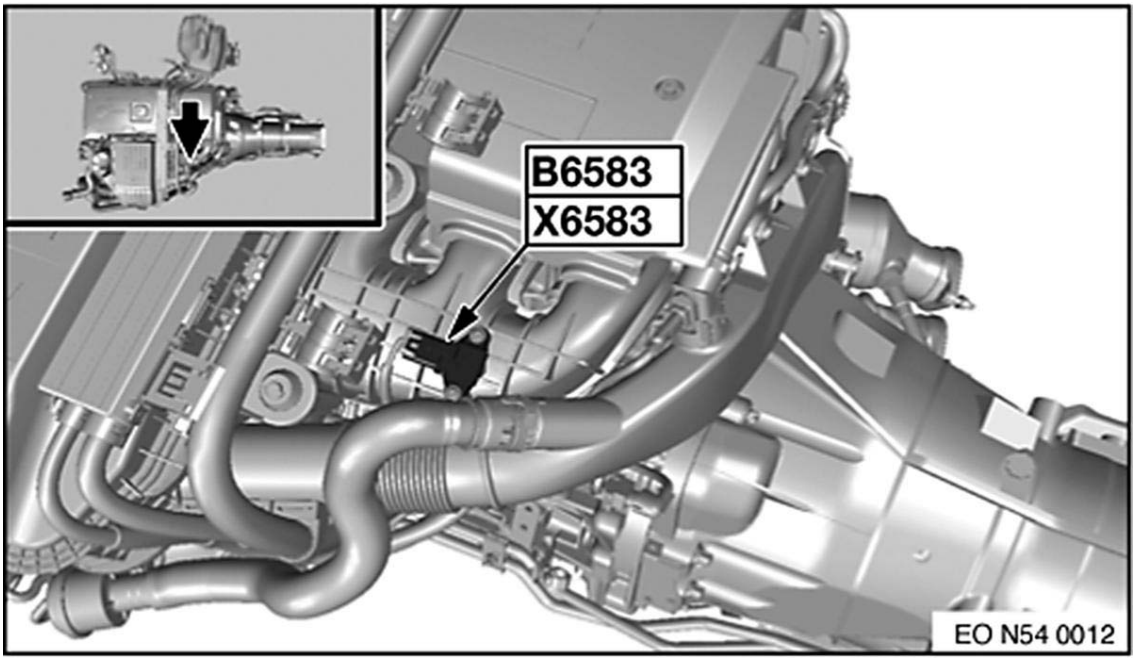


Fig. 61: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

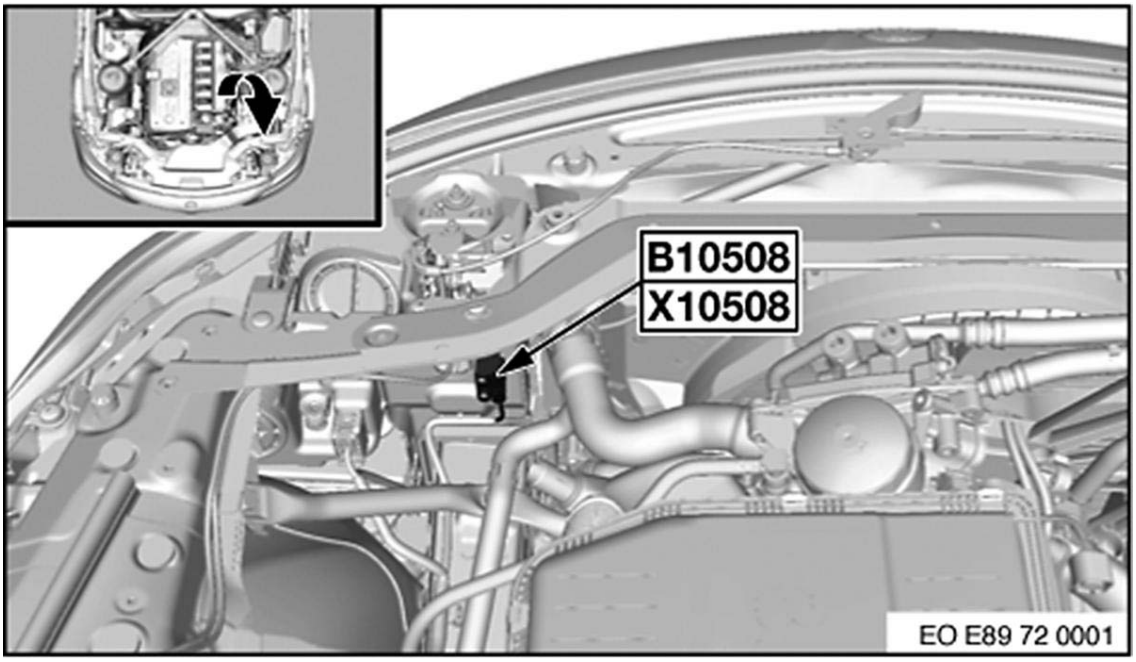


Fig. 62: Left Front Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

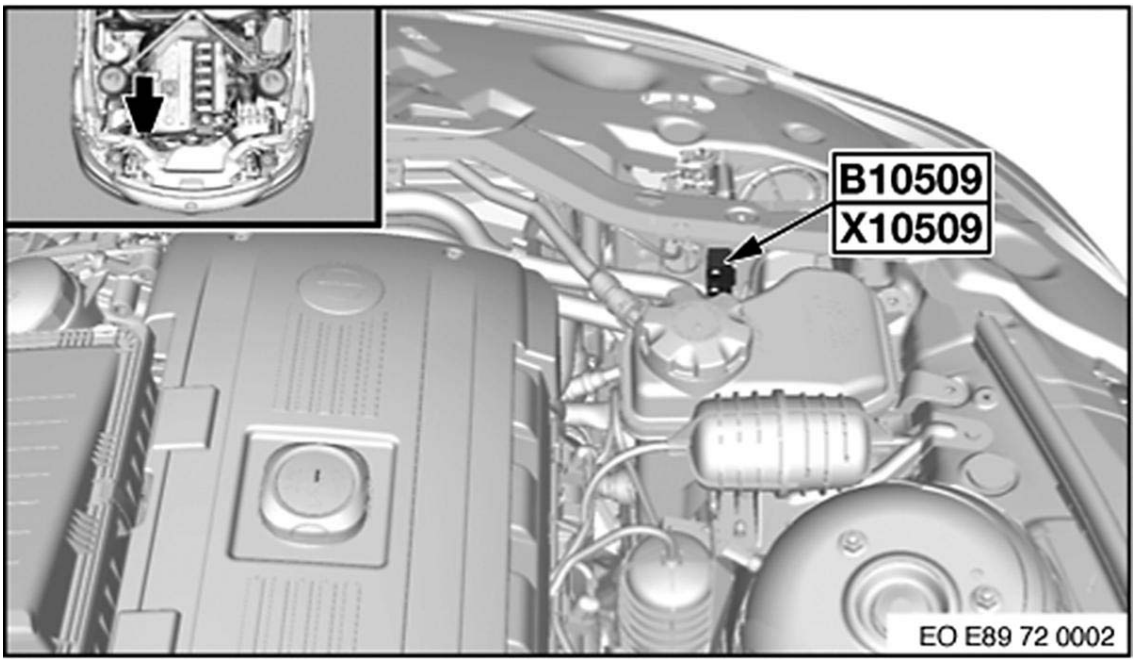


Fig. 63: Right Front Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

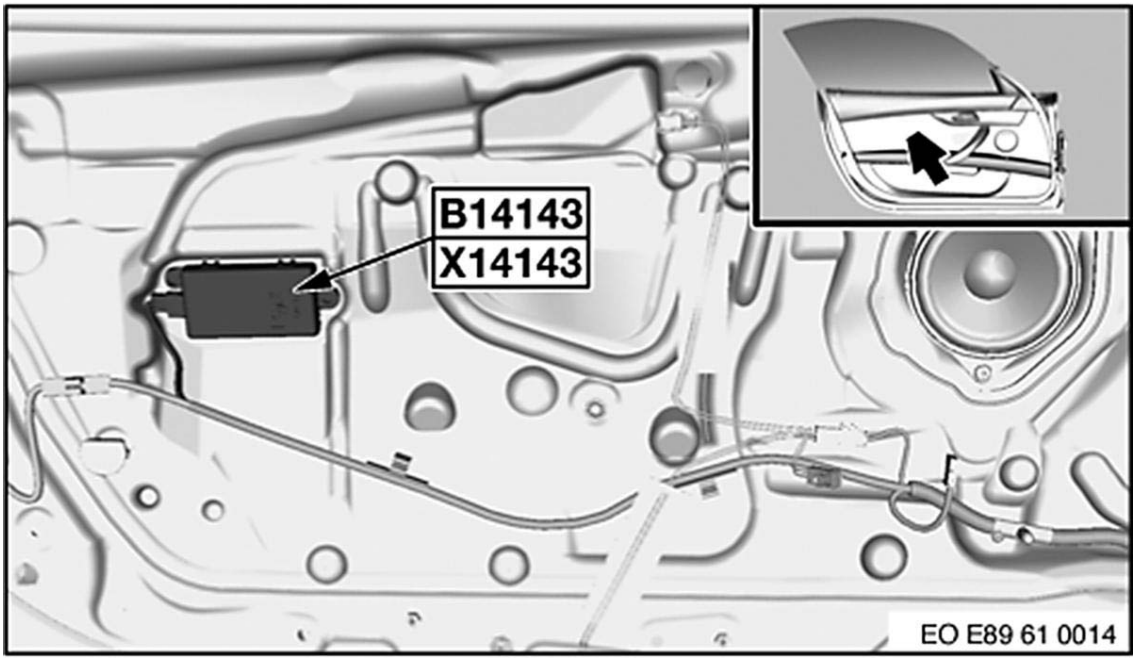


Fig. 64: Driver's Door (Passenger's Similar)
Courtesy of BMW OF NORTH AMERICA, INC.

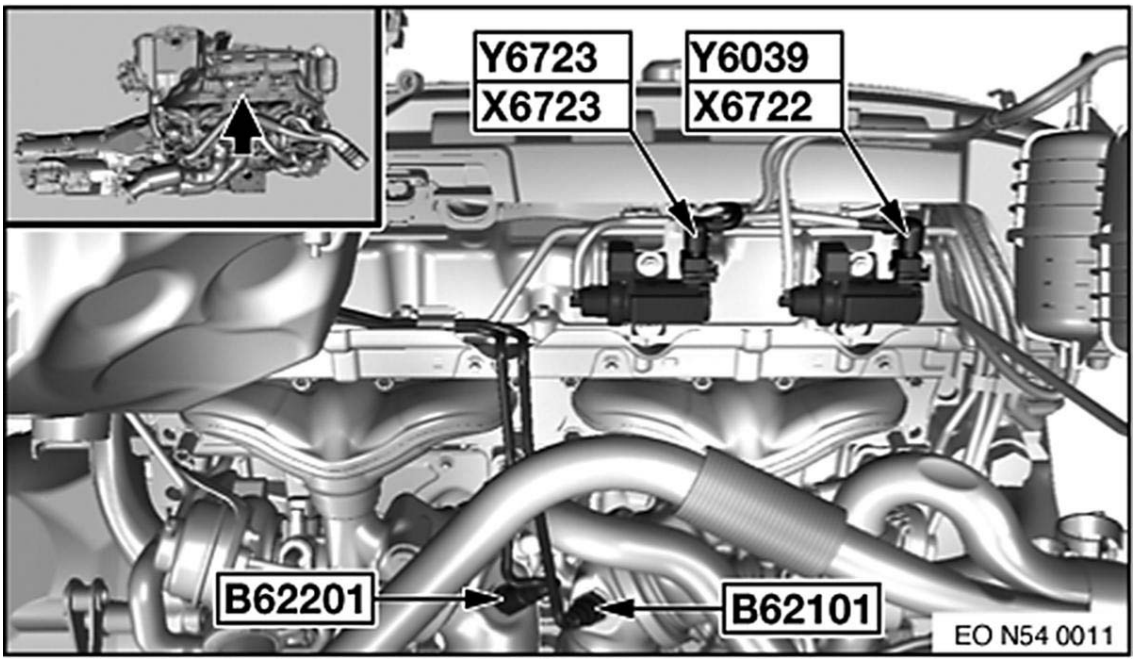


Fig. 65: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

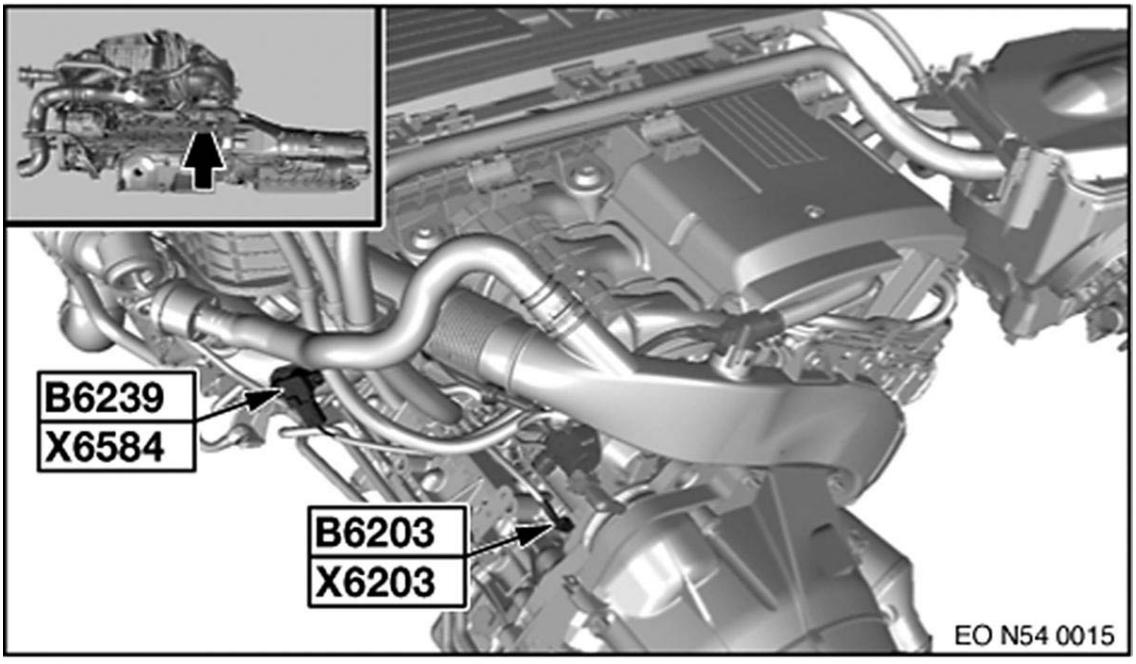


Fig. 66: Left Rear Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

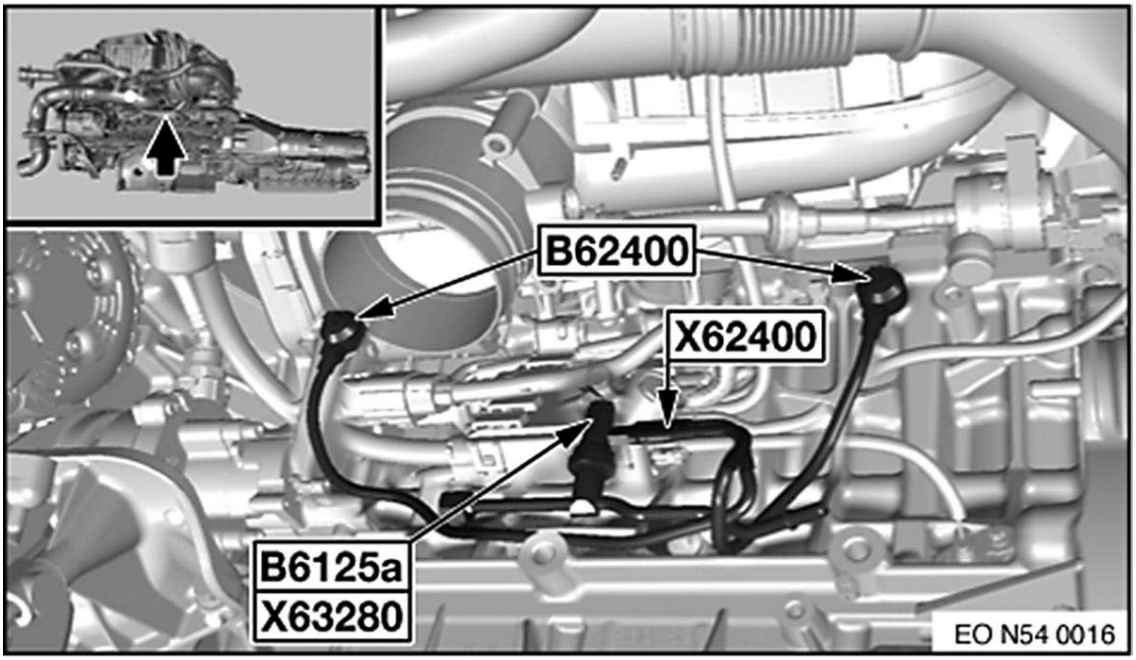


Fig. 67: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

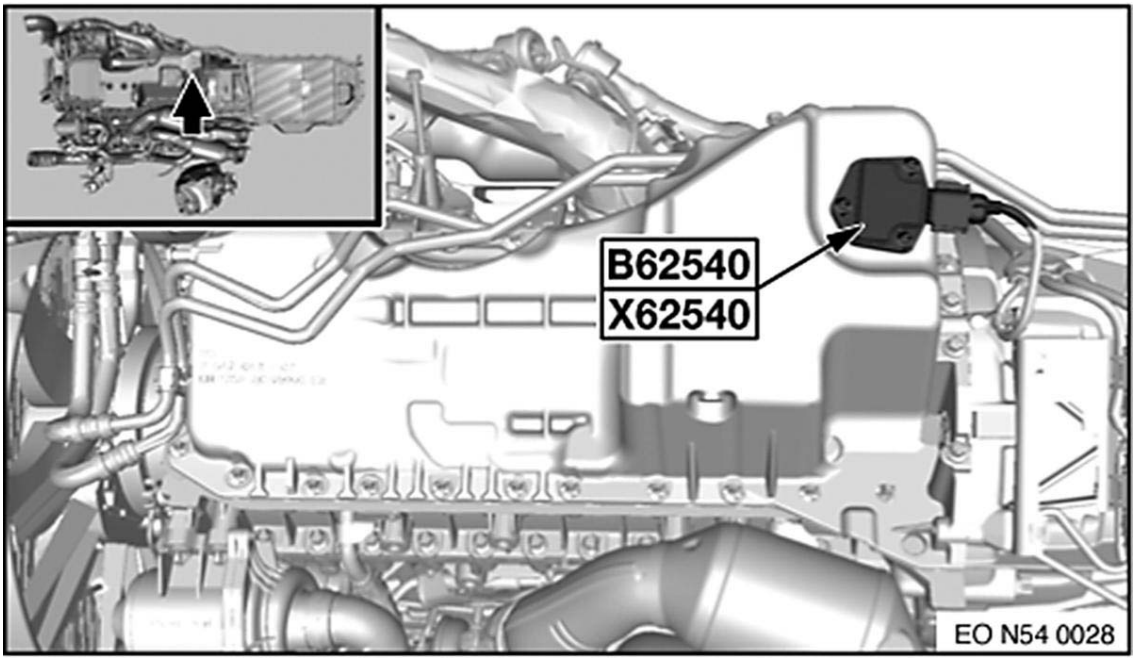


Fig. 68: Bottom Of Oil Pan
Courtesy of BMW OF NORTH AMERICA, INC.

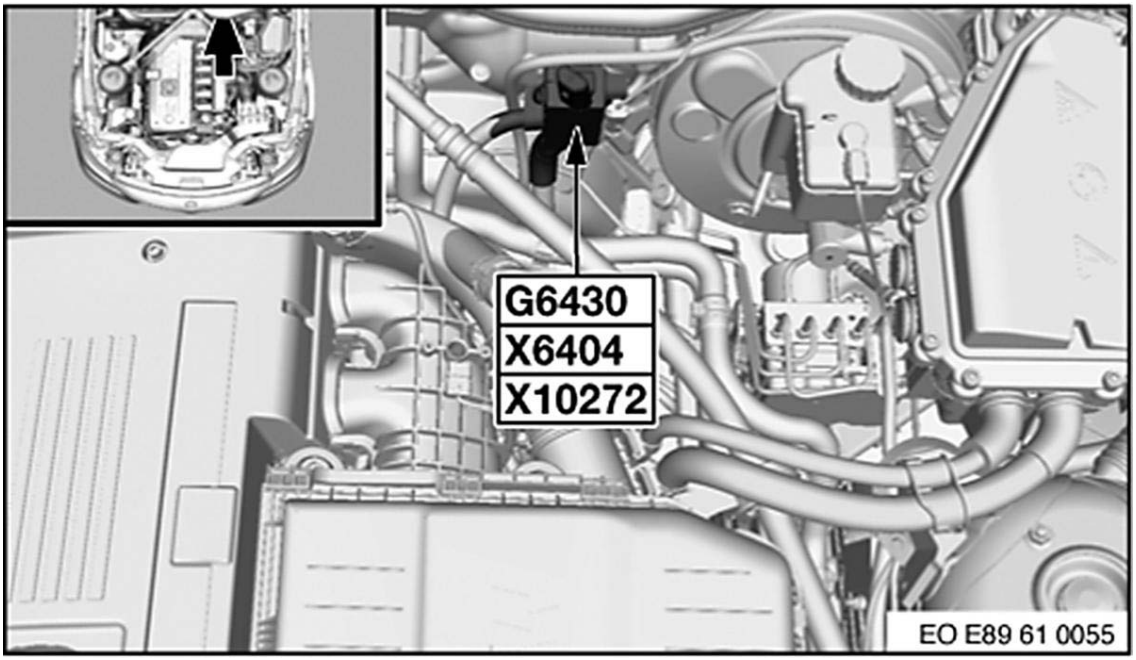


Fig. 69: Left Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

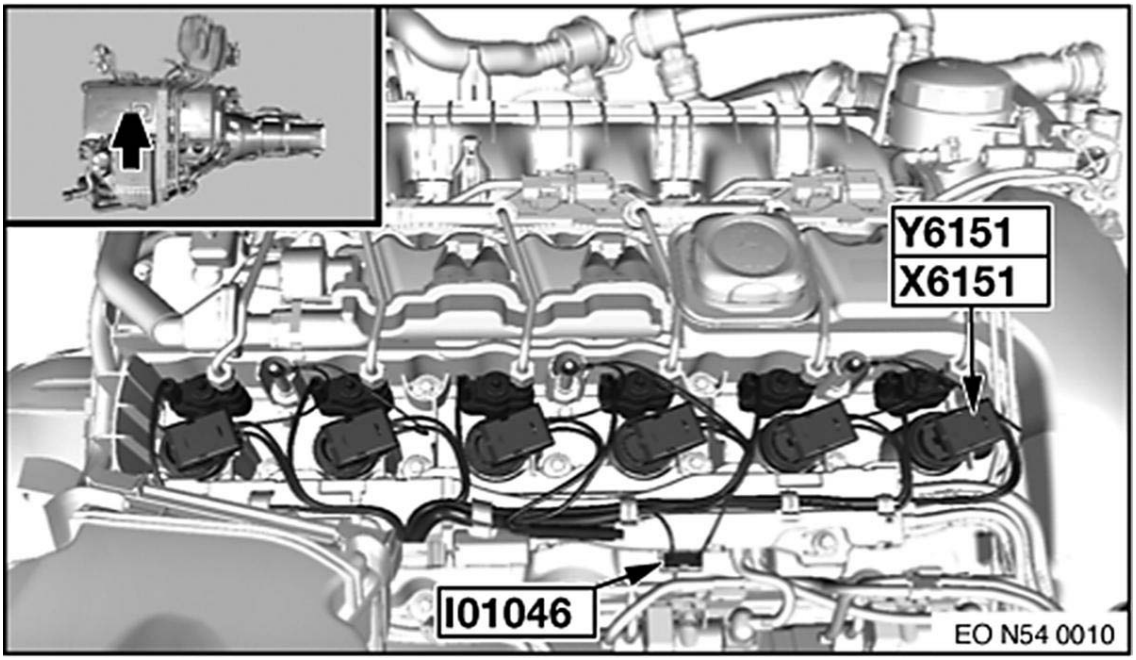


Fig. 70: Top Left Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

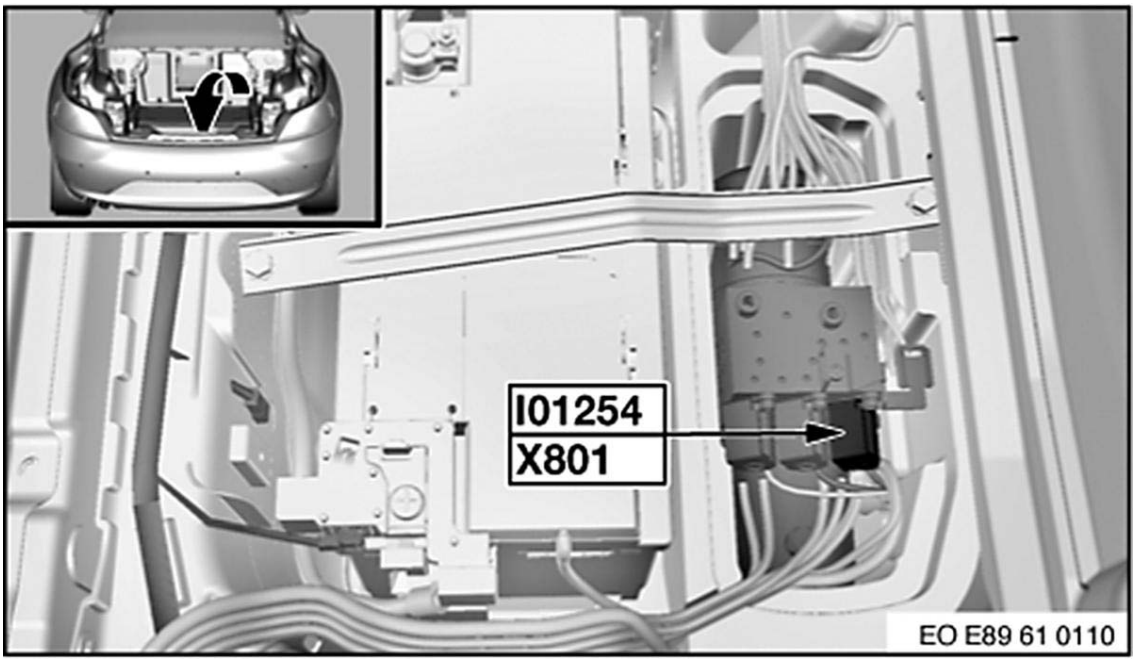


Fig. 71: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

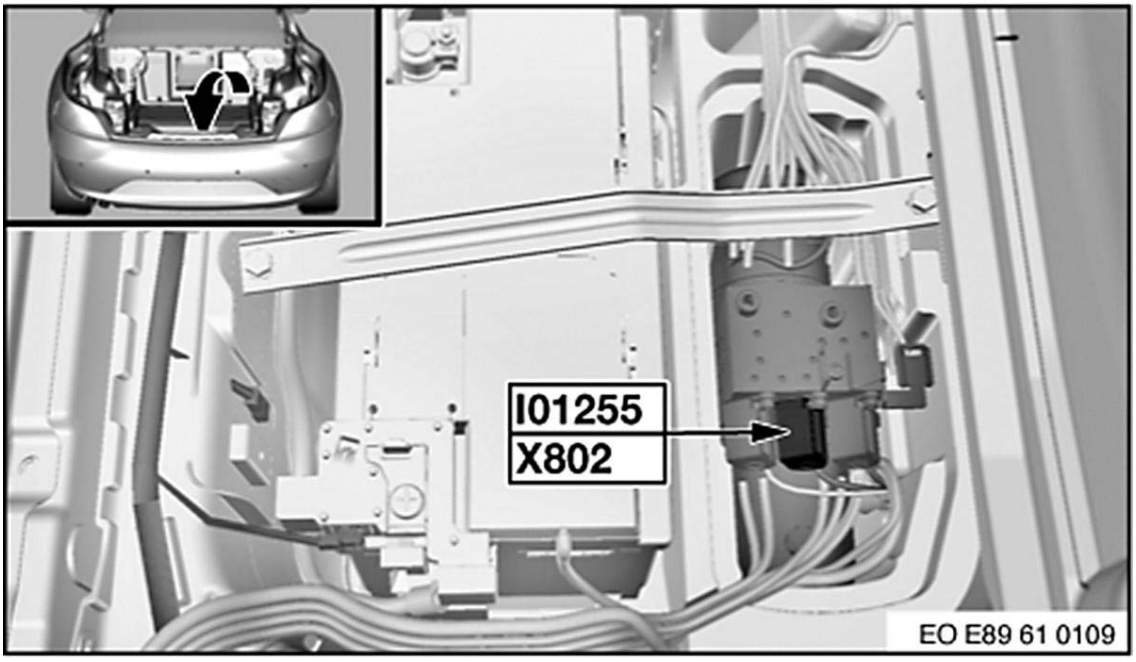


Fig. 72: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

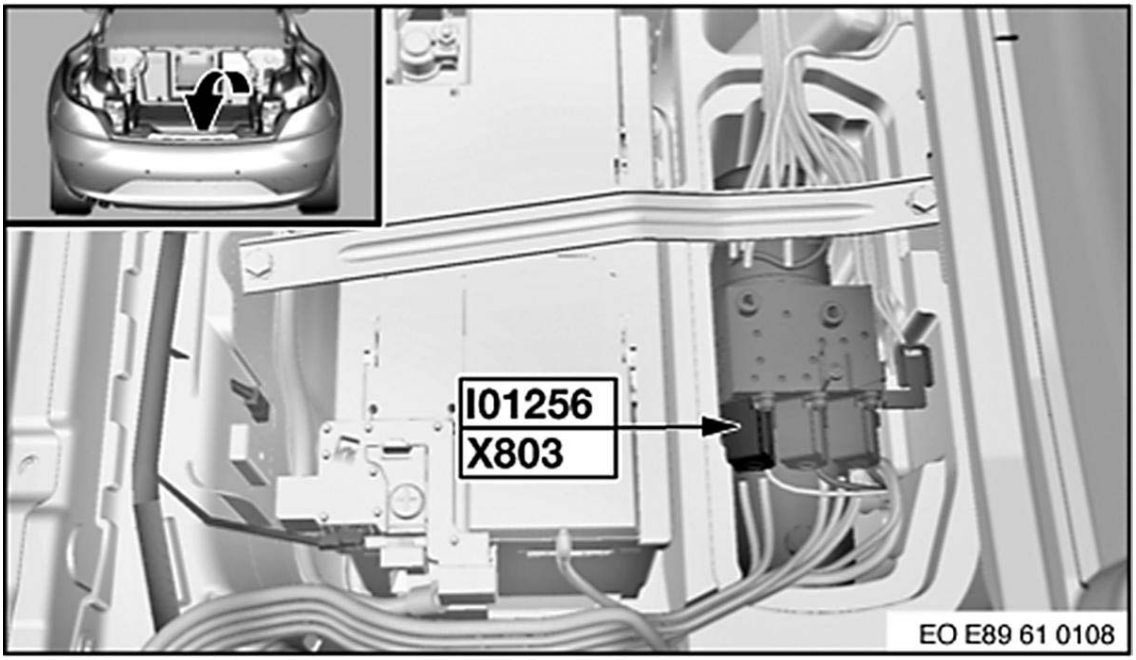


Fig. 73: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

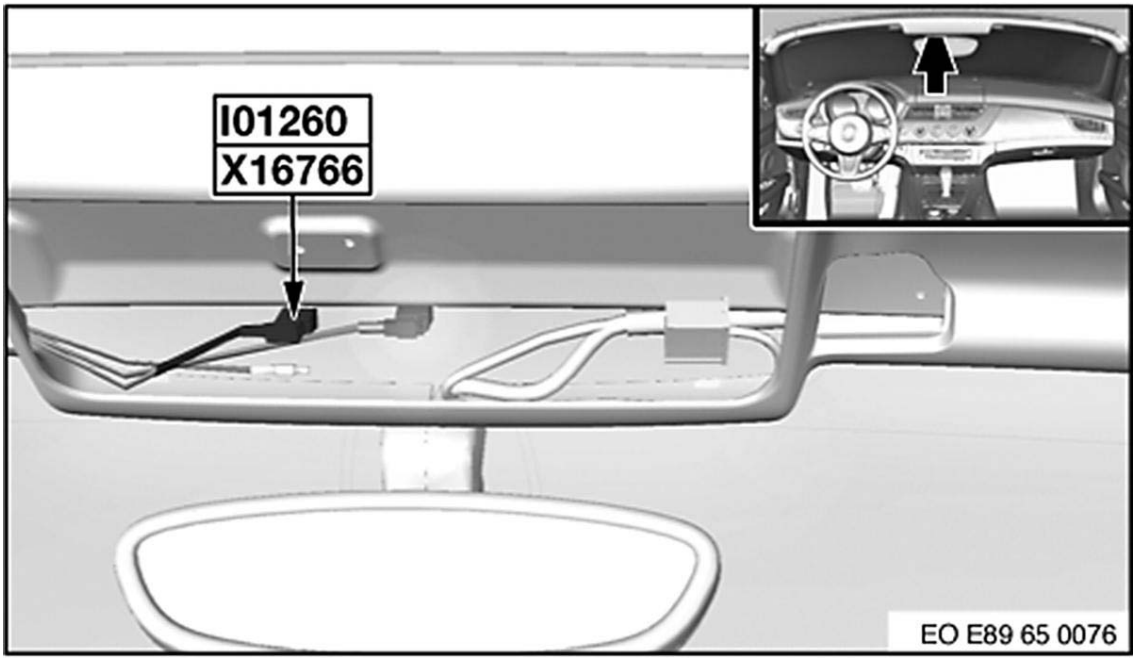


Fig. 74: Center Front Of Roof
Courtesy of BMW OF NORTH AMERICA, INC.

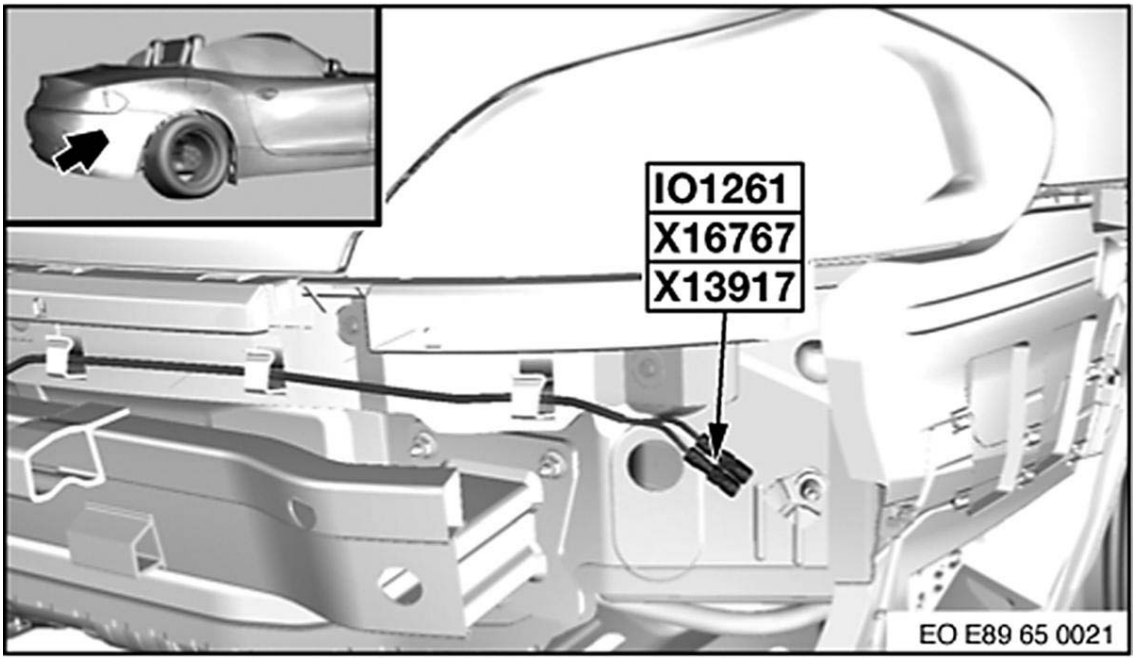


Fig. 75: Right End Of Rear Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

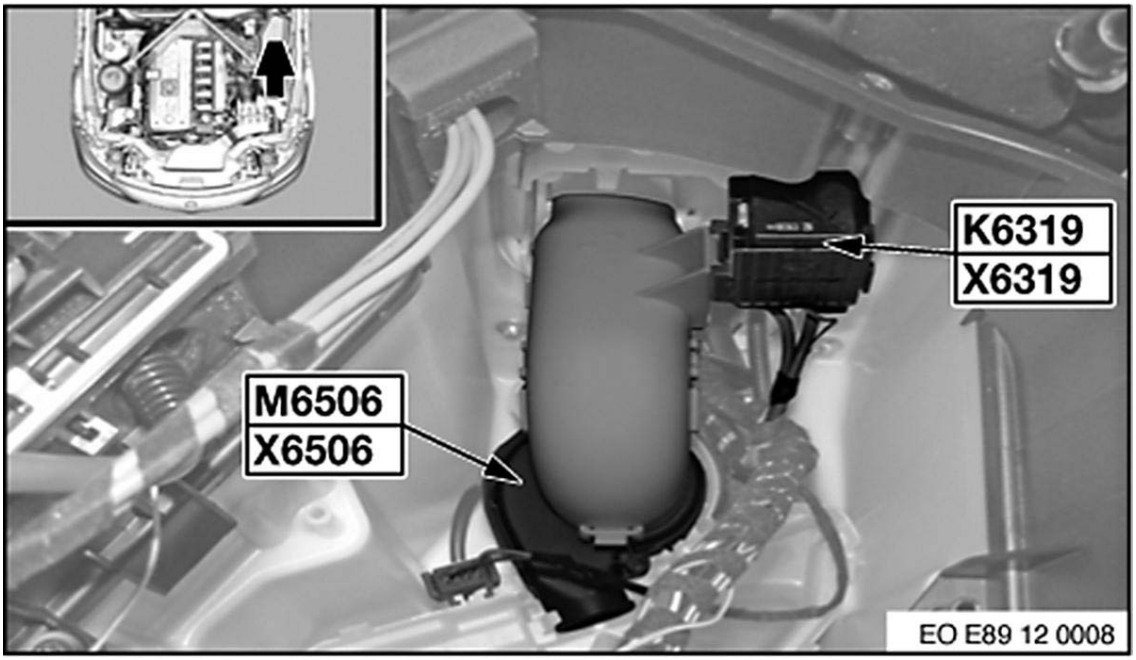


Fig. 76: Left Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

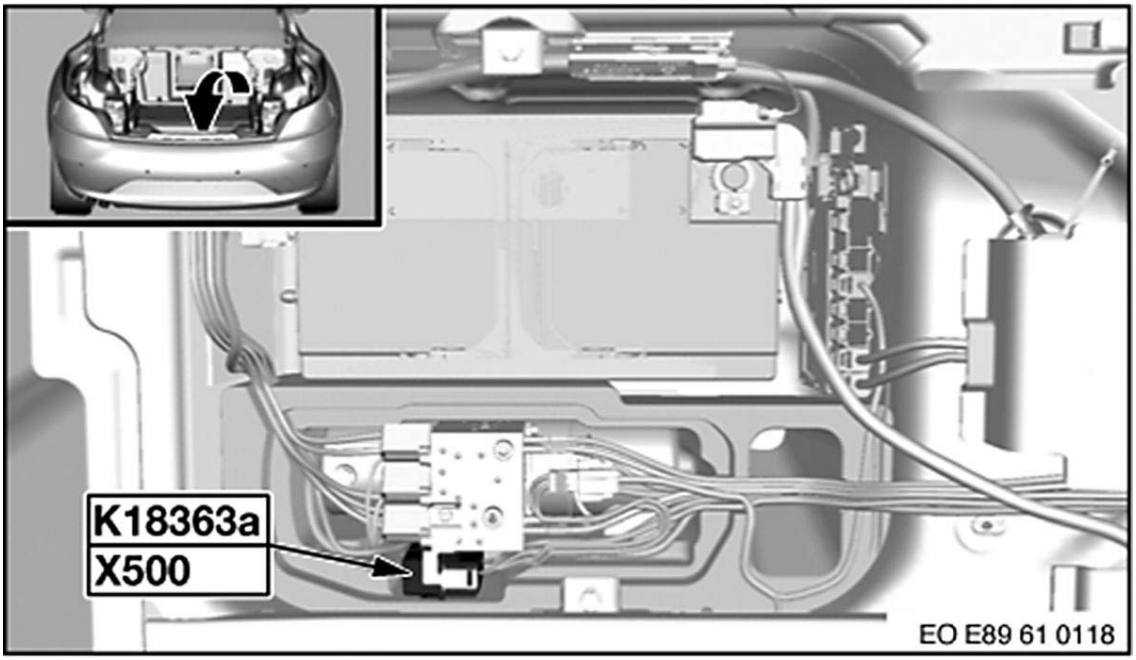


Fig. 77: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

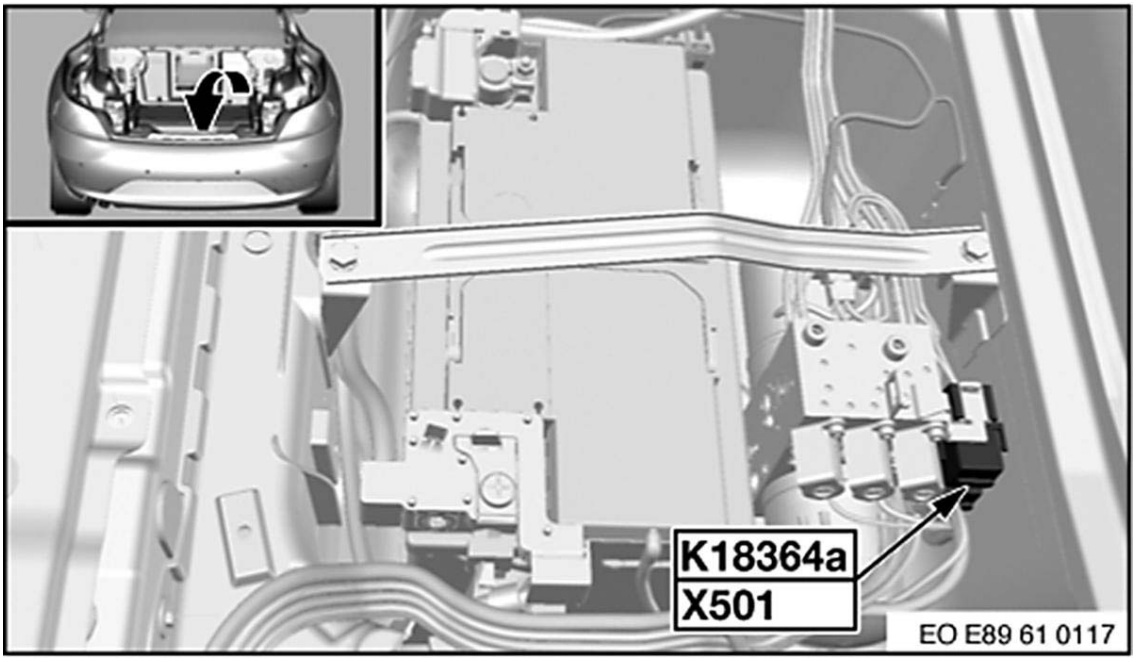


Fig. 78: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

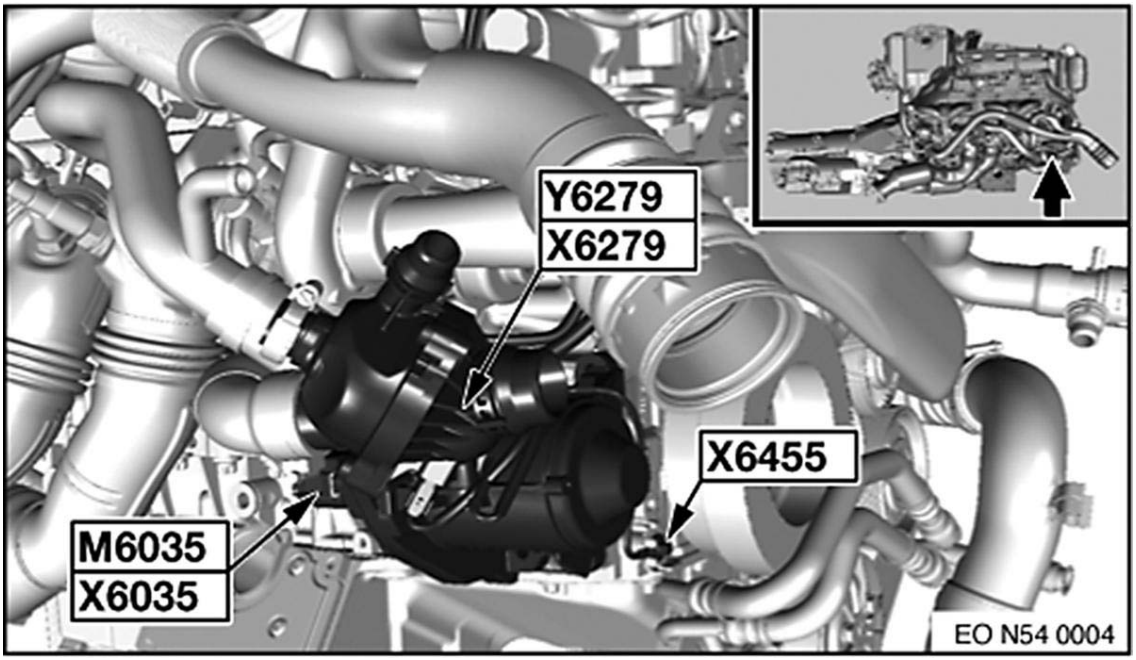


Fig. 79: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

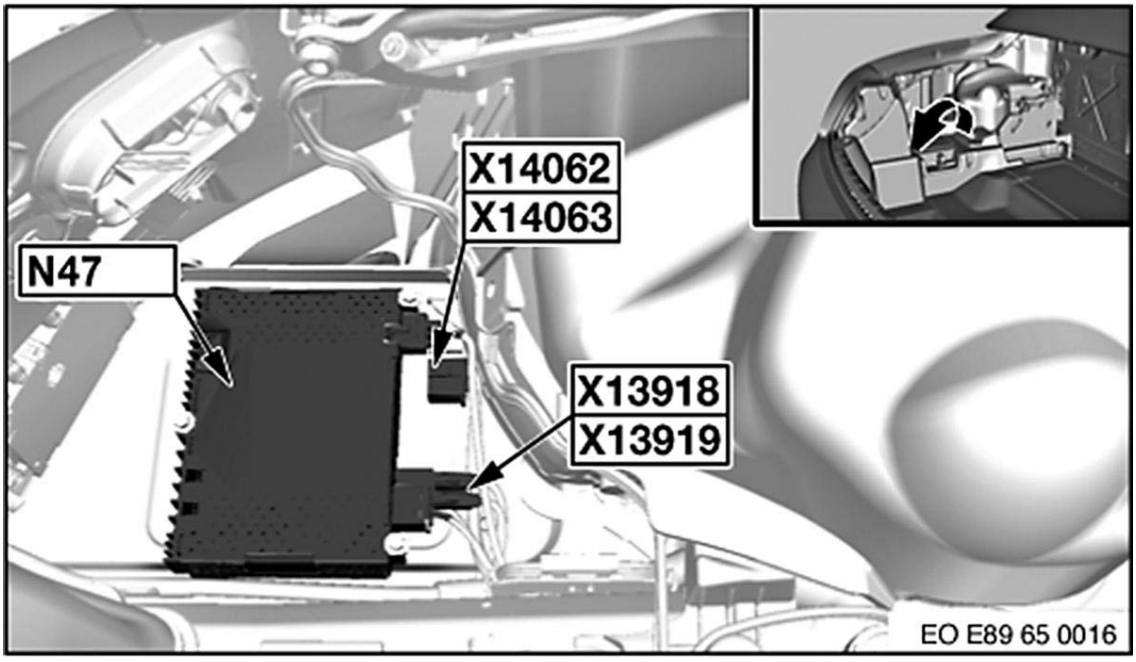


Fig. 80: Left Rear Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

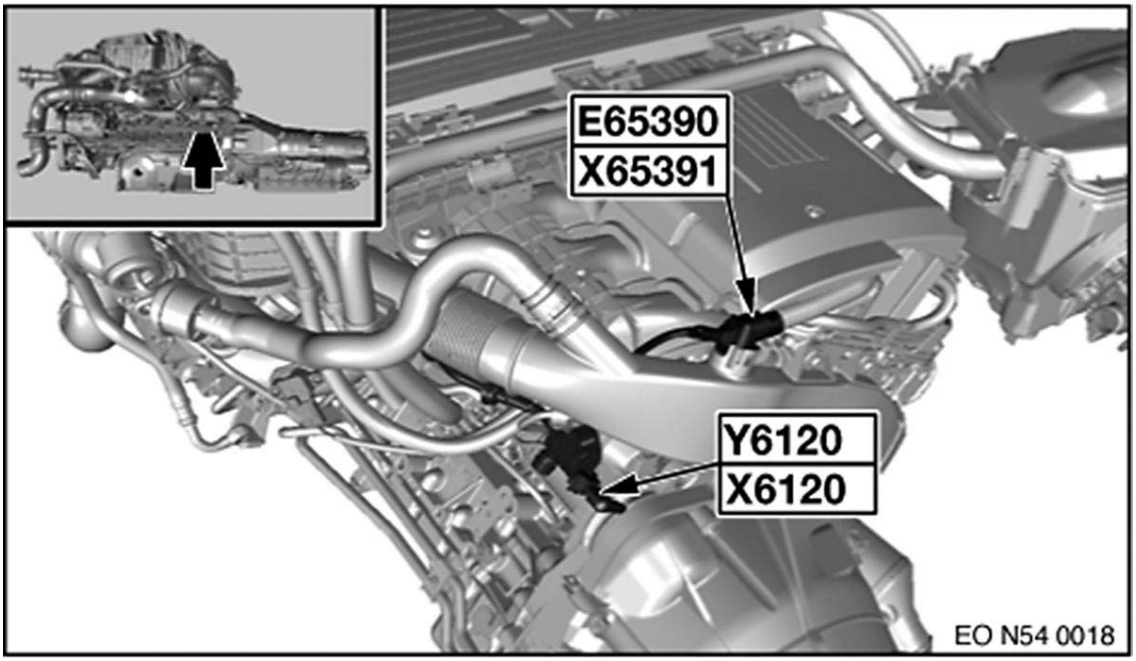


Fig. 81: Left Rear Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

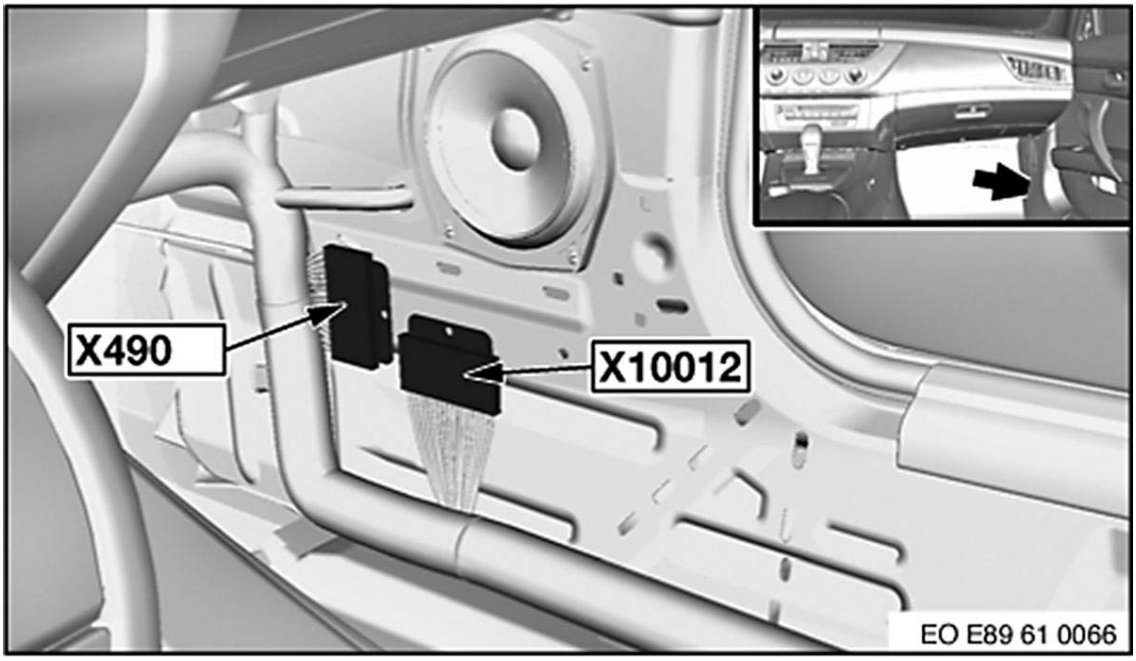


Fig. 82: Right Kick Panel
Courtesy of BMW OF NORTH AMERICA, INC.

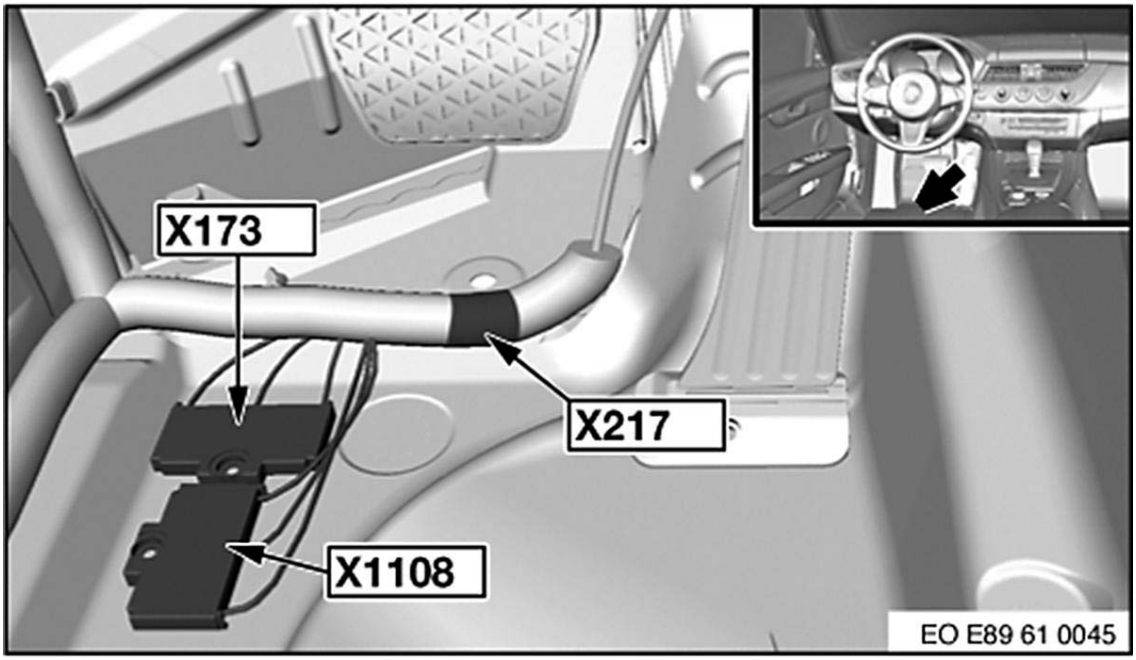


Fig. 83: Left Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

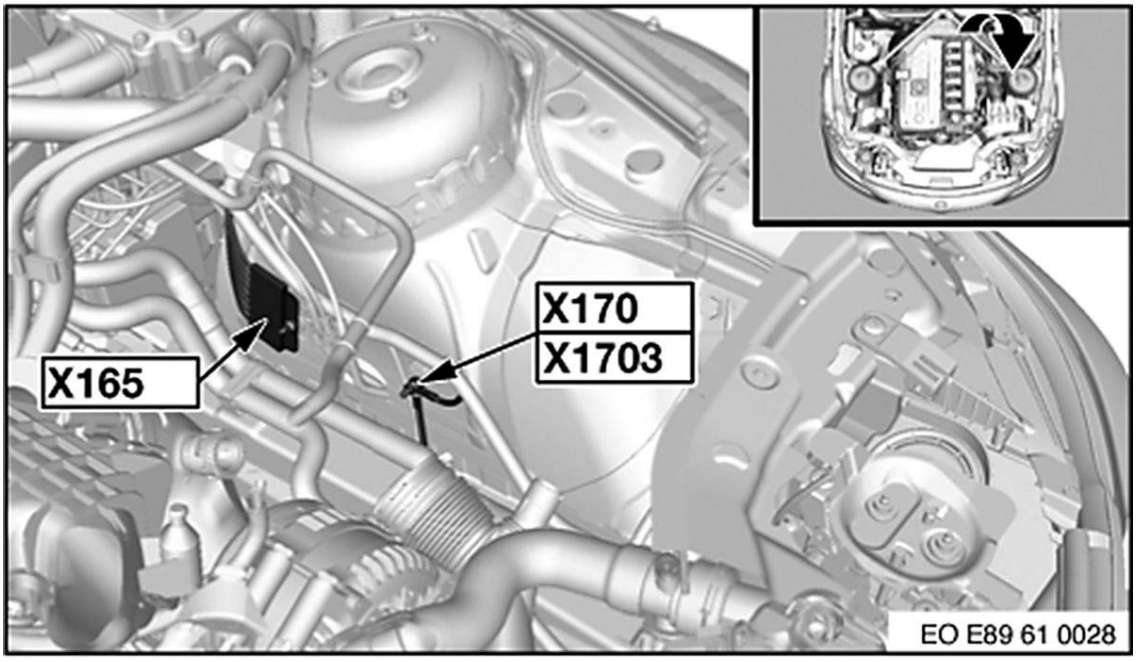


Fig. 84: Left Side Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

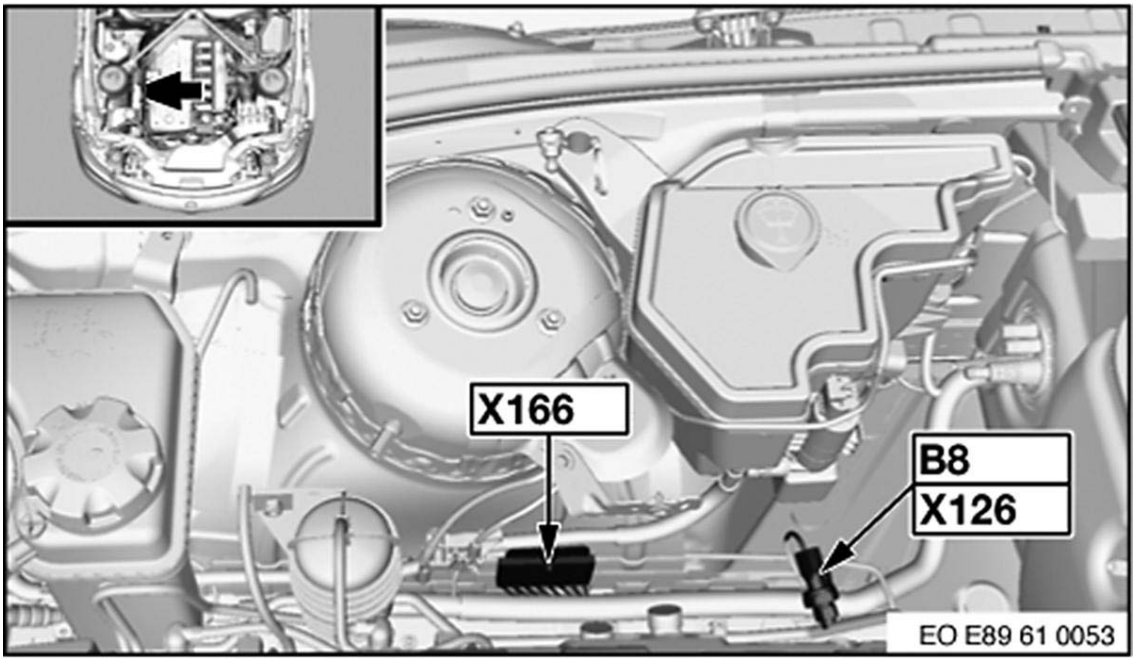


Fig. 85: Right Side Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

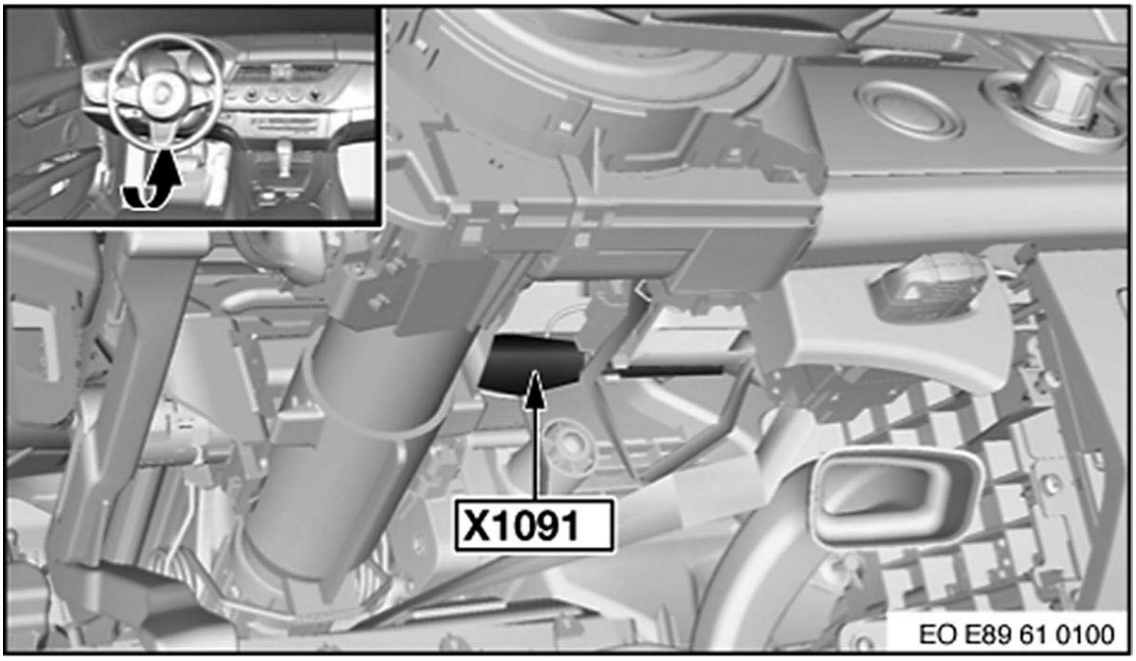


Fig. 86: Below Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

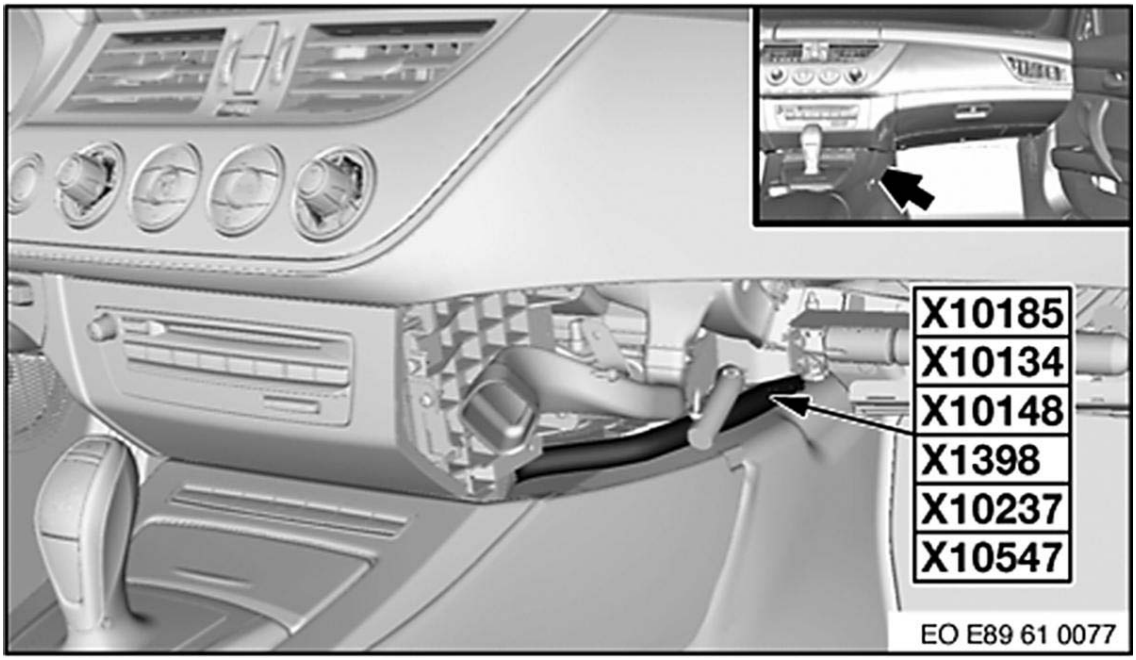


Fig. 87: Center Right Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

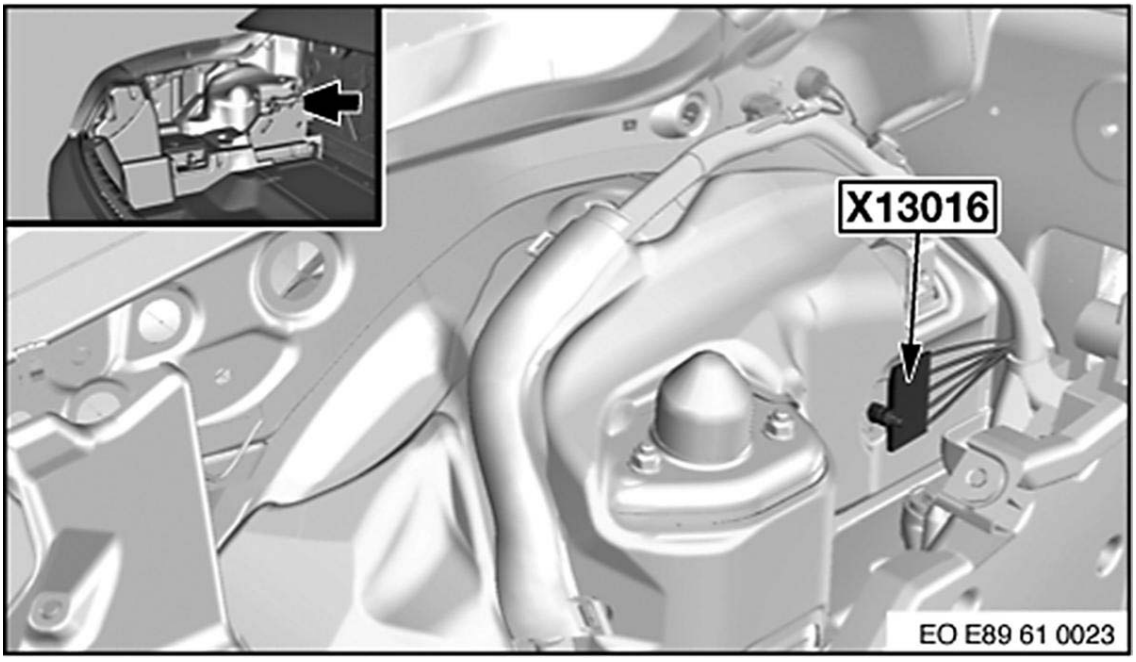


Fig. 88: Left Front Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

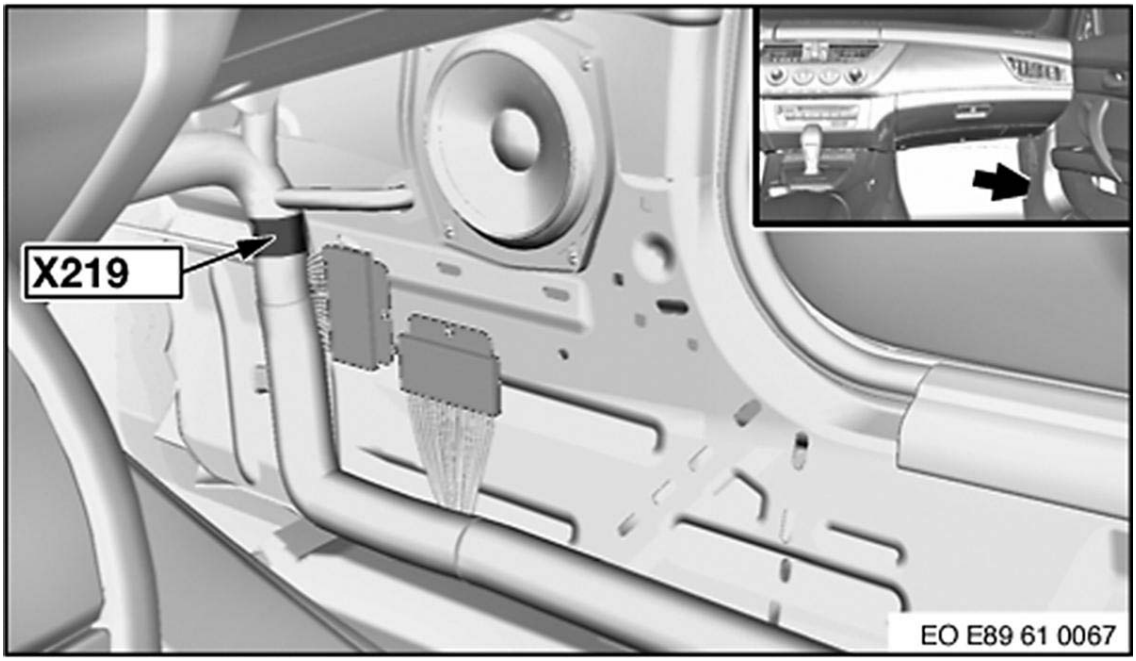


Fig. 89: Right Kick Panel
Courtesy of BMW OF NORTH AMERICA, INC.

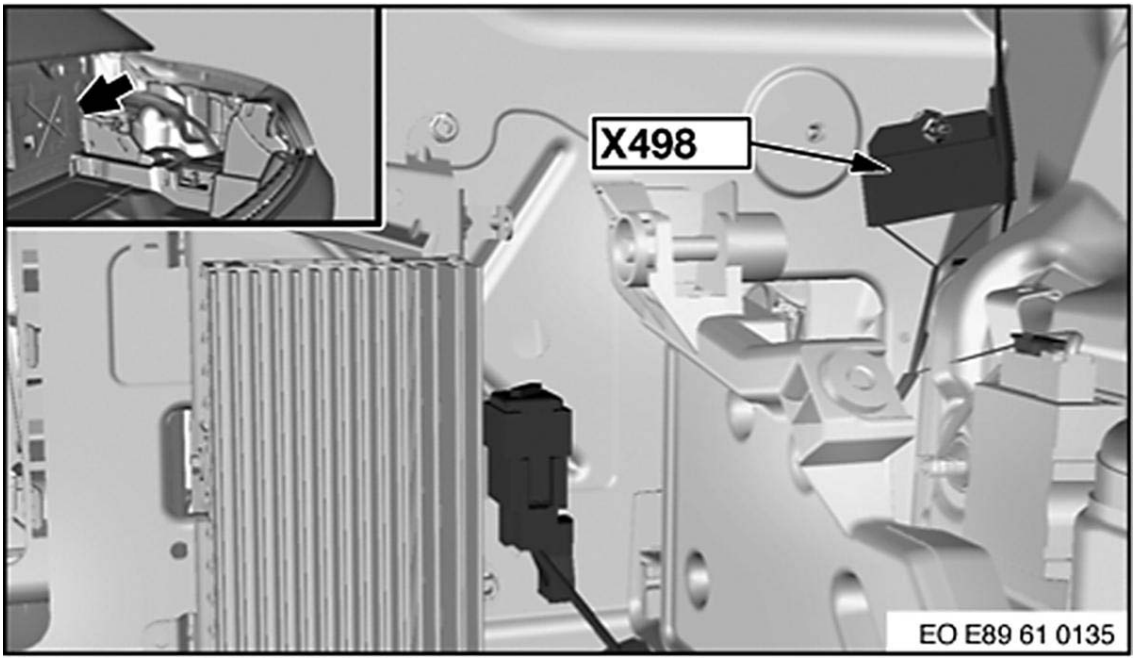


Fig. 90: Right Front Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

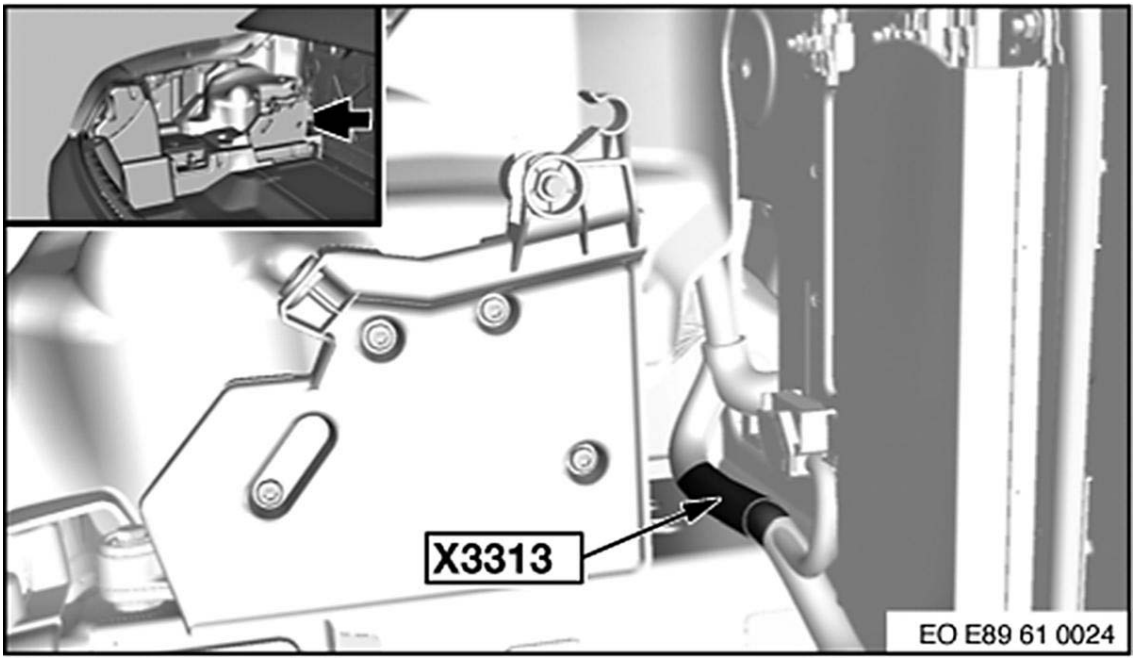


Fig. 91: Left Front Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

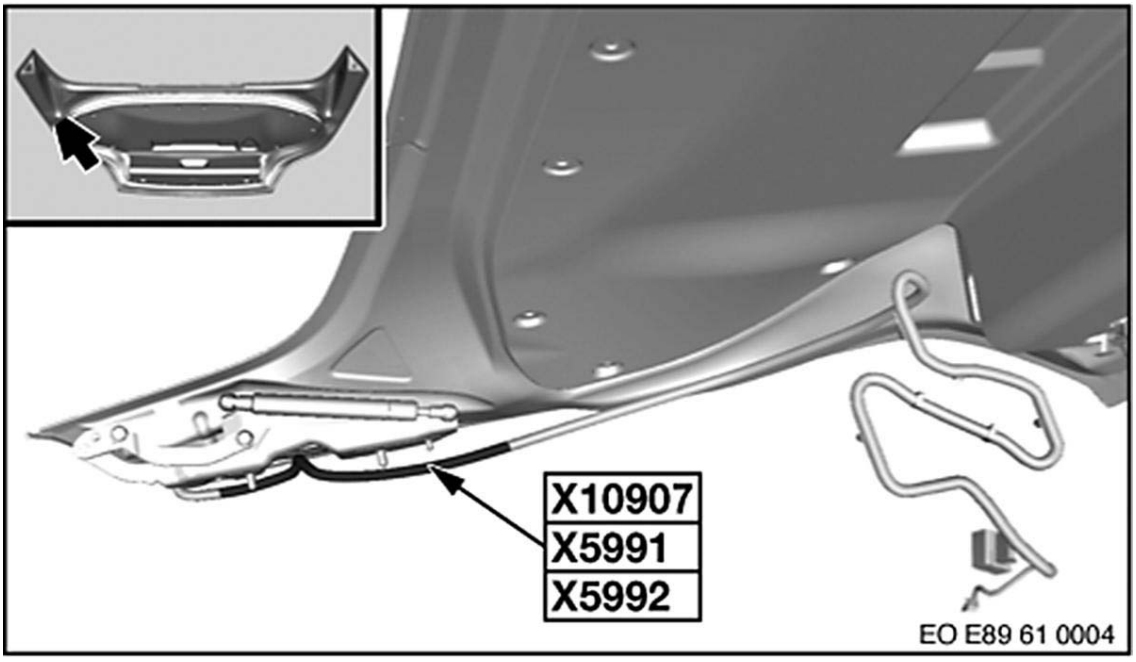


Fig. 92: Right Front Of Luggage Lid
Courtesy of BMW OF NORTH AMERICA, INC.

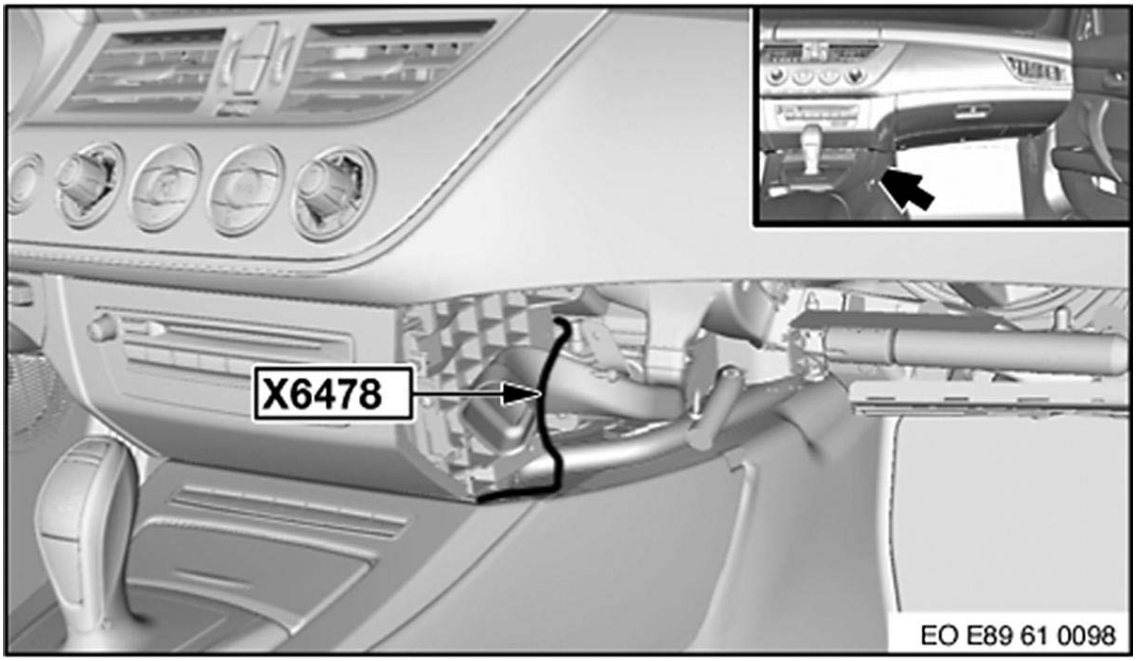


Fig. 93: Center Right Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

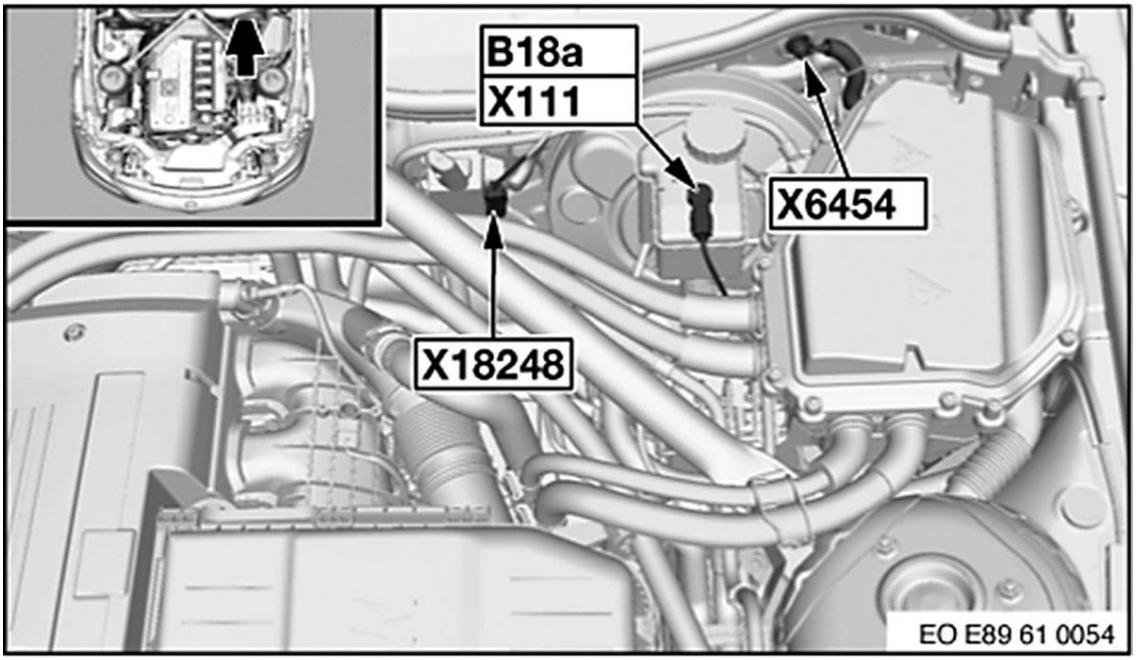


Fig. 94: Left Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

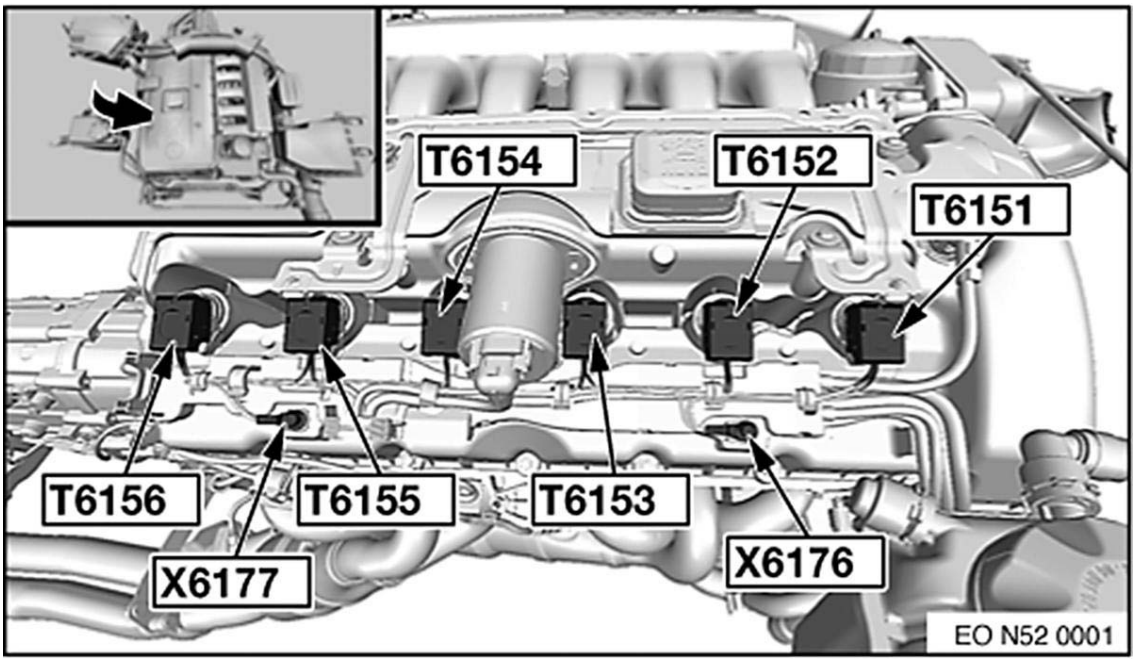


Fig. 95: Top Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

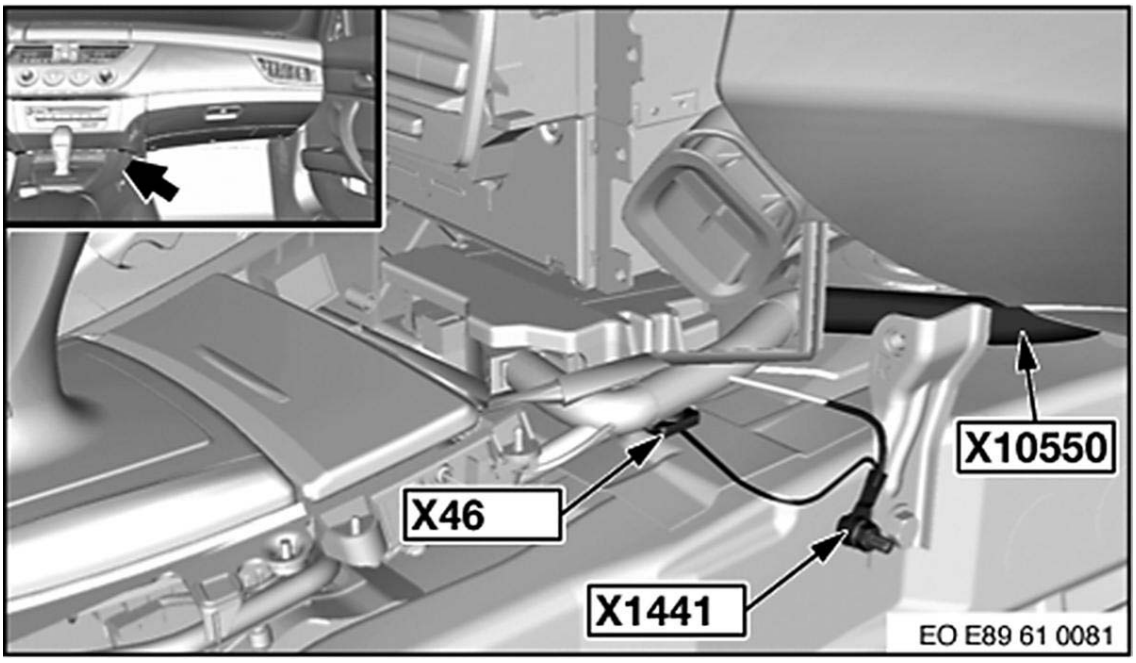


Fig. 96: Right Front Of Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

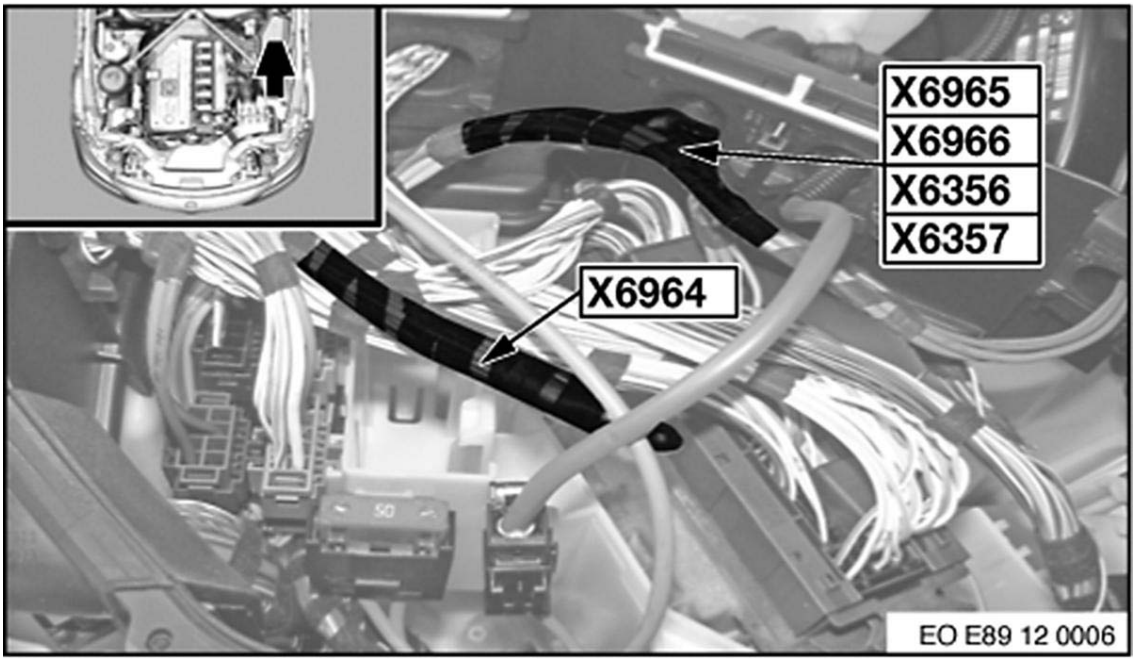


Fig. 97: Left Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

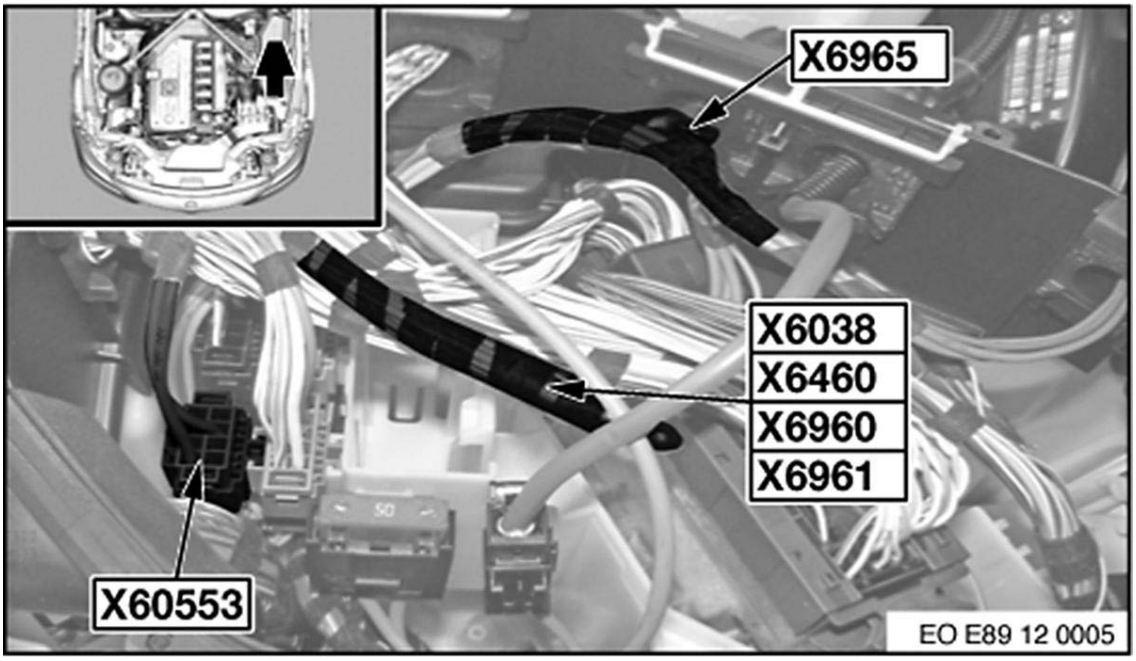


Fig. 98: Left Rear Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

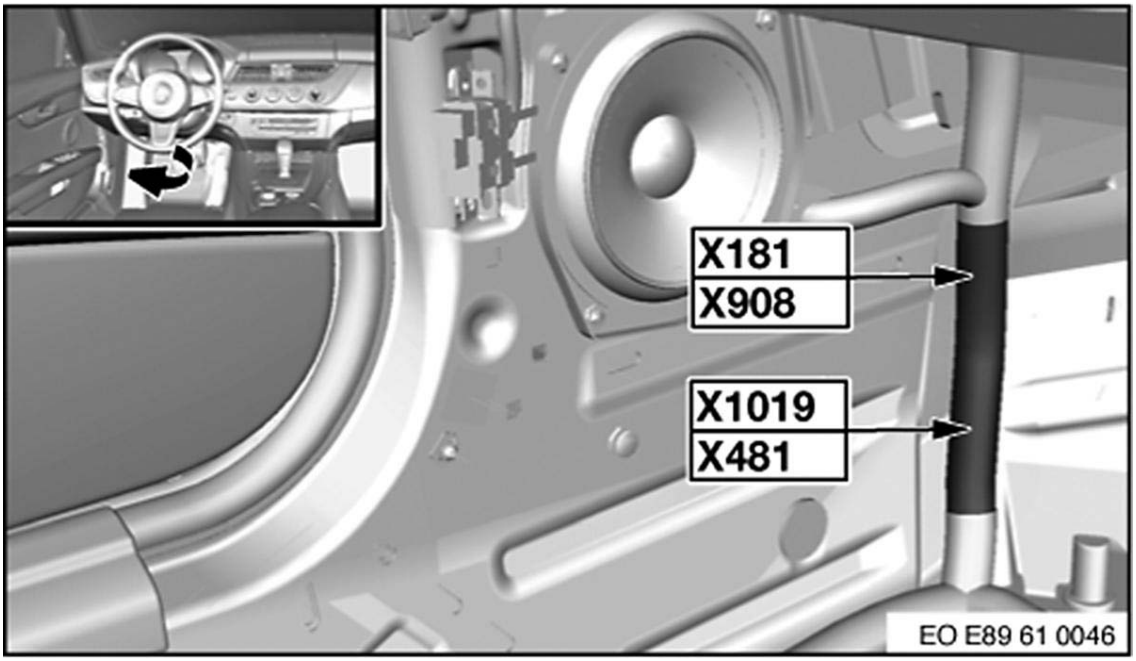


Fig. 99: Left Kick Panel
Courtesy of BMW OF NORTH AMERICA, INC.

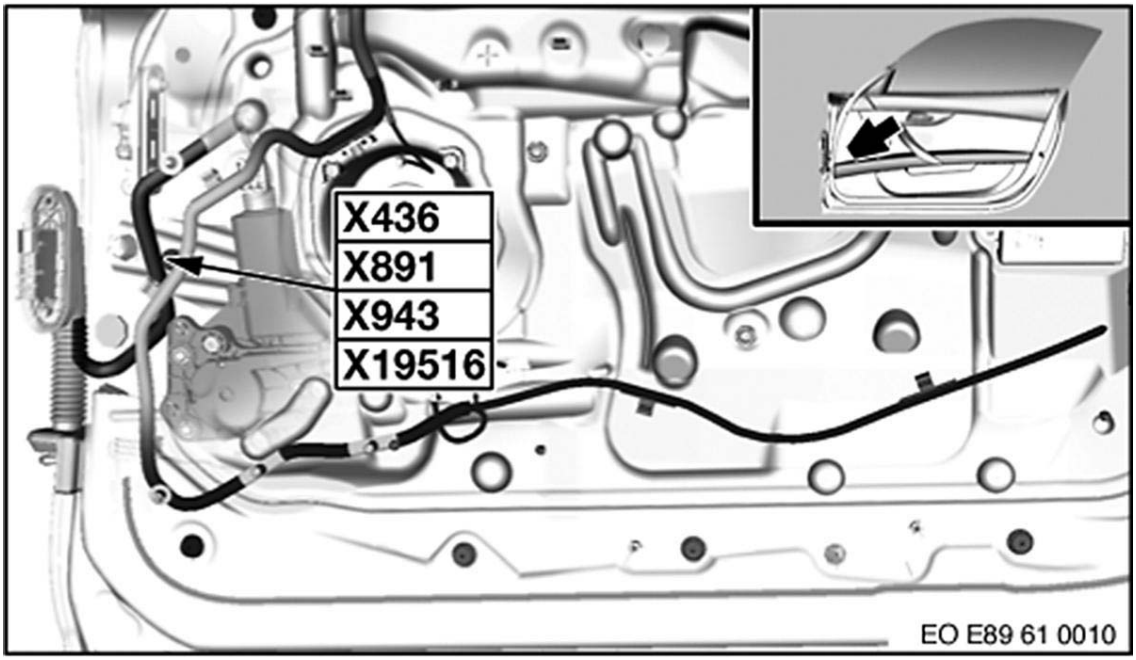


Fig. 100: Passenger's Door
Courtesy of BMW OF NORTH AMERICA, INC.

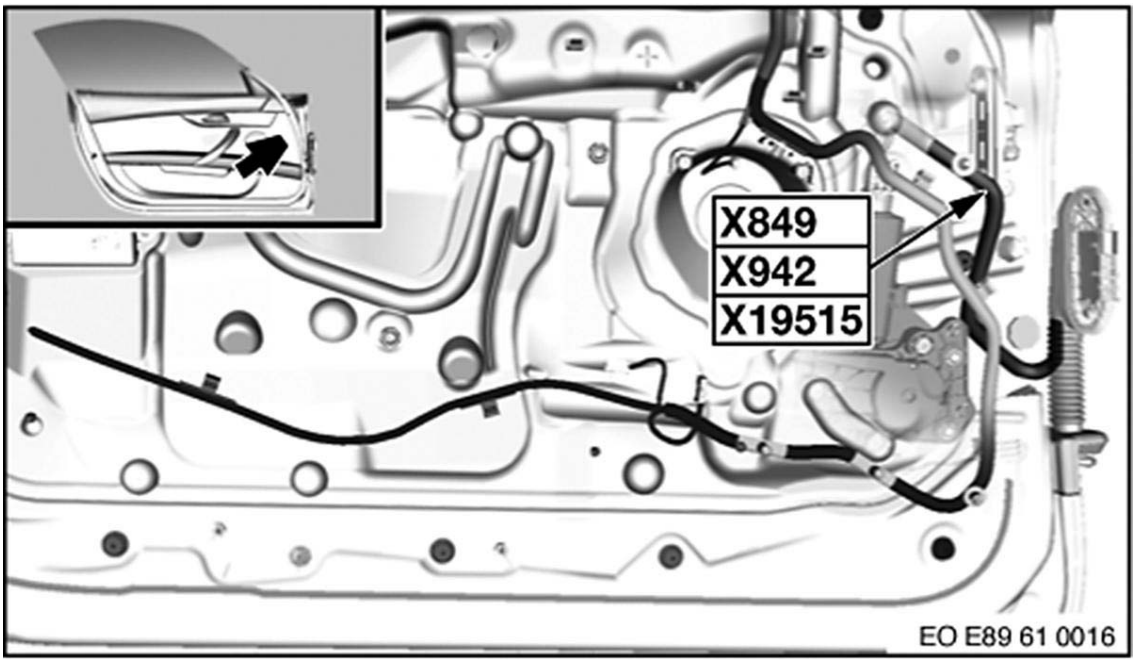


Fig. 101: Driver's Door
Courtesy of BMW OF NORTH AMERICA, INC.

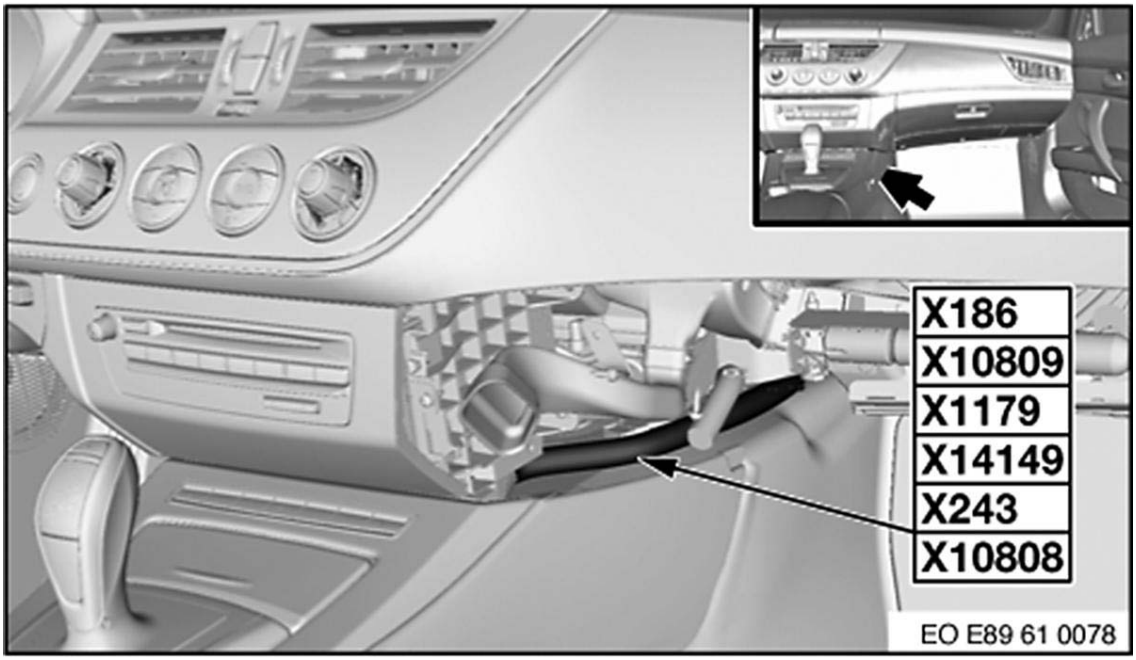


Fig. 102: Center Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

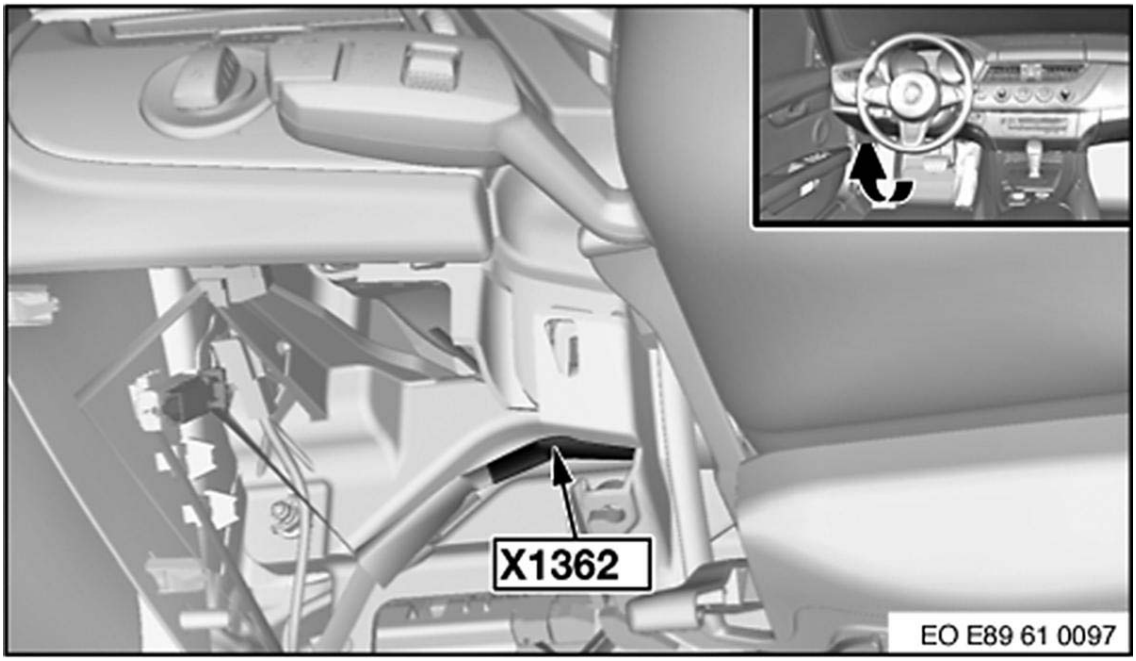


Fig. 103: Left End Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

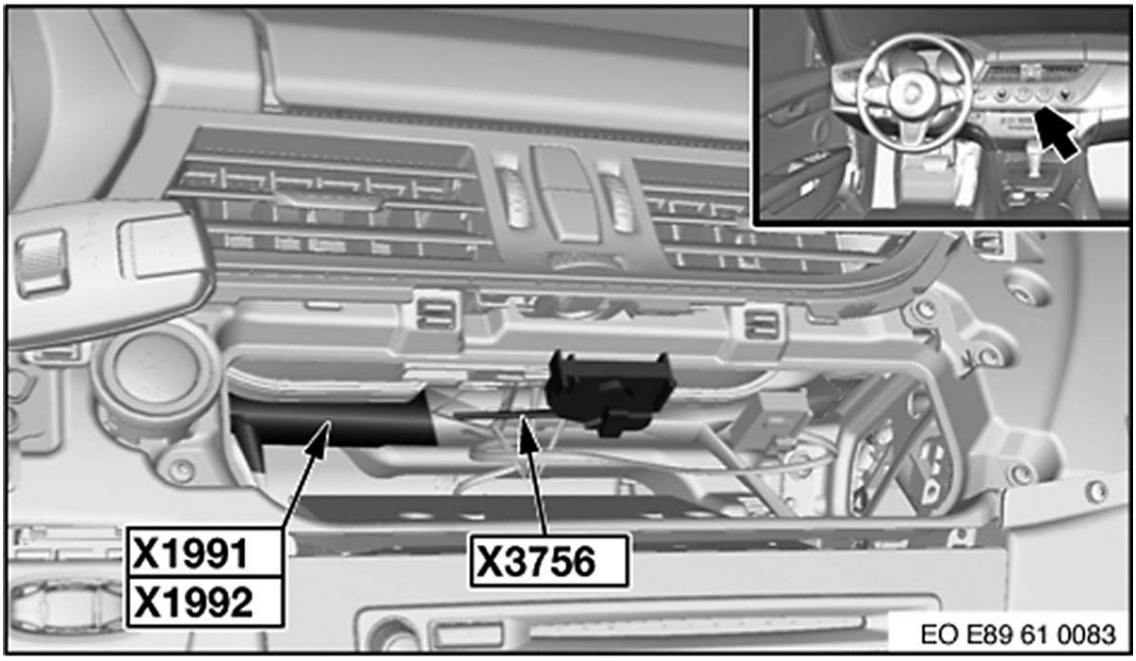


Fig. 104: Center Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

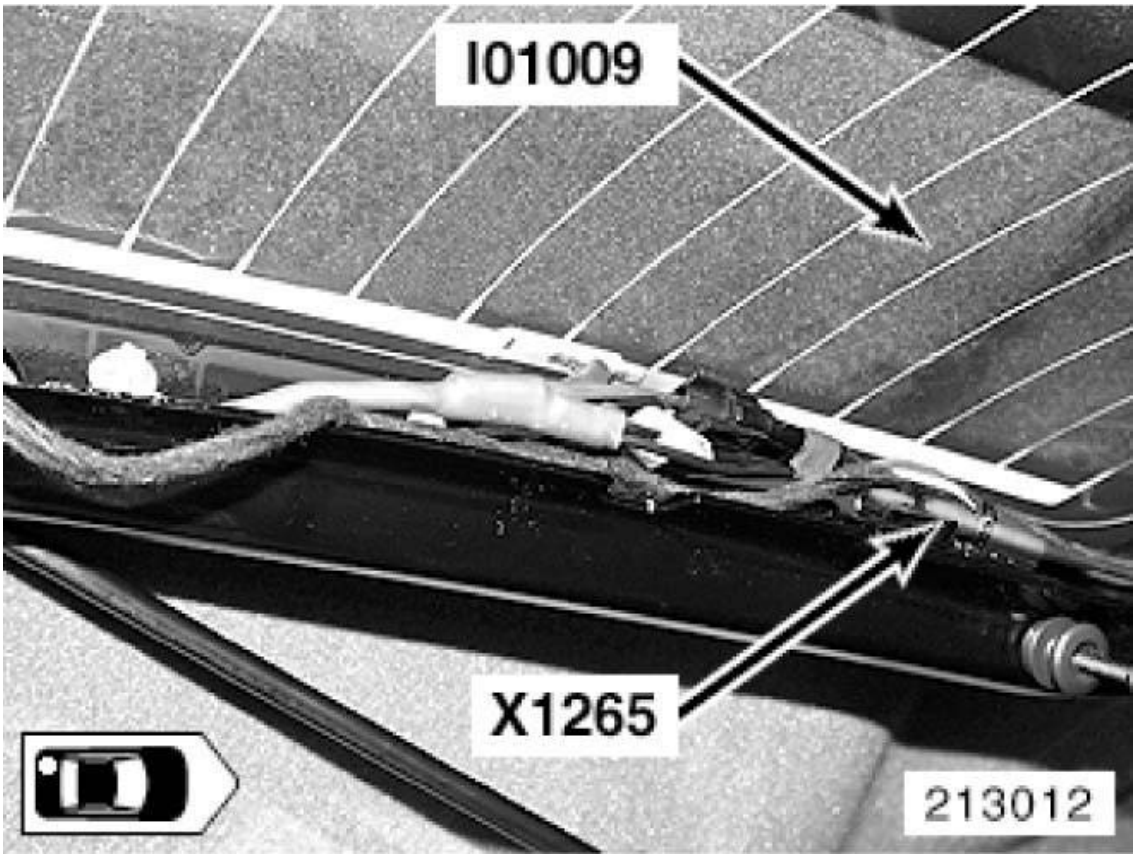


Fig. 105: Rear Window
Courtesy of BMW OF NORTH AMERICA, INC.

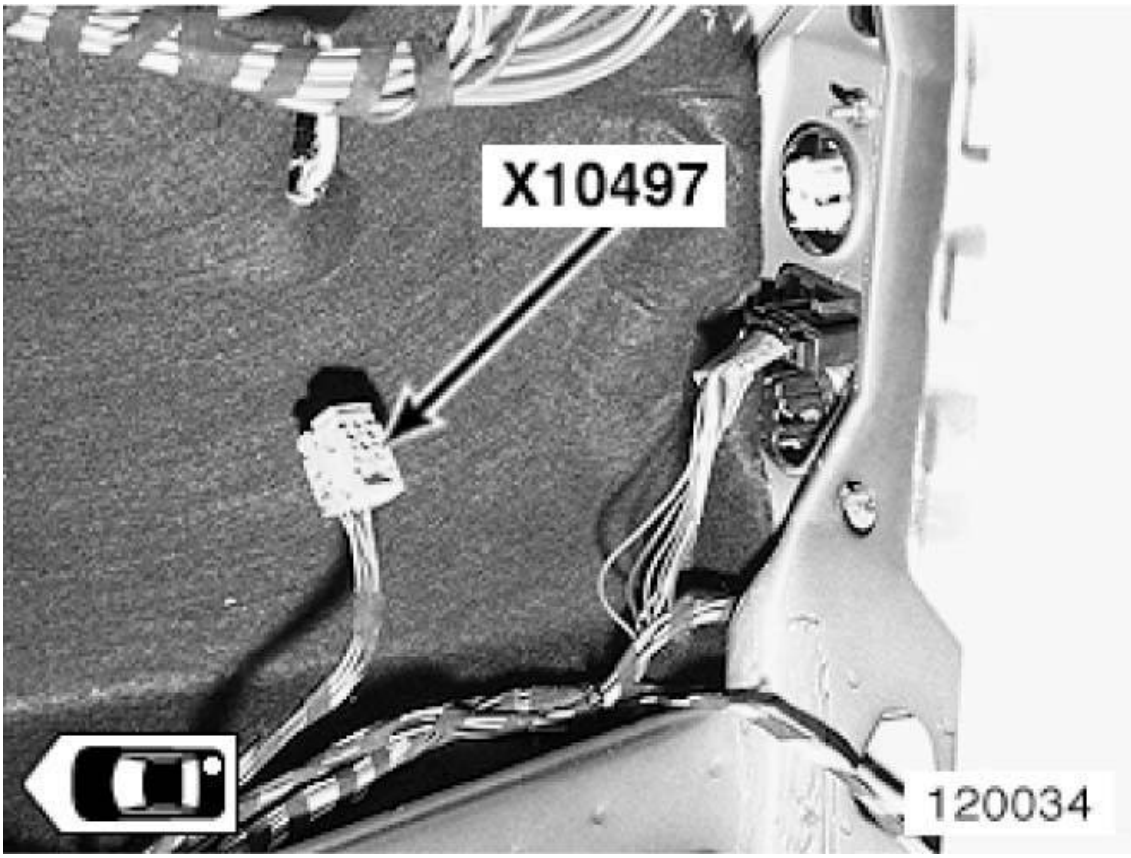


Fig. 106: Right Side Of Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

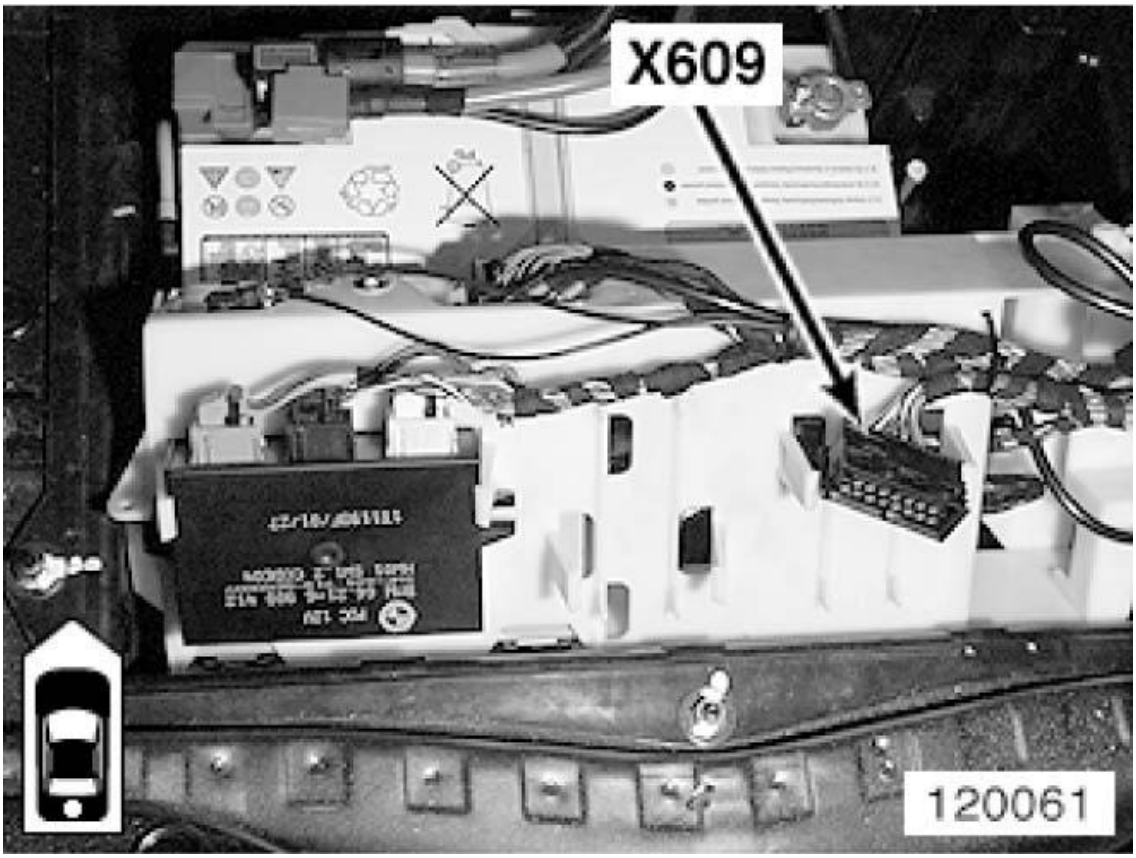


Fig. 107: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

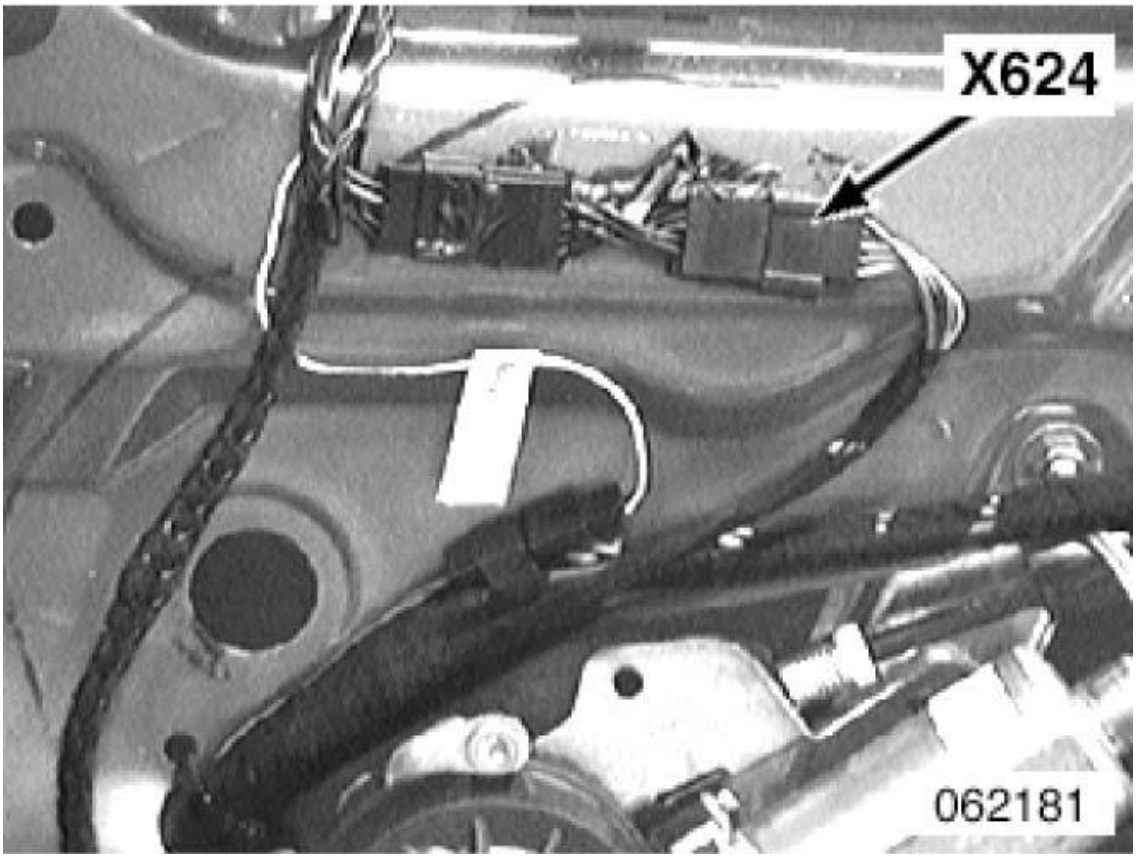


Fig. 108: Passenger's Door
Courtesy of BMW OF NORTH AMERICA, INC.

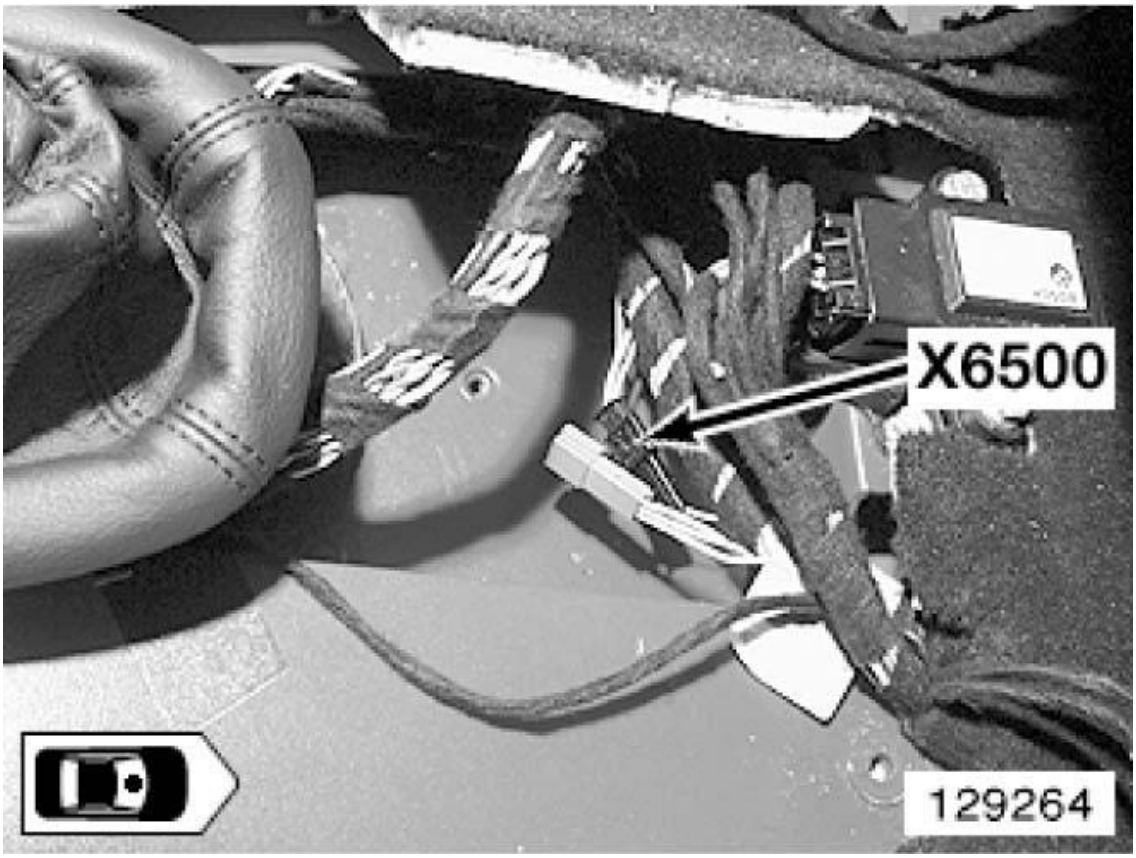


Fig. 109: Center Console
Courtesy of BMW OF NORTH AMERICA, INC.

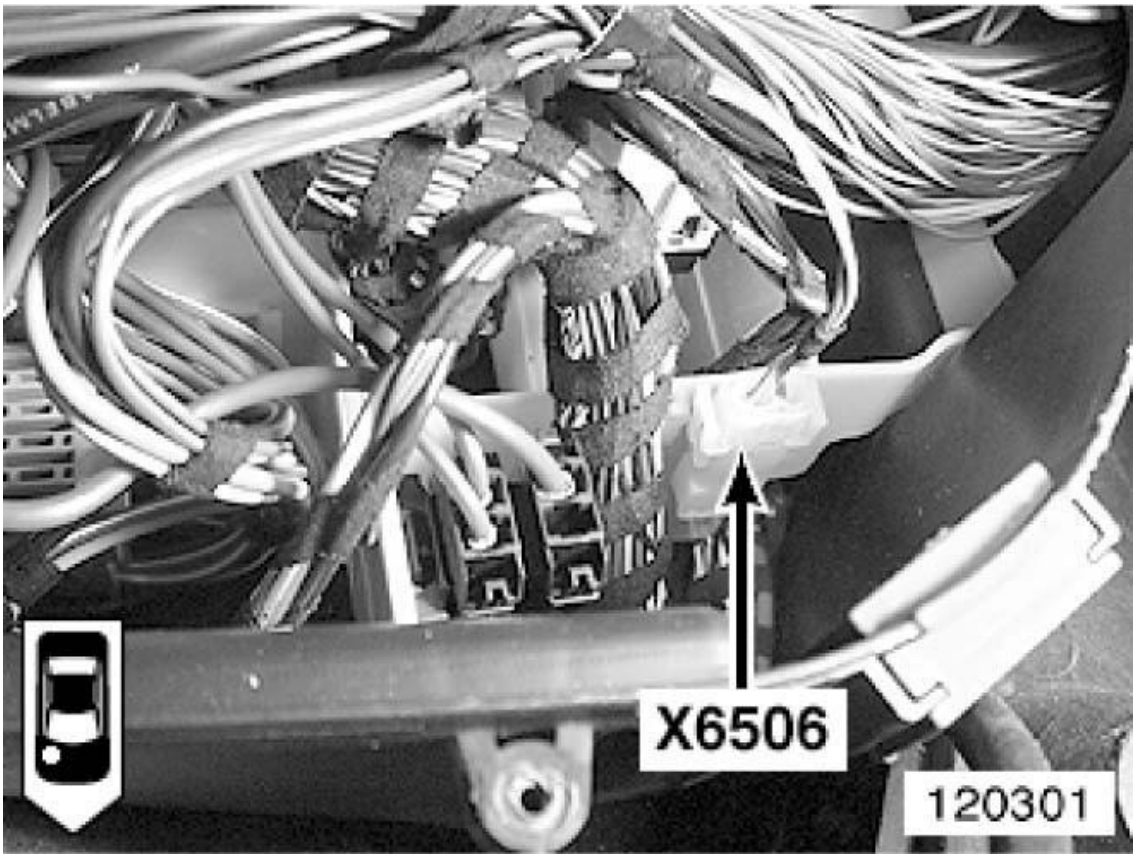


Fig. 110: Right Side Of Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

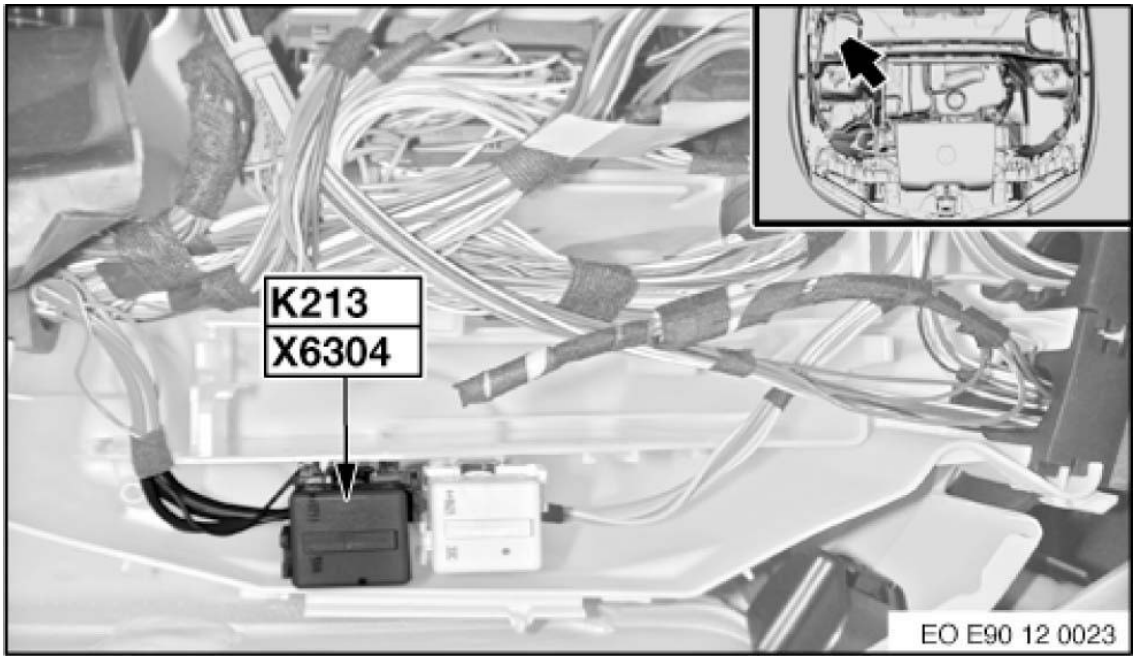


Fig. 111: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

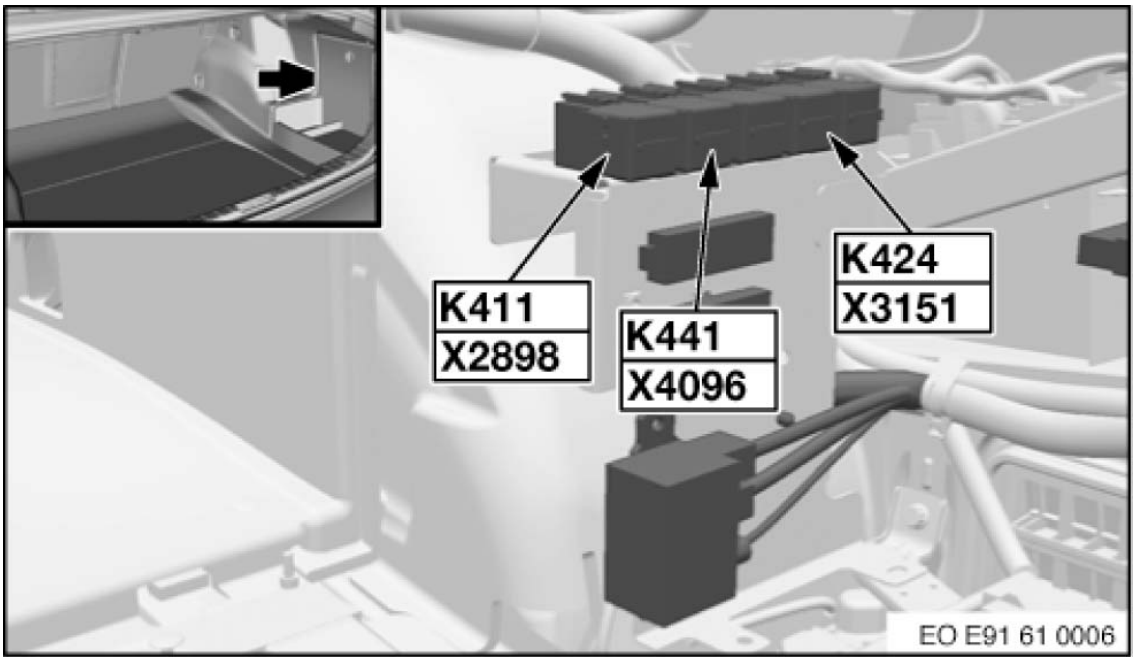


Fig. 112: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

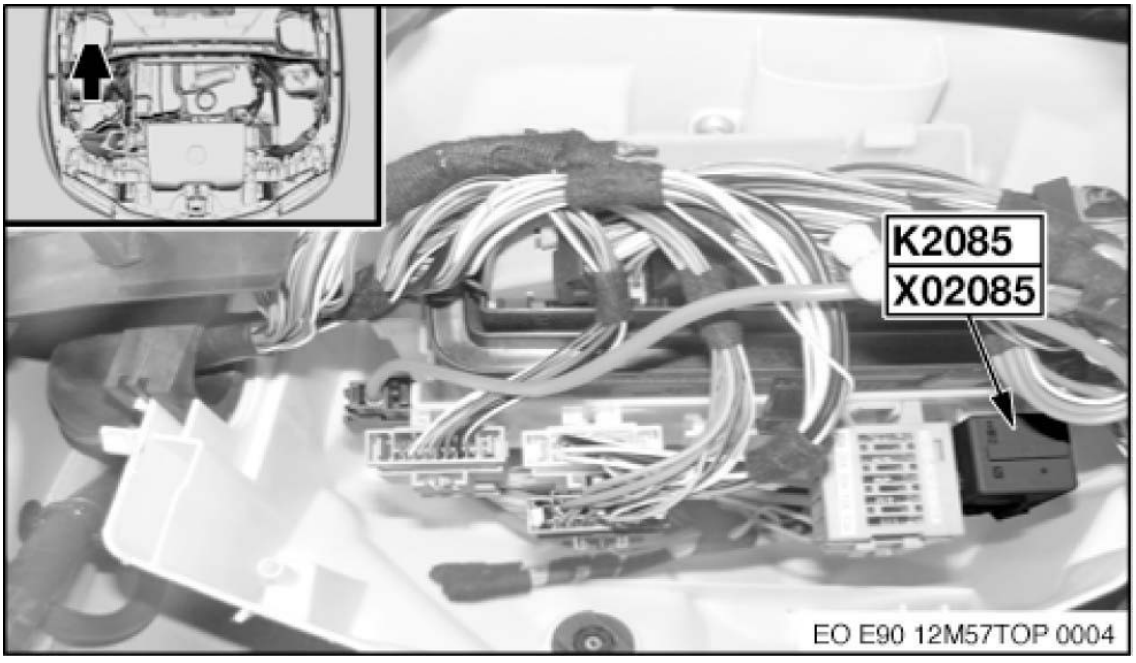


Fig. 113: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

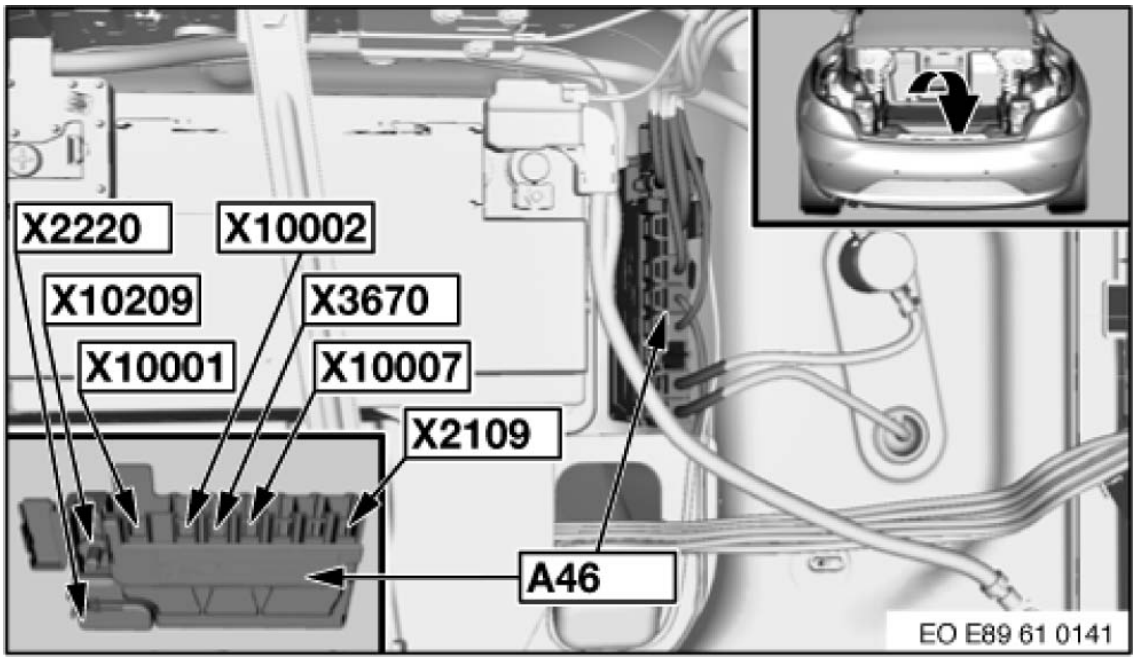


Fig. 114: Luggage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

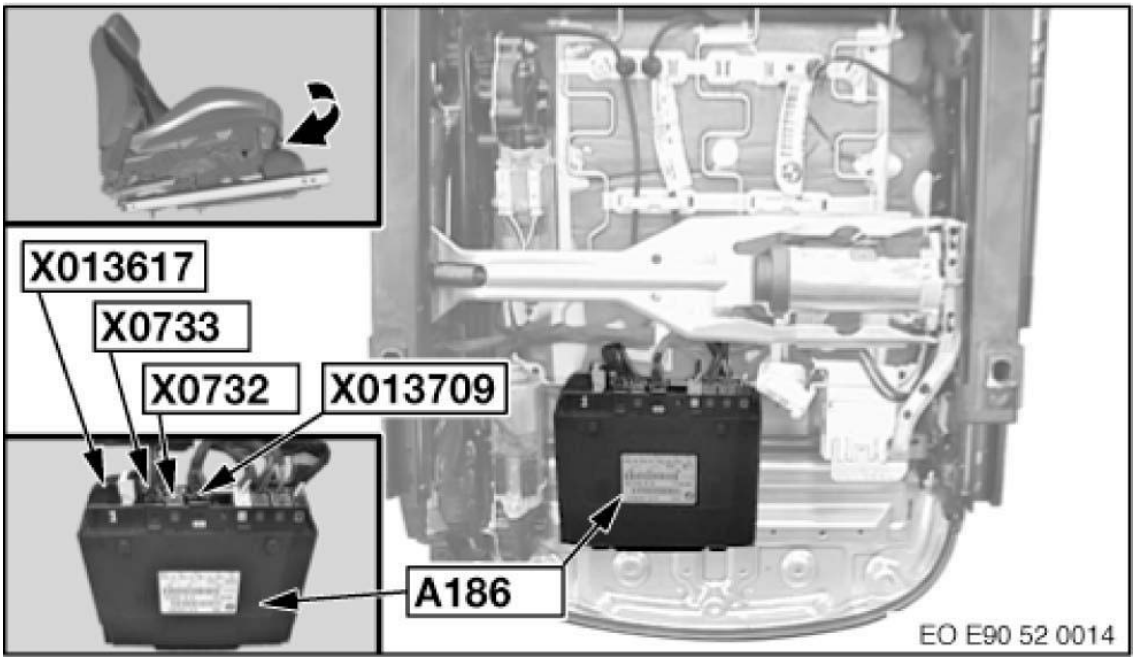


Fig. 115: Passenger's Seat
Courtesy of BMW OF NORTH AMERICA, INC.

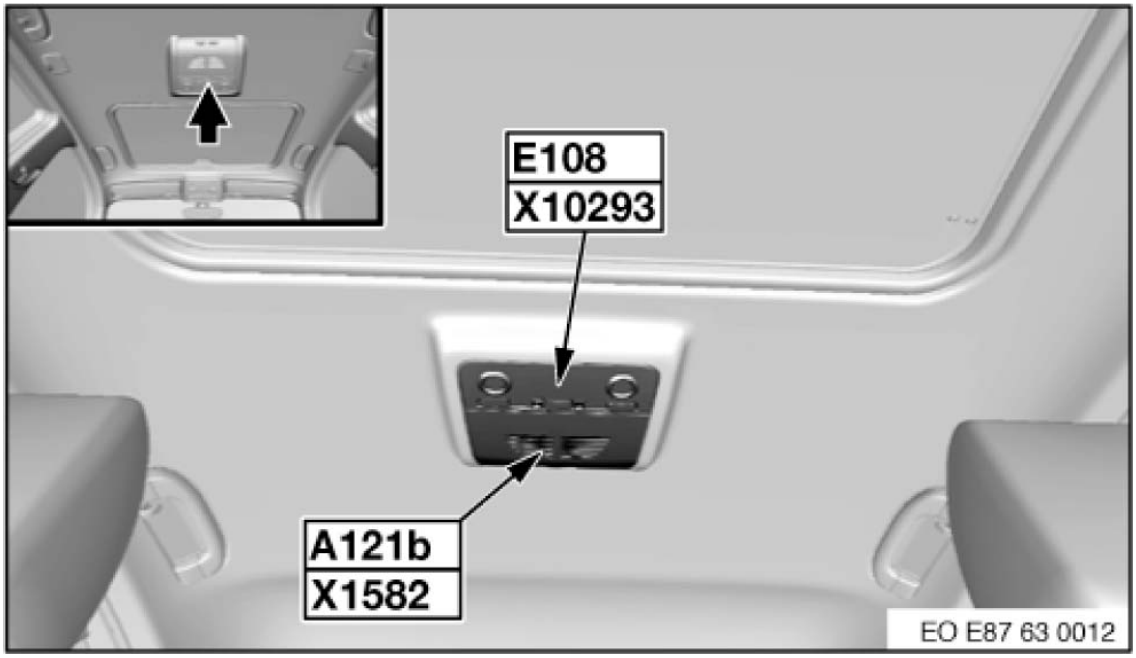


Fig. 116: Roof
Courtesy of BMW OF NORTH AMERICA, INC.

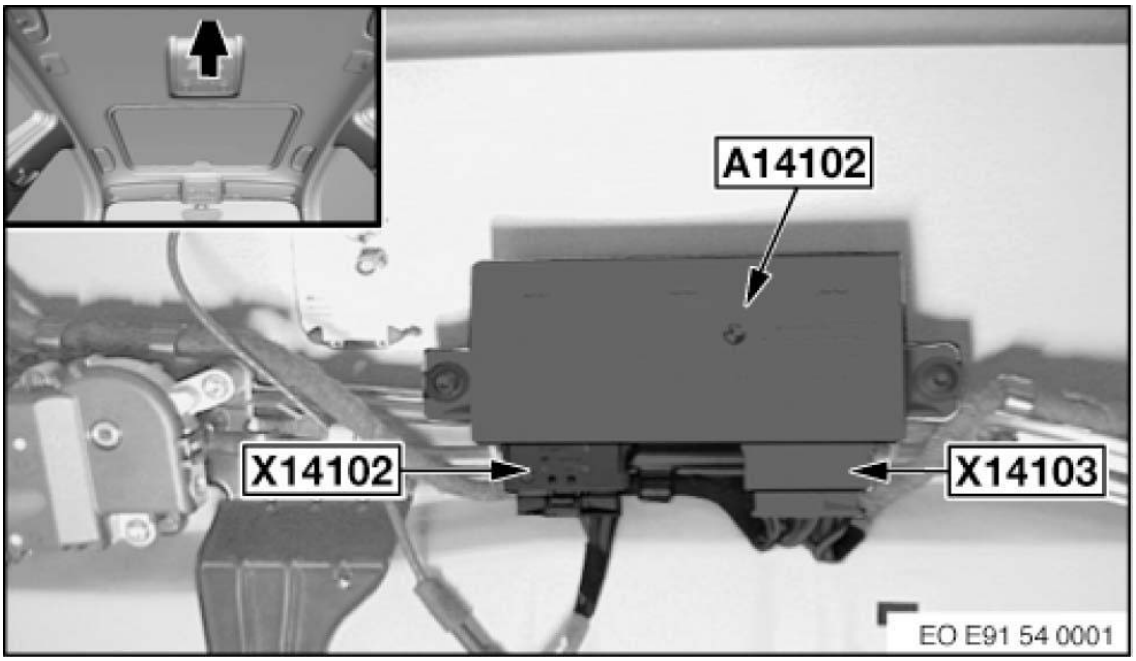


Fig. 117: Roof
Courtesy of BMW OF NORTH AMERICA, INC.

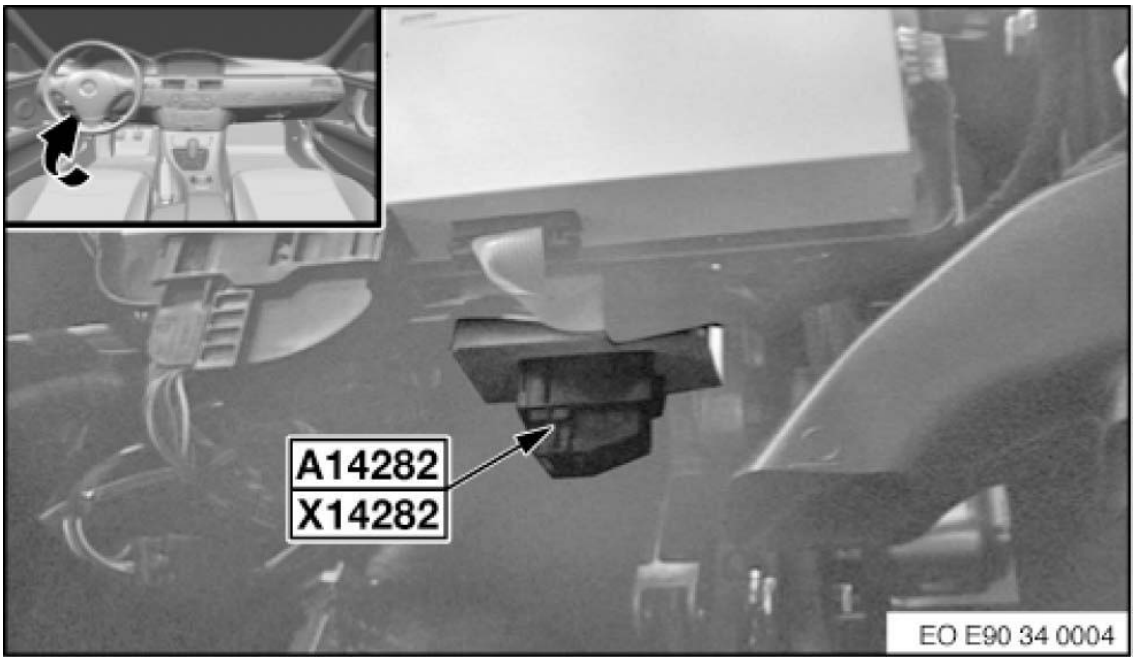


Fig. 118: Dash
Courtesy of BMW OF NORTH AMERICA, INC.

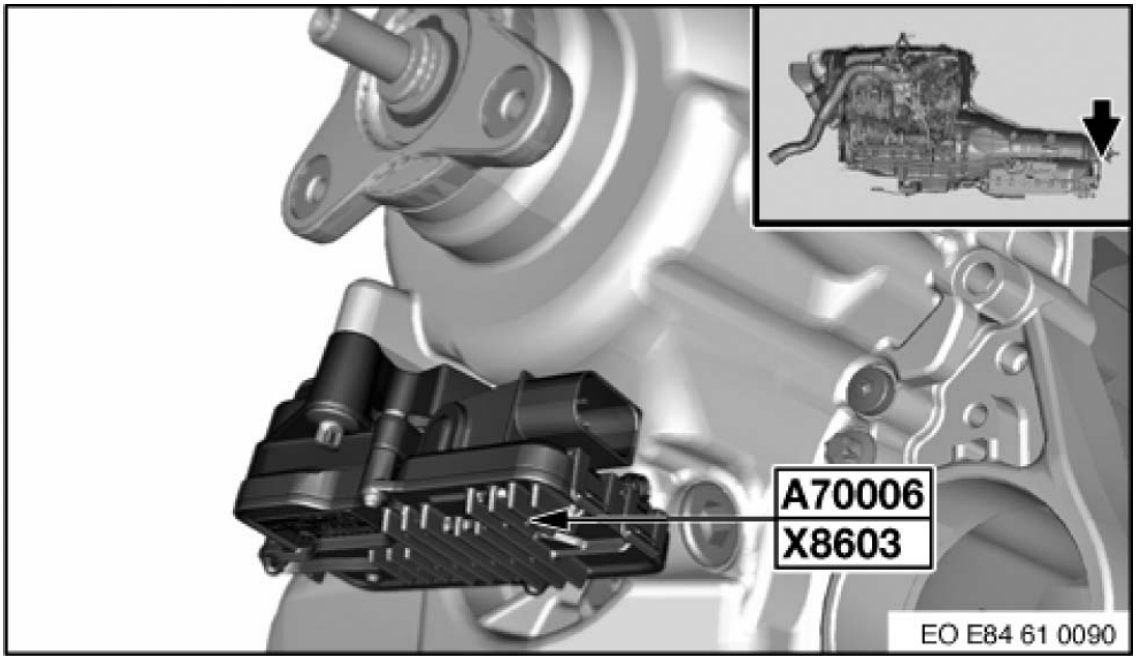


Fig. 119: Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

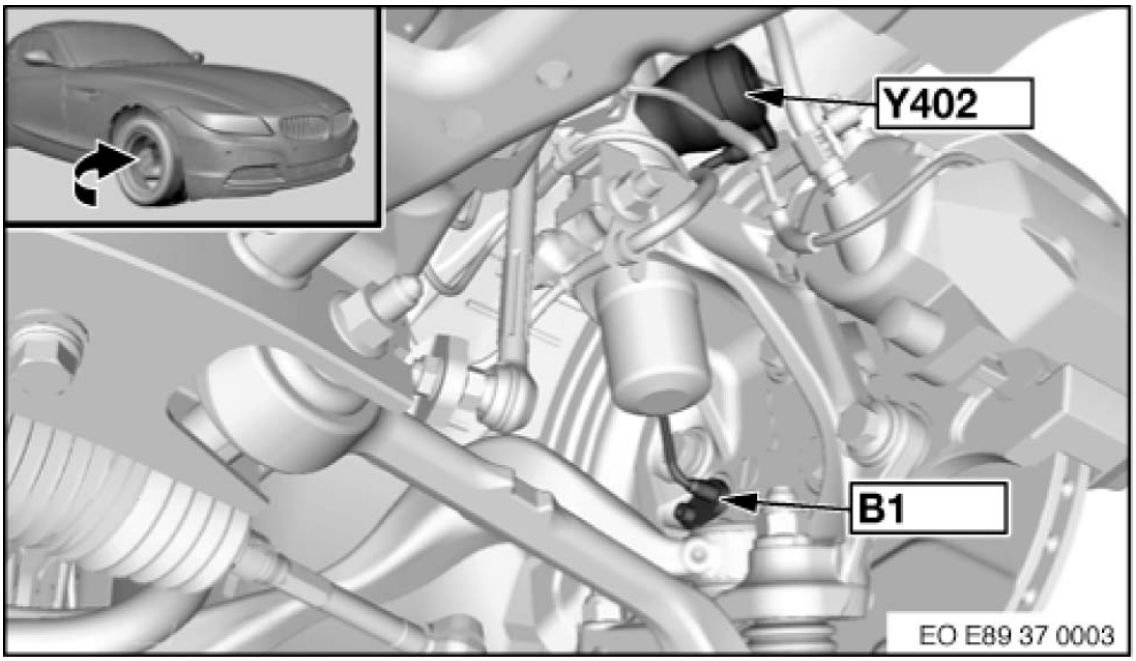


Fig. 120: Right Front Wheel Hub Assembly (Left Similar)
Courtesy of BMW OF NORTH AMERICA, INC.

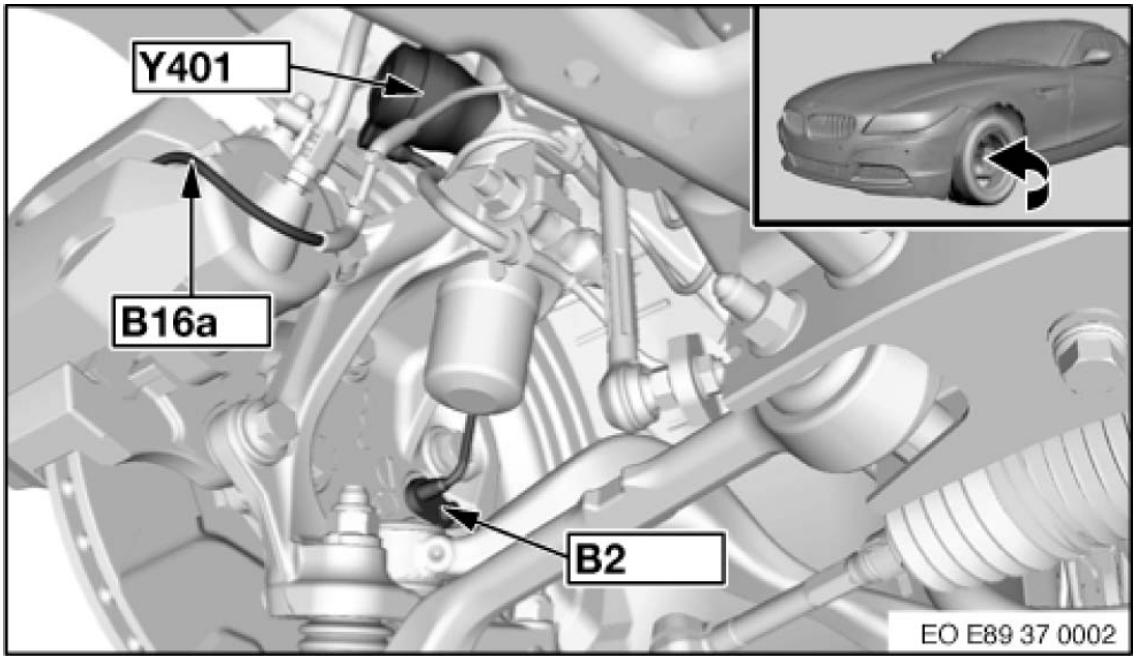


Fig. 121: Left Front Wheel Hub Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

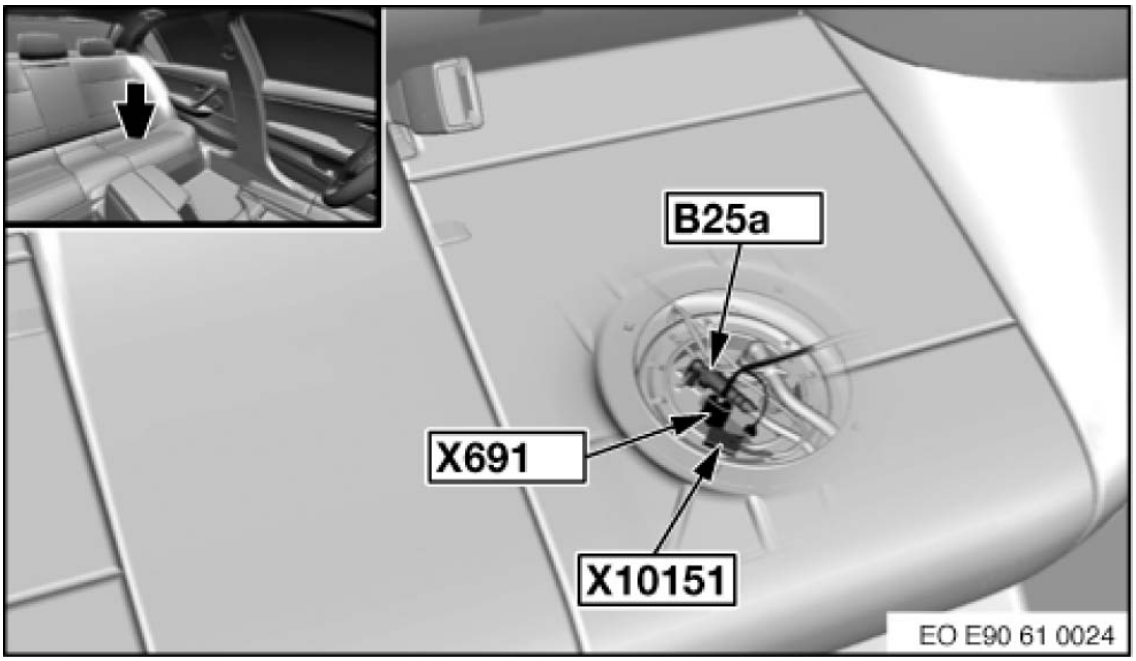


Fig. 122: Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

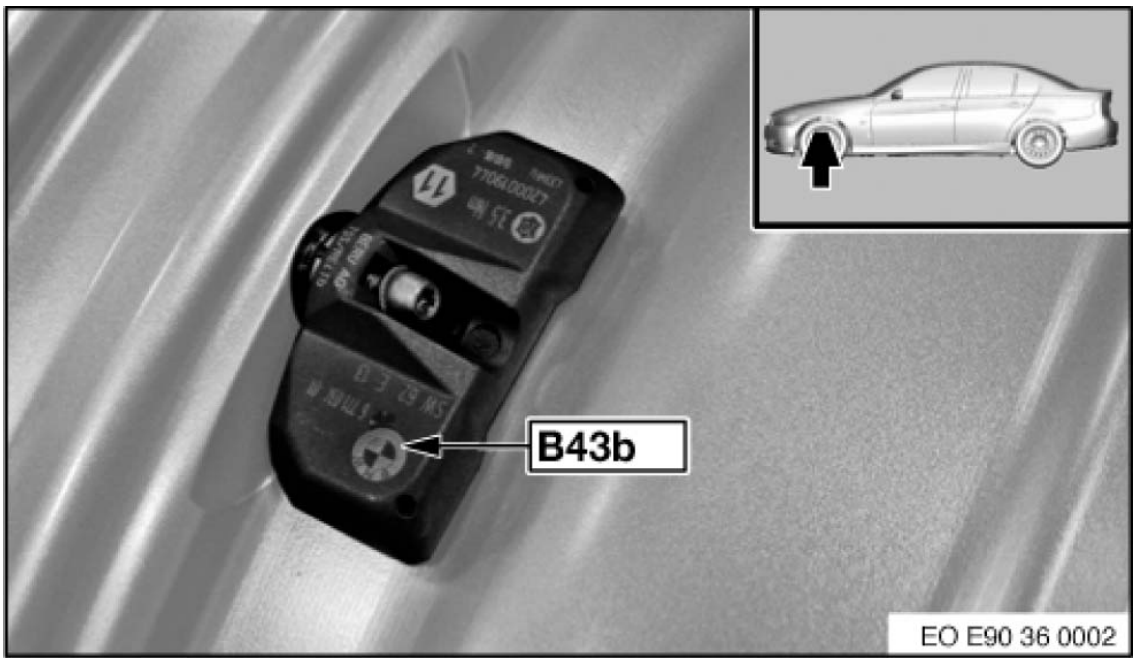


Fig. 123: Left Front Wheel Assembly (Typical)
Courtesy of BMW OF NORTH AMERICA, INC.

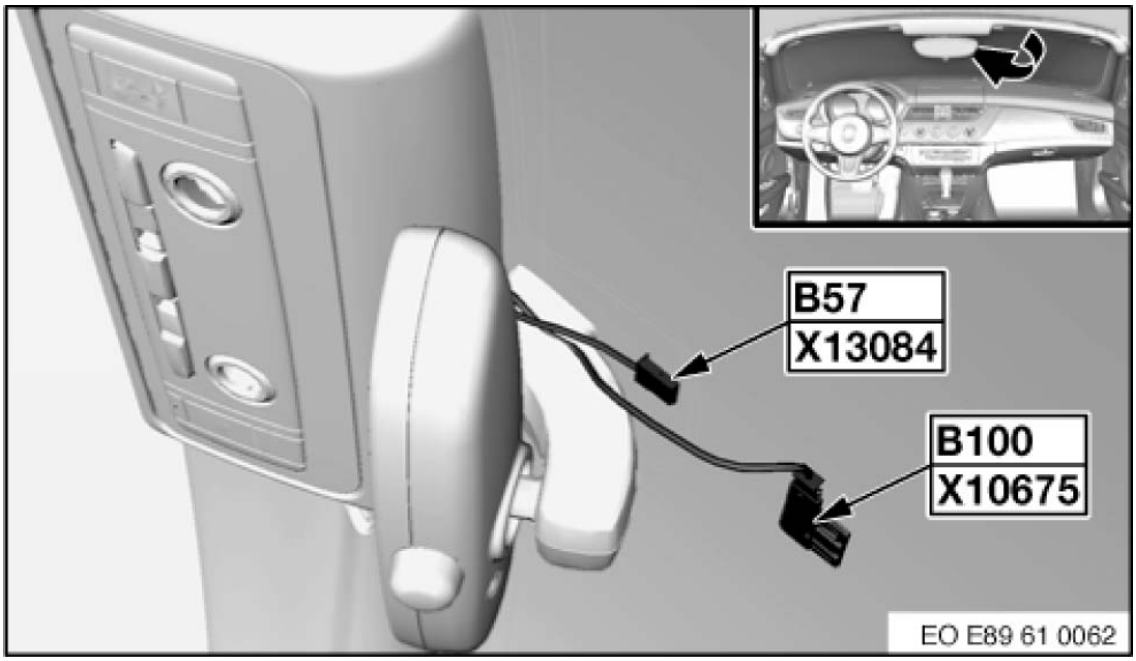


Fig. 124: Windshield
Courtesy of BMW OF NORTH AMERICA, INC.

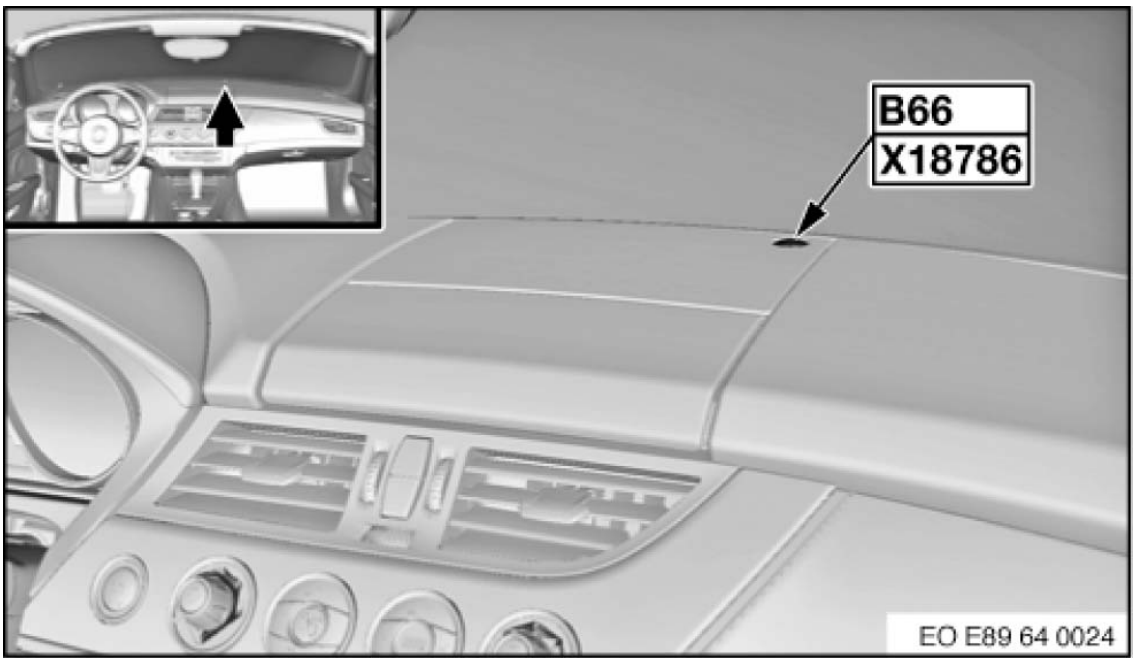


Fig. 125: Dash
Courtesy of BMW OF NORTH AMERICA, INC.

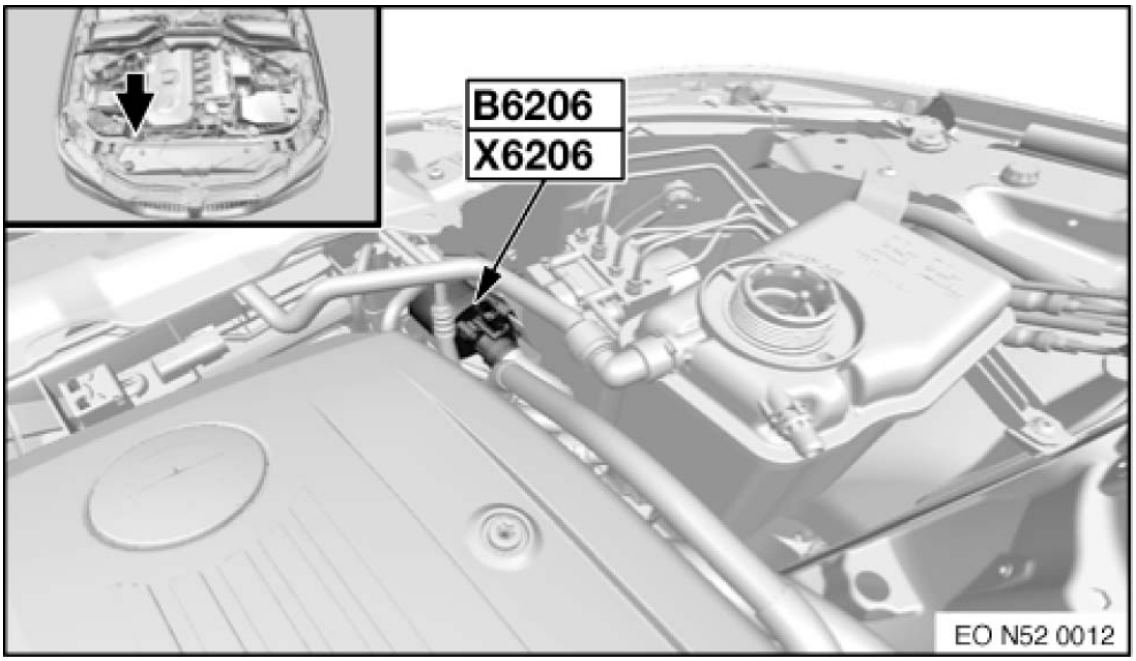


Fig. 126: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

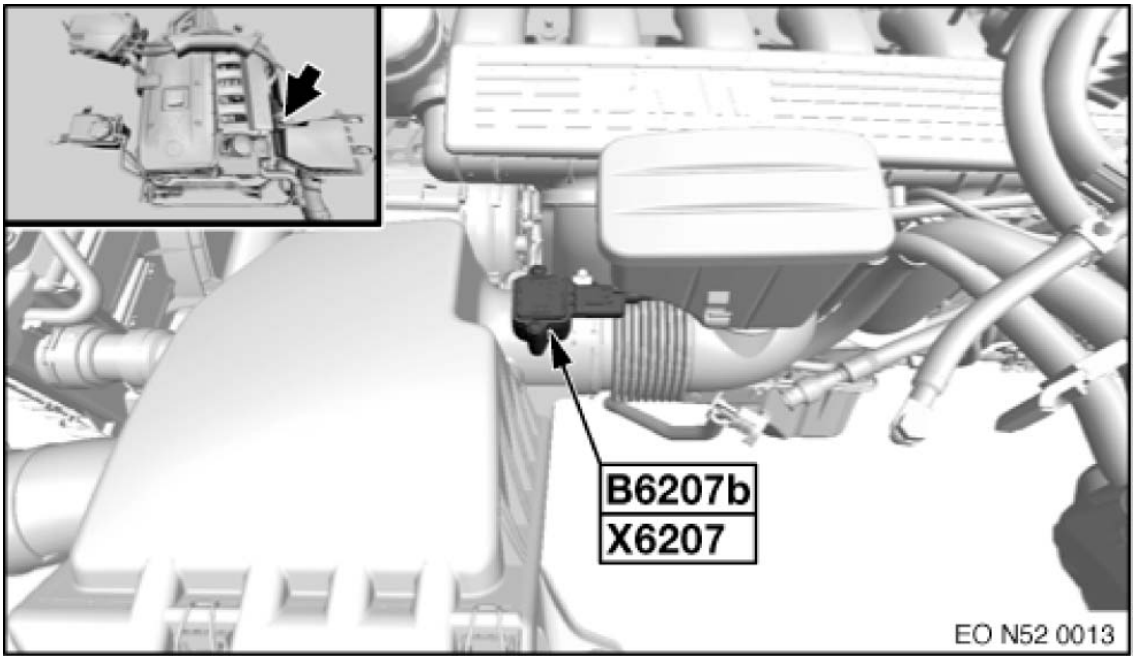


Fig. 127: Left Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

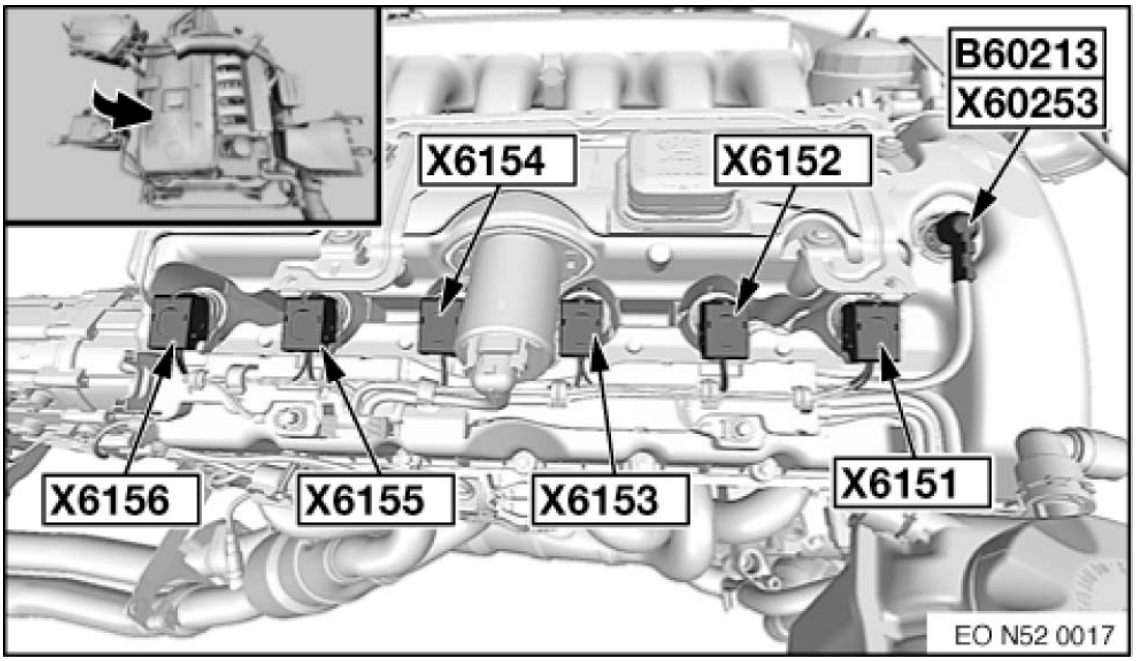


Fig. 128: Right Side Of Engine
Courtesy of BMW OF NORTH AMERICA, INC.

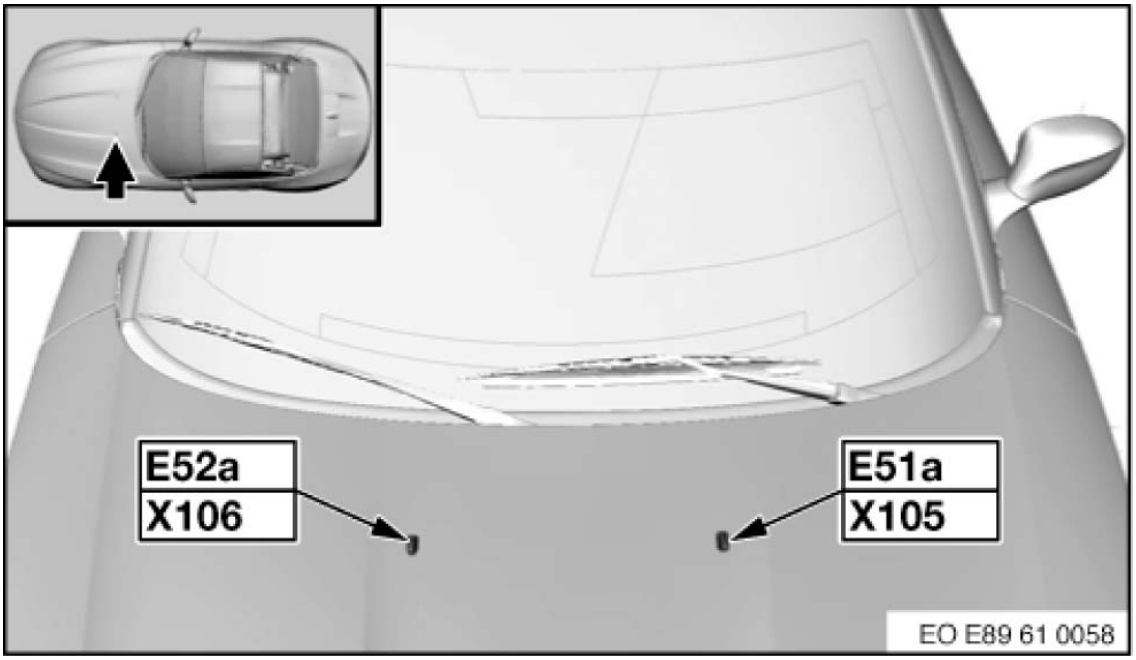


Fig. 129: Engine Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

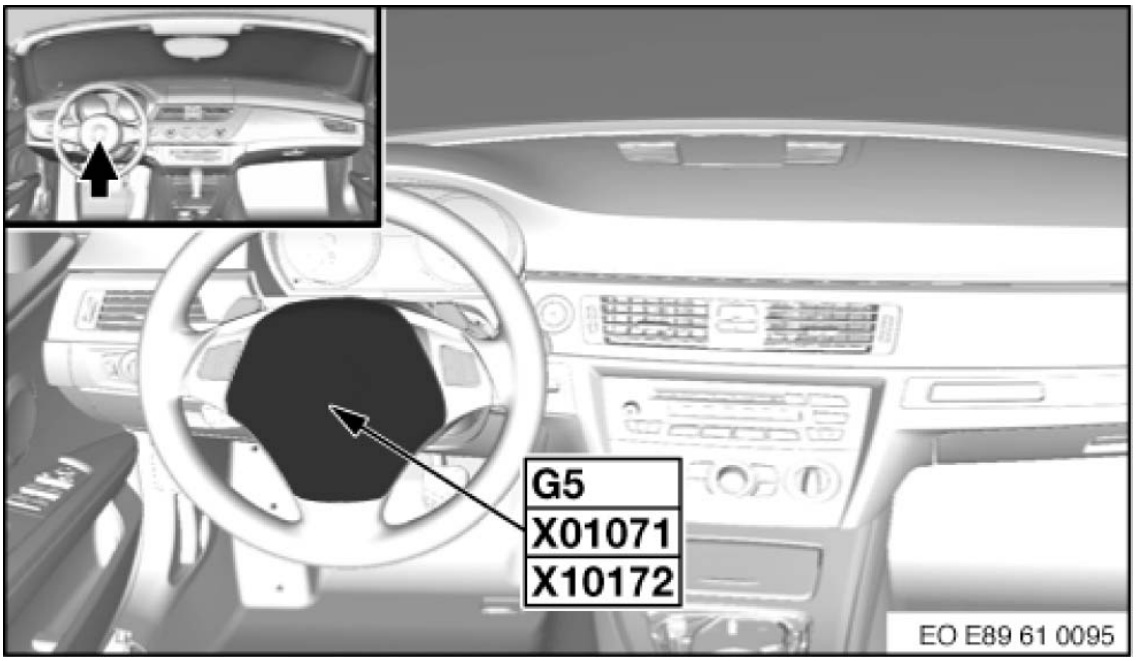


Fig. 130: Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

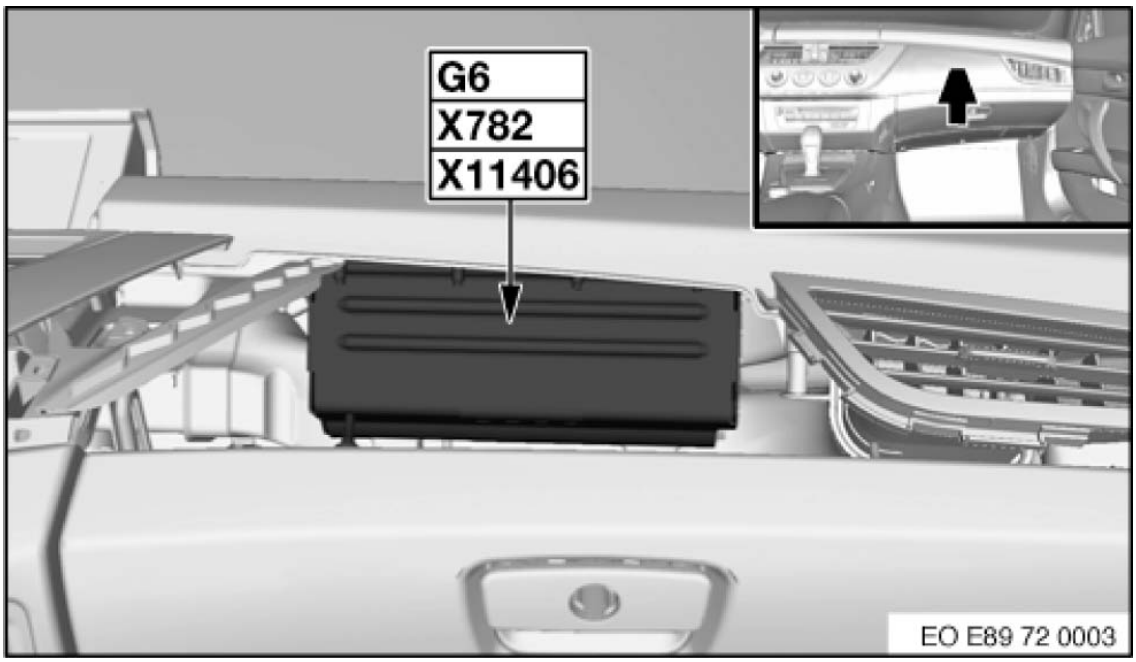


Fig. 131: Dash
Courtesy of BMW OF NORTH AMERICA, INC.

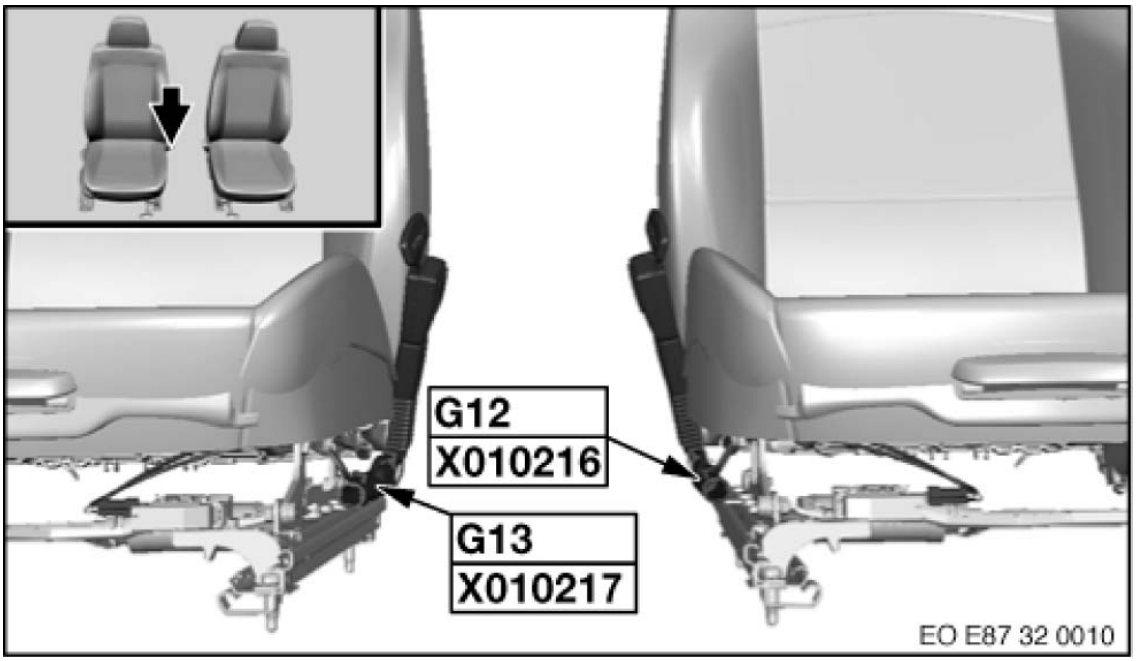


Fig. 132: Front Seats
Courtesy of BMW OF NORTH AMERICA, INC.

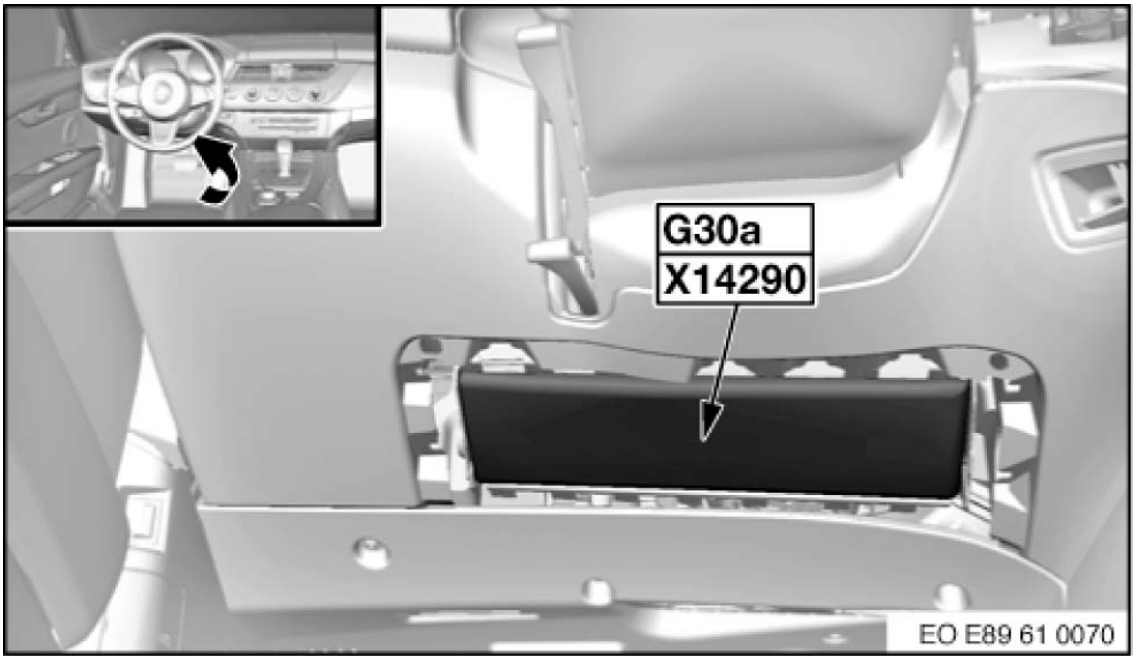


Fig. 133: Left Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

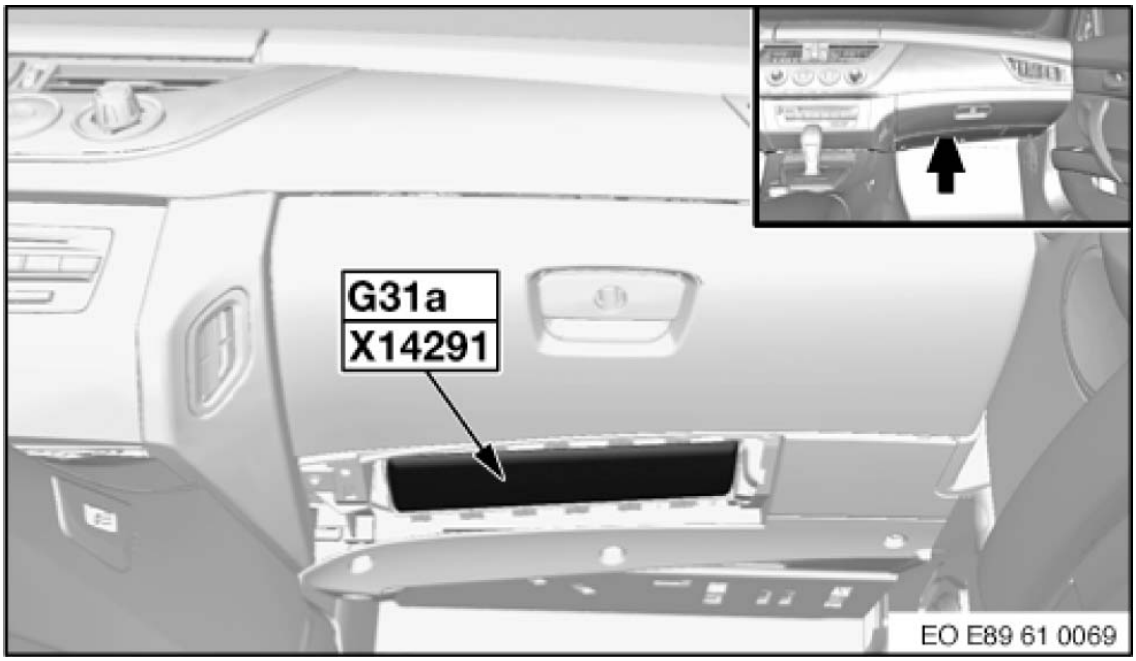


Fig. 134: Right Side Of Dash
Courtesy of BMW OF NORTH AMERICA, INC.

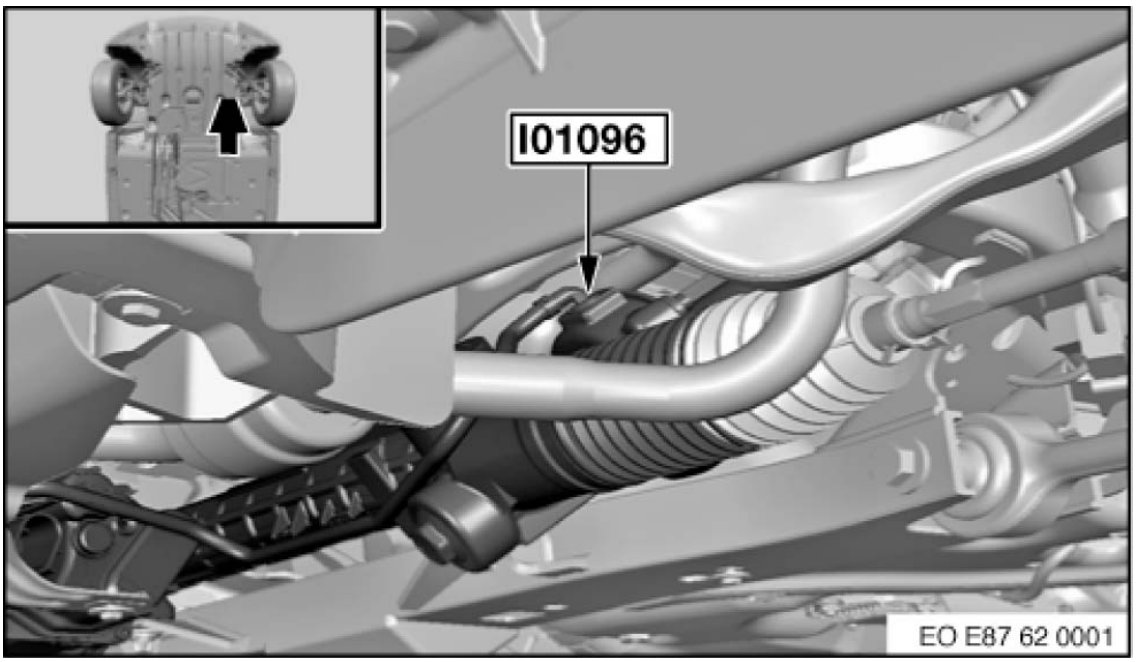


Fig. 135: Under Front Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

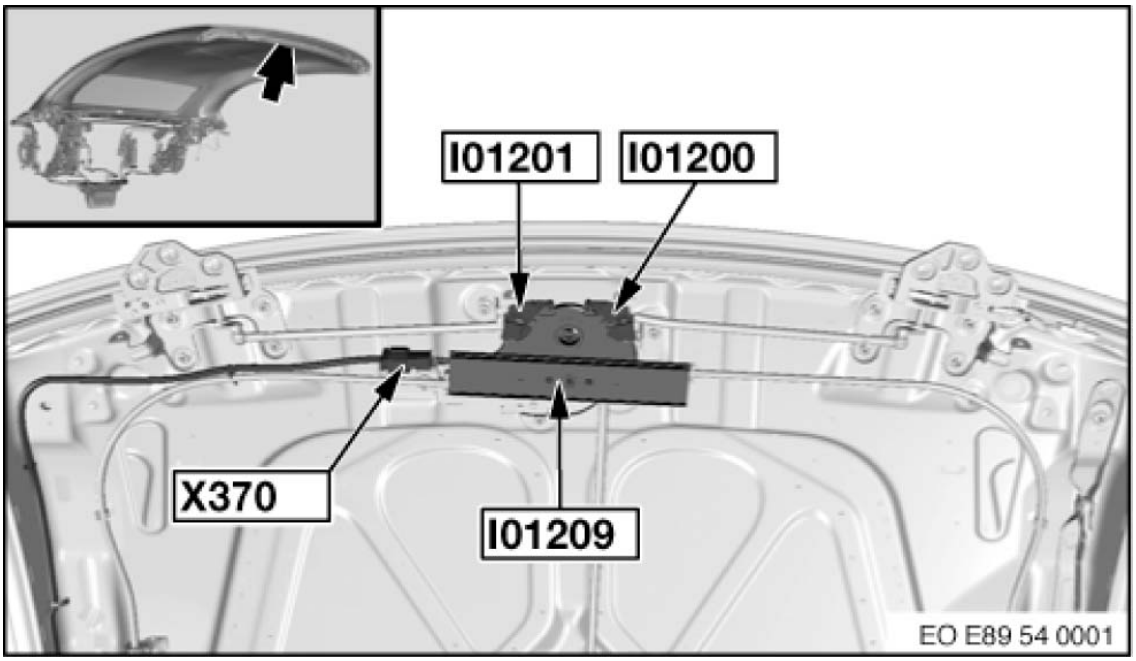


Fig. 136: Convertible Top
Courtesy of BMW OF NORTH AMERICA, INC.

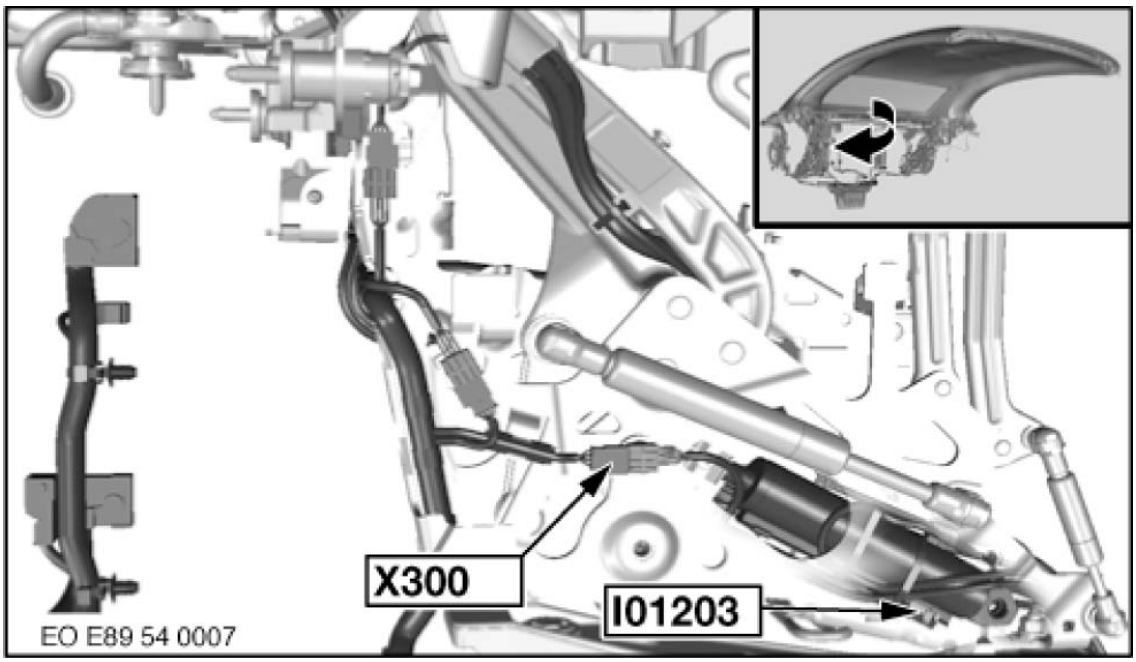


Fig. 137: Convertible Top
Courtesy of BMW OF NORTH AMERICA, INC.

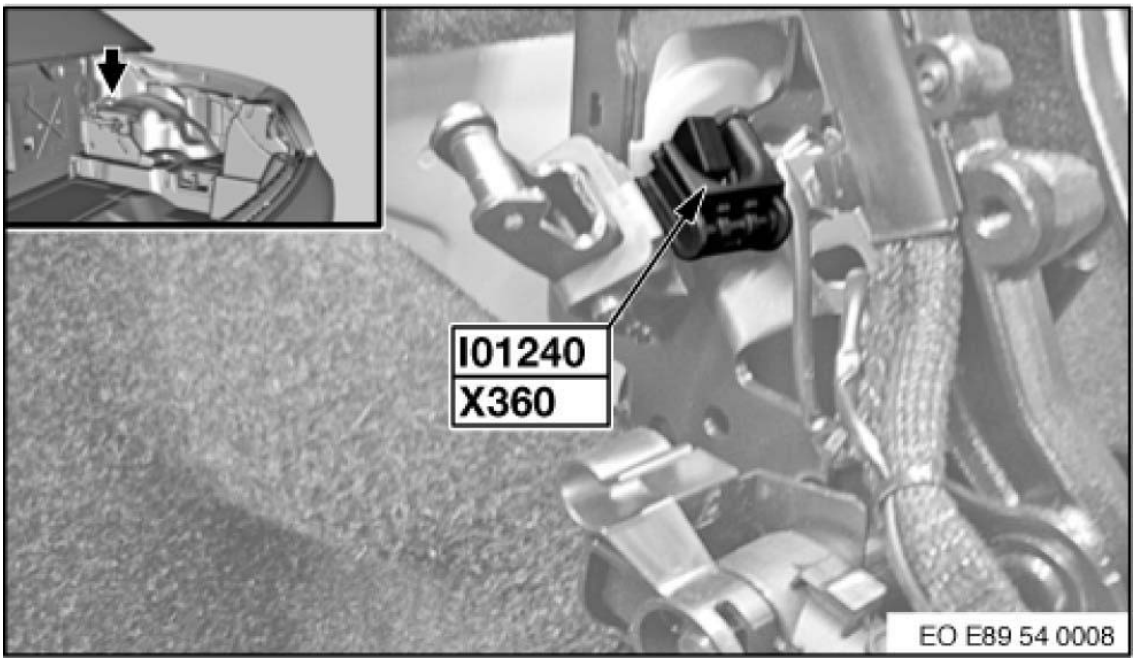


Fig. 138: Convertible Roof Stowage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

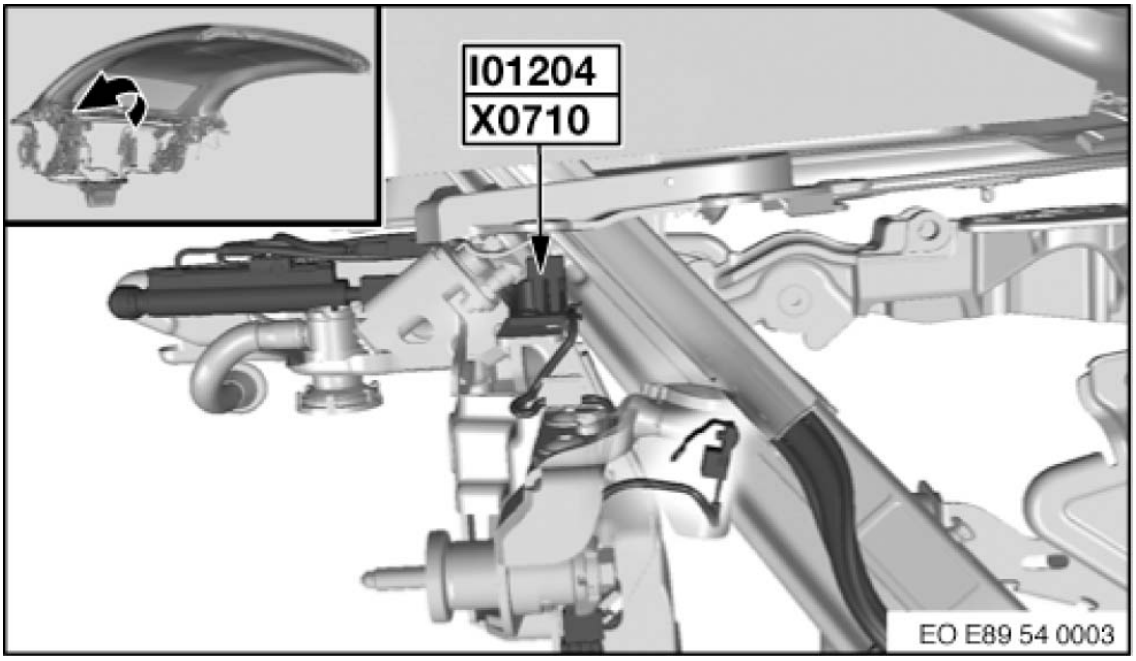


Fig. 139: Convertible Top
Courtesy of BMW OF NORTH AMERICA, INC.

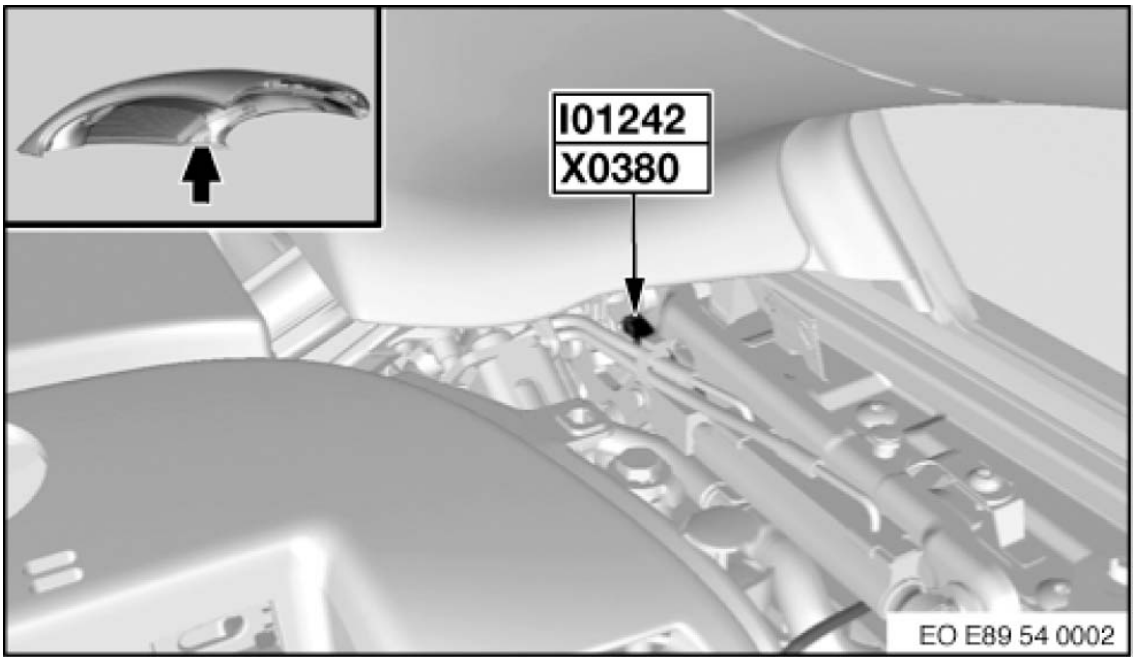


Fig. 140: Convertible Top
Courtesy of BMW OF NORTH AMERICA, INC.

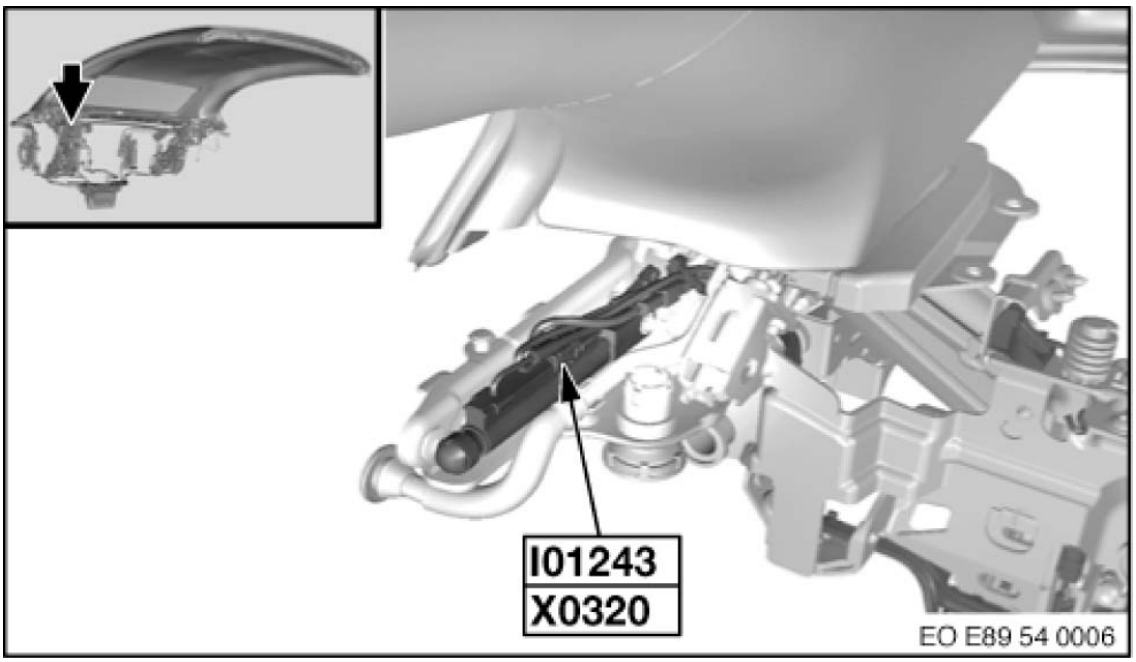


Fig. 141: Convertible Top
Courtesy of BMW OF NORTH AMERICA, INC.

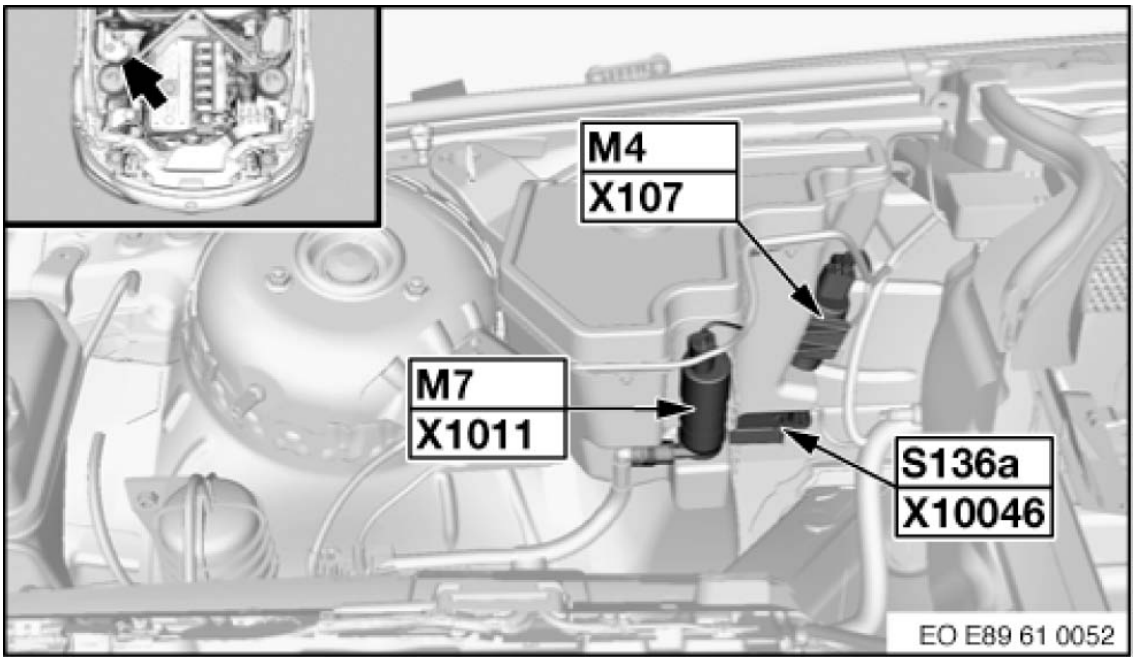


Fig. 142: Engine Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

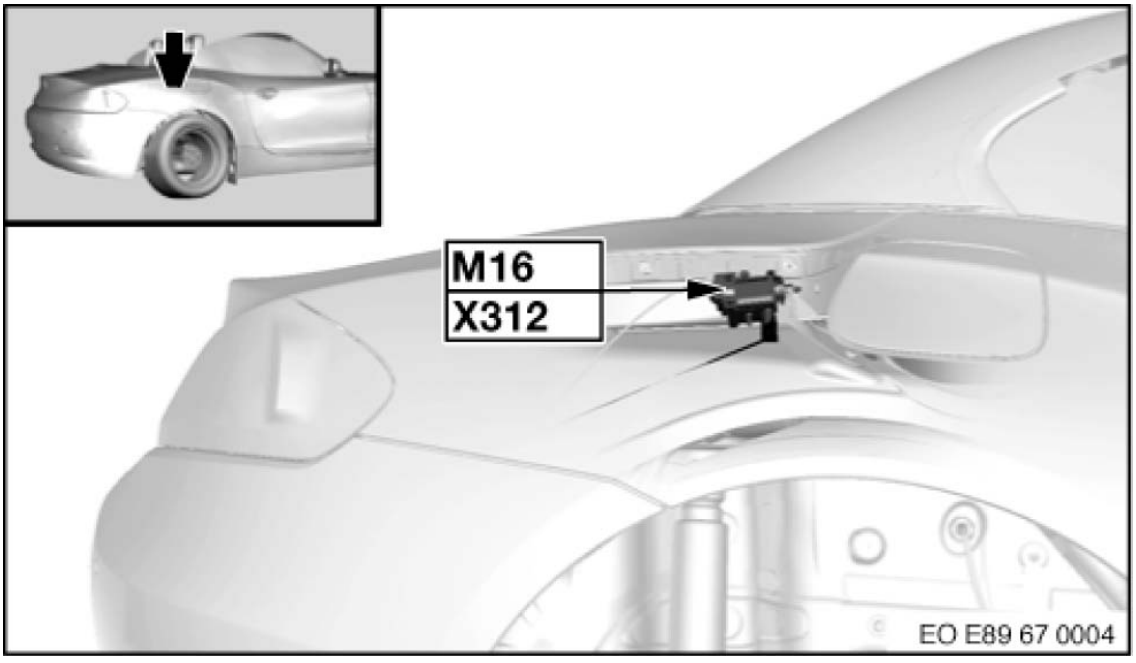


Fig. 143: Right Rear Quarterpanel
Courtesy of BMW OF NORTH AMERICA, INC.

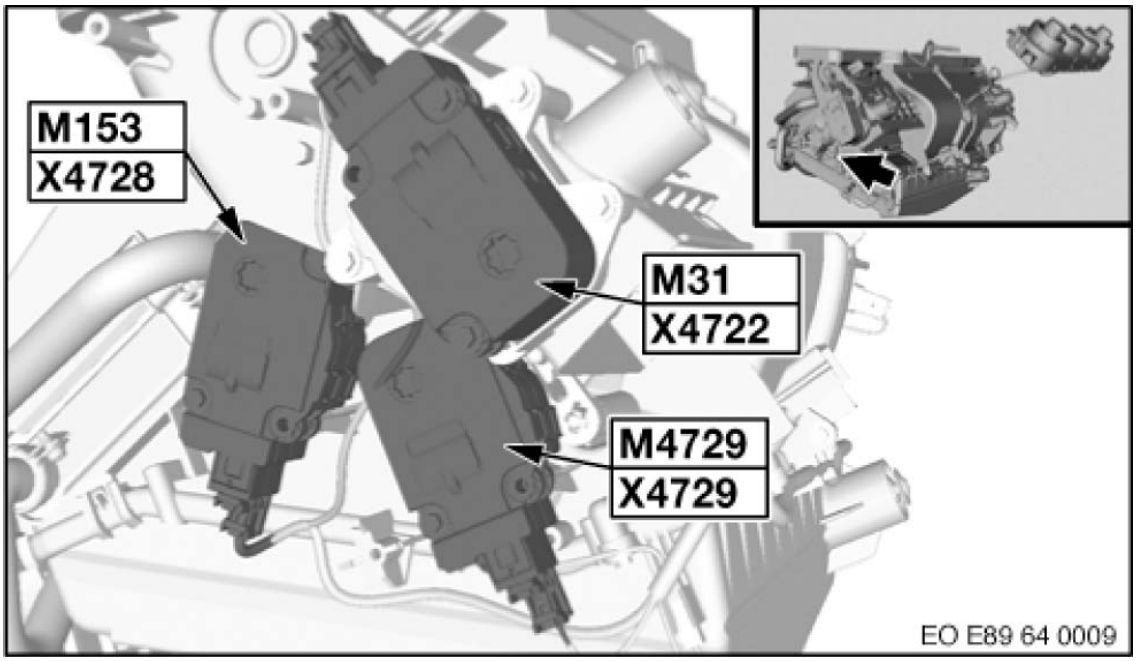


Fig. 144: HVAC Unit
Courtesy of BMW OF NORTH AMERICA, INC.

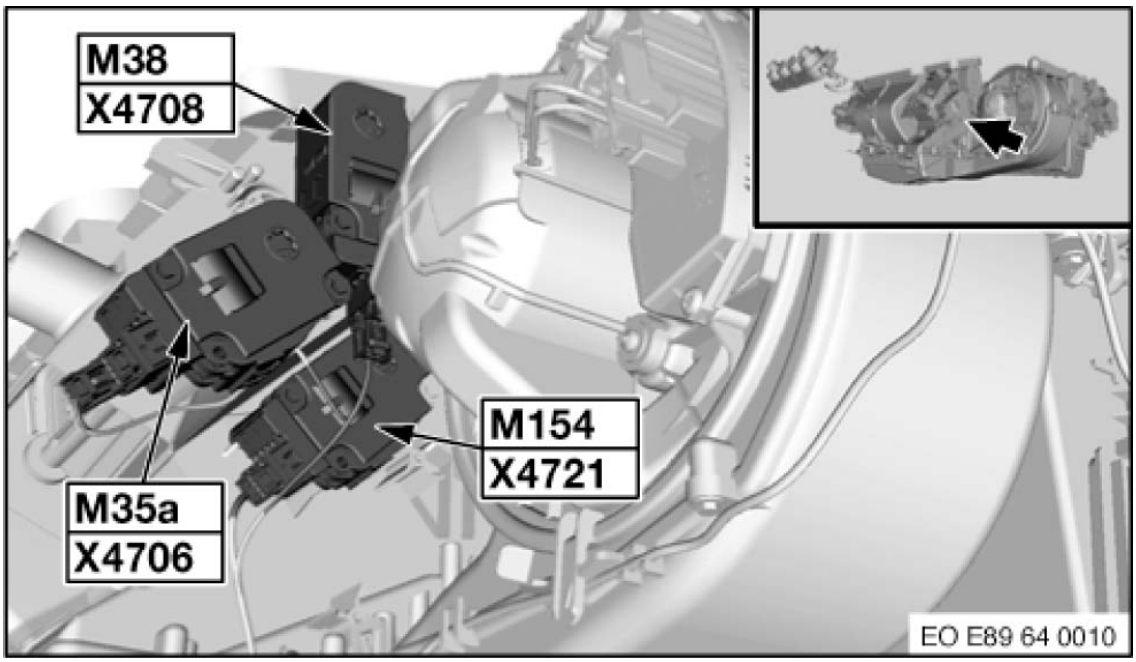


Fig. 145: HVAC Unit
Courtesy of BMW OF NORTH AMERICA, INC.

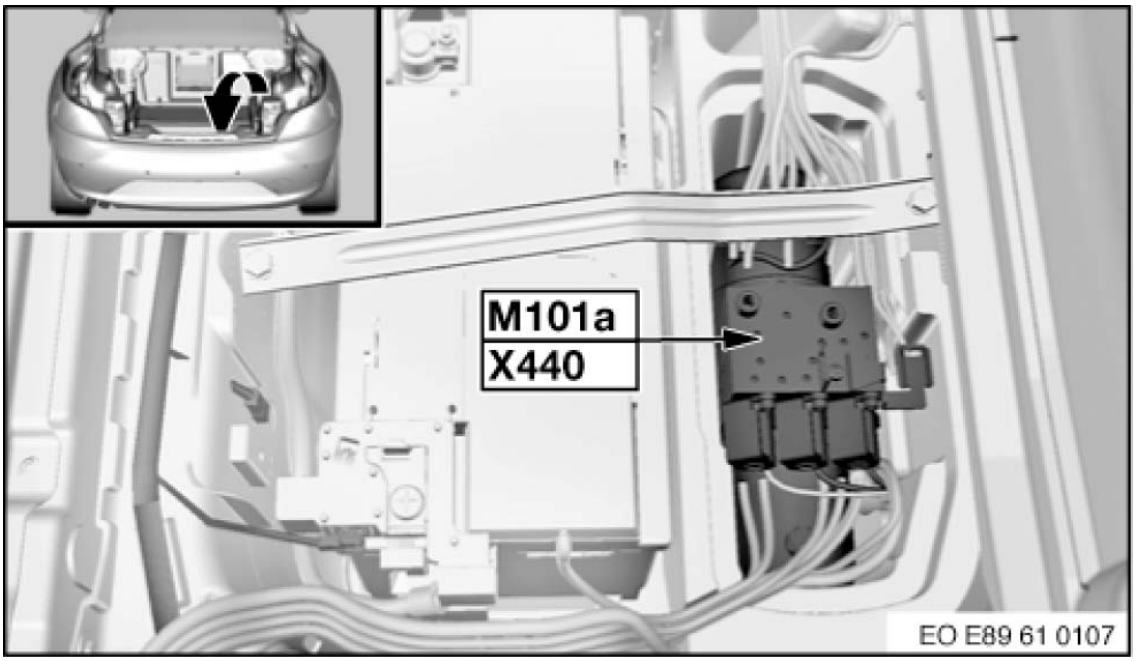


Fig. 146: Rear Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

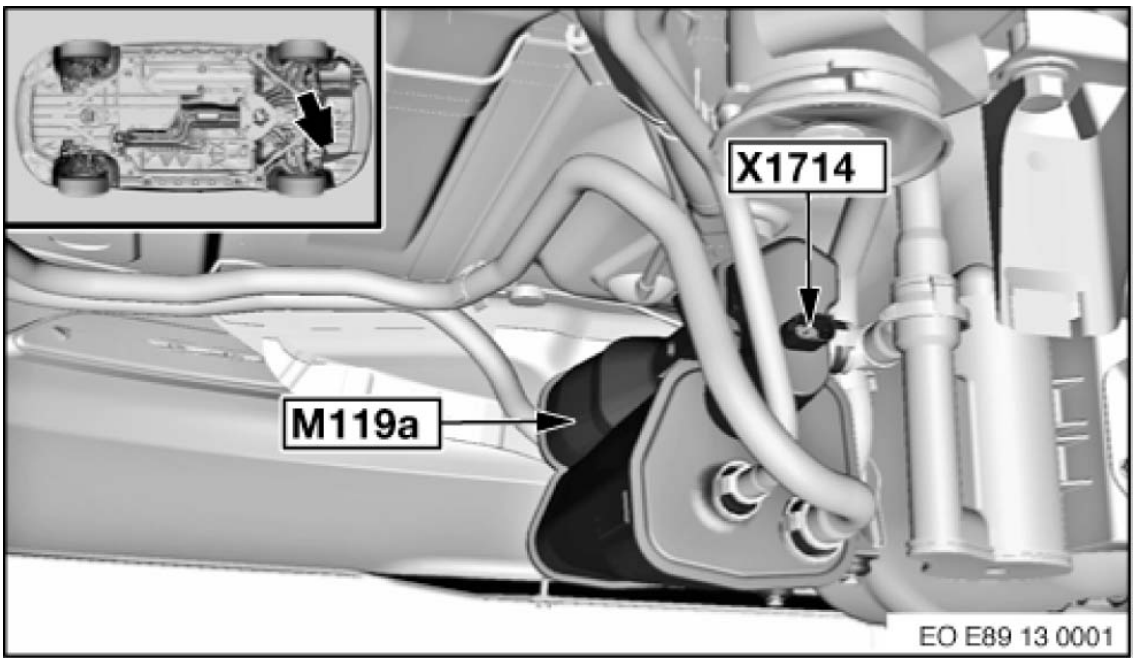


Fig. 147: Under Rear Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

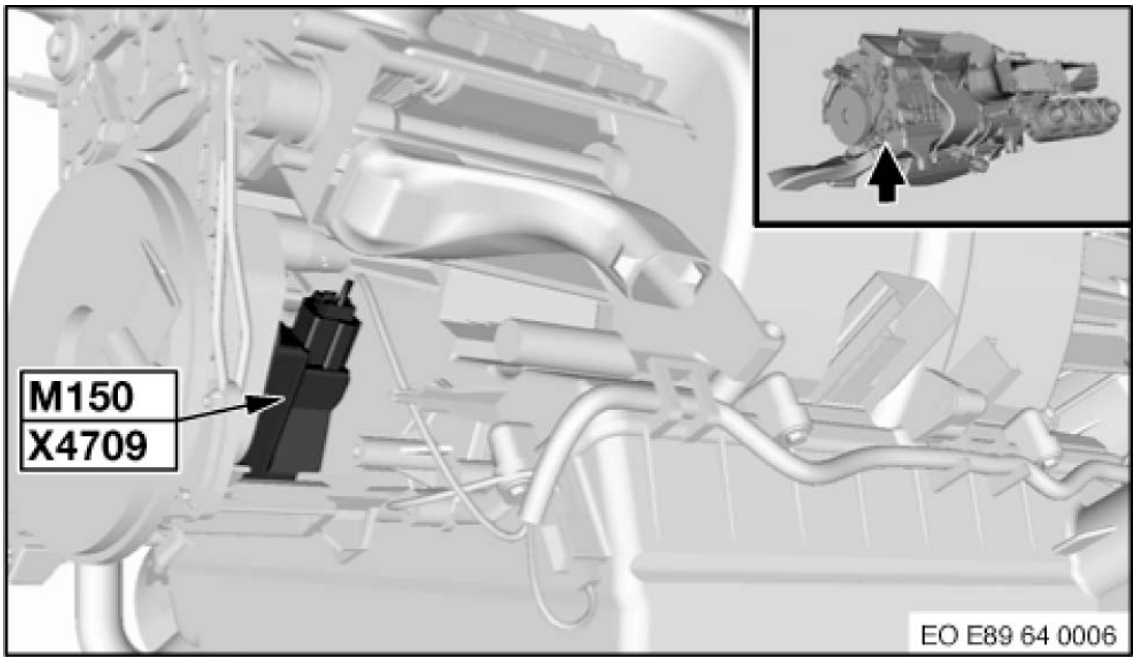


Fig. 148: HVAC Unit
Courtesy of BMW OF NORTH AMERICA, INC.

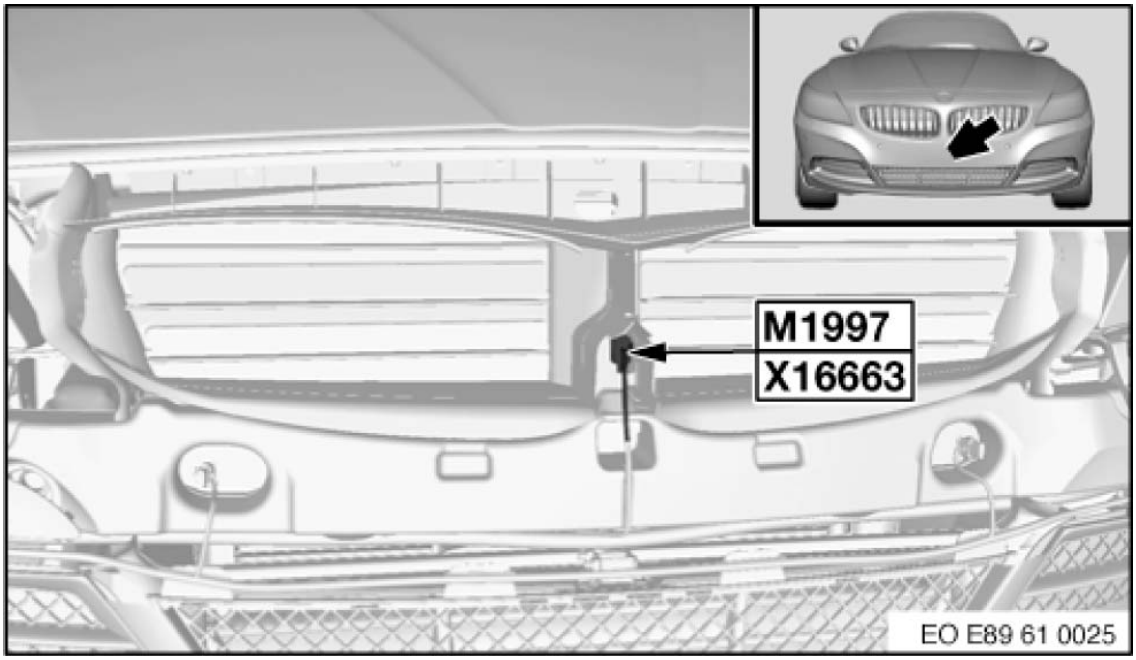


Fig. 149: Front Fascia
Courtesy of BMW OF NORTH AMERICA, INC.

6511 MONO RADIO

65 11 072 REMOVING AND INSTALLING/REPLACING CD CHANGER

Necessary preliminary tasks

- Remove **RIGHT GLOVEBOX WITH HOUSING**
- Clamp off **BATTERY NEGATIVE LEAD**

Release screws (1).

Remove CD changer (2) from glovebox.

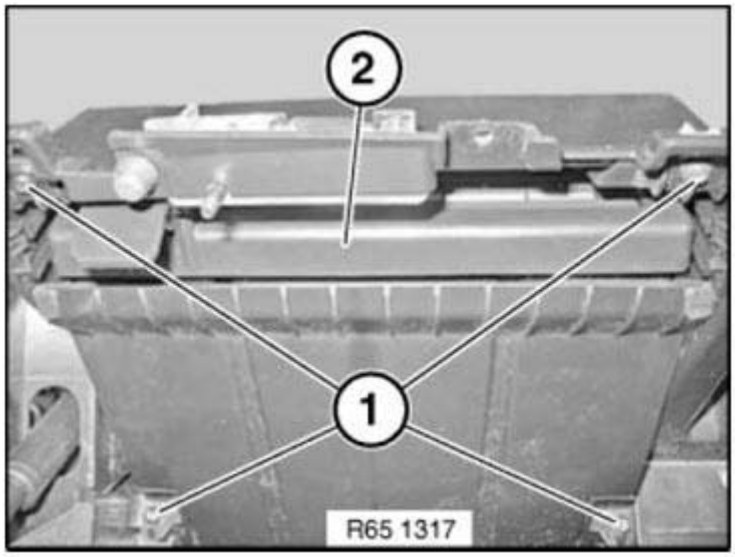


Fig. 1: Identifying CD Changer With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

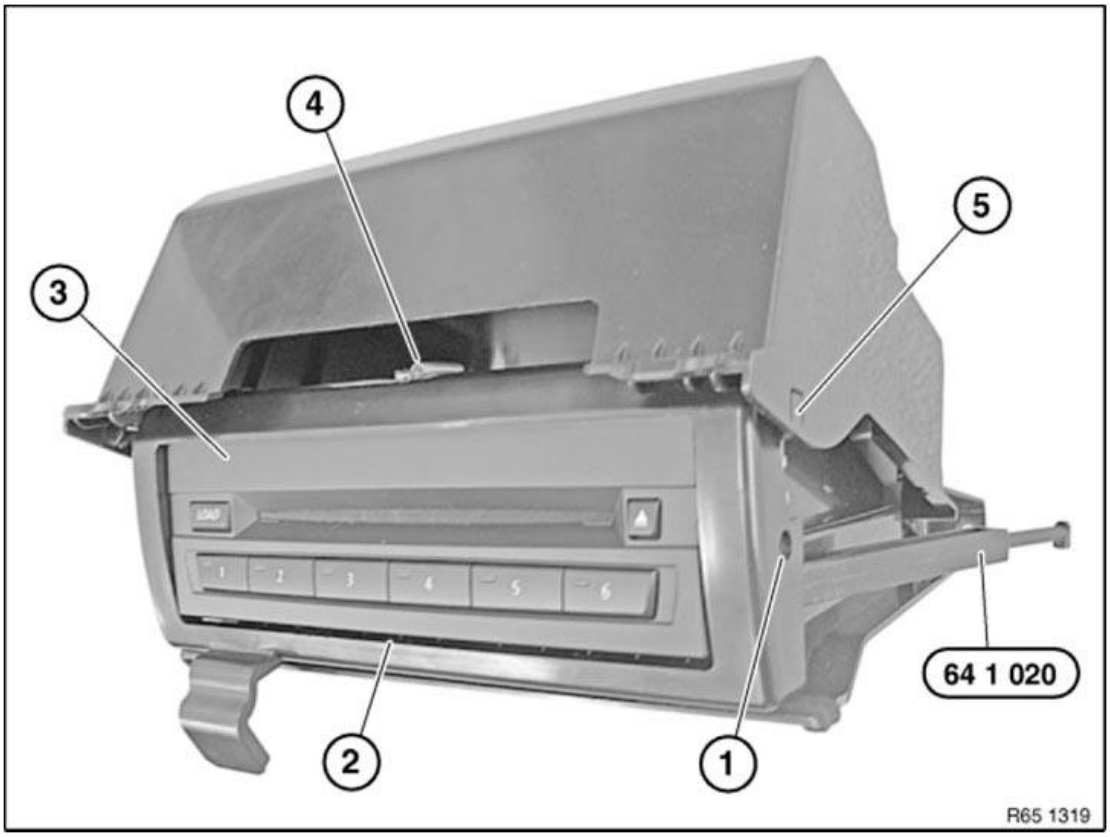


Fig. 2: Opening CD Changer Side Catches Using Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Unlock side catches (1) on front trim (2) with special tool 64 0 020.

Remove front trim (2) towards front from CD changer.

Disconnect spring (4).

Unlock side catches (5) with special tool 64 1 020.

Remove front trim (2).

Pull CD changer (3) forwards out of holder.

Replacement

Carry out vehicle programming and encoding.

65 11 080 REMOVING AND INSTALLING/REPLACING RADIO

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL FIBRES .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**

Pry out trim (1) with special tool 00 9 323 and remove.

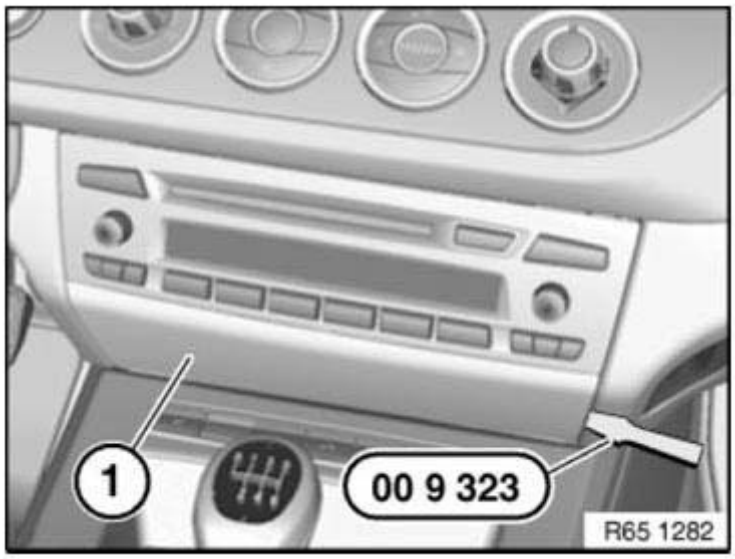


Fig. 3: Prying Out Trim Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Pull out radio (2) towards front.

Unlock associated plug connections and disconnect.

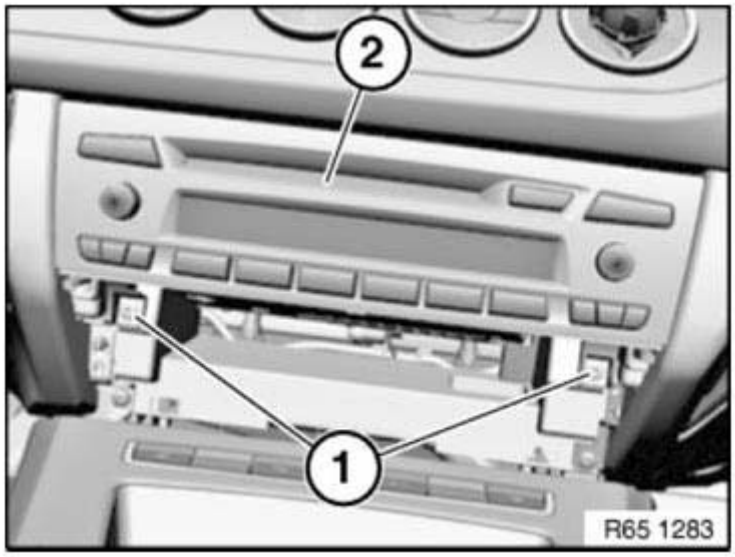


Fig. 4: Identifying Radio With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

US version only:

If there is a **violet** aerial connection (1) **as well as** the black aerial connection (2), additional **tasks are required when replacing the radio!**

Read and observe document REPLACING SATELLITE TUNER .

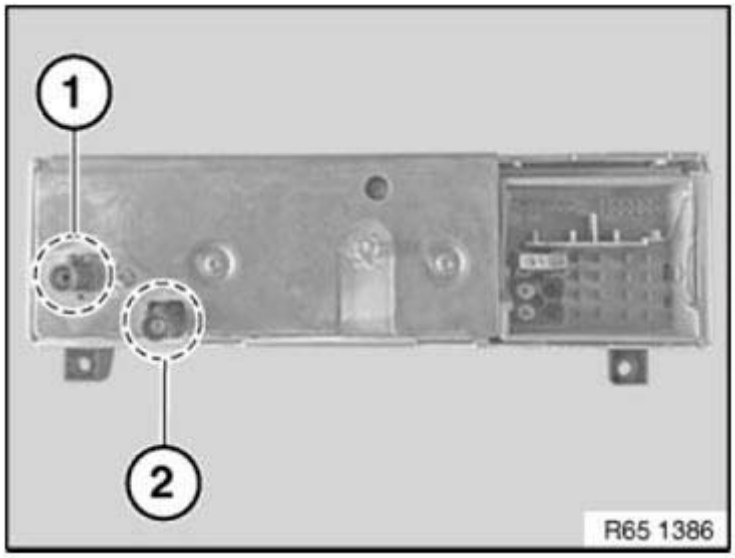


Fig. 5: Identifying Violet Aerial Connection And Black Aerial Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out vehicle programming/encoding.

65 11 ... REMOVING AND INSTALLING/REPLACING SATELLITE TUNER (US VERSION ONLY)

Necessary preliminary work

- Remove **RADIO**

NOTE: Satellite tuner can be recognized by the violet aerial connection (1) which is also located next to the black aerial connection (2).

Additional work is required when the satellite tuner is replaced!

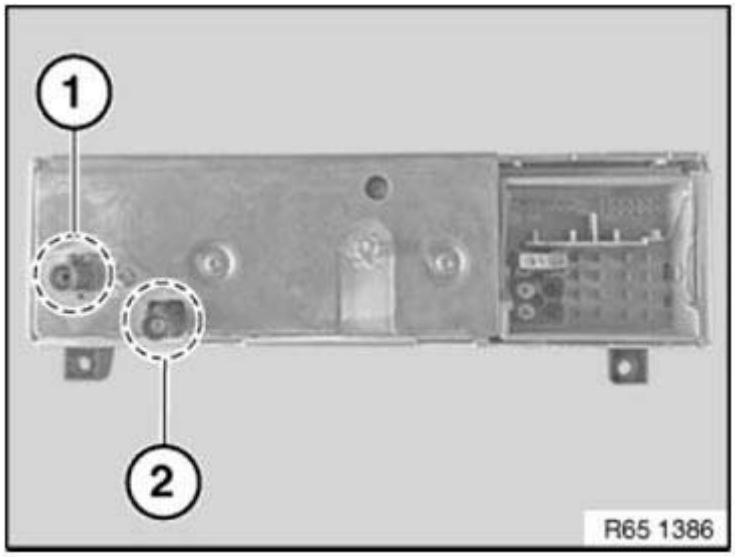


Fig. 6: Identifying Violet Aerial Connection And Black Aerial Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Record SID number (1) of the removed device.

NOTE: The SID number (1) can be found on the label of the housing.

Record SID number (1) of the new device.

Fig. 7: Identifying SID Number
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

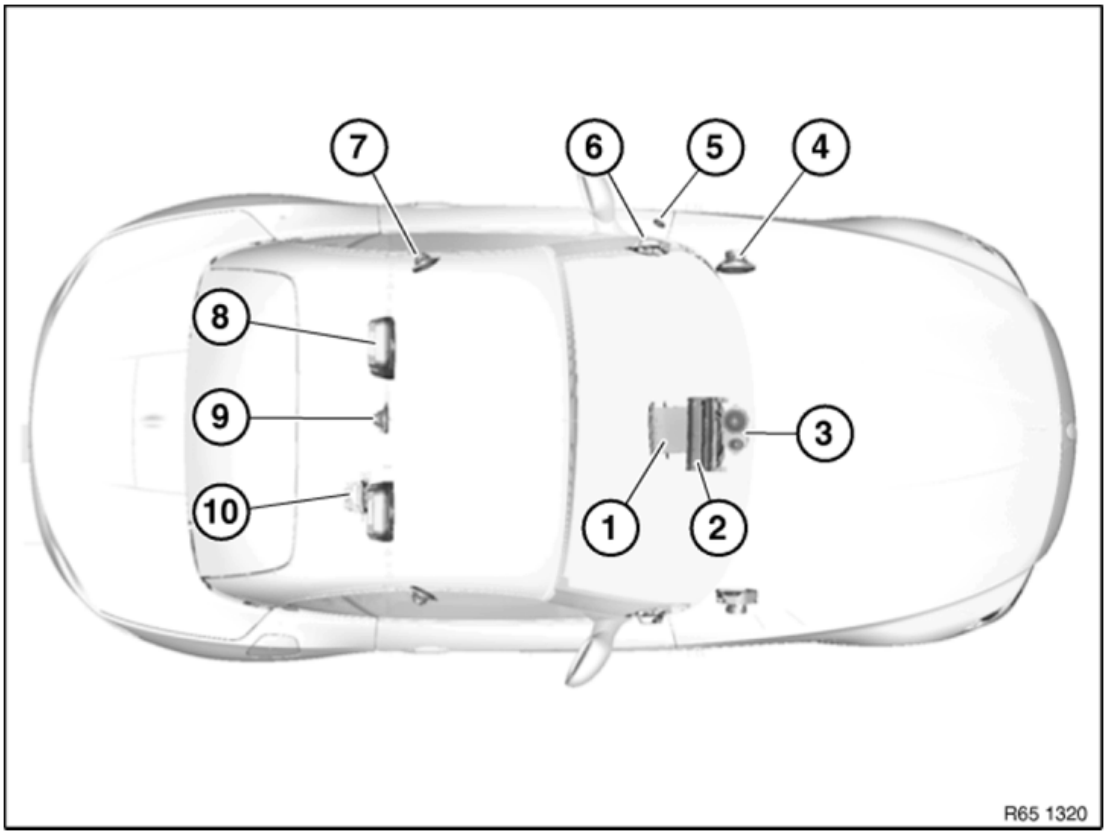
Carry out vehicle programming/encoding.

Replacement

Please contact Sirius. Use the SID number to cancel current device and register new one.

6512 STEREO RADIO, AMPLIFIER

65 00 .. OVERVIEW OF AUDIO COMPONENTS



1 Car Information Computer
2 Central Information Display (CID)
3 Mid-range speaker (instrument panel)
4 Bass speaker (A-pillar)
5 Tweeter (mirror trim)
6 Mid-range speaker (door)
7 Mid-range speaker (in side trim panel)
8 Central bass speaker
9 Mid-range speaker/tweeter (in partition wall panel)
10 Amplifier

Fig. 8: Identifying Audio System Components
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 230 REMOVING AND INSTALLING (REPLACING) DAB TUNER

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

NOTE: Follow instructions for HANDLING OPTICAL FIBRES .

Necessary preliminary tasks:

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **LUGGAGE COMPARTMENT TRIM ON LEFT SIDE PANEL**

Lever out expansion rivets (1).

Feed out storage compartment (2) towards top.

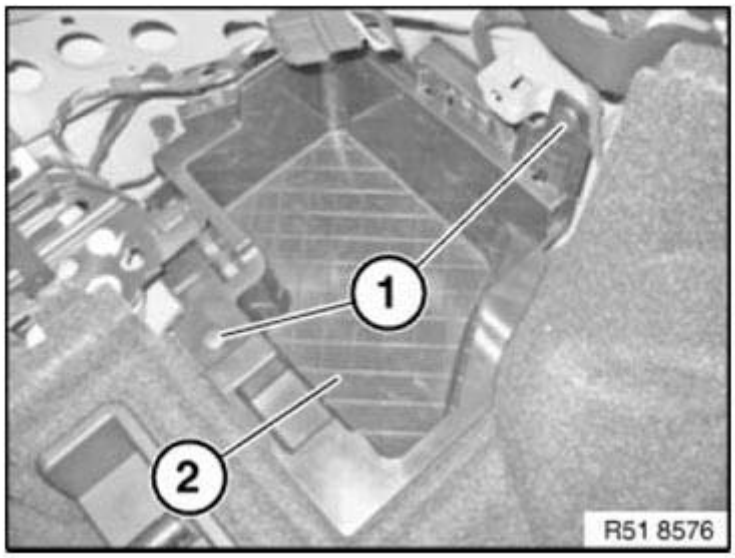


Fig. 9: Identifying Storage Compartment And Expansion Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Raise DAB tuner including bracket (2).

Unlock and disconnect associated plug connections (3).

Feed out DAB tuner including bracket (2).

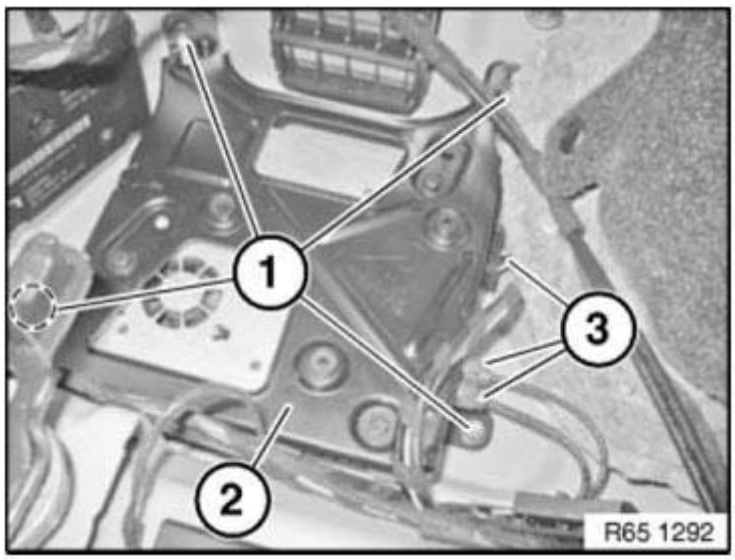


Fig. 10: Identifying DAB Tuner With Plug Connections And Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Release screws (1).

Remove bracket (2) from DAB tuner.

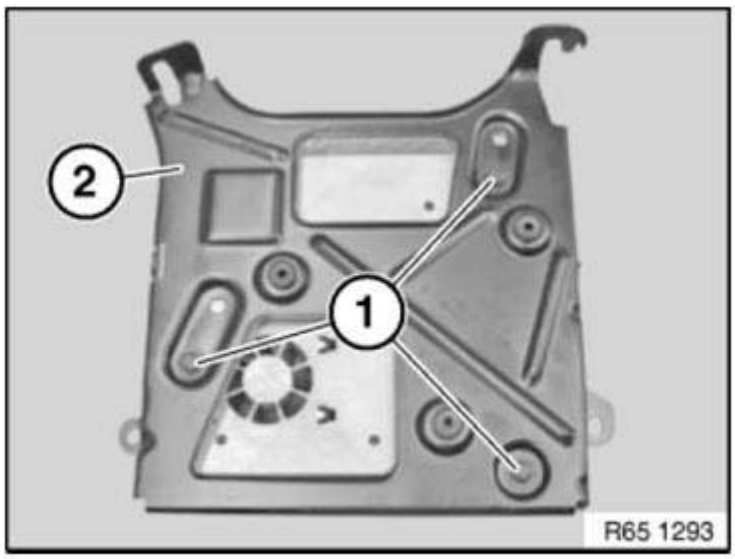


Fig. 11: Identifying DAB Tuner Bracket And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out vehicle programming/coding.

65 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT CENTRAL BASS SPEAKER

Necessary preliminary tasks

- Remove **LOWER PARTITION TRIM PANEL**

Release screws (1).

Unfasten plug connection (2) and disconnect.

Remove central bass speaker housing (3) towards front.

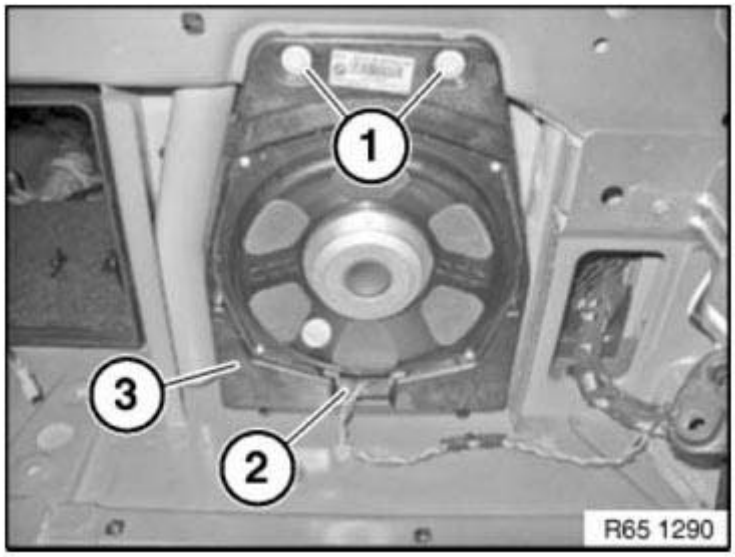


Fig. 12: Identifying Central Bass Speaker Housing With Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 188 REMOVING AND INSTALLING/REPLACING MID-RANGE SPEAKER (IN UPPER PARTITION PANEL)

Lever out rear speaker trim (1) with special tool 00 9 323 from partition panel (2) and remove.

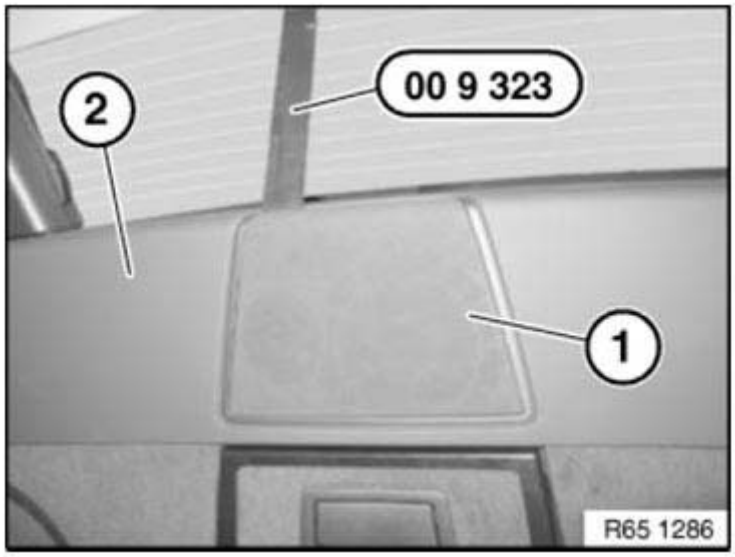


Fig. 13: Removing Rear Speaker Trim Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Lever plug connection (1) out of mounting and disconnect.

Unfasten screws (2).

Feed out speaker (3) towards front and disconnect associated plug connection.

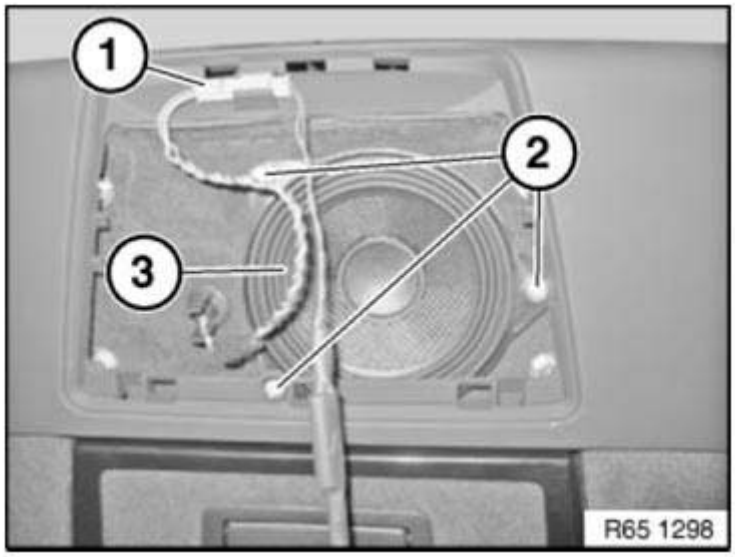


Fig. 14: Identifying Speaker With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 12 220 REMOVING AND INSTALLING/REPLACING SATELLITE RADIO (US VERSION ONLY UNTIL 09/2009)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

NOTE: Follow instructions for HANDLING OPTICAL FIBRES .

Necessary preliminary tasks:

- Disconnect **BATTERY EARTH CABLE**
- Remove **luggage compartment TRIM PANEL ON LEFT SIDE WALL**

Lever out expansion rivets (1).

Feed out storage compartment (2) towards top.

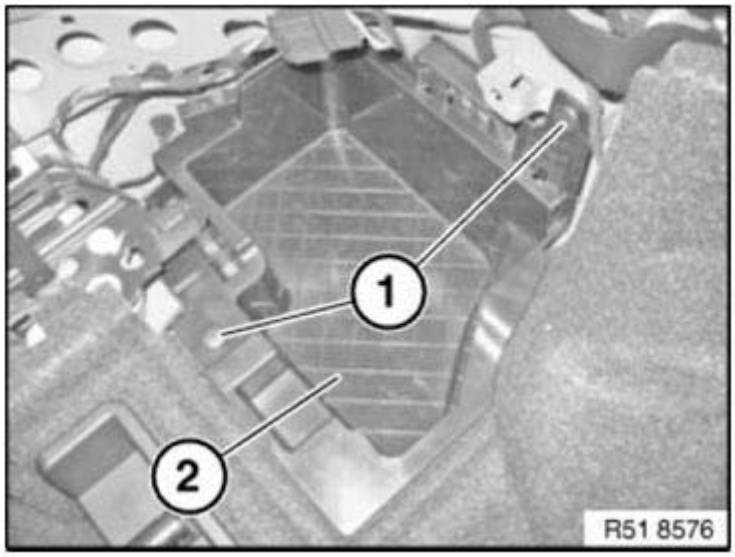


Fig. 15: Identifying Storage Compartment And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Raise satellite tuner including bracket (2).

Unlock and disconnect associated plug connections (3).

Slide out satellite tuner (2).

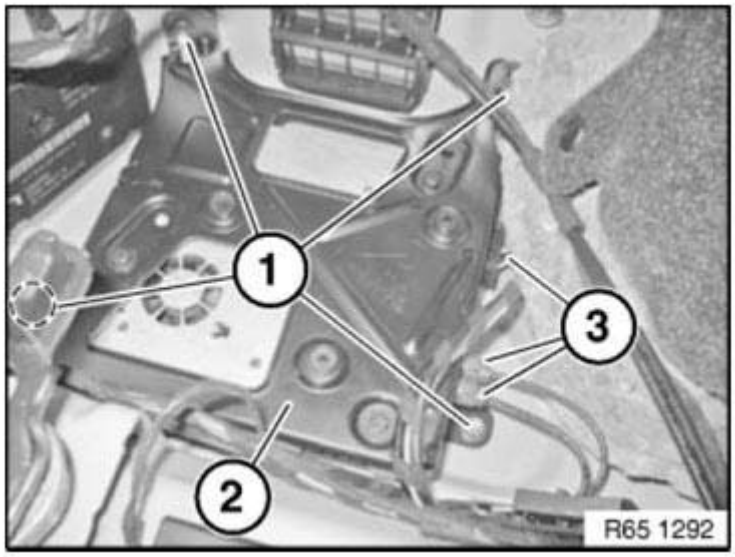


Fig. 16: Identifying Satellite Tuner With Plug Connections And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Release screws (1).

Remove bracket (2) from satellite tuner.

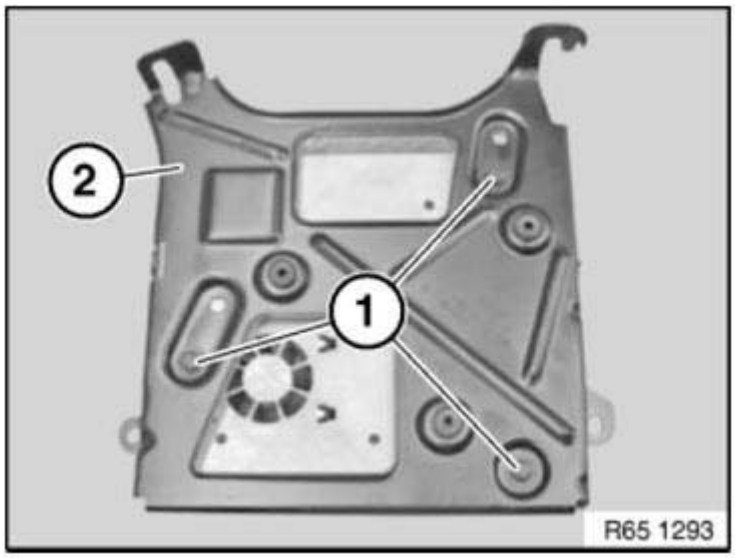


Fig. 17: Identifying Satellite Tuner Bracket And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing, please observe

Record ID number (2) of the removed device.

NOTE: The ID number (2) can be found on the label of the housing. Above the barcode the text reads "Sirius ID" (1) and next to it is the company's logo "Sirius Satellite Radio" (3).

Record ID number (2) of the new device.

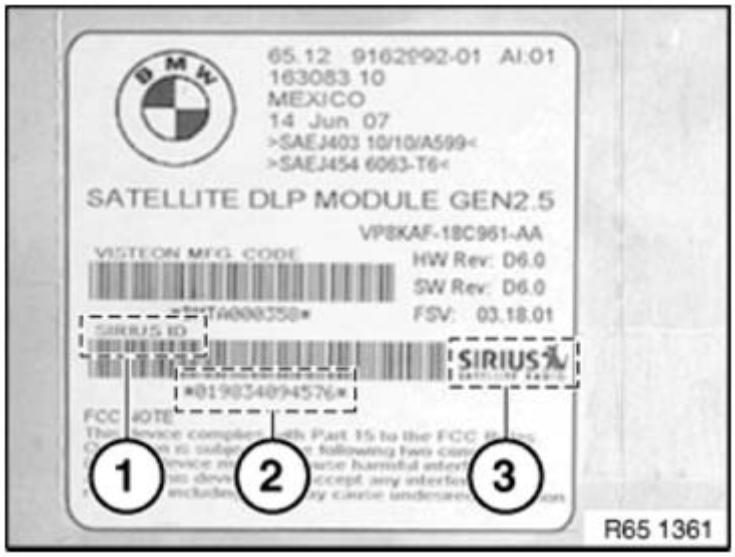


Fig. 18: Identifying Sirius ID, ID Number And Sirius Satellite Radio
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out vehicle programming/coding .

NOTE: Please contact Sirius. Use the ID number to cancel current device and register new one.

65 12 220 REMOVING AND INSTALLING/REPLACING SATELLITE TUNER (ONLY FOR US MODELS STARTING AT 09/2009)

Necessary preliminary tasks:

- Remove **CAR INFOTAINMENT COMPUTER**

When replacing, please observe

Record SID number (1) of the removed device.

NOTE: The SID number (1) can be found on the label of the housing. Location may be different, depending on the manufacturer of the device.

Record SID number (1) of the new device.

Input enabling code from the ASAP portal.

Fig. 19: Identifying SID Number
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Perform vehicle programming and coding .

NOTE: Please contact Sirius. Use the SID number to cancel current device and register new one.

65 13 100 REMOVING AND INSTALLING/REPLACING TWEETER (IN UPPER PARTITION PANEL)

Lever out rear speaker cover (1) with special tool 00 9 323 from partition wall panel (2) and remove.

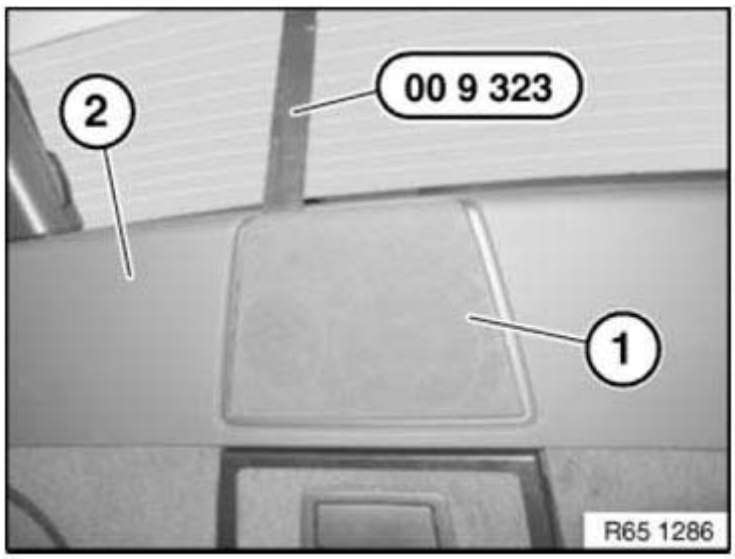


Fig. 20: Removing Rear Speaker Cover Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lever out plug connection (1) at resistor (2) and disconnect.

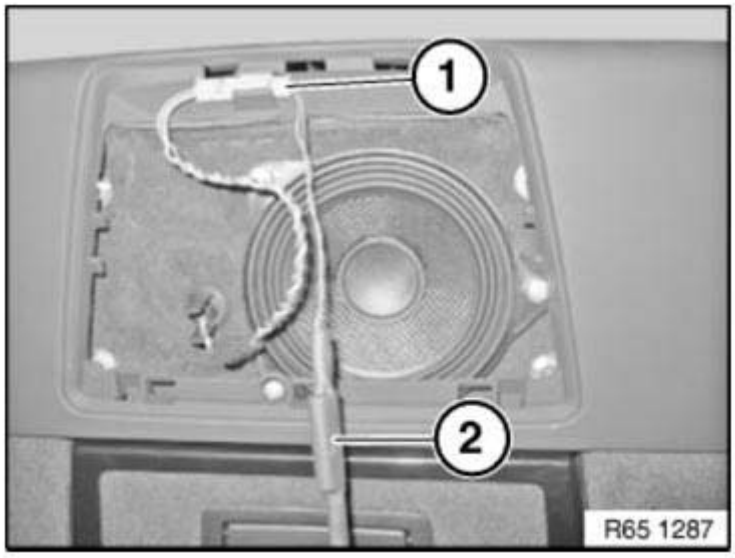


Fig. 21: Identifying Plug Connection And Resistor
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip tweeter (1) from rear speaker cover (2) and remove.

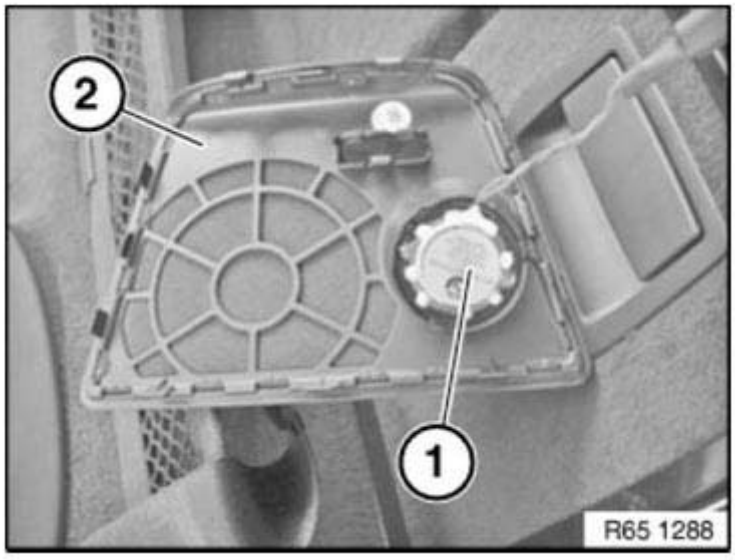


Fig. 22: Identifying Rear Speaker Cover Tweeter
Courtesy of BMW OF NORTH AMERICA, INC.

6513 SPEAKER AND COVER

65 13 065 REMOVING AND INSTALLING/REPLACING FRONT SPEAKER CARRIER (INSTRUMENT PANEL)

Unclip trim (1) with special tool 00 9 317 from catches and remove towards top.

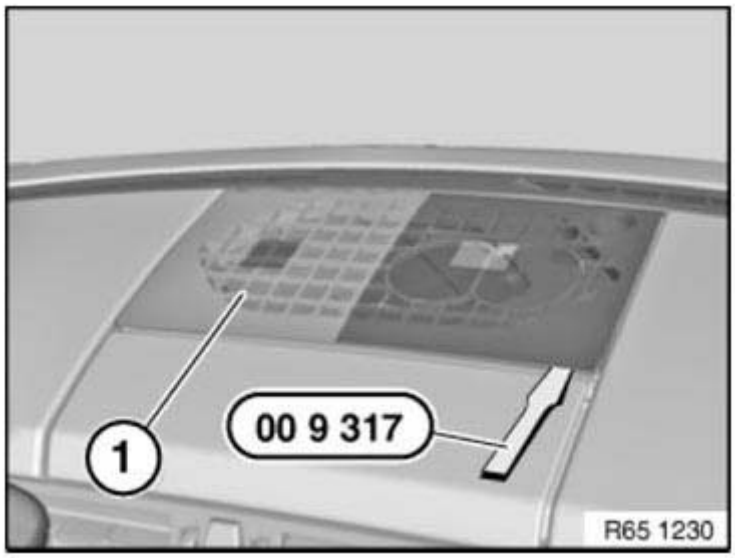


Fig. 23: Opening Trim Using Special Tool (00 9 317) From Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retainers (1) on speaker trim (2) must be correctly seated on associated lugs and must not be damaged.

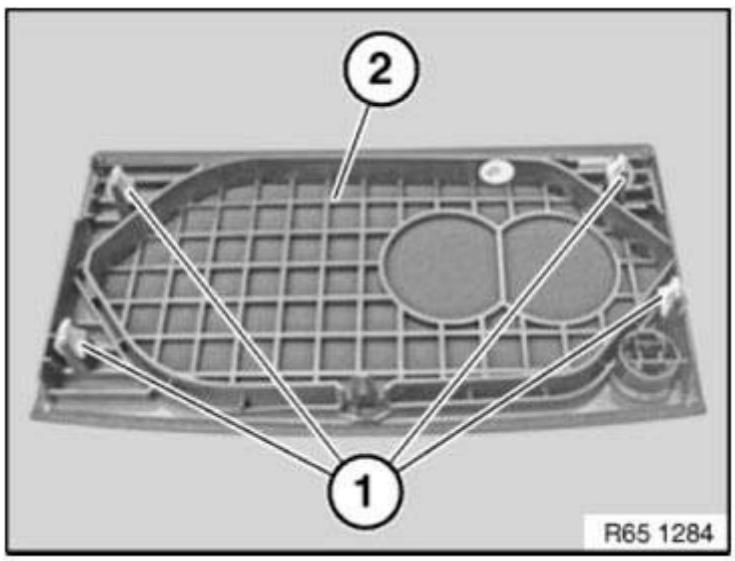


Fig. 24: Identifying Retainers On Speaker Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove speaker carrier (2) and disconnect associated plug connection.

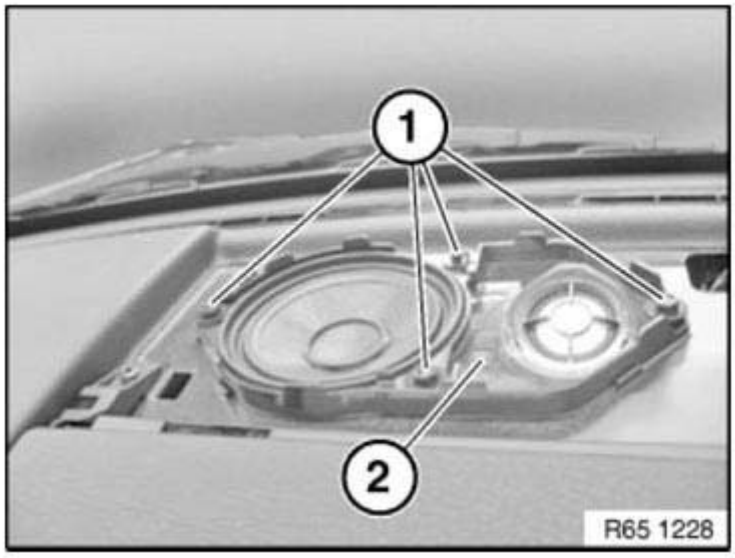


Fig. 25: Identifying Speaker Carrier With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Remove **midrange speaker** (1)

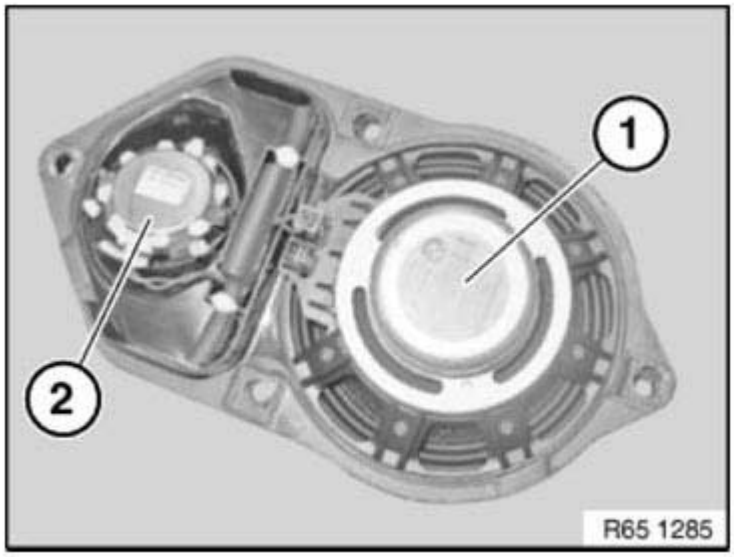


Fig. 26: Identifying Mid Range Speaker

Courtesy of BMW OF NORTH AMERICA, INC.

65 12 050 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT CENTRAL BASS SPEAKER

Necessary preliminary tasks

- Remove **LOWER PARTITION TRIM PANEL**

Release screws (1).

Unfasten plug connection (2) and disconnect.

Remove central bass speaker housing (3) towards front.

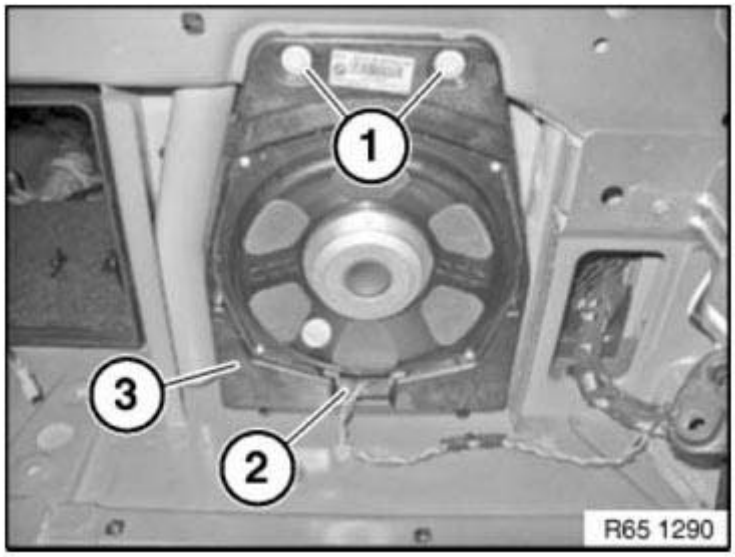


Fig. 27: Identifying Central Bass Speaker Housing With Plug Connection And Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 030 REMOVING AND INSTALLING/REPLACING LEFT SPEAKER (WOOFER, A-PILLAR)

Necessary preliminary tasks

- Remove **FOOTWELL SIDE TRIM PANEL ON A-PILLAR, LEFT**

Release screws (1).

Remove speaker (2) from side member (3) and disconnect associated plug connection.

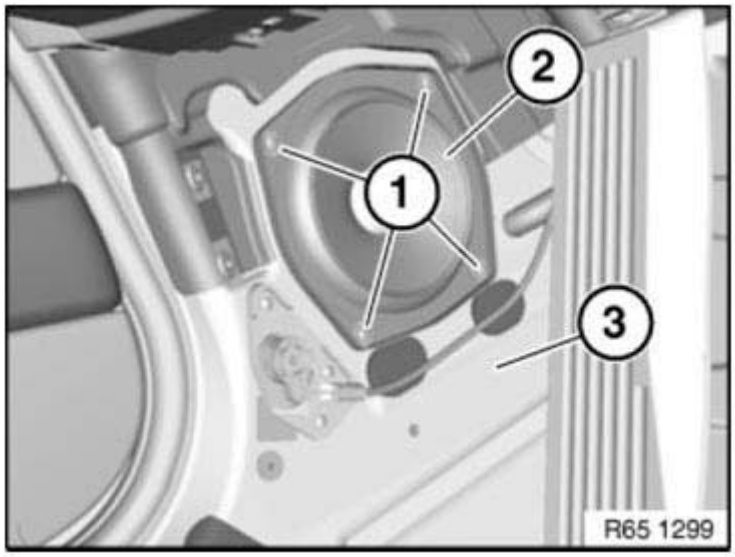


Fig. 28: Identifying Speaker With Side Member And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 188 REMOVING AND INSTALLING/REPLACING MID-RANGE SPEAKER (IN UPPER PARTITION PANEL)

Lever out rear speaker trim (1) with special tool 00 9 323 from partition panel (2) and remove.

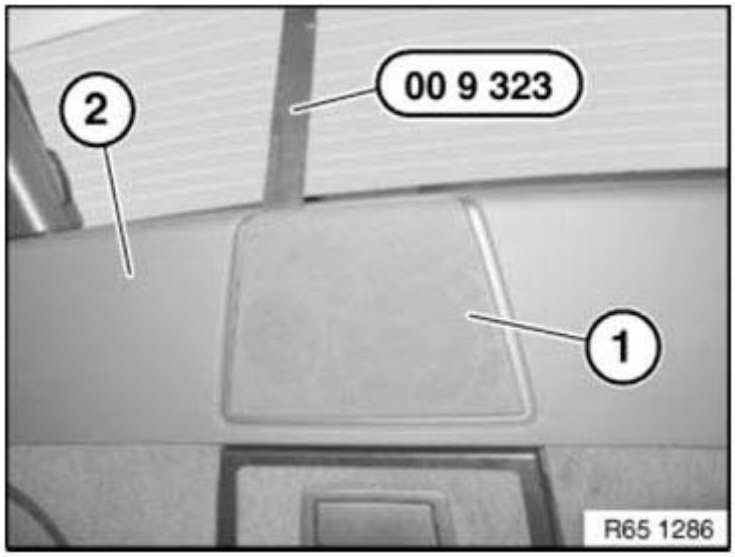


Fig. 29: Removing Rear Speaker Cover Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Lever plug connection (1) out of mounting and disconnect.

Unfasten screws (2).

Feed out speaker (3) towards front and disconnect associated plug connection.

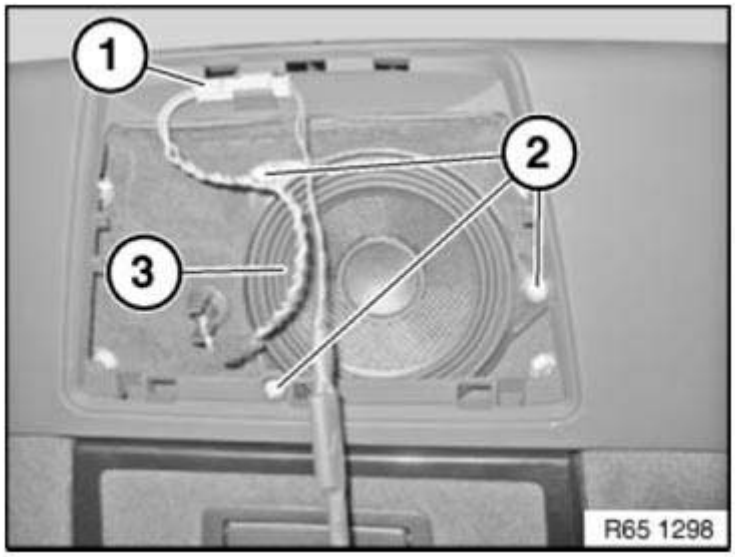


Fig. 30: Identifying Speaker With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 032 REMOVING AND INSTALLING/REPLACING RIGHT SPEAKER (WOOFER, A-PILLAR)

Necessary preliminary tasks

- Remove **FOOTWELL SIDE TRIM PANEL ON A-PILLAR ON RIGHT** .

Operation is shown on the left side by way of example.

Release screws (1).

Remove speaker (2) from side member (3) and disconnect associated plug connection.

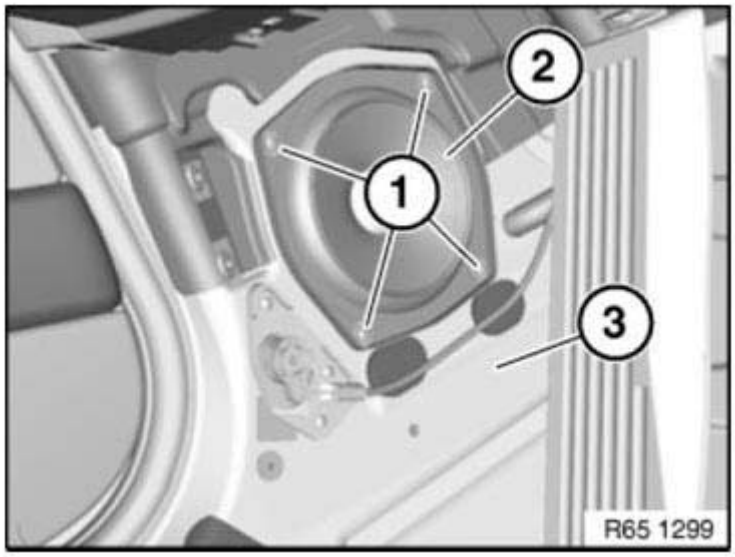


Fig. 31: Identifying Speaker With Side Member And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 070 REMOVING AND INSTALLING/REPLACING SPEAKER (MIDRANGE SPEAKER IN DOOR TRIM PANEL)

Necessary preliminary tasks:

- Remove front left or right **DOOR TRIM PANEL** .

Release screws (1).

Remove speaker (2).

Disconnect associated plug connections.

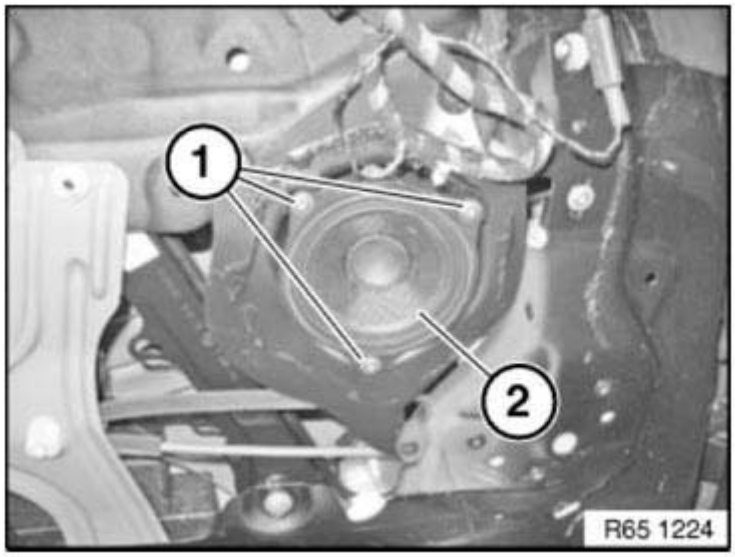


Fig. 32: Identifying Speaker With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 090 REMOVING AND INSTALLING/REPLACING SPEAKER (MIDRANGE SPEAKER IN REAR SIDE TRIM PANEL)

Unclip speaker cover (1) on side trim panel in middle with special tool 00 9 317 and remove.

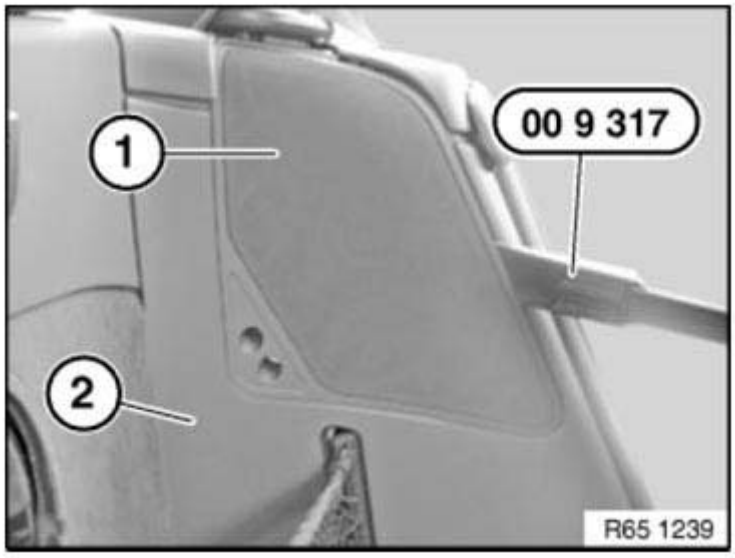


Fig. 33: Opening Speaker Cover On Side Trim Panel In Middle Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

All retaining lugs on speaker cover (1) must not be damaged.

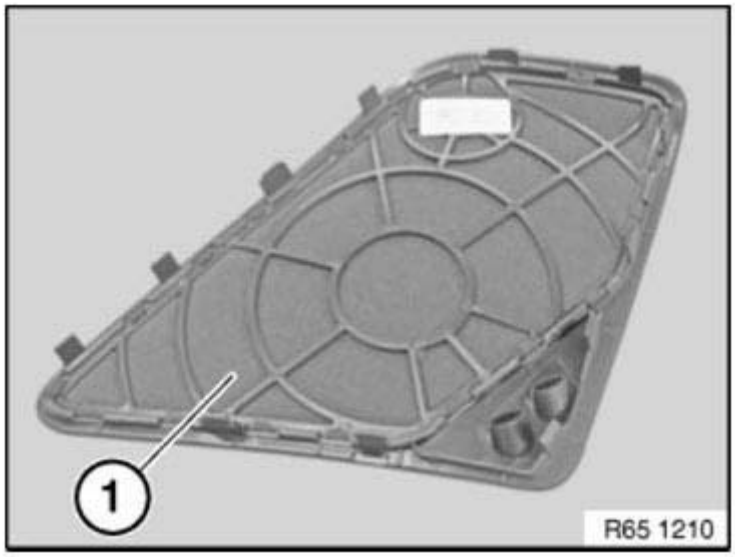


Fig. 34: Identifying Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove mid-range speaker (2).

Disconnect associated plug connection.

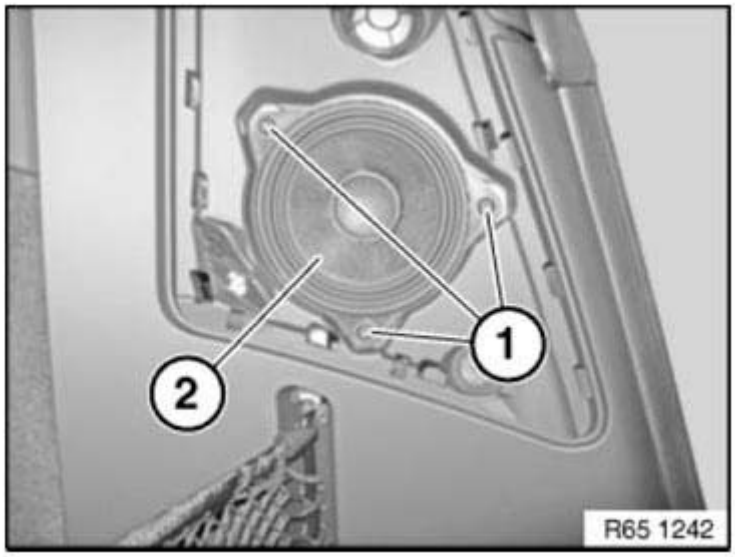


Fig. 35: Identifying Mid Range Speaker With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 060 REMOVING AND INSTALLING/REPLACING SPEAKER (MIDRANGE SPEAKER, IN INSTRUMENT PANEL)

Unclip trim (1) with special tool 00 9 317 from catches and remove towards top.

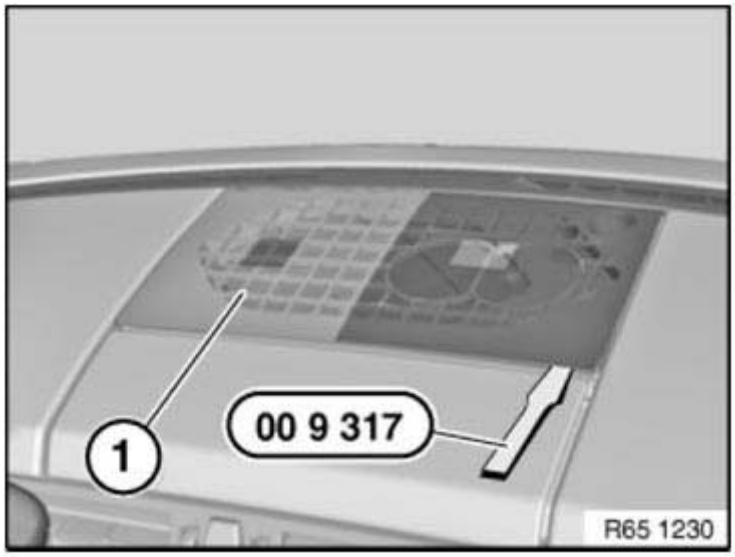


Fig. 36: Opening Trim Using Special Tool (00 9 317) From Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retainers (1) on speaker trim (2) must be correctly seated on associated lugs and must not be damaged.

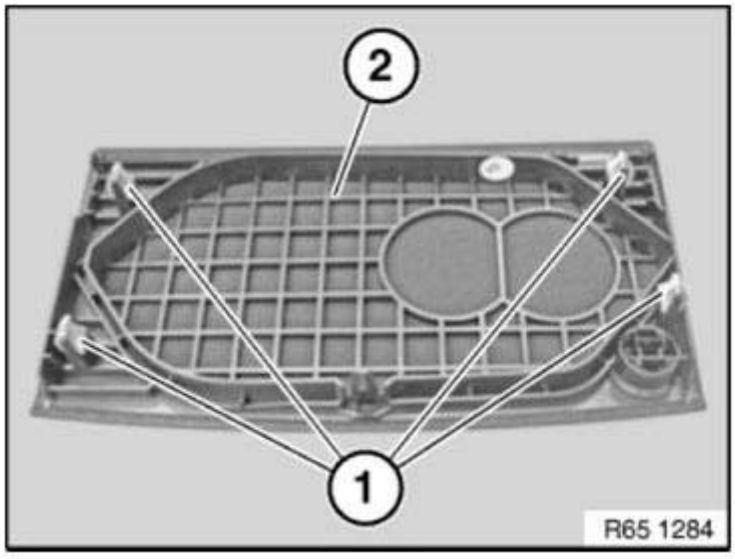


Fig. 37: Identifying Retainers On Speaker Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove speaker (2).

Disconnect plug connection underneath.

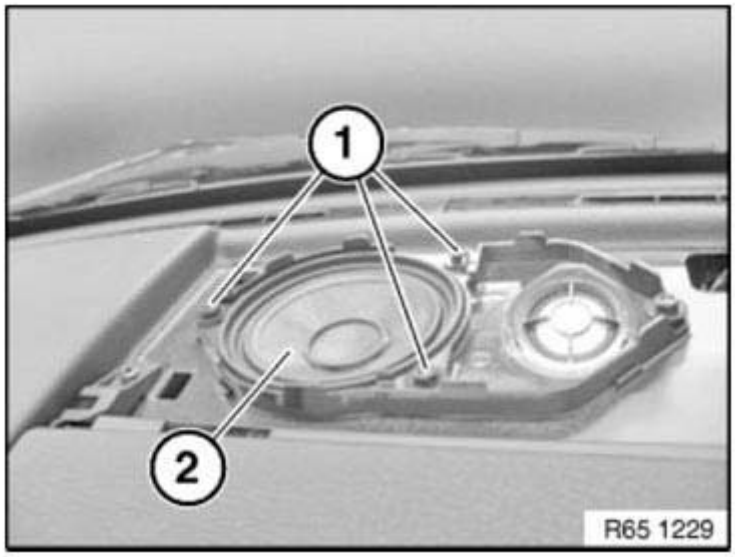


Fig. 38: Identifying Speaker With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 050 REMOVING AND INSTALLING/REPLACING SPEAKER (TWEETER IN MIRROR TRIANGLE TRIM)

Necessary preliminary tasks

- Remove **midrange speaker in door trim panel**.

Unclip speaker trim (1) first at top out of catch.

Then press speaker trim (1) downwards and remove.

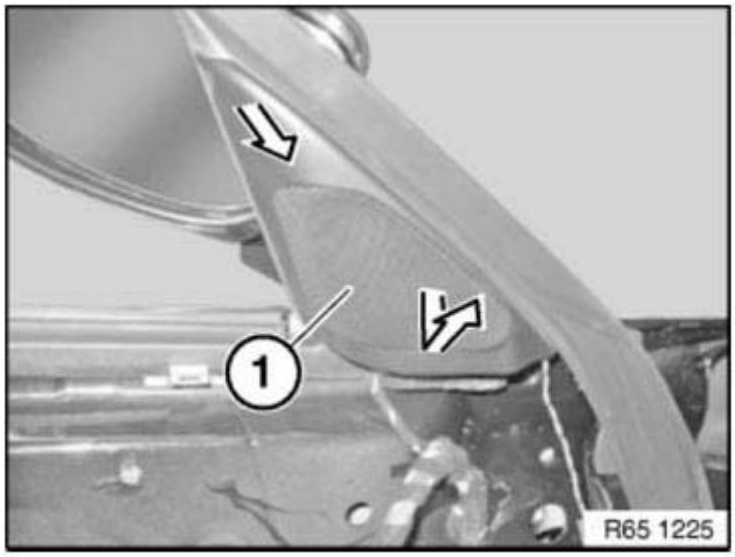


Fig. 39: Removing Speaker Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Unclip tweeter (1) from mountings (2) and remove.

Installation:

Retaining lugs must not be damaged.

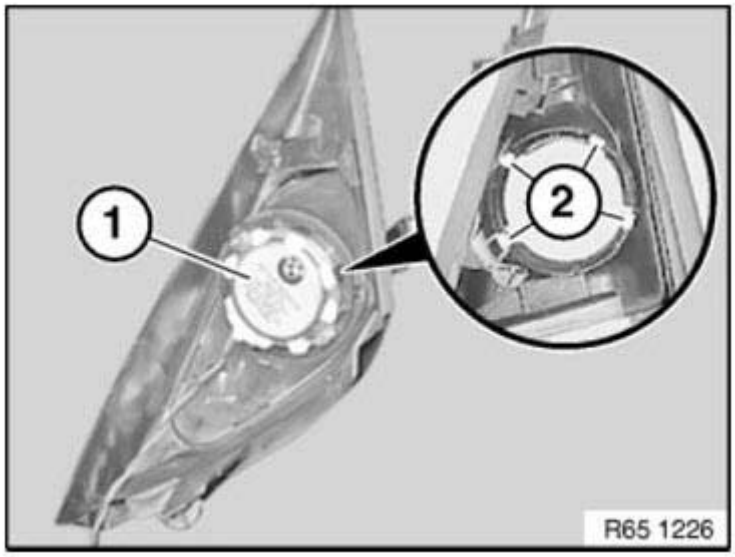


Fig. 40: Identifying Tweeter On Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

65 13 100 REMOVING AND INSTALLING/REPLACING TWEETER (IN UPPER PARTITION

PANEL)

Lever out rear speaker cover (1) with special tool 00 9 323 from partition wall panel (2) and remove.

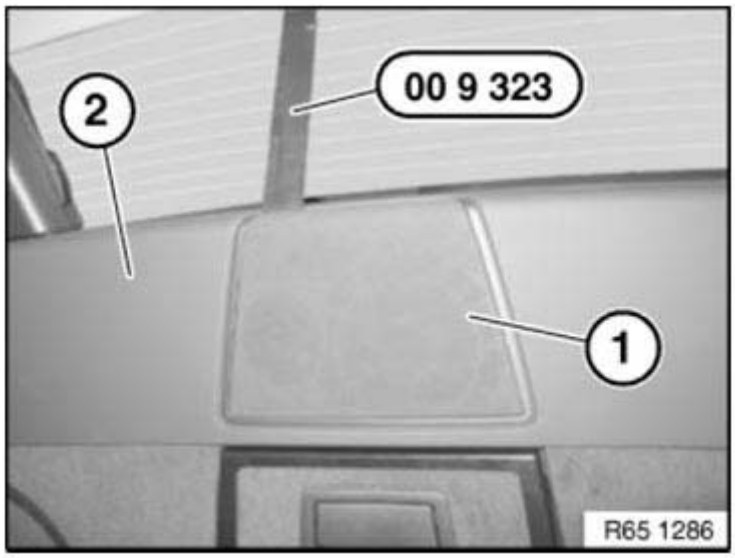


Fig. 41: Removing Rear Speaker Cover Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lever out plug connection (1) at resistor (2) and disconnect.

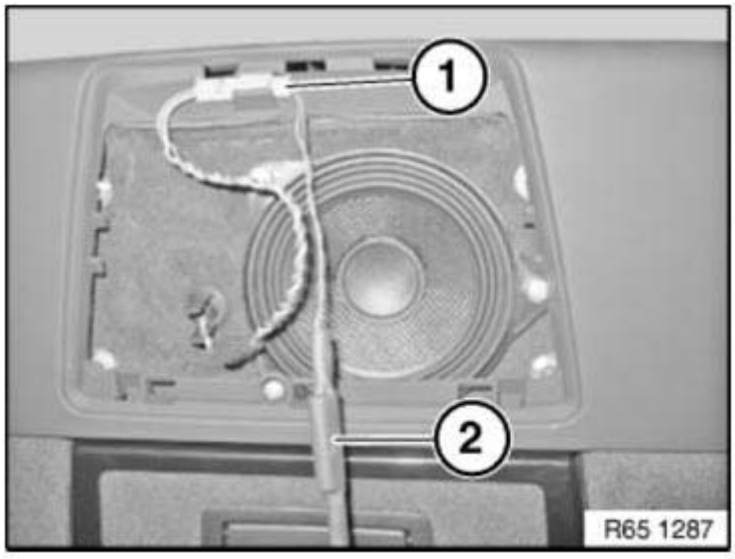


Fig. 42: Identifying Plug Connection And Resistor
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip tweeter (1) from rear speaker cover (2) and remove.

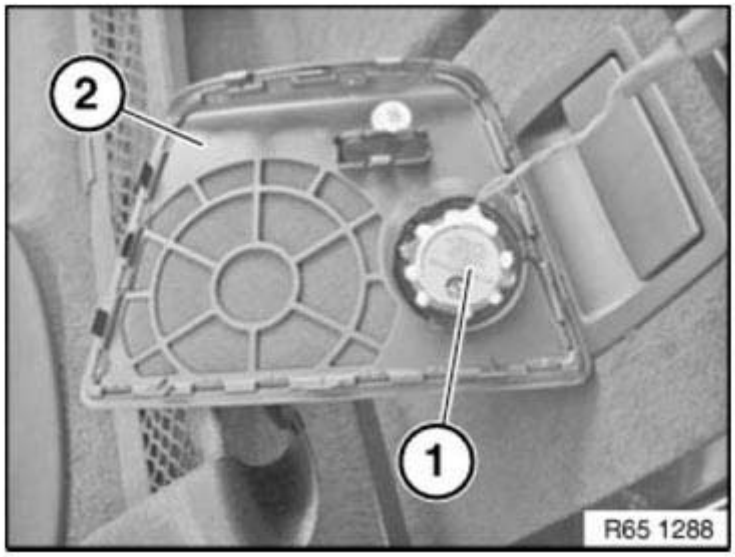


Fig. 43: Identifying Rear Speaker Cover Tweeter
Courtesy of BMW OF NORTH AMERICA, INC.

51 41 ... REPLACING SPEAKER COVER ON LEFT OR RIGHT DOOR TRIM PANEL

Partially fit special tool 00 9 317 as illustrated.

Carefully lever speaker cover (2) out of door trim panel (1).

IMPORTANT: Tape off working area. Risk of damage!

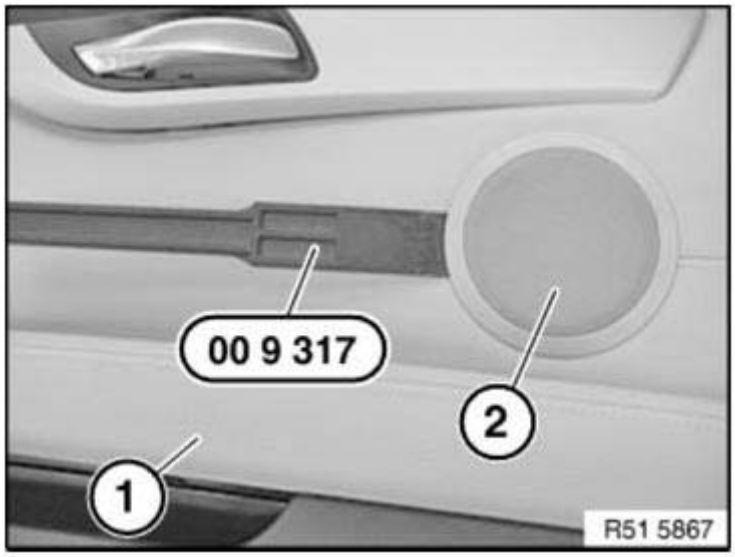


Fig. 44: Removing Speaker Cover Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Guide (2) and catch along line (3) must not be damaged.

Insert guide (2) of speaker cover (1) correctly in opening (5) of door trim panel (4) and carefully engage speaker cover (1) on edge.

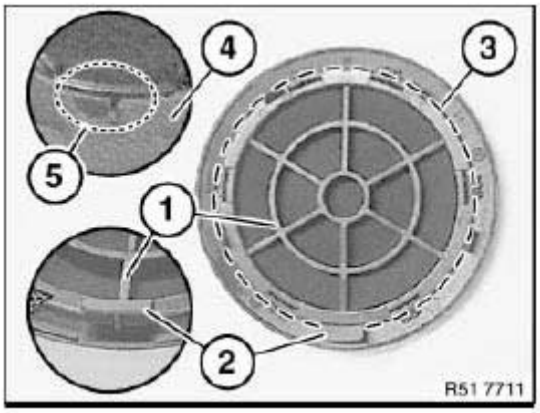


Fig. 45: Identifying Speaker Cover Guide
Courtesy of BMW OF NORTH AMERICA, INC.

6520 AERIAL ANTENNA

65 20 410 REMOVING AND INSTALLING/REPLACING DAB TUNER AERIAL

Necessary preliminary tasks:

- Remove **ROOF SWITCH CLUSTER**

Disconnect plug connection (1).

Unclip DAB tuner aerial (2) and remove.

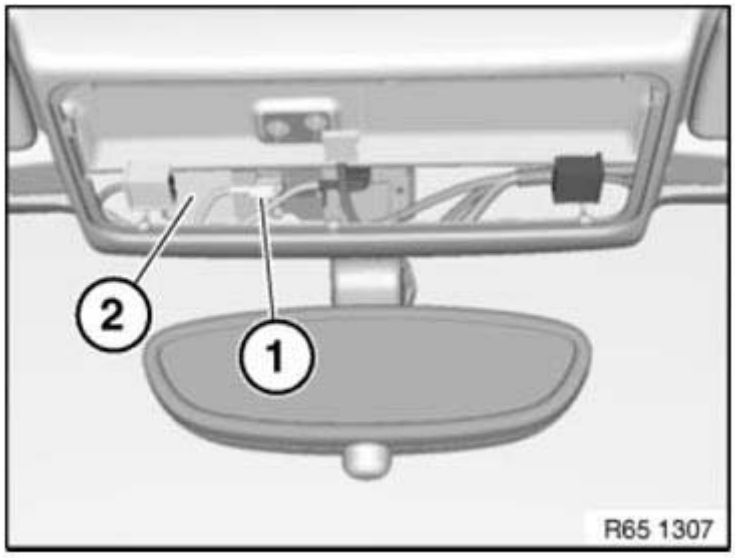


Fig. 46: Identifying DAB Tuner Aerial With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 110 REMOVING AND INSTALLING/REPLACING AERIAL AMPLIFIER (DIVERSITY)

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT TRIM ON SIDE PANEL**

Lever out expansion rivets (1).

Feed out storage compartment (2) towards top.

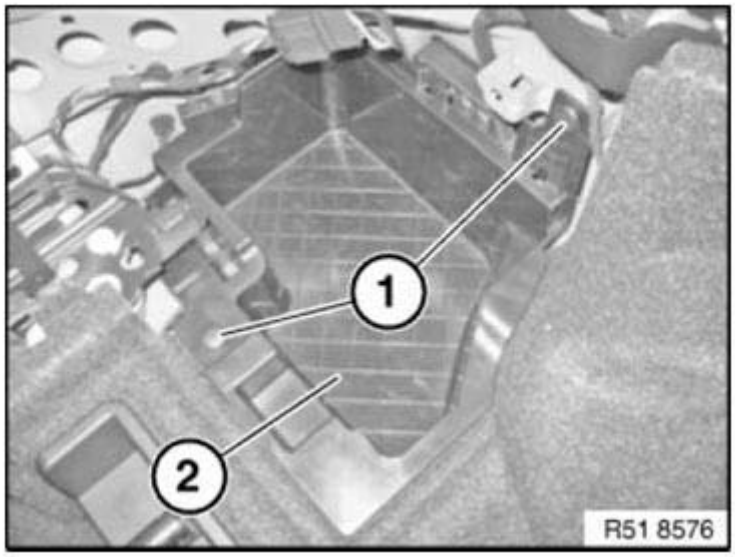


Fig. 47: Identifying Storage Compartment And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove aerial amplifier (3).

Unlock plug connections (2) and disconnect.

If necessary, disconnect further plug connections.

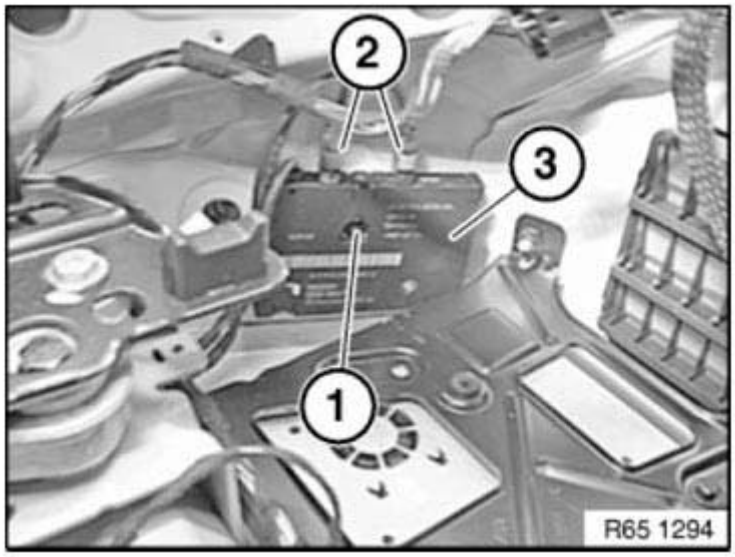


Fig. 48: Identifying Aerial Amplifier With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 055 REMOVING AND INSTALLING/REPLACING AERIAL BASE

Necessary preliminary tasks

- Remove **AERIAL ROD**
- Completely remove left rear **POWER WINDOW REGULATOR**

Lever out aerial base cover (1) with special tool 00 9 317, lifting upwards, and remove.

Installation:

Retaining lugs on cover (1) must not be damaged.

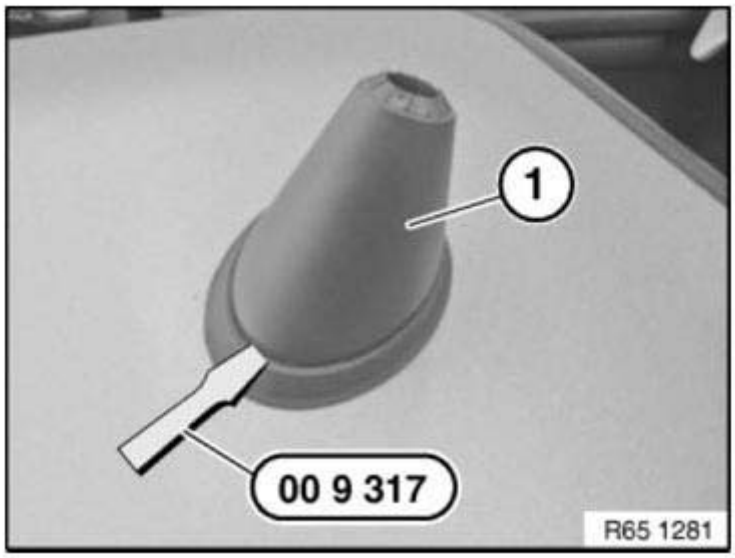


Fig. 49: Removing Aerial Base Cover Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Press plugs (2) inwards.

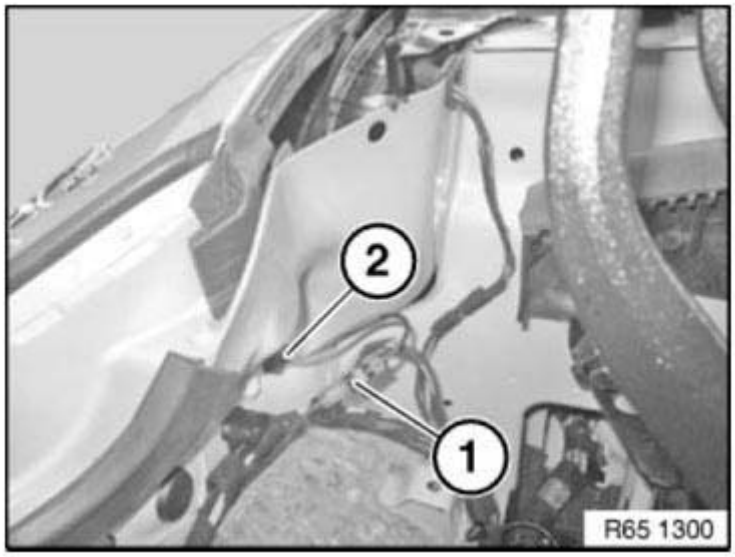


Fig. 50: Identifying Plug With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on aerial base (2).

Remove screw connection (2) in upward direction.

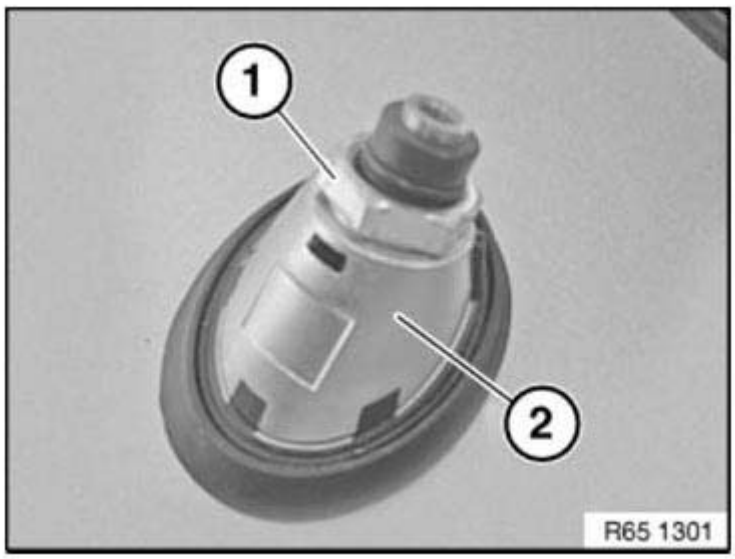


Fig. 51: Identifying Nut On Aerial Base
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, illustration shows aerial base removed.

Feed out aerial base (1) downwards through body.

Installation:

Sealing lip (2) must be correctly seated on body.

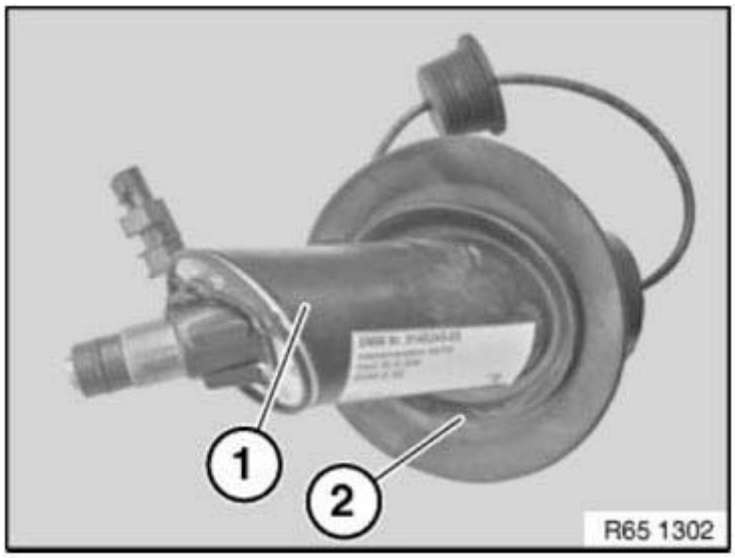


Fig. 52: Identifying Aerial Base And Sealing Lip
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 405 REMOVING AND INSTALLING/REPLACING AERIAL FOR SATELLITE DIGITAL AUDIO RADIO SERVICE (SDARS)

Necessary preliminary tasks:

- Remove **AUXILIARY BRAKE LIGHT REAR LID COVER**

Release nut (1) on underside of rear lid.

Unfasten aerial plug (2) and disconnect.

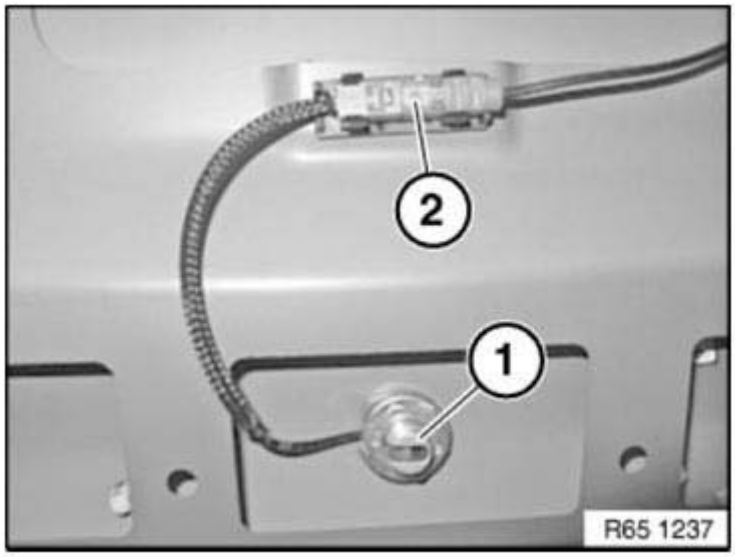


Fig. 53: Identifying Aerial Plug With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Lever SDARS aerial (1) upwards out of rear lid.

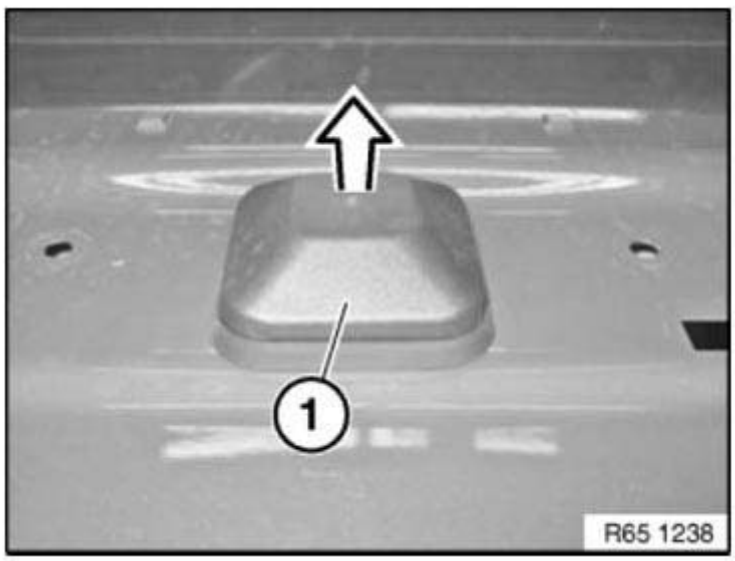


Fig. 54: Removing SDARS Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 420 REMOVING AND INSTALLING/REPLACING AERIAL OF GLOBAL POSITIONING SYSTEM (GPS)

Necessary preliminary tasks:

- Remove **ROOF SWITCH CLUSTER**

Unfasten plug connection (1) and disconnect.

Unlock retaining lug (2).

Remove GPS aerial (3).

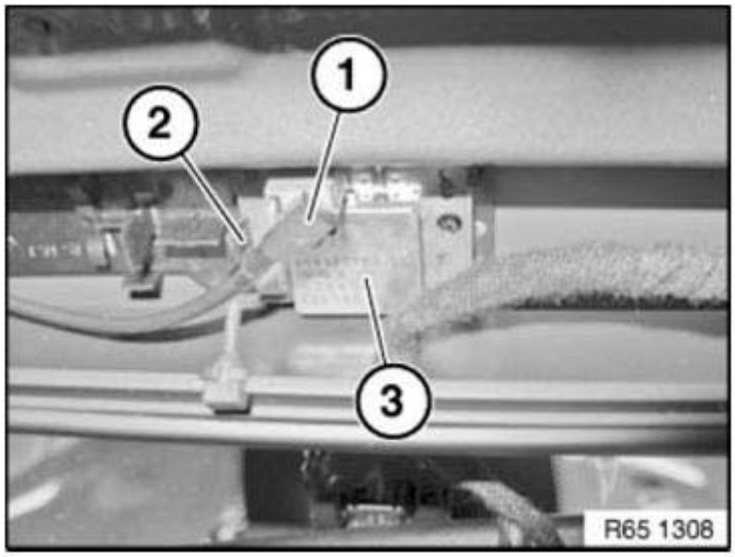


Fig. 55: Identifying GPS Aerial With Retaining Lug And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 050 REMOVING AND INSTALLING/REPLACING AERIAL ROD

Release aerial rod (1) in direction of arrow and remove from aerial base (2).

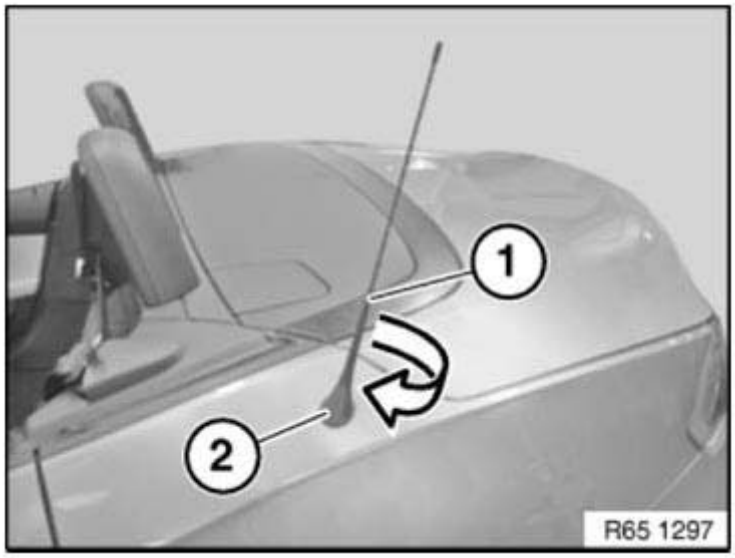


Fig. 56: Removing Aerial Rod
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 150 REMOVING AND INSTALLING/REPLACING BACK-UP AERIAL

Necessary preliminary tasks:

- Remove **COMPLETE CENTRE CONSOLE** .

Unfasten plug connection (1) and disconnect.

Unfasten screws (2).

Remove back-up aerial (3) towards top from tunnel (4).

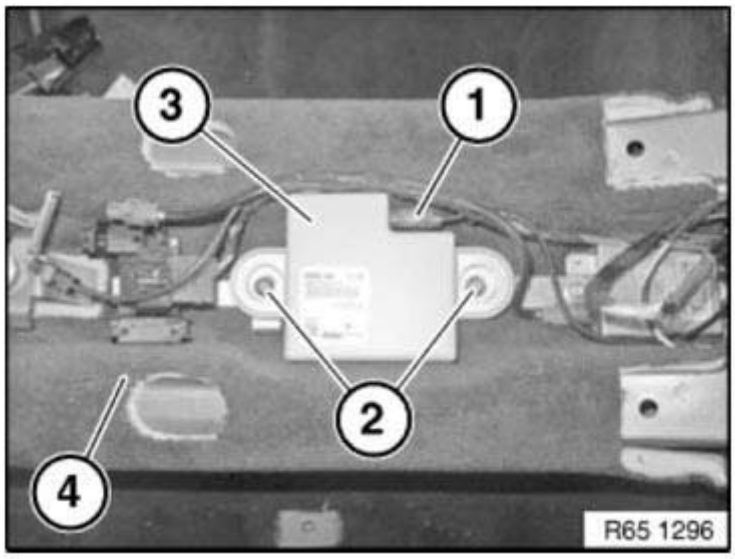


Fig. 57: Identifying Back-Up Aerial With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 300 REMOVING AND INSTALLING/REPLACING BUMPER AERIAL (FM)

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**
- Remove **LUGGAGE COMPARTMENT TRIM ON SIDE PANEL**

Disconnect plug connection (1) on aerial amplifier (2).

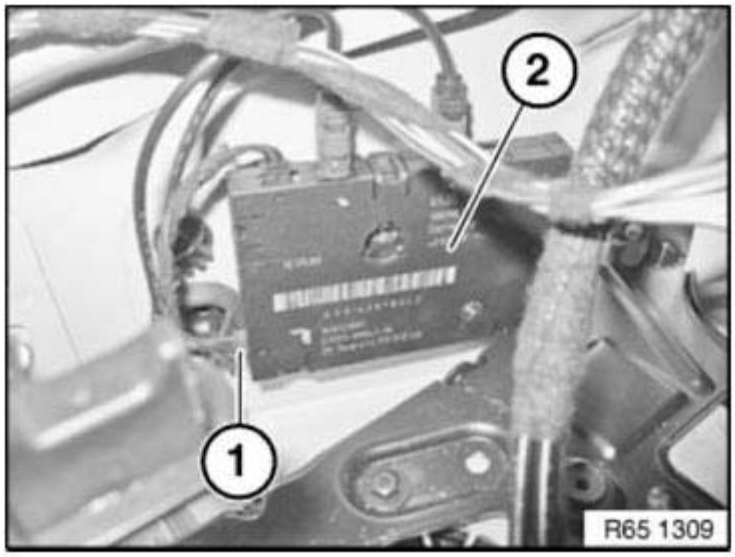


Fig. 58: Identifying Plug Connection On Aerial Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip FM aerial (1) from left bumper carrier (2).

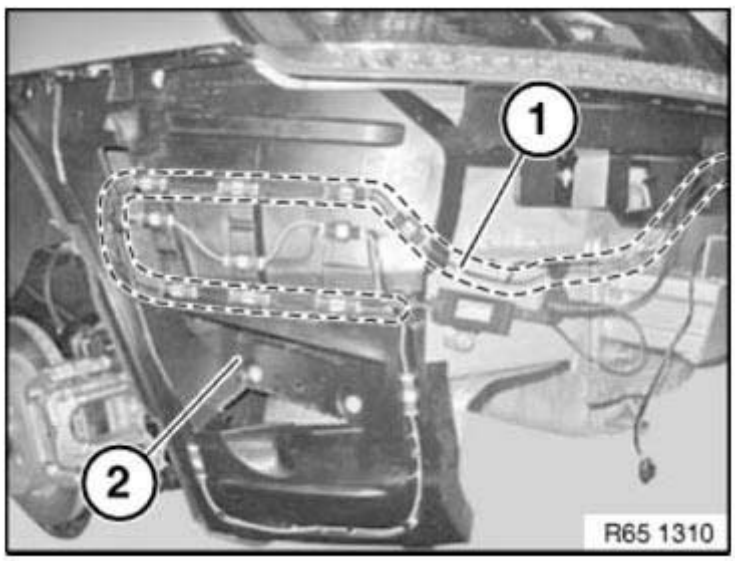


Fig. 59: Identifying FM Aerial And Left Bumper Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip FM aerial (1) from holders on bumper guide (2).

Feed FM aerial (1) out of penetration (3) and remove.

Installation:

Make sure FM aerial is laid correctly.

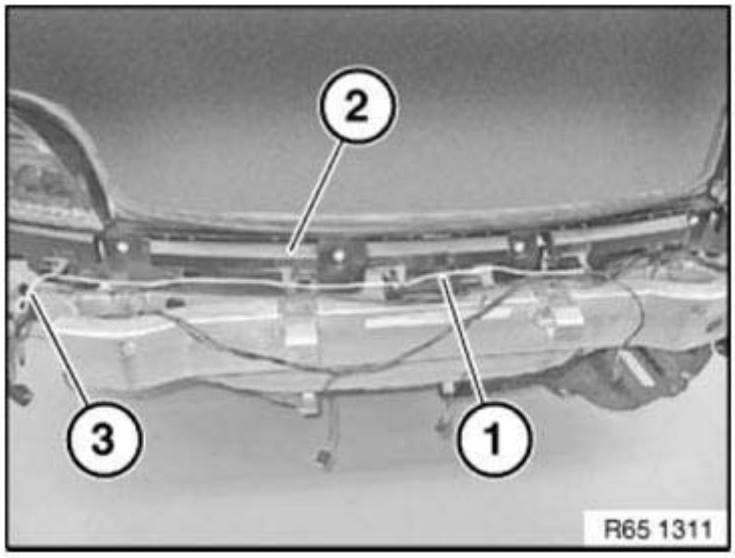


Fig. 60: Identifying FM Aerial And Bumper Guide
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 165 REMOVING AND INSTALLING/REPLACING LEFT TV AERIAL

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**

Unclip TV aerial (1).

Unfasten plug connection (2) and disconnect.

Release screw (3).

Remove TV aerial (1).

Installation:

Make sure TV aerial (1) is correctly laid.

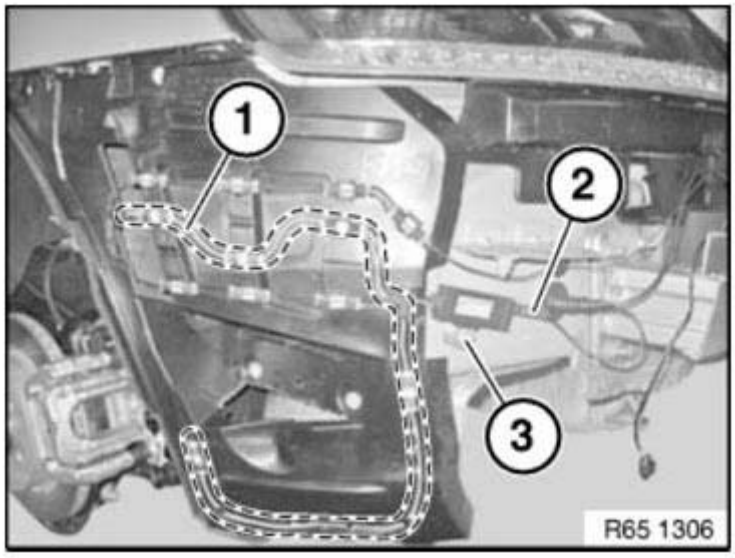


Fig. 61: Identifying TV Aerial With Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 250 REMOVING AND INSTALLING/REPLACING REAR TELEPHONE AERIAL

Necessary preliminary tasks

- Remove **REAR BUMPER TRIM**

Unfasten plug connection (1) and disconnect.

Unlock telephone aerial (2).

Remove telephone aerial (2) from bracket (3).

Installation:

Make sure telephone aerial (2) is correctly seated.

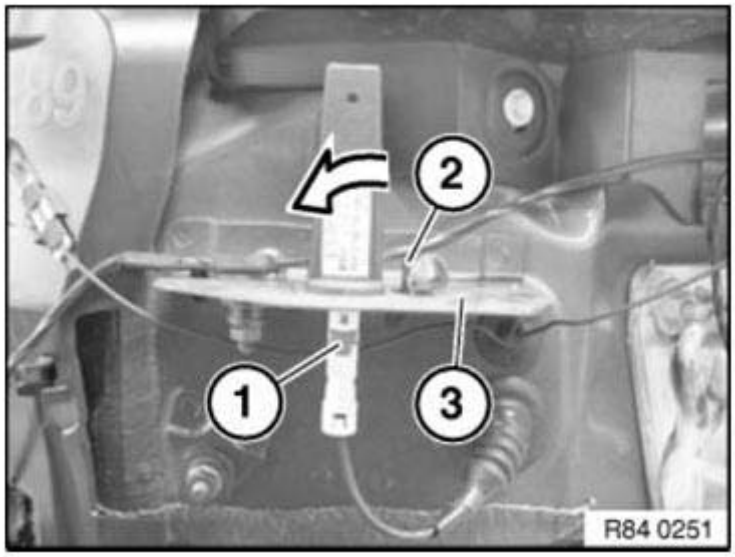


Fig. 62: Removing Telephone Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 167 REMOVING AND INSTALLING/REPLACING RIGHT TV AERIAL

Operation is identical to:

REMOVING AND INSTALLING LEFT TV AERIAL .

6524 REAR WINDOW AERIAL ANTENNA

65 50 030 REMOVING AND INSTALLING/REPLACING TV MODULE

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Follow INSTRUCTIONS for handling optical fibres.

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **LUGGAGE COMPARTMENT TRIM ON LEFT SIDE PANEL**

Lever out expansion rivets (1).

Feed out storage compartment (2) towards top.

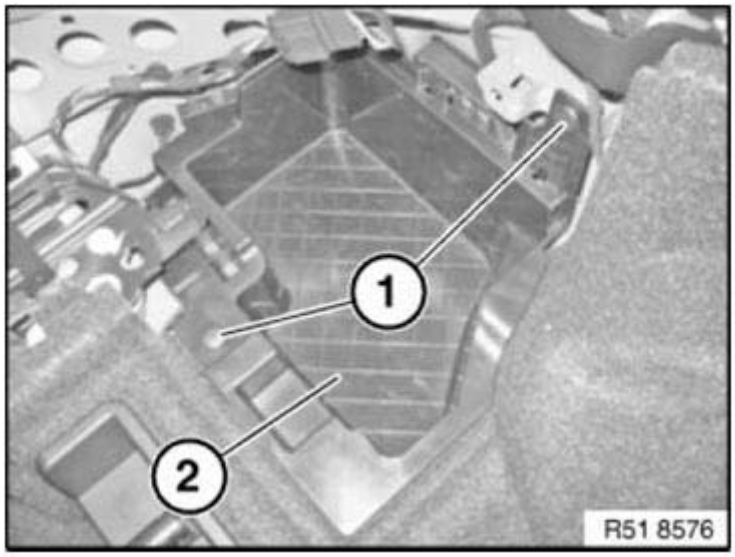


Fig. 63: Identifying Storage Compartment And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Raise TV module including bracket (2).

Unlock and disconnect associated plug connections (3).

Feed out TV module (2).

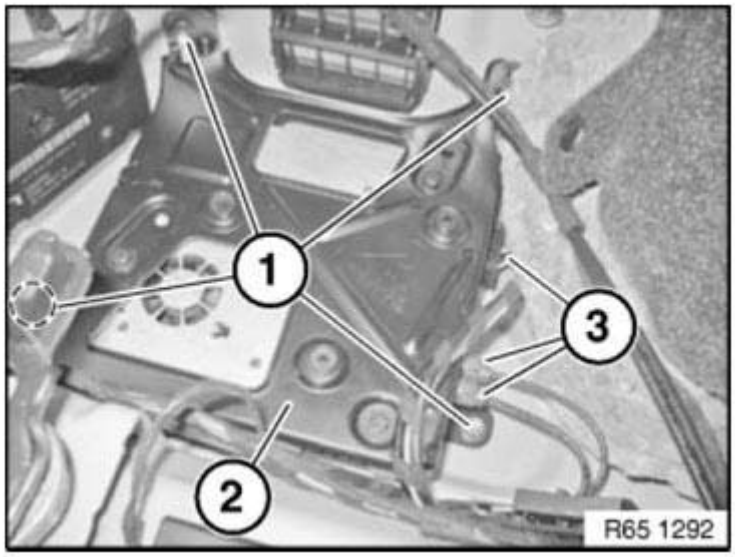


Fig. 64: Identifying TV Module With Plug Connections And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Release screws (1).

Remove bracket (2) from TV module.

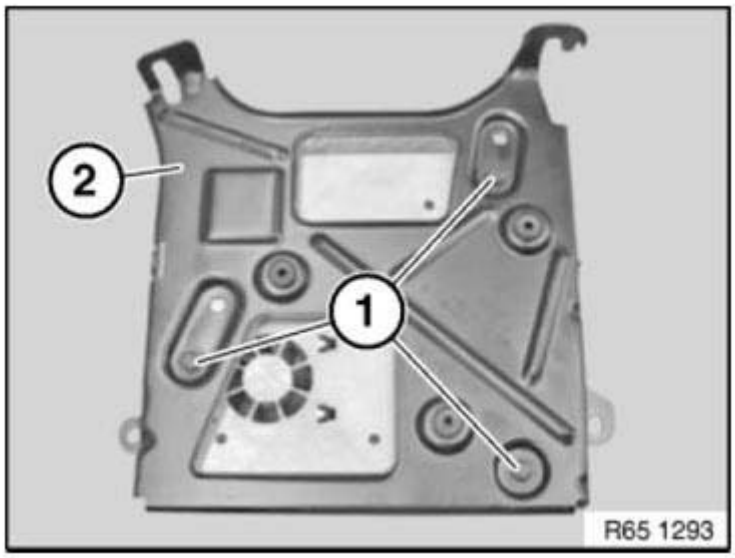


Fig. 65: Identifying Bracket On TV Module
Courtesy of BMW OF NORTH AMERICA, INC.

65 24 020 REMOVING AND INSTALLING/REPLACING BLOCKING CIRCUIT (LEFT OR RIGHT)

Necessary preliminary tasks

- Remove **ROOFLINER FOR ROOF SHELL AT REAR**

Release screw (1).

Remove blocking circuit (2) from roof shell (3).

Unlock associated plug connections and disconnect.

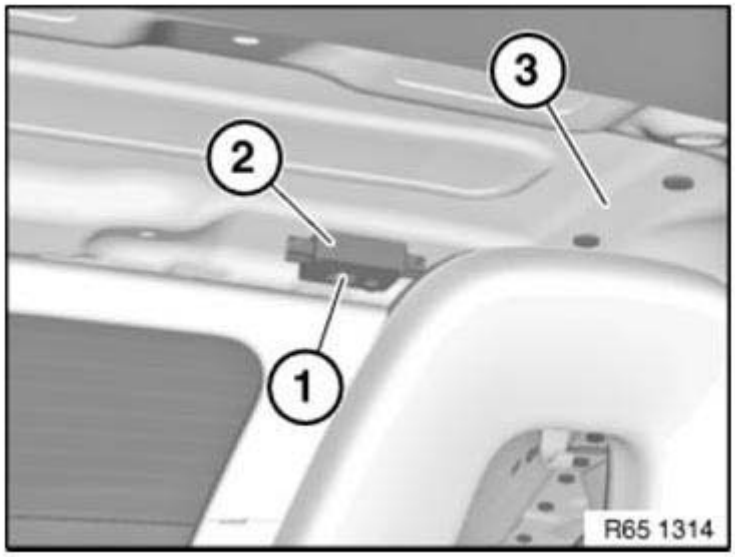


Fig. 66: Identifying Roof Shell With Blocking Circuit And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit blocking circuit (1) so that screw (2) engages thread (3) and locating pin (4) engages bore (5).

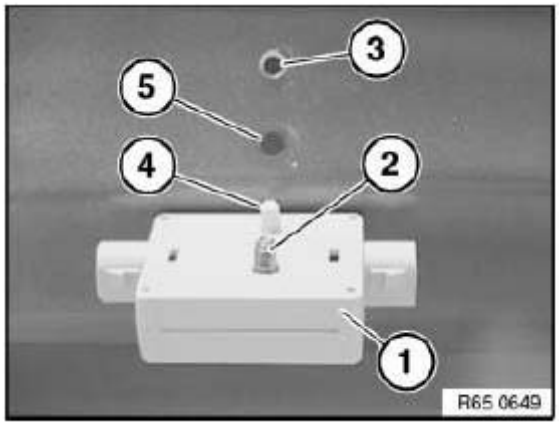


Fig. 67: Identifying Blocking Circuit, Screw, Thread, Locating Pin And Bore
Courtesy of BMW OF NORTH AMERICA, INC.

6550 VIDEO AND TV EQUIPMENT

65 50 057 REMOVING AND INSTALLING/REPLACING CENTRAL INFORMATION DISPLAY (CID)

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

Necessary preliminary tasks

- Remove **CENTRE FRESH-AIR GRILLE**

Lift trim (1) with special tool 00 9 317 out of latch mechanisms and remove upwards.

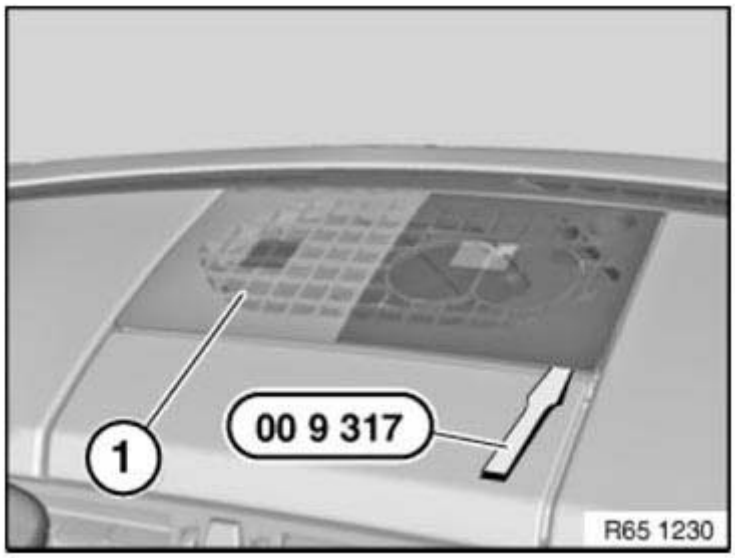


Fig. 68: Opening Trim Using Special Tool (00 9 317) From Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) from CID (2) on speaker carrier (3).

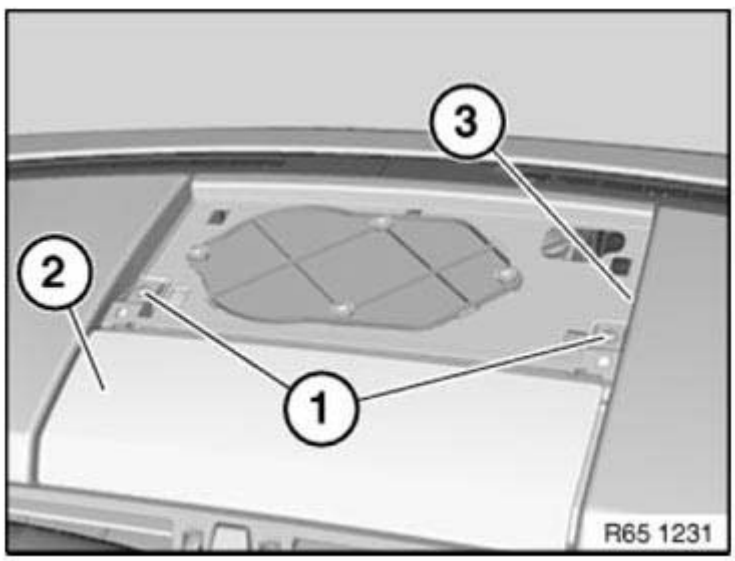


Fig. 69: Identifying CID Mounting Screws On Speaker Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Fold out CID (1) manually.

Unfasten screws (2).

Remove CID (1) towards top.

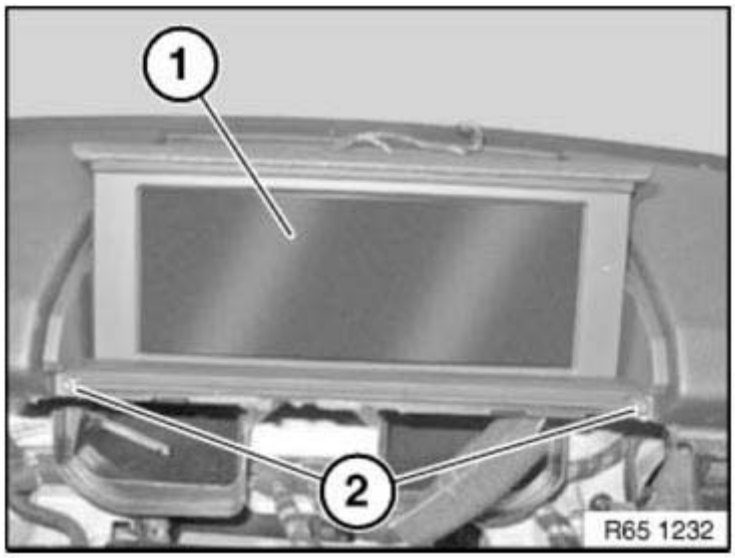


Fig. 70: Identifying CID With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slide protective sleeve (1) upwards.

Unfasten plug connection (2) and disconnect.

Disconnect plug connection (3).

Installation:

Ensure correct routing of cables.

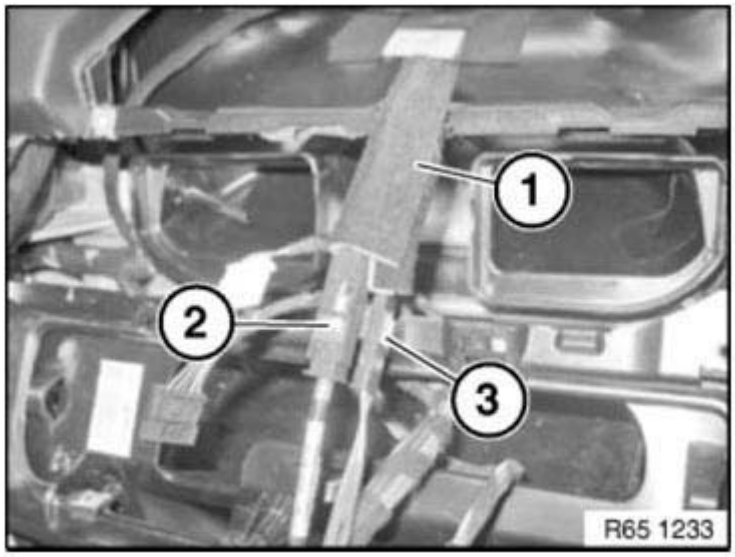


Fig. 71: Identifying Protective Sleeve With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out vehicle programming/coding.

65 50 030 REMOVING AND INSTALLING/REPLACING TV MODULE

IMPORTANT: Read and comply with NOTES on protection against electrostatic damage (ESD protection).

NOTE: Follow INSTRUCTIONS for handling optical fibres.

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **LUGGAGE COMPARTMENT TRIM ON LEFT SIDE PANEL**

Lever out expansion rivets (1).

Feed out storage compartment (2) towards top.

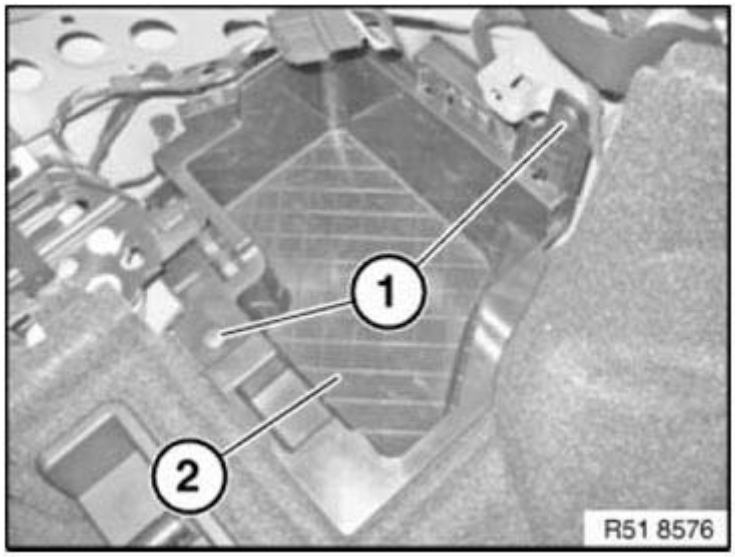


Fig. 72: Identifying Storage Compartment And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Raise TV module including bracket (2).

Unlock and disconnect associated plug connections (3).

Feed out TV module (2).

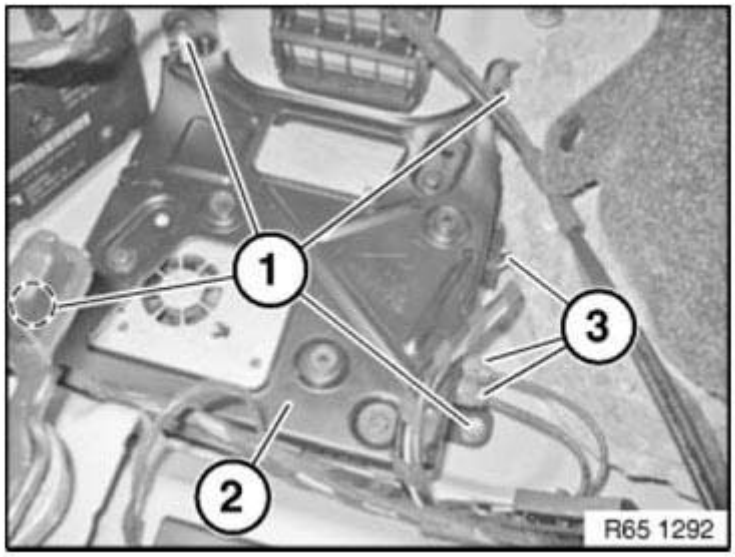


Fig. 73: Identifying TV Module With Plug Connections And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Release screws (1).

Remove bracket (2) from TV module.

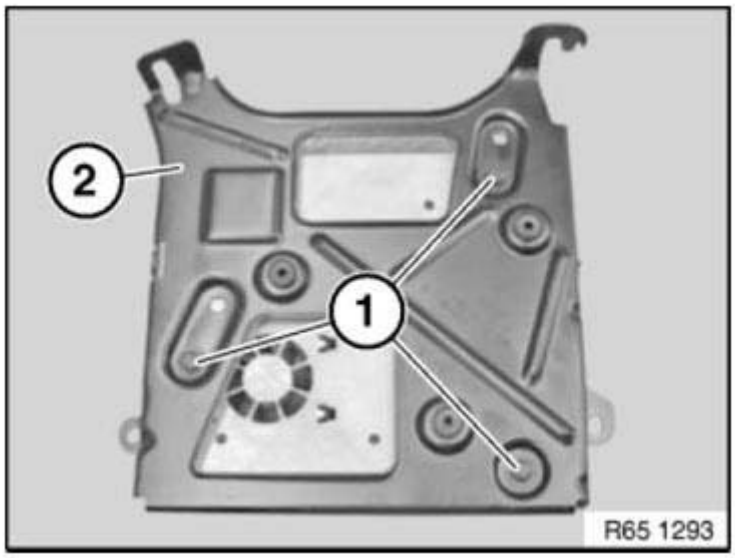


Fig. 74: Identifying Bracket On TV Module
Courtesy of BMW OF NORTH AMERICA, INC.

6575 ANTI-THEFT ALARM SYSTEM

65 75 055 REMOVING AND INSTALLING/REPLACING EMERGENCY POWER SIREN WITH TILT SENSOR

Necessary preliminary tasks

- Remove **FRONT LEFT WHEEL ARCH COVER**

Release screws (1).

Unfasten plug connection (2) and disconnect.

Remove emergency power siren including bracket (3).

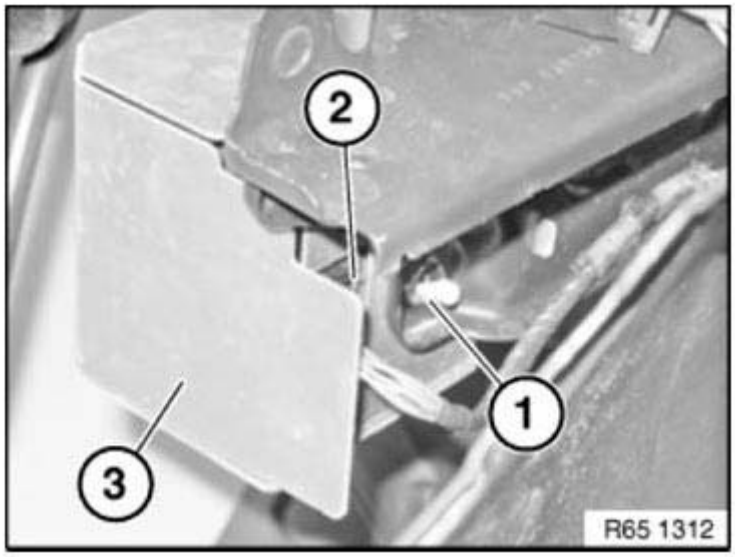


Fig. 75: Identifying Emergency Power Siren With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Release nut (1) and remove emergency power siren with tilt sensor (2).

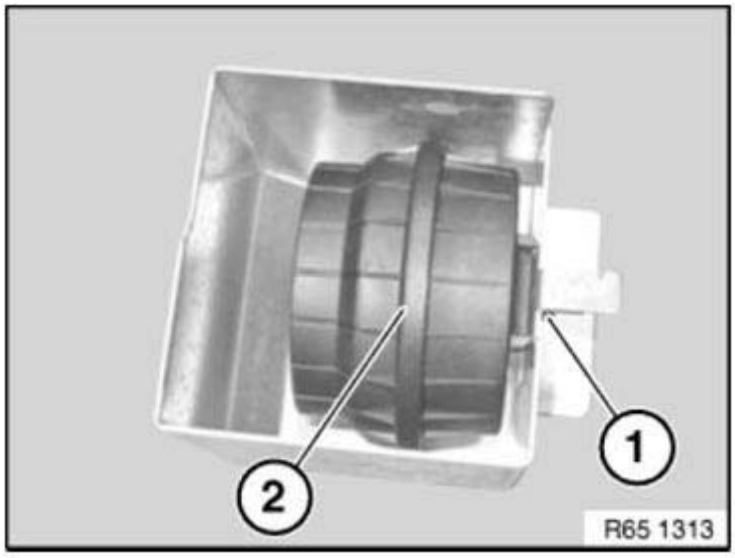


Fig. 76: Identifying Tilt Sensor And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

65 75 080 REMOVING AND INSTALLING/REPLACING INTERIOR MOVEMENT DETECTION

MODULE IN LEFT OR RIGHT FRONT DOOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove **FRONT DOOR TRIM PANEL**

Release screws (1).

Remove microwave sensor (2) from door trim panel (3).

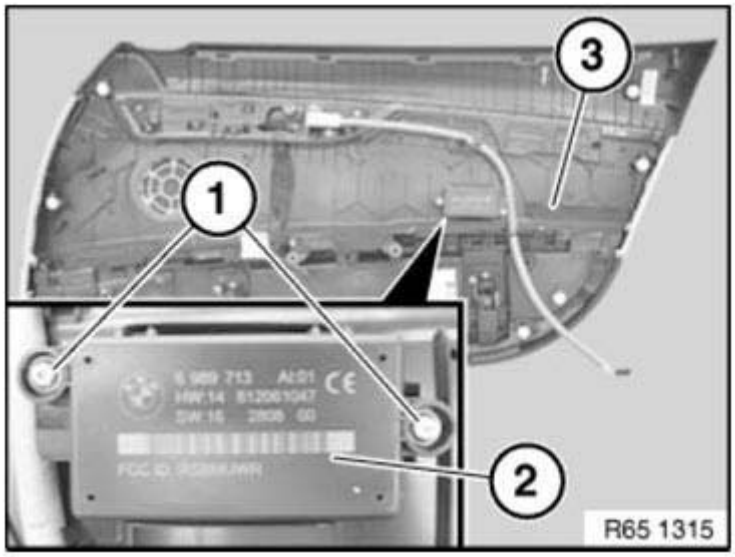
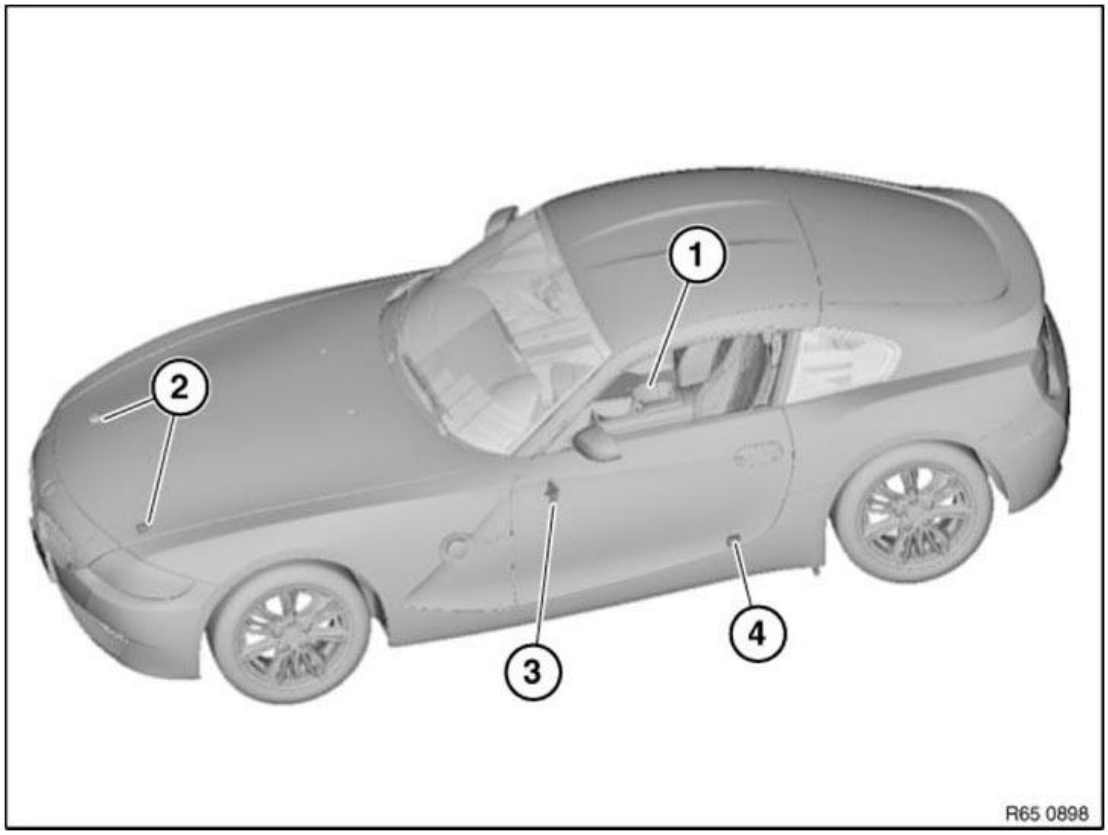


Fig. 77: Identifying Microwave Sensor With Door Trim Panel And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

6577 AIRBAG TRIGGERING UNIT, DIAGNOSIS UNIT

65 77 ... OVERVIEW OF SENSORS FOR AIRBAG SYSTEM



1. Airbag control unit
2. Acceleration sensors, front (left/right, US version only)
3. Sensor, B-pillar (left/right)
4. Sensor, front door (left/right)

Fig. 78: Identifying Airbag System Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

1. Airbag control unit
2. Acceleration sensors, front (left/right, US version only)
3. Sensor, B-pillar (left/right)
4. Sensor, front door (left/right)

65 77 720 REMOVING AND INSTALLING (REPLACING) LEFT B-PILLAR SENSOR

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS !
Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks:

- Disconnect battery negative lead and cover
- Remove **REAR BOTTOM SIDE TRIM PANEL**

Press floor lining (1) to one side.

Unfasten screws (2).

Tightening torque **65 77 3AZ** .

Remove B-pillar sensor (3).

Disconnect associated plug connection.

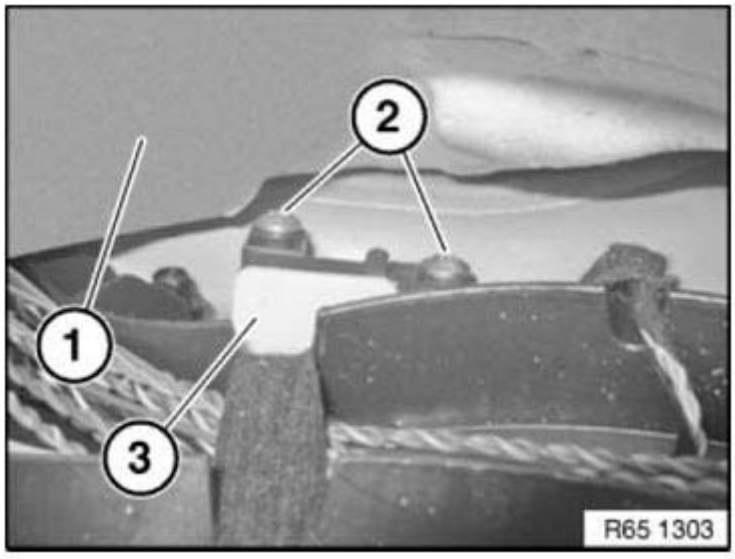


Fig. 79: Identifying Press Floor Lining And B-Pillar Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 016 REMOVING AND INSTALLING/REPLACING AIRBAG CONTROL UNIT

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS!
Incorrect handling can activate airbag and cause injury.

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION).

Necessary preliminary tasks:

- **DISCONNECT BATTERY NEGATIVE LEAD** and cover.
- Remove **COMPLETE CENTRE CONSOLE** .

Unlock plug connections (1) and disconnect.

Unscrew nuts (2).

Tightening torque **65 77 1AZ** .

Remove airbag control unit (3).

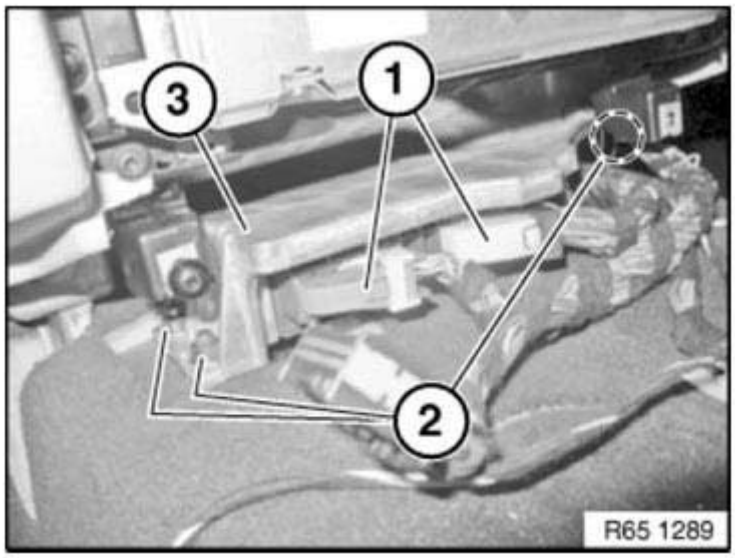


Fig. 80: Identifying Airbag Control Unit With Plug Connections And Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

65 75 055 REMOVING AND INSTALLING/REPLACING EMERGENCY POWER SIREN WITH TILT SENSOR

Necessary preliminary tasks

- Remove **FRONT LEFT WHEEL ARCH COVER**

Release screws (1).

Unfasten plug connection (2) and disconnect.

Remove emergency power siren including bracket (3).

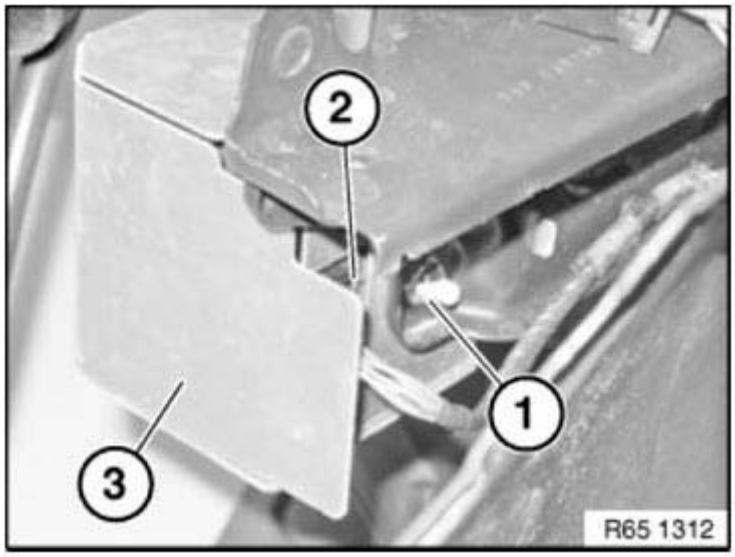


Fig. 81: Identifying Emergency Power Siren With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Release nut (1) and remove emergency power siren with tilt sensor (2).

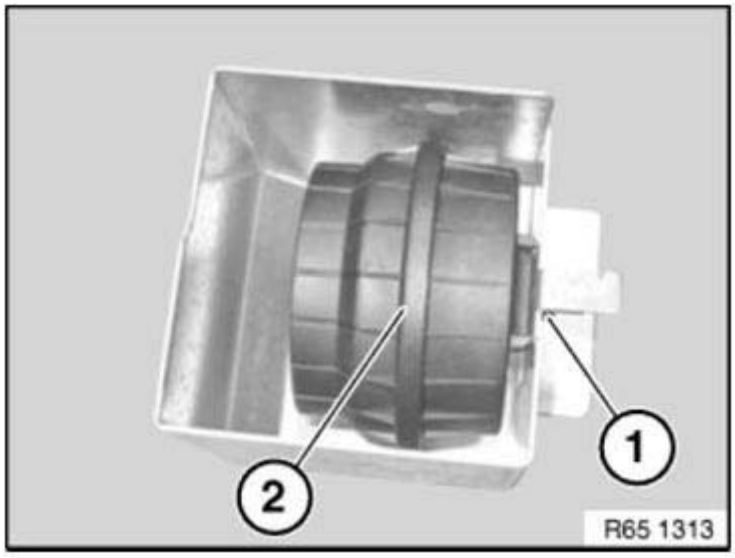


Fig. 82: Identifying Tilt Sensor And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding .

65 77 740 REMOVING AND INSTALLING/REPLACING FRONT LEFT DOOR SENSOR (US

VERSION ONLY

WARNING: NOTE AIRBAG SAFETY INSTRUCTIONS !

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **SOUND INSULATION FROM FRONT DOOR**

Release screws (1).

Tightening torque **51 21 16AZ** .

Remove adapter for door speaker (2).

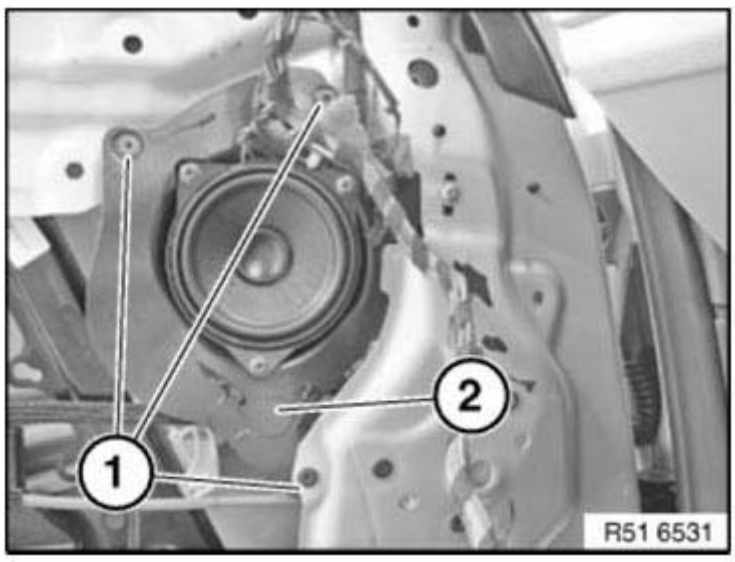


Fig. 83: Identifying Door Speaker Adapter With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on front door sensor.

Tightening torque **65 77 4AZ** .

Remove front door sensor () and unlock and disconnect associated plug connection.

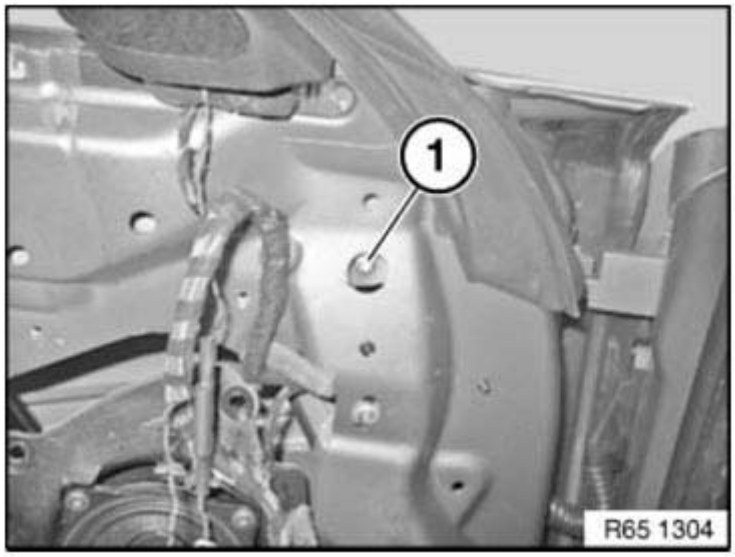


Fig. 84: Identifying Screw On Front Door Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure front door sensor (1) is in correct installation position.

Guide lug (2) must be correctly seated in corresponding mounting on front door.

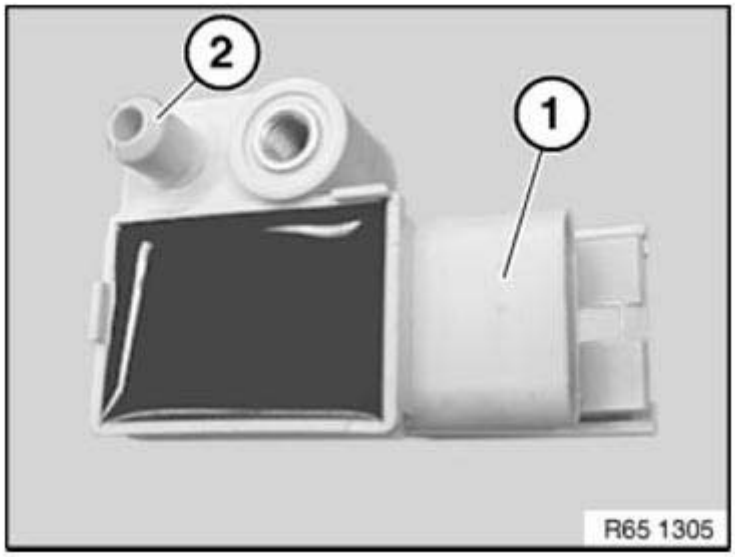


Fig. 85: Identifying Front Door Sensor And Guide Lug
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 532 REMOVING AND INSTALLING/REPLACING FRONT LEFT SENSOR (US VERSION ONLY)

Installation:

Remove **SUCTION FILTER HOUSING** .

Unscrew nuts (1).

Tightening torque **65 77 6AZ** .

Unfasten plug connection (2) and disconnect.

Remove front left sensor (3) from front panel.

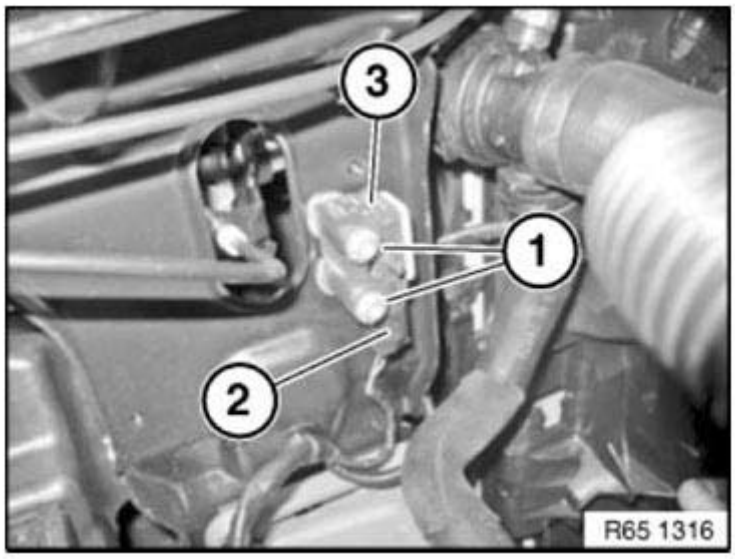


Fig. 86: Identifying Front Left Sensor With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 745 REMOVING AND INSTALLING/REPLACING FRONT RIGHT DOOR SENSOR (US VERSION ONLY)

Operation is described in:

REMOVING AND INSTALLING/REPLACING FRONT LEFT DOOR SENSOR .

65 77 534 REMOVING AND INSTALLING/REPLACING FRONT RIGHT SENSOR (US VERSION ONLY)

Release screws (1), tightening torque **65 77 6AZ** .

Unfasten plug connection (2) and disconnect.

Remove front right sensor (3) from front panel.

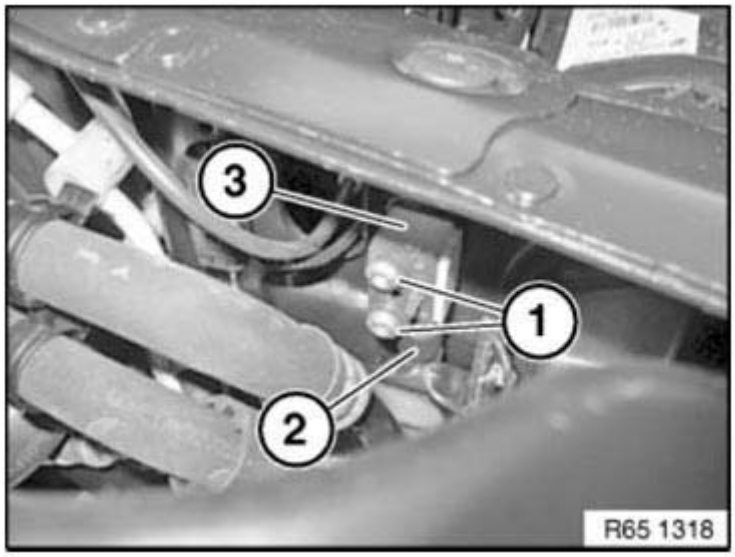


Fig. 87: Identifying Front Right Sensor With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 725 REMOVING AND INSTALLING/REPLACING RIGHT B-PILLAR SENSOR

Operation is identical to:

REMOVING AND INSTALLING LEFT B-PILLAR SENSOR

65 77 604 REPLACING SENSOR MAT (CIS MAT) FOR FRONT PASSENGER SEAT OCCUPANCY DETECTION DETECTOR

WARNING: Note AIRBAG SAFETY REGULATIONS !
Incorrect handling can lead to airbag deployment and cause injury.

WARNING: Only US and Canadian version of front passenger seat (with CIS mat):
The CIS mat can only be removed in conjunction with the padding from the seat cover.
If CIS mat or padding is defective, both parts may only be replaced together.
After fitting the seat cover, the CIS mat must be enabled with the BMW programming system.

Procedure for replacing the CIS mat together with the upholstery is described under:

- Remove padding for front seat . See **5213400 REPLACING SEAT COVER ON LEFT OR RIGHT FRONT SEAT (NORMAL/MANUAL)** or **5215400 REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (SPORT/MANUAL)**

The work scope with CIS mat is different in the following work steps:

Release the bolting point (1) of the ground cable on the seat pan.

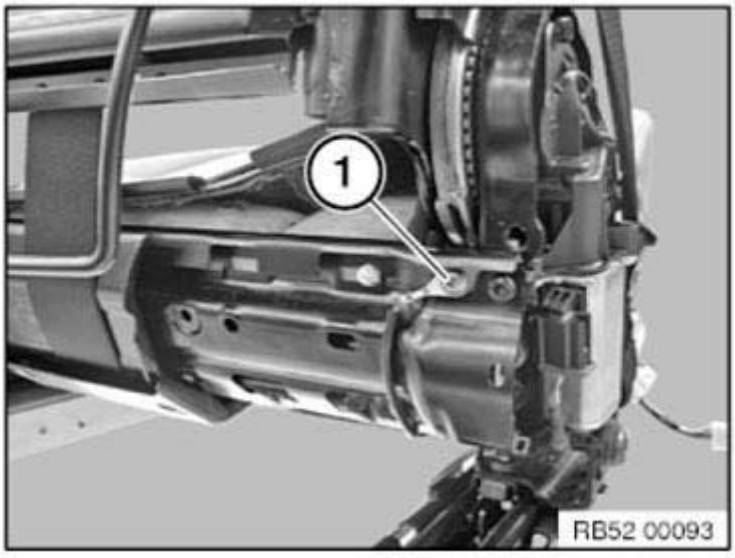


Fig. 88: Identifying Ground Cable Bolting Point On Seat Pan
Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable strap (1).

Lift the locking tab and pull the connector out of the side of the connector housing.

Installation note:

Replace cable tie (1).

Connector is encoded against incorrect assembly.

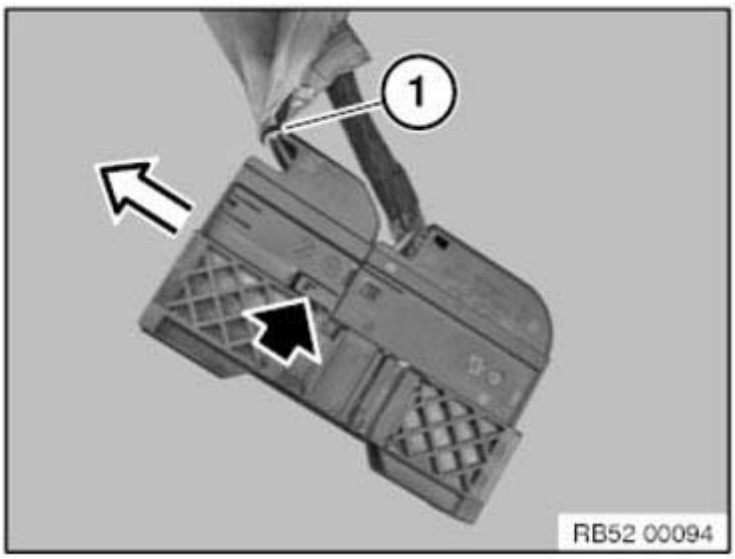


Fig. 89: Pulling Connector From Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Enabling seat occupancy detection (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

65 77 600 REPLACING SENSOR MAT FOR FRONT PASSENGER SEAT OCCUPANCY DETECTOR

WARNING: Note AIRBAG SAFETY INSTRUCTIONS !
Incorrect handling can activate airbag and cause injury.

WARNING: US/CDN front passenger seat (with OC3 mat) only:
A defective OC3 mat may only be replaced complete with the padding and the seat cover.
New OC3 mat is supplied with padding, seat cover and if necessary seat heating.
After fitting, the OC3 mat must be enabled with the diagnosis system.
Individual parts not available.

Release seat occupancy detector:

- Connect diagnosis system
- Release seat occupancy detector
- Clear fault memory if necessary

Necessary preliminary tasks

- Remove seat cover for right front seat

Disconnect plug connection (1).

IMPORTANT: To prevent the seat occupancy detector electronics box from slipping, do not pull too strongly on the cable.

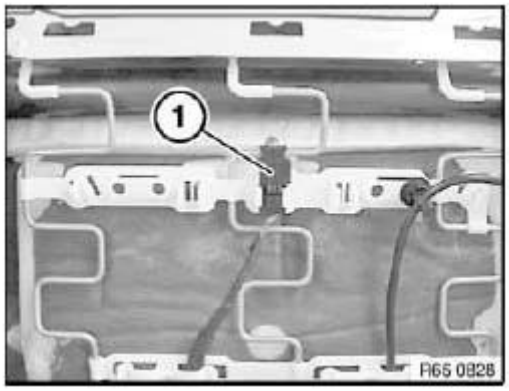


Fig. 90: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Cut front sticking surface (4) in area on sensor mat (1) with cutter knife or heavy-duty scalpel from foam without damaging the foam and the sensor mat.

If necessary, also cut away deviating sticking points from seat padding without incurring damage.

Remove sensor mat (1) and feed out electric lead.

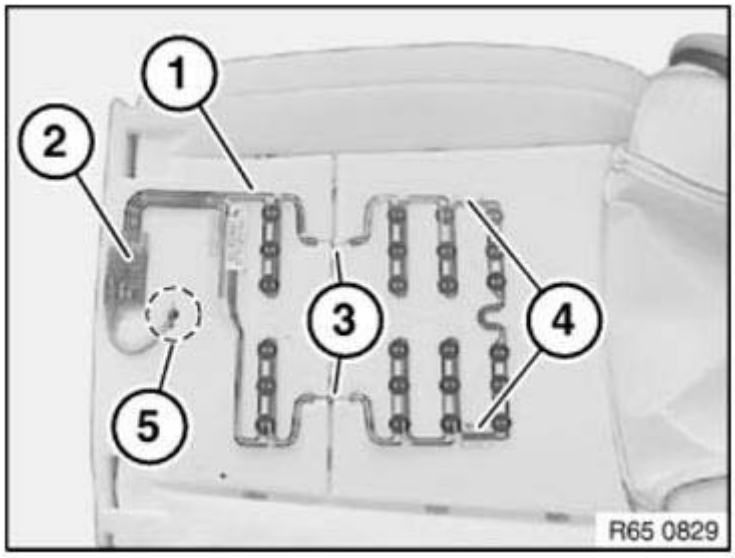


Fig. 91: Identifying Sensor Mat, Front Sticking Surface And Electronic Box
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Observe installation sequence:

- Align new sensor mat (1) to seat padding
- Guide cable in area (5) through hole penetration for seat padding

- Press sensor mat down to base of basting groove in area (3) and align again
- Carefully staple cross trim wire of seat cover to holding wire of seat padding
- Sensor mat must not be able to move and must be checked again
- Pull all protective foil off sensor mat adhesive strips and stick to seat padding

IMPORTANT: In order to guarantee the function and fastening (adhesive strength) at the sticking surfaces of sensor mat (1), the foam must not show any traces of damage.
Replace the foam if it is hardened or damaged particularly in the area of the sticking surfaces.
To prevent the electronics box (2) from slipping, do not pull cable too strongly through hole penetration (5).

65 77 601 REPLACING SENSOR MAT FOR FRONT PASSENGER SEAT OCCUPANCY DETECTOR (SPORT SEAT)

Operation is described in:

Replacing **SENSOR MAT FOR FRONT PASSENGER SEAT OCCUPANCY DETECTOR** .

6581 ON-BOARD COMPUTER

65 81 060 REMOVING AND INSTALLING/REPLACING OUTSIDE TEMPERATURE SENSOR

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

NOTE: Outside temperature sensor is situated in area (1) on left wheel arch cover (2).

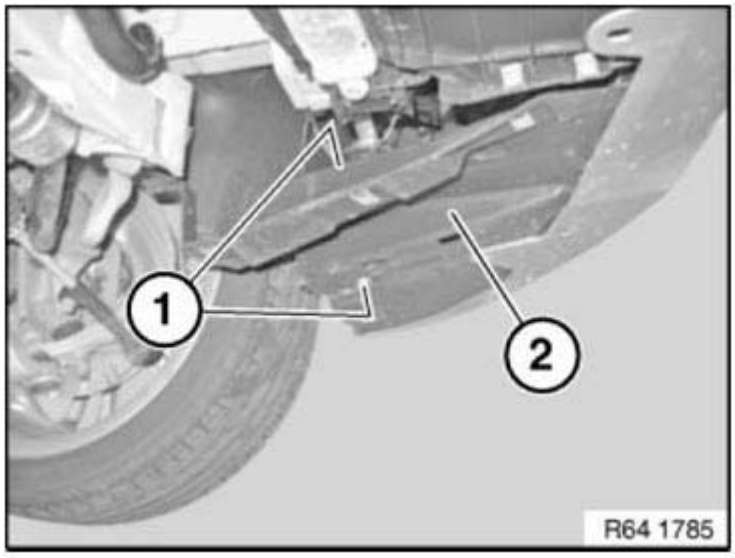


Fig. 92: Identifying Outside Temperature Sensor Position And Left Wheel Arch Cover
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, illustration shows wheel arch cover removed.

Unfasten plug connection (1) and disconnect.

Unclip outside temperature sensor (2) in direction of arrow from wheel arch cover.

Installation:

Make sure outside temperature sensor (2) is correctly engaged in wheel arch cover.

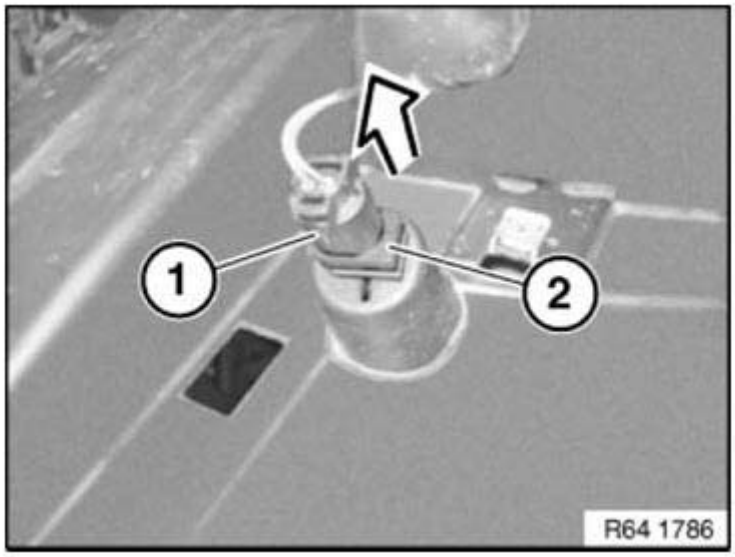


Fig. 93: Removing Outside Temperature Sensor

Courtesy of BMW OF NORTH AMERICA, INC.

6583 CAR COMMUNICATION COMPUTER (CCC)

65 83 020 REMOVING AND INSTALLING (REPLACING) CAR INFORMATION COMPUTER (CIC)

IMPORTANT: Risk of damage!

A hard disk is installed in the Car Information Computer (CIC).

Carry out mechanical work on the CIC and adjacent components with care.

Avoid subjecting the CIC to vibration/shocks.

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION).

NOTE: Comply with notes and instructions on HANDLING OPTICAL FIBRES .

Necessary preliminary work

- Clamp off **NEGATIVE BATTERY CABLE**

Unclip middle trim (1) with special tool 00 9 323.

Fig. 94: Opening Middle Trim Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Retainers (1) must be correctly seated and must not be damaged!

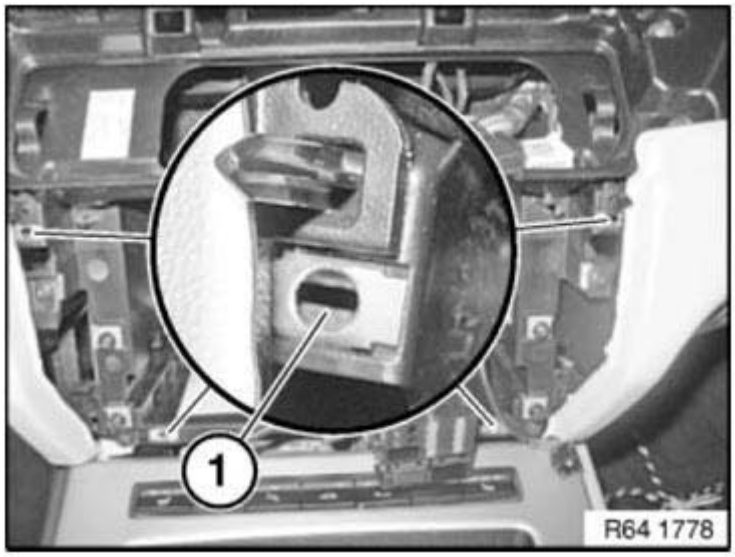


Fig. 95: Identifying Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Cover centre console to prevent damage and scratching.

Release screws (1).

Carefully pull out CIC (2) towards front.

Unlock associated plug connections and disconnect.

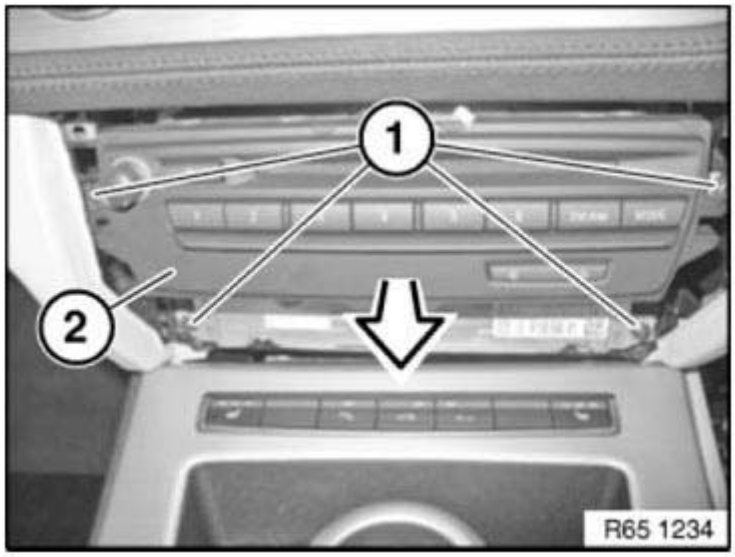


Fig. 96: Pulling Out CIC Towards Front

Courtesy of BMW OF NORTH AMERICA, INC.

Only for US models with satellite tuner:

When replacing the CIC unit, additional work is required!

- Read the document **REPLACING SATELLITE TUNERS FROM 09/2009 ONWARD** .

Replacement:

Carry out vehicle programming/coding.

6590 NAVIGATION SYSTEMS

65 20 410 REMOVING AND INSTALLING/REPLACING DAB TUNER AERIAL

Necessary preliminary tasks:

- Remove **ROOF SWITCH CLUSTER**

Disconnect plug connection (1).

Unclip DAB tuner aerial (2) and remove.

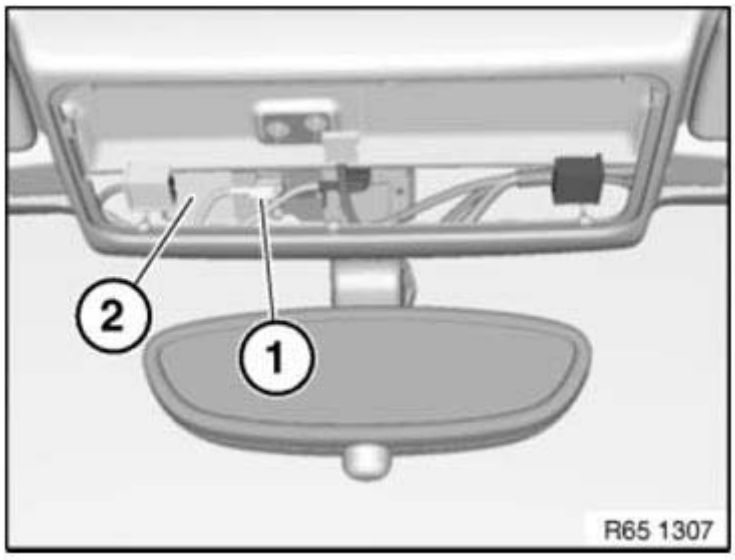


Fig. 97: Identifying DAB Tuner Aerial With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 405 REMOVING AND INSTALLING/REPLACING AERIAL FOR SATELLITE DIGITAL AUDIO RADIO SERVICE (SDARS)

Necessary preliminary tasks:

- Remove **AUXILIARY BRAKE LIGHT REAR LID COVER**

Release nut (1) on underside of rear lid.

Unfasten aerial plug (2) and disconnect.

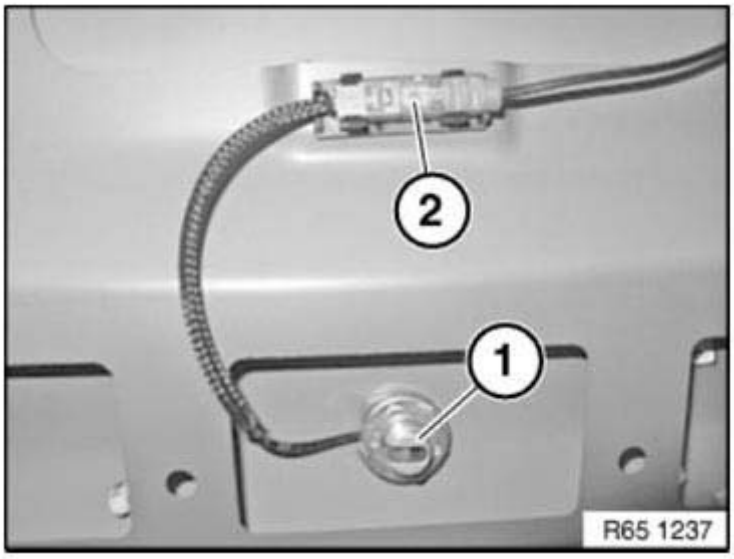


Fig. 98: Identifying Aerial Plug And Nut On Underside Of Rear Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Lever SDARS aerial (1) upwards out of rear lid.

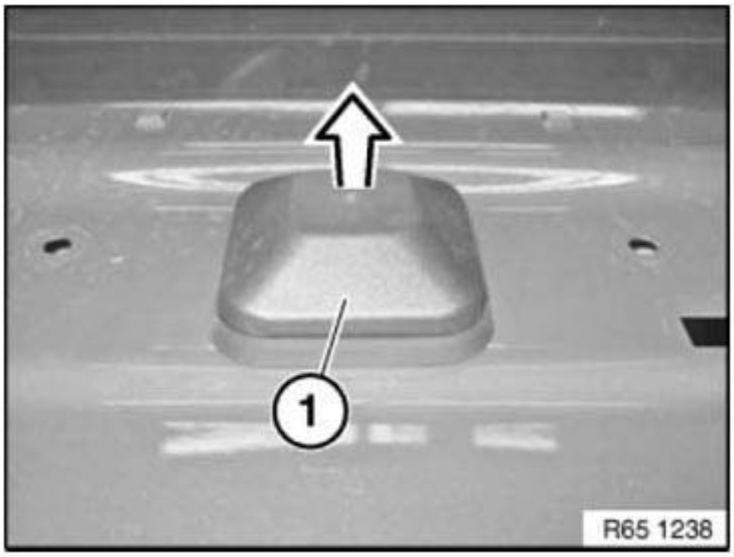


Fig. 99: Removing SDARS Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 420 REMOVING AND INSTALLING/REPLACING AERIAL OF GLOBAL POSITIONING SYSTEM (GPS)

Necessary preliminary tasks:

- Remove **ROOF SWITCH CLUSTER**

Unfasten plug connection (1) and disconnect.

Unlock retaining lug (2).

Remove GPS aerial (3).

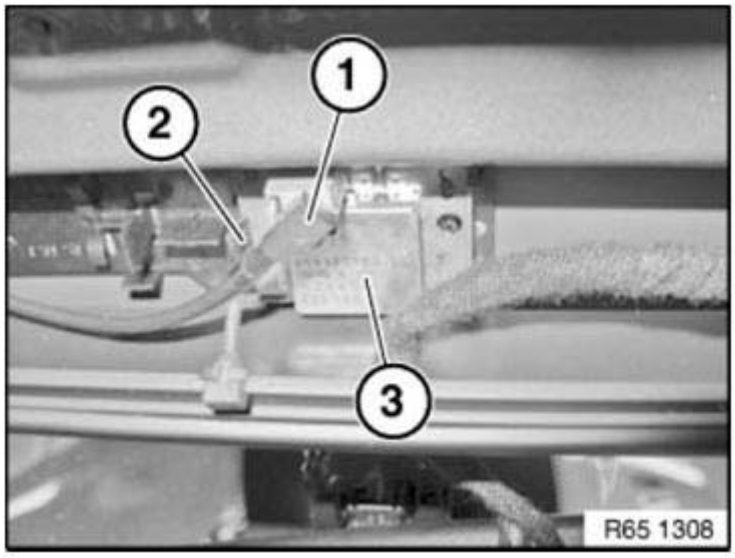


Fig. 100: Identifying GPS Aerial With Plug Connection And Retaining Lug
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 300 REMOVING AND INSTALLING/REPLACING BUMPER AERIAL (FM)

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**
- Remove **LUGGAGE COMPARTMENT TRIM ON SIDE PANEL**

Disconnect plug connection (1) on aerial amplifier (2).

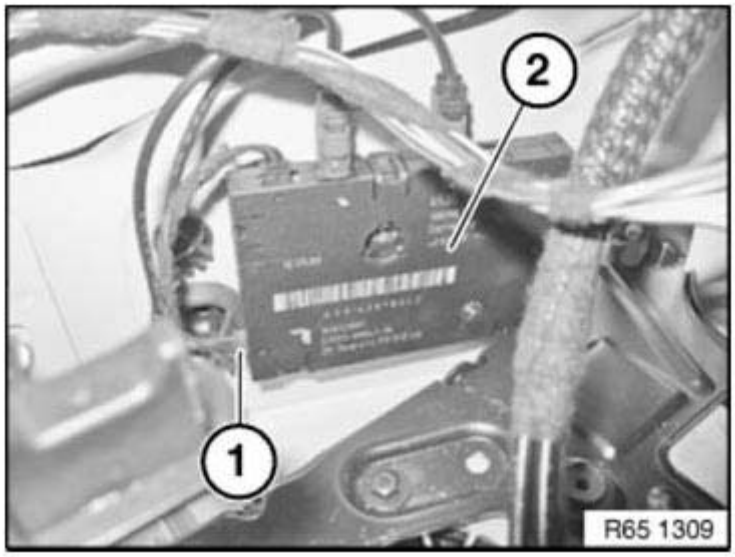


Fig. 101: Identifying Plug Connection On Aerial Amplifier
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip FM aerial (1) from left bumper carrier (2).

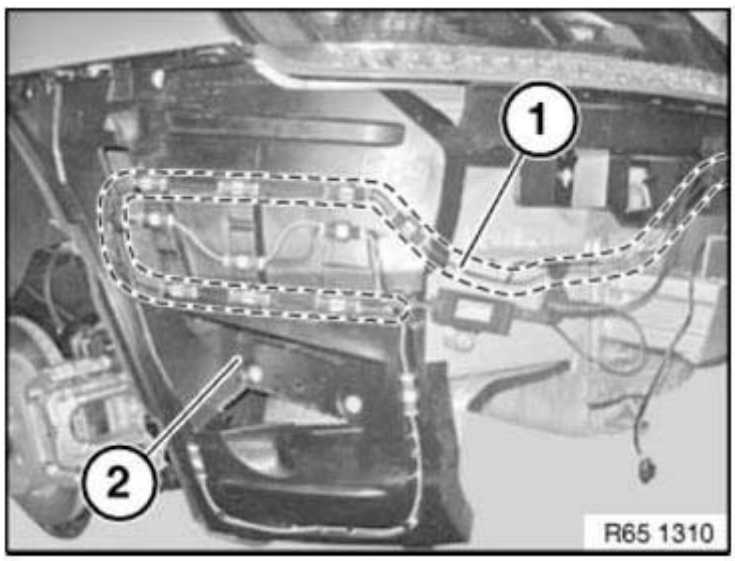


Fig. 102: Identifying FM Aerial And Left Bumper Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip FM aerial (1) from holders on bumper guide (2).

Feed FM aerial (1) out of penetration (3) and remove.

Installation:

Make sure FM aerial is laid correctly.

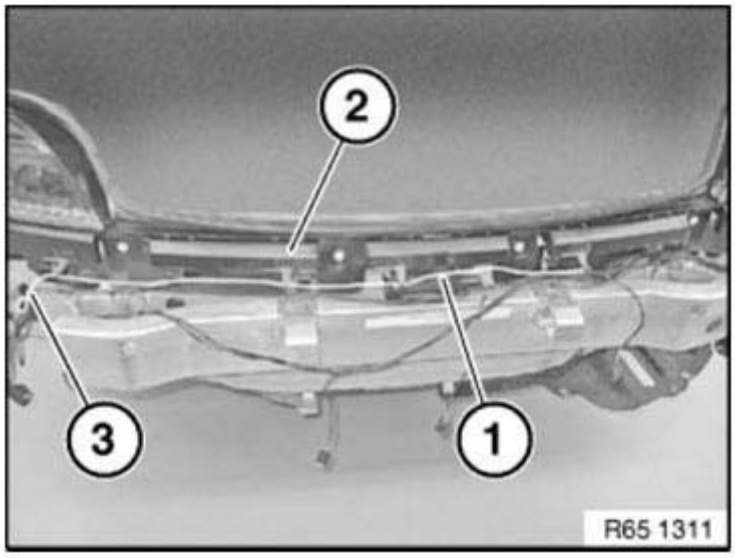


Fig. 103: Identifying FM Aerial And Bumper Guide
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 165 REMOVING AND INSTALLING/REPLACING LEFT TV AERIAL

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**

Unclip TV aerial (1).

Unfasten plug connection (2) and disconnect.

Release screw (3).

Remove TV aerial (1).

Installation:

Make sure TV aerial (1) is correctly laid.

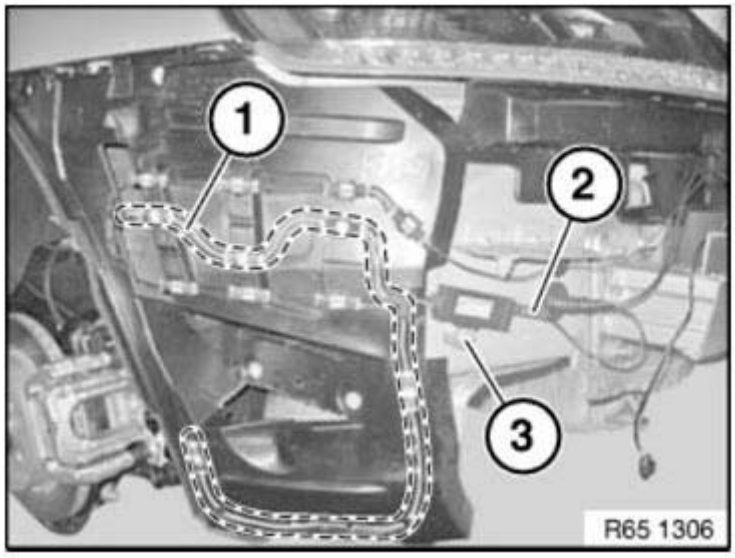


Fig. 104: Identifying TV Aerial With Plug Connection And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

65 20 167 REMOVING AND INSTALLING/REPLACING RIGHT TV AERIAL

Operation is identical to:

REMOVING AND INSTALLING LEFT TV AERIAL .

AIRBAG TRIGGERING CONTROL

65 77 AIRBAG TRIGGERING CONTROL

TIGHTENING TORQUE SPECIFICATION - AIRBAG TRIGGERING CONTROL

		Type	Thread	Tightening specification	Measure
1AZ	Airbag control unit to tunnel middle	E70, E71, E72, E82, E84, E88			8 Nm
		E89			8.5 Nm
2AZ	Sensor, A-pillar	E70			8 Nm
3AZ	Sensor, B-pillar	E70, E71, E72, E82, E84, E88, E89			8 Nm
4AZ	Sensor, front door, to inner door panel	E70, E71, E72, E82, E84, E88, E89			8 Nm
5AZ	Sensor, rear seat, to seat frame	E70			8 Nm
6AZ	Acceleration sensor to front carrier support	E70, E71, E72, E82, E84, E88, E89		Replace screws	8 Nm
7AZ	Holder, rollover controller to rollover protection	E88			4.5 Nm
8AZ	Rollover controller to holder	E88			5 Nm

8410 CELLULAR TELEPHONE

84 10 050 REMOVING AND INSTALLING (REPLACING) USB HUB

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary tasks

- Remove **COMPLETE CENTRE CONSOLE**

Unlock plug connections (1) and disconnect.

Unlock plug connections (2) and disconnect.

Release screws (3) and remove USB hub (4).

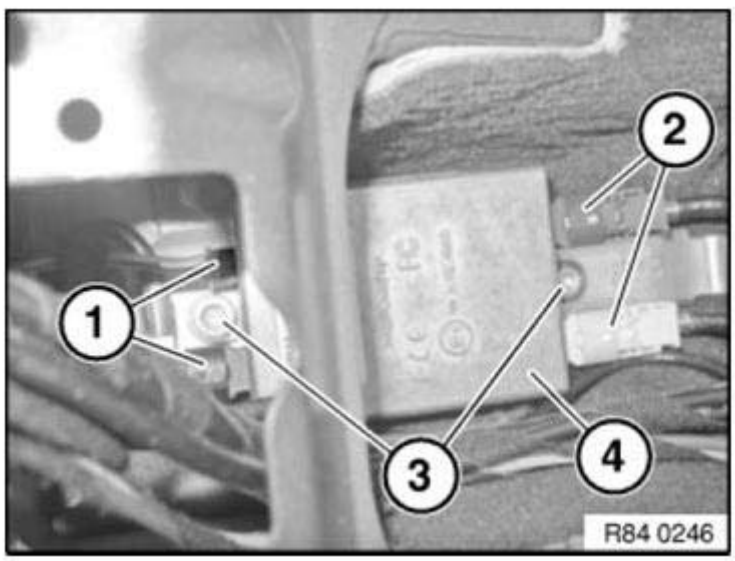


Fig. 1: Identifying USB Hub With Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/encoding with scan tool.

8411 TRANSCEIVER, HANDSET, SUPPORT, CARD READER

84 11 519 REMOVING AND INSTALLING/REPLACING EJECT BOX

Necessary preliminary tasks

- Remove complete **CENTRE CONSOLE**

Release cable tie (1).

Unlock retaining lugs (2).

Press eject box (3) upwards.

Installation:

Replace cable tie (1).

Retaining lugs must not be damaged.

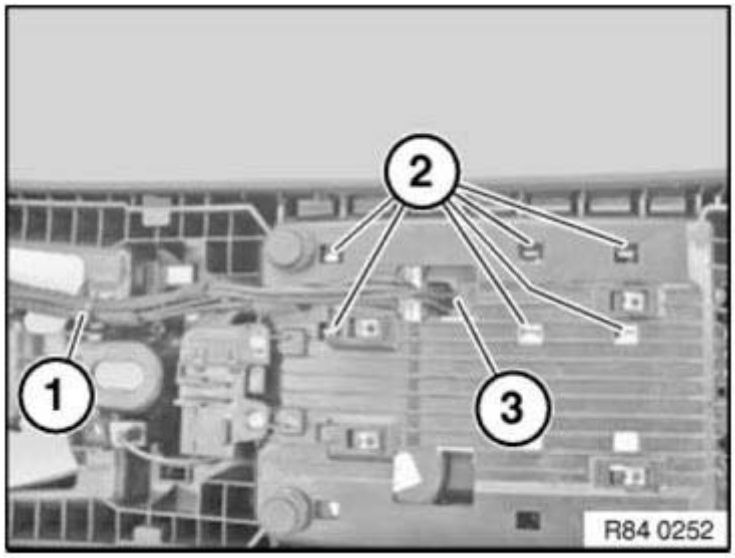


Fig. 2: Identifying Eject Box With Cable Tie And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Remove eject box (1) upwards from centre console (2).

Installation:

Ensure correct cable routing.

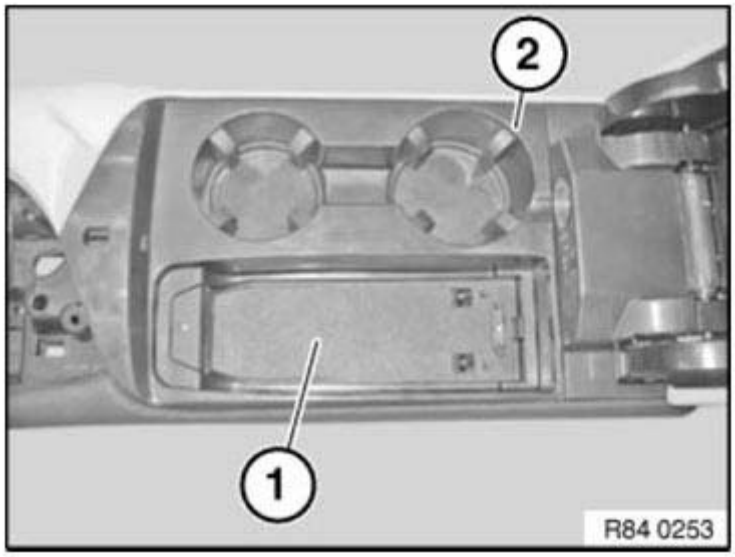


Fig. 3: Identifying Eject Box And Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

84 50 060 REMOVING AND INSTALLING/REPLACING BLUETOOTH AERIAL

Necessary preliminary tasks

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

Unclip Bluetooth aerial (1) and remove from trim panel for pedal assembly (2).

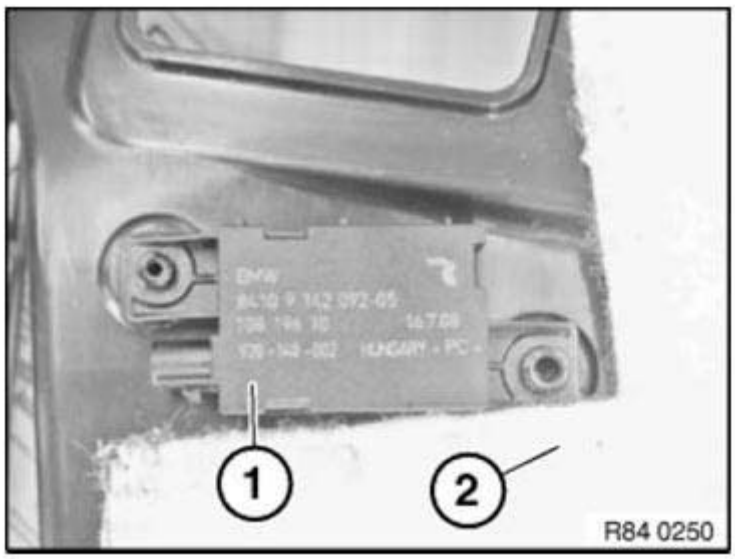


Fig. 4: Identifying Bluetooth Aerial And Trim Panel For Pedal Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

84 11 660 REMOVING AND INSTALLING/REPLACING TELEMATICS CONTROL UNIT (TCU)

(OPTION SA633/SA639)

IMPORTANT: Read and comply with notes on protection against electrical damage (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks:

- Remove **PANEL FOR LUGGAGE COMPARTMENT PARTITION**
- Disconnect **BATTERY NEGATIVE LEAD**

Unlock plug connections (1) and disconnect.

Unfasten aerial plug (2) and disconnect.

Release all nuts.

Remove TCU (3).

Installation:

Observe colour coding of aerial plugs (2).

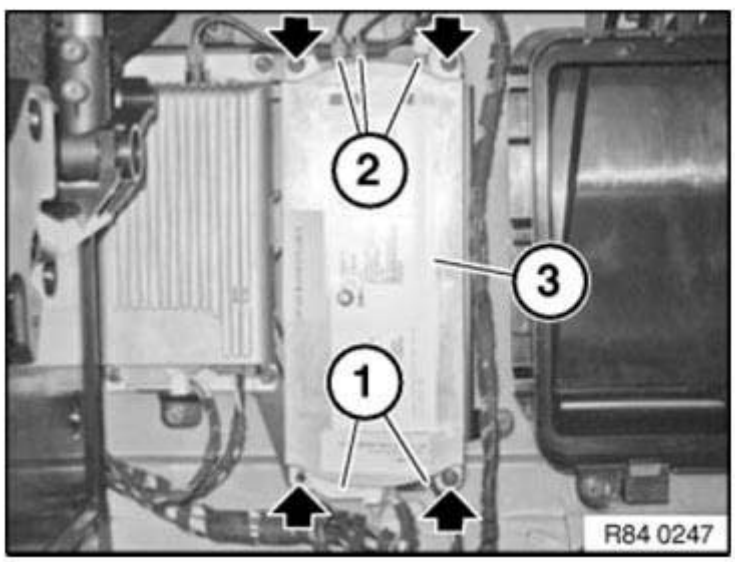


Fig. 5: Identifying TCU, Aerial Plug And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out vehicle programming/coding using scan tool.

8421 HANDHELD COMPUTER

84 21 542 REMOVING AND INSTALLING (REPLACING) HANDSFREE CHARGING ELECTRONICS (HIGH)

Operation is described in:

See removing and installing **hands-free** charging electronics.

Replacement:

- Carry out vehicle programming/coding using scan tool.

84 21 535 REMOVING AND INSTALLING (REPLACING) HANDSFREE CHARGING ELECTRONICS (OPTIONAL EXTRA SA644)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks

- Remove **PANEL FOR LUGGAGE COMPARTMENT PARTITION**
- Disconnect **BATTERY NEGATIVE LEAD**

Unlock plug connections (1) and disconnect.

Release all nuts.

Remove hands-free charging electronics (2).

Installation:

Make sure plug connections are correctly engaged.

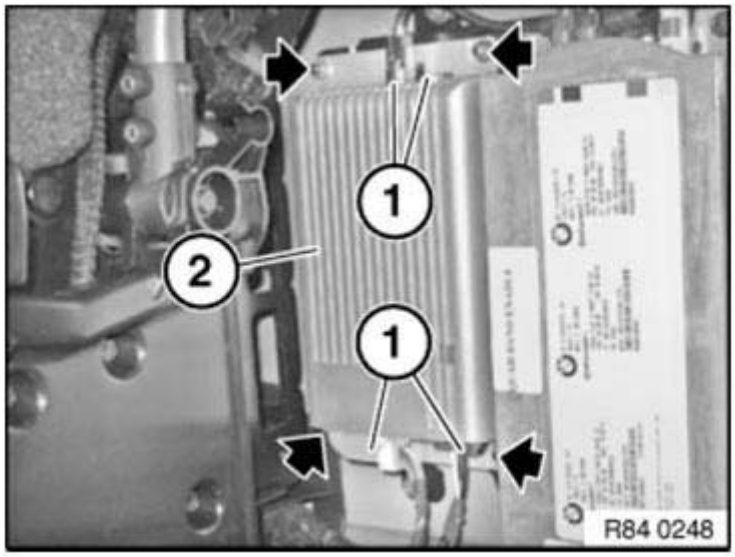


Fig. 6: Identifying Hands-Free Charging Electronics With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out vehicle programming/coding using scan tool.

84 21 545 REMOVING AND INSTALLING/REPLACING HANDS-FREE CHARGING ELECTRONICS (HIGH) (USB/AUDIO INTERFACE)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

NOTE: Comply with notes and instructions on HANDLING OPTICAL WAVEGUIDES .

Necessary preliminary tasks

- Remove **PANEL FOR LUGGAGE COMPARTMENT PARTITION**
- Disconnect **BATTERY NEGATIVE LEAD**

Unlock plug connections (1) and disconnect.

Release all nuts.

Remove hands-free charging electronics (2).

Installation:

Make sure plug connections are correctly engaged.

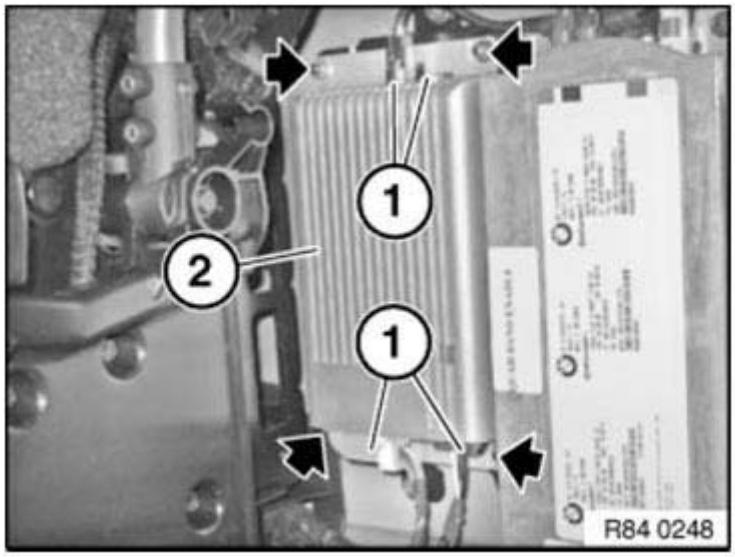


Fig. 7: Identifying Hands-Free Charging Electronics With Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out vehicle programming/coding

8431 HANDS-FREE SYSTEM, MICROPHONE, SPEAKER

84 31 541 REMOVING AND INSTALLING/REPLACING HANDS-FREE MICROPHONE ON STEERING COLUMN

Necessary preliminary tasks

- Remove **UPPER STEERING COLUMN TRIM**

Unlock hands-free microphone (1) and holder (2) and remove in direction of arrow.

Feed cable (3) out of upper steering column trim (4).

Remove hands-free microphone (1).

Installation:

Make sure cable (3) is laid without kinks.

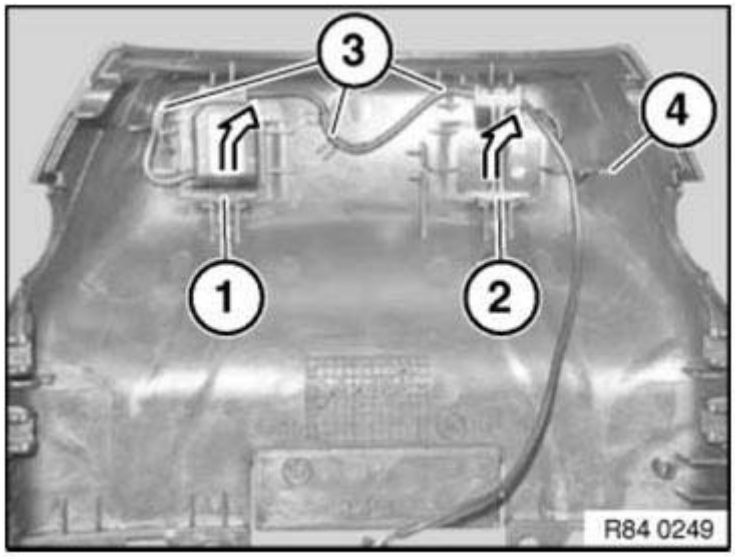


Fig. 8: Removing Hands-Free Microphone And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Disconnecting the plug connection for the hands-free microphone or emergency SOS call button results in fault memory entries in the telephone control unit (limitation in the emergency SOS call system).

After fitting, read out fault memory and if necessary delete entries.

84 31 020 REMOVING AND INSTALLING/REPLACING HANDS-FREE SYSTEM SPEAKER

Necessary preliminary tasks

- Remove **TRIM FOR PEDAL ASSEMBLY**

Disconnect plug connection (1).

If necessary, release cable tie from catches (2).

Unlock catches (2) and remove speaker (3) from mounting.

Installation:

Catches (2) must not be damaged.

Guide lugs of mounting must be seated in grooves of speaker (3).

Speaker (3) must snap audibly into place in mounting.

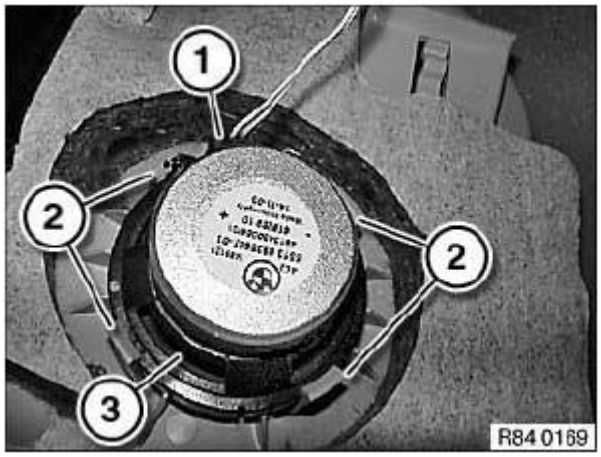


Fig. 9: Identifying Catches And Speaker With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

8450 ANTENNA

84 50 060 REMOVING AND INSTALLING/REPLACING BLUETOOTH AERIAL

Necessary preliminary tasks

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

Unclip Bluetooth aerial (1) and remove from trim panel for pedal assembly (2).

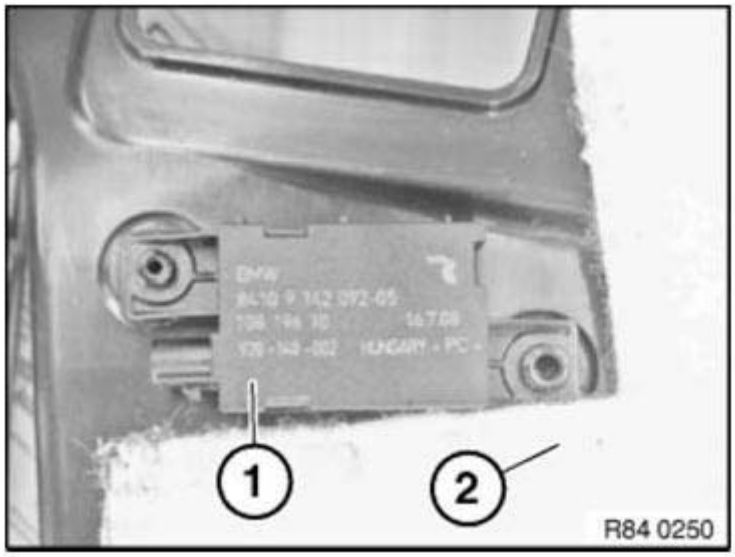


Fig. 10: Identifying Bluetooth Aerial And Trim Panel For Pedal Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

6612 RADIO-CONTROLLED LOCKING SYSTEM

66 12 100 REMOVING AND INSTALLING/REPLACING SLIDE-IN UNIT FOR RADIO CONTROL KEY

Necessary preliminary tasks

- Remove **LOWER LEFT TRIM FROM INSTRUMENT PANEL**

Replacement

Release screw (1).

Remove slide-in unit for radio control key (2) in direction of arrow from panel (3).

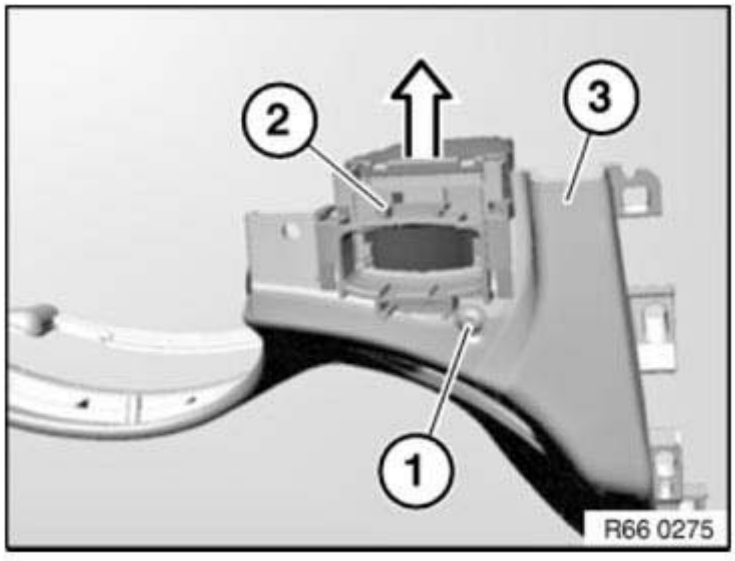


Fig. 1: Remove Radio Control Key Slide-In Unit
Courtesy of BMW OF NORTH AMERICA, INC.

6620 PARK DISTANCE CONTROL

66 20 520 REMOVING AND INSTALLING/REPLACING A FRONT ULTRASONIC TRANSDUCER (MIDDLE)

Necessary preliminary tasks

- Remove **FRONT BUMPER TRIM**

NOTE: For purposes of clarity, illustration shows bumper removed.

Disconnect plug connection (1) and unclip ultrasonic transducer (2) from retaining lugs (3).

Installation:

Retaining lugs must not be damaged!

Make sure ultrasonic transducer (2) is securely seated.

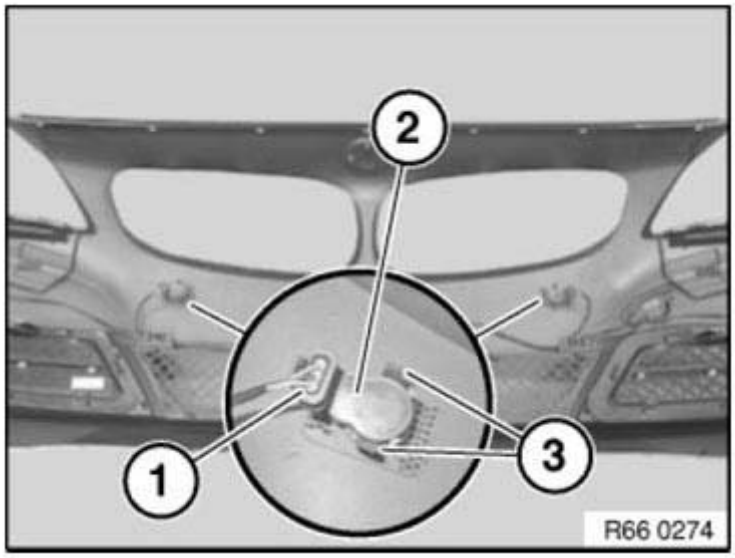


Fig. 2: Identifying Ultrasonic Transducer With Plug Connection And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure rubber ring (1) is correctly seated on ultrasonic transducer (2).

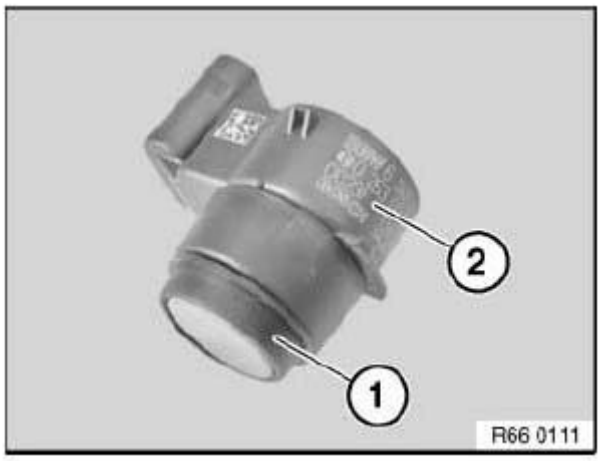


Fig. 3: Identifying Rubber Ring And Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

66 20 518 REMOVING AND INSTALLING/REPLACING A FRONT ULTRASONIC TRANSDUCER (SIDE)

Necessary preliminary tasks:

- Remove **FRONT WHEEL ARCH COVER** in working area

Unfasten plug connection (1) and disconnect.

Unclip ultrasonic transducer (2) from retaining lugs.

Installation:

Retaining lugs must not be damaged!

Make sure ultrasonic transducer (2) is securely seated.

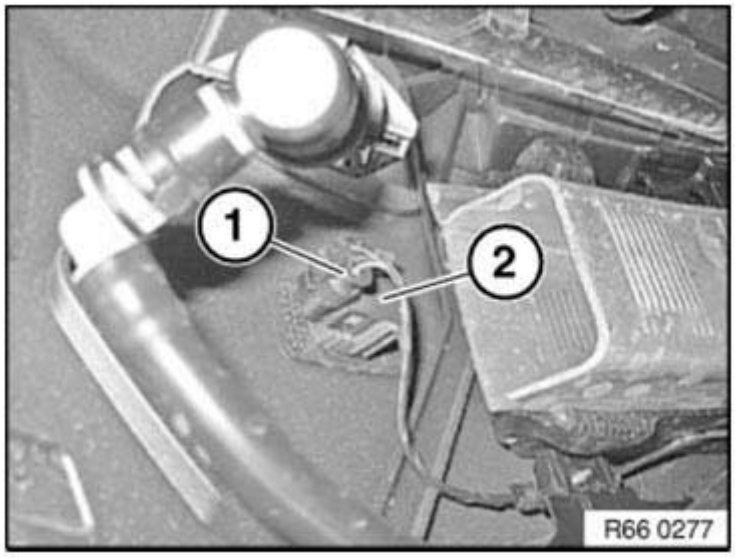


Fig. 4: Identifying Ultrasonic Transducer With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure rubber ring (1) is correctly seated on ultrasonic transducer (2).

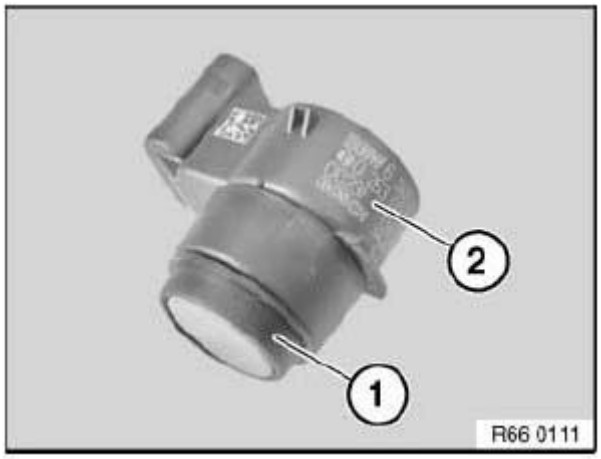


Fig. 5: Identifying Rubber Ring And Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

66 20 534 REMOVING AND INSTALLING/REPLACING A REAR LEFT ULTRASONIC TRANSDUCER (PARK DISTANCE CONTROL)

Unfasten plug connection (1) and disconnect.

Unclip ultrasonic transducer (2) from retaining lugs.

Installation:

Retaining lugs must not be damaged!

Make sure ultrasonic transducer (2) is securely seated.

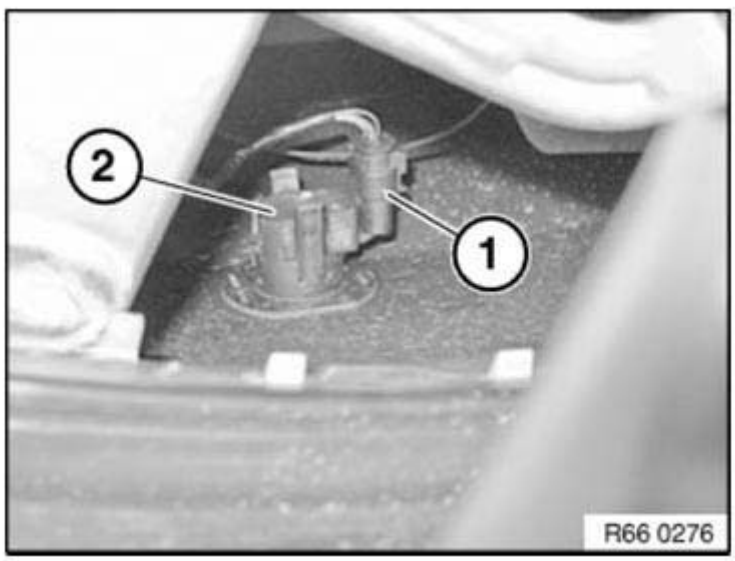


Fig. 6: Identifying Ultrasonic Transducer With Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure rubber ring (1) is correctly seated on ultrasonic transducer (2).

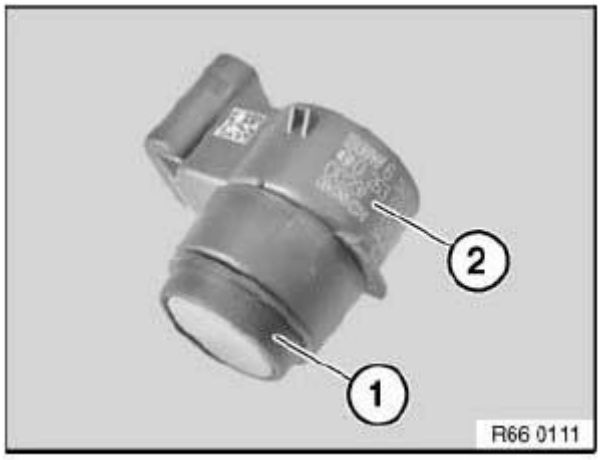


Fig. 7: Identifying Rubber Ring And Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

66 20 536 REMOVING AND INSTALLING/REPLACING A REAR MIDDLE LEFT ULTRASONIC TRANSDUCER (PARK DISTANCE CONTROL)

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**

Unlock retaining tabs (1) in direction of arrow and pull ultrasonic transducer (2) out of holder (3).

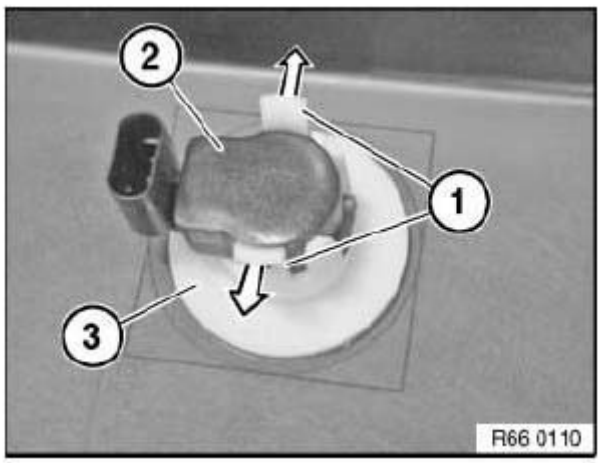


Fig. 8: Opening Ultrasonic Transducer Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) of ultrasonic transducer (2) must engage exactly in mountings (3).

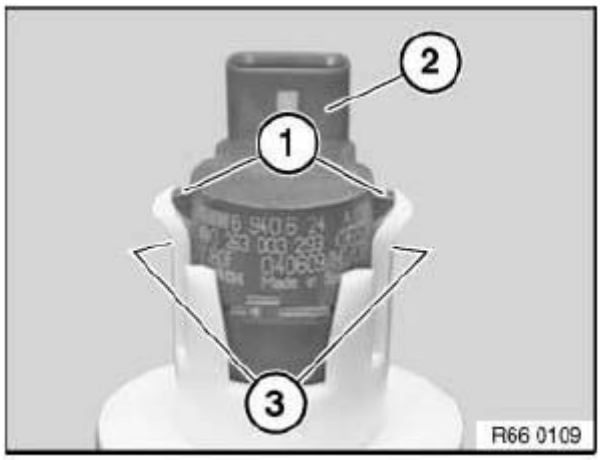


Fig. 9: Identifying Ultrasonic Transducer With Hooks And Mountings
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure rubber ring (1) is correctly seated on ultrasonic transducer (2).

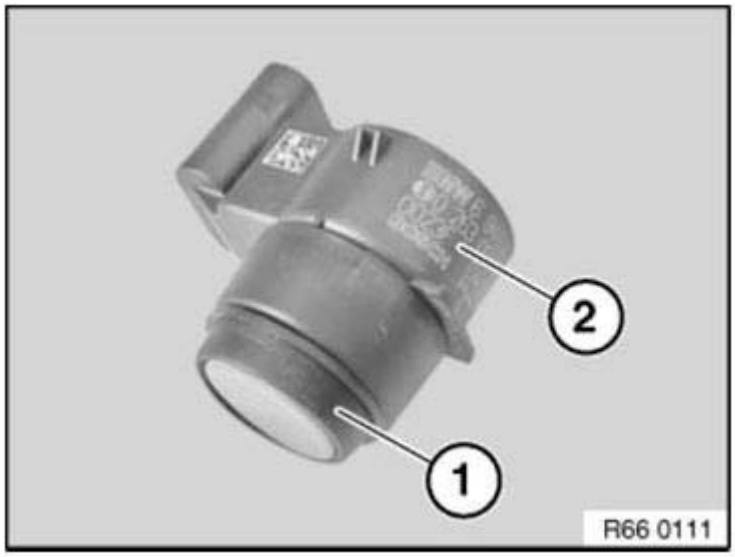


Fig. 10: Identifying Ultrasonic Transducer With Rubber Ring
Courtesy of BMW OF NORTH AMERICA, INC.

66 20 537 REMOVING AND INSTALLING/REPLACING A REAR MIDDLE RIGHT ULTRASONIC TRANSDUCER (PARK DISTANCE CONTROL)

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**

Unlock retaining tabs (1) in direction of arrow and pull ultrasonic transducer (2) out of holder (3).

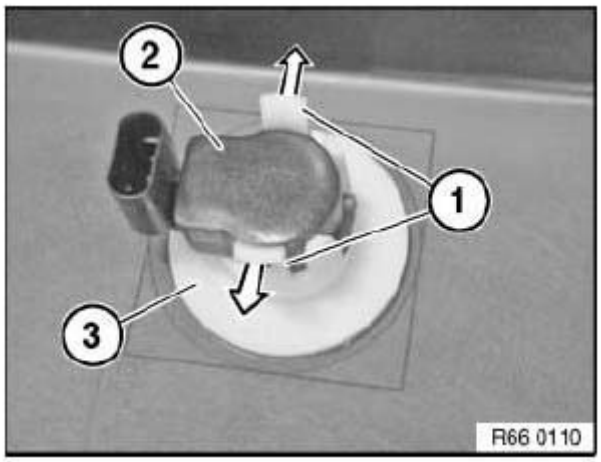


Fig. 11: Opening Ultrasonic Transducer Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) of ultrasonic transducer (2) must engage exactly in mountings (3).

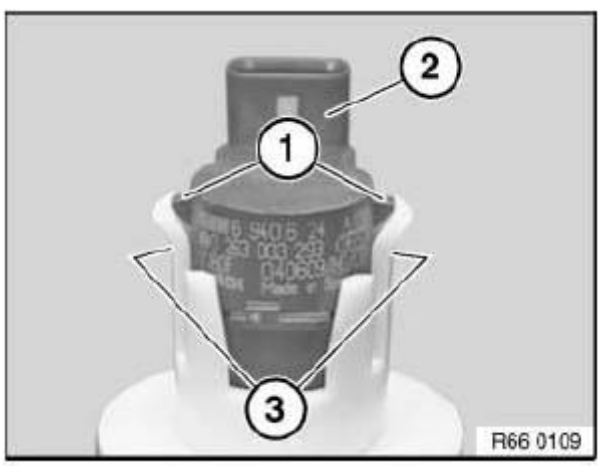


Fig. 12: Identifying Ultrasonic Transducer With Hooks And Mountings
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure rubber ring (1) is correctly seated on ultrasonic transducer (2).

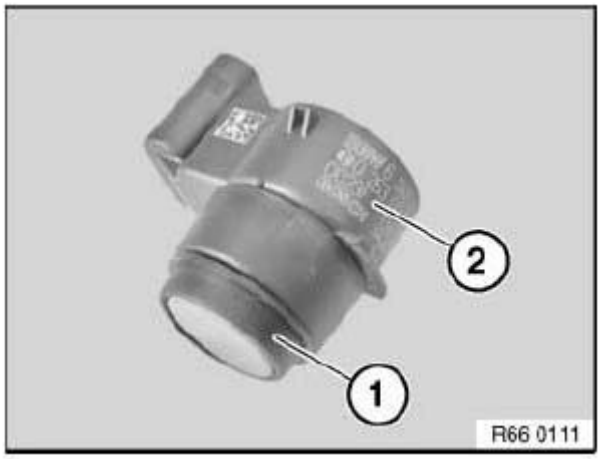


Fig. 13: Identifying Rubber Ring And Ultrasonic Transducer
Courtesy of BMW OF NORTH AMERICA, INC.

66 20 535 REMOVING AND INSTALLING/REPLACING A REAR RIGHT ULTRASONIC TRANSDUCER (PARK DISTANCE CONTROL)

The following operation is described in:

Removing **REAR LEFT ULTRASONIC TRANSDUCER**

66 20 508 REMOVING AND INSTALLING/REPLACING CONTROL UNIT (PARK DISTANCE CONTROL)

Necessary preliminary tasks:

- Remove **RIGHT LUGGAGE COMPARTMENT TRIM PANEL**

Unlock plug connections (1) and disconnect.

Lift out control unit (2).

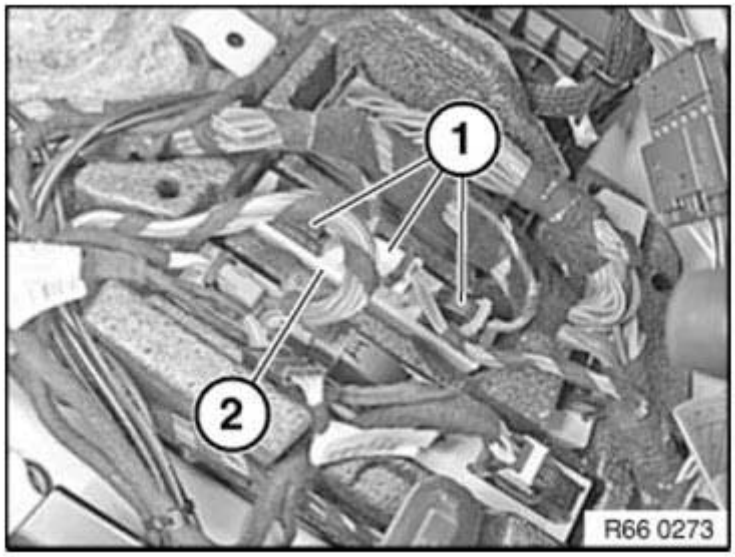


Fig. 14: Identifying Park Distance Control Unit With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/encoding using scan tool.

66 DISTANCE SYSTEMS, CRUISE CONTROL

66-3140 OPPS DEVICE

OPPS device MW

NOTE: (OPS package) (complete set)

Consisting of:

1 = 0495304 OPS device

NOTE: To order the OPS devices, please contact the appropriate SIEMENS hotline.

2 = 0495305 Cable

NOTE: (OBD cable, incl. CAN line)

3 = 0495306 Adapter cable

NOTE: (LAN adapter cable) To order the LAN adapter cable, please contact the appropriate SIEMENS hotline.

NOTE: Specify the LAN adapter cable model (crossed or uncrossed).

6211 INSTRUMENT CLUSTER

62 11 280 REMOVING AND INSTALLING/REPLACING INSTRUMENT CLUSTER

NOTE: Extend steering column completely and set in downward position.

Release screw (1).

Fold back instrument cluster (2) in direction of arrow and pull out towards rear.

Unlock associated plug connection and disconnect.

Remove instrument cluster (2).

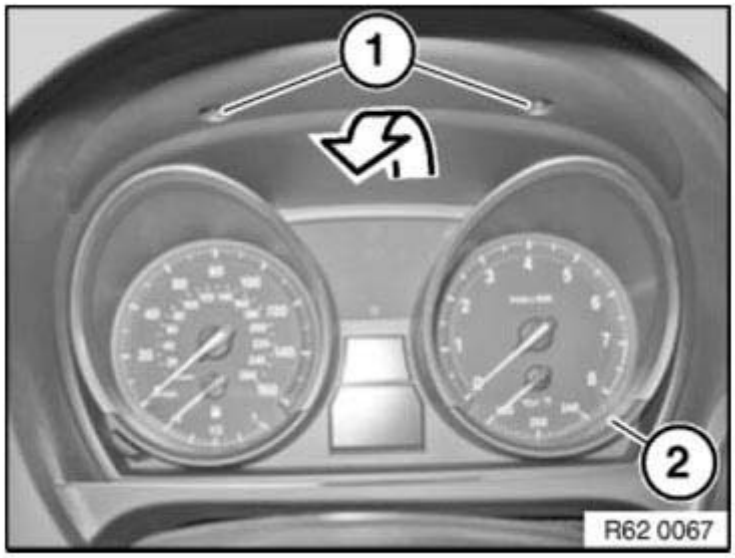


Fig. 1: Fold Back Instrument Cluster In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining lugs (1) of instrument cluster (2) must be exactly seated in mountings of instrument panel.

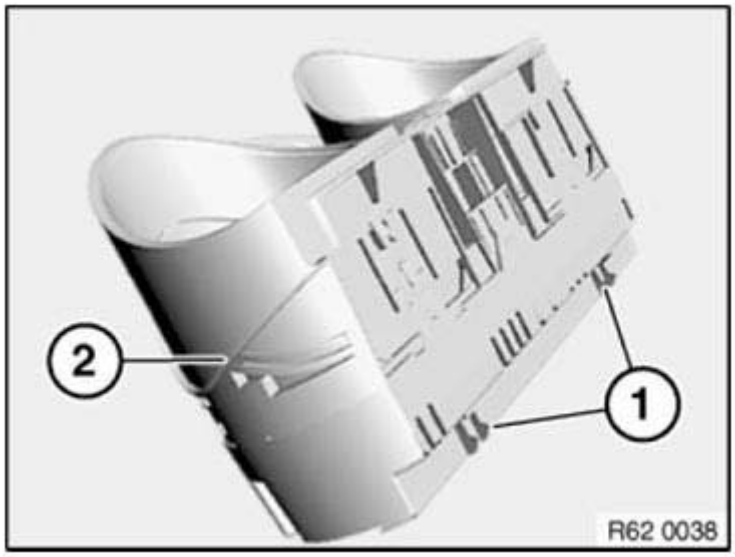


Fig. 2: Identifying Instrument Cluster Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding using scan tool.

62 INSTRUMENTS

62-1190 ADAPTER

0493028 621190 Adapter MW

NOTE: (Adapter 15/20-pin) only for oil service - Replaced by 62 1 140, July 94

Storage Location

I 106

62-1300 ADAPTER

0493042 621300 Adapter MW

NOTE: For instrument panel

Storage Location

Y2

SI number

02 03 89 (038)

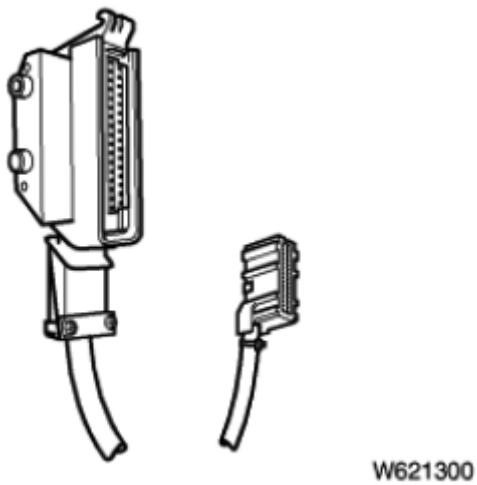


Fig. 1: Identifing Adapter (621300)
Courtesy of BMW OF NORTH AMERICA, INC.

REAR LIGHT UNIT

63 21 REAR LIGHT UNIT

TIGHTENING TORQUE SPECIFICATION - REAR LIGHT UNIT

	Type	Thread	Tightening specification	Measure
1AZ Retaining nuts, rear light	E89			2.5 Nm

NEW RADIO REMOTE CONTROL (RKE)

All Models Beginning 09/99

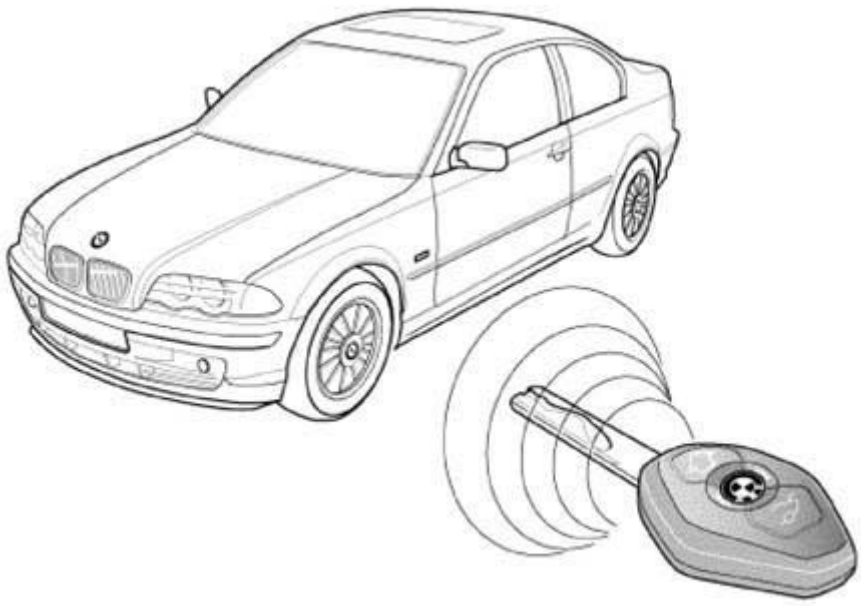


Fig. 1: Identifying New Radio Remote Control
Courtesy of BMW OF NORTH AMERICA, INC.

1. RADIO TECHNOLOGY

Radio technology is a comprehensive term covering all areas of cordless telecommunication such as telephone, radio, television. Transmission is by means of electromagnetic waves.

Due to the fact that the radio waves are not limited to one single direction and have a wider range than the infrared waves, this technology is also being increasingly employed in remote controls.

The same remote-control technology is used in motor vehicle construction as, for example, in construction site cranes, in model construction, alarm systems, garage-door opening systems etc.

These remote controls are operated on the same approved frequency (315 MHz or 433.92 MHz).

2. RADIO REMOTE CONTROL, GENERAL INFORMATION

The radio remote control for the central locking system (FZV) is a further development of the radio-compact

remote control, or the radio remote control which first appeared in the E38.

The radio transmitter is still located in the grip of the car key, the receiver module is installed in the vehicle. All radio telegrams are encoded by means of a constantly changing code. This ensures that the vehicle cannot be opened by someone who has eavesdropped telegrams.

Depending on vehicle type, equipment and country-specific version, in addition to the functions "opening/closing central locking system" and "central arrest" the following functions are also available: "activating/deactivating alarm system", "deactivating tilt sensor/passenger-compartment sensor", "convenient opening/closing window and sliding roof", "switching on interior lighting" and "opening/closing luggage compartment lid".

The remote control keys can be initialized at the vehicle without visiting a BMW Service point when, for example, the owner requires additional keys or, for security reasons, following the loss of a radio remote control key. The initialization procedure is described in the respective Owner's Handbooks.

The radio remote control is available as standard equipment in the models E38, E39, E46 and as an option in the E36 models (option 302).

Up to 4 radio transmitters can be operated per vehicle.

In many countries, radio remote controls are subject to radio-technical registration specifications. The required designation is on the key grip.

3. SYSTEM OVERVIEW

The radio remote control consists of:

1. Radio transmitter (integrated in the key grip)
2. General module of the central body electrics (ZKE)
3. Receiver module (integrated in aerial amplifier or aerial diversity)
4. Aerial in rear window or rear side window on touring

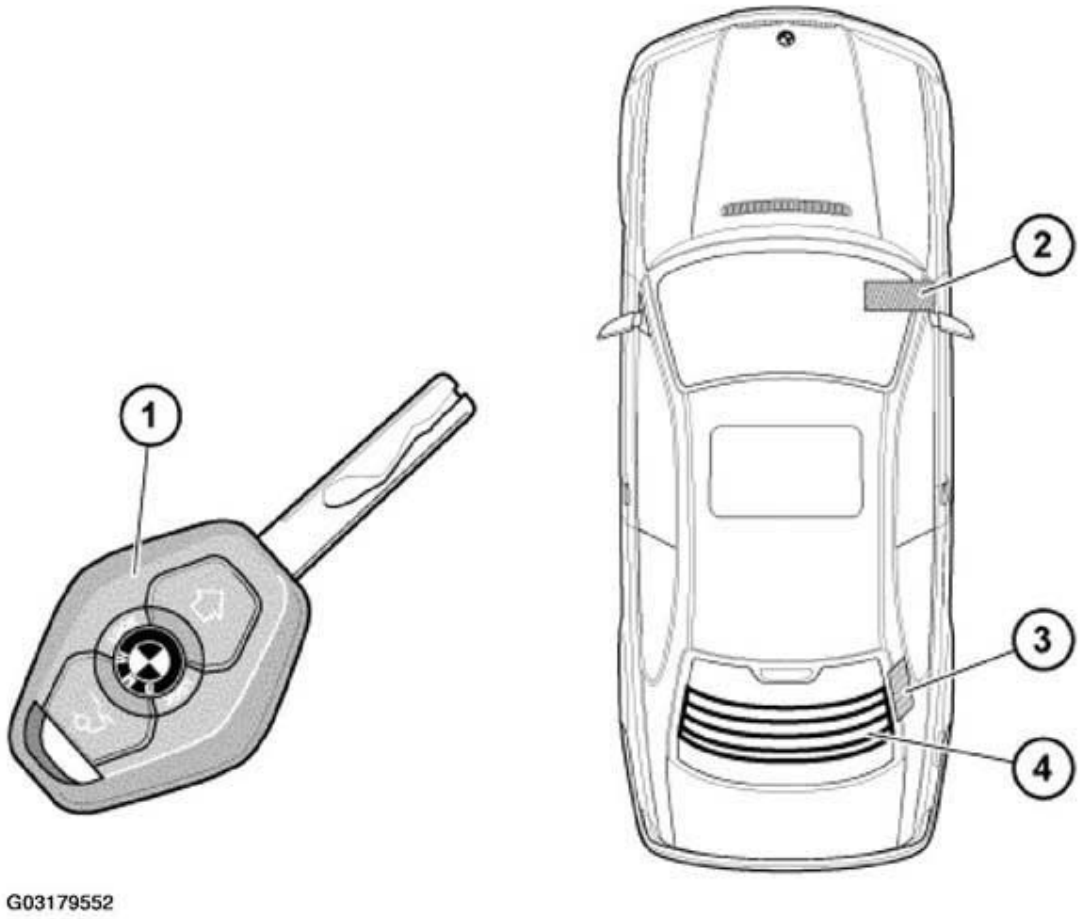


Fig. 2: Identifying RKE Components & Locations
Courtesy of BMW OF NORTH AMERICA, INC.

The reception of the radio signals from the transmitter varies according to location in relation to vehicle. The rear area (aerial) of the vehicle is the reference point.

External influences can cause the range or operation of the remote control to deviate from the mean distances specified below either **positively** (through reflection) or **negatively** due to sources of interference (radio-technical systems).

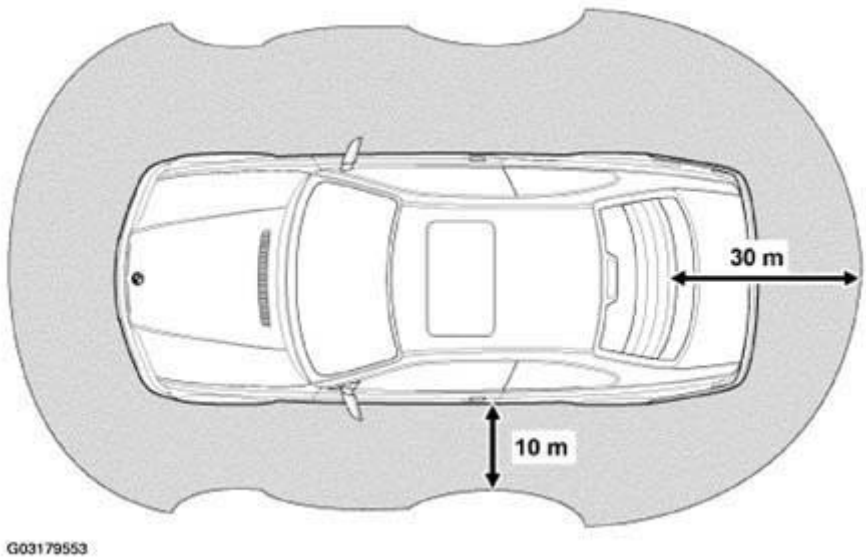


Fig. 3: Identifying RKE Range Of Operation
Courtesy of BMW OF NORTH AMERICA, INC.

External radio-technical systems/equipment that are operated on the same frequency (433.92 MHz; 315 MHz; 70 cm band) with a higher output can interfere with the remote control function. Possible sources of interference are:

- Radio Headphones (Known As Cordless Headphones)
- Radio Sets (Amateur Radio; Radio Telephone; Toy Models)
- Radio Modems
- Garage-Door Remote Controls
- Telemetry Transmitters, E.G. Weather Station With Temperature Sensor
- House Burglar Alarm Systems With Sensors
- Remote-Controlled Sockets
- Radio Bells (For Paging)
- TV Radio Systems (Reverse Channel For Television Remote Control)
- Industrial Plants
- Non-Suppressed Electric Motors

4. REMOTE CONTROL FUNCTIONS

- Opening/closing central locking system (ZV)
- Switching on interior lighting
- Activating/deactivating anti-theft alarm system (DWA)
- Activating/deactivating tilt sensor and interior protection of the anti-theft alarm system
- Opening/closing side windows

- Opening/closing sliding roof
- Opening/closing luggage compartment lid
- Activating/deactivating Panic Mode - only US models

If required, this function can be used to trip an alarm via the DWA.

5. OPERATING RELIABILITY

As of ignition lock position 1 (terminal "R", no more remote control functions are carried out.

If the ignition lock switches to position 1 following "Central arrest" of the central locking system (ZV), the ZV changes "Central arrest" to "Central locking".

If there is a key in the ignition lock which is recognised as valid by the electronic immobiliser III, the central locking system cannot be actuated in "Central arrest".

Due to the high range, "Convenient closing" of the rear vent windows is not possible on the E46 coupe as these windows do not have an anti-trap function.

All of the comfort functions and closing of the automatic luggage compartment lid operate only as long as the appropriate button is actuated on the remote control key.

6. NEW RADIO TRANSMITTER (KEY)

Beginning in September 1999, a new generation of radio transmitters will be introduced into series production.

The most important basic functions are the same as those of the present transmitters.

The operating functions will still be actuated via three buttons.

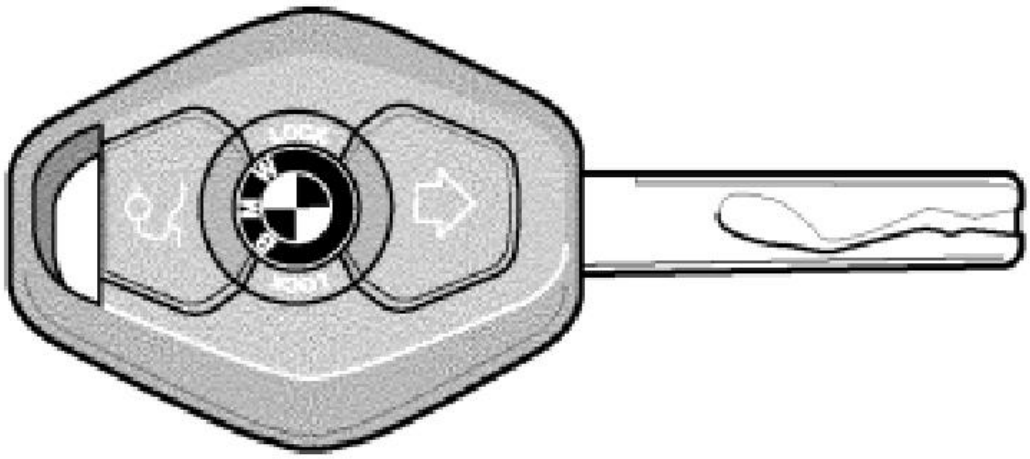


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Fig. 4: Identifying New Radio Transmitter (Front Of Key)
Courtesy of BMW OF NORTH AMERICA, INC.

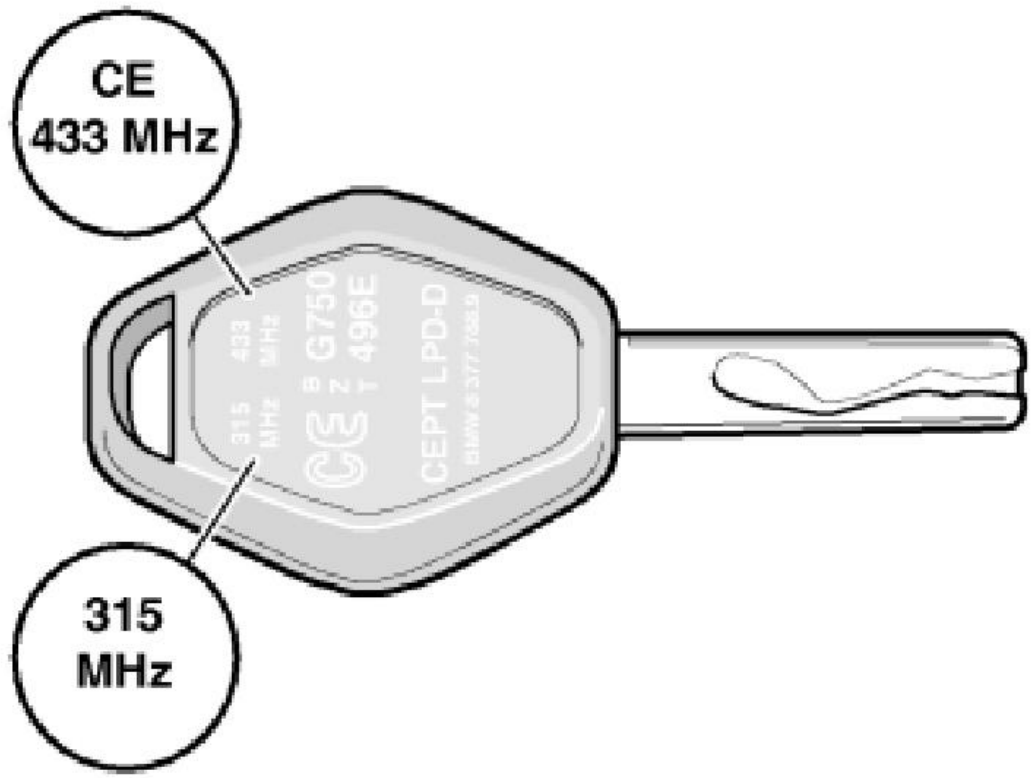


Fig. 5: Identifying New Radio Transmitter (Back Of Key)
Courtesy of BMW OF NORTH AMERICA, INC.

Overview Of Modifications:

1. New appearance with coloured BMW logo.
2. New keyboard arrangement and larger keys.
3. A storage battery instead of a regular battery, charged via the ring aerial at the ignition lock.
4. The key casing is waterproof, dustproof, sealed and cannot be opened.
5. The function display (red LED) has been omitted.

6.1 Operating Principles Of Input Keys

(Basic Functions)

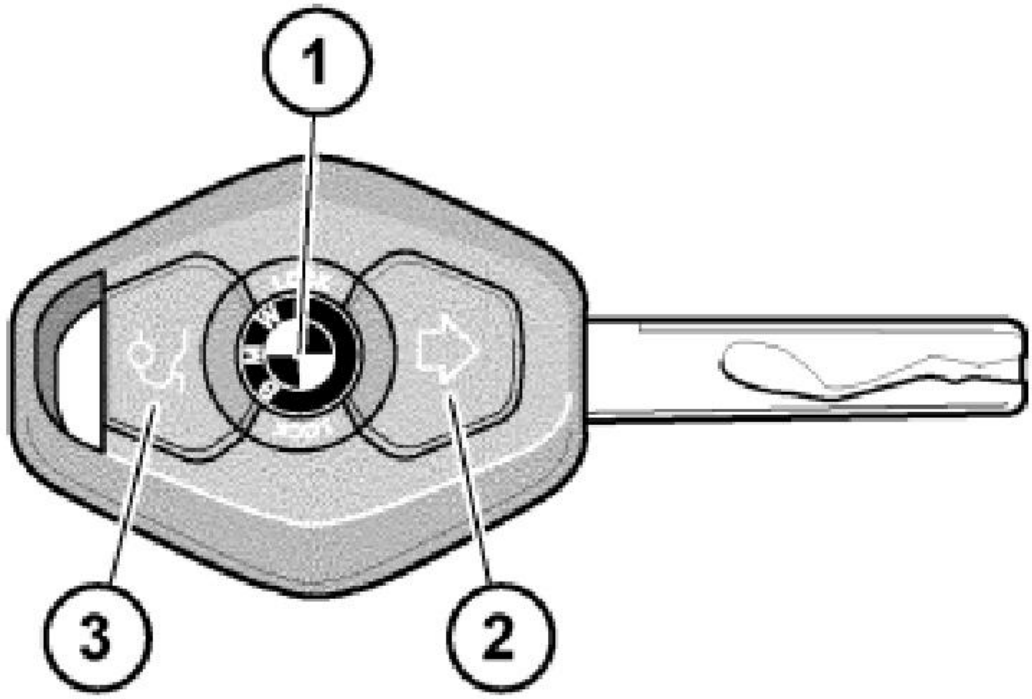


Fig. 6: Identifying RKE Input Buttons
Courtesy of BMW OF NORTH AMERICA, INC.

Press **button 1** briefly:

- Central locking system closes, moves into central arrest, the DWA may be activated.
- The interior lighting is switched on when the vehicle is locked.
- Panic Mode (on US models) is deactivated again.

Press **button 1** a second time after a short interval:

- The interior protection and tilt sensor of the DWA are deactivated

Press **button 1** and hold in:

- Central locking system, side windows and sliding roof close ("Convenient closing").
- This function is encoded differently from country to country and is not available in all national versions.

Press **button 2** briefly:

- Central locking system opens, interior lighting switches on, the DWA may be deactivated.

Press **button 2** and hold in:

- Central locking system, side windows and sliding roof open ("Convenient opening").

Press **button 3** briefly:

- Luggage compartment lid opens.

Press **button 3** and hold in:

- Panic Mode (on US models) is active again.
- Automatic luggage compartment lid closing.

Individual functions may deviate from those described above; this depends on the respective country-specific encoding and the settings made via Car & Key Memory.

6.2 Signal Processing

Signal processing is by means of a microprocessor on the printed circuit board in the key casing. This microprocessor:

- Evaluates The Key Actuations,
- Generates The New Key Code,
- Relays The Key Code,
- Controls Transmitter Output Stage,
- Monitors Power Supply (Storage Battery) For Radio Transmitter.

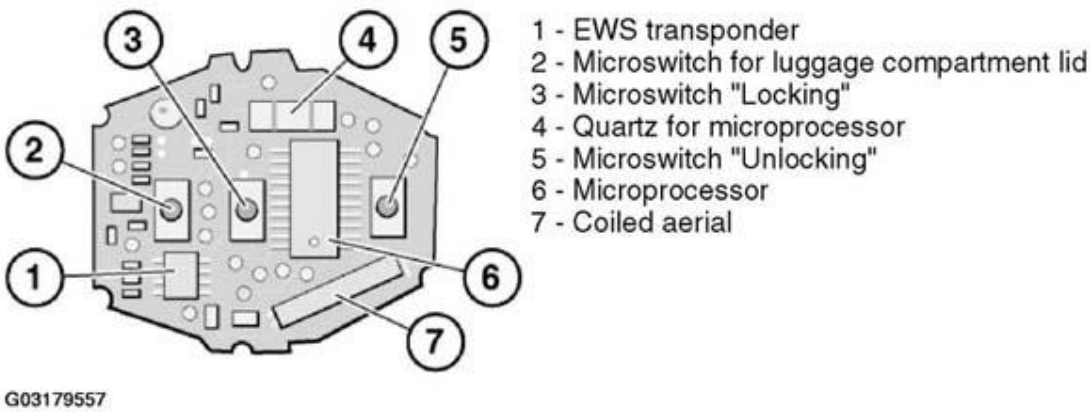


Fig. 7: Identifying RKE Components On Printed Circuit Board Of Key
Courtesy of BMW OF NORTH AMERICA, INC.

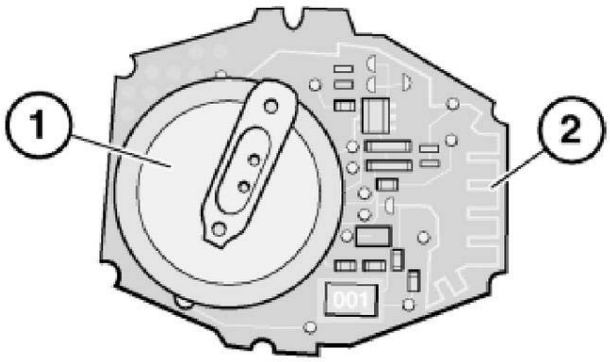
The signals transmitted via the transmitter output stage are radiated via an aerial integrated on the printed circuit board. The carrier frequency is 433.92 MHz (ECE) or 315 MHz (US), depending on country-specific registration.

When the system is being initialized, a key code is created and stored in the microprocessor of the radio transmitter. Following every key actuation at the radio transmitter, a new key code is transmitted (changing code). The codes are recalculated according to a specified process so that the receiver module can differentiate reliably between its own and external radio transmitters.

NOTE: Each transmitter can "lose" its key code if, e.g., someone inadvertently actuates buttons in the initialization sequence outside the car. In this case, all radio transmitters belonging to the car must be re-initialized.

6.3 Power Supply

The new radio transmitter does not use regular batteries but rather a rechargeable vanadium-lithium storage battery. New radio transmitters will be supplied with charged storage batteries.



1 - Storage battery
2 - High-frequency aerial
(433.92 MHz or 315 MHz)

Fig. 8: Identifying Storage Battery And High-Frequency Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

As of ignition lock position 1 (terminal "R"), the storage battery is charged inductively. The charging process is realized via the ring aerial of the ignition lock and via the coiled aerial integrated in the radio transmitter. An electronic charging unit on the printed circuit board controls the charging process.

The battery is designed for a very long service life. A prerequisite is that the radio transmitter is used.

If radio transmitters are not used, the storage battery is discharged after approx. 18 months.

With severely discharged storage batteries, the charging period is approx. 30 hours up to maximum capacity. After charging for approx. 30 minutes, the remote control can be actuated approx. 15 times.

6.4 Voltage Monitoring

If cell-end voltage has been reached, the central locking system, for example, can no longer be locked using the remote control. The "Convenient closing" can no longer be used, nor can the radio transmitter be initialized.

Every time a button is actuated, the storage battery voltage in the radio transmitter is monitored. Once the storage battery signal is contained in three consecutive telegrams, it is stored together with the corresponding radio transmitter key number for diagnostic purposes in the general module of the central body electrics. The entry is deleted when five consecutive radio transmitter telegrams no longer contain the storage battery signal.

In the case of E38 and E39 models, this status is already indicated by a signal in the check control.

7. SYSTEM INITIALIZATION

In order that the radio transmitters can communicate with the vehicle, each individual radio transmitter must be initialized with the receiver module.

Up to four radio transmitters can be initialized and used per vehicle.

Since each radio transmitter has its own key code, all existing radio transmitters must be reinitialized when, for example, a new radio transmitter is to be added.

Initialization Procedure:

1. Open central locking system (ZV) using the car key.
2. Get into the car and close all doors.
3. Using the car key, switch the ignition lock briefly to ignition lock position 1 and then switch off again. The switching time must remain under 5 seconds, otherwise the system is not ready for initialization.
4. At the radio transmitter: Press button 2 and hold in.
5. Press button 1 three times (in a space of 10 seconds). Button 2 must remain held in.
6. Release button 2.
7. The ZV signals by means of "Locking" and immediate "Unlocking" that a radio transmitter has been successfully initialized.

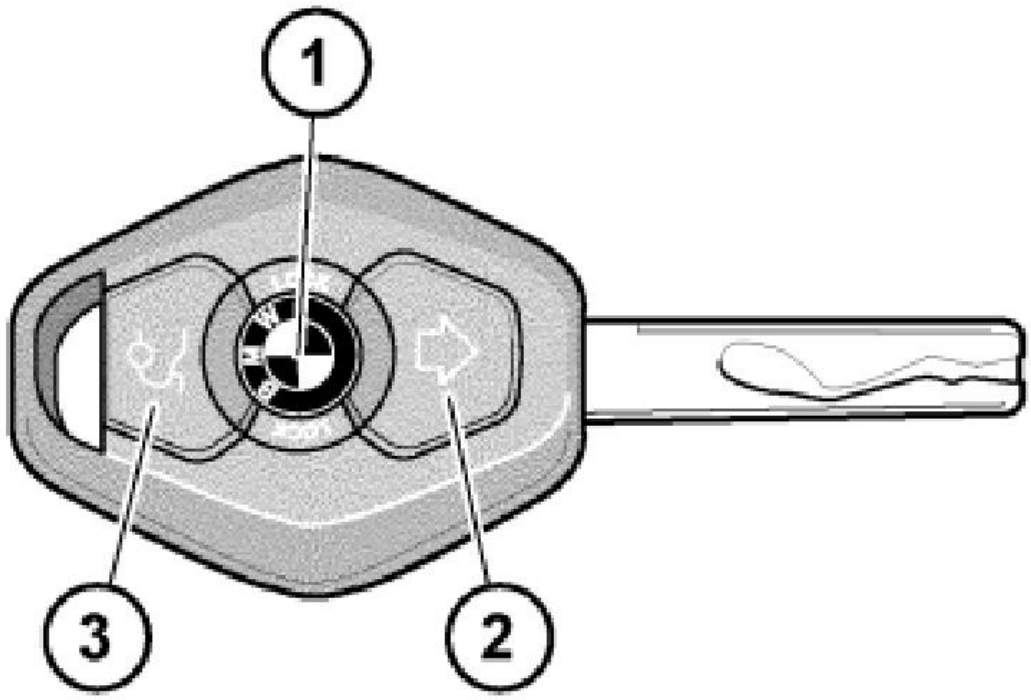


Fig. 9: Identifying RKE Input Buttons
Courtesy of BMW OF NORTH AMERICA, INC.

If the ZV does not send a return signal, initialization must be restarted.

Once the first initialization process has been completed, another three radio transmitters can be initialized.

For every other radio transmitter, the procedure described under step 4) above must be repeated within 30 seconds, otherwise initialization stand-by is switched off.

During initialization, all other existing radio transmitters must be initialized. The ignition lock must never be reactivated during the initialization process. If this were to happen, then all radio transmitters would have to be re-initialized.

8. DIAGNOSIS

The radio remote control can be diagnosed via DIS and MoDiC under "Central body electrics - ZKE".

9. SYSTEM INTERCONNECTIONS

Various functions in the central body electrics, the anti-theft alarm system (DWA) and the electronic immobiliser (EWS) can be activated or deactivated by means of the radio transmitters.

During vehicle diagnosis, it is important to know how the radio transmitter influences the total system.

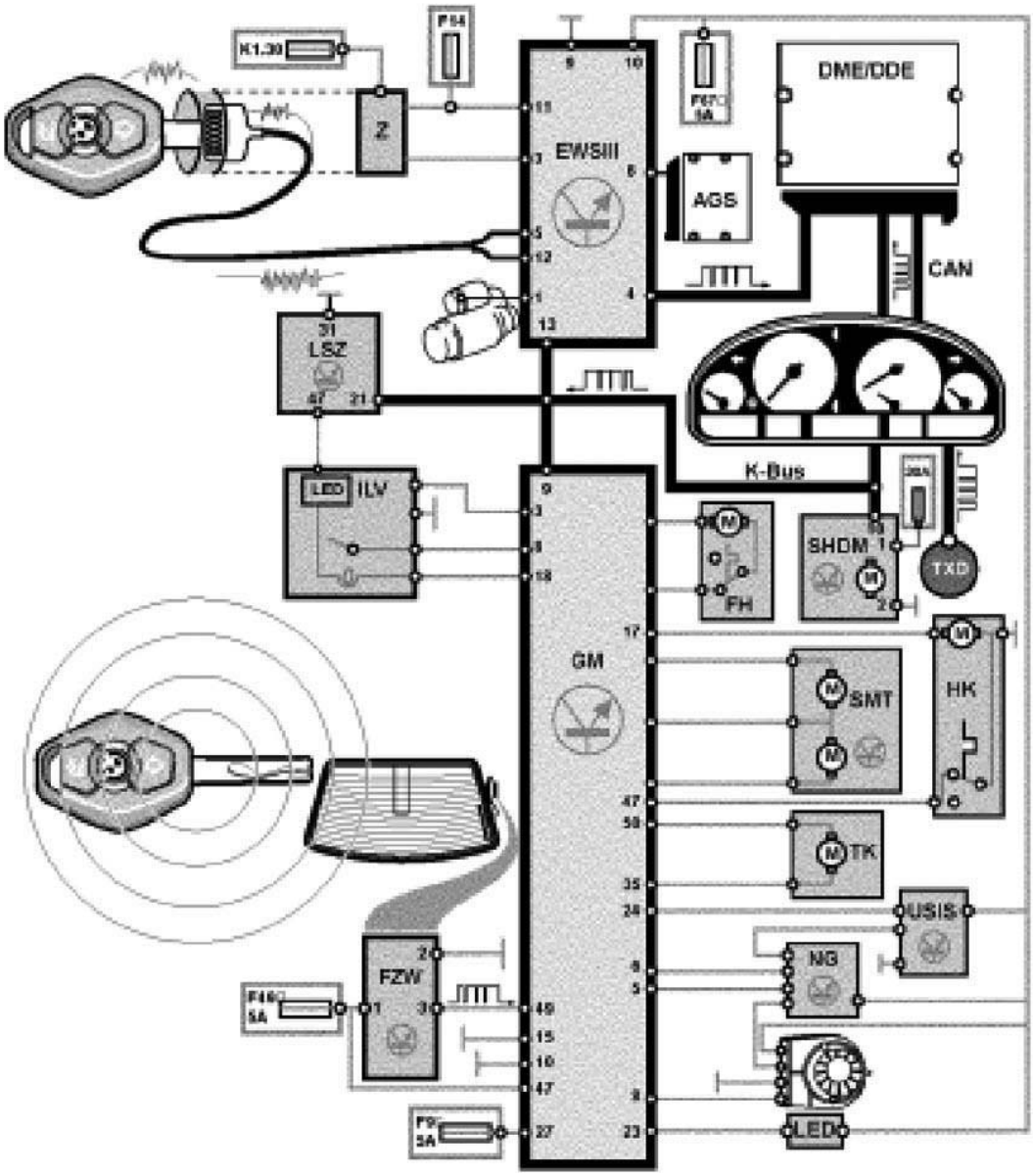


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Fig. 10: Identifying System Interconnections And Function (E46 Shown)
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM INTERCONNECTION LEGEND

Component	Designation
Z	Ignition lock, electromechanical part
EWSIII	Electronic immobiliser, control unit
EWSIII/1	Output - starter signal (X1659)
EWSIII/3	Input - ignition/starter switch signal (X1659)
EWSIII/4	Output - engine control unit signal, uni-directional (X1659)
EWSIII/5	Output - ring coil signal (X1659)
EWSIII/6	Input - transmission control unit switch signal (X1659)
EWSIII/9	Ground/earth (X1659)
EWSIII/10	Input - terminal 30 of fuse F67 (X1659)
EWSIII/11	Input - terminal R from ignition lock via fuse F14 (X1659)
EWSIII/12	Output - ring coil signal (X1659)
EWSIII/13	Input/output - K bus signal (X1659)
F9	Terminal 30/5A fuse
F46	Terminal 30/30A fuse
F49	Terminal 30/5A fuse
F67	Terminal 30/5A fuse
LSZ	Central light switch
LSZ/21	Input/output K bus (X12)
LSZ/31	Ground/earth (X12)
LSZ/47	Output - search light signal (58g) (X12)
ILV	Interior lighting, front
ACS	Automatic transmission control unit
DME/DDE	Digital Engine Electronics/Digital Diesel Electronics
DME/33	Input - EWS release signal (X6004)
CAN	Controller Area Network (CAN bus)
K-Bus	Bodyshell bus
FH	Window lift (stands for all window lifts in vehicle)
SHDM	Sunroof module
SMT	Lock module (stands for all doors)
HK	Luggage compartment lid motor
TK	Fuel filler cap drive
USIS	Ultrasonic interior protection
NG	Tilt sensor
FZV	Radio central locking receiver
FZV/1	Input - terminal 30 signal of fuse F49 (X1143)
FZV/2	Ground/earth - (X1143)

FVZ/3	Input/output - radio transmitter signal (X1153)
GM	General module V
GM/3	Output - electric consumer cut-out signal (X332)
GM/5	Output - tilt sensor monitoring signal (X254)
GM/6	Input - tilt sensor monitoring, immobiliser signal (X254)
GM/8	Input - interior lighting switch signal, front, continuous operation (X253)
GM/8	Output - control signal, DWA emergency power siren alarm (X254)
GM/9	Input/output - K bus signal (X253)
GM/10	Ground/earth (X253)
GM/17	Output - luggage compartment lid unlocking motor signal to luggage compartment lid drive (X253)
GM/18	Input - interior lighting signal (X253)
GM/23	Output - DWA light emitting diode signal (X254)
GM/24	Input - passenger-compartment sensor signal (USIS) (X254)
GM/27	Input - terminal R of fuse F9 (X253)
GM/35	Output - fuel filler cap unlocking signal (X253)
GM/42	Input - luggage compartment lid contact signal from luggage compartment lid drive (X253)
GM/47	Input - terminal 30 signal of fuse F49 (X253)
GM/49	Input/output - radio remote control data line signal (X253)
GM/50	Output - fuel filler cap locking signal (X253)
TXD	Diagnostic bus to diagnostic connector

1.0 SEAT LEATHER CARE

"Karneol" leather care cleans the leather upholstery of mild stains or dirt. It also provides conditioners to prevent drying out. Not suitable for suede.

BMW Part No. 81 22 9 400 901.

2.0 PREMIUM LEATHER CARE KIT

BMW Part No. 81 11 024 455.

5213 FRONT SEAT, NORMAL, MANUAL

52 14 ... PERFORMING FUNCTION CHECK WITH ADAPTER CABLE (FOR SEAT REPAIRS)

NOTE: **The function check on a repaired driver's or front passenger seat can be performed outside the vehicle by using adapter cable 61 4 360.**

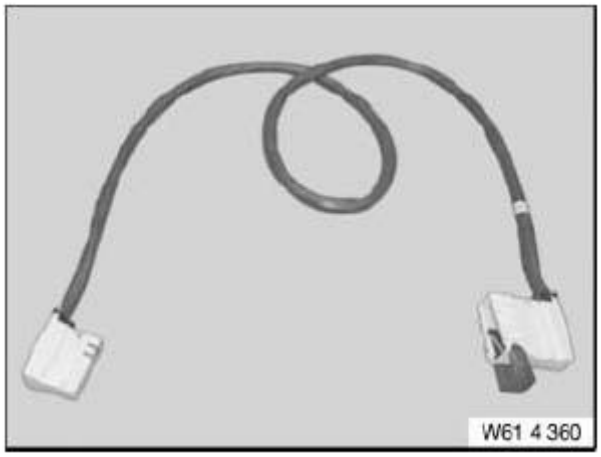


Fig. 1: Identifying Adapter Cable (61 4 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Use:

Adapter cable 61 4 360 is connected to vehicle wiring harness (1) and removed seat (2).

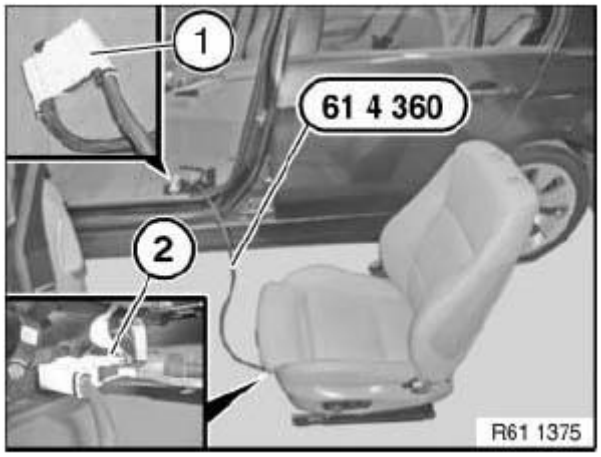


Fig. 2: Connecting Adapter Cable (61 4 360) To Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

52 14 ... PERFORMING FUNCTION CHECK WITH ADAPTER CABLE (FOR SEAT REPAIRS)

NOTE: The function check on a repaired driver's or front passenger seat can be performed outside the vehicle by using adapter cable 61 4 360.

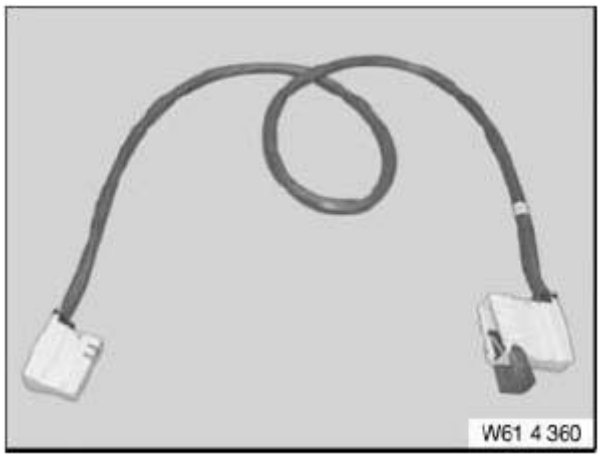


Fig. 3: Identifying Adapter Cable (61 4 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Use:

Adapter cable 61 4 360 is connected to vehicle wiring harness (1) and removed seat (2).

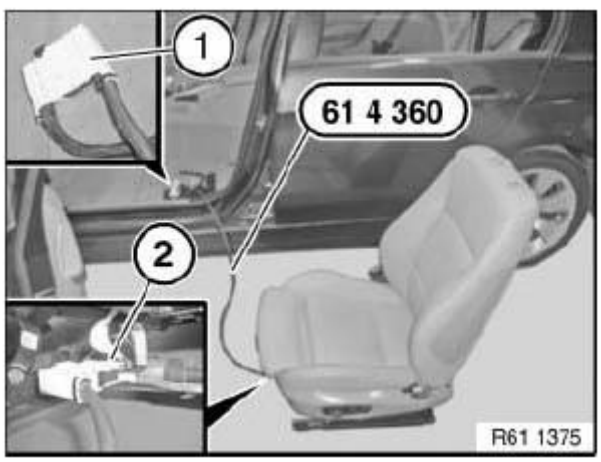


Fig. 4: Connecting Adapter Cable (61 4 360) To Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 021 REMOVING AND INSTALLING/REPLACING FLEXMAT ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Remove padding for front seat . See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **52 15 400 Replacing seat cover for left or right front seat (sport/manual)**

Remove plug housing (1) from flexmat.

Cut all cable ties and disengage wiring harnesses from flexmat.

Installation:

Make sure wiring harnesses are laid correctly.

Observe bending radius and do not lay wiring harnesses tensioned.

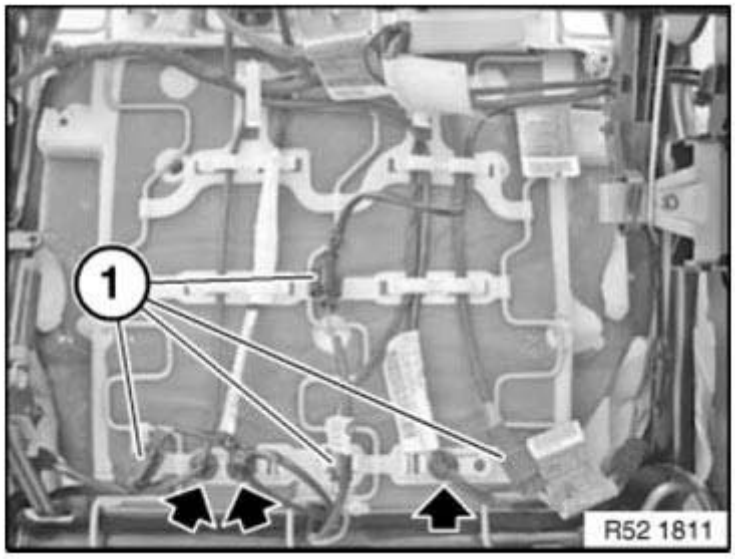


Fig. 5: Identifying Flexmat Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage flexmat (1) at front.

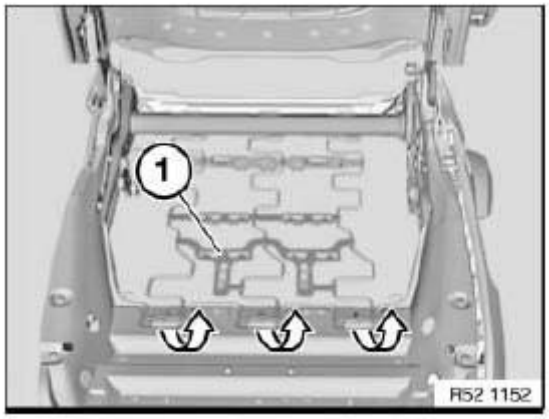


Fig. 6: Removing Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

Swing flexmat (1) down and disengage from seat frame.

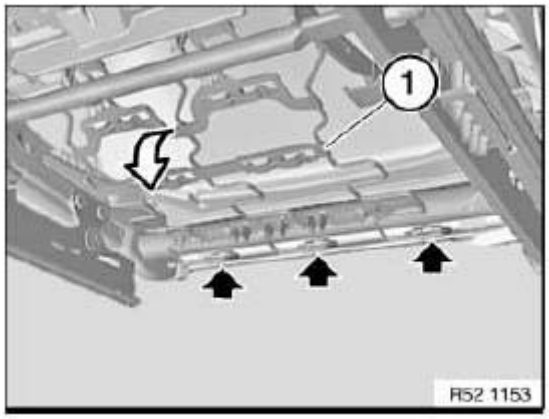


Fig. 7: Moving Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 ... REMOVING AND INSTALLING ISOFIX HOLDER

Necessary preliminary tasks

- Remove seat fabric See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

Release screws (1).

Tightening torque **52 10 07AZ** .

Remove Isofix holder.

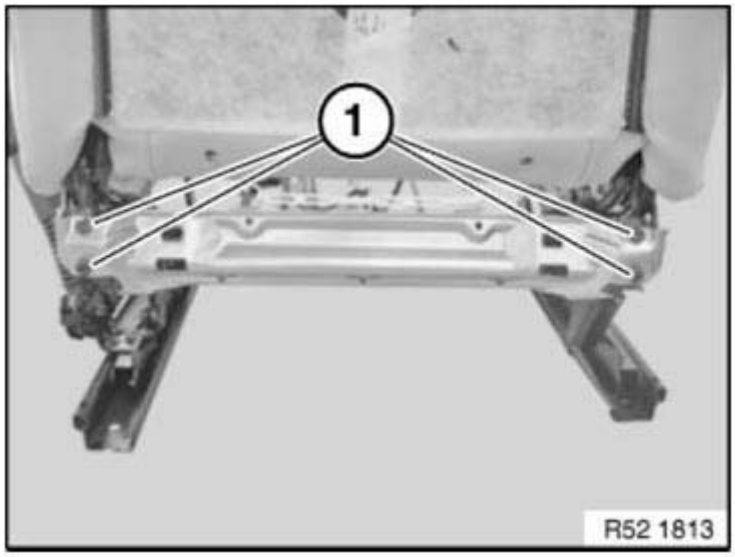


Fig. 8: Identifying Isofix Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 000 REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (NORMAL/MANUAL)

Necessary preliminary tasks

- Open convertible top
- Disconnect **BATTERY NEGATIVE LEAD**

IMPORTANT: An airbag module and a pyrotechnical seat belt tensioner are installed in the front seat.
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

Installation:

- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads
- Screws are fitted with a Torx Plus system and can be released with a standard Torx screwdriver

Move seat to upper back position.

Release and dispose of screws (1).

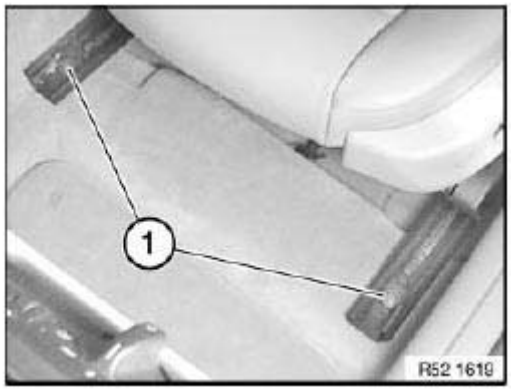


Fig. 9: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Move seat forwards and position flush with seat runners.

Unclip release tab (2) for belt anchor fitting trim (1) with plastic wedge.

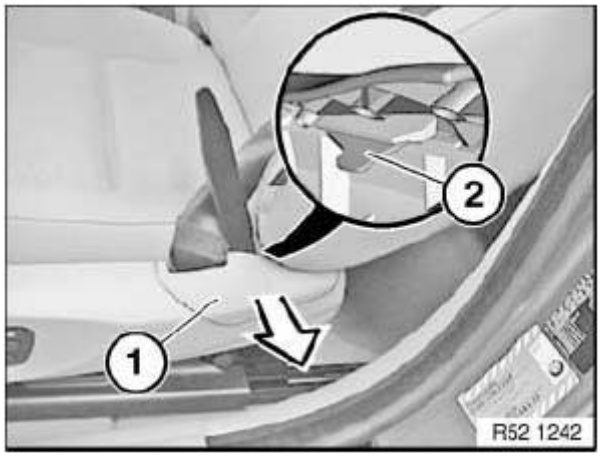


Fig. 10: Removing Release Tab For Belt Anchor Fitting Trim Using Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 2AZ** .

Remove anchor fitting (2).

Installation:

Make sure anchor fitting (2) is correctly seated on seat mechanism pin.

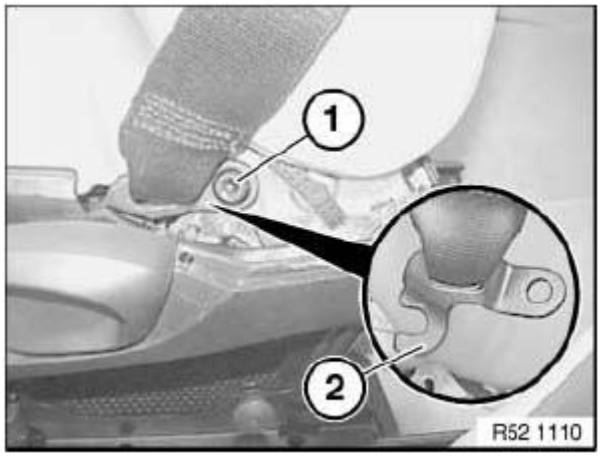


Fig. 11: Identifying Anchor Fitting With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release and dispose of screws (1).

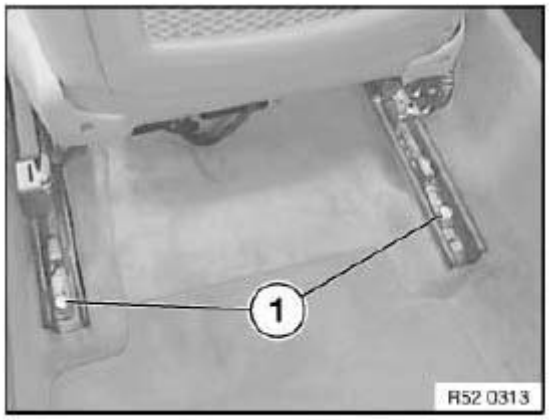


Fig. 12: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

IMPORTANT: Cover door sill with protective covers (risk of damage).

Lift out front seat.

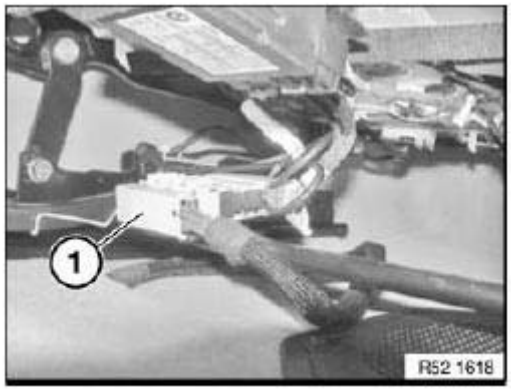


Fig. 13: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Carpet must not get between seat rails and floor pan in area of fastening points (grating noises)
- Replace microencapsulated screws
- Insert all screws loose to avoid twisting
- Tighten down all screws to specified torque

Tightening torque **52 10 1AZ** .

WARNING: When carrying out further work on the front seat, it is absolutely imperative to observe the SAFETY REGULATIONS on handling airbag modules and pyrotechnical seat belt tensioners
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

52 13 390 REMOVING AND INSTALLING OR REPLACING FRONT LEFT OR RIGHT HEAD RESTRAINT

WARNING: Danger of pinching!

Reach on left and right under head restraint and unclip in jerks in upward direction.

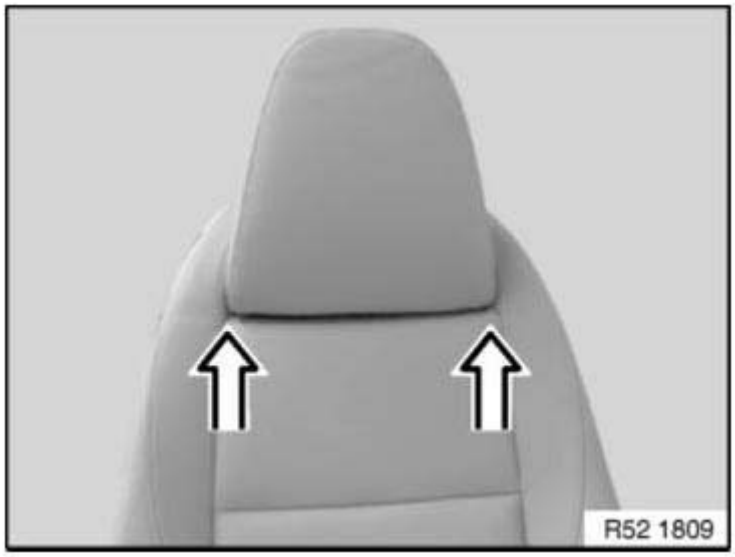


Fig. 14: Removing Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 198 REMOVING AND INSTALLING OR REPLACING REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST

Release clips (1) with diagonal cutting pliers.

Remove rear panel (2) downwards with a turning action.

NOTE: Remove remnants of clips.

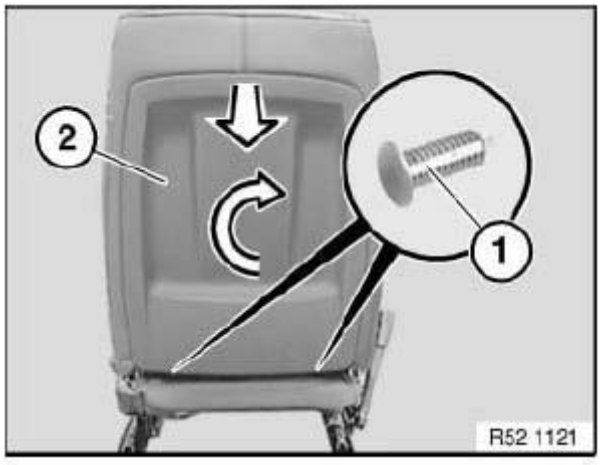


Fig. 15: Removing Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) and bore holes (2) on rear panel (3) must not be damaged.

Replace faulty clips.

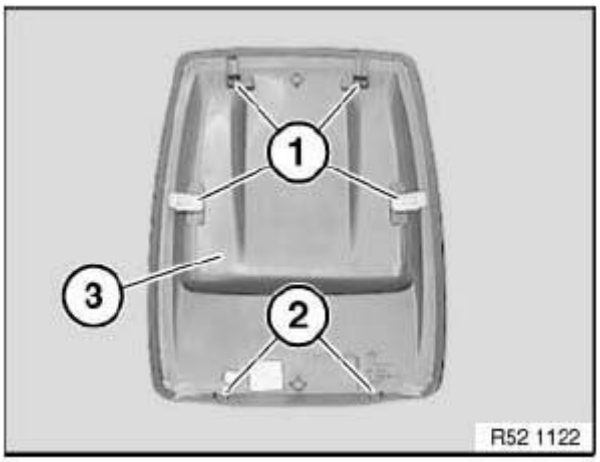


Fig. 16: Identifying Hooks And Bore Holes On Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 030 REMOVING AND INSTALLING/REPLACING BACKREST FRAME ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Remove **FRONT SEAT**
- Remove **REAR PANEL** on front seat backrest

Release airbag wiring harness (2) from cable holders on flexmat.

Disconnect cable tie from clips.

Raise release clip (3) and pull plug (4) out of plug housing (1).

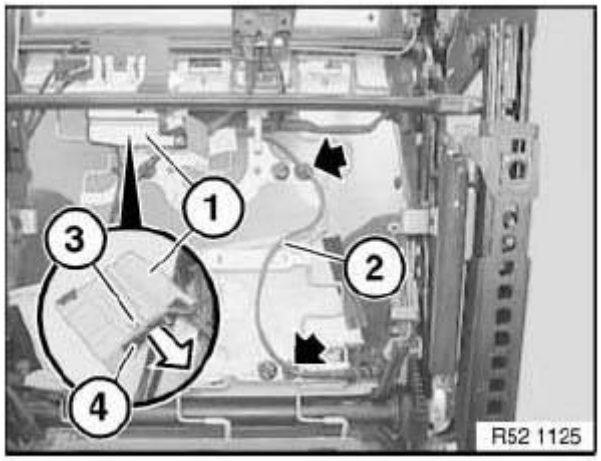


Fig. 17: Pulling Plug Out Of Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Always feed in cable tie (1) at narrow end of plug housing in direction of arrow.

Cables must be secured with insulation under cable tie.

Firmly tighten cable tie (1) to relieve strain. It must not be possible to move the cable.

Make sure plug (2) is correctly locked in plug housing (3).

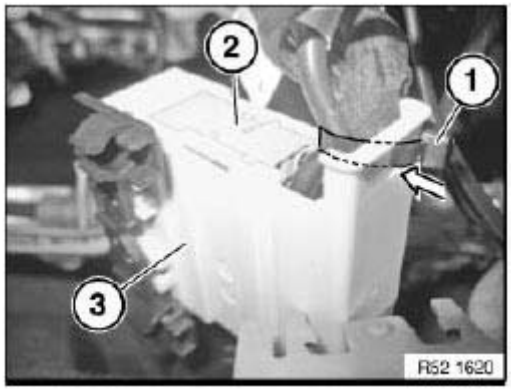


Fig. 18: Installing Cable Tie At Narrow End Of Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unclip cable.

Release wiring harness (3) from cable holders on seat mechanism.

Unfasten plug connection (2) and disconnect.

IMPORTANT: Feed all wiring harnesses carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

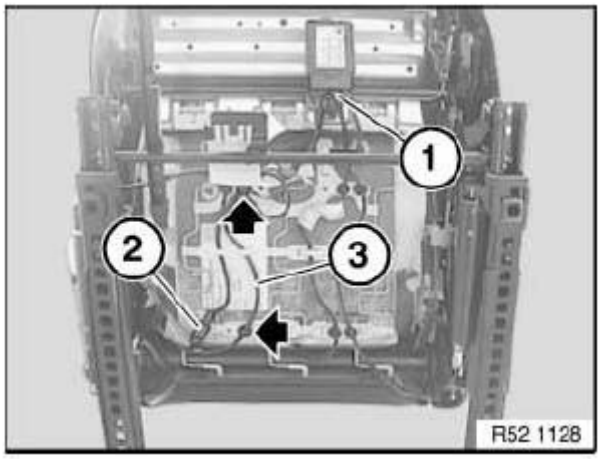


Fig. 19: Identifying Plug Connections And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook backrest cover (1) on left and right.

Release screws (2) on left and right.

Tightening torque **52 10 02AZ** .

Remove backrest frame (3) completely towards top.

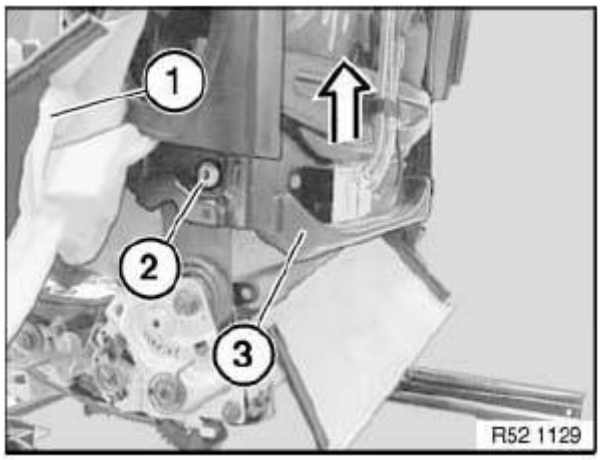


Fig. 20: Removing Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove backrest cover with padding.
- Remove **SIDE AIRBAG** .
- Remove lumbar support See **5215059 Removing and installing/replacing lumbar support pump with valve housing for lumbar support/backrest width adjustment**; **5213059 Removing and installing/replacing lumbar support pump with valve housing for lumbar support**; **5213055 Removing and installing/replacing lumbar support on front seat** or **5215061 Replacing both air cushions for backrest width adjustment on left or right front seat**.

52 13 025 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SEAT MECHANISM (NORMAL/MANUAL)

This job is described under:

- Remove **BACKREST FRAME** on front seat

Replacement only:

- Remove seat cover . See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)** for front seat
- Remove **SEAT BELT TENSIONER**
- Remove control unit for seat heating . See **6135080 Removing and installing/replacing control unit/module for left or right seat adjustment** or **6135095 Removing and installing/replacing control unit/module for seat heating**

Seat mechanism is supplied complete with corresponding drive units.

Unlock plug housing (3) and remove from holder.

Disengage wiring harnesses from flexmat.

Installation:

Make sure wiring harnesses are laid correctly.

Observe bending radius and do not lay wiring harnesses tensioned.

Release screws (1).

Tightening torque **52 10 05AZ** .

Remove holder (2) for control unit.

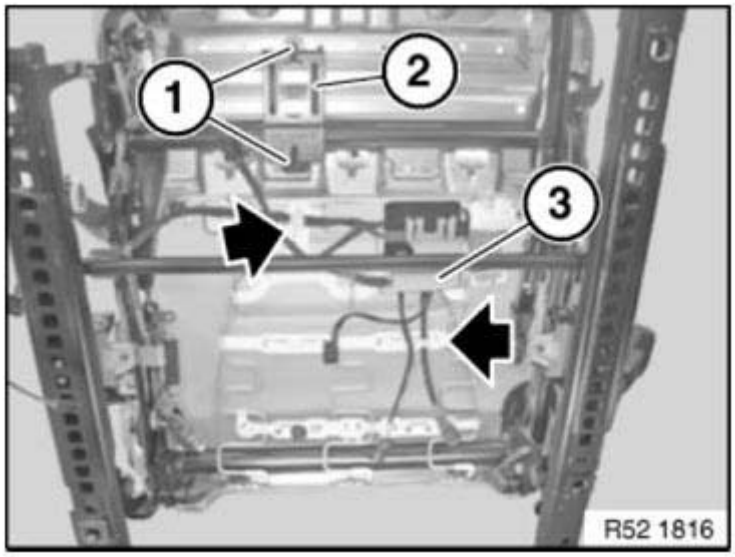


Fig. 21: Identifying Plug Housing With Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **52 10 03AZ** .

Remove belt buckle deflector trim (2).

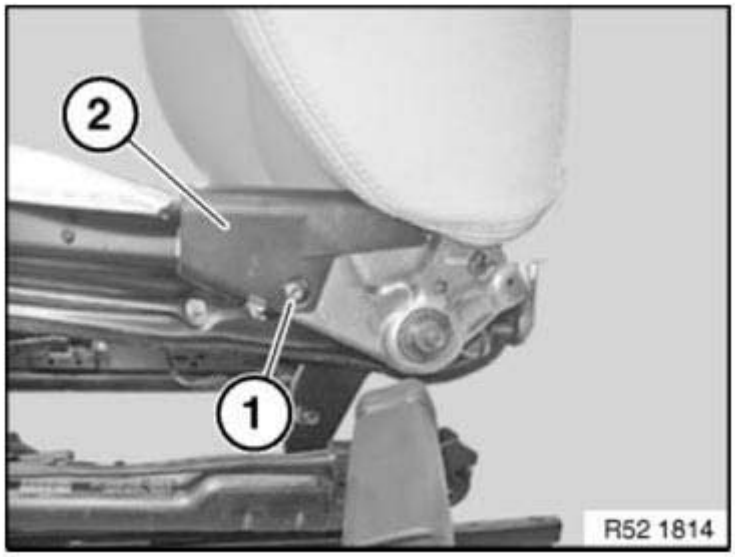


Fig. 22: Identifying Belt Buckle Deflector Trim With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Sport seat only:

Release screws (1).

Remove connection for thigh support.

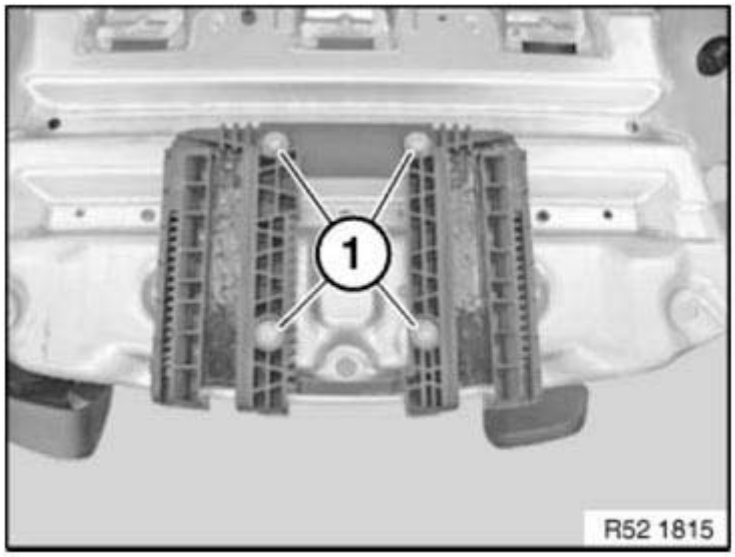


Fig. 23: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 055 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT ON FRONT SEAT

Necessary preliminary tasks

- Remove **REAR PANEL ON FRONT SEAT**

Detach backrest cover (1) from backrest frame.

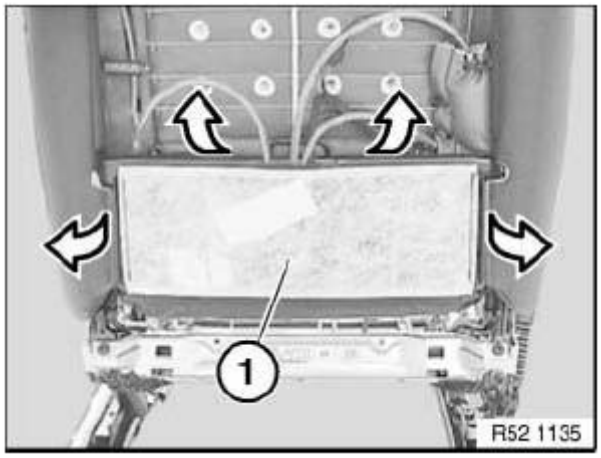


Fig. 24: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not pop valve housing (1) out of backrest frame for this operation.

Carefully pull valve housing (1) forwards out of backrest frame.

Unlock quick connectors and detach air hoses from valve housing (1).

NOTE: Connections are coded against incorrect assembly.

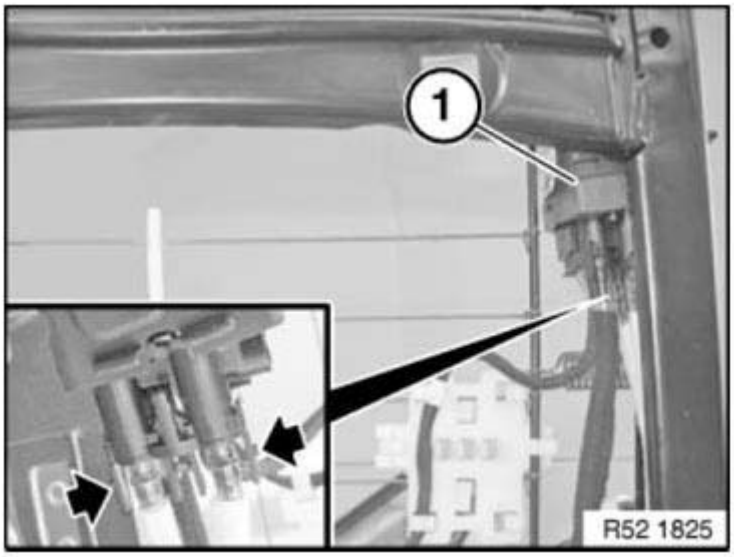


Fig. 25: Identifying Valve Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Detach lumbar cushion (1) from spring wire.

Installation:

Attach lumbar cushion (1) to second and fourth wires from below.

Press backrest support forwards a little.

Pull out lumbar cushion (1) downwards.

Feed air hoses out of backrest frame and spring wire.

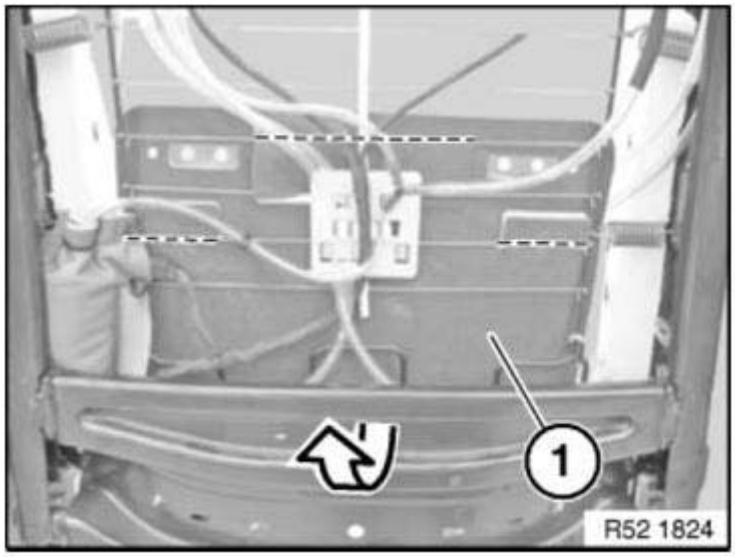


Fig. 26: Pulling Out Lumbar Cushion
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check lumbar cushion at top (1) and bottom (2) for damage.

Air hoses (3) must not be kinked.

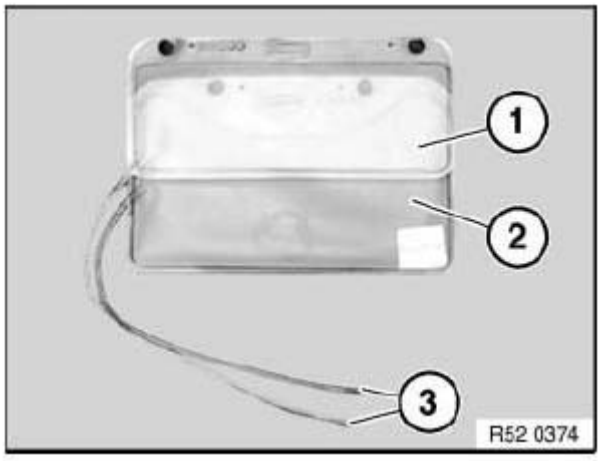


Fig. 27: Identifying Lumbar Cushion At Top And Bottom With Air Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carry out **FUNCTION CHECK** .

52 13 059 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT PUMP WITH VALVE

HOUSING FOR LUMBAR SUPPORT

Necessary preliminary tasks

- Remove **REAR PANEL ON FRONT SEAT**

Detach backrest cover (1) from backrest frame.

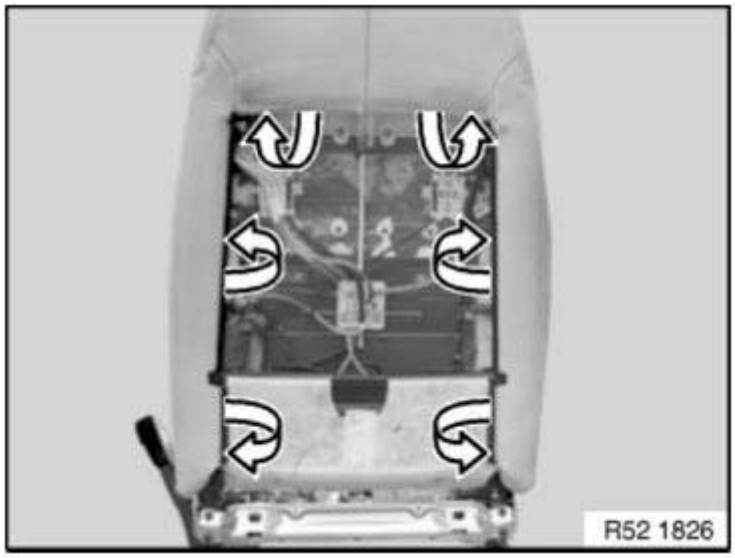


Fig. 28: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Installation:

Replace defective cable tie.

Open zip fastener (2).

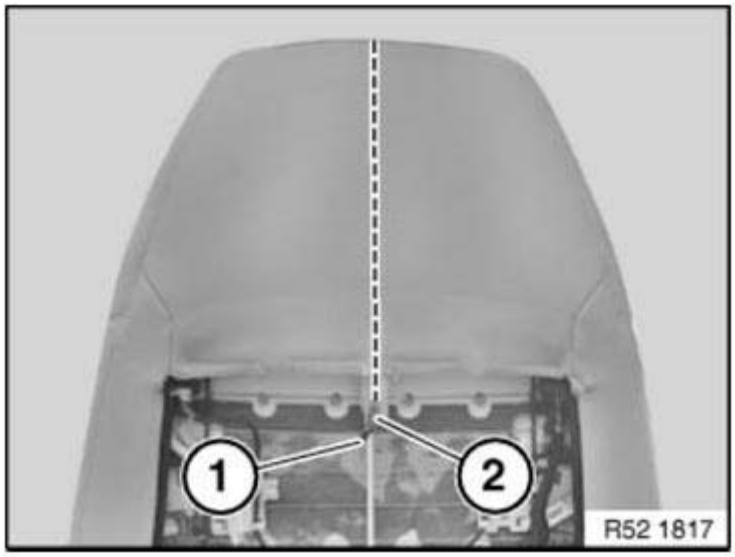


Fig. 29: Identifying Cable Tie And Zip Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach cable tie.

Installation:

Replace defective cable ties.

Remove lumbar support pump (1) from backrest frame.

Unfasten plug connection (2) and disconnect.

Unclip air hose from holder (3).

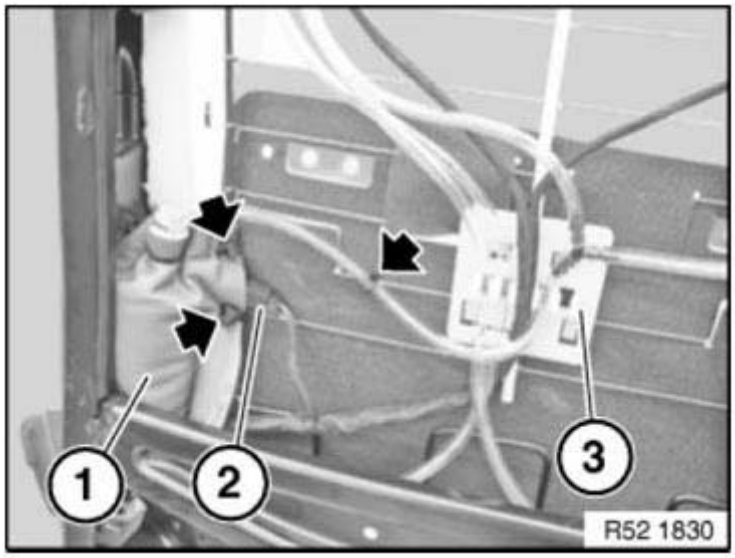


Fig. 30: Identifying Lumbar Support Pump With Plug Connection And Air Hose Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows removal without backrest cover for purposes of clarity.

Pop valve housing (2) for lumbar support in direction of arrow out of backrest frame.

Disengage wiring harness from cable tie (3).

Installation:

Feed rubber plug (1) through backrest frame.

Pull rubber plug (1) and pop valve housing into backrest frame.

Check rubber sleeve of valve housing for correct seating in backrest frame.

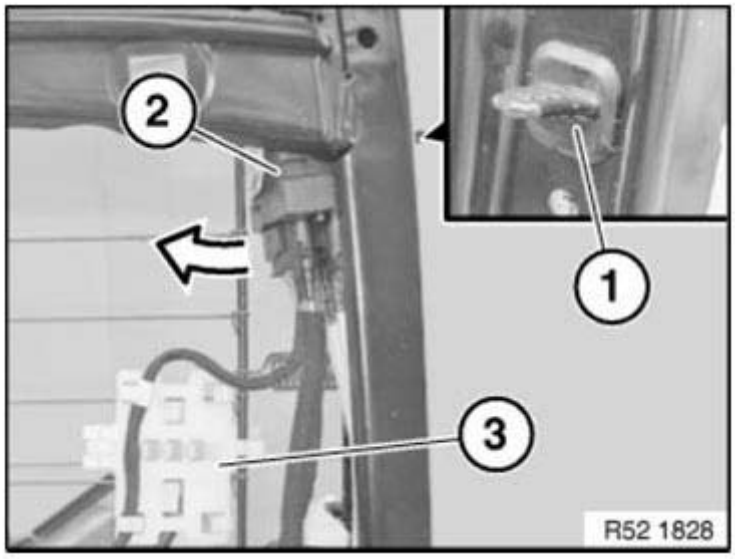


Fig. 31: Removing Valve Housing For Lumbar Support Out Of Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unlock quick connector and detach air hoses (2) and (3 and 4) from valve housing.

Valve unit for lumbar support:

(2) Hose (clear), lumbar drive
(3) Hose (blue), top lumbar cushion
(4) Hose (red), bottom lumbar cushion

NOTE: Connections are coded against incorrect assembly.

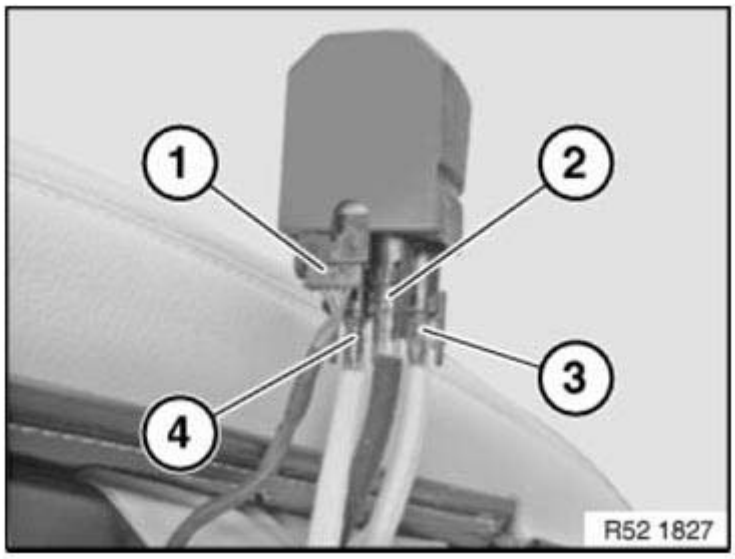


Fig. 32: Identifying Plug Connection With Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out FUNCTION TEST .

52 13 040 REMOVING AND INSTALLING/REPLACING OUTER COVER ON LEFT OR RIGHT FRONT SEAT BACKREST (NORMAL/MANUAL)

Necessary preliminary tasks

- Remove **FRONT SEAT**

NOTE: Picture shows installed seat by way of example.

Raise lock (3) and lever out handle

1. for backrest angle adjustment and
2. for seat height adjustment with special tool 00 9 317 .

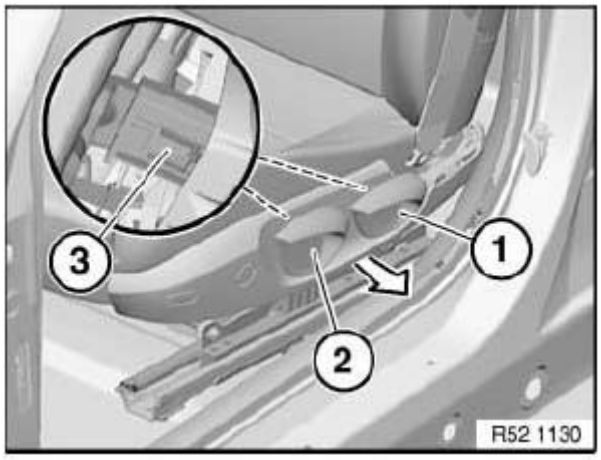


Fig. 33: Removing Handle
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **52 10 10AZ** .

NOTE: Trim (2) is engaged in marked area.

Press lock (3) and pull trim (2) off seat mechanism.

If necessary, lever out carefully with special tool 00 9 317 .

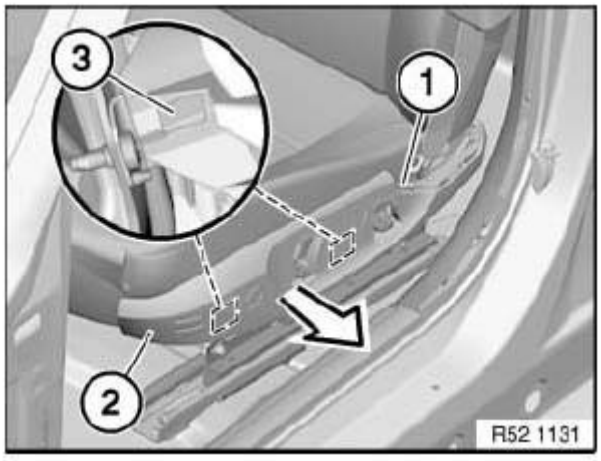


Fig. 34: Pulling Trim Off Seat Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, unlock plug connection (1) for backrest width adjustment and disconnect.

If necessary, unlock plug connection (2) for lumbar support and disconnect.

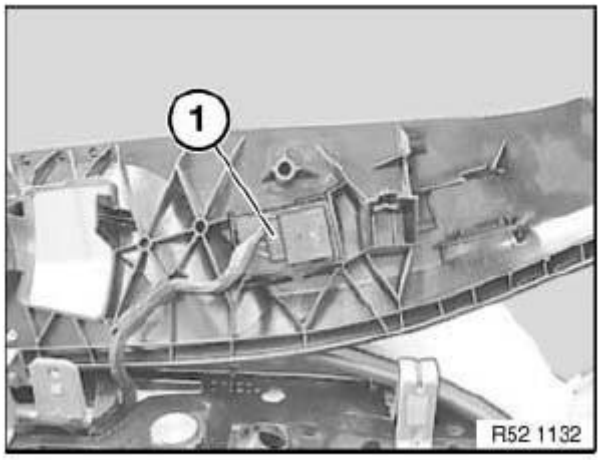


Fig. 35: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove backrest width adjustment switch and lumbar support switch.

Installation:

Make sure backrest width adjustment and lumbar support switches are correctly engaged.

52 13 405 REPLACING BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **REAR PANEL**
- Remove **HEAD RESTRAINT**

Version with seat heating only

Unfasten plug connection (1) and disconnect.

Detach cable tie.

Release wiring harness (2) from cable holders on seat mechanism.

IMPORTANT: Feed the wiring harness carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

Installation:

Lay wiring harness without kinks and tension.

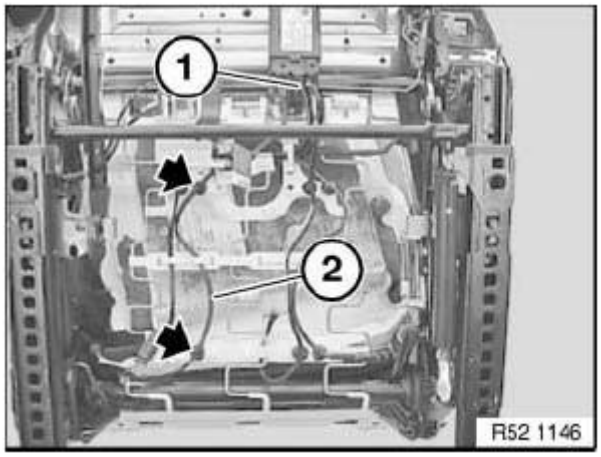


Fig. 36: Identifying Plug Connection And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable tie (1) from seat mechanism.

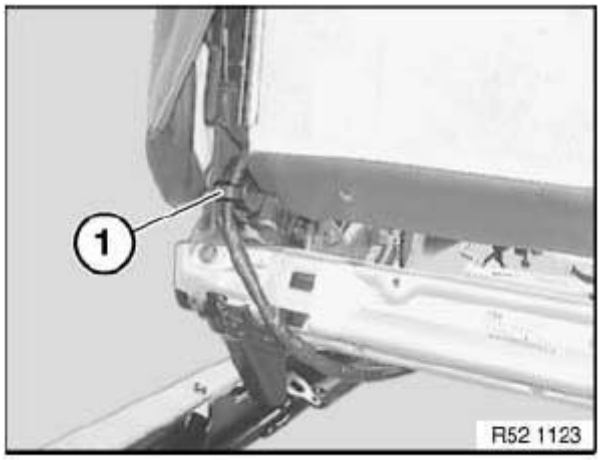


Fig. 37: Identifying Seat Mechanism Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Installation:

Replace defective cable tie.

Open zip fastener (2).

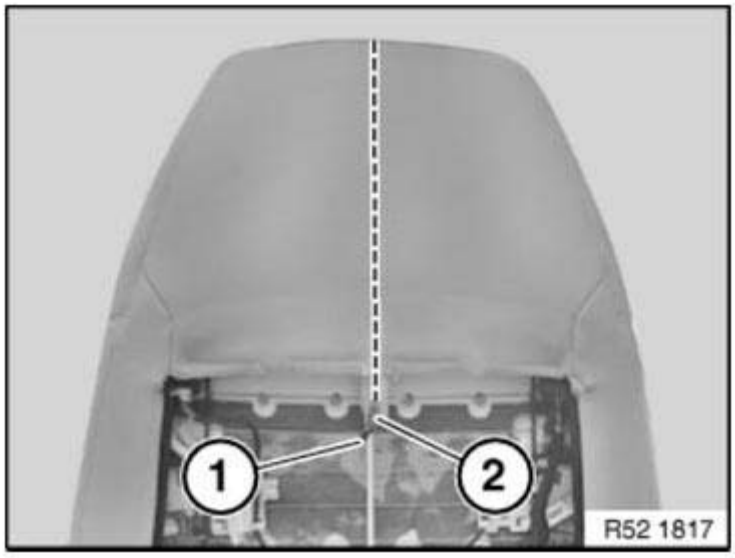


Fig. 38: Identifying Cable Tie And Zip Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach backrest cover (1) from backrest frame.

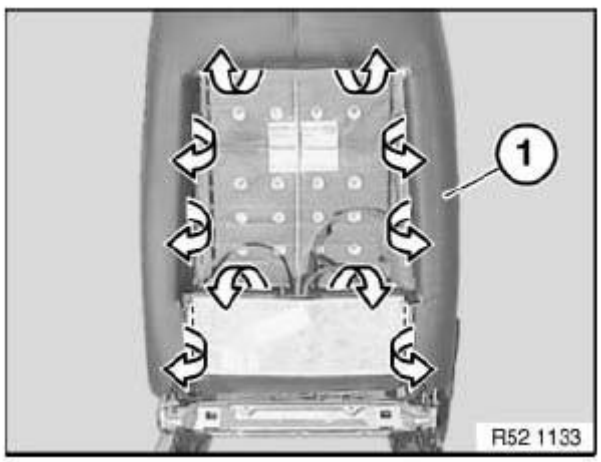


Fig. 39: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Installation:

Replace nuts.

Tightening torque **72 12 03AZ** .

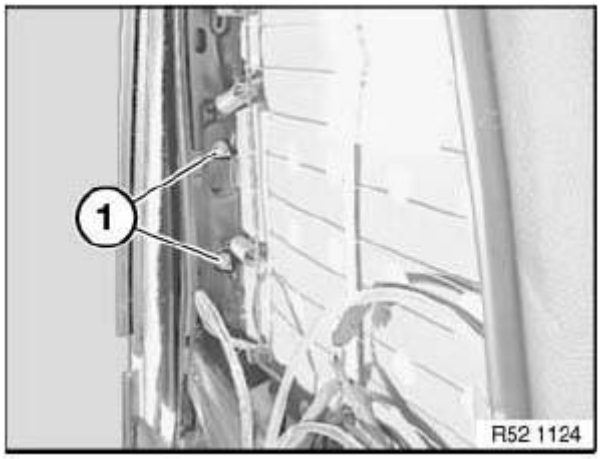


Fig. 40: Identifying Seat Mechanism Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Detach mounting strip (4) from flexmat.

Carefully pull airbag module (3) with threaded pins out of backrest frame and feed out between padding (1) and inner bag (2).

Set down airbag module (3) to one side.

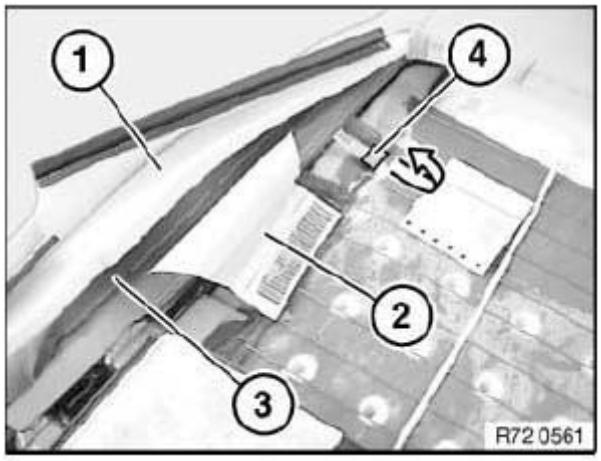


Fig. 41: Removing Mounting Strip From Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull inner bag (1) fully over airbag module and threaded pins.

Feed in mounting strip (2) of inner bag (1) through backrest frame.

Insert threaded pins into backrest frame and secure with new nuts.

No inner bag material is permitted to project through the hole in the inner frame.

Install nuts and tighten down.

Tightening torques **72 12 03AZ** .

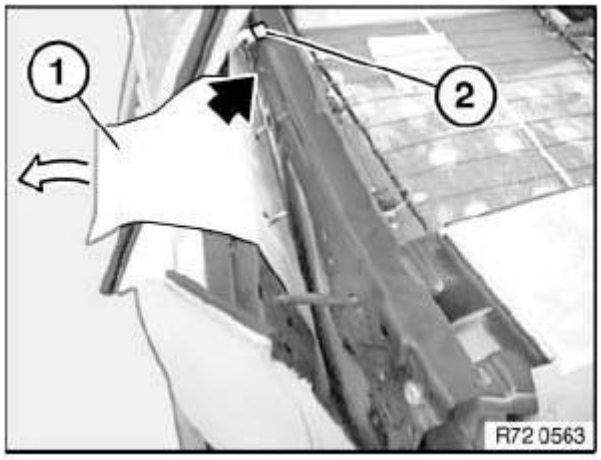


Fig. 42: Pulling Inner Bag Over Airbag Module And Threaded Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Inner bag must be between airbag module and backrest frame!

Engage mounting strip (1) of inner bag in flexmat.

Position inner bag (2) smoothly over backrest frame.

Engage backrest cover (3) in backrest frame.

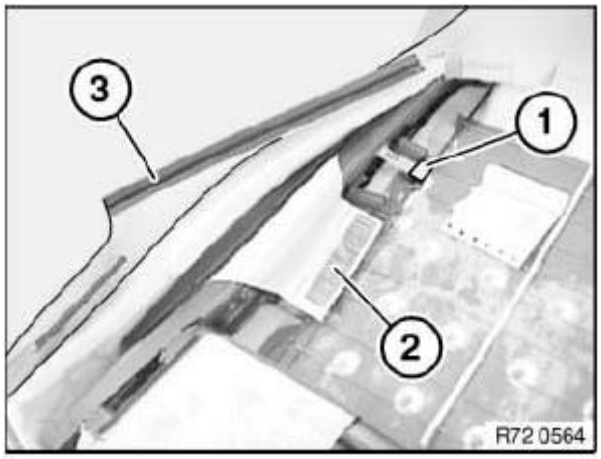


Fig. 43: Identifying Mounting Strip, Inner Bag And Backrest Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Reposition backrest cover (1) at side and bottom and pull off with padding towards top from backrest frame.

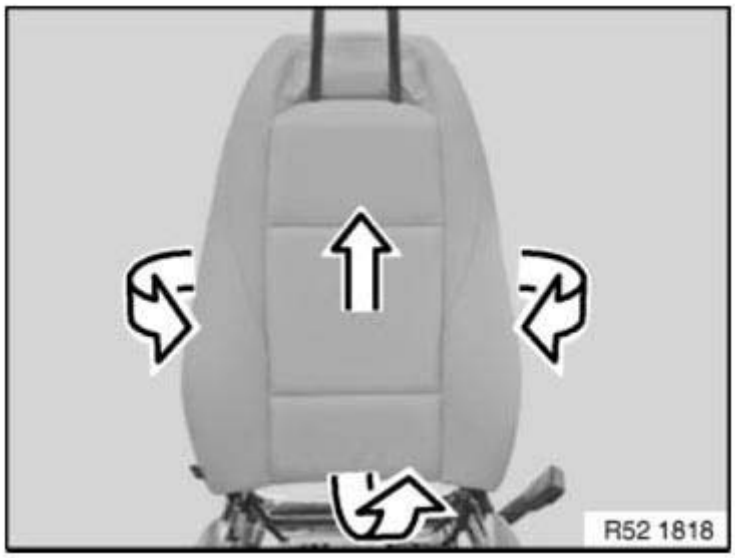


Fig. 44: Positioning Backrest Cover At Side And Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Release all retainers in marked area.

Remove backrest cover from padding.

NOTE: Remove all remnants of retainers from backrest cover and padding.

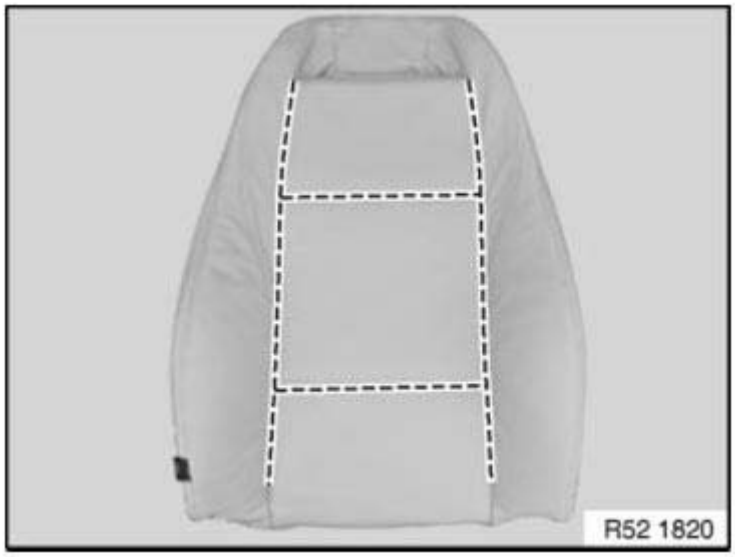


Fig. 45: Identifying Retainers Marked Area

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend new retainer (2) with special tool **52 0 050** .

1. Padding
2. Retainer
3. Trim wire in padding
4. Trim wire in backrest cover
5. Backrest cover

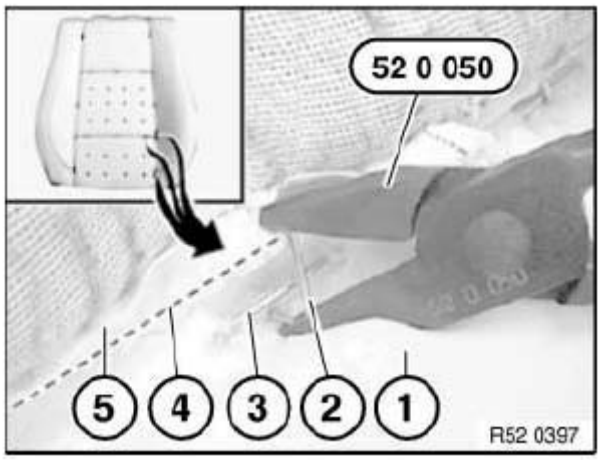


Fig. 46: Bending Retainer Using Special Tool (52 0 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement of backrest cover

Pull trim wires out of backrest cover.

Cut new backrest cover to size and insert trim wires.

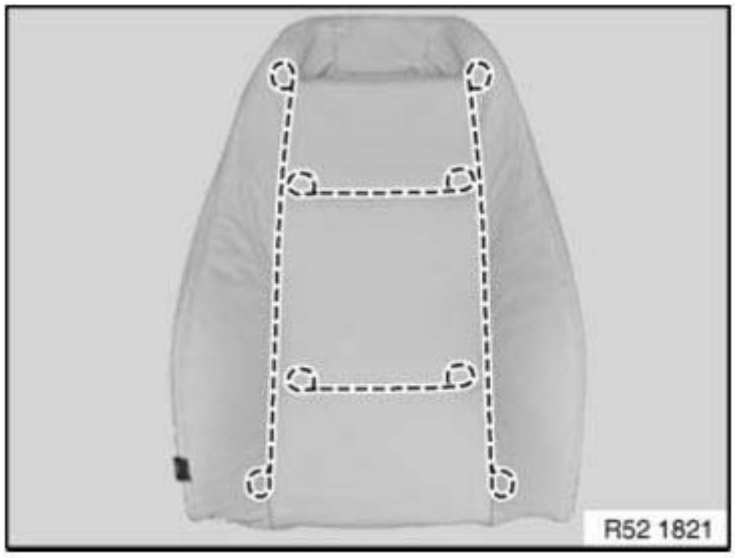


Fig. 47: Identifying Backrest Cover
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 455 REPLACING HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT (BASIC)

Necessary preliminary tasks

- Remove seat and backrest covers See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5213405 Replacing backrest cover for left or right front seat**

NOTE: Heating element is bonded to the foam section and cannot be separated from each other without incurring damaging.
Foam section and heating mat must be replaced.

Check new foam section:

- No obvious damage or material defects
- All trim wires present in foam
- No bubbles in foam section
- No dirt/contamination on foam or residual foam
- Pay attention to foam section on left and right

Check new heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note variant by examining label on cable

Guide cable for backrest heating through foam hole.

Stick on main section (1):

- Pull adhesive film pieces off main section (1) and stick to upper edge of main section foam until flush

Stick on bead section (2):

- Pull adhesive film pieces off bead section (2) and stick on heating mat along bead section edges.
- Press down evenly in outwards direction

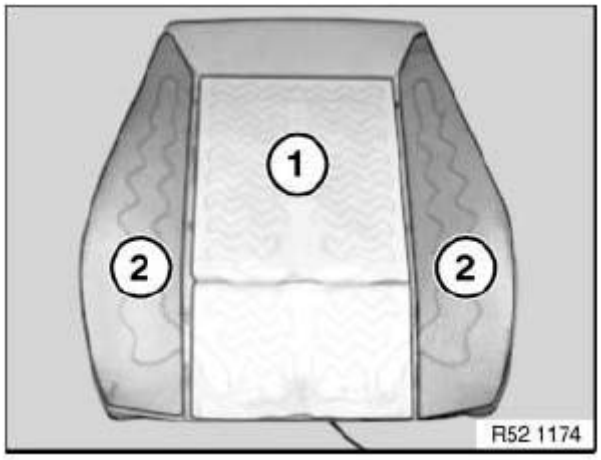


Fig. 48: Identifying Sticks On Main And Bead Section (Backrest Heating)
Courtesy of BMW OF NORTH AMERICA, INC.

Guide cable for seat heating through foam hole.

Stick on main section (1):

- Pull adhesive film pieces off main section (1) and stick to upper edge of main section foam until flush

Stick on bead section (2):

- Pull adhesive film pieces off bead section (2) and stick on heating mat along bead section edges.
- Press down evenly in outwards direction

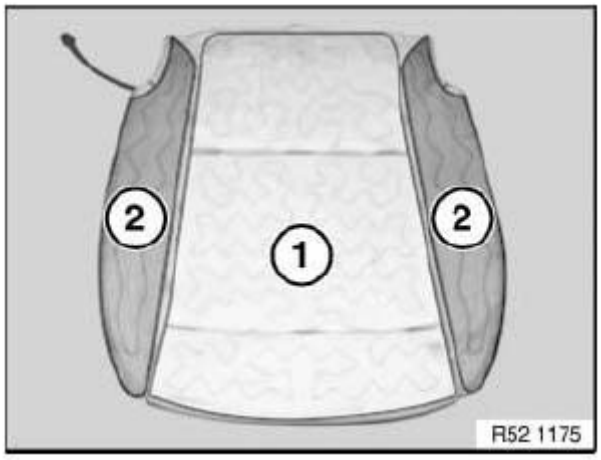


Fig. 49: Identifying Sticks On Main And Bead Section (Seat Heating)
Courtesy of BMW OF NORTH AMERICA, INC.

Check laying of heating mats:

- Heating mats laid without folds
- Heating mats correctly positioned
- All bonding surfaces stuck on

NOTE: Carry out FUNCTION CHECK .

52 13 415 REPLACING LEFT OR RIGHT SUPPORT FOR FRONT SEAT (NORMAL/MANUAL)

Operation is described in:

- Replacing **SEAT COVER ON LEFT OR RIGHT FRONT SEAT** .

WARNING: US/CDN front passenger seat (with CIS mat) only:
If CIS mat or padding is defective, both parts must be replaced together.
Seat heating is integrated in the CIS mat and is stuck to the padding over the full surface.

Fig. 50: Identifying US/CDN Front Passenger Seat
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The CIS mat must be enabled after each installation operation.

Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Code airbag control unit
- Clear fault memory if necessary

52 13 420 REPLACING LEFT OR RIGHT SUPPORT FOR FRONT SEAT BACKREST (NORMAL/MANUAL)

Operation is described in:

Replacing **BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT** .

52 13 400 REPLACING SEAT COVER ON LEFT OR RIGHT FRONT SEAT (NORMAL/MANUAL)

Necessary preliminary tasks

- Remove **FRONT SEAT**
- Remove outer cover See **5213040 Removing and installing/replacing outer cover on left or right front seat backrest (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)** on front seat

WARNING: US/CDN front passenger seat (with CIS mat) only:
If CIS mat or padding is defective, both parts must be replaced together.

WARNING: US/CDN front passenger seat (with CIS mat) only:
To avoid damaging the CIS mat, it is essential to carry out the following operations with extra care.

IMPORTANT: Risk of damage on sharp-edged seat mechanism.
Guide all cables carefully through seat and backrest mechanism.
Make sure cable is routed without kinks and tension.
Make sure plug connections are correctly locked.
Make sure plugs are correctly seated in catches.

Version with seat occupancy detector (CIS mat) only:

1. Data line CIS
2. Earth cable, seat pan
3. Earth cable, backrest frame

Unlock all plug connections and disconnect.

NOTE: From build date 09/2009 onward, earth cable (3) not included on backrest frame.

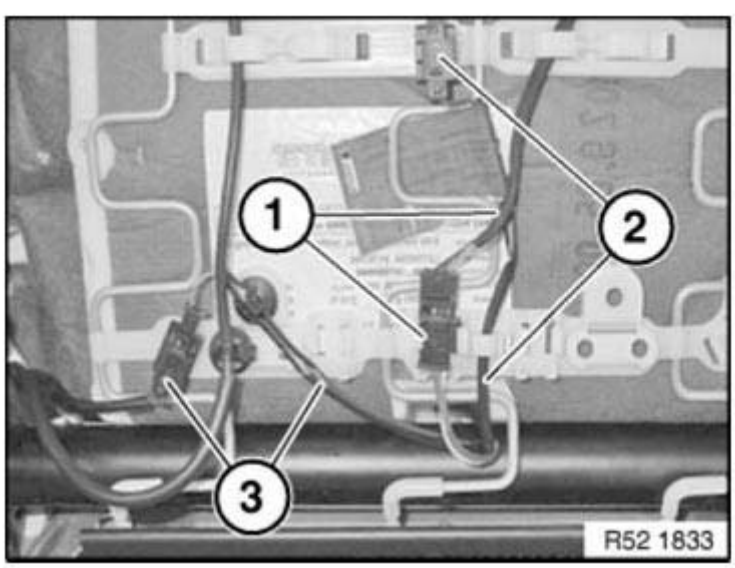


Fig. 51: Identifying Data Line CIS And Earth Cables
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat heating only:

Unlock plug connection (1) for seat heating and disconnect.

Unfasten cable strap.

Disengage wiring harness from cable clips (flexmat).

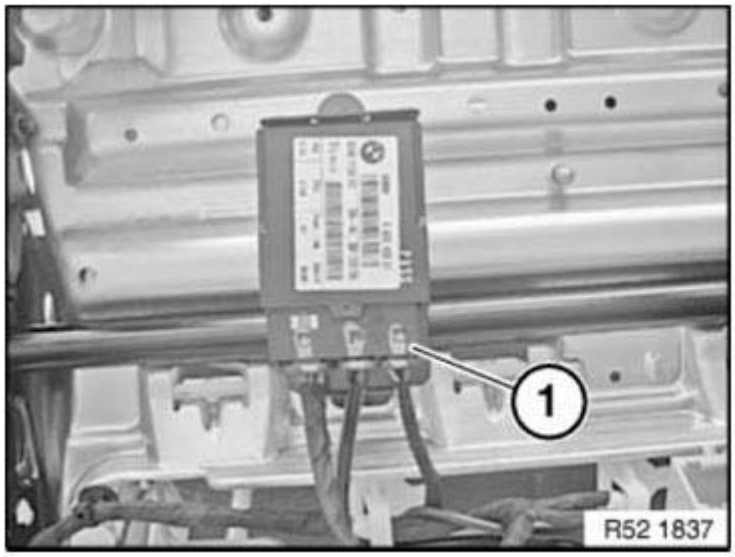


Fig. 52: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat occupancy detector without seat heating (CIS mat) only:

Seat heating is integrated in the CIS mat and is stuck to the padding over the full surface.

Lay cable for seat heating as shown to flexmat and secure with cable strap.

Secure plug with cable strap to cable.

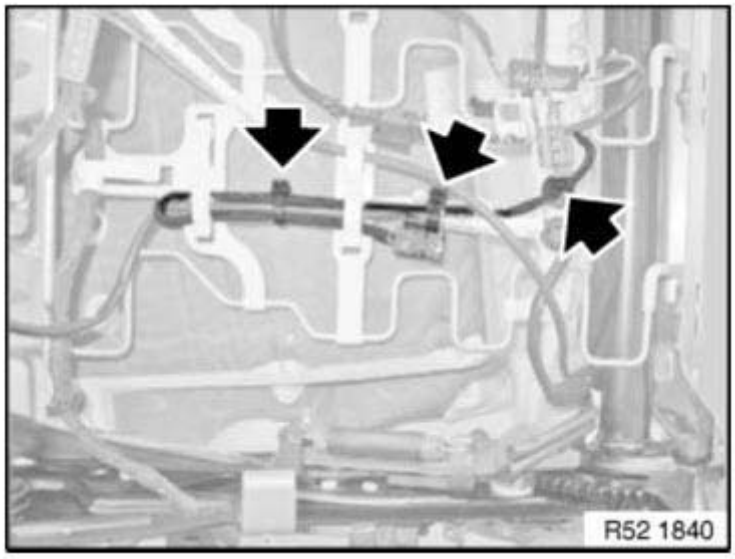


Fig. 53: Locating Plug With Cable Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicle exterior:

Lever clip (1) out of seat cover.

Installation:

If necessary, replace faulty clip.

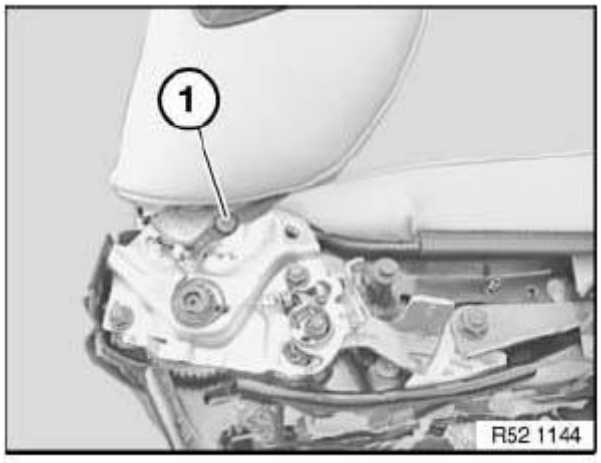


Fig. 54: Identifying Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Tunnel side:

Disengage cover fastener (1) from belt deflector trim.

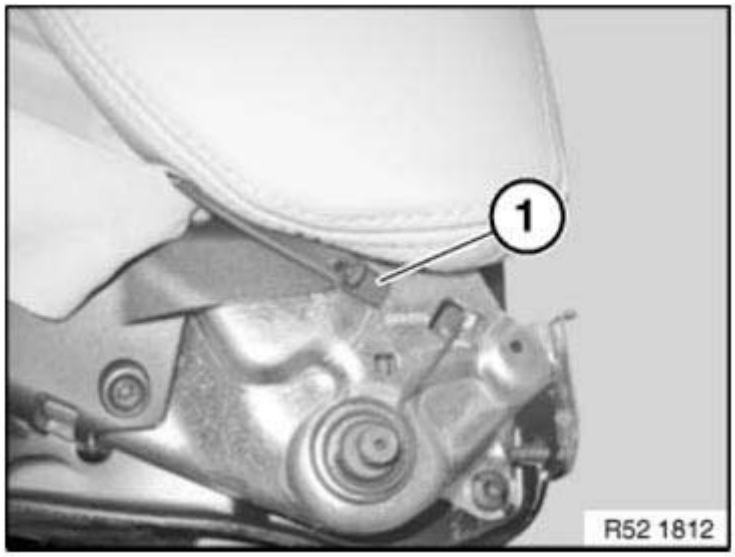


Fig. 55: Identifying Cover Fastener Of Belt Deflector Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Detach seat cover (1) from seat frame.

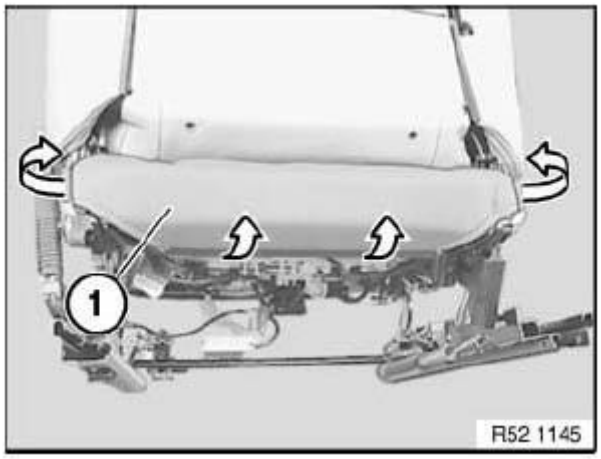


Fig. 56: Removing Seat Cover From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out cover welt (1) completely from seat frame (2).

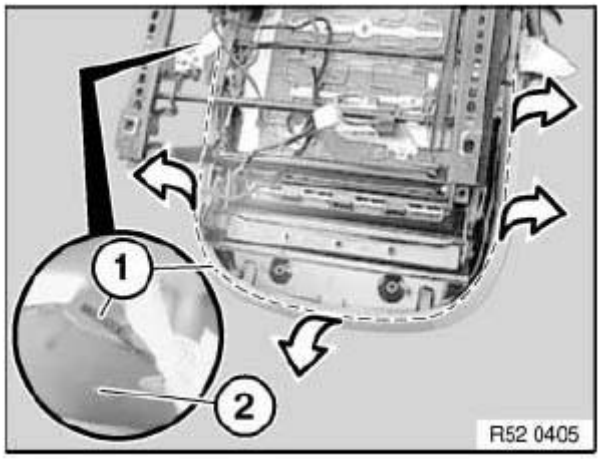


Fig. 57: Pulling Cover Welt From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seat cover (1) with padding towards front/top.

IMPORTANT: Carefully slide bracing cloth with foam through backrest gap and seat structure.

Installation:

Slide foam completely through backrest gap and seat structure. Make sure foam and bracing cloth are correctly fitted.

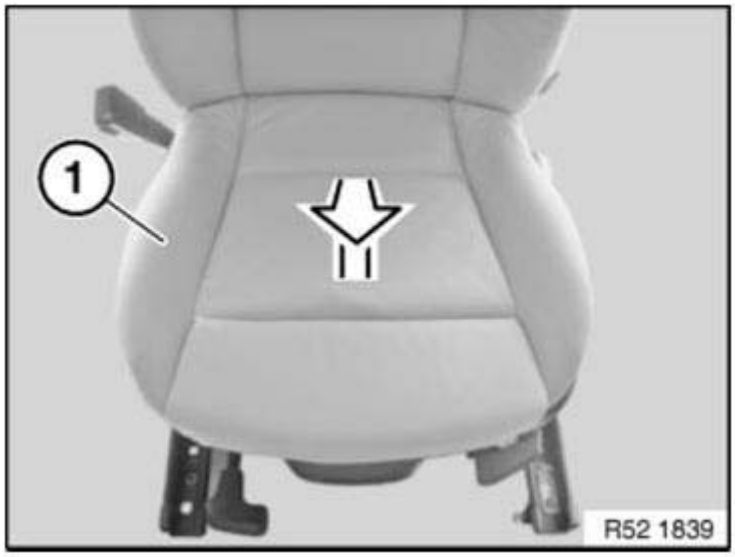


Fig. 58: Removing Seat Cover With Padding
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat heater and/or with seat occupancy detector (CIS mat):

Pull seat cover (1) with padding forward a little and feed wiring harnesses (2) out.

Remove seat cover (1) with padding towards front/top.

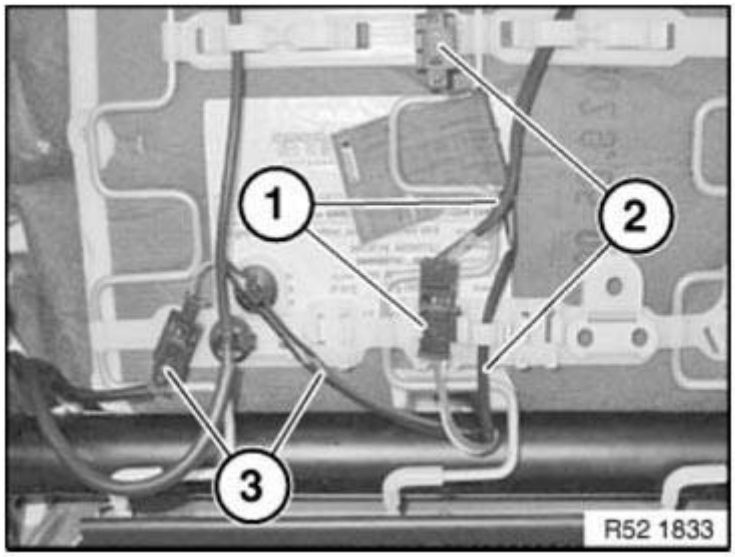


Fig. 59: Identifying Seat Cover And Wiring Harnesses
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully detach all retainers in side area from OKE strips (1).

Carefully turn seat cover over and release retainers from OKE strips (2).

Remove seat cover from padding.

IMPORTANT: Remove all remnants of clips from seat cover and padding (CIS mat).

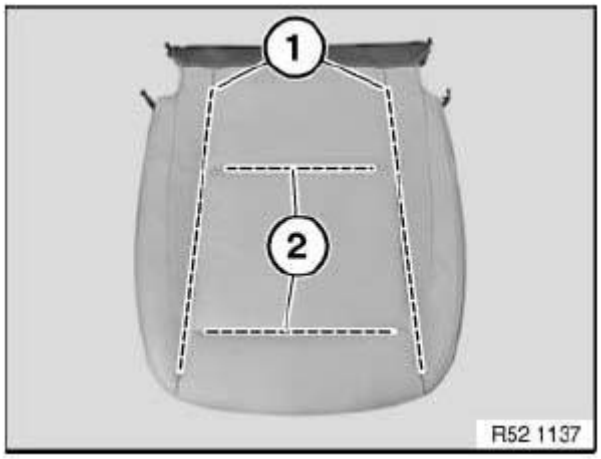


Fig. 60: Identifying Retainers Of OKE Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend new retainers (2) with special tool **52 0 050** .

1. Padding
2. Retainer
3. Trim wire in padding
4. OKE strip in cover
5. Seat cover

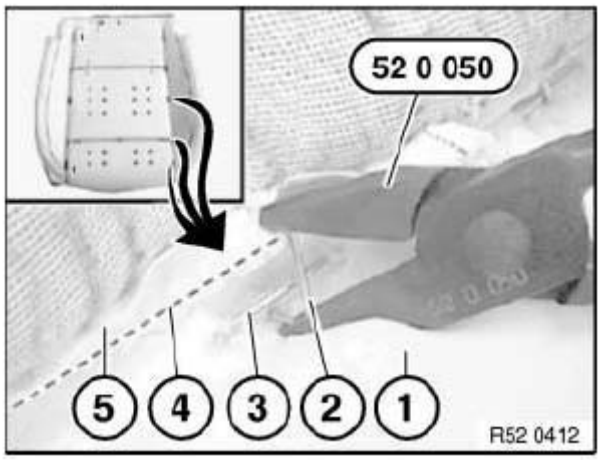


Fig. 61: Bending Retainers Using Special Tool (52 0 050)
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 604 REPLACING SENSOR MAT (CIS MAT) FOR FRONT PASSENGER SEAT OCCUPANCY DETECTION DETECTOR

WARNING: Note AIRBAG SAFETY REGULATIONS !
Incorrect handling can lead to airbag deployment and cause injury.

WARNING: Only US and Canadian version of front passenger seat (with CIS mat):
The CIS mat can only be removed in conjunction with the padding from the seat cover.
If CIS mat or padding is defective, both parts may only be replaced together.
After fitting the seat cover, the CIS mat must be enabled with the BMW programming system.

Procedure for replacing the CIS mat together with the upholstery is described under:

- Remove padding for front seat See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

The work scope with CIS mat is different in the following work steps:

Release the bolting point (1) of the ground cable on the seat pan.

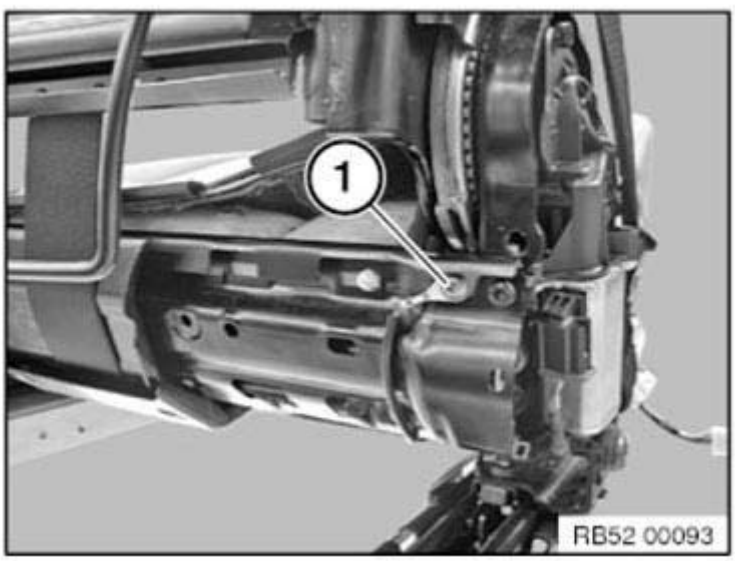


Fig. 62: Identifying Bolting Point Of Ground Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable strap (1).

Lift the locking tab and pull the connector out of the side of the connector housing.

Installation note:

Replace cable tie (1).

Connector is encoded against incorrect assembly.

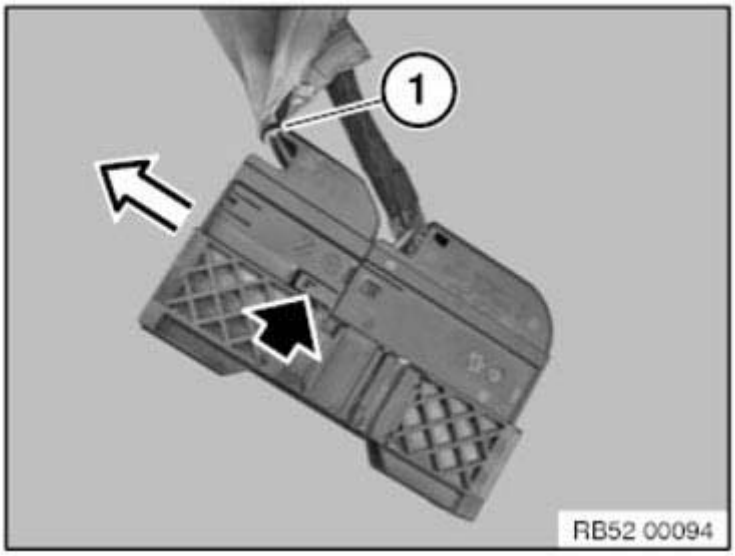


Fig. 63: Pulling Connector Out Of Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Enabling seat occupancy detection (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

5214 FRONT SEAT, NORMAL, ELECTRIC

52 14 ... ADDITIONAL WORK IN EVENT OF FAULTY DRIVE/GEARING FOR LONGITUDINAL ADJUSTMENT

Release screws (1) of rockers for seat height adjustment.

Installation:

Carefully bend side section back and feed rocker out of top rail.

Tilt front seat back.

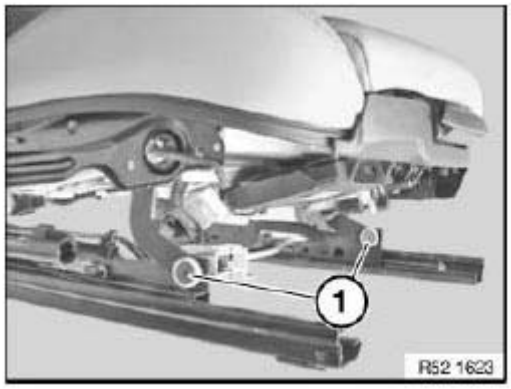


Fig. 64: Identifying Rocker Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

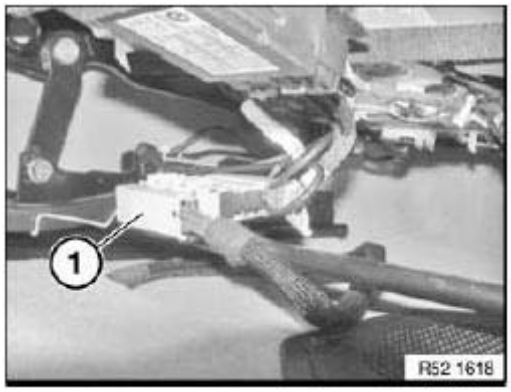


Fig. 65: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip central connector (2) from seat mechanism.

Unclip control units (1) See **6135080 Removing and installing/replacing control unit/module for left or right seat adjustment** or **6135095 Removing and installing/replacing control unit/module for seat heating** .

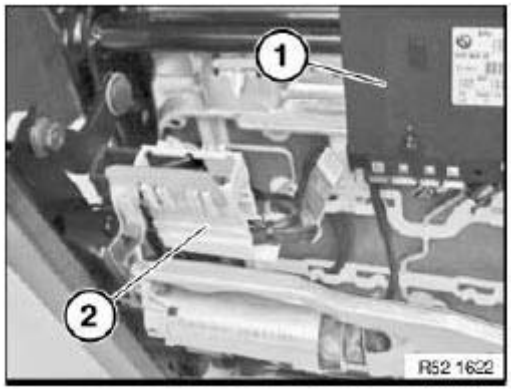


Fig. 66: Identifying Control Unit And Central Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

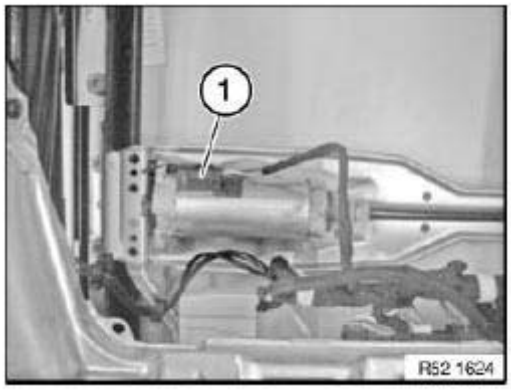


Fig. 67: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Bend metal tab (1) open.

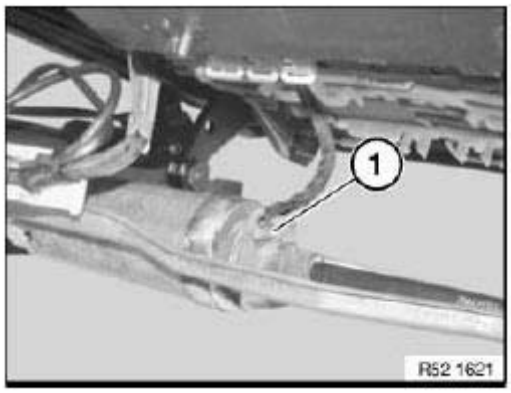


Fig. 68: Identifying Metal Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Lift drive (1) and flex shaft (2) out of guide (4) in direction of arrow.

Detach drive (1) from rubber mounts (3).

Detach flex shaft (3) from drive (1).

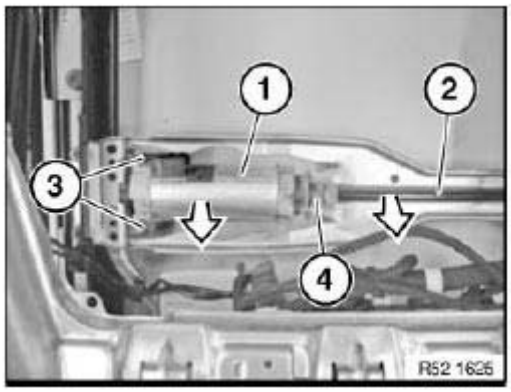


Fig. 69: Lifting Drive And Flex Shaft Out Of Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) at front.

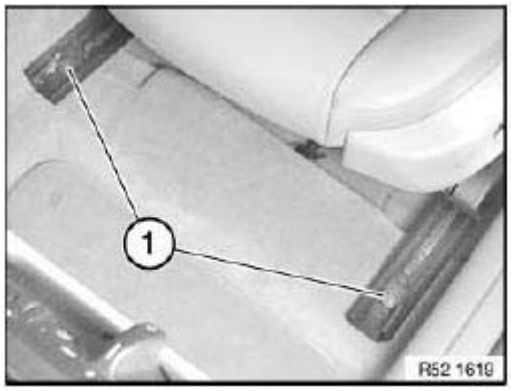


Fig. 70: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install new drive for longitudinal seat adjustment.

Move front seat forwards.

Release screws (1) at rear.

IMPORTANT: Cover door sill with protective covers (risk of damage).

Lift out front seat and assemble.

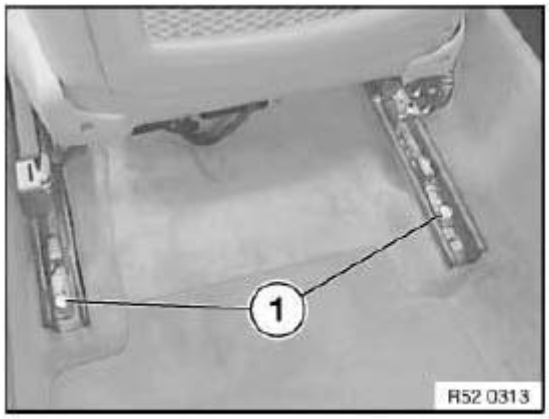


Fig. 71: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Make sure flex shaft is correctly fitted on drive
- Carpet must not get between seat rails and floor pan in area of fastening points (grating noises)
- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads
- Insert all screws loose to avoid twisting
- Tighten down all screws to specified torque

  Tightening torque **52 10 1AZ** .

52 14 ... PERFORMING FUNCTION CHECK WITH ADAPTER CABLE (FOR SEAT REPAIRS)

NOTE: The function check on a repaired driver's or front passenger seat can be performed outside the vehicle by using adapter cable 61 4 360.

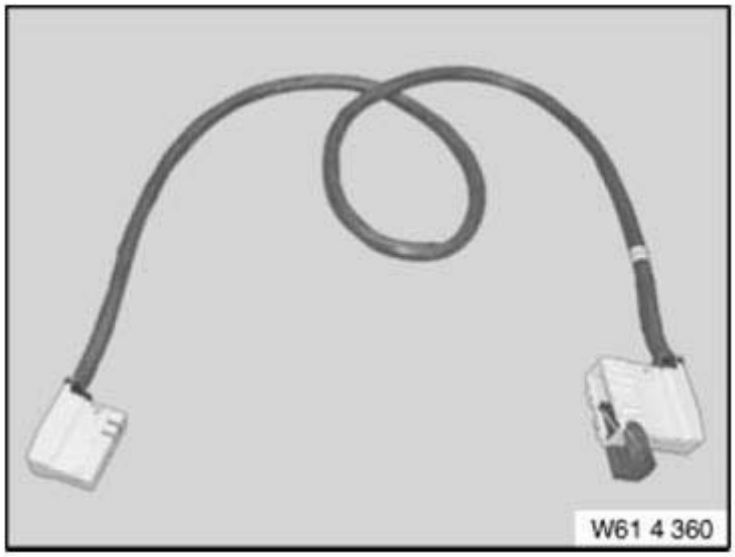


Fig. 72: Identifying Adapter Cable (61 4 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Use:

Adapter cable 61 4 360 is connected to vehicle wiring harness (1) and removed seat (2).

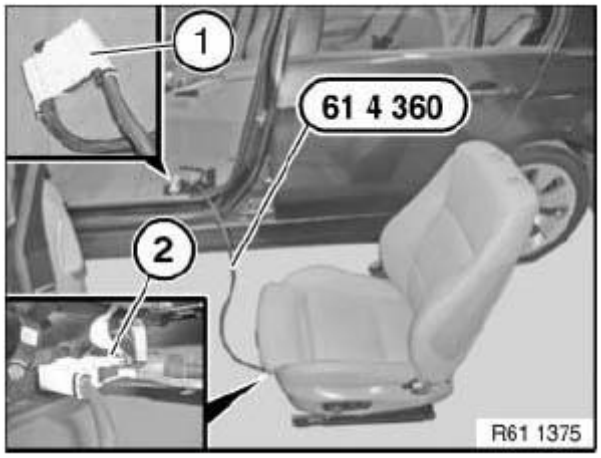


Fig. 73: Connecting Adapter Cable (61 4 360) To Vehicle Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

52 14 ... PERFORMING FUNCTION CHECK WITH ADAPTER CABLE (FOR SEAT REPAIRS)

NOTE: The function check on a repaired driver's or front passenger seat can be performed outside the vehicle by using adapter cable 61 4 360.

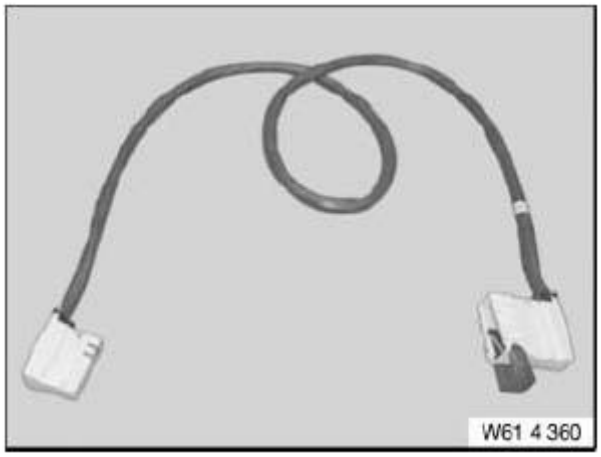


Fig. 74: Identifying Adapter Cable (61 4 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Use:

Adapter cable 61 4 360 is connected to vehicle wiring harness (1) and removed seat (2).

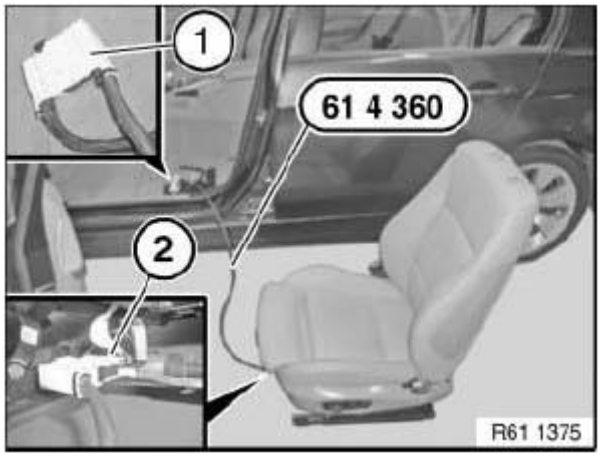


Fig. 75: Connecting Adapter Cable (61 4 360) To Vehicle Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 021 REMOVING AND INSTALLING/REPLACING FLEXMAT ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Remove padding for front seat See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

Remove plug housing (1) from flexmat.

Cut all cable ties and disengage wiring harnesses from flexmat.

Installation:

Make sure wiring harnesses are laid correctly.

Observe bending radius and do not lay wiring harnesses tensioned.

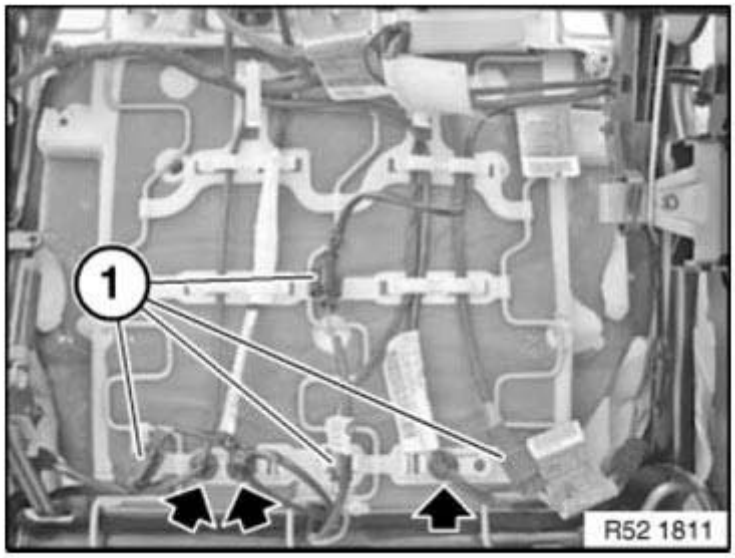


Fig. 76: Identifying Flexmat Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage flexmat (1) at front.

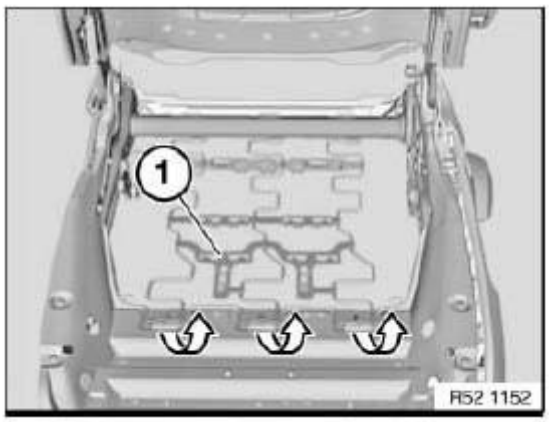


Fig. 77: Removing Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

Swing flexmat (1) down and disengage from seat frame.

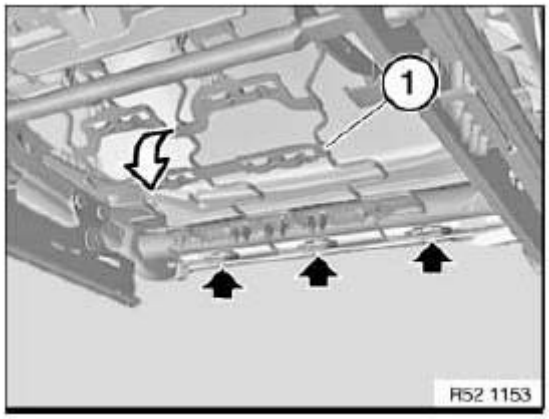


Fig. 78: Moving Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 ... REMOVING AND INSTALLING ISOFIX HOLDER

Necessary preliminary tasks

- Remove seat fabric See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

Release screws (1).

Tightening torque **52 10 07AZ** .

Remove Isofix holder.

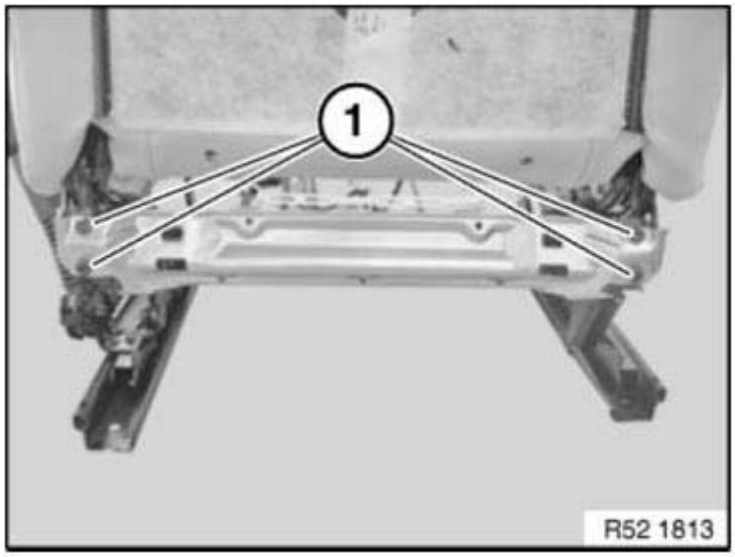


Fig. 79: Identifying Isofix Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

52 14 ... REMOVING AND INSTALLING CARRIER FOR OUTER COVER ON LEFT OR RIGHT FRONT SEAT (ELECTRIC)

Necessary preliminary tasks

- Remove **OUTER COVER**

Cut open cable tie (1).

Unlock and disconnect plug connections (2) on servodrive.

Release screw (3).

Tightening torque **52 10 06AZ** .

Unclip carrier in marked area and remove.

Installation:

Replace cable ties.

Make sure carrier is correctly seated on seat mechanism.

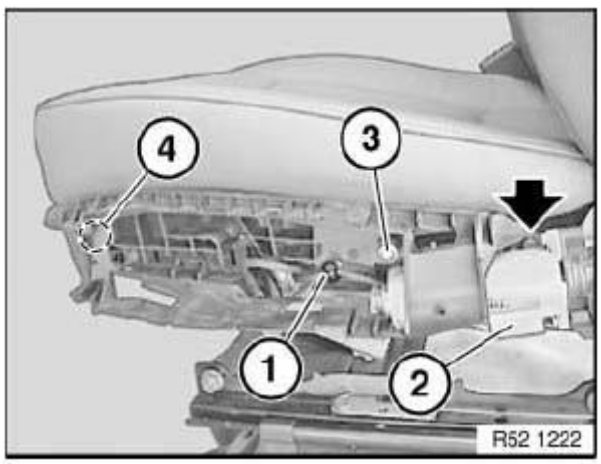


Fig. 80: Identifying Cable Tie, Plug Connections With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 000 REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (NORMAL/MANUAL)

Necessary preliminary tasks

- Open convertible top
- Disconnect **BATTERY NEGATIVE LEAD**

IMPORTANT: An airbag module and a pyrotechnical seat belt tensioner are installed in the front seat.
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

Installation:

- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads
- Screws are fitted with a Torx Plus system and can be released with a standard Torx screwdriver

Move seat to upper back position.

Release and dispose of screws (1).

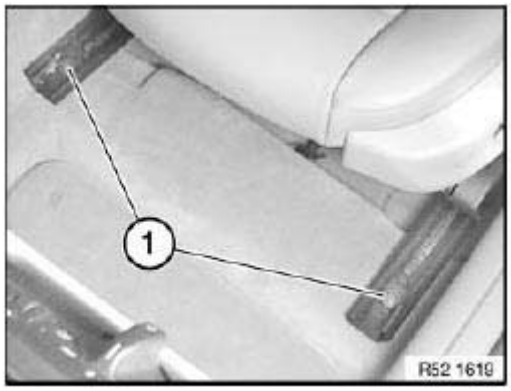


Fig. 81: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Move seat forwards and position flush with seat runners.

Unclip release tab (2) for belt anchor fitting trim (1) with plastic wedge.

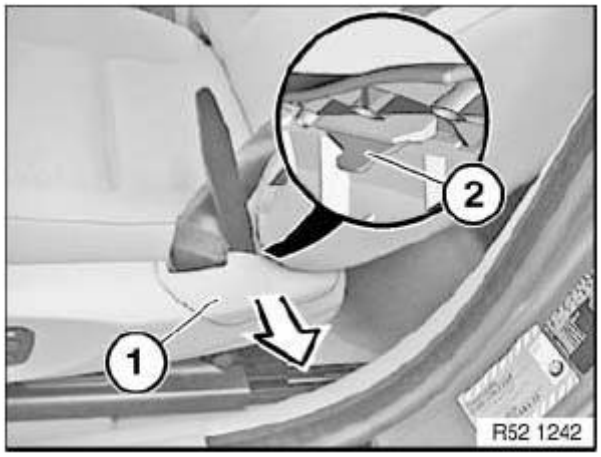


Fig. 82: Removing Release Tab For Belt Anchor Fitting Trim Using Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 2AZ** .

Remove anchor fitting (2).

Installation:

Make sure anchor fitting (2) is correctly seated on seat mechanism pin.

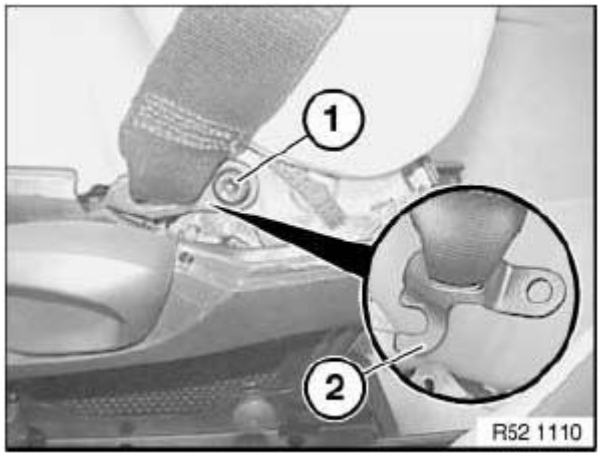


Fig. 83: Identifying Anchor Fitting With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release and dispose of screws (1).

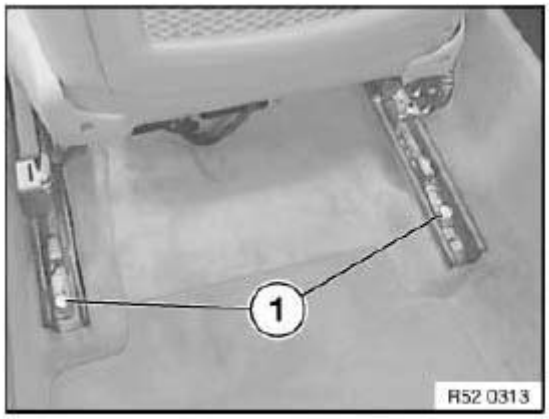


Fig. 84: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

IMPORTANT: Cover door sill with protective covers (risk of damage).

Lift out front seat.

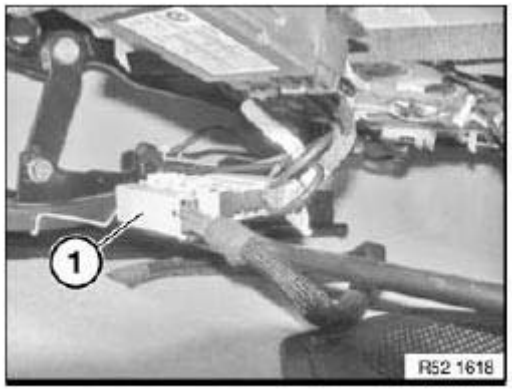


Fig. 85: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Carpet must not get between seat rails and floor pan in area of fastening points (grating noises)
- Replace microencapsulated screws
- Insert all screws loose to avoid twisting
- Tighten down all screws to specified torque

Tightening torque **52 10 1AZ** .

WARNING: When carrying out further work on the front seat, it is absolutely

imperative to observe the SAFETY REGULATIONS on handling airbag modules and pyrotechnical seat belt tensioners
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

52 13 390 REMOVING AND INSTALLING OR REPLACING FRONT LEFT OR RIGHT HEAD RESTRAINT

WARNING: Danger of pinching!

Reach on left and right under head restraint and unclip in jerks in upward direction.

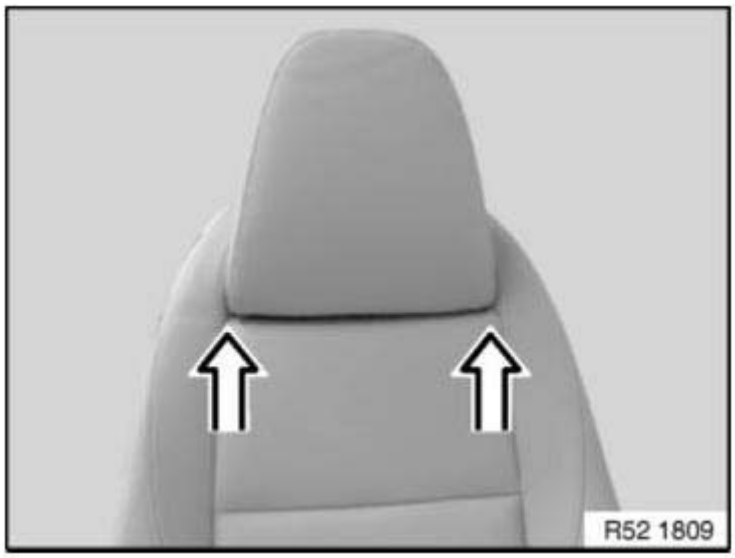


Fig. 86: Removing Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 198 REMOVING AND INSTALLING OR REPLACING REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST

Release clips (1) with diagonal cutting pliers.

Remove rear panel (2) downwards with a turning action.

NOTE: Remove remnants of clips.

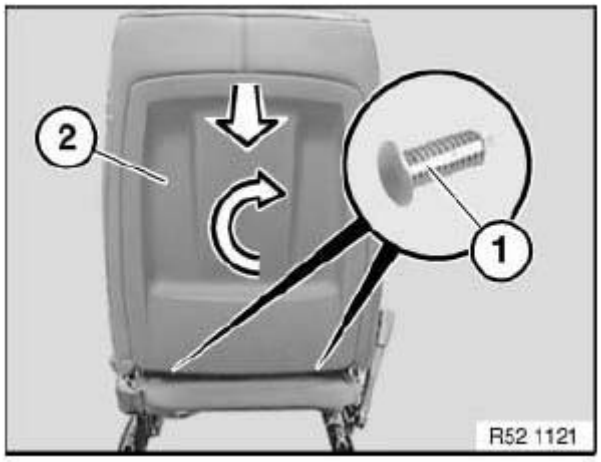


Fig. 87: Removing Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) and bore holes (2) on rear panel (3) must not be damaged.

Replace faulty clips.

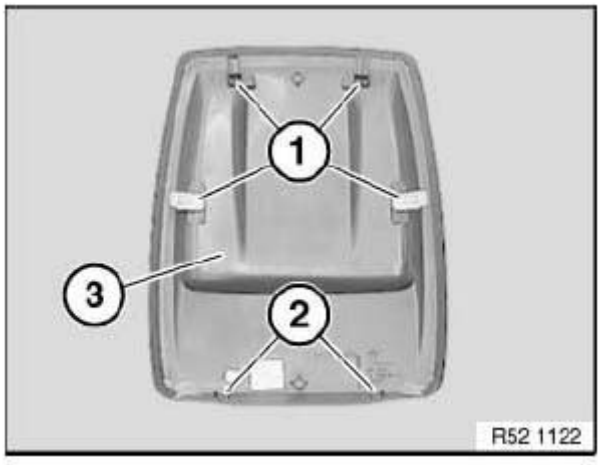


Fig. 88: Identifying Hooks And Bore Holes On Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 030 REMOVING AND INSTALLING/REPLACING BACKREST FRAME ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Remove **FRONT SEAT**
- Remove **REAR PANEL** on front seat backrest

Release airbag wiring harness (2) from cable holders on flexmat.

Disconnect cable tie from clips.

Raise release clip (3) and pull plug (4) out of plug housing (1).

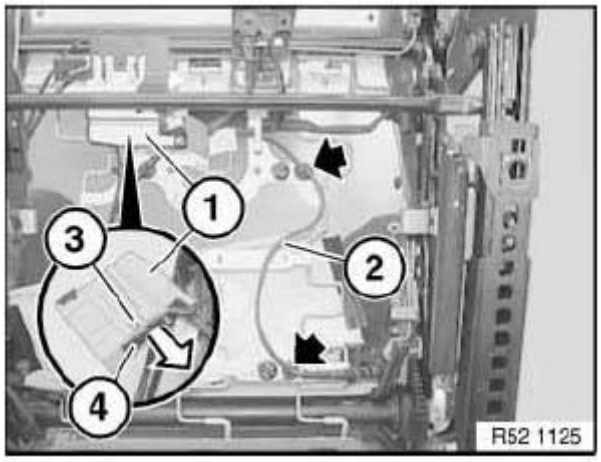


Fig. 89: Pulling Plug Out Of Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Always feed in cable tie (1) at narrow end of plug housing in direction of arrow.

Cables must be secured with insulation under cable tie.

Firmly tighten cable tie (1) to relieve strain. It must not be possible to move the cable.

Make sure plug (2) is correctly locked in plug housing (3).

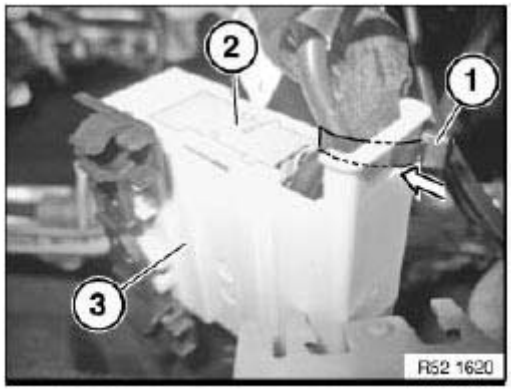


Fig. 90: Installing Cable Tie At Narrow End Of Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unclip cable.

Release wiring harness (3) from cable holders on seat mechanism.

Unfasten plug connection (2) and disconnect.

IMPORTANT: Feed all wiring harnesses carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

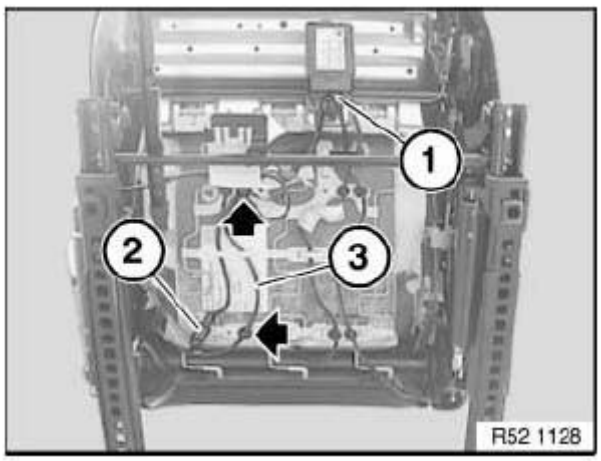


Fig. 91: Identifying Plug Connections And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook backrest cover (1) on left and right.

Release screws (2) on left and right.

Tightening torque **52 10 02AZ** .

Remove backrest frame (3) completely towards top.

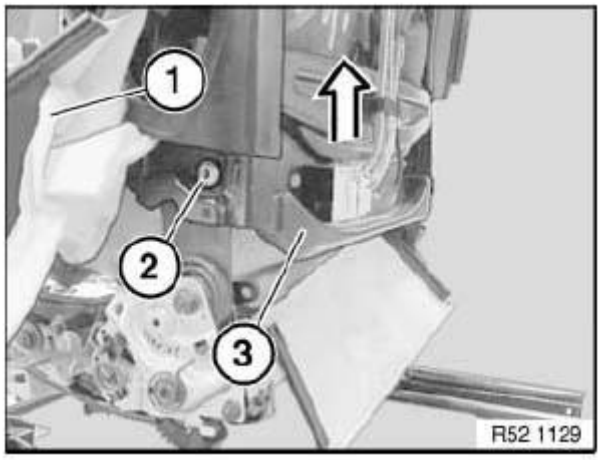


Fig. 92: Removing Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove backrest cover with padding.
- Remove **SIDE AIRBAG** .
- Remove lumbar support See **5215059 Removing and installing/replacing lumbar support pump with valve housing for lumbar support/backrest width adjustment**; **5213059 Removing and installing/replacing lumbar support pump with valve housing for lumbar support**; **5213055 Removing and installing/replacing lumbar support on front seat** or **5215061 Replacing both air cushions for backrest width adjustment on left or right front seat**.

52 13 025 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SEAT MECHANISM (NORMAL/MANUAL)

This job is described under:

- Remove **BACKREST FRAME** on front seat

Replacement only:

- Remove seat cover See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)** for front seat
- Remove **SEAT BELT TENSIONER**
- Remove control unit for seat heating See **6135080 Removing and installing/replacing control unit/module for left or right seat adjustment** or **6135095 Removing and installing/replacing control unit/module for seat heating**

Seat mechanism is supplied complete with corresponding drive units.

Unlock plug housing (3) and remove from holder.

Disengage wiring harnesses from flexmat.

Installation:

Make sure wiring harnesses are laid correctly.

Observe bending radius and do not lay wiring harnesses tensioned.

Release screws (1).

Tightening torque **52 10 05AZ** .

Remove holder (2) for control unit.

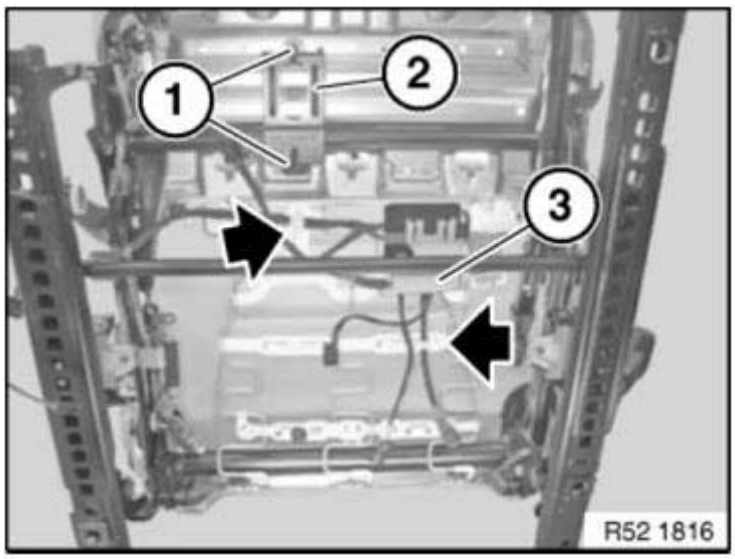


Fig. 93: Identifying Plug Housing With Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **52 10 03AZ** .

Remove belt buckle deflector trim (2).

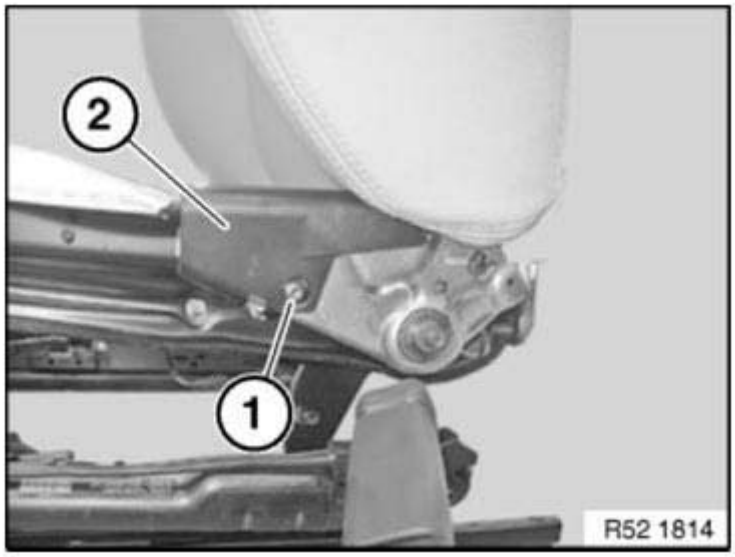


Fig. 94: Identifying Belt Buckle Deflector Trim With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Sport seat only:

Release screws (1).

Remove connection for thigh support.

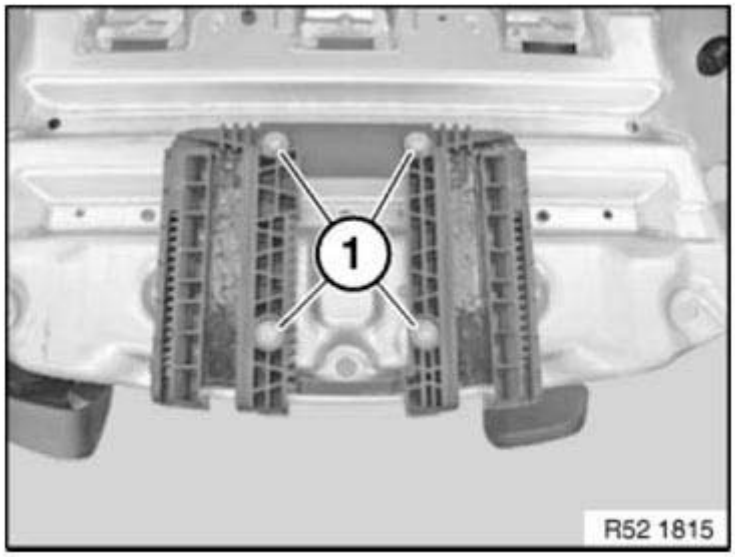


Fig. 95: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 055 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT ON FRONT SEAT

Necessary preliminary tasks

- Remove **REAR PANEL ON FRONT SEAT**

Detach backrest cover (1) from backrest frame.

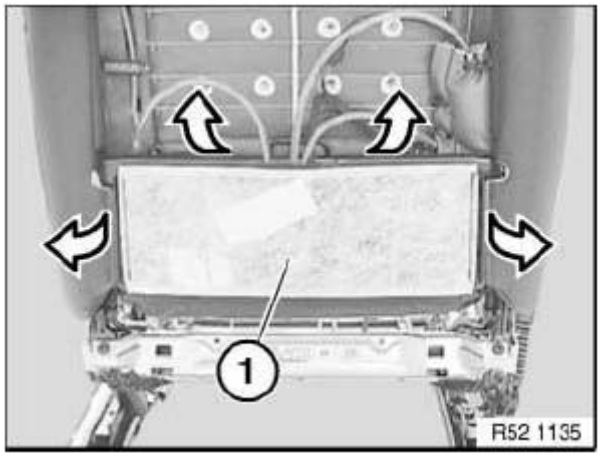


Fig. 96: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not pop valve housing (1) out of backrest frame for this operation.

Carefully pull valve housing (1) forwards out of backrest frame.

Unlock quick connectors and detach air hoses from valve housing (1).

NOTE: Connections are coded against incorrect assembly.

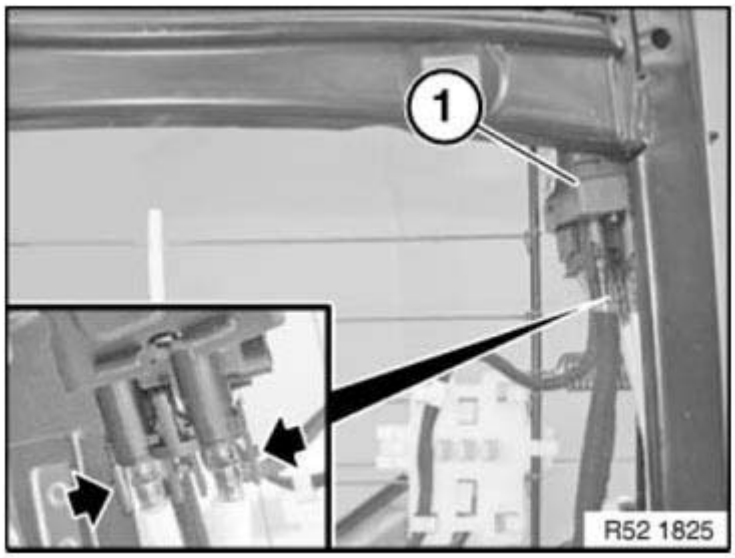


Fig. 97: Identifying Valve Housing

Courtesy of BMW OF NORTH AMERICA, INC.

Detach lumbar cushion (1) from spring wire.

Installation:

Attach lumbar cushion (1) to second and fourth wires from below.

Press backrest support forwards a little.

Pull out lumbar cushion (1) downwards.

Feed air hoses out of backrest frame and spring wire.

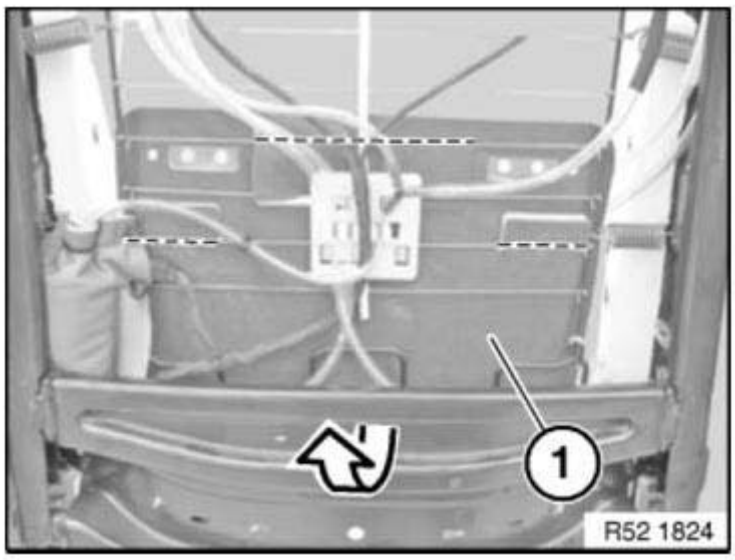


Fig. 98: Pulling Out Lumbar Cushion
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check lumbar cushion at top (1) and bottom (2) for damage.

Air hoses (3) must not be kinked.

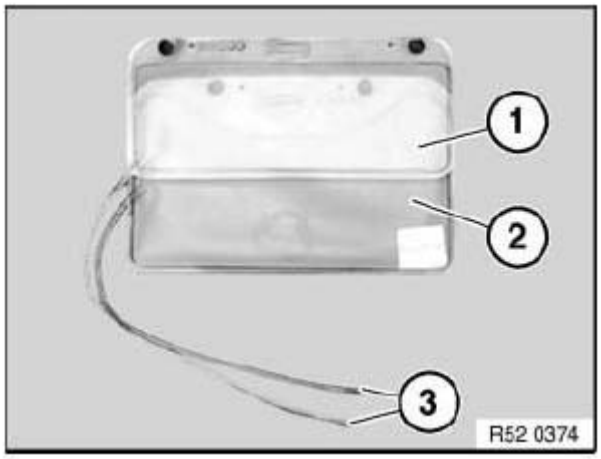


Fig. 99: Identifying Lumbar Cushion At Top And Bottom With Air Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carry out **FUNCTION CHECK** .

52 13 059 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT PUMP WITH VALVE HOUSING FOR LUMBAR SUPPORT

Necessary preliminary tasks

- Remove **REAR PANEL ON FRONT SEAT**

Detach backrest cover (1) from backrest frame.

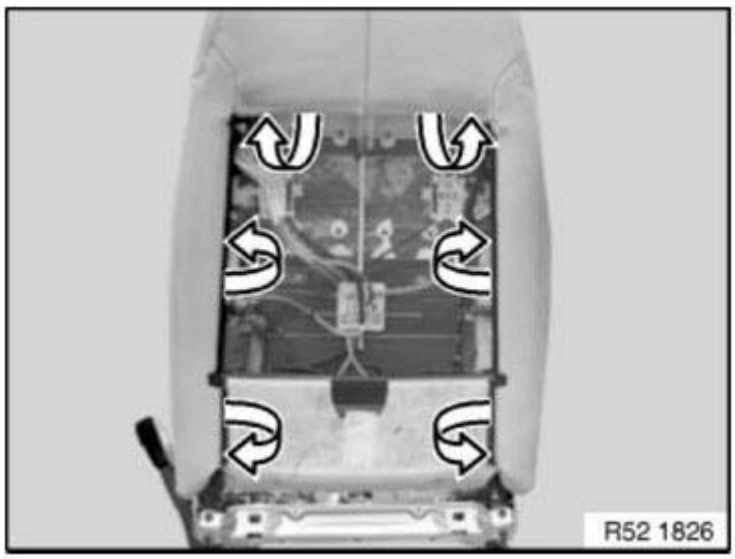


Fig. 100: Removing Backrest Cover From Backrest Frame

Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Installation:

Replace defective cable tie.

Open zip fastener (2).

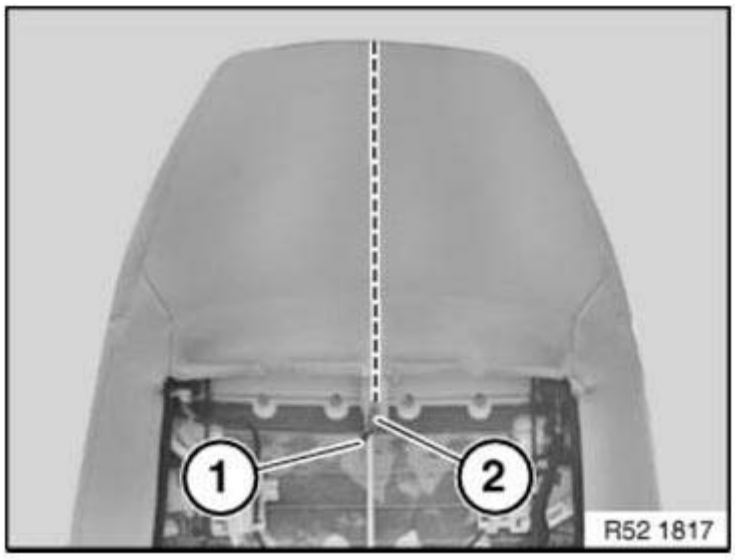


Fig. 101: Identifying Cable Tie And Zip Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach cable tie.

Installation:

Replace defective cable ties.

Remove lumbar support pump (1) from backrest frame.

Unfasten plug connection (2) and disconnect.

Unclip air hose from holder (3).

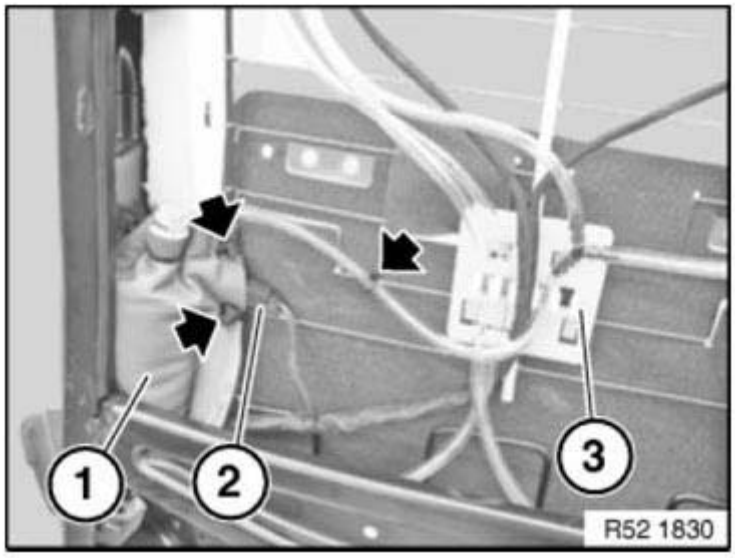


Fig. 102: Identifying Lumbar Support Pump With Plug Connection And Air Hose Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture shows removal without backrest cover for purposes of clarity.

Pop valve housing (2) for lumbar support in direction of arrow out of backrest frame.

Disengage wiring harness from cable tie (3).

Installation:

Feed rubber plug (1) through backrest frame.

Pull rubber plug (1) and pop valve housing into backrest frame.

Check rubber sleeve of valve housing for correct seating in backrest frame.

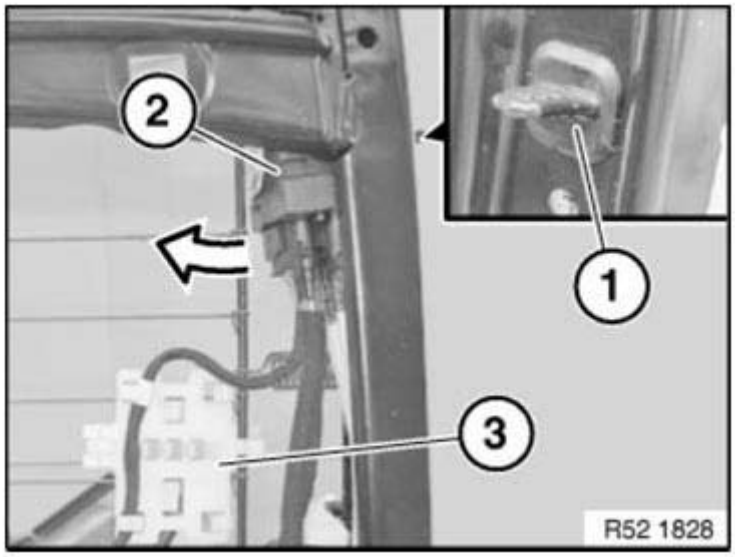


Fig. 103: Removing Valve Housing For Lumbar Support Out Of Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unlock quick connector and detach air hoses (2) and (3 and 4) from valve housing.

Valve unit for lumbar support:

(2) Hose (clear), lumbar drive
(3) Hose (blue), top lumbar cushion
(4) Hose (red), bottom lumbar cushion

NOTE: Connections are coded against incorrect assembly.

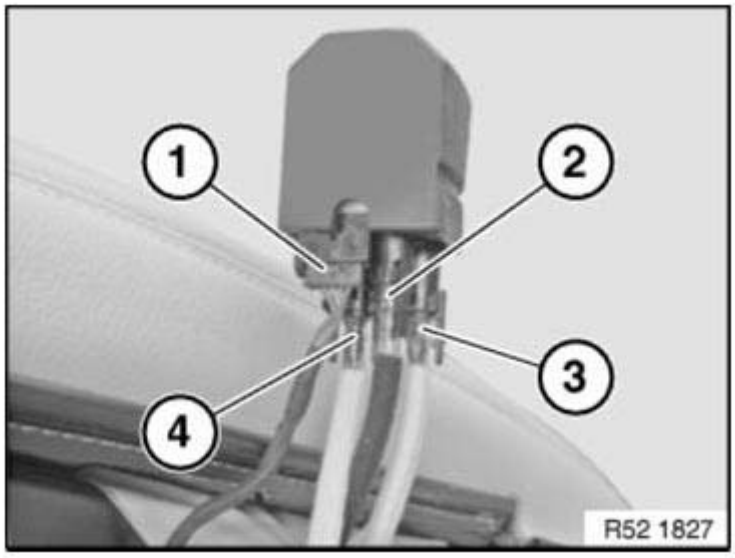


Fig. 104: Identifying Plug Connection With Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out FUNCTION TEST .

52 14 040 REMOVING AND INSTALLING/REPLACING OUTER COVER ON FRONT LEFT OR RIGHT SEAT (NORMAL/ELECTRIC)

Necessary preliminary tasks

- Remove **FRONT SEAT**

NOTE: Picture shows installed seat by way of example.

Move backrest to full rearward position.

Unclip release tab (2) for belt anchor fitting trim (1) with plastic wedge.

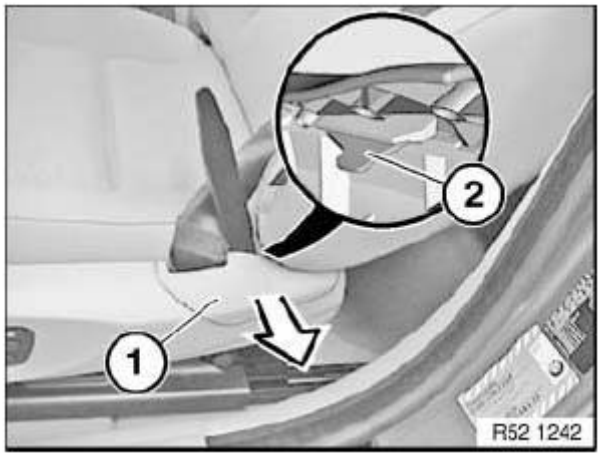


Fig. 105: Removing Release Tab For Belt Anchor Fitting Trim Using Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw or catch (3).

Lever lugs (1) out of holders (2).

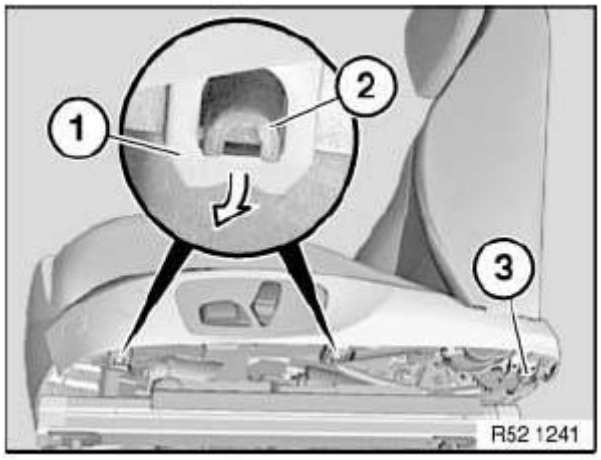


Fig. 106: Removing Lugs Out Of Holders
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Cover (1) could detach itself in from area with carrier section (2) from seat mechanism.

Carefully pull cover (1) with carrier section (2) in front area off seat mechanism.

Press unlocking lug (3) with screwdriver and detach cover from carrier section.

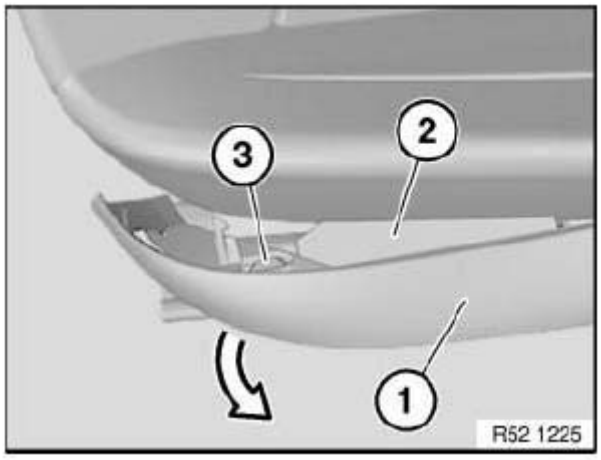


Fig. 107: Pulling Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Raise lug (1) and unlock.

Reach between seat padding and cover (2) and pull cover off carrier section.

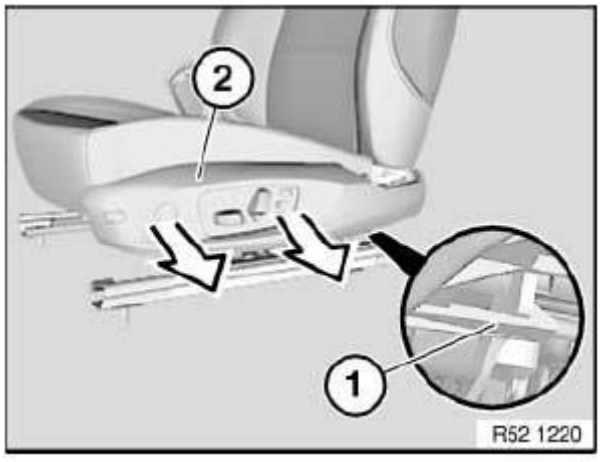


Fig. 108: Pulling Cover Off Carrier Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug connections:

1. Switch combination
2. Lumbar support
3. Backrest width adjustment

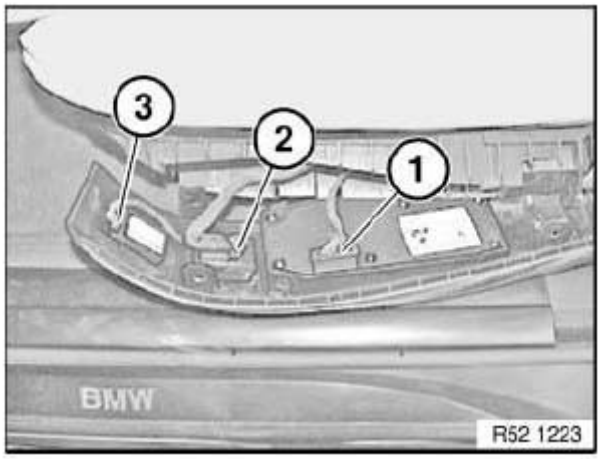


Fig. 109: Identifying Switch Combination, Lumbar Support And Backrest Width Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining clips and lugs of cover must not be damaged.

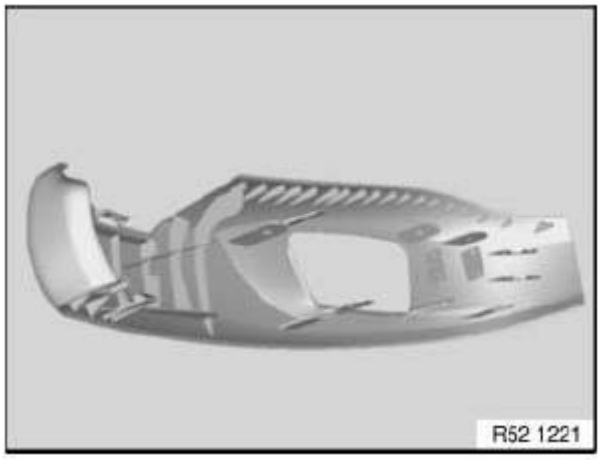


Fig. 110: Identifying Retaining Clips And Lugs Of Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

Unlock catches of switch housing and remove switch from cover.

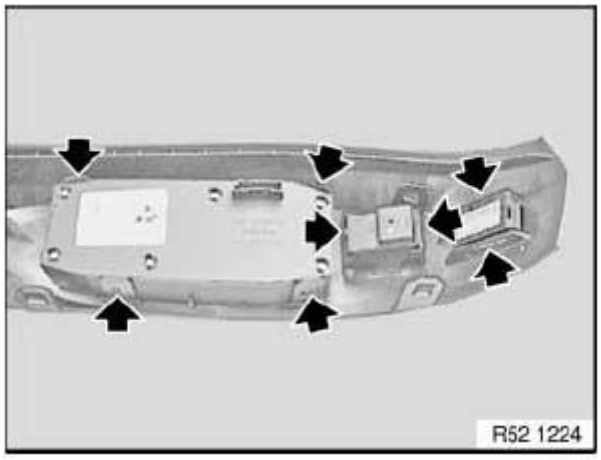


Fig. 111: Locating Catches Of Switch Housing
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 405 REPLACING BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **REAR PANEL**
- Remove **HEAD RESTRAINT**

Version with seat heating only

Unfasten plug connection (1) and disconnect.

Detach cable tie.

Release wiring harness (2) from cable holders on seat mechanism.

IMPORTANT: Feed the wiring harness carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

Installation:

Lay wiring harness without kinks and tension.

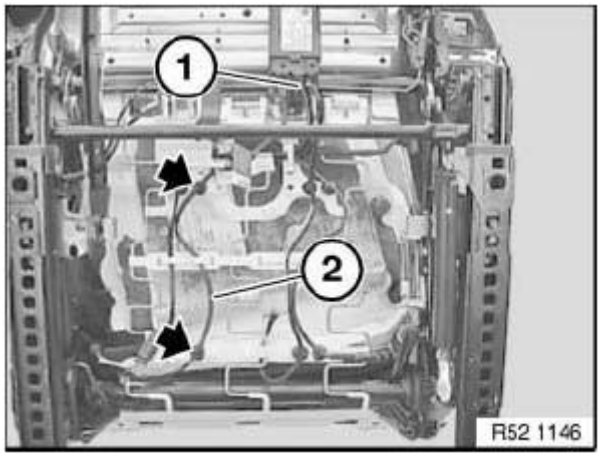


Fig. 112: Identifying Plug Connection And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable tie (1) from seat mechanism.

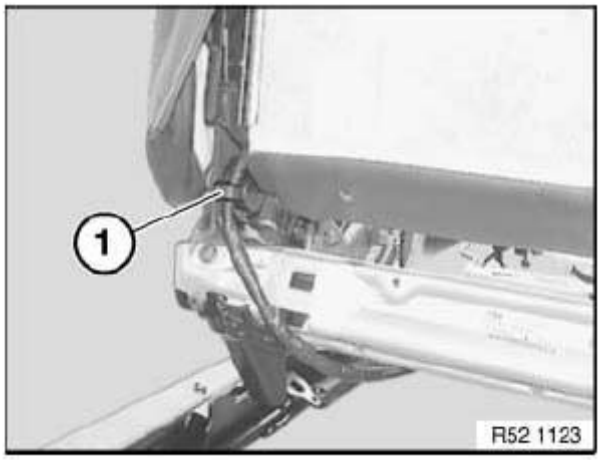


Fig. 113: Identifying Cable Tie Of Seat Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Installation:

Replace defective cable tie.

Open zip fastener (2).

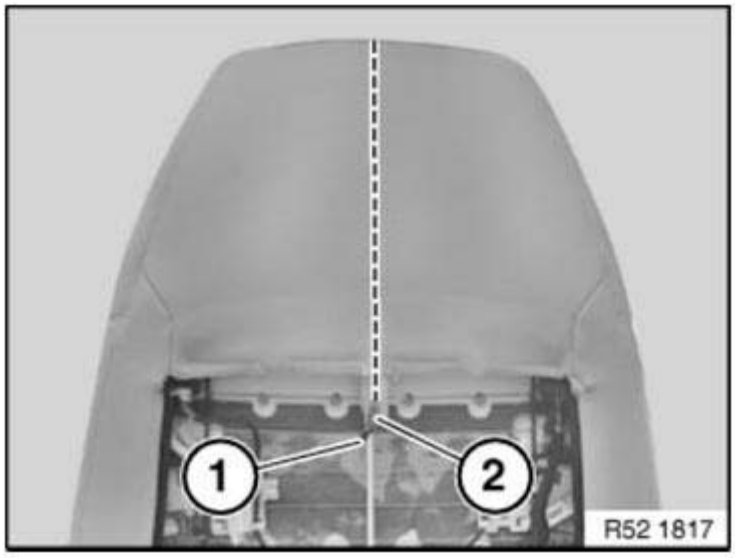


Fig. 114: Identifying Cable Tie And Zip Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach backrest cover (1) from backrest frame.

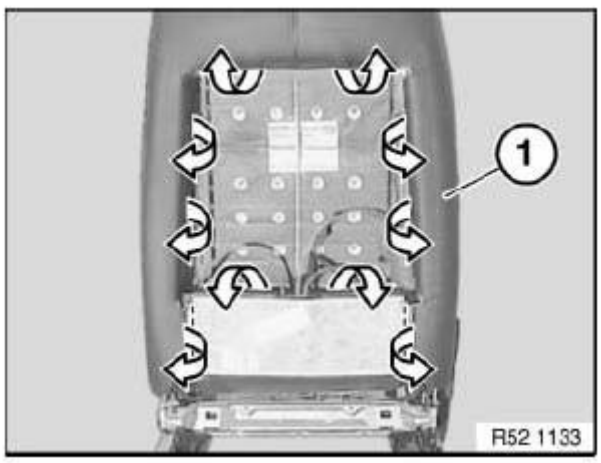


Fig. 115: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Installation:

Replace nuts.

Tightening torque **72 12 03AZ** .

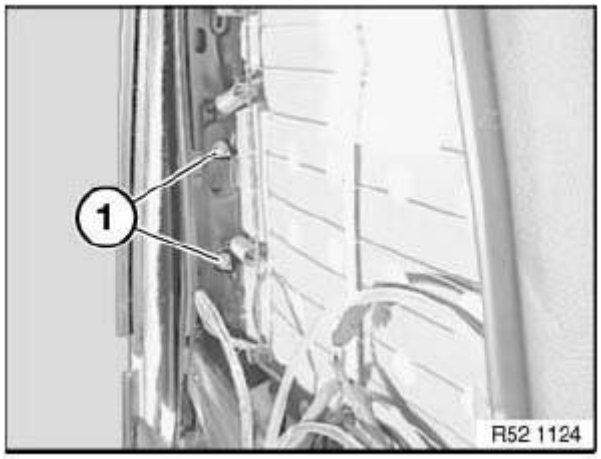


Fig. 116: Identifying Seat Mechanism Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Detach mounting strip (4) from flexmat.

Carefully pull airbag module (3) with threaded pins out of backrest frame and feed out between padding (1) and inner bag (2).

Set down airbag module (3) to one side.

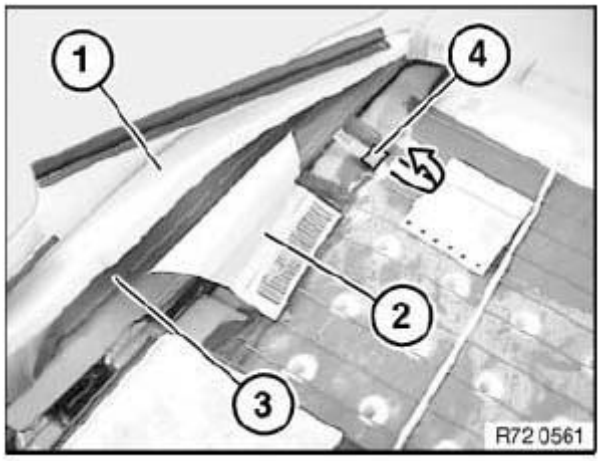


Fig. 117: Removing Mounting Strip From Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull inner bag (1) fully over airbag module and threaded pins.

Feed in mounting strip (2) of inner bag (1) through backrest frame.

Insert threaded pins into backrest frame and secure with new nuts.

No inner bag material is permitted to project through the hole in the inner frame.

Install nuts and tighten down.

Tightening torques **72 12 03AZ** .

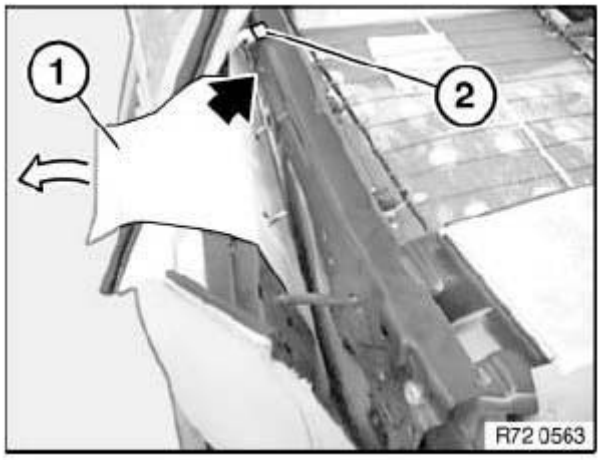


Fig. 118: Pulling Inner Bag Over Airbag Module And Threaded Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Inner bag must be between airbag module and backrest frame!

Engage mounting strip (1) of inner bag in flexmat.

Position inner bag (2) smoothly over backrest frame.

Engage backrest cover (3) in backrest frame.

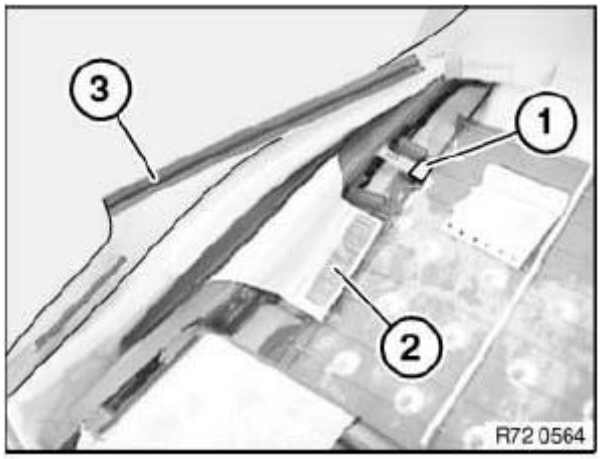


Fig. 119: Identifying Mounting Strip, Inner Bag And Backrest Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Reposition backrest cover (1) at side and bottom and pull off with padding towards top from backrest frame.

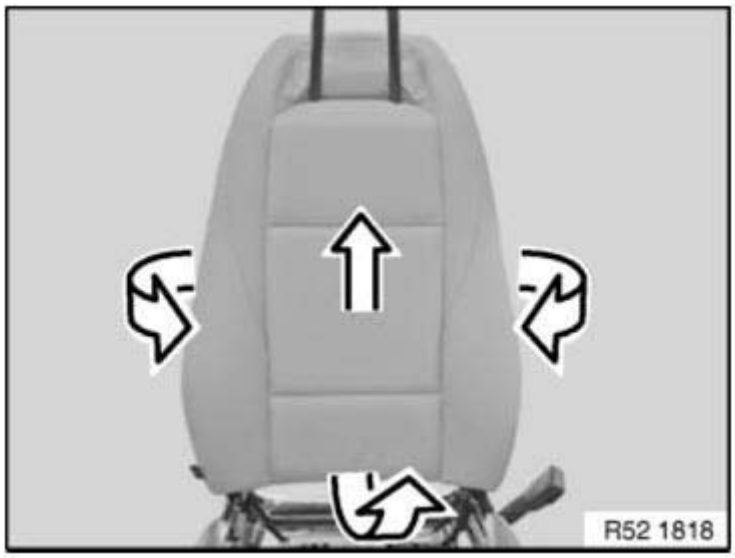


Fig. 120: Positioning Backrest Cover At Side And Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Release all retainers in marked area.

Remove backrest cover from padding.

NOTE: Remove all remnants of retainers from backrest cover and padding.

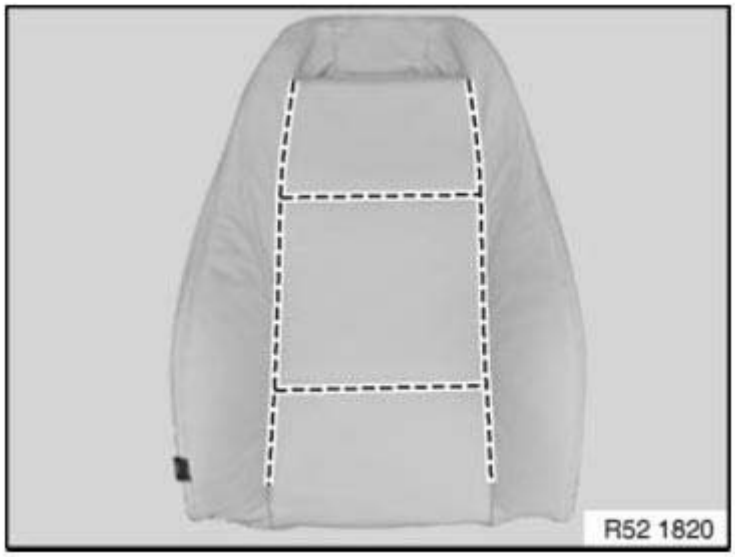


Fig. 121: Identifying Retainer Marked Area

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend new retainer (2) with special tool **52 0 050** .

1. Padding
2. Retainer
3. Trim wire in padding
4. Trim wire in backrest cover
5. Backrest cover

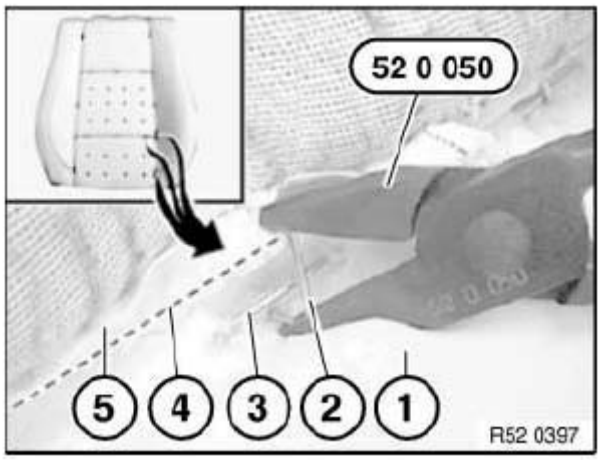


Fig. 122: Bending Retainer Using Special Tool (52 0 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement of backrest cover

Pull trim wires out of backrest cover.

Cut new backrest cover to size and insert trim wires.

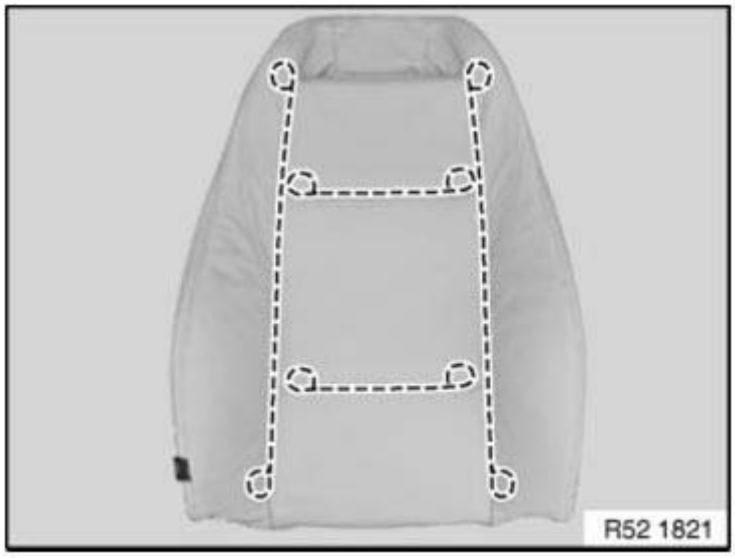


Fig. 123: Identifying Backrest Cover
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 455 REPLACING HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT (BASIC)

Necessary preliminary tasks

- Remove seat and backrest covers See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5213405 Replacing backrest cover for left or right front seat**

NOTE: Heating element is bonded to the foam section and cannot be separated from each other without incurring damaging.
Foam section and heating mat must be replaced.

Check new foam section:

- No obvious damage or material defects
- All trim wires present in foam
- No bubbles in foam section
- No dirt/contamination on foam or residual foam
- Pay attention to foam section on left and right

Check new heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note variant by examining label on cable

Guide cable for backrest heating through foam hole.

Stick on main section (1):

- Pull adhesive film pieces off main section (1) and stick to upper edge of main section foam until flush

Stick on bead section (2):

- Pull adhesive film pieces off bead section (2) and stick on heating mat along bead section edges.
- Press down evenly in outwards direction

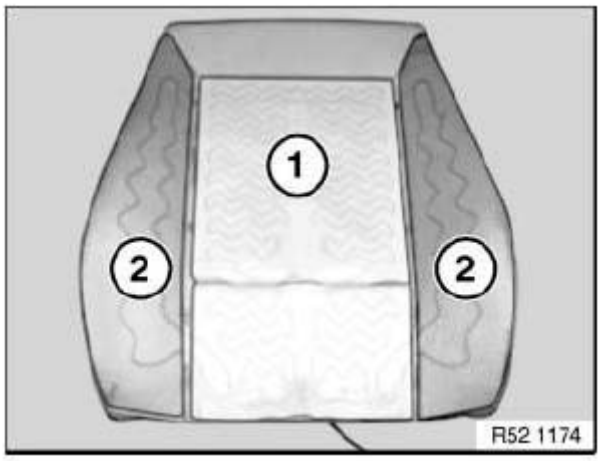


Fig. 124: Identifying Sticks On Main And Bead Section (Backrest Heating)
Courtesy of BMW OF NORTH AMERICA, INC.

Guide cable for seat heating through foam hole.

Stick on main section (1):

- Pull adhesive film pieces off main section (1) and stick to upper edge of main section foam until flush

Stick on bead section (2):

- Pull adhesive film pieces off bead section (2) and stick on heating mat along bead section edges.
- Press down evenly in outwards direction

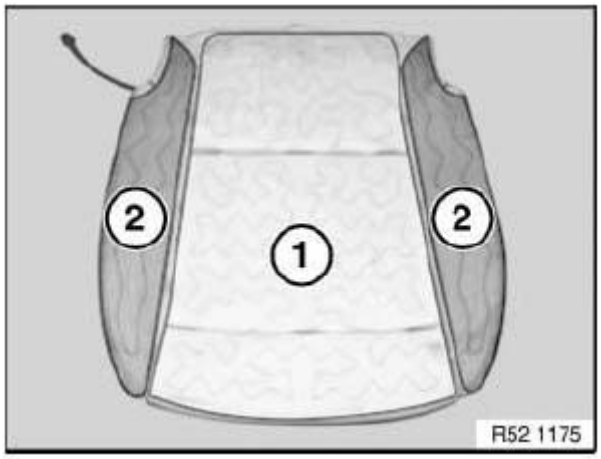


Fig. 125: Identifying Sticks On Main And Bead Section (Seat Heating)
Courtesy of BMW OF NORTH AMERICA, INC.

Check laying of heating mats:

- Heating mats laid without folds
- Heating mats correctly positioned
- All bonding surfaces stuck on

NOTE: Carry out FUNCTION CHECK .

52 13 415 REPLACING LEFT OR RIGHT SUPPORT FOR FRONT SEAT (NORMAL/MANUAL)

Operation is described in:

- Replacing **SEAT COVER ON LEFT OR RIGHT FRONT SEAT** .

WARNING: US/CDN front passenger seat (with CIS mat) only:
If CIS mat or padding is defective, both parts must be replaced together.
Seat heating is integrated in the CIS mat and is stuck to the padding over the full surface.

Fig. 126: Identifying US/CDN Front Passenger Seat
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The CIS mat must be enabled after each installation operation.

Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Code airbag control unit
- Clear fault memory if necessary

52 13 420 REPLACING LEFT OR RIGHT SUPPORT FOR FRONT SEAT BACKREST (NORMAL/MANUAL)

Operation is described in:

Replacing **BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT** .

52 13 400 REPLACING SEAT COVER ON LEFT OR RIGHT FRONT SEAT (NORMAL/MANUAL)

Necessary preliminary tasks

- Remove **FRONT SEAT**
- Remove **OUTER COVER** on front seat

WARNING: US/CDN front passenger seat (with CIS mat) only:
If CIS mat or padding is defective, both parts must be replaced together.

WARNING: US/CDN front passenger seat (with CIS mat) only:

To avoid damaging the CIS mat, it is essential to carry out the following operations with extra care.

IMPORTANT: Risk of damage on sharp-edged seat mechanism.
Guide all cables carefully through seat and backrest mechanism.
Make sure cable is routed without kinks and tension.
Make sure plug connections are correctly locked.
Make sure plugs are correctly seated in catches.

Version with seat occupancy detector (CIS mat) only:

1. Data line CIS
2. Earth cable, seat pan
3. Earth cable, backrest frame

Unlock all plug connections and disconnect.

NOTE: From build date 09/2009 onward, earth cable (3) not included on backrest frame.

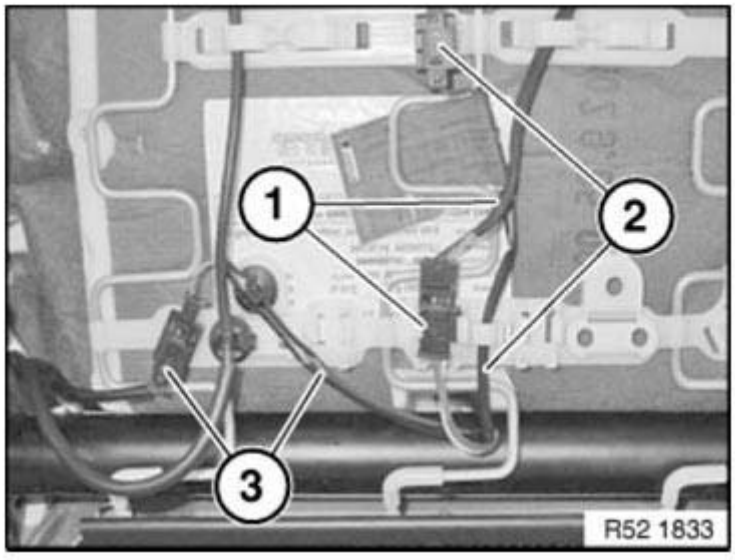


Fig. 127: Identifying Data Line CIS And Earth Cables
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat heating only:

Unlock plug connection (1) for seat heating and disconnect.

Unfasten cable strap.

Disengage wiring harness from cable clips (flexmat).

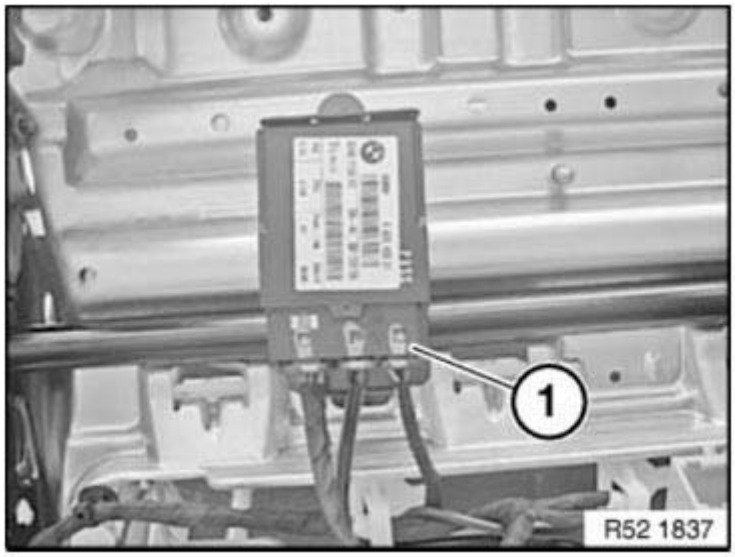


Fig. 128: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat occupancy detector without seat heating (CIS mat) only:

Seat heating is integrated in the CIS mat and is stuck to the padding over the full surface.

Lay cable for seat heating as shown to flexmat and secure with cable strap.

Secure plug with cable strap to cable.

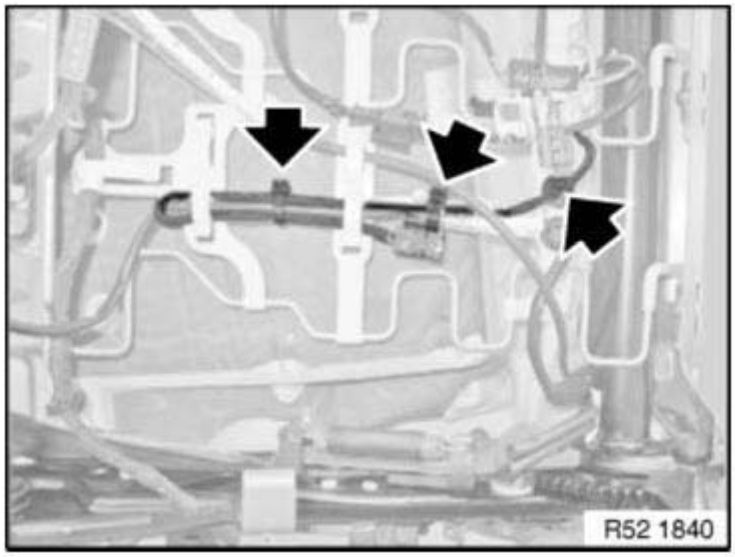


Fig. 129: Locating Plug With Cable Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Vehicle exterior:

Lever clip (1) out of seat cover.

Installation:

If necessary, replace faulty clip.

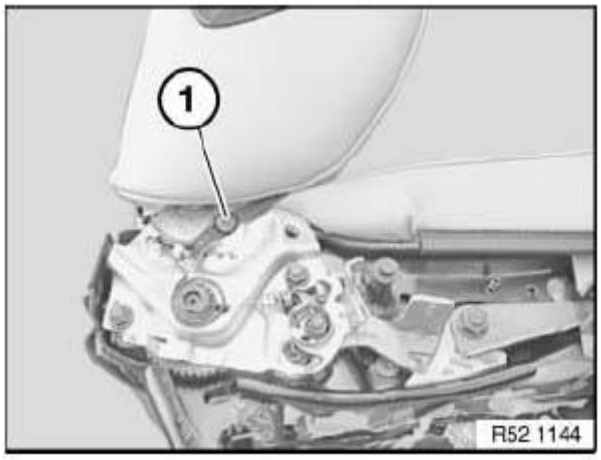


Fig. 130: Identifying Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Tunnel side:

Disengage cover fastener (1) from belt deflector trim.

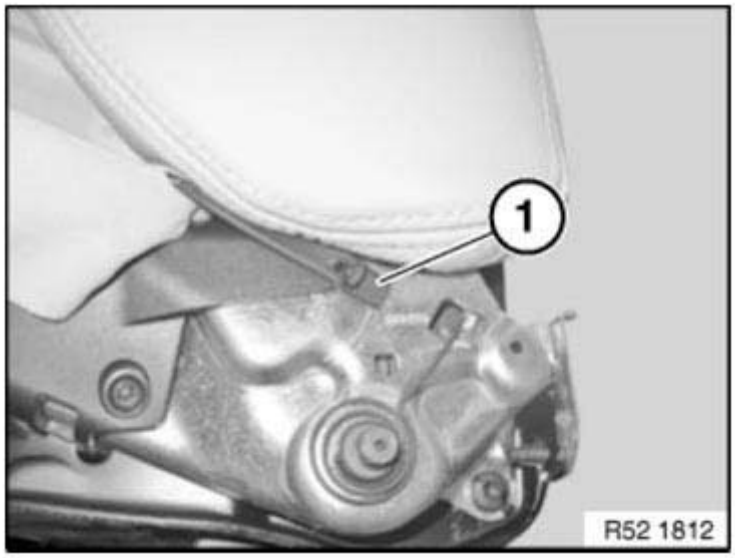


Fig. 131: Identifying Cover Fastener Of Belt Deflector Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Detach seat cover (1) from seat frame.

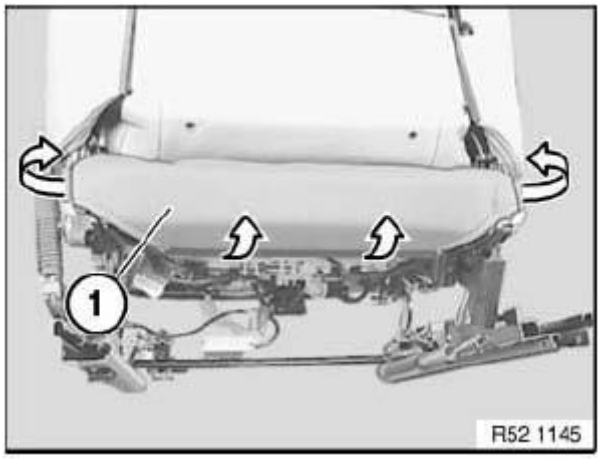


Fig. 132: Removing Seat Cover From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out cover welt (1) completely from seat frame (2).

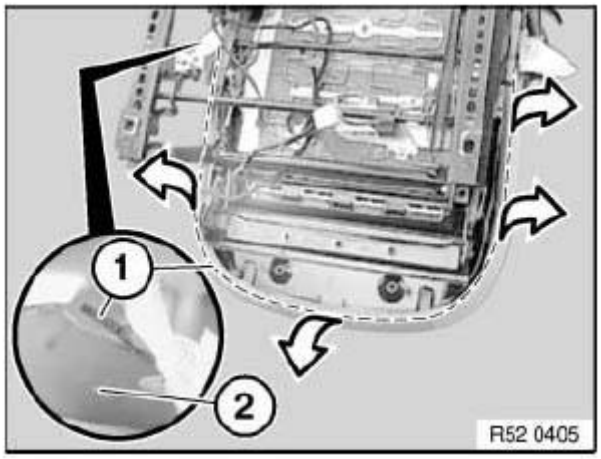


Fig. 133: Pulling Out Cover Welt From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seat cover (1) with padding towards front/top.

IMPORTANT: Carefully slide bracing cloth with foam through backrest gap and seat structure.

Installation:

Slide foam completely through backrest gap and seat structure. Make sure foam and bracing cloth are correctly fitted.

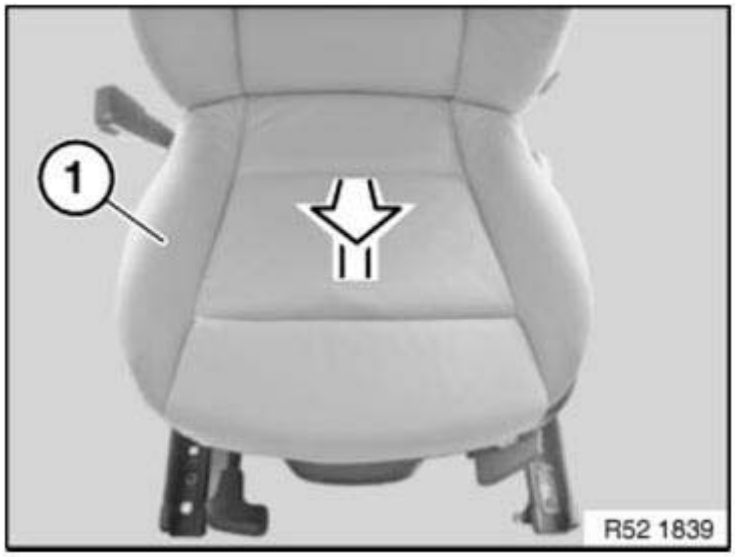


Fig. 134: Removing Seat Cover With Padding
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat heater and/or with seat occupancy detector (CIS mat):

Pull seat cover (1) with padding forward a little and feed wiring harnesses (2) out.

Remove seat cover (1) with padding towards front/top.

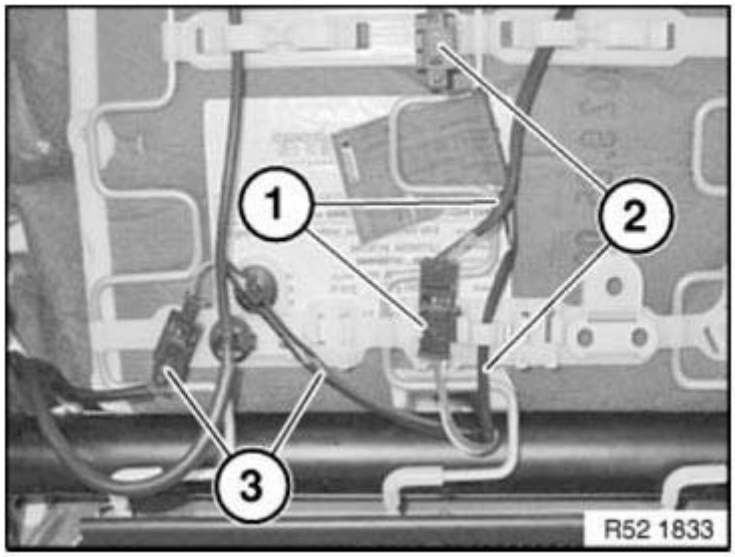


Fig. 135: Identifying Seat Cover With Wiring Harnesses
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully detach all retainers in side area from OKE strips (1).

Carefully turn seat cover over and release retainers from OKE strips (2).

Remove seat cover from padding.

IMPORTANT: Remove all remnants of clips from seat cover and padding (CIS mat).

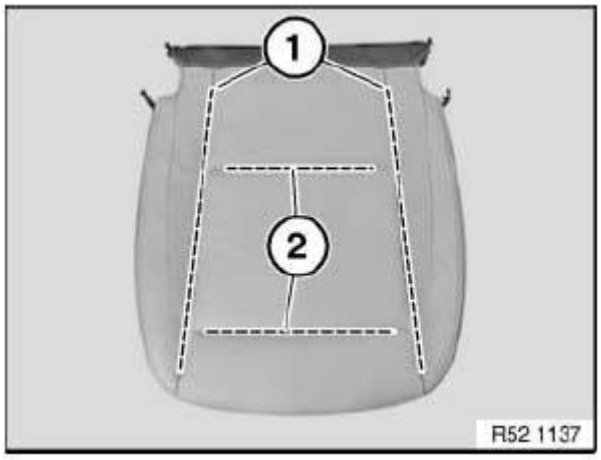


Fig. 136: Identifying OKE Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend new retainers (2) with special tool **52 0 050** .

1. Padding
2. Retainer
3. Trim wire in padding
4. OKE strip in cover
5. Seat cover

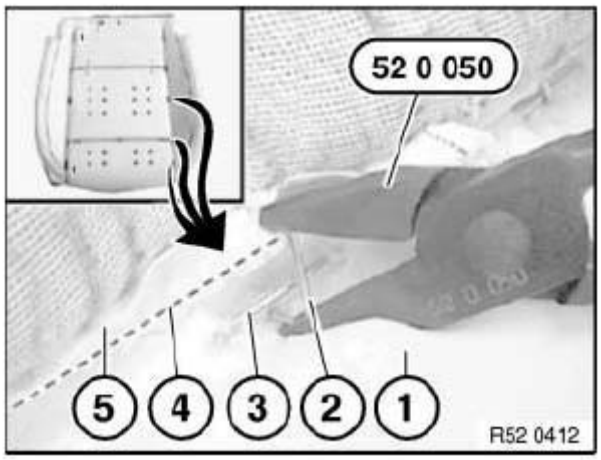


Fig. 137: Bending Retainers Using Special Tool (52 0 050)
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 604 REPLACING SENSOR MAT (CIS MAT) FOR FRONT PASSENGER SEAT OCCUPANCY DETECTION DETECTOR

WARNING: Note AIRBAG SAFETY REGULATIONS !
Incorrect handling can lead to airbag deployment and cause injury.

WARNING: Only US and Canadian version of front passenger seat (with CIS mat):
The CIS mat can only be removed in conjunction with the padding from the seat cover.
If CIS mat or padding is defective, both parts may only be replaced together.
After fitting the seat cover, the CIS mat must be enabled with the BMW programming system.

Procedure for replacing the CIS mat together with the upholstery is described under:

- Remove padding for front seat See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

The work scope with CIS mat is different in the following work steps:

Release the bolting point (1) of the ground cable on the seat pan.

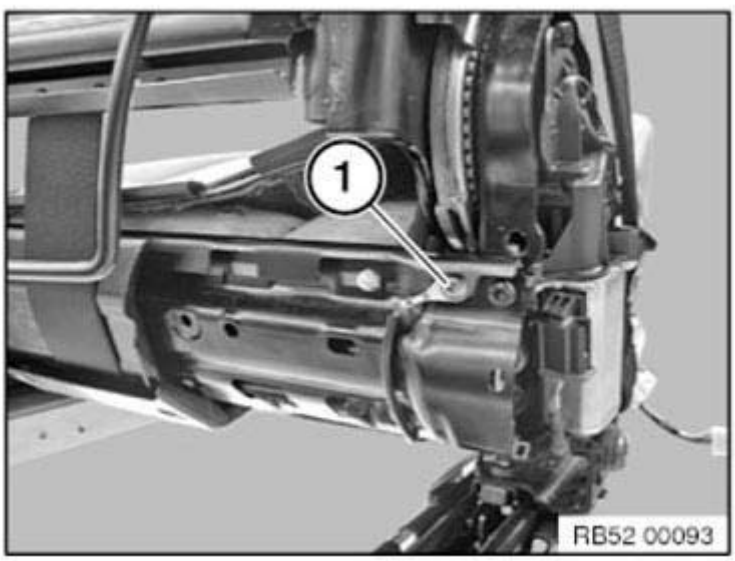


Fig. 138: Identifying Bolting Point Of Ground Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable strap (1).

Lift the locking tab and pull the connector out of the side of the connector housing.

Installation note:

Replace cable tie (1).

Connector is encoded against incorrect assembly.

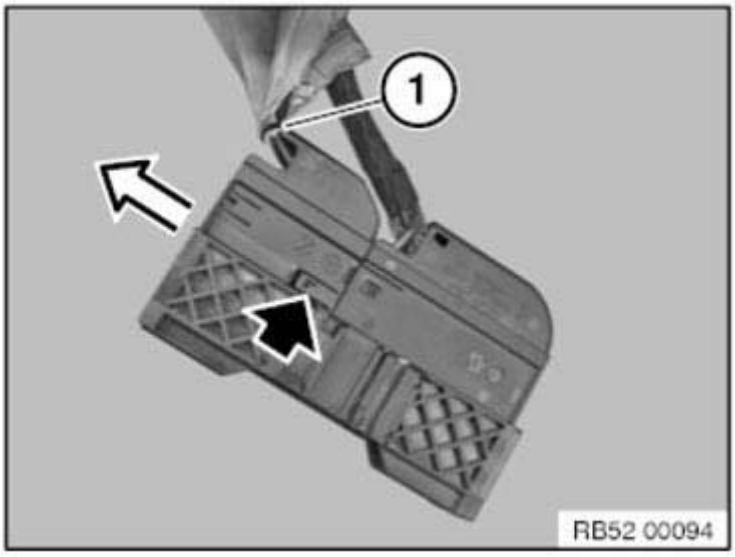


Fig. 139: Pulling Connector Out Of Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Enabling seat occupancy detection (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

5215 FRONT SEAT, SPORTS, MANUAL

52 14 ... PERFORMING FUNCTION CHECK WITH ADAPTER CABLE (FOR SEAT REPAIRS)

NOTE: The function check on a repaired driver's or front passenger seat can be performed outside the vehicle by using adapter cable 61 4 360.

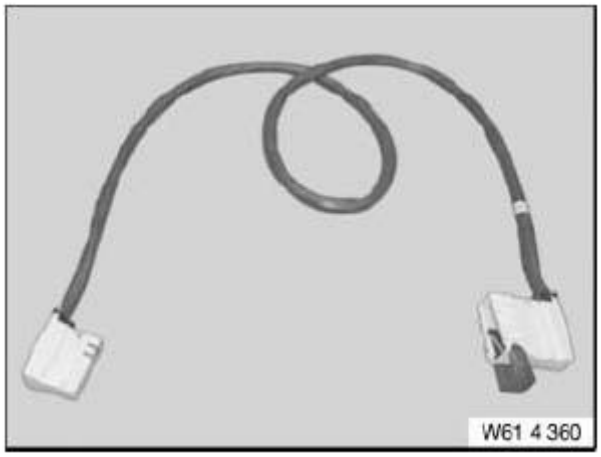


Fig. 140: Identifying Adapter Cable (61 4 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Use:

Adapter cable 61 4 360 is connected to vehicle wiring harness (1) and removed seat (2).

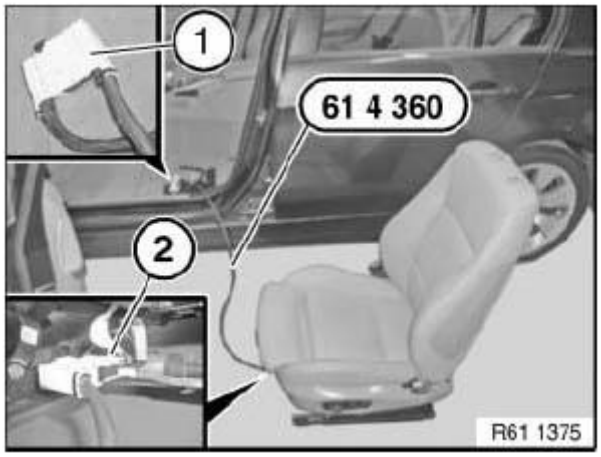


Fig. 141: Connecting Adapter Cable (61 4 360) To Vehicle Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

52 14 ... PERFORMING FUNCTION CHECK WITH ADAPTER CABLE (FOR SEAT REPAIRS)

NOTE: The function check on a repaired driver's or front passenger seat can be performed outside the vehicle by using adapter cable 61 4 360.

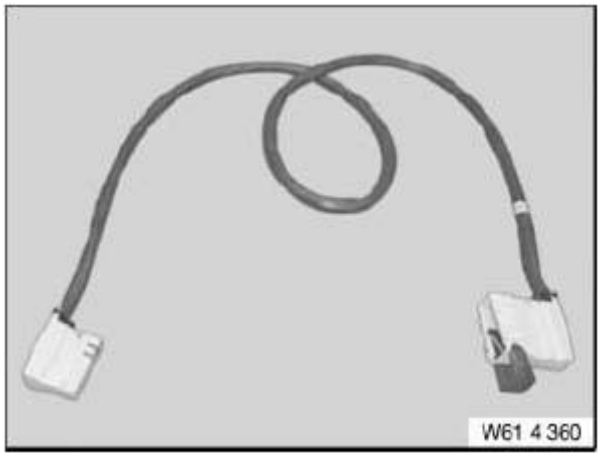


Fig. 142: Identifying Adapter Cable (61 4 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Use:

Adapter cable 61 4 360 is connected to vehicle wiring harness (1) and removed seat (2).

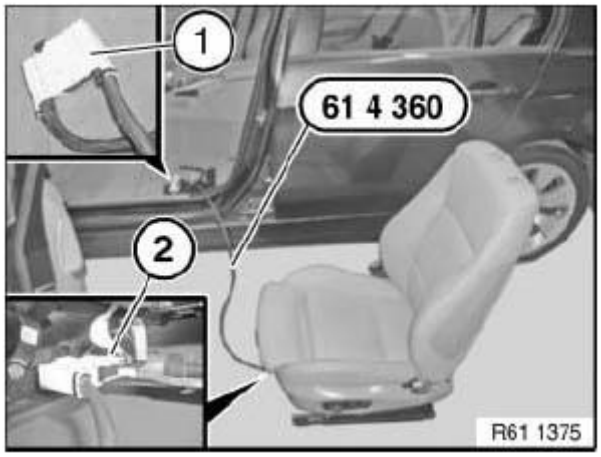


Fig. 143: Connecting Adapter Cable (61 4 360) To Vehicle Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 021 REMOVING AND INSTALLING/REPLACING FLEXMAT ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Remove padding for front seat See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

Remove plug housing (1) from flexmat.

Cut all cable ties and disengage wiring harnesses from flexmat.

Installation:

Make sure wiring harnesses are laid correctly.

Observe bending radius and do not lay wiring harnesses tensioned.

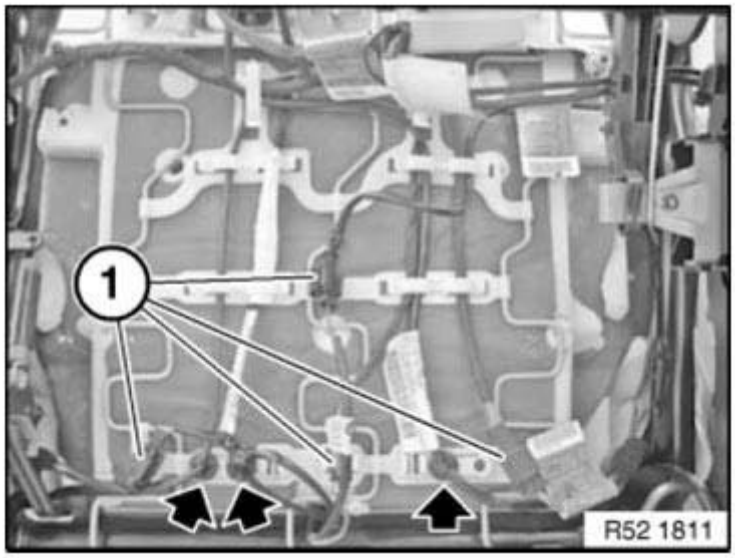


Fig. 144: Identifying Flexmat Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage flexmat (1) at front.

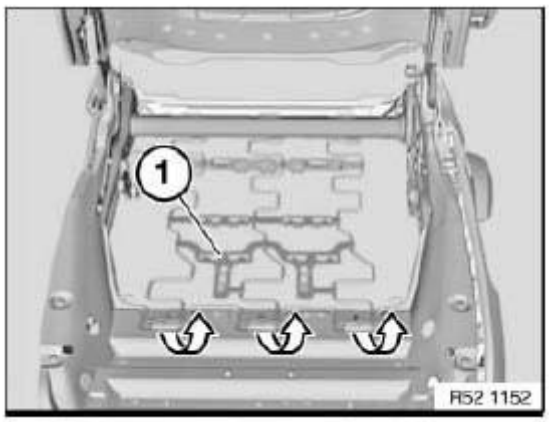


Fig. 145: Removing Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

Swing flexmat (1) down and disengage from seat frame.

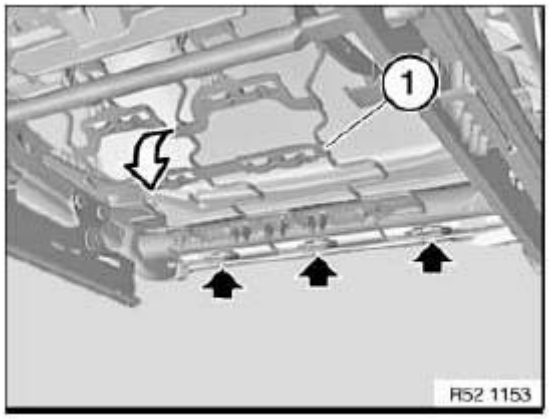


Fig. 146: Moving Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 ... REMOVING AND INSTALLING ISOFIX HOLDER

Necessary preliminary tasks

- Remove seat fabric See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

Release screws (1).

Tightening torque **52 10 07AZ** .

Remove Isofix holder.

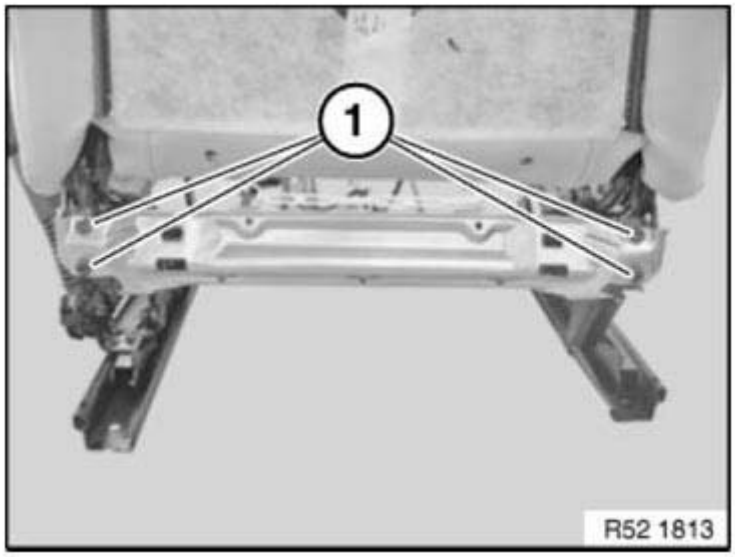


Fig. 147: Identifying Isofix Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 000 REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (NORMAL/MANUAL)

Necessary preliminary tasks

- Open convertible top
- Disconnect **BATTERY NEGATIVE LEAD**

IMPORTANT: An airbag module and a pyrotechnical seat belt tensioner are installed in the front seat.
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

Installation:

- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads
- Screws are fitted with a Torx Plus system and can be released with a standard Torx screwdriver

Move seat to upper back position.

Release and dispose of screws (1).

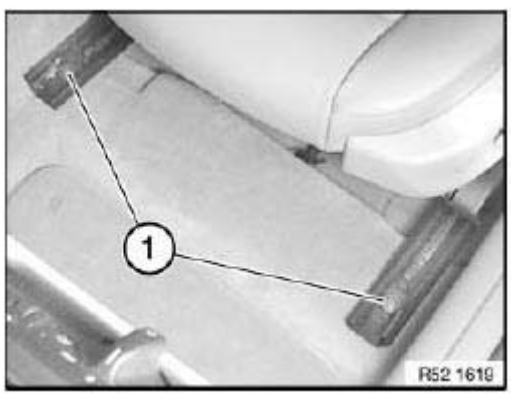


Fig. 148: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Move seat forwards and position flush with seat runners.

Unclip release tab (2) for belt anchor fitting trim (1) with plastic wedge.

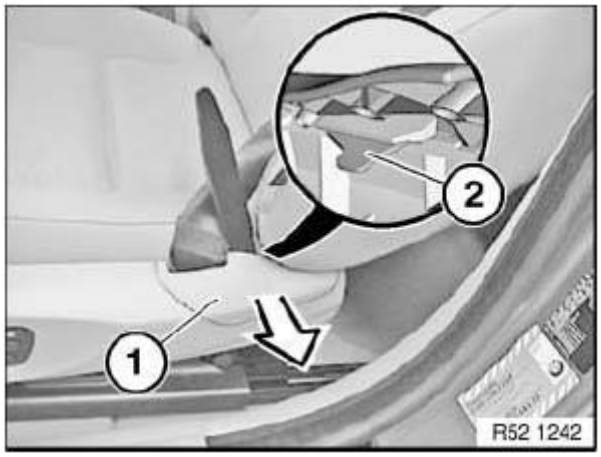


Fig. 149: Removing Release Tab For Belt Anchor Fitting Trim Using Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 2AZ** .

Remove anchor fitting (2).

Installation:

Make sure anchor fitting (2) is correctly seated on seat mechanism pin.

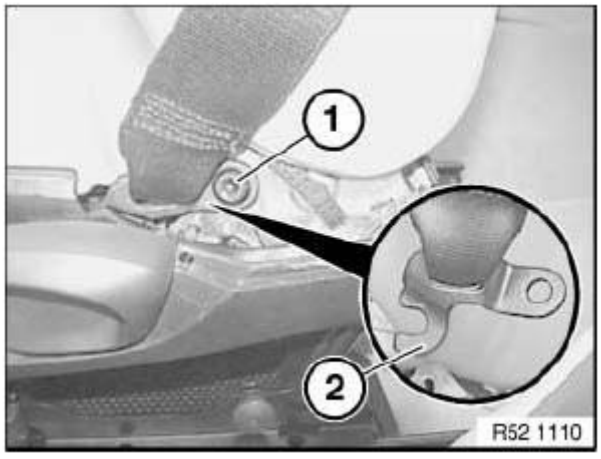


Fig. 150: Identifying Anchor Fitting With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release and dispose of screws (1).

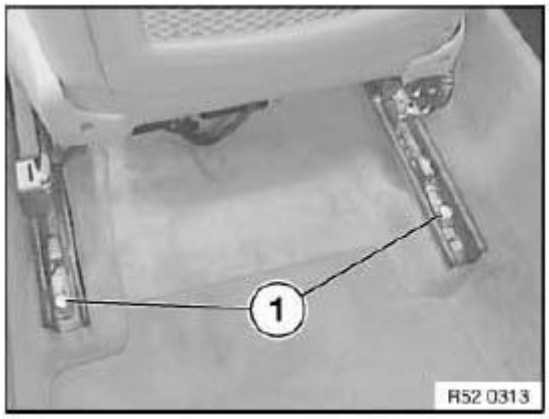


Fig. 151: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

IMPORTANT: Cover door sill with protective covers (risk of damage).

Lift out front seat.

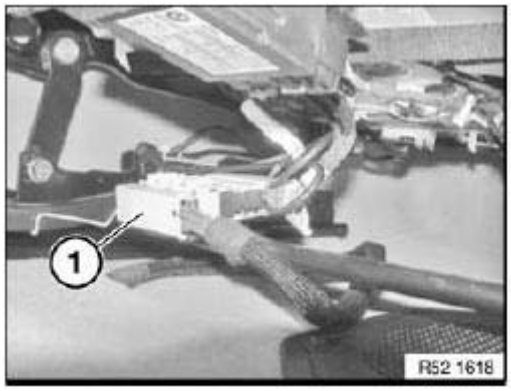


Fig. 152: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Carpet must not get between seat rails and floor pan in area of fastening points (grating noises)
- Replace microencapsulated screws
- Insert all screws loose to avoid twisting
- Tighten down all screws to specified torque

Tightening torque **52 10 1AZ** .

WARNING: When carrying out further work on the front seat, it is absolutely

imperative to observe the SAFETY REGULATIONS on handling airbag modules and pyrotechnical seat belt tensioners
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

52 13 390 REMOVING AND INSTALLING OR REPLACING FRONT LEFT OR RIGHT HEAD RESTRAINT

WARNING: Danger of pinching!

Reach on left and right under head restraint and unclip in jerks in upward direction.

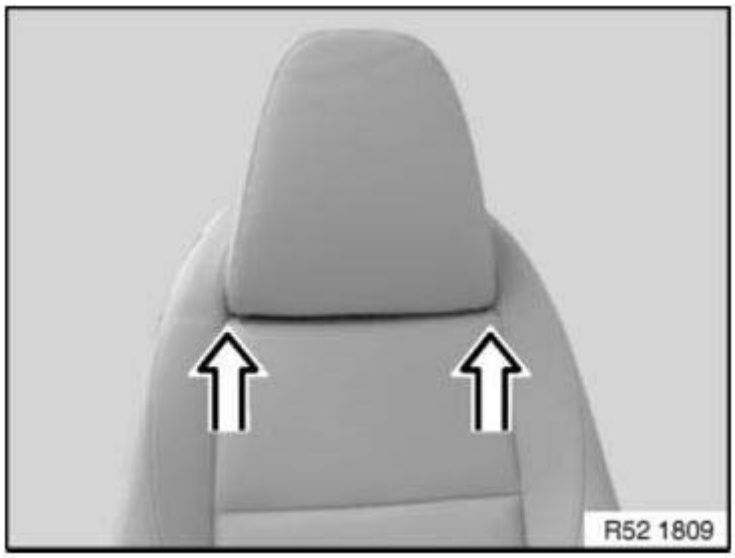


Fig. 153: Removing Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 198 REMOVING AND INSTALLING OR REPLACING REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST

Release clips (1) with diagonal cutting pliers.

Remove rear panel (2) downwards with a turning action.

NOTE: Remove remnants of clips.

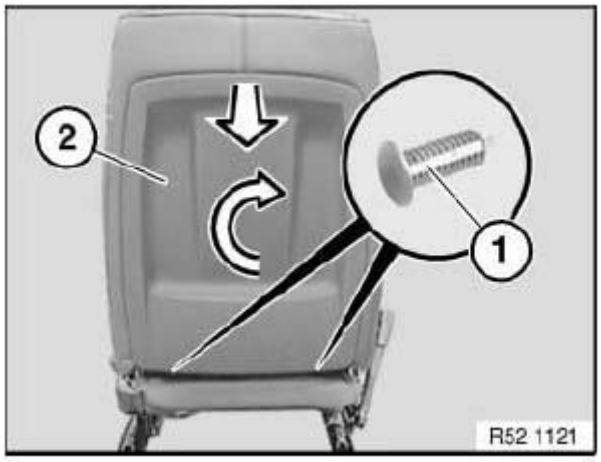


Fig. 154: Removing Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) and bore holes (2) on rear panel (3) must not be damaged.

Replace faulty clips.

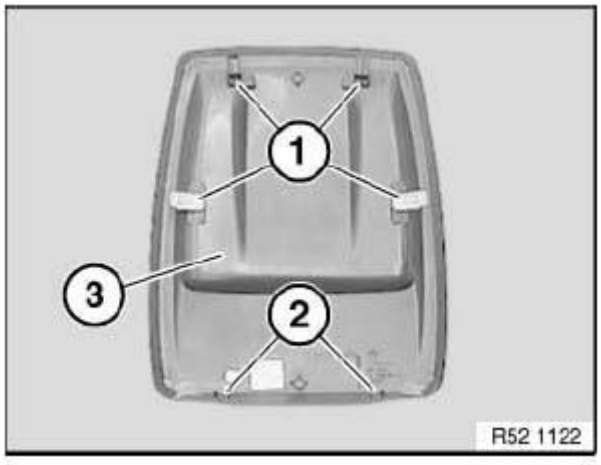


Fig. 155: Identifying Hooks And Bore Holes On Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 030 REMOVING AND INSTALLING/REPLACING BACKREST FRAME ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Remove **FRONT SEAT**
- Remove **REAR PANEL** on front seat backrest

Release airbag wiring harness (2) from cable holders on flexmat.

Disconnect cable tie from clips.

Raise release clip (3) and pull plug (4) out of plug housing (1).

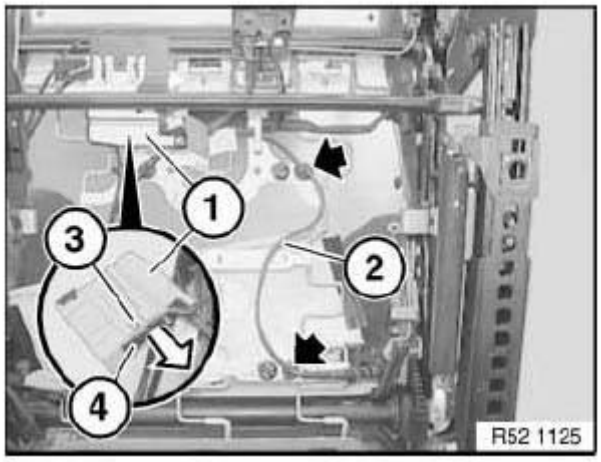


Fig. 156: Pulling Plug Out Of Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Always feed in cable tie (1) at narrow end of plug housing in direction of arrow.

Cables must be secured with insulation under cable tie.

Firmly tighten cable tie (1) to relieve strain. It must not be possible to move the cable.

Make sure plug (2) is correctly locked in plug housing (3).

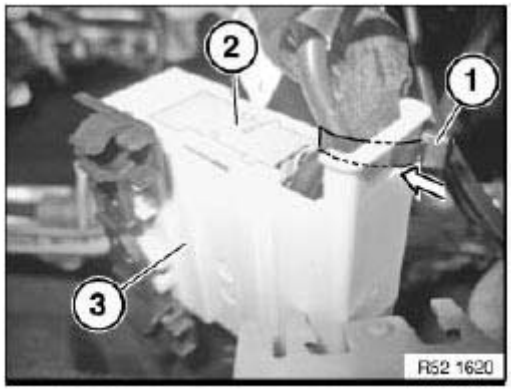


Fig. 157: Installing Cable Tie At Narrow End Of Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect. Unclip cable.

Release wiring harness (3) from cable holders on seat mechanism.

Unfasten plug connection (2) and disconnect.

IMPORTANT: Feed all wiring harnesses carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

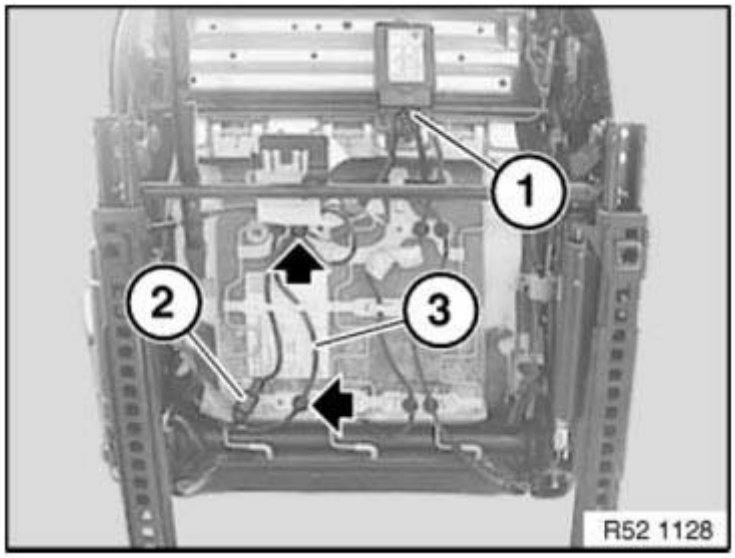


Fig. 158: Identifying Plug Connection And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook backrest cover (1) on left and right.

Release screws (2) on left and right.

Tightening torque **52 10 02AZ** .

Remove backrest frame (3) completely towards top.

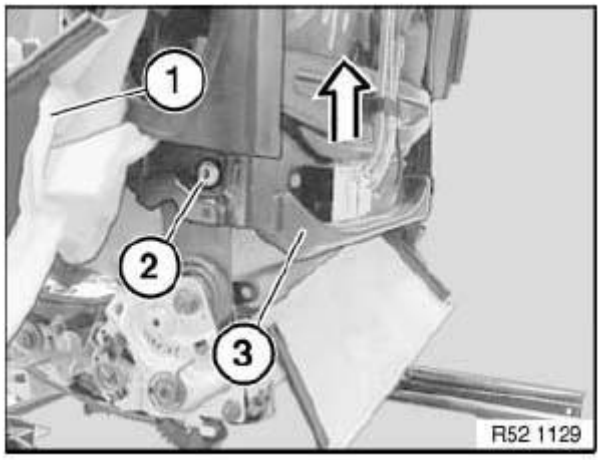


Fig. 159: Removing Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove backrest cover with padding.
- Remove **SIDE AIRBAG** .
- Remove lumbar support See **5215059 Removing and installing/replacing lumbar support pump with valve housing for lumbar support/backrest width adjustment**; **5213059 Removing and installing/replacing lumbar support pump with valve housing for lumbar support**; **5213055 Removing and installing/replacing lumbar support on front seat** or **5215061 Replacing both air cushions for backrest width adjustment on left or right front seat**.

52 13 025 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SEAT MECHANISM (NORMAL/MANUAL)

This job is described under:

- Remove **BACKREST FRAME** on front seat

Replacement only:

- Remove seat cover See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)** for front seat
- Remove **SEAT BELT TENSIONER**
- Remove control unit for seat heating See **6135080 Removing and installing/replacing control unit/module for left or right seat adjustment** or **6135095 Removing and installing/replacing control unit/module for seat heating**

Seat mechanism is supplied complete with corresponding drive units.

Unlock plug housing (3) and remove from holder.

Disengage wiring harnesses from flexmat.

Installation:

Make sure wiring harnesses are laid correctly.

Observe bending radius and do not lay wiring harnesses tensioned.

Release screws (1).

Tightening torque **52 10 05AZ** .

Remove holder (2) for control unit.

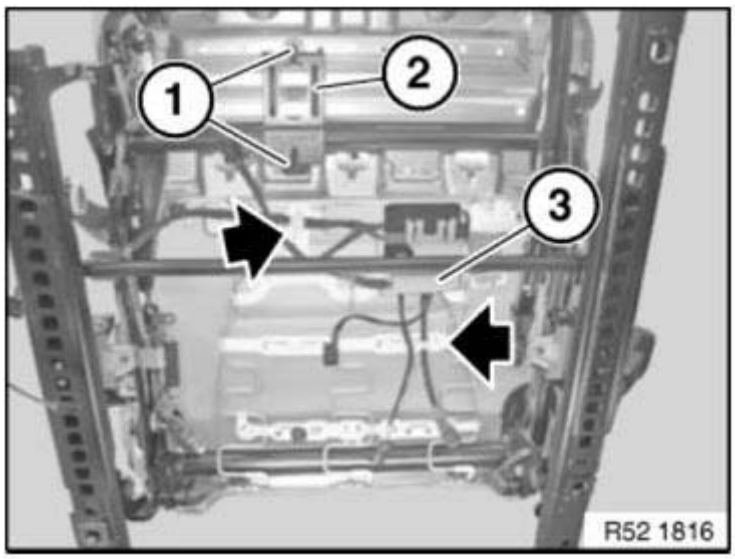


Fig. 160: Identifying Plug Housing With Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **52 10 03AZ** .

Remove belt buckle deflector trim (2).

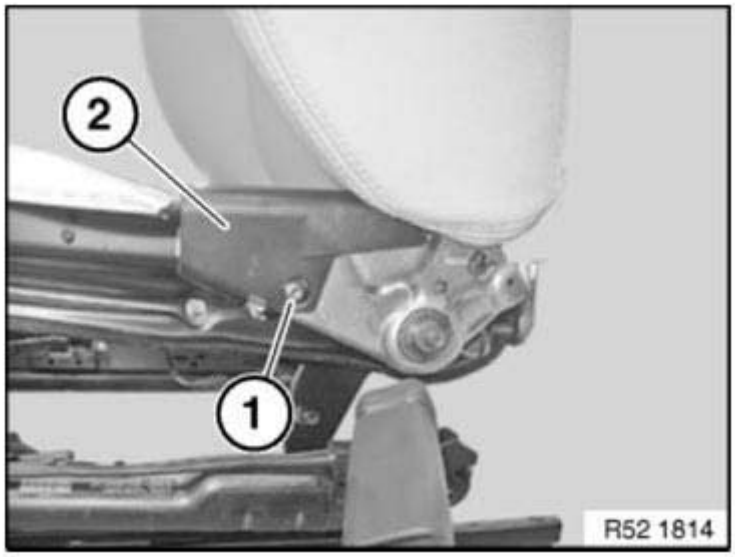


Fig. 161: Identifying Belt Buckle Deflector Trim With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Sport seat only:

Release screws (1).

Remove connection for thigh support.

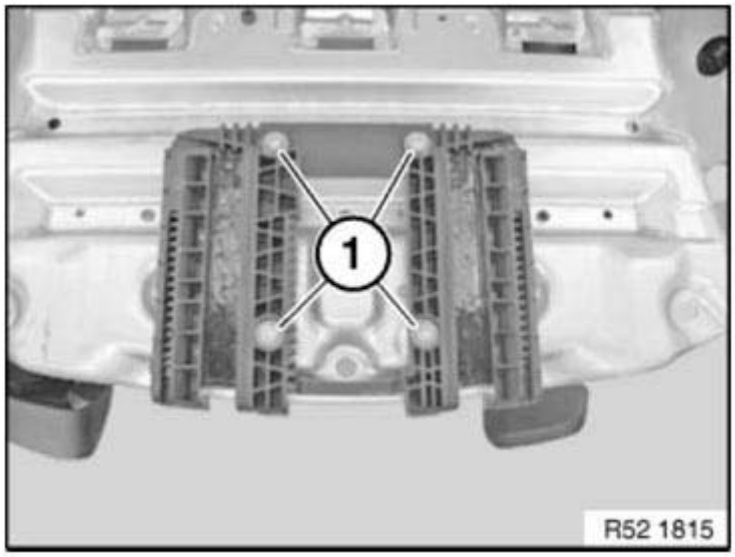


Fig. 162: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 055 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT ON FRONT SEAT

Necessary preliminary tasks

- Remove **REAR PANEL ON FRONT SEAT**

Detach backrest cover (1) from backrest frame.

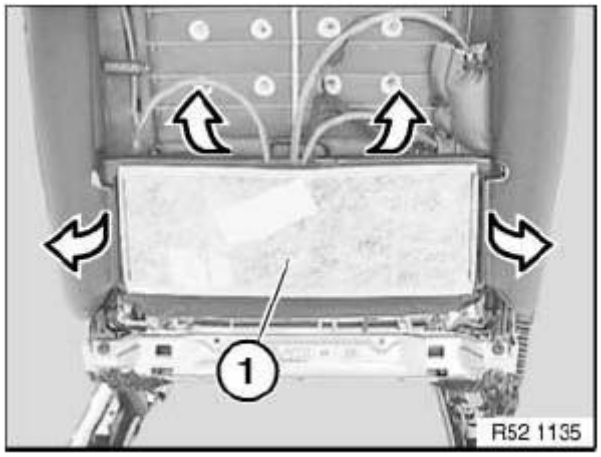


Fig. 163: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not pop valve housing (1) out of backrest frame for this operation. Carefully pull valve housing (1) forwards out of backrest frame.

Unlock quick connectors and detach air hoses from valve housing (1).

NOTE: Connections are coded against incorrect assembly.

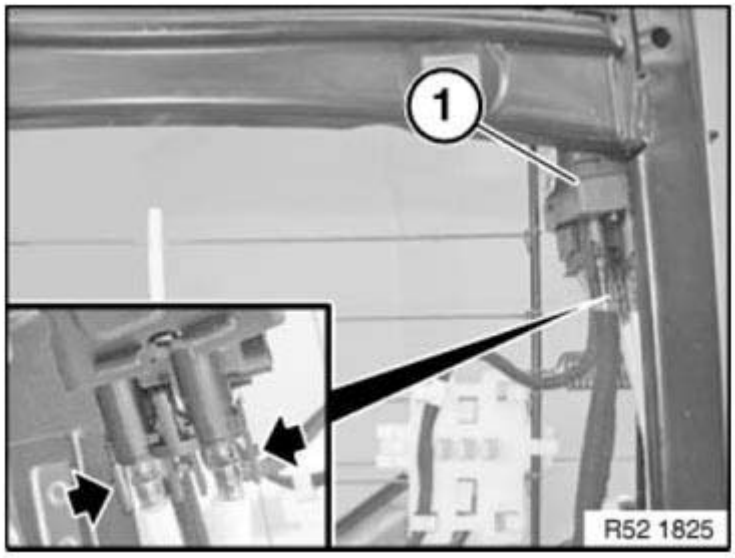


Fig. 164: Identifying Valve Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Detach lumbar cushion (1) from spring wire.

Installation:

Attach lumbar cushion (1) to second and fourth wires from below.

Press backrest support forwards a little.

Pull out lumbar cushion (1) downwards.

Feed air hoses out of backrest frame and spring wire.

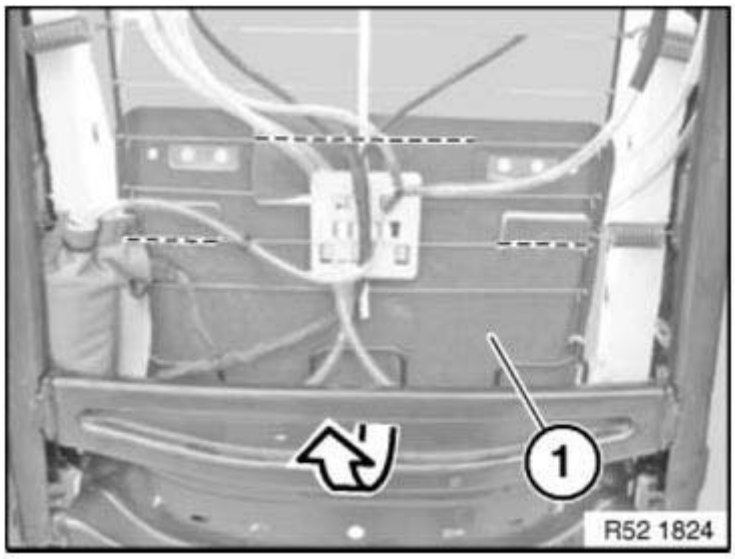


Fig. 165: Pulling Out Lumbar Cushion
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check lumbar cushion at top (1) and bottom (2) for damage.

Air hoses (3) must not be kinked.

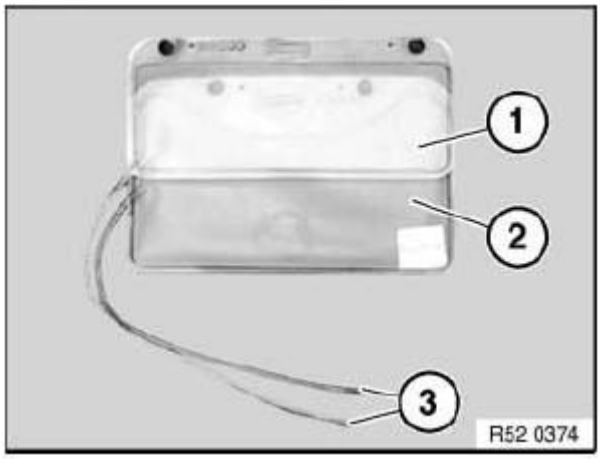


Fig. 166: Identifying Lumbar Cushion At Top And Bottom With Air Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carry out **FUNCTION CHECK** .

52 15 059 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT PUMP WITH VALVE HOUSING FOR LUMBAR SUPPORT/BACKREST WIDTH ADJUSTMENT

Necessary preliminary tasks

- Remove **REAR PANEL ON FRONT SEAT**

Detach backrest cover (1) from backrest frame.

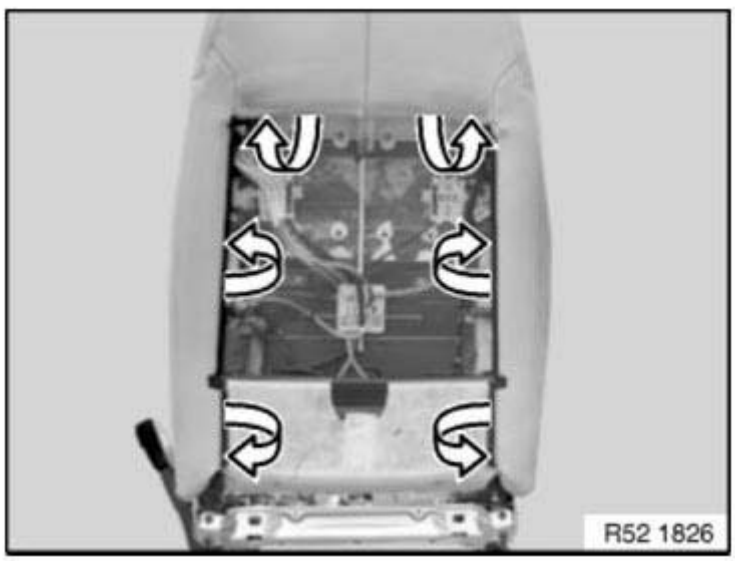


Fig. 167: Removing Backrest Cover From Backrest Frame

Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Installation:

Replace defective cable tie.

Open zip fastener (2).

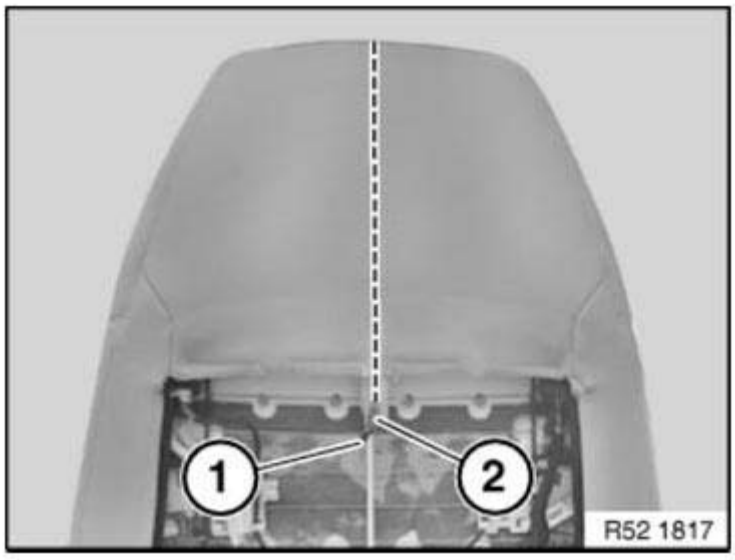


Fig. 168: Identifying Cable Tie And Zip Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach cable tie.

Installation:

Replace defective cable ties.

Remove lumbar support pump (1) from backrest frame.

Unfasten plug connection (2) and disconnect.

Unclip air hose from holder (3).

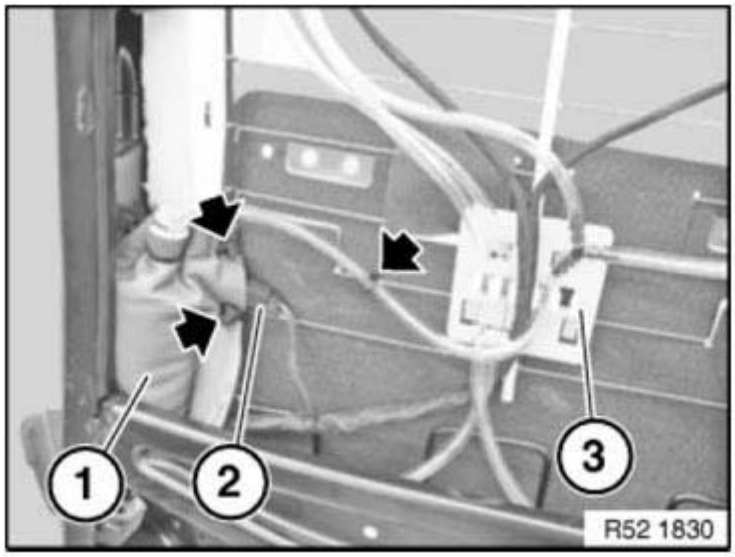


Fig. 169: Identifying Lumbar Support Pump With Plug Connection And Air Hose Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Pop valve housing (2) for lumbar support in direction of arrow out of backrest frame.

Disengage wiring harness from cable tie (3).

Installation:

Feed rubber plug (1) through backrest frame.

Pull rubber plug (1) and pop valve housing into backrest frame.

Check rubber sleeve of valve housing for correct seating in backrest frame.

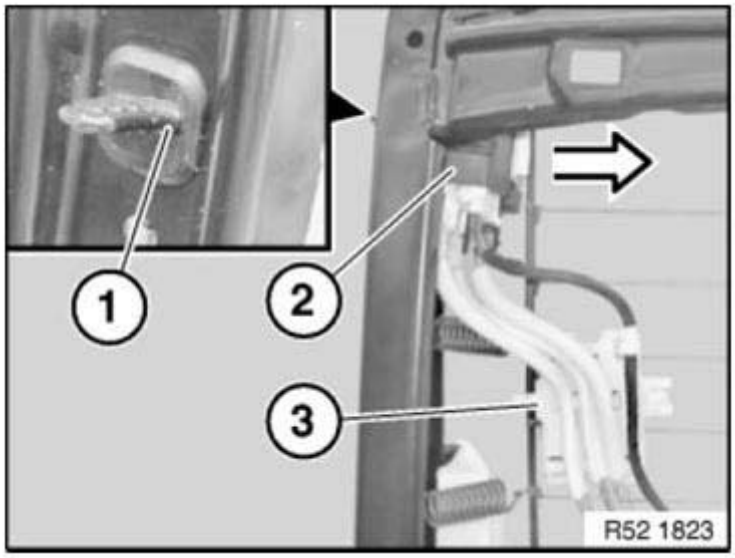


Fig. 170: Removing Valve Housing Out Of Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unlock quick connector and detach air hoses (2, 3 and 4) from valve housing.

Valve unit for backrest width adjustment:

(2) Hose (clear), lumbar drive
(3) Hose (clear), right lumbar cushion
(4) Hose (clear), left lumbar cushion

NOTE: Connections are coded against incorrect assembly.

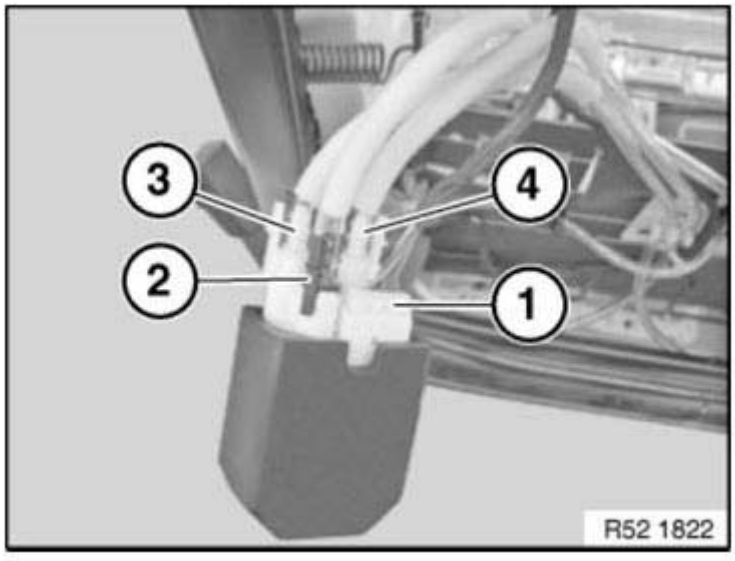


Fig. 171: Identifying Plug Connection With Air Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out FUNCTION CHECK .

52 13 040 REMOVING AND INSTALLING/REPLACING OUTER COVER ON LEFT OR RIGHT FRONT SEAT BACKREST (NORMAL/MANUAL)

Necessary preliminary tasks

- Remove **FRONT SEAT**

NOTE: Picture shows installed seat by way of example.

Raise lock (3) and lever out handle

1. for backrest angle adjustment and
2. for seat height adjustment

with special tool 00 9 317 .

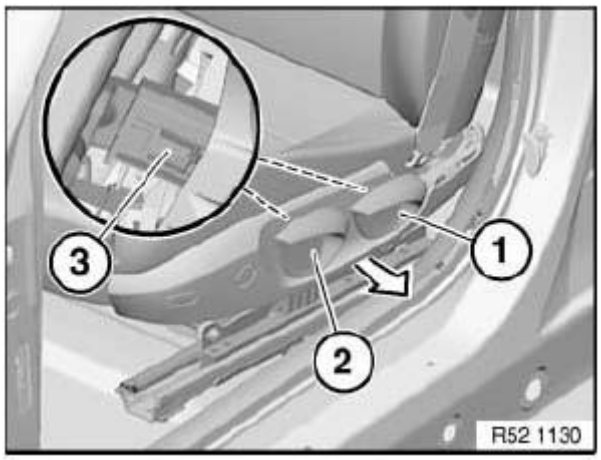


Fig. 172: Removing Handle
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **52 10 10AZ** .

NOTE: Trim (2) is engaged in marked area.

Press lock (3) and pull trim (2) off seat mechanism.

If necessary, lever out carefully with special tool 00 9 317 .

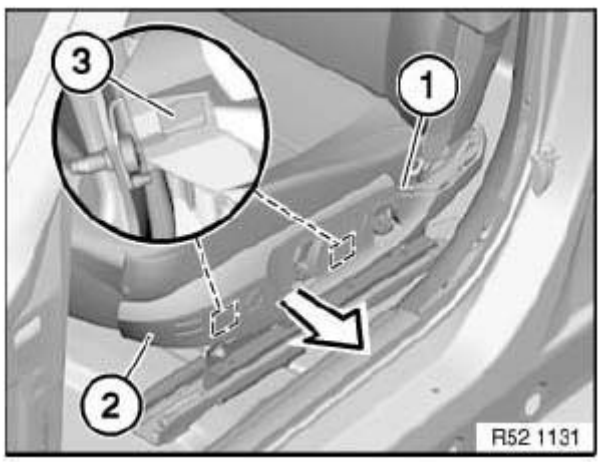


Fig. 173: Pulling Off Seat Mechanism Trim
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, unlock plug connection (1) for backrest width adjustment and disconnect.

If necessary, unlock plug connection (2) for lumbar support and disconnect.

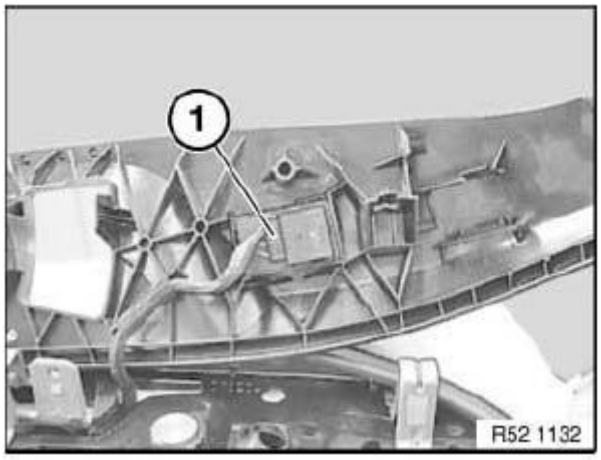


Fig. 174: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove backrest width adjustment switch and lumbar support switch.

Installation:

Make sure backrest width adjustment and lumbar support switches are correctly engaged.

52 15 403 REMOVING AND INSTALLING/REPLACING THIGH SUPPORT COVER ON FRONT SEAT (SPORT/MANUAL)

Release thigh support (1) and move forward.

Lever welt of seat cover (2) out of thigh support.

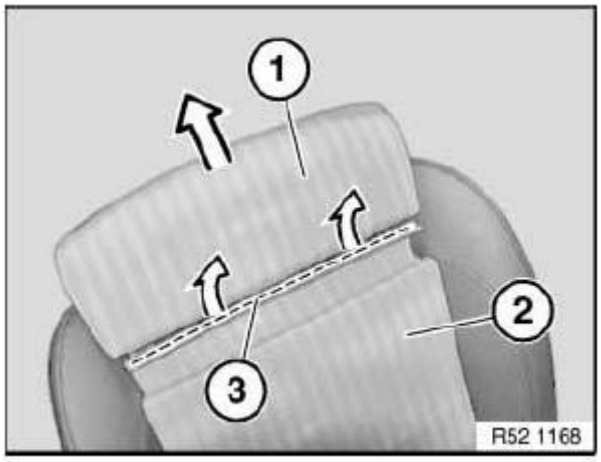


Fig. 175: Removing Thigh Support
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out cover welt in marked area (1).

Disengage trim thread in marked area (2) from thigh support.

Remove cover with padding.

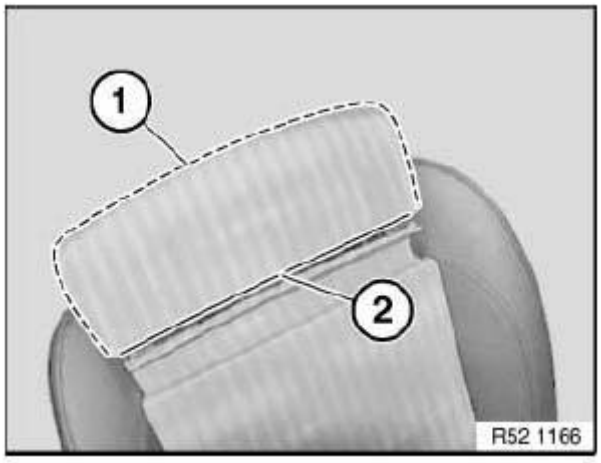


Fig. 176: Identifying Cover Welt And Trim Thread Marked Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Pull cover (1) off padding (2).

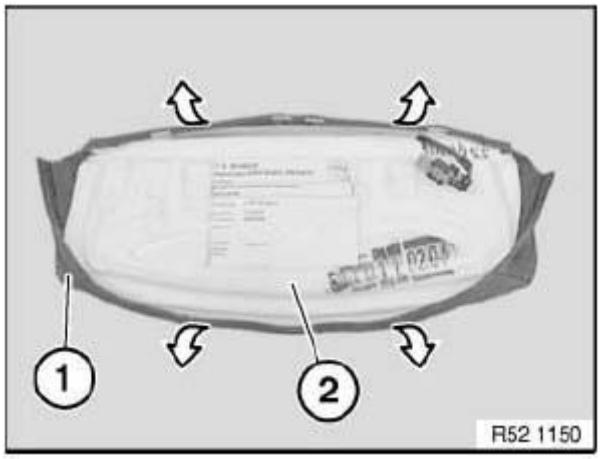


Fig. 177: Pulling Cover Off Padding
Courtesy of BMW OF NORTH AMERICA, INC.

52 15 050 REMOVING AND INSTALLING/REPLACING THIGH SUPPORT ON LEFT OR RIGHT FRONT SEAT (SPORT/MANUAL)

Release thigh support (1) and move forward.

Lever welt (3) of seat cover (2) out of thigh support (1).

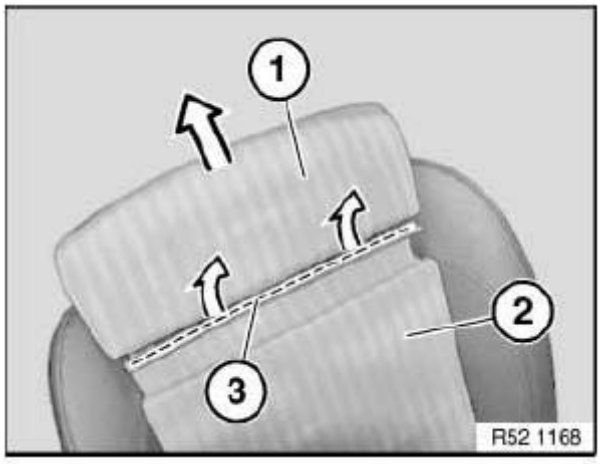


Fig. 178: Removing Thigh Support
Courtesy of BMW OF NORTH AMERICA, INC.

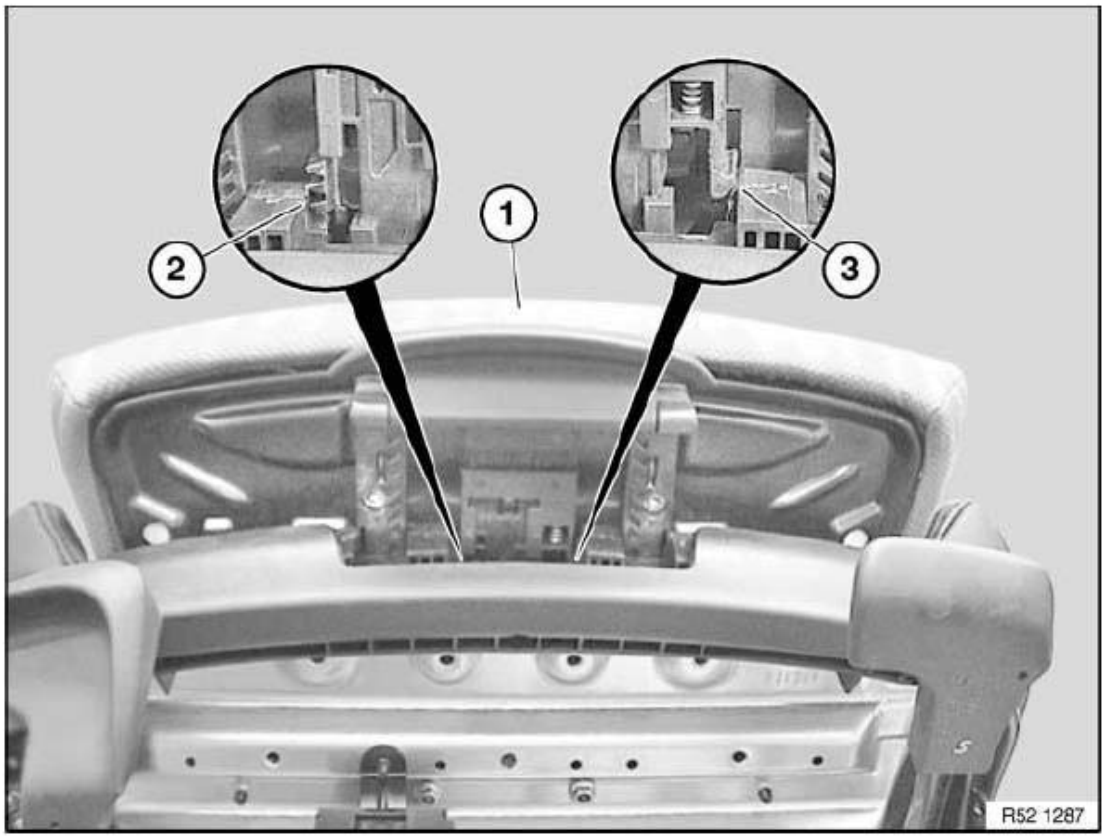


Fig. 179: Identifying Actuator, Centering Element And End Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Do not extend thigh support to its full extent.

Keep actuator (1) pressed in order to unlock centering element (2).

Carefully raise end stop (3) for thigh support with a screwdriver and at same time pull thigh support forwards out of guide rails.

View of thigh support mechanism:

1. End stop for thigh support
2. Locking mechanism for thigh support

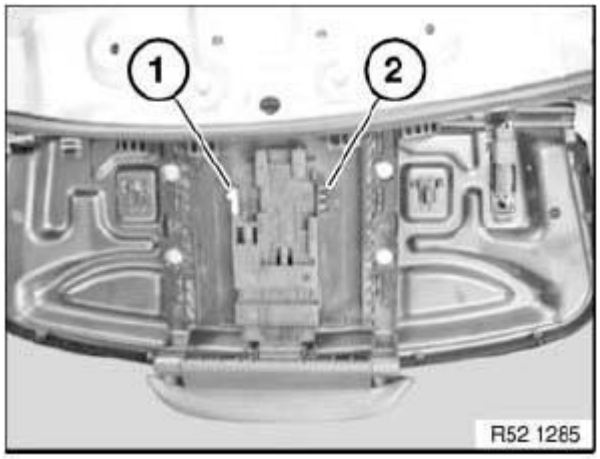


Fig. 180: Identifying End Stop And Locking Mechanism For Thigh Support
Courtesy of BMW OF NORTH AMERICA, INC.

View of seat frame mechanism:

3. Guide rail on seat with depth arrester
4. Guide rail on seat with end stop

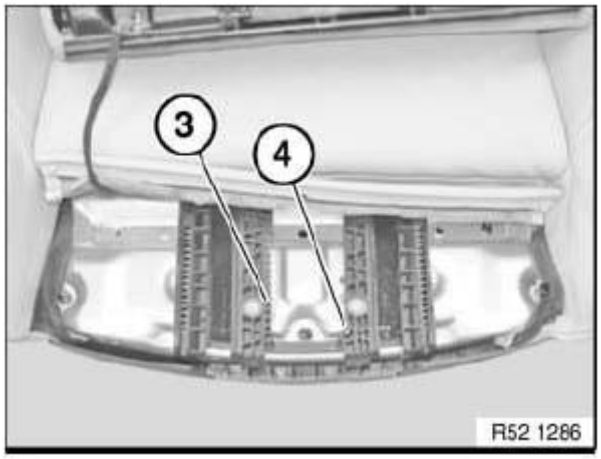


Fig. 181: Identifying Guide Rails On Seat With Depth Arrester And End Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

NOTE: Check guide rails (2) and adjustment mechanism (3) for damage.

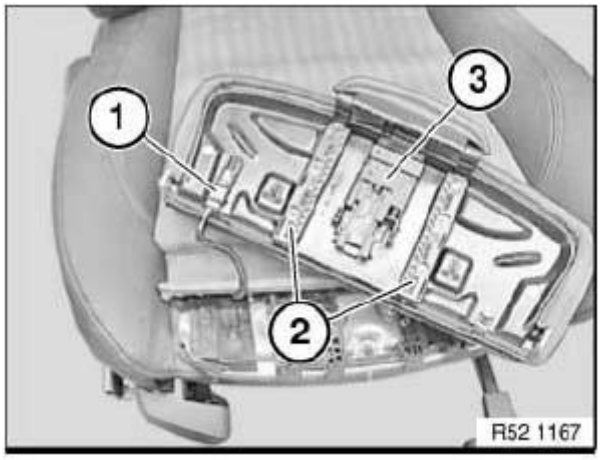


Fig. 182: Identifying Plug Connection, Guide Rail With Adjustment Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 405 REPLACING BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **REAR PANEL**
- Remove **HEAD RESTRAINT**

Version with seat heating only

Unfasten plug connection (1) and disconnect.

Detach cable tie.

Release wiring harness (2) from cable holders on seat mechanism.

IMPORTANT: Feed the wiring harness carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

Installation:

Lay wiring harness without kinks and tension.

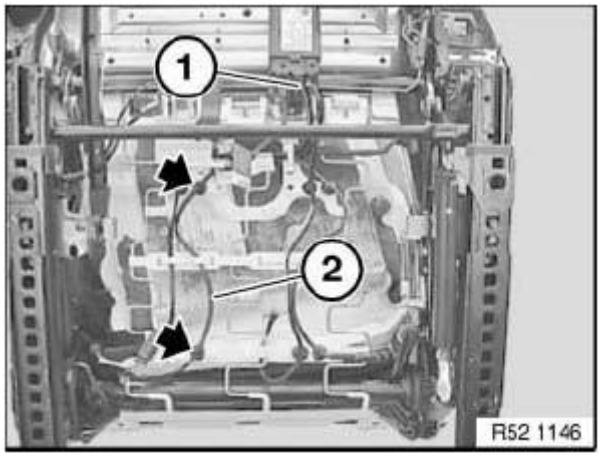


Fig. 183: Identifying Plug Connection And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable tie (1) from seat mechanism.

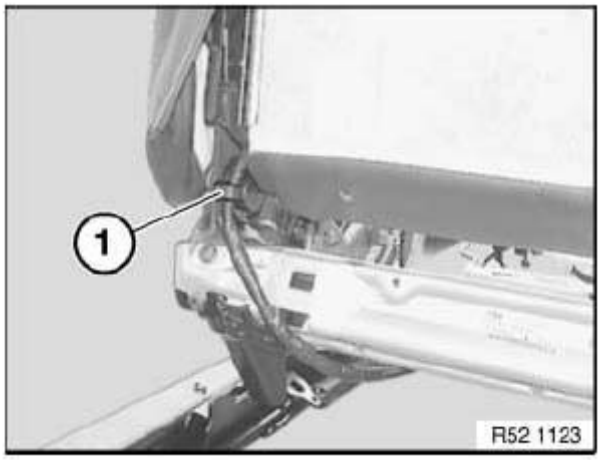


Fig. 184: Identifying Cable Tie Of Seat Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Installation:

Replace defective cable tie.

Open zip fastener (2).

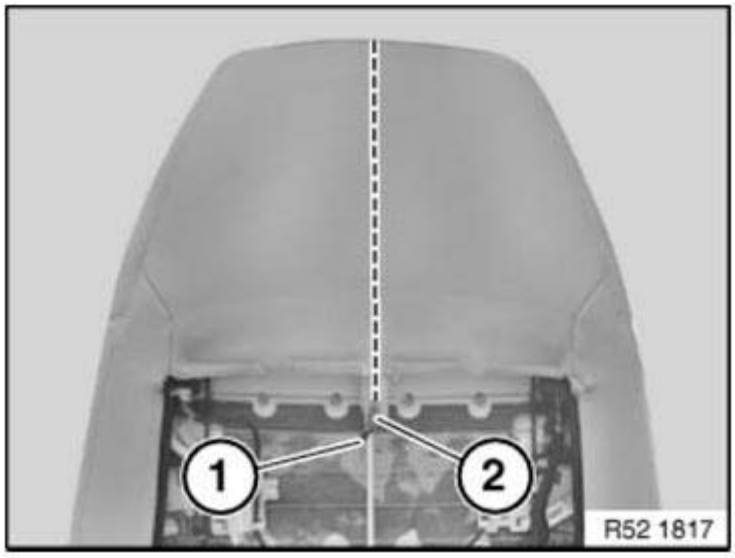


Fig. 185: Identifying Cable Tie And Zip Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach backrest cover (1) from backrest frame.

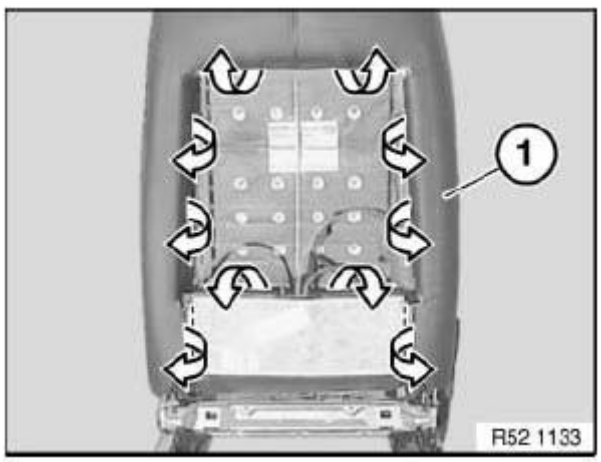


Fig. 186: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Installation:

Replace nuts.

Tightening torque **72 12 03AZ** .

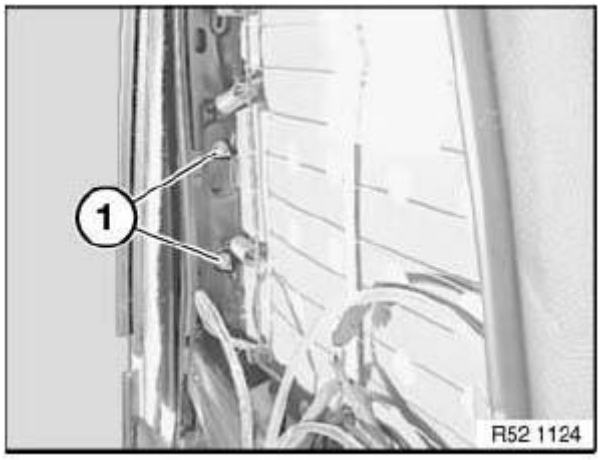


Fig. 187: Identifying Seat Mechanism Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Detach mounting strip (4) from flexmat.

Carefully pull airbag module (3) with threaded pins out of backrest frame and feed out between padding (1) and inner bag (2).

Set down airbag module (3) to one side.

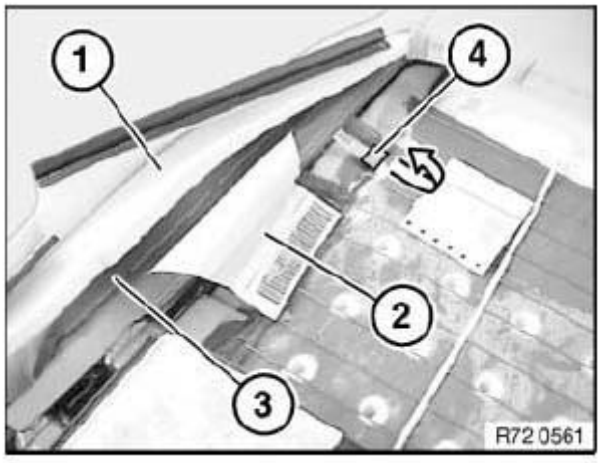


Fig. 188: Removing Mounting Strip From Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull inner bag (1) fully over airbag module and threaded pins.

Feed in mounting strip (2) of inner bag (1) through backrest frame.

Insert threaded pins into backrest frame and secure with new nuts.

No inner bag material is permitted to project through the hole in the inner frame.

Install nuts and tighten down.

Tightening torques **72 12 03AZ** .

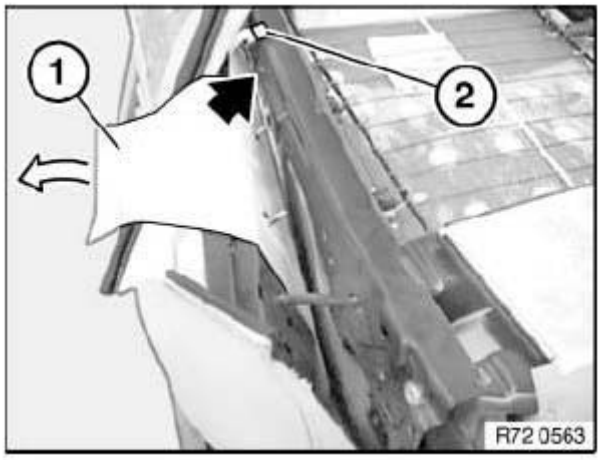


Fig. 189: Pulling Inner Bag Over Airbag Module And Threaded Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Inner bag must be between airbag module and backrest frame!

Engage mounting strip (1) of inner bag in flexmat.

Position inner bag (2) smoothly over backrest frame.

Engage backrest cover (3) in backrest frame.

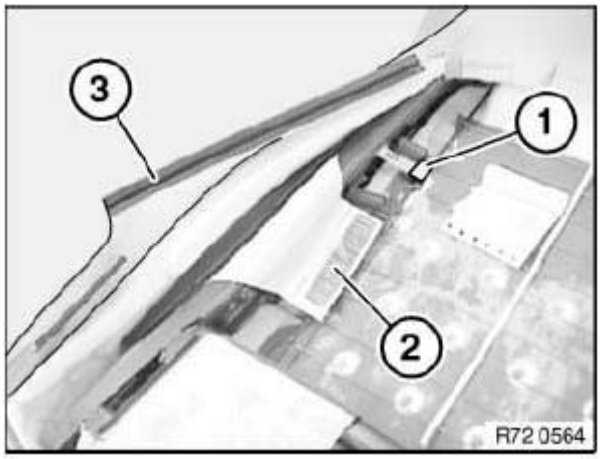


Fig. 190: Identifying Mounting Strip, Inner Bag And Backrest Cover

Courtesy of BMW OF NORTH AMERICA, INC.

Reposition backrest cover (1) at side and bottom and pull off with padding towards top from backrest frame.

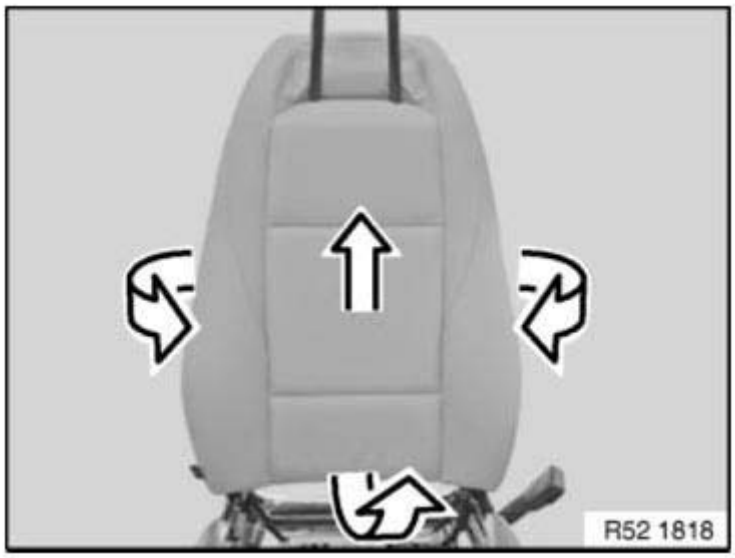


Fig. 191: Positioning Backrest Cover At Side And Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Release all retainers in marked area.

Remove backrest cover from padding.

NOTE: Remove all remnants of retainers from backrest cover and padding.

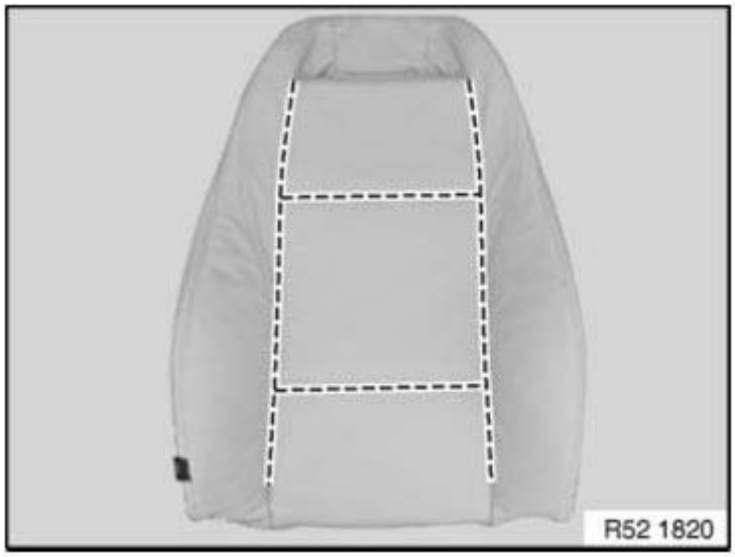


Fig. 192: Identifying Retainers Marked Area

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend new retainer (2) with special tool **52 0 050** .

1. Padding
2. Retainer
3. Trim wire in padding
4. Trim wire in backrest cover
5. Backrest cover

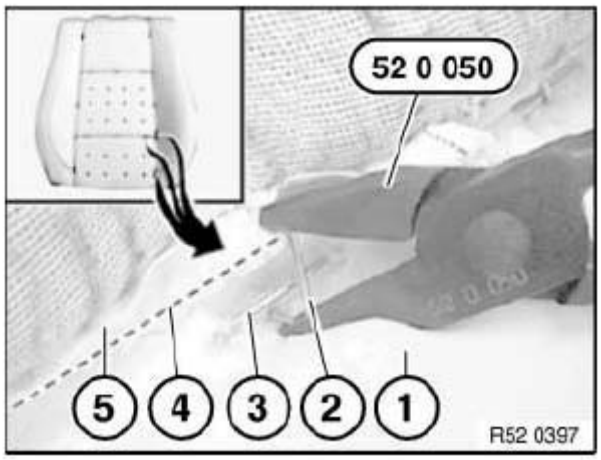


Fig. 193: Bending Retainer Using Special Tool (52 0 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement of backrest cover

Pull trim wires out of backrest cover.

Cut new backrest cover to size and insert trim wires.

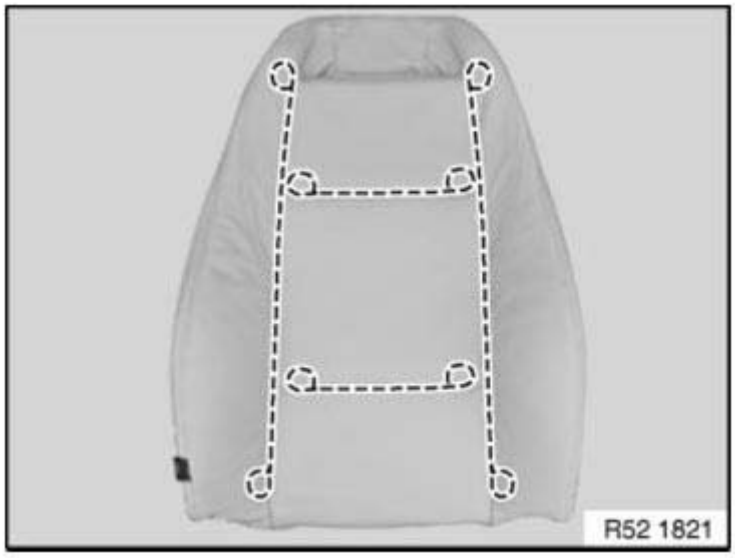


Fig. 194: Identifying Backrest Cover
Courtesy of BMW OF NORTH AMERICA, INC.

52 15 451 REPLACING BACKREST HEATING ELEMENT FOR LEFT OR RIGHT SPORTS SEAT

Operation is described in:

- Replacing **HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT**

52 15 061 REPLACING BOTH AIR CUSHIONS FOR BACKREST WIDTH ADJUSTMENT ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Partially remove **BACKREST COVER**

NOTE: Do not pop valve housing (1) out of backrest frame for this operation.

Carefully pull valve housing (1) forwards out of backrest frame.

Unlock quick connectors and detach air hoses from valve housing (1).

NOTE: Connections are coded against incorrect assembly.

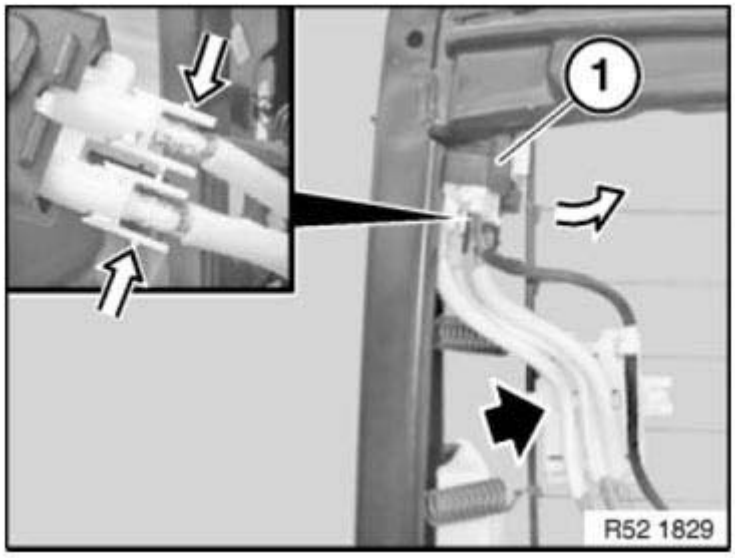


Fig. 195: Removing Valve Housing Out Of Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Removal of the cushion on the left side is depicted; proceed in the same way for the right side.

Air cushion must be completely drained.

Unclip carrier for backrest width adjustment from backrest frame.

Feed carrier with air hose out of backrest frame.

Installation:

Make sure the carrier for backrest width adjustment is fitted correctly on the backrest frame.

Install air hoses without kinks.

Check air cushion for damage.

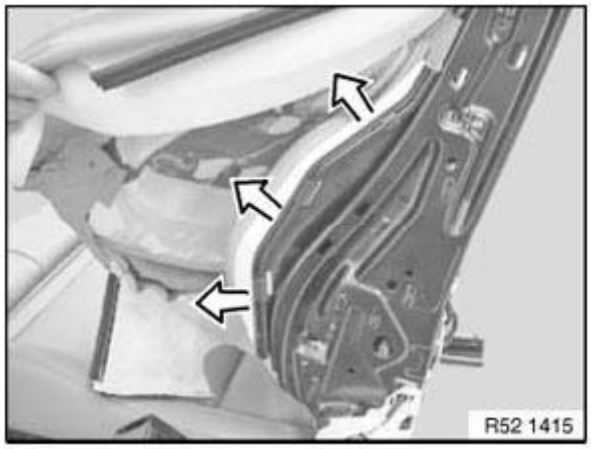


Fig. 196: Removing Carrier With Air Hose Out Of Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out FUNCTION TEST

52 15 450 REPLACING CUSHION HEATING ELEMENT FOR LEFT OR RIGHT FRONT SEAT

Operation is described in:

- Replacing **HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT**

52 15 452 REPLACING HEATING ELEMENT FOR LEFT OR RIGHT FRONT SEAT (THIGH SUPPORT)

Operation is described in:

- Replacing **HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT**

52 15 455 REPLACING HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT (SPORT)

Necessary preliminary tasks

- Remove **SEAT FABRIC**
- Remove **BACKREST COVER**
- Remove **THIGH SUPPORT COVER**

NOTE: Heating elements are bonded with a foam section and cannot be separated from each other without causing damage.
Foam section and heating elements must be replaced.

Check new foam section:

- No obvious damage or material defects

- All trim wires present in foam
- No bubbles in foam section
- No dirt/contamination on foam or residual foam
- Pay attention to foam section on left and right

Check new heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note variant by examining label on cable

Guide cable for backrest heating through foam hole.

Stick on main section (1):

- Pull adhesive film pieces off main section (1) and stick to upper edge of main section foam until flush

Stick on bead section (2):

- Pull adhesive film pieces off bead section (2) and stick on heating mat along bead section edges.
- Press down evenly in outwards direction

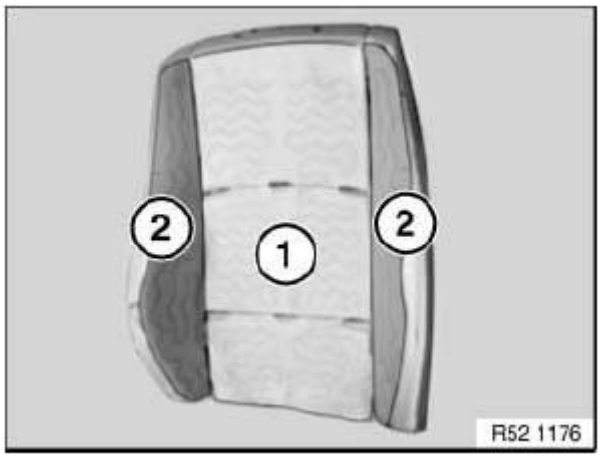


Fig. 197: Identifying Sticks On Main And Bead Section
Courtesy of BMW OF NORTH AMERICA, INC.

Guide cable for seat heating through foam hole.

Stick on STV heating mat (1):

- Pull off adhesive film and stick to rear foam edge until flush

Stick on bead section (2):

- Pull adhesive film pieces off bead section (2) and stick on heating mat along bead section edges.
- Press down evenly in outwards direction

Stick on main section (3):

- Pull adhesive film pieces off main section (3) and stick to upper edge of main section foam until flush

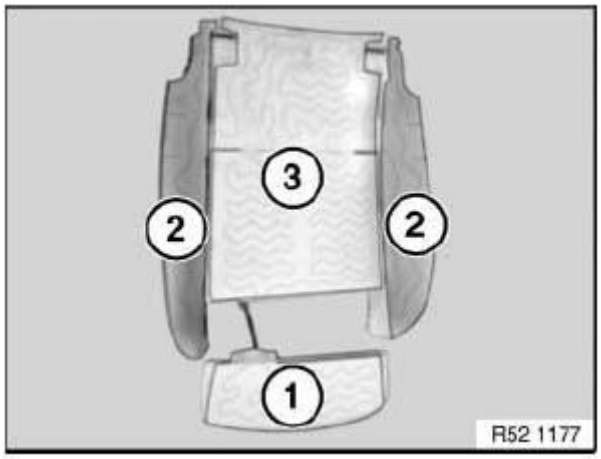


Fig. 198: Identifying Sticks On STV Heating Mat, Main And Bead Section
Courtesy of BMW OF NORTH AMERICA, INC.

Check laying of heating mats:

- Heating mats laid without folds
- Heating mats correctly positioned
- All bonding surfaces stuck on

NOTE: Carry out FUNCTION TEST

52 15 415 REPLACING PADDING FOR LEFT OR RIGHT FRONT SEAT (SPORT/MANUAL)

Operation is described in:

Replacing **SEAT COVER ON LEFT OR RIGHT FRONT SEAT** .

52 15 420 REPLACING PADDING FOR LEFT OR RIGHT FRONT SEAT BACKREST (SPORT/MANUAL)

Operation is described in:

Replacing **BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT** .

52 15 417 REPLACING PADDING FOR LEFT OR RIGHT THIGH SUPPORT (SPORT/MANUAL)

This operation is described in section on:

Replacing **THIGH SUPPORT COVER ON LEFT OR RIGHT FRONT SEAT** .

52 15 400 REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (SPORT/MANUAL)

Necessary preliminary tasks

- Remove **FRONT SEAT**
- Remove **THIGH SUPPORT**
- Manual version:

  Remove **OUTER COVER**

- Electric version:

Remove **CARRIER FOR COVER**

WARNING: US/CDN front passenger seat (with CIS mat) only:
If CIS mat or padding is defective, both parts must be replaced together.

IMPORTANT: The CIS mat must be enabled after each installation operation.

Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Clear fault memory if necessary

WARNING: US/CDN front passenger seat (with CIS mat) only:
To avoid damaging the CIS mat, it is essential to carry out the following operations with extra care.

IMPORTANT: Risk of damage on sharp-edged seat mechanism.

Guide all cables carefully through seat and backrest mechanism.

Make sure cable is routed without kinks and tension.

Make sure plug connections are correctly locked.

Make sure plugs are correctly seated in catches.

Version with seat occupancy detector (CIS mat) only:

1. Data line CIS
2. Earth cable, seat pan
3. Earth cable, backrest frame

Unlock all plug connections and disconnect.

NOTE: From build date 09/2009 onward, earth cable (3) not included on backrest frame.

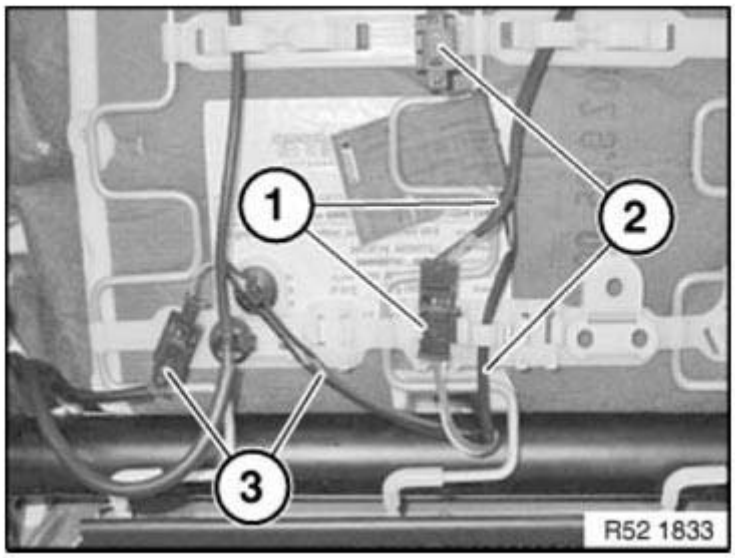


Fig. 199: Identifying Data Line CIS And Earth Cables
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat heating only:

Unlock plug connection (1) for seat heating and disconnect.

Unfasten cable strap.

Disengage wiring harness from cable clips (flexmat).

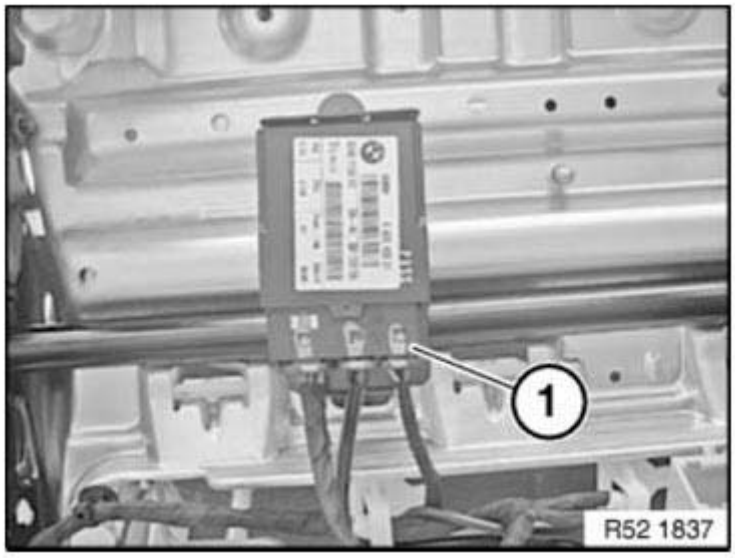


Fig. 200: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat occupancy detector (CIS mat) without seat heating only

Cable for seat heating, seat padding:

Seat heating is integrated in the CIS mat and is stuck to the padding over the full surface.

Lay cable for seat heating as shown to flexmat and secure with cable strap.

Secure plug with cable strap to cable.

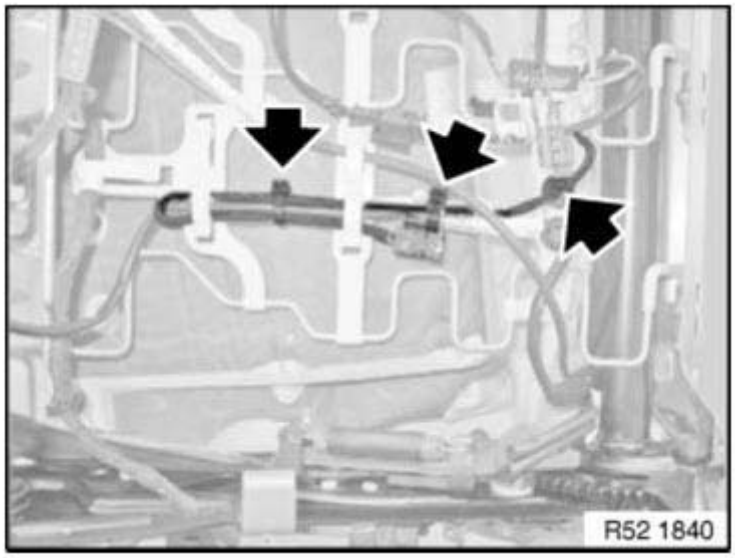


Fig. 201: Locating Plug With Cable Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Cable for seat heating, thigh support:

Cramp cable (1) to welt strip with retainers (2).

Installation:

Bend retainers (2) with special tool **52 0 050** .

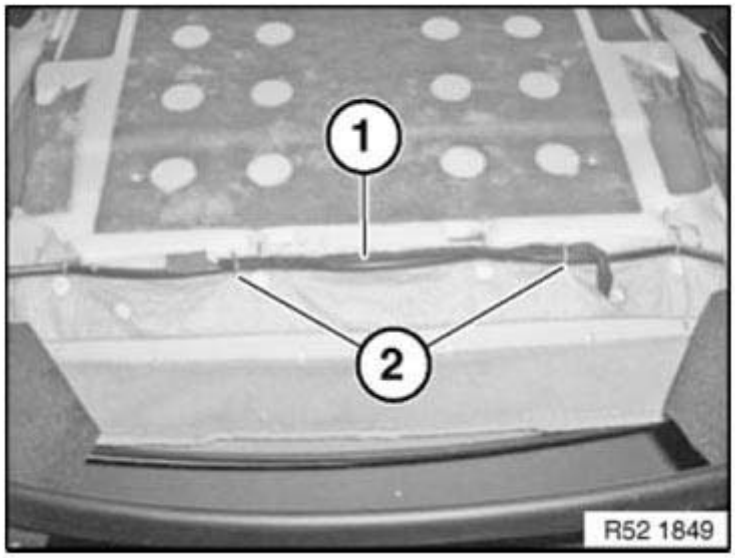


Fig. 202: Identifying Cable And Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp plug (1) behind welt strip (2).

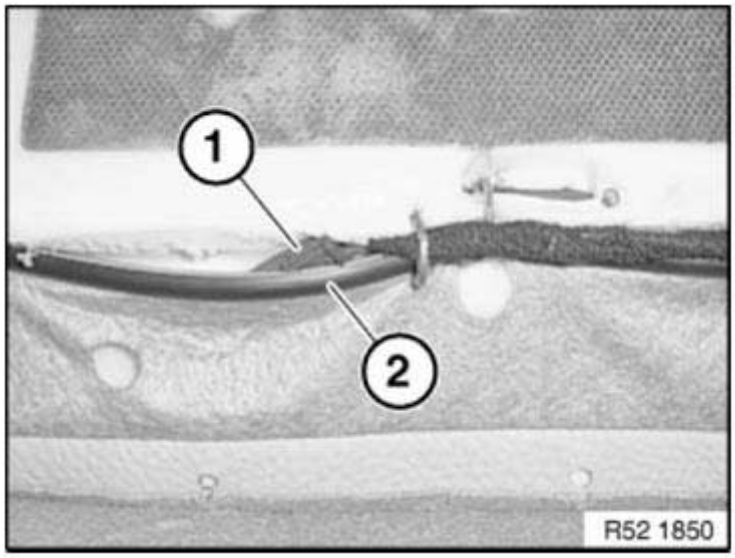


Fig. 203: Identifying Plug With Welt Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining lugs (1).

Remove seat trim (2) downwards.

Installation:

Seat trim (2) must not be damaged.

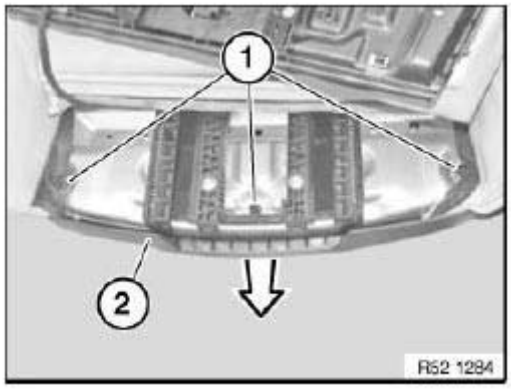


Fig. 204: Removing Seat Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Lever clip (1) out of seat cover on left and right.

Installation:

If necessary, replace faulty clip.

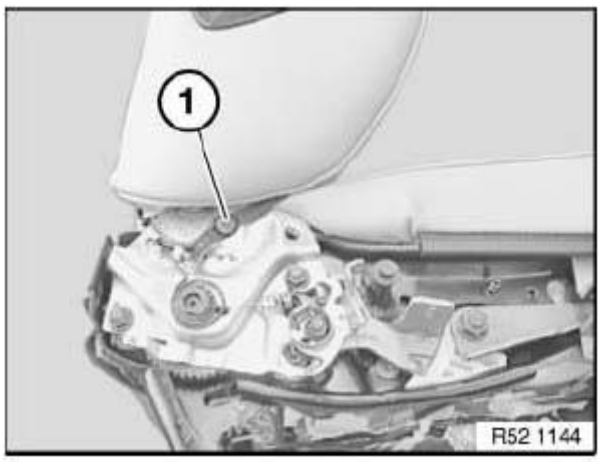


Fig. 205: Identifying Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Tunnel side:

Disengage cover fastener (1) from belt deflector trim.

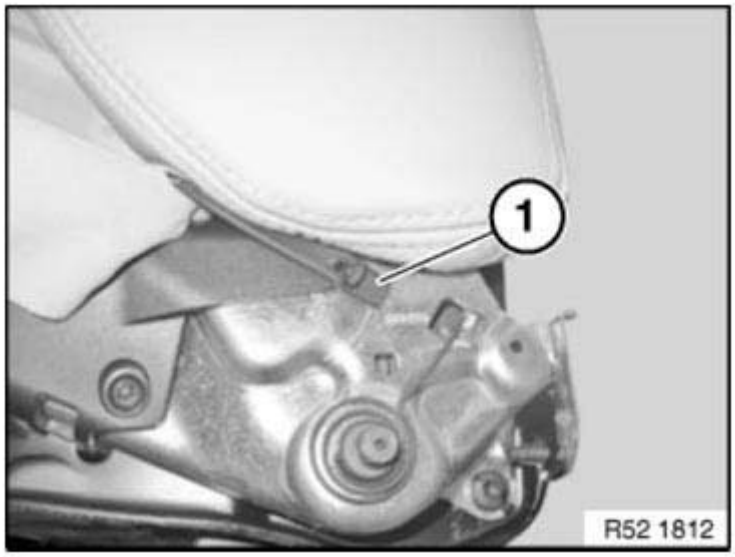


Fig. 206: Identifying Cover Fastener Of Belt Deflector Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Detach seat cover (1) from seat frame.

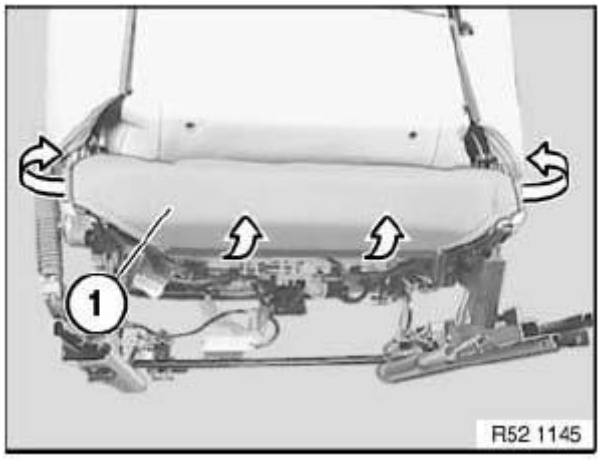


Fig. 207: Removing Seat Cover From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out cover welt (1) completely from seat frame (2).

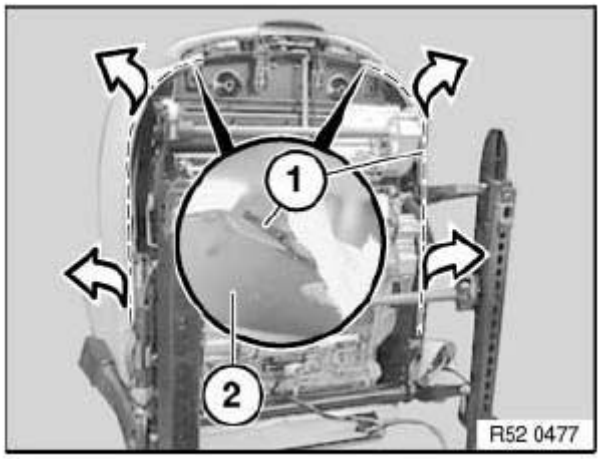


Fig. 208: Pulling Out Cover Welt From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seat cover (1) with padding towards front/top.

IMPORTANT: Carefully slide bracing cloth with foam through backrest gap and seat structure.

Installation:

Slide foam completely through backrest gap and seat structure. Make sure foam and bracing cloth are correctly fitted.

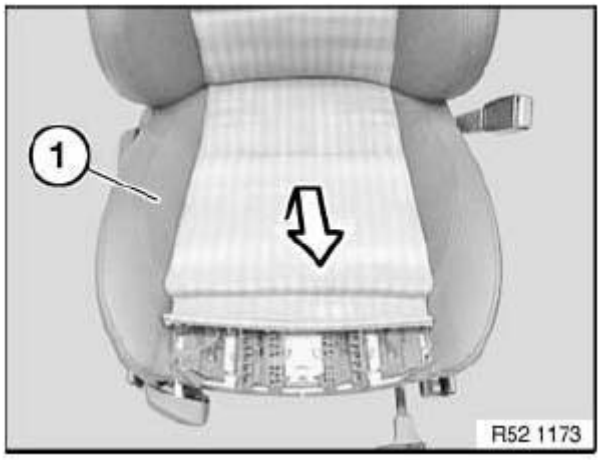


Fig. 209: Removing Seat Cover With Padding
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat heating and/or seat occupancy detector (CIS mat):

Release the corresponding plug connections depending on the version and disconnect.

Pull seat cover (1) with padding forward a little and feed wiring harness (2) out.

Remove seat cover (1) with padding towards front/top.

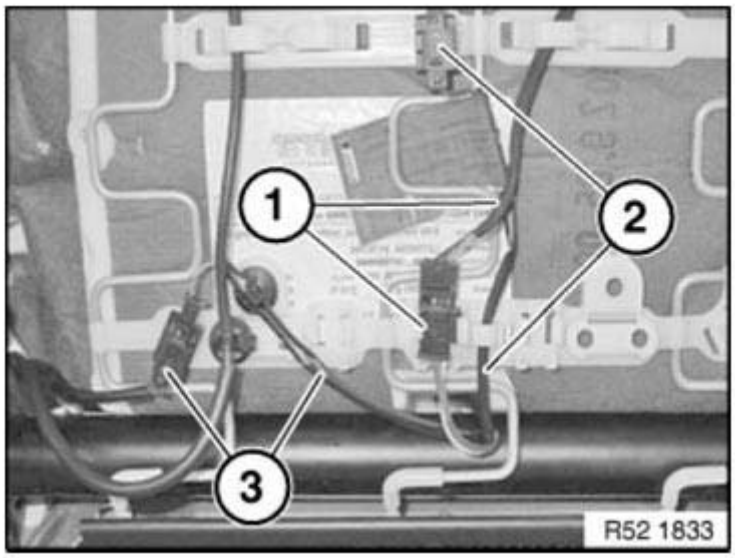


Fig. 210: Identifying Seat Cover And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Release all retainers in marked area.

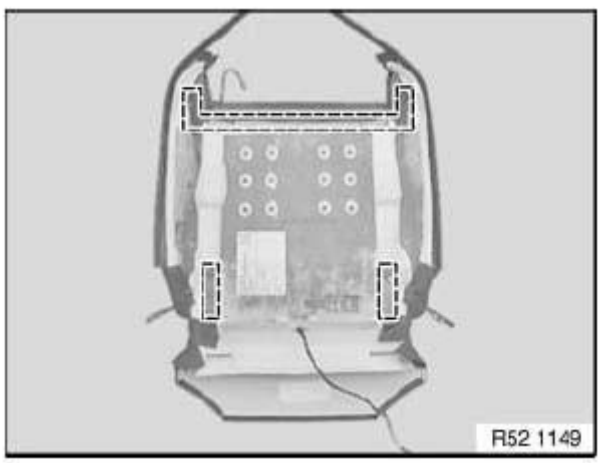


Fig. 211: Identifying Retainers Marked Area
Courtesy of BMW OF NORTH AMERICA, INC.

Detach all retainers in side area from OKE strips.

Carefully fold back seat cover and release retainers from OKE strips.

Remove seat cover from padding.

IMPORTANT: Remove all remnants of clips from seat cover and padding (CIS mat).

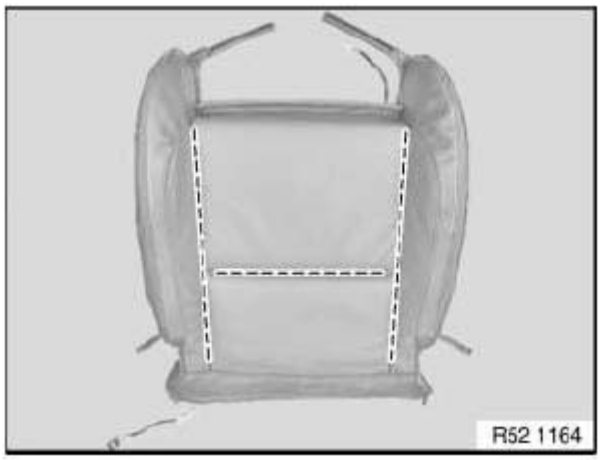


Fig. 212: Identifying Retainers Of OKE Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend new retainers (2) with special tool **52 0 050** .

1. Padding
2. Retainer
3. Trim wire in padding
4. OKE strip in cover
5. Seat cover

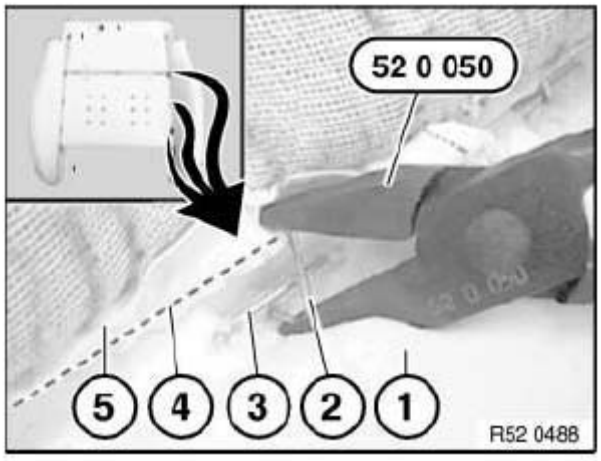


Fig. 213: Bending Retainers Using Special Tool (52 0 050)
Courtesy of BMW OF NORTH AMERICA, INC.

5216 FRONT SEAT, SPORTS, ELECTRIC

52 14 ... ADDITIONAL WORK IN EVENT OF FAULTY DRIVE/GEARING FOR LONGITUDINAL ADJUSTMENT

Release screws (1) of rockers for seat height adjustment.

Installation:

Carefully bend side section back and feed rocker out of top rail.

Tilt front seat back.

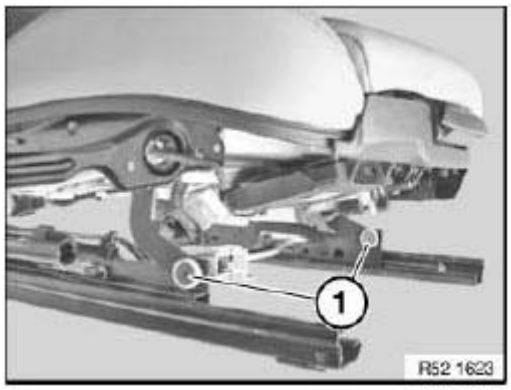


Fig. 214: Identifying Rocker Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

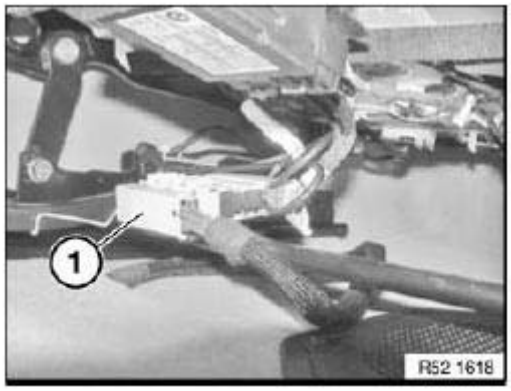


Fig. 215: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip central connector (2) from seat mechanism.

Unclip control units (1) See **6135080 Removing and installing/replacing control unit/module for left or**

right seat adjustment or **6135095 Removing and installing/replacing control unit/module for seat heating** .

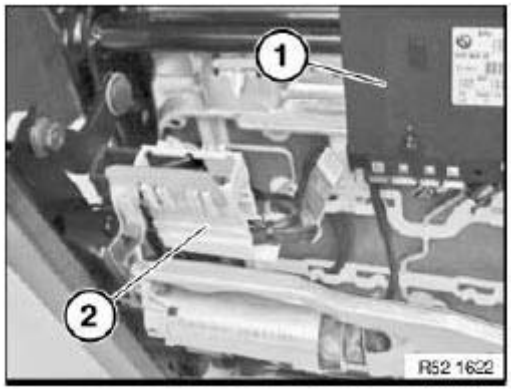


Fig. 216: Identifying Control Units And Seat Mechanism Central Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

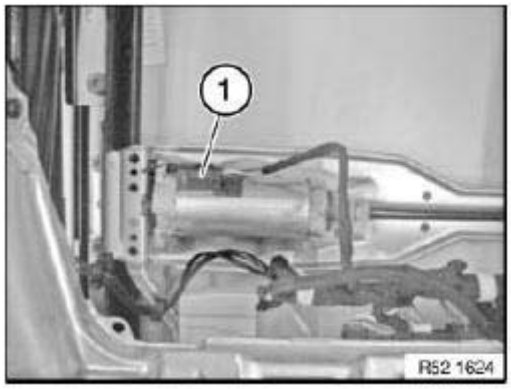


Fig. 217: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Bend metal tab (1) open.

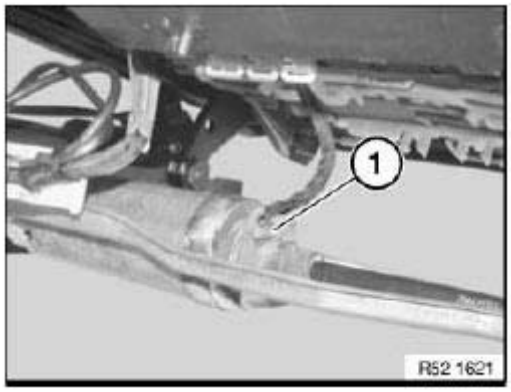


Fig. 218: Identifying Metal Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Lift drive (1) and flex shaft (2) out of guide (4) in direction of arrow.

Detach drive (1) from rubber mounts (3).

Detach flex shaft (3) from drive (1).

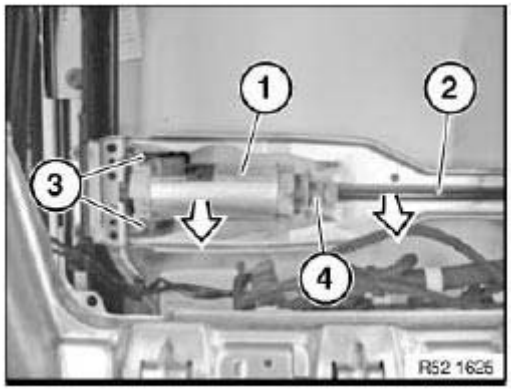


Fig. 219: Lifting Drive And Flex Shaft Out Of Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) at front.

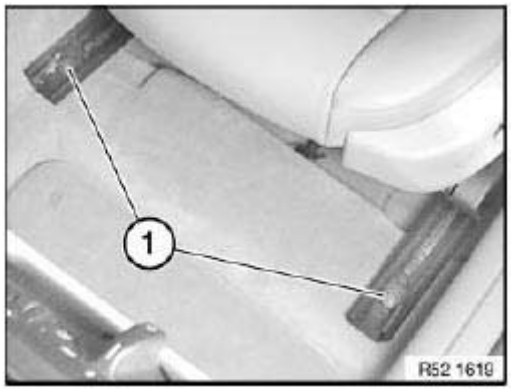


Fig. 220: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install new drive for longitudinal seat adjustment.

Move front seat forwards.

Release screws (1) at rear.

IMPORTANT: Cover door sill with protective covers (risk of damage).

Lift out front seat and assemble.

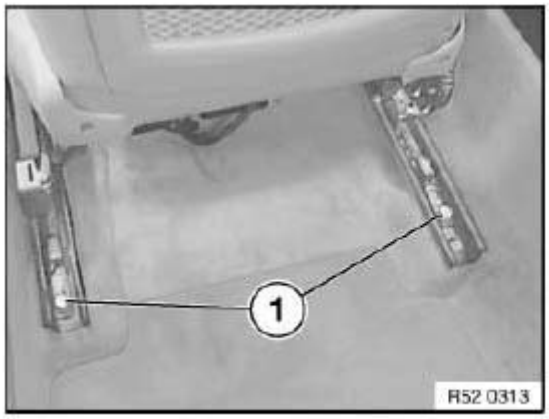


Fig. 221: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Make sure flex shaft is correctly fitted on drive
- Carpet must not get between seat rails and floor pan in area of fastening points (grating noises)
- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads
- Insert all screws loose to avoid twisting
- Tighten down all screws to specified torque

Tightening torque **52 10 1AZ** .

52 14 ... PERFORMING FUNCTION CHECK WITH ADAPTER CABLE (FOR SEAT REPAIRS)

NOTE: The function check on a repaired driver's or front passenger seat can be performed outside the vehicle by using adapter cable 61 4 360.

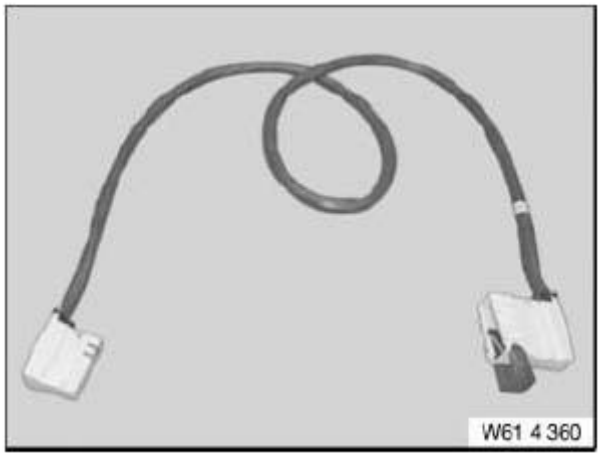


Fig. 222: Identifying Adapter Cable (61 4 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Use:

Adapter cable 61 4 360 is connected to vehicle wiring harness (1) and removed seat (2).

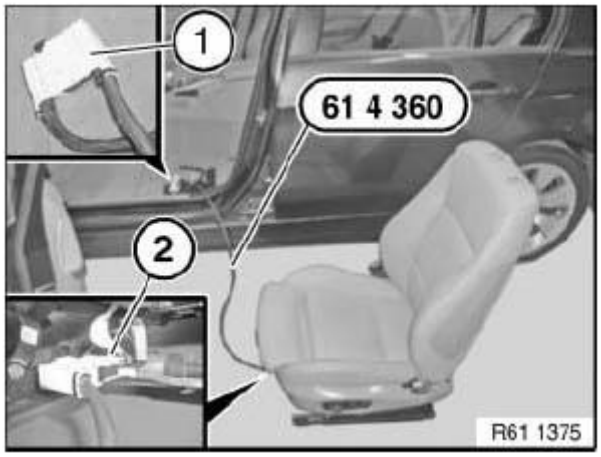


Fig. 223: Connecting Adapter Cable (61 4 360) To Vehicle Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

52 14 ... PERFORMING FUNCTION CHECK WITH ADAPTER CABLE (FOR SEAT REPAIRS)

NOTE: The function check on a repaired driver's or front passenger seat can be performed outside the vehicle by using adapter cable 61 4 360.

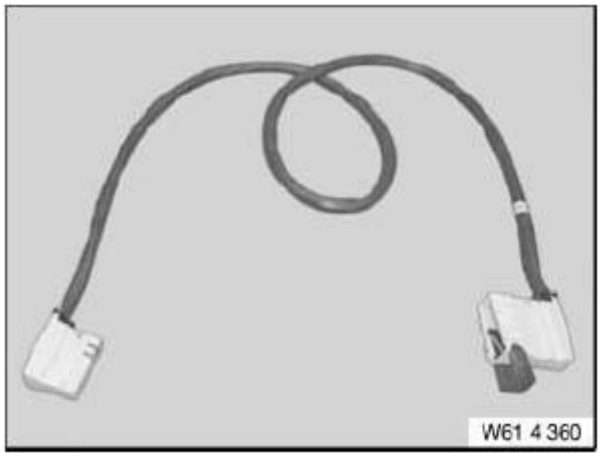


Fig. 224: Identifying Adapter Cable (61 4 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Use:

Adapter cable 61 4 360 is connected to vehicle wiring harness (1) and removed seat (2).

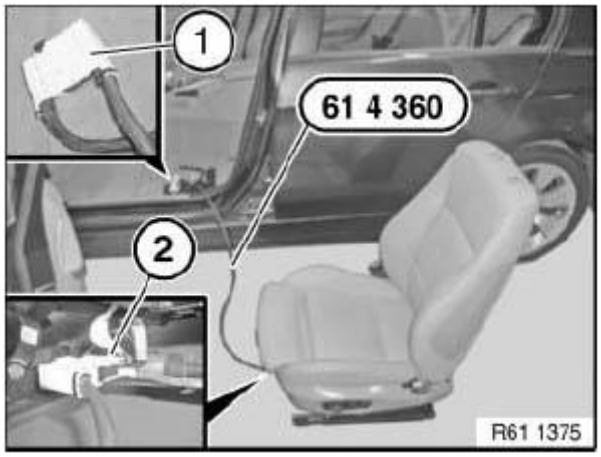


Fig. 225: Connecting Adapter Cable (61 4 360) To Vehicle Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 021 REMOVING AND INSTALLING/REPLACING FLEXMAT ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Remove padding for front seat See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

Remove plug housing (1) from flexmat.

Cut all cable ties and disengage wiring harnesses from flexmat.

Installation:

Make sure wiring harnesses are laid correctly.

Observe bending radius and do not lay wiring harnesses tensioned.

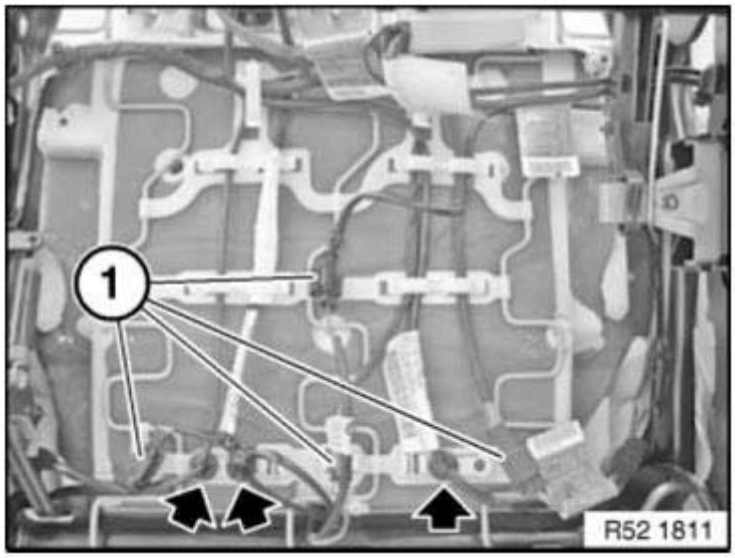


Fig. 226: Identifying Flexmat Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage flexmat (1) at front.

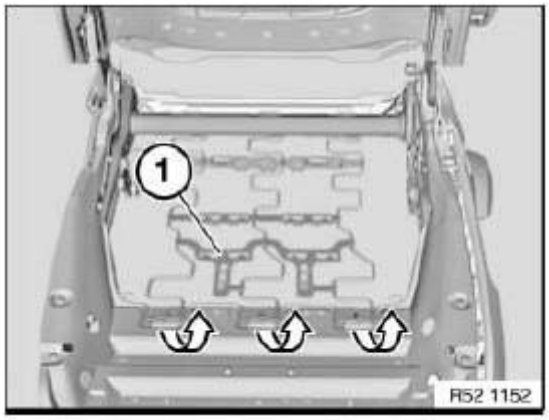


Fig. 227: Removing Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

Swing flexmat (1) down and disengage from seat frame.

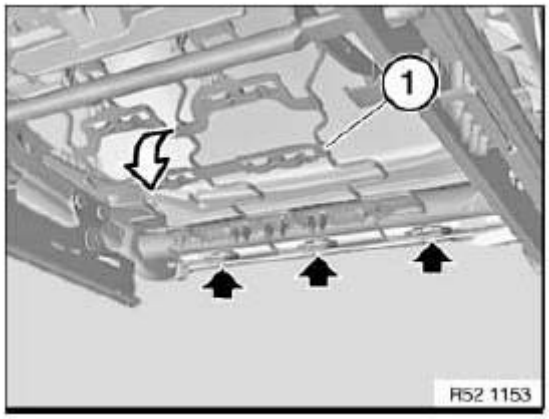


Fig. 228: Moving Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 ... REMOVING AND INSTALLING ISOFIX HOLDER

Necessary preliminary tasks

- Remove seat fabric See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

Release screws (1).

Tightening torque **52 10 07AZ** .

Remove Isofix holder.

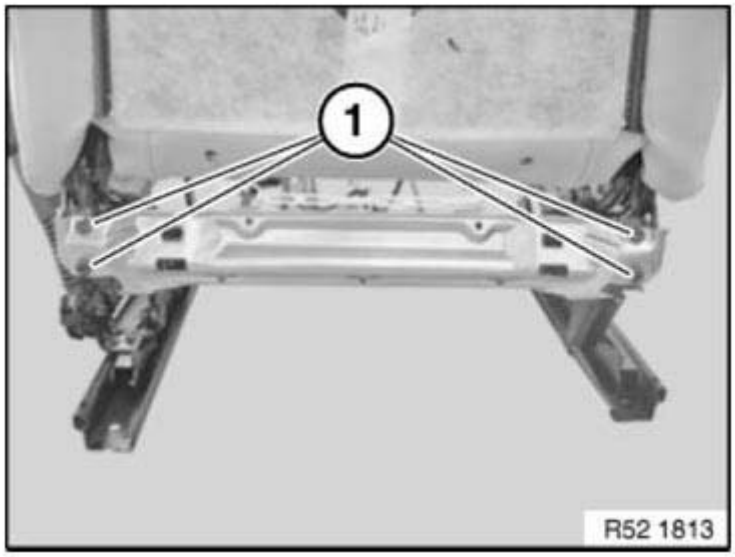


Fig. 229: Identifying Isofix Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

52 14 ... REMOVING AND INSTALLING CARRIER FOR OUTER COVER ON LEFT OR RIGHT FRONT SEAT (ELECTRIC)

Necessary preliminary tasks

- Remove **OUTER COVER**

Cut open cable tie (1).

Unlock and disconnect plug connections (2) on servodrive.

Release screw (3).

Tightening torque **52 10 06AZ** .

Unclip carrier in marked area and remove.

Installation:

Replace cable ties.

Make sure carrier is correctly seated on seat mechanism.

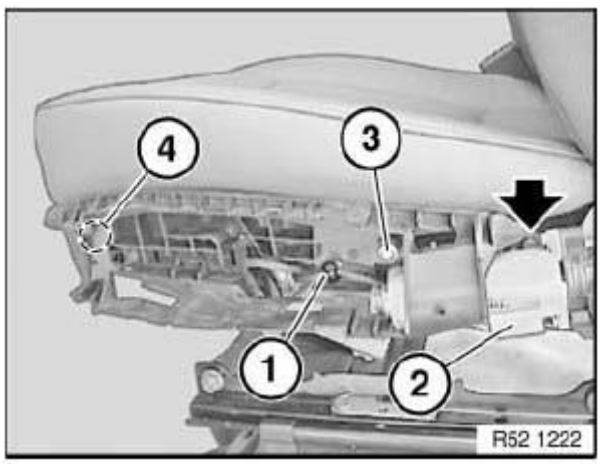


Fig. 230: Identifying Cable Tie, Plug Connections With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 000 REMOVING AND INSTALLING LEFT OR RIGHT FRONT SEAT (NORMAL/MANUAL)

Necessary preliminary tasks

- Open convertible top
- Disconnect **BATTERY NEGATIVE LEAD**

IMPORTANT: An airbag module and a pyrotechnical seat belt tensioner are installed in the front seat.
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

Installation:

- Powerlok screws must be replaced and must **not** be reused
- Powerlok screws are mechanical screw locks with trilobular threads
- Screws are fitted with a Torx Plus system and can be released with a standard Torx screwdriver

Move seat to upper back position.

Release and dispose of screws (1).

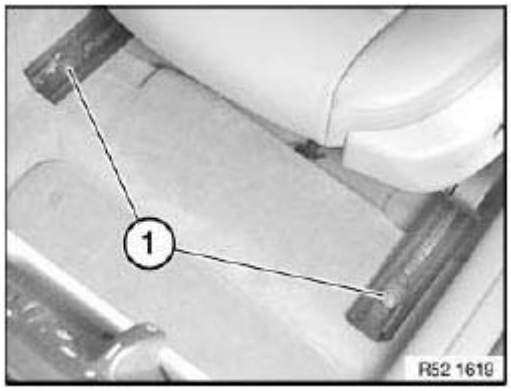


Fig. 231: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Move seat forwards and position flush with seat runners.

Unclip release tab (2) for belt anchor fitting trim (1) with plastic wedge.

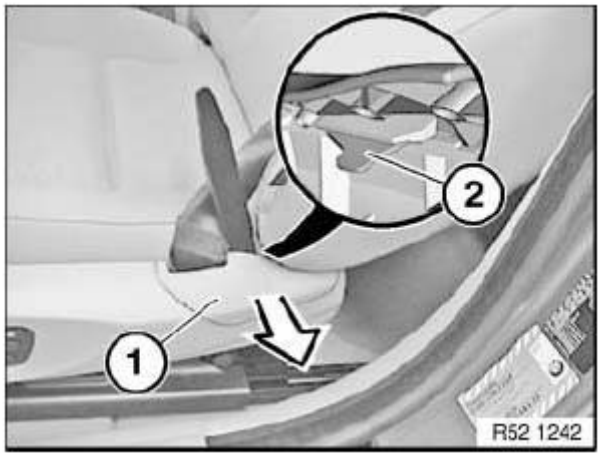


Fig. 232: Removing Release Tab For Belt Anchor Fitting Trim Using Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 2AZ** .

Remove anchor fitting (2).

Installation:

Make sure anchor fitting (2) is correctly seated on seat mechanism pin.

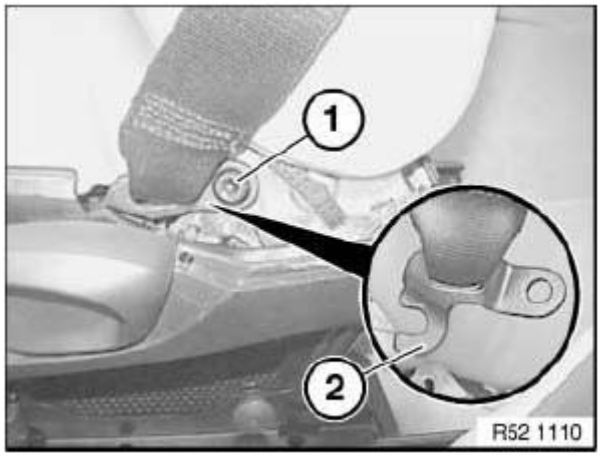


Fig. 233: Identifying Anchor Fitting With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release and dispose of screws (1).

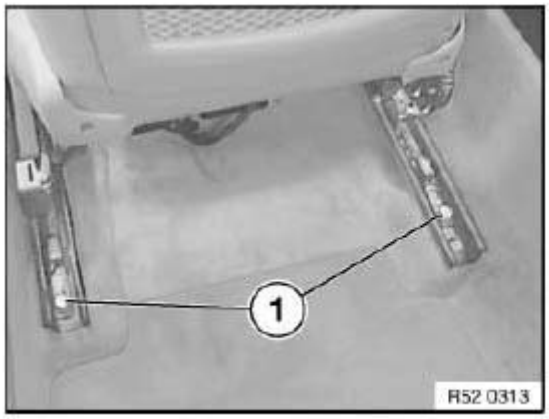


Fig. 234: Identifying Seat Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

IMPORTANT: Cover door sill with protective covers (risk of damage).

Lift out front seat.

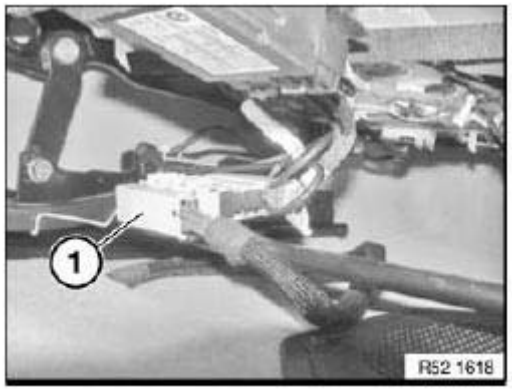


Fig. 235: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Carpet must not get between seat rails and floor pan in area of fastening points (grating noises)
- Replace microencapsulated screws
- Insert all screws loose to avoid twisting
- Tighten down all screws to specified torque

Tightening torque **52 10 1AZ** .

WARNING: When carrying out further work on the front seat, it is absolutely

imperative to observe the SAFETY REGULATIONS on handling airbag modules and pyrotechnical seat belt tensioners
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

52 13 390 REMOVING AND INSTALLING OR REPLACING FRONT LEFT OR RIGHT HEAD RESTRAINT

WARNING: Danger of pinching!

Reach on left and right under head restraint and unclip in jerks in upward direction.

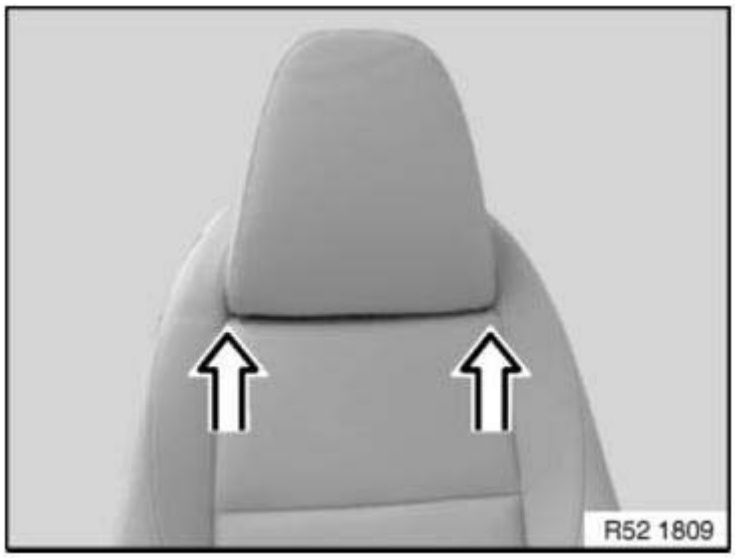


Fig. 236: Removing Head Restraint
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 198 REMOVING AND INSTALLING OR REPLACING REAR PANEL ON LEFT OR RIGHT FRONT SEAT BACKREST

Release clips (1) with diagonal cutting pliers.

Remove rear panel (2) downwards with a turning action.

NOTE: Remove remnants of clips.

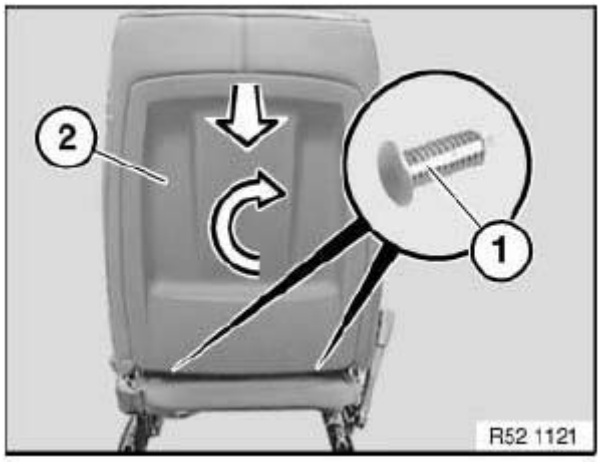


Fig. 237: Removing Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining hooks (1) and bore holes (2) on rear panel (3) must not be damaged.

Replace faulty clips.

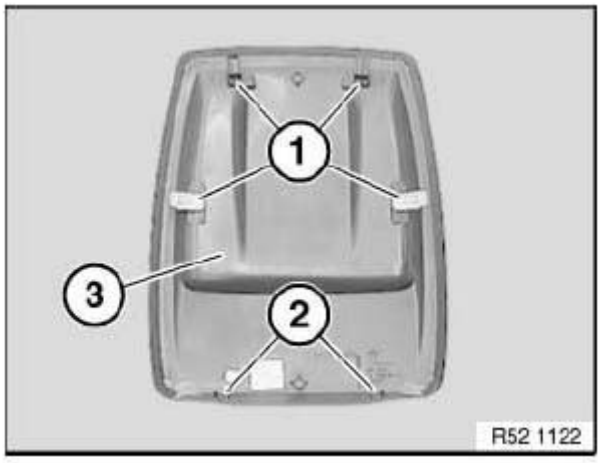


Fig. 238: Identifying Hooks And Bore Holes On Rear Panel
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 030 REMOVING AND INSTALLING/REPLACING BACKREST FRAME ON LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks:

- Remove **FRONT SEAT**
- Remove **REAR PANEL** on front seat backrest

Release airbag wiring harness (2) from cable holders on flexmat.

Disconnect cable tie from clips.

Raise release clip (3) and pull plug (4) out of plug housing (1).

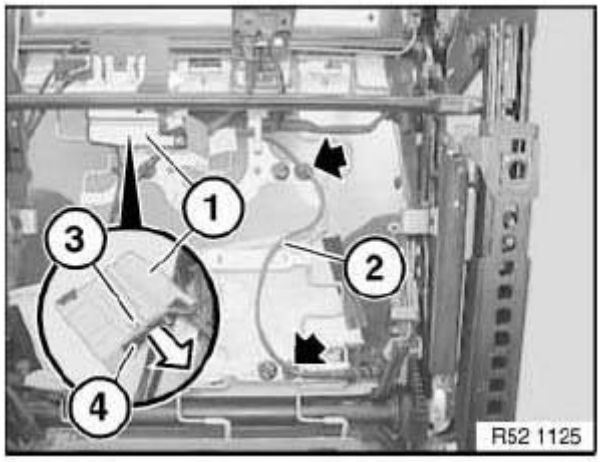


Fig. 239: Pulling Plug Out Of Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Always feed in cable tie (1) at narrow end of plug housing in direction of arrow.

Cables must be secured with insulation under cable tie.

Firmly tighten cable tie (1) to relieve strain. It must not be possible to move the cable.

Make sure plug (2) is correctly locked in plug housing (3).

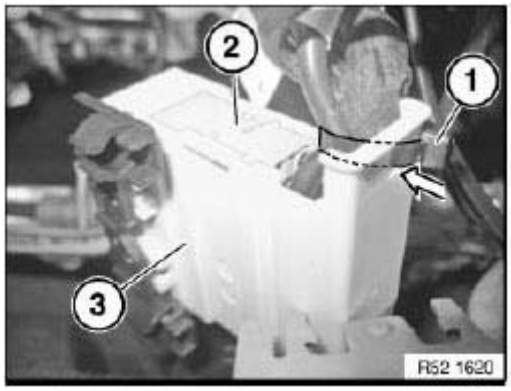


Fig. 240: Installing Cable Tie At Narrow End Of Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unclip cable.

Release wiring harness (3) from cable holders on seat mechanism.

Unfasten plug connection (2) and disconnect.

IMPORTANT: Feed all wiring harnesses carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

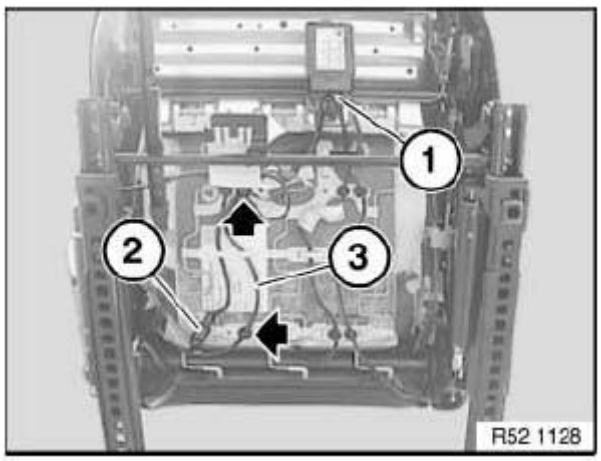


Fig. 241: Identifying Plug Connections And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook backrest cover (1) on left and right.

Release screws (2) on left and right.

Tightening torque **52 10 02AZ** .

Remove backrest frame (3) completely towards top.

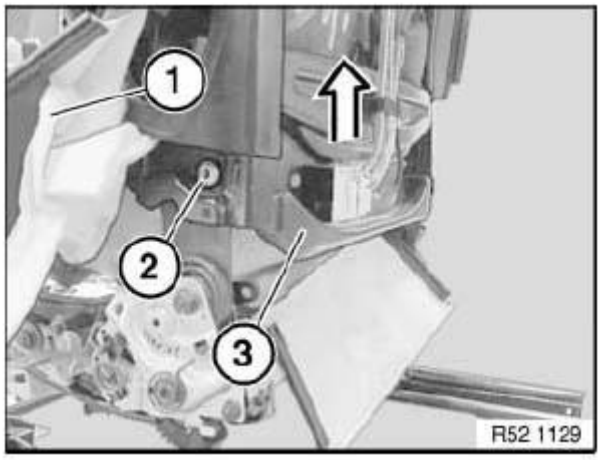


Fig. 242: Removing Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove backrest cover with padding.
- Remove **SIDE AIRBAG** .
- Remove lumbar support See **5215059 Removing and installing/replacing lumbar support pump with valve housing for lumbar support/backrest width adjustment**; **5213059 Removing and installing/replacing lumbar support pump with valve housing for lumbar support**; **5213055 Removing and installing/replacing lumbar support on front seat** or **5215061 Replacing both air cushions for backrest width adjustment on left or right front seat**.

52 13 025 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SEAT MECHANISM (NORMAL/MANUAL)

This job is described under:

- Remove **BACKREST FRAME** on front seat

Replacement only:

- Remove seat cover See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)** for front seat
- Remove **SEAT BELT TENSIONER**
- Remove **control unit for seat heating**

Seat mechanism is supplied complete with corresponding drive units.

Unlock plug housing (3) and remove from holder.

Disengage wiring harnesses from flexmat.

Installation:

Make sure wiring harnesses are laid correctly.

Observe bending radius and do not lay wiring harnesses tensioned.

Release screws (1).

Tightening torque **52 10 05AZ** .

Remove holder (2) for control unit.

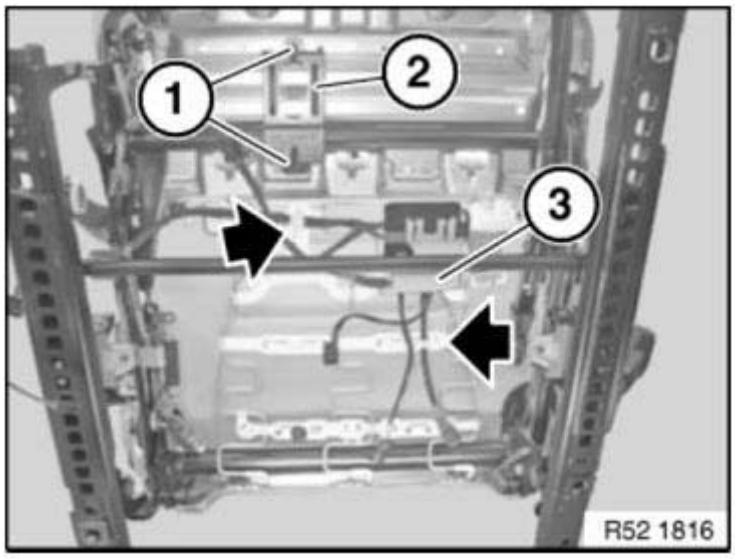


Fig. 243: Identifying Plug Housing With Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **52 10 03AZ** .

Remove belt buckle deflector trim (2).

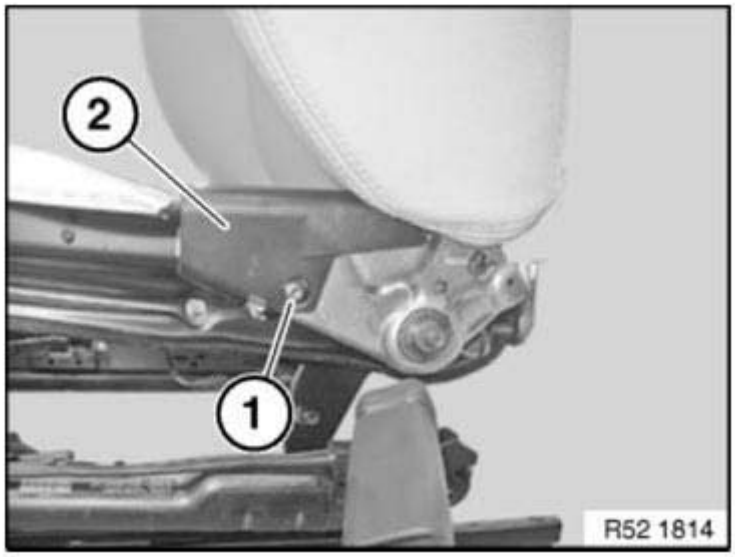


Fig. 244: Identifying Belt Buckle Deflector Trim With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Sport seat only:

Release screws (1).

Remove connection for thigh support.

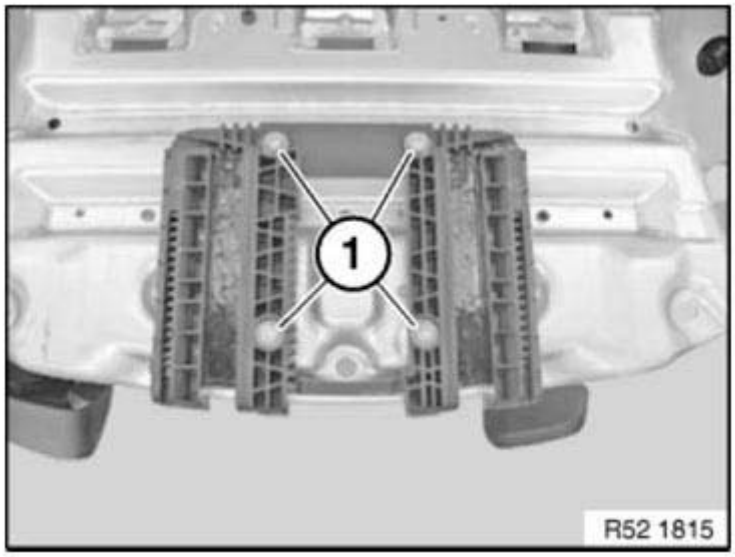


Fig. 245: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

52 15 059 REMOVING AND INSTALLING/REPLACING LUMBAR SUPPORT PUMP WITH VALVE HOUSING FOR LUMBAR SUPPORT/BACKREST WIDTH ADJUSTMENT

Necessary preliminary tasks

- Remove **REAR PANEL ON FRONT SEAT**

Detach backrest cover (1) from backrest frame.

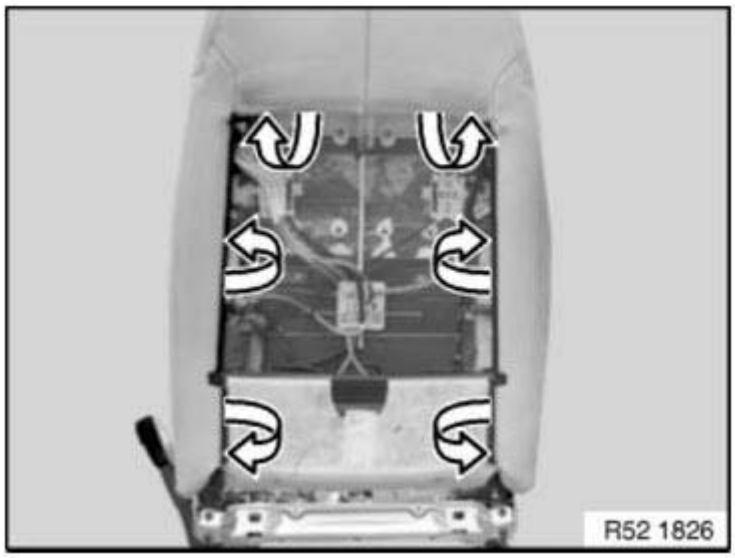


Fig. 246: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Installation:

Replace defective cable tie.

Open zip fastener (2).

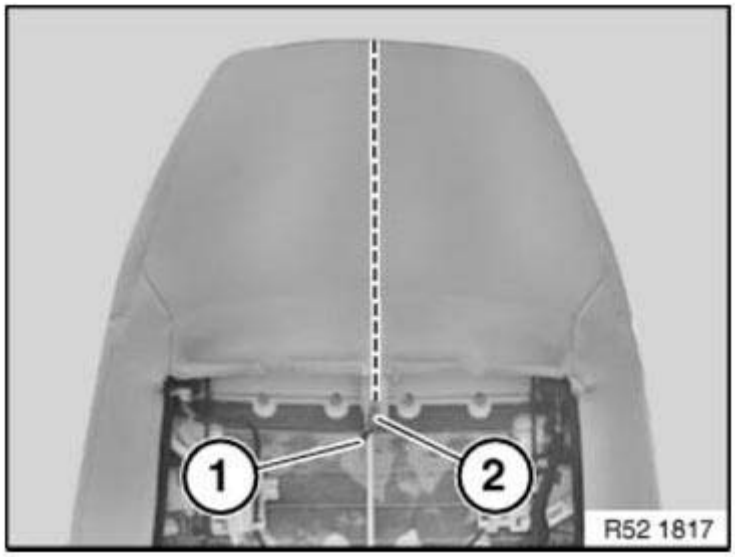


Fig. 247: Identifying Cable Tie And Zip Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach cable tie.

Installation:

Replace defective cable ties.

Remove lumbar support pump (1) from backrest frame.

Unfasten plug connection (2) and disconnect.

Unclip air hose from holder (3).

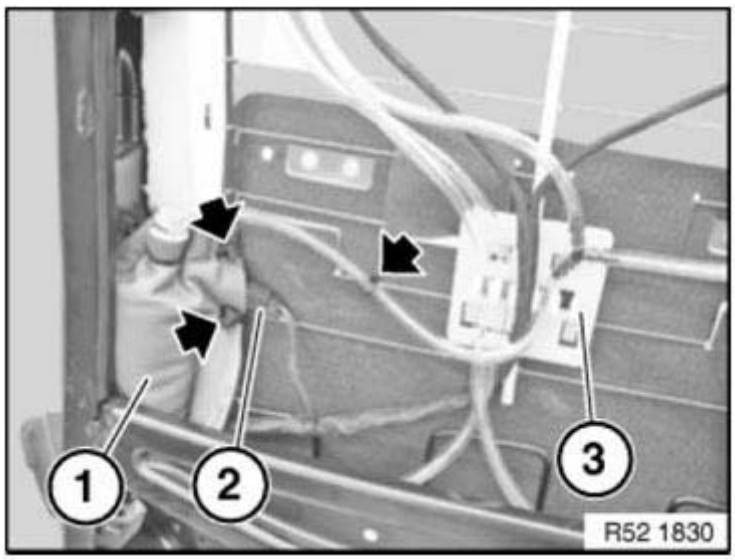


Fig. 248: Identifying Lumbar Support Pump With Plug Connection And Air Hose Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Pop valve housing (2) for lumbar support in direction of arrow out of backrest frame.

Disengage wiring harness from cable tie (3).

Installation:

Feed rubber plug (1) through backrest frame.

Pull rubber plug (1) and pop valve housing into backrest frame.

Check rubber sleeve of valve housing for correct seating in backrest frame.

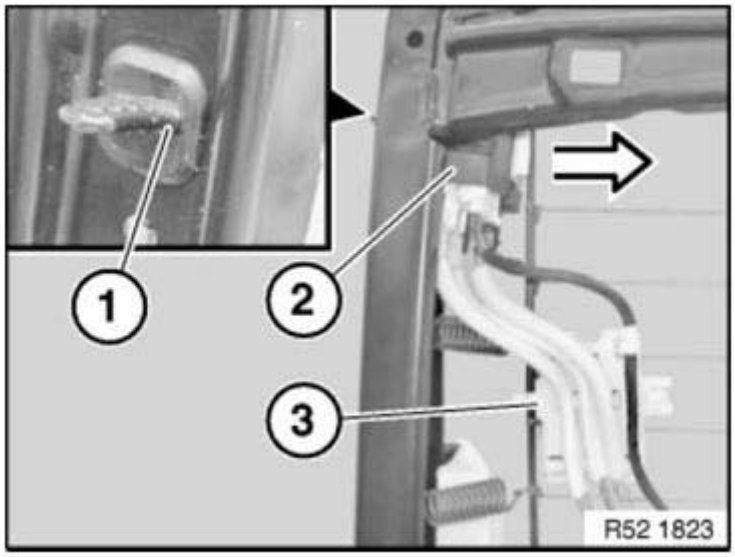


Fig. 249: Removing Valve Housing Out Of Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unlock quick connector and detach air hoses (2, 3 and 4) from valve housing.

Valve unit for backrest width adjustment:

(2) Hose (clear), lumbar drive
(3) Hose (clear), right lumbar cushion
(4) Hose (clear), left lumbar cushion

NOTE: Connections are coded against incorrect assembly.

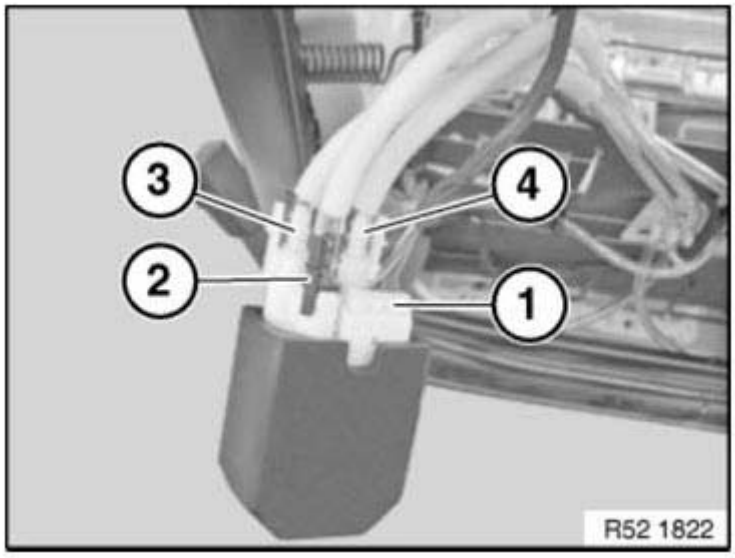


Fig. 250: Identifying Plug Connection With Air Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out FUNCTION CHECK .

52 14 040 REMOVING AND INSTALLING/REPLACING OUTER COVER ON FRONT LEFT OR RIGHT SEAT (NORMAL/ELECTRIC)

Necessary preliminary tasks

- Remove **FRONT SEAT**

NOTE: Picture shows installed seat by way of example.

Move backrest to full rearward position.

Unclip release tab (2) for belt anchor fitting trim (1) with plastic wedge.

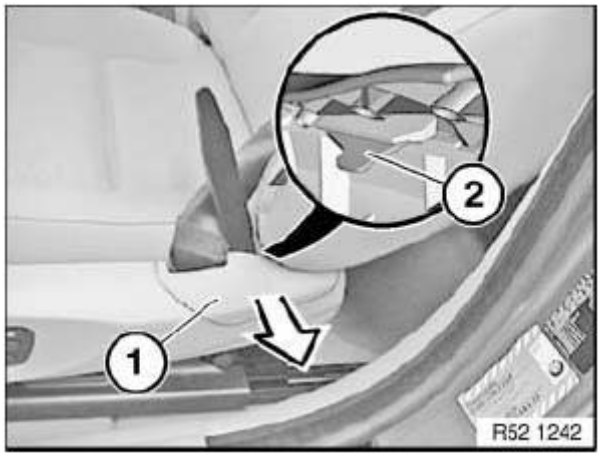


Fig. 251: Removing Release Tab For Belt Anchor Fitting Trim Using Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw or catch (3).

Lever lugs (1) out of holders (2).

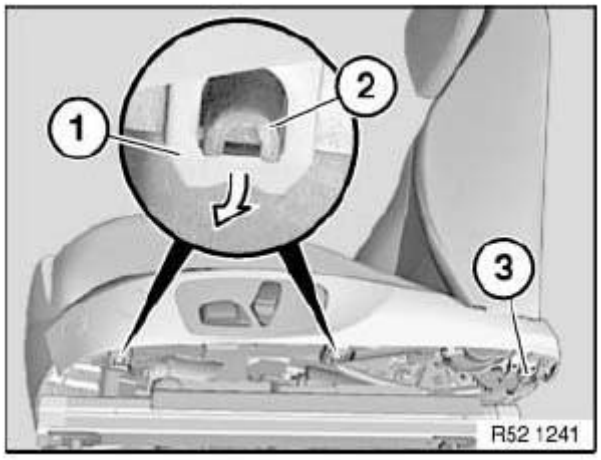


Fig. 252: Removing Lugs Out Of Holders
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Cover (1) could detach itself in from area with carrier section (2) from seat mechanism.

Carefully pull cover (1) with carrier section (2) in front area off seat mechanism.

Press unlocking lug (3) with screwdriver and detach cover from carrier section.

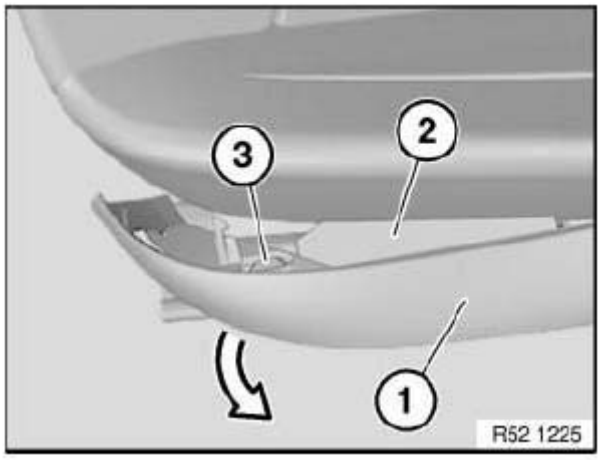


Fig. 253: Pulling Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Raise lug (1) and unlock.

Reach between seat padding and cover (2) and pull cover off carrier section.

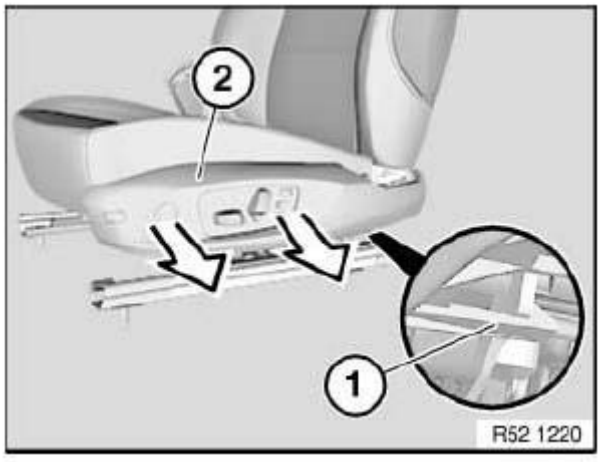


Fig. 254: Pulling Cover Off Carrier Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug connections:

1. Switch combination
2. Lumbar support
3. Backrest width adjustment

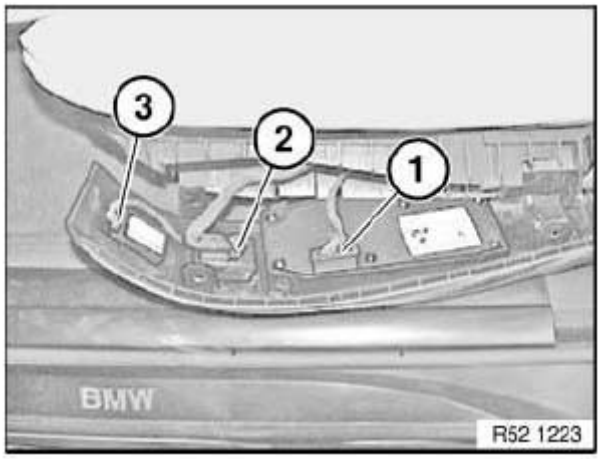


Fig. 255: Identifying Switch Combination, Lumbar Support And Backrest Width Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining clips and lugs of cover must not be damaged.

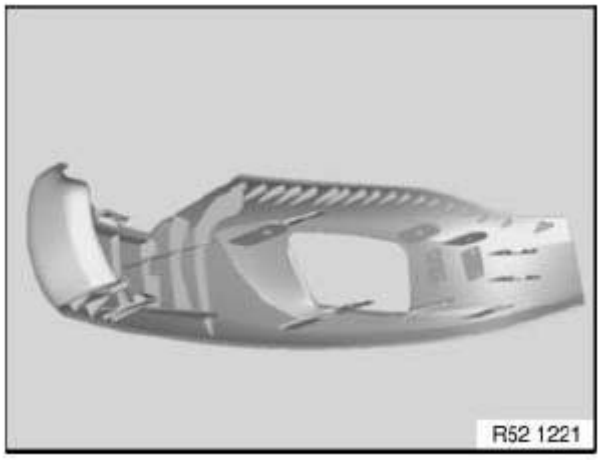


Fig. 256: Identifying Retaining Clips And Lugs Of Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

Unlock catches of switch housing and remove switch from cover.

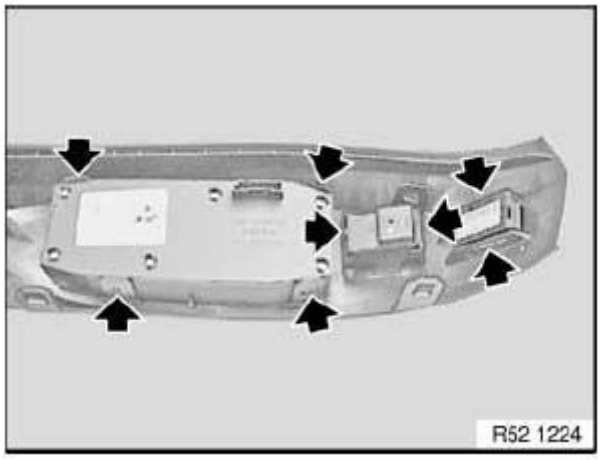


Fig. 257: Locating Catches Of Switch Housing
Courtesy of BMW OF NORTH AMERICA, INC.

52 15 403 REMOVING AND INSTALLING/REPLACING THIGH SUPPORT COVER ON FRONT SEAT (SPORT/MANUAL)

Release thigh support (1) and move forward.

Lever welt of seat cover (2) out of thigh support.

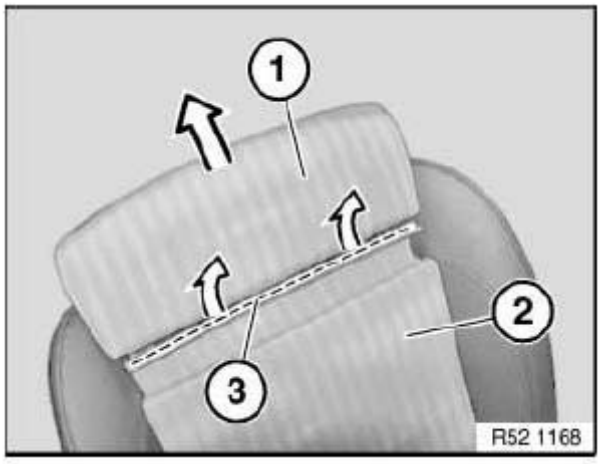


Fig. 258: Removing Thigh Support
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out cover welt in marked area (1).

Disengage trim thread in marked area (2) from thigh support.

Remove cover with padding.

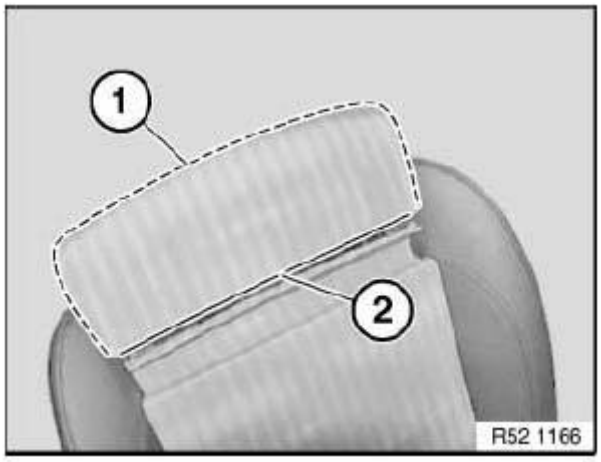


Fig. 259: Identifying Cover Welt And Trim Thread Marked Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Pull cover (1) off padding (2).

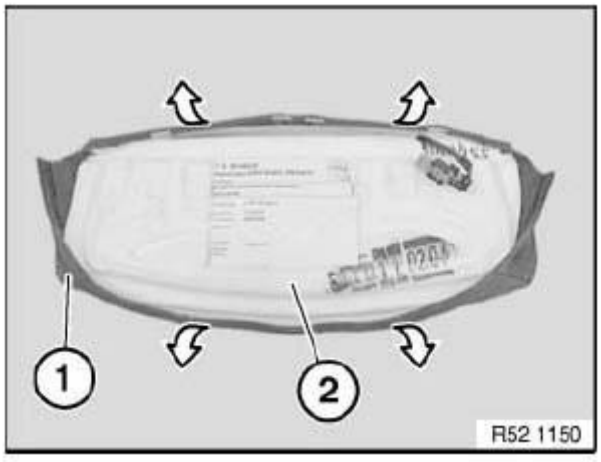


Fig. 260: Pulling Cover Off Padding
Courtesy of BMW OF NORTH AMERICA, INC.

52 13 405 REPLACING BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **REAR PANEL**
- Remove **HEAD RESTRAINT**

Version with seat heating only

Unfasten plug connection (1) and disconnect.

Detach cable tie.

Release wiring harness (2) from cable holders on seat mechanism.

IMPORTANT: Feed the wiring harness carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

Installation:

Lay wiring harness without kinks and tension.

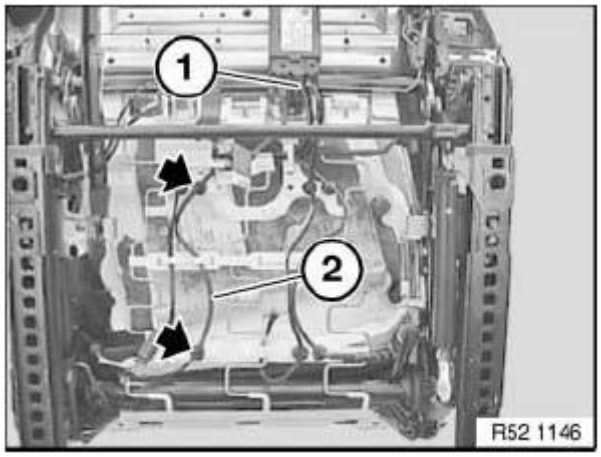


Fig. 261: Identifying Plug Connection And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable tie (1) from seat mechanism.

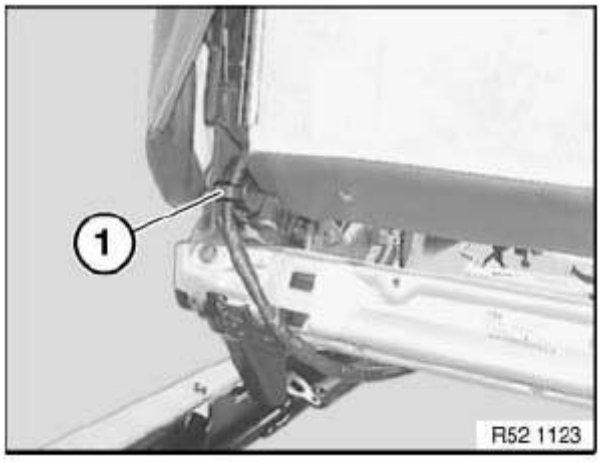


Fig. 262: Identifying Cable Tie Of Seat Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Installation:

Replace defective cable tie.

Open zip fastener (2).

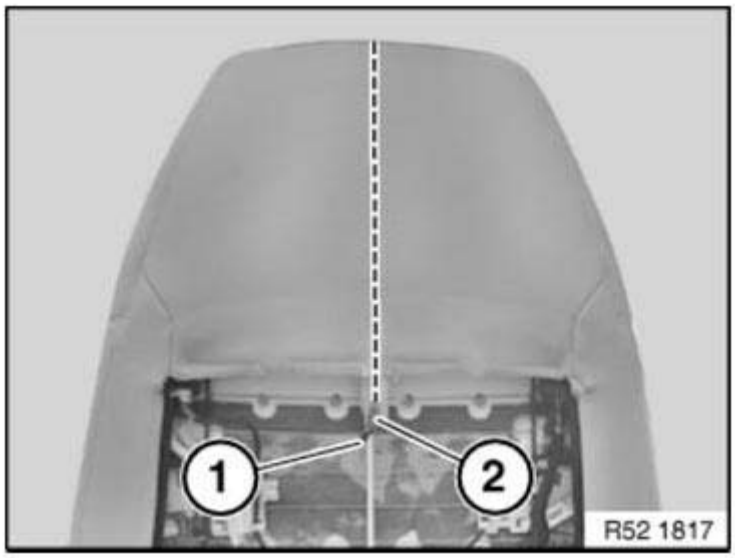


Fig. 263: Identifying Cable Tie And Zip Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach backrest cover (1) from backrest frame.

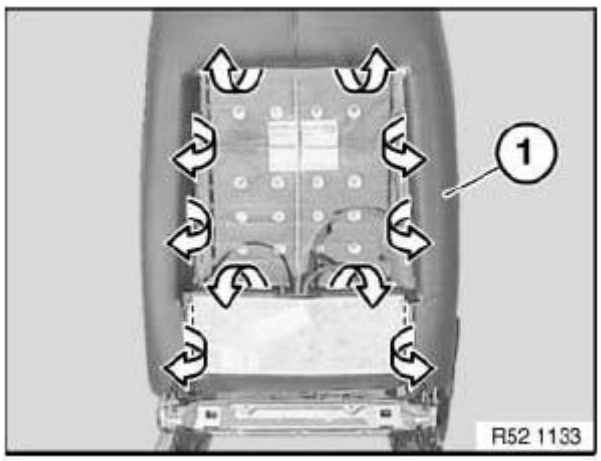


Fig. 264: Removing Backrest Cover From Backrest Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Installation:

Replace nuts.

Tightening torque **72 12 03AZ** .

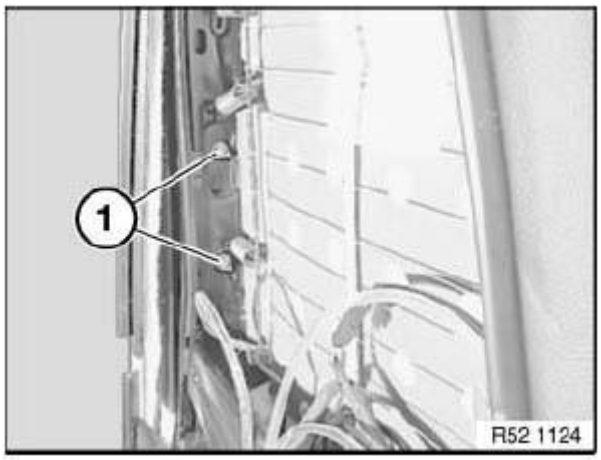


Fig. 265: Identifying Seat Mechanism Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Detach mounting strip (4) from flexmat.

Carefully pull airbag module (3) with threaded pins out of backrest frame and feed out between padding (1) and inner bag (2).

Set down airbag module (3) to one side.

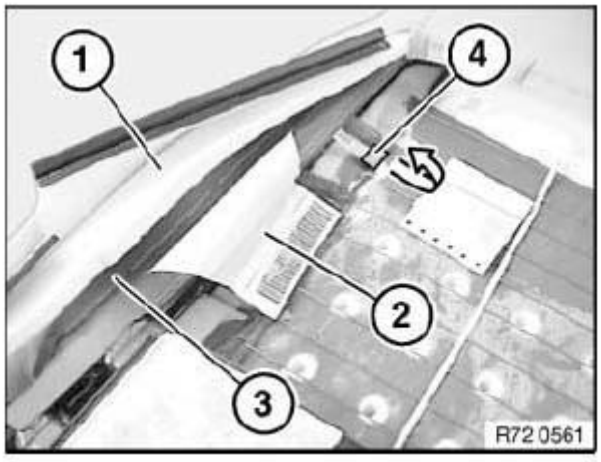


Fig. 266: Removing Mounting Strip From Flexmat
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull inner bag (1) fully over airbag module and threaded pins.

Feed in mounting strip (2) of inner bag (1) through backrest frame.

Insert threaded pins into backrest frame and secure with new nuts.

No inner bag material is permitted to project through the hole in the inner frame.

Install nuts and tighten down.

Tightening torques **72 12 03AZ** .

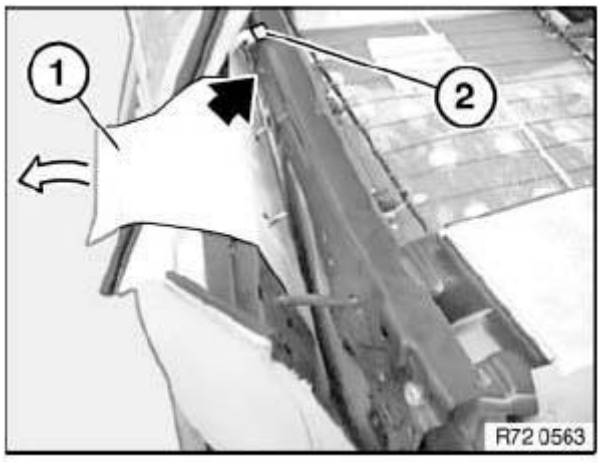


Fig. 267: Pulling Inner Bag Over Airbag Module And Threaded Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Inner bag must be between airbag module and backrest frame!

Engage mounting strip (1) of inner bag in flexmat.

Position inner bag (2) smoothly over backrest frame.

Engage backrest cover (3) in backrest frame.

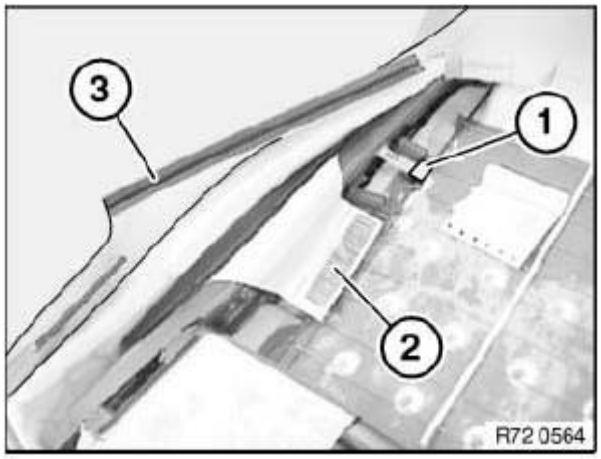


Fig. 268: Identifying Mounting Strip, Inner Bag And Backrest Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Reposition backrest cover (1) at side and bottom and pull off with padding towards top from backrest frame.

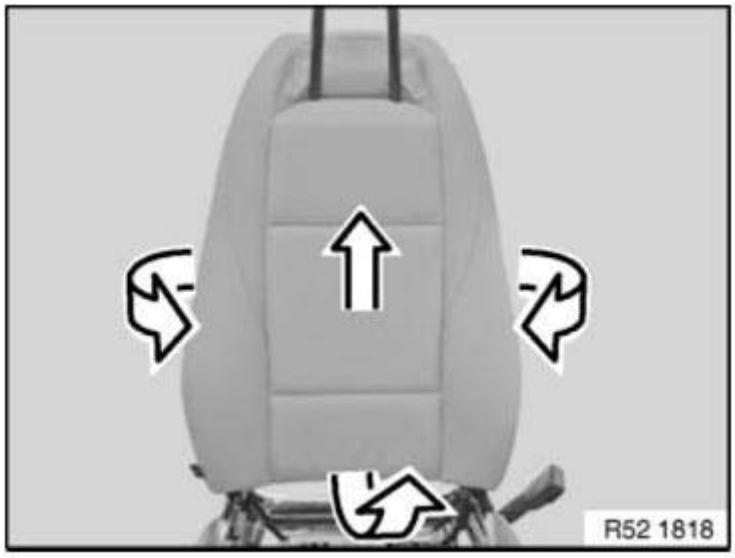


Fig. 269: Positioning Backrest Cover At Side And Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Release all retainers in marked area.

Remove backrest cover from padding.

NOTE: Remove all remnants of retainers from backrest cover and padding.

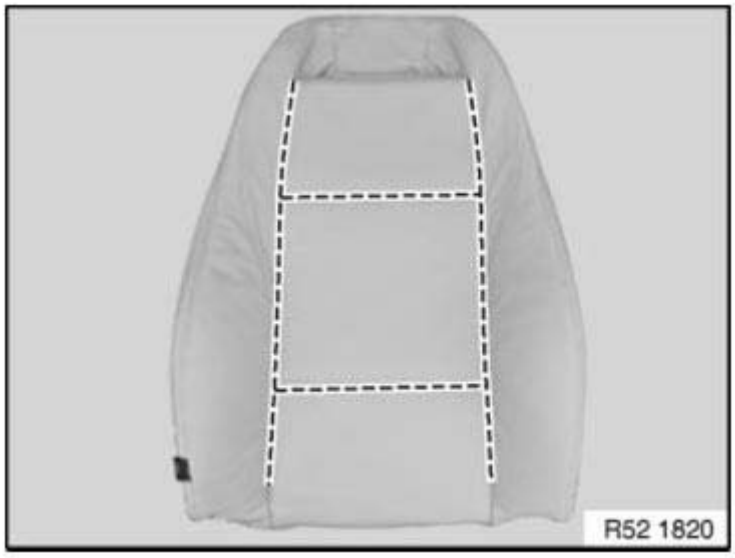


Fig. 270: Identifying Retainers Marked Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend new retainer (2) with special tool **52 0 050** .

1. Padding
2. Retainer
3. Trim wire in padding
4. Trim wire in backrest cover
5. Backrest cover

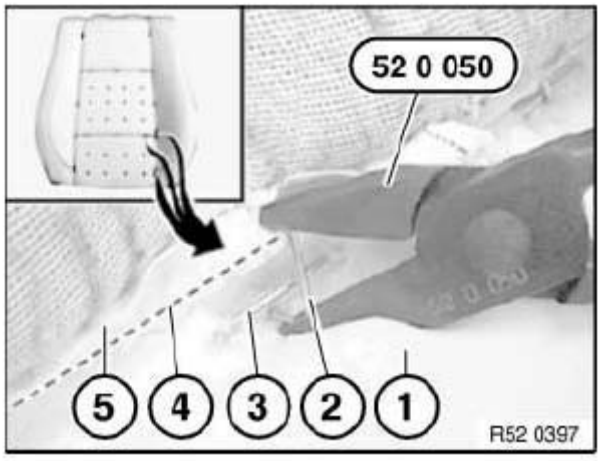


Fig. 271: Bending Retainer Using Special Tool (52 0 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement of backrest cover

Pull trim wires out of backrest cover.

Cut new backrest cover to size and insert trim wires.

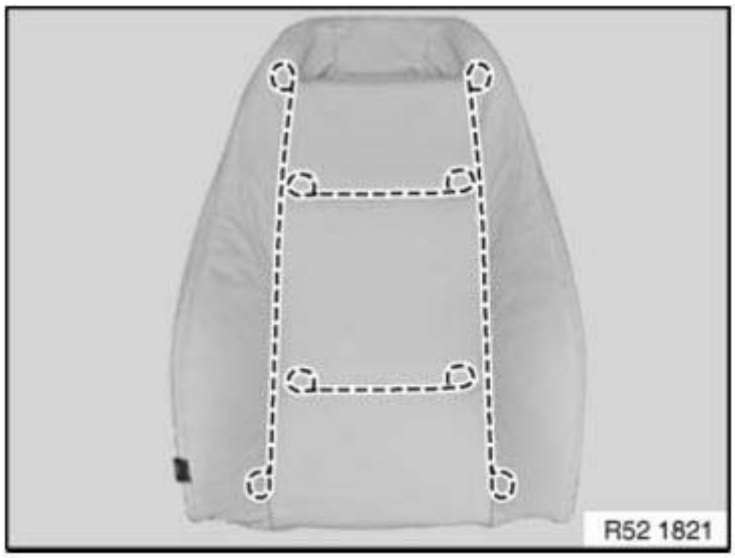


Fig. 272: Identifying Backrest Cover
Courtesy of BMW OF NORTH AMERICA, INC.

52 15 451 REPLACING BACKREST HEATING ELEMENT FOR LEFT OR RIGHT SPORTS SEAT

Operation is described in:

- Replacing **HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT**

52 16 056 REPLACING BOTH AIR CUSHIONS FOR BACKREST WIDTH ADJUSTMENT ON LEFT OR RIGHT FRONT SEAT (SPORT/ELECTRIC)

Operation is identical to:

Replacing **BOTH AIR CUSHIONS FOR BACKREST WIDTH ADJUSTMENT** on left or right front seat (Sport/mechanical).

52 15 450 REPLACING CUSHION HEATING ELEMENT FOR LEFT OR RIGHT FRONT SEAT

Operation is described in:

- Replacing **HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT**

52 15 452 REPLACING HEATING ELEMENT FOR LEFT OR RIGHT FRONT SEAT (THIGH SUPPORT)

Operation is described in:

- Replacing **HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT**

52 15 455 REPLACING HEATING ELEMENTS FOR LEFT OR RIGHT FRONT SEAT (SPORT)

Necessary preliminary tasks

- Remove **SEAT FABRIC**
- Remove **BACKREST COVER**
- Remove **THIGH SUPPORT COVER**

NOTE: Heating elements are bonded with a foam section and cannot be separated from each other without causing damage.
Foam section and heating elements must be replaced.

Check new foam section:

- No obvious damage or material defects
- All trim wires present in foam
- No bubbles in foam section
- No dirt/contamination on foam or residual foam
- Pay attention to foam section on left and right

Check new heating mat:

- No obvious damage or material defects
- All tear-off film pieces presents
- Note variant by examining label on cable

Guide cable for backrest heating through foam hole.

Stick on main section (1):

- Pull adhesive film pieces off main section (1) and stick to upper edge of main section foam until flush

Stick on bead section (2):

- Pull adhesive film pieces off bead section (2) and stick on heating mat along bead section edges.
- Press down evenly in outwards direction

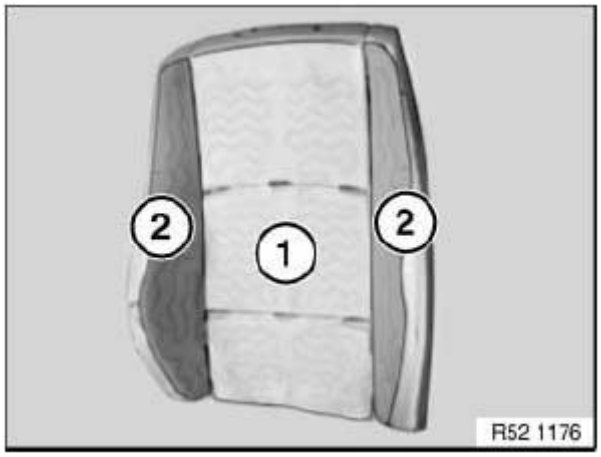


Fig. 273: Identifying Sticks On Main And Bead Section
Courtesy of BMW OF NORTH AMERICA, INC.

Guide cable for seat heating through foam hole.

Stick on STV heating mat (1):

- Pull off adhesive film and stick to rear foam edge until flush

Stick on bead section (2):

- Pull adhesive film pieces off bead section (2) and stick on heating mat along bead section edges.
- Press down evenly in outwards direction

Stick on main section (3):

- Pull adhesive film pieces off main section (3) and stick to upper edge of main section foam until flush

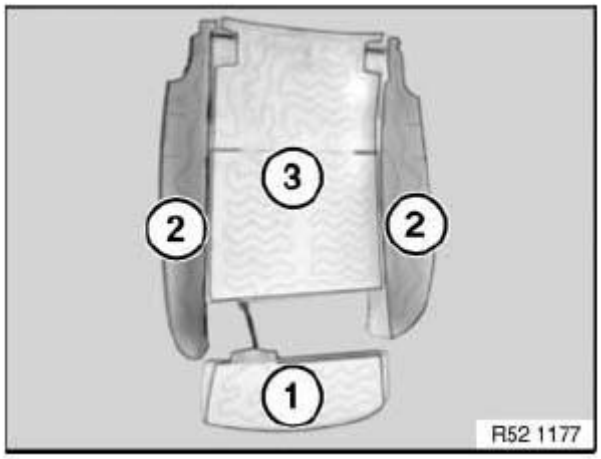


Fig. 274: Identifying Sticks On STV Heating Mat, Main And Bead Section
Courtesy of BMW OF NORTH AMERICA, INC.

Check laying of heating mats:

- Heating mats laid without folds
- Heating mats correctly positioned
- All bonding surfaces stuck on

NOTE: Carry out FUNCTION TEST

52 16 050 REPLACING LUMBAR CUSHION ON LEFT OR RIGHT FRONT SEAT

Removal is identical to:

Removing and installing/replacing **LUMBAR SUPPORT ON FRONT SEAT**

52 15 415 REPLACING PADDING FOR LEFT OR RIGHT FRONT SEAT (SPORT/MANUAL)

Operation is described in:

Replacing **SEAT COVER ON LEFT OR RIGHT FRONT SEAT** .

52 15 420 REPLACING PADDING FOR LEFT OR RIGHT FRONT SEAT BACKREST (SPORT/MANUAL)

Operation is described in:

Replacing **BACKREST COVER FOR LEFT OR RIGHT FRONT SEAT** .

52 15 417 REPLACING PADDING FOR LEFT OR RIGHT THIGH SUPPORT (SPORT/MANUAL)

This operation is described in section on:

Replacing **THIGH SUPPORT COVER ON LEFT OR RIGHT FRONT SEAT** .

52 15 400 REPLACING SEAT COVER FOR LEFT OR RIGHT FRONT SEAT (SPORT/MANUAL)

Necessary preliminary tasks

- Remove **FRONT SEAT**
- Remove **THIGH SUPPORT**
- Manual version:

  Remove **OUTER COVER**

- Electric version:

Remove **CARRIER FOR COVER**

WARNING: US/CDN front passenger seat (with CIS mat) only:
If CIS mat or padding is defective, both parts must be replaced together.

IMPORTANT: The CIS mat must be enabled after each installation operation.

Enabling seat occupancy detector (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Clear fault memory if necessary

WARNING: US/CDN front passenger seat (with CIS mat) only:
To avoid damaging the CIS mat, it is essential to carry out the following operations with extra care.

IMPORTANT: Risk of damage on sharp-edged seat mechanism.

Guide all cables carefully through seat and backrest mechanism.

Make sure cable is routed without kinks and tension.

Make sure plug connections are correctly locked.

Make sure plugs are correctly seated in catches.

Version with seat occupancy detector (CIS mat) only:

1. Data line CIS
2. Earth cable, seat pan
3. Earth cable, backrest frame

Unlock all plug connections and disconnect.

NOTE: From build date 09/2009 onward, earth cable (3) not included on backrest frame.

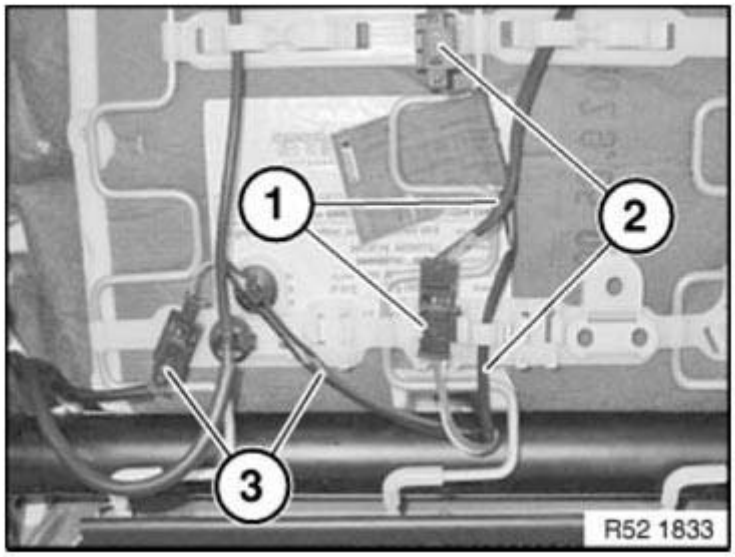


Fig. 275: Identifying Data Line CIS And Earth Cables
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat heating only:

Unlock plug connection (1) for seat heating and disconnect.

Unfasten cable strap.

Disengage wiring harness from cable clips (flexmat).

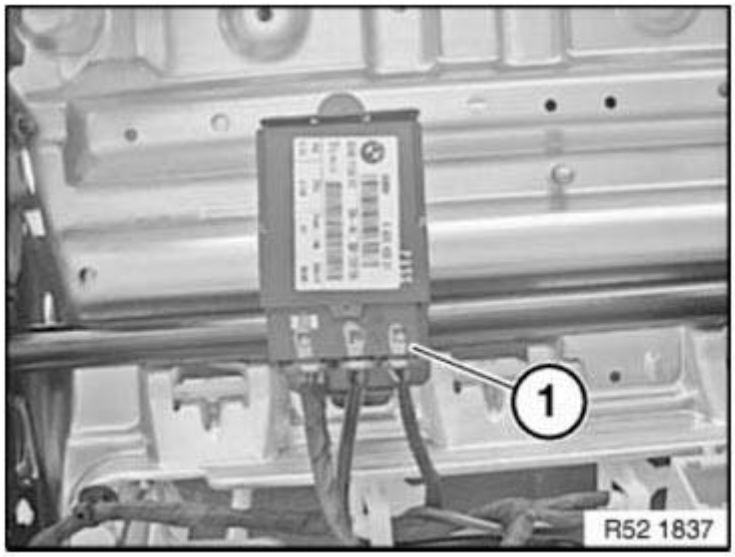


Fig. 276: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat occupancy detector (CIS mat) without seat heating only:

Cable for seat heating, seat padding:

Seat heating is integrated in the CIS mat and is stuck to the padding over the full surface.

Lay cable for seat heating as shown to flexmat and secure with cable strap.

Secure plug with cable strap to cable.

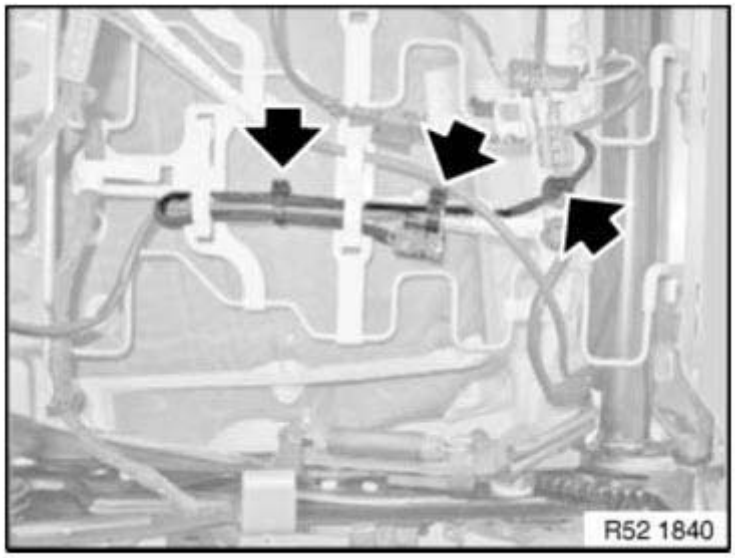


Fig. 277: Locating Plug With Cable Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Cable for seat heating, thigh support:

Cramp cable (1) to welt strip with retainers (2).

Installation:

Bend retainers (2) with special tool **52 0 050** .

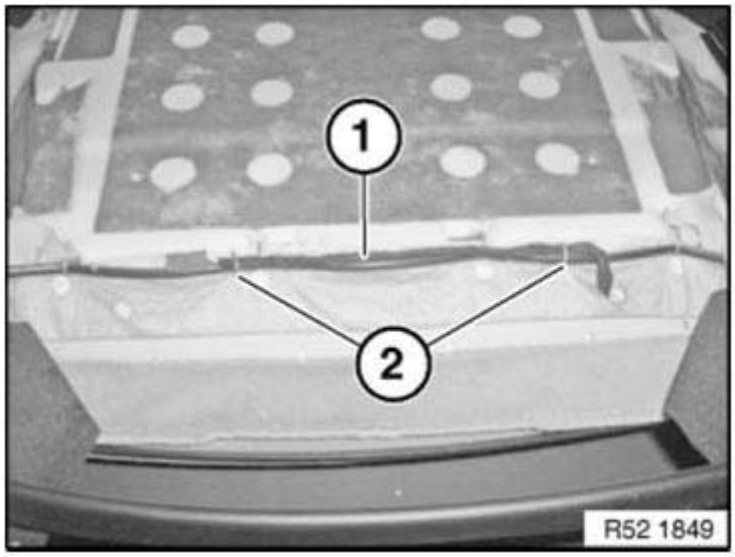


Fig. 278: Identifying Cable And Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp plug (1) behind welt strip (2).

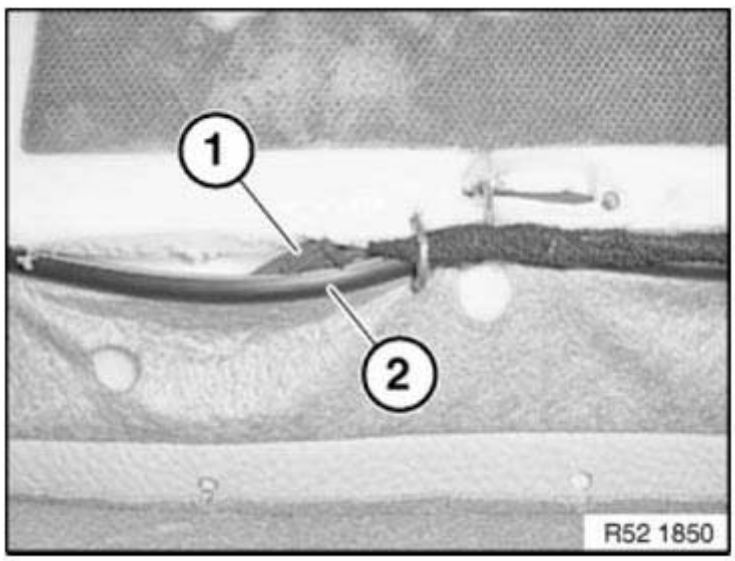


Fig. 279: Identifying Plug With Welt Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining lugs (1).

Remove seat trim (2) downwards.

Installation:

Seat trim (2) must not be damaged.

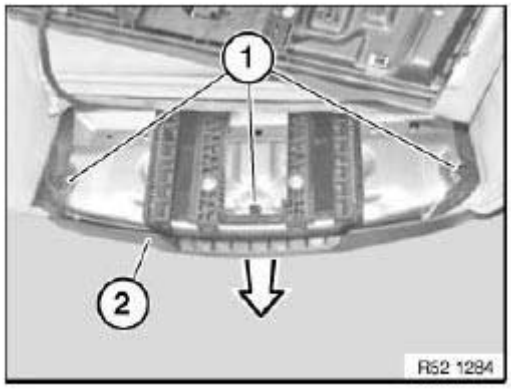


Fig. 280: Removing Seat Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Lever clip (1) out of seat cover on left and right.

Installation:

If necessary, replace faulty clip.

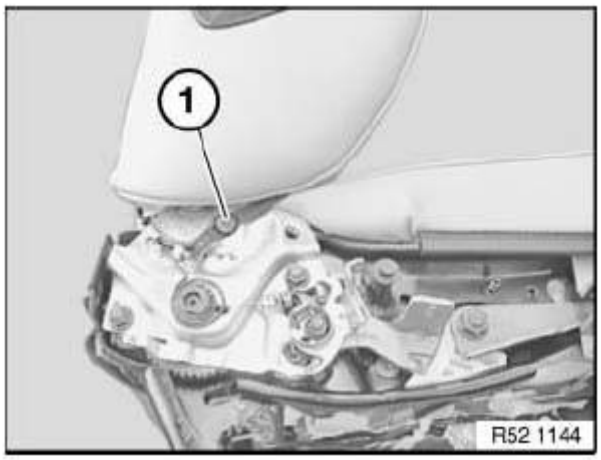


Fig. 281: Identifying Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Tunnel side:

Disengage cover fastener (1) from belt deflector trim.

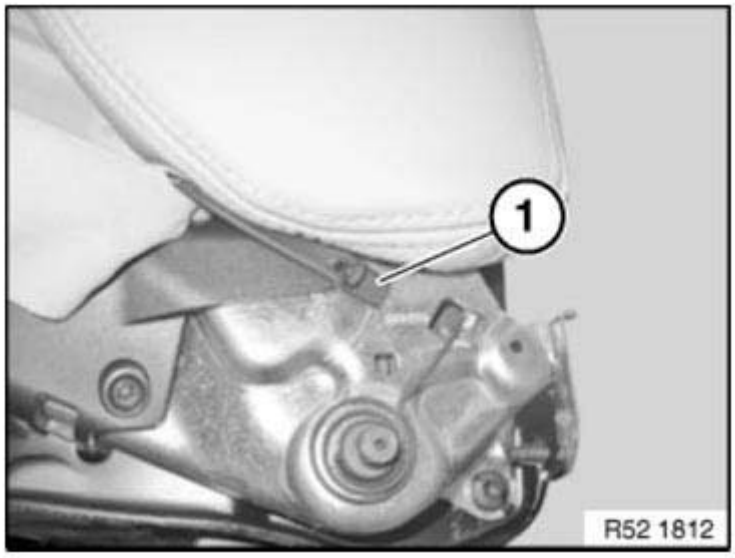


Fig. 282: Identifying Cover Fastener Of Belt Deflector Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Detach seat cover (1) from seat frame.

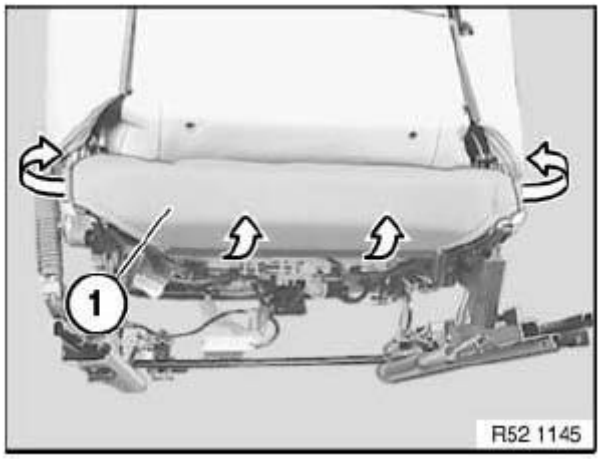


Fig. 283: Removing Seat Cover From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out cover welt (1) completely from seat frame (2).

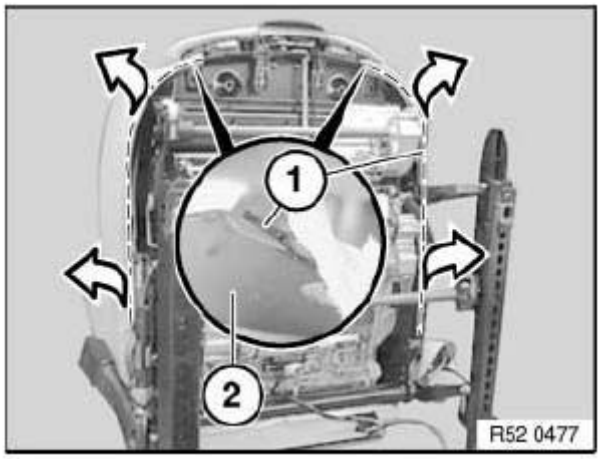


Fig. 284: Pulling Out Cover Welt From Seat Frame
Courtesy of BMW OF NORTH AMERICA, INC.

Remove seat cover (1) with padding towards front/top.

IMPORTANT: Carefully slide bracing cloth with foam through backrest gap and seat structure.

Installation:

Slide foam completely through backrest gap and seat structure. Make sure foam and bracing cloth are correctly fitted.

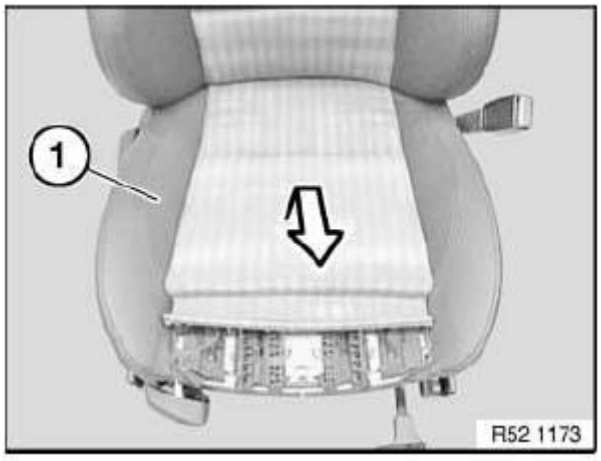


Fig. 285: Removing Seat Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Version with seat heating and/or seat occupancy detector (CIS mat):

Release the corresponding plug connections depending on the version and disconnect.

Pull seat cover (1) with padding forward a little and feed wiring harness (2) out.

Remove seat cover (1) with padding towards front/top.

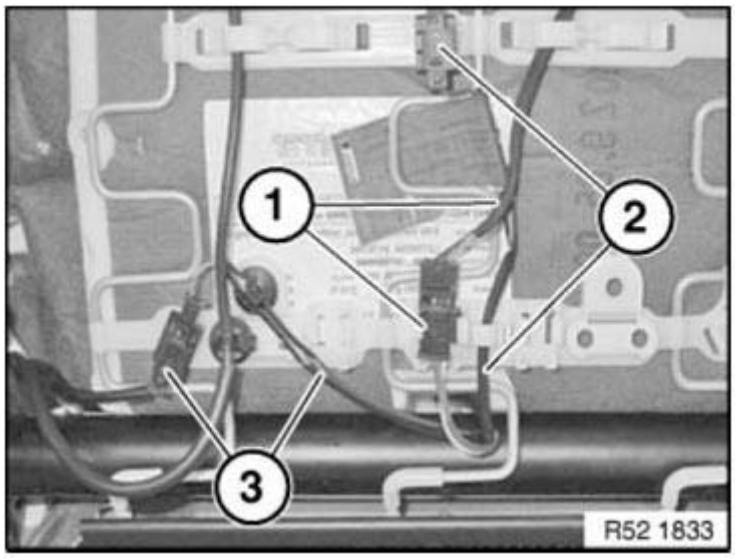


Fig. 286: Identifying Seat Cover And Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Release all retainers in marked area.

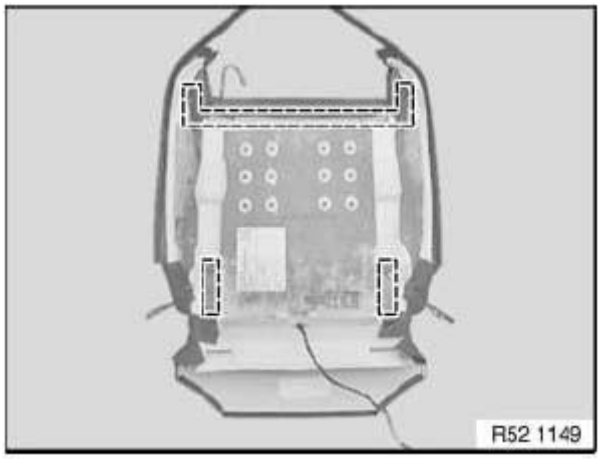


Fig. 287: Identifying Retainers Marked Area
Courtesy of BMW OF NORTH AMERICA, INC.

Detach all retainers in side area from OKE strips.

Carefully fold back seat cover and release retainers from OKE strips.

Remove seat cover from padding.

IMPORTANT: Remove all remnants of clips from seat cover and padding (CIS mat).

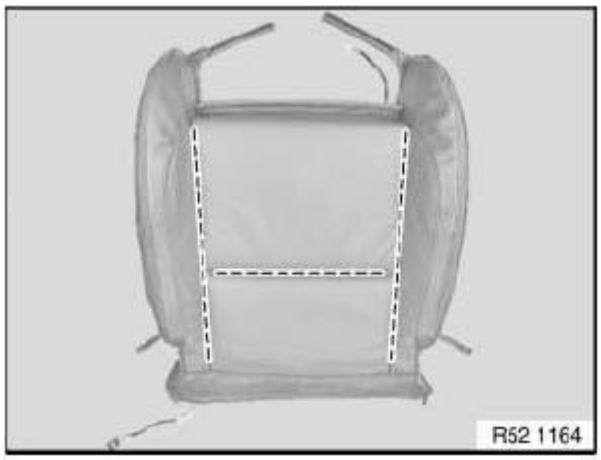


Fig. 288: Identifying Retainers Of OKE Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bend new retainers (2) with special tool **52 0 050** .

1. Padding
2. Retainer
3. Trim wire in padding
4. OKE strip in cover
5. Seat cover

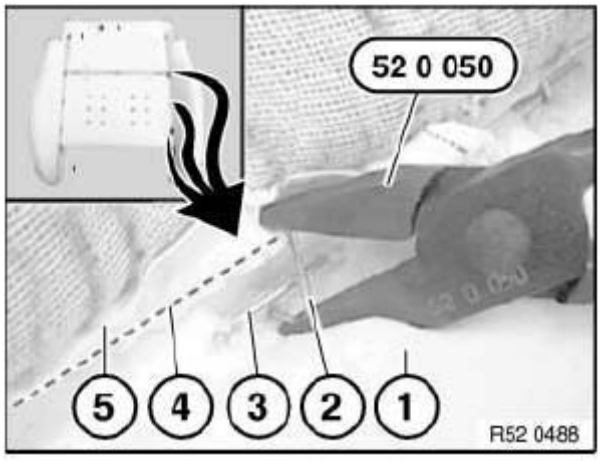


Fig. 289: Bending Retainers Using Special Tool (52 0 050)
Courtesy of BMW OF NORTH AMERICA, INC.

65 77 604 REPLACING SENSOR MAT (CIS MAT) FOR FRONT PASSENGER SEAT OCCUPANCY

DETECTION DETECTOR

WARNING: Note AIRBAG SAFETY REGULATIONS !
Incorrect handling can lead to airbag deployment and cause injury.

WARNING: Only US and Canadian version of front passenger seat (with CIS mat):
The CIS mat can only be removed in conjunction with the padding from the seat cover.
If CIS mat or padding is defective, both parts may only be replaced together.
After fitting the seat cover, the CIS mat must be enabled with the BMW programming system.

Procedure for replacing the CIS mat together with the upholstery is described under:

- Remove padding for front seat See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

The work scope with CIS mat is different in the following work steps:

Release the bolting point (1) of the ground cable on the seat pan.

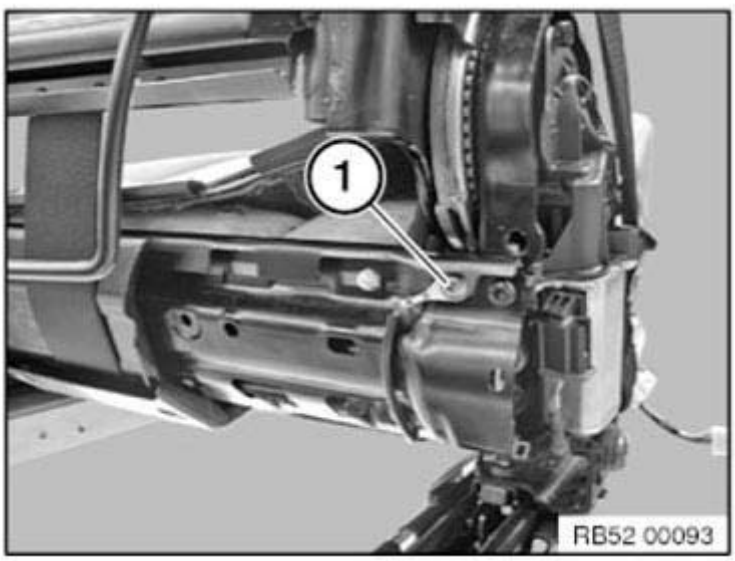


Fig. 290: Identifying Bolting Point Of Ground Cable On Seat Pan
Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable strap (1).

Lift the locking tab and pull the connector out of the side of the connector housing.

Installation note:

Replace cable tie (1).

Connector is encoded against incorrect assembly.

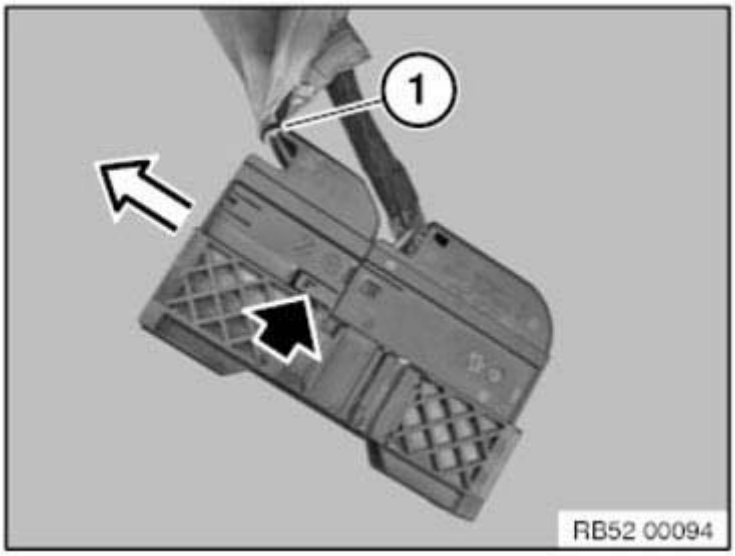


Fig. 291: Pulling Connector Out Of Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Enabling seat occupancy detection (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

5217 FRONT SEAT, COMFORT

65 77 604 REPLACING SENSOR MAT (CIS MAT) FOR FRONT PASSENGER SEAT OCCUPANCY DETECTION DETECTOR

WARNING: Note AIRBAG SAFETY REGULATIONS !
Incorrect handling can lead to airbag deployment and cause injury.

WARNING: Only US and Canadian version of front passenger seat (with CIS mat):
The CIS mat can only be removed in conjunction with the padding from the seat cover.
If CIS mat or padding is defective, both parts may only be replaced together.
After fitting the seat cover, the CIS mat must be enabled with the BMW

programming system.

Procedure for replacing the CIS mat together with the upholstery is described under:

- Remove padding for front seat See **5213400 Replacing seat cover on left or right front seat (normal/manual)** or **5215400 Replacing seat cover for left or right front seat (sport/manual)**

The work scope with CIS mat is different in the following work steps:

Release the bolting point (1) of the ground cable on the seat pan.

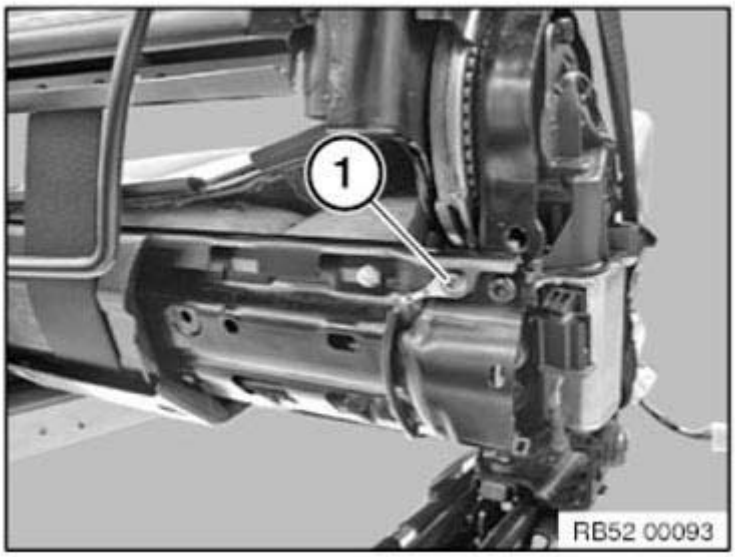


Fig. 292: Identifying Bolting Point Of Ground Cable On Seat Pan
Courtesy of BMW OF NORTH AMERICA, INC.

Cut open cable strap (1).

Lift the locking tab and pull the connector out of the side of the connector housing.

Installation note:

Replace cable tie (1).

Connector is encoded against incorrect assembly.

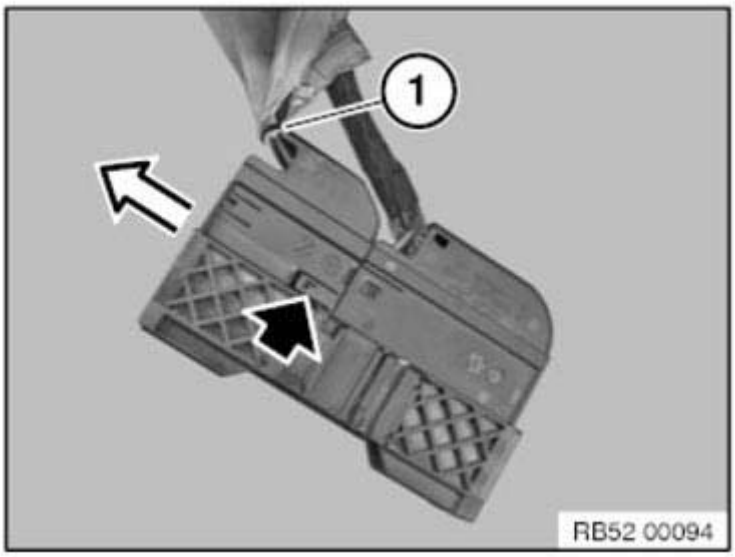


Fig. 293: Pulling Connector Out Of Connector Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Enabling seat occupancy detection (CIS mat):

- Connect BMW programming system
- Encode airbag control unit
- Delete fault memory if necessary

52 SEATS

52-0000 ADAPTER CABLE

Adapter cable MW

NOTE: (Adapter cable OC3) OC3 mat in conjunction with ISTA --> action only USA and Canada

Fig. 1: Identifing Adapter Cable (520000)
Courtesy of BMW OF NORTH AMERICA, INC.

52-0050 PLIERS

Pliers MW

NOTE: For securing clamps on seat cover

Storage Location

A13

SI number

52 06 87 (808)

W52 0 050

Fig. 2: Identifing Pliers (520050)
Courtesy of BMW OF NORTH AMERICA, INC.

FRONT SEATS

52 10 FRONT SEATS

TIGHTENING TORQUE SPECIFICATION - FRONT SEATS

		Type	Thread	Tightening specification	Measure
1AZ	Seat to floor plate	E89	M10 (trilobular)	Replace Powerlok screw	44 Nm
2AZ	Backrest frame to seat frame	E89			32 Nm
3AZ	Mounting, belt buckle deflector	E89			3.7 Nm
4AZ	Seat depth adjustment to seat mechanism	E89			1.1 Nm
5AZ	Bracket, control unit, to seat structure	E89			2 Nm
6AZ	Carrier unit to seat frame	E89			9 Nm
7AZ	Isofix clip on backrest frame	E89	M6		10 Nm
		E89	M5		3 Nm
8AZ	Mounting frame to partition	E89			3.3 Nm
9AZ	Holder, skibag retainer, to body	E89			15 Nm
10AZ	Trim, seat, outer	E89			1 Nm

TELEMATICS

FREQUENTLY ASKED QUESTIONS

1. **What is telematics?**

   Telematics combines wireless voice and data to provide location-specific security, information, productivity, and in-vehicle entertainment services to drivers and their passengers.

2. **How does a telematics system work?**

   The heart of a telematics system within the car is a telematics Communications Unit (TCU) that is connected (wirelessly) to a central service center. The TCU serves as the central platform of a telematics system, where all telematics-related technologies are deeply integrated. It communicates location-specific information to a central service center and in turn the center helps deliver telematics services to a driver via the cellular phone.

   These services can include dispatching ambulance services to a driver in an emergency situation, or sending roadside assistance to a driver whose car has broken down. Other services include the ability of a central server to deliver navigation assistance and real-time traffic information, among others. What's more, the TCU is also connected to the engine control unit (or the onboard computer) which enables enhanced services such as remote engine diagnostics and automatic airbag notification.(01)

3. **What is the difference between telematics and navigation systems?**

   A telematics system provides numerous services to drivers, and navigation is simply one of the services offered. Navigation systems that are starting to appear in highend cars today are referred to as autonomous navigation systems. Here, the navigation database resides in the car on a CD. These systems are relatively expensive. telematics systems provide navigation assistance "off-board". This means that the database resides outside the car, making the service far more affordable to a wider number of people.

4. **Where does the word "telematics" come from?**

   The term originated in Europe and remains widely used in the European automotive industry to describe automotive communications technologies.

5. **Can you explain a telematics system in technological detail? What are its components?**

   The main component in a telematics system is the telematics Communications Unit (TCU). In North America, a TCU contains a Motorola GPS receiver, cellular transceiver, and modem/transceiver control board. In Europe, a TCU contains a Motorola GPS receiver and GSM transceiver. Motorola's European telematics systems do not require a modem due to the already existing digital data transfer services, such as SMS (short message service) available with GSM.

Every telematics system developed by Motorola contains Motorola's automotivegrade telematics software, which is uniquely programmed to deeply integrate the components of a TCU, enabling simplified delivery of telematics services from one centralized area.

6. **What services does a telematics system offer today?**

   Today, telematics systems offer drivers emergency and roadside assistance, air bag deployment notification, navigation, remote door unlock, vehicle security notification and stolen vehicle tracking services.(01) (02)

7. **What services will telematics offer in the future?**

   Just as today's telematics safety and security features are a direct result of initial consumer demand, future telematics services will also be a direct result of what drivers want in their cars. These systems may provide customized services such as travel information (traffic updates, parking availability, airline status), messaging (voice mail and email retrieval), information (sports, weather, stock market updates and Internet access) and entertainment (audio games, books, magazines and newspapers). These are only a few of the applications which will evolve with telematics to keep drivers and their passengers in touch.

   Eventually, telematics will even reach outside the car and communicate with the office and home, extending far beyond voice conversations. Drivers will be able to turn on home lights, start and stop the sprinkler system, set their office security system - all via their telematics systems.

8. **How does a driver interact with a telematics system?**

   Drivers activate telematics systems via buttons located on the dashboard or the overhead console of the car. Motorola works with each automaker to help develop a purpose-built system for the projected ergonomic desires of drivers. The BMW Mayday telematics system has an emergency and roadside assistance button located on a cellular handset. The Mercedes TeleAid system has an S.O.S. button located behind the rear view mirror and "Information" and "Roadside Assistance" buttons located in the armrest.

9. **Can a Global Positioning System (GPS) phone handle telematics services?**

   We have several concerns about integrating GPS functionality into a phone handset, instead of the vehicle itself.

   Our first issue is the ability of a GPS phone to operate inside of the automobile without an external GPS or cellular antenna. GPS antennas must have an unrestricted view of the sky to track satellites. So the decision must be made whether it's more cost-effective to have the GPS in the phone or in the car.

   Furthermore, integrating telematics into a portable phone may be very attractive from a cost and convenience perspective, but does not support the stolen vehicle alarm, door lock/unlock, and other features that require the device to remain in the car when the occupants have left.

   Finally, GPS is only one part of the locating solution. In addition, cellular infrastructure positioning, such as cell tower triangulation, can help. Given current technology, GPS does not operate as effectively inside multiple story, concrete or metal buildings, where many emergency calls originate.

All of these issues, and many others, are taken into account when designing telematics systems and service.

10. **How does the airbag deployment notification feature work?**

    The TCU is constantly "listening" or on the lookout for any sign of emergency. Because the TCU is connected to the engine control unit, when the airbag sensor sends a message to the engine controller to deploy the airbag, the controller alerts the TCU as well. Automotive-grade software that enables these functions and assures their reliability.

    Once the TCU is alerted, it automatically makes a cellular call to the response center. The call gets priority call status and jumps ahead of other telematics calls, and the operator is alerted that a call has been received from an airbag deployment. That way, emergency crews can be sent immediately to the scene. (01)

11. **What services do consumers really want in their cars?**

    Initially, autonomous navigation-only systems caught the fancy of drivers in Europe and Japan, while in North America, consumers were more interested in emergency response or emergency call systems. Increasingly, consumers are attracted to the broader spectrum of telematics services, such as the delivery of personalized information and entertainment.

12. **Do Motorola's systems use digital cellular technology?**

    Yes. In Europe, Motorola's telematics systems use the European digital standard, GSM.

    In North America, however, only AMPS offers the broad geographic coverage essential for reliable emergency response services. That's why it's the system being utilized in North American telematics right now.

13. **What do telematics systems cost?**

    While each automotive company determines its own pricing, system prices currently range from $500 to $2000 in Europe and North America. Some GM vehicles include the OnStar system at no additional equipment charge, and require only a low monthly service fee. Monthly service costs vary, depending on the services offered. Like other new technologies, we anticipate that consumer demand will ultimately drive these costs down.

14. **Do European and North American drivers expect different features?**

    It's clear that Europeans and Americans are all interested in navigation, safety and security services. But the degree to which they prioritize these services varies.

    In Europe, there is a greater emphasis on navigation. At the same time, frequent cross-border travel creates language barriers, making familiar navigation and security services even more welcome. In the United States and Canada, safety and security are the most desired services. North Americans are also interested in navigation, but the need for it is not as great. All drivers are interested in getting real-time traffic information.

15. **When will North American telematics make the shift to digital?**

    In North America, the growth of telematics depends on digital cellular standards providing service over a larger geographic area, especially in cities. Unlike the European-wide GSM standard, North America has multiple standards including AMPS, TDMA, CDMA, GSM and iDEN®.

    Today, only AMPS offers wide enough geographic cellular coverage for emergency response services. That's why it is utilized in the Motorola telematics systems Motorola currently installed in North America. For data transmission on analog AMPS, modems can be added to the telematics hardware and central service center. In the future, systems will be based on digital wireless, to allow a richer array of features in metropolitan areas.

    In addition, as the industry endeavors to deliver comprehensive data services such as Internet access and customized entertainment services, the migration to digital communications technology will be even more essential.

    Companies such as Motorola, Nokia, Ericsson and Unwired Planet are addressing these issues for a wide variety of wireless devices. Through the Wireless Applications Protocol (WAP) consortium, we are working together to ensure a reliable and standard method of transferring data over wireless networks worldwide.

16. **What new technologies will help deliver greater telematics services?**

    An important, ongoing initiative that will help drive telematics growth is the ITS Data Bus, or IDB. IDB is based on an open protocol for networking car audio, video, communication and computing devices. Lead by the Society of Automotive Engineers (SAE) and supported by several corporations (including Motorola), IDB will allow seamless integration of multiple technologies inside the car.

    IDB will allow simple plug-and-play use of any consumer electronics, regardless of the manufacturer. In addition, a firewall contained in the IDB will allow all electronics in the car to operate independently of each other, eliminating signal interference.

17. **How will IDB specifically impact telematics?**

    Many companies are expected to integrate IDB into their telematics components and other electronics systems. Motorola, for example, plans to integrate IDBs into our telematics Communications Units, enabling the system to act as the central hub for all electronics interacting within the car. This will allow consumers to simply plug and play various electronics via their TCU, and take advantage of additional telematics services, without requiring multiple wires and cables overlapping in different areas of their vehicle. Not only will IDB allow easier installations, but it enable drivers to add new services without being concerned about propriety systems and wiring. With IDB, consumers will have greater choice, resulting in greater market growth.

Automatic airbag deployment notification, information services and other telamatics services must be supported by your carrier's network, depend on service availability and coverage, and require a subscription. These services are not available in all areas. Check with your service provider for availability. All location based services are subject to the availability of GPS signal or alternative location tracking means. GPS coverage is not

available in all areas.

The use of wireless devices and their accessories may be prohibited or restricted in certain areas. Always obey the laws and regulations on the use of these products. All navigation systems select routes based on several criteria: geographic distance, type of route, and in some cases dynamic traffic information. While these systems usually opt for the shortest travel time to your destination, it is important that you take into account factors including road and driving conditions, terrain and local environments, some of which may contain hazards to you or your vehicle. Always use your best judgment when deciding on a route. As the driver of your vehicle, you are always the final decision-maker, and despite the many advantages of using any Telematics system, you are ultimately responsible for ensuring your safety.

GLOSSARY

AMPS Advanced Mobile Phone System

The first-generation analog cellular phone system that originated in the United States.

APCO

Association of Public Communications Officials

CDMA Code Division Multiple Access

An advanced digital cellular and PCS platform that converts audio signals into a stream of digital information (made up of 1s and 0s). This "digital speech packet" is transmitted via a wide-band channel consisting of several radio frequencies. CDMA differs from the other popular digital cellular platform, TDMA, in that it uses several frequencies instead of just one. These digital platforms ensure greater call clarity and security, prevent cloning fraud and allow a greater number of calls to be handled by a tower or response center at one time.

CDPD Cellular Digital Packet Data

Using the existing AMPS system to carry digital data, by transmitting dense packets of information across vacant analog channels.

CTIA

Cellular Telephone Industry Association

Data Bus

The central collection of wires that carry instructions to electronic components throughout the vehicle.

DCS-1800

The low-power variant of GSM (the European digital standard). Uses a 1.8 GHz carrier. Example: Mercury One-2-One.

DCS-1900

The proposed use of GSM (the European digital standard) with a 1.9 GHz carrier for PCS applications.

DCTU Digital Cordless Telephone U.S.

A standard based on a micro-cellular radio system that provides low-power cordless access between a subscriber and a base station up to a few hundred meters away. DCTU is a version of its European counterpart, DECT.

DECT Digital European Cordless Telephone

A standard based on a micro-cellular radio system that provides low-power cordless access between a subscriber and a base station up to a few hundred meters away.

ETACS Enhanced TACS (Total Access Communication System)

European analog cellular.

ETSI European Telecommunications Standards Institute

The standards body responsible for GSM.

FDMA Frequency Division Multiple Access

Used for AMPS and TACS, the two key analog systems and their variants, this system gives each conversation its own unique radio channel.

FLEX® Protocol

Created by Motorola, FLEX is the global de facto standard for high-speed, one-way alphanumeric paging. With its ability to handle more robust code transport messages effectively, Motorola's FLEX protocol is laying the foundation for graceful growth from 1600 to 6400 bits per second (bps) transmission rates.

Gateway

A device that allows consumer products to interface with the communication system in vehicles, while protecting the vehicle's system from defective devices or inappropriate messages.

GPS Global Positioning System

Also refers to Global Positioning Satellite. A system using satellites, receivers and software to allow users to determine their exact geographic position.

GSM Global System for Mobiles

A European digital standard.

Half-Rate

A variant of GSM, Half-Rate doubles system capacity by more efficient speech coding.

IDB ITS Data Bus

A medium-speed multiplexed bus intended for command and control of devices in vehicles. It has been proposed by Motorola and the Society of Automotive Engineers (SAE) as an industry standard. Should this happen, IDB will allow device manufacturers to create products that will be compatible with all vehicles - versus today's data bus systems which differ by automobile manufacturer. The IDB would interface with an existing vehicle bus through a gateway.

iDEN® Integrated Digital Enhanced Network

A new generation of digital wireless technology developed by Motorola to enable multiple services to be delivered from a single, integrated wireless communications system. iDEN is the backbone of the Nextel all-digital cellular service.

InFLEXion®

A Motorola protocol which enables transmission and storage of voice messages and offers enhanced privacy, channel efficiency and ease of use. What's more, InFLEXion allows greater detail and expression to come through.

IS-41

The protocol for "roaming" within the U.S., describing how services should "hand over" between operators.

IS-54

The TDMA standard for U.S. digital cellular.

IS-95

The CDMA standard for U.S. digital cellular.

ISO 9000

The International Organization for Standardization (ISO) published the ISO 9000 series of quality management and quality assurance standards in 1987 as a means to rationalize the many various national approaches to the subject of product quality. The ISO 9000 series has been widely recognized as an aid in developing manufacturing and service organizations' quality management as an additional assurance to product purchasers that the products and services they buy will consistently meet quality objectives.

ISO 9001

This standard is used when conformance with specific requirements is to be assured by the supplier during several product stages including design and development, production, testing, inspection and servicing.

ITS IntelligentTransportation Systems

A broad range of diverse technologies, including information processing, communications, control and electronics, which, when applied to our transportation system, can save time, money and lives.

ITS America IntelligentTransportation Systems of America

An organization mandated by the U.S. Congress in 1991 to foster public and private partnerships to increase the safety and efficiency of surface transportation through the application of advanced ITS technologies.

JDC Japanese Digital Cellular

Now renamed PDC.

JTAC Japanese Total Access Communication

Like the European TACS, JTAC is the Japanese analog cellular system.

LMR Land Mobile Radio

Wireless communication for specialized applications, such as taxis and emergency services.

MMI Man/Machine Interface

Also known as User Interface. The means by which the user interacts with a machine or device. In the past, knobs, dials and displays manipulated by a user's hand were common interfaces on technical devices. Today, MMI includes more advanced functions such as Voice Dialing, speech synthesis and touch screens.

NAMPS

Narrowband AMPS.

PCS Personal Communications Service

Service that bundles voice communications, numeric and text messaging, voice mail and other features into one device, service or bill.

PCS-1900

Like DCS-1900, this refers to the proposed use of a 1.9 GHz carrier for PCS applications.

PDC Personal Digital Cellular

The Japanese cellular standard.

PHS Personal Handy System

The Japanese cordless phone standard.

Protocol

A standard set of rules that governs how computers or other electronics communicate with one another. Protocols define a message's format as well as how they are exchanged. Agreeing to a standard protocol allows different types of computer systems to communicate with one another in spite of their differences.

PSAP Public Safety Answering Point

PSTN Public Switched Telephone Network

QS 9000

The quality system standard established by Chrysler, Ford, General Motors, truck manufacturers and other subscribing companies. This standard includes the ISO 9000 requirements, plus additional requirements for all aspects of the business. QS 9000 includes a detailed Advanced Product Quality Planning, Control Plan, Continuous Improvement, Production Part Approval Process, Manufacturing Capabilities methodologies and more.

ReFLEX®

The world's first two-way alphanumeric paging protocol, created by Motorola. ReFLEX enables pagers to confirm receipt, respond to and initiate messages.

SAE Society of Automotive Engineers

A one-stop resource for technical information and expertise used in designing, building, maintaining and operating self-propelled vehicles for use on land or sea, in air or space.

SIM Subscriber Identification Module

A card used in GSM to personalize a handset.

TACS Total Access Communication System

European analog cellular.

TCU Telematics Control Unit

The embedded vehicle control unit that communicates with the automobile controls, GPS satellite and customer service center to provide Telematics features to a driver.

TDMA Time Division Multiple Access

An advanced digital cellular platform that converts audio signals into a stream of digital information (made up of 1s and 0s) and divides it into "digital speech packets" according to time. The packets are then transmitted one a single radio frequency. TDMA differs from the other popular digital cellular platform, CDMA, in that it uses one channel instead of many. These digital platforms ensure greater call clarity and security, prevent cloning fraud and allow a greater number of calls to be handled by a tower or response center at one time.

TETRA TErrestrial Trunked RAdio

European digital cellular land mobile radio system.

TIA Telecommunications Industry Association

The United States' telecommunications standards making body.

User Interface

Also known as Man/Machine Interface (MMI). The means by which the user interacts with a machine or device. In the past, knobs, dials and displays manipulated by a user's hand were common interfaces on technical devices. Today, User Interfaces include more advanced functions such as Voice Dialing, speech synthesis and touch screens.

VR Virtual Reality

Used in a variety of Motorola products and services, it is a type of computer-generated environment in which the user interacts with the environment in three dimensions that provide sensory information to make an individual feel that they are in a different place.

WAP Wireless Application Protocol

A standard that aims to align industry efforts to bring advanced applications and Internet content to digital cellular phones.

LOADING PLATFORM

86 10 ... ADJUSTING BRAKE SYSTEM

Proper adjustment of the brake system is only possible if the brake Bowden cables and all brake system moving parts move freely and are ready for operation.

The wheels must be completely fitted and able to rotate freely. Always adjust both brake sides. The left and right sides are adjusted in the same way.

Pull out overrunning equipment (1) fully in direction of arrow.

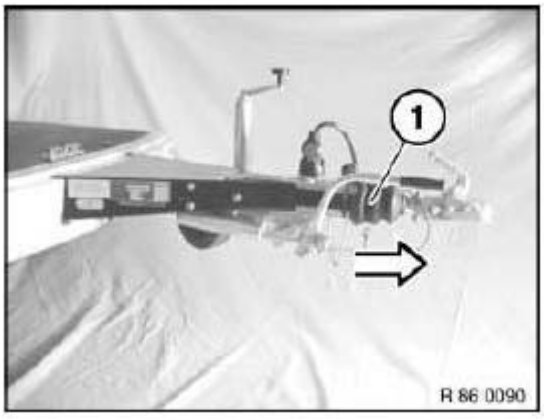


Fig. 1: Pulling Overrunning Equipment
Courtesy of BMW OF NORTH AMERICA, INC.

Reversing lever (1) must rest directly on innerlying tow tube of overrunning brake.

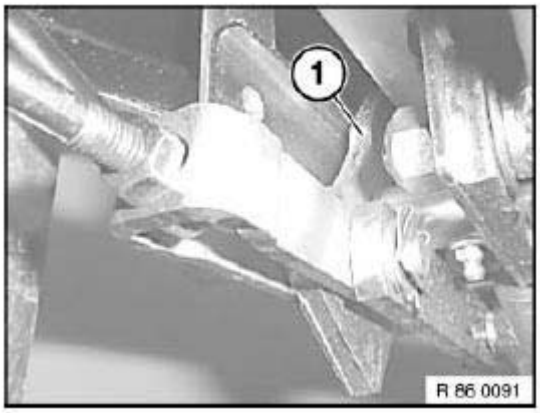


Fig. 2: Identifying Reversing Lever

Courtesy of BMW OF NORTH AMERICA, INC.

Screw brake linkage (1) into nut (2) until distance (3) (nut (2) - end of brake linkage (1)), is 10 - 15mm. Lock brake linkage (1) in position with nut (4).

Check distance (3) and nuts (2, 4) with brake linkage installed.

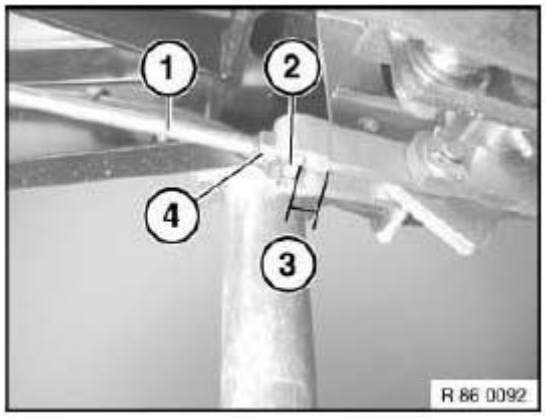


Fig. 3: Identifying Brake Linkage With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert pull rod (1) in brake compensator (2) and screw nut (3) onto pull rod (2).

Tighten nut (3) until pull rod (1) is free of play.

Check pull rod (1) already fitted for zero play.

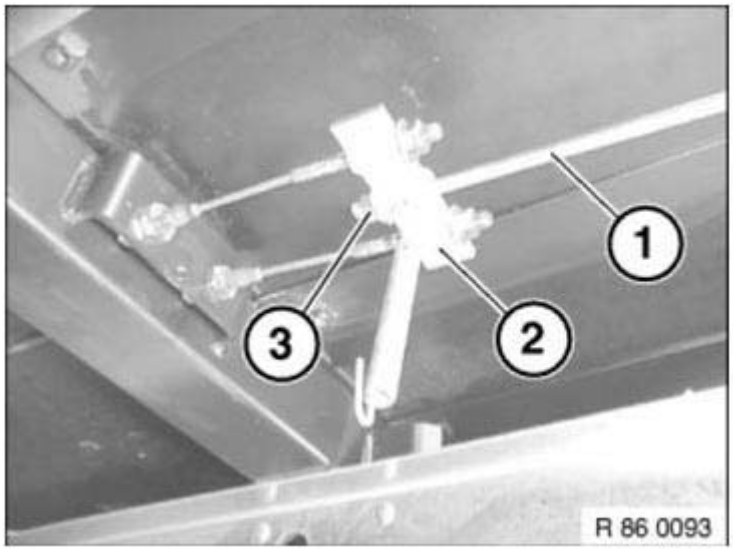


Fig. 4: Identifying Pull Rod, Brake Compensator And Screw Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Hook tension spring (1) to tension spring mount (2).

Installation

The brake shoes are adjusted in two work steps. In the first step, the distance between the lower half of the brake shoes and the brake drum is adjusted. In the second step, the distance between the upper half of the brake shoes and the brake drum is adjusted.

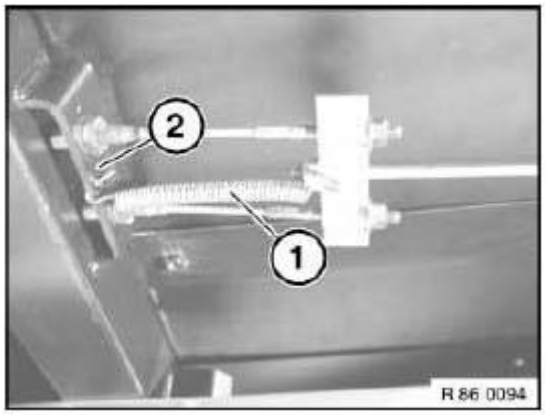


Fig. 5: Identifying Tension Spring On Tension Spring Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate road wheel (1) in direction of travel and simultaneously turn adjusting screw (2) in direction of arrow.

Tighten adjusting screw (2) until road wheel (1) can no longer be turned.

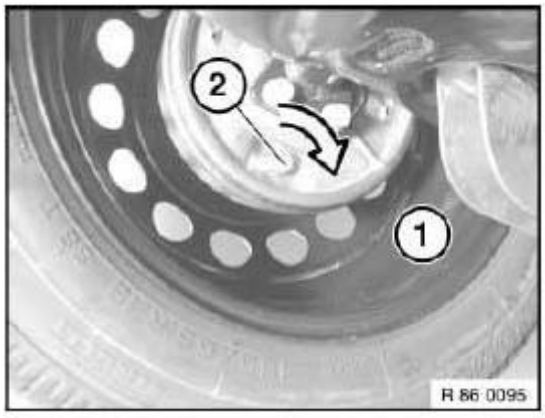


Fig. 6: Rotating Road Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Turn adjusting screw (1) in direction of arrow and release slowly until road wheel (2) can rotate.

Finish adjustment procedure when slight grinding noises can be heard in lower brake shoe halves.

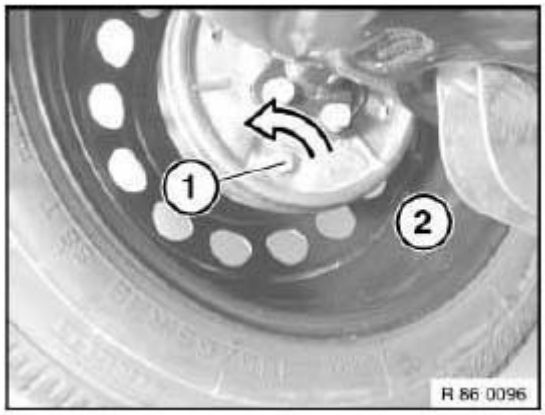


Fig. 7: Turning Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Firmly tighten handbrake lever three to five times.

Depending on road wheel side, tighten nut (1) or (2) until slight grinding noises can be heard in upper brake shoe halves.

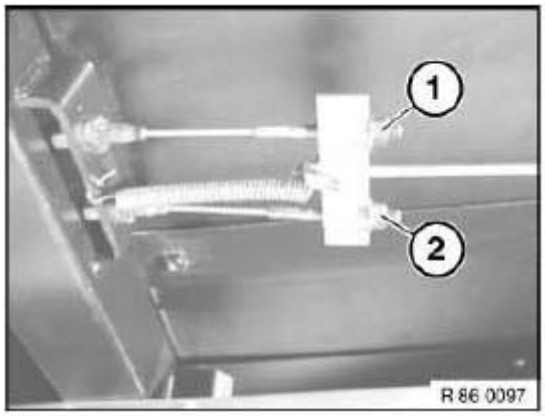


Fig. 8: Identifying Road Wheel Side Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... ADJUSTING SPRING FORCE ACCUMULATOR

The spring force accumulator requires no maintenance and generally does not need to be readjusted.

Adjustment dimension, spring force accumulator: distance between end of support tube - internal washer (1) is 90 mm.

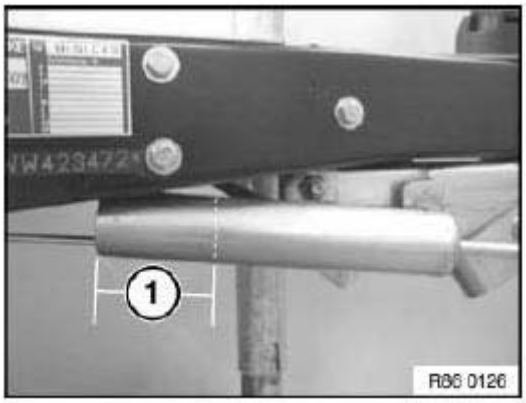


Fig. 9: Identifying Distance Between End Of Support Tube And Internal Washer
Courtesy of BMW OF NORTH AMERICA, INC.

To tension spring force accumulator: turn nut (2) located in support tube (1) clockwise.

To relieve tension on spring force accumulator: turn nut (2) located in support tube (1) counterclockwise.

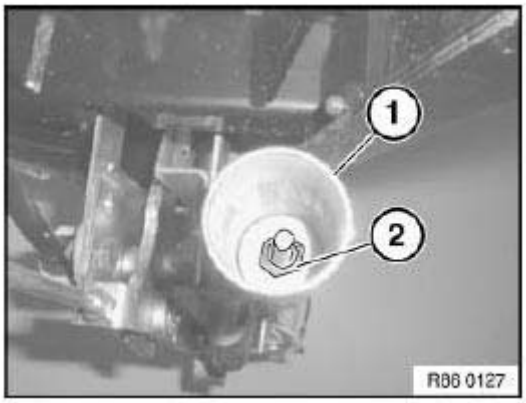


Fig. 10: Identifying Support Tube With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF CAMLOCK RETAINING CAM

Unscrew bolts (1).

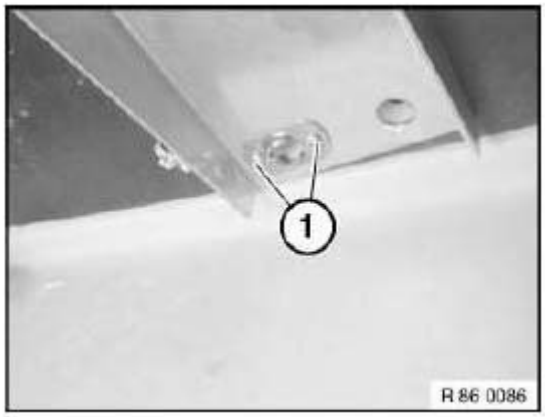


Fig. 11: Identifying Camlock Retaining Cam Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF BASE PLATE

NOTE: **Disassembly of bar**
REFER TO 86 10 ... REPLACING BAR
Disassembly of lashing plate
REFER TO 86 10 ... REPLACING LASHING PLATE AND LASHING EYE
Disassembly of 12 volt socket
REFER TO 86 10 ... REPLACING 12 VOLT SOCKET
Remove plastic bush/metal bush
REFER TO 86 10 ... REMOVING PLASTIC BUSH/METAL BUSH
Disassembly of light guard
REFER TO 86 10 ... REPLACING REAR LIGHT
Disassembly of front apron
REFER TO 86 10 ... DISASSEMBLY OF FRONT APRON
Disassembly of left and right aprons
REFER TO 86 10 ... DISASSEMBLY OF LEFT AND RIGHT APRONS
Disassembly of left and right wheel boxes
REFER TO 86 10 ... DISASSEMBLY OF LEFT AND RIGHT WHEEL BOXES
Disassembly of rear apron
REFER TO 86 10 ... DISASSEMBLY OF REAR APRON
Disassembly of left and right lamp housings
REFER TO 86 10 ... DISASSEMBLY OF LEFT AND RIGHT LAMP HOUSINGS
Disassembly of rivet connection, rear support
REFER TO 86 10 ... DISASSEMBLY PROCEDURE OF RIVET CONNECTION, REAR SUPPORT

Unscrew bolts (1).

CAUTION: Before drilling out rivet heads, drive in rivet pins with a punch. Drill out rivet connections (2).

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 32AZ.**

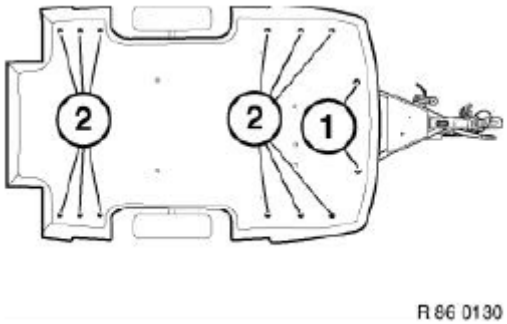


Fig. 12: Identifying Base Plate Nut And Rivet Connections
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF BRACKET ON PLATFORM BASE

Unscrew bolts (1).

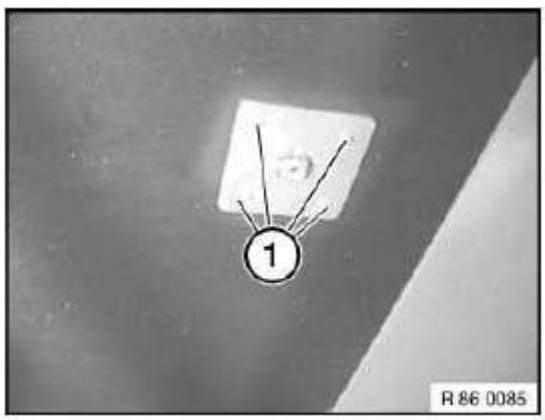


Fig. 13: Identifying Platform Base Bracket Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF FRONT APRON

Drill out rivets (1) on lower apron edge.

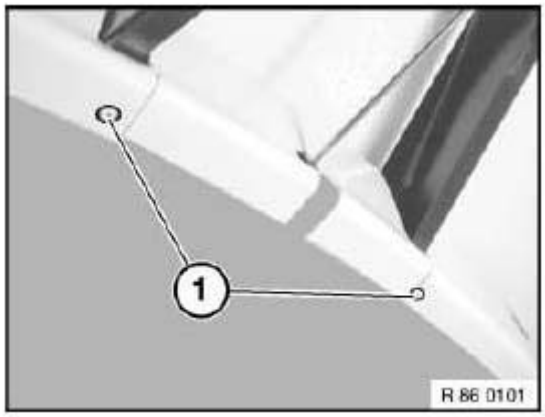


Fig. 14: Identifying Rivets On Lower Apron Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound (1).

Drill out rivets (2).

Installation

Use Sikaflex 221 as sealing compound.

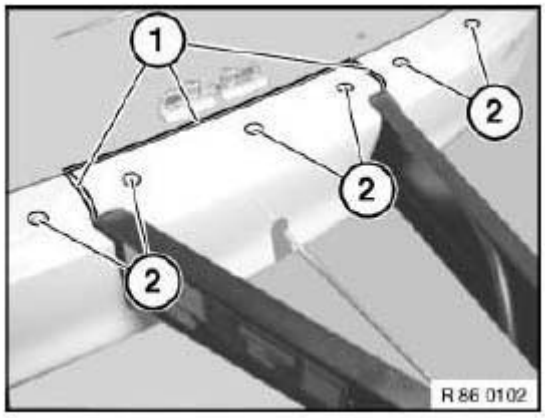


Fig. 15: Identifying Front Apron Sealing Compound And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Press side sections (1) to side in direction of arrow. Tilt center section (2) downwards and remove to side.

Installation

Use Sikaflex 221 as sealing compound.

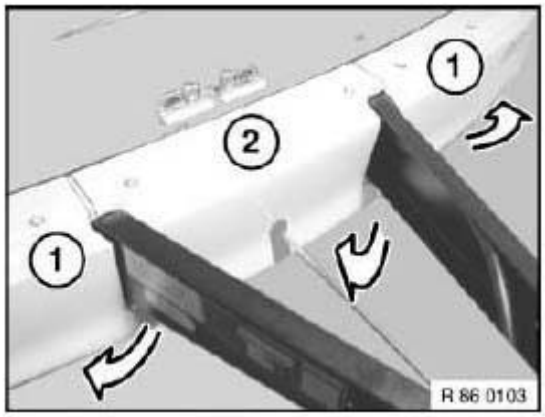


Fig. 16: Pressing Side Sections
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF FRONT PROTECTION BAR

Release screws (1) on cross-member (2).

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 4AZ.**

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 5AZ.**

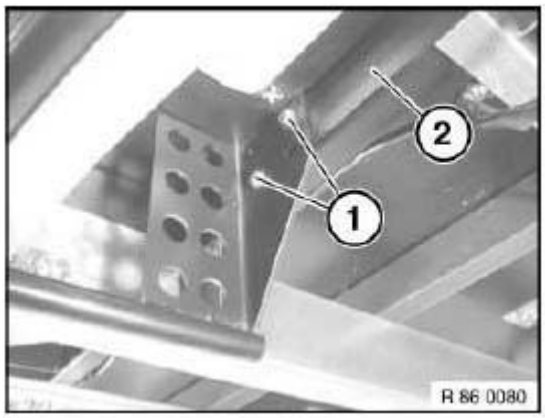


Fig. 17: Identifying Screws On Cross-Member
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on longitudinal member (2).

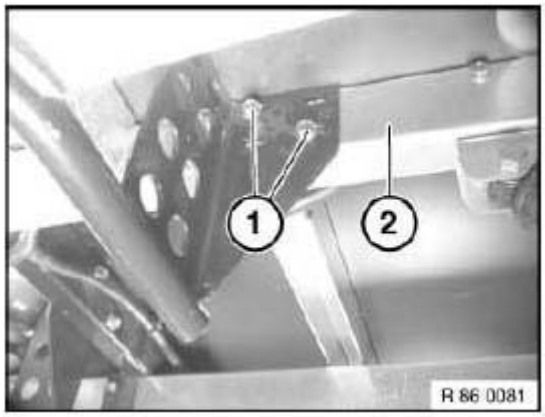


Fig. 18: Identifying Screws On Longitudinal Member
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 5AZ.**

86 10 ... DISASSEMBLY OF JOCKEY WHEEL OR JOCKEY WHEEL MOUNT

Turn clamping lever (1) in direction of arrow and release clamping connection. Open clamping bracket (2) and remove jockey wheel (3). Release screws on mount (4) and remove screws.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 11AZ.**

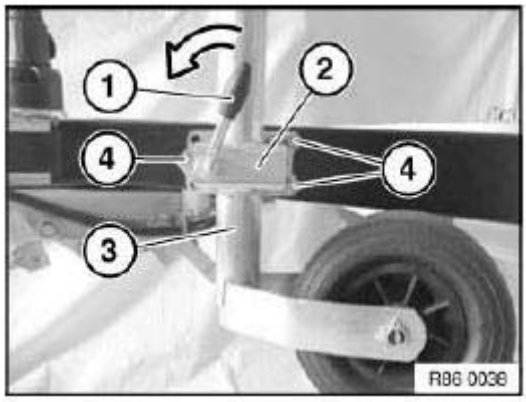


Fig. 19: Turning Clamping Lever
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF LEFT AND RIGHT APRONS

NOTE: Remove position light, REFER TO 86 10 ... REPLACING POSITION LIGHT.

Remove rear light, REFER TO 86 10 ... REPLACING REAR LIGHT.
Remove plastic bush/metal bush
REFER TO 86 10 ... REMOVING PLASTIC BUSH/METAL BUSH.

Drill out rivets (1) on lower apron edge.

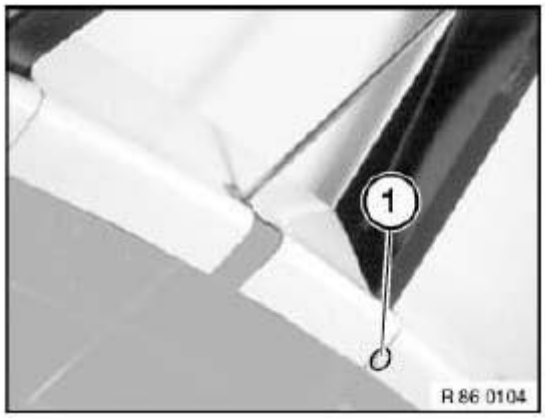


Fig. 20: Identifying Rivets On Lower Apron Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound (1).

Drill out all rivets (2) along apron edge.

Installation

Use Sikaflex 221 as sealing compound.

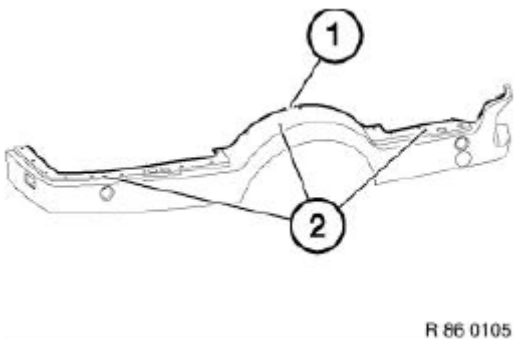


Fig. 21: Identifying Rivets On Lower Apron Edge And Sealing Compound
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound (1).

Drill out rivets (2) on lower apron edge.

Installation

Use Sikaflex 221 as sealing compound.

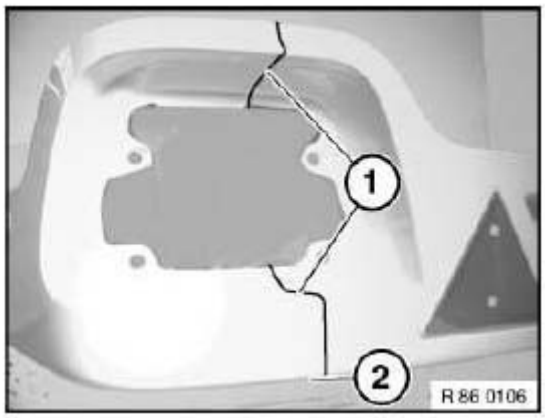


Fig. 22: Identifying Sealing Compound And Rivets On Lower Apron Edge
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF LEFT AND RIGHT LAMP HOUSINGS

Cut through sealing compound (1) and remove.

Drill out rivet connections (2).

Installation

Use Sikaflex 221 as sealing compound.

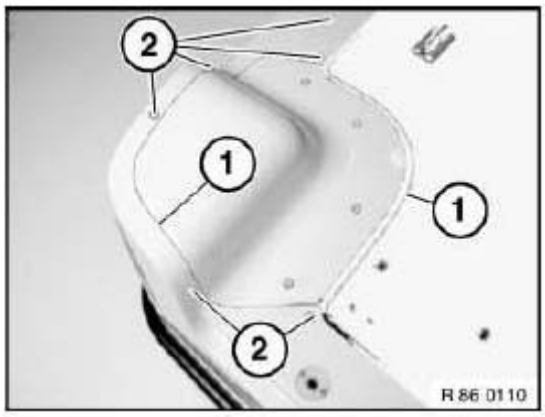


Fig. 23: Identifying Sealing Compound And Rivet Connections Of Left And Right Lamp Housings
Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivet connections (1).

Raise side sections (2, 3).

Pull out lamp housing (4) towards inside in direction of platform.

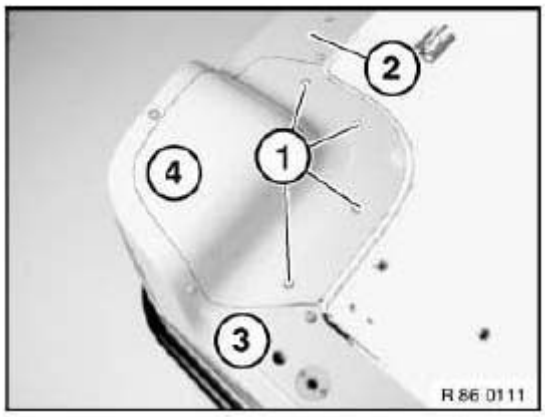


Fig. 24: Identifying Lamp Housing With Rivet Connections And Side Sections
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF LEFT AND RIGHT WHEEL BOXES

Remove sealing compound (1).

Drill out rivets (2).

Raise side apron (3). Pull out wheel box (4) towards rear.

Installation

Use Sikaflex 221 as sealing compound.

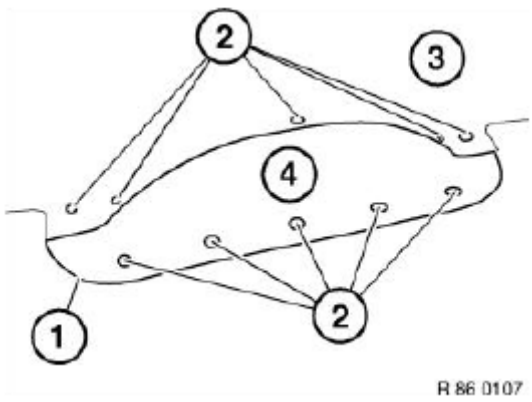


Fig. 25: Identifying Wheel Box With Rivets, Side Apron And Sealing Compound
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF LICENCE PLATE MOUNTING PLATE

CAUTION: Once the connecting screws (1) have been removed, the closing spring of the hinge retracts. Risk of trapping!

Release screws (1) in loading ramp frame (2) on left and right sides.

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 7AZ.**

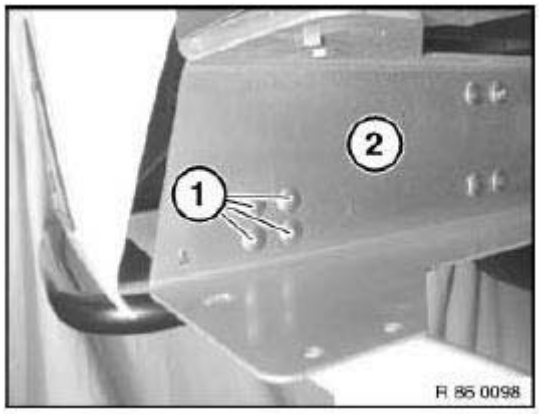


Fig. 26: Identifying Screws On Loading Ramp Frame
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF LOADING RAMP FRAME/DISASSEMBLY OF RAIL, LEFT/RIGHT

NOTE: Two persons are required to disassemble the loading ramp frame.
Disassembly of license plate mounting plate
REFER TO 86 10 ... DISASSEMBLY OF LICENSE PLATE MOUNTING PLATE.
Disassembly of pull rod
REFER TO 86 10 ... DISASSEMBLY OF OVERRUNNING EQUIPMENT.

Release screws (1) of loading ramp frame (2) on cross-strut (3).

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 7AZ.**

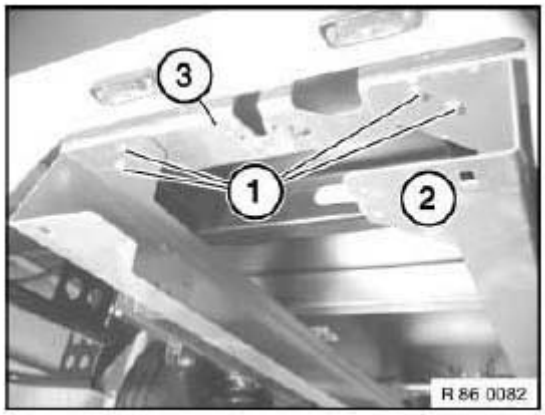


Fig. 27: Identifying Loading Ramp Frame Screws On Cross-Strut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1, 2) on left and right sides of loading ramp frame (3).

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 8AZ.**

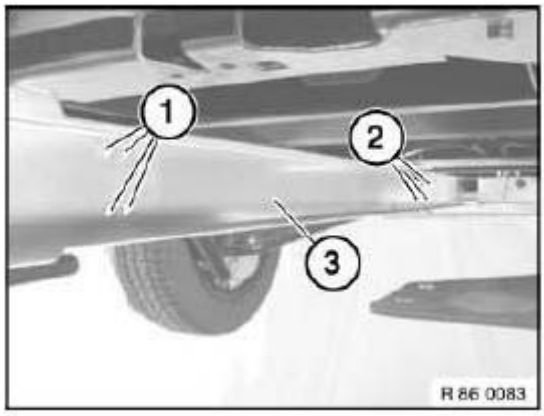


Fig. 28: Identifying Loading Ramp Frame Screws On Left And Right Sides
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1, 2, 3).

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 9AZ.**

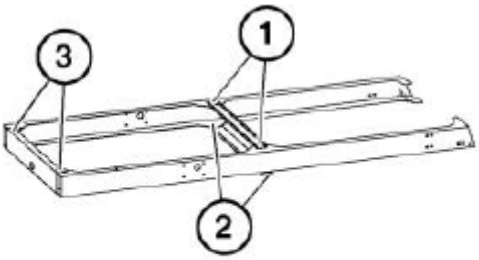


Fig. 29: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISASSEMBLY OF REAR APRON

NOTE: Remove rear light, REFER TO 86 10 ... REPLACING REAR LIGHT.
Remove plastic bush/metal bush
REFER TO 86 10 ... REMOVING PLASTIC BUSH/METAL BUSH.

Cut through sealing compound (1) on left and right and remove.

Drill out rivets (2) on left and right sides on lower apron edge.

Installation

Use Sikaflex 221 as sealing compound.

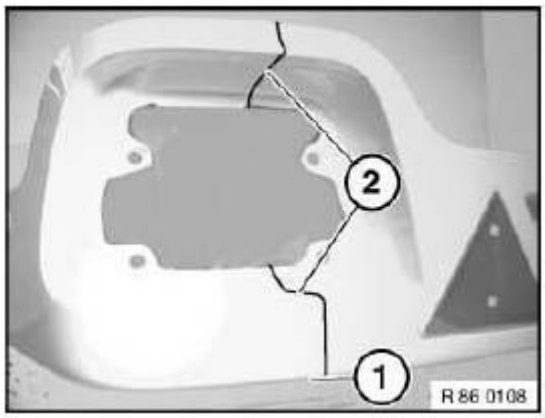


Fig. 30: Identifying Rear Apron Sealing Compound And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through sealing compound (1) and remove.

Drill out rivets (2).

Installation

Use Sikaflex 221 as sealing compound.

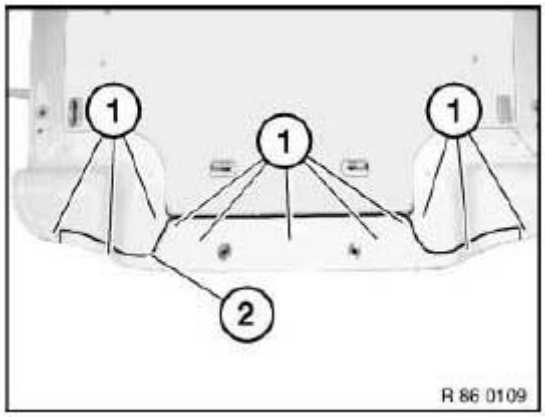


Fig. 31: Identifying Sealing Compound And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... DISCONNECTING PLUG CONNECTION, WIRING HARNESS, FRONT/REAR

Spread levers (1) on socket housing apart in direction of arrow and disconnect female connector (2) in direction of arrow towards bottom.

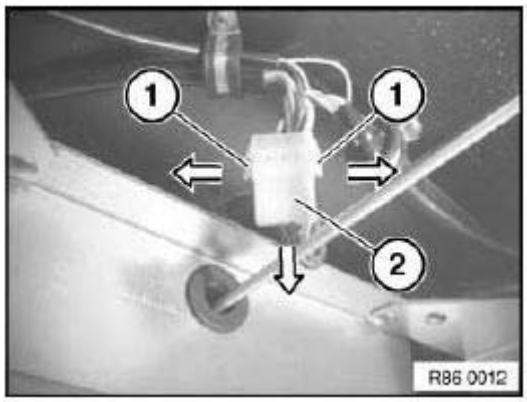


Fig. 32: Disconnecting Female Connector
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... INSTALLATION POSITION OF BMW LETTERING

Top edge of lettering at same height as recess for position light (1).

Distance between drawbar member and lettering (2) is 300 mm.

Installation

Remove grease from gluing surfaces.

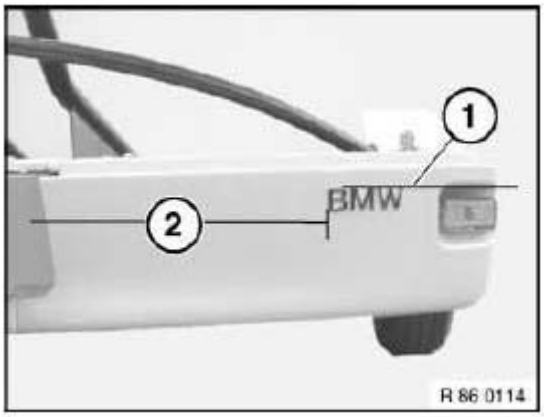


Fig. 33: Identifying BMW Lettering Distance
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... POSITIONING OF MULTITRAILER HOOD FOR MAINTENANCE AND REPAIR WORK

IMPORTANT: At least two persons are needed to install and remove the hood from the platform.
Before installing and removing the hood, secure the BMW multitrailer and the entire combination against rolling. For this purpose, use the parking brake and the chocks of the BMW multitrailer.
The hood can also be set up and lowered with the aid of the universal lift available from BMW in conjunction with the roof racks and the hood adapter.
Under no circumstances should work of any kind be carried out below the suspended hood.

For maintenance and repair work, raise the hood using a lifting platform. Twin-column lifting platforms, body lifting platforms and twin-stamp underfloor platforms are suitable. The seating plates and areas of the lifting platform must be adjustable according to the dimensions of **Fig. 34**.

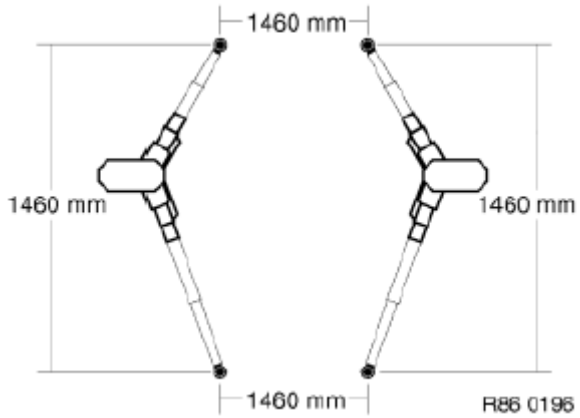


Fig. 34: Identifying Adjustable Dimension Of Seating Plates And Lifting Platform Areas
Courtesy of BMW OF NORTH AMERICA, INC.

The lifting platform must conform to the relevant legal provisions of the accident prevention regulations and be serviced as specified. Comply with the lifting platform operating instructions, in particular the safety instructions and the carrying capacity.

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Please comply with the following instructions before raising the hood:

- Raise only when it is unloaded;
- Ensure sufficient clearance between the seating plates/seating areas and the GFP edge of the hood;
- The hood must always be positioned in the middle of the lifting platform.

IMPORTANT: The hood may only be raised at the pin (1). Under no circumstances may the hood be raised at the GFP edge of the hood (2). See Fig. 35. Exclusively for removal of pin (1), raise the hood in the GFP area.
Also refer to:
86 21 ... REMOVING CENTERING PIN FROM MOUNTING BRACKET .

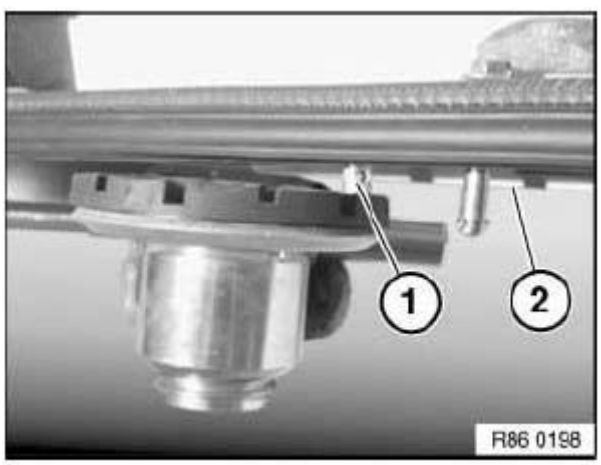


Fig. 35: Identifying Centering Pin Of Mounting Bracket And Hood
Courtesy of BMW OF NORTH AMERICA, INC.

00 00 ... RAISING BMW MULTI-TRAILER

CAUTION: Twin-strut underfloor platforms and twin-pillar lifting platforms are suitable for raising the BMW multi-trailer.
Lifting platforms with drive-on surfaces are not suitable for raising in order to carry out maintenance and repair work.

The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions. It is essential to follow the lifting platform operating instructions, in particular the safety instructions and carrying capacity!

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Before raising the BMW multi-trailer, please observe the following points:

- Raise the trailer only when it is unloaded
- Remove a supplied loading ramp from the loading ramp frame so that all chassis areas of the BMW multi-trailer are freely accessible
- There must be sufficient clearance between the carrier arms/flat girder bridges and the GFK aprons or the front guard of the BMW multi-trailer
- The BMW multi-trailer must always be positioned in the middle of the lifting platform.

CAUTION: You will need special additional supports for the lifting platform in order to bridge the difference in height between longitudinal member and lower edge of GFK side apron or front guard of the BMW multi-trailer. The minimum height of the additional supports is 145 mm. Use only the additional supports approved by the platform manufacturer or specified in these repair instructions.
You will find appropriate examples in the repair instructions for the majority of lifting platforms present in BMW workshops. For lifting platforms that are not named, the relevant manufacturers will offer you appropriate additional supports. Please contact directly the manufacturer of the lifting platform used in your dealership.

CAUTION: The BMW multi-trailer may only be raised by its longitudinal members. Do not under any circumstances raise the BMW multi-trailer by the GFK aprons. Make sure the additional supports bear the longitudinal members over their entire width and no attachments or wiring harnesses are touched or jammed. Check the securing equipment of the additional supports for correct seating. Under no circumstances should any work be carried out underneath the BMW multi-trailer if it is not adequately secured against slipping off the lifting platform.

The areas (2) on the longitudinal members (1) marked in the adjacent diagram are the best areas for attaching the additional supports.

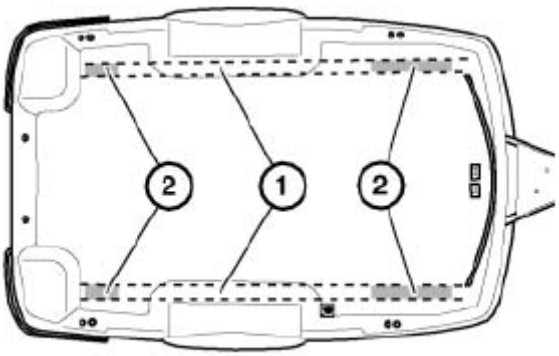


Fig. 36: Identifying Additional Support Areas On Longitudinal Members
Courtesy of BMW OF NORTH AMERICA, INC.

General notes on using twin-pillar lifting platforms

For the twin-pillar lifting platforms described, the BMW multi-trailer is positioned in the direction of travel on the platform. For lifting platforms which do not create sufficient clearance between disk wheel and carrier arms, move the BMW multi-trailer against the direction of travel onto the platform.

Becker & Sohne twin-strut underfloor platform

The BMW multi-trailer can only be raised if it is supported at right angles to the direction of travel. For raising, use the high additional supports (1) of Becker&Sohne.

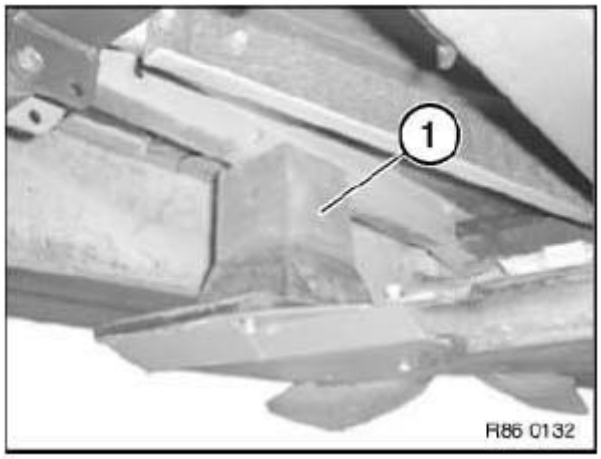


Fig. 37: Identifying Additional Support
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Also lash the BMW multi-trailer to the flat girder bridges of the lifting platform. Flag the protruding tow hitch and the drawbar member of the BMW multi-trailer conspicuously so as to prevent injury, e.g. with a red cloth.

MAHA twin-pillar lifting platform

The BMW multi-trailer can only be raised if you use the support plate attachment sleeves for transporters (1). Position the axle of the BMW multi-trailer in the direction of travel in front of the pillars of the platform in order to obtain the specified lifting ranges and to establish sufficient clearance between disk wheel and carrier arms. The long carrier arms raise the front and the short carrier arms raise the rear of the BMW multi-trailer.

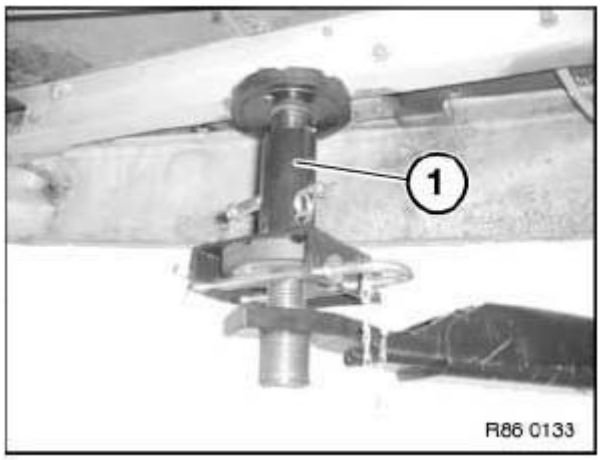


Fig. 38: Identifying MAHA Twin-Pillar Lifting Platform
Courtesy of BMW OF NORTH AMERICA, INC.

Romaico-Lift twin-pillar lifting platform

The BMW multi-trailer can only be raised if you use the 146 mm high attachments (1).

Position the axle of the BMW multi-trailer in the direction of travel in front of the pillars of the platform in order to obtain the specified lifting ranges and to establish sufficient clearance between disk wheel and carrier arms. The long carrier arms raise the front and the short carrier arms raise the rear of the BMW multi-trailer.

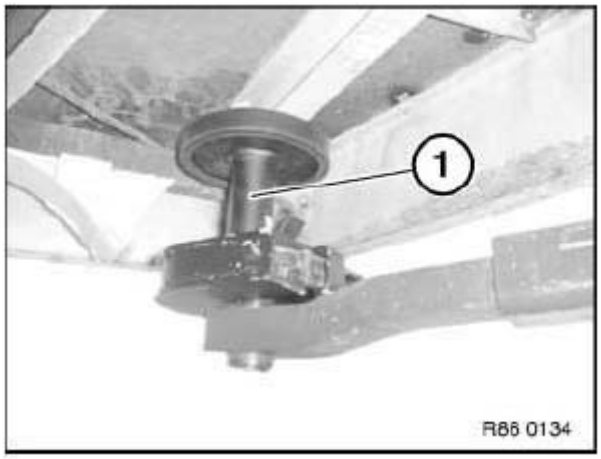


Fig. 39: Identifying High Attachment
Courtesy of BMW OF NORTH AMERICA, INC.

Working pit

The BMW multi-trailer can be serviced or repaired in conjunction with a working pit if the following measures are taken into consideration. The BMW multi-trailer must be secured against slipping/tilting sideways. The drawbar jockey wheel must be firmly secured against rolling.

86 10 ... REMOVING CAMLOCK RETAINING CAM ON LOADING RAMP

Drill out rivets (1).

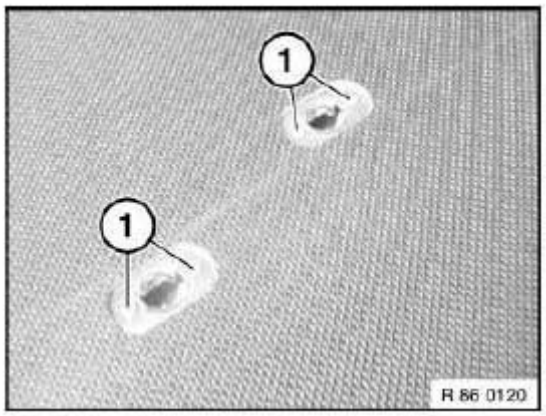


Fig. 40: Identifying Loading Ramp Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING CAMLOCK SCREW CAP

Bend back edges (1) of tab washer (2). Remove tab washer (2) over cross pin (3) towards bottom.

Installation

Replace lockplate.

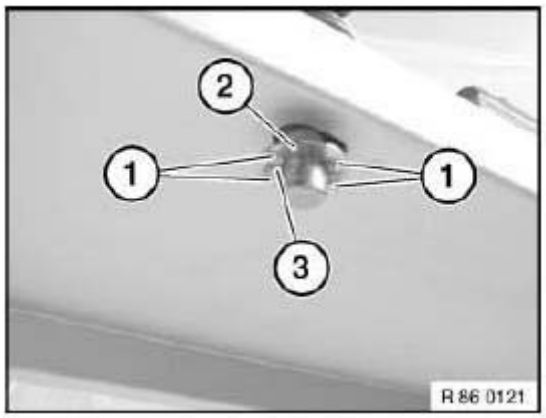


Fig. 41: Identifying Back Edges Of Tab Washer And Cross-Pin

Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT COIL SPRING

Release screw (1) and remove, tilt shock absorber (2) in direction of arrow towards rear.

Installation

Use new self-locking nut.

Hold shock absorber vertically and protective cap points upwards. Completely press in shock absorber once and pull out up to required installation length. Do not tilt shock absorber further than is needed for installation.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 21AZ.**

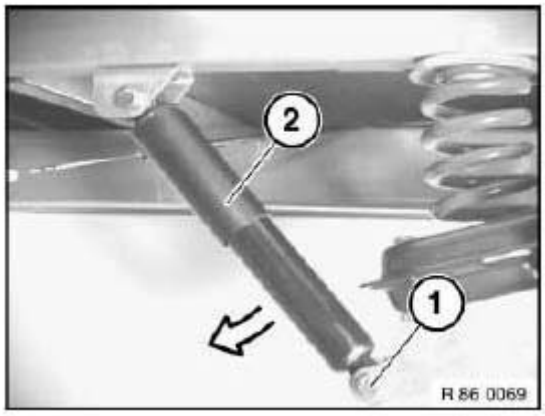


Fig. 42: Tilting Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

The trailing arm folds down once the coil spring on the arm has been released.

No persons should be located underneath trailing arm. Risk of injury!

Release screw (1) between trailing arm (2) and coil spring.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 22AZ.**

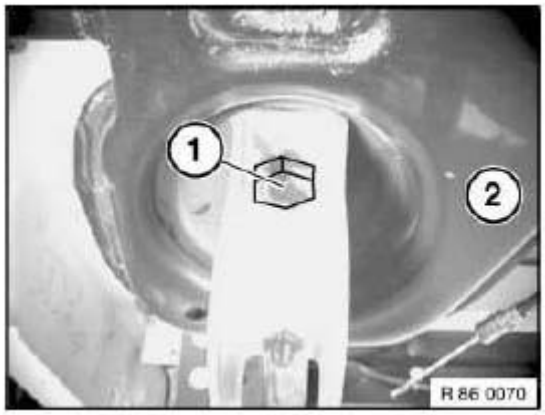


Fig. 43: Identifying Trailing Arm And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove pressure plate (1) from coil spring (2).

Installation

Use pressure plate with nut.

Fit pressure plate (1) according to its shape (3) into pressure spring (2).

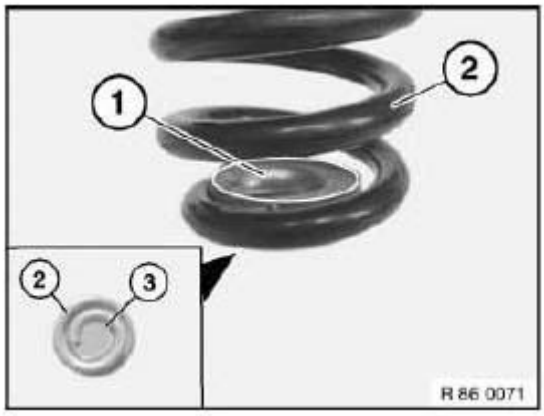


Fig. 44: Identifying Pressure Plate And Pressure Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) between coil spring (2) and longitudinal member (3). Remove small pressure plate (4) and large pressure plate (5).

Installation

Use pressure plate without nut. Fit small pressure plate (4) according to its shape (6) into pressure spring (2).

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 23AZ.**

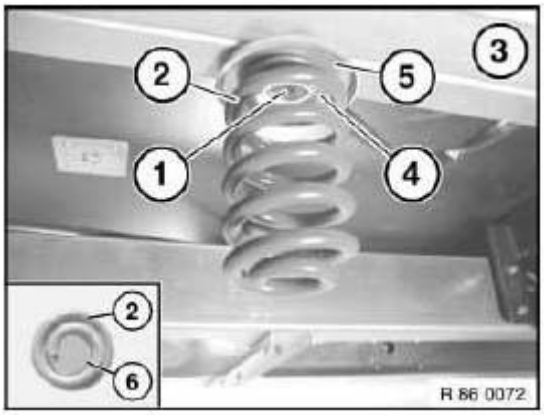


Fig. 45: Identifying Large And Small Pressure Plate, Coil Spring, Longitudinal Member And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Two persons are needed to install the coil spring correctly. One person presses down the pressure plate (2) seated inside the coil spring (1) and tightens the coil spring (1)/trailing arm (3) screw connection. At the same time, the second person levers the coil spring (1) with a screwdriver into its correct seat.

Tightening Torque for coil spring (1)/trailing arm (3),

REFER TO TECHNICAL DATA 86 10 22AZ.

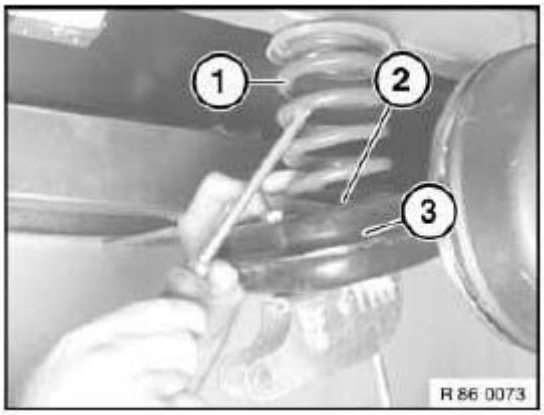


Fig. 46: Installing Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING BOLT ON LOADING RAMP

Insert a drift into hole (1) of bolt (2) and turn clockwise.

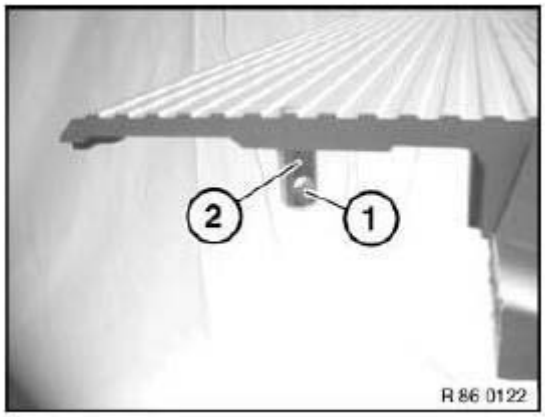


Fig. 47: Identifying Hole On Loading Ramp Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING BRAKE SHOES

The wheels of the multi-trailers must be able to rotate freely. Adjust and check brake system after installing brake shoes.

Unhook tension spring (1) from tension spring mount (2).

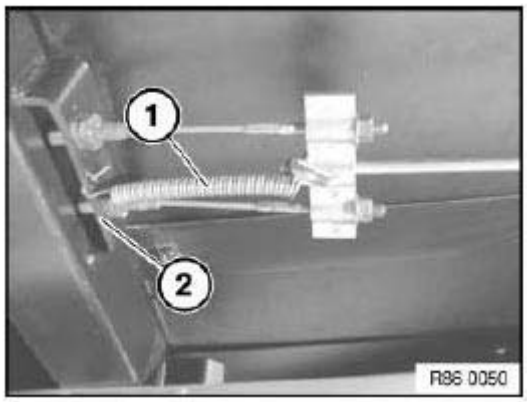


Fig. 48: Identifying Tension Spring And Tension Spring Mount
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Once nut (1) of pull rod (2) has been released, do not move handbrake lever. Handbrake lever can flick upwards.

Release nut (1) on pull rod (2) and remove hexagon nut. Slide brake compensator (3) towards rear.

Installation

Use new self-locking nut.

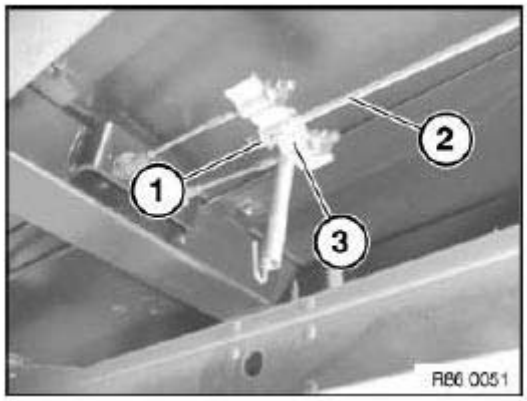


Fig. 49: Identifying Brake Compensator And Pull Rod Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Grip openings (1) in wheel trim (2) with both hands and pull off wheel trim (2).

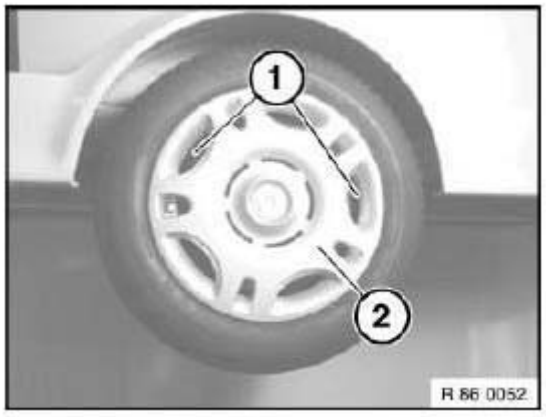


Fig. 50: Identifying Grip Openings On Wheel Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Release wheel bolts (1) and remove disk wheel (2).

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 19AZ.**

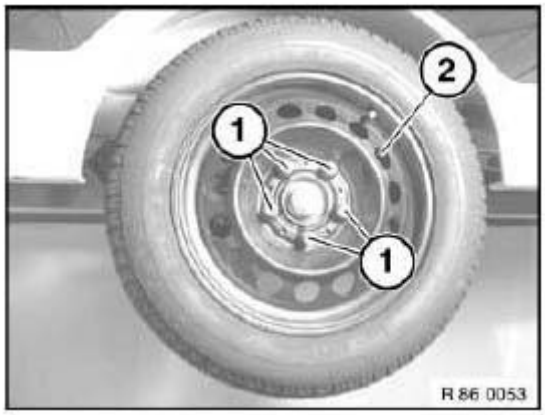


Fig. 51: Identifying Disk Wheel With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Turn brake shoe adjusting screw (2) on brake carrier (1) in direction of arrow and release fully. The brake shoes do not rest against the drum.

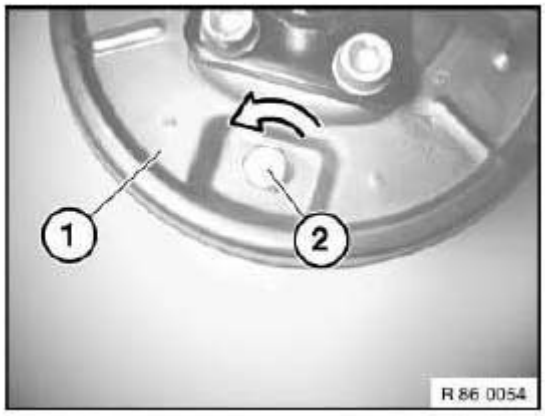


Fig. 52: Turning Brake Shoe Adjusting Screw On Brake Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Lever off cap (1).

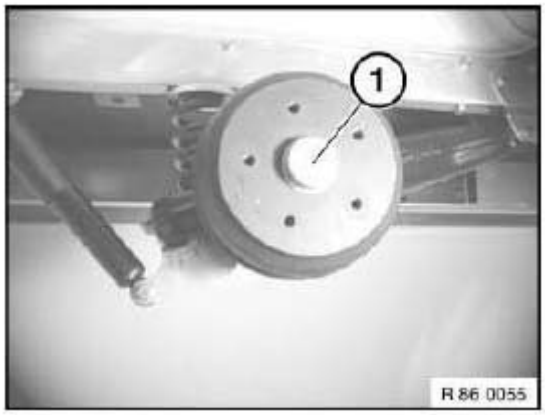


Fig. 53: Removing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove. Pull off brake hub (2) with both hands.

Installation

Only a new nut is permitted for reinstallation.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 20AZ.**

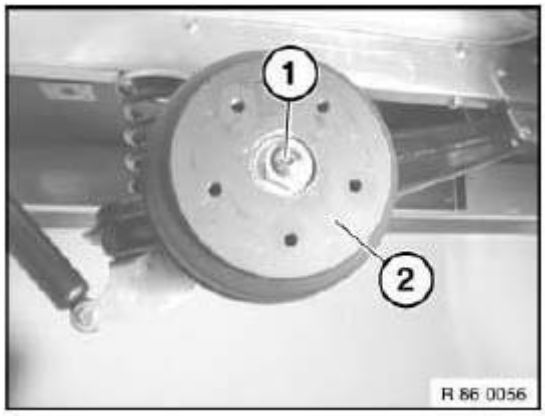


Fig. 54: Identifying Brake Hub With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Do not screw off brake hub under any circumstances.

To illustrate more clearly the work steps in **Fig. 55**, **Fig. 56** and **Fig. 57**, the wheel brake has been detached from the axle.

This procedure is not necessary for removing the brake shoes.

Push back cable (1).

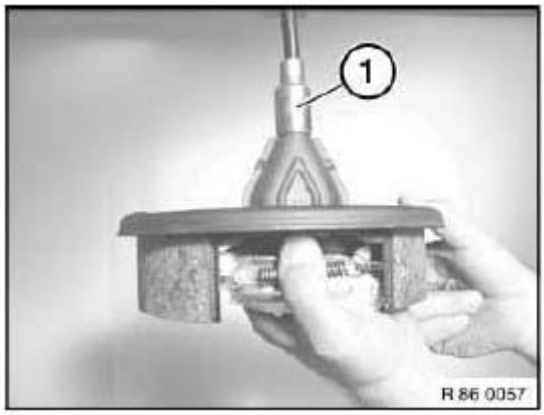


Fig. 55: Pushing Back Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Remove shell (1).

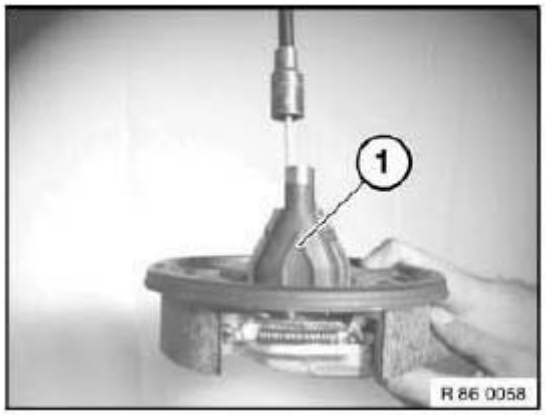


Fig. 56: Removing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Remove brake cable (1) from mounting (2).

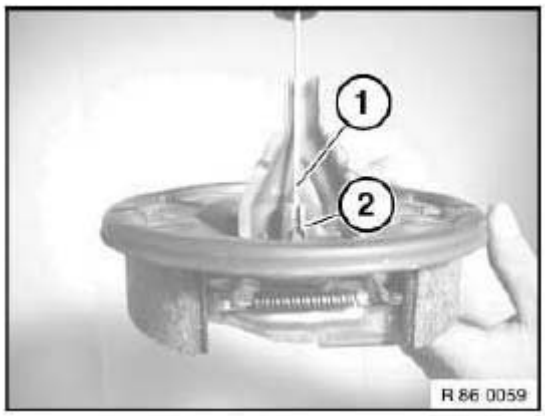


Fig. 57: Removing Brake Cable From Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook pressure spring (1) from fixed brake shoe (2) and brake carrier (3).

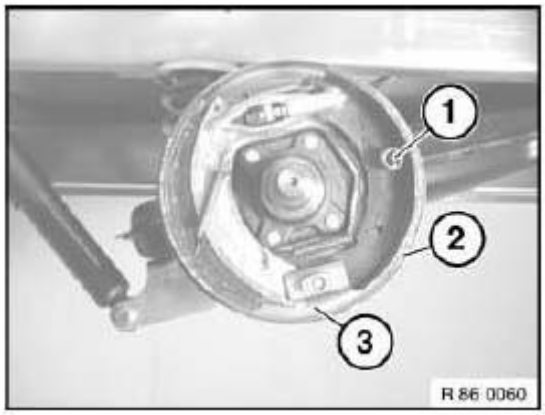


Fig. 58: Identifying Brake Shoe, Brake Cable And Pressure Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Remove tension spring (1) from both brake shoe fixtures (2).

Remove brake lever assembly (3).

Installation

The fixed part of the brake lever assembly (3) is seated on the moving brake shoe. The moving part of the brake lever assembly is seated on the fixed brake shoe.

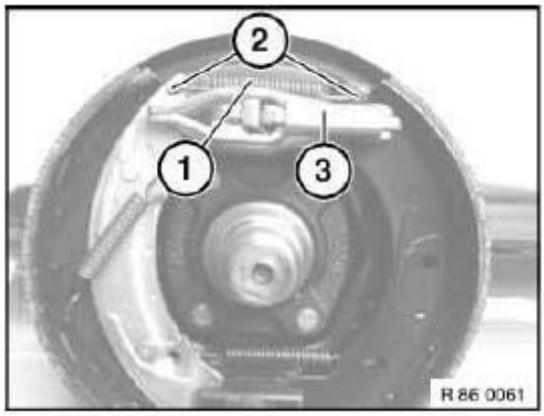


Fig. 59: Identifying Tension Spring On Brake Shoe Fixtures And Brake Lever Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Pull brake shoes (1) apart in direction of arrow, tilt forward and remove from adjustment device (2).

Installation

Always replace the four shoes and use the same make.

Minimum lining thickness: 1.5 mm

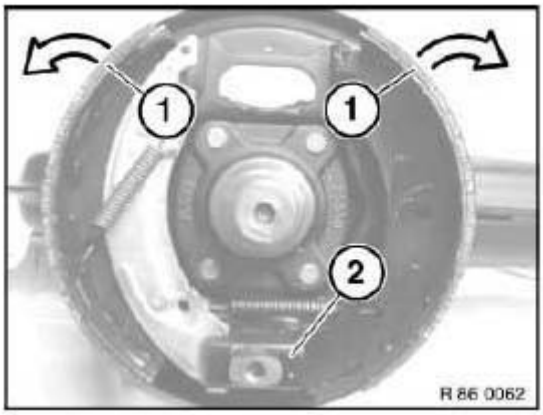


Fig. 60: Pulling Brake Shoes
Courtesy of BMW OF NORTH AMERICA, INC.

Check adjustment device (1).

Check wedge (2) and setting pins (3) for ease of movement and wear.

Apply grease if necessary.

Check brake cables for ease of movement and wear.

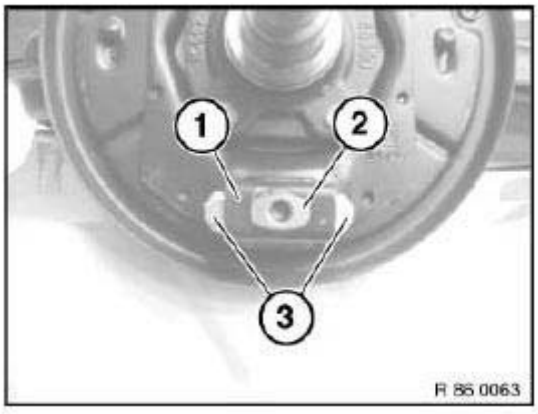


Fig. 61: Identifying Adjustment Device With Wedge And Setting Pins
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING ENTRY PROFILE SECTION ON LOADING RAMP, LEFT, RIGHT AND CENTER

CAUTION: Before drilling out rivets, drive in rivet pins with a punch.

Drill out rivets (1). Remove entry profile section (2) towards front.

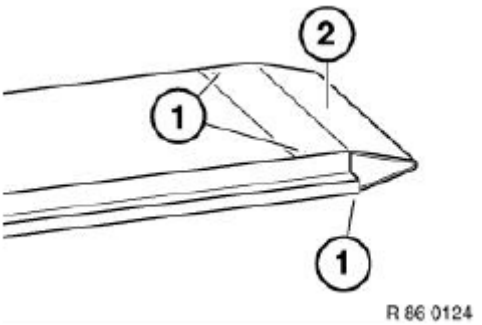


Fig. 62: Identification Entry Profile Section With Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING LEFT OR RIGHT SHOCK ABSORBER

Inspect the shock absorber while installed to ascertain whether it needs to be replaced.

Replace shock absorber if it is leaking. Replace shock absorber if it can be easily pushed in or pulled out when removed.

Release screw (1) and remove. Tilt shock absorber in direction of arrow. Release screw (2) and remove shock absorber.

Installation

Hold shock absorber vertically: protective cap points upwards. Completely press in shock absorber once and pull out up to required installation length. Do not tilt shock absorber further than is needed for installation.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 21AZ.**

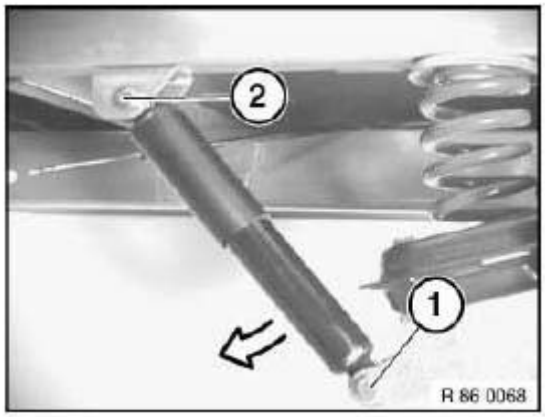


Fig. 63: Tilting Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING LOADING RAMP LOCK

Unscrew bolts (1).

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 28AZ.**

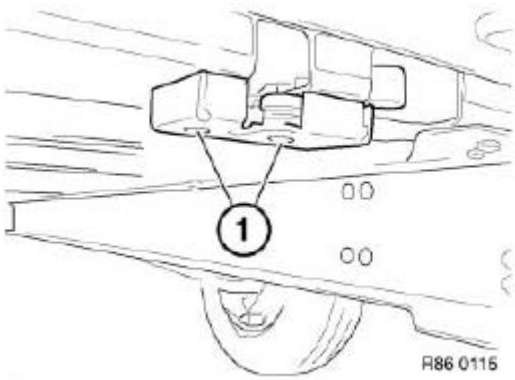


Fig. 64: Identifying Loading Ramp Lock Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Pass lever (1) of rotary striker lock (2) out of square hole (3) by twisting from side to side.

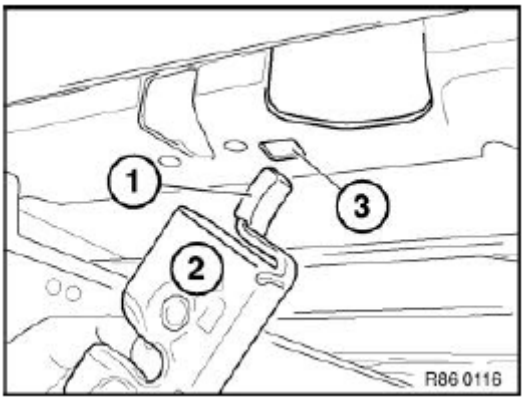


Fig. 65: Identifying Lever Of Rotary Striker Lock Out Of Square Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolts (1).

Installation

Opening for securing clip (2) points to front or rear.

Square-head nut (3) rests with its square surface parallel to bearing pedestal (4).

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 29AZ.**

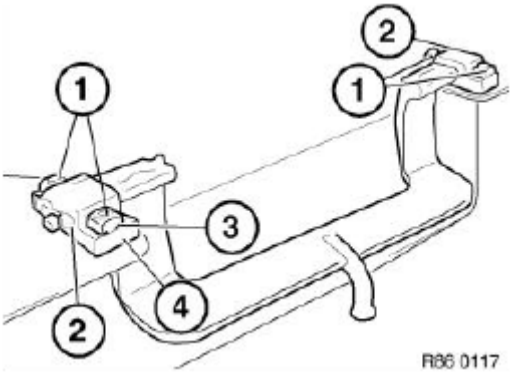


Fig. 66: Identifying Clip, Square-Head Nut With Bearing Pedestal And Loading Ramp Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Raise edge (1) of securing clip and slide in direction of arrow towards rear.

Detach bearing pedestal (2).

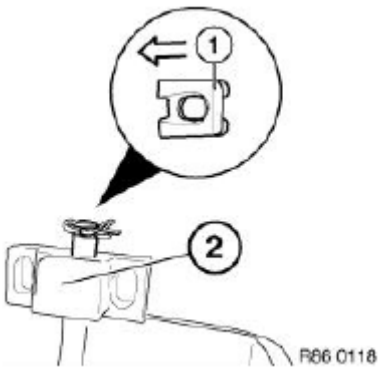


Fig. 67: Removing Bearing Pedestal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Install bearing pedestal (1) on stub (3) of locking bracket (3).

Off-center bore (4) in bearing pedestal (1) points with short distance (A) to locking bracket (3).

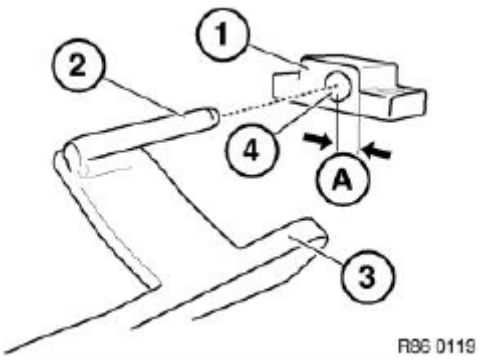


Fig. 68: Identifying Bearing Pedestal On Stub Of Locking Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING MOUNTING BRACKET SEALING CAP

Cut out mounting bracket (3) along markings (1, 2) and lever out of apron (4).

Installation

For gluing, use two-component adhesive ICEMA R 101 and hardener 7.

Mixture ratio: ICEMA R 101 7 parts; hardener 7 1 part.

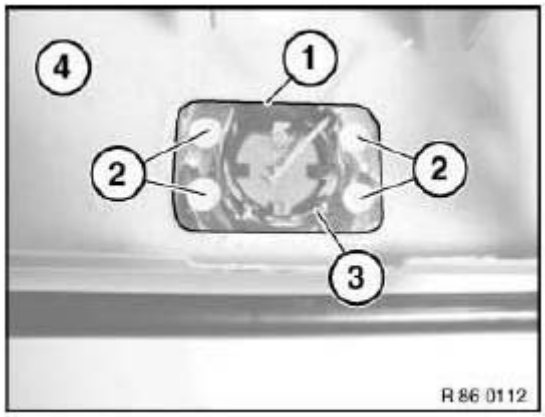


Fig. 69: Identifying Marking On Mounting Bracket And Apron
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING MOUNTING BRACKET, CENTER, LEFT AND RIGHT

NOTE: Disassembly of Camlock retaining cam
REFER TO 86 10 ... DISASSEMBLY OF CAMLOCK RETAINING CAM

Unscrew bolts (1).

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 31AZ.**

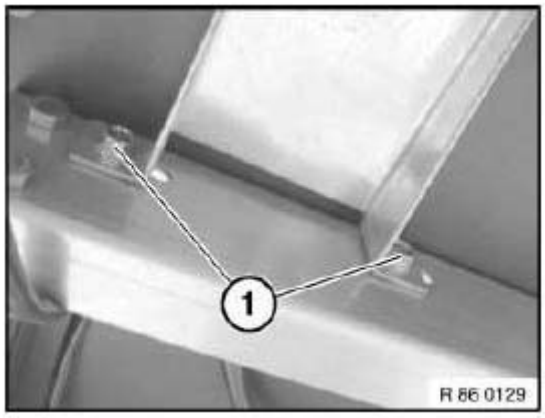


Fig. 70: Identifying Mounting Bracket Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING OUTER PULL ROD MOUNT, LEFT AND RIGHT

Release screws (1) and remove pull rod mount (2).

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 30AZ.**

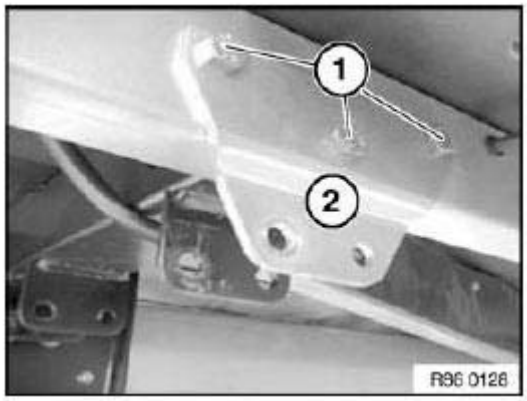


Fig. 71: Identifying Pull Rod Mount With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING OVERRUNNING EQUIPMENT/MAINTAINING OR REPLACING GUIDE BUSH/INSTALLING OVERRUNNING EQUIPMENT

After installing overrunning equipment, readjust brake system,

REFER TO 86 10 ... ADJUSTING BRAKE SYSTEM

Check the guide bush while installed to ascertain whether it needs to be replaced. Raise ball end area and replace guide bush if play is detected in ball end area.

NOTE: After installing, readjust and check brake system.

Release round head screws (1) and remove running board (2) towards top.

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 10AZ.**

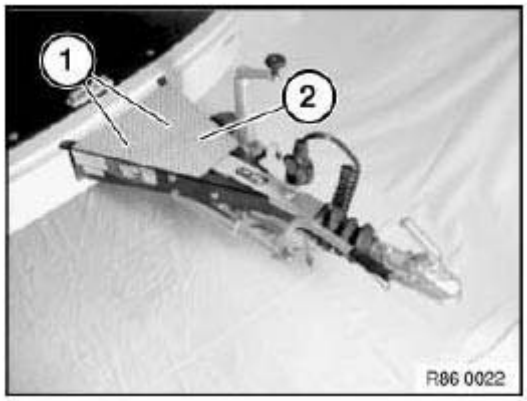


Fig. 72: Identifying Running Board With Round Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook tension spring (1) from tension spring mount (2).

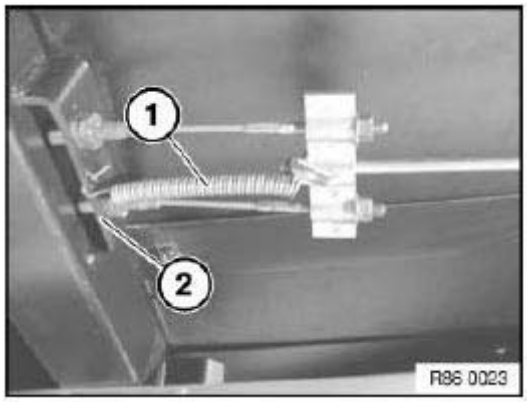


Fig. 73: Identifying Tension Spring And Tension Spring Mount
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Once nut (1) of pull rod (2) has been released, do not move handbrake lever. Handbrake lever can flick upwards.

Release screw (1) on pull rod (2) and remove hexagon nut. Slide brake compensator (3) towards rear.

Installation

Use new self-locking nut.

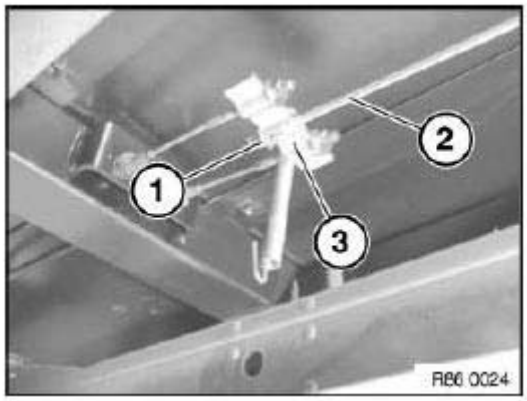


Fig. 74: Identifying Brake Compensator With Pull Rod And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on jockey wheel mount and remove.

Release wiring harness mount (2) and remove. Reinstall screw and tighten until hand-tight.

Installation

Tightening Torque for jockey wheel mount (1),

REFER TO TECHNICAL DATA 86 10 11AZ.

Tightening Torque for wiring harness mount (2), **REFER TO TECHNICAL DATA 86 10 12AZ.**

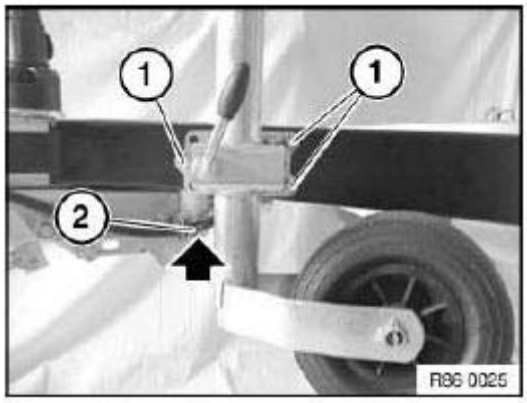


Fig. 75: Identifying Wiring Harness Mount And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on socket holder (1) and remove. Cut through strap (2) and lay wiring harness to one side. Pull gaiter (3) in direction of arrow.

Installation

Use new self-locking nut.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 13AZ.**

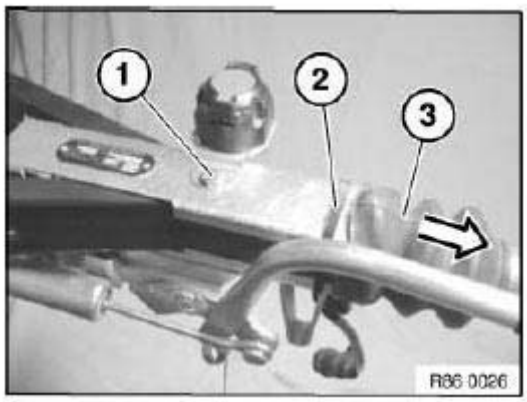


Fig. 76: Pulling Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective caps (1).

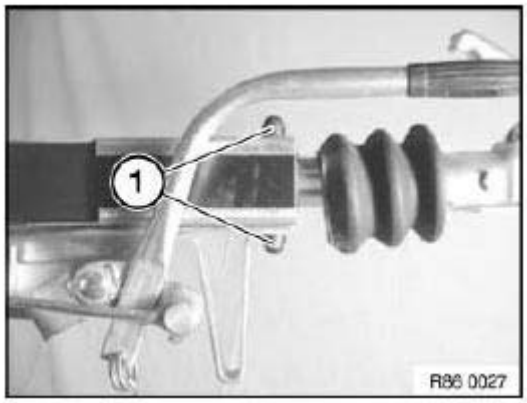


Fig. 77: Identifying Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and remove.

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 14AZ.**

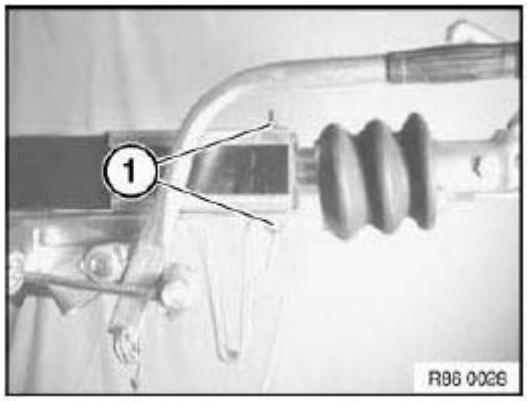


Fig. 78: Identifying Brake System Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Tilt top reversing housing (1) in direction of arrow towards rear. Slide out top reversing housing (1) and bottom reversing housing with handbrake lever unit (2) in direction of arrow towards rear.

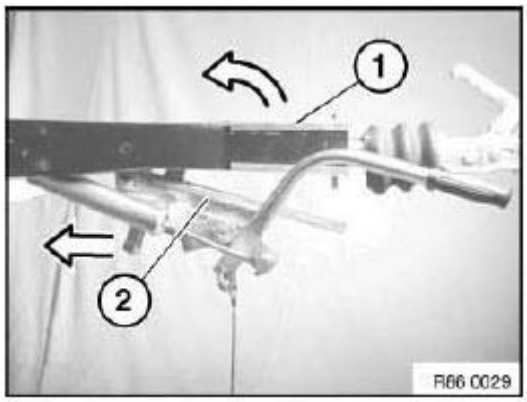


Fig. 79: Sliding Out Top Reversing Housing And Bottom Reversing Housing With Handbrake Lever Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Remove holder (1) towards bottom.

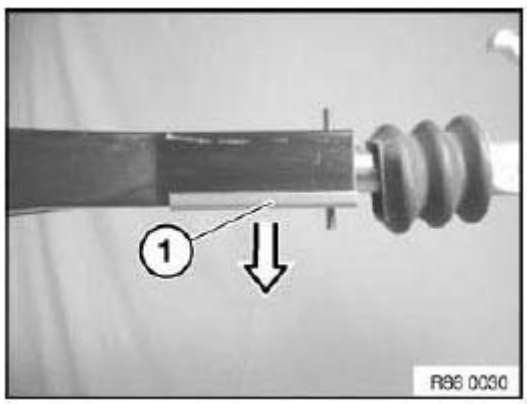


Fig. 80: Removing Holder Towards Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Pull drawbar member (1) in direction of arrow and pull out overrunning equipment (2) in direction of arrow towards front.

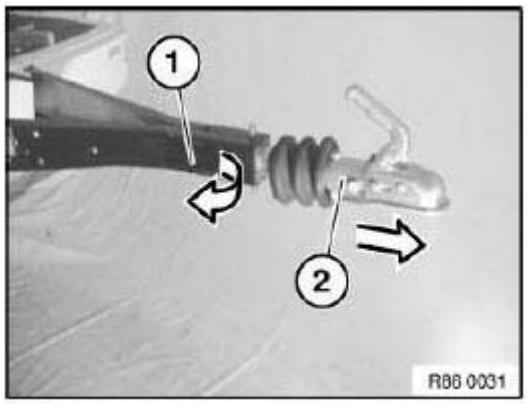


Fig. 81: Pulling Drawbar Member And Overrunning Equipment
Courtesy of BMW OF NORTH AMERICA, INC.

Remove spacer tubes (1) and threaded pins (2) from guide bush (3).

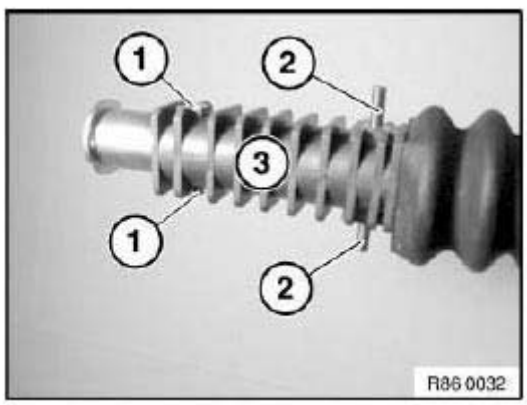


Fig. 82: Identifying Spacer Tubes And Threaded Pins Of Guide Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Press pins (1) inwards. Detach counter support (2) and guide bush (3).

Maintenance

Grease tow tube (4) and attach guide bush (3).

Installation

Secure counter support (2) with new clamping sleeves to tow tube (4).

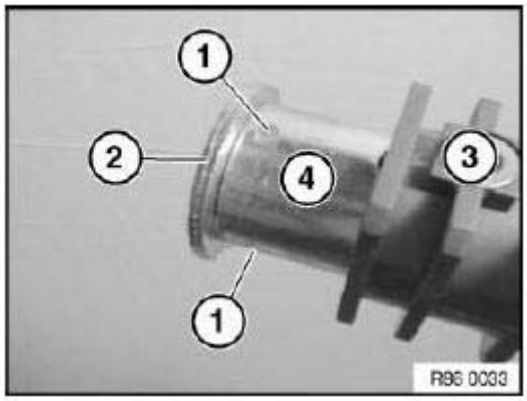


Fig. 83: Identifying Guide Bush, Tow Tube And Counter Support With Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Insert spacer tubes (1) and threaded pins (2) in guide bush (3).

Make sure spacer tubes (1) are correctly seated in guide bush (3).

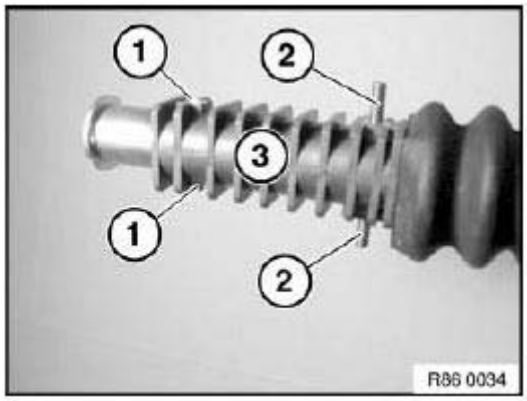


Fig. 84: Identifying Spacer Tubes And Threaded Pins With Guide Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Using a screwdriver, link spacer tubes (1) and shock absorber located in tow tube. This ensures that the shock absorber remains in the correct installation position. Pull drawbar member (2) in direction of arrow and push in overrunning equipment (3) in direction of arrow towards rear.

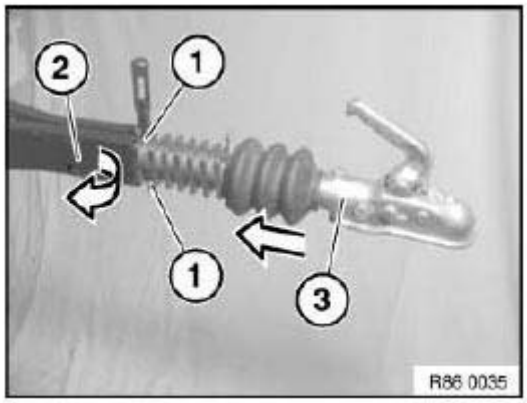


Fig. 85: Pulling Drawbar Member
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING PLASTIC BUSH/METAL BUSH

Release countersunk metal screws (1).

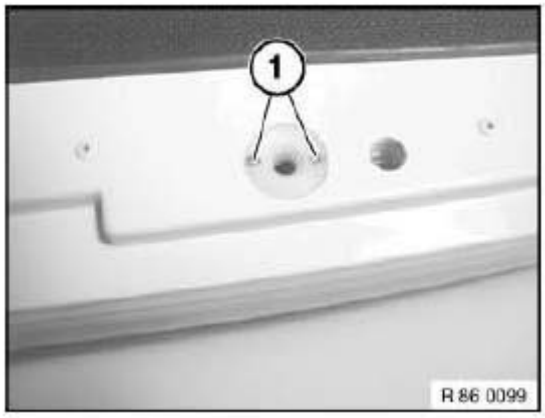


Fig. 86: Identifying Countersunk Metal Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out plastic bush/metal bush (1) with a screwdriver.

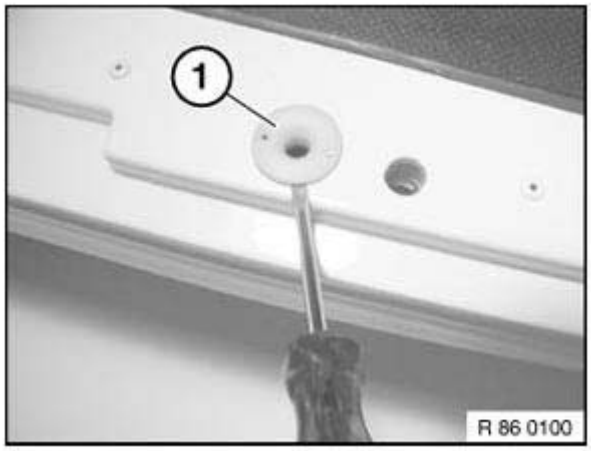


Fig. 87: Removing Plastic Bush/Metal Bush Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING REAR SUPPORTS AND BRACKET

Release screws (1) and remove rear support (2) from bracket (3).

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 26AZ.**

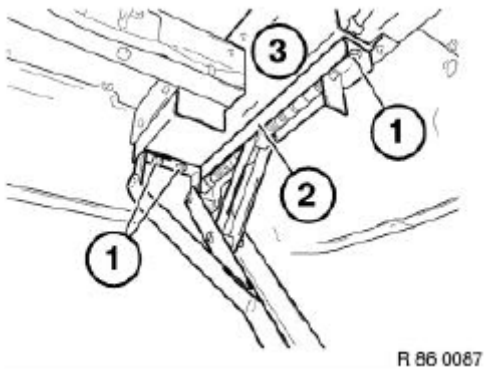


Fig. 88: Identifying Rear Support On Bracket And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cable holders (1) from bracket (2). Release screws (3) on left and right sides of bracket (2). Drill out rivets (4) from underside of platform. Drill out rivets (5) from upper side of platform.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 27AZ.**

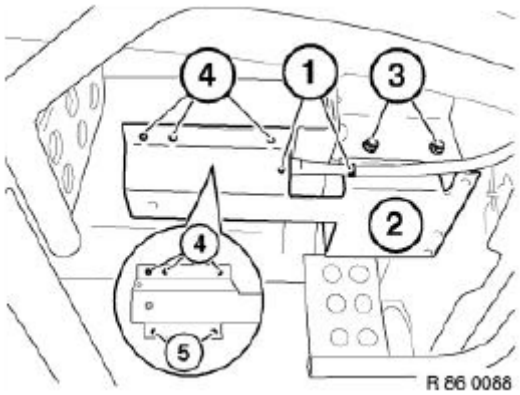


Fig. 89: Identifying Cable Holder, Bracket Screws And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Feed cable for rear light (1) through opening (2). Fit cable holders (4) in holes (3).

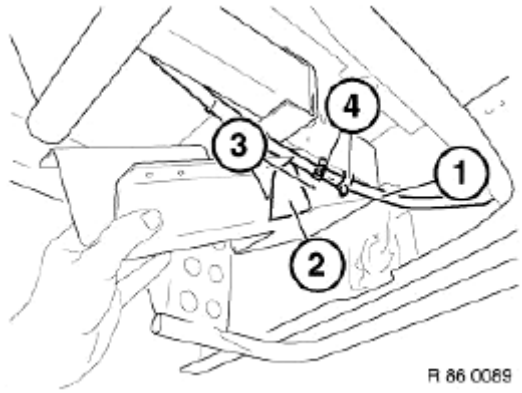


Fig. 90: Removing Cable For Rear Light From Opening
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING REFLECTING REAR LIGHT

From rear side of GFK apron, drive out plastic pins (1) with a drift.

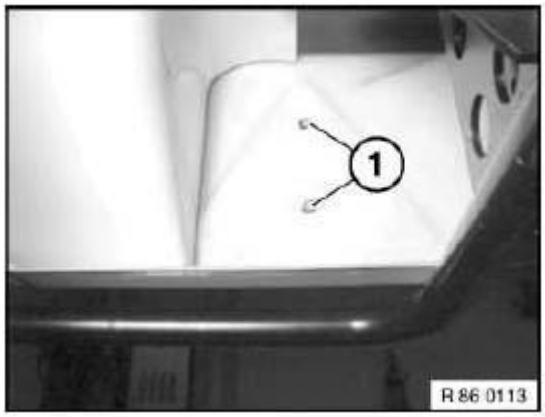


Fig. 91: Identifying Plastic Pins
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING REST ON LOADING RAMP, LEFT, RIGHT AND CENTER

CAUTION: Before drilling out rivets, drive in rivet pins with a punch.

Drill out rivets (1). Remove rest (2) towards front.

Installation

Stick on new sealing tape.

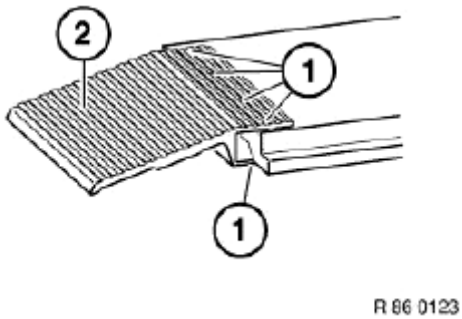


Fig. 92: Identifying Loading Ramp Rest With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING SHOCK ABSORBER FROM OVERRUNNING EQUIPMENT

Check the overrunning equipment shock absorber while installed to ascertain whether it needs to be replaced.

Apply handbrake. Push in and pull out tow ball end by hand. If it is very easy to pull out the tow ball end, the shock absorber must be replaced.

NOTE: **Complete disassembly of overrunning equipment and guide bush, REFER TO 8610 ... DISASSEMBLY OF OVERRUNNING EQUIPMENT.**

Release screw (1) and remove. Pull out internal shock absorber (2) from opening in tow tube (3) towards rear.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 15AZ.**

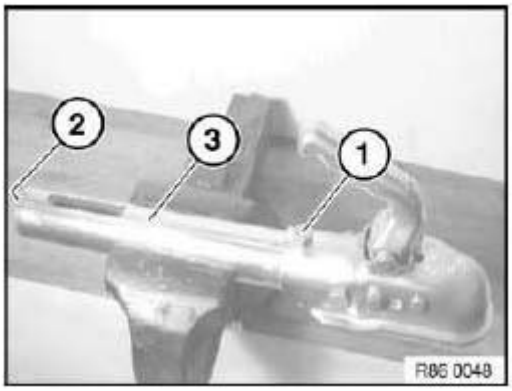


Fig. 93: Identifying Shock Absorber With Tow Tube And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Push in new shock absorber (1) as shown in illustration through opening in tow tube (2).

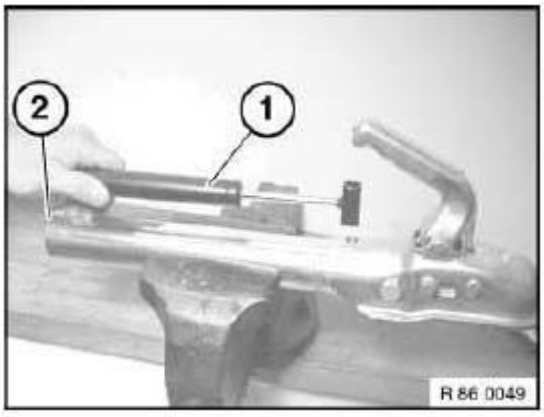


Fig. 94: Pushing Shock Absorber In Tow Tube
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING TRAILING ARM, REMOVING AND INSTALLING OR REPLACING MOUNTING

Replace bearing in trailing arm if there is play in trailing arm.

NOTE: **Remove brake cable, REFER TO 86 10 ... REMOVING BRAKE SHOES. Remove shock absorber and coil spring, REFER TO 86 10 ... REMOVING AND INSTALLING COIL SPRING.**

Release screws (1) between wheel brake (2) and trailing arm (3) and remove complete wheel brake (2).

Installation

Do not reuse screws (1). Use only the socket-head cap screws intended for this purpose. Stamped arrow on the reverse side of the brake carrier points in the direction of travel and stands at the 12 o'clock position.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 24AZ.**

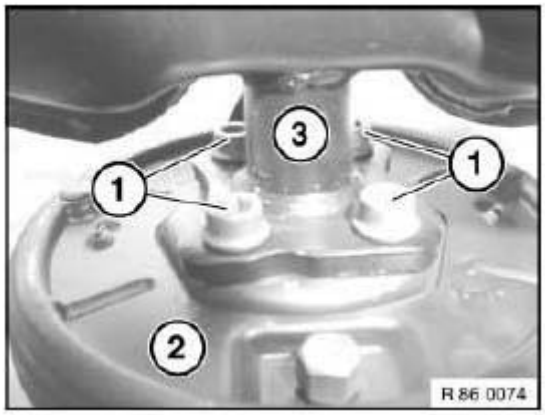


Fig. 95: Identifying Trailing Arm On Wheel Brake And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

The trailing arm folds down once the coil spring on the arm has been released.

No persons should be located underneath trailing arm. Risk of injury!

Release screws (1, 2). Use assembly hole (3) to release screw connection (2).

Press out screws (1, 2) with a mandrel.

Installation

Use new self-locking nut.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 25AZ.**

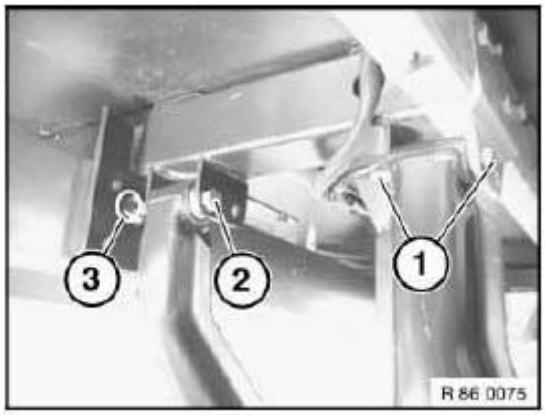


Fig. 96: Identifying Hole With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Mount trailing arms (1) at rear mounts (4) only, viewed in direction of travel, with screws (2, 3).

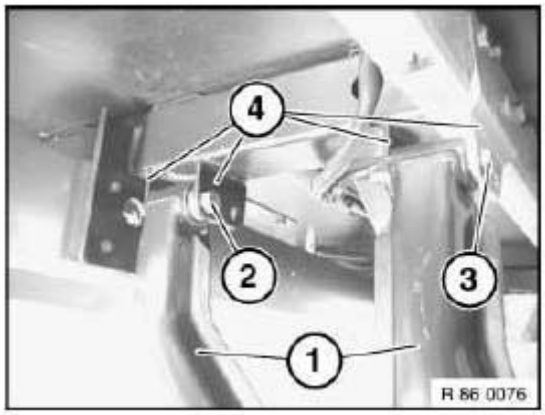


Fig. 97: Identifying Trailing Arms On Rear Mounts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Do not damage trailing arm with drill when drilling.

Drill spacer tube (1) with a 4 mm drill at three evenly offset points. Place drill as near as possible to compensating bush (2).

Bores relieve tension on material of spacer tube.

Press out spacer tube (1) and compensating bush (2) with a drift.

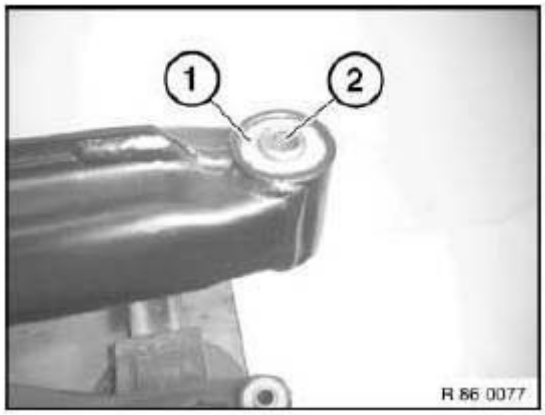


Fig. 98: Identifying Spacer Tube And Compensating Bush
Courtesy of BMW OF NORTH AMERICA, INC.

Grease new spacer tube (1) for installation with Syntheso Glep I. Drive new spacer tube (1) with a rubber mallet into trailing arm mount (2).

Installation

Make sure spacer tube (1) is not tilted when driven in.

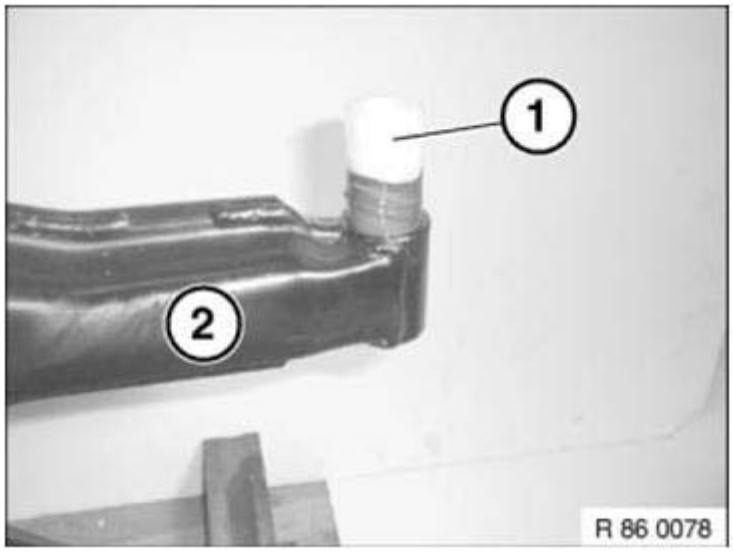


Fig. 99: Identifying Spacer Tube And Trailing Arm Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Drive compensating bush (1) with a drift into spacer tube (2). Set compensating bush (1) and spacer tube (2) centrally in trailing arm mount (3).

Installation

Make sure compensating bush (1) is not tilted when driven in.

Install coil spring, **REFER TO 86 10 ... REMOVING AND INSTALLING COIL SPRING.**

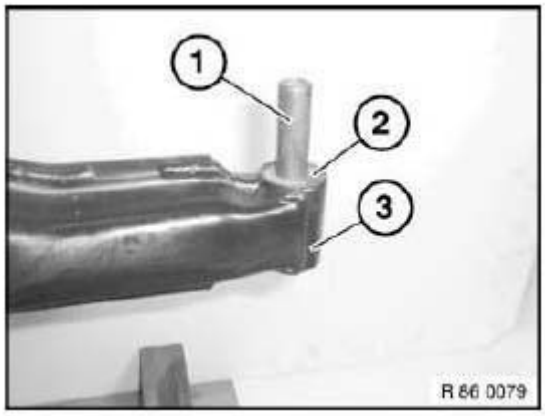


Fig. 100: Identifying Compensating Bush And Spacer Tube On Trailing Arm Mount
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING WHEEL BEARING

The angular-contact ball bearings do not require maintenance and have lifetime lubrication. The bearings cannot be readjusted.

Remove brake drum, **REFER TO 86 10 ... REMOVING BRAKE SHOES.**

Lever out both snap rings (1).

Installation

Replace expanded or damaged snap rings (1). Ensure correct seating.

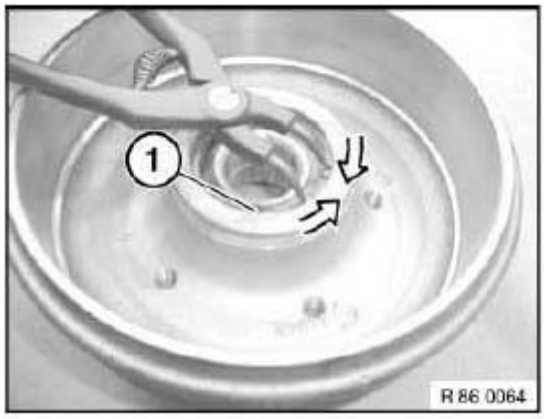


Fig. 101: Removing Snap Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Press out wheel bearing with special tool 24 1 010.

CAUTION: Do not reuse old wheel bearing.

Fig. 102: Pressing Out Wheel Bearing With Special Tool (24 1 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Place new wheel bearing (1) with lathe-turned end (2) in center of bore in brake drum (3).

Installation

Before pressing in new wheel bearing, check bearing seat for possible damage.

Make sure wheel bearing is not tilted when pressed in.

Fig. 103: Identifying Wheel Bearing With Lathe-Turned End On Brake Drum
Courtesy of BMW OF NORTH AMERICA, INC.

Press in new wheel bearing (1) with special tool 23 2 150 and 33 1 374.

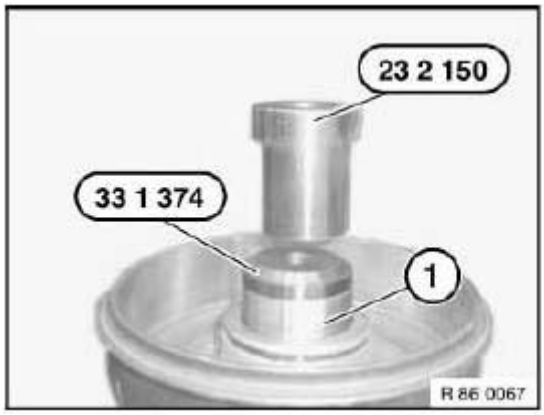


Fig. 104: Pressing Wheel Bearing Using Special Tools (23 2 150 And 33 1 374)
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REMOVING WOODEN REST ON LOADING RAMP, LEFT, RIGHT AND CENTER

CAUTION: Before drilling out rivets, drive in rivet pins with a punch.

Drill out rivets (1).

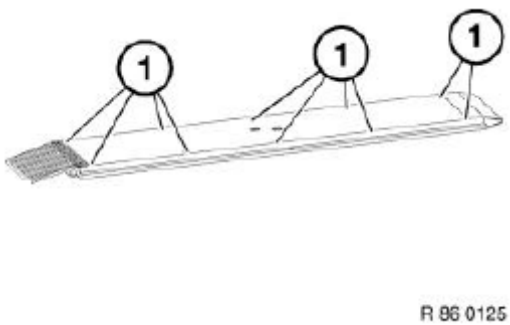


Fig. 105: Identifying Loading Ramp Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPAIR WORK ON GFP COMPONENTS WITH GELCOAT SURFACE

Scratches in Gelcoat surface

Scratches in the Gelcoat surface which do not allow the GFP mat structure to show through can be touched up. Sand out scratches with water and 800 wet sandpaper. Then sand with water and 2000 wet sandpaper. Prepare repair area for polishing (refer to Original BMW Painting Handbook Chapter 8).

Cracks in Gelcoat surface

Sand the cracked area in a V shape beyond the end of the crack and clean.

There must be no grease or oil residues, moisture or dust remaining in the crack to be repaired.

When repairing holes such as e.g. rivet holes, deburr hole edge and heavily roughen large area around hole.

Prepare required amount of Gelcoat paste with 2% hardener and fill prepared repair area with spatula.

Apply Gelcoat paste in several applications to repair areas.

Adhere to mixture ratio (2 parts hardener to 100 parts Gelcoat paste) as precisely as possible.

Too much added hardener slows down the hardening time and changes the paint color.

The hardening period is at least 12 hours at 20° C room temperature.

The hardening period can be longer depending on the temperature.

Once the Gelcoat paste has hardened, sand the touched-up area with water and 800 wet sandpaper. Sand with water and 2000 wet sandpaper and prepare for polishing.

86 10 ... REPLACING 12 VOLT SOCKET

From underside of platform, cut through cable tie (1) and remove. Disconnect plug with grommet (2) from socket (3) towards bottom.

Installation

Position all seals correctly. Also secure plug with grommet (2) using new cable tie to other socket.

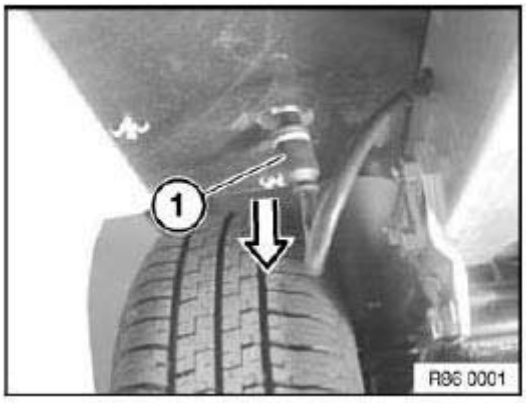


Fig. 106: Identifying Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

On upper side of platform, release Phillips screws (1) on mounting bracket (2).

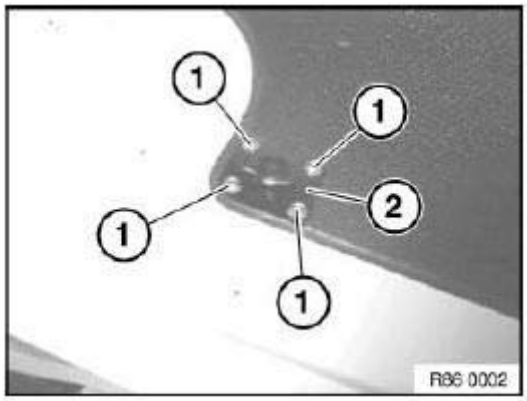


Fig. 107: Identifying Mounting Bracket With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound along white marking (1).

Installation

Make sure cable is correctly laid.

Use Sikaflex 221 as sealing compound.

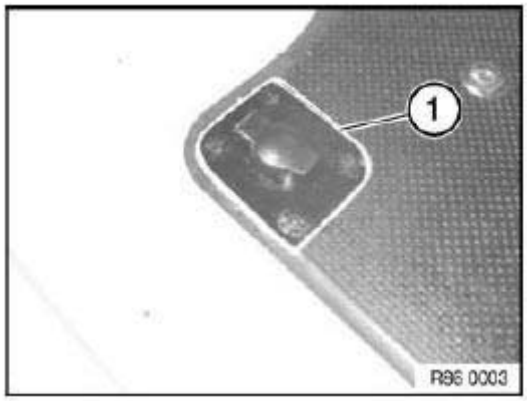


Fig. 108: Identifying White Marking Sealing Compound
Courtesy of BMW OF NORTH AMERICA, INC.

Grip under mounting bracket (1) with a screwdriver and lever out bracket (1) towards top. Remove bracket (1).

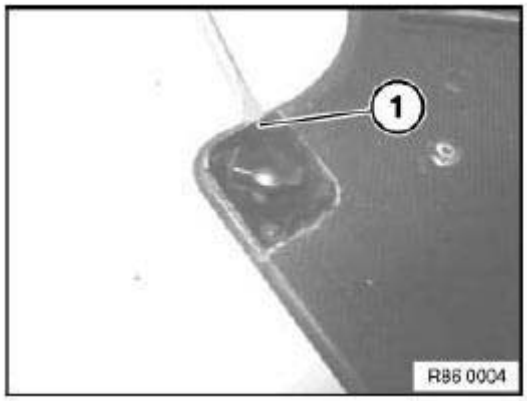


Fig. 109: Identifying Mounting Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1). Remove socket (2) from mounting bracket (3).

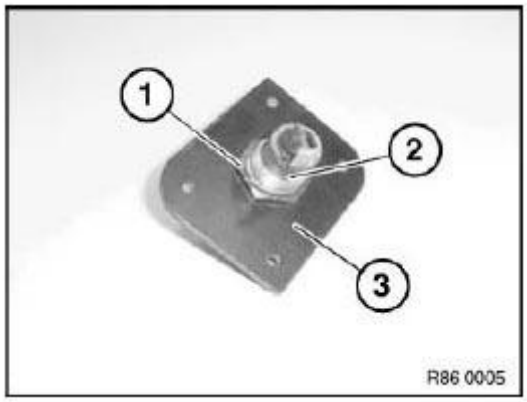


Fig. 110: Identifying Mounting Bracket With Socket And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPLACING BAR

NOTE: Disassembly of lashing eyes, REFER TO 86 10 ... REPLACING LASHING PLATE AND LASHING EYE.

Remove lashing eyes (1).

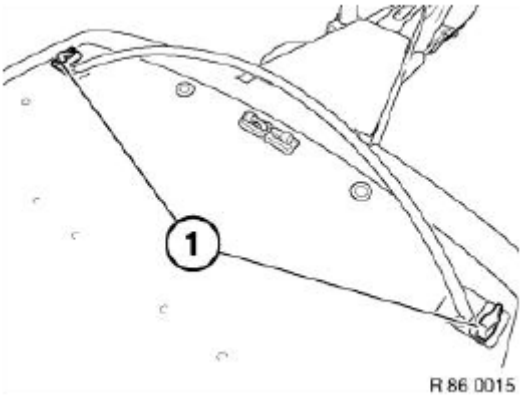


Fig. 111: Identifying Lashing Eyes
Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective caps (1) on left/right.

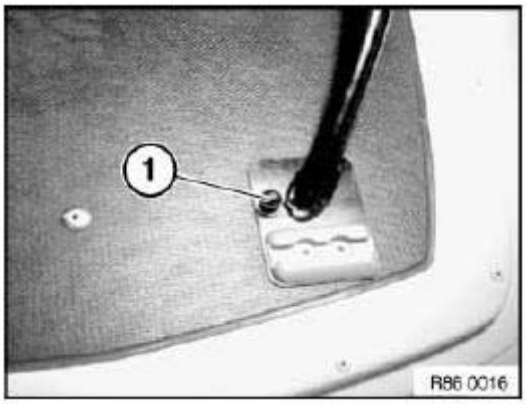


Fig. 112: Identifying Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon screws (1) and countersunk head screws (2) on left/right.

Remove bar.

Installation:

Tightening Torque for hexagon screw, **REFER TO TECHNICAL DATA 86 10 2AZ.**

Tightening Torque for countersunk head screw, **REFER TO TECHNICAL DATA 86 10 3AZ.**

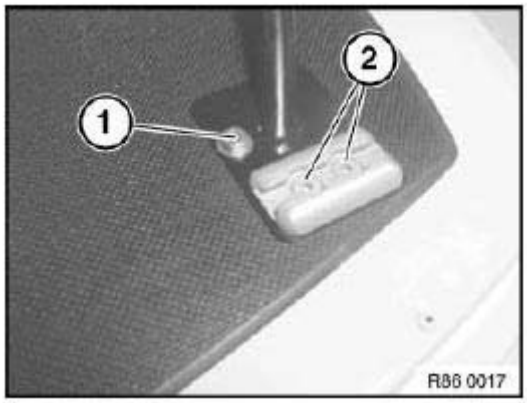


Fig. 113: Identifying Hexagon Screw And Countersunk Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPLACING DRAWBAR MEMBERS, LEFT AND RIGHT

NOTE: **Disassembly of overrunning equipment, REFER TO 86 10 ... DISASSEMBLY OF OVERRUNNING EQUIPMENT.**
Remove complete brake pull rod.
Removal of position light cable, REFER TO 86 10 ... REPLACING LICENSE PLATE LIGHT.

Release screws (1) on cross-member (2). Pull out cross-member (2) towards rear.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 16AZ.**

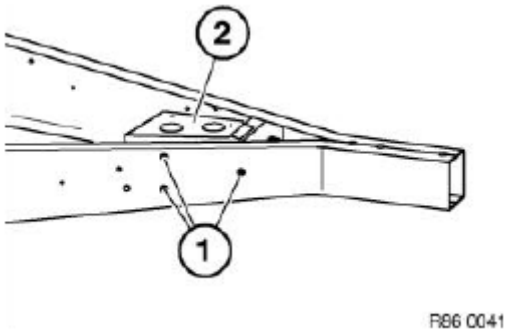


Fig. 114: Identifying Screws On Cross-Member
Courtesy of BMW OF NORTH AMERICA, INC.

Release countersunk head screws (1) and remove.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 3AZ.**

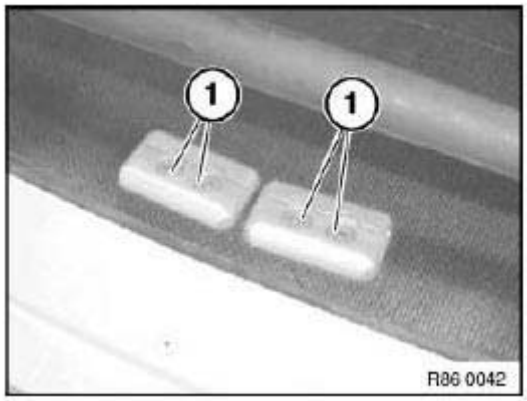


Fig. 115: Identifying Countersunk Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cable holder (1) and remove wiring harness (2) from drawbar member (3).

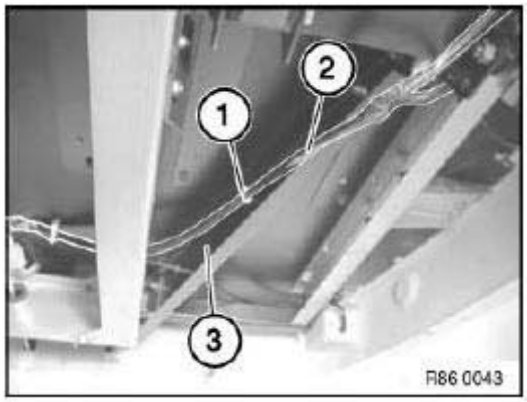


Fig. 116: Identifying Cable Holder With Wiring Harness On Drawbar Member
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cable (1) from position light housing (2). Pull out cable (1) through drawbar member aperture (3).

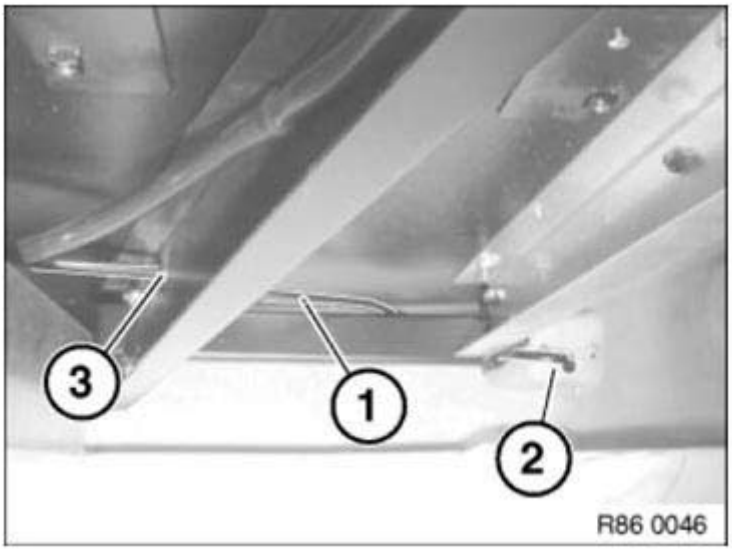


Fig. 117: Identifying Cable, Light Housing And Drawbar Member Aperture
Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws on cross-member (1) and remove cross-member (1).

If necessary, release screws on mounting brackets (2) and remove cross-members (3).

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 17AZ.**

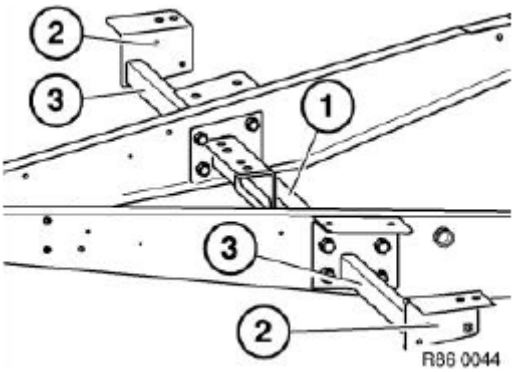


Fig. 118: Identifying Cross-Member With Mounting Brackets
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolt (1). Grip nut from rear through assembly hole (2) in crossmember.

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 18AZ.**

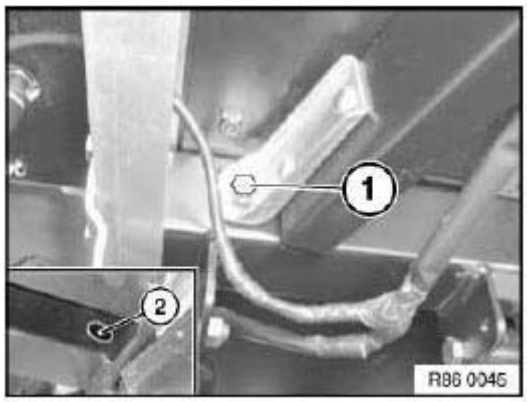


Fig. 119: Identifying Assembly Hole And Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Tilt drawbar member (1) down in direction of arrow A and pull out towards rear in direction of arrow B.

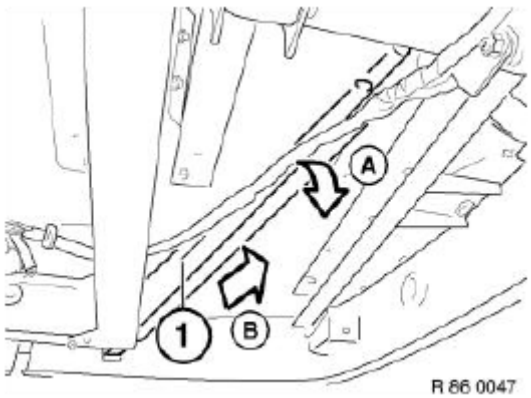


Fig. 120: Tilting Drawbar Member
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPLACING GAITER

Position brake lever fully towards rear.

Release screws (1) and (2) and remove.

Pull off towing attachment (3) in direction of arrow.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 15AZ.**

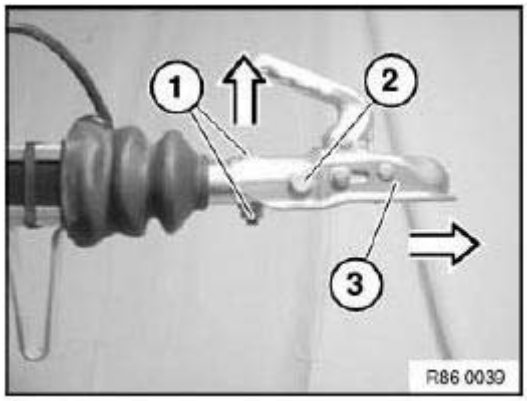


Fig. 121: Pulling Off Towing Attachment
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off gaiter (1) in direction of arrow.

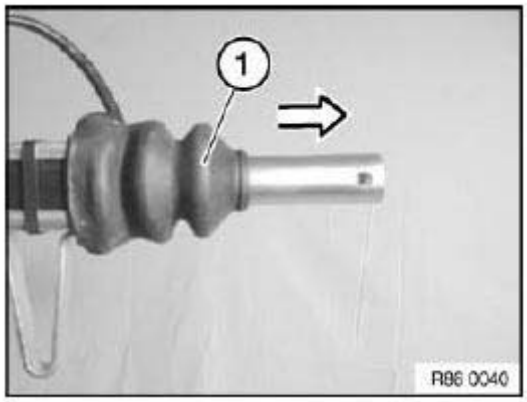


Fig. 122: Pulling Off Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPLACING HOLDER FOR CHOCK

Pull bar (1) down in direction of arrow A. Pull out chock (2) in direction of arrow B at an angle towards bottom.

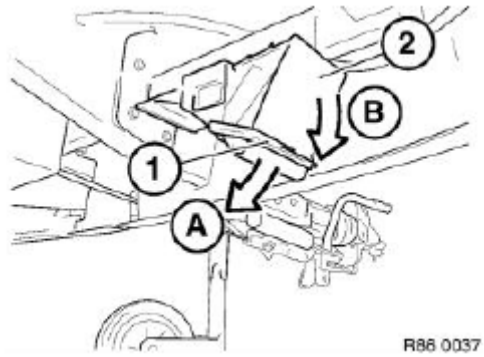


Fig. 123: Pulling Bar And Chock
Courtesy of BMW OF NORTH AMERICA, INC.

Release and unscrew cheese head tapping screws (1) on holder (2).

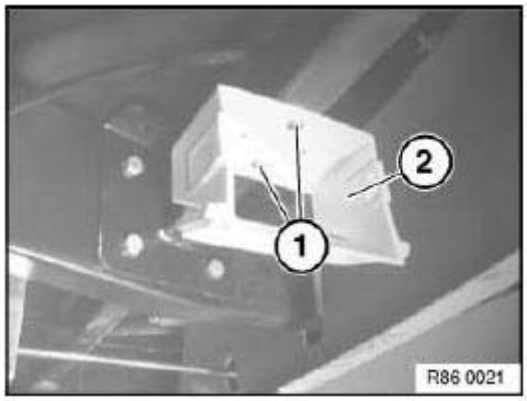


Fig. 124: Identifying Cheese Head Tapping Screws On Holder
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPLACING LASHING PLATE AND LASHING EYE

Releasing lashing eye

Pull spring bar (1) upwards in direction of arrow A. Slide lashing eye (3) in direction of arrow B and remove from lashing plate (2).

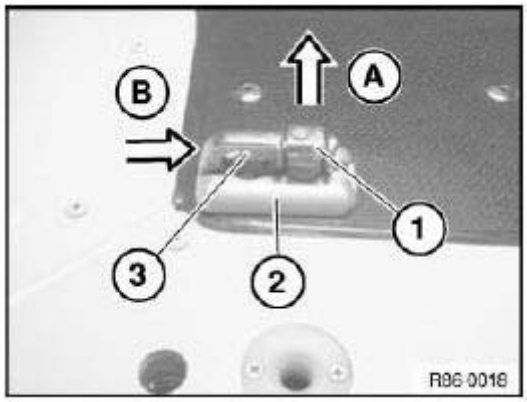


Fig. 125: Pulling Spring Bar Upward
Courtesy of BMW OF NORTH AMERICA, INC.

Release countersunk head screws (1) and remove lashing plate.

Installation

Tightening torque, **REFER TO TECHNICAL DATA 86 10 3AZ.**

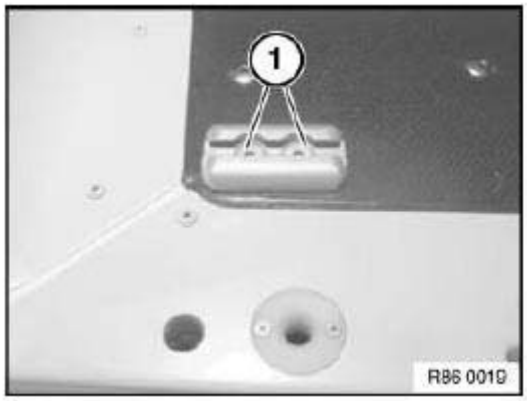


Fig. 126: Identifying Countersunk Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Locking lashing eye

Position lashing eye (1) on circular openings on lashing plate (2). Press lashing eye (1) in direction of arrow A into lashing plate (2). In this position, slide lashing eye (1) in direction of arrow B.

Spring bar (3) snaps in, anchors and secures lashing eye (1) in lashing plate (2).

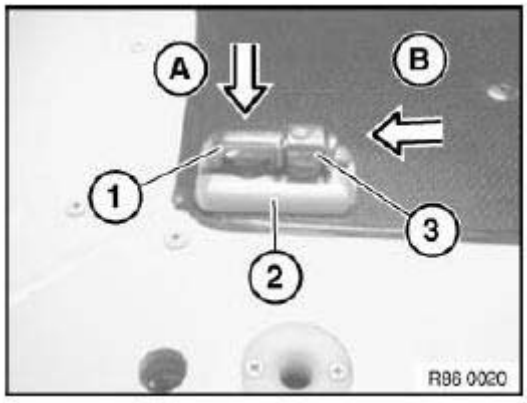


Fig. 127: Pressing Lashing Eye
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPLACING LICENSE PLATE LIGHT

Release screws (1) and remove license plate light (2) from mounting.

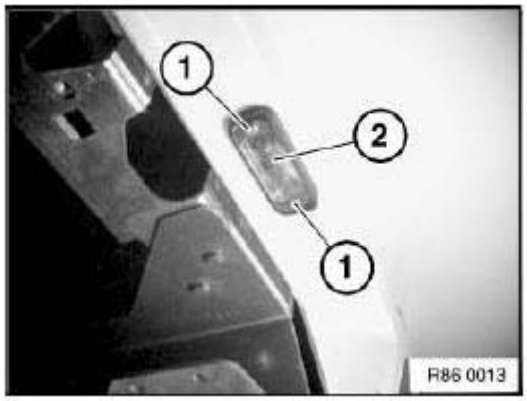


Fig. 128: Identifying License Plate Light With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect flat connector (1) in direction of arrow.

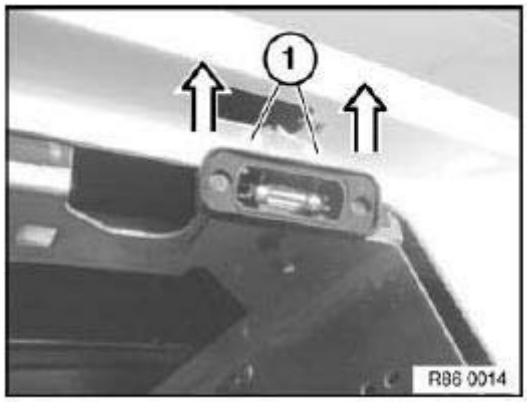


Fig. 129: Disconnecting Flat Connector
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPLACING POSITION LIGHT

Unclip cover (1) on side recess (arrow).

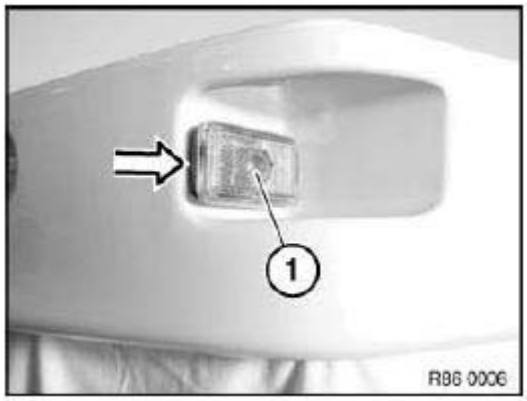


Fig. 130: Removing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Pull flat connector (1) from flat contact.

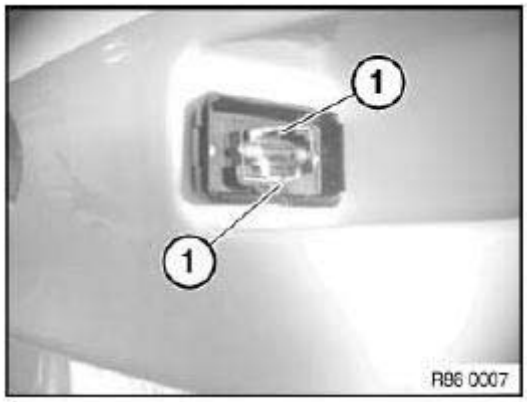


Fig. 131: Identifying Flat Connector And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out cable (1) completely.

CAUTION: Before drilling out rivet heads, drive in rivet pins with a punch. Drill out rivet heads (2) and remove position light housing from front.

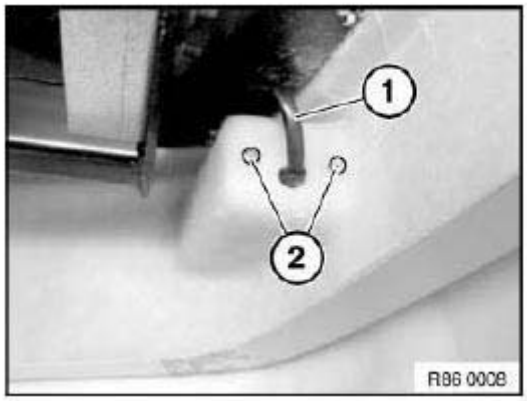


Fig. 132: Identifying Cable And Rivet Heads
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... REPLACING REAR LIGHT

Release thumb screws (1), slide light guard (2) in direction of middle of car and tilt out towards rear.

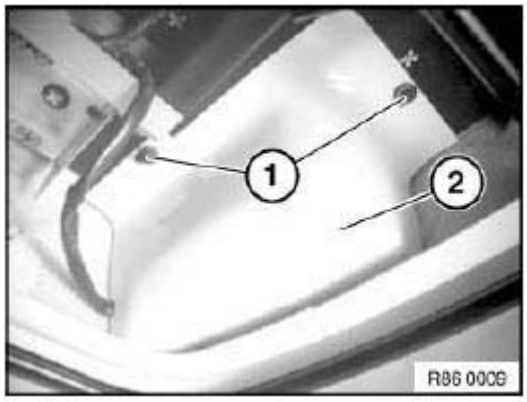


Fig. 133: Identifying Light Guard With Thumb Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Turn handwheel (1) counterclockwise in direction of arrow and remove base (2).

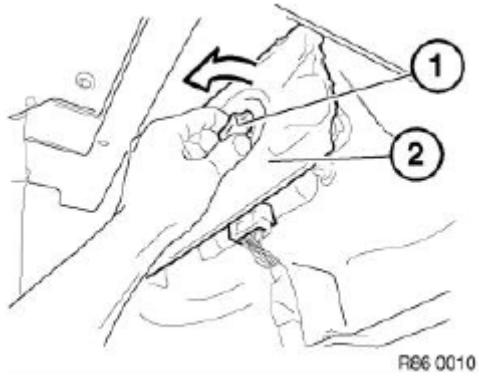


Fig. 134: Removing Base
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and press rear light (2) out towards front.

Installation

Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 10 1AZ.**

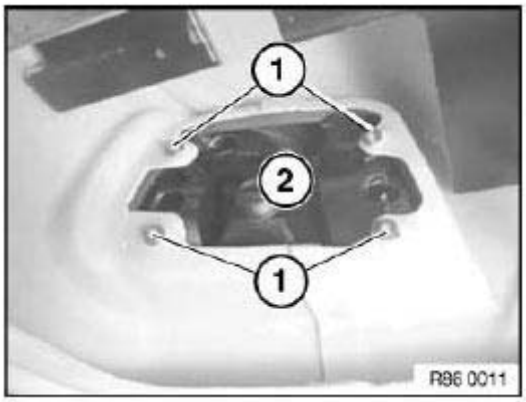


Fig. 135: Identifying Rear Light With Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... TROUBLESHOOTING ON MULTI-TRAILER

TROUBLESHOOTING CHART

Fault	Cause	Remedy
Trailer already brakes when foot is taken off accelerator	Shock absorber of overrunning equipment faulty	Replace shock absorber of overrunning equipment
Reversing sluggish or not possible	Brake system adjusted too strongly	Adjust brake system
NOTE: **When automatic reversing is activated, there is a residual braking torque caused by the design. This results**	Brake shoes jammed	Free brake shoes, replace complete brake shoes with brake shoe carrier if necessary
in slightly heavier overrunning.	Cables overtensioned	Adjust brake system
Handbrake effect too weak	Faulty adjustment	Adjust brake system
	Faulty spring force accumulator	Adjust spring force accumulator
	Brake cables heavily contaminated, corroded or kinked	Free cables, replace if necessary

Wheel brakes overheating	Brake system incorrectly adjusted	Adjust brake system
	Overrunning equipment is sluggish	Lubricate overrunning equipment
	Brake cables heavily contaminated, corroded or kinked	Free cables, replace if necessary
	Cables overtensioned	Adjust brake system
	Wheel brakes contaminated	Clean wheel brakes
	Reversing lever of overrunning equipment jammed	Remove reversing lever, clean and grease with conventional BMW lubricants
Braking effect too weak	Excessive play in brake system	Adjust brake system
	Brake linings glazed, fouled by oil, damaged or worn	Replace complete brake shoes, clean brake drums, replace if necessary
	Overrunning equipment is sluggish	Lubricate overrunning equipment
	Brake cables heavily contaminated, corroded or kinked	Free cables, replace if necessary
Jolting braking or starting off	Excessive play in brake system	Adjust brake system
	Shock absorber of overrunning equipment faulty	Replace shock absorber of overrunning equipment
	Brake shoes jammed	Replace complete brake shoes with brake shoe carrier
Brakes squeal or rattle	Wheel brakes contaminated or worn	Clean wheel brakes, replace brake shoes and/or brake drums if necessary
	Out-of-round or banging brake drum	Replace brake drums
	Pad loose	Replace brake shoes
	Wheel-bearing play excessive	Replace wheel bearings
Brakes pull to one side	Tire pressure incorrect	Correct tire pressure
	Brake linings glazed, fouled by oil, damaged or worn	Replace complete brake shoes, clean brake drums, replace if necessary
	Suspension shock absorber has no effect	Replace suspension shock absorber
	Wheel-bearing play	

Brake pads worn at angle	excessive	Replace wheel bearings
	Pads worn to less than minimum thickness	Replace brake shoes
Towing attachment fails to engage after connection	Internal attachment parts contaminated	Clean and lubricate attachment

HOOD

86 21 ... ADJUSTING HOOD PRETENSION - CAMLOC FASTENER WITH SPACERS

NOTE: At least two persons are needed to install and remove the hood. Before installing and removing the hood, secure the BMW multitrailer and the entire combination against rolling. For this purpose, use the parking brake and the chocks of the BMW multitrailer.
To help adjust the hood pretension, you will need four blocks with a minimum height of 60 mm.

Installation

Before attaching the hood, thoroughly clean the top side of the GFP apron of the BMW multitrailer.

It is particularly important to clean the contact surface of the GFP apron (1) (marked in gray) on which the rubber seal of the hood rests. Refer to **Fig. 136**.

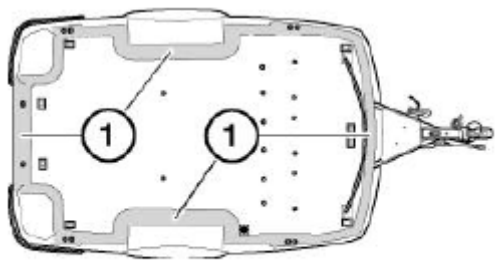


Fig. 136: Identifying Contact Surface Of GFP Apron
Courtesy of BMW OF NORTH AMERICA, INC.

The following text describes how to adjust the hood pretension as an example at one support area of the platform or at one hood fastener. The pretension is adjusted at the other support areas and fasteners in the same sequence.

The hood must be fixed on the platform in such a way that the rubber seal of the hood is placed under pretension or compressed. Only with this pretension is it possible to obtain a tight seal between hood and platform. Pretension is achieved with the Camloc fasteners and by using spacers.

Two different types of spacers (2) are available for each Camloc fastener (1): one thick and one thin. You can

fit one, two or no spacer (2) on the Camloc fastener (1).

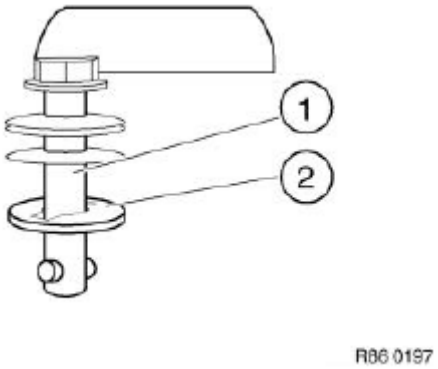


Fig. 137: Identifying Calmoc Fastener And Spacer
Courtesy of BMW OF NORTH AMERICA, INC.

Access to hood lighting plug (1):

Right side lid.

Open out spring-loaded cap (2) on socket (3) and remove hood lighting plug (1). Close cap (2). Insert hood lighting plug (1) into plug receptacle (4).

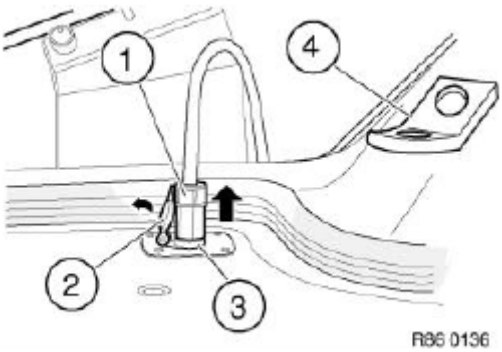


Fig. 138: Opening Spring-Loaded Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Unlocking Camloc fastener:

Wing (1) of Camloc fastener (2) is parallel to outer edge of hood. Turn Camloc fastener (2) counterclockwise until it is heard and felt to unlock.

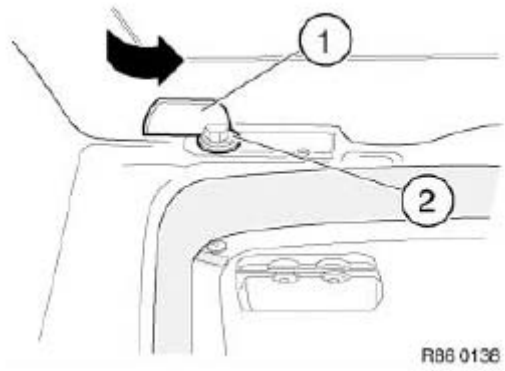


Fig. 139: Turning Camloc Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Locking

Press hood in lid frame downwards by hand. Turn Camloc fastener clockwise until it is heard and felt to lock into place. Wing (1) of Camloc fastener is parallel to outer edge of hood.

Raise hood and place block (1) between centering pin (2) and platform. Lower hood and position centering pin (2) on block (1).

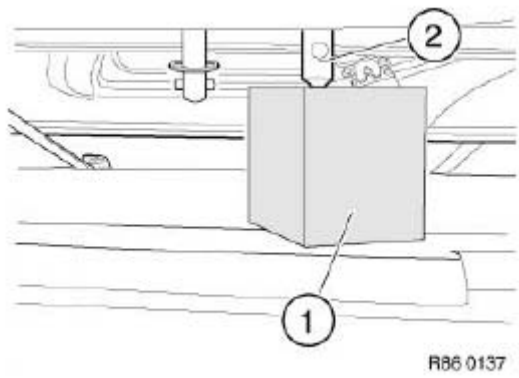


Fig. 140: Placing Block Between Centering Pin And Platform
Courtesy of BMW OF NORTH AMERICA, INC.

Remove spring nut (1) from Camloc fastener (2).

Installation

Use new spring nut.

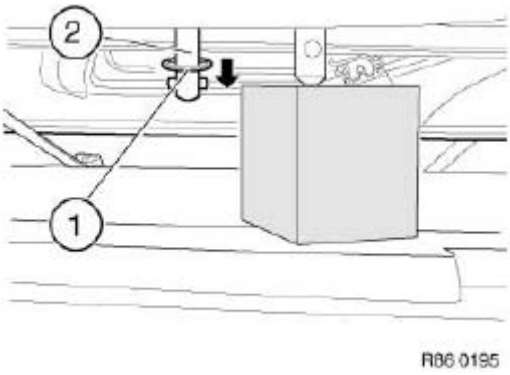


Fig. 141: Removing Spring Nut From Camloc Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Remove Camloc fastener (1) from locating hole (2).

Installation

Press Camloc fastener (1) downwards until contact is made with hood stop. Wing (3) of Camloc fastener points to middle of hood.

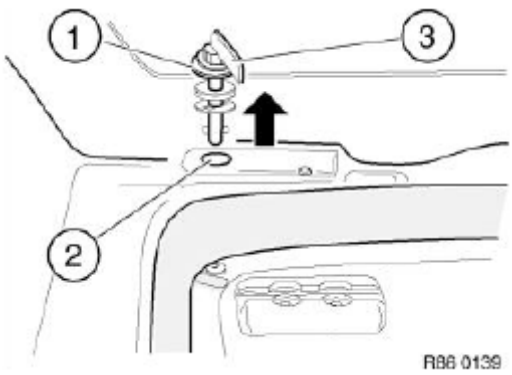


Fig. 142: Removing Camloc Fastener From Locating Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing spacer:

Remove spacer (1) from Camloc fastener (4) by aligning opening (2) over lateral pin (3).

Reducing pretension:

Reduce spacer thickness, replace spacer or install Camloc fastener without spacer.

Increasing pretension:

Fit a thicker spacer or two spacers.

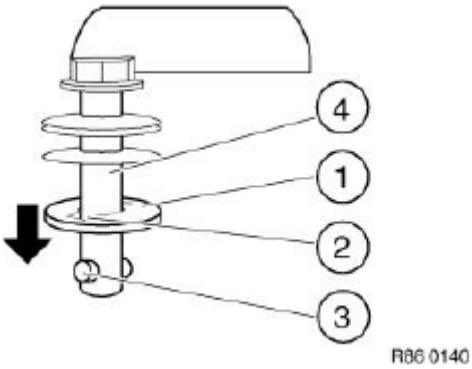


Fig. 143: Removing Spacer From Camloc Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Place spacer (1) on Camloc fastener (4) and turn until it is in a secure position.

Check that hood seal is correctly seated.

Check that Camloc fasteners are locked. Lift hood by handle recesses. Hood must not be able to move with respect to platform of BMW multitrailer.

86 21 ... ADJUSTING REAR LID TO FIT

NOTE: The following text describes how to adjust the rear lid to fit at one mounting point as an example.
Proceed in the same way for the other mounting points.

Height adjustment of rear lid:

Release screws (1) and move rear lid in direction of arrows.

Depth adjustment of rear lid:

Release screws (2) and move rear lid in direction of arrows.

Installation

Tightening Torque, height adjustment, **REFER TO TECHNICAL DATA 86 21 7AZ.**

Tightening Torque, depth adjustment, **REFER TO TECHNICAL DATA 86 21 9AZ.**

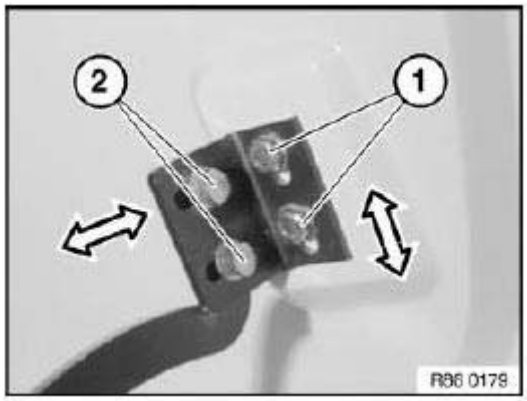


Fig. 144: Adjusting Rear Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust gap (A) evenly all around without displacement and correct if necessary.

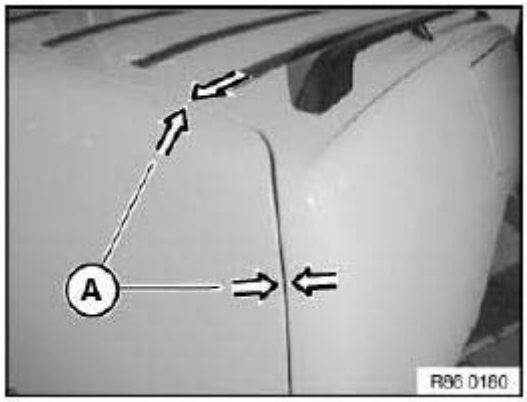


Fig. 145: Adjusting Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Check lid in transition (B) to hood for displacement and correct if necessary (flush).

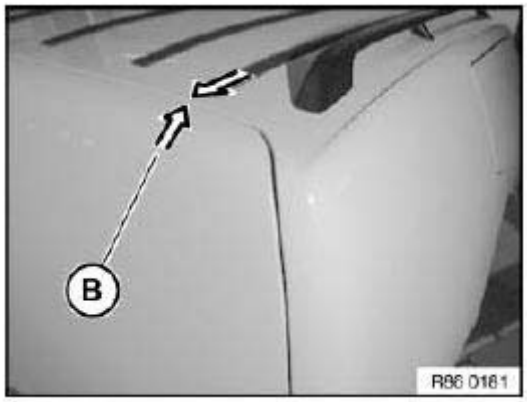


Fig. 146: Checking Lid In Transition To Hood

Courtesy of BMW OF NORTH AMERICA, INC.

To align lid in transverse direction, you can install or remove plastic washers (3) between hinge bracket (1) and mounting bracket (2).

Installation

There must always be a plastic washer (3) fitted on left and right sides of mounting bracket (2). Plastic washers are available in thicknesses of 1 mm and 3 mm.

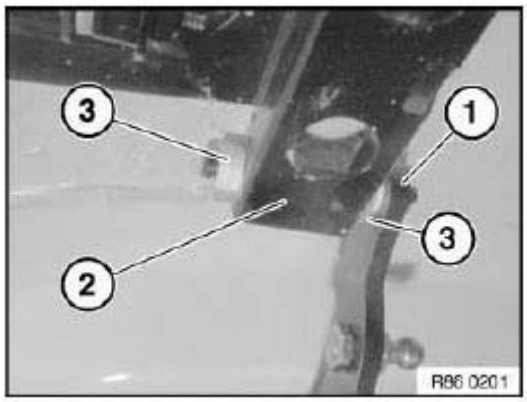


Fig. 147: Identifying Hinge Bracket, Mounting Bracket And Plastic Washer
Courtesy of BMW OF NORTH AMERICA, INC.

Check lid in transition (C) to hood (flush) and correct if necessary. Correction is made by inserting or omitting plastic washers (refer to **Fig. 147**).

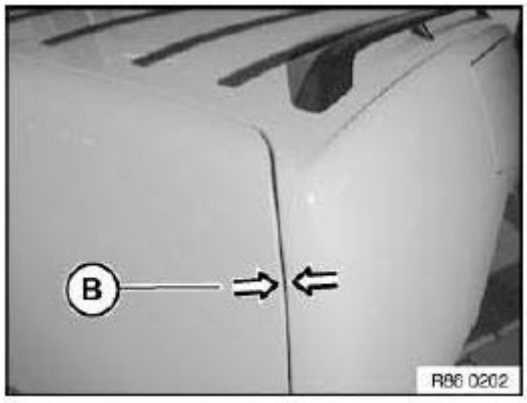


Fig. 148: Checking Lid In Transition To Hood
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... ADJUSTING ROTARY STRIKER LOCK

The following text describes how to adjust the rotary striker lock on the rear lid as an example. Proceed in the same way for the side lids. Adjust the lock while the lid is open.

Release screws (1) and adjust rotary striker lock (2) in elongated hole area in direction of arrows.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 21 12AZ.**

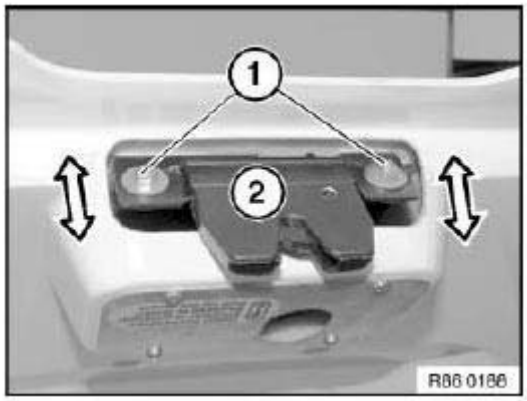


Fig. 149: Adjusting Rotary Striker Lock In Hole
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... ADJUSTING SIDE LID TO FIT

NOTE: The following text describes how to adjust the side lid to fit at one mounting point as an example. Proceed in the same way for all other mounting points.

Height adjustment of side lid:

Release screws (1) and move side lid in direction of arrows.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 21 7AZ.**

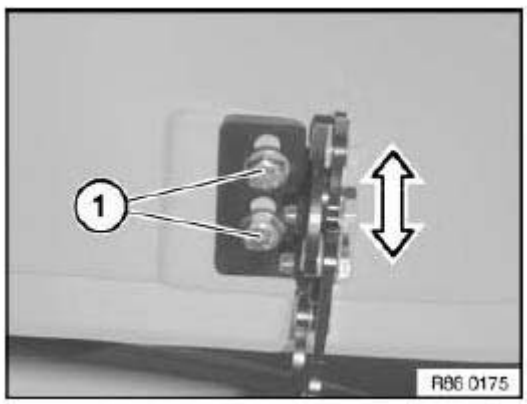


Fig. 150: Adjusting Side Lid

Courtesy of BMW OF NORTH AMERICA, INC.

Depth adjustment of side lid:

Release screws (1) and move side lid in direction of arrows.

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 21 7AZ.**

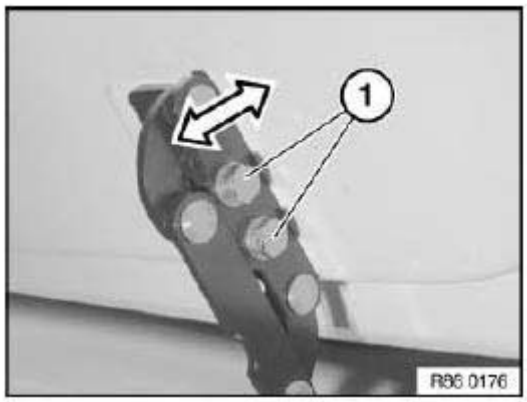


Fig. 151: Adjusting Side Lid Depth
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust gap (A) evenly all around and correct if necessary.

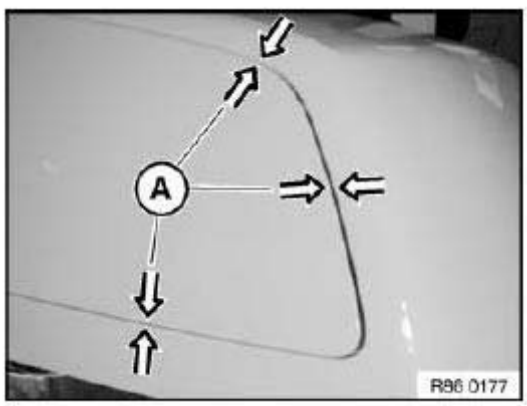


Fig. 152: Adjusting Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Check lid in transition (B) to hood for displacement and correct if necessary (flush).

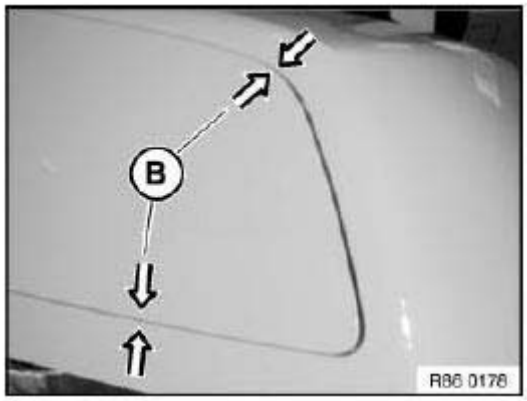


Fig. 153: Checking Lid In Transition To Hood
Courtesy of BMW OF NORTH AMERICA, INC.

To align lid in direction of travel, you can install or remove a spacer plate (3) between mounting bracket (1) and hinge (2).

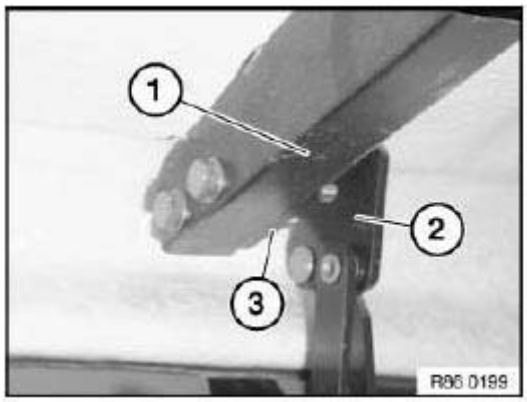


Fig. 154: Identifying Mounting Bracket With Spacer Plate And Hinge
Courtesy of BMW OF NORTH AMERICA, INC.

Check lid in transition (C) to hood for displacement and correct if necessary (flush). Correction is made by inserting or omitting spacer plates (refer to **Fig. 154**).

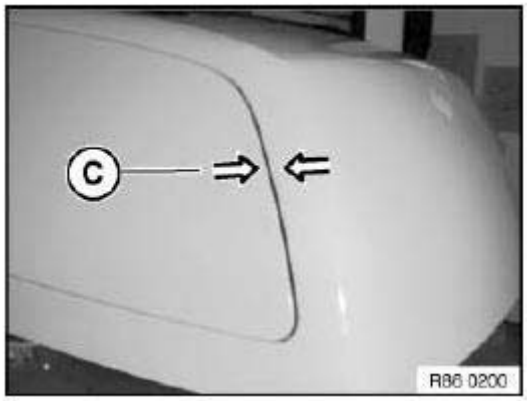


Fig. 155: Checking Lid In Transition To Hood
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... ATTACHING/REPLACING BMW BADGE

Position of attachment: inside of rear lid Remove plastic cover (1) from bore holes (2).

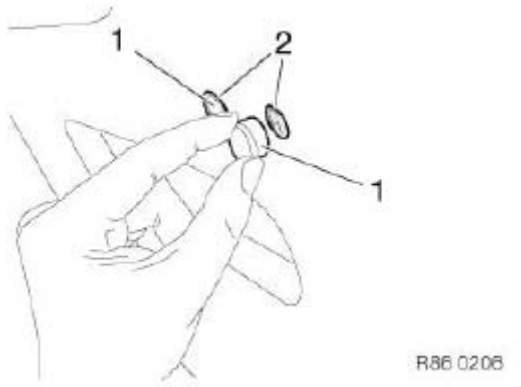


Fig. 156: Removing Plastic Cover From Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Inserting a set of pointed pliers through bore holes (1), detach retaining washers (2) from pins of BMW badge.

Installation:

Use only new retaining washers.

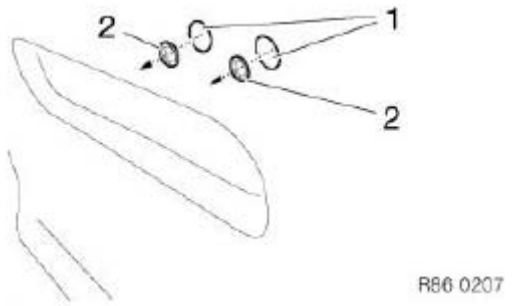


Fig. 157: Identifying Bore Holes And Retaining Washers
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Instruction for removing BMW badge:
Slide a blunt object (e.g. a wooden wedge) under the BMW badge and carefully lever off the badge.

Position of attachment: outside of rear lid

The BMW badge must be attached at room temperature.

Degrease bonding area with petroleum ether.

Rub down bonding area with a dry cloth.

Peel off protective film on BMW badge (1).

Insert BMW badge (1) with pin (2) into bore hole (3). If bore holes (3) are considerably larger than pin (2), optically align BMW badge (1) exactly.

Press down BMW badge (1) firmly.

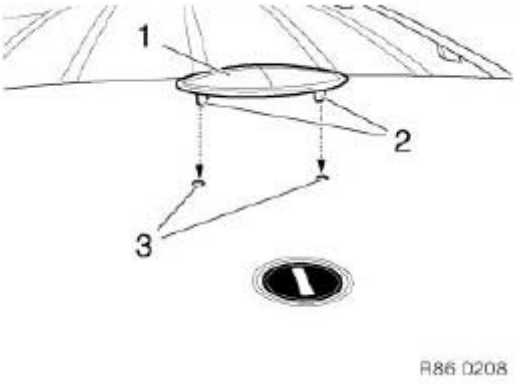


Fig. 158: Identifying BMW Badge With Pin And Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Position of attachment: inside of rear lid

By inserting a 1/4" ratchet with extension and socket wrench insert (7 mm A/F) through bore holes (2), attach a retaining washer (1) in each case to pin of BMW badge. In so doing, press down on outside of rear lid with one hand on BMW badge and grip.

Push on relevant retaining washer (1) as far as it will go.

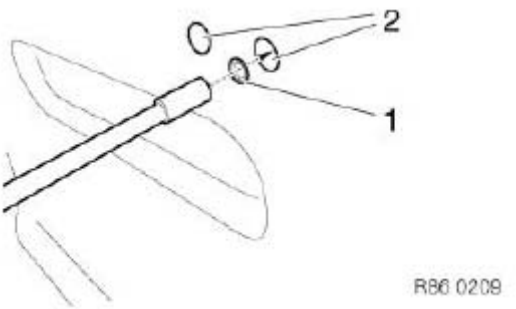


Fig. 159: Identifying Retaining Washer And Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Position of attachment: inside of rear lid

Insert plastic cover (1) in bore holes (2).

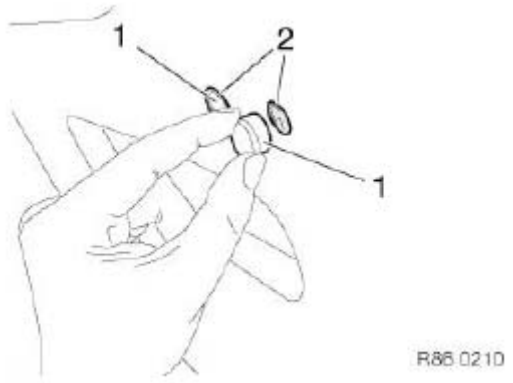


Fig. 160: Inserting Plastic Cover In Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... FITTING BMW LOGO

Distance between hood edge and lower edge of BMW logo (1) is 100 mm.

Distance between middle of lock and lettering (2) is 300 mm.

Installation

Degrease bonding areas with benzine. Rub down bonding area with a dry cloth.

Position of BMW logo (1): parallel to lower edge.

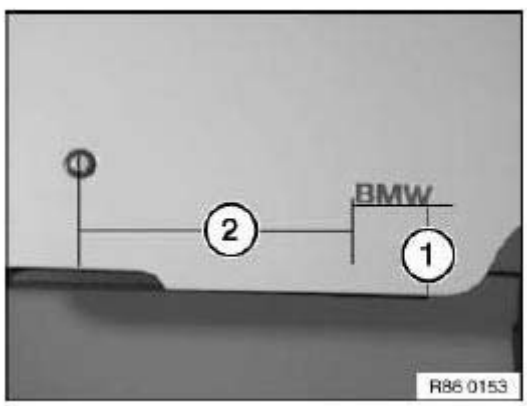


Fig. 161: Identifying BMW Logo Fitting Distance
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... INSTALLING HOOD SEAL

NOTE: Removing old seal:

In a straight area of hood, grip old seal piping with a pair of pliers and pull off horizontally. Grip detached seal with both hands and uniformly pull away from hood ridge.

Push seal piping (1) by hand onto hood ridge (2). Using a rubber hammer, gently tap seal piping (1) as far as it will go onto hood ridge (2). Make sure piping is evenly positioned especially in radii of hood ridge.

Installation

Position end face of seal at front end of hood in a straight area. Lay seal from front to rear.

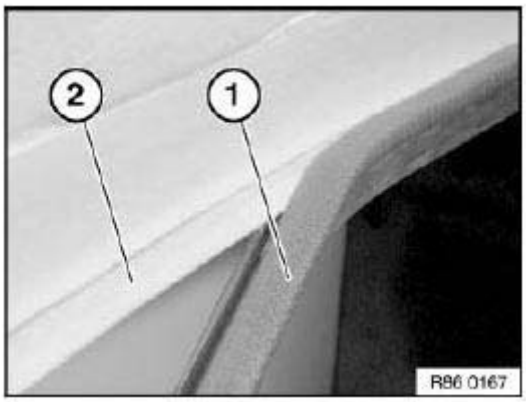


Fig. 162: Identifying Seal Piping And Hood Ridge
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... INSTALLING RUBBER ROOF STRIP

NOTE: Pull off old rubber roof strip and remove remaining traces of adhesive with universal cleaner, refer to BMW Operating Fluids. Rub down with a dry cloth.

Select rubber roof strip according to length of roof recess (1). Arrange chamfered ends of rubber roof strip to match shape of roof recess (1).

Installation

Pretreat bonding area and stick on rubber roof strip according to manufacturer's instructions.

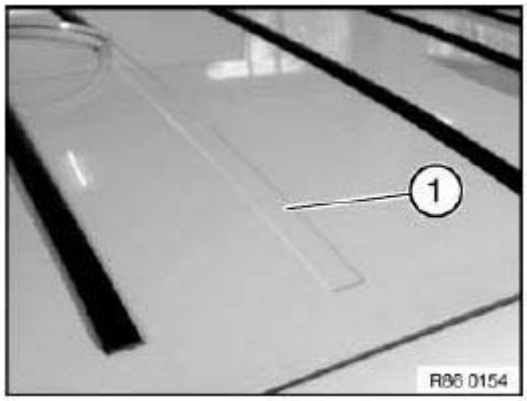


Fig. 163: Identifying Roof Recess
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... INSTALLING SEAL FOR REAR LID AND SIDE LID

NOTE: The following text describes how to install the seal for the rear lid as an example. Proceed in the same way for the side lids.
Removing old seal:
Open lid. Grip seal piping with both hands and pull seal off hood ridge. Remove old seal over lid.

Push seal piping (1) by hand onto hood ridge (2). Using a rubber hammer, gently tap seal piping (1) as far as it will go onto hood ridge (2). Make sure piping (1) is evenly positioned especially in radii of hood ridge.

Installation

Always position end face of seal in a straight area only:

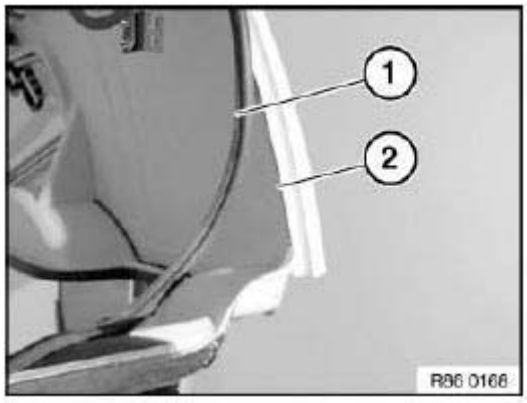


Fig. 164: Identifying Seal Piping And Hood Ridge
Courtesy of BMW OF NORTH AMERICA, INC.

e.g. on cross-member or on upper hood ridge of rear lid.

Suitable areas on side lids:

Upper and lower hood ridge.

Sealing lip of seal must point outwards.

After installing from inside and outside, check correct seating between lid seal and lid. Lid must rest without air on lid seal.

86 21 ... INSTALLING SPONGE RUBBER SEAL

NOTE: Removing old sponge rubber seal: Pull off old sponge rubber seal. Remove remaining traces of adhesive with universal cleaner, refer to BMW Operating Fluids.

Sponge rubber seal runs along area marked gray (1).

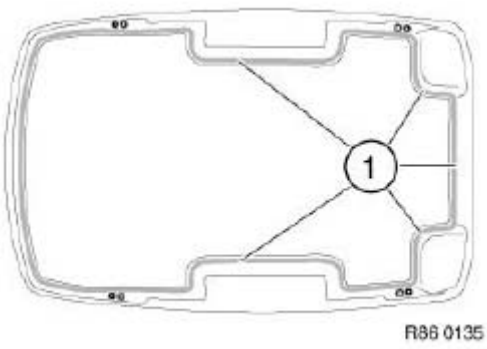


Fig. 165: Identifying Sponge Rubber Seal Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Lay sponge rubber seal (1) in middle of hood contact surface (2).

Installation

Degrease contact surface (2) with benzine and rub down with a dry cloth. Stick on sponge rubber seal (1) according to manufacturer's instructions. Position end face of seal (1) in a straight area.

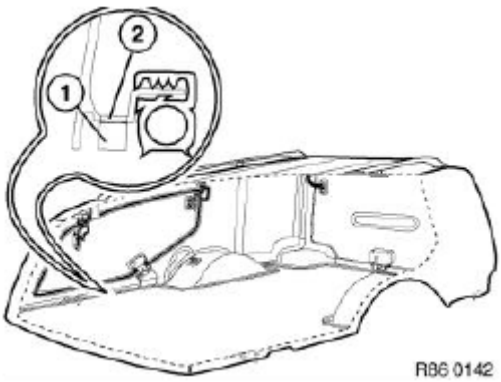


Fig. 166: Identifying Rubber Seal With Contact Surface Area
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... POSITIONING OF MULTITRAILER HOOD FOR MAINTENANCE AND REPAIR WORK

IMPORTANT: At least two persons are needed to install and remove the hood from the platform.
Before installing and removing the hood, secure the BMW multitrailer and the entire combination against rolling. For this purpose, use the parking brake and the chocks of the BMW multitrailer.
The hood can also be set up and lowered with the aid of the universal lift available from BMW in conjunction with the roof racks and the hood adapter.
Under no circumstances should work of any kind be carried out below the suspended hood.

For maintenance and repair work, raise the hood using a lifting platform. Twin-column lifting platforms, body lifting platforms and twin-stamp underfloor platforms are suitable. The seating plates and areas of the lifting platform must be adjustable according to the dimensions of **Fig. 167**.

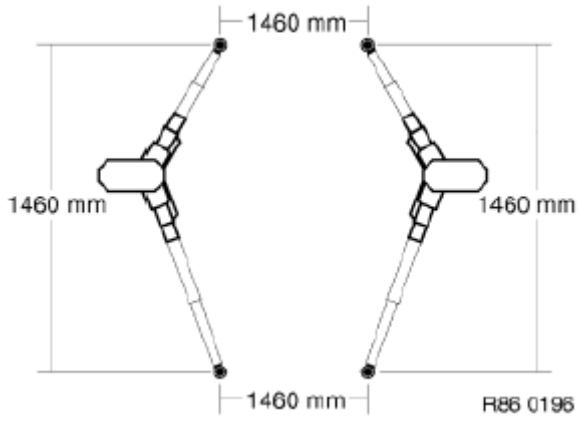


Fig. 167: Identifying Adjustable Dimension Of Seating Plates And Lifting Platform Areas
Courtesy of BMW OF NORTH AMERICA, INC.

The lifting platform must conform to the relevant legal provisions of the accident prevention regulations and be

serviced as specified. Comply with the lifting platform operating instructions, in particular the safety instructions and the carrying capacity.

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Please comply with the following instructions before raising the hood:

- Raise only when it is unloaded;
- Ensure sufficient clearance between the seating plates/seating areas and the GFP edge of the hood;
- The hood must always be positioned in the middle of the lifting platform.

IMPORTANT: The hood may only be raised at the pin (1). Under no circumstances may the hood be raised at the GFP edge of the hood (2). See Fig. 168. Exclusively for removal of pin (1), raise the hood in the GFP area.
Also refer to:
86 21 ... REMOVING CENTERING PIN FROM MOUNTING BRACKET .

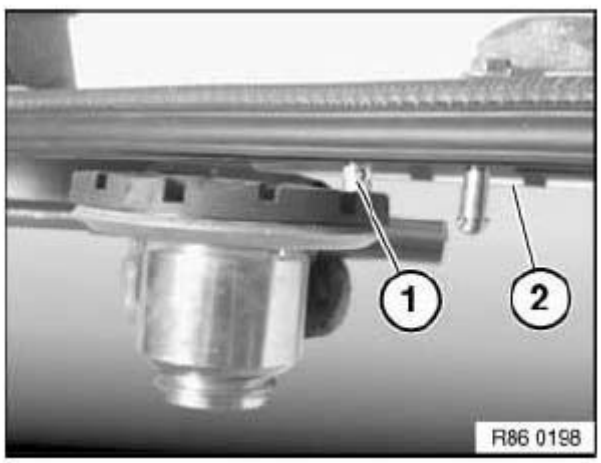


Fig. 168: Identifying Centering Pin Of Mounting Bracket And Hood
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING BALL PIVOT

NOTE: Remove gas spring,
REFER TO 86 21 ... REMOVING GAS SPRING.

NOTE: The following text describes how to remove the ball pivot from the hinge retaining bracket on the rear lid as an example. Proceed in the same way for the other ball pivots.
Make sure the attachments are reinstalled in the correct sequence. Only in this way will the gas springs open and close properly.

Grip ball pivot (1) at hexagon mount (2) and release nut (3).

Installation

Use new self-locking nut.

Tightening Torque, **REFER TO TECHNICAL DATA 86 21 10AZ.**

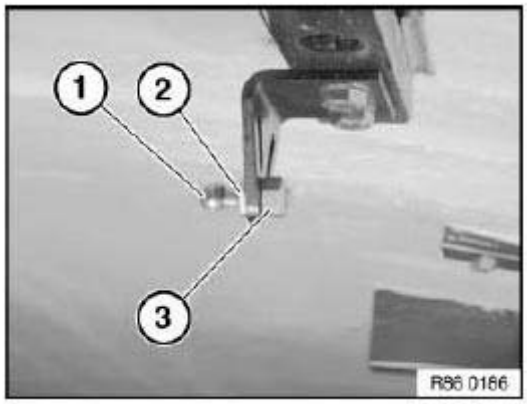


Fig. 169: Identifying Ball Pivot, Hexagon Mount And Release Nut
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING CENTERING PIN FROM MOUNTING BRACKET

NOTE: Exclusively for removal of pin, raise the hood in the GFP area. For raising, use a wooden block with a maximum width of 35 mm and a height of 45 mm. The length must be selected depending on the lifting platform securing point. Ensure the hood is secure on the blocks.

Position block (1) so that it is only located in area of sponge rubber seal (2).

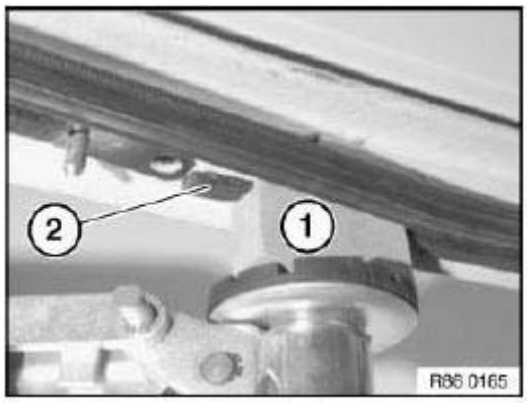


Fig. 170: Identifying Block And Rubber Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Insert a mandrel into hole (1) of pin (2) and turn counterclockwise.

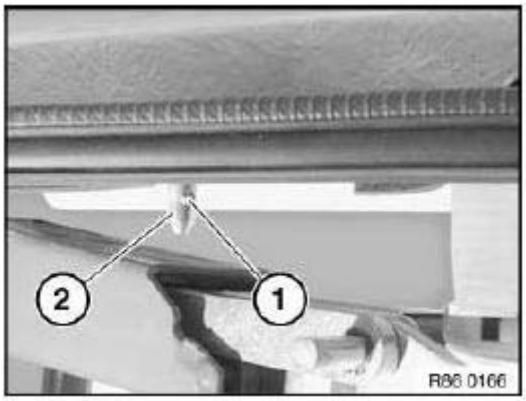


Fig. 171: Identifying Hole And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING GAS SPRING

Only remove the gas spring while the lid is open. The gas spring will then not be subjected to load and the spring piston will not jump out of the spring housing. Prop the lid open with one hand to prevent it dropping closed. Remove the gas spring with your other hand.

NOTE: Side lids are each fitted with a gas spring. Rear lid is fitted with two gas springs. The following text describes how to remove the gas spring at one mounting point as an example. Proceed in the same way for all other mounting points. Rear lid: Replace gas springs in pairs only.

Lever out retaining clip (1) in recess (2) and push on gas spring head (3) in direction of arrow. Detach spring head (3) from ball pivot.

Installation

Push retaining clip (1) back into its original position. Press spring head (3) onto ball pivot until spring head (3) snaps audibly into place.

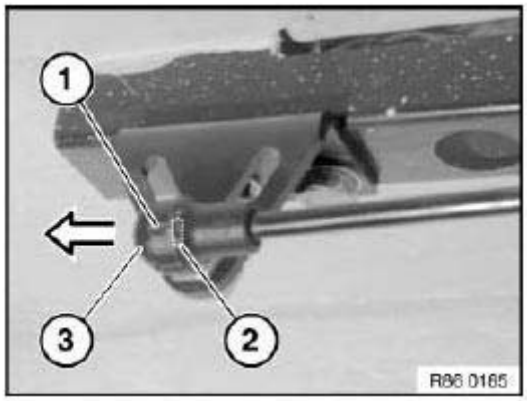


Fig. 172: Pushing Gas Spring Head
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING GAS SPRING RETAINING BRACKET

NOTE: **Remove gas spring,**
REFER TO 86 21 ... REMOVING GAS SPRING.
Remove ball pivot,
REFER TO 86 21 ... REMOVING BALL PIVOT.

Release screws (1) and remove gas spring retaining bracket (2) from mounting bracket (3).

Installation

Install retaining bracket so that it is centered in elongated holes.

Tightening Torque, **REFER TO TECHNICAL DATA 86 21 11AZ.**

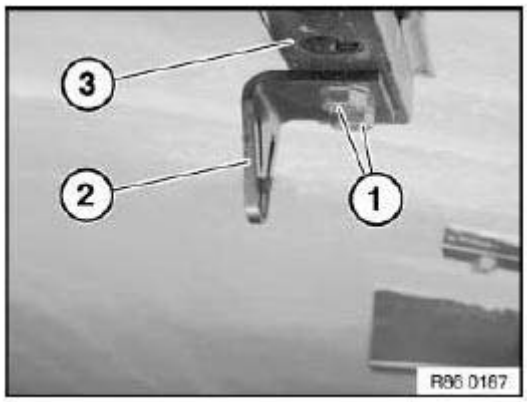


Fig. 173: Identifying Gas Spring Retaining And Mounting Bracket With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING HINGE BRACKET ON REAR LID

NOTE: **Remove rear lid, REFER TO 86 21 ... REMOVING LID.**
Remove gas spring, remove gas spring on hinge side only, REFER TO 86 21 ... REMOVING GAS SPRING.

Raise edge (1) of retaining clip (2) and slide in direction of arrow towards rear.

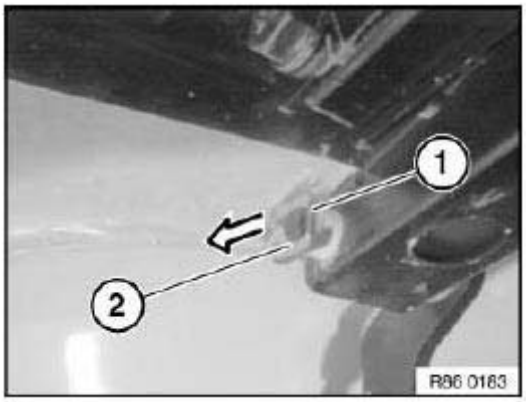


Fig. 174: Sliding Retaining Clip Edge Towards Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plastic washer (1). Pull hinge bracket (2) in direction of arrow out of mounting bracket (3).

Installation

There must always be a plastic washer (1) fitted on left and right sides of mounting bracket (3).

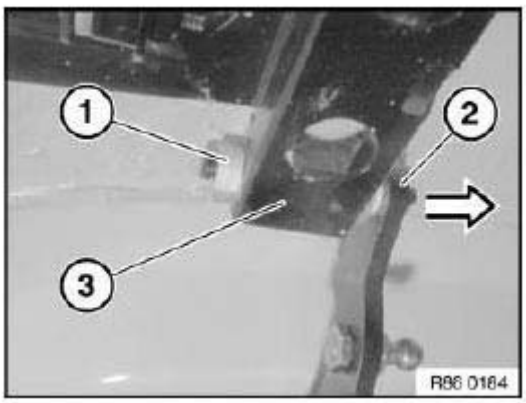


Fig. 175: Pulling Hinge Bracket Out Of Mounting Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING LID

NOTE: **Adjusting side lid to fit, REFER TO R8621 ... ADJUSTING SIDE LID TO FIT.**
Adjusting rear lid to fit, REFER TO R8621 ... ADJUSTING REAR LID TO FIT.

NOTE: **The text describes how to remove the lid at one rear lid mounting point as an example. Proceed in the same way for the side lids. Spare part lids are always supplied without complete locking systems.**

Two persons are required for this task.

NOTE: **Open lid.**

Loosen screws (1). Remove lid (2).

Installation

Rear lid: shoulder (3) points to middle of hood.

Side lid: shoulder (3) points to outside of hood.

Tightening Torque:

REFER TO TECHNICAL DATA 86 21 7AZ.

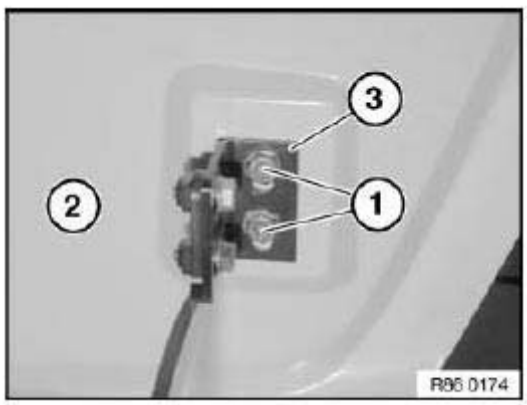


Fig. 176: Identifying Screws And Lid
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING LOCK BARREL

NOTE: **The following text describes how to remove the lock barrel on the rear lid as an example.**
Proceed in the same way for the side lids. Remove the lock barrel while the lid is open.
Remove cover, spring nut and pull rod, REFER TO 86 21 ... REMOVING ROTARY STRIKER LOCK.

Slide retainer (1) in direction of arrow away from lock barrel (2). Remove lock barrel (2).

Installation

Examine rubber backing for damage and replace if necessary. When replacing lock barrel, make sure coding of new lock barrel matches coding of fitted lock barrel (simultaneous closing).

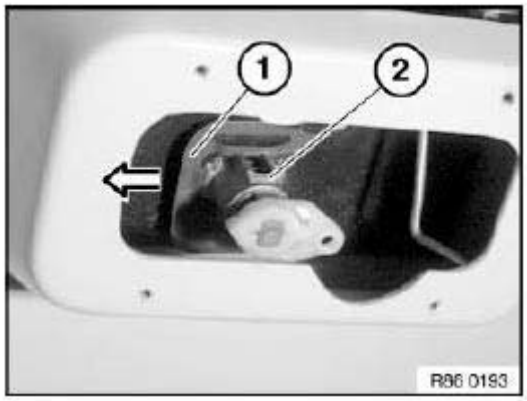


Fig. 177: Removing Lock Barrel
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING LOCK STRIKER FIXTURE ON REAR LID

Grip rubber seal on seal piping (1) and pull off in area of lock striker fixture (2). Grip lid seal (3) on seal piping (4) and pull off in area of lock striker fixture (2).

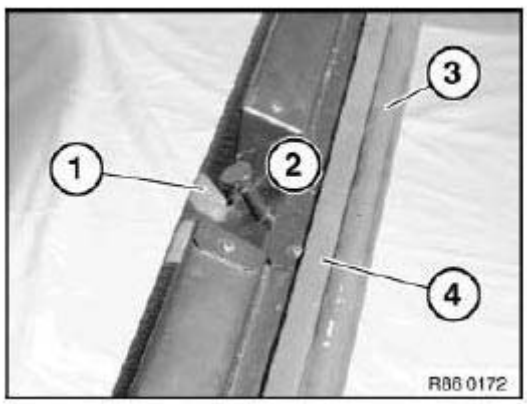


Fig. 178: Identifying Rubber And Lid Seals On Seal Piping And Lock Striker Fixture
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Before drilling out rivets, drive in rivet pins with a punch. Drill out rivets (1+2) and remove lock striker fixture (3).

Installation

Rivets (1) have black heads and long shanks. Rivets (2) have silver heads and short shanks.

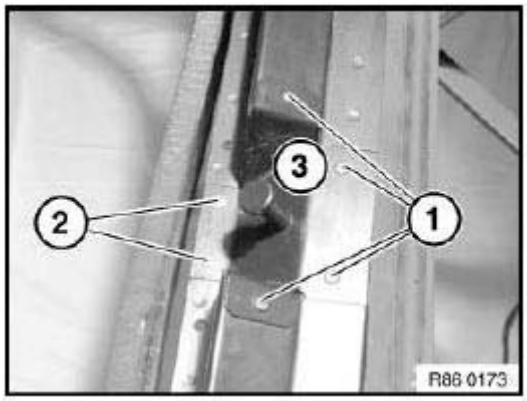


Fig. 179: Identifying Lock Striker Fixture With Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING PLUG FOR INSIDE LIGHT

NOTE: Two different types of plugs are used for the inside light. Both types function in the same way, only their designs are different.

Type 1:

Release screw (1) and separate housing plug (2).

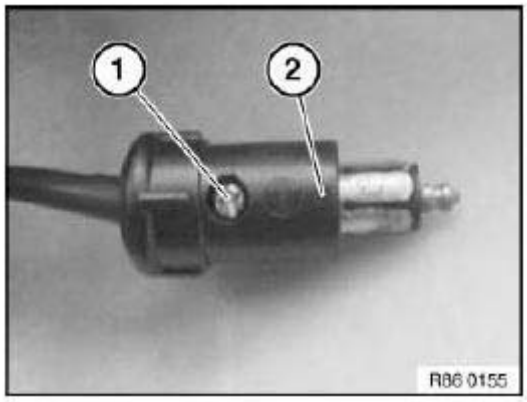


Fig. 180: Identifying Housing Plug With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and disconnect cables (2) from screw clamp.

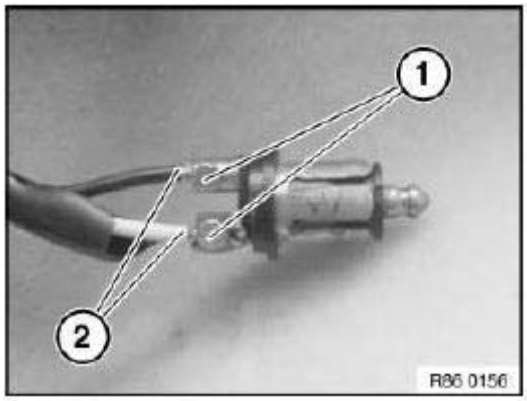


Fig. 181: Identifying Cables And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Type 2:

Release screw (1) and separate housing plug (2).

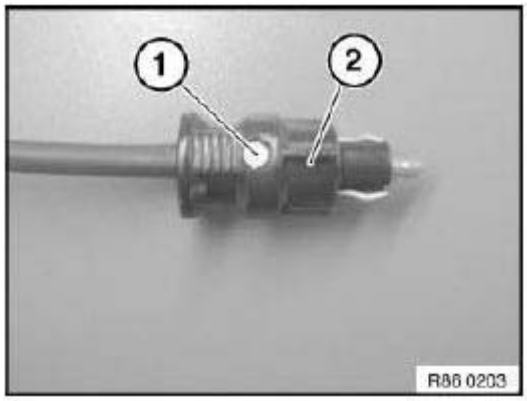


Fig. 182: Identifying Housing Plug And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove contact parts (1+2).

Installation

When installing, make sure contact parts (1+2) are in correct installation position.

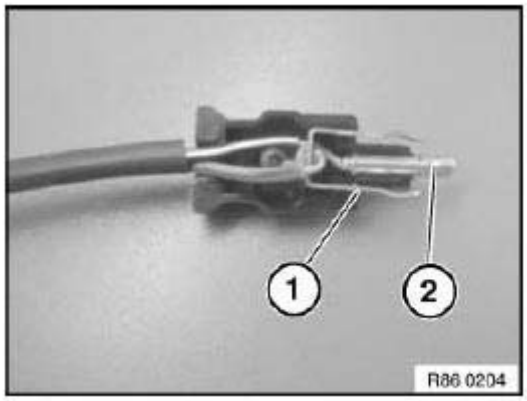


Fig. 183: Identifying Contact Parts
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING ROOF RAILING

NOTE: The text describes how to remove the roof railing at one mounting point as an example. Proceed in the same way for the other mounting points.

Open cover (1) and fold down.

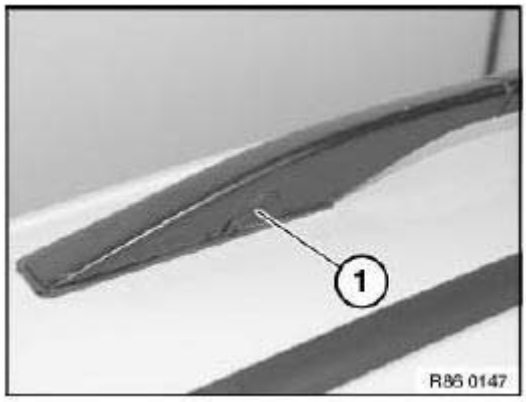


Fig. 184: Identifying Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew bolt (1).

After releasing three retaining screws, lift off roof railing (2).

Installation

Check molded sealing parts for faults and replace if necessary. Pay attention to identification of molded sealing parts and position accordingly.

Check butylene tape seal.

Use new screws. Coat all screws with OKS 90 thread locking adhesive.

First screw down railing adapter in middle. Then press roof railing downwards with a force of approx. 50 N. Then screw down railing adapter at front and rear.

Tightening Torque for roof railing at front and rear,

REFER TO TECHNICAL DATA 86 21 1AZ.

Tightening Torque for roof railing in middle, **REFER TO TECHNICAL DATA 86 21 2AZ.**

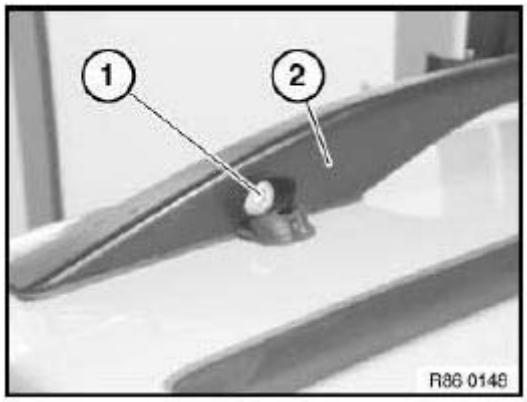


Fig. 185: Identifying Roof Railing With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING ROOF RAILING ADAPTER

NOTE: Removing roof railing, REFER TO 86 21 ... REMOVING ROOF RAILING

Remove molded sealing part (1).

Installation

All molded sealing parts must rest flat on hood. Molded sealing parts are marked according to their position.

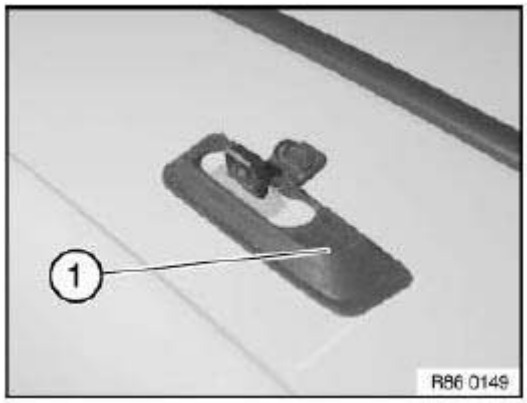


Fig. 186: Identifying Molded Sealing Part
Courtesy of BMW OF NORTH AMERICA, INC.

Cut butylene tape (1) out of railing adapter (2) along dotted line (3) with a knife.

Installation

Use butylene tape, 5 mm round, for sealing railing adapter on hood roof.

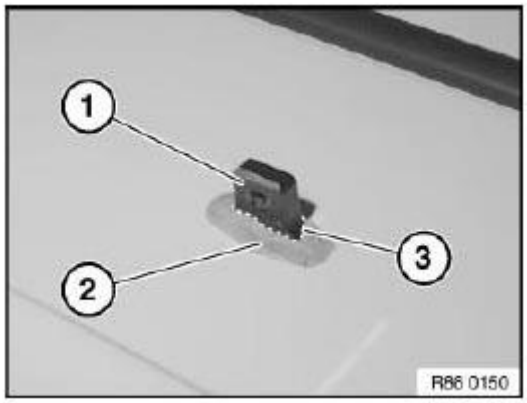


Fig. 187: Identifying Butylene Tape And Dotted Line On Roof Railing Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

Railing adapters at front and rear: Release screws (1) from inside of hood. Pull out railing adapter (2) and spacer plate (3) towards bottom.

Installation

Use new screws. Coat all screws with OKS 90 thread locking adhesive. Install spacer plate (3) in its original position.

Tightening Torque for railing adapters at front and rear, **REFER TO TECHNICAL DATA 86 21 3AZ.**

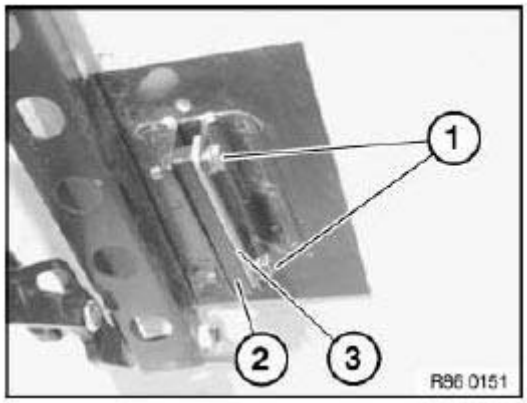


Fig. 188: Identifying Railing Adapter, Spacer Plate With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Railing adapter in middle: Release screws (1) from inside of hood. Twist out railing adapter from outside.

Installation:

Use new screws. Tightening Torque for railing adapter in middle, **REFER TO TECHNICAL DATA 86 21 4AZ.**

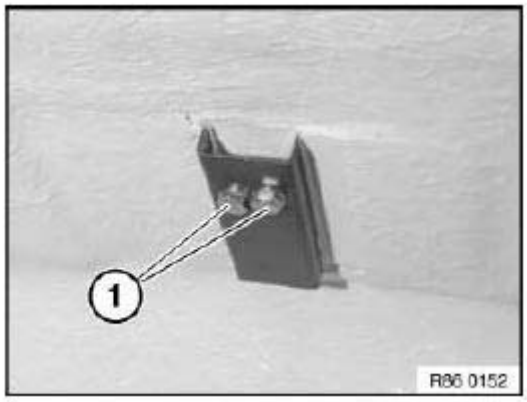


Fig. 189: Identifying Hood Inside Screws
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING ROTARY STRIKER LOCK

The following text describes how to remove the rotary striker lock on the rear lid as an example. Proceed in the same way for the side lids. Remove the lock while the lid is open.

Release screws (1) and remove cover (2). On rear lid, remove red cap (3).

Installation, rear lid only:

Place red cap back on pull rod. Red cap serves to indicate rear lid emergency unlocking facility.

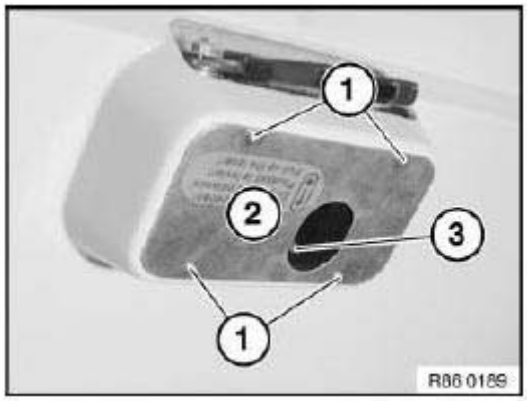


Fig. 190: Identifying Red Cap, With Cover And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove spring nut (1) from pull rod (2).

Installation

Use new spring nut.

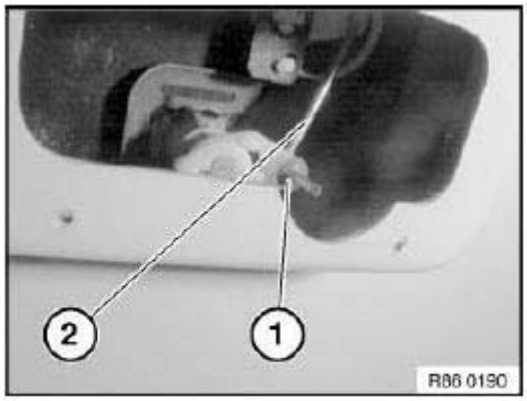


Fig. 191: Identifying Spring Nut And Pull Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook pull rod (1) from rocker (2).

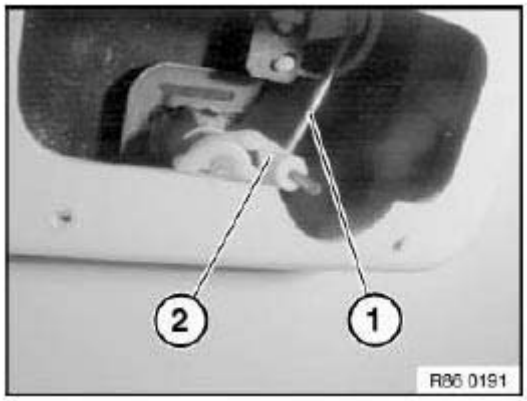


Fig. 192: Identifying Pull Rod And Rocker
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove rotary striker lock (2) from opening (3).

Installation

Tightening Torque, **REFER TO TECHNICAL DATA 86 21 12AZ.**

Use new Stover nuts.

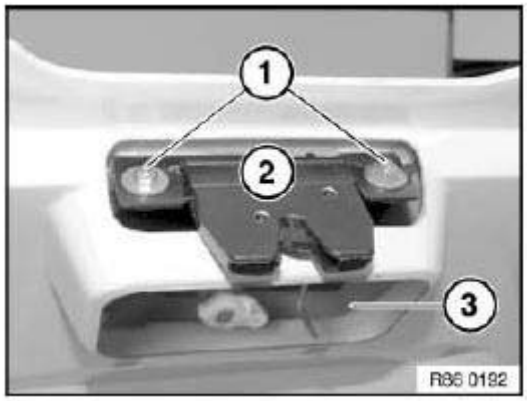


Fig. 193: Identifying Rotary Striker Lock With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach spring nut (1) from pull rod (2). Remove pull rod (2) from rotary striker lock (3).

Installation

Use new spring nut.

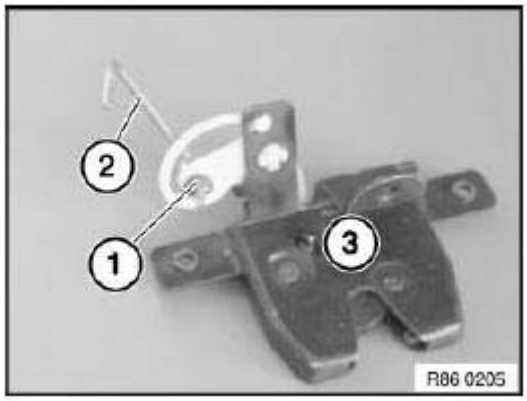


Fig. 194: Identifying Rotary Striker Lock, Pull Rod And Spring Nut
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REMOVING SIDE LID HINGE

NOTE: Remove side lid, REFER TO 86 21 ... REMOVING LID.
Remove gas spring, remove gas spring on hinge side only, REFER TO 86 21 ... REMOVING GAS SPRING.

Unscrew bolt (1). Remove hinge (2). If fitted, remove spacer plate(s) (3).

Installation

Pass screws (1) again through spacer tubes. Reinstall existing spacer plate (s) in its/their original position(s). Use new self-locking nuts.

Tightening Torque, **REFER TO TECHNICAL DATA 86 21 6AZ.**

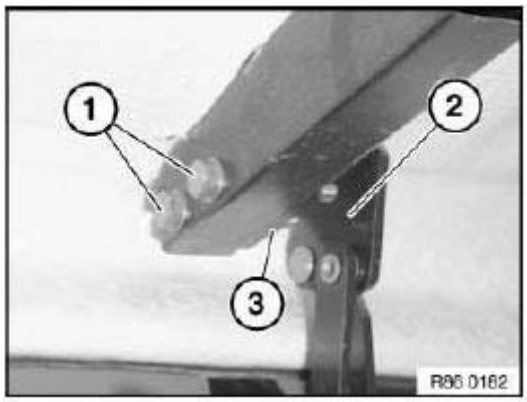


Fig. 195: Identifying Lid Hinge With Bolt And Spacer Plate
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REPLACING INSIDE LIGHT

Unclip cover (1) at side recess (arrowed) and remove towards bottom.

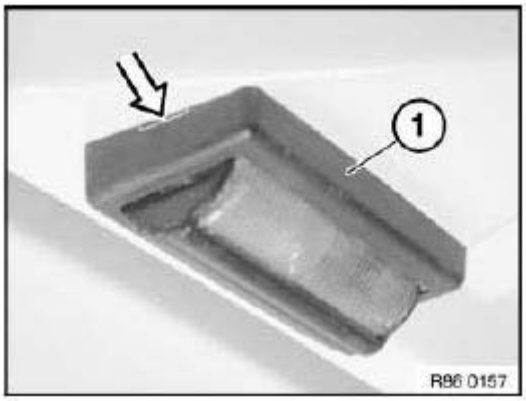


Fig. 196: Locating Cover Side Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip lamp housing (1) at side recess (arrowed).

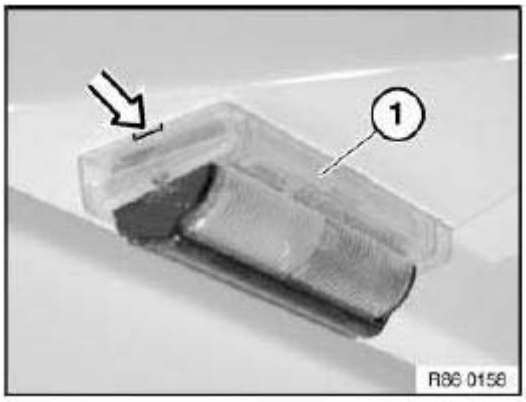


Fig. 197: Locating Lamp Housing Recess
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect flat connector (1) from flat connector contact.

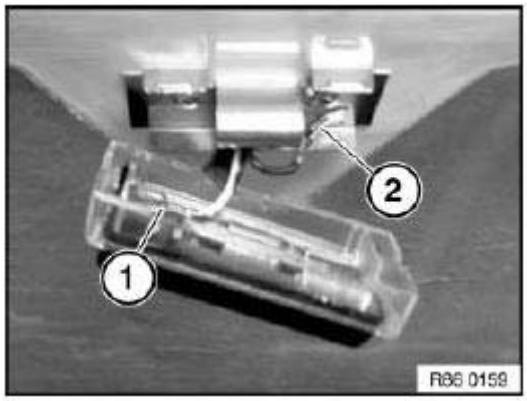


Fig. 198: Identifying Flat Connector And Contact
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Before drilling out rivets, drive in rivet pins with a punch. Drill out rivets (1). Pull off inside light mounting bracket (2) over flat connector (3).

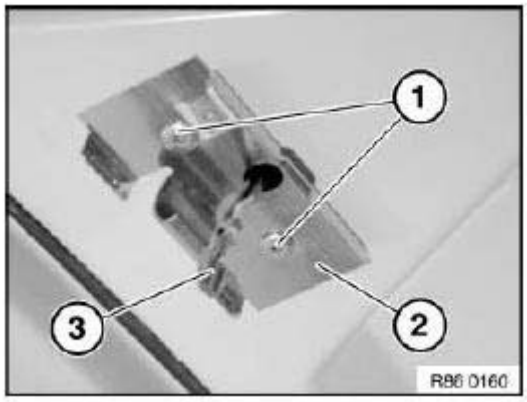


Fig. 199: Identifying Mounting Bracket, Flat Connector With Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

86 21 ... REPLACING INSIDE LIGHT POWER CABLE

NOTE: Remove inside light cover and lamp housing, REFER TO 86 21 ... REPLACING INSIDE LIGHT. Remove inside light plug, REFER TO 86 21 ... REMOVING INSIDE LIGHT PLUG.

Carefully remove adhesive bonds of power cable (1) from hood surface.

Installation

Carefully remove traces of old adhesive with a scraper. Use standard heat gun adhesive as adhesive.

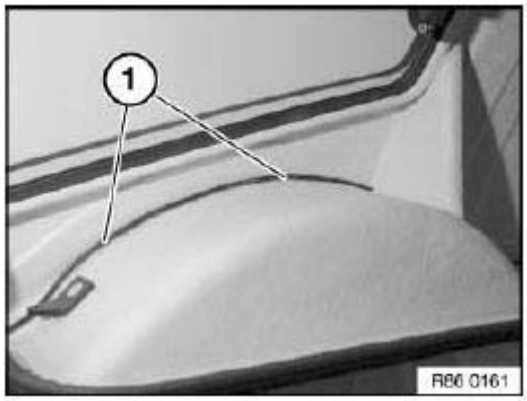


Fig. 200: Identifying Adhesive Bonds Of Power Cable On Hood Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove adhesive bonds of power cable (1) from hood surface.

Installation

Carefully remove traces of old adhesive with a scraper. Use standard heat gun adhesive as adhesive.

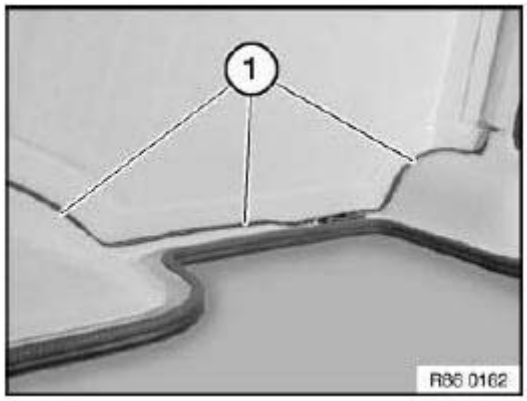


Fig. 201: Identifying Adhesive Bonds Of Power Cable On Hood Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Remove flat connectors (1). Strip cable ends (2) and connect to a new cable. Feed cable connection through opening (3).

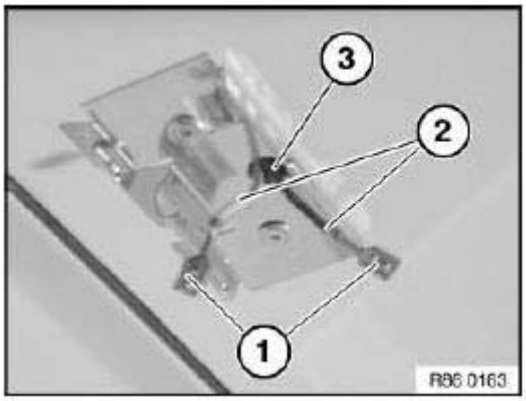


Fig. 202: Identifying Flat Connectors And Cable Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Lay new power cable with old power cable through duct (1).

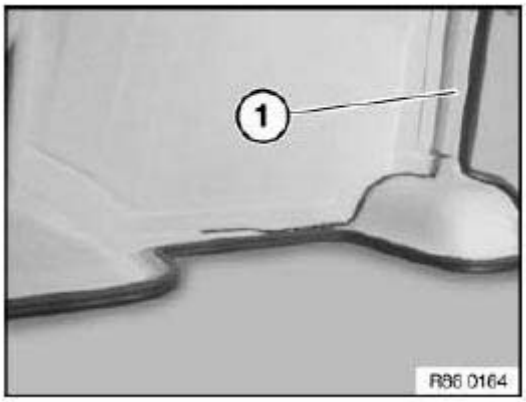


Fig. 203: Identifying Power Cable Duct
Courtesy of BMW OF NORTH AMERICA, INC.

HOOD

86 21 HOOD

TIGHTENING TORQUE SPECIFICATION - HOOD

		Type	thread	tightening specification	Measure
1AZ	Roof railing, front and rear, to roof railing adapter		M8		22.5 Nm
2AZ	Roof railing, middle, to roof railing adapter		M8		22.5 Nm
3AZ	Roof railing, front and rear, to support		M6		15 Nm
4AZ	Roof railing, middle, to support		M6		10 Nm
5AZ	Upper lock striker fixture to lower lock striker fixture		M8		27 Nm
6AZ	Hinge, side lid, to support		M8		27 Nm
7AZ	Support, lid to lid		M8		23 Nm
8AZ	Screw, depth adjustment, side lid		M8		27 Nm
9AZ	Screw, depth adjustment, rear lid		M8		27 Nm
10AZ	Ball pivot to retaining bracket		M8		23 Nm
11AZ	Retaining bracket to support		M8		27 Nm
12AZ	Rotary striker lock to support		M5		7 Nm

PLATFORM

86 10 PLATFORM

TIGHTENING TORQUE SPECIFICATION - PLATFORM

	Type	thread	tightening specification	Measure

1AZ	Nut to retaining thread, rear light		M5		7 Nm
2AZ	Bar to platform		M8x35		23 Nm
3AZ	Lashing plate to platform		M8x35		15 Nm
4AZ	Front guard to cross-member		M8x55		28 Nm
5AZ	Front guard to longitudinal member		M8x25		34 Nm
6AZ	Saucer head screw to rail		M5x15		7 Nm
7AZ	Rail, loading ramp frame to cross strut		M6x16		11.5 Nm
8AZ	Rail, loading ramp frame to longitudinal member mount		M6x16		11.5 Nm
9AZ	Cross strut to rail		M6x16		5.5 Nm
10AZ	Footplate to drawbar member		M6x25		11.5 Nm
11AZ	Bracket to drawbar member		M8x25		34 Nm
12AZ	Wiring harness mount to reversing housing		M10x1x20		58 Nm
13AZ	Socket holder to drawbar		M10x95		55 Nm
14AZ	Top reversing housing and bracket to drawbar member		M10		55 Nm
15AZ	Towing attachment to tow tube		M12x70		96 Nm
16AZ	Drawbar member to crossmember		M8x20		28 Nm
17AZ	Cross-member to drawbar member		M8x25		40 Nm
18AZ	Drawbar member to crossmember		M8x25		28 Nm
19AZ	Disk wheel to brake hub				100 Nm
20AZ	Brake hub to axle				280 Nm
21AZ	Shock absorber to bracket		M12x55		96 Nm
22AZ	Trailing arm to coil spring		M10x35		46 Nm
23AZ	Coil spring to		M10x25		46 Nm

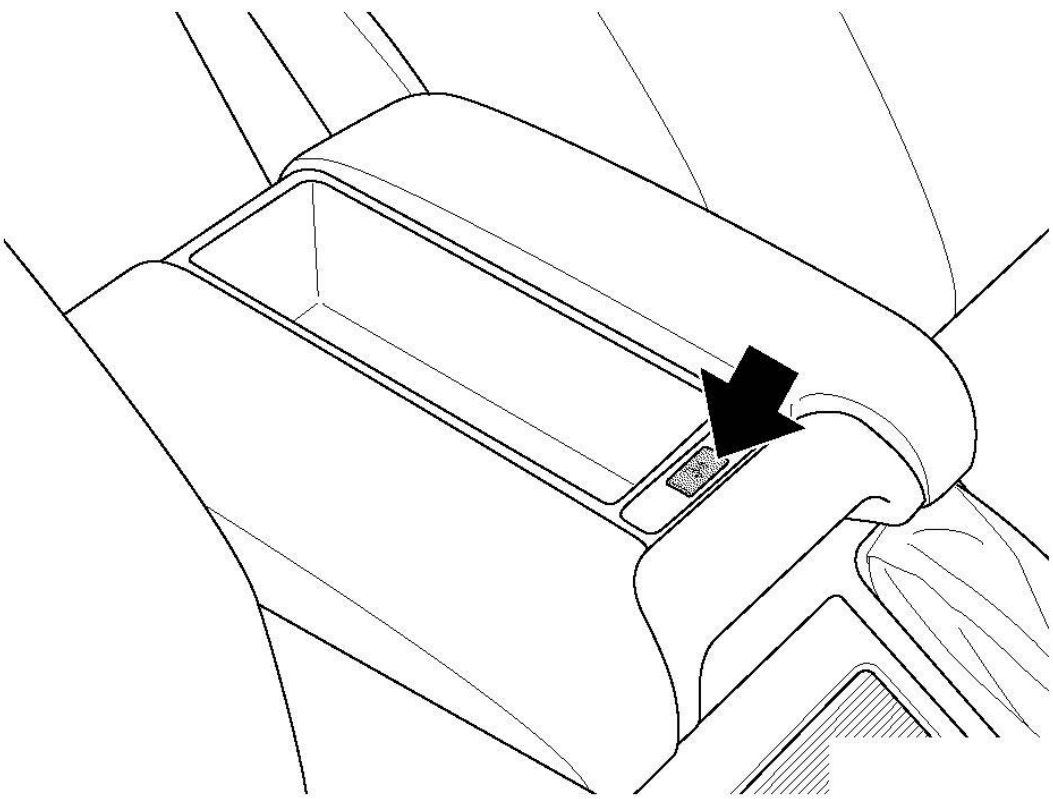
	longitudinal member				
24AZ	Wheel brake to trailing arm		M10x1.5x30		145 Nm
25AZ	Trailing arm to mount		M12x85		96 Nm
26AZ	Rear apron to bracket		M8x25		26 Nm
27AZ	Bracket to mounting bracket		M6x16		11 Nm
28AZ	Rotary striker lock to cross strut		M8x35		18 Nm
29AZ	Bearing pedestal to loading ramp frame		M6x16		10 Nm
30AZ	Outer towbar mount to longitudinal member		M10x25		55 Nm
31AZ	Mounting bracket to longitudinal member		M10x25		78 Nm
32AZ	Base plate to cross-member		M10x35		78 Nm

BMW UNIVERSAL BLUETOOTH™

INTRODUCTION

The BMW Universal Bluetooth™ HandsFree System (ULF) utilizes Bluetooth™ wireless technology to enable a wireless connection to be established between a Bluetooth™ enabled mobile phone and the ULF Control Module installed in the vehicle. The combination of these components results in a new generation of in-vehicle phone system.

The ULF Control Module forms an interface that allows a mobile phone with the embedded Bluetooth™ wireless technology feature to be wirelessly integrated into the vehicle. For the first time BMW is introducing a new generation hands-free telephone system kit that provides the customer with the option of using various Bluetooth™ enabled mobile phones (a list of recommended phones is available from your BMW Center).



G03399806

Fig. 1: Identifying Oddment Tray Button

Courtesy of BMW OF NORTH AMERICA, INC.

WHAT IS BLUETOOTH™

The name Bluetooth™ is derived from the Danish King Harald Bluetooth who lived in the 10th century. He was well known for his ability to unify his kingdom and today lends his name to a wireless technology standard that can connect/unify various electronic devices that are Bluetooth™ enabled and located within a short range (approx. 10 m or 32.8 ft) of each other.

Bluetooth™ wireless technology is a short-range radio frequency technology standard that allows several devices to communicate with each other simultaneously. The standard indicates that up to seven simultaneous connections can be established and maintained at one time, as long as the connected devices are within a range of 10 m (32.8 ft).

NOTE: The ULF system will allow four phones to be paired to the system at a time and only allow one phone to be connected at a time.

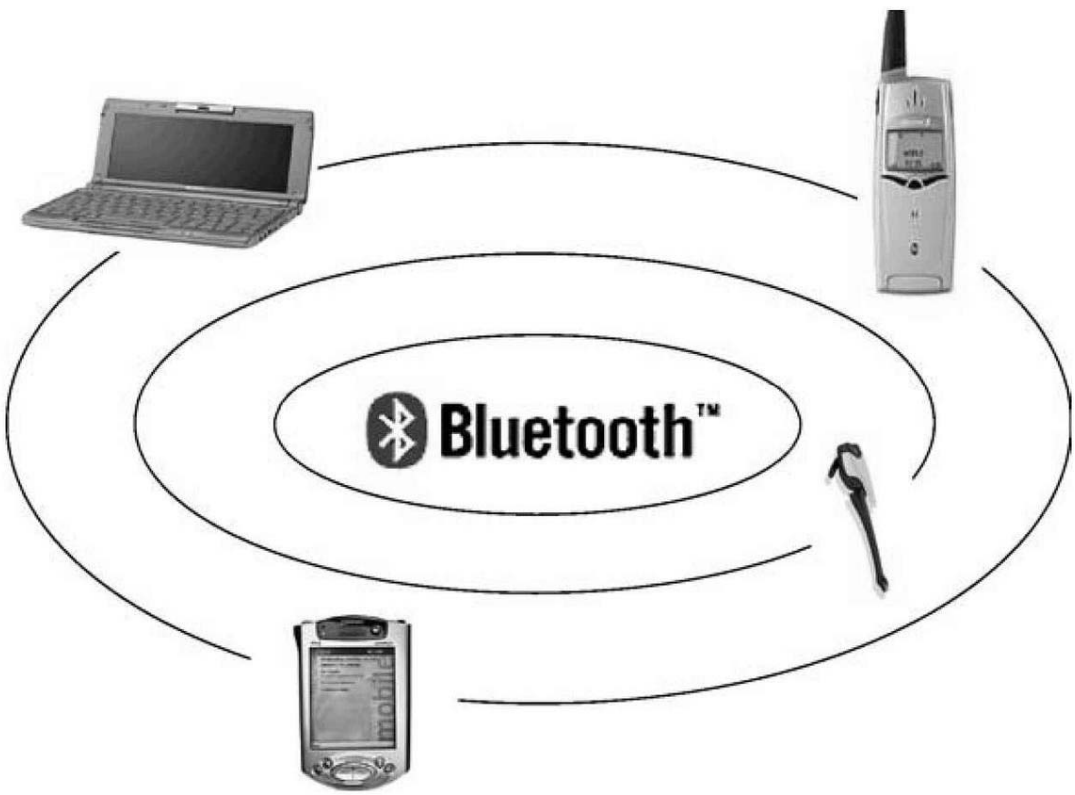


Fig. 2: Bluetooth Network Area Description
Courtesy of BMW OF NORTH AMERICA, INC.

Communication/Security

The system uses the license-free, global Industrial Scientific Medical band (ISM) at 2.45 GHz. This frequency range from 2.402 GHz to 2.480 GHz is subdivided into 79 channels with a 1 MHz bandwidth.

Signals transmitted through the airways can be scrambled and unscrambled to enhance communication security. With Bluetooth™ technology, communication frequencies are changed 1600 times per second to reduce the risk of interference or interception of the transmitted signal. The relatively small operating range of approx. 10 m (32.8 ft) also enhances the security of this technology, since tampering with the transmitted data is only possible when inside the 10 m (32.8 ft) wireless "network".

To further enhance the security of this short-range wireless network the ULF system requires a pairing procedure to be carried out for each device that will be introduced into the network. As part of this procedure a required passkey must be entered once (during the initial pairing procedure) to establish a secure connection between the phone and the ULF Control Module.

Data and Voice

Bluetooth™ was developed for the transmission of both voice as well as data. A bandwidth of approx. 1 MB/s is available for this purpose.

Bluetooth™ Enabled Phones

Ideally all phones that are Bluetooth™ enabled should work with the ULF system, however not all phones utilize the same profiles and therefore may not be recognized by the ULF System. A list of recommended Bluetooth™ enabled phones is available from your BMW Center.

ADVANTAGES OF THE ULF SYSTEM

- Once a phone is paired to the system it will be able to automatically connect to the Bluetooth™ wireless network of the vehicle, the next time it is introduced into the vehicle and the vehicle ignition is on.
- Up to four different Bluetooth™ phones can be paired to the system at one time, although only one phone can be wirelessly connected at any time.
- The phone does not need to be inserted into a phone specific cradle in order to be integrated into the vehicle.
- The phone can remain in a briefcase, purse, glove box, etc.; as long as it is turned on and located within the interior of the vehicle.
- The MFL buttons on the steering wheel can be utilized to place or receive a call, to scroll the phone book and select a number or activate voice recognition in order to dial a number via voice command.
- A voice recognition system is integrated into the ULF control module and can be activated by depressing the send/receive ™ button.
- The communications protocol of Bluetooth™ wireless technology is standardized irrespective of the manufacturer, this therefore allows various mobile telephones that utilize Bluetooth™ wireless technology and a recognized profile to be connected to the ULF System.

System Overview

A ULF system consists of a control module, microphone, Bluetooth™ antenna, a standalone pairing

(send/receive) button, or eject box with a coin tray insert.

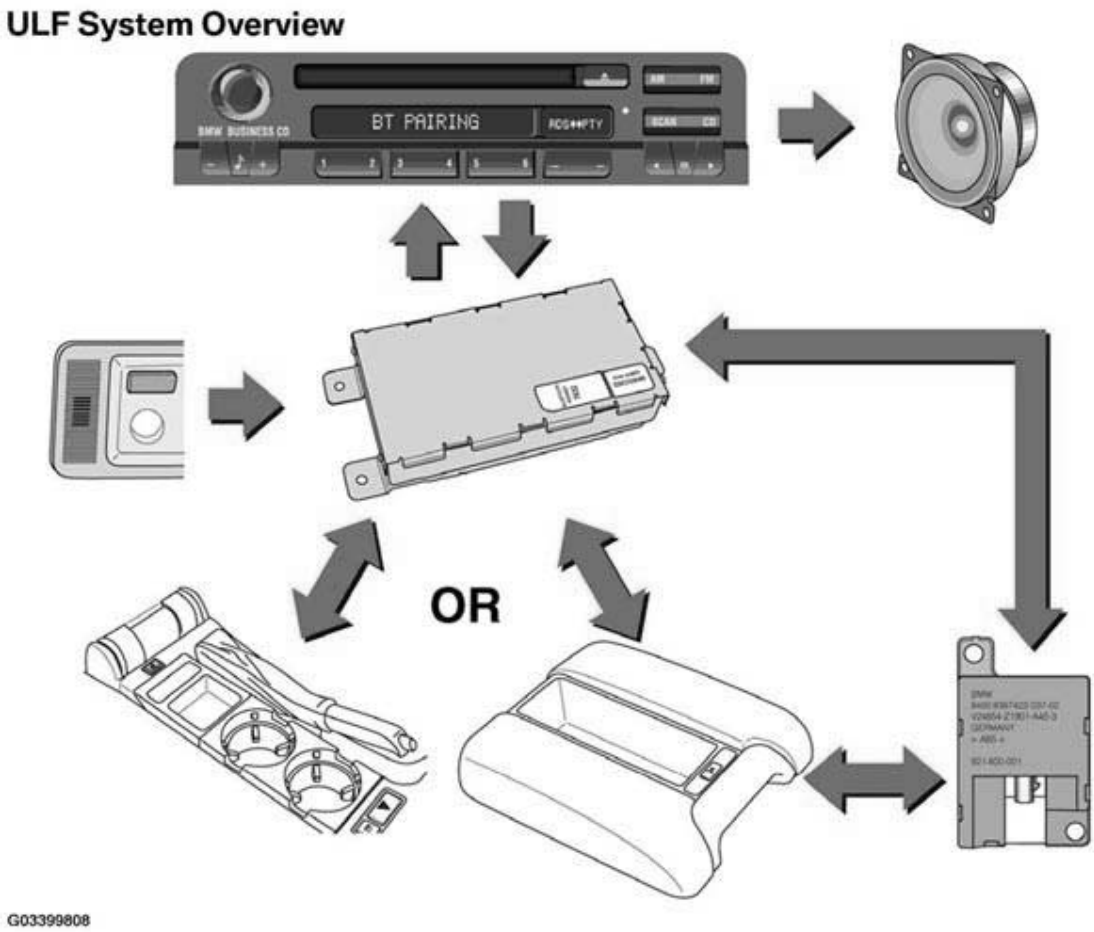


Fig. 3: ULF Control Module System Components
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Control Module

The ULF module forms the interface between the Bluetooth™ mobile phone and the electronic system in the vehicle. The mobile phone with the embedded Bluetooth™ wireless technology is the transceiver, this requires that the phone be activated, paired and present within the vehicle network in order to place or receive a call in the vehicle.

Oddment Tray

The oddment tray, which is connected to the ULF control module via the vehicles wiring harness, serves the purpose of:

Housing the send/receive ™ or pairing button, which must be depressed to activate the pairing procedure between the phone and the control module.

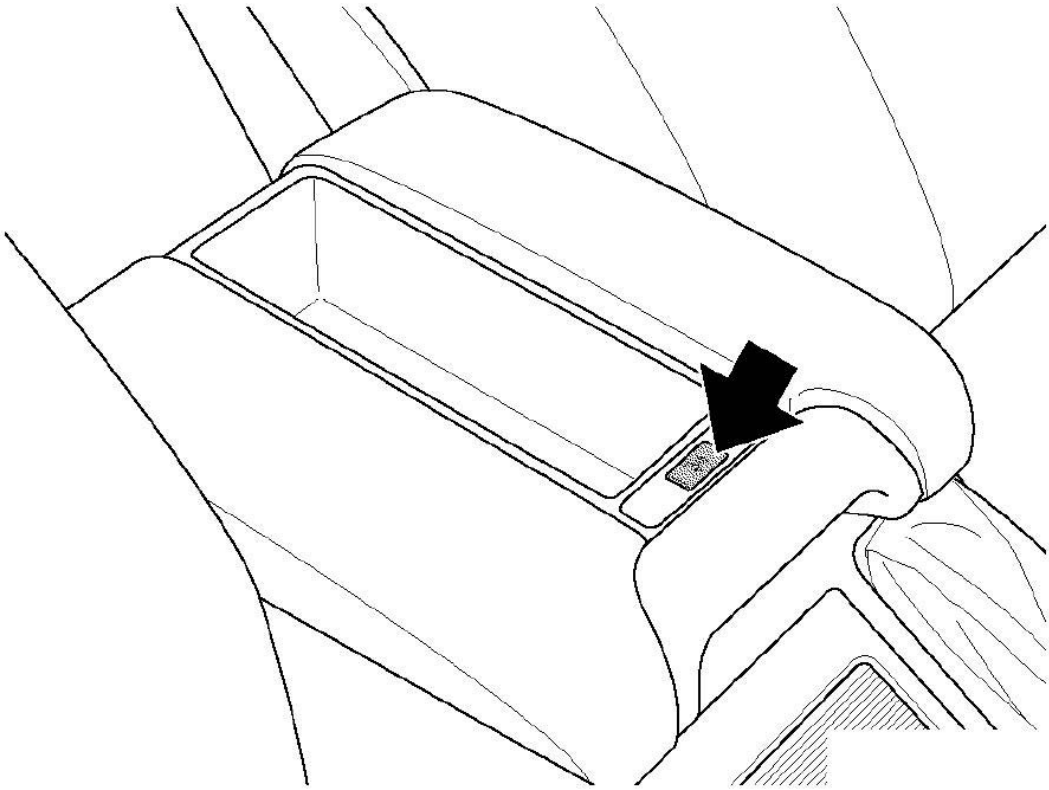


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Fig. 4: Identifying Oddment Tray Button
Courtesy of BMW OF NORTH AMERICA, INC.

Pairing Button

A stand-alone send/receive ™ or pairing button is supplied for the 3 Series in order to retain the cup holders. The button provides the same function as the send/receive ™ button on the steering wheel, plus is the button that must be depressed to activate the pairing procedure between the phone and the control module.

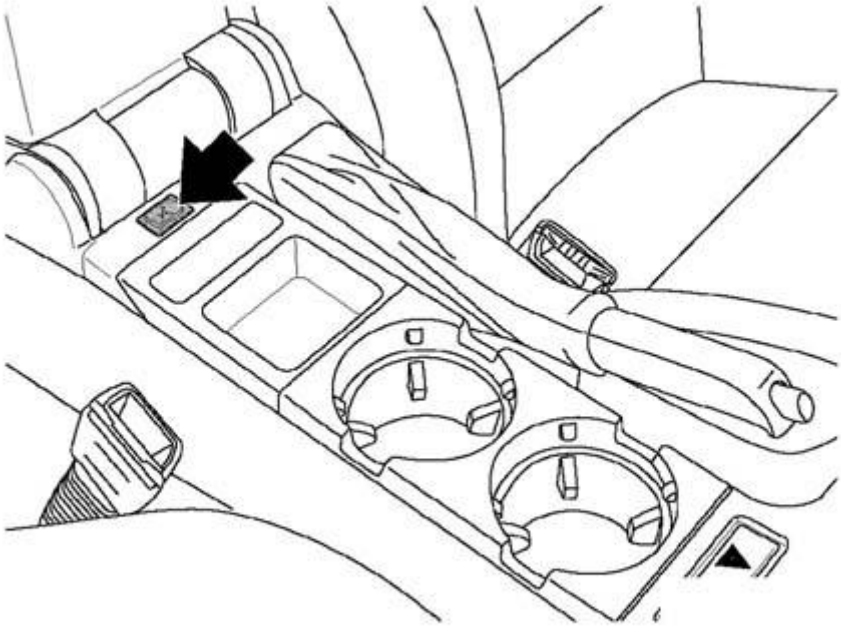

Fig. 5: Identifying Pairing Button
Courtesy of BMW OF NORTH AMERICA, INC.

Bluetooth™ Antenna

The Bluetooth™ antenna operates on a frequency of 2.45 GHZ and is installed in the interior compartment of the vehicle. This antenna provides the wireless interface between the Bluetooth™ enabled phone and the ULF Control Module.

SYSTEM OPERATION

Initial Operation

Prior to using the system for the first time, the Bluetooth™ mobile phone that is to be used must be paired with the ULF control module. This pairing procedure is necessary in order to assign the digital code of the mobile phone to the ULF control module installed in the vehicle. The pairing procedure is only required when a new phone is introduced to the ULF system for the very first time or the list of paired devices is cleared form the memory of the ULF module, it does not need to be performed every time the phone is used with the system.

After pairing, the mobile phone is recognized automatically by the ULF control module within 45 seconds after it is introduced into the vehicle and the ignition is turned on.

NOTE: Depending on the mobile phone manufacturer, particular care must be taken prior to initial operation to ensure that no headset is coupled with the mobile phone. Various devices may interpret the ULF control module as a headset and

request deactivation of the headset. Please refer to the operating instructions of the mobile phone for detailed information.

Pairing Procedure

The pairing procedure that must be initiated through the phone will differ corresponding to the different menu configurations of the various Bluetooth™ mobile phones on the market. The user's manual of the phone manufacturer should always be referenced for specific steps on how to activate the Bluetooth™ feature and to pair/link devices.

The following steps are generalized steps that should help in activating the Bluetooth™ function of most phones:

In Vehicle:

1. Depress the send /receive (pairing) button located in the center console, for at least 1 second prior to switching on the ignition and continue to hold the button down for approximately 2-3 seconds after the ignition is turned on.
2. Release the button.

NOTE: The send/receive (pairing) button in 5 Series and X5 SAV is located on the oddment tray assembly in the center console.

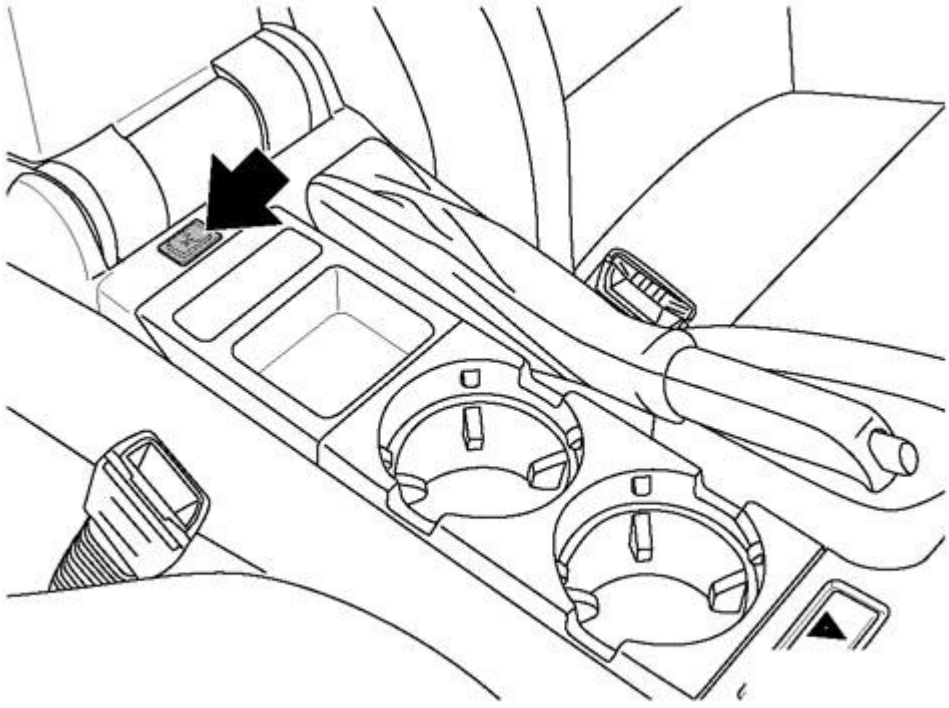

Fig. 6: Identifying Send /Receive (Pairing) Button Location (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

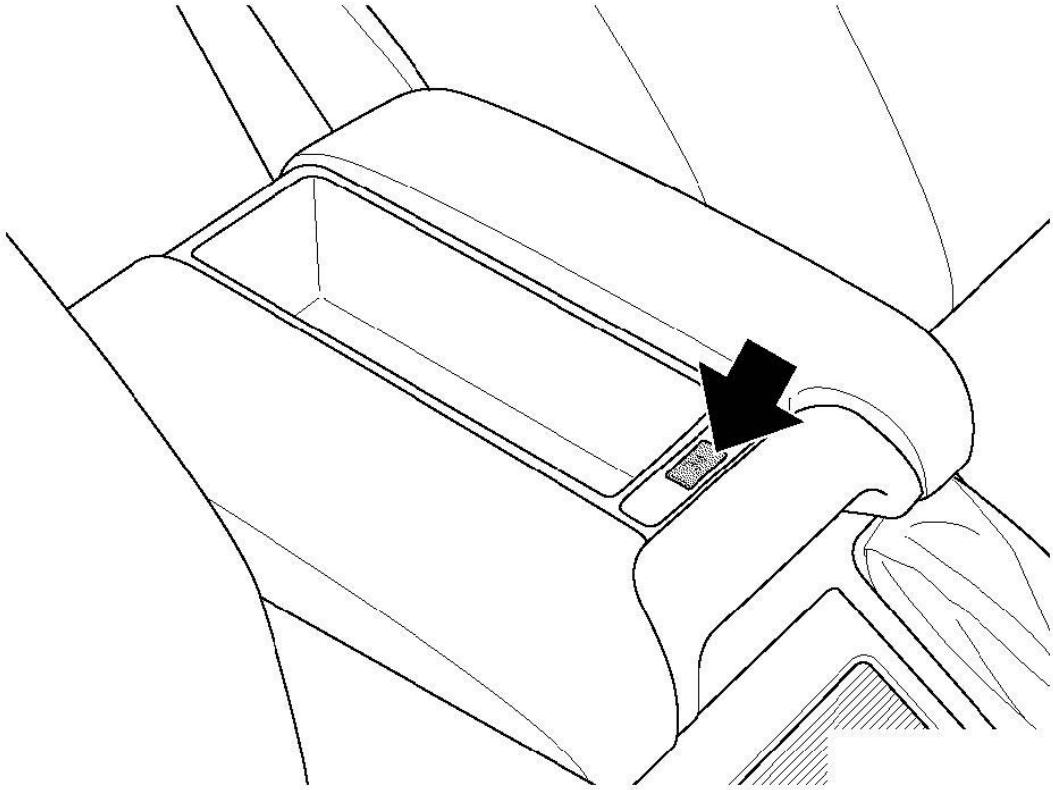

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Fig. 7: Identifying Send /Receive (Pairing) Button Location (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

3. Shortly after releasing the button on the Radio or Display Screen, the following message should be displayed:
   a. Display Screen:

      "Bluetooth Pairing" displayed.

      Green, Yellow and Red LEDs on the right side of the unit are flashing which indicates that the ULF is waiting for a signal from the Bluetooth™ device to be paired.

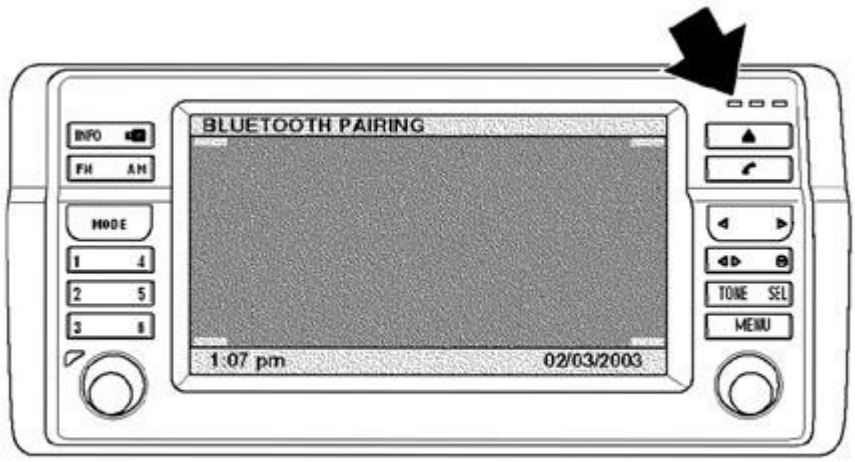

Fig. 8: Identifying Releasing Button On Radio
Courtesy of BMW OF NORTH AMERICA, INC.

b. Radio Display (5 Series and X5 SAV):

"Bluetooth Pairing" Display Which Indicates That The Ulf Is Searching For Available Bluetooth™ Devices. Green, Yellow And Red Leds On The Right Side Of The Unit Are Flashing Which Indicates That The Ulf Is Waiting For A Signal From The Bluetooth™ Device To Be Paired.

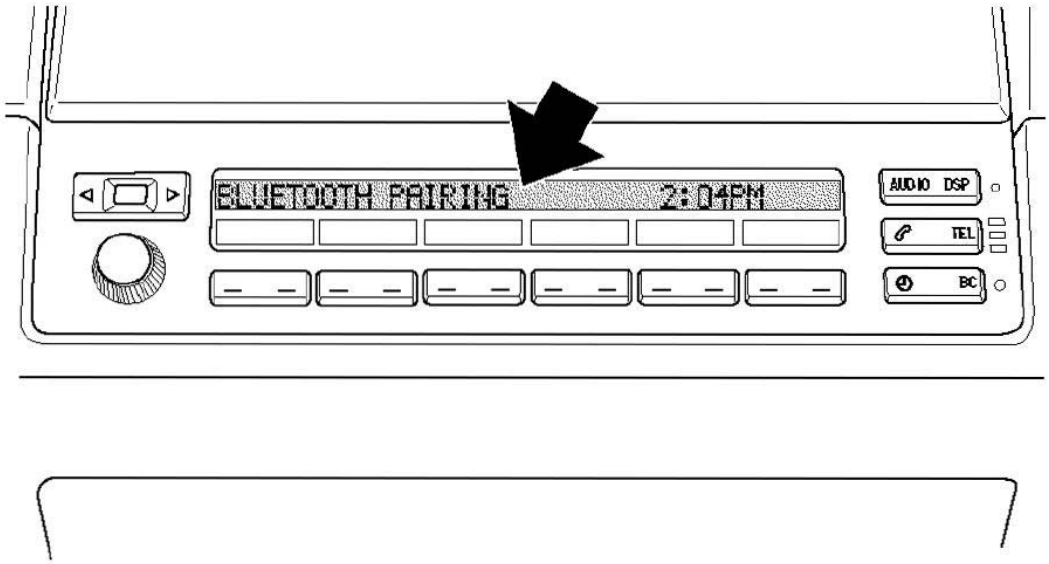

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Fig. 9: Bluetooth Pairing Display
Courtesy of BMW OF NORTH AMERICA, INC.

c. Radio Display (3 Series with CD or Cassette):

"BT Pairing" display which indicates that the ULF is searching for available Bluetooth™ devices.

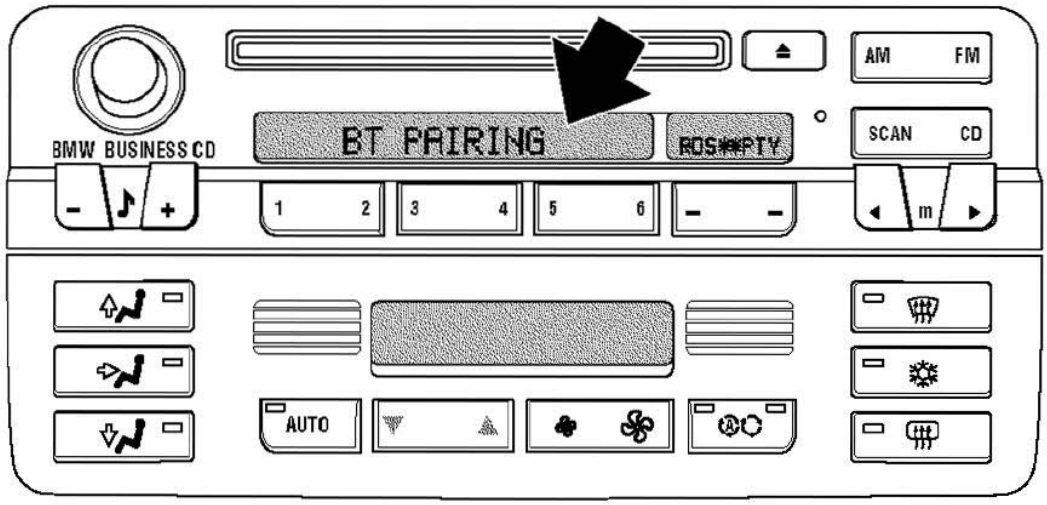


Fig. 10: BT Pairing Display
Courtesy of BMW OF NORTH AMERICA, INC.

4. Activate the search function of the phone as indicated below.

ON PHONE:

1. Locate the connection/settings menu and select Bluetooth™.
2. Select the response that will activate the Bluetooth™ feature of the phone.
3. Next select a menu option that will allow you to "Discover" or "Search" for active Bluetooth™ devices.
4. If the phone identifies/finds a device (named "BMW" followed by 5 digits) select it and follow the indicated steps to complete the pairing process.
5. Once the phone is successfully paired to the device cycle the vehicle ignition switch off and back on and the devices should wirelessly connect within 30 seconds. When the connection is established the phone will display a connection symbol.

The following steps are an example of the pairing procedure that must be initiated to pair the Sony Ericsson T68i phone to the ULF Control Module.

1. Press the menu button.
2. Select "Connect".
3. Select option 3: "Bluetooth".
4. Select option 4: "Options".
5. Select option 1: "Operation mode" and set to "On" or "Automatic".
6. Go back one step by pressing the red phone button several times.

7. Select option 3: "Discover".
8. Mobile phone display shows 'Searching'
9. Select "BMW ....." in upcoming list.
10. Select option 1: "Add to paired".
11. Enter the password (= ULF passkey) located on ULF Control Module that is in the rear of the vehicle or on the Passkey Reference Card.
    - Mobile phone display shows 'BMW ..... Pairing'
    - Mobile phone display shows 'Pairing Successful'
    - Display screen shows 'Pairing succeeded' for 3 seconds
12. Enter device name or accept the name that is automatically displayed.
13. Mobile phone display shows "Added to paired devices".
14. Exit menu by pressing the red phone/NO button.
15. Once the phone is successfully paired to the device cycle the ignition switch off and back on.
16. The devices should wirelessly connect within 30 seconds. The connection is established when the phone displays the symbols indicated, on the right side of the screen.

NOTE: **Shortly after turning on the ignition and the Bluetooth™ connection is identified, the phone may display a message asking if the connection should be established/accepted. The connection authorization request will always occur unless the setting on the phone is modified to allow automatic connection every time, please refer to the user's manual of the phone to determine how to change this setting.**

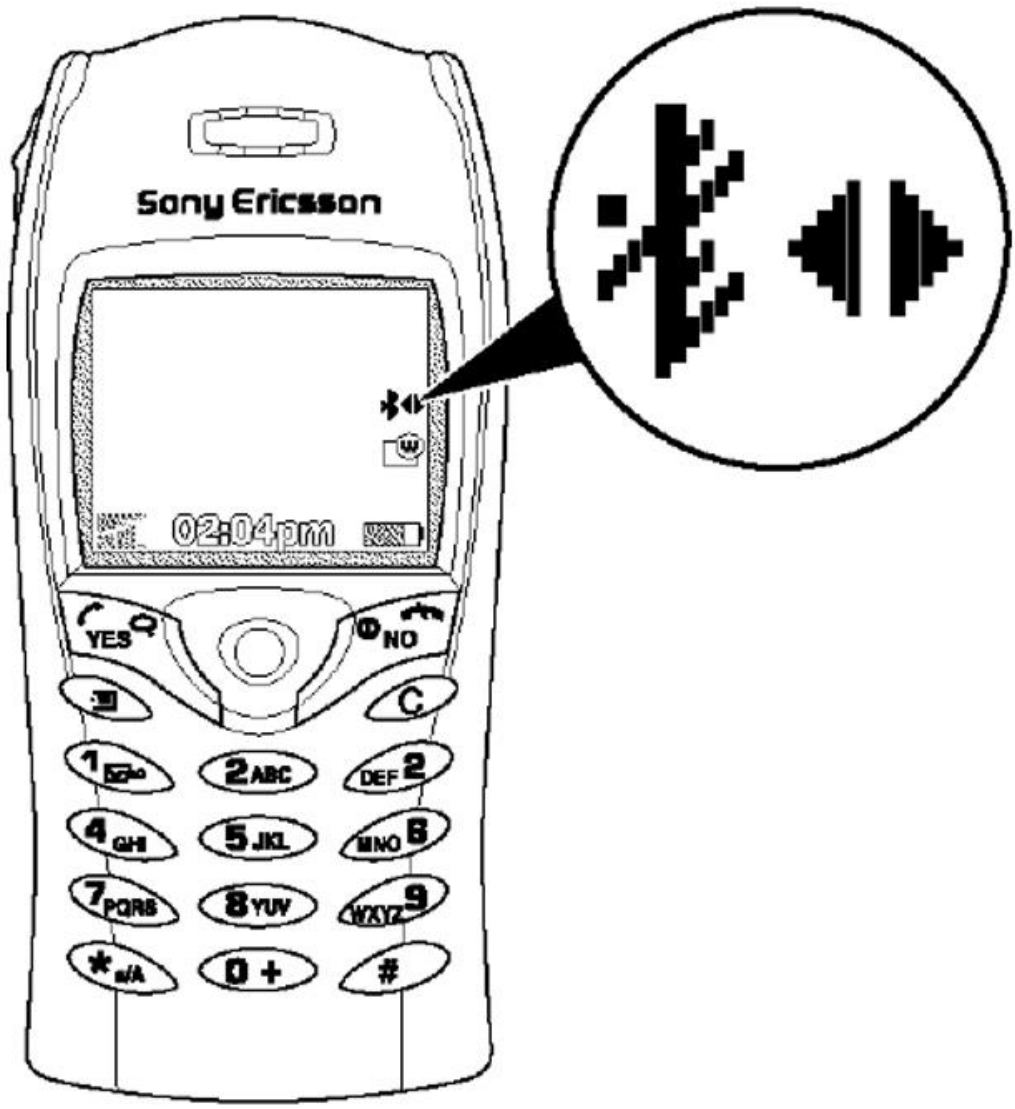


Fig. 11: Locating Connection/Settings Menu On Phone
Courtesy of BMW OF NORTH AMERICA, INC.

System Functions

The mobile phone must always be activated, paired and present within the Bluetooth™ network in order to place or receive a call through the vehicle.

Indicator Lamps

The indicator lamps show the following:

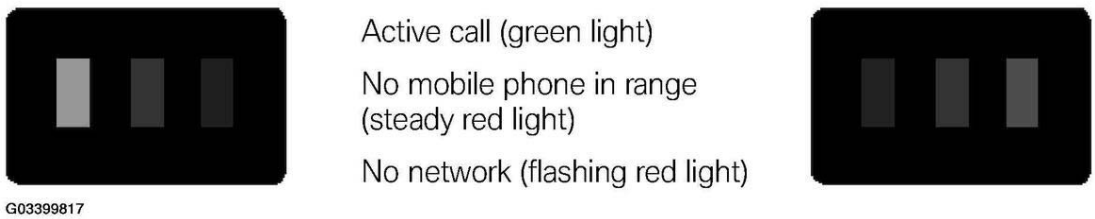


Fig. 12: Identifying Indicator Lamps
Courtesy of BMW OF NORTH AMERICA, INC.

Active call (green light).

No mobile phone in range (steady red light).

No network (flashing red light).

Adopting Telephone Book

Depending on the type of Bluetooth™ mobile phone, the telephone book is either transferred automatically (ex. Nokia 6310, Sony Ericsson T68i) or manually (depending on software version of phone) by the user to the ULF control module. The address book is stored temporarily for the purpose of accessing/displaying stored phonebook information using the steering wheel controls or telephone menu selections available on the display screen or some radio displays.

If a manual transfer of the address book must be made, the ULF must be in setup mode for manual transfer. The corresponding data can then be transferred. If phonebook data is modified while the phone is wirelessly connected to the vehicle the changes will not be displayed in the vehicle if the phonebook is scrolled via the steering wheel or display screen, changes will only be transferred the next time the ignition is cycled.

Placing a Call

A call can be placed in several different ways:

1. Using the keypad or address book of the mobile phone and depressing the send button on the phone.

   NOTE: Some phones may ask if the call is to remain within the phone. Refer to the users manual of the phone for specific instructions on disabling this feature.

2. Depressing the R/T button on the steering wheel, then scrolling (using the ™ or ™ buttons) through the address book of the phone that is linked to the ULF, until the desired number is displayed on the radio or display screen and then depressing the send/receive ™ button on the steering wheel or center console to

place the call.

3. Depressing the ™ button on the steering wheel until an audible "beep" is heard through the vehicle speakers, at this point a call can be placed by using the following voice commands:
    - "Dial number" or "Dial phone":
    - After the system asks for a number say the number.

      Example: "123 456 7890"; the system will repeat the number requested once you stop speaking momentarily, the number may also be displayed depending on the vehicle and equipment/accessories installed.

    - "Dial":

      NOTE: Once the dial command is given the number will be displayed on the dis play screen or radio; plus it will always be displayed on the mobile phone after a call is placed.

4. Briefly depressing the ™ button on the steering wheel will redial the last number dialed.

For more information on using voice commands refer to the " Owner's Manual for Voice Input System. The Convenient Alternative to Manual Control" (P/N 84 11 027 942)

Receiving/Accepting a Call

The call ringer in the Bluetooth™ mobile phone is audible when an incoming call signal is received. At the same time, the signal is sent via the Bluetooth™ interface in the mobile phone to the Bluetooth™ antenna in the vehicle. The ULF receives the incoming ring/call signal via the Bluetooth™ antenna and mutes the radio. The incoming ring/tone signal is then also transmitted to the vehicle speakers.

The following options are available for accepting a call:

3 Series without Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive ™ button in the center console.
- Press send/receive key on mobile phone.

5 Series and X5 SAV without Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive key on radio.
- Press send/receive ™ button on the oddment tray (Center Console).
- Press send/receive key on mobile phone.

Vehicles with Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive ™ button on the oddment tray (Center Console).
- Select the green phone symbol on the Display Screen.
- Press send/receive key on mobile phone.

Conducting a Call

If the call is accepted by pressing the send/receive key ™ on the Radio (5 series and X5 SAV), Display Screen, steering wheel or center console, it will be conducted via the hands free microphone and vehicle speakers.

If a call is accepted by pressing the send/receive key on the mobile phone, the reaction will depend on the type of handset. In the majority of cases, however, the question appears:

"Do you wish to use the mobile phone?"

Please refer to the operating instructions of the mobile phone for a detailed description of the operating procedure of the phone.

The hands-free function is activated after pressing the send/receive key. The incoming call is encoded (scrambled) via the Bluetooth™ interface in the mobile phone and sent to the Bluetooth™ antenna in the vehicle. The call is received by the ULF control module and output via the radio to the audio speakers.

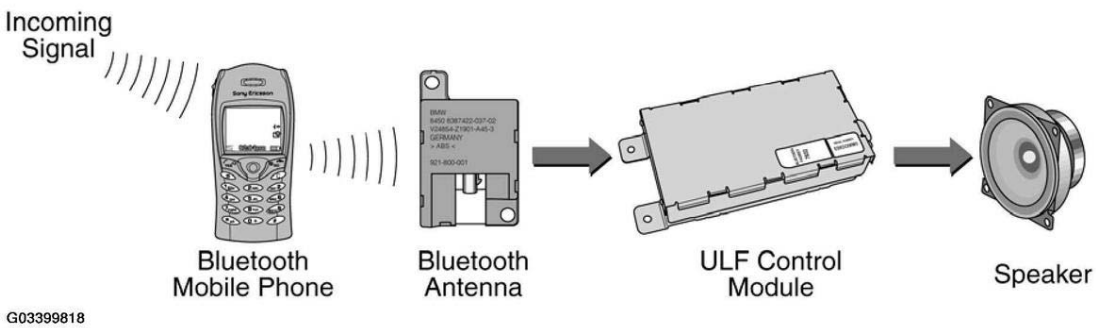


Fig. 13: Identifying Call Components (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Since the ULF system provides a digital full-duplex hands-free operation, it is possible to simultaneously speak and listen to calls. An echo cancellation function prevents feedback when speaking into the microphone. The microphone audio signal is sent via a hardwire connection to the ULF control module. In the ULF module the received audio signal is scrambled via the Bluetooth™ module and transferred via the Bluetooth™ antenna to the mobile phone. The mobile phone then transmits the call via the phone antenna.

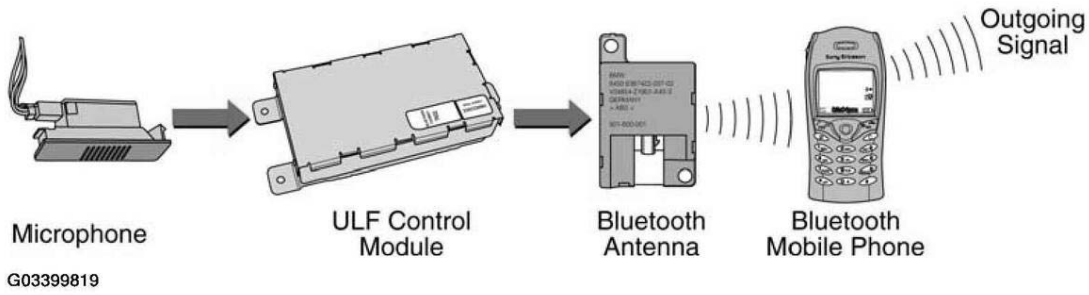


Fig. 14: Identifying Call Components (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Ending a Call

The following options are available for ending a call:

3 Series without Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive ™ button in the center console.
- Press send/receive key on mobile phone.

5 Series and X5 SAV without Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive key on radio.
- Press send/receive ™ button on the oddment tray (Center Console).
- Press send/receive key on mobile phone.

Vehicles with Display Screen:

- Press send/receive ™ button on MFL (Steering Wheel).
- Press send/receive ™ button on the oddment tray (Center Console).
- Select the green phone symbol on the Display Screen.
- Press send/receive key on mobile phone.

Transfer Active Call From Phone to ULF

If a call is received or placed via the handset, it can be transferred into the vehicle once the phone is within the active Bluetooth™ network of the vehicle.

Call transfer procedure:

1. Ignition must be on.

2. Bluetooth™ connection must be established.
3. Briefly depress the send/receive ™ button located in the center console.

NOTE: Some phones may automatically display a statement asking the user if the active call should be transferred to the ULF system shortly after the Bluetooth™ connection is established. If the request is acknowledged the call is automatically transferred into the vehicle/ULF system without having to depress the send/receive button.

Transfer Active Call from ULF to Phone

If you are currently in an active call and you need to leave the vehicle the call can be transferred into the handset in several ways.

1. Ignition is turned off and you walk away from the vehicle. Once outside the 10 m (32.8 ft) range a message may be displayed on the phone asking if the current call should be maintained or ended, by maintaining the call it will be transferred to the handset.
2. Depending on the model of phone being used the call can be transferred to the handset by manually disconnecting from the Bluetooth™ network via the connections menu or selecting a transfer function in the settings menu of the phone (refer to the user's manual of the phone for more information).

Linking Several Bluetooth™ Mobile Phones

Up to four Bluetooth™ mobile phones can be paired one after the other to the ULF control module. The pairing operation corresponds to the procedure described above.

The handset paired last has the highest priority. The telephone paired first will drop out of the list if a fifth Bluetooth™ mobile phone is paired.

NOTE: For incoming and outgoing calls, only the user connected first to the system can speak via the hands-free facility.

If two users enter the network or connection range simultaneously, only the user with the highest priority (the user last paired during the initial pairing procedure) will be able to use the hands-free function for incoming & outgoing calls. If the highest priority phone is turned off the phone with the next highest priority will be connected.

Deleting Devices

The paired Bluetooth™ mobile phones can only be deleted as a single group from the ULF control module.

The pairing procedure must first be activated, and then the send/receive ™ button on the installed eject-box or the pairing button located at the rear of the center console must again be depressed for an additional 10 seconds after the "Bluetooth Pairing" message is displayed on the radio in order to clear the list of paired devices from the control module and the message "paired devices deleted" is displayed.

TECHNICAL INFORMATION

Not only does the Universal Bluetooth™ Hands-Free System offer a means to wirelessly integrate a mobile phone into the vehicle, it also can be diagnosed using the DISplus or GT1.

The control module should always be coded to the specific vehicle that it is installed into to ensure optimum system performance. Coding of the module can be done using the DISplus or GT1 with CD33 or higher installed.

The ULF control module contains several controllers that provide the following functions:

1. Bluetooth™ Control Circuit:

   The Bluetooth™ control circuit is physically connected to the Bluetooth™ antenna. It establishes the connection between the Bluetooth™ mobile phone and the vehicle, de-scrambles the incoming call/signal from the phone, scrambles the outgoing signal from the microphone for transmission to the phone, plus controls all communication to paired Bluetooth™ devices.

2. Hands-free Control Circuit:

   The hands-free control circuit in the ULF controls the input/output of audio frequency signals in hands-free mode. The hands-free mode is designed for full-duplex transmission. This means the user can listen and speak simultaneously. Voice transmission takes place via a microphone located in the interior of the vehicle.

   Pressing and holding the send/receive ™ button until an audible beep is heard will activate the integrated voice recognition system and place the system into a hands-free mode.

3. Audio Output Control:

   The incoming signal from the Bluetooth™ phone is processed, sent through the radio and to the speakers.

4. Audio Input Control:

   The outgoing audio received from the vehicle microphone is processed and transmitted to the Bluetooth™ phone.

5. I/K-Bus Interface:

   The interface in the ULF control module for the I/K-bus controls the procedure for transmitting and receiving data telegrams via the I/K-bus in connection with other components on the bus.

6. Power Module:

   The power module in the ULF control module regulates the voltage supply and monitors system shutdown in the event of an under voltage situation in the vehicle.

SYSTEM OVERVIEW

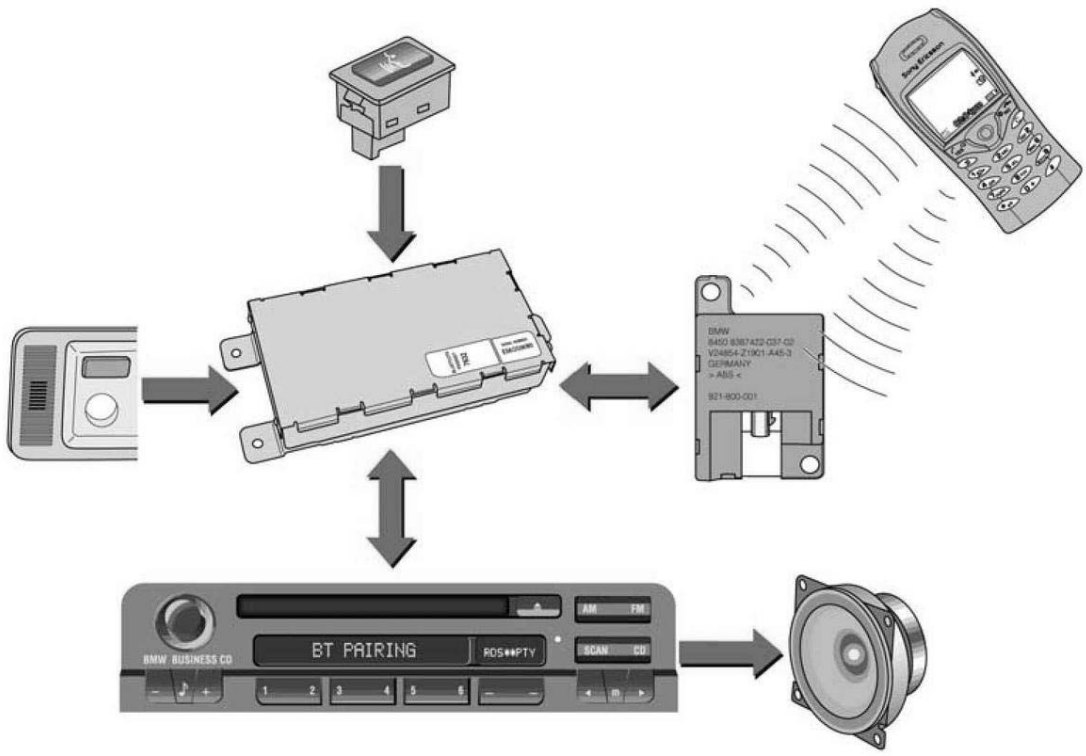


Fig. 15: Identifying Power Module System Components
Courtesy of BMW OF NORTH AMERICA, INC.

Voice Recognition

The voice recognition for the this system is integrated into the ULF Control Module and utilizes the same voice commands as those used with the TEMIC Voice Recognition Module used with the CPT8000 phone system. The "Owner's Manual for the Voice Input System" P/N 84 11 0 027 942 should be referenced for more detailed information regarding voice command features.

Coding ULF Control Module to Vehicle

After installing the ULF Kit, the vehicle should be re-coded with DISPlus/GT1 SW 33 or higher, using the "Retrofit" path to ensure that the system works properly with the systems currently installed in the vehicle. The recoding is done automatically when using the following "retrofit" procedure:

Example for coding E46 with ULF installed:

- Connect DIS or GT1 to vehicle (with SW 33 or higher installed).
- Turn on ignition.
- Select "Coding ZCS".

- Series: "E46 Series".
- Path: "2 Retrofit".
- System: "ULF Universal charging and Handsfree facility".
- Follow the on screen requests to activate the coding procedure.

Function Test

Upon completion of the recoding, verify that the BMW Universal Bluetooth™ HandsFree System is working correctly by going through the following action steps. After completing each step ensure that the desired result is obtained:

FUNCTION TEST

Action	Response
Pair phone to vehicle (refer to section for pairing instructions).	Phone and or Radio/MID/Board Computer should display statement indicating Pairing succeeded.
Turn on radio and initiate a call using voice recognition commands by depressing/holding the Voice recognition button on steering wheel until an audible beep is heard.	Radio should mute and an audible beep is heard through vehicle speakers.
Say "Dial number".	System states "Please speak the number".
Say phone number to be dialed ex"1234567890".	System states "1234567890".
If number is correct say "Dial"	Call is placed and number being dialed is displayed on phone as well as on Radio/MID/Board Computer.

TROUBLESHOOTING

TROUBLESHOOTING

Situation	Correction
No audio output through vehicle speakers.	Check SES module jumper plug.
Radio does not mute after placing a call.	Check connections at rear of radio for Tel On and Tel Mute signal. Verify that connectors and pins are properly seated.
Audio quality in vehicle may not sound very good.	Recode ULF Control Module.™ **NOTE:** **Audio quality in vehicle or at person being contacted, is dependent on the quality and signal strength of the wireless service provider in the area traveled.**
Customer complains that the person being contacted hears a "Buzzing" noise, at times during their conversation or on voice mail message that he/she has left.	Intermittently a "Buzzing" noise is noticeable to the person being called from the vehicle. The "Buzzing" noise is a result of the GSM signal being feedback through the microphone, this usually occurs if the GSM phone is located too close to the microphone.

	The customer should change the location of where the phone is placed/stored.
Driver is told that the person being contacted complains that there is an echo/reverberation in the audio; person can hear his/her voice back through the phone.	Audio volume in vehicle during a call may be a bit to loud, causing the other person to hear his/her voice coming back through the phone.
A second call is received while in a call, and call cannot be accepted using MFL controls.	Use handset to expect second call and place previous called on hold. Call waiting is functional only via the handset.
The radio audio does not come back immediately if the "other" person hangs up first.	It takes approximately 15 seconds for the ULF system to recognize that the call was terminated from outside the vehicle. If the call is terminated from outside the vehicle first, the driver can depress the button on the steering wheel to terminate the call from the vehicle and un-mute the radio quicker.
Customer is not able to pair phone to system, not able to locate ULF passkey/password reference card.	The "Bluetooth™ Passkey" is identified on the label of the ULF Control Module located in the rear of the vehicle.™ The "Bluetooth™ Passkey" for the installed control module can be obtained by connecting the DISPlus or GT1and accessing the diagnostics for the ULF system:- select "Diagnostic requests" - select "Bluetooth code".
Intermittently a popping noise is audible through the vehicles speaker and there is no Bluetooth™ wireless communication established between the ULF module and the phone.	Vehicle and /or ULF Control Module are not correctly coded.™ Recode module and vehicle (refer to **CODING ULF CONTROL MODULE TO VEHICLE**).
E46 Only: After installation of ULF system the speedometer and odometer do not work.	Remove pin 7 & 8 from the 54-pin connector going to the ULF Control Module. .

CONNECTOR PIN ASSIGNMENTS

The 54-pin connector of the ULF Control Module utilizes the following pins on X01185

PINS DESCRIPTION

PIN	**Description**
1	Microphone +
11	Cradle On/Enable
15	I-Bus
17	KL 30
19	Microphone -
21	Microphone Shield
22	Hook
27	Programming
28	Programming
32	Cradle Key +

33	Telephone On
34	Telephone On (pin 33)
35	KL R (Ignition)
36	KL 31 (Ground)
43	Programming
44	Programming
45	Programming
51	Telephone Mute
52	KL 58g (illumination)

The following pins on X4545 are utilized when the eject box is connected

PINS DESCRIPTION

PIN	Description
1	Cradle Key +
2	KL 31
3	58G
5	KL 30
13	Cradle On/Enable

NOTE: The pairing button used on the E46 only utilizes pin 1, 2 & 3 of X4545

ULF Wiring Schematic for the E53 with Boardmonitor

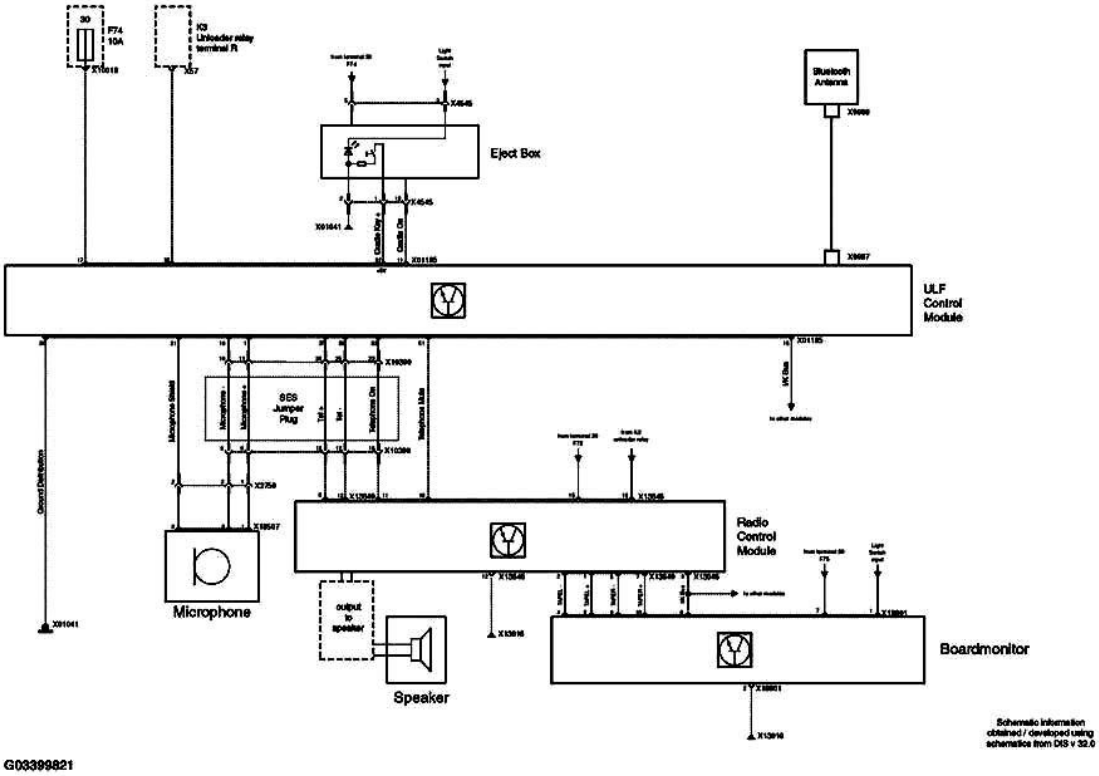


Fig. 16: ULF Wiring Schematic For E53 With Boardmonitor
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E53 with Multi Information Display

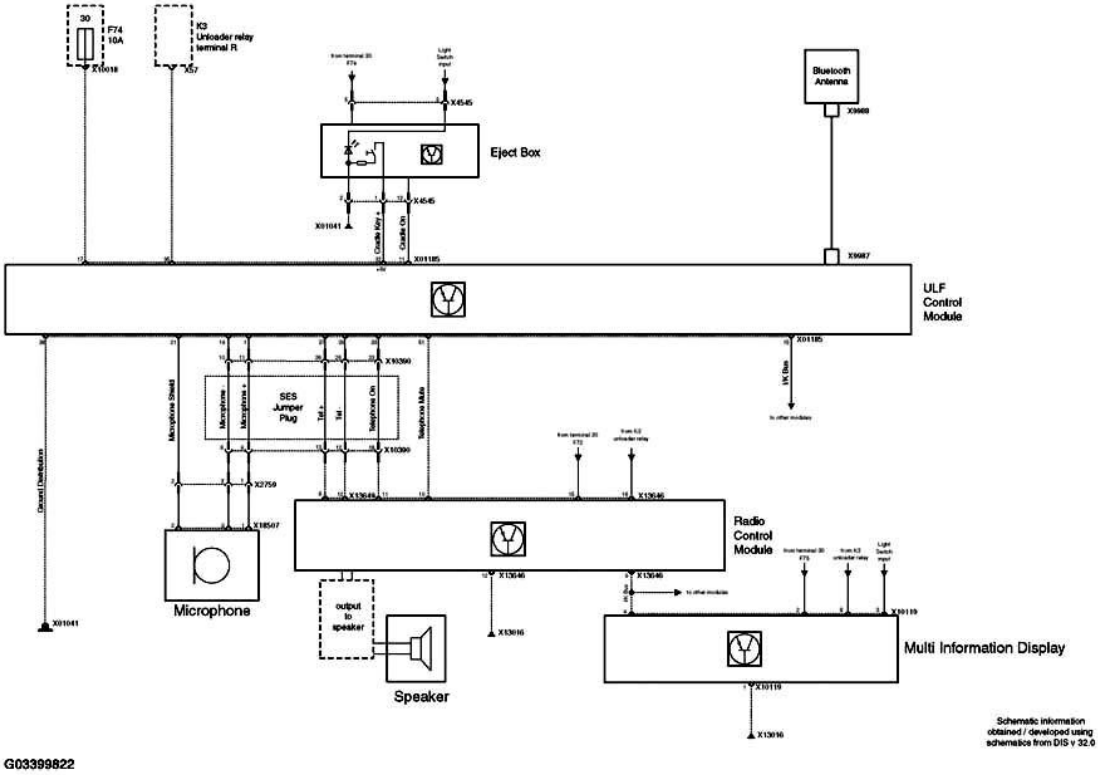


Fig. 17: ULF Wiring Schematic For E53 With MULTI Information Display
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E39 with Boardmonitor

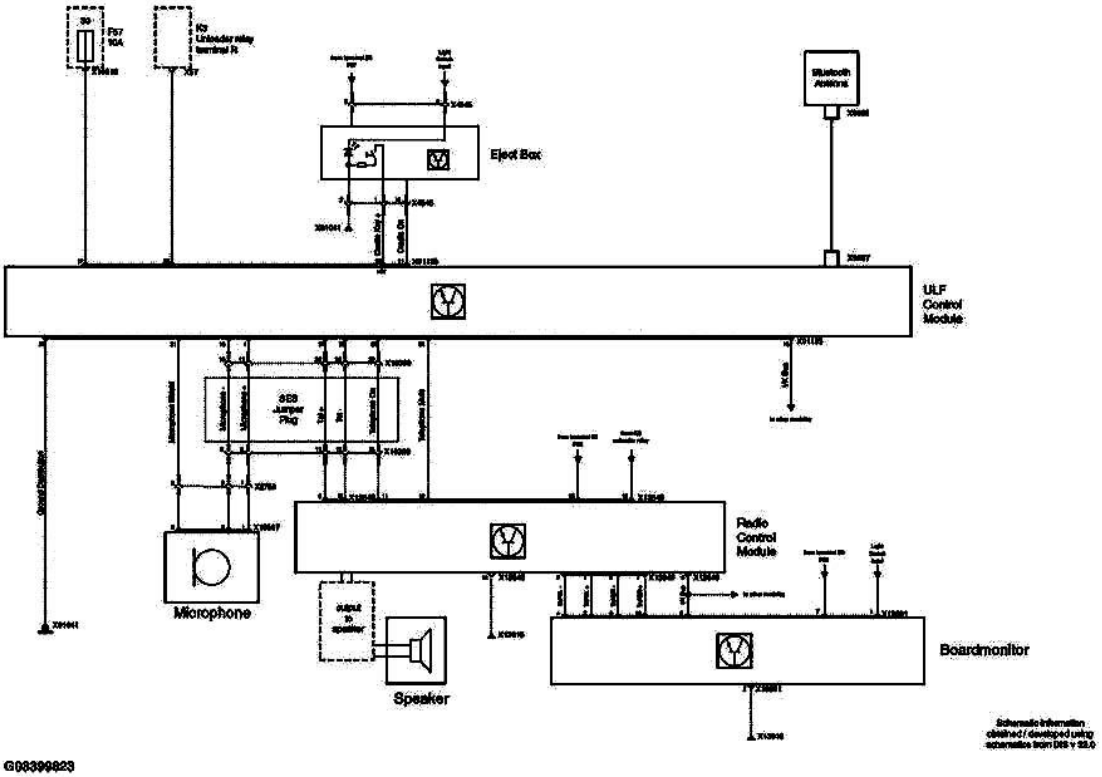


Fig. 18: ULF Wiring Schematic For E39 With Boardmonitor
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E39 with Multi Information Display

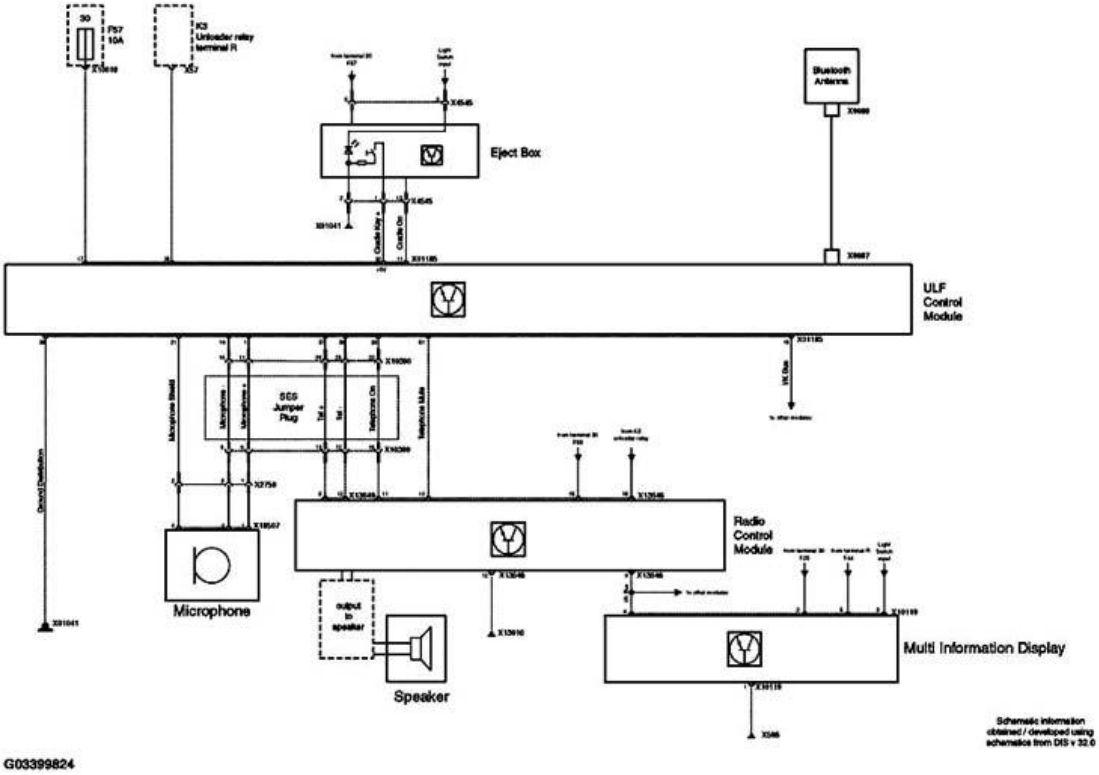


Fig. 19: ULF Wiring Schematic For E39 With Multi Information Display
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E46 with Boardmonitor

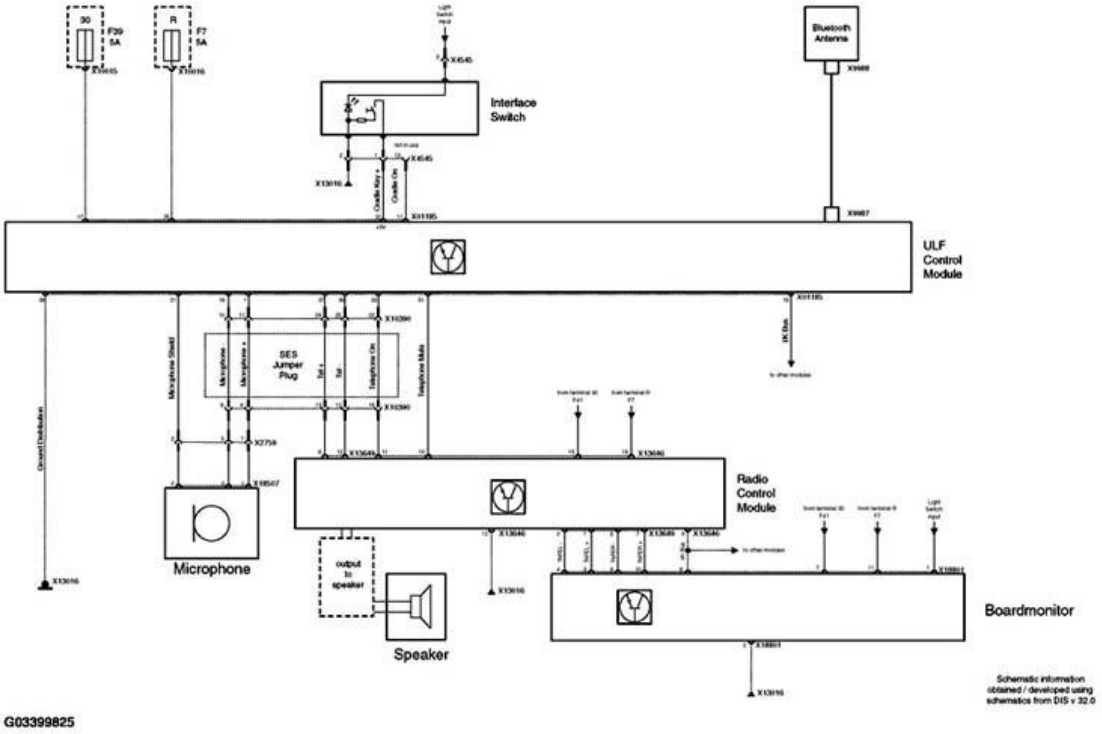


Fig. 20: ULF Wiring Schematic For E46 With Boardmonitor
Courtesy of BMW OF NORTH AMERICA, INC.

ULF Wiring Schematic for the E46 without the Boardmonitor

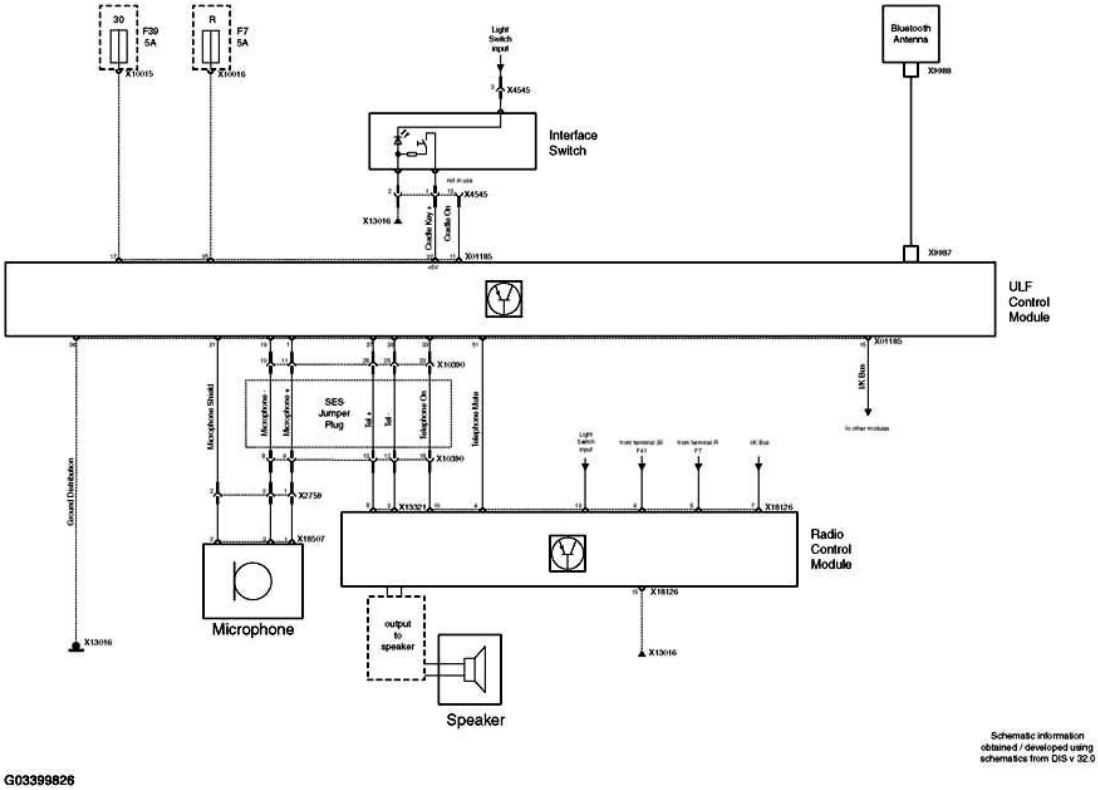


Fig. 21: ULF Wiring Schematic For E46 Without Boardmonitor
Courtesy of BMW OF NORTH AMERICA, INC.

1.0 SEALING COMPOUNDS

Seam Sealer, Sikaflex 221 may be used to seal adjoining sheet metal parts which create creaking noises due to interactive contact. High-adhesion, polyurethane-based, black-colored.

Sikaflex 221 Sealer

BMW Part No. 81 22 9 407 533

Other sealants for body panels are found in Group 97 (Body Cavity Sealings and Undercoatings).

2.0 LUBRICANTS

BMW offers several lubricants which are formulated for specific components. Some of these lubricants also appear in the "Universal Lubricants" group.

3.0 DOOR HINGES AND PIVOTS

Moly spray for quieting squeaks and similar noises. (former BMW Part No. 81 22 9 400 720)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8876
Loctite	Part No. 24378

4.0 DOOR BRAKES

Grease for any sliding contact area, especially door brake mechanisms. (former BMW Part No. 81 22 9 407 629)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8878
Loctite	Part No. 20029

5.0 DOOR LOCKS

Lock cylinder lubricant prevents locks from jamming in sub-freezing temperatures. Insert tip of spray can directly into keyslot.

(former BMW Part No. 81 22 9 407 421)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8878
Wurth	Part No. 893051
Loctite	Part No. 20029

6.0 (HKL) AUTOMATIC TRUNK LID LIFT HYDRAULIC FLUID

E65/E66 Automatic Trunk Lid Lift Hydraulic Fluid

BMW Part No. 51 24 7 066 901

4100 BODY

41 0 0 CONTENTS OF BODY, GENERAL

General Information

- **QUALITY STANDARD**
- **WORKSHOP EQUIPMENT**

Safety regulations

- **SAFETY AT WORK**
- Information on **VEHICLE PROTECTION**
- **INFORMATION ON HAZARDS**

Materials

- **MATERIALS SCIENCE**
- **EXPENDABLE MATERIALS**
- **USE OF MATERIALS** in outer skin

Handling components after an accident

- **ELECTRICAL SYSTEM,** electronics and optical fibre

  Passive safety See **4100... HANDLING AIRBAGS AND RESTRAINT SYSTEMS** or **7212... PROCEDURE AFTER AIRBAG TRIGGERING AS RESULT OF AN ACCIDENT**

- **CHASSIS, SUSPENSION AND STEERING**
- **FOLDING ROOF**
- Vehicles with Hybrid drive

Body dimensions

- **FRAME DIMENSIONS**
- **GAP DIMENSIONS**

Cavity sealing

- Installation of shaped parts See **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)** or **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)**

- Position of shaped parts See or **4100... POSITION OF SHAPED PARTS FOR CAVITY ACOUSTIC BAFFLE**

Vehicle identification number

- **VEHICLE IDENTIFICATION NUMBER, GENERAL**
- Stamping vehicle identification number See or **4100... STAMPING VEHICLE IDENTIFICATION NUMBER (NEEDLE STAMPING UNIT)**

Repair techniques

- **REPAIR STAGE 1** All repairs that only provide for replacement of screwed/bolted components and planishing operations.
- **REPAIR STAGE 2** Repairs that are carried out by bonding and riveting without the use of a straightening bench.
- **REPAIR STAGE 3** Repairs that are carried out by bonding and riveting with the use of a straightening bench or welding.

Corrosion protection

- **GENERAL INFORMATION**

Paintwork

- **GENERAL INFORMATION**
- **INFORMATION/WARNING LABELS**

41 00 ... BLIND RIVETS

1.0 Recommended tools and equipment

- Blind riveting tongs
- Rivet head extension

Setting blind rivets

- Refer to repair instruction for rivet size.
- Position bore holes for blind rivets as specified in repair instruction. If necessary, carry over the positions of the rivets to the new component.
- Drill holes (0.2 mm bigger than the outside diameter of the rivet. Example 4.2 mm dia. for 4 mm rivet and 6.7 mm dia. for 6.5 mm rivet).
- Deburr holes.
- **APPLY ADHESIVE** .
- Insert blind rivet. If necessary, remove adhesive that has emerged.

Position blind rivet tool vertically. Use rivet head extension if accessibility is poor.

- Rivet blind rivet with blind rivet tool. In the meantime clean rivet head if fouled with adhesive. Risk of damage to rivet head by penetrating adhesive.
- Seal blind rivets with **SEALANT D1** (risk of corrosion).
- Seal cavities after painting vehicle with **CAVITY SEALANT** (risk of corrosion).

41 00 ... BONDING ON PAINTED SURFACES

IMPORTANT: Conform with safety regulations See 4100... SAFETY AT WORK or 4100... INFORMATION ON HAZARDS!

Overview of topics:

1. Equipment
2. Expiry date of consumables
3. Preparation of surface
4. Bonding coat
5. Hardening times
6. Subsequent treatment
7. Disposing of adhesive

1.0 Equipment

- **CLEANER R1**
- Adhesive as specified in repair instructions
- **CARTRIDGE GUN**

2.0 Expiry date of consumables

- Glue cartridge is marked with a date.
- Do not use adhesive after this date.

3.0 Preparation of surface

3.1 Preparation of surface on vehicle

- Establish a level bonding surface (e.g. grinding). Do not remove primer entirely.

  Do not grind/sand bonding surfaces.

- If necessary, pre-clean bonding surfaces with cavity sealing wax remover.

  Clean bonding surfaces with cleaning agent R1.

- Allow cleaned surfaces to dry for approx. 5 minutes.

  Bonding surfaces must be completely dry.

3.2 Preparation of surface on new part

- Do not remove primer.

  Do not grind/sand bonding surfaces.

- Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 minutes.

  Bonding surfaces must be completely dry.

4.0 Adhesive application

- Processing temperature of glue cartridge 18 °C - 30 °C.
- Object temperature, vehicle and new parts, min. 15°C.
- Do not use any compressed-air-operated cartridge guns.
- Insert glue cartridge in cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube.
- Allow approx. 10 cm of mixed adhesive to emerge and then apply the mixed adhesive first on one side of the bonding surface.
- After applying the adhesive, check whether an adhesive component has emerged at the back of the cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.
- Potlife of mixed adhesive approx. 2 hours. A change of mixer is only necessary if over a period of 30 minutes no material has flowed through the mixer.
- Join components and secure in position.
- Remove excess adhesive.

5.0 Hardening times

- **Do not move the vehicle before the adhesive has hardened.**

  Check the degree of hardness of the adhesive with a fingernail.

  If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).

- Vehicle **strength for driving applications** is achieved after:

  48 hours at min. 15 °C object temperature (corresponding to approx. 18 °C room temperature).

or 1 hour in the spray booth (spray booth temperature 80 °C/object temperature 60 °C).

- When using radiant heaters, make sure that the object temperature does not exceed 85 °C. Excessively high temperatures will destroy the adhesive.
- Remove contamination caused by adhesive residue immediately.

  Hardened adhesive can only be removed mechanically.

6.0 Subsequent treatment

- Reseal areas which are cavity-sealed as standard.

7.0 Disposing of adhesive

- Hardened adhesive is disposed of as normal waste.
- Empty glue cartridges are disposed of as normal waste.
- Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00 ... BONDING STEEL ON STEEL

IMPORTANT: Conform with safety regulations See 4100... SAFETY AT WORK or 4100... INFORMATION ON HAZARDS!

Overview of topics:

1. Equipment
2. Preparing the surface
3. Bonding coat
4. Hardening times
5. Subsequent treatment

1.0 Equipment

- Sandpaper
- **CLEANING AGENT R1**
- **ADHESIVE K1**
- **CARTRIDGE GUN**

2.0 Surface preparation

- For better adhesion, remove oxide film and paint from the adhesive areas with a stainless steel wire brush or special sandpaper.
- Clean bonding surfaces with cleaning agent R1.
- Allow cleaned surfaces to dry for approx. 5 minutes.

  Bonding surfaces must be completely dry.

3.0 Adhesive application

- Processing temperature of glue cartridge 18°C - 30°C.
- Object temperature, vehicle and new parts, min. 15°C.
- After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.
- Join components and secure in position.
- Remove excess adhesive. Do not use solvent cleaning agents.

4.0 Hardening times

- Refer to **NOTES REGARDING ADHESIVE K1**

5.0 Subsequent treatment of bonding surfaces

- Protect the repair area with cavity sealant.

41 00 505 CHECKING FRONT BODY STRUCTURE

Necessary preliminary tasks:

- Remove **FRONT UNDERBODY PROTECTION**

Structural damage can be identified by measuring with a beam trammel.

Here, symmetrically arranged points on the vehicle are measured in diagonal sequence.

If the two measured values are identical, there is no damage to the vehicle.

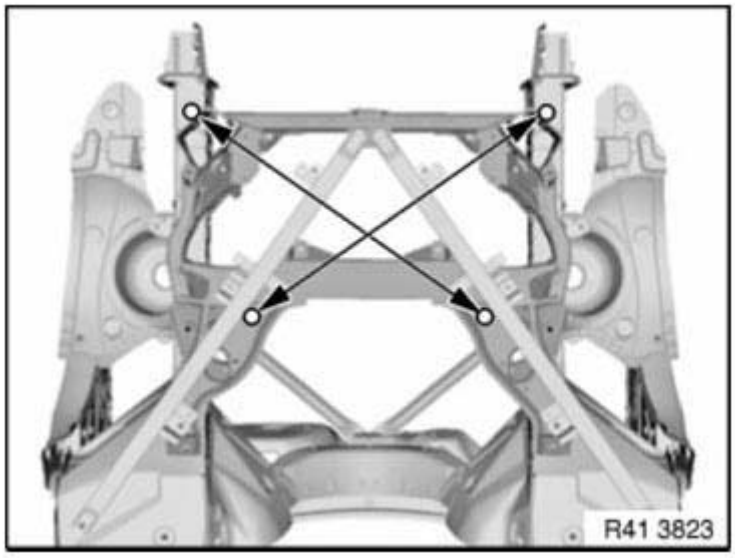


Fig. 1: Measuring Symmetrically Arranged Points In Diagonal Sequence On Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

In front area use conical adapter (2) at bore hole (1).

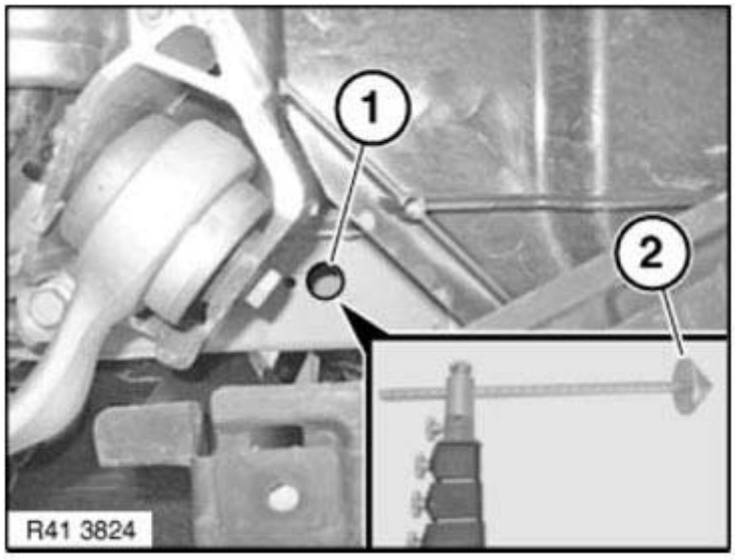


Fig. 2: Identifying Conical Adapter And Bore Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Use 8 mm dia. bore hole (1) on front axle support.

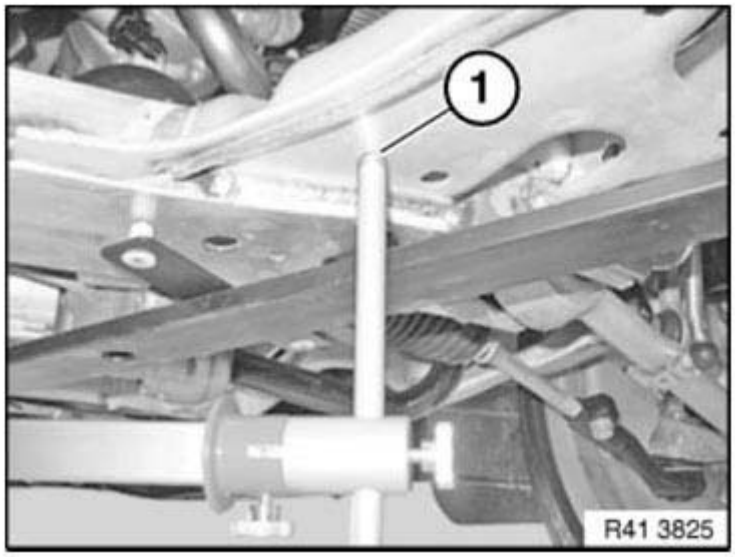


Fig. 3: Identifying Bore Hole On Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 510 CHECKING REAR BODY STRUCTURE

Necessary preliminary tasks:

- Remove **REINFORCEMENT PLATE FROM REAR AXLE**

Structural damage can be identified by measuring with a beam trammel.

Here, symmetrically arranged points on the vehicle are measured in diagonal sequence.

If the two measured values are identical, there is no damage to the vehicle.

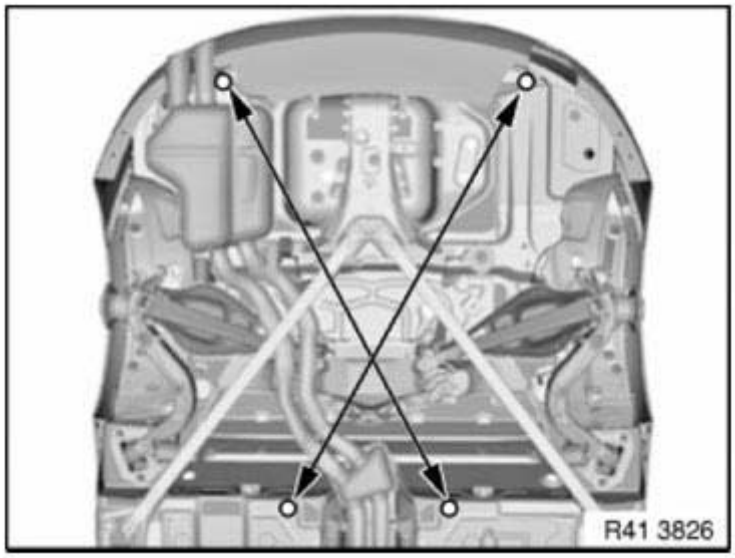


Fig. 4: Measuring Symmetrically Arranged Points In Diagonal Sequence On Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

In rear area use adapter (2) on threaded bolt of impact plate (1).

NOTE: If necessary, make recess in adapter yourselves.

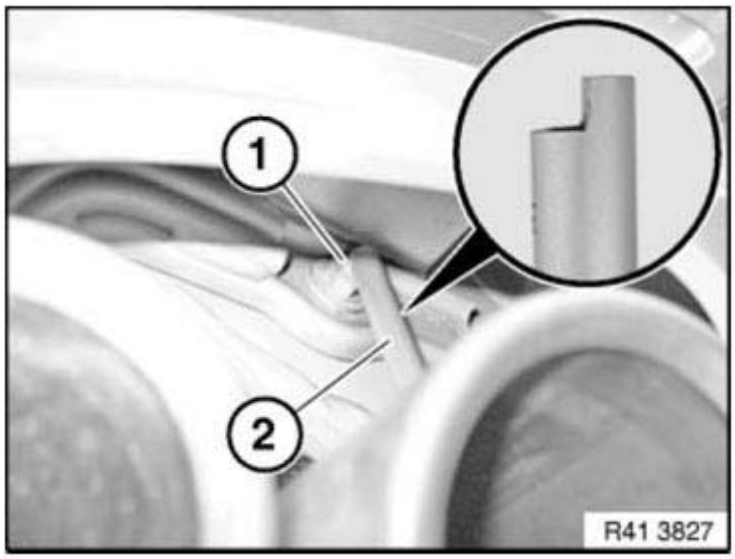


Fig. 5: Identifying Adapter And Impact Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Use conical adapter (1) at attachment point of reinforcement plate.

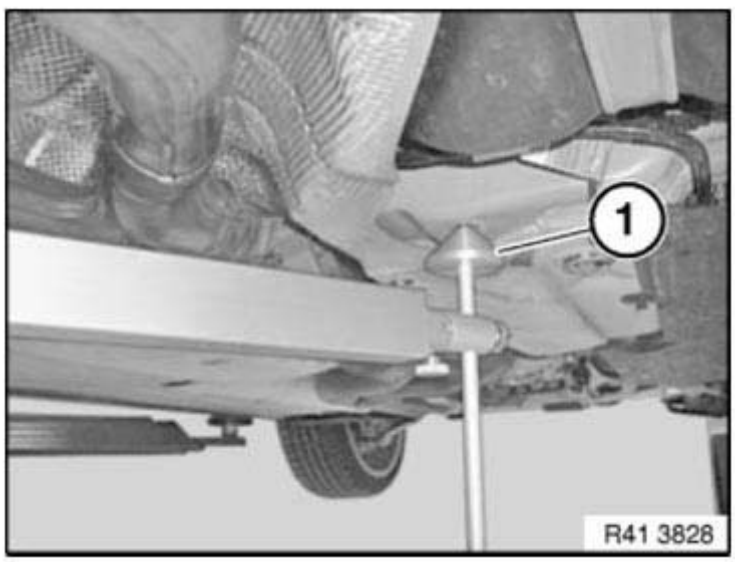


Fig. 6: Identifying Conical Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... CORROSION PROTECTION

NOTE: **Following repairs, the corrosion protection work already begins with the correct removal of the PVC undercoating, anti-drumming layer and seam seals. The PRODUCTS RECOMMENDED by BMW are optimized with regard to corrosion protection.**

1.0 Removing and applying sealing materials

1.1 Removing sealing materials

IMPORTANT:

- **Do not burn off PVC material (sealing compound) with a gas burner or similar or heat to temperatures above 180 °C. This would generate highly corrosive hydrochloric acid and release harmful fumes.**
- **The new lining does not form a satisfactory bond with burnt PVC material which means that subsequent subsurface rust may set in.**

Remove PVC material with a rotating steel brush, or heat PVC to maximum 180 °C with a hot air blower and scrape off with a spatula.

1.2 Applying sealing materials

All weld joints sealed off with body sealing compound in original state must be primed and sealed off again thoroughly after repairing. Replace damaged or removed anti-drumming layers.

NOTE: **Spray gun required for body sealing compound (order no. 81 49 0 300 887).**

2.0 Cavity preservation of sheet-metal parts

Carry out cavity preservation after all body repairs.

Concluding cavity preservation is the most important part of all corrosion protection measures.

Use the cavity protection spray only for smaller-scale straightening work where the parts in question are easily accessible. Use the Vaupel **PRESSURE CUP GUN** for all other repairs. Cavity protection agent is available in different container sizes.

Use the relevant probes with tubes for the different cavity areas.

Required tools can be found in the Aftersales Assistance Portal (ASAP) - Service/Technology - Workshop Equipment (Start BMW) - Shop Workshop Equipment or at www.bmwgroup-wep.com.

IMPORTANT: **Incorrectly performed cavity protection can, especially in the case of steel/aluminium joints, give rise to a non-calculable product liability and safety risk.**

The best repair is worth nothing if the subsequent cavity protection measures are not conscientiously carried out.

2.1 Cavity preservation of steel parts

New doors and lids must be sealed with cavity protection agent after being painted.

New sheet-metal parts or cavities, weld seams and folds formed by new sheet-metal parts must be sealed with cavity protection agent after being painted.

The cavities affected must be sealed with cavity protection agent after all straightening work.

2.2 Cavity preservation of aluminium parts

New doors, lids and side panels made of aluminium are not sealed with cavity protection agent.

After all straightening work on aluminium components, the cavities affected must be sealed with cavity protection agent after being painted.

After all welding work (E52 only) on aluminium components, the cavities affected must be sealed with cavity protection agent after being painted.

Cavities, seams and folds formed from new sheet-metal parts must be sealed with cavity protection agent after being painted.

41 00 ... EMC SCREWS

(EMC = Electro-Magnetic Compatibility)

1. Purpose

- **EMC SCREWS** are used in the Bonding/Riveting repair method to re-establish bonding transition.
- They assume the function of welded joints, which ensure transition to ground between the individual components.
- The punch or blind rivets used in the repair do not guarantee permanent bonding transition between the individual components!
- The EMC screws ensure the operational reliability and safety of the electrical/electronic components following repairs!

2. Procedure, aluminium front end

- Each welded joint which is opened must be replaced by at least 2 EMC screws.
- Position the 2 screws on the flange on which the weld seam has been separated. In the event of partial replacement, position the screws in the area of the component overlap.
- In the case of repairs using partial replacement, the number of EMC screws described in the repair instructions must be fitted.

- Drill holes to a diameter of 4.2 mm and insert screws.
- Seal EMC screws with PU sealing material (risk of corrosion).

3. Procedure, steel body

- Install the number of EMC screws described in the repair instructions.
- Drill holes to a diameter of 4.2 mm and insert screws.
- Seal EMC screws with PU sealing material (risk of corrosion).

41 00 ... FRAME ALIGNMENT CONTROL DIMENSIONS, BODY

Dimensions in mm.

Measurement tolerances:

- < or = 1000 mm ± 1 mm
- < or = 1000 mm ± 2 mm

The control points shown serve to check the body and the straightening attachment.

Underbody view 1

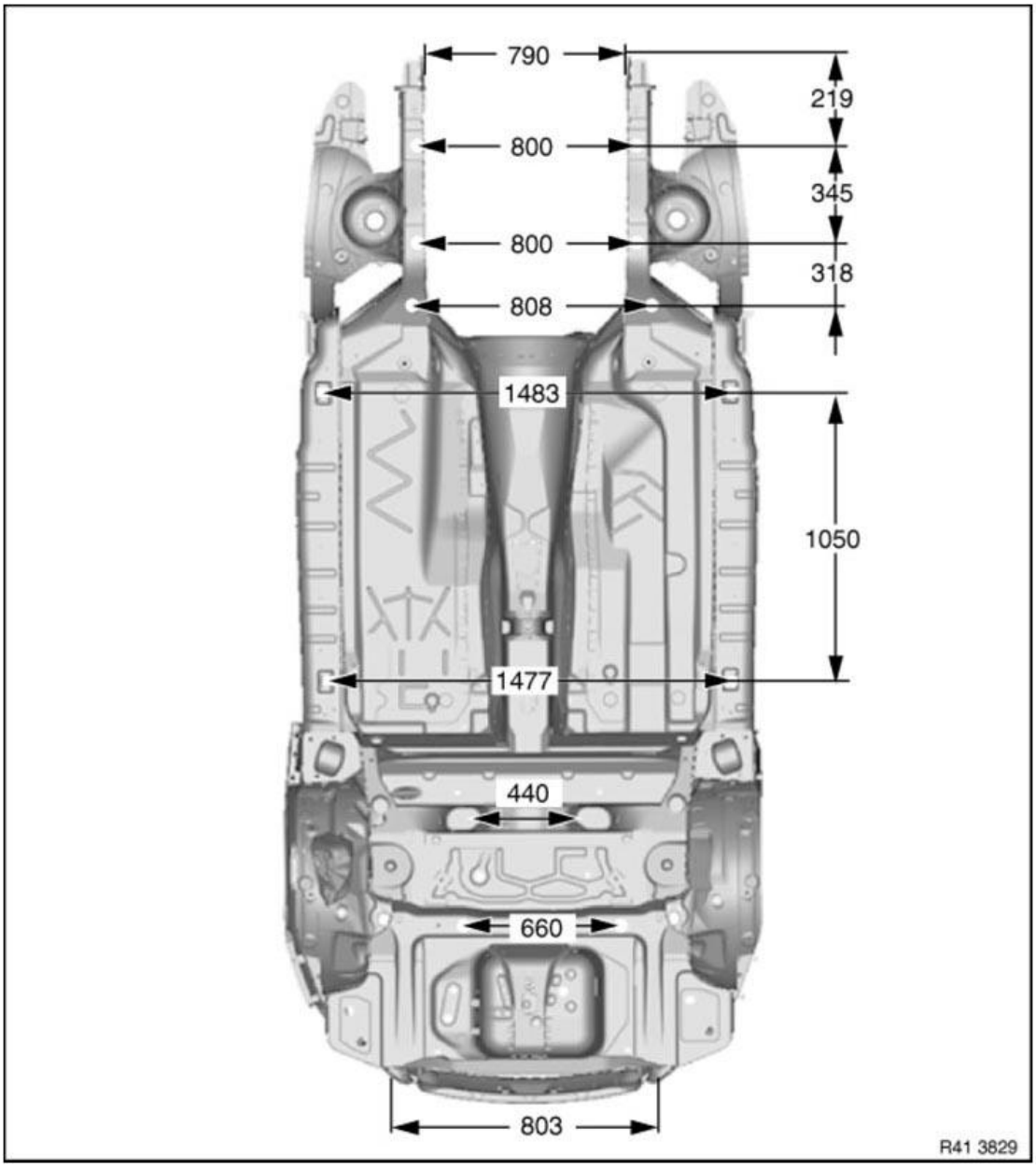


Fig. 7: Frame Alignment Control Dimensions - Underbody View 1
Courtesy of BMW OF NORTH AMERICA, INC.

Underbody view 2

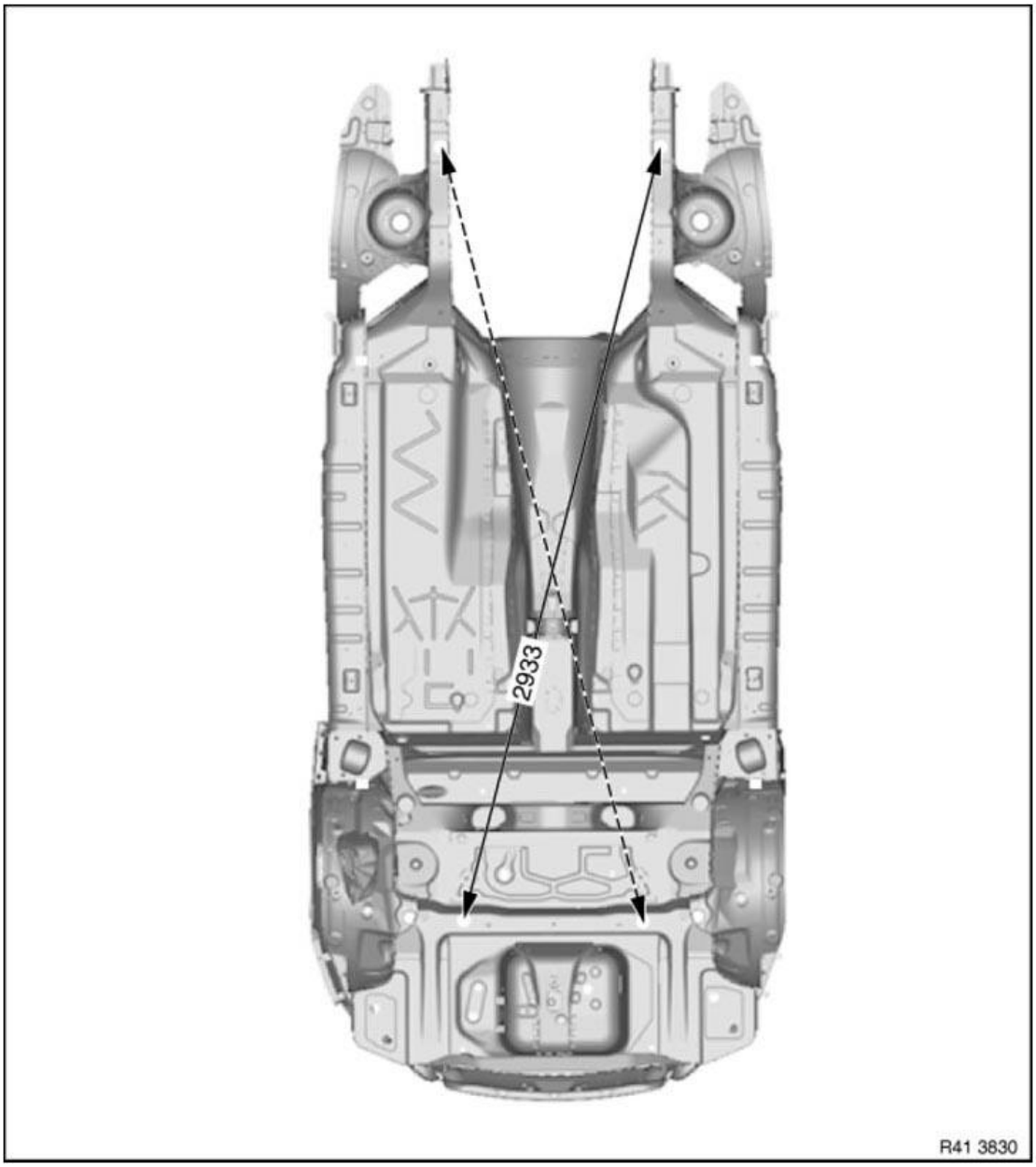


Fig. 8: Frame Alignment Control Dimensions - Underbody View 2
Courtesy of BMW OF NORTH AMERICA, INC.

Top view, front end

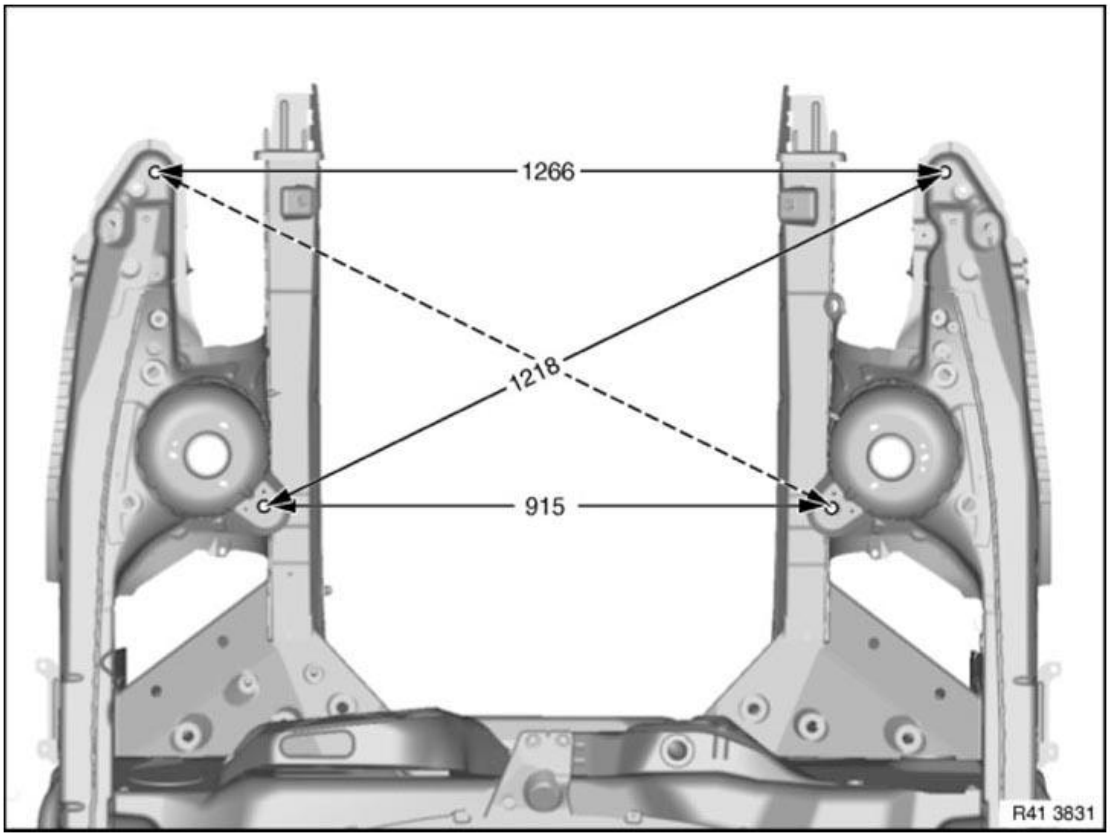


Fig. 9: Frame Alignment Control Dimensions - Top View (Front End)
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... GAP DIMENSIONS, BODY

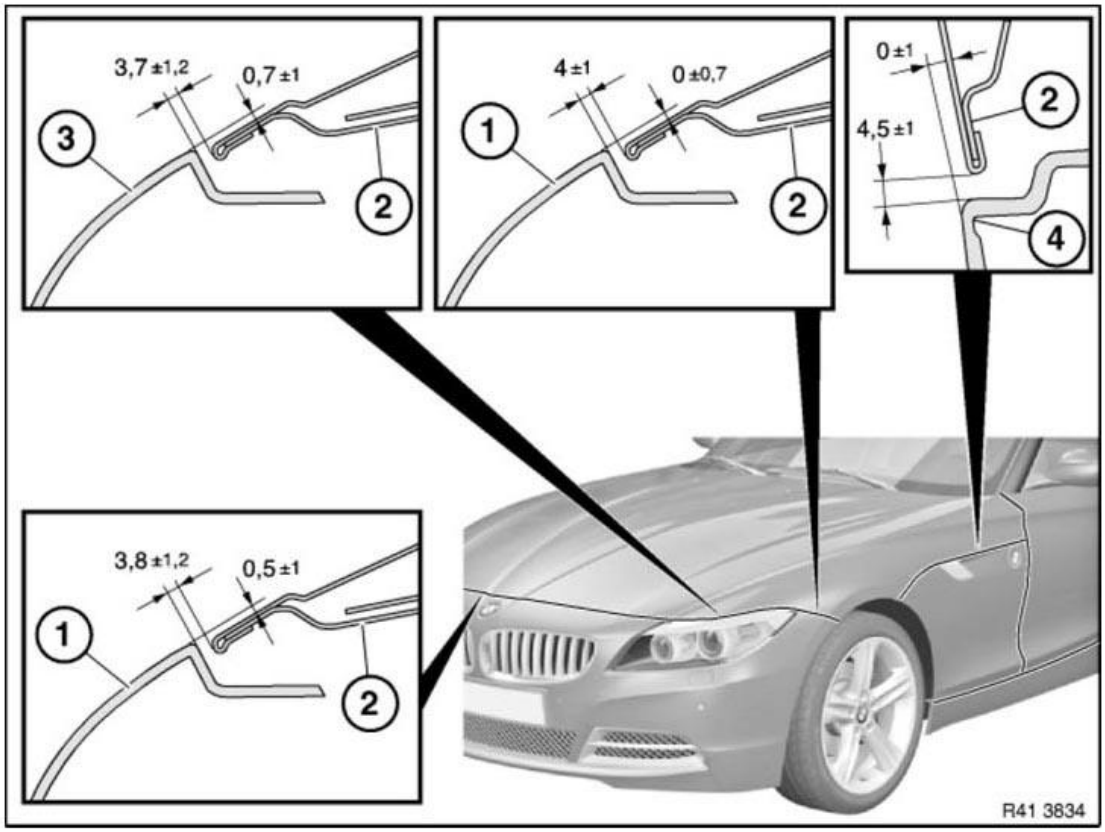
The dimensions specified in this document are applicable at an object temperature of 20 °C. The aim of adjustment is to achieve a uniform gap.

Symmetry of the gaps between left and right sides of the vehicle has top priority.

The door gaps must not deviate between the front and rear gap by more than 1.0 mm.

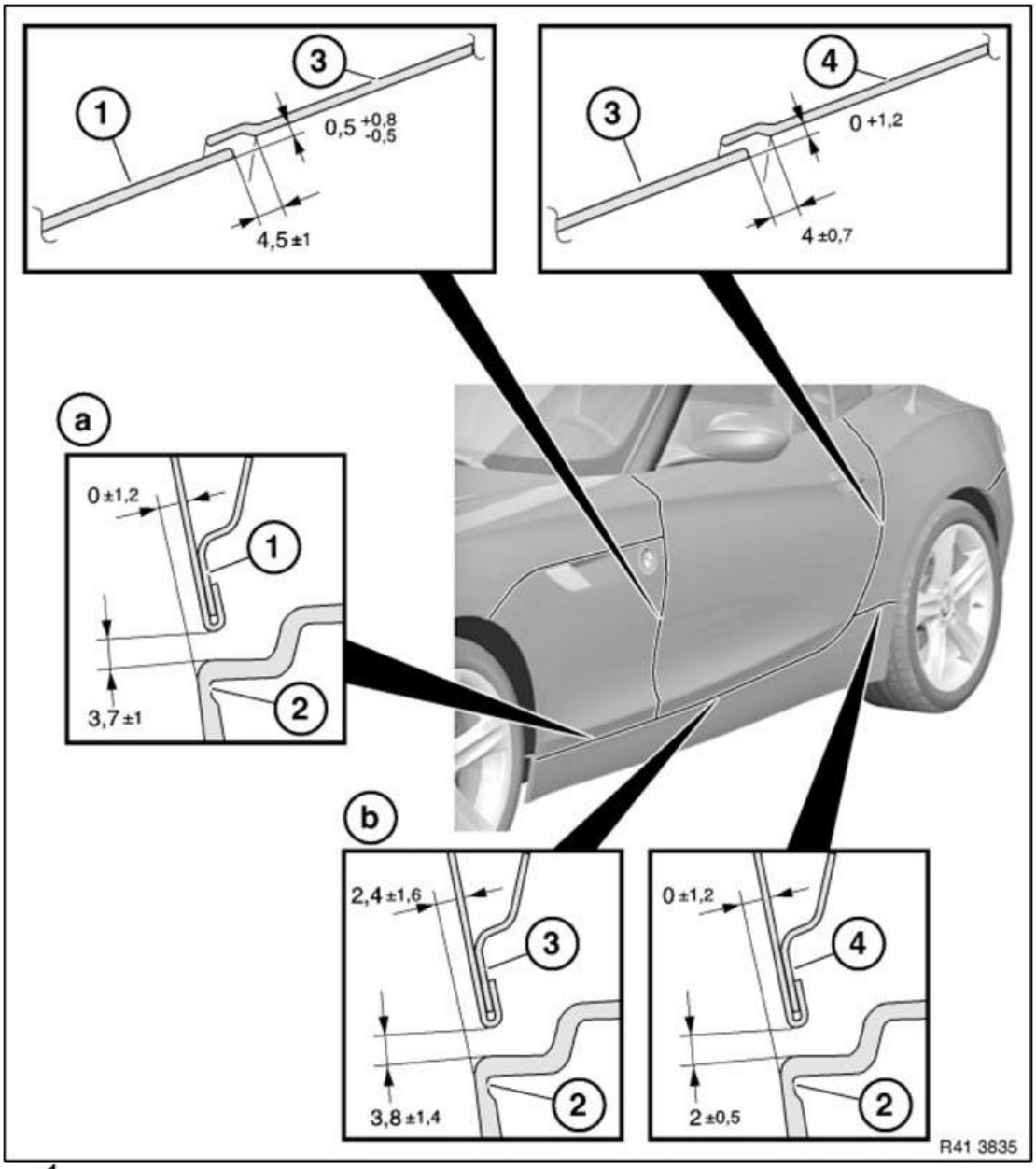
No gap dimension are specified for components which cannot be adjusted.

Dimensions in mm



1. Panel, bumper, front
2. Engine bonnet/hood
3. Headlight
4. Side wall, front

Fig. 10: Identifying Gap Dimensions Of Panel, Bumper, Engine Bonnet/Hood, Headlight And Side Wall
Courtesy of BMW OF NORTH AMERICA, INC.

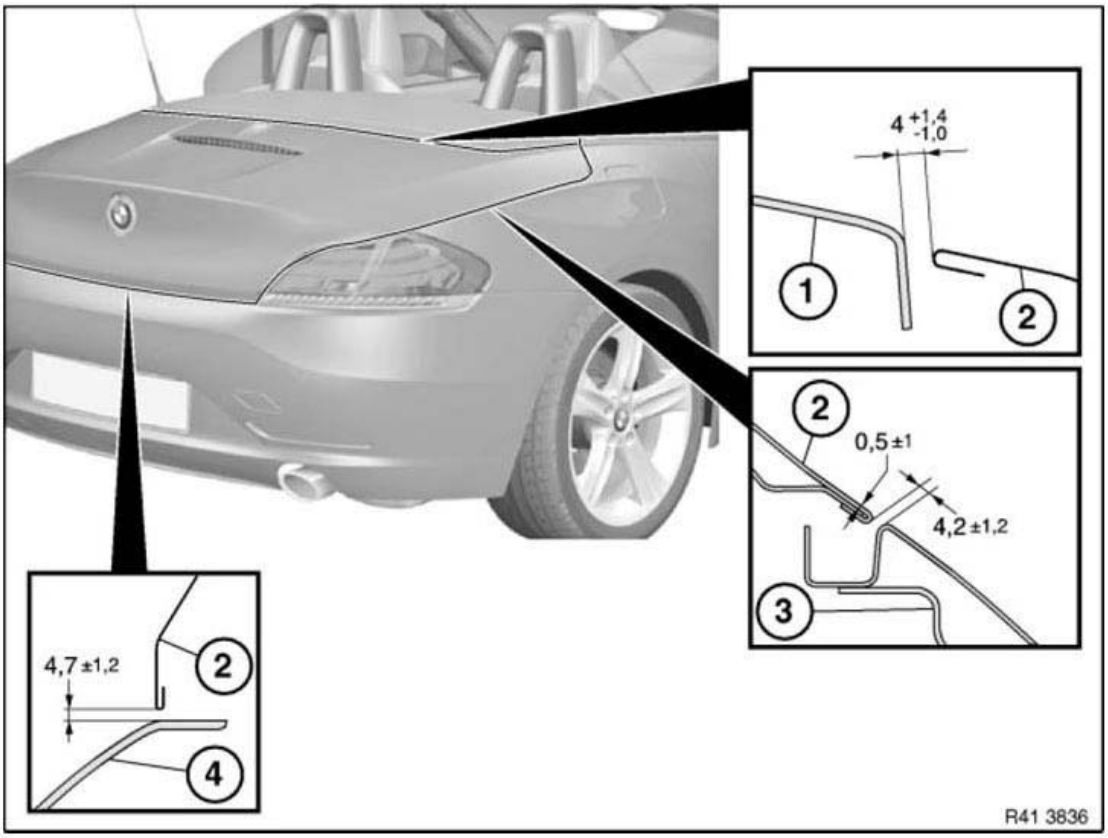


1. Side wall, front
2. Trim for side member cover
3. Front door:
4. Rear side panels

Fig. 11: Identifying Gap Dimensions Of Side Wall, Trim, Front Door And Rear Side Panels
Courtesy of BMW OF NORTH AMERICA, INC.

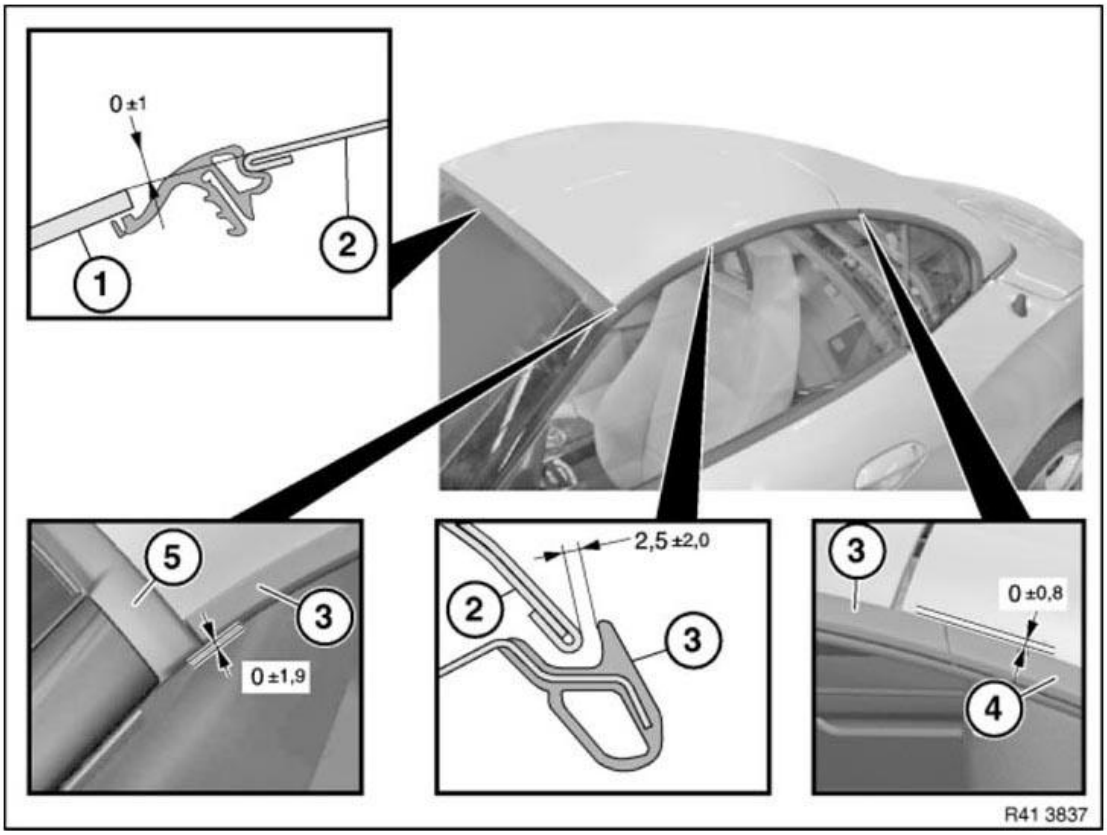
Dimension (a) is increased in the rearward direction to 2.7

Dimension (b) 5.0 is reduced from door centre in the rearward direction to 0±1.3



1. Trim strip, soft top compartment lid
2. Rear Lid
3. Rear side panels
4. Panel, bumper, rear

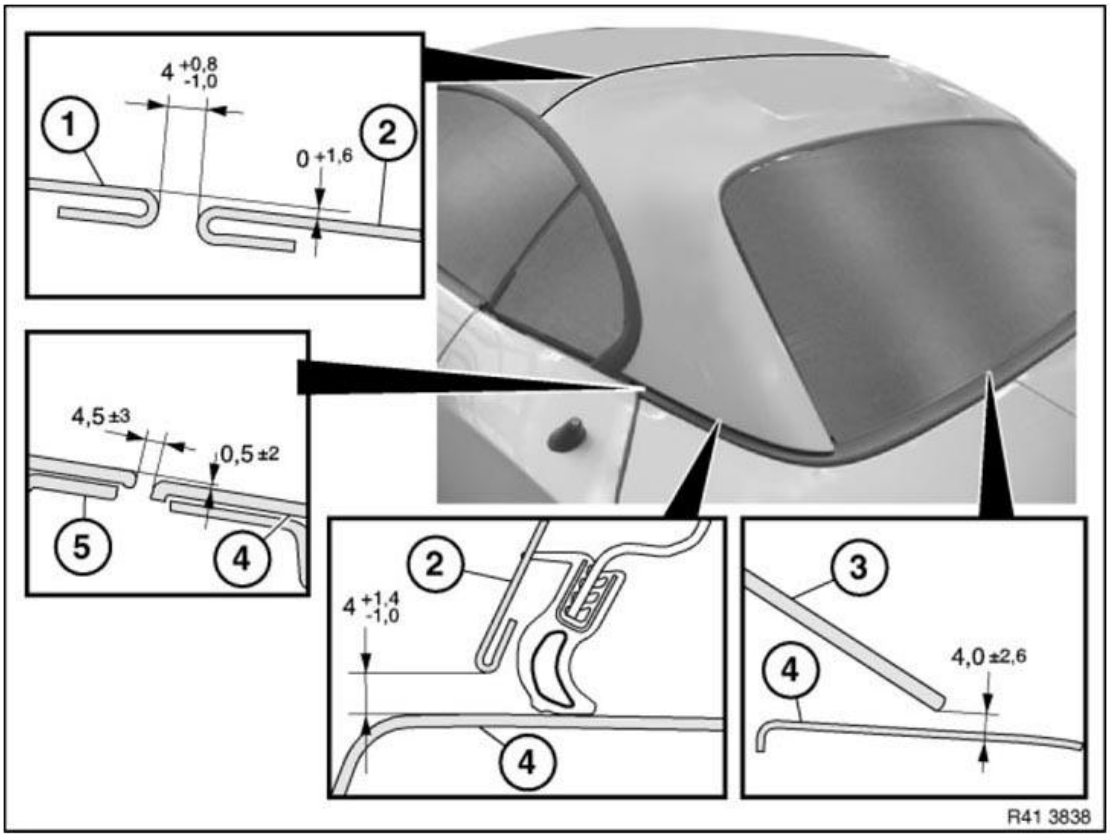
Fig. 12: Identifying Gap Dimensions Of Rear Lid, Panel, Bumper, Trim And Rear Side Panels
Courtesy of BMW OF NORTH AMERICA, INC.



1. Windscreen
2. Roof shell, front
3. Seal for front roof shell
4. Seal, roof shell, rear:
5. Seal, windscreen frame

Fig. 13: Identifying Gap Dimensions Of Windscreen, Roof Shell (Rear And Front), Seal And Windscreen Frame

Courtesy of BMW OF NORTH AMERICA, INC.



1. Roof shell, front
2. Roof shell, rear
3. Rear window
4. Trim strip, soft top compartment lid
5. Window cavity cover strip, rear

Fig. 14: Identifying Gap Dimensions Of Roof Shell (Rear And Front), Rear Window, Trim Strip And Window Cavity Cover Strip
Courtesy of BMW OF NORTH AMERICA, INC.

99 00 ... GENERAL INSTRUCTIONS ON PAINTING

General instructions and classification of paint stages are described on the KSD-CD (notes-general information on flat rate unit data, passenger car explanation for FR specifications for painting).

The marked area serves as the starting point for painting. This area may differ from the illustration for technical painting reasons.

Touching-up areas are taken into account.

41 00 ... GRINDING ALUMINIUM PARTS

1.0 Recommended tools and equipment

Grinding on the outer shell:

- To carry out grinding work by hand or machine, you must use the recommended tools and equipment.

  The work area can be cleaned with conventional extractor systems (low dust concentration).

Grinding work on the structure (except Z8):

- To carry out grinding work by hand or machine, you must use the recommended tools and equipment.

  The work area can be cleaned with conventional extractor systems (low dust concentration).

Z 8 Spaceframe structure:

- To carry out machine grinding on the structure, you must use the recommended device with grinding dust extractor facility.

  The work area must be cleaned with the recommended explosion-proof extractor system.

  High dust concentration, **explosion hazard!**

2.0 Grinding outer shell and structure

Do not use any abrasives (grinding wheels, paper, etc.) which contain iron (risk of corrosion).

Always replace abrasives which have already been used to treat steel (risk of corrosion).

Use stainless steel wire brushes only (risk of corrosion).

Reduce speed of grinding machines. Excessive speeds cause a smearing effect.

Do not use coarse abrasive grains (only =. 80).

Do not grind notches into the material (risk of cracking).

Do not grind the material thin.

41 00 ... GRINDING STEEL PARTS

1.0 Recommended tools and equipment

- Tools are recommended for manual grinding work.
- Machines/equipment are recommended for machine grinding work.

2.0 Grinding outer shell and structure

Always replace abrasives which have already been used to treat aluminum (risk of corrosion).

Do not grind the material thin.

41 00 ... GUN FOR CAVITY SEALING

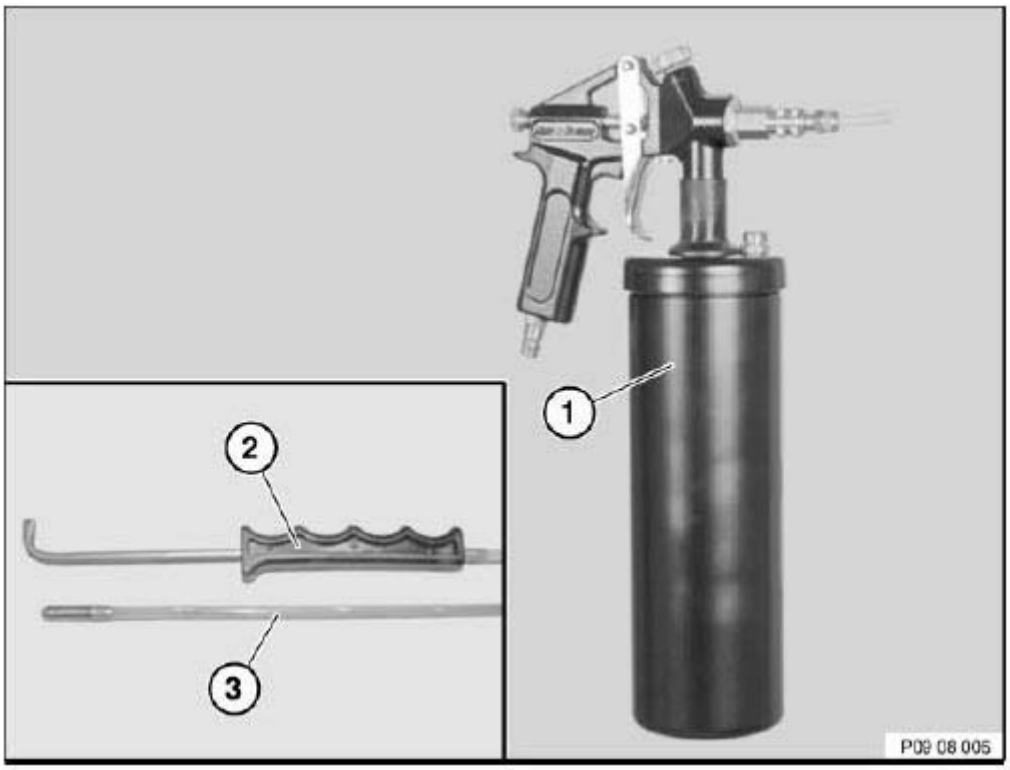


Fig. 15: Identifying Vessel Gun, Angle Nozzle And Round Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

1.0 Scope of delivery

- Owner's Handbook
- Pressure vessel gun (1) for cavity sealing
- Spray set, consisting of spray hoses: angle nozzle (2) and round spray nozzle (3)

IMPORTANT: Before start-up, read Owner's Handbook and safety instructions.

2.0 Start-up

- Open pressure vessel and introduce cavity sealant in form of a 1-litre can.

  Close pressure vessel.

- Connect spray hose to quick-connect coupling.
- Connect apparatus to compressed air supply.

Working pressure 2-6 bar, max. 8 bar!

3.0 Mode of operation

NOTE: Unlike previous apparatus, it is possible here to alter the spray pattern with the air flow control screw (large knurled screw)!

- Twisting the air flow control screw in decreases the air flow and thus reduces the material spray mist.

  This facilitates optimum working when preserving open components/surfaces.

- Twisting the air flow control screw out increases the air flow and thus the material spray mist (for closed cavities).
- The trigger lever has two stages.

  Stage 1 - discharge of air only.

  Stage 2 - discharge of air and material.

- After finishing work, press the first stage to clean the spray hose with compressed air.
- When storing, remember to twist the air flow control screw closed to prevent the material from drying out.
- Clean the gun prior to extended periods of non-use (approx. 2 weeks and upwards).
- To ensure that the spray hoses function properly, do not store the hoses coiled up e.g. in the frame side member area!

Store spray hoses stretched out.

4.0 Application examples

- Use the matching spray hoses for the different cavities or surfaces.
- Example - doors and lids:

  Spray hose with angle nozzle. Reduce air flow to keep spray mist to a minimum.

- Example - frame side member:

  Long spray hose with round spray nozzle. Depending on the type, increase the air flow slightly.

- Always keep the spray mist to a minimum so as to avoid fouling and bad smells.

5.0 Safety instructions

- Do not inhale spray mist.
- Use only in well ventilated rooms.

- Working pressure max. 8 bar.

41 00 ... HANDLING AIRBAGS AND RESTRAINT SYSTEMS

1.0 Airbags and restraint systems

- In the case of vehicles with airbags and restraint systems observe the relevant **SAFETY INSTRUCTIONS** .
- When straightening work is carried out on the body there is a risk of airbags being accidentally activated when the battery is connected.

  Because of this risk the battery negative lead must be disconnected prior to all repair work on the body.

41 00 ... HANDLING ELECTRICAL AND ELECTRONIC EQUIPMENT

1.0 Battery

- Explosion hazard in the vicinity of the battery during welding and grinding work. The battery must be removed.

2.0 Control units

- The following risks exist when the battery is connected:

- Damage to control units resulting from welding work on the body or a line short circuit.
- Accidental activation of airbags during straightening work on the body.

Because of these risks the battery negative lead must be disconnected prior to all repair work.

- Control units are designed for a temperature of 65 °C. The temperatures in a spray booth do not pose any problems. If a vehicle is in the spray booth at a displayed temperature of 80°C, the actual temperature of the vehicle is = 60 °C (object temperature).
- Protect control units against effects of heat >65 °C (e.g. during welding and drying work with an infrared radiator or hot air blower).

3.0 Electrical wires and wiring harnesses

- Protect electrical wires and wiring harnesses against damage (e.g. during straightening and grinding work).
- Protect electrical wires and wiring harnesses against effects of heat >65 °C (e.g. during welding and drying work with an infrared radiator or hot air blower).
- Do not kink electrical wires.

41 00 ... INFORMATION/WARNING LABELS

Missing or damaged information/warning labels (e.g. tyre inflation pressure) must be replaced.

--> Overview of **INSTALLATION LOCATIONS**

41 00 ... INFORMATION ON HAZARDS

1.0 Aluminium

HAZARDS INFORMATION CHART

Hazards/effects	Measures/regulations
Repair stage 1: (replacement of bolted components, dent removal) Repair stage 2: (repairs with bonding and riveting)	○ When a vehicle outer skin is ground, aluminium dust accumulates in small amounts. This dust can be removed with conventional exhaust extraction unit.
Repair stage 3: (repairs with welding) ○ Explosion hazard due to high concentration of fine aluminium dust. Arising e.g. during straight-through grinding of coated components in the base material and large-surface grinding of bright-finish components. ○ Explosion hazard due to swirling up of fine aluminium dust in cavities. Created by the necessary, thorough cleaning of machining surfaces and tools before and after machining aluminium.	○ Avoid high concentration of fine aluminium dust by means of continuous extraction. ○ Use explosion-proof exhaust extraction unit ○ Do not use compressed air when cleaning the workbay. ○ Avoid swirling up dust when cleaning the workbay.
○ Spontaneous combustion of fine aluminium dust when ignition and fire sources are drawn in. E.g.: hot swarf, grinding sparks, cigarettes, etc.	○ Do not operate ignition and fire sources in the intake area of exhaust extraction unit.

41 00 ... INFORMATION ON METAL FILLER

IMPORTANT: Note the following information before starting to apply metal filler!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on the packaging

Storage

Dry at 15°C to 25 °C.

Shelf life

The packaging is marked with a date.

Do not use the metal filler after this date.

Surface pre-treatment

Grind surface to a metallic bright-finish. The surface must be clean, dry and free from grease.

Clean the surface with a cleaning agent R1 and let it vent for 2-3 minutes.

Processing

The working temperature of the metal filler must be at least 18°C.

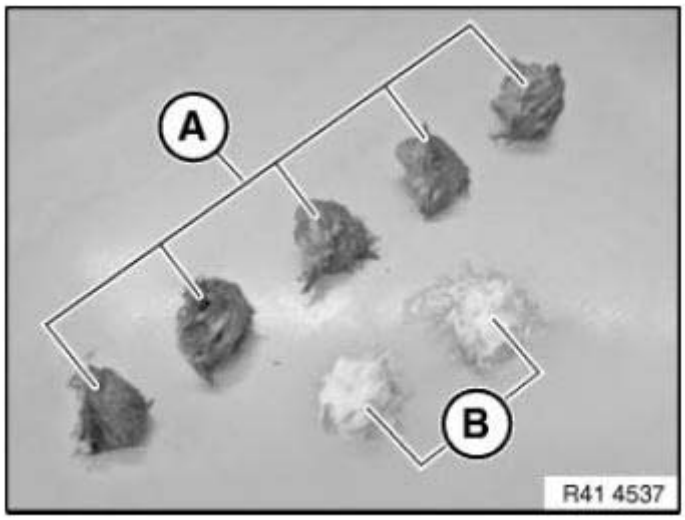


Fig. 16: Identifying Metal Filler And Hardener
Courtesy of BMW OF NORTH AMERICA, INC.

A = Metal filler

B = Hardener

NOTE: The mixture ratio refers to the volume.

Mix metal filler in mixture ratio of 5:2. Mix components thoroughly and free of pores.

IMPORTANT: Do not stir components. Danger of air pockets in metal filler!

Working life of the metal filler is approx. 45 minutes.

Applying filler

Apply pressure to apply a thin layer of metal filler. Carefully coat all edges in gaps with filler.

Then fill gap completely with filler. Apply filler with about 30% excess because the filler will significantly shrink during hardening. A second application of metal filler is not possible due to poor adhesion.

IMPORTANT: Use a narrow spatula to fill the gaps. Apply the filler in one draw if possible. Danger of formation of pores in gaps!

No restrictions related to the layer thickness.

Hardening time

The metal filler must be hardened using a short-wave infrared heater.

- 10 minutes at 50 °C - pre-hardening (avoid formation of bubbles/blisters and pores)
- 10 minutes at 75 °C - 1st stage hardening
- 10 minutes at 85 °C - 2nd stage hardening (avoid material shrinkage)

IMPORTANT: In the first 10 minutes, the temperature of 50°C may not be exceeded. In contrast, a temperature that is too low may be equalized by extending the time.

NOTE: When the heater is used for the first time, the distances that match the temperature must be determined.
Switch the heater on and change the distance until the surface temperature of the metal filler no longer changes for a period of 2 minutes. Measure the temperature with a temperature gauge. When optical temperature gauges are used (Epsilon value 0.92-0.95), the heater must be switched off briefly during the measurement. Record the measurement

Post-processing

WARNING: When grinding, wear a fine dust mask with particulate filter P2-P3!

After cooling, the metal filler can be machined.

Pores and faulty spots that become visible after grinding the surface must be closed with polyester filler (BMW Colour system).

Special procedure for pores:

Use a Ø4.2mm drill. Turn the drill by hand to expand the pores in v shape. by t

Fill cavities with polyester filler.

Paintwork

Perform paintwork according to the specifications in the painting handbook.

Metal filler disposal

Hardened metal filler is disposed of as normal waste.

Empty packaging is disposed of as normal waste.

Non-hardened metal filler and mixtures of metal filler with solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

32 00 ... INFORMATION ON REPLACING STEERING GEAR AFTER ACCIDENT DAMAGE

Situation

In the event of accidents or driving conditions similar to accidents, shocklike loads can cause different types of damage to steering gears. When a steering gear is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering gear and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure

The steering gear must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering gear
    - Version with electric steering gear (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.
B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic/electrical assistance)
C. Permissible tolerances exceeded during axle/wheel alignment (include alignment record with invoice/report if necessary)
D. Fire damage
E. Damage, permanent deformation or fractures to:
    - Wheel rims in the event of a negative result from the wheel/axle alignment check

- Spring struts, steering knuckles, wheel carriers
- Control arms
- struts or diagonal members or stabilisers with this function
- Body-side screwing/bolting points for wheel guide/control components
- Front axle support
- Pitman arms
- Tie rods
- Steering gear fixtures
- Steering Column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE: If the steering gear replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

IMPORTANT: The vehicle's type approval will be invalidated whenever the function of any of its safety components is compromised!

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**

- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!
First Aid:

- **If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.**
- **In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.**
- **If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.**
- **After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.**

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

41 00 ... INFORMATION ON VEHICLE PROTECTION

- Vehicle parts located in the repair zone or threatened by heat, sparks or dust, must be removed or covered. For suitable covering material

IMPORTANT: Do not use flammable or dirty material for covering.

41 00 ... INSTALLATION SOLUTION FOR STRAIGHT SHANK/HEXAGON RIVET NUT

Protection measures!

- Wear safety goggles
- Wear protective gloves

Hexagon/straight shank rivet nut (up to thread 8) with hand rivet gun ZS308

IMPORTANT: Risk of damage!
Failure to comply with these instructions may result in the drill bit slipping and causing significant paintwork damage.

1. Mark position of bore and then punch-mark component

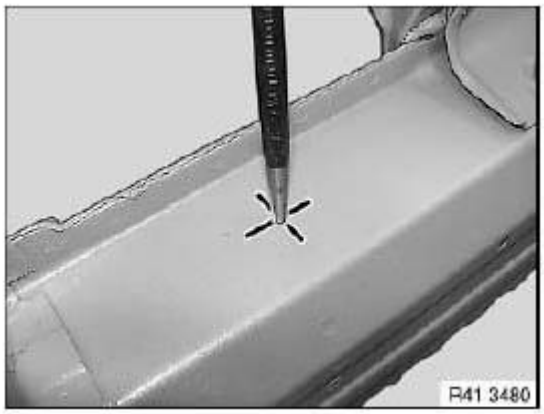


Fig. 17: Marking Bore Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the determined drill bit diameter is not observed:

- **the knurling on the straight shank rivet nut is rendered useless**
- **the component will be damaged when the straight shank rivet nut is inserted**

Determining suitable drill bit:

Depending on the rivet nut shank diameter, the next drill bit diameter higher (5/10 step) can be used.

E.g. with a shank diameter of 10.1 mm, the 10.5 mm drill bit can be used. The 11.0 mm drill bit must not be used.

2. Drill bore with determined drill bit and deburr, pilot-drill with a smaller drill bit if necessary

Fig. 18: Drilling Bore Using Drill Bit
Courtesy of BMW OF NORTH AMERICA, INC.

3. Clean component, eliminate paintwork damage if necessary

Fig. 19: Identifying Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid corrosion, stop chips/swarf by means of cavity sealing.

Follow INSTRUCTIONS ON CORROSION PROTECTION .

4. Preserving cavity

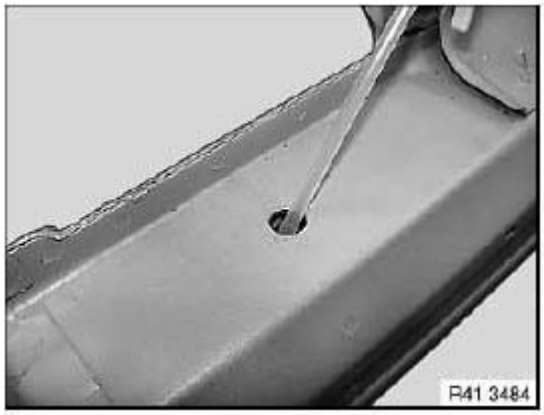


Fig. 20: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow manufacturer's operating instructions.
Make sure straight shank rivet nut correctly contacts component.

5Set rivet nut with hand rivet gun

NOTE: According to the manufacturer, the pictured tool is suitable up to an M8 thread.

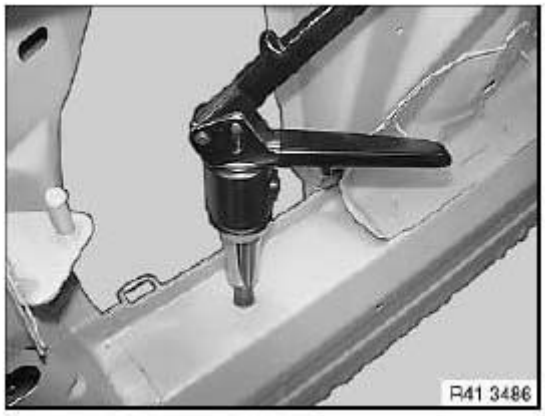


Fig. 21: Setting Rivet Using With Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

Hexagon/straight shank rivet nut (up to thread M12) with hand rivet gun MB512

IMPORTANT: Follow manufacturer's operating instructions.
Make sure hexagon rivet nut correctly contacts component.

Set rivet nut with hand rivet gun

NOTE: According to the manufacturer, the pictured tool is suitable up to an M12

thread.

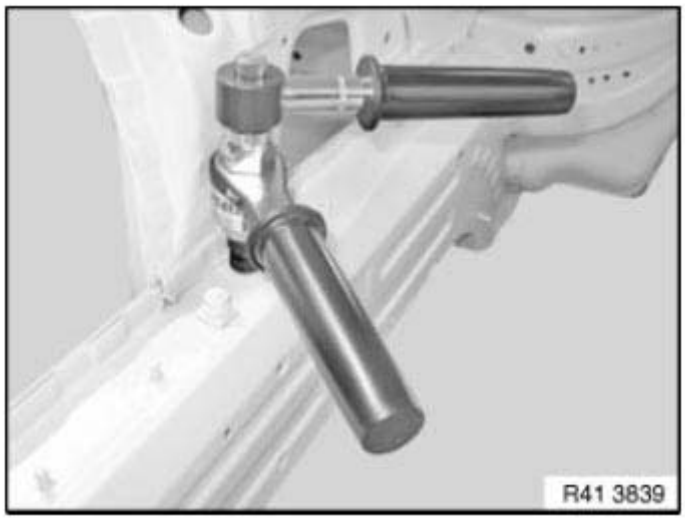


Fig. 22: Setting Rivet Nut With Hand Rivet Gun (MB512)
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)

NOTE: Carry over schematic representation to the relevant vehicle type.

The following repair represents the procedure for an already expanded cavity bulkhead.

The cavity bulkhead remains on the body in this instance.

Before these work steps, prepare the new part so that it is ready to install (adapting, cutting to size, applying welding primer etc.).

Clean contact surface (1) with cleaning agent R2.

Apply a bead (2) approx. 15 mm high of **SEALANT D1** to contact surface (1).

In order to avoid run off of the sealant when bonding to a vertical surface, a thin coat of sealant on both sides of the surface may be necessary.

Fit, secure and weld up new part.

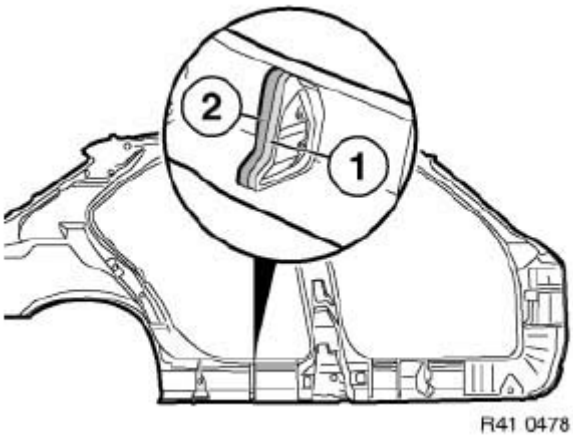


Fig. 23: Identifying Contact Surface Sealant Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Ensure adequate ventilation over entire processing period.

41 00 ... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)

NOTE: Carry over schematic representation to the relevant vehicle type.

The following repair represents replacement of a cavity bulkhead.

Before these work steps, prepare the new part so that it is ready to install (adapting, cutting to size, applying welding primer etc.).

Sand contact surface of cavity acoustic baffle (1) with coarse-grained sandpaper (grain 50-100).

Clean contact surface (1) with cleaning agent R2.

Apply a bead approx. 15 mm high of **SEALANT D1** to contact surface (1).

If necessary apply sealant D1 somewhat thinner on each side, to prevent the sealant from running.

Attach cavity bulkhead in specified position (see old part).

Fit, secure and weld up new part.

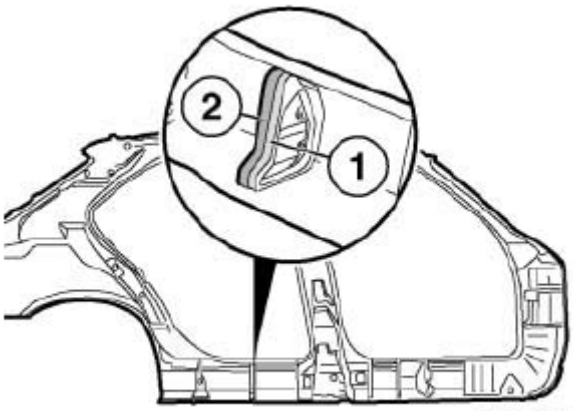


Fig. 24: Identifying Contact Surface Sealant Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Ensure adequate ventilation over entire processing period.

41 00 ... MATERIALS SCIENCE

1. Aluminum

1.2 Material influences

MATERIAL INFLUENCES

Causes	Effects/remedies
A galvanic element is created under the effects of moisture by contact with materials such as copper, tin, nickel, iron and zinc.	This plating process causes aluminium to be removed from the joint.
	This results in surface corrosion or pitting.
	New parts and accessory parts which have been approved by the BMW Group for aluminum (screws, washers, nuts etc.) have undergone special surface treatment.
	Such parts must not be replaced by conventional parts.
	NOTE: **Damaged parts lose this protection and must be specially coated or replaced.** **Damage caused by contact corrosion is excluded from the warranty.**
Materials also used for work on steel components can implant steel particles in the softer surface of an aluminium component.	Surface corrosion or pitting occurs. A separate tool kit is available for processing/machining aluminum.
Surfaces are attacked when fluxing agents are used.	Soldering is not permitted for joining aluminum

	components.
	Risk of corrosion from chemical factors.
Aluminum/steel grinding dust from adjoining work areas.	This results in surface corrosion.
	Erection of protective barriers.

1.3 Machining properties

MACHINING PROPERTIES

Properties of aluminum compared with steel	**Effects**
Aluminum parts are magnetically neutral.	Attachment with magnetic tools/working aids is not possible.
Elasticity is only 1/3 as high.	Convertibility is limited in comparison with steel.
Elongation failure is approx. 50% slighter.	Overstretching the material results in strain-hardening and an increased tendency of cracking.
Electrical conductivity is almost 4 times higher.	Electric welding procedures require different equipment (MIG welding).
Material expansion during heating is twice as high.	The material expands more markedly. Shorter heat treatment is necessary for removing dents.
Thermal conductivity is 3 times higher.	Heat is drained more quickly. Adjoining working areas are affected more heavily e.g. during welding.
Microstructural change between 200°C and 250°C.	Elongation characteristics and thus plasticity are improved.
	Strength is reduced. **IMPORTANT:** **No heat treatment when working on the vehicle structure! Temperature cannot be monitored to sufficiently exact levels in garages.**
Aluminum shows no annealing colors.	The melting point is 650°C. Once the melting temperature has been reached, the material begins to flow without any further indications.
	The temperature can only be estimated by means of the paint coloring and the surface warpage. **IMPORTANT:** **Do not use thermal applicators. Not suitable for garage use because the paint runs too quickly.**

1.4 Mounting

ALUMINUM SPECIAL FEATURES

Characteristic features of aluminum	**Special measures**
Corrosion (ageing) in damp environments.	Store aluminum parts in a dry place.

Contact corrosion in event of contact e.g. with steel parts.	Always store aluminum parts separately or in isolation from steel parts.
Susceptibility to paint infiltration.	Do not damage protective surface layer since this would cause oxidation.
	Failure to comply with this requirement would result in more painting work.

41 00 ... NOTES ON ADHESIVE K1

IMPORTANT: Note the following information before starting to apply adhesive!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on glue cartridge

Storage

Dry at 15°- 25 °C.

Shelf life

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment

The **PRE-TREATMENT** depends on the material to be bonded and its coating.

Required cartridge gun

Overview of glue cartridge guns

Do not use any compressed-air-operated cartridge guns.

Preparing the glue cartridge

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 20°C.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Approx. Allow approx. 10 cm of mixed adhesive to emerge and then apply the mixed adhesive first on one side of the bonding surface.

Pot life of mixed adhesive approx. 2 hours. A change of mixer is only necessary if over a period of 1 hour no material has flowed through the mixer.

Adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.

Hardened adhesive can only be removed mechanically.

Hardening time

Do not move the vehicle before the adhesive has hardened.

Check the degree of hardness of the adhesive with a fingernail.

If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).

Vehicle **strength for driving applications** is achieved after:

48 hours at min. 15 °C object temperature (corresponding to approx. 18 °C room temperature).

or 1 hour in the spray booth (spray booth temperature 80 °C/object temperature 60 °C).

When using radiant heaters, make sure that the object temperature does not exceed 85 °C. Excessively high temperatures will destroy the adhesive.

Disposal of adhesive

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00 ... NOTES ON ADHESIVE K2

IMPORTANT: Note the following information before starting to apply adhesive!

- Country-specific safety and industrial safety regulations
- Material safety data sheet of manufacturer
- Processing instructions on glue cartridge

Storage

Dry at 15°-25 °C.

Shelf life

The glue cartridge is marked with a date.

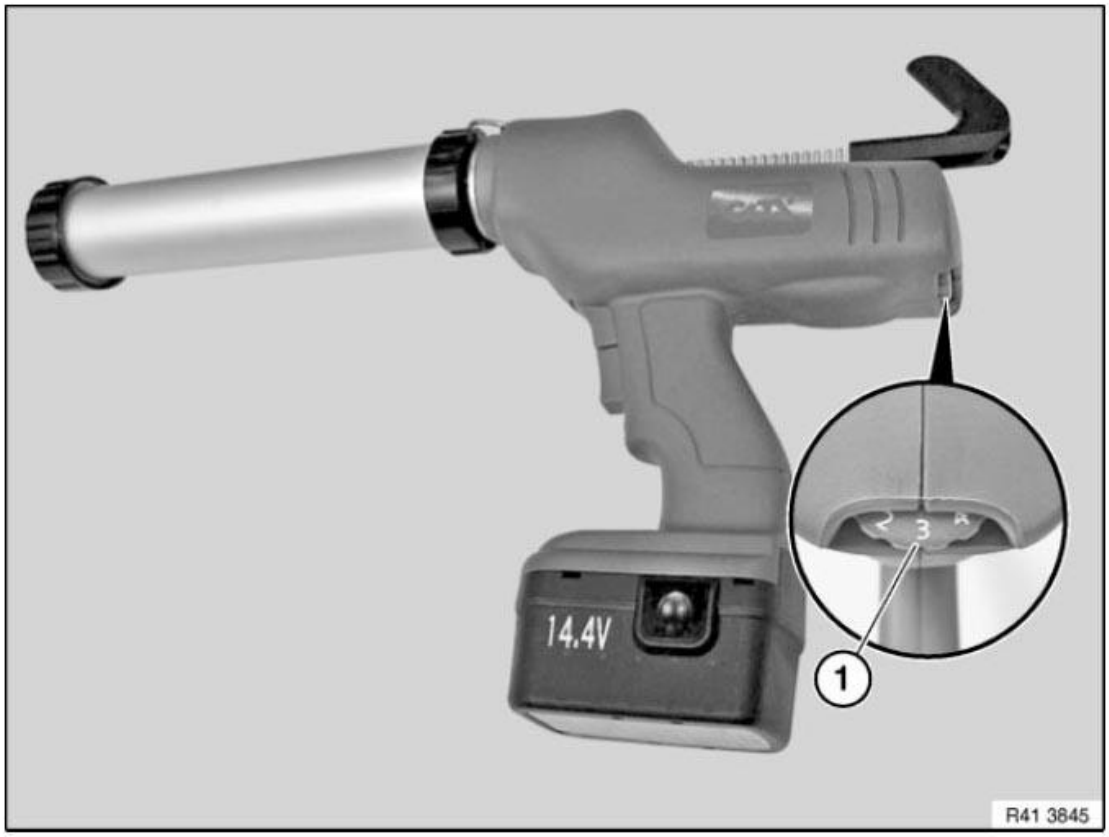
Do not use the adhesive after this date.

Surface pre-treatment

See vehicle-specific repair instructions

Required cartridge gun

CARTRIDGE GUN 81 43 2 159 881/883



1. Speed control

Fig. 25: Identifying Cartridge Gun With Speed Control
Courtesy of BMW OF NORTH AMERICA, INC.

1. Speed control

IMPORTANT: Set speed control (1) to interval stage 3 to prevent overloading the cartridge gun.

Preparing the glue cartridge

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 20°C.

Working life of adhesive is approx. 20 minutes.

IMPORTANT: At working temperatures above 30°C, the working life of the adhesive is reduced to 10 minutes!

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Approx. Allow approx. 10 cm of mixed adhesive to emerge and then apply the mixed adhesive first on one side of the bonding surface.

Adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.

Hardened adhesive can only be removed mechanically.

Hardening time

See vehicle-specific repair instructions

Disposal of adhesive

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00 ... NOTES ON ADHESIVE K3

IMPORTANT: Note the following information before starting to apply adhesive!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on glue cartridge**

Storage

Dry at 15°- 25 °C.

Shelf life

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment

See vehicle-specific repair instructions

Required cartridge gun

Overview of glue cartridge guns

Preparing the glue cartridge

Do not prepare the glue cartridge until just before applying the adhesive.

The working temperature of glue cartridge must be at least 18°C.

Pot life of adhesive is approx. 10 minutes at 25 °C.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. 1 mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

Opened cartridges may be used again before the expiry date as long as a new mixing tube is used.

2-component adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

Hardening time

See vehicle-specific repair instructions

Adhesive disposal

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00 ... NOTES ON ADHESIVE K4

IMPORTANT: Note the following information before starting to apply adhesive!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on glue cartridge**

Storage

Dry at 15°- 25 °C.

Shelf life

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment

See vehicle-specific repair instructions

Required cartridge gun

Overview of glue cartridge guns

Preparing the glue cartridge

Do not prepare the glue cartridge until just before applying the adhesive.

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

The working temperature of glue cartridge must be at least 18°C.

Working life of adhesive is approx. 10 minutes.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. one half mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

2-component adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

Hardening time

The bonded connection will be resistant after 30 minutes.

Disposal of adhesive

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00 ... NOTES ON ADHESIVE K5

IMPORTANT: Note the following information before starting to apply adhesive!

- **Country-specific safety and industrial safety regulations**
- **Material safety data sheet of manufacturer**
- **Processing instructions on glue cartridge**

Storage

Dry at 15°- 32 °C.

Shelf life

The glue cartridge is marked with a date.

Do not use the adhesive after this date.

Surface pre-treatment

See vehicle-specific repair instructions

Required cartridge gun

Overview of glue cartridge guns

Preparing the glue cartridge

The working temperature of glue cartridge must be at least 20°C.

Opened glue cartridges may be used again before the expiry date as long as a new mixing tube is used.

Insert glue cartridge into cartridge gun, remove cap and allow both adhesive components to emerge. Strip adhesive components uniformly and attach mixing tube. Only use mixing tubes supplied with glue cartridge.

Before starting to apply adhesive, allow approx. 1 mixing tube length of mixed adhesive to emerge. Only then apply the mixed adhesive to one side of the bonding surface.

Pot life of adhesive is approx. 60 minutes at 23°C.

Adhesive application

Read the vehicle-specific repair instructions to determine the thickness and positioning of the adhesive bead.

After applying the adhesive, check whether an adhesive component has emerged at the back of the glue cartridge. If yes, break off the bonding procedure. Clean new part. Use new glue cartridge. Contact national hotline.

Remove contamination caused by adhesive residue immediately.

Hardened adhesive can only be removed mechanically.

Hardening time

Do not move the vehicle before the adhesive has hardened.

Check the degree of hardness of the adhesive with a fingernail.

If the adhesive cannot be pressed in any further with a fingernail, the vehicle may be moved (without engine force) for further processing applications (e.g. painting).

The procedure may be accelerated by using a radiant heater. Let the adhesive harden for 30 minutes at 85°C. The component can then be processed in the joint areas.

Vehicle **strength for driving applications** is achieved after:

24 hours at a minimum object temperature of 23°C.

or 1 hour in the spray booth (spray booth temperature 80 °C/object temperature 60 °C).

When using radiant heaters, make sure that the object temperature does not exceed 85 °C. Excessively high temperatures will destroy the adhesive.

Disposal of adhesive

Hardened adhesive is disposed of as normal waste.

Empty glue cartridges are disposed of as normal waste.

Non-hardened adhesives and mixtures of adhesive and solvent and the like must be disposed of as hazardous waste.

These regulations apply to the Federal Republic of Germany.

For other countries, comply with the (possibly differing) nationally applicable regulations.

41 00 ... NOTES ON CLEANING AGENT R1

Use only cleaning agent R1, as other cleaning agents cab be emollient/moistening or may start to dissolve the cathodic dip paint primer.

41 00 ... NOTES ON REPAIRING THREADS

IMPORTANT: Install Helicoil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads may be repaired with Helicoil thread inserts. Comply with the PROCEDURE described in the example.

REPAIRING THREADS REFERENCE CHART

Screw connection	Vehicle	Bolting point (s)	Helicoil thread insert
Front axle support to engine support	E46	All	M12x1.5x18
	E53	All	M12x1.5x18
	E60, E61, E63, E64	Front, middle	See repair elements
		Rear	M12x1.5x18
	E65, E66, E67	All	M12x1.5x18
	E70, E71, E72	All	M14x1.5x21
	E83	All	M12x1.5x18
	E85, E84, E86, E89	All	M12x1.5x18
	E81, E82, E87, E88	All	M12x1.5x18
	E90, E91, E92, E93	All	M12x1.5x18
	E92 with S65	All	M10x1.5x15
Bracket, wishbone, to engine support	E46, E85, E86, E89	All	M10x1.5x15
Rear axle support to side member	E46	All	M12x1.5x18
	E53	All	M14x1.5x21
	E60, E61	All	M14x1.5x21
	E63, E64	All	M14x1.5x21
	E65, E66, E67	All	M14x1.5x21
	E70, E71, E72	All	M14x1.5x21
	E83	All	M12x1.5x18
	E84, E85, E86, E89	All	M12x1.5x18
	E81, E82, E87, E88	All	M12x1.5x18
	E90, E91, E92, E93	All	M12x1.5x18
Bearing support, trailing arm to side member	E46, E83, E85, E86, E89	All	M12x1.5x18

41 00 ... OPENING ADHESIVE BONDS

1. Opening spot-weld bonds

OPEN WELD SPOTS .

WARNING: Extract vapours and gases.
Use personal protective clothing/equipment.

Heat connecting flange with a hot-air blower. Heat components to max. 250 °C object temperature.

Release connection flange with chisel.

Remove adhesive residue from connecting flange.

2. Opening adhesive bonds

If necessary, open existing **PUNCH OR BLIND RIVETS** .

Roughly cut out damaged component.

WARNING: Extract vapours and gases.
Use personal protective clothing/equipment.

Heat adhesive flange with a hot-air blower. Heat components to max. 250 °C object temperature.

The component can be peeled with the aid of pliers. Do not damage adjacent components.

Remove adhesive residue from connecting flange.

3. Opening adhesive bonds on aluminium roofs

Procedure is described in detailed in the relevant repair instructions.

4. Opening adhesive bonds on carbon-fibre-reinforced plastic parts

Procedure is described in detailed in the relevant repair instructions.

41 00 ... OPENING BRAZED JOINTS

The "Bonding and Riveting" repair method involves replacing the watertight brazed joint with adhesive.

This gives rise to a new procedure for opening brazed joints.

Grind brazed seam with a belt grinder. This keeps the influence of heat in the area around the brazed seam as small as possible.

IMPORTANT: Never use a gas flame.

All traces of brazing solder do not have to be removed.

Do not grind body panels thin.

41 00 ... OPENING RIVETED JOINTS

Different rivet types are used on BMW vehicles.

1. Opening blind rivets

1.1 Opening blind rivets (N1 and N2)

Grind off blind rivet head with a belt or angle grinder. Do not grind off base material. Remove rivet remnants with a drift punch.

1.2 Opening blind rivets (N3 and N6)

Drill out blind rivet head with a 5 mm dia. drill bit. Do not damage base material. Remove rivet remnants with a drift punch.

2. Opening punch rivets

2.1 Opening punch rivets by extraction

This procedure is used on the reduced-weight aluminium front end.

Recommended tools and equipment:

- Stud welding apparatus with gas bottle containing inert gas (82 % argon, 18 % CO 2).
- Stainless steel stud
- Universal riveting tool

Grind off paint and dark grey coating of punch rivets.

Position bolt centrally on the rivet and weld on vertically. The area in which the bolts are welded on should be between the two grounding terminals. Position both terminals, if possible, on the top side of the metal plate on which the rivet is located.

Extract bolt with welded-on rivet using universal riveting tool. Use a large plastic nose piece if not otherwise specified in the repair instructions. Check plastic nose piece prior to use for wear.

Plastic nose piece must rest on sheet metal all round; if necessary, grind off plastic noise piece in collision area.

Do not push riveting tool forcefully onto special-steel bolts.

Do not use riveting tool to bend special-steel bolts.

Pay particular attention to central positioning of the bolt when using the small plastic mouthpiece.

Follow the equipment manufacturer's instructions for use.

2.2 Opening punch rivets by drilling out

Drill out rivets with a 6 mm dia. carbide drill bit.

Punch rivets can be drilled out on both sides. When drilling from the protruding rear side, spot-drill the rivet shank only and remove the rest with a rivet punch.

Use a drift punch to remove punch rivet remnants in the aluminium (risk of corrosion).

Clean vehicle to remove chips (risk of corrosion).

41 00 ... OPENING WELD JOINTS

1. Opening weld spots (resistance pressure spot welding)

Sheet steel panels made from high- and super-high-strength materials make great demands on the tools used.

Only with special carbide milling cutters can weld spots be drilled out on these sheet panels.

Use BTR/BOR milling cutters only in conjunction with Vario Drill spot-weld remover. Sourcing reference for spot-weld remover and BTR/BOR milling cutters

- **Procedure:**

  If necessary, surface-grind existing unevenness with a belt or angle grinder in the area around the weld spot.

  Set punch mark in centre of weld spot. Set 8 mm dia. weld spot drill bit on punch mark and drill through top metal sheet.

  NOTE: Because the weld spots may have surface-hardened, grind them if necessary with an angle grinder and paper grinding disk.

  Use a chisel to separate the sheet metal flange and remove the component.

  Follow the special procedure for **SPOT WELDS** .

2. Opening MAG weld seams and MIG brazing seams

- **Procedure:**

  Grind off weld seams with a belt or angle grinder. Do not grind the base material thin.

Use a chisel to separate the sheet metal flange and remove the component.

3. Opening laser weld seams

Laser weld seams are used in the roof outer skin area.

- **Procedure:**

  Roughly cut roof outer skin in the roof channel to improve accessibility.

  Place angle grinder with grinding disc on laser weld seam and grind through top metal sheet. Be careful not to cut through and damage sheet metal underneath.

  Remove sheet metal flange.

41 00 ... OVERVIEW OF ADHESIVE CARTRIDGE GUNS

Adhesive gun 83 19 2 149 522

Obtainable via Electronic Parts Catalogue.

Usable for adhesives K4, K5a.

Including insert 1:1 and 2:1.

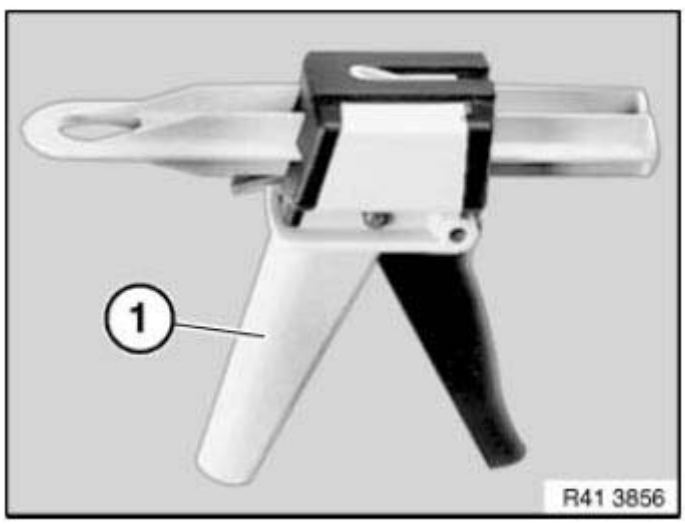


Fig. 26: Identifying Adhesive Gun (83 19 2 149 522)
Courtesy of BMW OF NORTH AMERICA, INC.

Adhesive gun 81 49 0 443 166

Usable for adhesive K3.

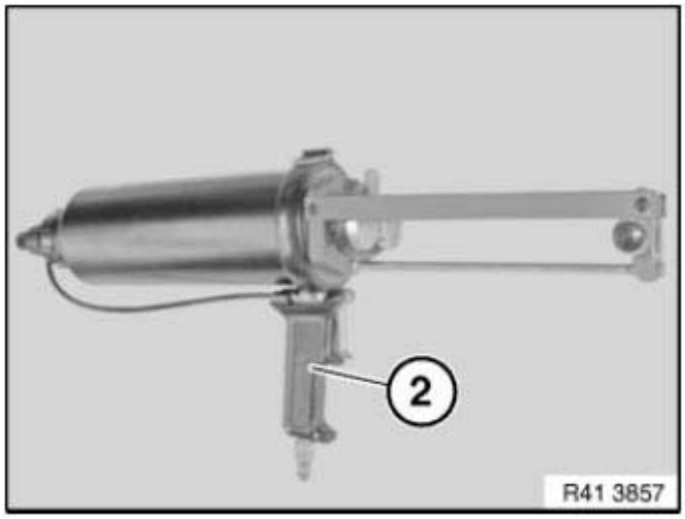


Fig. 27: Identifying Adhesive Gun (81 49 0 443 166)
Courtesy of BMW OF NORTH AMERICA, INC.

Adhesive cartridge gun 81 49 2 159 881/883

Usable for adhesives K1, K2, K5b, sealant D1 and window glass adhesive.

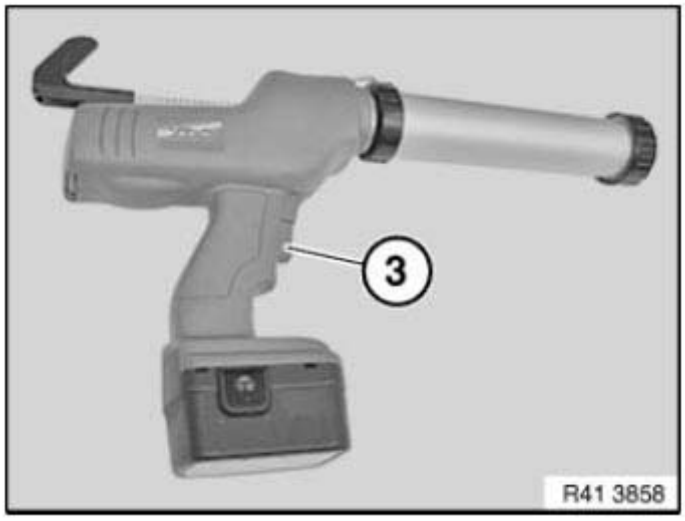


Fig. 28: Identifying Adhesive Cartridge Gun (81 49 2 159 881/883)
Courtesy of BMW OF NORTH AMERICA, INC.

Adhesive cartridge gun 83 30 0 494 836

Usable for structural foam HS2.

NOTE: Special tool number 41 3 010

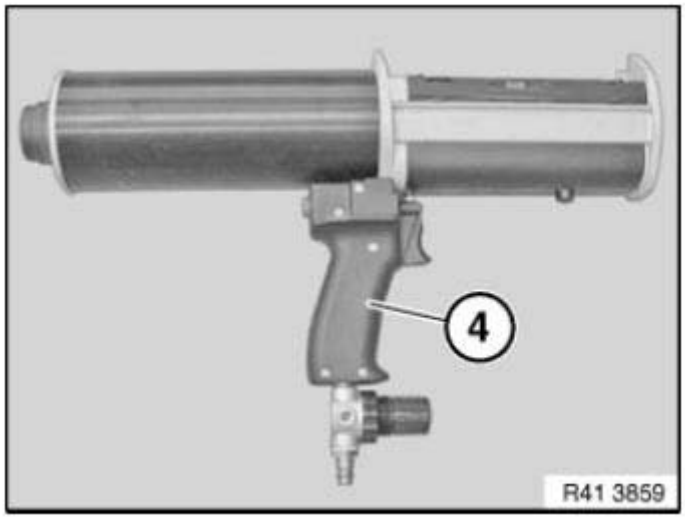


Fig. 29: Identifying Adhesive Cartridge Gun (83 30 0 494 836)
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)

1.0 Adhesives

ADHESIVES REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Adhesive K1	Body adhesive K1	83 19 0 413 015	195 ml
Adhesive K2	Body adhesive K2	83 19 2 156 847	195 ml
Adhesive K3	Body adhesive K3 83	19 0 417 144	2 x 300 ml
Adhesive K4	Body adhesive K4	83 19 2 149 520	50 ml
Adhesive K5a	Body adhesive K5a	83 19 2 158 654	50 ml
Adhesive K5b	Body adhesive K5b	83 19 2 157 298	195 ml
Adhesives K5a and K5b are the same adhesive in different package sizes.			

1.1 Primer

PRIMER REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Primer P1	Primer P1	83 19 0 302 556	50 ml
Primer P2	Primer P2/Gas cartridge	83 19 0 302 555	50 ml

1.2 Cleaning agent

CLEANING AGENT REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cleaning agent R1	Cleaning agent R1	83 19 2 157 286	125 ml
Cleaning agent R2	Cleaning agent R2	83 19 0 417 324	500 ml
Cavity sealing wax remover	Cavity sealing wax remover	83 12 0 390 086	500 ml

1.3 Fillers

FILLERS REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Metal filler	2C metal filler	83 19 2 154 175 US version: 83 19 2 163 602 Asian version: 83 19 2 163 603	

2.1 Rivets

RIVETS REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Blind rivet N1 Hemlock 813	Blind rivet N1	83 19 0 301 414	dia. 6.5 mm; clamping range 2.8-4.8 mm
Blind rivet N2 Hemlock 815	Blind rivet N2	83 19 0 301 419	dia. 6.5 mm; clamping range 4.8-6.8 mm
Blind rivet N3	Blind rivet N3	83 19 0 301 421	dia. 4 mm; clamping range 1-3 mm
Punch rivet N4	Punch rivet N4	83 19 2 158 080	dia. 3 mm; length 4 mm
Punch rivet N5	Punch rivet N5	83 19 2 158 079	dia. 5 mm; length 5 mm
Blind rivet N6	Blind rivet N6	83 19 2 158 655	dia. 4 mm; clamping range 3-5 mm

2.2 Plastic nuts

PLASTIC NUTS REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cap nut	Plastic nut	51 16 1 943 122	Dia. 18 mm
Cap nut	Clip nut	07 14 7 139 081	Dia. 30 mm

3.0 Primer

PRIMER REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Primer	HS-AK multibase filler 2K spray	51 91 0 432 612	200 ml; pot life 5 hours
Primer	EP base filler 2K spray	51 91 0 432 615	200 ml; pot life 8 hours
Welding primer	INOX spray welding primer	83 40 0 409 992	500 ml

4.0 Sealant

SEALANT REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Sealant D1 Sprayable sealant	Seam sealing	83 42 0 428 349	310 ml

5.0 Cavity preservation

CAVITY PRESERVATION REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cavity sealant	Cavity sealant spray	83 42 0 428 190	400 ml
Cavity sealant	Cavity preservation	83 42 0 428 348	1000 ml

6.0 Cavity foam

CAVITY FOAM REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Cavity foam HS1	Cavity foam	83 42 9 410 694	400 ml
Structural foam HS2	Structural foam	83 19 0 007 361	420 ml

7.0 EMC screw (electromagnetic compatibility)

EMC SCREW REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
EMC screw	Screw	83 19 0 301 639	SF Plus M5x15

8.0 Twist drill

TWIST DRILLL REFERENCE CHART

Designation, repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Remarks
Drill bit	Twist drill	83 19 2 166 461	4.2 x 119 mm
Drill bit	Twist drill	83 19 2 166 462	6.8 x 156 mm
Drill bit	Twist drill	83 19 2 166 463	4.2 x 55 mm
Drill bit	Twist drill	83 19 2 166 464	6.8 x 74 mm

41 00 ... POSITION OF SHAPED PARTS FOR CAVITY ACOUSTIC BAFFLE

Cavity sealing is carried out in specific body areas in order to reduce internal noise and to reduce condensate. To do this, shaped parts are inserted in the cavities. These shaped parts adapt themselves optimally due to heating of the body to approx. 180 °C by expansion to the shape of the cavities.

Because it is not possible to heat the body to this extent for a body repair, a different procedure See **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)** or **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)** has been specified for this situation.

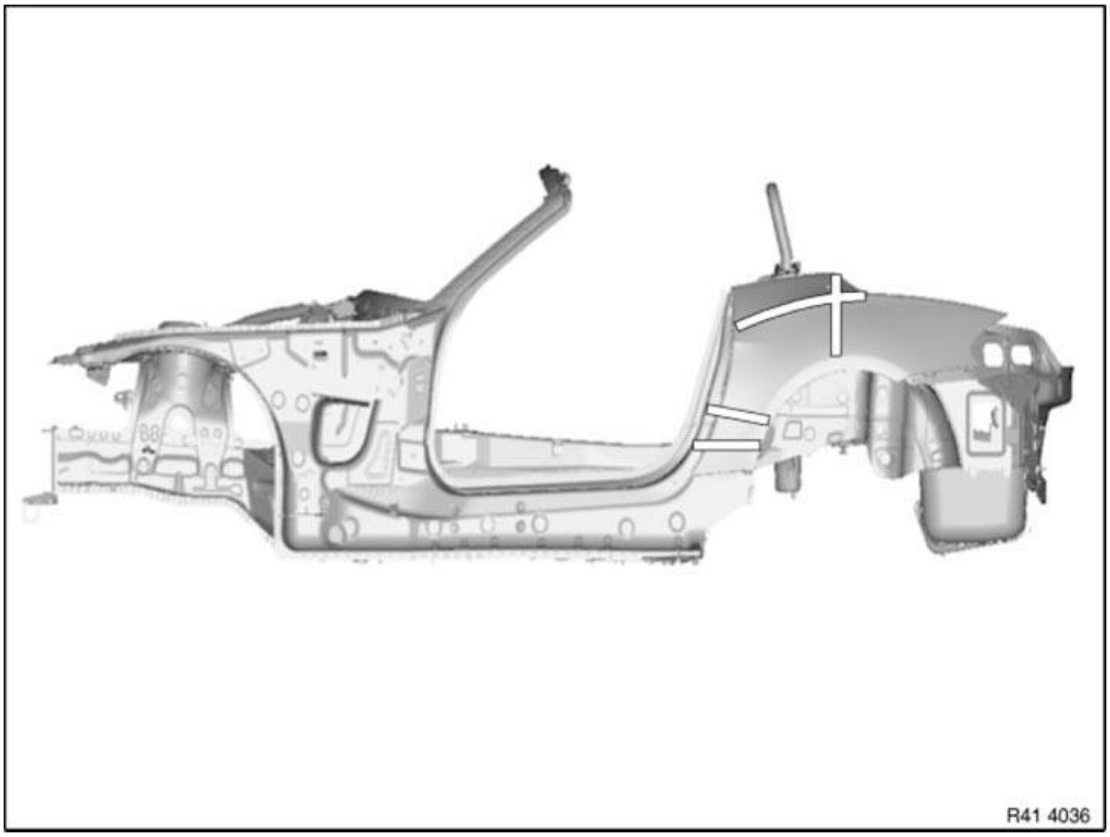


Fig. 30: Identifying Cavity Acoustic Baffle Shaped Parts Position
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... PROCEDURE FOR FOLDING HARDTOP AFTER AN ACCIDENT

The hardtop may be under tension after the vehicle has incurred damage following an accident. Moving the hardtop by hydraulic means may result in irreparable damage. For this reason, the hardtop may only be moved manually until the damaged has been repaired.

IMPORTANT: It is not possible to check the correct operation of the folding roof on the damaged vehicle.

Different procedures are required, depending on the degree of damage which the vehicle has incurred. The repair instructions for emergency operation See **5437290 HARDTOP EMERGENCY OPENING** or **5437295 EMERGENCY CLOSING HARDTOP** describe only the complete sequences for manually opening and closing the hardtop.

When removing the roof module and/or the rear module, it is possible to move the hardtop manually into the necessary intermediate positions in each case.

WARNING: Risk of injury due to the heavy weight of the hardtop!
Since the hydraulic system may have to be depressurized during manual movement of the hardtop, there is an increased risk of injury by trapping. Secure the hardtop permanently and adequately against unintentional movement.

After body repairs to the vehicle

All the hardtop components screwed/bolted to the body are precisely screwed/bolted to the vehicle at the factory by means of gauges. This affects above all the base plates and consoles of the roof and rear modules. To minimize extensive adjustment work after a body repair as much as possible, only remove those components which are screwed/bolted to a damaged body part.

- Gauge the base plates *only* after a body repair to the cowl panel.

41 00 ... PUNCH RIVETS

The "Bonding and Riveting" repair method involves the use for the first time of punch rivets in the repair. This requires new tools and procedures.

The punch rivets are matched in size to the material thickness and quality used at the respective connection point.

1.0 Recommended tools and equipment

- Punch rivet tool

Setting punch rivets

- Mark the positions of the rivets on the vehicle. Set punch rivets at roughly equal spacings.

Punch rivets do not require a predrilled hole. They are pressed directly into the full material.

- Insert punch rivet in riveting die. Position punch rivet tool on sheet metal parts to be riveted.

  Riveting direction:

  Always from new part to used part.

  Deviations are specified in the vehicle-specific repair instructions.

- Rivet punch rivets with punch rivet tool. In the meantime clean riveting die and matrix if fouled with adhesive.
- Seal punch rivets in moist area (e.g. wheel arch or carrier support) on both sides with **SEALANTD1** (risk of corrosion).
- Seal cavities after painting vehicle with **CAVITY SEALANT** (risk of corrosion).

41 00 ... QUALITY STANDARD

- The overall requirements relating to a vehicle can only be implemented by including "all" components. This applies in particular to the body. With regard to an optimum crash result, it is necessary to maintain the structural measures.

  It is absolutely essential to observe the procedures set out in the repair instructions. Any deviation from these procedures will only be permitted after prior consultation with and approval by BMW. Should you have any questions, please contact the country-specific Hotline.

  The use of non-approved repair steps or tools may have serious consequences for the structure of the vehicle (e.g. in the event of a crash). In the end, this can result in safety and product liability risks which cannot be calculated.

  Corrosion protection measures during and after repairs are absolutely essential to maintain the value of the vehicle.

- Use only genuine BMW parts and approved auxiliary devices, materials and operating fluids when carrying out repairs.

41 00 ... REINFORCEMENT PLATE (BONDED)

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is bonded in to ensure sufficient strength.

Observe notes on **REPAIR STAGE 2** .

NOTE: The following graphics serve as general illustrations of reinforcement plate repair work. They apply to sectional repairs to the structure.

Mark component in accordance with measurement a and cut.

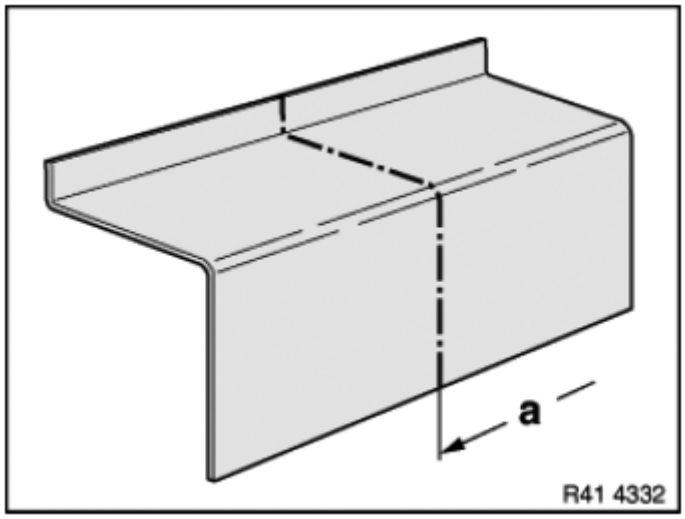


Fig. 31: Identifying Component Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Cut new part (1) in accordance with cut on vehicle and if necessary adjust to fit with straightening attachment or universal mount.

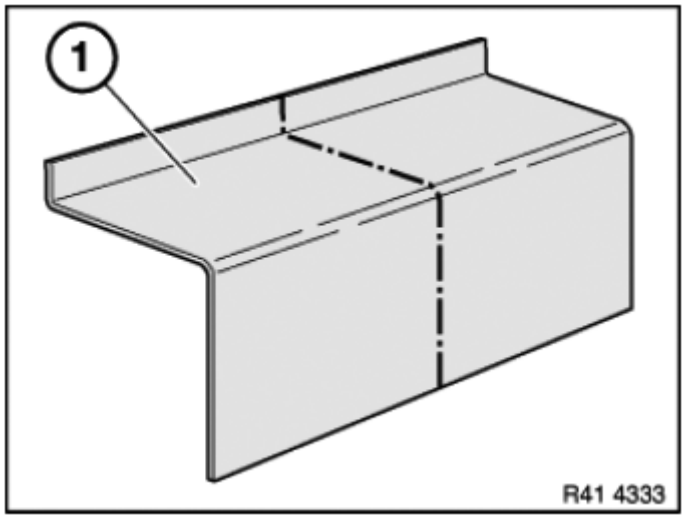


Fig. 32: Identifying Cutting Position
Courtesy of BMW OF NORTH AMERICA, INC.

Make reinforcement plate (1) from trim of new part (2).

Length of reinforcement plate is 80 mm.

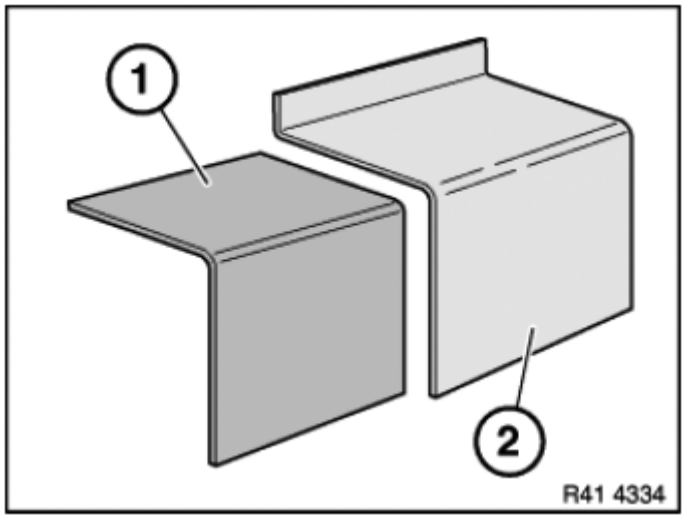


Fig. 33: Identifying Reinforcement Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Slide reinforcement plate (1) half-way into component on body and fasten with 2 self-tapping screws (2).

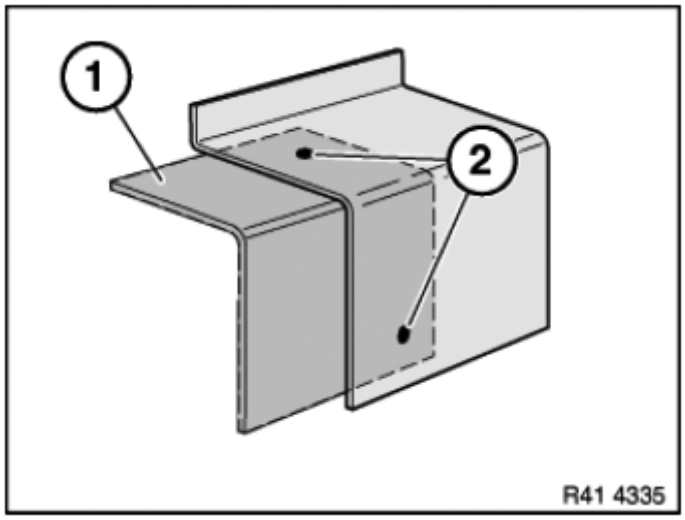


Fig. 34: Sliding Reinforcement Plate Half-Way Into Body Component
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust new part (1) to fit and set 4.3 mm dia. bore holes (2).

Remove new part again.

Release self-tapping screws (3).

Remove reinforcement plate.

Drill out bore holes (3) for screws to 4.3 mm dia.

Deburr all bore holes.

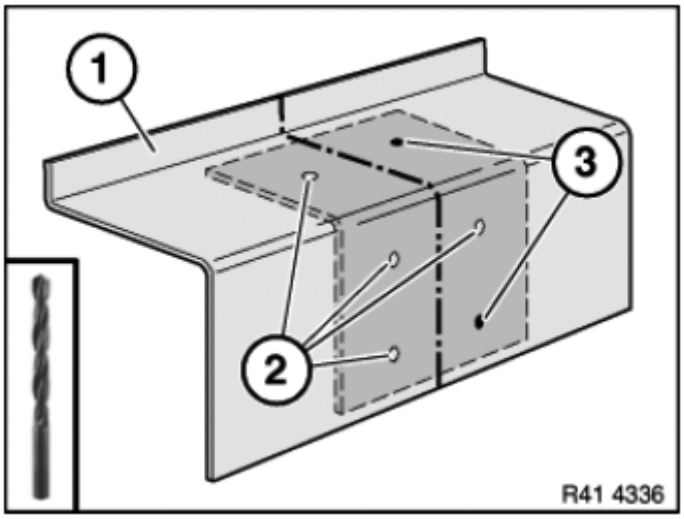


Fig. 35: Identifying Bore Drilling Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Installing reinforcement plate

Clean all bonding surfaces with cleaning agent R1.

Apply adhesive (1) to reinforcement plate bonding surface.

Carefully slide reinforcement plate half-way into body component (2).

IMPORTANT: When joining reinforcement plate, make sure there is sufficient adhesive on bonding surfaces.

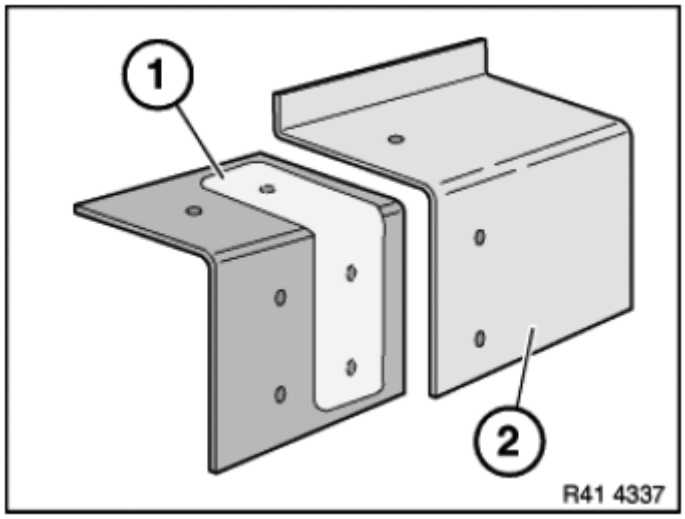


Fig. 36: Identifying Adhesive On Reinforcement Plate Bonding Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Rivet reinforcement plate (1) up to half-way with blind rivets N3 (2).

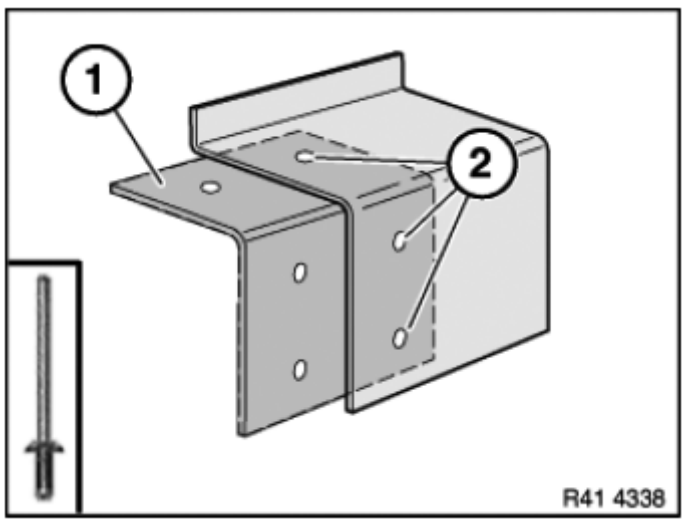


Fig. 37: Riveting Reinforcement Plate Up To Half-Way With Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive (1) to reinforcement plate bonding surface.

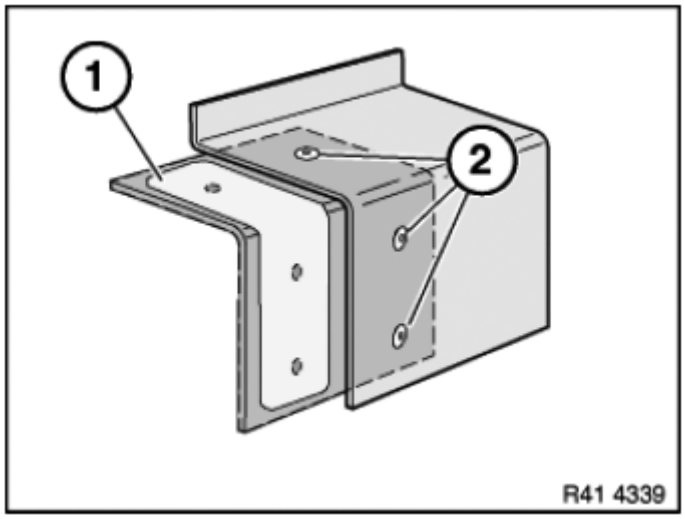


Fig. 38: Identifying Adhesive On Reinforcement Plate Bonding Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Install new part (1) with straightening attachment or universal mount and rivet with blind rivets N3 (2).

After adhesive has hardened, flatten adhesive area and seal blind rivets.

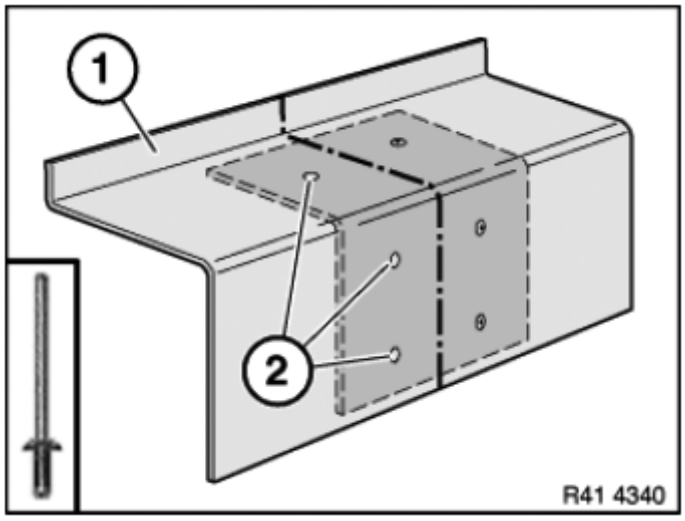


Fig. 39: Installing New Part Using Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... REINFORCEMENT PLATE WITH STUD BOLT (BONDED)

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is bonded in to ensure sufficient strength.

Reinforcement plates are available as new parts and must also be used.

NOTE: **The following graphics serve as general illustrations of reinforcement plate repair work. They are applicable to sectional repairs in the outer skin area.**

Overview of reinforcement plates:

1. Reinforcement plate, sill
2. Reinforcement plate, C-pillar
3. Reinforcement plate, universal
4. Reinforcement plate, C- or D-pillar
5. Lock nuts (not pictured)
    - Plastic nut _ 18 mm, part number 1 943 122
    - Clip nut _ 30 mm, part number 7 139 081

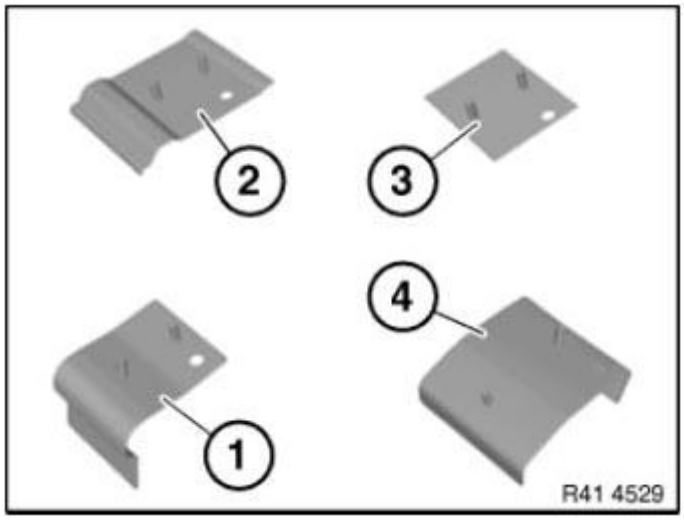


Fig. 40: Identifying Reinforcement Plate Sill, C-Pillar, Universal And C- Or D-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Mark component in accordance with dimension a and cut.

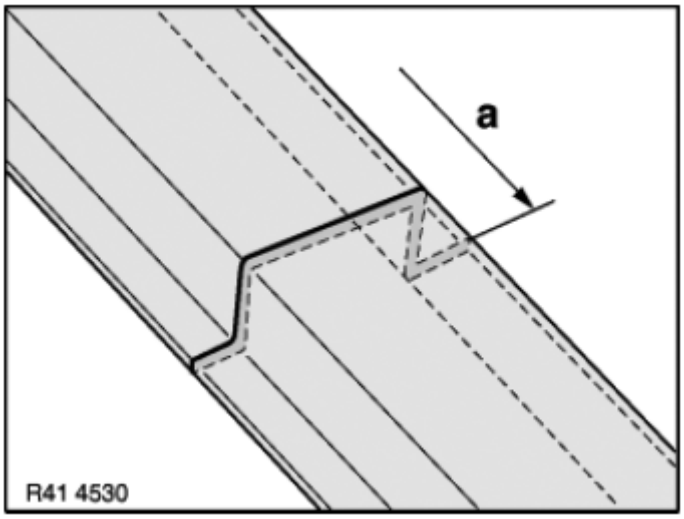


Fig. 41: Identifying Component Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

The reinforcement plates must if necessary be reworked and cut to size.

Adjust reinforcement plate (1) to fit in component (2) on vehicle.

Make recesses (3) for stud bolts (4) in a semicircular shape.

Diameter of recesses approx. 10 - 12 mm.

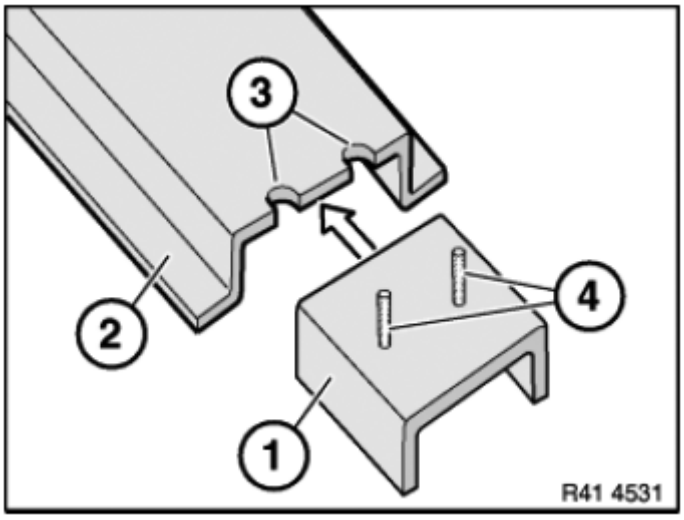


Fig. 42: Adjusting Reinforcement Plate On Vehicle Components
Courtesy of BMW OF NORTH AMERICA, INC.

Secure reinforcement plate by screwing on lock nuts (1).

Fit new part (2). Make recesses (3) in new part in a semicircular shape.

Diameter of recesses approx. 10 - 12 mm.

Remove reinforcement plate again.

NOTE: Width of joint between new part and component on vehicle approx. 3 - 8 mm (at least 30 mm flange width per side).

Plastic nuts should be screwed on once before applying adhesive (no thread in new plastic nut)!

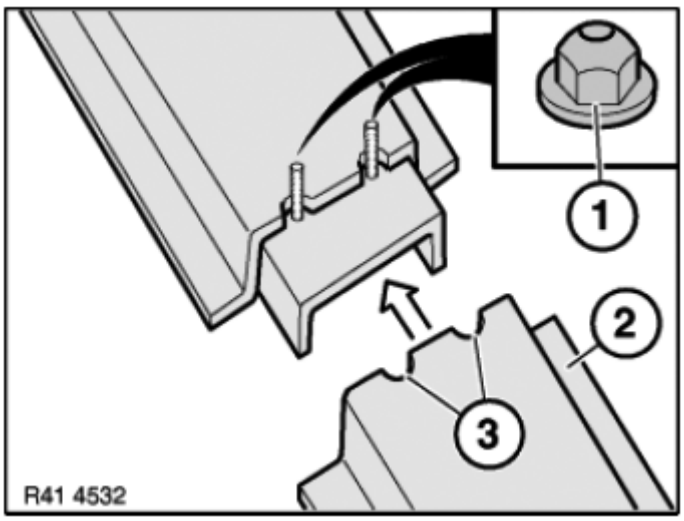


Fig. 43: Fitting New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Round off cutting edges (1) on joint by grinding.

(2) Component on vehicle

(3) New part

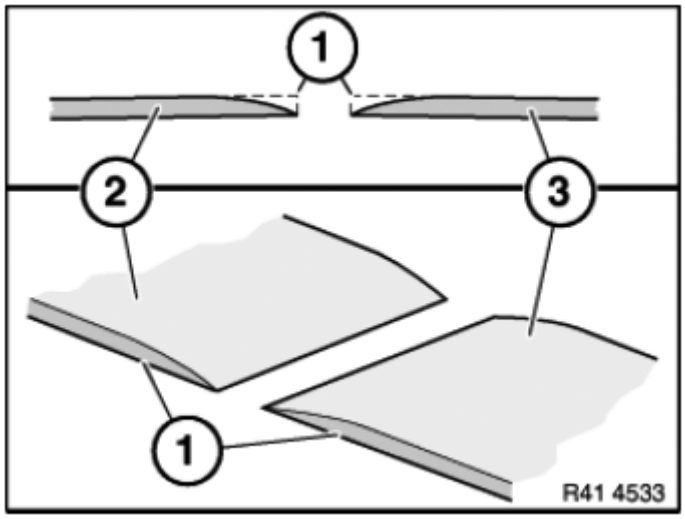


Fig. 44: Identifying Cutting Edges, Vehicle Component And New Part
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Procedure for using universal reinforcement plate

The universal reinforcement plate needs to be adapted. The plate must be divided if the distance between the pins is too great.

Dimension a is between 40 and 80 mm depending on the space available.

Secure plates with N4 punch rivets.

NOTE: Ensure the rivet is positioned correctly! Rivet head is on the adhesion side!

Rivet the plate to the inside of the flange!

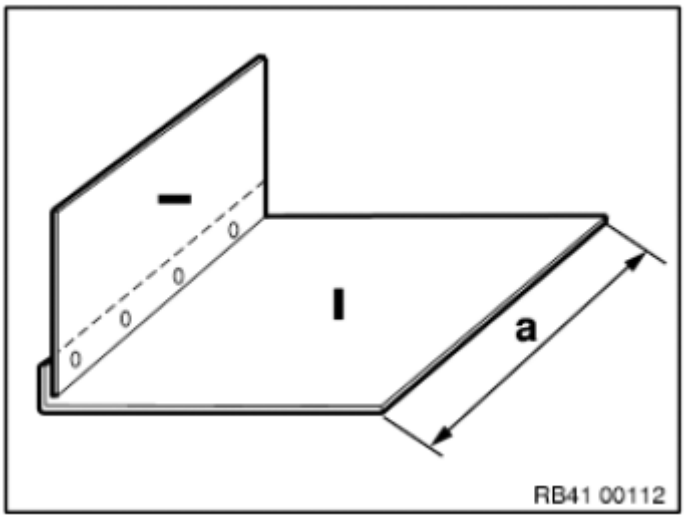


Fig. 45: Identifying Universal Reinforcement Plate Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Installing reinforcement plate

Clean all bonding surfaces.

Apply adhesive to reinforcement plate in area (1). Apply more adhesive in the radii to avoid air pockets.

Carefully slide reinforcement plate into component on vehicle and secure by screwing on nuts (2). Screw on nuts a few turns only.

IMPORTANT: When joining reinforcement plate, make sure there is sufficient adhesive on bonding surfaces.

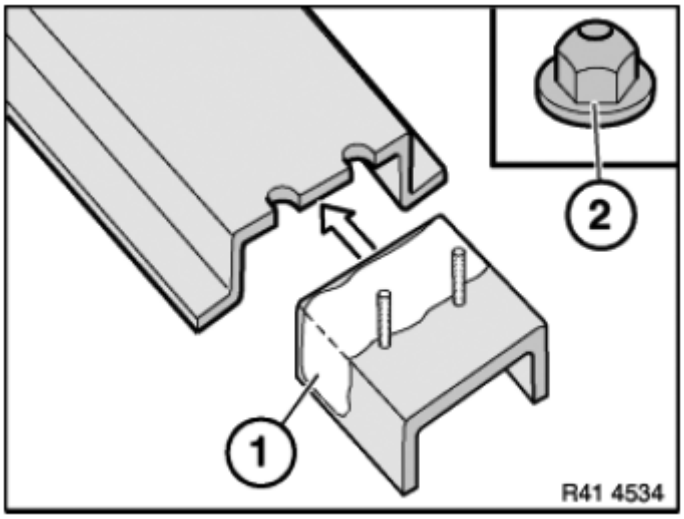


Fig. 46: Applying Adhesive To Reinforcement Plate Bonding Surface

Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive to reinforcement plate bonding surface (1). Apply more adhesive in the radii to avoid air pockets.

Fit new part (2).

Align new part to adjoining component and secure with gripping pliers.

Tighten nuts.

Tightening torque **41 14 1AZ.**

IMPORTANT: Check that the transition of the components is OK at the separation point. Corrections can only be made before the adhesive has hardened. Straightening at a later stage is not possible.

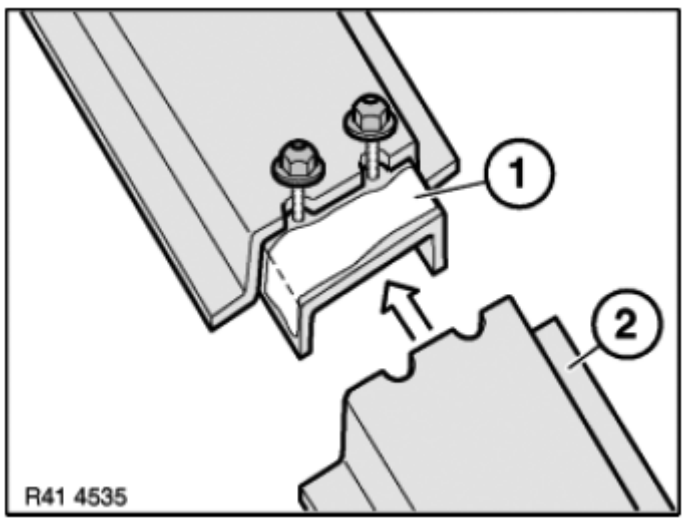


Fig. 47: Fitting New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Concluding tasks at separation point:

After adhesive has hardened:

In area visible to customer:

Cut off stud bolts with bodywork saw.

Completely remove adhesive residue in joint (1).

Round off sharp edges by grinding.

IMPORTANT: Avoid heating the separation point by excessive grinding. Reworking by pressing not permitted!

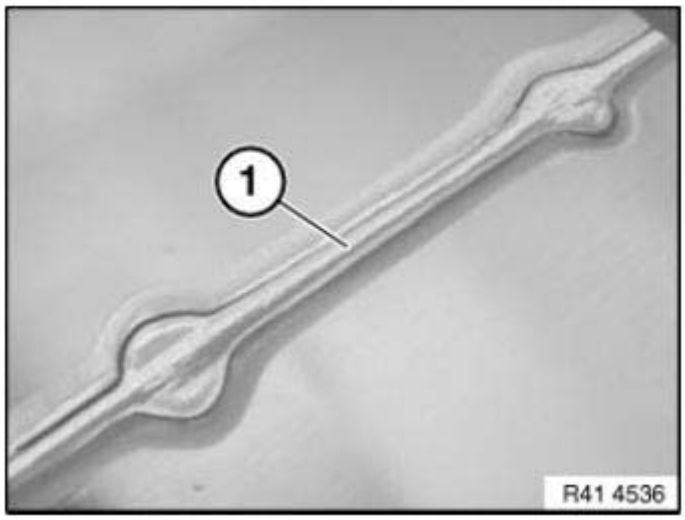


Fig. 48: Identifying Reinforcement Plate Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Only the BMW-approved **METAL FILLER** should be used on the joint.

METAL FILLER - INSTRUCTIONS FOR USE

Not in area visible to customer:

Examples: The joint is covered by sill trim panel, windows, seals, etc.

Grind off stud bolts and surplus adhesive flush. Do not use metal filler. Paint area as specified in BMW Painting Handbook.

NOTE: After painting, the joint becomes visible as the adhesive shrinks. This has no affect on the quality.

41 05 800 RELEASING BONDED FOLDED SEAM CONNECTIONS

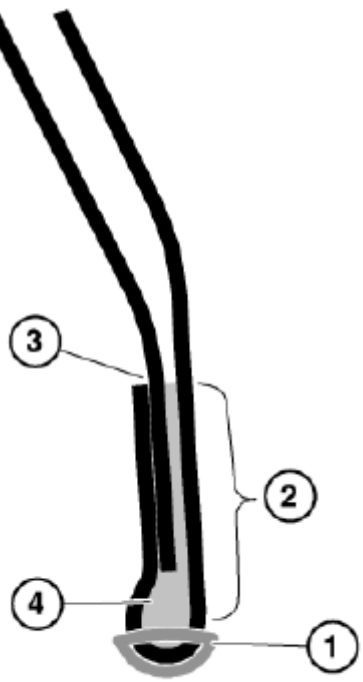


Fig. 49: Removing Bonded Folded Seam Connections
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove area (1) of bead edge on wheel arch bend with a one-hand angle grinder and rough grinding wheel.
- Heat area (2) with hot air blower.

CAUTION: Extract vapours and gases.

- Release connection flange with chisel.
- Grind adhesive residue (4) off wheel arch connection flange.

CAUTION: Wear a grinding dust mask.

- Remove remnants of sealing material in area (3).

41 00 ... REPAIR SOLUTION FOR STRAIGHT SHANK/HEXAGON RIVET NUT

Protection measures!

- Wear safety goggles

- Wear protective gloves

IMPORTANT: To prevent the material from tapering, do not drill out the rivet head.

1. Carefully spot-drill rivet head with a larger drill bit/countersink

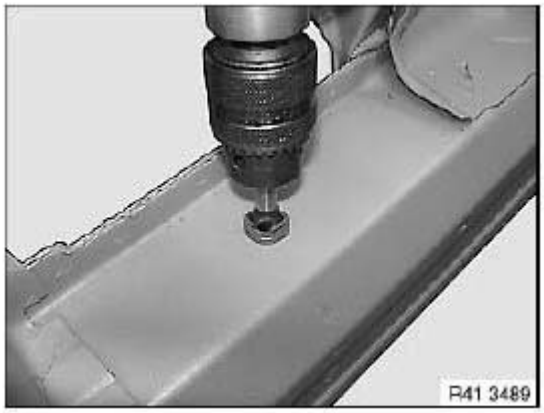


Fig. 50: Drilling Rivet Head Using Larger Drill Bit/Countersink
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid paintwork damage

2. Knock rivet head away with a chisel

Fig. 51: Knocking Rivet Head Using Chisel
Courtesy of BMW OF NORTH AMERICA, INC.

3. Drive through rivet shank into cavity, remove if necessary

Fig. 52: Identifying Rivet Shank Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

4. Clean component, eliminate paintwork damage if necessary

Fig. 53: Cleaning Component To Eliminate Paintwork Damage
Courtesy of BMW OF NORTH AMERICA, INC.

If the rivet shank can be removed:

IMPORTANT: To avoid corrosion, stop chips/swarf by means of cavity sealing. Follow INSTRUCTIONS ON CORROSION PROTECTION .

5. Preserving cavity

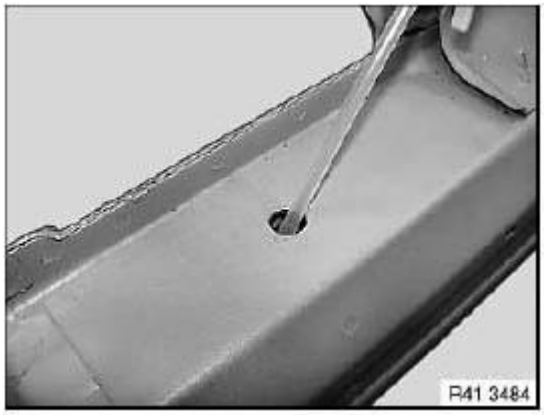


Fig. 54: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

If the rivet shank cannot be removed:

WARNING: Risk of injury!
Observe NOTES ON CAVITY FOAM .

IMPORTANT: To avoid corrosion and rattling noises, stop chips/swarf and rivet nut shank with cavity foam.
Remove foam remnants with isohexane (benzine).

Fig. 55: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

5. Stop rivet shank by means of specific foaming

6. Set rivet nut with hand rivet gun

NOTE: Fit rivet nut as quickly as possibly, ideally before the cavity foam hardens.

Hexagon/straight shank rivet nut (up to thread M8) with hand rivet gun ZS308

IMPORTANT: Follow manufacturer's operating instructions.
Make sure rivet nut correctly contacts component.

NOTE: According to the manufacturer, the pictured tool is suitable up to an M8 thread

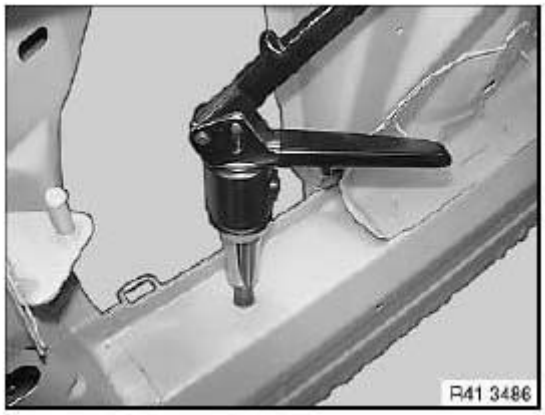


Fig. 56: Setting Rivet Using With Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

Hexagon/straight shank rivet nut (up to thread M12) with hand rivet gun MB512

IMPORTANT: Follow manufacturer's operating instructions.
Make sure rivet nut correctly contacts component.

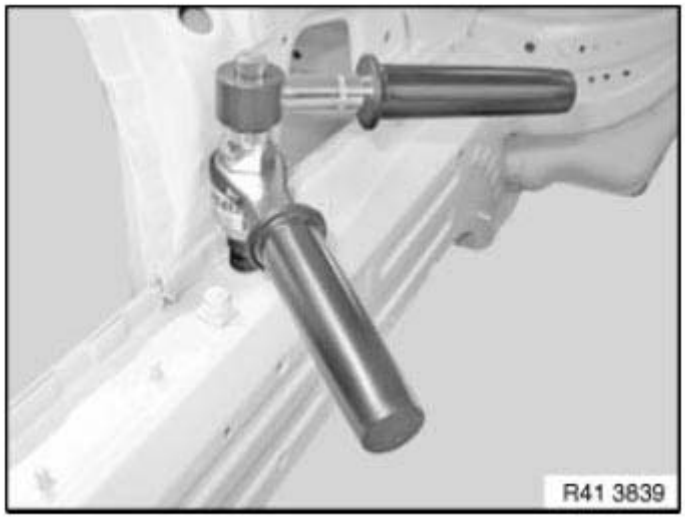


Fig. 57: Setting Rivet Nut With Hand Rivet Gun (MB512)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: According to the manufacturer, the pictured tool is suitable up to an M12 thread

41 0 REPAIR TECHNIQUES, REPAIR STAGE 1

All work which provides only for replacement of screwed/bolted components and planishing operations.

Repair techniques

- Straightening outer skin
  - Straightening aluminium parts See or **4100... STRAIGHTENING ALUMINIUM PARTS ON OUTER SKIN**
  - Straightening steel parts See or **4100... STRAIGHTENING STEEL PARTS ON OUTER SKIN**
  - **METAL FILLER**
- Grinding
  - Grinding aluminium components See **4100... GRINDING ALUMINIUM PARTS**
  - Grinding steel parts See or **4100... GRINDING STEEL PARTS**
- Repair elements
  - Steel thread repairs See ; **4100... REPAIR SOLUTION FOR STRAIGHT SHANK/HEXAGON RIVET NUT** or **4100... NOTES ON REPAIRING THREADS**

41 0 REPAIR TECHNIQUES, REPAIR STAGE 2

Repairs that are carried out by bonding and riveting without the use of a straightening bench.

Repair techniques

- Removing used part
  - **OPENING WELDED CONNECTIONS**
  - **OPENING BRAZED CONNECTIONS**
  - **OPENING RIVETED CONNECTION**
  - Opening bonded connection See **4100... OPENING ADHESIVE BONDS** or **4105800 RELEASING BONDED FOLDED SEAM CONNECTIONS**
  - **GRINDING ALUMINIUM COMPONENTS**
  - **GRINDING STEEL COMPONENTS**
- Sectional repairs
  - Reinforcement plate (bonded) See **4100... REINFORCEMENT PLATE (BONDED)** or **4100... REINFORCEMENT PLATE WITH STUD BOLT (BONDED)**
  - **METAL FILLER**
- Installing new part
  - Notes on consumables See **4100... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)**; **4100... NOTES ON CLEANING AGENT R1** or **4100... INFORMATION ON METAL FILLER**

    - Notes on adhesive See **4100... NOTES ON ADHESIVE K2**; **4100... NOTES ON ADHESIVE K3**; **4100... NOTES ON ADHESIVE K1**; **4100... NOTES ON ADHESIVE K4** or **4100... NOTES ON ADHESIVE K5**
    - **BONDING ON PAINTED SURFACES**
    - **BLIND RIVETS**
    - **PUNCH RIVETS**
    - Cavity sealing See **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)** or **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)**
    - **EMC SCREWS**
- Miscellaneous
    - **REPAIRING PLASTIC PARTS**
    - **BONDING GLASS PANES**
    - **BLIND RIVET NUTS AND BOLTS**

41 0 REPAIR TECHNIQUES, REPAIR STAGE 3

Repairs that are carried out by bonding and riveting with the use of a straightening bench or welding.

Repair techniques

- Straightening structure
    - **STRAIGHTENING ALUMINIUM COMPONENTS ON THE STRUCTURE**
    - **STRAIGHTENING STEEL COMPONENTS ON THE STRUCTURE**
- Removing used part
    - **OPENING WELD JOINTS**
    - **OPENING BRAZED CONNECTIONS**
    - **OPENING RIVETED CONNECTIONS**
    - **OPENING BONDED CONNECTIONS**
    - **GRINDING ALUMINIUM COMPONENTS**
    - **GRINDING STEEL COMPONENTS**
- Sectional repairs
    - **WELDING IN REINFORCEMENT PLATE (STEEL PLATE)**
    - Sectional repair (steel) with repair element

      Sectional repair (aluminium) with repair element
- Installing new part
    - Welding aluminium components
    - **WELDING STEEL COMPONENTS**
    - **SPOT-WELD BONDING STEEL COMPONENTS**
    - **SOLDERING STEEL COMPONENTS**

- Notes on consumables See **4100... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)** or **4100... NOTES ON CLEANING AGENT R1**
- **NOTES ON ADHESIVE**
- Bonding aluminium on steel
- **BONDING STEEL ON STEEL**
- **BLIND RIVETS**
- **PUNCH RIVETS**
- Cavity sealing See **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (EXPANDED)** or **4100... INSTALLING A CAVITY ACOUSTIC BAFFLE (NOT EXPANDED)**
- **EMC SCREWS**

41 00 ... REPAIRING PLASTIC PARTS

1.0 General information

- Economic efficiency must always be checked prior to repair.
- Only the following painted **COMPONENTS IN THE OUTER SKIN AREA** are approved for repair:
  - Bumper trims (exception: E52)
  - Sill trims
  - Front side panels
  - Hardtop/roof
  - Convertible top compartment lid
  - Rear lid
- Prerequisite for professional repair:
  - Only minor deformations (without microcracks, usually visible in the paint)
  - Only minor damage, e.g. abrasions, cracks and holes up to 2.5 cm long
  - No damage (cracks) to the edge of the component!

CAUTION: The following are not approved for repair:

- **Fuel tanks, reservoirs for liquids/fluids (e.g. windscreen washer unit, brake fluid, coolant expansion tank, etc.)**
- **Headlight mountings (pedestrian protection)**

2.0 Shaping plastic parts

- Plastic parts can be reshaped using a hot-air blower.
- Microcracks can occur in the plastic if plastic parts are deformed. After the component is reshaped and then painted, the cracks may become visible again on the surface after a period of time.
- The component must be replaced if microcracks can be identified in the area of deformation.

3.0 Bonding plastic parts

IMPORTANT: Conform with safety precautions See 4100... SAFETY AT WORK or 4100... INFORMATION ON HAZARDS!

- **A plastics repair box is offered for cost-effective and time-value-compatible repairs.**
- **The plastics repair box contains the step-by-step instructions for repairing plastic parts.**

41 00 ... SAFETY AT WORK

1.1 Working with aluminium dust

- Wear a fine dust mask.
- E52 only: Use an explosion-proof extractor system
- Note national regulations.

First Aid

If product comes in contact with eyes, immediately flush with running water for about 10 -15 minutes. Seek the advice of eye specialist.

In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. If necessary, consult a doctor.

If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.

After inhaling adhesive vapours ensure ample supply of fresh air. Stay calm. Keep air passages open. Consult a doctor.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

When working with diagnosis tools

- Observe instructions in diagnosis tool

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

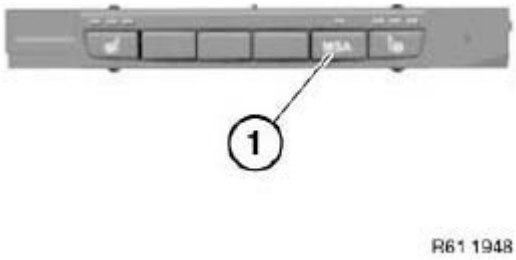


Fig. 58: Identifying MSA Switch
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

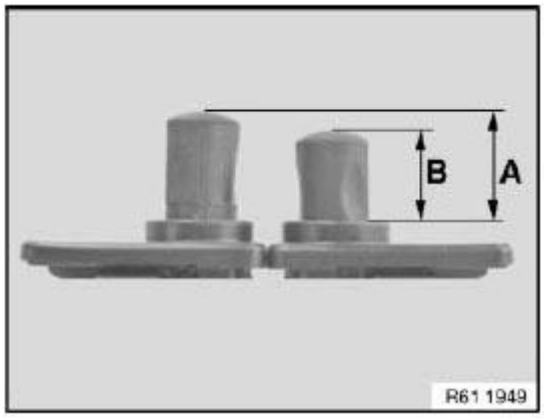


Fig. 59: Identifying Basic Setting For Engine Hood/Bonnet Basic
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... SEPARATING CUT DETERMINATION WITH A TEMPLATE

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A template may be used for the exact position determination for the separating cut.

The template is made from the reinforcement plate and can be reused.

Carry over schematic diagram at the separation cut C-pillar to the relevant vehicle type.

Remove stud bolts (1).

Set bore holes Ø 4 mm at the positions of the removed stud bolts.

If applicable, place additional bore holes in the area of the edges.

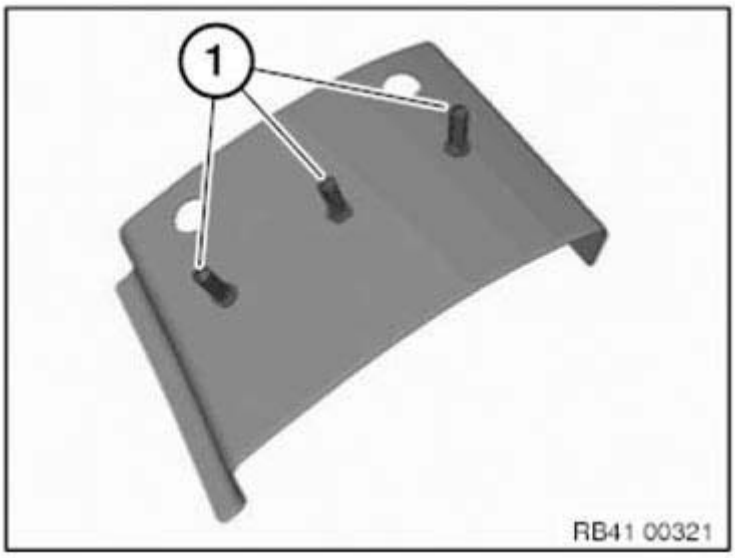


Fig. 60: Identifying Stud Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert the template (1) into the new part (in direction of arrow) until it is flush (without gap).

Carry over the positions of the holes (2) to the new part.

Remove reinforcement plate again.

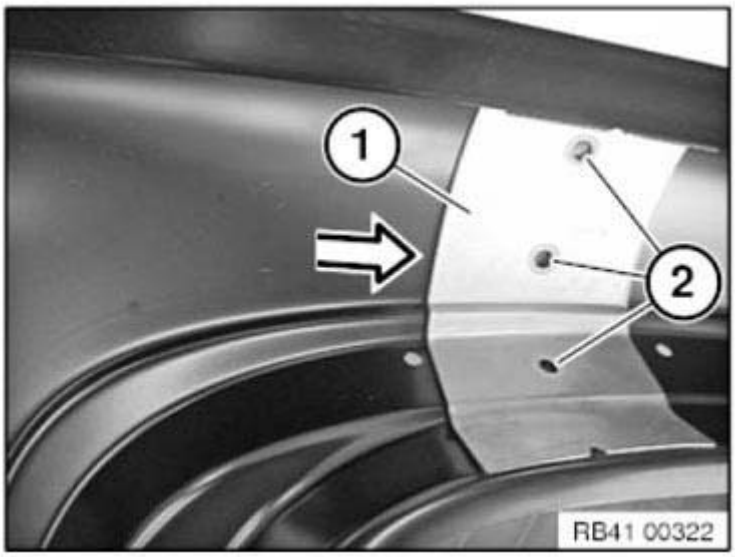


Fig. 61: Inserting Template Into New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Connect marks (positions of holes) to the separating cut line (1).

Carry out the separating cut.

Tear and separate the separating cut on the vehicle according to the new part.

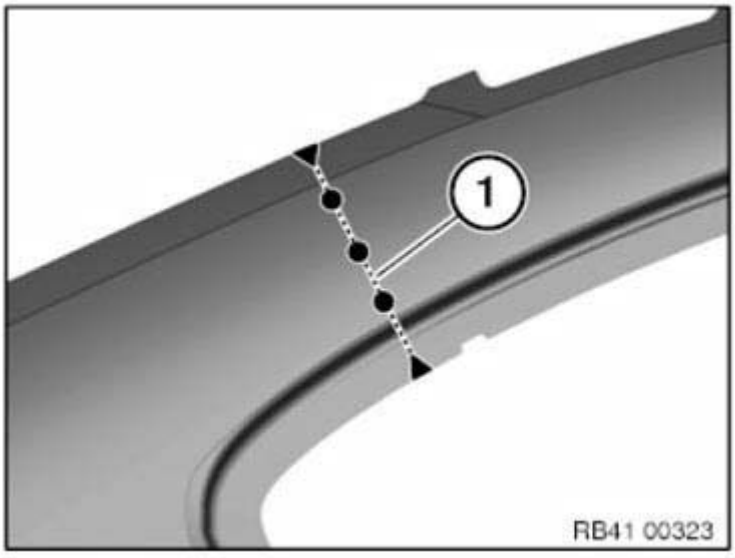


Fig. 62: Connecting Position Of Holes Through Separating Cut Line
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... SETTING BLIND RIVET NUTS AND BOLTS

- Studs welded as standard are always replaced by blind rivet bolts.

- Drill holes (0.2 mm larger than the outside diameter of the blind rivet nuts or blind rivet bolts).
- Blind rivet nuts and studs must have a special coating for anti-corrosion purposes

Use the blind rivet nuts and bolts supplied in the case of the manual riveting tool for steel only!

- It will no longer be possible to set a blind rivet nut if the drilled hole is too big. In this event, set a clip nut. This nut tightens itself automatically when screwed to the component.
- Insert blind rivet nuts or bolts and **TIGHTEN DOWN WITH RIVET TOOL** .
- Seal blind rivet nuts and blind rivet bolts with **SEALANTD1** (risk of corrosion).

41 00 ... SOLDERING STEEL COMPONENTS

IMPORTANT: Comply with the following topics from "Body, General":
Safety regulations See 4100... SAFETY AT WORK or 4100... INFORMATION ON HAZARDS.
Handling electrical/electronic equipment, airbags and restraint systems See 4100... HANDLING AIRBAGS AND RESTRAINT SYSTEMS or 4100... HANDLING ELECTRICAL AND ELECTRONIC EQUIPMENT.

1. General information

- For repair cases the following method will implemented:
  - Gas brazing
- *The MIG soldering procedure is not used in repairs for strength reasons. MIG soldered/brazed seams used in series production are replaced in repairs by MAG weld seams.*
- Brazed areas from vehicle production are bonded with the same method.

2. Work materials

- Tube pack and torch (gas torch)
- Brazing solder
- Gas bottles (oxygen and acetylene)
- Welding goggles

3. Preparation

- Remove the paint and zinc coating in an area of approx. 30 mm around the seam to be soldered.

4. Implementation

- Execute brazed seam without overheating the solder and with low heat dissipation. If necessary, use heat protecting paste.

5. Subsequent treatment of brazed joints

- Remove burnt residual zinc completely. Align and grind visible connection faces.
- Remove burnt paint with a stainless steel wire brush.

6. Notes on melting/tinning

Only applicable within the European Union!

European used-car regulations prohibit the use of tin containing lead in motor vehicles introduced after 01.07.2003!

Even out unevenness smaller than 2 mm with filler according to painting handbook

If an exceptional unevenness is larger than 2 mm, use **METAL FILLER** .

Only perform in visible areas of the outer skin and on the carrier support.

All areas which have covers on the vehicle are not to be processed.

41 00 ... SPOT-WELD BONDING STEEL PARTS

IMPORTANT: Comply with the following topics from "Body, General":
Safety regulations See 4100... SAFETY AT WORK or 4100... INFORMATION ON HAZARDS.
Handling electrical/electronic equipment, airbags and restraint systems See 4100... HANDLING AIRBAGS AND RESTRAINT SYSTEMS or 4100... HANDLING ELECTRICAL AND ELECTRONIC EQUIPMENT.
Welding steel parts.

- The spot-weld bonding process is used starting from the E65 to increase vehicle rigidity. In partial bodywork areas, a 1-component adhesive is applied to the spot flanges and this is followed by resistance pressure spot welding. The adhesive is hardened only after the paint drying process (at approx. 180 °C).
- In the case of repairs, adhesive is not applied to the spot flanges. The number of welding spots is doubled as a substitute for the omitted adhesive.
- The following processes are used as a substitute for spot-weld bonding:
  - MAG welding (**M** etal **A** ctive **G** as welding)
  - Resistance pressure spot welding (referred to in the following and in the repair instructions as spot welding).
- Adhesive is not applied between the spot flanges on new parts in the case of 2- or multi-sheet joints. Areas which cannot be reached by the spot-welding tongs can be joined by MAG spot welding. The number of welding spots is doubled as a substitute for the omitted adhesive.

  Exceptions (e.g. E65) are described in the relevant repair instructions. Apply welding spots to existing welding spots on new part. This is necessary because the adhesive between the spot flanges of the new part acts as an insulator.

-

CAUTION: Extract smoke and fumes during welding work.

-

41 00 ... STAMPING VEHICLE IDENTIFICATION NUMBER (NEEDLE STAMPING UNIT)

Read and comply with **GENERAL INFORMATION** .

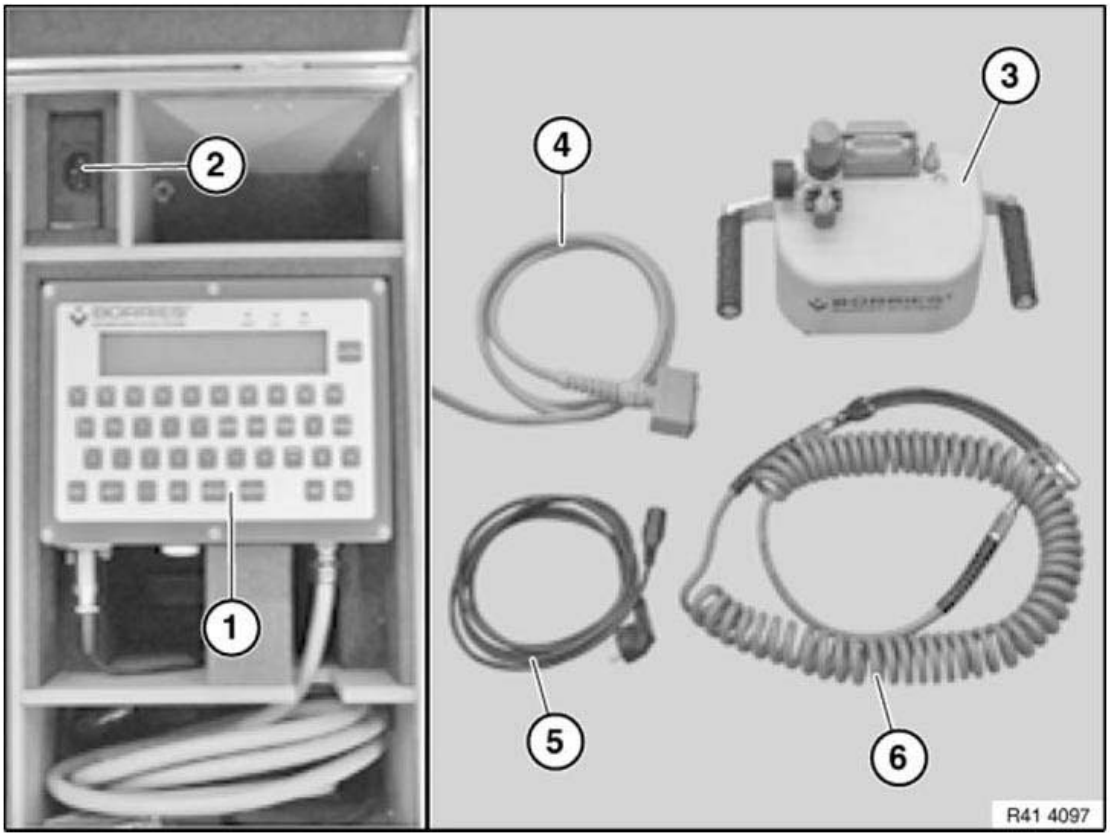


Fig. 63: Identifying Display, Mains Adapter, Needle Stamping Unit, Connecting Cable And Power Cable
Courtesy of BMW OF NORTH AMERICA, INC.

- (1) Display
- (2) Mains adapter
- (3) Needle stamping unit
- (4) Connecting cable
- (5) Power cable
- (6) Compressed-air hose

NOTE: A compressed-air connection is also required.

- **Operating pressure approx. 4 bar**
- **Use only dried, oil-free air**

Procedure for additional vehicle identification number

- Cross through original vehicle identification number.

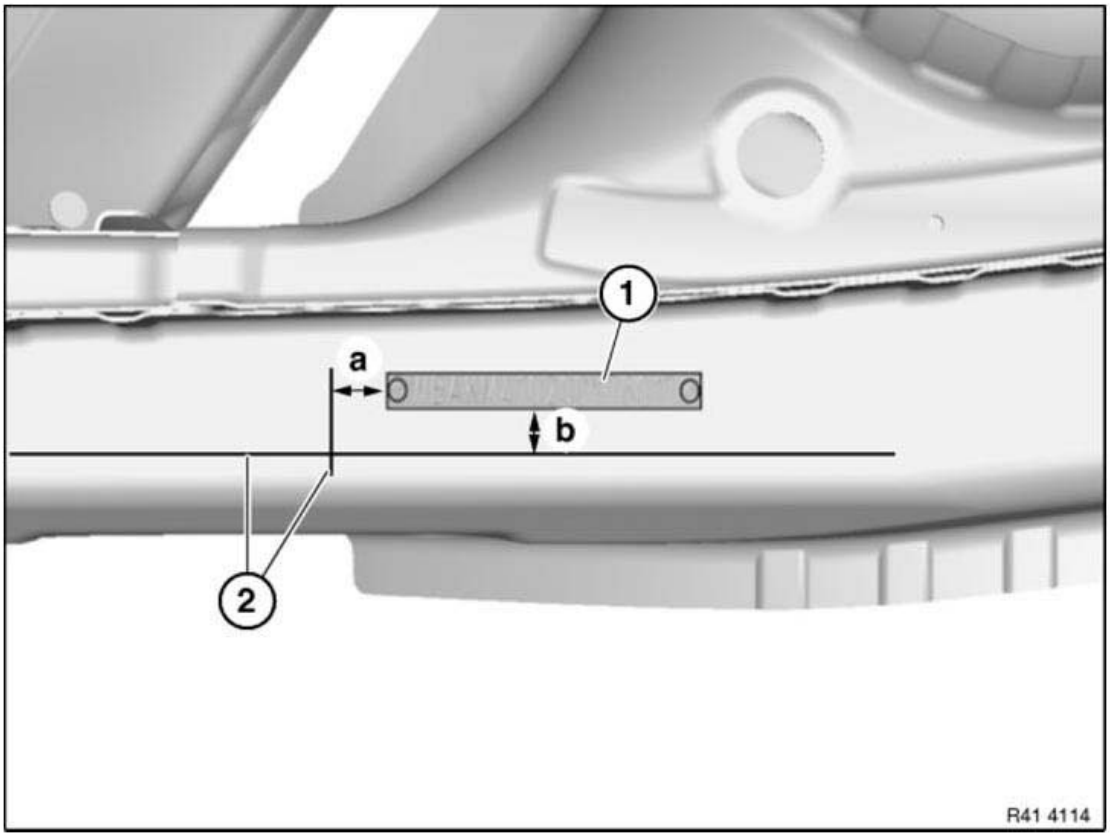


Fig. 64: Identifying Original Vehicle Identification Number And Position Lines
Courtesy of BMW OF NORTH AMERICA, INC.

(1) = original vehicle identification number.

Mark position lines (2) in accordance with specified dimensions/measurements.

Measurement a = 12 mm

Measurement b = 10 mm

Display input:

- Select Layout 5 with arrow button.
- Enter vehicle identification number with F10.
- Press "ENTER" button.

NOTE: With Layout 5 the vehicle identification number (line 1) is crossed through.

Fig. 65: Identifying Display
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Perform stamping operation with position lines in advance on a test sheet.

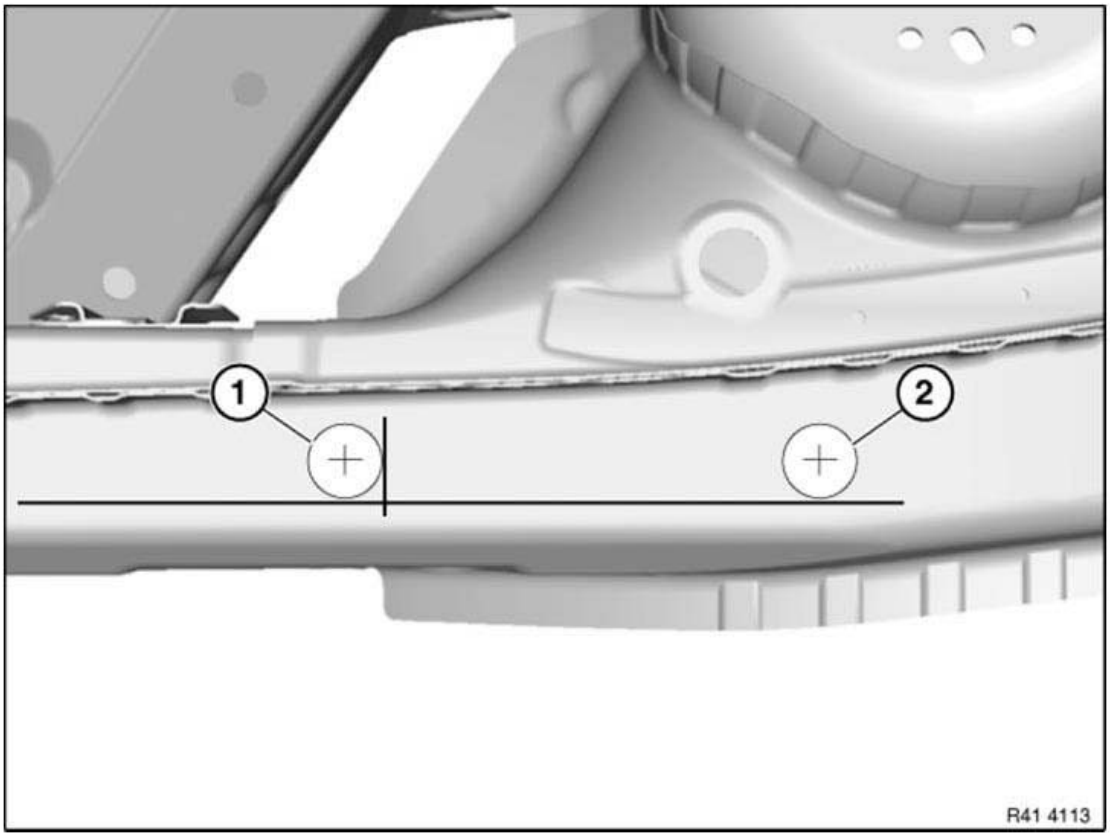


Fig. 66: Adjusting Needle Stamping Unit Suction Feet Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Move suction feet of needle stamping unit to positions (1) and (2) shown.

- First adjust position (1)
- Then adjust position (2)

Press pushbutton (1) for vacuum pressure.

Then start stamping operation with pushbutton (2).

After completing the stamping operation, switch off vacuum and set unit down.

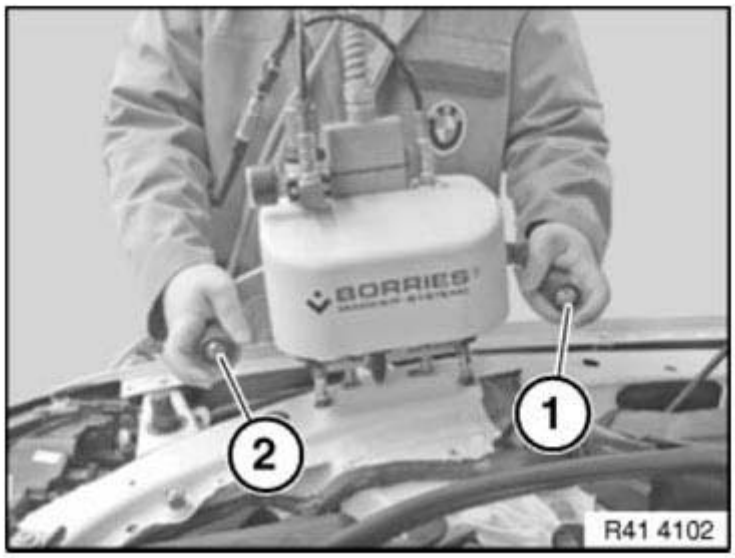


Fig. 67: Stamping Vehicle Identification Number
Courtesy of BMW OF NORTH AMERICA, INC.

Stamping second vehicle identification number

NOTE: The second vehicle identification number is stamped at the height of the spring strut dome.

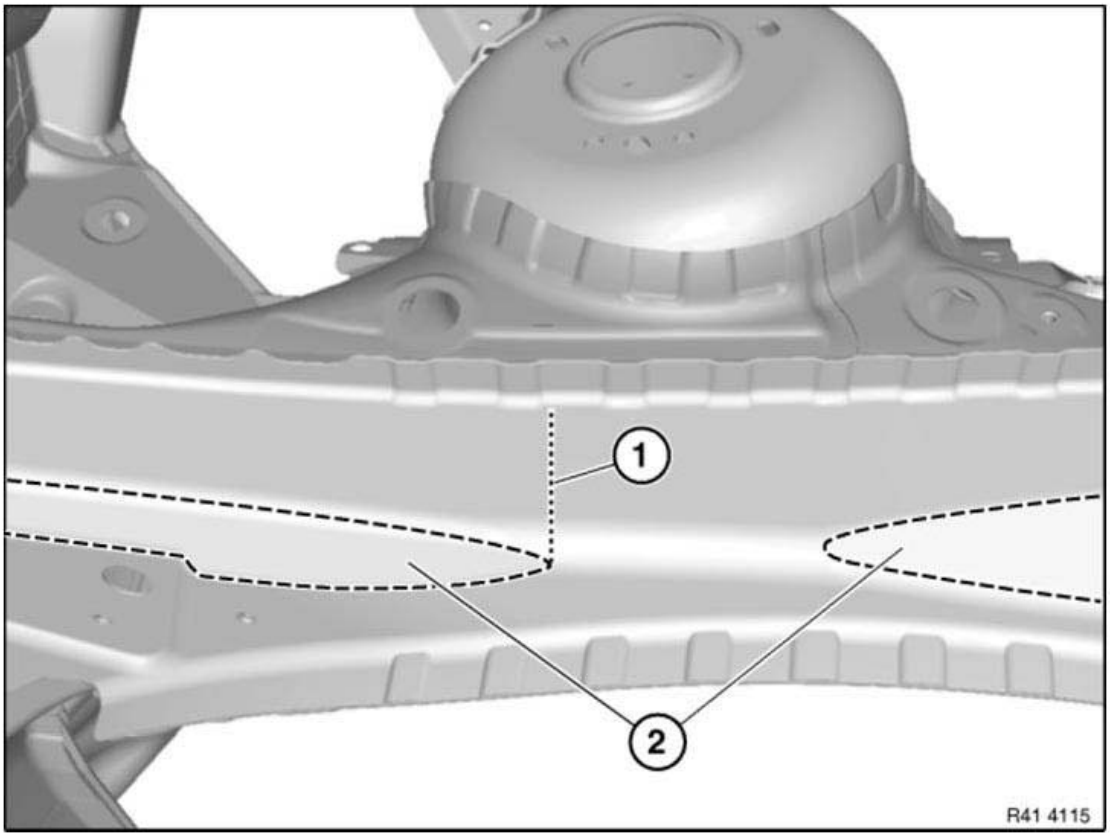


Fig. 68: Marking Help Line In Accordance With Reference Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Mark help line (1) in accordance with reference surfaces (2).

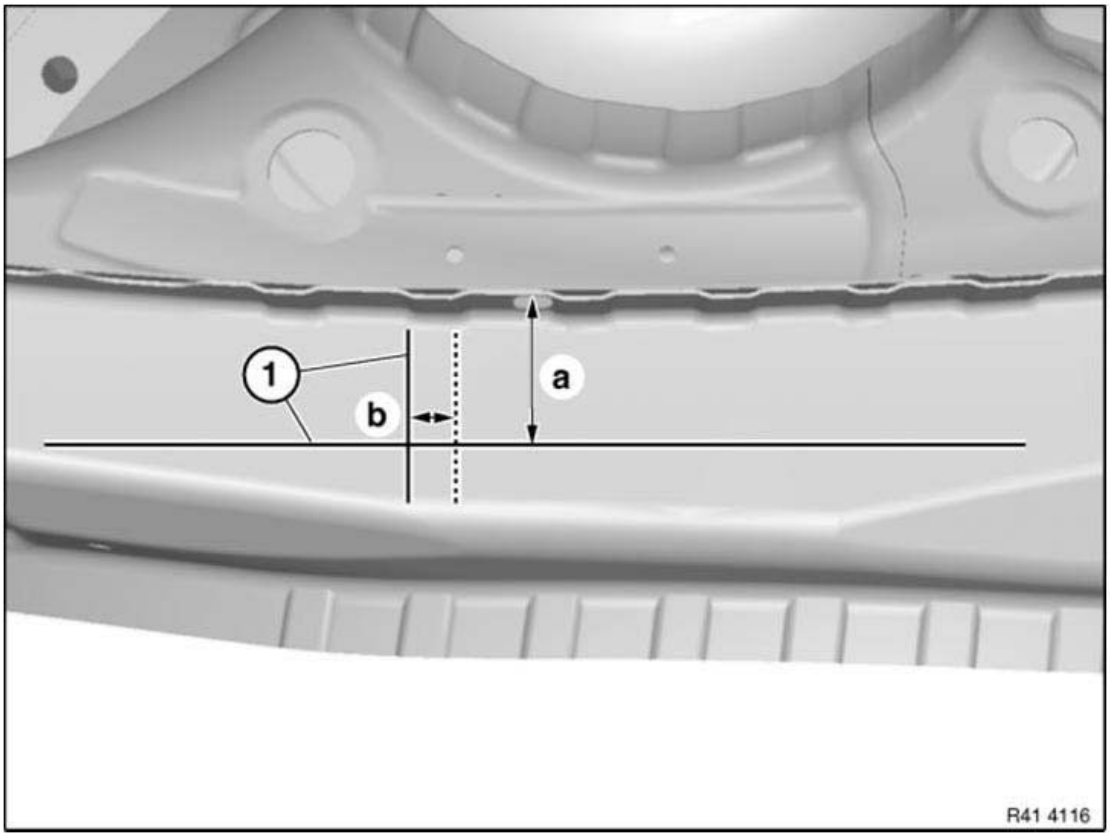


Fig. 69: Marking Position Lines In Accordance With Specified Dimensions/Measurements
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position lines (1) in accordance with specified dimensions/measurements.

Measurement a = 45 mm

Measurement b = 15 mm

Display input:

- Select Layout 1 with arrow button.
- Press "ENTER" button.

NOTE: With Layout 1 the already entered vehicle identification number is stamped in line 1.

Fig. 70: Identifying Display
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Perform stamping operation with position lines in advance on a test sheet.

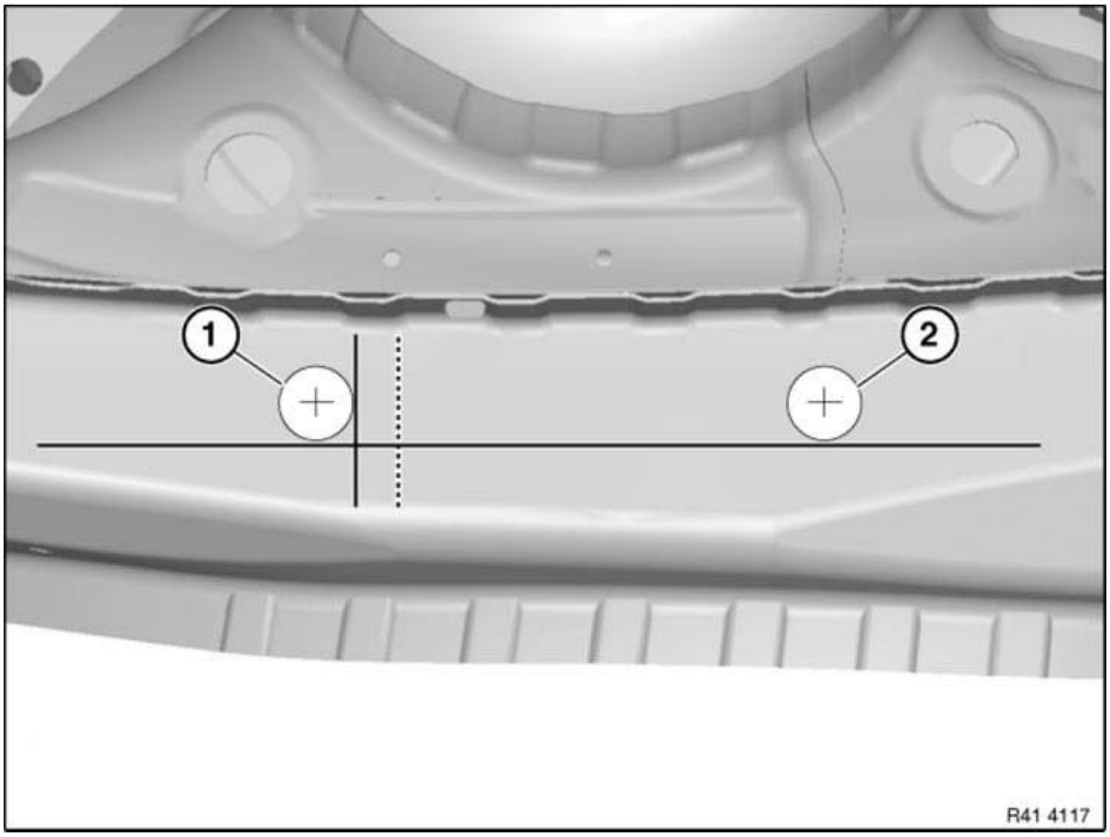


Fig. 71: Adjusting Needle Stamping Unit Suction Feet Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Move suction feet of needle stamping unit to positions (1) and (2) shown.

- First adjust position (1)
- Then adjust position (2)

Press pushbutton (1) for vacuum pressure.

Then start stamping operation with pushbutton (2).

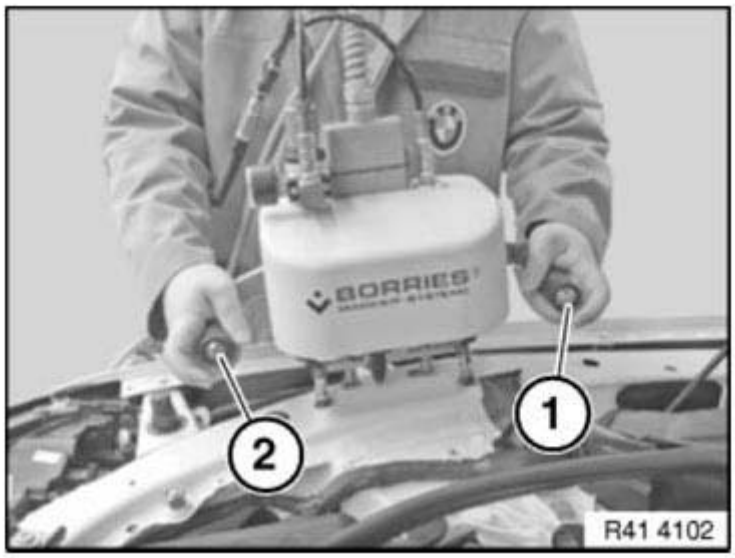


Fig. 72: Stamping Vehicle Identification Number
Courtesy of BMW OF NORTH AMERICA, INC.

Following layout functions are available:

LAYOUT FUNCTIONS REFERENCE CHART

Layout selection	Vehicle identification number
Layout 1	In line 1
Layout 2	In line 2
Layout 3	Turned through 180° in line 1
Layout 4	Turned through 180° in line 2
Layout 5	Cross through in line 1
Layout 6	Cross through in line 2

41 00 ... STRAIGHTENING ALUMINIUM COMPONENTS IN STRUCTURE

- **Reshaping or heating extruded sections and cast parts is not permitted!**

  Failure to comply with this requirement would have the following results:

In the case of reshaping, weld seams (E52) or glued connections (E60, E61, E63, E64) tear in the surrounding area.

In the case of reshaping, the material loses up to 40 % of its original strength.

In the case of heating, the material loses up to 40 % of its original strength.

The adhesive is destroyed at temperatures =120 °C (E60, E61, E63, E64).

Extruded sections and cast parts which show visible or measurable signs of deformation must be replaced.

Perform the check for deformation with the aid of the straightening system.

For optical testing, strip adjoining components in cases of doubt.

Extruded sections are used in the E52 as engine supports, door pillars, side members, etc.

Extruded sections are used in the E60, E61, E63, E64 as engine supports.

Cast parts are used in the E60, E61, E63, E64, E70, E71 as spring supports.

- Reshaping of extruded sections and cast parts may only be used to achieve optimum joining of connecting faces (e.g. when bulkhead is damaged). Reshaped parts must be replaced.
- Repairs which affect the mounting points of mechanical assemblies and chassis components must be carried out on the straightening bench. Use the vehicle-specific straightening attachment set or vehicle-specific data sheet.

  Straightening attachment supports and data sheets are also available for the top section, e.g.: door pillars, convertible top mounts, cowl, rear lid hinges, etc.

- Check windshield and rear window apertures for curvature by inserting the original glass.
- Take the gap dimensions for doors, engine hood and rear lid from the vehicle-specific gap dimension diagram.
- Exceptions on the E60, E61, E63, E64:

  Carrier support and bulkhead may be straightened if they do not have any cracks, sharp-edged damage or holes. After repair work, check parts again for cracks.

  Examine adjoining adhesive flanges for peeling off. If necessary, seal and preserve with **SEALING COMPOUND** .

  Observe the frame alignment control dimensions for the carrier support.

  Any repairs to the bulkhead if cracked outside the approved repair scopes are only permitted after consultation with and approval by BMW. Should you have any questions, please contact the country-specific Hotline.

41 00 ... STRAIGHTENING ALUMINIUM PARTS ON OUTER SKIN

1.0 Recommended tools

- Use only those tools specially intended for aluminium repairs.
- Do not use any tools that have already been used for steel repairs (contact corrosion).
- Do not use any sharp-edged tools (notch effect).

2.0 Straightening outer shell

- "Cold" straightening: Press dents out from their centre and smooth in an outwards direction with gentle taps.

  In the case of small, soft dents (hail and parking damage), this is also possible without damaging the paintwork. This work requires a special tool and a trained worker.

- "Hot" straightening: Heat dents in their central point only with a gas flame or hot air blower. Then quench the material with a wet cloth. Heating can only be detected by warpage of the material. The colour of the paint does not change.
- In the case of damaged areas which are only accessible from one side, stud welding can be used. The aluminium stud welded on in the centre of the damaged area is beaten out with a hammer until the dent is eliminated. The stud is then ground off.
- Avoid notching and cracking.
- Avoid hardening and overstretching.
- Avoid heating and overheating the outer shell over large areas.

41 00 ... STRAIGHTENING STEEL COMPONENTS IN THE STRUCTURE

- High-strength and super-high-strength steel plates as a rule cannot be reshaped. Reshaping only serves as a preparatory measure to replacing the component in order to achieve optimal joining of the connection points.
- Bearing body components such as e.g. engine supports, door pillars, side members etc. with deformations which can no longer be returned to their original shape by "cold straightening" must be replaced.

  Heating bearing body components for better reshaping is not permitted!

  Failure to comply with this requirement would result in a loss of original strength of up to 40 %.

- **The body must be anchored as follows for reshaping:**

  If using vehicle-specific/universal straightening attachment sets (Carbench/Celette/Car-O-Liner), it is necessary to secure the body **additionally** with 4 retaining clips to the spot flange of the entrance or to the 4 jacking points. The spot flange (if available) is to be preferred.

  If using universal electronic or mechanical straightening systems (Car-O-liner/Celette), it is necessary to secure the body with 4 retaining clips to the spot flange of the entrance or to the 4 jacking points. The

spot flange (if available) is to be preferred. In **addition** anchor at least 2 points with the securing set.

Failure to comply with these instructions will result in damage to the body during reshaping in non-damaged areas. Vehicle-specific straightening attachments and universal mounts may be damaged.

- Repairs affecting the mounting points of assemblies and chassis/suspension components must be carried out on the straightening bench with the matching straightening attachment set or specification sheet for the vehicle.

  Straightening attachments and specification sheets are also available for the top section, e.g.: door pillars, convertible top mounts, cowl, rear lid hinges, etc.

- Check windshield and rear window apertures for curvature by inserting the original glass.
- Take the gap dimensions for doors, engine hood and rear lid from the vehicle-specific gap dimension diagram.

41 00 ... STRAIGHTENING STEEL PARTS ON OUTER SKIN

1.0 Recommended tools

Only use those tools designed for steel repairs.

2.0 Straightening outer shell

- "Cold" straightening: Press dents out from their centre and smooth in an inwards direction with gentle taps.

  In the case of small, soft dents (hail and parking damage), this is also possible without damaging the paintwork. This work requires a special tool and a trained worker.

- "Hot" straightening: Heat dents in their central point only with a gas flame until bright red hot. Then quench the material with a wet cloth.
- Stud welding can be used in the case of damage where access is only possible from one side. Weld on the stud in the middle of the damaged area. The steel pin or shim is driven out using a hammer until the depression is removed. The stud, pin or shim is then ground or twisted off.
- Avoid cracking.
- Avoid hardening and overstretching.
- Avoid heating and overheating the outer shell over large areas.
- If, after steel parts have been straightened, the surface shows no dents larger than 2 mm, these dents may be touched up with knifing filler.

  Dents larger than 2 mm must be treated with filling solder.

NOTE: Only applicable within the European Union!

European used-car regulations prohibit the use of tin containing lead in motor vehicles introduced after 01.07.2003!

- For safety vehicles, follow the special notes and information in the repair instructions.

41 00 ... USE OF MATERIALS IN OUTER SKIN

The following illustration is a schematic representation of all the body variants.

Apply this illustration to the relevant vehicle.

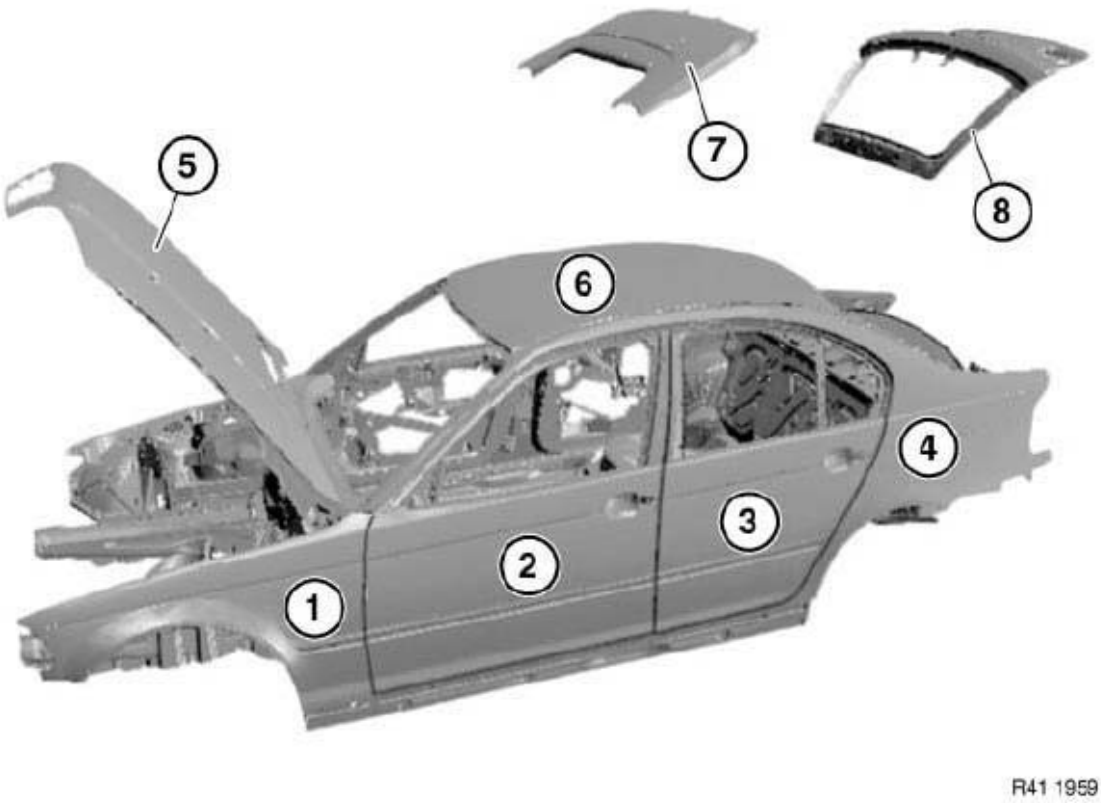


Fig. 73: Identifying Body Components
Courtesy of BMW OF NORTH AMERICA, INC.

All components not listed in the table below are composed of established sheet steel qualities.

BODY COMPONENT MATERIAL REFERENCE CHART

Component	Vehicle	Material
(1) Side panel, front	E52 (Z8)	Aluminium
	E60, E61	Aluminium
	E63, E64	Plastic (thermoplastic)
	E65, E66:	Aluminium
	E70, E71, E92, E93	Plastic (thermoplastic)

	E89 (Z4)	Aluminium
(2) Front door	E36/C (M3)	Aluminium or steel
	E36/2 (M3)	Aluminium or steel
	E52 (Z8)	Aluminium
	E63, E64	Aluminium
(4) Side panel, rear	E52 (Z8)	Aluminium
(5) Engine compartment lid	E38 (750i)	Aluminium or steel
(5) Engine compartment lid	E46/C (M3)	Aluminium
	E46/2 (M3)	Aluminium
	E52 (Z8)	Aluminium
	E60, E61, E63, E64	Aluminium
	E65, E66, E70, E71	Aluminium
	E85 (Z4)	Aluminium
	E92 (M3)	Aluminium
	E89 (Z4)	Aluminium
(6) Hardtop/roof	E36/C	Aluminium
	E36/7 (Z3)	Plastic (glass fibre/epoxy resin)
	E46/C	Aluminium
	E46/2 (M3 CSL)	Plastic (CFK)
	E52 (Z8)	Plastic (PU)
	E85 (Z4)	Plastic (SMC)
	E63 (M6)	Plastic (CFK)
	E89 (Z4)	Aluminium
(7) Soft top compartment lid	E46/C	Magnesium
	E64 Plastic	(SMC)
(8) Rear lid	E46/2 (M3 CSL)	Plastic (SMC)
	E52 (Z8)	Aluminium
	E63, E64	Plastic (SMC)

41 00 ... VEHICLE IDENTIFICATION NUMBER, GENERAL

In the event of repair 2 procedures are used, depending on the vehicle. Refer to the vehicle-specific repair instructions for the correct procedure.

1. General notes for stamped vehicle identification numbers

The vehicle identification number is stamped with a special tool. There are different special tool numbers and stamping procedures for the various vehicles. Refer to the relevant repair instructions.

In repair work, the vehicle identification number is always stamped into a replacement vehicle identification number surface. The replacement surface is usually situated under the original VIN surface.

The IGEF number (bodyshell number) is omitted when the wheel arch is replaced.

In the event of component or body replacement by the BMW garages/workshops, clearly delimit the vehicle identification number at front and rear by stamping a + in place of the BMW badge.

If a VIN is stamped into the replacement surface in addition to the original VIN (e.g. if the original VIN has been tampered with), the following applies: The original VIN must be crossed out. To do so, stamp the letter I from the punch digits lengthways through the original VIN.

IMPORTANT: Do not use an angle grinder in conjunction with a cutting disk!

The protective film used as standard is omitted after the VIN has been manually stamped in. Paint area in accordance with BMW Painting Handbook. Ensure that layer thicknesses are small.

Observe national/country-specific regulations.

2. General notes for embossed vehicle identification numbers

This procedure is used on all newly launching model series from model year 09/2008 (exception X1).

For the repair new parts with an embossed vehicle identification number can as a rule be ordered from the BMW Parts Department. If this is not possible, observe country-specific regulations.

The IGEF number (bodyshell number) is omitted when the wheel arch is replaced.

If a VIN is embossed into the replacement surface in addition to the original VIN (e.g. if the original VIN has been tampered with), the following applies: The vehicle-specific repair instructions describe the procedure.

The protective film used as standard is omitted after the VIN has been embossed. Paint area in accordance with BMW Painting Handbook. Ensure that layer thicknesses are small.

Observe national/country-specific regulations.

41 00 ... WELDING IN REINFORCEMENT PLATE (STEEL PLATE)

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is welded in to ensure sufficient strength.

Follow notes for welding steel parts.

NOTE: The following illustrations serve as general illustrations of reinforcement plate repair work. They are applicable to all cutting repairs.

Mark component in accordance with distance A and cut.

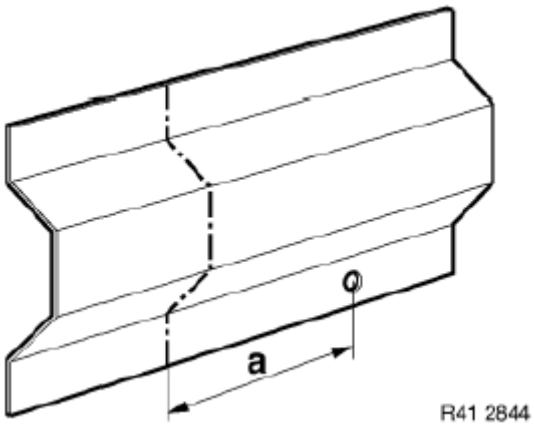


Fig. 74: Identifying Component Cutting Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Cut new part (1) in accordance with cut and if necessary adjust to fit with straightening attachment or universal mount.

Installation:

Adhere to a gap at severance cut of approx. one to max. two material thicknesses in order to ensure welding with the reinforcement plate and to facilitate a more tolerant fit.

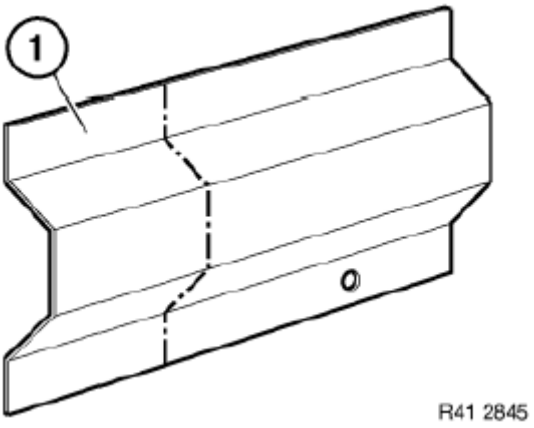


Fig. 75: Identifying Cut Position Of Part
Courtesy of BMW OF NORTH AMERICA, INC.

Clean inner and outer sides of connecting areas (1) on new part and (2) on body.

Coat inner sides with welding primer.

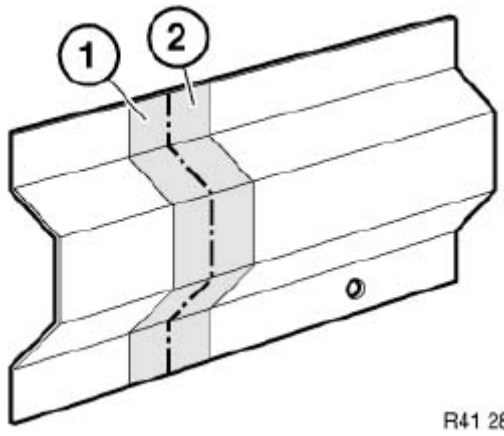


Fig. 76: Identifying Inner And Outer Sides Of Connecting Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Drill holes (1) and (2) at distance of 25 mm to each other.

Hole diameter approx. 8 mm.

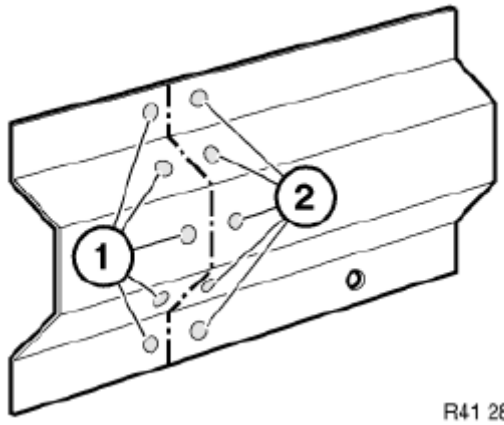


Fig. 77: Identifying Drill Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Make reinforcement plate (1) from trim of new part.

If necessary, make further reinforcement plates.

Length of reinforcement plates is min. 40 mm.

Coat reinforcement plates (1) and (2) on both sides with welding primer.

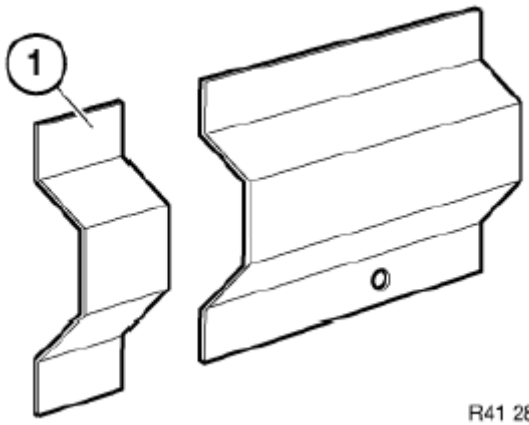


Fig. 78: Identifying Reinforcement Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Push reinforcement plate (1) into component on body up to half way and plug-weld (3).

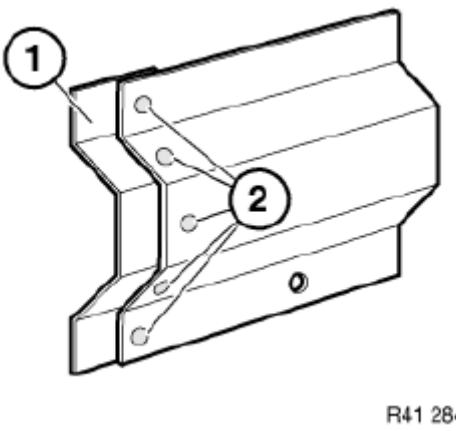


Fig. 79: Pushing Reinforcement Plate Into Body Component
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust new part (1) to fit with straightening attachment or universal mount and plug-weld (2).

MAG weld joint (3).

Grind and clean weld seam and plug weld spots.

Only visible areas of the outer skin and worn areas on the support carrier must be tinned.

All areas which have covers on the vehicle are not to be tinned.

NOTE: Only applicable within the European Union!

European used-car regulations prohibit the use of tin containing lead in motor vehicles introduced after

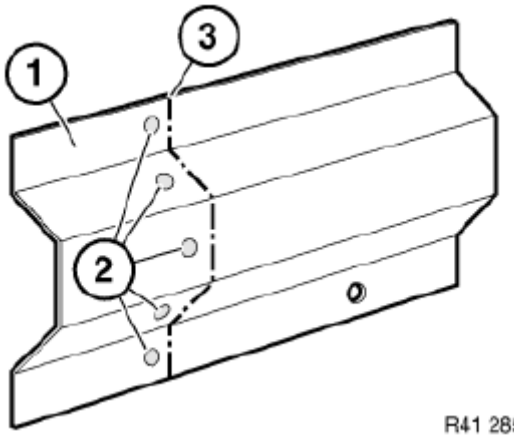


Fig. 80: Identifying Plug-Weld And MAG Weld Joint
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... WELDING STEEL COMPONENTS

IMPORTANT: Comply with the following topics from "Body, General":
Safety regulations See 4100... SAFETY AT WORK or 4100... SAFETY AT WORK.
Handling electrical/electronic equipment, airbags and restraint systems See 4100... HANDLING AIRBAGS AND RESTRAINT SYSTEMS or 4100... HANDLING ELECTRICAL AND ELECTRONIC EQUIPMENT.

1. General information

- The following procedures are used for repairs:

- MAG welding (**M** etal **A** ctive **G** as welding)
- Resistance pressure spot welding (referred to in the following and in the repair instructions as spot welding).

- Take the number and location of weld spots and MAG weld seams from the separated part. Replace areas inaccessible to spot-welding tongs with MAG plug/spot welds at the same distance. Diameter of bores for plug/spot welds 8 mm.
- In the case of emissions extraction, observe a minimum distance of 30 cm for MAG welding during the welding process. Otherwise the inert gas would be drawn off.
- Follow the equipment manufacturer's instructions for use.

2. Work materials

- MAG welding:

- Steel welding apparatus (see **WORKSHOP EQUIPMENT**).

- Steel welding wire - G3SI1 (SG2) or alternatively G4SI1 (SG3)

- Welding mask
- Gas bottle containing inert gas (82 % argon, 18 % CO 2)

- Resistance pressure spot welding:

- Spot-welding apparatus (see **WORKSHOP EQUIPMENT**).
- Protective goggles

3. Preparations for MAG and spot-welding

- Remove the paint coating in an area of approx. 30 mm around the weld seam or spot.
  - The zinc coating underneath must be removed during the MAG welding operation.
  - It is not necessary to remove the zinc coating underneath during spot-welding.
- Remove the paint coating on the reverse side of the weld seam or spot.
  - Contaminants will otherwise enter the weld pool via the root of the weld seam.
  - An insufficient electron flow prevents an optimum spot-weld joint.
- Coat all metal overlaps and weld spot flanges with welding primer.
- To determine the optimum electrode contact force for spot-welding, carry out spot-weld shear tests on sample metal sheets.
- In order to keep the electron flow short during MAG welding on the body, you must if possible attach the ground terminal directly to the component to be welded.

4. Welding

- During MAG welding, the weld gap must be kept as small as possible. The larger the weld gap, the lower will be the strength of the joint.
- During spot-welding, the metal flanges to be joined must be placed as close together as possible without gaps.

The larger the gap, the lower will be the strength of the joint.

Minimum gap between welding spots 25 mm.

5. Subsequent treatment of weld joints

- When grinding a weld seam, do not grind thin the base material next to the seam.
- After joining, clean all weld seams and spots with a stainless steel wire brush.
- Remove burnt paint with a stainless steel wire brush.
- All weld joints sealed off with body sealing compound in original state must be primed and sealed off again thoroughly after repairing. Replace damaged or removed anti-drumming layers.

41 00 ... WORKING WITH 2-COMPONENT PU CAVITY FOAM

Sourcing reference for cavity foam.

Properties of cavity foam:

- 2-component PU foam, solvent-free.
- Excellent flow capacity, enabling complete sealing of cavities.
- Good strength, preventing slipping in cavities.
- Low water absorption, preventing corrosion.
- Ideal for use as insulating and sealing compound

Information on dangers/hazards

- Avoid eye and skin contact.

  Wear protective goggles, solvent-resistant protective gloves and protective clothing.

- Do not inhale.

  Apply in well ventilated rooms only.

- **WARNING: Application time after mixing: within 8 minutes!**

  Completely empty open can after use.

- Remaining amounts which are not used can cause the can to explode on account of a chemical reaction (buildup of heat)!

  Alternatively, cool the can containing the non-removed remaining amount for several hours in cold water.

- Do not eat, drink or smoke during this operation.
- Keep heat and ignition sources well away.
- Read the manufacturer's information on hazards/dangers (printed on the can) prior to application.

Application instructions

- Use by date on can.

  Do not use the spray can after the Use by date on the can has expired. After the Use by date the properties of the cavity foam will no longer meet the requirements of the BMW Group.

- Cavity sealing of repair area possible after an air drying time of 1 hour.
- Backing surface must be

  clean and free from

dust,

grease,

oil and stripping agent.

- Application temperature at least 15 °C. Optimally 20 °C.
- Remove fresh, non-hardened PU foam with adhesive cleaner 208.

  Hardened PU foam can only be removed by mechanical means (machine).

- Excess, hardened PU foam can be disposed of as residual waste.

  Cans which are not entirely empty and unused whose Use by date has expired are classed as hazardous waste.

  Observe country-specific waste-disposal regulations.

- Observe the manufacturer's application instructions (printed on the can).
- **IMPORTANT: Foam expands many times over as it sets (change in volume).**
- Setting takes approx. 30 minutes. Mechanical processing (e.g. drilling, cutting, etc.) is then possible.

41 00 ... WORKSHOP EQUIPMENT

Minimum workshop equipment requirements in order to ensure the correct and expert performance of body repairs:

The tools listed below **must be used.**

All repair stages:

WORKSHOP EQUIPMENT - ALL REPAIR STAGES

	Steel		Aluminium	
Tool(1)	**Structure**	**Outer skin**	**Structure**	**Outer skin**
Vaupel pressure cup spray gun for cavity preservation	x	x	x	x
(1) Sourcing reference **BMW Workshop Equipment Catalogue**				

Repair stage 1:

WORKSHOP EQUIPMENT - REPAIR STAGE 1

	Steel		Aluminium	
Tool(1)	**Structure**	**Outer skin**	**Structure**	**Outer skin**
Body tool trolley	x	x		x

Aluminium bodywork tool assortment			x	x
(1) Sourcing reference **BMW Workshop Equipment Catalogue**				

Repair stage 2:

WORKSHOP EQUIPMENT - REPAIR STAGE 2

	Steel		Aluminium	
Tool(1)	**Structure**	**Outer skin**	**Structure**	**Outer skin**
Body tool trolley	x	x		
Bodywork saw	x	x		
Belt sander	x	x	x	x
Single-handed grinder	x	x	x	x
Welding spot remover	x	x		
Universal riveting tool	x	x	x	
Punch riveting tool	x	x	x	
CARTRIDGE GUN for adhesives	x	x		x
(1) Sourcing reference **BMW Workshop Equipment Catalogue**				

Repair stage 3:

WORKSHOP EQUIPMENT - REPAIR STAGE 3

	Steel		Aluminium	
Tool(1)	**Structure**	**Outer skin**	**Structure**	**Outer skin**
Body tool trolley	x	x		
Aluminium bodywork tool assortment			x	x
Bodywork saw	x	x		
Belt sander	x	x	x	x
Single-handed grinder	x	x	x	x
Welding spot remover	x	x		
Drill	x		x	
MAG welding apparatus	x	x		
MIG welding apparatus			x (E52 only)	
Spot welding apparatus	x	x		
Gas welder		x		
Straightening system	x		x	
Stud welding apparatus	x		x	
Flame coating set			x	
Universal riveting tool			x	
CARTRIDGE GUN for adhesives	x	x	x	
(1) Sourcing reference BMW Workshop Equipment Catalogue				

IMPORTANT: In vehicles from model year 2001, higher-tensile and high-tensile steels are used in certain areas.
It is essential to check whether the spot-welding apparatus used conforms to the technical requirements of the currently recommended welding sets. Should you have any questions, please contact the country-specific Hotline.
The use of technically obsolete equipment may have serious consequences for the structure of the vehicle (e.g. in the event of a crash). In the end, this can result in safety and product liability risks which can not be calculated.

Use and restrictions:

Definition of recommendation:

All currently recommended spot welding sets comply according to the latest information with the requirements relating to reliable welding of today's and future BMW Group vehicles. A spot welding unit will loose its recommendation as soon as tests with materials and material combinations designated for future use in BMW Group vehicles return negative results. All previous application before the withdrawal of the recommendation shall remain unaffected.

BMW DEVICE DESIGNATION CHART

	Device designation	**Manufacturer**
Group 1 Devices currently no longer recommended	CR500	Car-O-Liner
	Spot9000	Tecna
	ATL 400V	Wielander&Schill
Group 2 Devices currently recommended	MIDIspot QSVM9000	Celette(1)
	MIDIspot QSVM9000	Elmatech(1)
	CR600 QSM	Car-O-Liner(1)
	MIDIspot QSVM12000T	Car-O-Liner
	Multispot MI-100 Control	Elektron
	MIDIspot QSVM12000T	Elmatech
(1) no longer produced		

Application options and restrictions of above devices.

BMW DEVICE DESIGNATION CHART - APPLICATION AND RESTRICTIONS

Vehicle	**Group 1**	**Group 2**
All convertibles from E64	x Except A-pillar, B-pillar, sill	x
All model series from E70	x Except B-pillar	x

NOTE: Status October 2009

All vehicles not mentioned can be repaired with the equipment of Group 1 and Group 2.

4111 SUPPORT MEMBERS

41 00 ... PROCEDURE FOR FOLDING HARDTOP AFTER AN ACCIDENT

The hardtop may be under tension after the vehicle has incurred damage following an accident. Moving the hardtop by hydraulic means may result in irreparable damage. For this reason, the hardtop may only be moved manually until the damaged has been repaired.

IMPORTANT: It is not possible to check the correct operation of the folding roof on the damaged vehicle.

Different procedures are required, depending on the degree of damage which the vehicle has incurred. The repair instructions for emergency operation See **5437290 HARDTOP EMERGENCY OPENING** or **5437295 EMERGENCY CLOSING HARDTOP** describe only the complete sequences for manually opening and closing the hardtop.

When removing the roof module and/or the rear module, it is possible to move the hardtop manually into the necessary intermediate positions in each case.

WARNING: Risk of injury due to the heavy weight of the hardtop!
Since the hydraulic system may have to be depressurized during manual movement of the hardtop, there is an increased risk of injury by trapping. Secure the hardtop permanently and adequately against unintentional movement.

After body repairs to the vehicle

All the hardtop components screwed/bolted to the body are precisely screwed/bolted to the vehicle at the factory by means of gauges. This affects above all the base plates and consoles of the roof and rear modules. To minimize extensive adjustment work after a body repair as much as possible, only remove those components which are screwed/bolted to a damaged body part.

- Gauge the base plates *only* after a body repair to the cowl panel.

41 11 141 REPLACING COVER FOR LEFT OR RIGHT FRAME SIDE MEMBER (PARTIAL REPLACEMENT BETWEEN A- AND B-PILLARS)

Read contents of **BODY, GENERAL** .

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Following new body parts are required:

- (1) Outer rocker panel

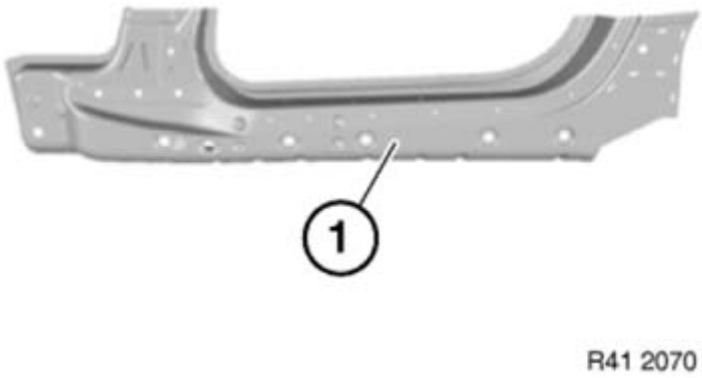


Fig. 81: Identifying Outer Rocker Panel
Courtesy of BMW OF NORTH AMERICA, INC.

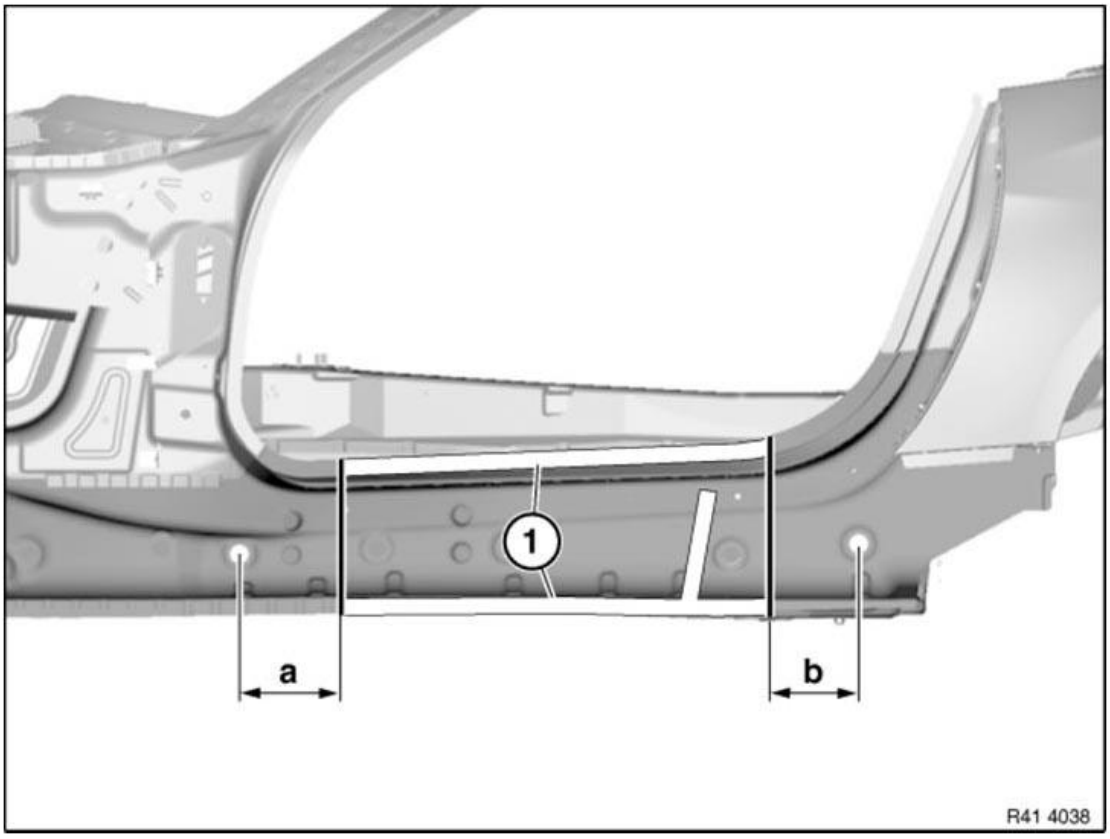


Fig. 82: Identifying Weld Joints Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified measurements and cut.

Distance a = approx. 150 mm behind bore dia. 25 mm.

Distance b = approx. 130 mm before bore dia. 25 mm.

Release weld joints in areas (1) and remove outer rocker panel.

Installation:

Weld in **REINFORCING PANELS** at all severance cuts.

41 11 155 REPLACING COVER FOR LEFT OR RIGHT SIDE MEMBER (PARTIAL REPLACEMENT, DOOR PILLAR)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific procedure See **4100... SPOT-WELD BONDING STEEL PARTS** or **4100... OPENING ADHESIVE BONDS**.

Place vehicle on straightening bench.

Necessary preliminary tasks

- Remove **FRONT SIDE PANEL**
- Remove rear side panel See **4135111 REPLACING REAR RIGHT SIDE PANEL** or **4135101 REPLACING REAR LEFT SIDE PANEL**
- **REMOVE DOOR**

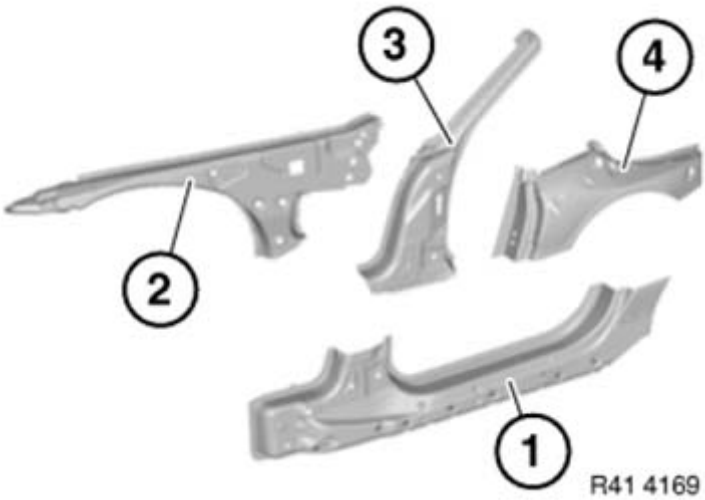


Fig. 83: Identifying Entrance, Carrier Support, Wheel Arch, A-Pillar And B-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

- (1) Entrance, outer
- (2) Carrier support, wheel arch
- (3) A-pillar, outer

- (4) B-pillar, outer

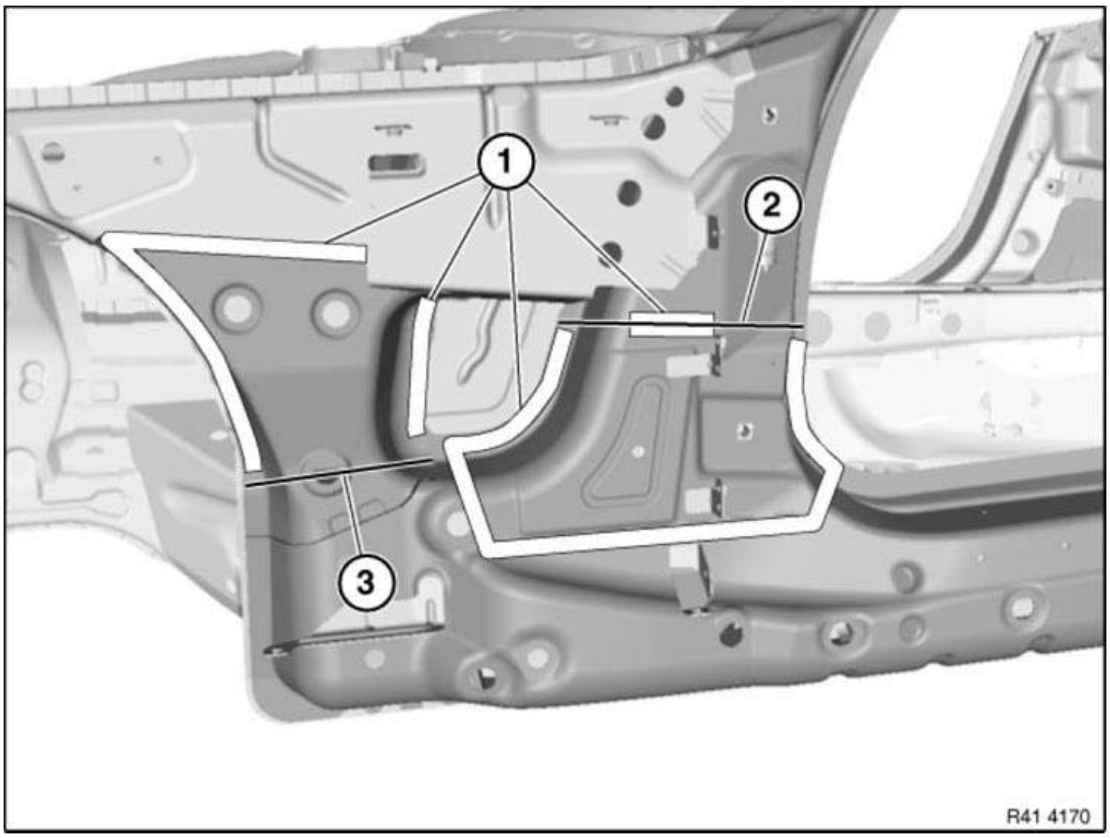


Fig. 84: Identifying Weld Joints And Spot-Welded Adhesive Joints Areas With Cuts
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints and spot-welded adhesive joints in areas (1).

Mark severance cuts (2) and (3) and cut.

IMPORTANT: Cut only outer plates.

Installation:

No reinforcing panel is welded in at severance cut (2).

Execute severance cut (2) so that there is an overlap to new entrance part.

Open weld joints in areas (1).

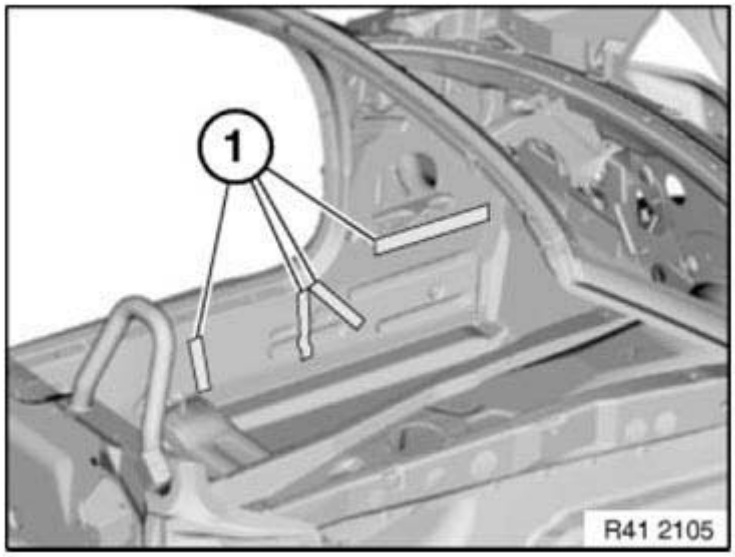


Fig. 85: Identifying Weld Joint Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) and cut.

Open weld joints and spot-welded adhesive joints in area (2).

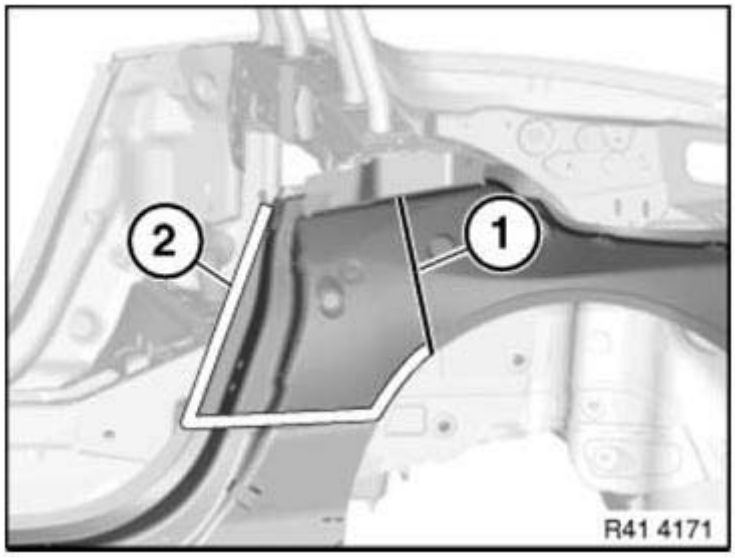


Fig. 86: Identifying Weld Joints And Spot-Welded Adhesive Joints Areas With Cuts
Courtesy of BMW OF NORTH AMERICA, INC.

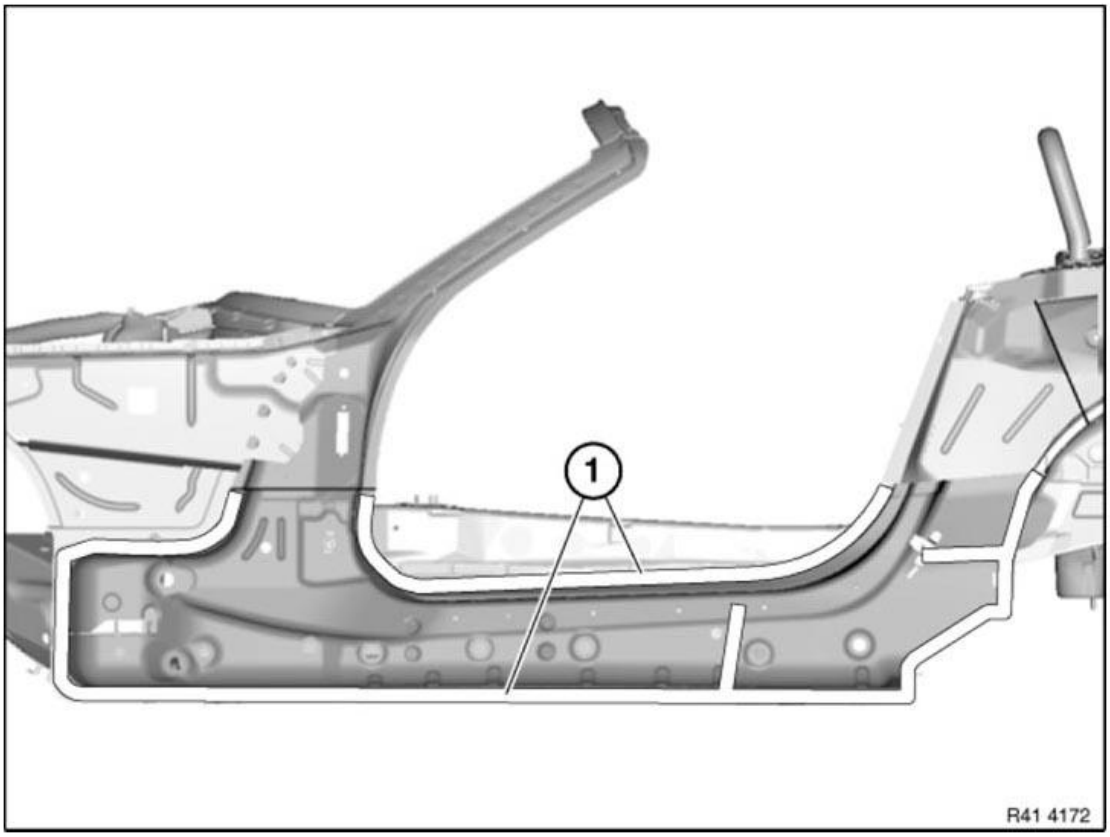


Fig. 87: Identifying Weld Joints And Spot-Welded Adhesive Joints Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints and spot-welded adhesive joints in area (1).

Installation:

Slide **outer entrance** underneath remaining A-pillar.

Adhere to specific procedure with regard to spot-welded adhesive joints.

When welding the new part, make sure that the adhesive joints of adjoining components are not damaged by the application of heat.

41 21 512 REPLACING DOOR PILLAR INNER SECTION (DOOR PILLAR REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on the E85. Observe specific procedure See **4100... SPOT-WELD BONDING STEEL PARTS** or **4100... OPENING ADHESIVE BONDS**.

Place vehicle on straightening bench.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

- (1) Support, A-pillar

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N1	4
CleanerR1	1
Sealing compoundD1	

Fig. 88: Identifying Support And A-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

View from inside.

Open weld joints in areas (1).

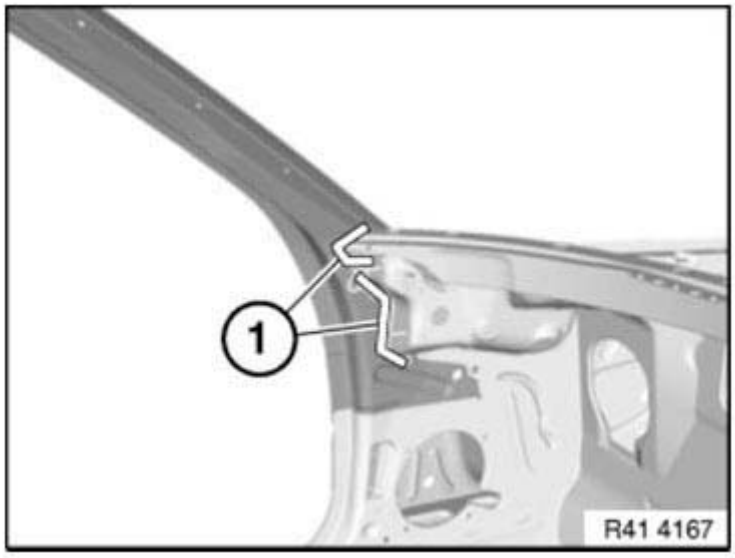


Fig. 89: Identifying Weld Joint Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

Open spot-weld bonded joints in area (2)

Installation:

Adjust new part to fit with straightening attachment or universal mount.

Apply adhesive K5a in area (2). Rivet new part with 4 blind rivets N1. Before applying adhesive, clean bonding surfaces with adhesive cleaner.

Observe fitting of door pillar when selecting the rivet positions.

When welding the new part, make sure that the adhesive joints of adjoining components are not damaged by the application of heat.

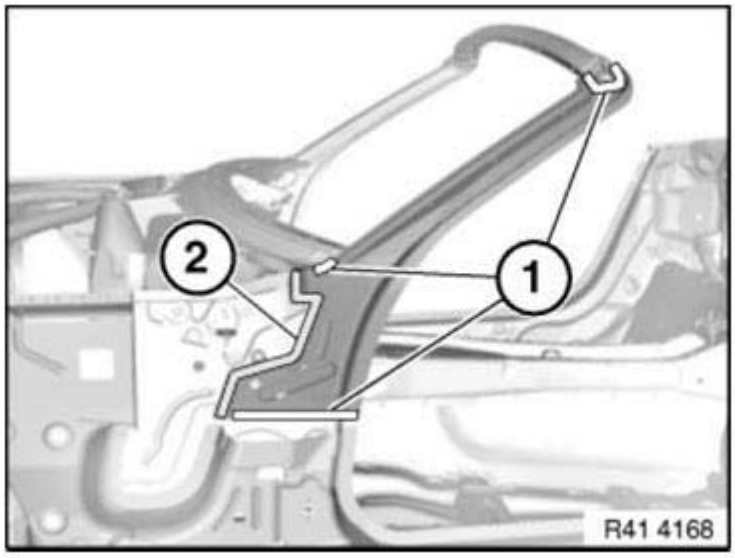


Fig. 90: Identifying Weld Joint Areas And Spot Weld Bonded Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 048 REPLACING FRONT LEFT ENGINE SUPPORT (WITHOUT WHEEL ARCH) (PARTIAL REPLACEMENT BEFORE BULKHEAD)

Read contents of **BODY, GENERAL** .

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Place vehicle on straightening bench.

- (1) Engine support, front

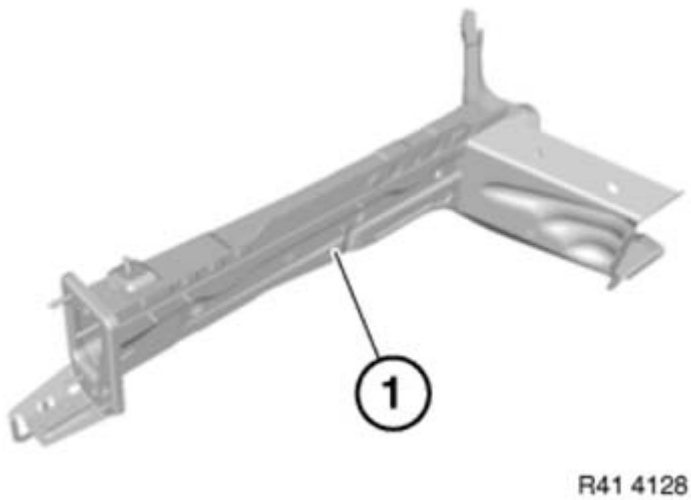


Fig. 91: Identifying Engine Support
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in area (1).

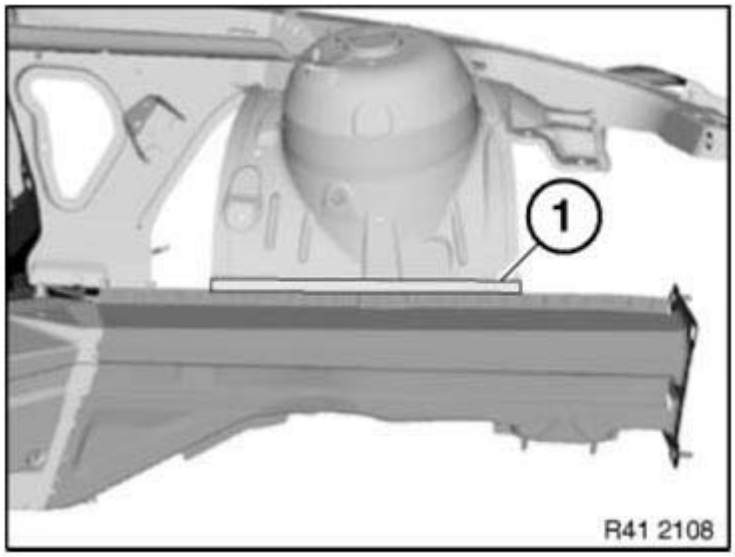


Fig. 92: Identifying Weld Joint Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

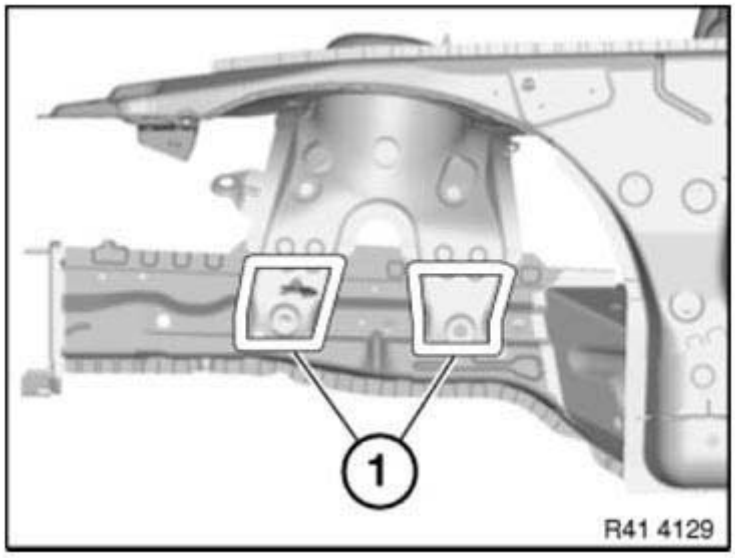


Fig. 93: Identifying Weld Joint Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) and cut.

IMPORTANT: Cut outer metal sheet only.

Installation information:

- **WELD IN REINFORCEMENT PLATE AT** at severance cut.

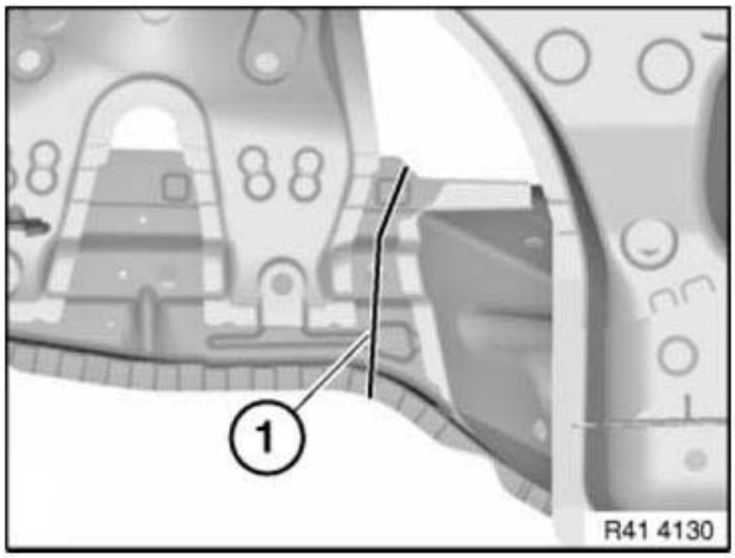


Fig. 94: Marking Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in area (1).

Remove engine support.

Installation:

Adjust new part to fit with straightening attachment or universal mount.

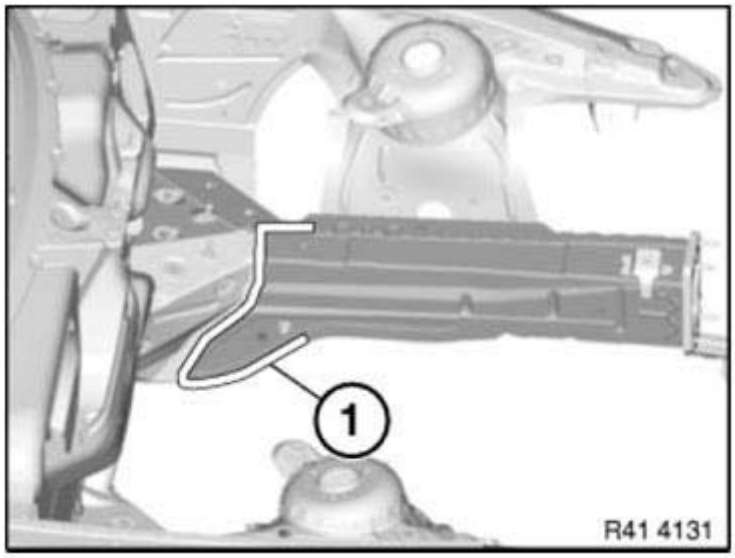


Fig. 95: Identifying Weld Joint Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 015 REPLACING FRONT LEFT OR RIGHT ENGINE BRACKET WITH WHEEL ARCH

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Place vehicle on straightening bench.

- (2) Wheel arch, front
- (1) Carrier support, wheel arch

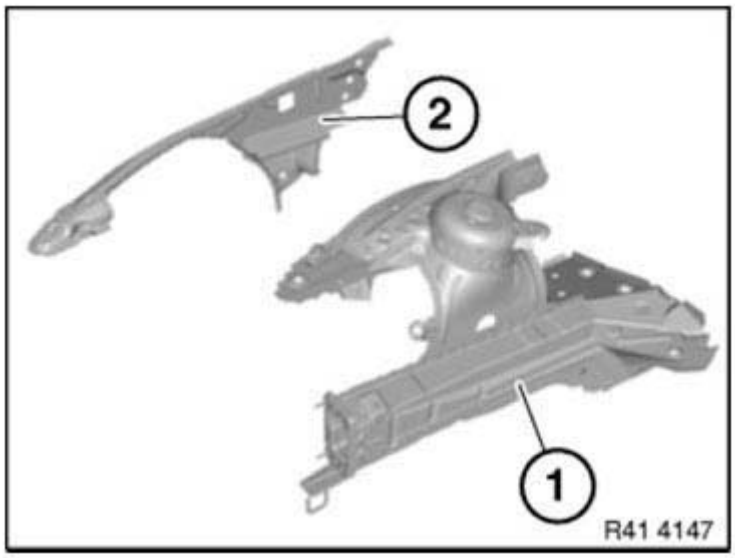


Fig. 96: Identifying Wheel Arch (Front) And Carrier Support
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) and cut.

IMPORTANT: Cut outer metal sheet only.

Open weld joints in area (2).

Installation information:

- Sheet section is needed again to seal bulkhead carrier support.
- **WELD IN REINFORCEMENT PLATE** at severance cut.

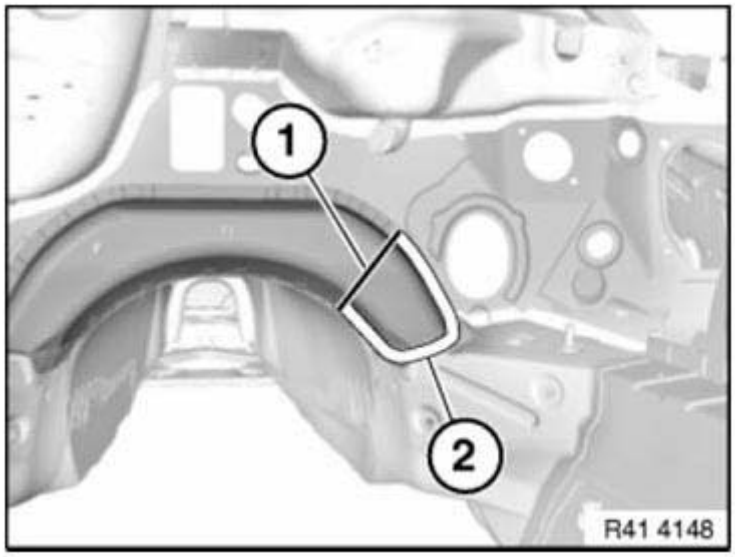


Fig. 97: Identifying Weld Joint Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

Open spot-weld bonded joints in area (2)

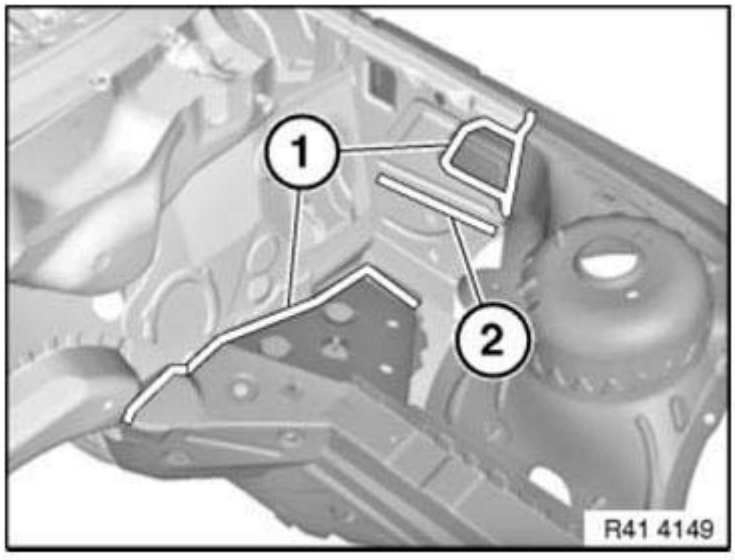


Fig. 98: Identifying Weld Joints Areas And Spot-Weld Bonded Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

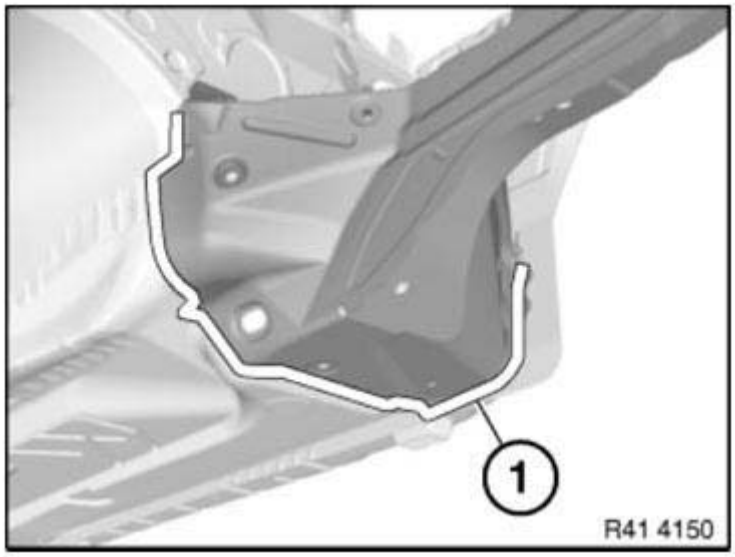


Fig. 99: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

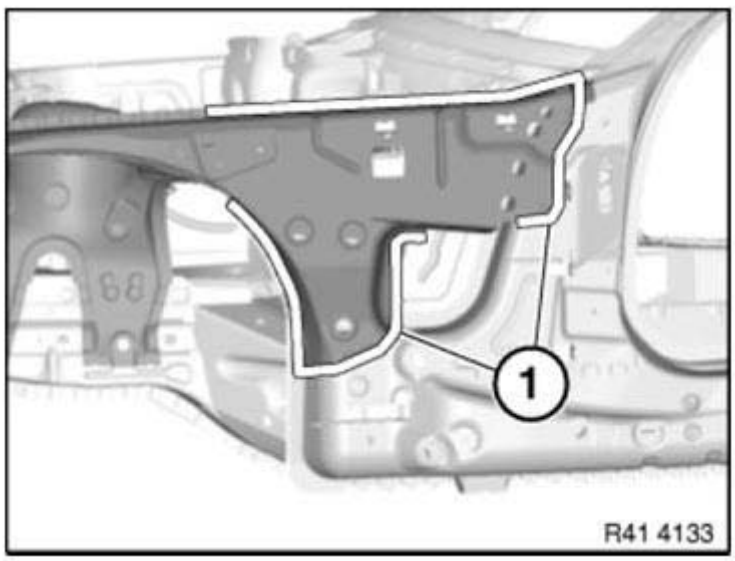


Fig. 100: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

Remove wheel arch with carrier support.

Installation:

Adjust new part to fit with straightening attachment or universal mount.

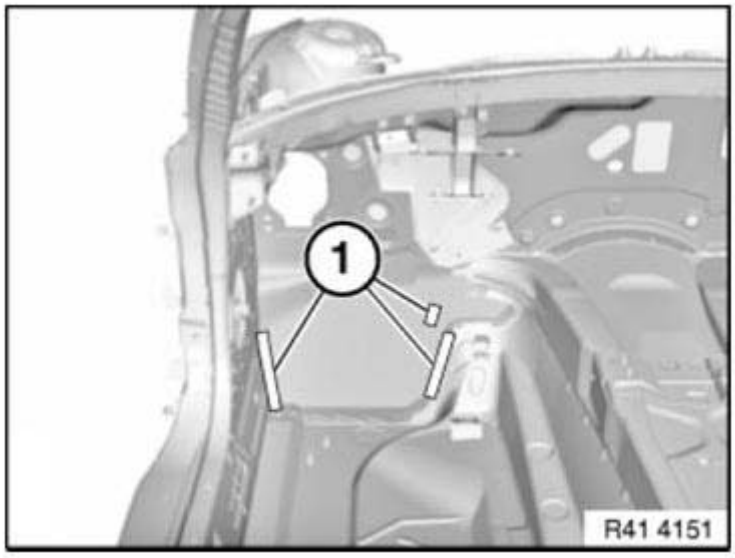


Fig. 101: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 516 REPLACING FRONT LEFT OR RIGHT SUPPORT CARRIER (PARTIAL REPLACEMENT, FRONT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE .

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

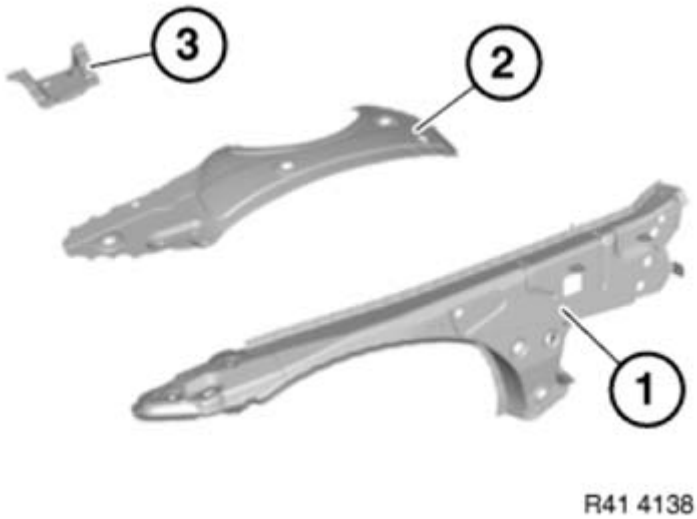


Fig. 102: Identifying Support Carrier, Wheel Arch, Front And Carrier Support, Wheel Arch, Inner

Courtesy of BMW OF NORTH AMERICA, INC.

- (1) Support carrier, wheel arch, front,
- (2) Carrier support, wheel arch, inner
- (3) Bracket, diagonal strut, carrier support

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N1	12
Punch rivets N5	12
CleanerR1	1
Cavity sealing wax remover	1
Sealing compoundD1	

Removing carrier support

View from below.

Mark severance cut (1) in accordance with specified measurements and cut.

Measurement a = 80 mm

Measurement b = 50 mm

IMPORTANT: Cut outer metal sheet only.

Open weld joints in areas (2).

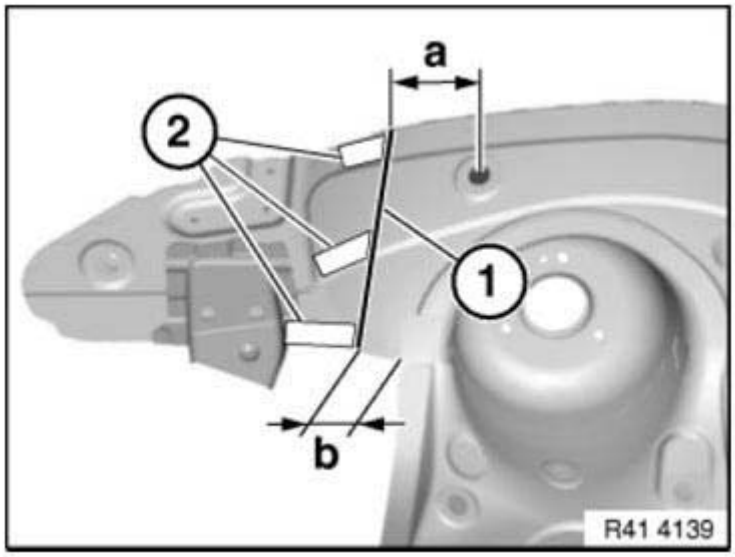


Fig. 103: Identifying Weld Joint Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Roughly mark severance cut (1) and cut.

Remove carrier support section (2).

Open weld joints in area (3) from below.

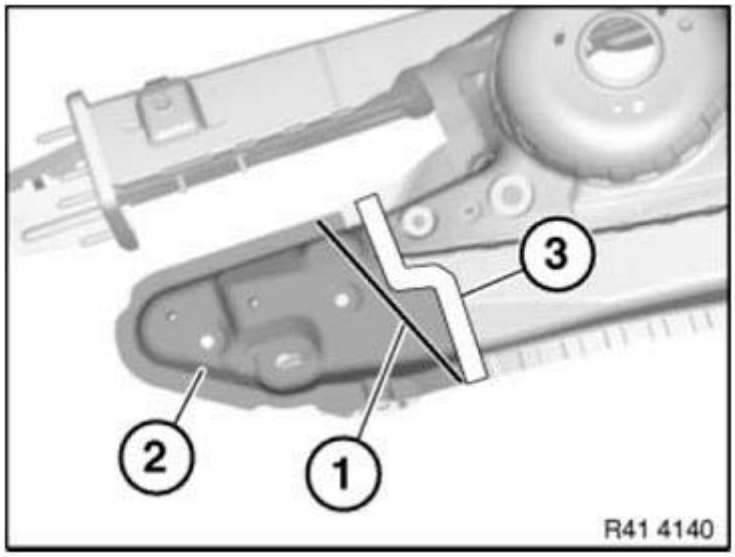


Fig. 104: Identifying Carrier Support Section With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Open weld joints in area (1).

Mark severance cut (2) in accordance with severance cut on vehicle + 20 mm extra material and cut.

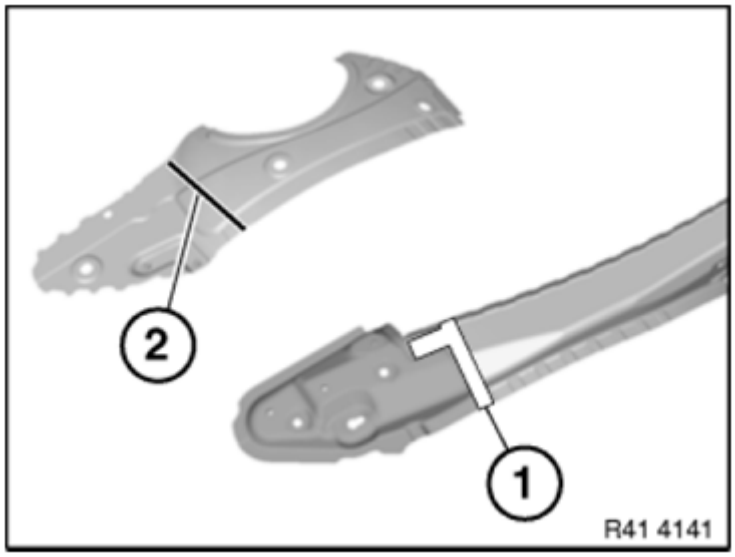


Fig. 105: Identifying Carrier Support Section With Weld Joints Area And Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Offer up new parts with attachments and fix in place.

Set four 6.8 mm dia. holes for blind rivets N1 in area (1).

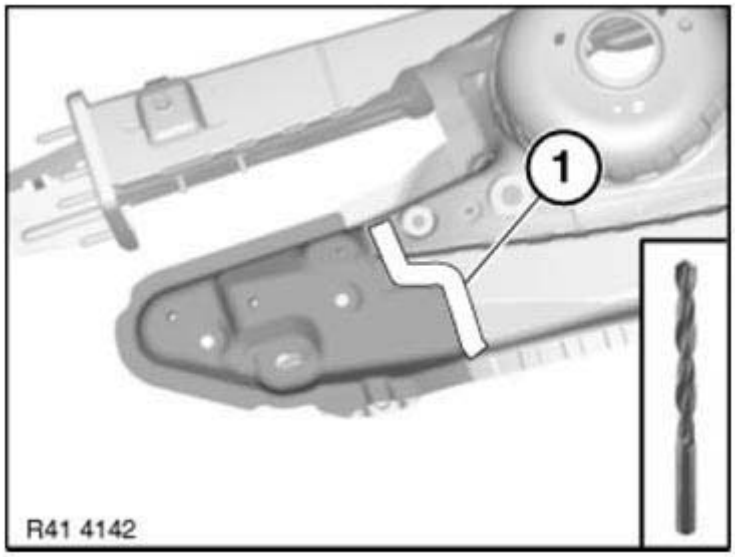


Fig. 106: Identifying Weld Joint Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

View from below

Diagonal strut must be fitted in order to adjust holder (1) to fit.

In areas (2) set eight 6.8 mm dia. holes for blind rivets N1.

Remove new parts again and deburr holes.

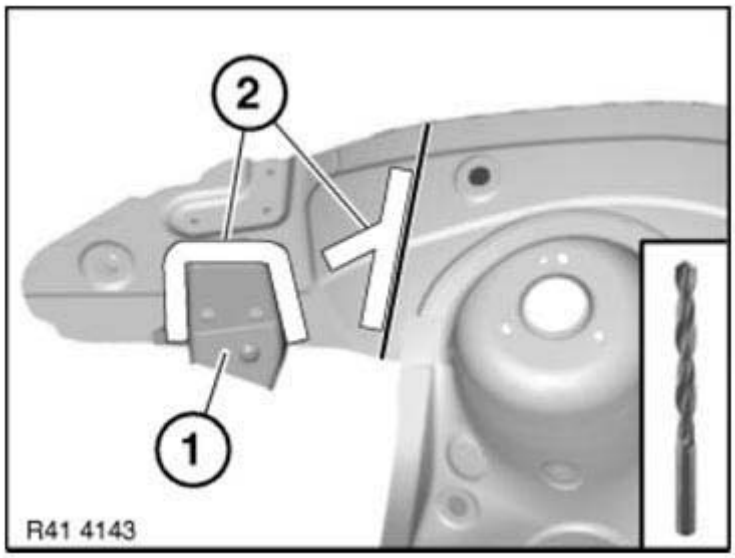


Fig. 107: Identifying Holder And Rivets Areas
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Installing carrier support

Clean all bonding surfaces on vehicle and on new part with cleaning agent R1.

Apply adhesive K5a to bonding surfaces.

Attach new part and attachments and rivet with blind rivets (1).

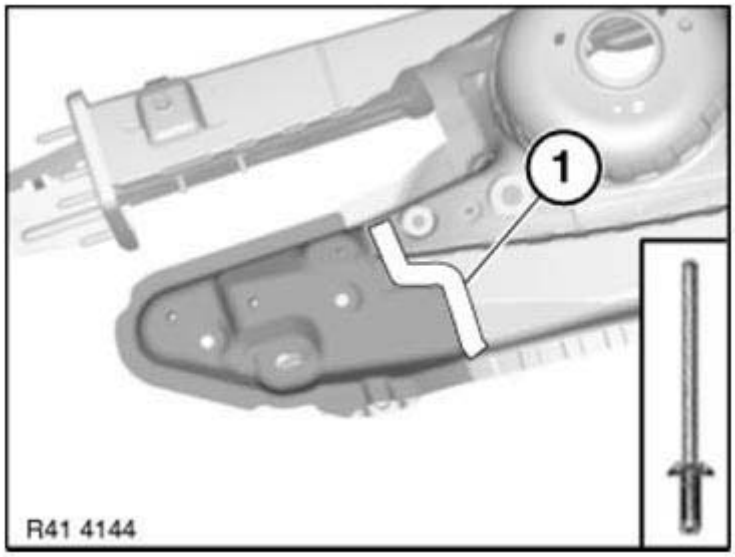


Fig. 108: Identifying Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Clean all bonding surfaces on vehicle and on new part with cleaning agent R1.

Apply adhesive K5a to bonding surfaces.

Mount new part and rivet with blind rivets (1).

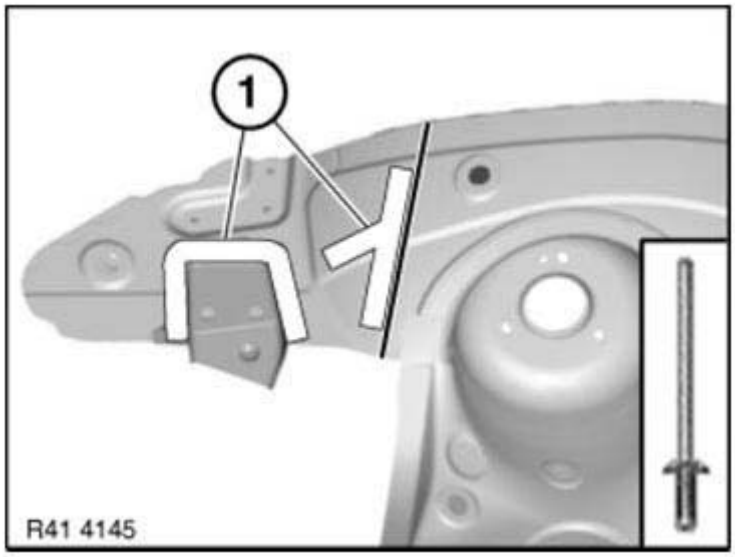


Fig. 109: Identifying Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

In area (1) rivet new parts with 12 punch rivets N5.

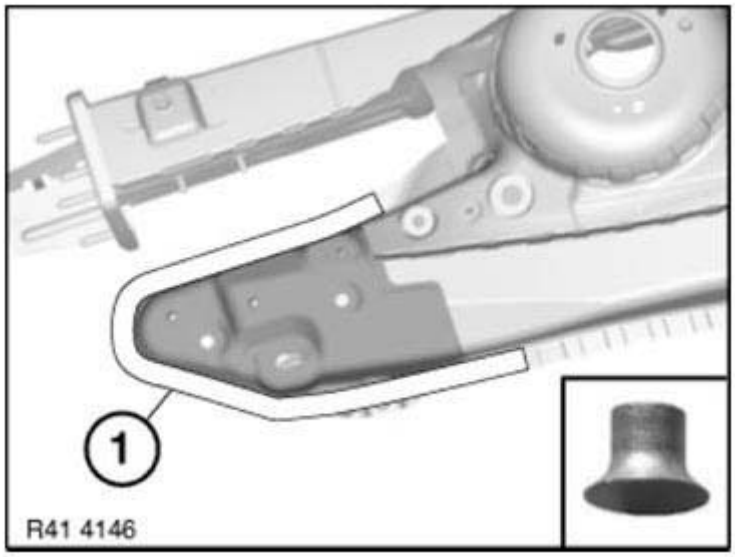


Fig. 110: Identifying Rivet Area
Courtesy of BMW OF NORTH AMERICA, INC.

Seal adhesive areas and blind rivets in accordance with right side of vehicle with sealant.

41 11 733 REPLACING FRONT LUGGAGE COMPARTMENT FLOOR CROSS-MEMBER (LUGGAGE COMPARTMENT FLOOR COMPLETELY REMOVED)

Read contents of **BODY, GENERAL** .

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Place vehicle on straightening bench.

Following new body parts are required

- (1) Cross-member, luggage compartment floor, front

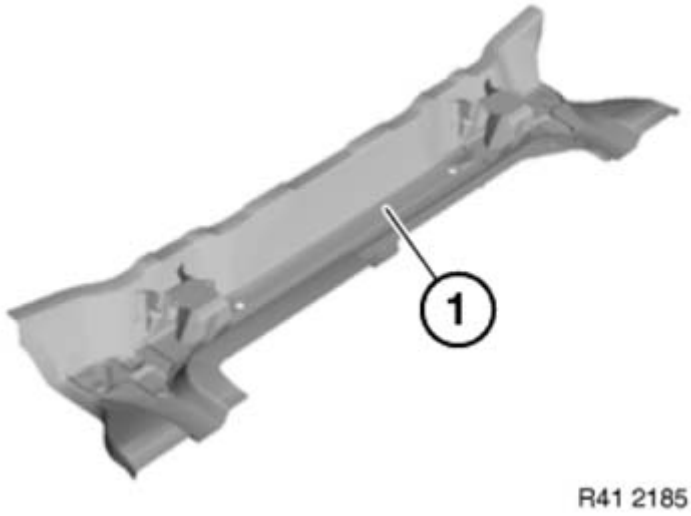


Fig. 111: Identifying Cross Member, Luggage Compartment Floor, Front
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in area (1) on left and right sides of car.

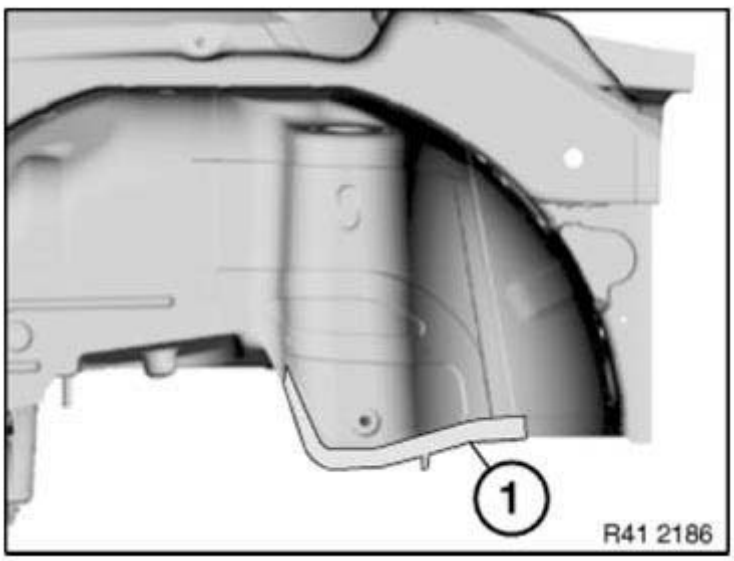


Fig. 112: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

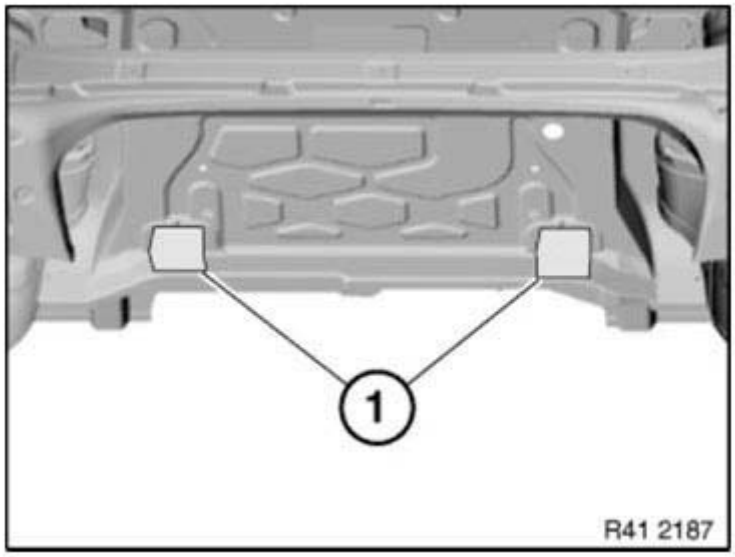


Fig. 113: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: View from vehicle floorpan

(1) = direction of travel

Open weld joints in areas (2).

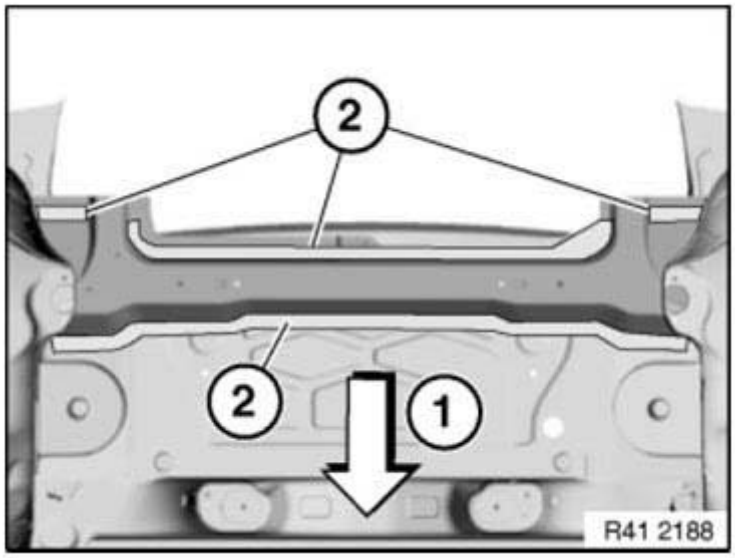


Fig. 114: Identifying Travel Direction And Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 028 REPLACING LEFT ENGINE CARRIER (PARTIAL REPLACEMENT BEFORE FRONT AXLE)

Read contents of **BODY, GENERAL** .

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Place vehicle on straightening bench.

- (1) Partial section, engine carrier

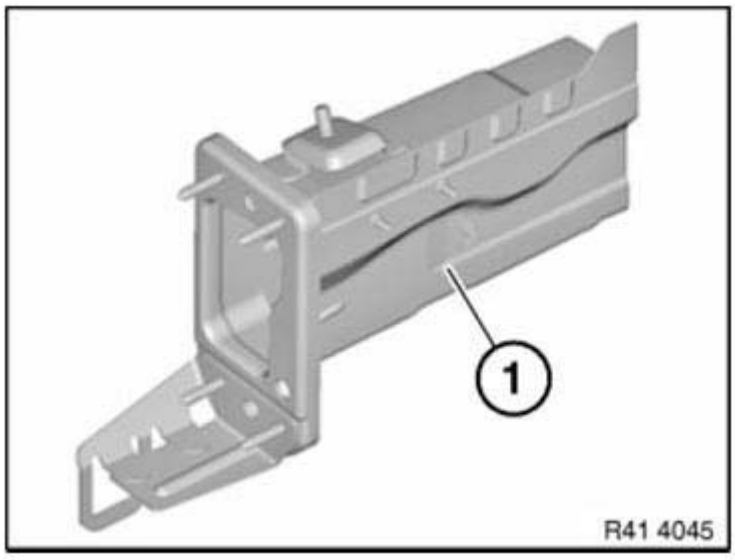


Fig. 115: Identifying Engine Carrier Partial Section
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement a and cut.

IMPORTANT: Cut outer metal sheet only.

Measurement a = approx. 15 mm in front of bore dia. 20 mm.

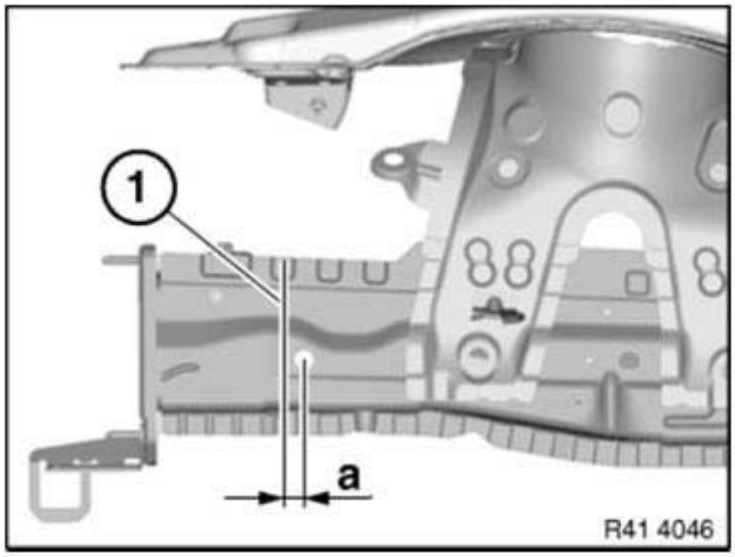


Fig. 116: Marking Severance Cut In Accordance With Measurement
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) through 15 mm dia. bore and cut.

Preparation of new part:

Mark severance cuts in accordance with vehicle and cut.

Installation:

Adjust new part to fit with straightening attachment and universal mount.

Weld in **REINFORCEMENT PLATES** at severance cuts.

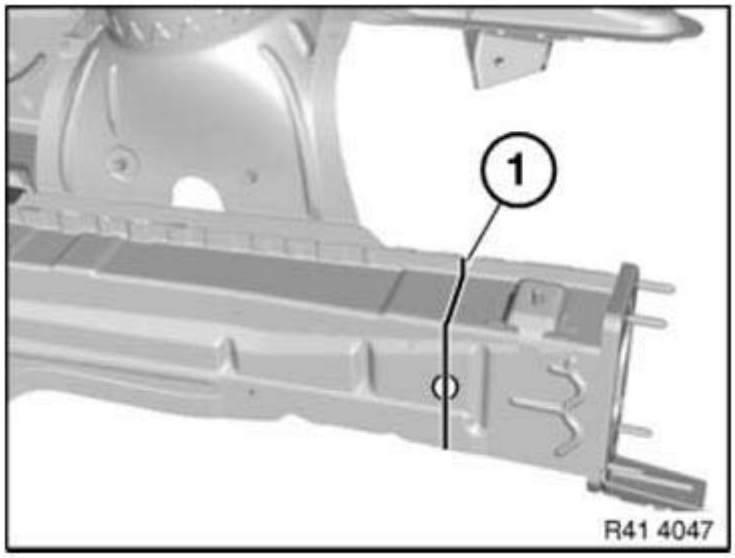


Fig. 117: Marking Severance Cut In Accordance With Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 516 STRIPPING OPERATIONS - REPLACING LEFT CARRIER SUPPORT

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.
The following list basically represents the removal sequence.

- Remove front panel (FR number: 4133040)
- Remove intake silencer housing (FR number: 4135111)
- Remove left spring strut (FR number: 3131000)
- Remove left wishbone (FR number: 3112000)

4112 LUGGAGE COMPARTMENT FLOOR

41 00 ... PROCEDURE FOR FOLDING HARDTOP AFTER AN ACCIDENT

The hardtop may be under tension after the vehicle has incurred damage following an accident. Moving the hardtop by hydraulic means may result in irreparable damage. For this reason, the hardtop may only be moved manually until the damaged has been repaired.

IMPORTANT: It is not possible to check the correct operation of the folding roof on the damaged vehicle.

Different procedures are required, depending on the degree of damage which the vehicle has incurred. The repair instructions for emergency operation See **5437290 HARDTOP EMERGENCY OPENING** or **5437295 EMERGENCY CLOSING HARDTOP** describe only the complete sequences for manually opening and closing the hardtop.

When removing the roof module and/or the rear module, it is possible to move the hardtop manually into the necessary intermediate positions in each case.

WARNING: Risk of injury due to the heavy weight of the hardtop!
Since the hydraulic system may have to be depressurized during manual movement of the hardtop, there is an increased risk of injury by trapping.
Secure the hardtop permanently and adequately against unintentional movement.

After body repairs to the vehicle

All the hardtop components screwed/bolted to the body are precisely screwed/bolted to the vehicle at the factory by means of gauges. This affects above all the base plates and consoles of the roof and rear modules. To minimize extensive adjustment work after a body repair as much as possible, only remove those components which are screwed/bolted to a damaged body part.

- Gauge the base plates *only* after a body repair to the cowl panel.

41 12 535 REPLACING COMPLETE REAR LUGGAGE COMPARTMENT FLOOR (TAIL PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Place vehicle on straightening bench.

NOTE: **This repair instructions comprises the procedures for repair stages 2 and 3 See 410 REPAIR TECHNIQUES, REPAIR STAGE 2 or 410 REPAIR TECHNIQUES, REPAIR STAGE 3.**

- (1) Cross-member, luggage compartment floor
- (2) Mounting, impact absorber
- (3) Mounting, RHT (hard top)
- (4) Luggage compartment floor
- (5) Side member, rear
- (6) Luggage compartment well
- (7) Mounting, tension strut

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N1	21
CleanerR1	1
Sealing compoundD1	

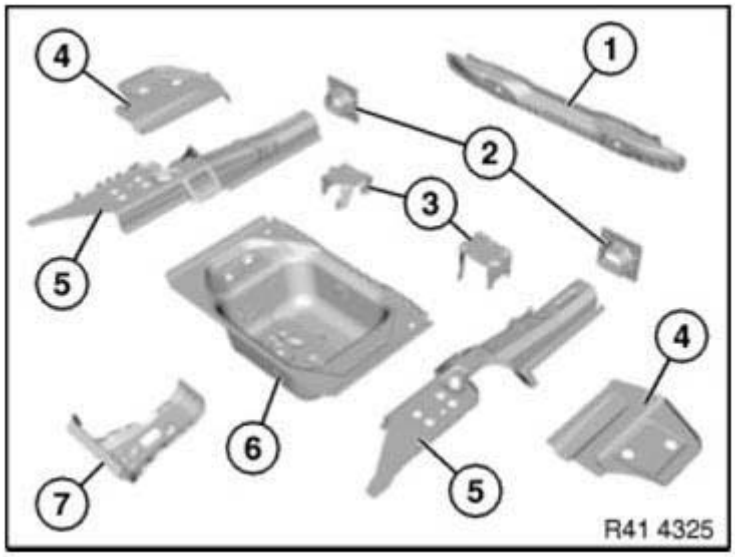


Fig. 118: Identifying Cross-Member, Luggage Compartment Floor, Mounting, Impact Absorber, Luggage Compartment Floor, Side Member, Luggage Compartment Well And Tension Strut
Courtesy of BMW OF NORTH AMERICA, INC.

View from vehicle underbody:

Open weld joints in areas (1).

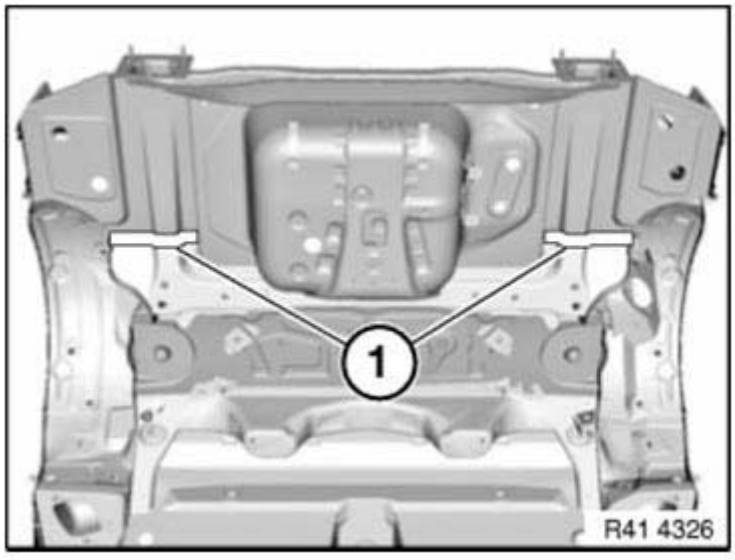


Fig. 119: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

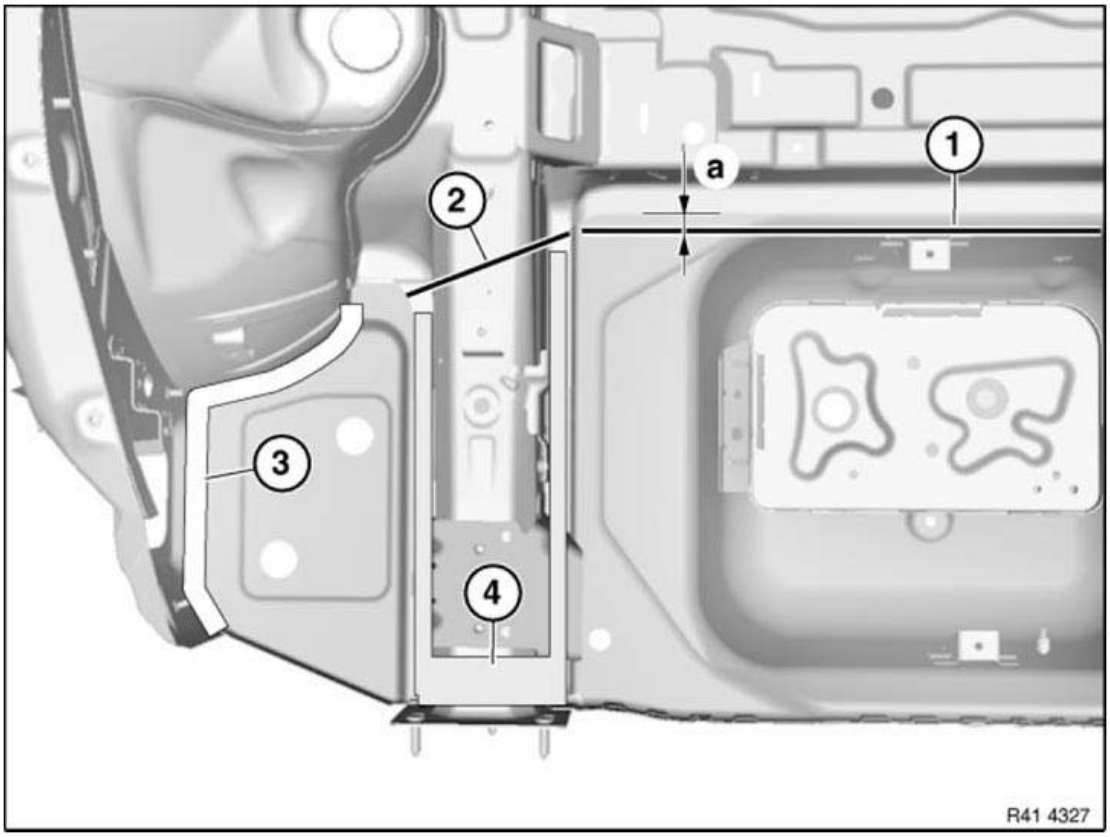


Fig. 120: Identifying Weld Joint Area With Severance Cut And New Components Weld Area
Courtesy of BMW OF NORTH AMERICA, INC.

Operation is described on the left side. Right side identical.

Mark severance cut (1) in accordance with measurement and cut.

Measurement a = 20 mm from luggage compartment floor, front.

Mark severance cut (2) and cut.

Open weld joints in area (3).

Remove trunk floor.

Installation:

Adjust luggage compartment floor to fit with straightening attachment or universal mount.

Before welding in, also adjust tail panel, rear lid and rear lights to fit.

Tension strut mounting is bonded to luggage compartment well and riveted.

Weld in **REINFORCING PANEL** at severance cut (2).

Weld new components in area (4) additionally.

Mark new luggage compartment well part in accordance with severance cut (1) on vehicle + 20 mm extra material and cut.

New part preparation, tension strut mounting

View from below.

Adjust tension strut mounting (1) with mounted torsion struts (2) to fit and secure.

Set twenty one 4.2 mm _ holes for blind rivets in adhesive flange area.

Remove new part again and deburr holes.

NOTE: 6 holes are sufficient for positioning the component.
Make all further holes for blind rivets if necessary on removed components.

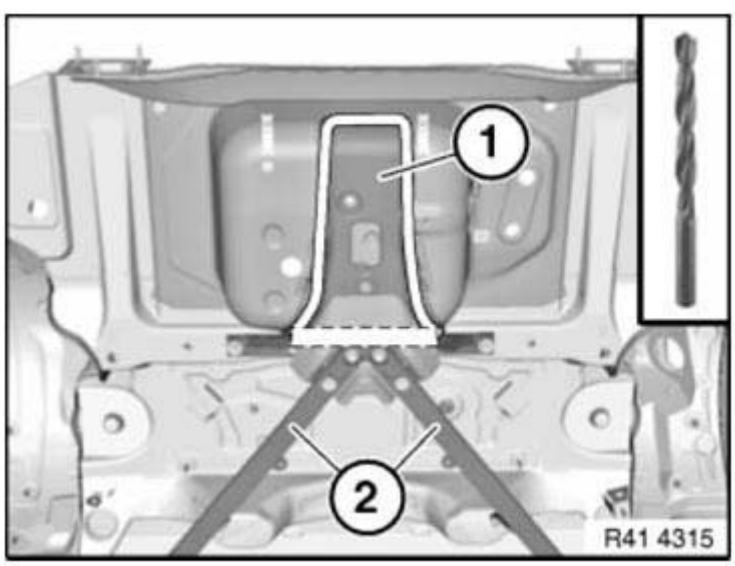


Fig. 121: Identifying Tension Strut Mounting And Mounted Torsion Struts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installing tension strut mounting

Clean all bonding surfaces (1) with cleaning agent R1.

Apply adhesive K5a to bonding surfaces (1).

Rivet tension strut mounting (2) and luggage compartment well (3) with blind rivets N3.

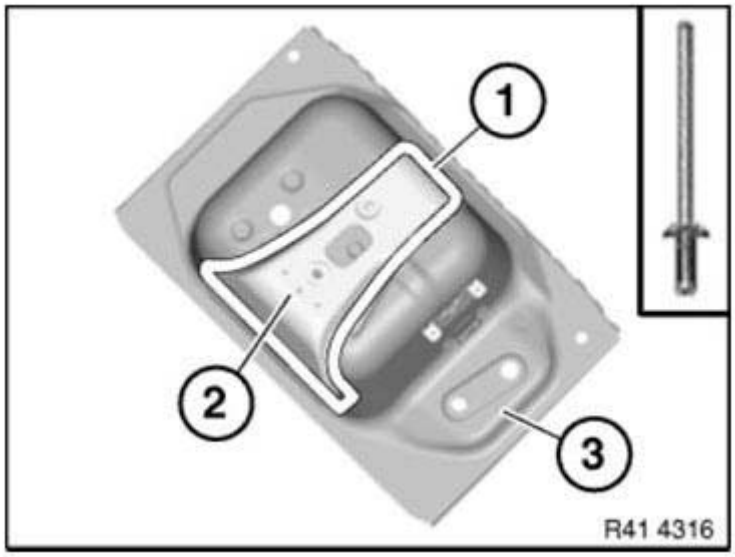


Fig. 122: Cleaning All Bonding Surfaces With Cleaning Agent
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 733 REPLACING FRONT LUGGAGE COMPARTMENT FLOOR CROSS-MEMBER (LUGGAGE COMPARTMENT FLOOR COMPLETELY REMOVED)

Read contents of **BODY, GENERAL** .

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Place vehicle on straightening bench.

Following new body parts are required:

- (1) Cross-member, luggage compartment floor, front

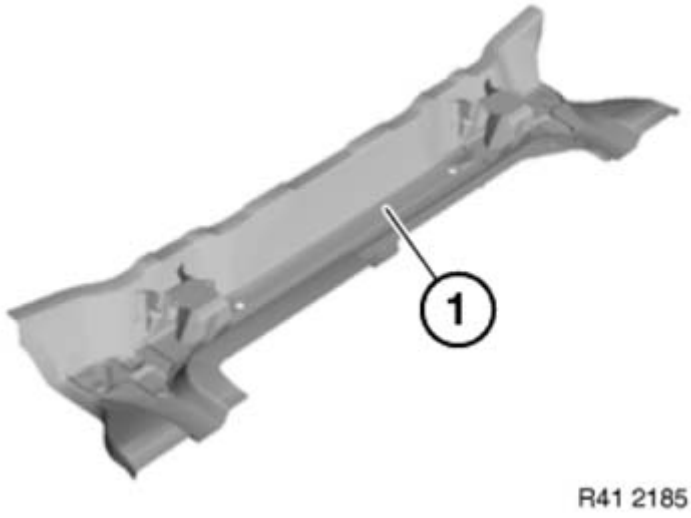


Fig. 123: Identifying Cross-Member, Luggage Compartment Floor, Front
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in area (1) on left and right sides of car.

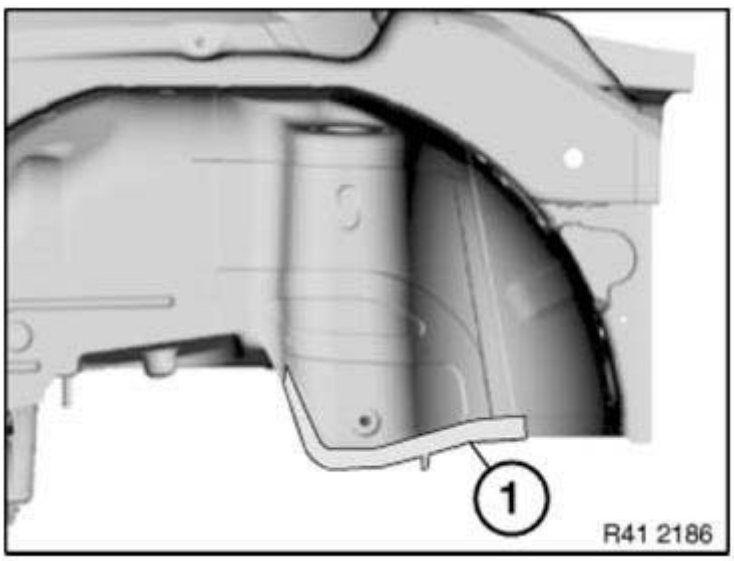


Fig. 124: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

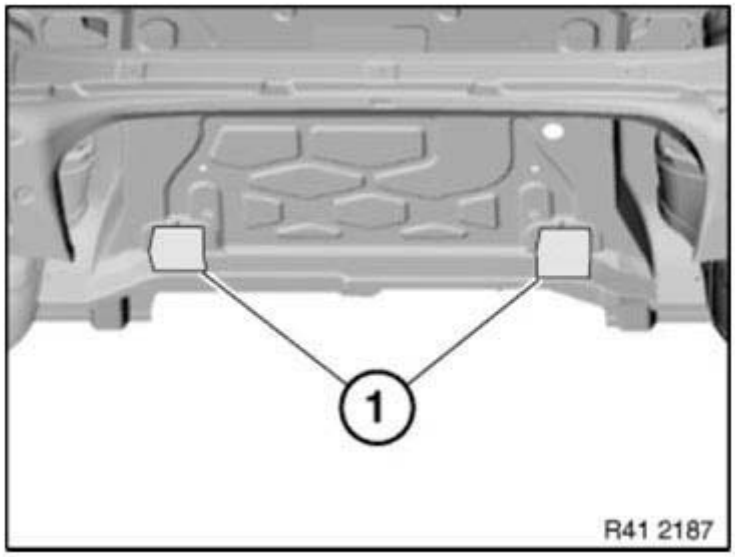


Fig. 125: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: View from vehicle floorpan

(1) = direction of travel

Open weld joints in areas (2).

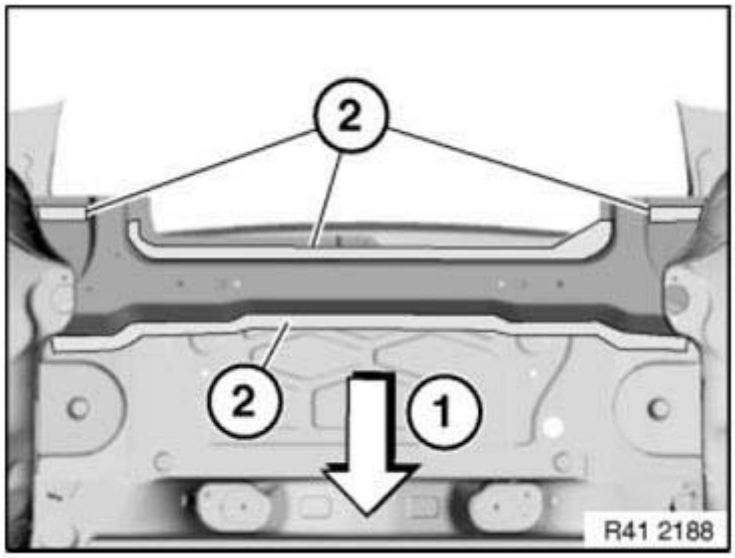


Fig. 126: Identifying Travel Direction And Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 12 653 REPLACING LUGGAGE COMPARTMENT FLOOR, LEFT SECTION (TAIL PANEL AND SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Strip down vehicle.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Luggage compartment floor, left section
- (2) End plate, rear ventilation, left

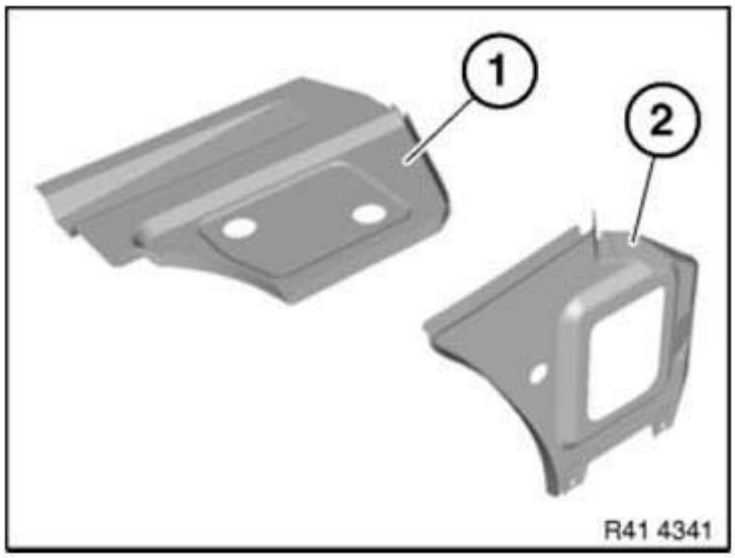


Fig. 127: Identifying Luggage Compartment Floor, Left Section And End Plate, Rear Ventilation, Left
Courtesy of BMW OF NORTH AMERICA, INC.

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N3	9
Blind rivets N6	6
Punch rivets N4	4
CleanerR1	1
Sealing compoundD1	

Removal of luggage compartment floor

Open weld joints in area (1).

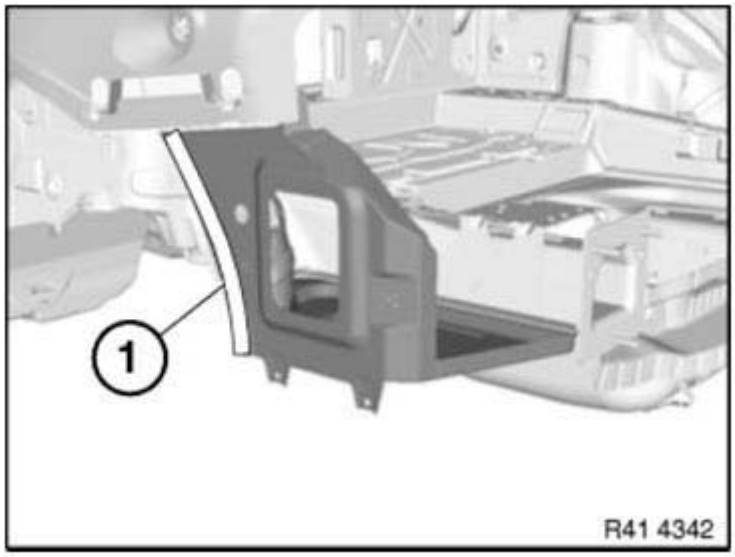


Fig. 128: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

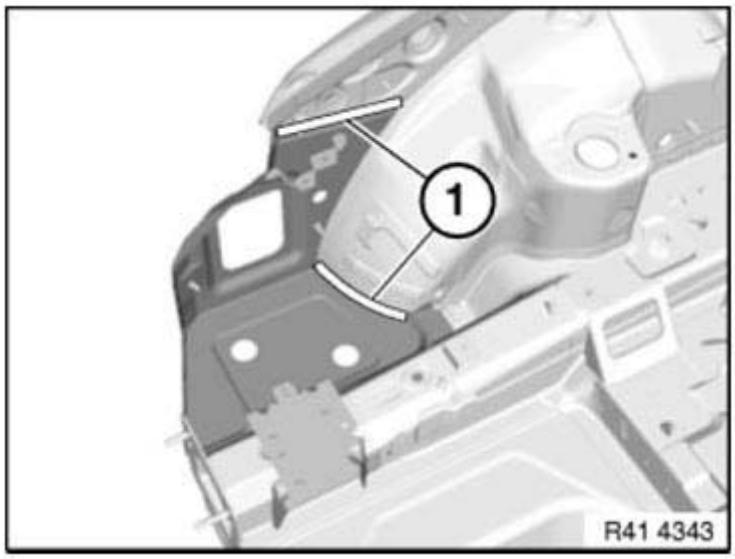


Fig. 129: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in radius and cut.

Remove luggage compartment floor and rear ventilation end plate.

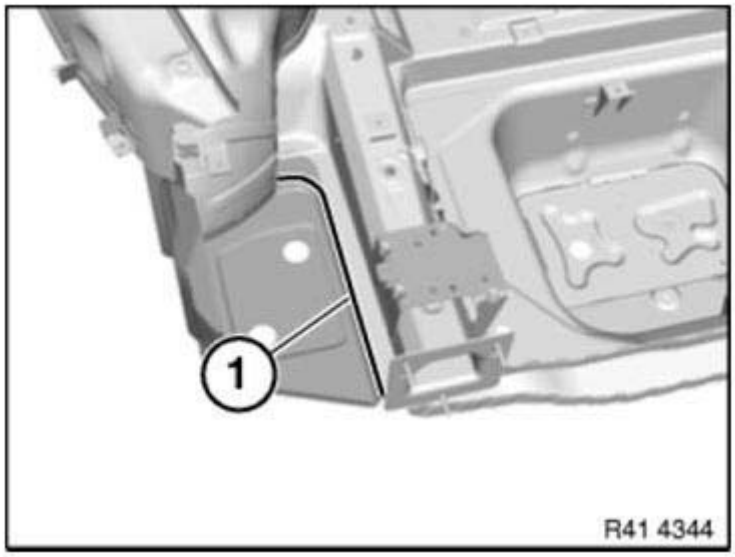


Fig. 130: Marking Severance Cut In Radius
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Mark new luggage compartment floor part in accordance with severance cut on vehicle + 20 mm extra material and cut.

Adjust new parts in combination with tail panel to fit and secure.

Set nine 4.2 mm dia. holes for blind rivets in areas (1).

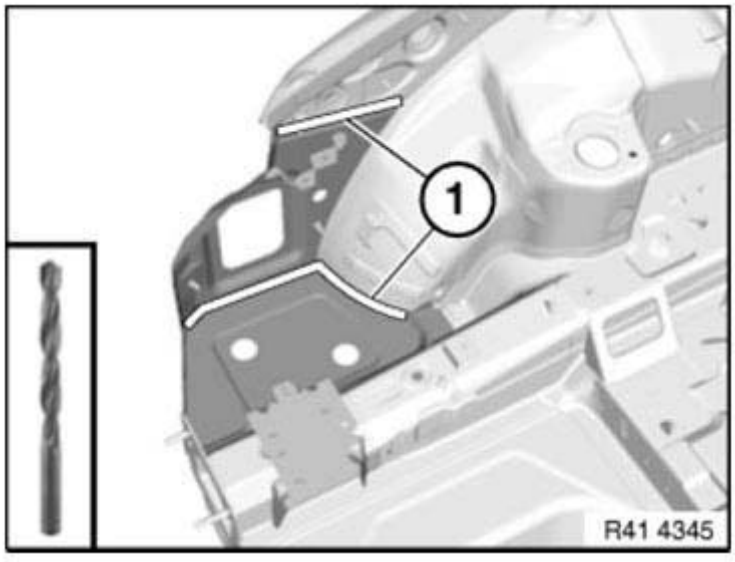


Fig. 131: Identifying Rivets Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Set six 4.2 mm dia. holes for blind rivets in area (1).

Remove new parts again and deburr holes.

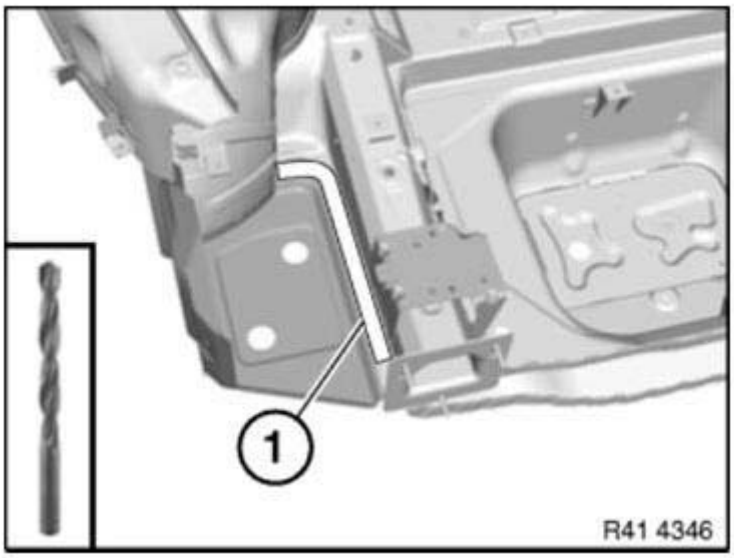


Fig. 132: Identifying Rivets Areas
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installation of luggage compartment floor

Clean all bonding surfaces (1) on new parts and on vehicle with cleaning agent R1!

Apply adhesive K5a to all bonding and rivet surfaces (1).

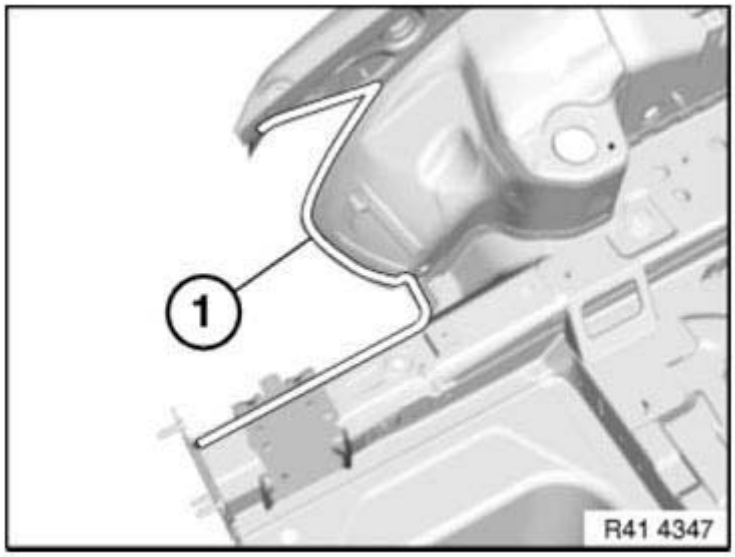


Fig. 133: Cleaning All Vehicle Bonding Surfaces With Cleaning Agent
Courtesy of BMW OF NORTH AMERICA, INC.

Install new parts and rivet in area (1) with blind rivets N6.

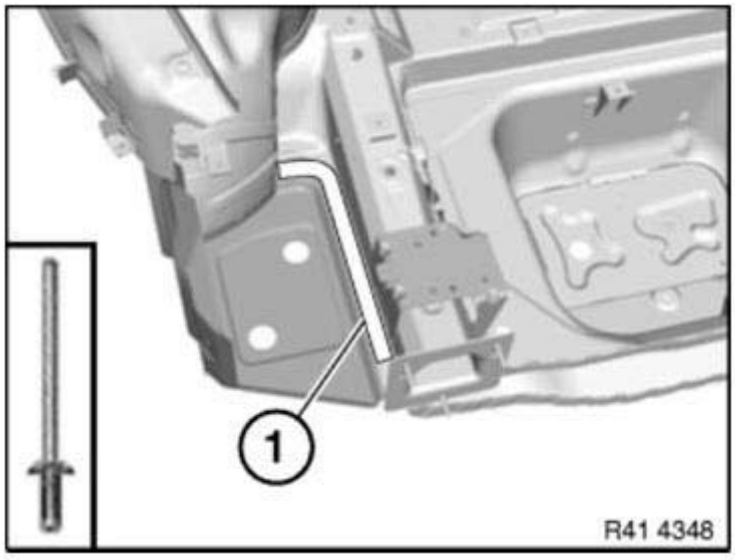


Fig. 134: Installing New Parts And Rivet Using Blind Rivets N6
Courtesy of BMW OF NORTH AMERICA, INC.

Use blind rivets N3 in areas (1).

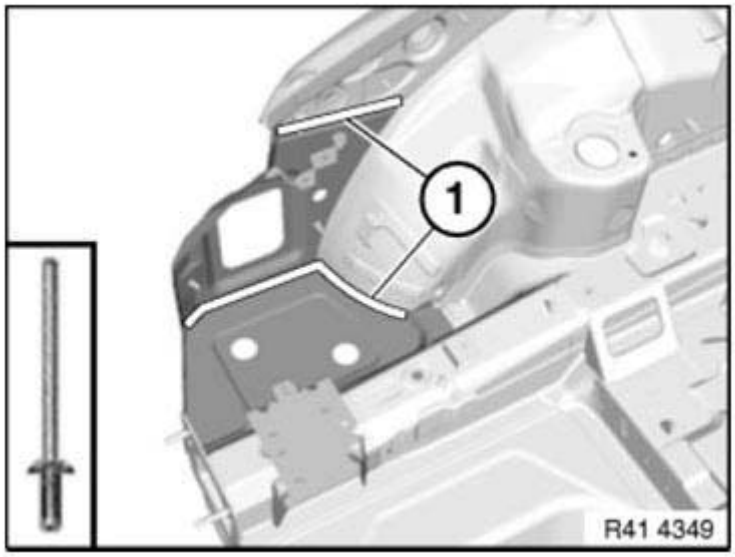


Fig. 135: Identifying Rivet Area With Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

Use 4 punch rivets N4 in area (1).

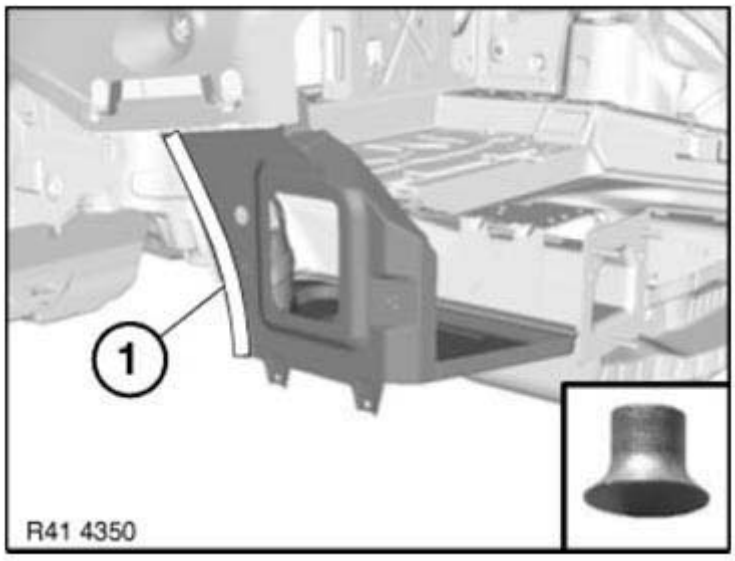


Fig. 136: Identifying Rivet Area With 4 Punch Rivets N4
Courtesy of BMW OF NORTH AMERICA, INC.

41 12 557 REPLACING LUGGAGE COMPARTMENT FLOOR, MIDDLE SECTION (TAIL PANEL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE .

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Mounting, tension strut
- (2) Luggage compartment well
- (3) Cross-member, luggage compartment floor, rear

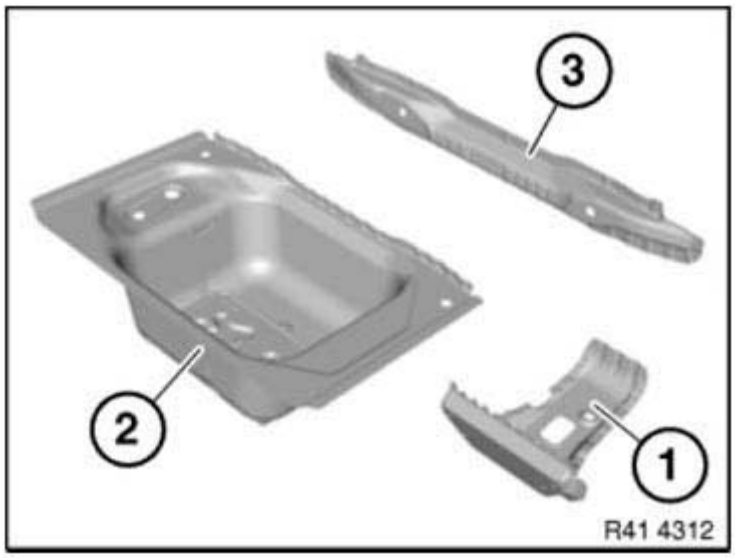


Fig. 137: Identifying Mounting, Tension Strut, Luggage Compartment Well And Cross-Member, Luggage Compartment Floor, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5b	1
Blind rivets N3	21
EMC screws	2
CleanerR1	1
Sealing compoundD1	

Removal of luggage compartment floor

View from below.

Operation is described on the left side. Right side identical.

Open weld joints in area (1).

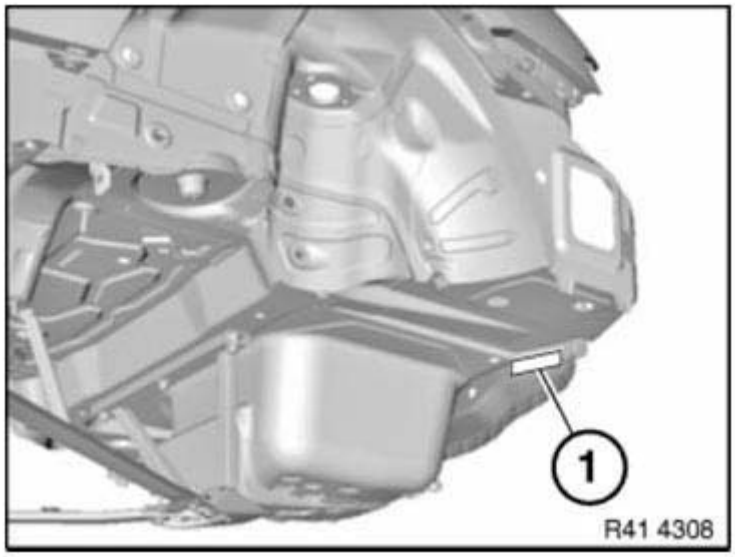


Fig. 138: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

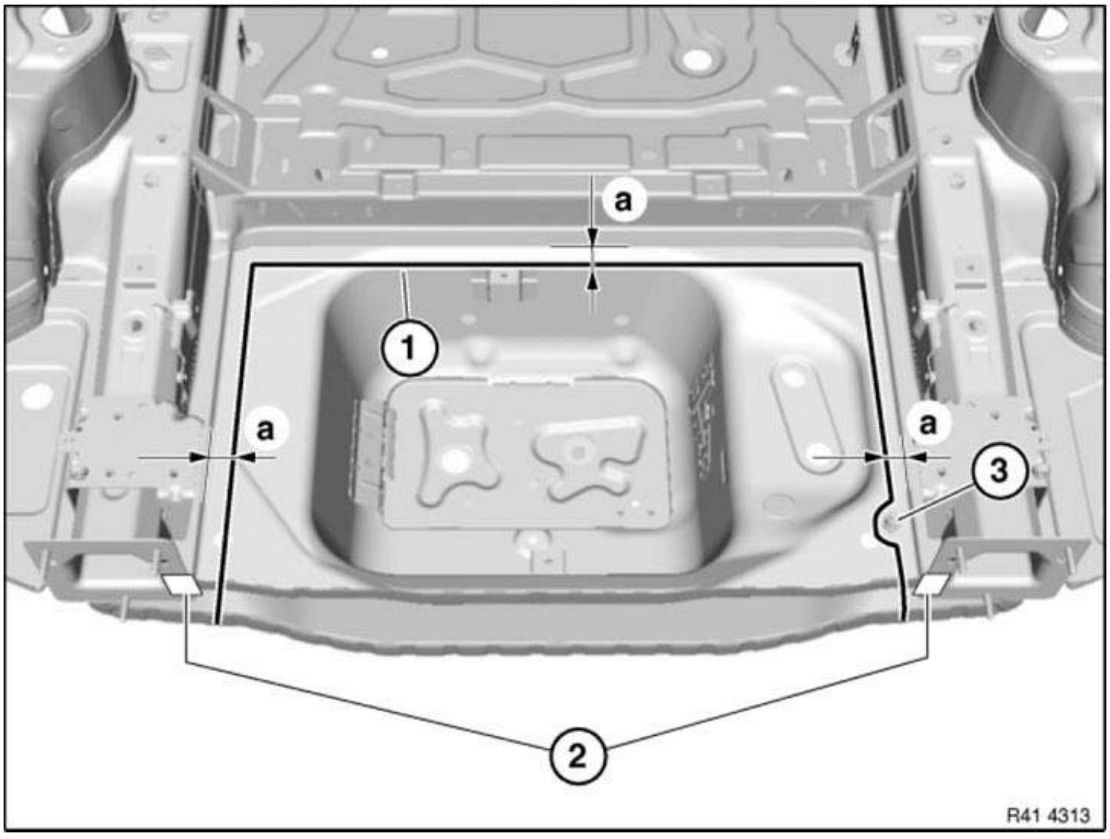


Fig. 139: Identifying Weld Joint Area With Severance Cut And Earth Support Point
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement and cut.

Measurement a = 20 mm

Open weld joints in area (2).

Remove luggage compartment well and cross-member.

NOTE: Earth support point (3) remains on vehicle.

New part preparation

Mark new luggage compartment well part in accordance with severance cuts on vehicle + 20 mm extra material and cut.

Set down luggage compartment well (1) from above and adjust in combination with cross-member (2) and **TAIL PANEL** to fit and secure.

Set fourteen 4.2 mm dia. holes for blind rivets in area (3).

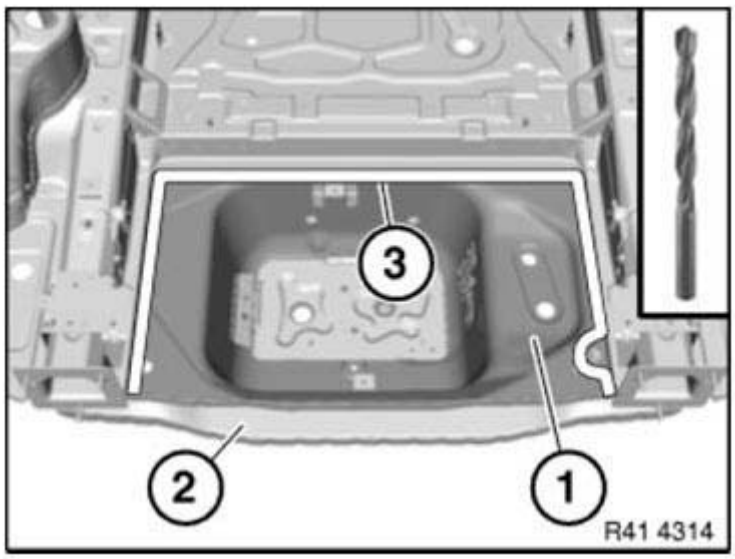


Fig. 140: Identifying Luggage Compartment Well, Cross-Member And Rivet Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set three 4.2 mm dia. holes for blind rivets in area (1).

Set four 4.2 mm dia. holes for blind rivets in areas (2).

Set holes for blind rivets with adjusted tail panel in area (3).

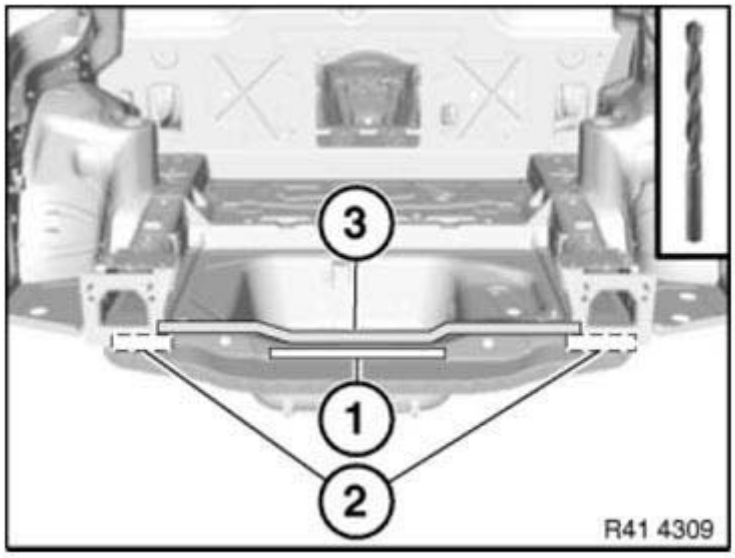


Fig. 141: Setting Holes Diameter For Blind Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

View from below.

Adjust tension strut mounting (1) with mounted torsion struts (2) to fit and secure.

Set twenty one 4.2 mm dia. holes for blind rivets in adhesive flange area.

Remove all new parts again and deburr holes.

NOTE: 6 holes are sufficient for positioning the component.

Make all further holes for blind rivets if necessary on removed components.

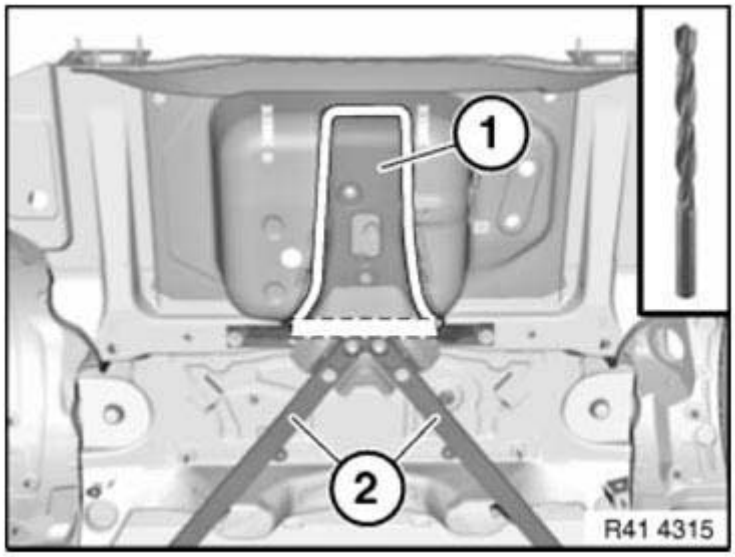


Fig. 142: Identifying Tension Strut Mounting And Mounted Torsion Struts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installation of luggage compartment floor

Clean all bonding surfaces (1) with cleaning agent R1.

Apply adhesive K5b to bonding surfaces (1).

Rivet tension strut mounting (2) and luggage compartment well (3) with blind rivets N3.

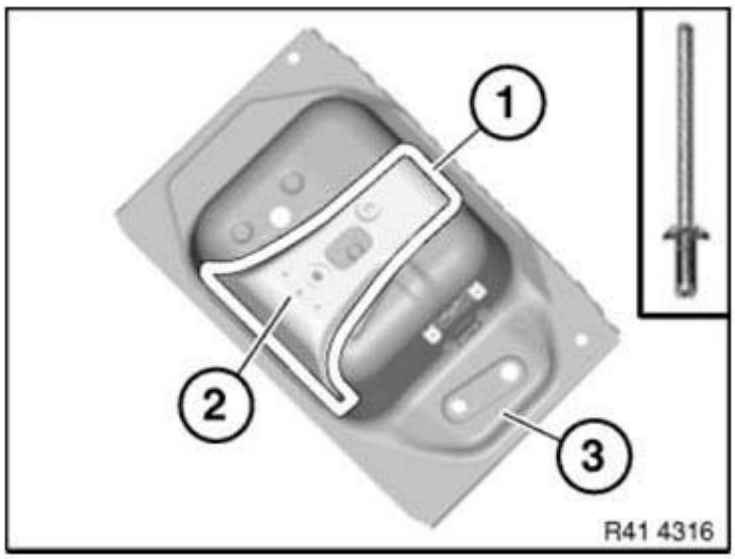


Fig. 143: Rivetting Tension Strut Mounting And Luggage Compartment Well Using Blind Rivets N3

Courtesy of BMW OF NORTH AMERICA, INC.

Clean all bonding surfaces (1) on new part and on vehicle with cleaning agent R1.

Apply adhesive K5b to bonding surfaces (1) and to corresponding bonding surfaces on new part.

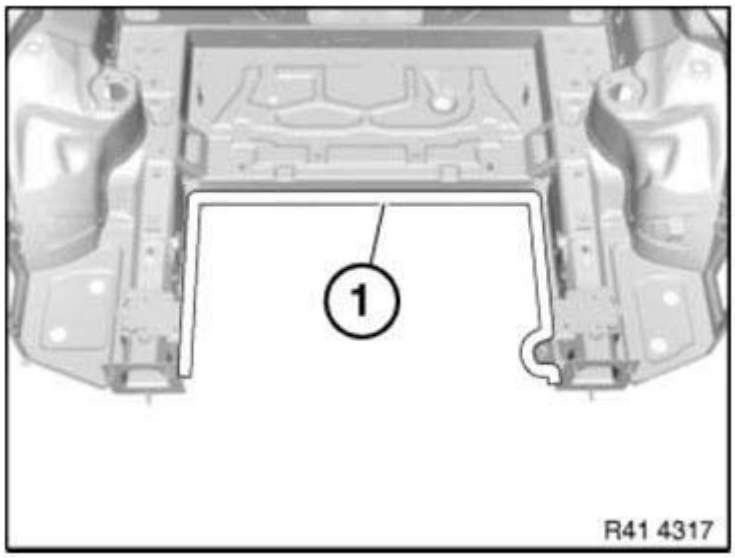


Fig. 144: Clean All Vehicle Bonding Surfaces With Cleaning Agent
Courtesy of BMW OF NORTH AMERICA, INC.

Fit luggage compartment well (2) and rivet in area (1) with blind rivets N3.

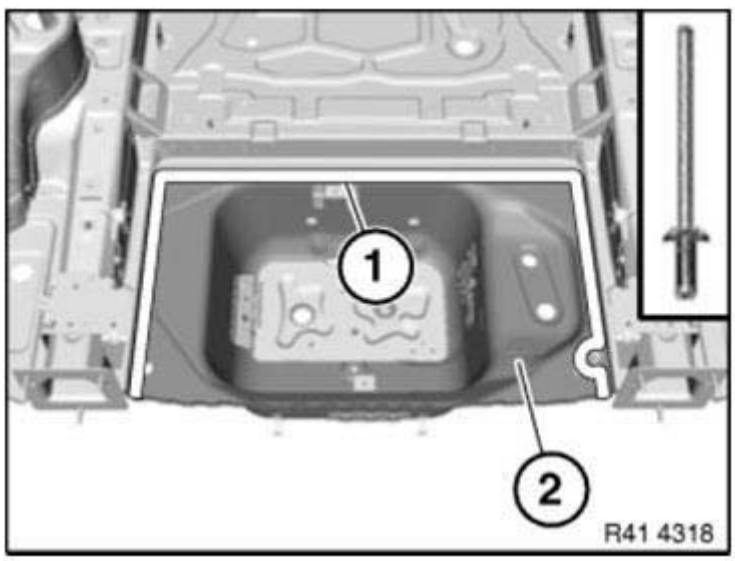


Fig. 145: Identifying Luggage Compartment Well And Rivet Area Using Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

Installation of cross-member

Clean all bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive K5b to bonding surfaces (1) and to corresponding bonding surfaces on new part.

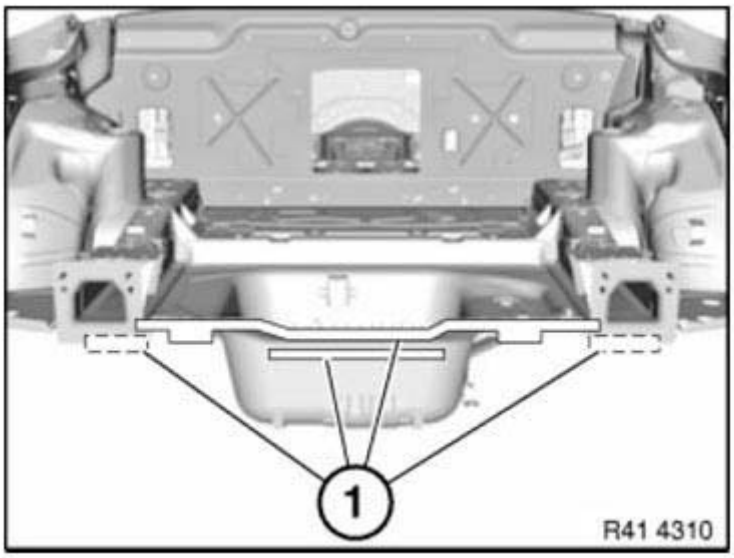


Fig. 146: Applying Adhesive K5B To Bonding Surfaces For Cleaning
Courtesy of BMW OF NORTH AMERICA, INC.

Install cross-member and rivet in area (1) with blind rivets.

Rivet cross-member in combination with tail panel in area (2).

IMPORTANT: When installing the cross-member, make sure there is sufficient adhesive on the bonding surfaces.

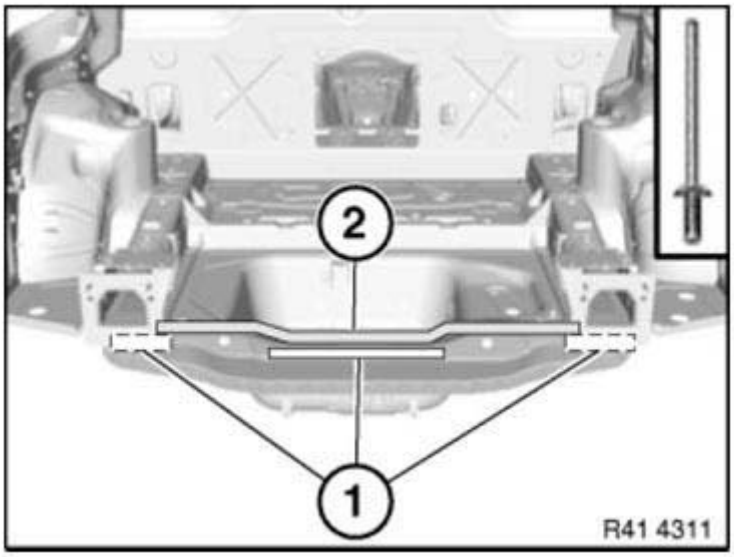


Fig. 147: Installing Cross-Member And Rivet In Area Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After adhesive has hardened:
Install 2 EMC SCREWS in area of side member/rear cross-member.

41 12 548 REPLACING REAR CROSS-MEMBER ON LUGGAGE COMPARTMENT FLOOR (TAIL PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Strip down vehicle.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Cross-member, luggage compartment floor, rear

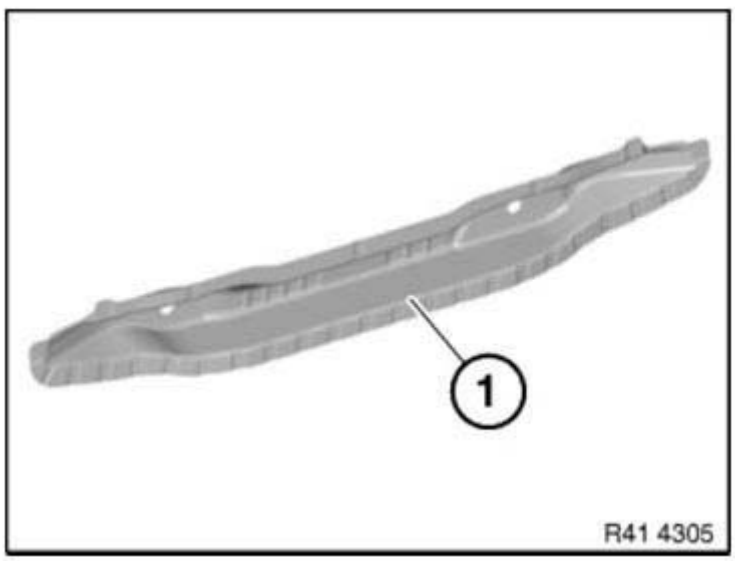


Fig. 148: Identifying Cross-Member, Luggage Compartment Floor, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N3	7
CleanerR1	1

Cavity sealing wax remover	
Sealing compoundD1	

Removing cross-member

Open weld joints in areas (1).

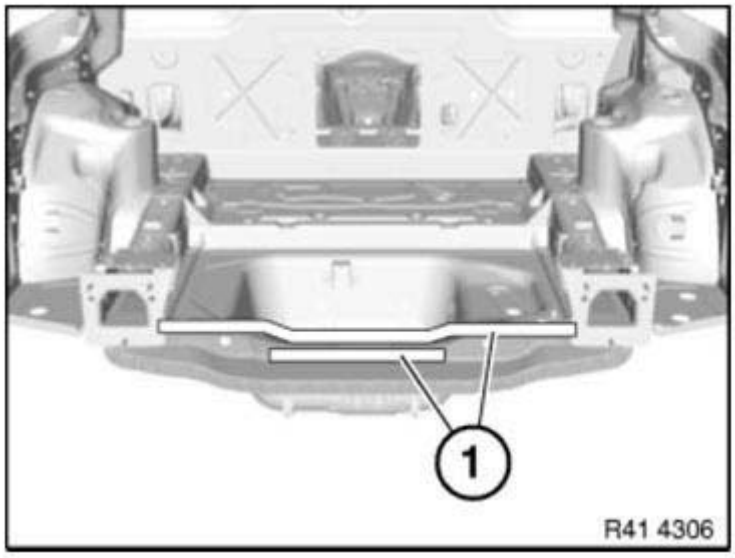


Fig. 149: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

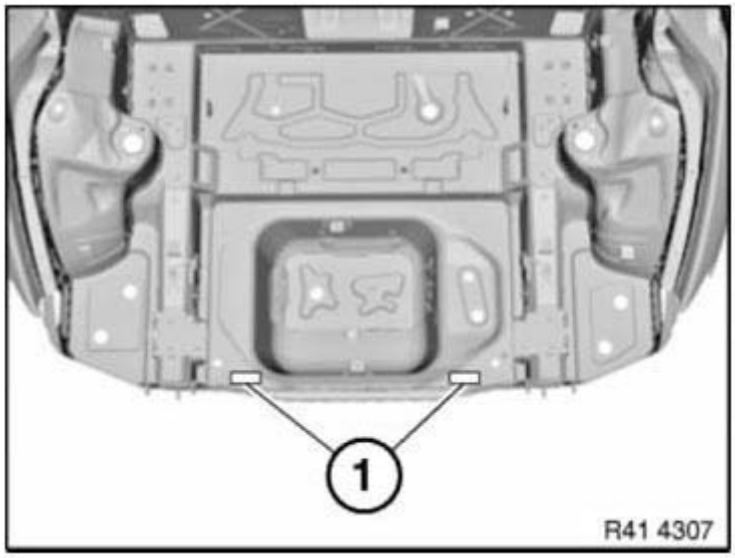


Fig. 150: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

View from below.

Operation is described on the left side. Right side identical.

Open weld joints in area (1).

Remove cross-member.

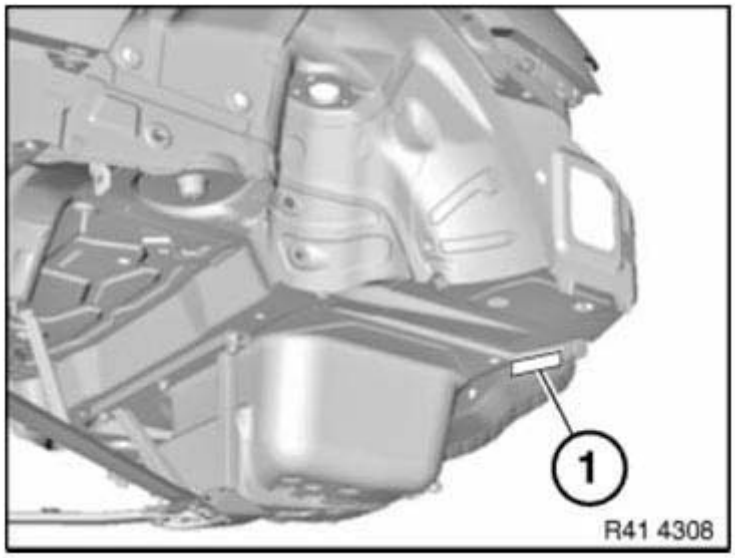


Fig. 151: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Adjust cross-member in combination with tail panel to fit and secure.

Set three 4.2 mm dia. holes for blind rivets in area (1).

Set four 4.2 mm dia. holes for blind rivets in areas (2).

Set holes with adjusted **TAIL PANEL** in area (3).

Remove new parts again and deburr holes.

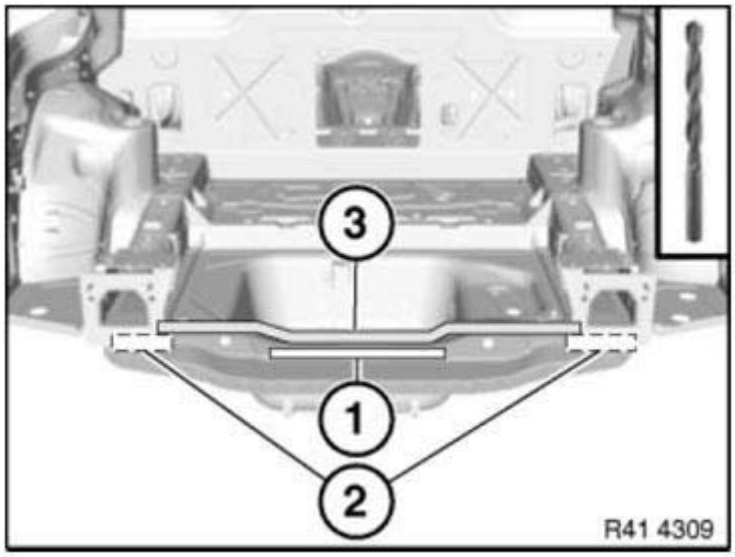


Fig. 152: Setting Holes Diameter For Blind Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installing cross-member

Clean all bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive K5a to bonding surfaces (1) and to corresponding bonding surfaces on new part.

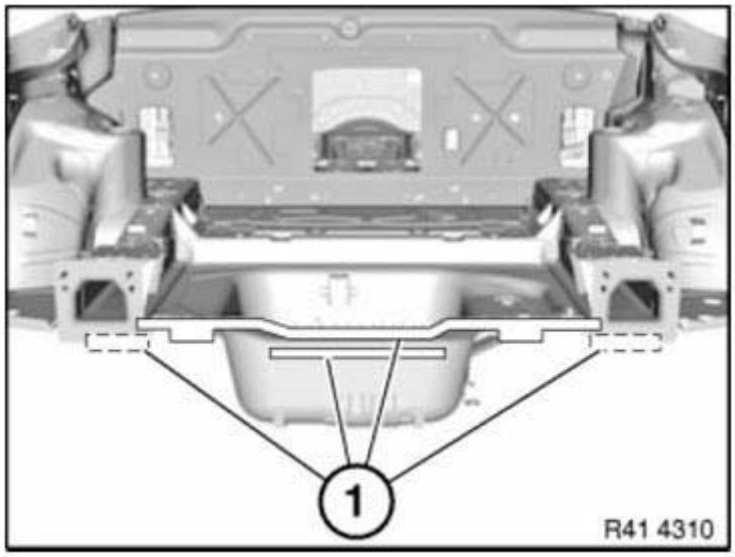


Fig. 153: Applying Adhesive K5A To Bonding Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Install cross-member and rivet in area (1) with blind rivets.

Rivet cross-member in combination with tail panel in area (2).

IMPORTANT: When installing the cross-member, make sure there is sufficient adhesive on the bonding surfaces.

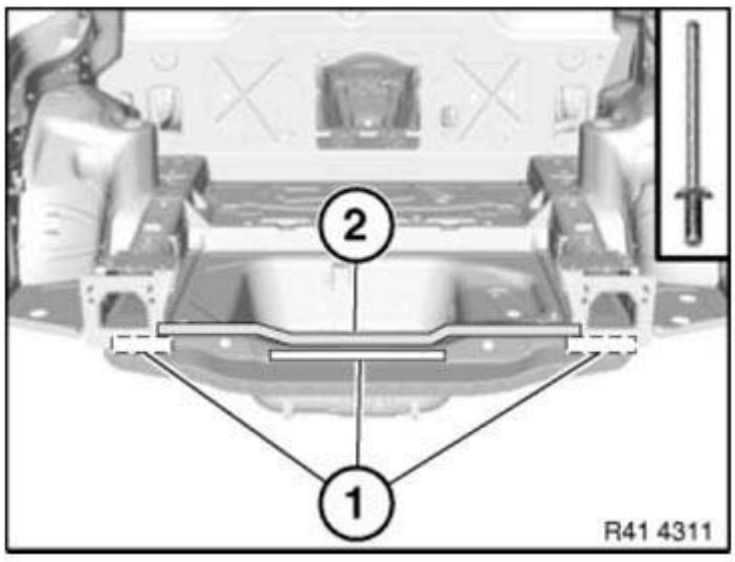


Fig. 154: Installing Cross-Member And Rivet In Area Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

41 12 557 STRIPPING OPERATIONS - REPLACING LUGGAGE COMPARTMENT FLOOR, MIDDLE (TAIL PANEL REMOVED)

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.

The following list basically represents the removal sequence.

- Remove exhaust system (FR number: 1800020)
- Remove heat shield
- Remove battery (FR number: 6121010)
- Remove hydraulic unit (engine) for retractable hard top (FR number: 5437185)

Release snap fasteners (1), disconnect lines.

Unfasten screws (2).

Remove carbon canister (3).

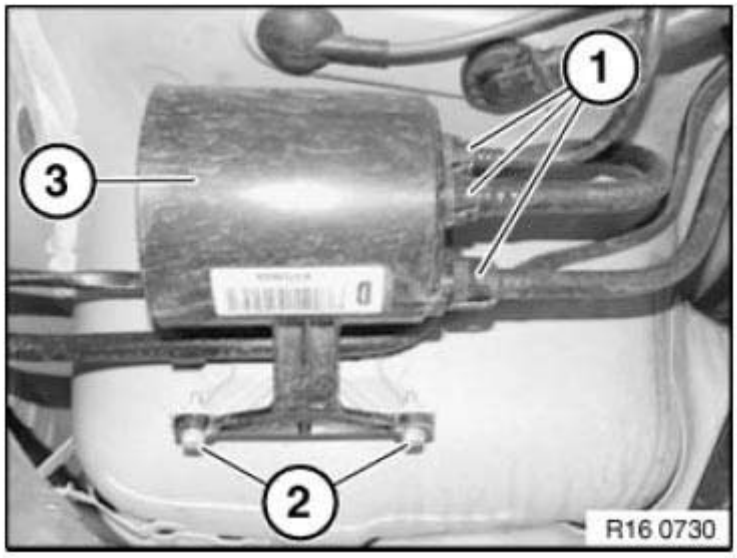


Fig. 155: Identifying Snap Fasteners, Screws And Carbon Canister
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug (1) and pull cable through luggage compartment floor.

Release screw (2).

Remove positive point.

Unscrew nut (3).

Remove earthing cable.

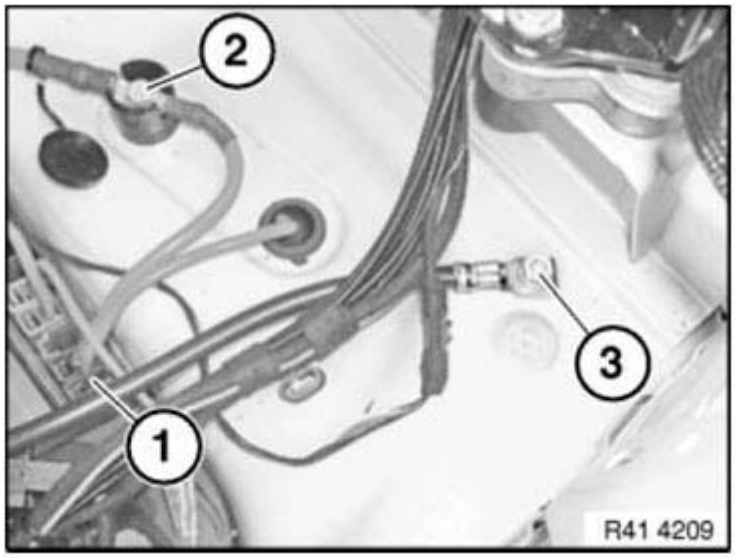


Fig. 156: Identifying Plug, Screw And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

4114 WHEEL WELLS

41 00 ... PROCEDURE FOR FOLDING HARDTOP AFTER AN ACCIDENT

The hardtop may be under tension after the vehicle has incurred damage following an accident. Moving the hardtop by hydraulic means may result in irreparable damage. For this reason, the hardtop may only be moved manually until the damaged has been repaired.

IMPORTANT: It is not possible to check the correct operation of the folding roof on the damaged vehicle.

Different procedures are required, depending on the degree of damage which the vehicle has incurred. The repair instructions for emergency operation See **5437290 HARDTOP EMERGENCY OPENING** or **5437295 EMERGENCY CLOSING HARDTOP** describe only the complete sequences for manually opening and closing the hardtop.

When removing the roof module and/or the rear module, it is possible to move the hardtop manually into the necessary intermediate positions in each case.

WARNING: Risk of injury due to the heavy weight of the hardtop!
Since the hydraulic system may have to be depressurized during manual movement of the hardtop, there is an increased risk of injury by trapping.
Secure the hardtop permanently and adequately against unintentional movement.

After body repairs to the vehicle

All the hardtop components screwed/bolted to the body are precisely screwed/bolted to the vehicle at the factory by means of gauges. This affects above all the base plates and consoles of the roof and rear modules. To minimize extensive adjustment work after a body repair as much as possible, only remove those components which are screwed/bolted to a damaged body part.

- Gauge the base plates *only* after a body repair to the cowl panel.

41 14 511 REPLACING COMPLETE REAR LEFT WHEEL ARCH (REAR LEFT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Place vehicle on straightening bench.

Following new body parts are required:

- (1) B-pillar, outer left

- (2) Wheel arch, rear, outer half, left
- (3) Wheel arch, inner rear left
- (4) Side section, inner left
- (5) Cavity acoustic baffle, window cavity (not pictured)

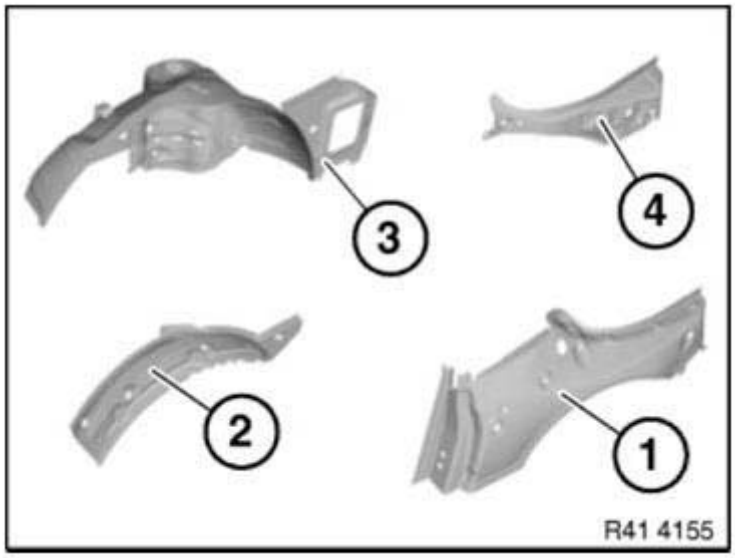


Fig. 157: Identifying B-Pillar, Outer Left, Wheel Arch, Rear, Outer Half, Left And Wheel Arch, Inner Rear Left
Courtesy of BMW OF NORTH AMERICA, INC.

Open spot-weld bonded joints in area (1)

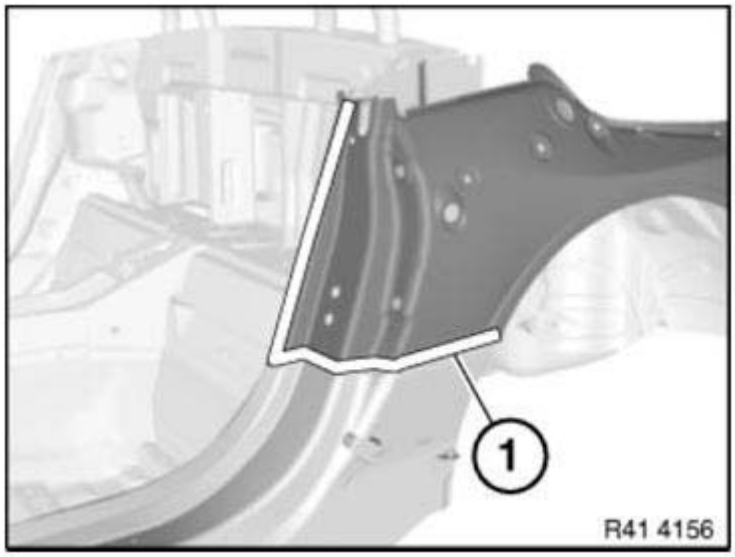


Fig. 158: Identifying Spot-Weld Bonded Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

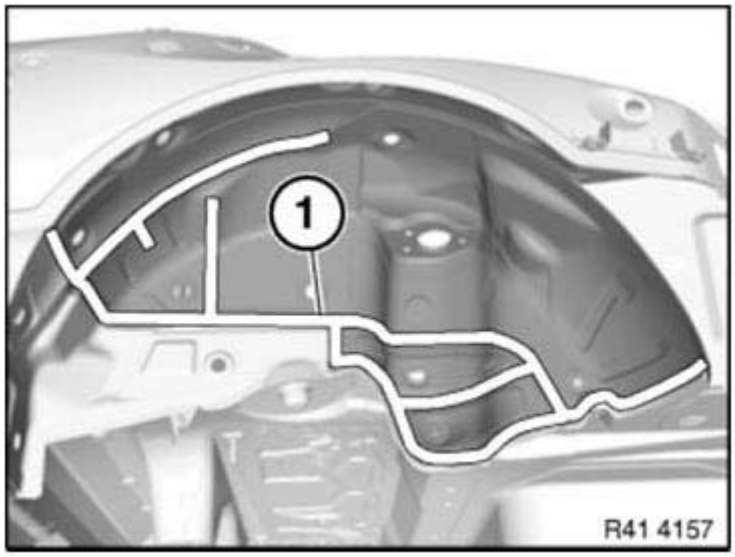


Fig. 159: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

Open brazed joints in area (2).

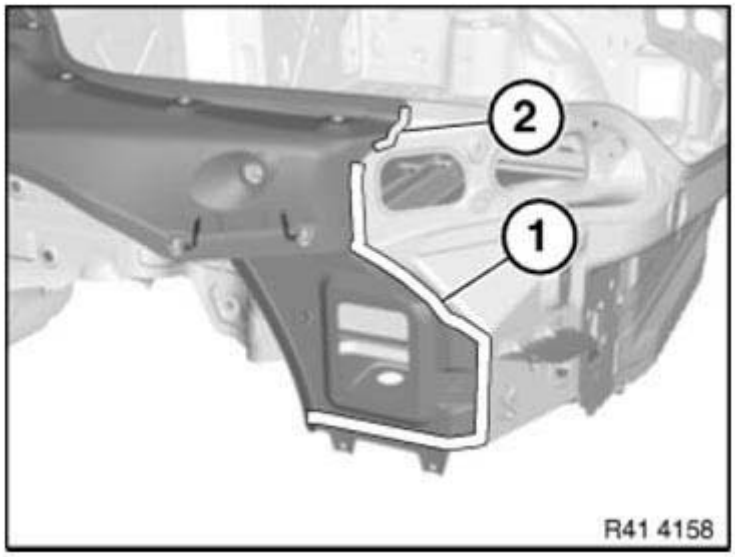


Fig. 160: Identifying Weld Joints Area And Brazed Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

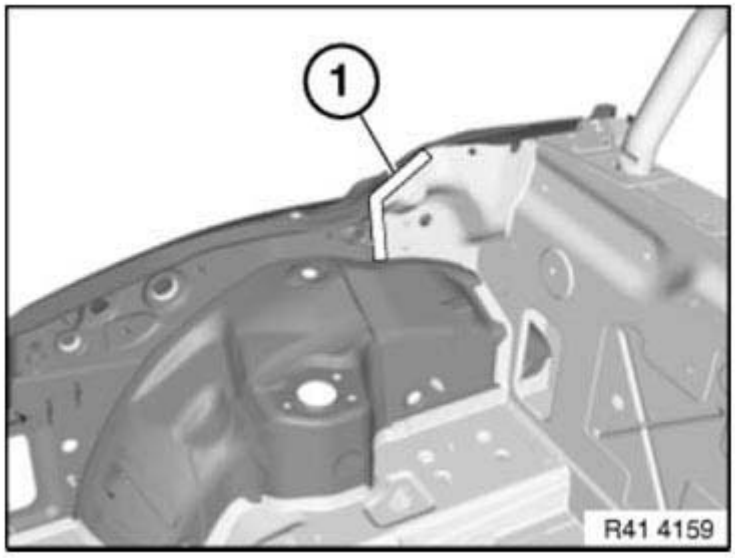


Fig. 161: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Adjust new part to fit with straightening attachment or universal mount (soft top securing mount).

BOND new part in area (1).

Set two **BLIND RIVETSN3** in area (1).

Weld new part in accordance with body.

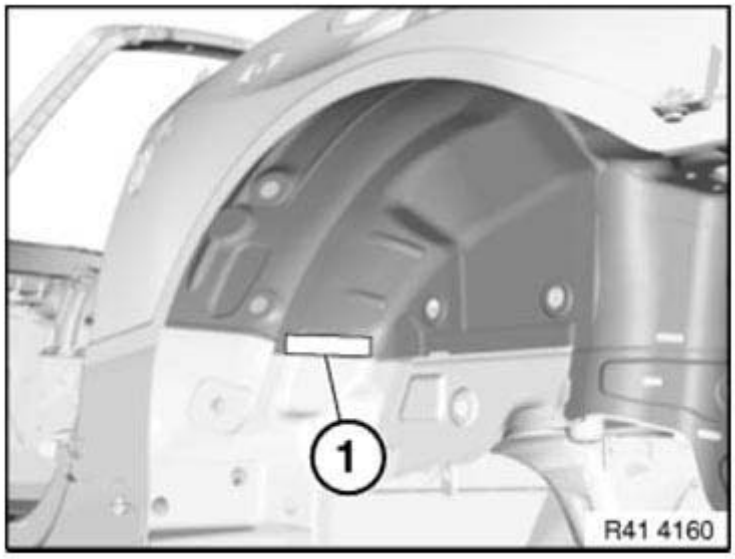


Fig. 162: Identifying Rivet Area With Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

41 14 020 REPLACING FRONT LEFT OR RIGHT WHEEL ARCH

Note the special vehicle identification number procedure when replacing the front right wheel arch (order the new body part with the vehicle identification number, if necessary)!

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Use only an approved **SPOT-WELDING APPARATUS** for repairs!

Place vehicle on straightening bench.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required

- (1) Wheel arch, front
- (2) Carrier support, wheel arch, front,

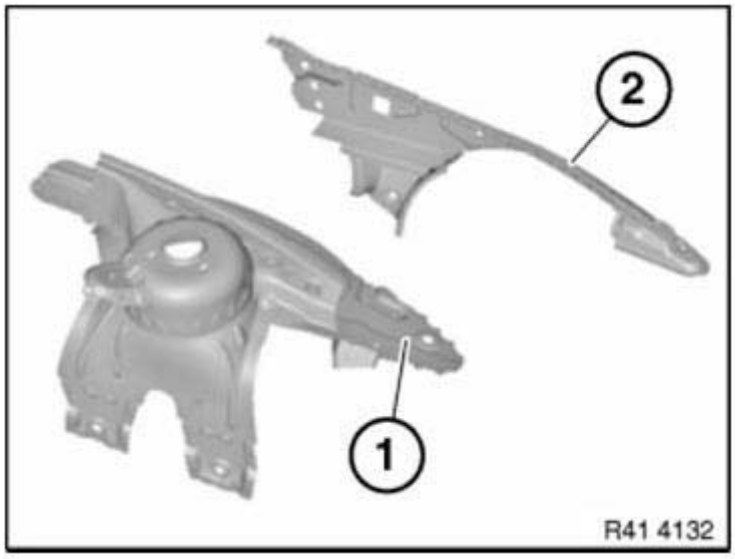


Fig. 163: Identifying Wheel Arch, Front And Carrier Support, Wheel Arch, Front
Courtesy of BMW OF NORTH AMERICA, INC.

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K1	1
Blind rivets N1	32
Cleaning agent R1	1

Open welded connections in areas (1).

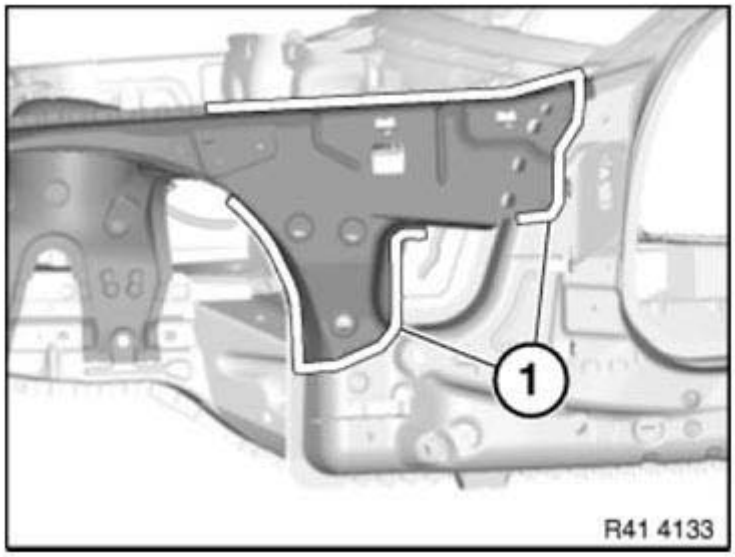


Fig. 164: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in areas (1).

IMPORTANT: When opening welding spot joints, do not damage panel underneath.

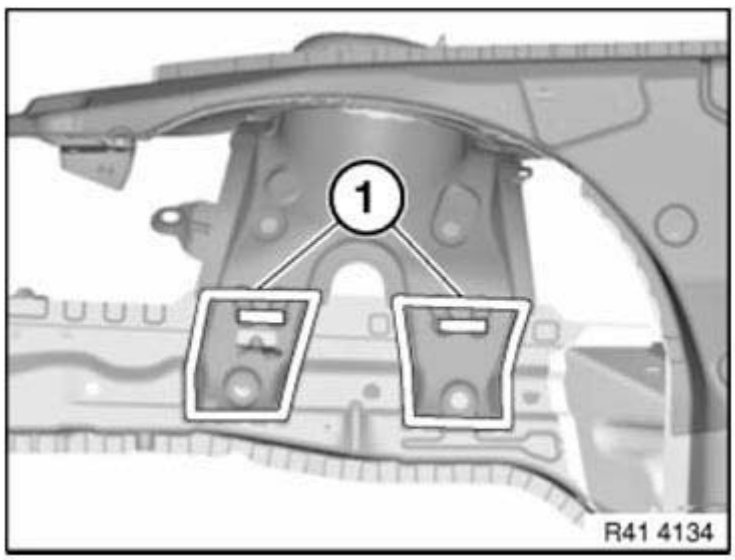


Fig. 165: Identifying Spot-Weld Bonded Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open welded connections in area (1).

Open spot-welded adhesive joint in area (2).

Remove wheel arch with carrier support.

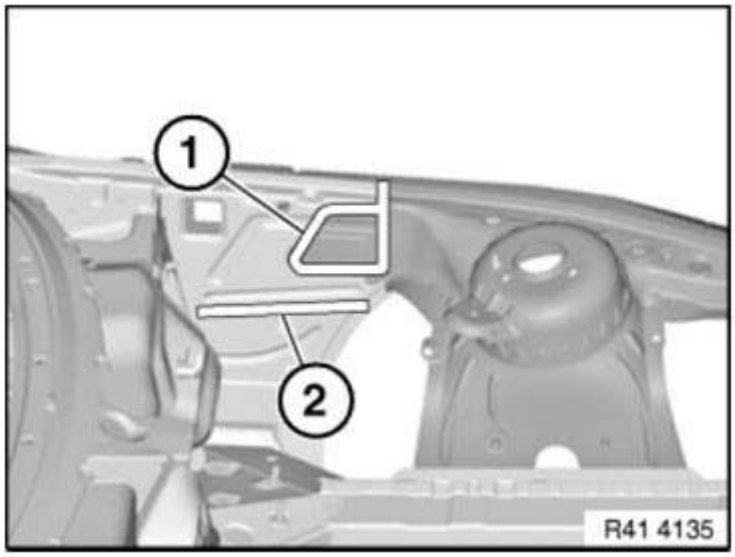


Fig. 166: Identifying Weld Joints Areas And Spot-Weld Bonded Joints Areas
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Adjust new part to fit with alignment bracket or universal mount and secure.

In areas (1) set thirty two 6.8 mm dia. bore holes for blind rivets N1.

NOTE: Number of blind rivets must correspond to number of opened welding spot joints.

Remove new part and deburr bore holes.

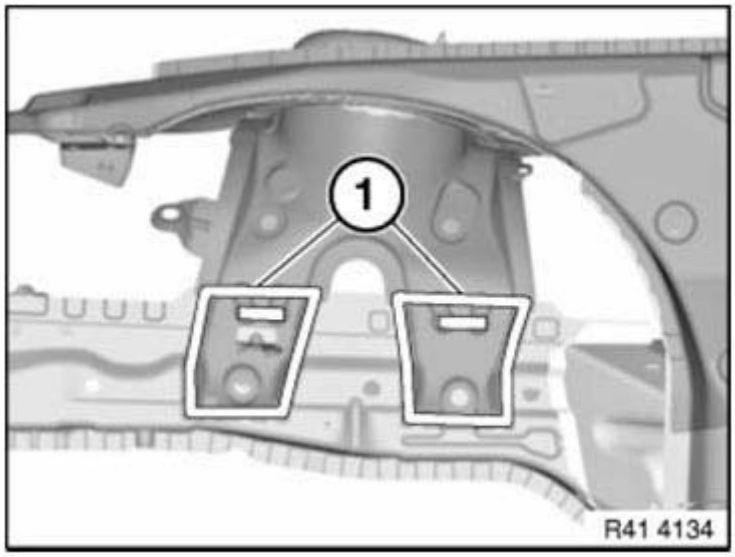


Fig. 167: Setting Holes Diameter Using Blind Rivets N1
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Installing wheel arch and carrier support

Clean all bonding surfaces on vehicle (1) and on new part with cleaning agent.

Apply K1 adhesive to bonding surfaces (1).

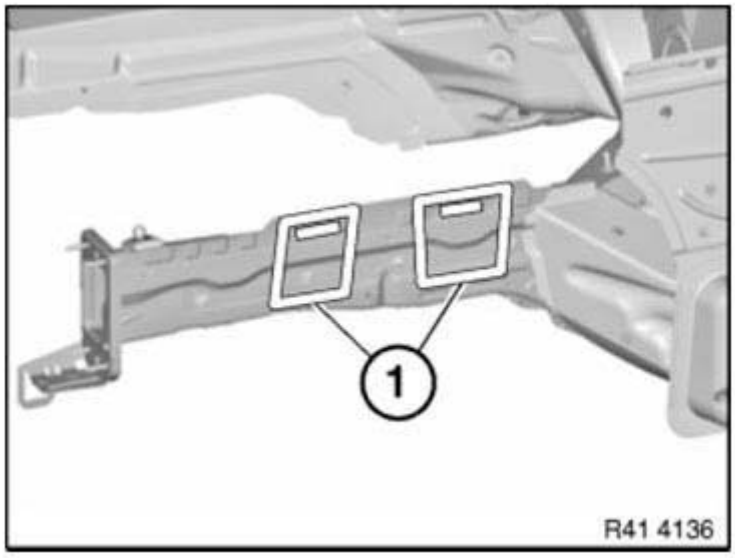


Fig. 168: Applying K1 Adhesive To Bonding Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Install new parts and rivet with blind rivets N 1 (1).

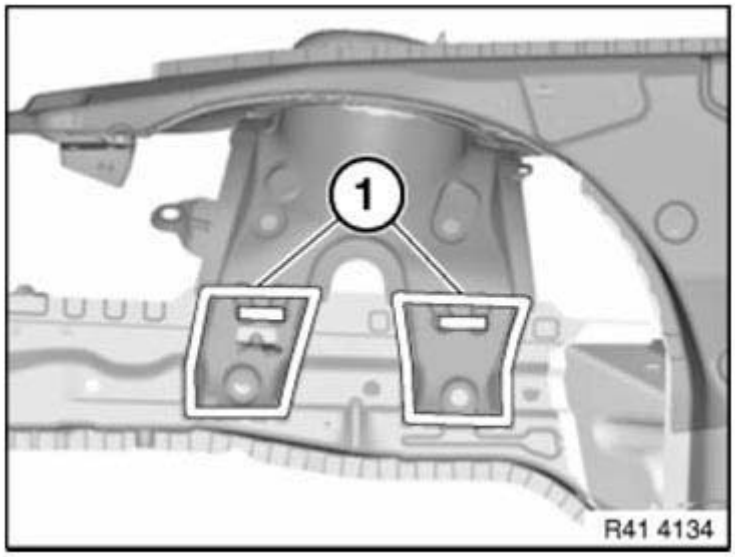


Fig. 169: Installing New Parts And Rivet Using Blind Rivets N 1
Courtesy of BMW OF NORTH AMERICA, INC.

41 21 518 REPLACING LEFT B-PILLAR (REAR LEFT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Following new body parts are required:

- (1) B-pillar, outer left

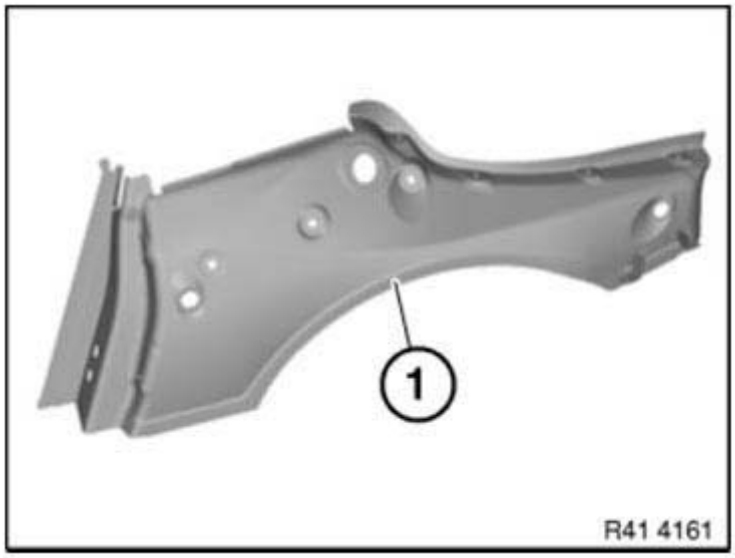


Fig. 170: Identifying B-Pillar, Outer Left
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

Open brazed joint in area (2).

Installation:

Apply sealant to **CAVITY ACOUSTIC BAFFLE** (3).

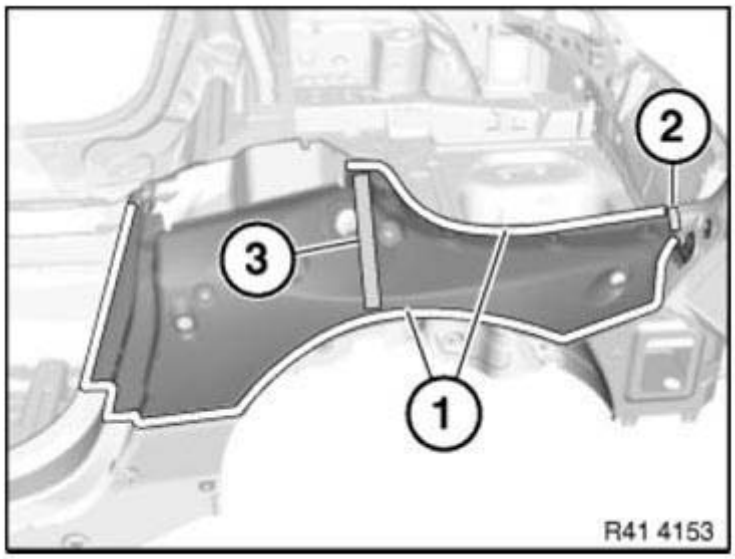


Fig. 171: Identifying Weld And Brazed Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 14 502 REPLACING REAR LEFT OUTER WHEEL ARCH SECTION (REAR LEFT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Following new body parts are required:

- (1) B-pillar, outer left
- (2) Side section, inner left
- (3) Cavity acoustic baffle, window cavity (not pictured)

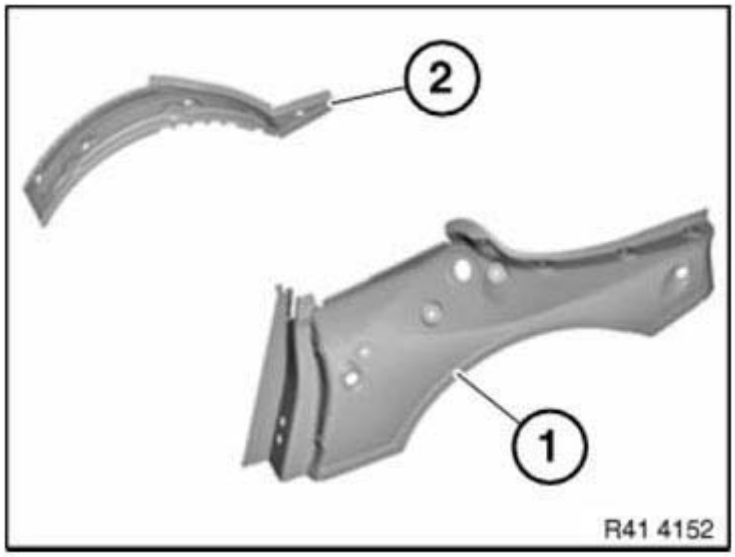


Fig. 172: Identifying B-Pillar, Outer Left, Side Section, Inner Left And Cavity Acoustic Baffle, Window Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

Open brazed joint in area (2).

Installation:

Apply sealant to **CAVITY ACOUSTIC BAFFLE** (3).

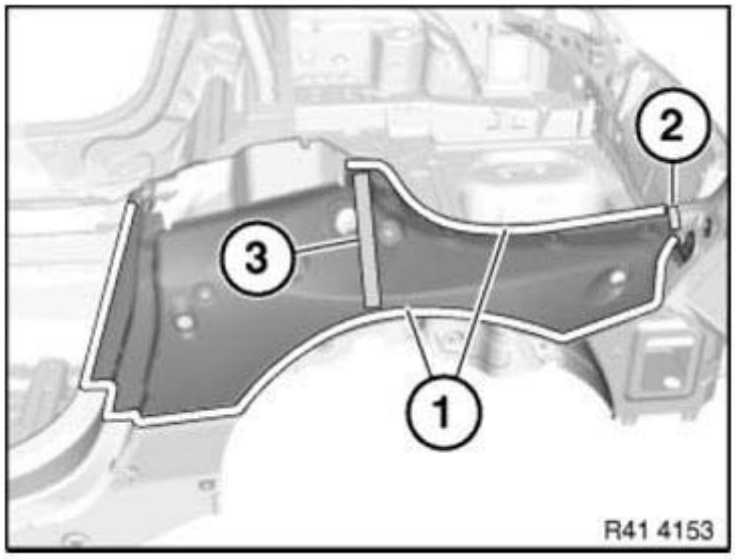


Fig. 173: Identifying Weld And Brazed Joints Area With Cavity Acoustic Baffle
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement and cut.

Measurement a = 20 mm from inner wheel arch section.

Open weld joints in area (1).

Installation:

Weld new part overlapping.

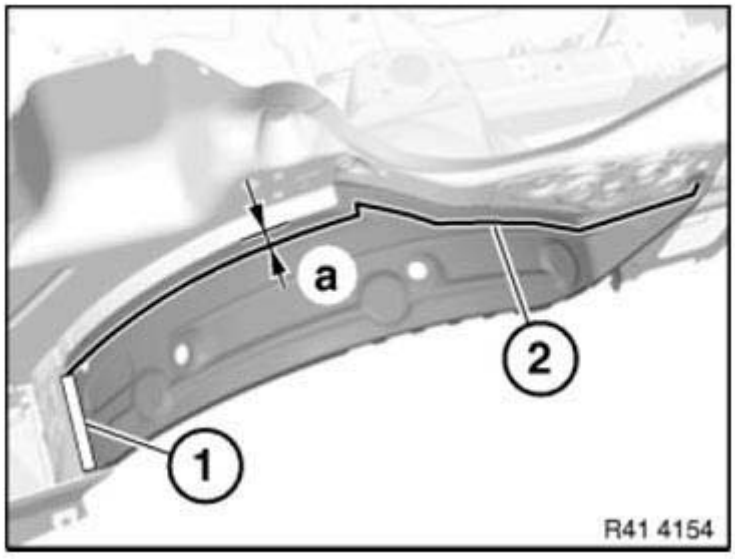


Fig. 174: Identifying Weld Joint Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... STAMPING VEHICLE IDENTIFICATION NUMBER (NEEDLE STAMPING UNIT)

Read and comply with **GENERAL INFORMATION** .

The needle stamping system 360 - VRM - BMW is required to stamp the vehicle identification number.

Order number: 81 43 2 155 736

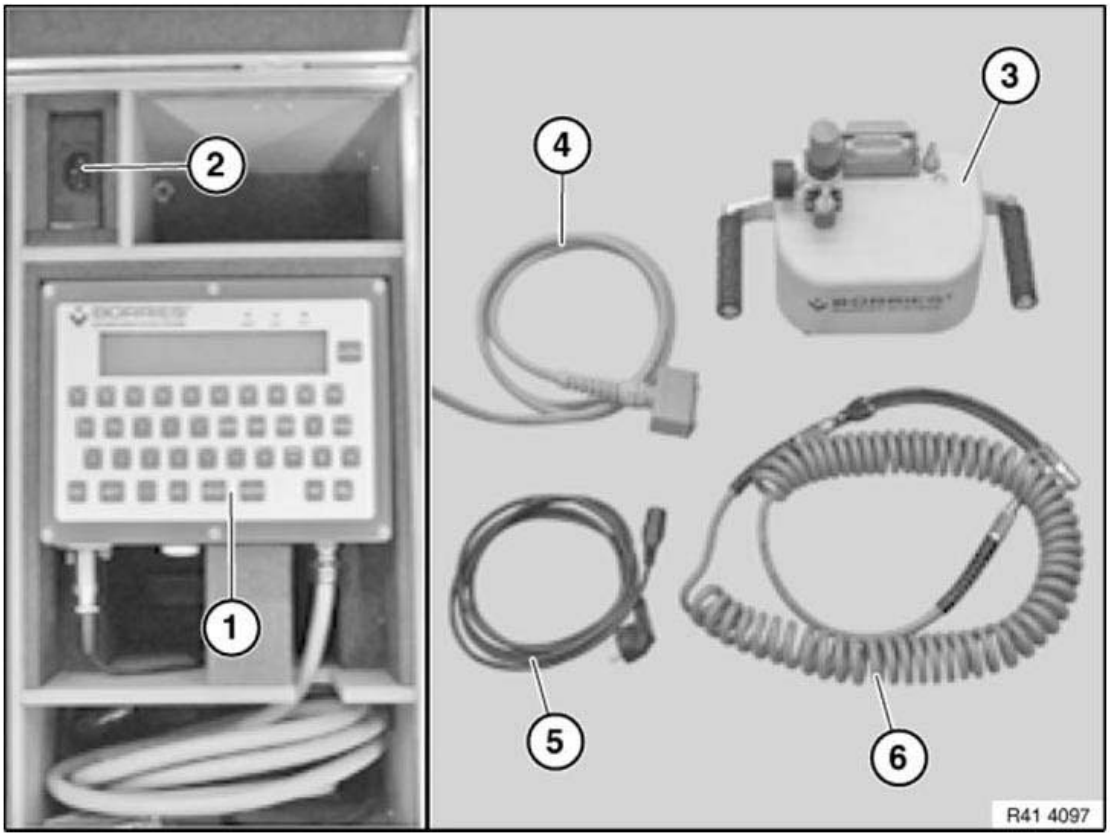


Fig. 175: Identifying Display, Mains Adapter, Needle Stamping Unit, Connecting Cable And Power Cable
Courtesy of BMW OF NORTH AMERICA, INC.

The needle stamping system 360 tool set comprises:

- (1) Display
- (2) Mains adapter
- (3) Needle stamping unit
- (4) Connecting cable
- (5) Power cable
- (6) Compressed-air hose

NOTE: A compressed-air connection is also required.

- **Operating pressure approx. 4 bar**
- **Use only dried, oil-free air**

Procedure for additional vehicle identification number

- Cross through original vehicle identification number.

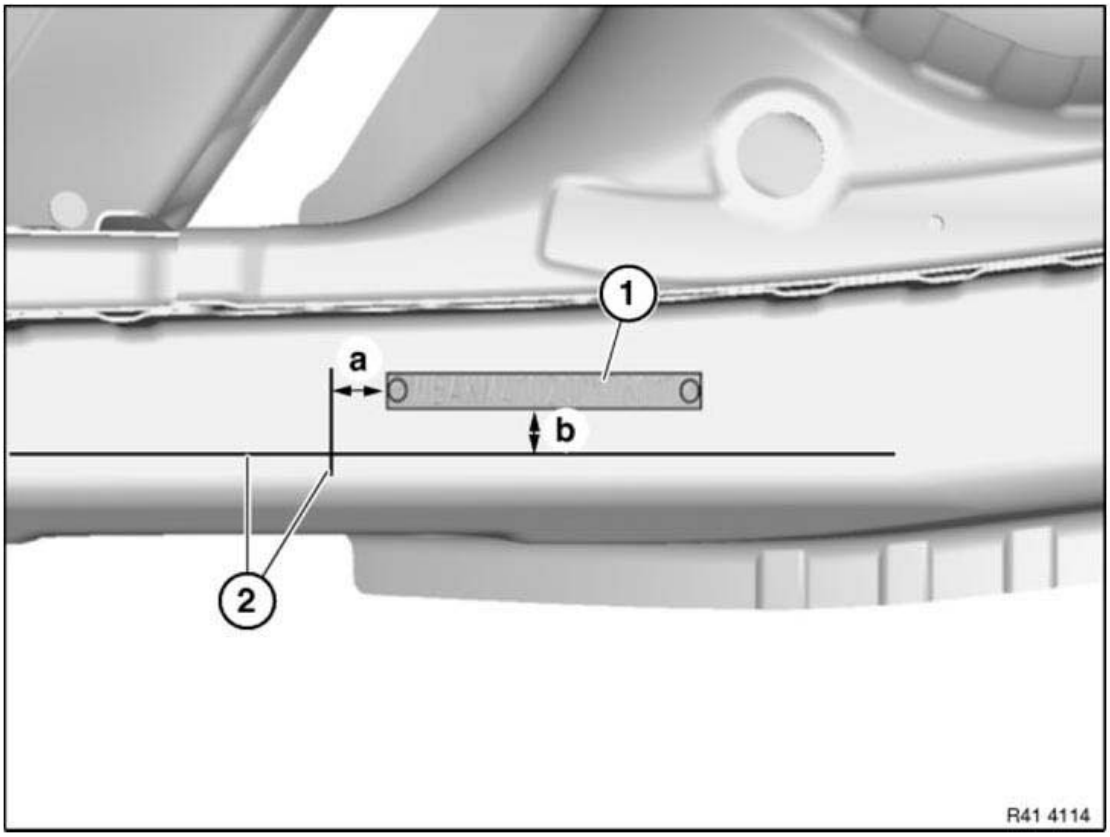


Fig. 176: Identifying Original Vehicle Identification Number With Position Lines
Courtesy of BMW OF NORTH AMERICA, INC.

(1) = original vehicle identification number.

Mark position lines (2) in accordance with specified dimensions/measurements.

Measurement a = 12 mm

Measurement b = 10 mm

Display input:

- Select Layout 5 with arrow button.
- Enter vehicle identification number with F10.
- Press "ENTER" button.

NOTE: With Layout 5 the vehicle identification number (line 1) is crossed through.

Fig. 177: Identifying Display
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Perform stamping operation with position lines in advance on a test sheet.

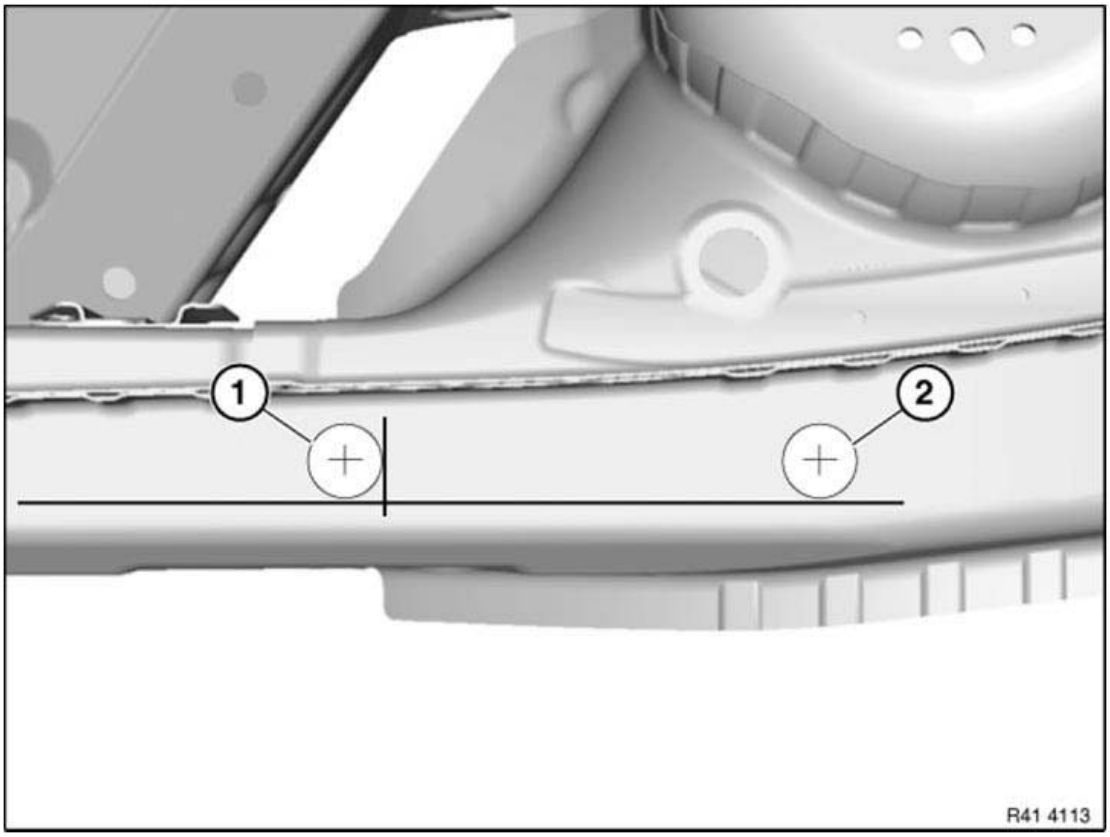


Fig. 178: Identifying Needle Stamping Unit Suction Feet Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Move suction feet of needle stamping unit to positions (1) and (2) shown.

- First adjust position (1)
- Then adjust position (2)

Press pushbutton (1) for vacuum pressure.

Then start stamping operation with pushbutton (2).

After completing the stamping operation, switch off vacuum and set unit down.

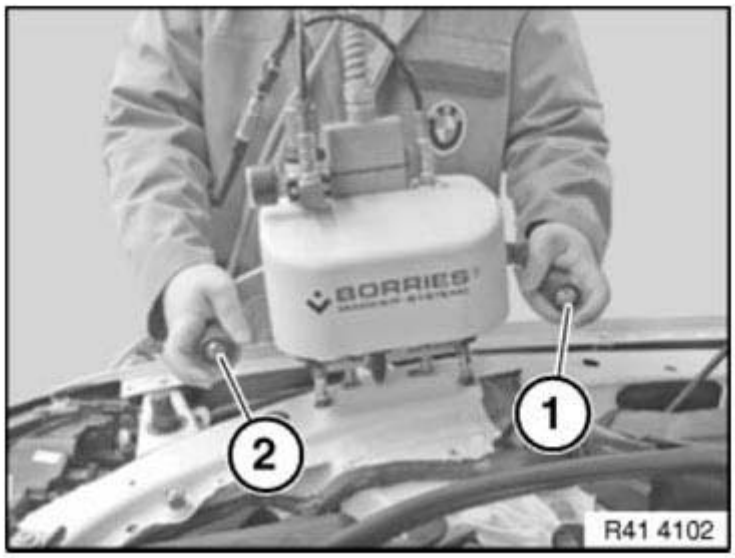


Fig. 179: Stamping Vehicle Identification Number
Courtesy of BMW OF NORTH AMERICA, INC.

Stamping second vehicle identification number

NOTE: The second vehicle identification number is stamped at the height of the spring strut dome.

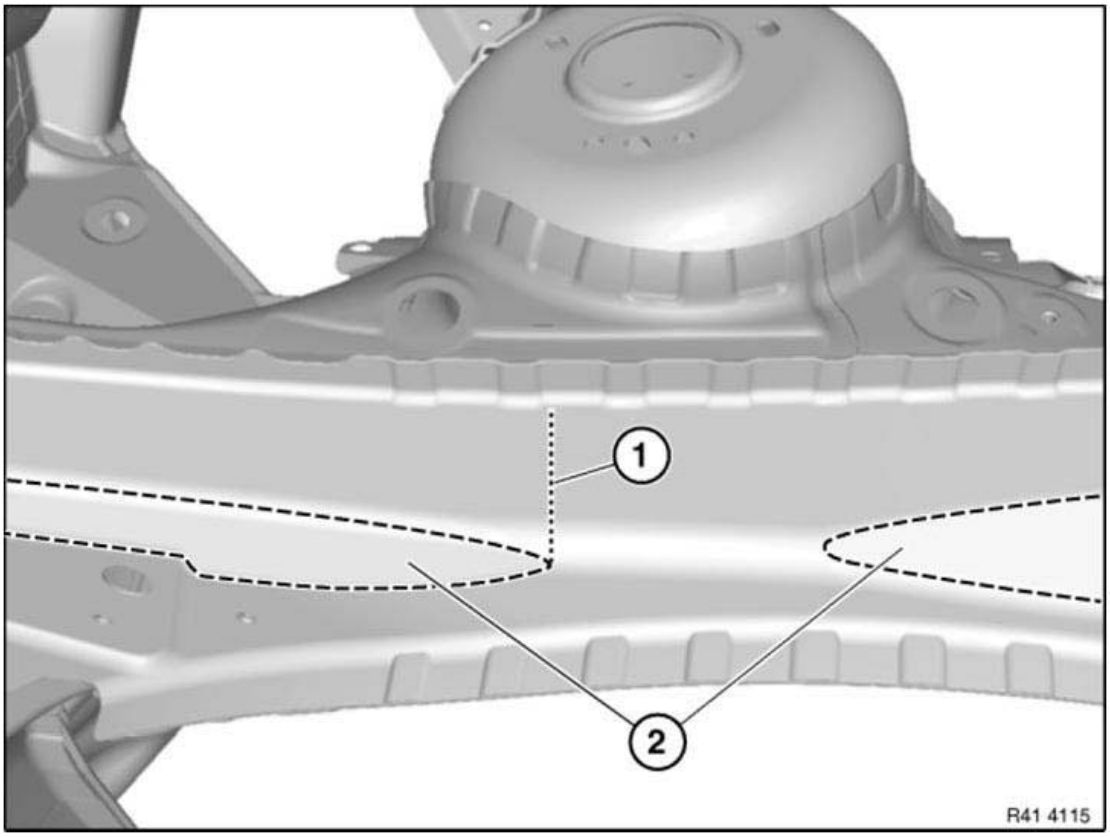


Fig. 180: Marking Help Line In Accordance With Reference Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Mark help line (1) in accordance with reference surfaces (2).

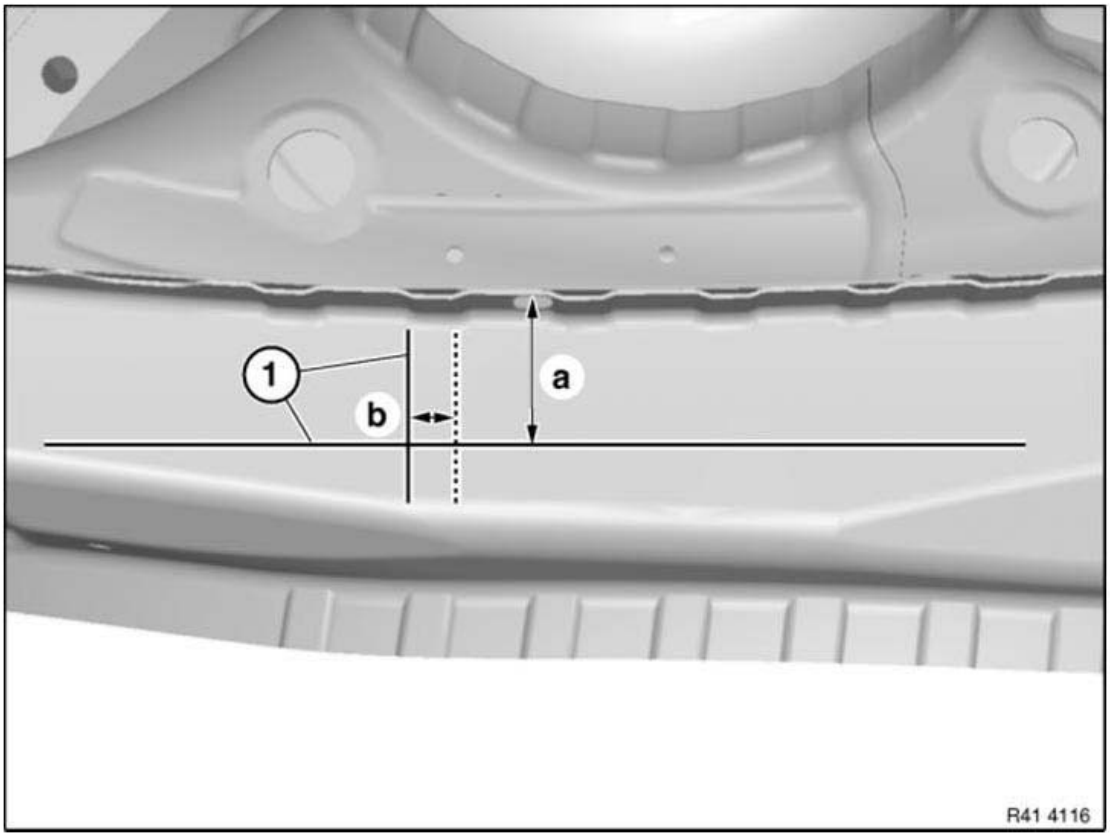


Fig. 181: Marking Position Lines In Accordance With Specified Dimensions/Measurements
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position lines (1) in accordance with specified dimensions/measurements.

Measurement a = 45 mm

Measurement b = 15 mm

Display input:

- Select Layout 1 with arrow button.
- Press "ENTER" button.

NOTE: With Layout 1 the already entered vehicle identification number is stamped in line 1.

Fig. 182: Identifying Display
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Perform stamping operation with position lines in advance on a test sheet.

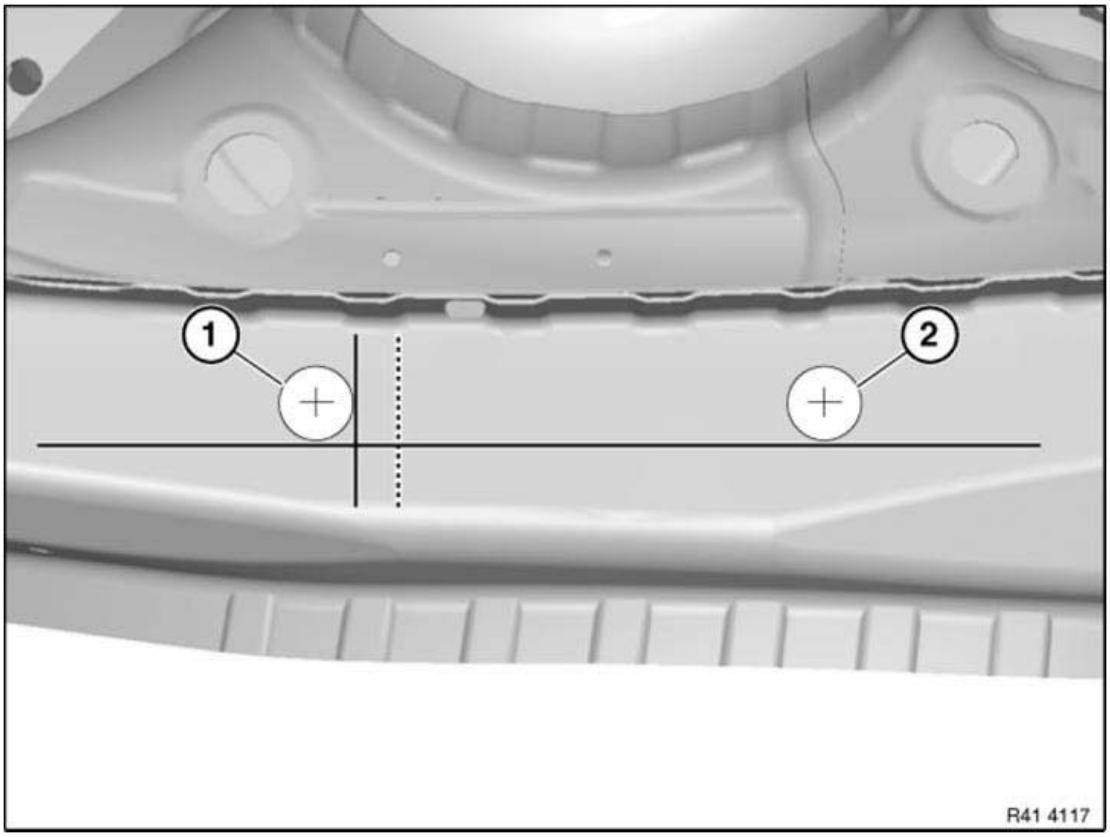


Fig. 183: Identifying Needle Stamping Unit Suction Feet Positions
Courtesy of BMW OF NORTH AMERICA, INC.

Move suction feet of needle stamping unit to positions (1) and (2) shown.

- First adjust position (1)
- Then adjust position (2)

Press pushbutton (1) for vacuum pressure.

Then start stamping operation with pushbutton (2).

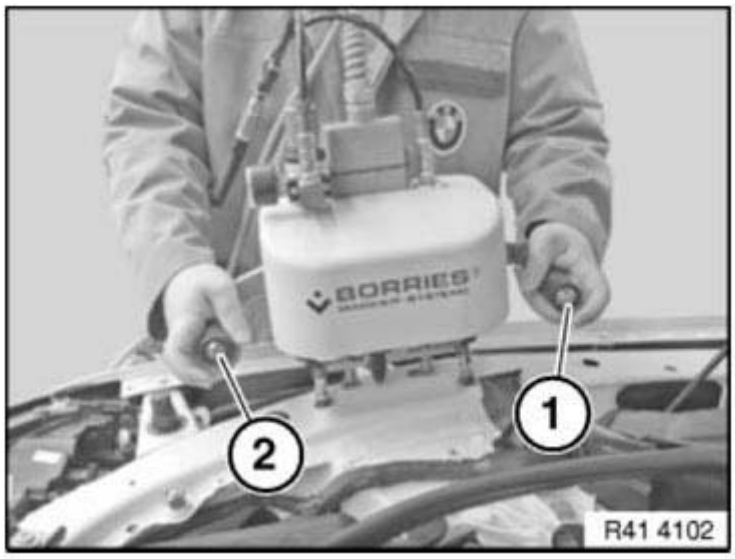


Fig. 184: Stamping Vehicle Identification Number
Courtesy of BMW OF NORTH AMERICA, INC.

Following layout functions are available:

LAYOUT FUNCTION CHART

Layout selection	Vehicle identification number
Layout 1	In line 1
Layout 2	In line 2
Layout 3	Turned through 180° in line 1
Layout 4	Turned through 180° in line 2
Layout 5	Cross through in line 1
Layout 6	Cross through in line 2

41 00 ... VEHICLE IDENTIFICATION NUMBER, GENERAL

In the event of repair 2 procedures are used, depending on the vehicle. Refer to the vehicle-specific repair instructions for the correct procedure.

1. General notes for stamped vehicle identification numbers

The vehicle identification number is stamped with a special tool. There are different special tool numbers and stamping procedures for the various vehicles. Refer to the relevant repair instructions.

In repair work, the vehicle identification number is always stamped into a replacement vehicle identification number surface. The replacement surface is usually situated under the original VIN surface.

The IGEF number (bodyshell number) is omitted when the wheel arch is replaced.

In the event of component or body replacement by the BMW garages/workshops, clearly delimit the vehicle identification number at front and rear by stamping a + in place of the BMW badge.

If a VIN is stamped into the replacement surface in addition to the original VIN (e.g. if the original VIN has been tampered with), the following applies: The original VIN must be crossed out. To do so, stamp the letter I from the punch digits lengthways through the original VIN.

IMPORTANT: Do not use an angle grinder in conjunction with a cutting disk!

The protective film used as standard is omitted after the VIN has been manually stamped in. Paint area in accordance with BMW Painting Handbook. Ensure that layer thicknesses are small.

Observe national/country-specific regulations.

2. General notes for embossed vehicle identification numbers

This procedure is used on all newly launching model series from model year 09/2008 (exception X1).

For the repair new parts with an embossed vehicle identification number can as a rule be ordered from the BMW Parts Department. If this is not possible, observe country-specific regulations.

The IGEF number (bodyshell number) is omitted when the wheel arch is replaced.

If a VIN is embossed into the replacement surface in addition to the original VIN (e.g. if the original VIN has been tampered with), the following applies: The vehicle-specific repair instructions describe the procedure.

The protective film used as standard is omitted after the VIN has been embossed. Paint area in accordance with BMW Painting Handbook. Ensure that layer thicknesses are small.

Observe national/country-specific regulations.

4121 SIDE FRAME AND DOOR PILLARS

41 11 141 REPLACING COVER FOR LEFT OR RIGHT FRAME SIDE MEMBER (PARTIAL REPLACEMENT BETWEEN A- AND B-PILLARS)

Read contents of **BODY, GENERAL** .

Remove or cover those vehicle components in the repair area which are susceptible to heat or dust.

Use only approved **SPOT-WELDING APPARATUS** for repairs.

Following new body parts are required:

- (1) Outer rocker panel

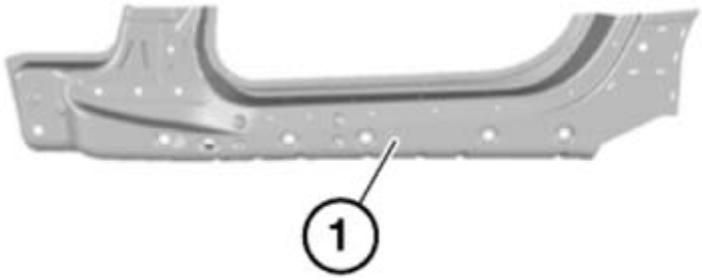


Fig. 185: Identifying Outer Rocker Panel
Courtesy of BMW OF NORTH AMERICA, INC.

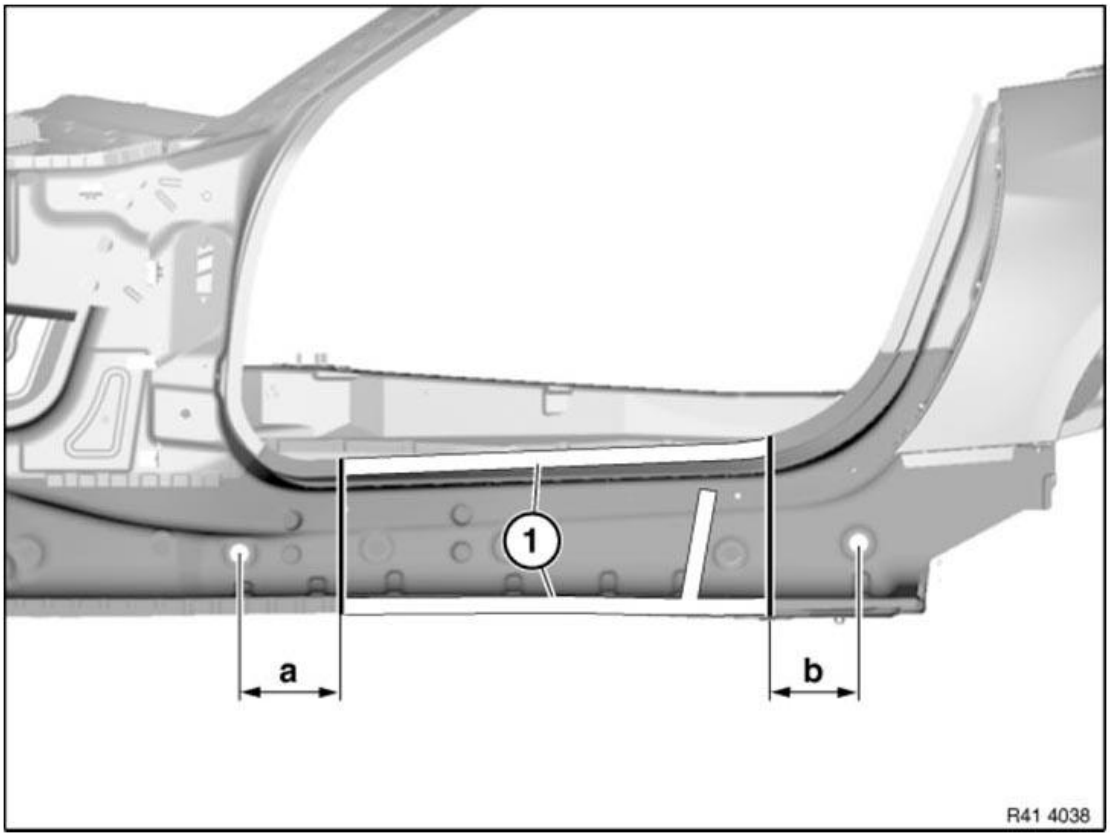


Fig. 186: Identifying Weld Joint Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cuts in accordance with specified measurements and cut.

Distance a = approx. 150 mm behind bore dia. 25 mm.

Distance b = approx. 130 mm before bore dia. 25 mm.

Release weld joints in areas (1) and remove outer rocker panel.

Installation:

Weld in **REINFORCING PANELS** at all severance cuts.

41 11 155 REPLACING COVER FOR LEFT OR RIGHT SIDE MEMBER (PARTIAL REPLACEMENT, DOOR PILLAR)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific procedure See **4100... SPOT-WELD BONDING STEEL PARTS** or **4100... OPENING ADHESIVE BONDS**.

Place vehicle on straightening bench.

Necessary preliminary tasks

- Remove **FRONT SIDE PANEL**
- Remove rear side panel See **4135111 REPLACING REAR RIGHT SIDE PANEL** or **4135101 REPLACING REAR LEFT SIDE PANEL**
- **REMOVE DOOR**

Following new body parts are required:

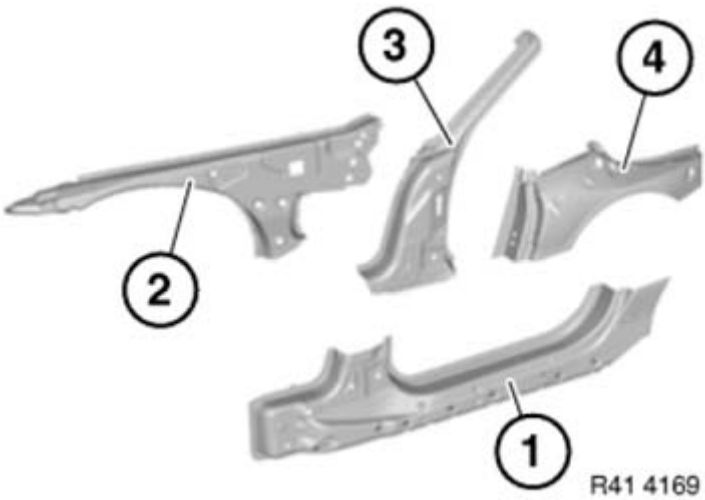


Fig. 187: Identifying Entrance, Outer, Carrier Support, Wheel Arch, A-Pillar, Outer And B-Pillar, Outer

Courtesy of BMW OF NORTH AMERICA, INC.

- (1) Entrance, outer
- (2) Carrier support, wheel arch
- (3) A-pillar, outer
- (4) B-pillar, outer

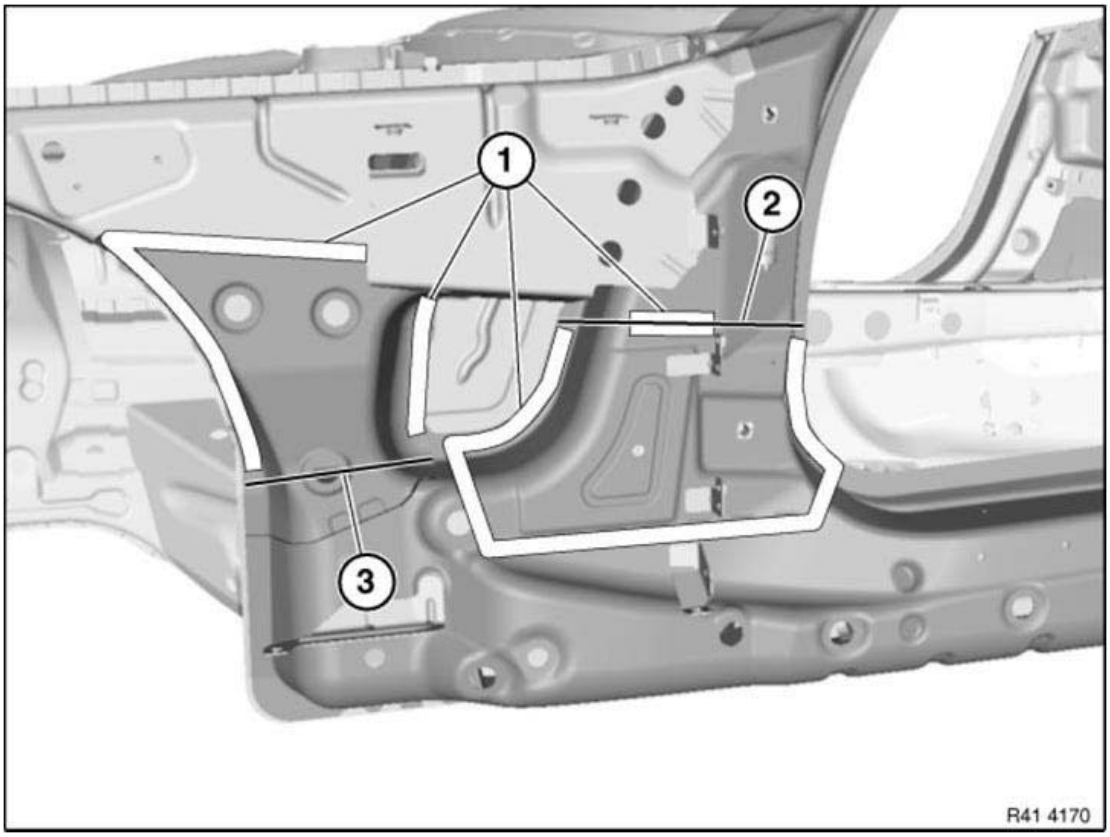


Fig. 188: Identifying Weld Joints Areas And Spot-Weld Adhesive Joints Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints and spot-welded adhesive joints in areas (1).

Mark severance cuts (2) and (3) and cut.

IMPORTANT: Cut only outer plates.

Installation:

No reinforcing panel is welded in at severance cut (2).

Execute severance cut (2) so that there is an overlap to new entrance part.

Open weld joints in areas (1).

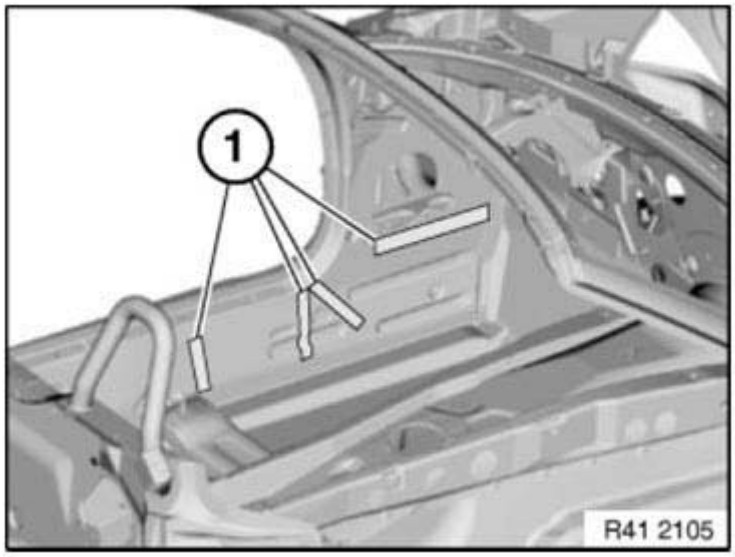


Fig. 189: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) and cut.

Open weld joints and spot-welded adhesive joints in area (2).

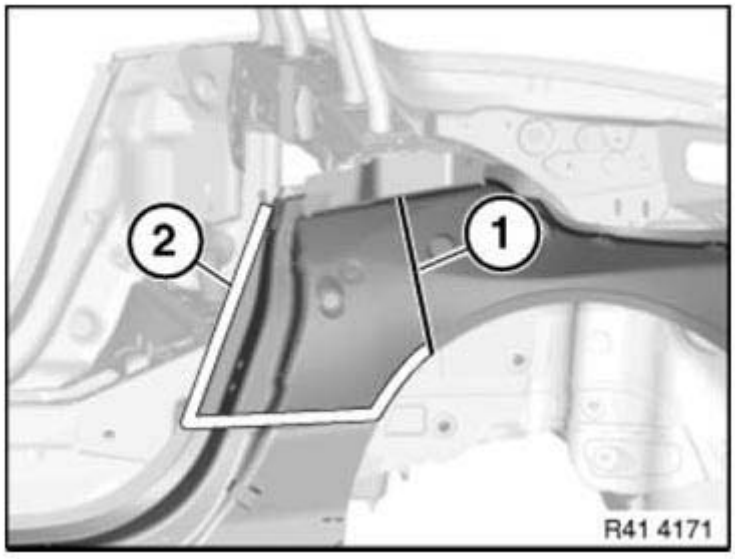


Fig. 190: Identifying Weld Joints Areas And Spot-Weld Adhesive Joints Areas With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

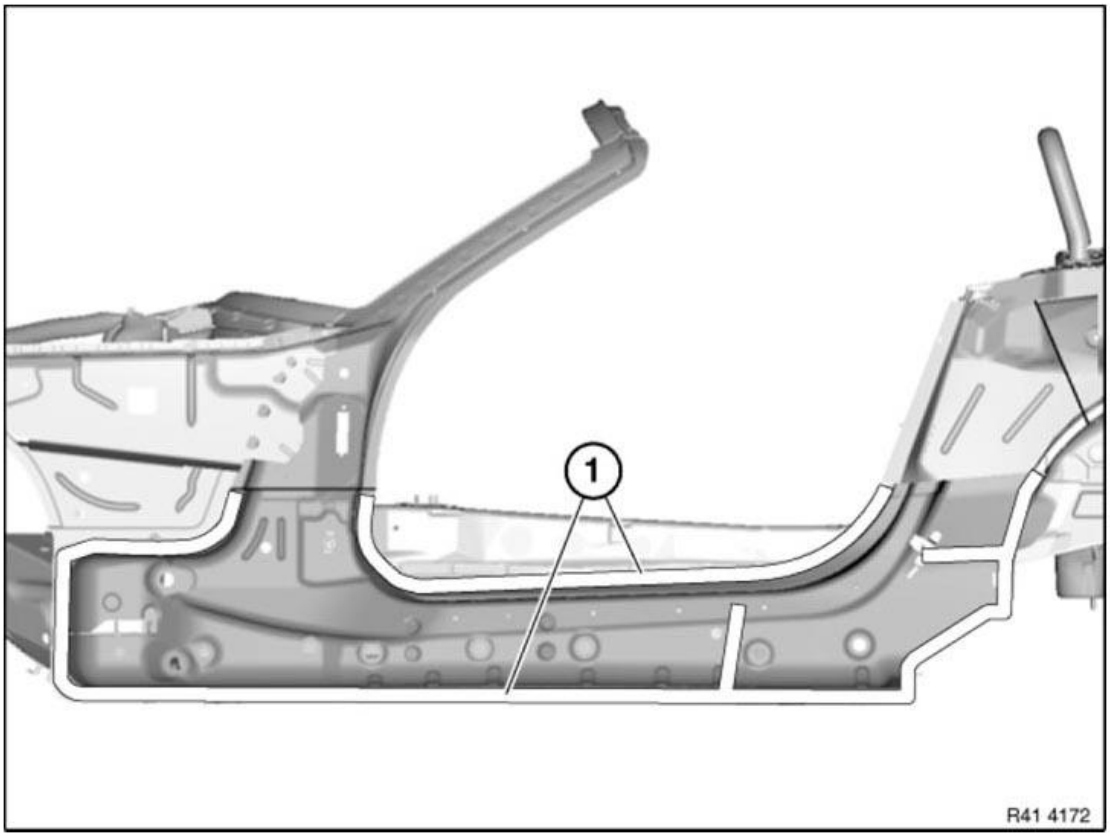


Fig. 191: Identifying Weld Joints Areas And Spot-Weld Adhesive Joints Areas
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints and spot-welded adhesive joints in area (1).

Installation:

Slide **outer entrance** underneath remaining A-pillar.

Adhere to specific procedure with regard to spot-welded adhesive joints.

When welding the new part, make sure that the adhesive joints of adjoining components are not damaged by the application of heat.

41 21 512 REPLACING DOOR PILLAR INNER SECTION (DOOR PILLAR REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on the E85. Observe specific procedure See **4100... SPOT-WELD BONDING STEEL PARTS** or **4100... OPENING ADHESIVE BONDS**.

Place vehicle on straightening bench.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Support, A-pillar

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N1	4
CleanerR1	1
Sealing compoundD1	

Fig. 192: Identifying Support, A-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

View from inside.

Open weld joints in areas (1).

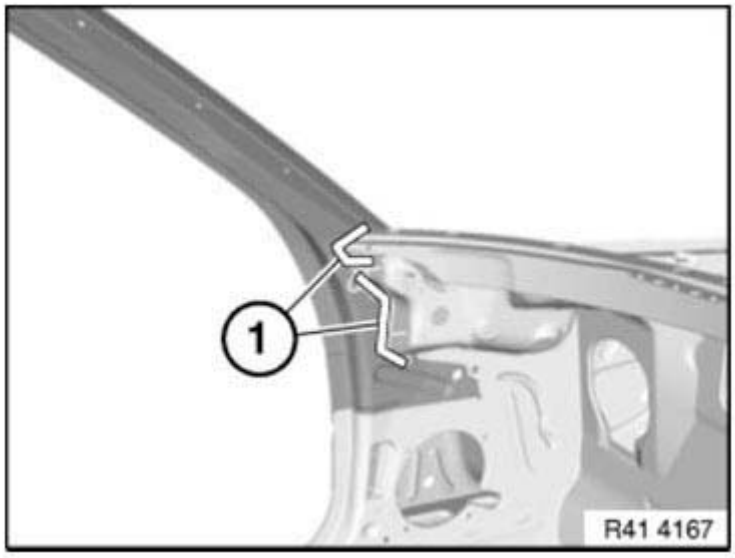


Fig. 193: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

Open spot-weld bonded joints in area (2)

Installation:

Adjust new part to fit with straightening attachment or universal mount.

Apply adhesive K5a in area (2). Rivet new part with 4 blind rivets N1. Before applying adhesive, clean bonding surfaces with adhesive cleaner.

Observe fitting of door pillar when selecting the rivet positions.

When welding the new part, make sure that the adhesive joints of adjoining components are not damaged by the application of heat.

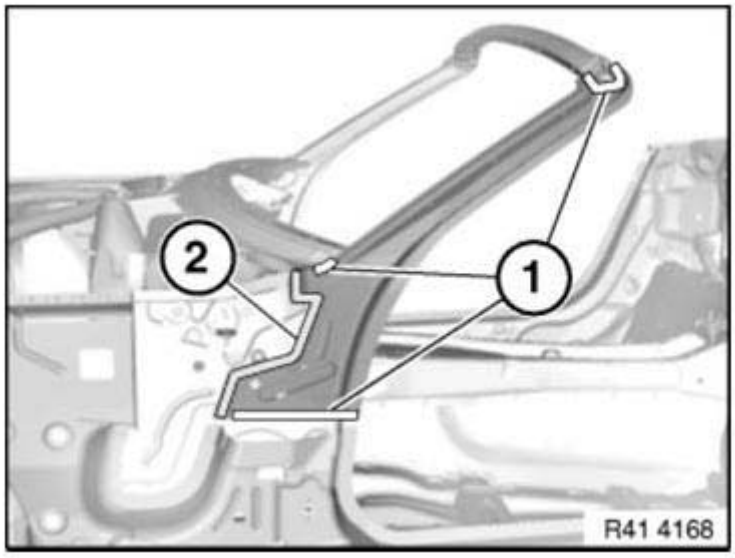


Fig. 194: Identifying Weld Joints Areas And Spot-Weld Bonded Joints Areas
Courtesy of BMW OF NORTH AMERICA, INC.

41 21 540 REPLACING FRONT LEFT OR RIGHT DOOR PILLAR (FRONT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific procedure See **4100... SPOT-WELD BONDING STEEL PARTS** or **4100... OPENING ADHESIVE BONDS**.

Place vehicle on straightening bench.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) A-pillar, outer left
- (2) Support carrier, wheel arch, left

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N1	1
Cavity sealing wax remover	1
CleanerR1	1
Sealing compoundD1	

NOTE: **New outer A-pillar part does not contain a reinforcing tube.**

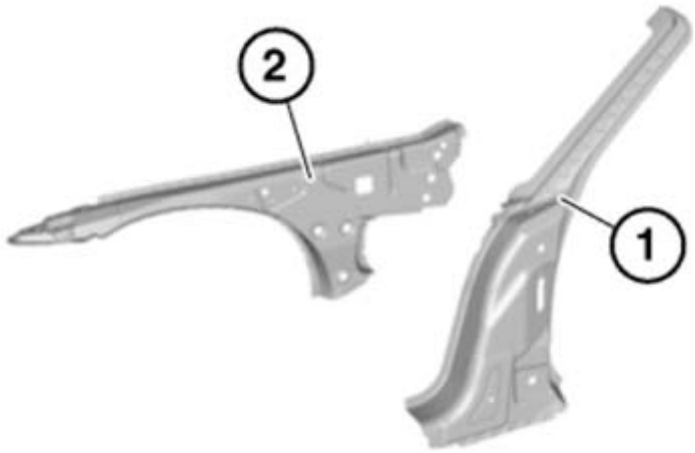


Fig. 195: Identifying A-Pillar, Outer Left And Support Carrier, Wheel Arch, Left
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement a and cut support carrier.

Measurement a = 115 mm from hole dia. 25 mm.

IMPORTANT: Cut outer metal sheet only.

Open weld joints in area (2).

Installation:

Weld in **REINFORCEMENT PLATE** at severance cut.

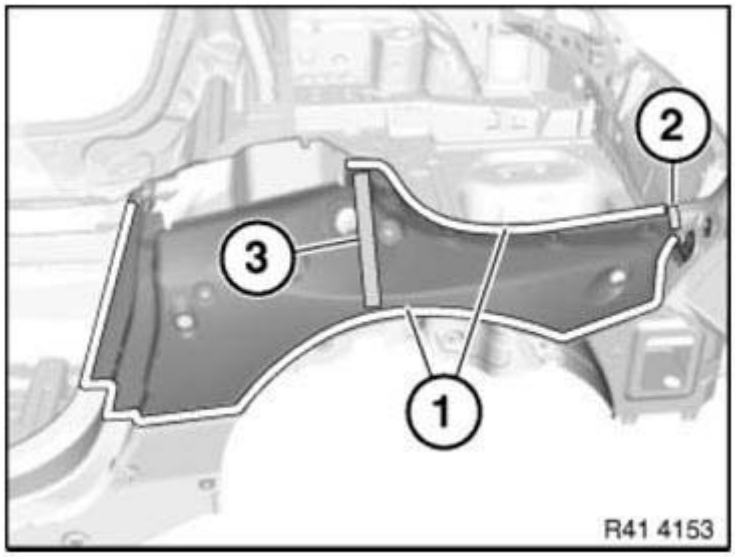


Fig. 196: Identifying Weld Joints Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Open spot-weld bonded joints in area (1)

Open weld joints in area (2).

Open brazed joint in area (3).

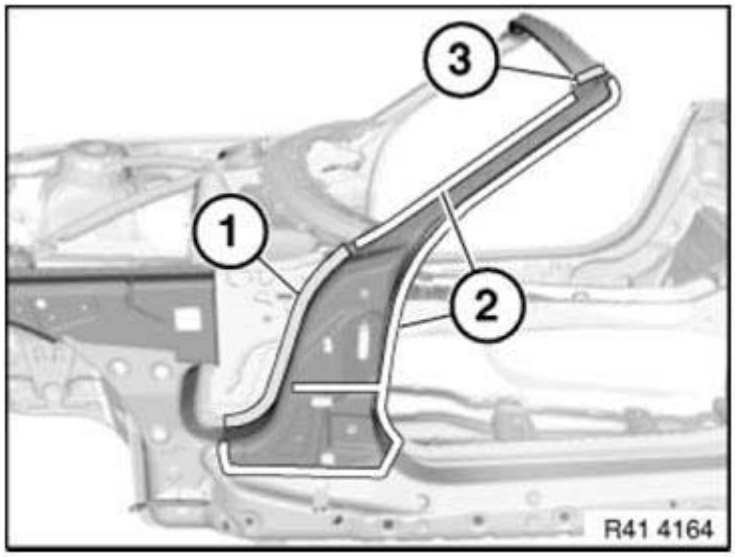


Fig. 197: Identifying Weld Joints And Brazed Joints
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Adjust new part to fit with straightening attachment or universal mount.

Adhesive is omitted in areas (1). Observe specific **PROCEDURE** and seal this area with utmost care.

Apply **ADHESIVE K1A** in area (2). Rivet new part with blind rivet N1. Before applying adhesive, clean bonding surfaces with adhesive cleaner.

When welding the new part, make sure that the adhesive joints of adjoining components are not damaged by the application of heat.

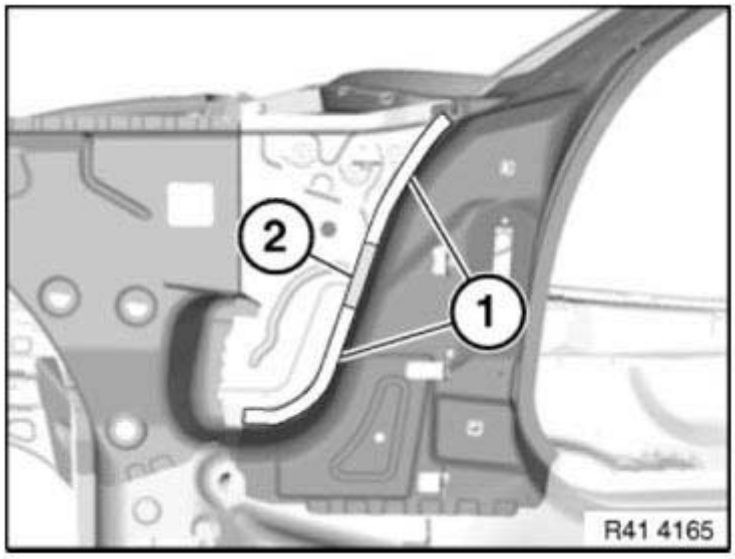


Fig. 198: Applying Adhesive k1a In Rivet Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 21 518 REPLACING LEFT B-PILLAR (REAR LEFT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific **PROCEDURE** .

Following new body parts are required:

- (1) B-pillar, outer left

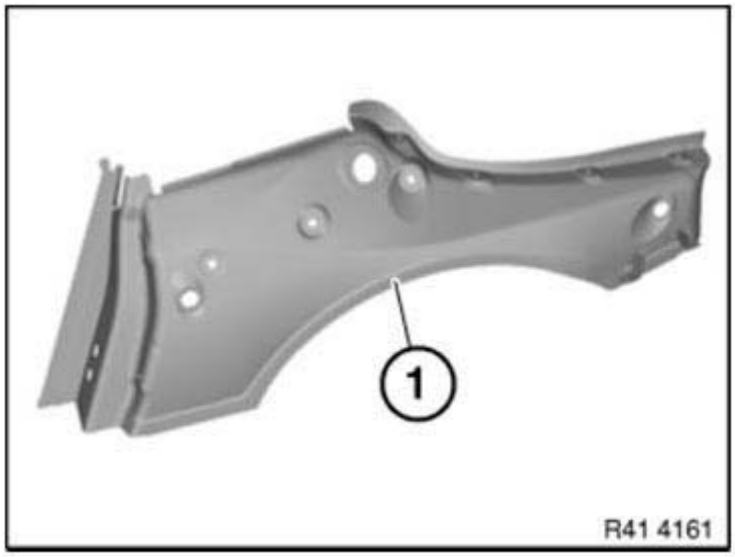


Fig. 199: Identifying B-Pillar, Outer Left
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

Open brazed joint in area (2).

Installation:

Apply sealant to **CAVITY ACOUSTIC BAFFLE** (3).

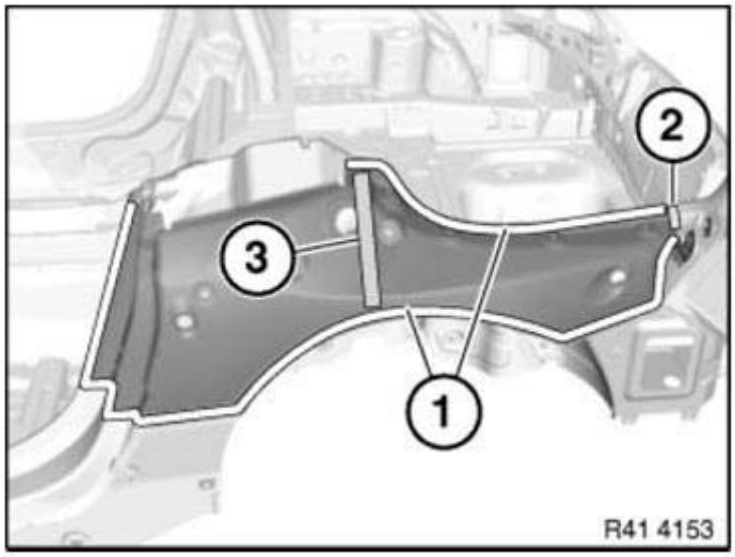


Fig. 200: Identifying Weld And Brazed Joints With Cavity Acoustic Baffle
Courtesy of BMW OF NORTH AMERICA, INC.

4132 DASH COWL

41 00 ... PROCEDURE FOR FOLDING HARDTOP AFTER AN ACCIDENT

The hardtop may be under tension after the vehicle has incurred damage following an accident. Moving the hardtop by hydraulic means may result in irreparable damage. For this reason, the hardtop may only be moved manually until the damaged has been repaired.

IMPORTANT: It is not possible to check the correct operation of the folding roof on the damaged vehicle.

Different procedures are required, depending on the degree of damage which the vehicle has incurred. The repair instructions for emergency operation See **5437290 HARDTOP EMERGENCY OPENING** or **5437295 EMERGENCY CLOSING HARDTOP** describe only the complete sequences for manually opening and closing the hardtop.

When removing the roof module and/or the rear module, it is possible to move the hardtop manually into the necessary intermediate positions in each case.

WARNING: Risk of injury due to the heavy weight of the hardtop!
Since the hydraulic system may have to be depressurized during manual movement of the hardtop, there is an increased risk of injury by trapping. Secure the hardtop permanently and adequately against unintentional movement.

After body repairs to the vehicle

All the hardtop components screwed/bolted to the body are precisely screwed/bolted to the vehicle at the factory by means of gauges. This affects above all the base plates and consoles of the roof and rear modules. To minimize extensive adjustment work after a body repair as much as possible, only remove those components which are screwed/bolted to a damaged body part.

- Gauge the base plates *only* after a body repair to the cowl panel.

41 21 540 REPLACING FRONT LEFT OR RIGHT DOOR PILLAR (FRONT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Spot-weld bonding is used on this vehicle. Observe specific procedure See **4100... SPOT-WELD BONDING STEEL PARTS** or **4100... OPENING ADHESIVE BONDS**.

Place vehicle on straightening bench.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required

- (1) A-pillar, outer left
- (2) Support carrier, wheel arch, left

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N1	1
Cavity sealing wax remover	1
CleanerR1	1
Sealing compoundD1	

NOTE: New outer A-pillar part does not contain a reinforcing tube.

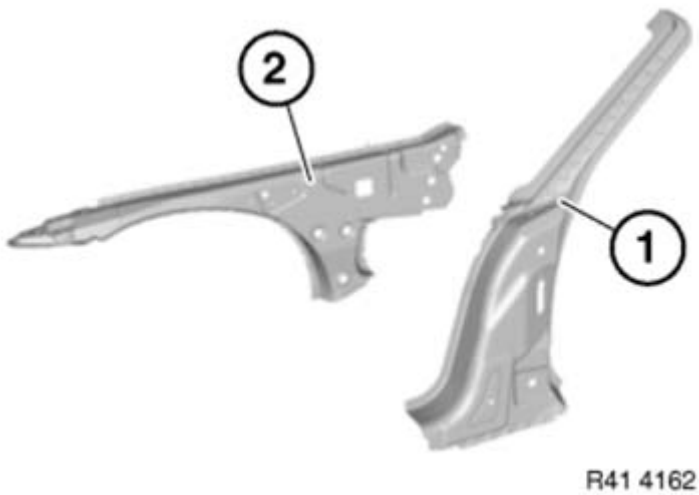


Fig. 201: Identifying A-Pillar, Outer Left And Support Carrier, Wheel Arch
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement a and cut support carrier.

Measurement a = 115 mm from hole dia. 25 mm.

IMPORTANT: Cut outer metal sheet only.

Open weld joints in area (2).

Installation:

Weld in **REINFORCEMENT PLATE** at severance cut.

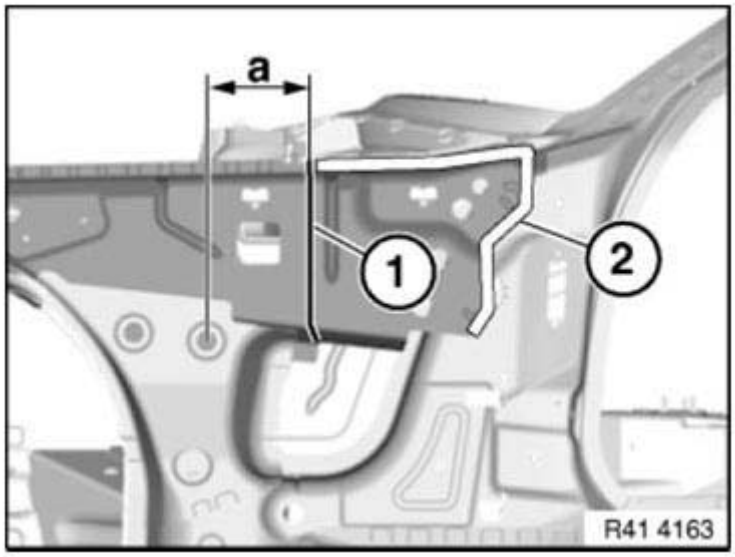


Fig. 202: Identifying Weld Joints Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Open spot-weld bonded joints in area (1)

Open weld joints in area (2).

Open brazed joint in area (3).

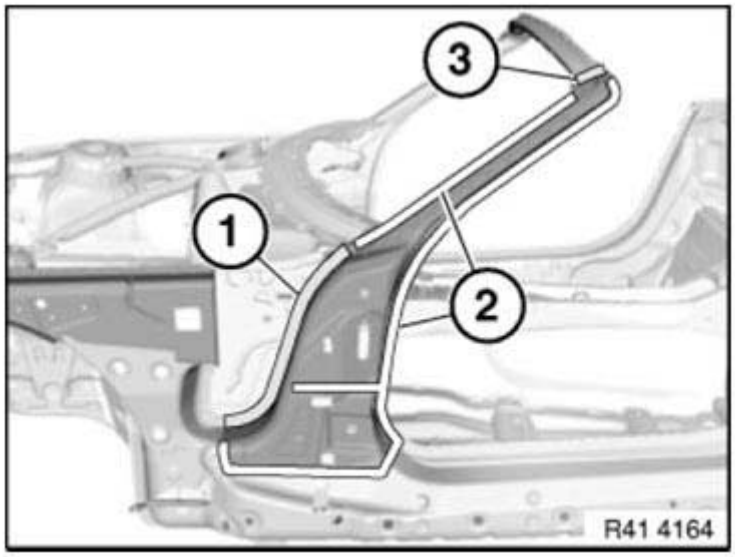


Fig. 203: Identifying Weld Joint And Brazed Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Adjust new part to fit with straightening attachment or universal mount.

Adhesive is omitted in areas (1). Observe specific **PROCEDURE** and seal this area with utmost care.

Apply **ADHESIVE K1A** in area (2). Rivet new part with blind rivet N1. Before applying adhesive, clean bonding surfaces with adhesive cleaner.

When welding the new part, make sure that the adhesive joints of adjoining components are not damaged by the application of heat.

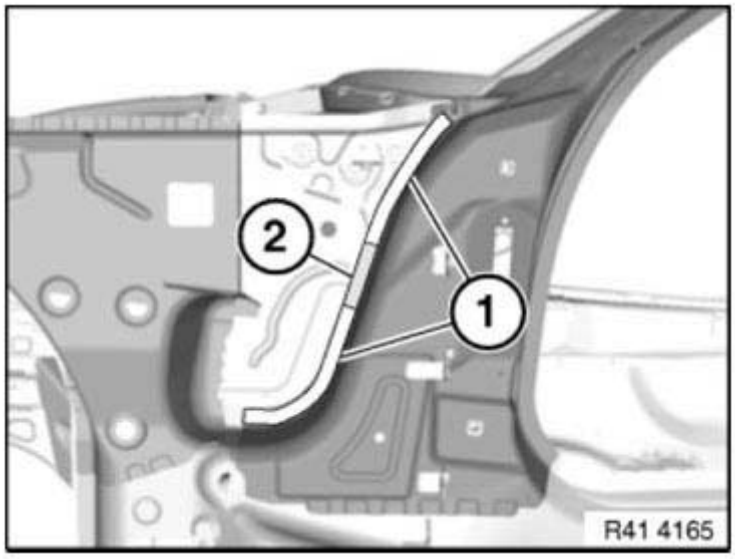


Fig. 204: Applying Adhesive K1a In Rivet Area
Courtesy of BMW OF NORTH AMERICA, INC.

4133 FRONT TRIM PANEL

41 33 040 REPLACING FRONT WALL

Read contents of **BODY, GENERAL** .

Following new body parts are required:

- (1) Front panel

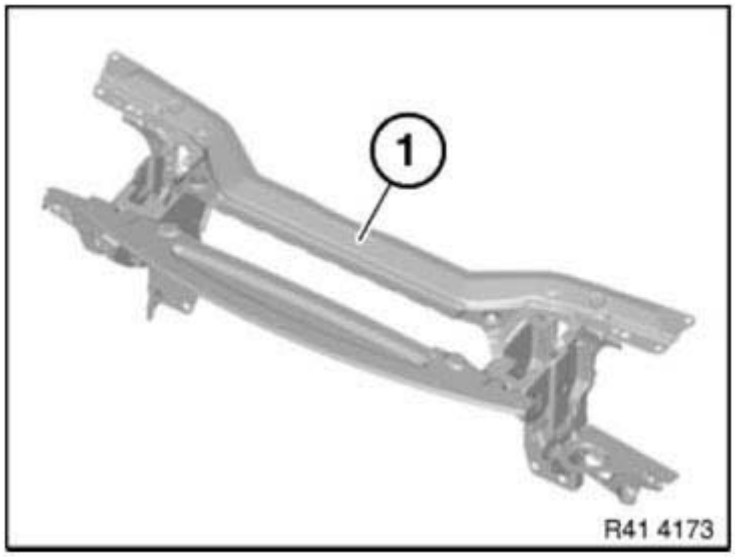


Fig. 205: Identifying Front Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove front panel.

Tightening torque **41 33 1AZ** .

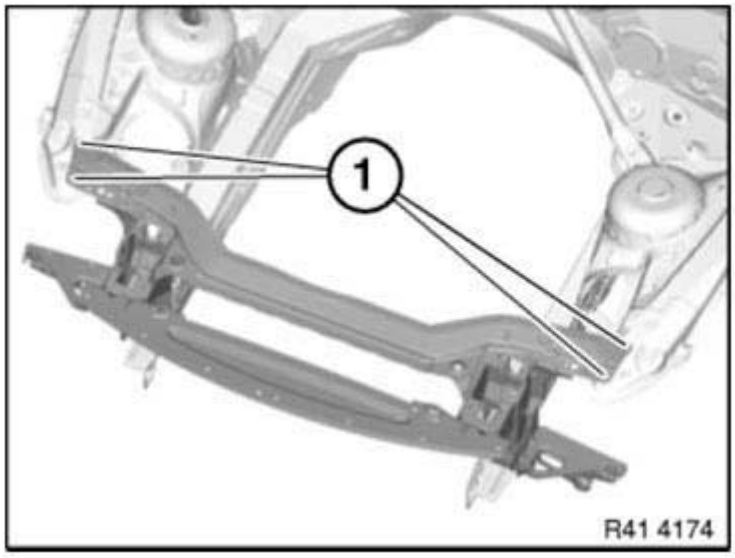


Fig. 206: Identifying Front Panel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

41 33 051 REPLACING LEFT FRONT PANEL

Necessary preliminary tasks

- Remove **DEFORMATION ELEMENT FOR BUMPER**

- Remove **CROSS-MEMBER UPPER SECTION**
- Remove **FRONT BUMPER MOUNTING**
- Remove engine compartment lid lock See **5123110 REMOVING AND INSTALLING/REPLACING LEFT BONNET LOCK** or **5123100 REMOVING AND INSTALLING/REPLACING RIGHT ENGINE HOOD/BONNET LOCK**
- Remove sensor See **6577532 REMOVING AND INSTALLING/REPLACING FRONT LEFT SENSOR (US VERSION ONLY)** or **6577534 REMOVING AND INSTALLING/REPLACING FRONT RIGHT SENSOR (US VERSION ONLY)**

Release screws (1).

Tightening torque **51 64 1AZ** .

Remove headlight mounting (2).

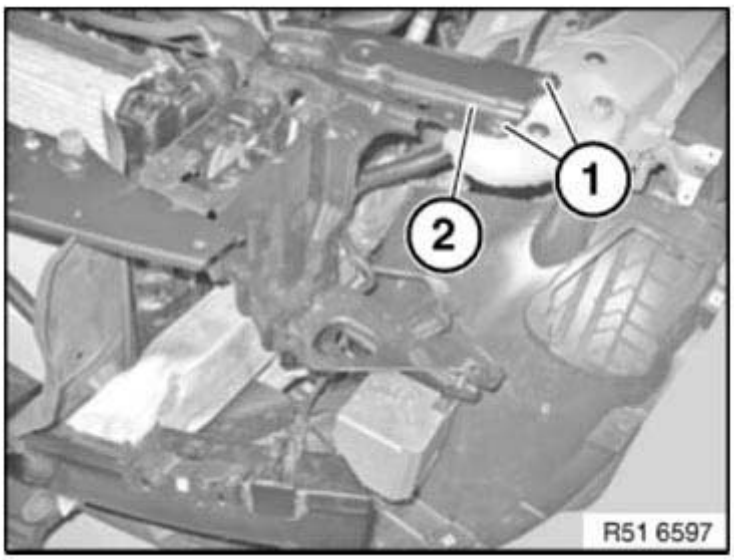


Fig. 207: Identifying Headlight Mounting With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

41 33 052 REPLACING RIGHT FRONT PANEL

Operations correspond to:

REPLACING LEFT FRONT PANEL

4134 REAR TRIM PANEL

41 11 516 REPLACING FRONT LEFT OR RIGHT SUPPORT CARRIER (PARTIAL REPLACEMENT, FRONT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE .

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Support carrier, wheel arch, front,
- (2) Carrier support, wheel arch, inner
- (3) Bracket, diagonal strut, carrier support

Fig. 208: Identifying Support Carrier, Wheel Arch, Front And Carrier Support, Wheel Arch, Inner
Courtesy of BMW OF NORTH AMERICA, INC.

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N1	12
Punch rivets N5	12
CleanerR1	1
Cavity sealing wax remover	1
Sealing compoundD1	

Removing carrier support

View from below.

Mark severance cut (1) in accordance with specified measurements and cut.

Measurement a = 80 mm

Measurement b = 50 mm

IMPORTANT: Cut outer metal sheet only.

Open weld joints in areas (2).

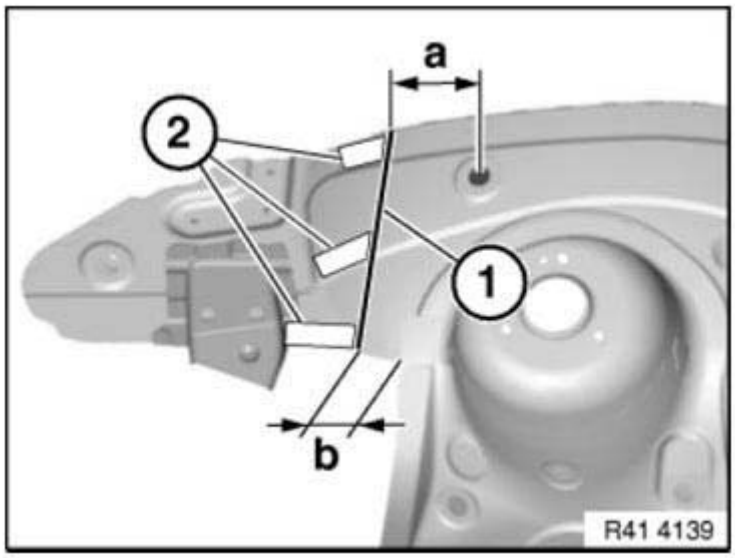


Fig. 209: Identifying Weld Joints Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Roughly mark severance cut (1) and cut.

Remove carrier support section (2).

Open weld joints in area (3) from below.

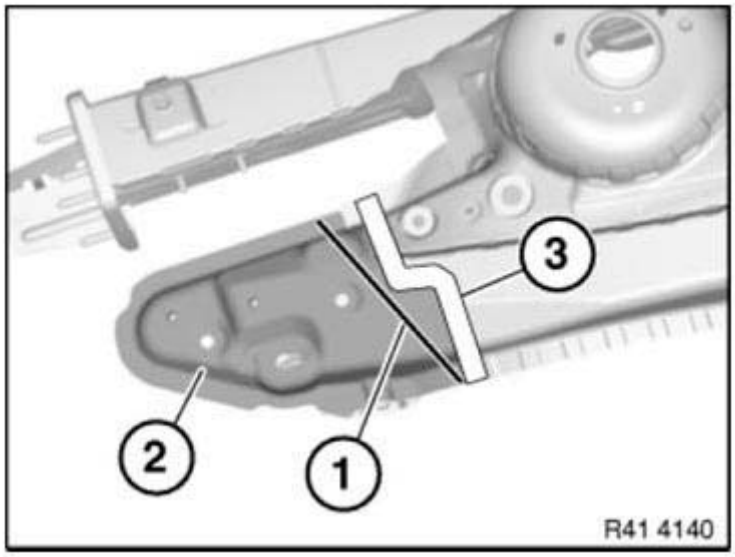


Fig. 210: Removing Carrier Support Section With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Open weld joints in area (1).

Mark severance cut (2) in accordance with severance cut on vehicle + 20 mm extra material and cut.

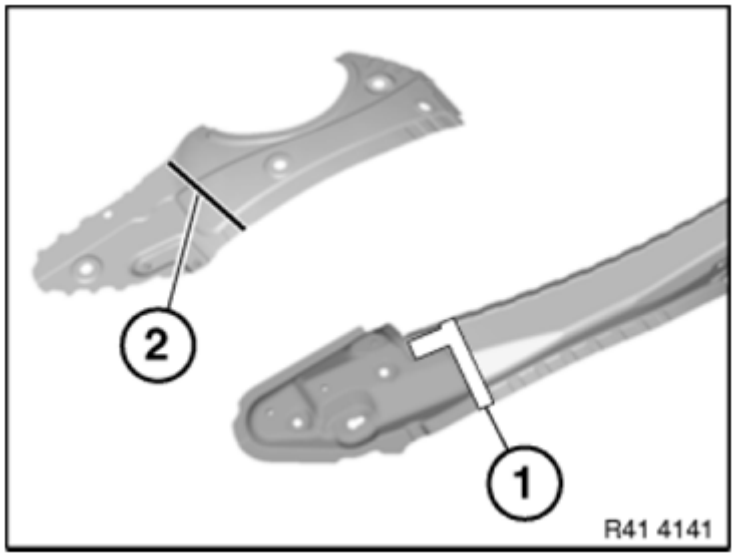


Fig. 211: Identifying Weld Joints Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Offer up new parts with attachments and fix in place.

Set four 6.8 mm dia. holes for blind rivets N1 in area (1).

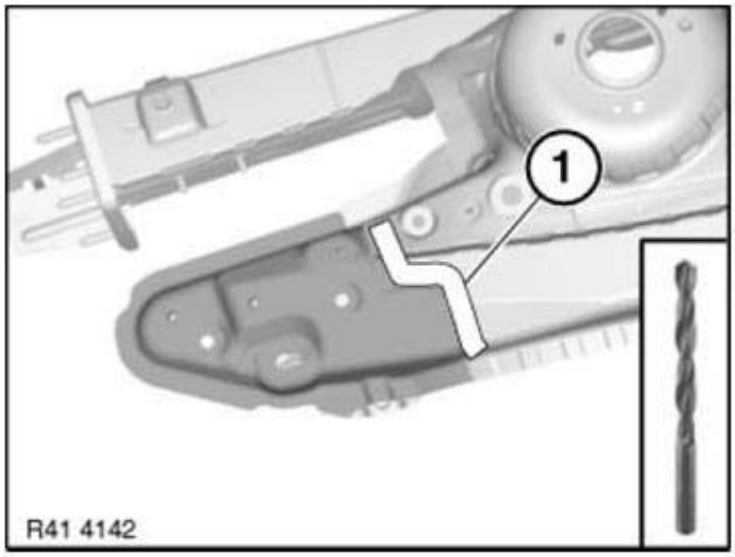


Fig. 212: Setting Four Diameter Holes For Blind Rivets N1
Courtesy of BMW OF NORTH AMERICA, INC.

View from below

Diagonal strut must be fitted in order to adjust holder (1) to fit.

In areas (2) set eight 6.8 mm dia. holes for blind rivets N1.

Remove new parts again and deburr holes.

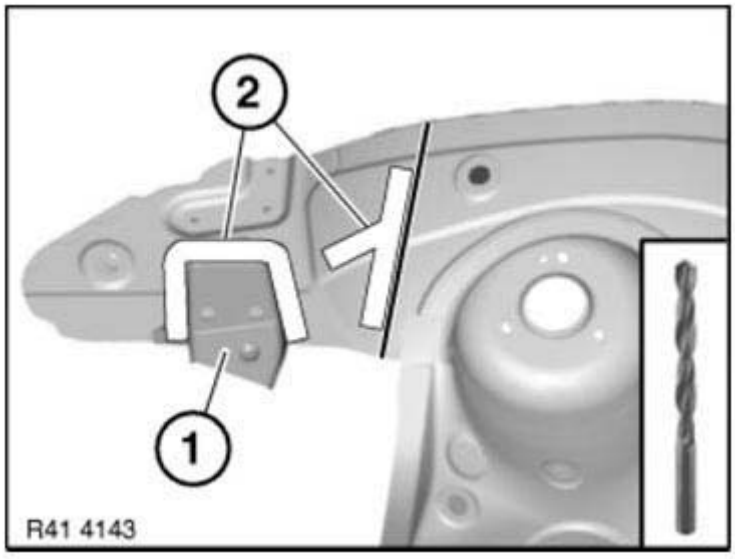


Fig. 213: Identifying Holder And Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Installing carrier support

Clean all bonding surfaces on vehicle and on new part with cleaning agent R1.

Apply adhesive K5a to bonding surfaces.

Attach new part and attachments and rivet with blind rivets (1).

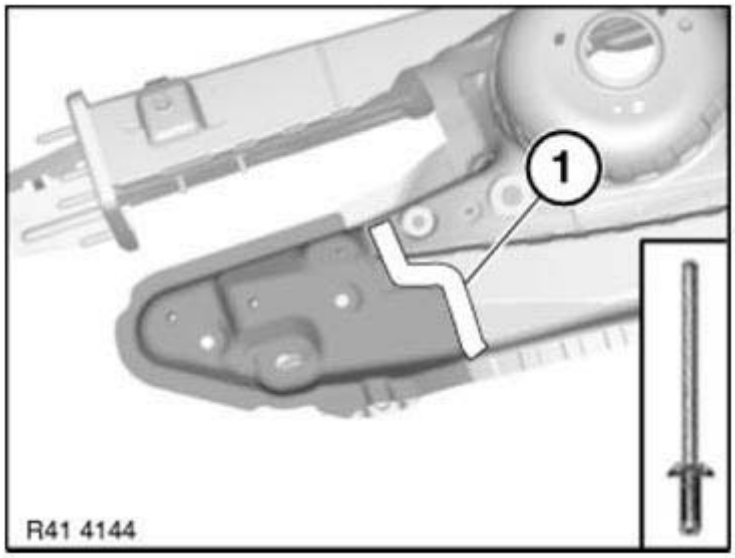


Fig. 214: Installing New Part, Attachments And Rivet Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Clean all bonding surfaces on vehicle and on new part with cleaning agent R1.

Apply adhesive K5a to bonding surfaces.

Mount new part and rivet with blind rivets (1).

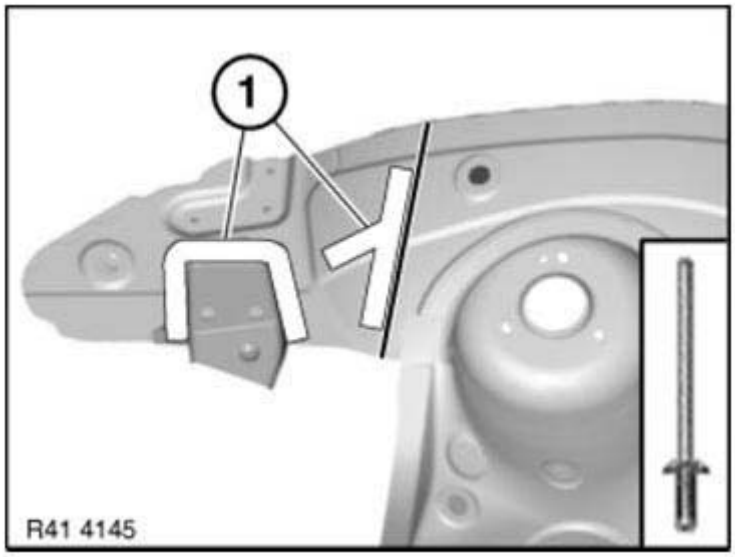


Fig. 215: Mounting New Part And Rivet Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

In area (1) rivet new parts with 12 punch rivets N5.

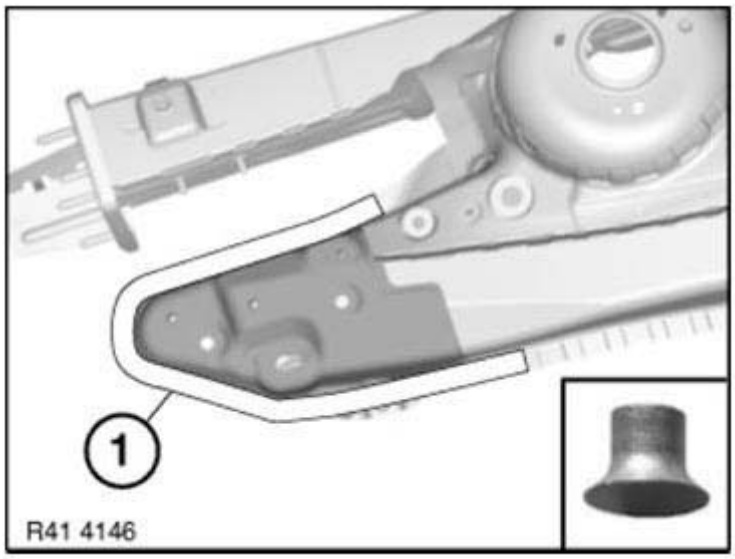


Fig. 216: Identifying Rivet Area With 12 Punch Rivets N5
Courtesy of BMW OF NORTH AMERICA, INC.

Seal adhesive areas and blind rivets in accordance with right side of vehicle with sealant.

41 12 653 REPLACING LUGGAGE COMPARTMENT FLOOR, LEFT SECTION (TAIL PANEL AND SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Strip down vehicle.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Luggage compartment floor, left section
- (2) End plate, rear ventilation, left

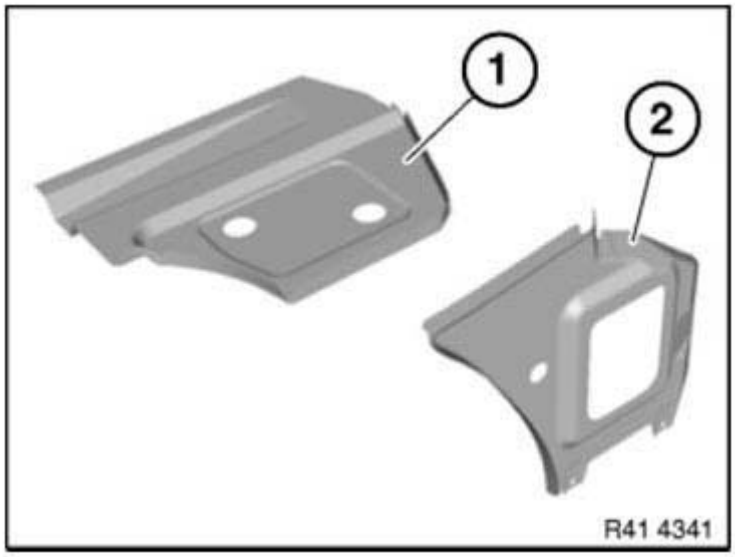


Fig. 217: Identifying Luggage Compartment Floor, Left Section And End Plate, Rear Ventilation, Left
Courtesy of BMW OF NORTH AMERICA, INC.

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N3	9
Blind rivets N6	6
Punch rivets N4	4
CleanerR1	1
Sealing compoundD1	

Removal of luggage compartment floor

Open weld joints in area (1).

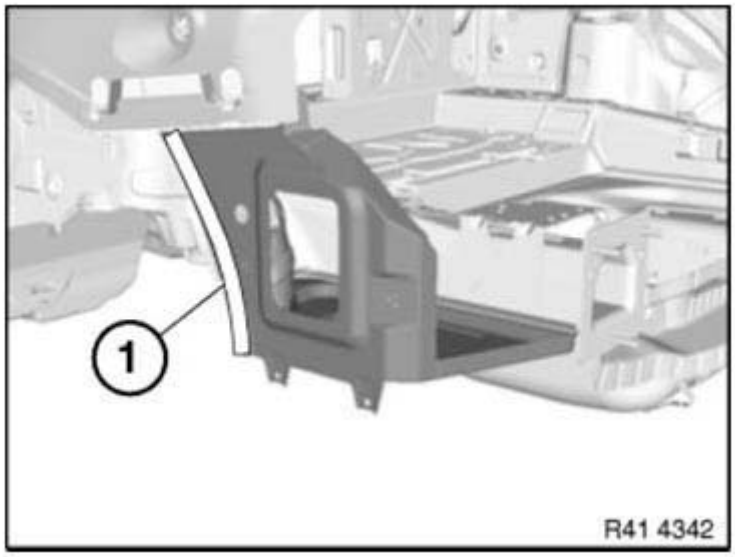


Fig. 218: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

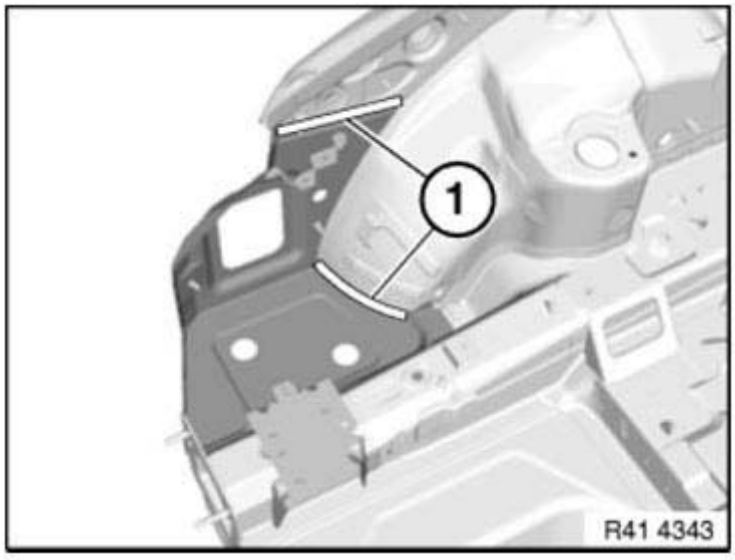


Fig. 219: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in radius and cut.

Remove luggage compartment floor and rear ventilation end plate.

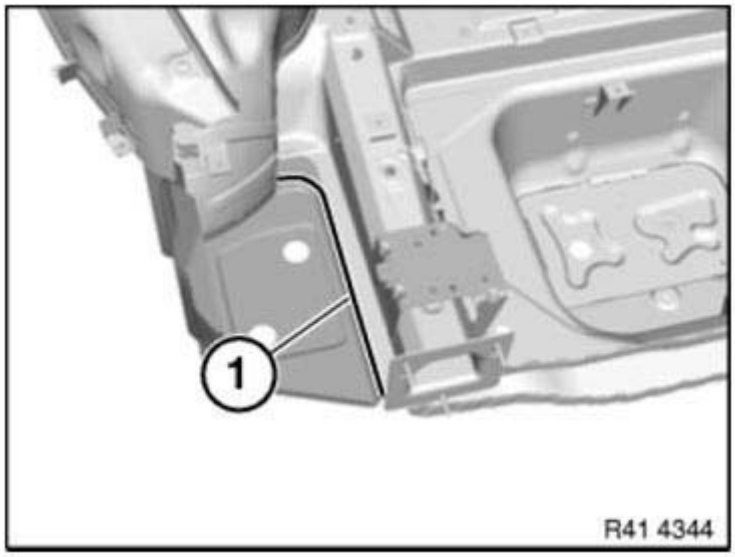


Fig. 220: Marking Severance Cut In Radius
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Mark new luggage compartment floor part in accordance with severance cut on vehicle + 20 mm extra material and cut.

Adjust new parts in combination with tail panel to fit and secure.

Set nine 4.2 mm dia. holes for blind rivets in areas (1).

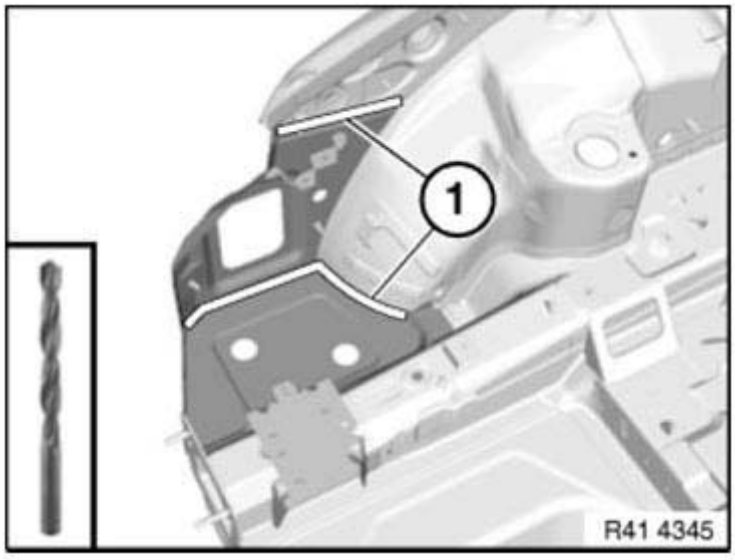


Fig. 221: Identifying Rivet Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set six 4.2 mm dia. holes for blind rivets in area (1).

Remove new parts again and deburr holes.

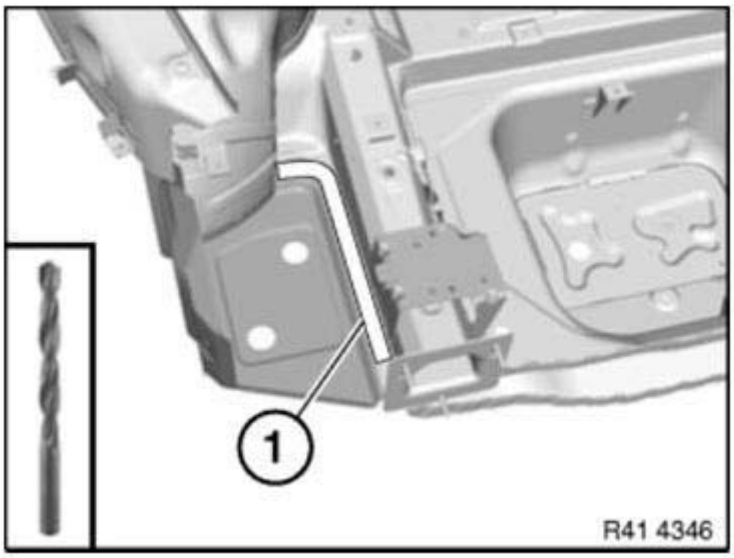


Fig. 222: Identifying Rivet Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installation of luggage compartment floor

Clean all bonding surfaces (1) on new parts and on vehicle with cleaning agent R1!

Apply adhesive K5a to all bonding and rivet surfaces (1).

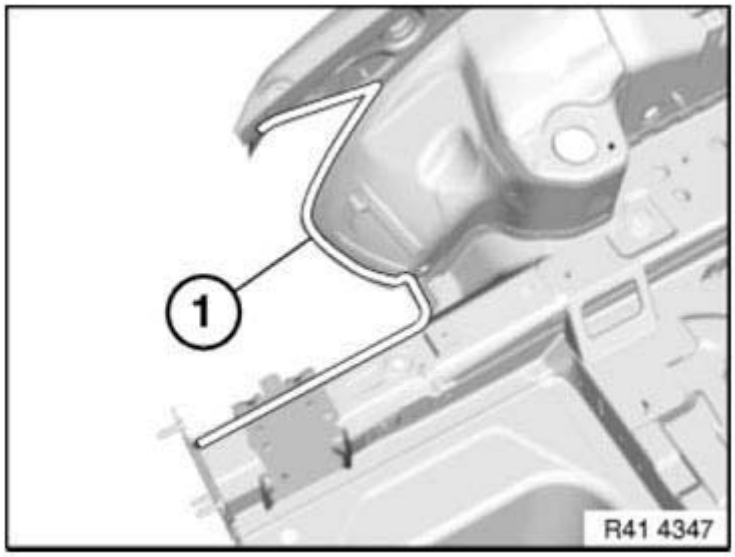


Fig. 223: Applying Adhesive K5a To All Bonding And Rivet Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Install new parts and rivet in area (1) with blind rivets N6.

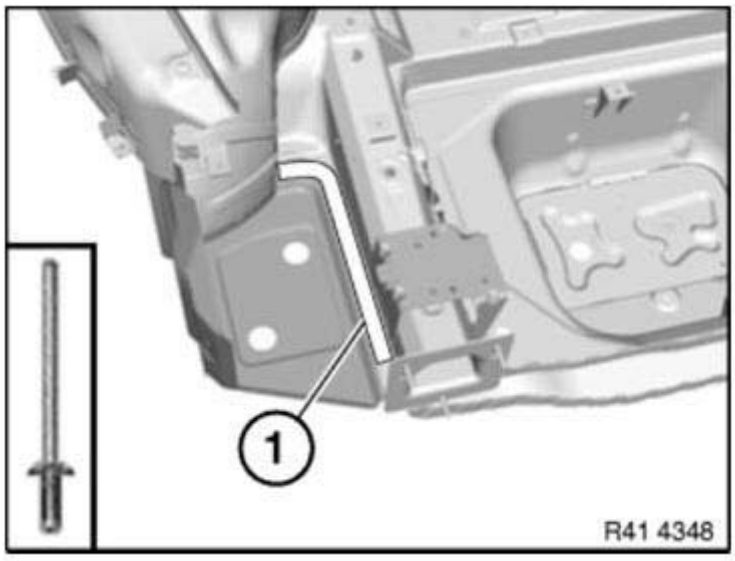


Fig. 224: Installing New Parts And Rivet In Area Using Blind Rivets N6
Courtesy of BMW OF NORTH AMERICA, INC.

Use blind rivets N3 in areas (1).

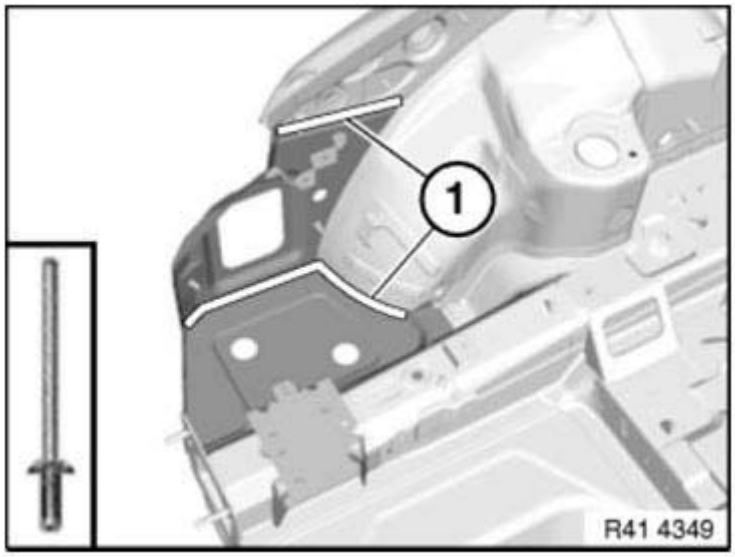


Fig. 225: Identifying Rivet Area With Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

Use 4 punch rivets N4 in area (1).

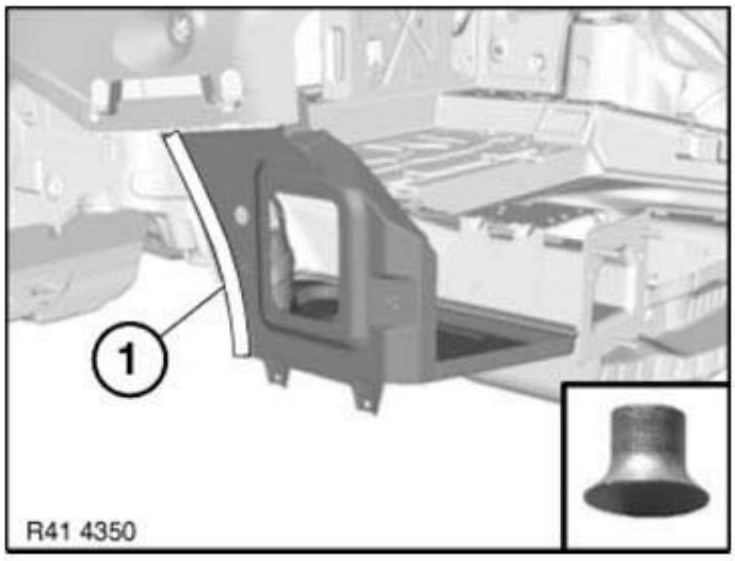


Fig. 226: Identifying Rivet Area With 4 Punch Rivets N4
Courtesy of BMW OF NORTH AMERICA, INC.

41 12 557 REPLACING LUGGAGE COMPARTMENT FLOOR, MIDDLE SECTION (TAIL PANEL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE .

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Mounting, tension strut
- (2) Luggage compartment well
- (3) Cross-member, luggage compartment floor, rear

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5b	1
Blind rivets N3	21
EMC screws	2
CleanerR1	1
Sealing compoundD1	

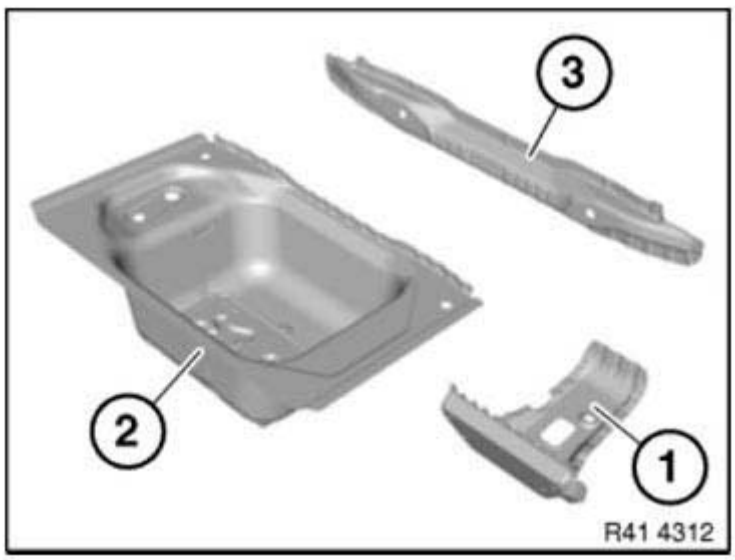


Fig. 227: Identifying Mounting, Tension Strut And Luggage Compartment Well
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of luggage compartment floor

View from below.

Operation is described on the left side. Right side identical.

Open weld joints in area (1).

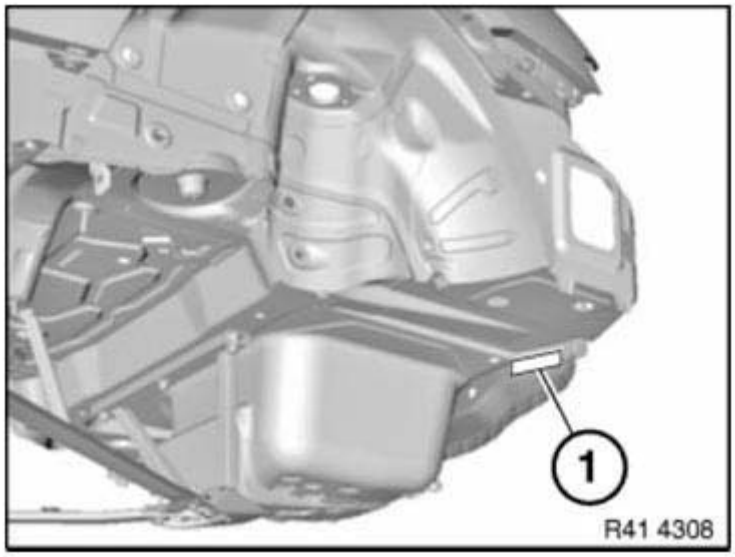


Fig. 228: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

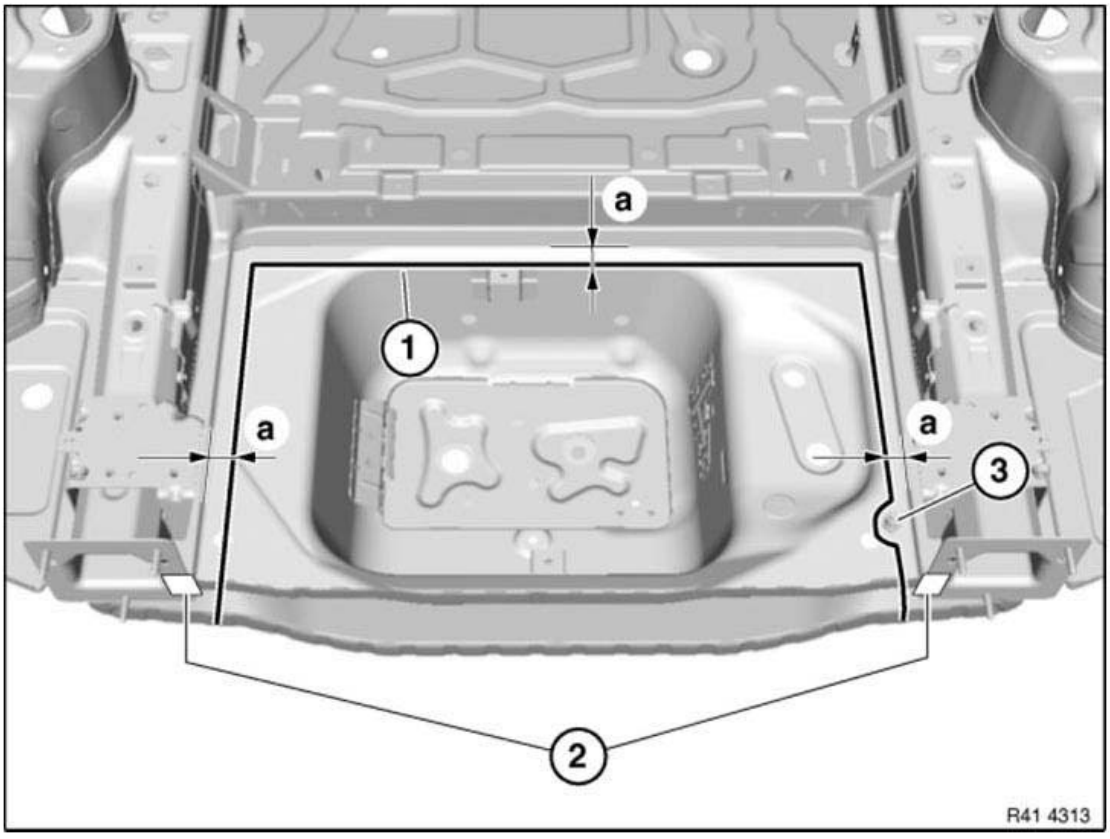


Fig. 229: Marking Severance Cut In Accordance With Measurement
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with measurement and cut.

Measurement a = 20 mm

Open weld joints in area (2).

Remove luggage compartment well and cross-member.

NOTE: Earth support point (3) remains on vehicle.

New part preparation

Mark new luggage compartment well part in accordance with severance cuts on vehicle + 20 mm extra material and cut.

Set down luggage compartment well (1) from above and adjust in combination with cross-member (2) and **TAIL PANEL** to fit and secure.

Set fourteen 4.2 mm dia. holes for blind rivets in area (3).

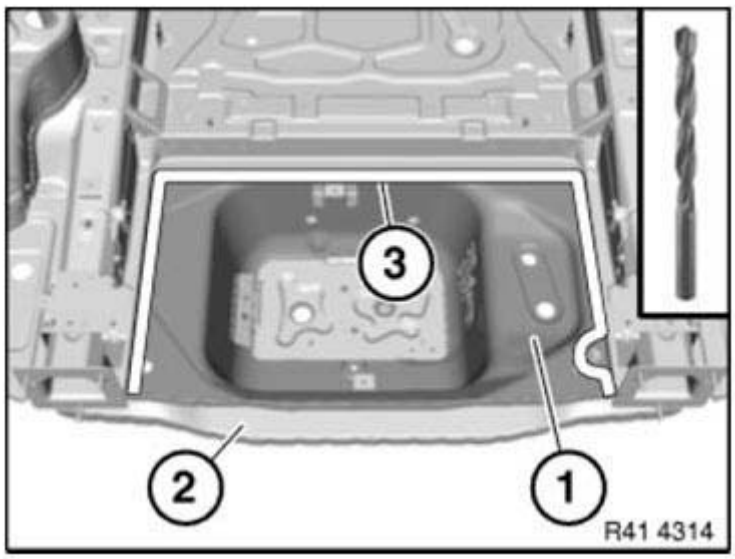


Fig. 230: Identifying Luggage Compartment Well, Cross-Member And Blind Rivets In Area
Courtesy of BMW OF NORTH AMERICA, INC.

Set three 4.2 mm dia. holes for blind rivets in area (1).

Set four 4.2 mm dia. holes for blind rivets in areas (2).

Set holes for blind rivets with adjusted tail panel in area (3).

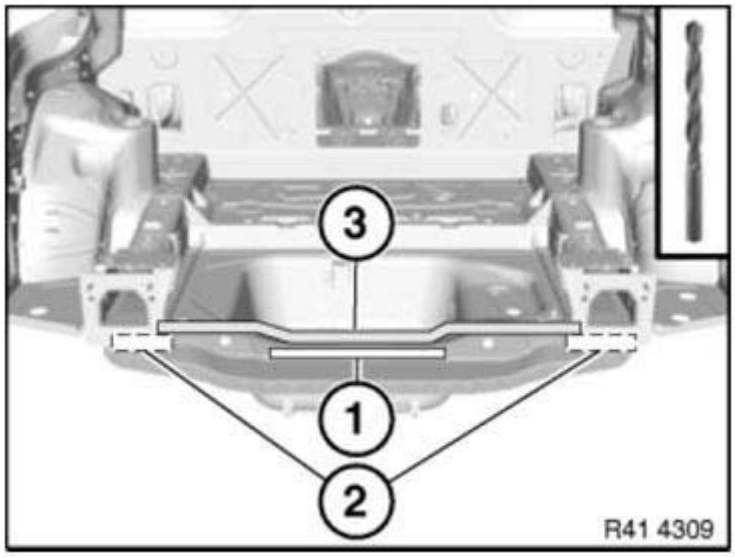


Fig. 231: Setting Holes Diameter For Blind Rivets In Area
Courtesy of BMW OF NORTH AMERICA, INC.

View from below.

Adjust tension strut mounting (1) with mounted torsion struts (2) to fit and secure.

Set twenty one 4.2 mm dia. holes for blind rivets in adhesive flange area.

Remove all new parts again and deburr holes.

NOTE: 6 holes are sufficient for positioning the component.
Make all further holes for blind rivets if necessary on removed components.

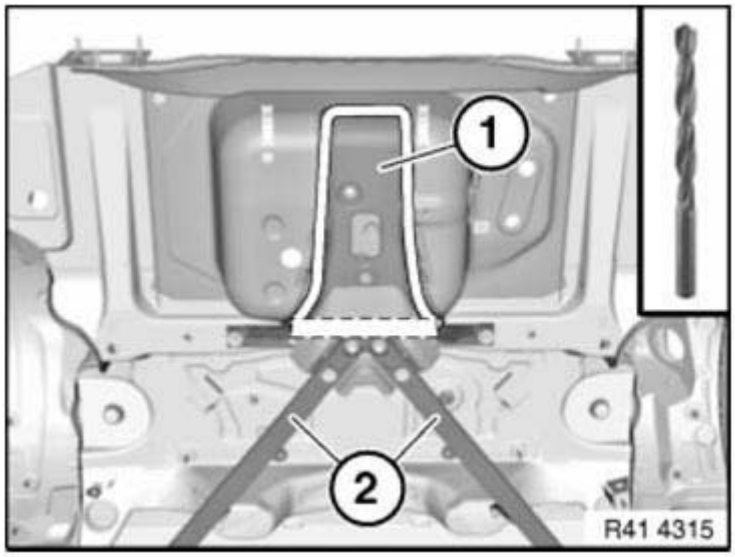


Fig. 232: Identifying Tension Strut Mounting And Mounted Torsion Struts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installation of luggage compartment floor

Clean all bonding surfaces (1) with cleaning agent R1.

Apply adhesive K5b to bonding surfaces (1).

Rivet tension strut mounting (2) and luggage compartment well (3) with blind rivets N3.

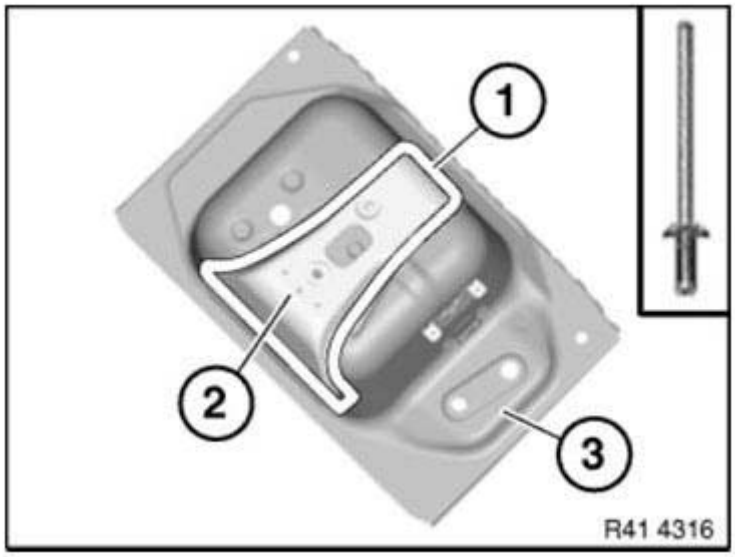


Fig. 233: Rivetting Tension Strut Mounting And Luggage Compartment Well Using Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

Clean all bonding surfaces (1) on new part and on vehicle with cleaning agent R1.

Apply adhesive K5b to bonding surfaces (1) and to corresponding bonding surfaces on new part.

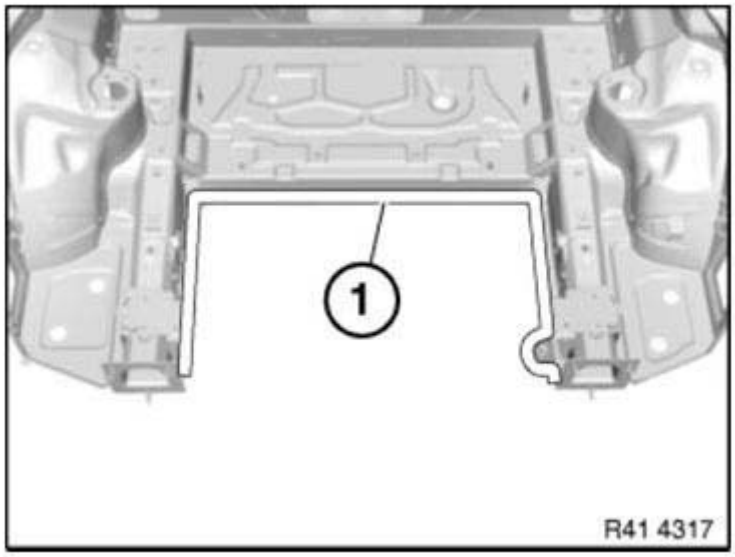


Fig. 234: Applying Adhesive K5B To Bonding Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Fit luggage compartment well (2) and rivet in area (1) with blind rivets N3.

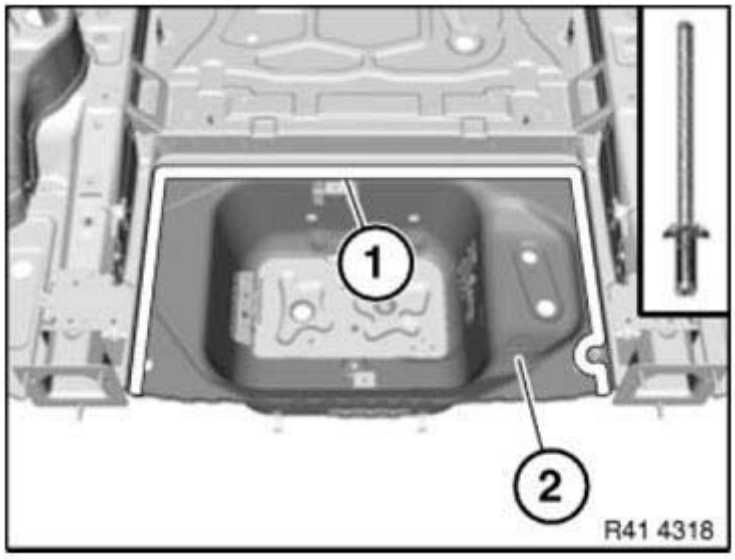


Fig. 235: Identifying Luggage Compartment Well And Rivet Area Using Blind Rivets N3
Courtesy of BMW OF NORTH AMERICA, INC.

Installation of cross-member

Clean all bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive K5b to bonding surfaces (1) and to corresponding bonding surfaces on new part.

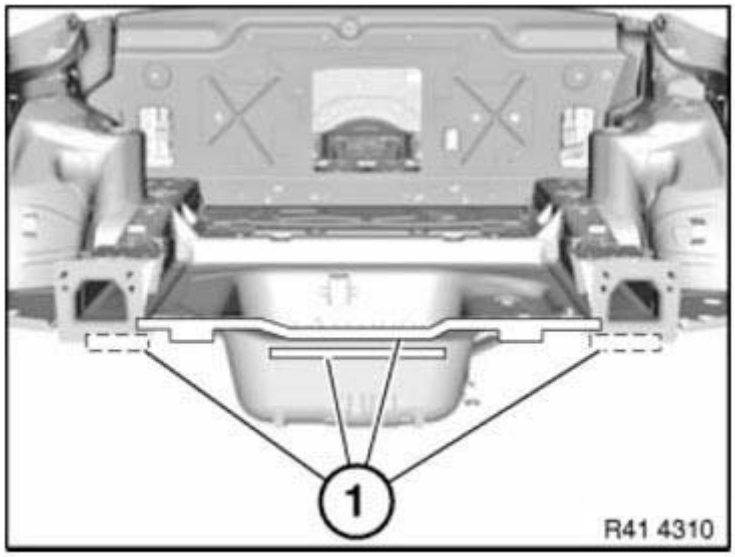


Fig. 236: Applying Adhesive K5A To Bonding Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Install cross-member and rivet in area (1) with blind rivets.

Rivet cross-member in combination with tail panel in area (2).

IMPORTANT: When installing the cross-member, make sure there is sufficient adhesive on the bonding surfaces.

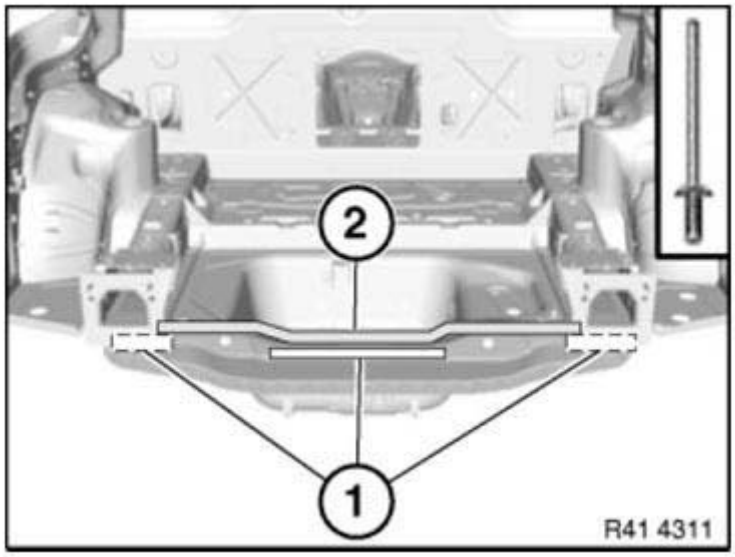


Fig. 237: Installing Cross-Member And Rivet In Area Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After adhesive has hardened:

Install 2 EMC SCREWS in area of side member/rear cross-member.

41 12 548 REPLACING REAR CROSS-MEMBER ON LUGGAGE COMPARTMENT FLOOR (TAIL PANEL REMOVED)

Read contents of **BODY, GENERAL** .

Strip down vehicle.

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Cross-member, luggage compartment floor, rear

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N3	7
CleanerR1	1
Cavity sealing wax remover	
Sealing compoundD1	

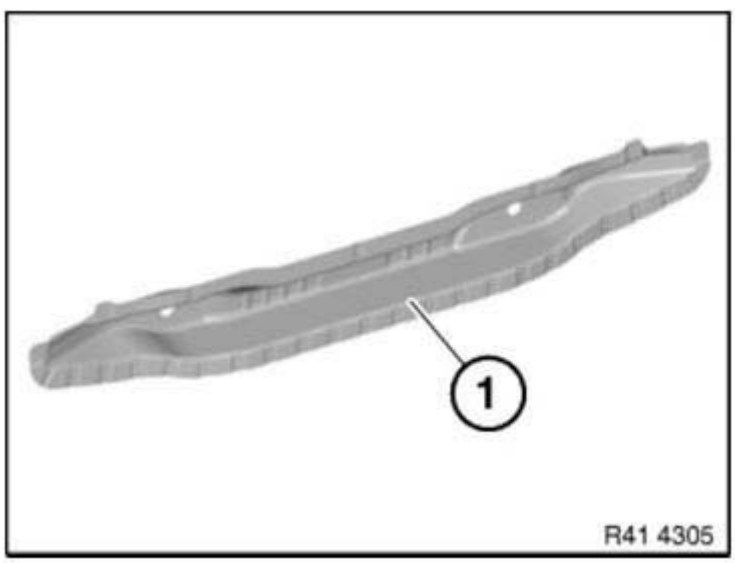


Fig. 238: Identifying Cross-Member, Luggage Compartment Floor, Rear
Courtesy of BMW OF NORTH AMERICA, INC.

Removing cross-member

Open weld joints in areas (1).

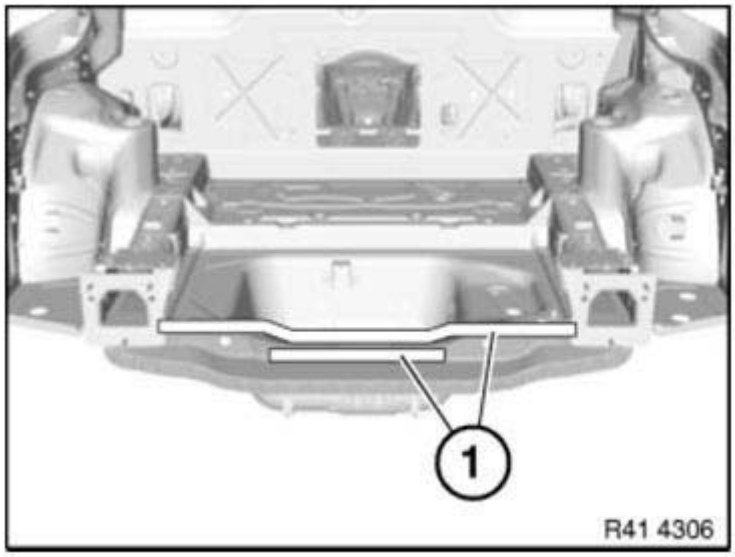


Fig. 239: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

Open weld joints in areas (1).

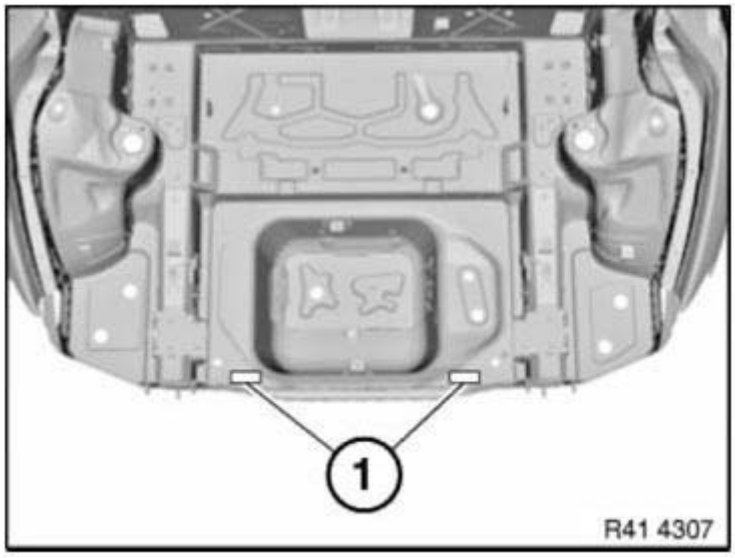


Fig. 240: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

View from below.

Operation is described on the left side. Right side identical.

Open weld joints in area (1).

Remove cross-member.

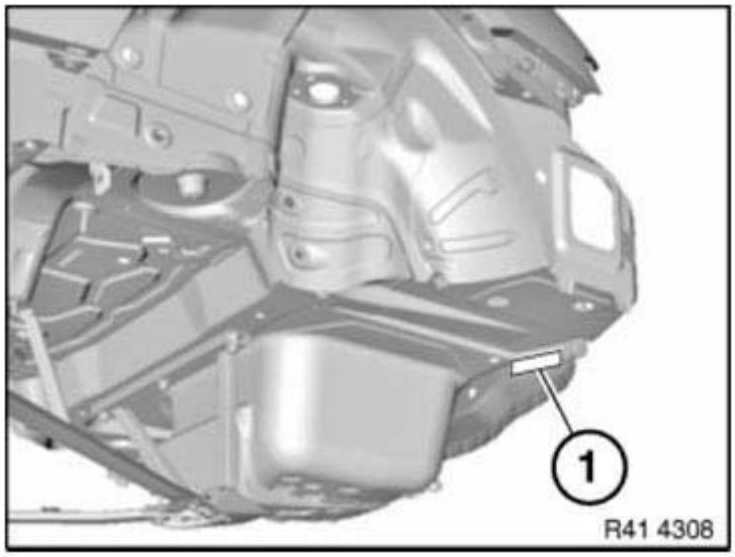


Fig. 241: Identifying Weld Joints Area
Courtesy of BMW OF NORTH AMERICA, INC.

New part preparation

Adjust cross-member in combination with tail panel to fit and secure.

Set three 4.2 mm dia. holes for blind rivets in area (1).

Set four 4.2 mm dia. holes for blind rivets in areas (2).

Set holes with adjusted **TAIL PANEL** in area (3).

Remove new parts again and deburr holes.

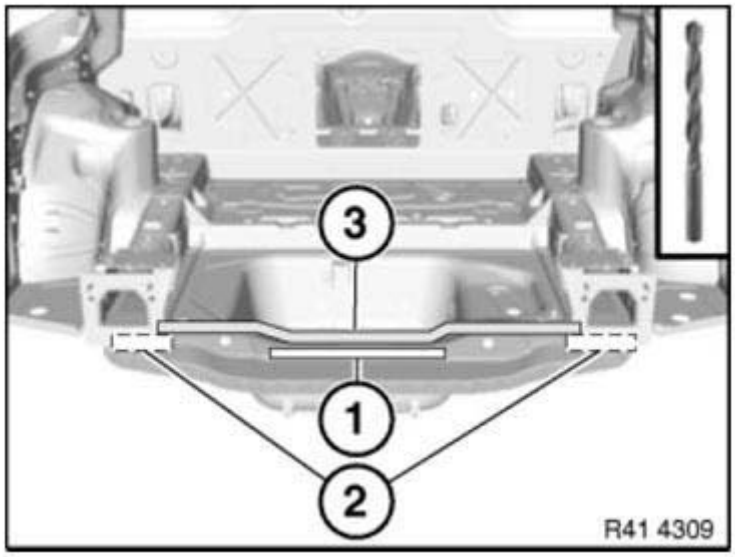


Fig. 242: Setting Holes Diameter For Blind Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installing cross-member

Clean all bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive K5a to bonding surfaces (1) and to corresponding bonding surfaces on new part.

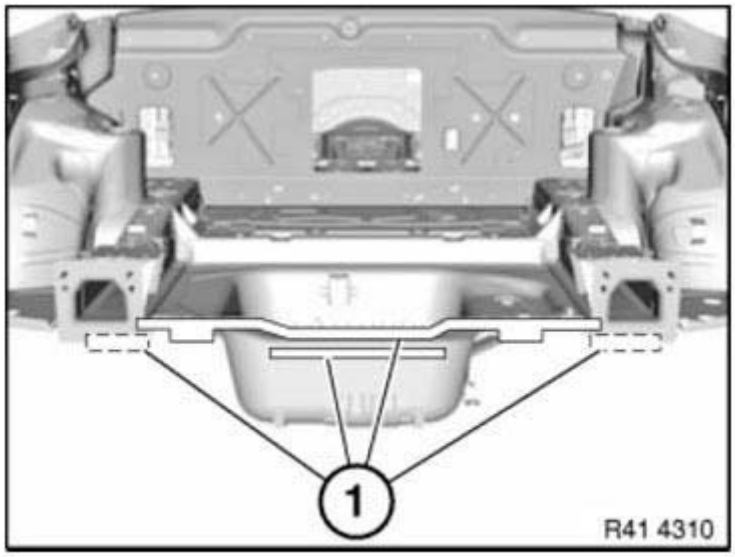


Fig. 243: Applying Adhesive K5A To Bonding Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Install cross-member and rivet in area (1) with blind rivets.

Rivet cross-member in combination with tail panel in area (2).

IMPORTANT: When installing the cross-member, make sure there is sufficient adhesive on the bonding surfaces.

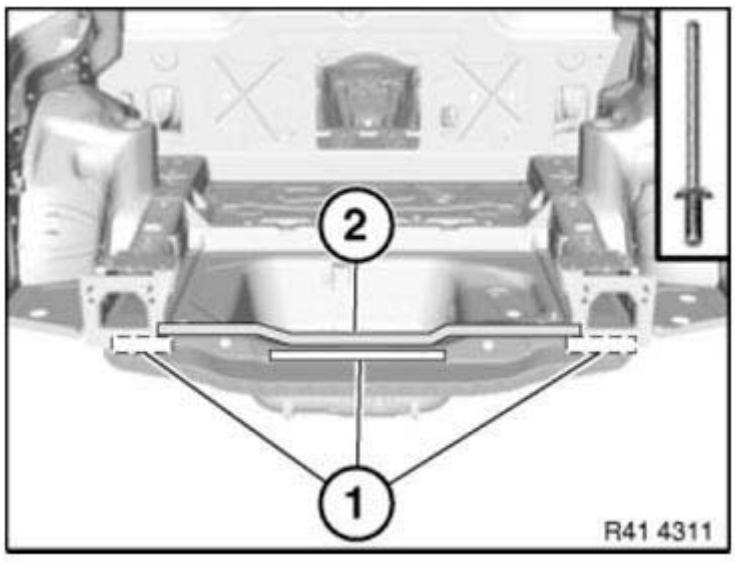


Fig. 244: Installing Cross-Member And Rivet In Area Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

41 34 041 REPLACING TAIL PANEL

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE .

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required

- (1) Rear trim, complete

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5b	1
Blind rivets N3	16
Blind rivets N6	8

Punch rivets N4	15
EMC screws	2
Cavity sealing wax remover	
Cleaning agent R1	1
Sealant D1	

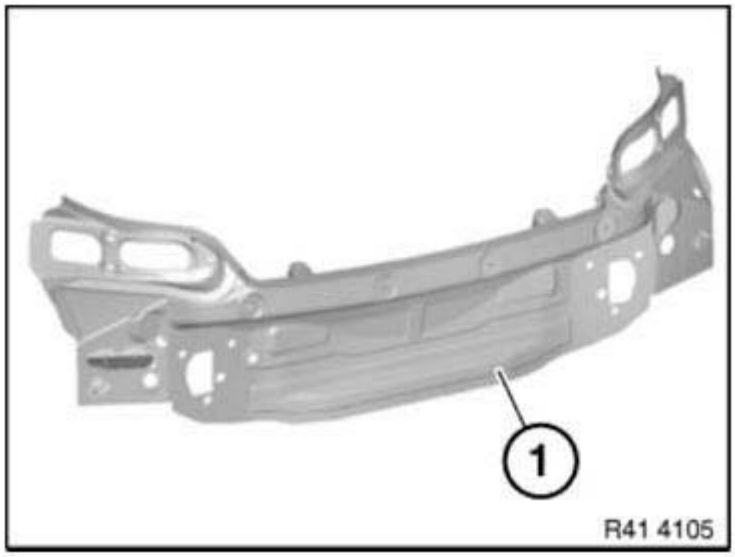


Fig. 245: Identifying Rear Trim, Complete
Courtesy of BMW OF NORTH AMERICA, INC.

Removing rear trim panel

Operation is described on the left side. Right side identical.

Picture show side panel removed for an improved overview.

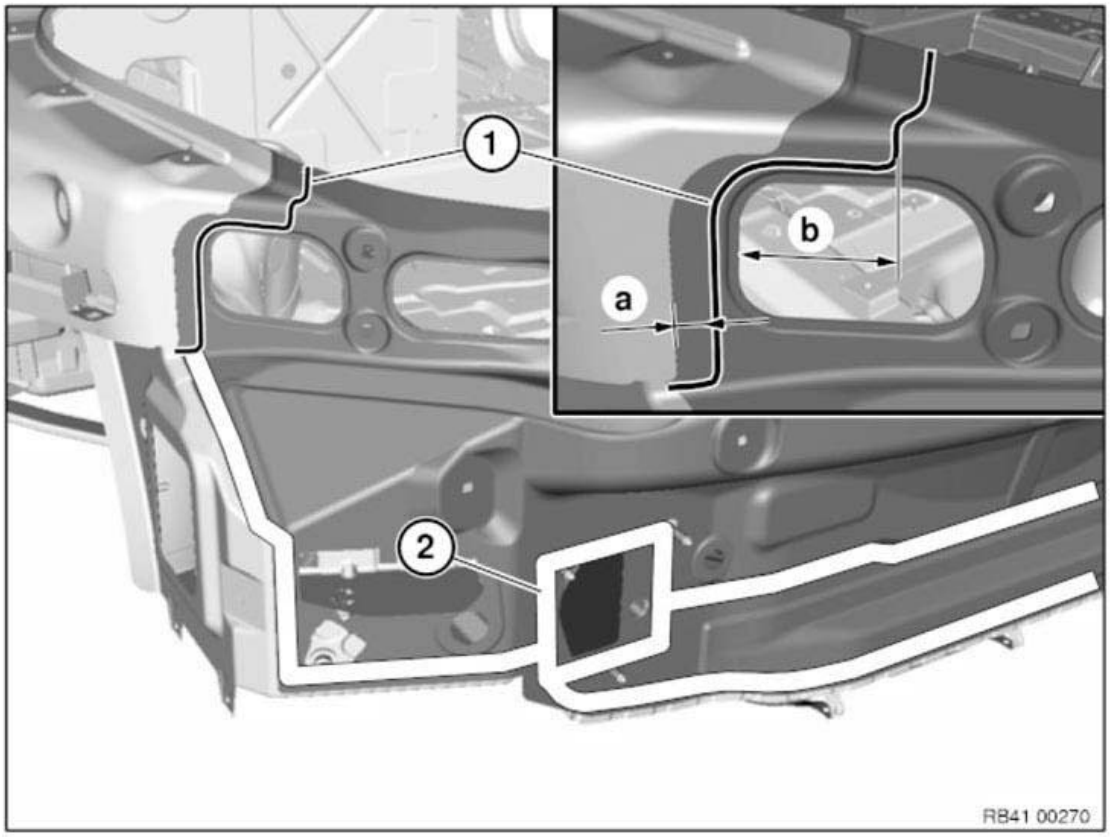


Fig. 246: Marking Severance Cut In Accordance With Specified Measurements
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) in accordance with specified measurements and cut.

Dimension a = approx. 20 mm from component edge of wheel arch.

Dimension b = approx. 60 mm from the edge of recess.

Open welded connections in area (2).

Remove rear trim panel.

NOTE: Install new part overlapping in area of severance cut.

New part preparation

Mark severance cuts on new part according to vehicle with approx. 20 mm extra material (adhesive flange) and cut.

The new part must not cover the adjacent wheel arch component. Adjust flange area accordingly.

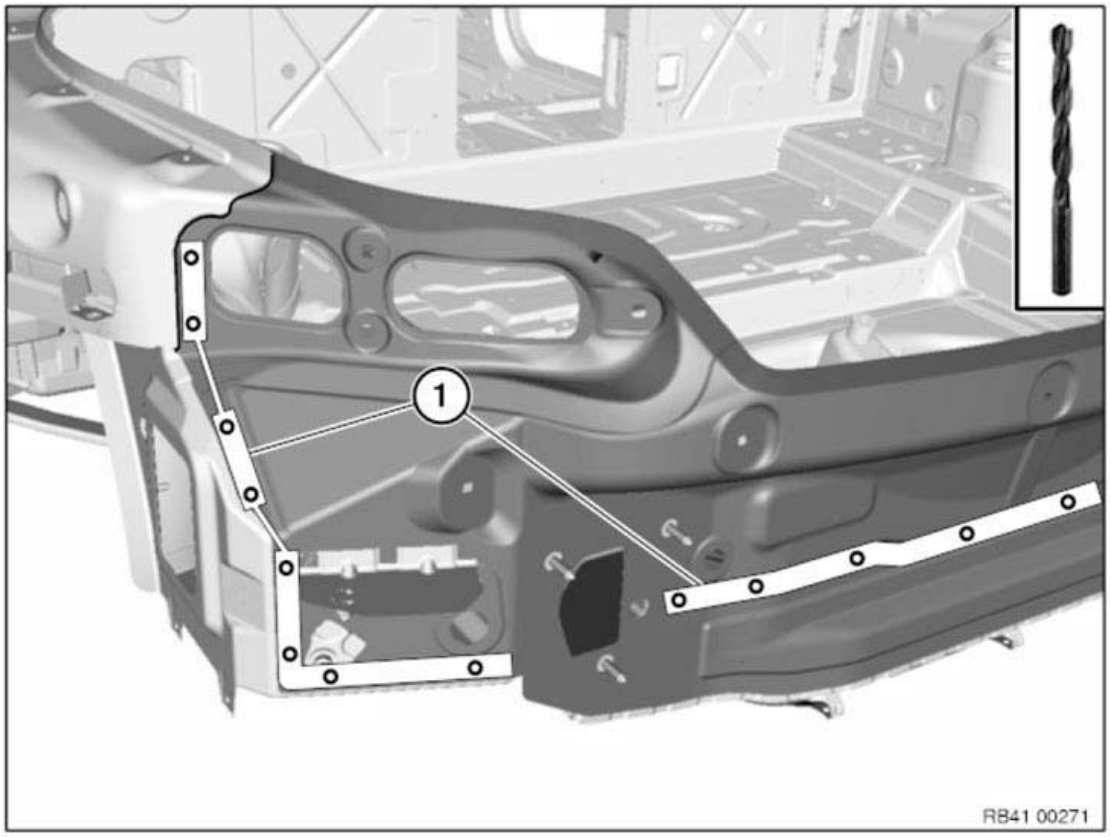


Fig. 247: Marking Severance Cuts On New Part According To Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust rear trim panel to fit and secure.

In areas (1), set 24 holes with a diameter of 4.2 mm for blind rivets.

Remove new part again and deburr bore holes.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installing rear trim panel

Clean all bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive to bonding surfaces (1).

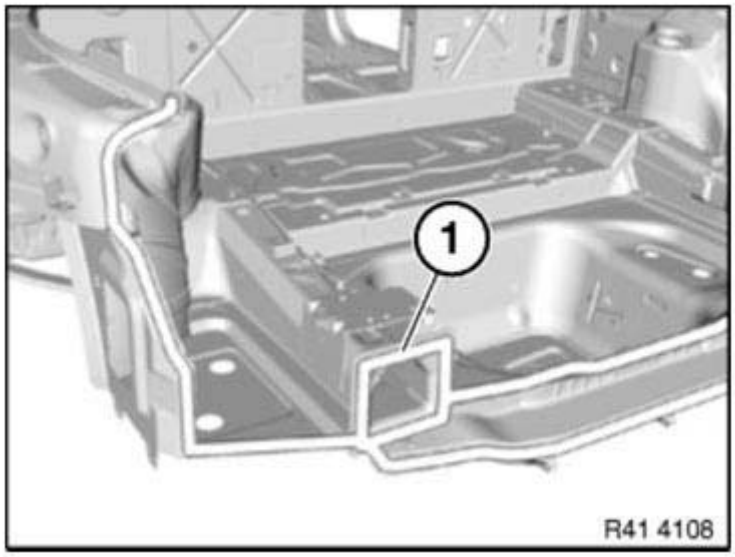


Fig. 248: Applying Adhesive To Bonding Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

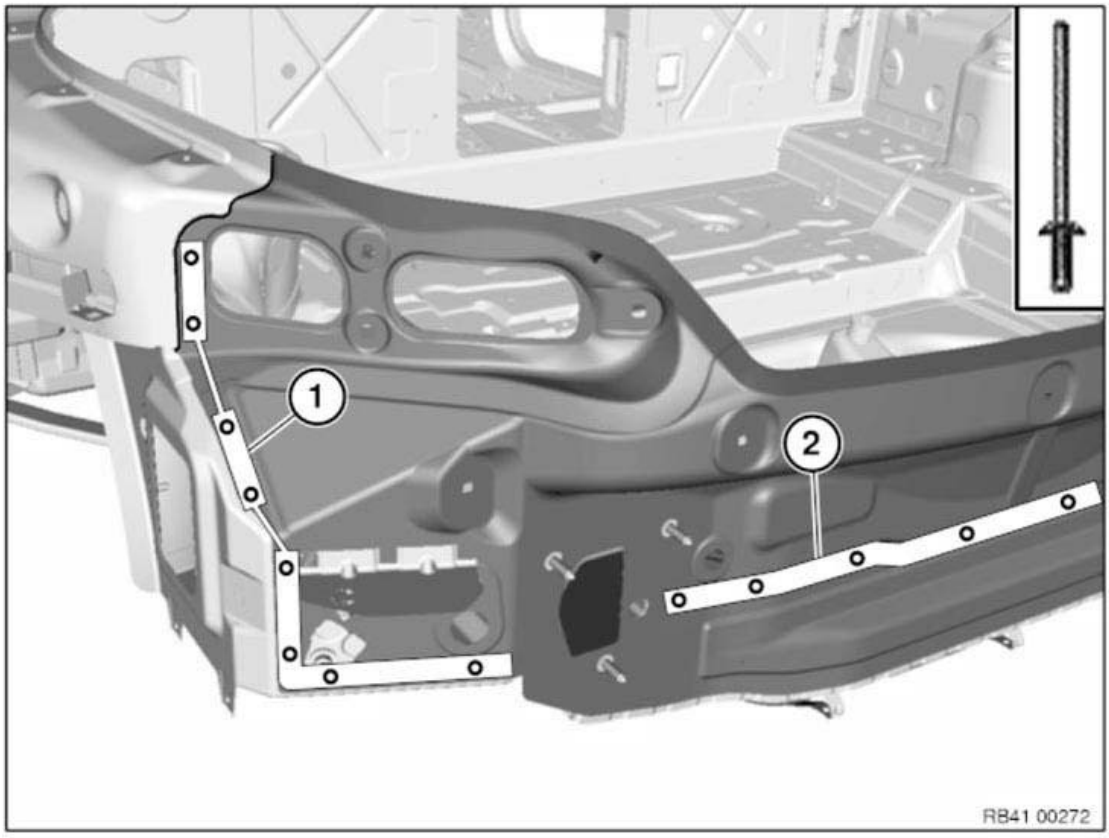


Fig. 249: Installing Rear Trim Panel And Rivet Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Install rear trim panel and rivet with blind rivets.

In area (1), use blind rivets N3.

In area (2), use blind rivets N6.

NOTE: When mounting rear trim panel, make sure there is sufficient adhesive on bonding surfaces.

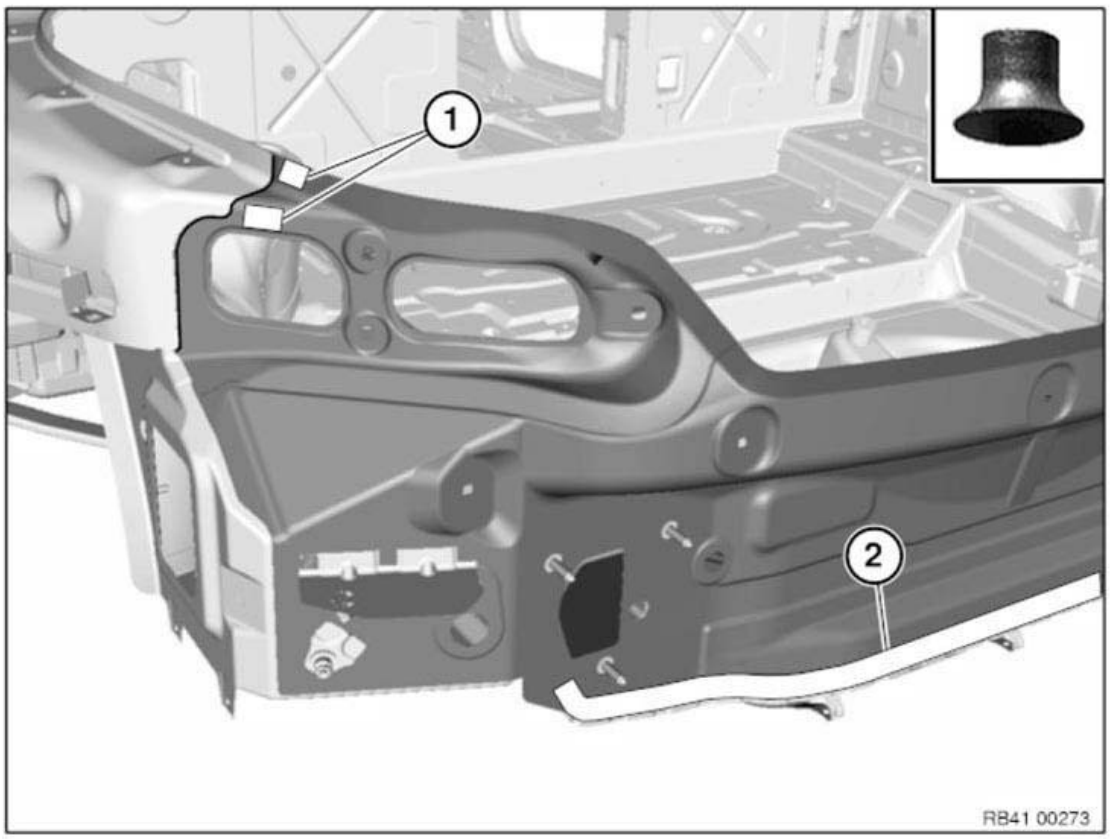


Fig. 250: Identifying Rivet Rear Trim Panel With 2 Punch Rivets N4 And 11 Punch Rivets N4
Courtesy of BMW OF NORTH AMERICA, INC.

In areas (1), rivet rear trim panel with 2 punch rivets N4.

In area (2), rivet rear trim panel with a total of 11 punch rivets N4.

NOTE: After hardening of the adhesive install two EMC SCREWS in area (2).

Press rear trim panel in areas (1) and remove emerging adhesive.

Then mount support for bumper trim to secure rear trim panel.

IMPORTANT: Prevent emerging adhesive from coming into contact with support.

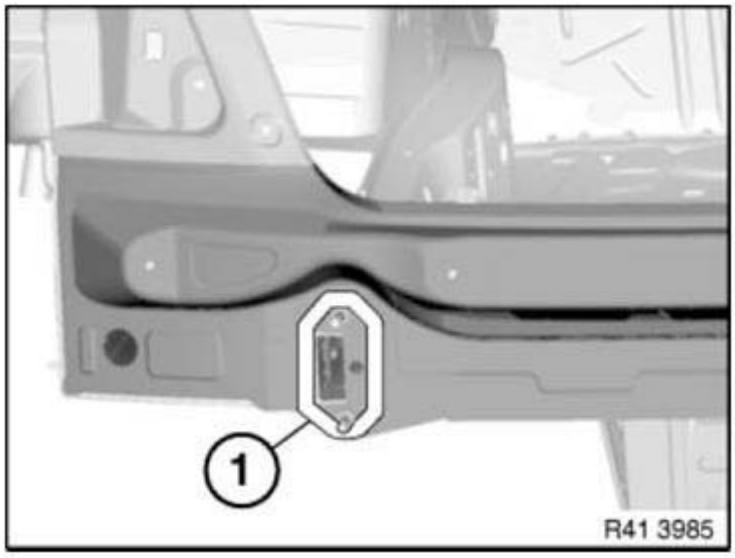


Fig. 251: Identifying Rear Panel Adhesive Application Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 34 041 REPLACING TAIL PANEL

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE .

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Rear trim, complete
- (2) Rear left side panel (not shown)
- (3) Rear right side panel (not shown)

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5b	1
Blind rivets N6	26
Punch rivets N4	13
EMC screws	2
Cavity sealing wax remover	
Cleaning agent R1	1
Sealant D1	

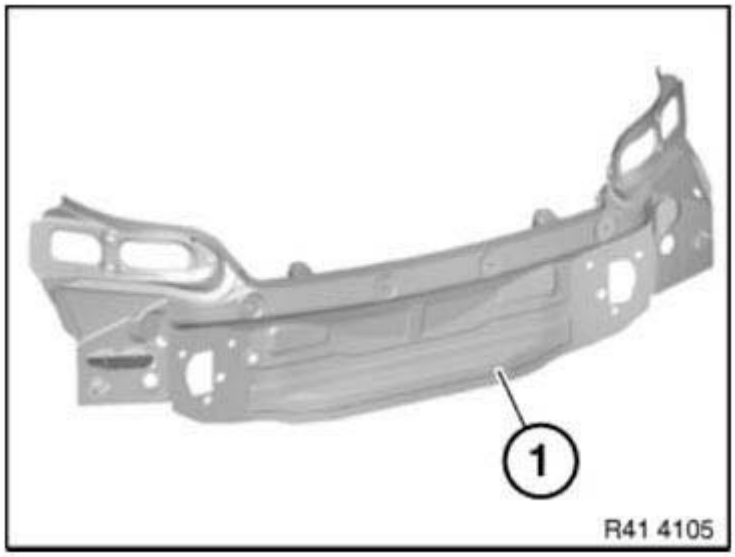


Fig. 252: Identifying Rear Trim, Complete
Courtesy of BMW OF NORTH AMERICA, INC.

Removing rear trim panel

Operation is described on the left side. Right side identical.

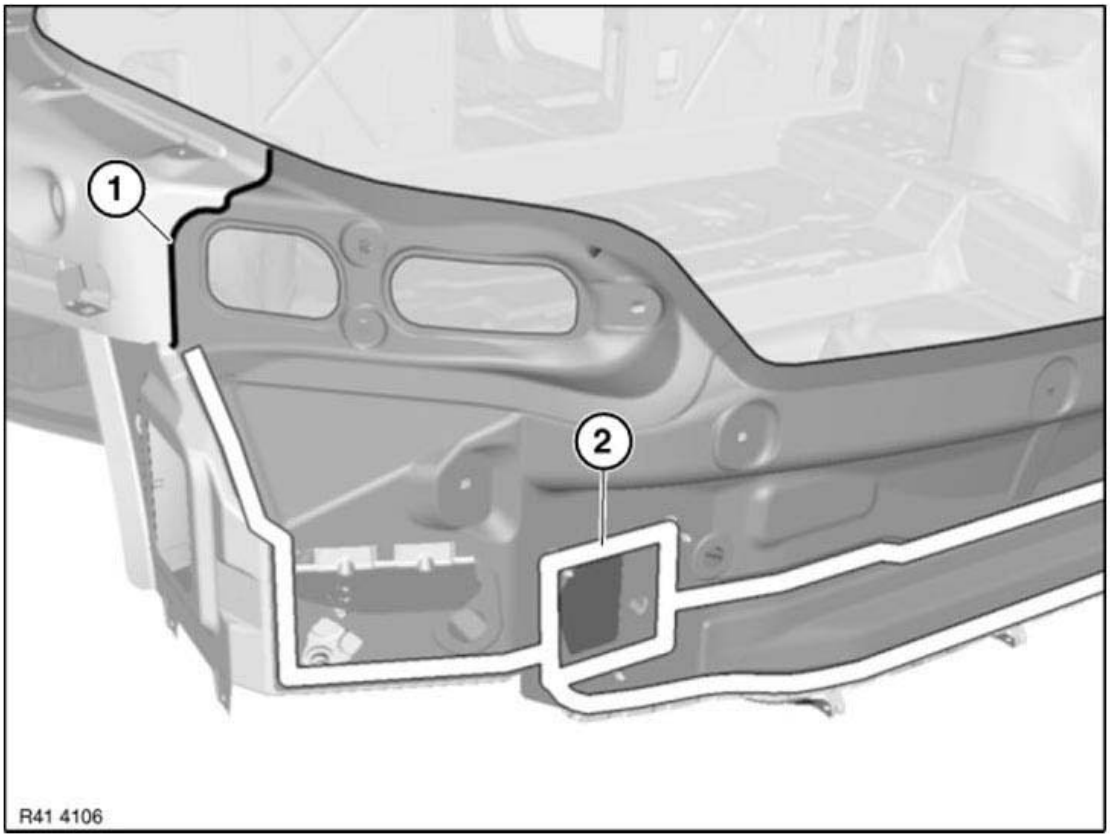


Fig. 253: Marking Severance Cut To Wheel Arch Component Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Mark severance cut (1) next to wheel arch component edge and cut.

Open welded connections in area (2).

Remove rear trim panel.

New part preparation

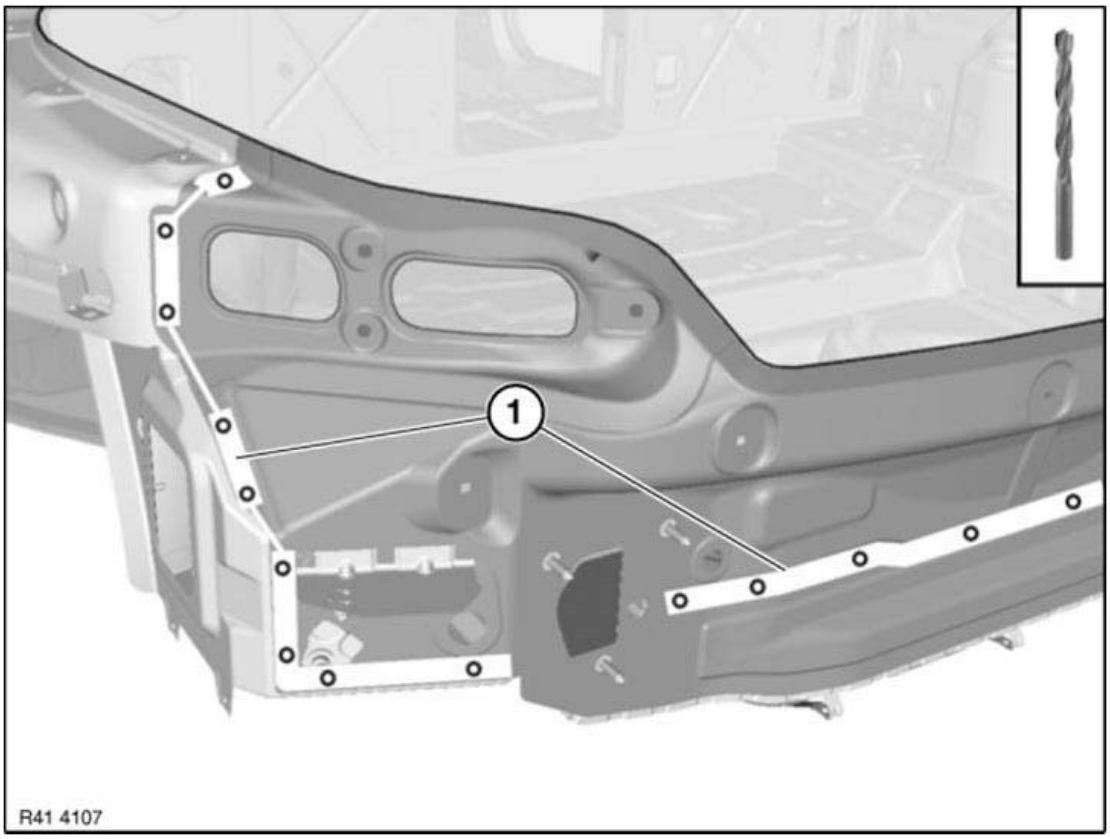


Fig. 254: Setting Holes Diameter For Blind Rivets In Area
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust rear trim panel to fit and secure.

Set 14 4.2 mm dia. holes for blind rivets in area (1).

Remove new part again and deburr bore holes.

IMPORTANT: Do not grind new parts and body in area of bonding surfaces.

Installing rear trim panel

Clean all bonding surfaces on new part and on vehicle with cleaning agent R1.

Apply adhesive to bonding surfaces (1).

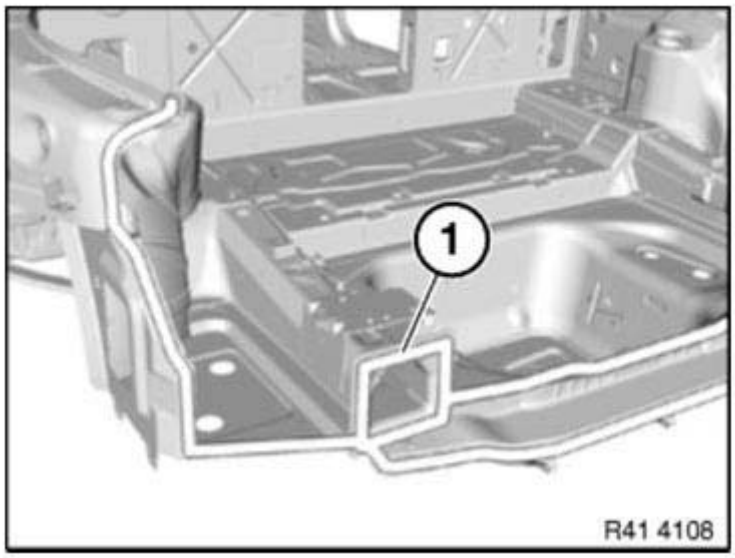


Fig. 255: Applying Adhesive To Bonding Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

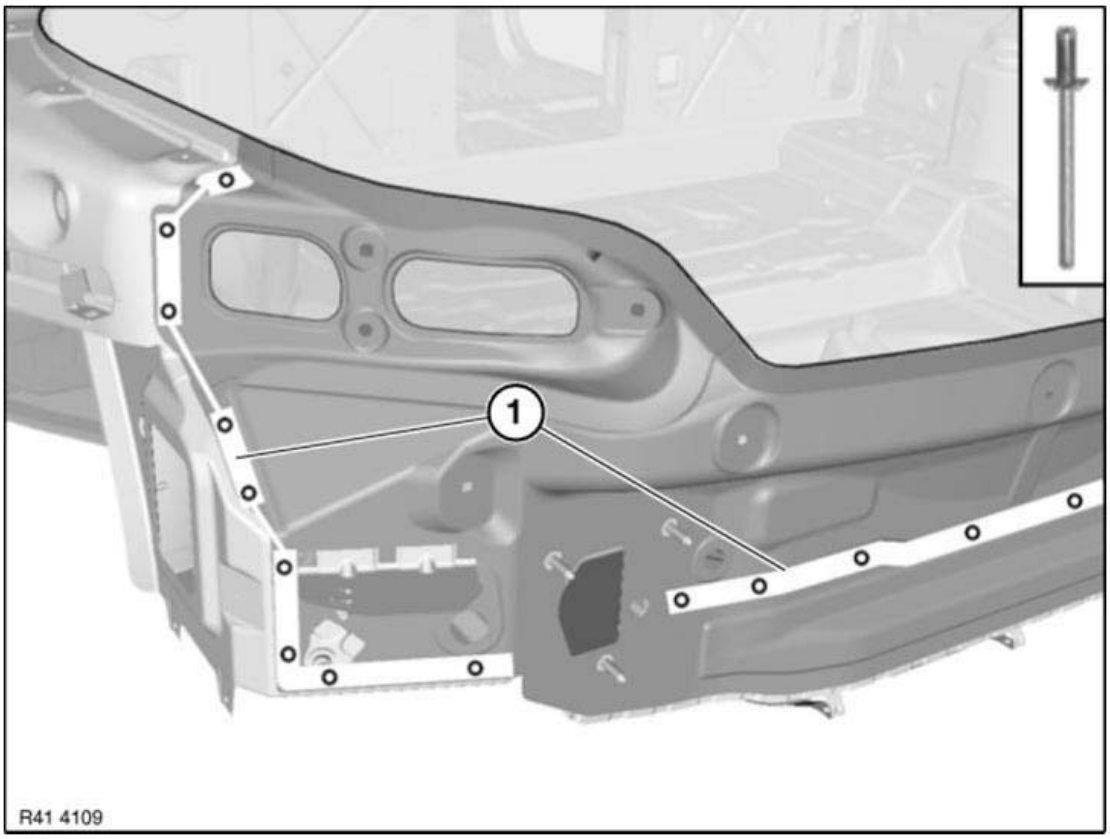


Fig. 256: Mounting Rear Trim Panel And Rivet Using Blind Rivets N6
Courtesy of BMW OF NORTH AMERICA, INC.

Mount rear trim panel and rivet with blind rivets N6 (1).

NOTE: When mounting rear trim panel, make sure there is sufficient adhesive on bonding surfaces.

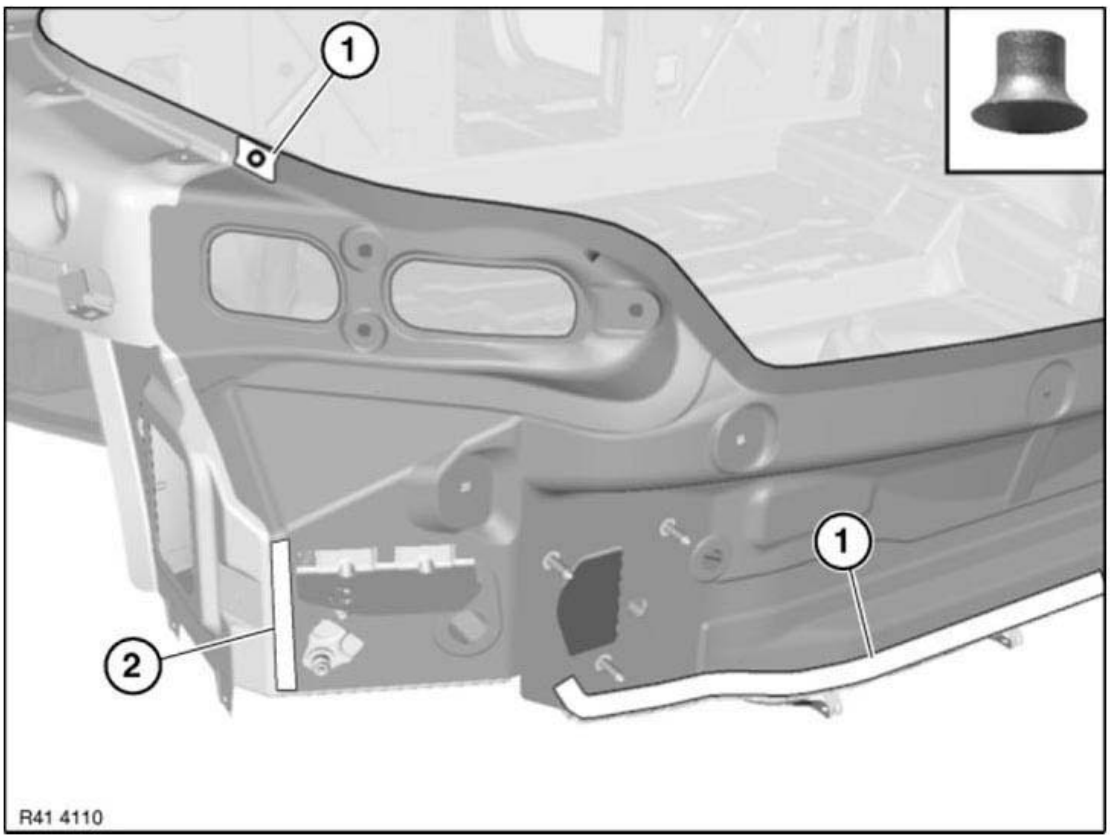


Fig. 257: Identifying Rear Trim Panel With 11 N4 Punch Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Rivet rear trim panel with a total of 11 N4 punch rivets in areas (1).

NOTE: After hardening of the adhesive in area (2), install one EMC SCREW in each case.

Press rear trim panel in areas (1) and remove emerging adhesive.

Then mount support for bumper trim to secure rear trim panel.

IMPORTANT: Prevent emerging adhesive from coming into contact with support.

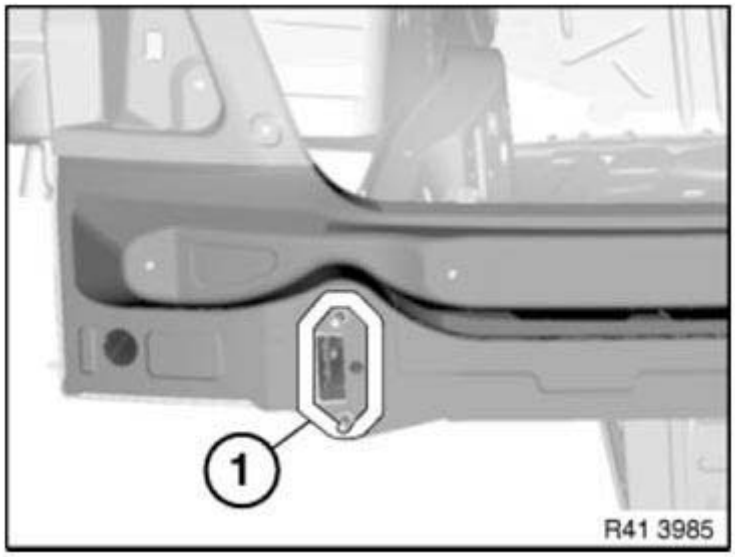


Fig. 258: Identifying Rear Panel Adhesive Application Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 11 516 STRIPPING OPERATIONS - REPLACING LEFT CARRIER SUPPORT

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.
The following list basically represents the removal sequence.

- Remove front panel (FR number: 4133040)
- Remove intake silencer housing (FR number: 4135111)
- Remove left spring strut (FR number: 3131000)
- Remove left wishbone (FR number: 3112000)

41 12 557 STRIPPING OPERATIONS - REPLACING LUGGAGE COMPARTMENT FLOOR, MIDDLE (TAIL PANEL REMOVED)

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.
The following list basically represents the removal sequence.

- Remove exhaust system (FR number: 1800020)
- Remove heat shield
- Remove battery (FR number: 6121010)
- Remove hydraulic unit (engine) for retractable hard top (FR number: 5437185)

Release snap fasteners (1), disconnect lines.

Unfasten screws (2).

Remove carbon canister (3).

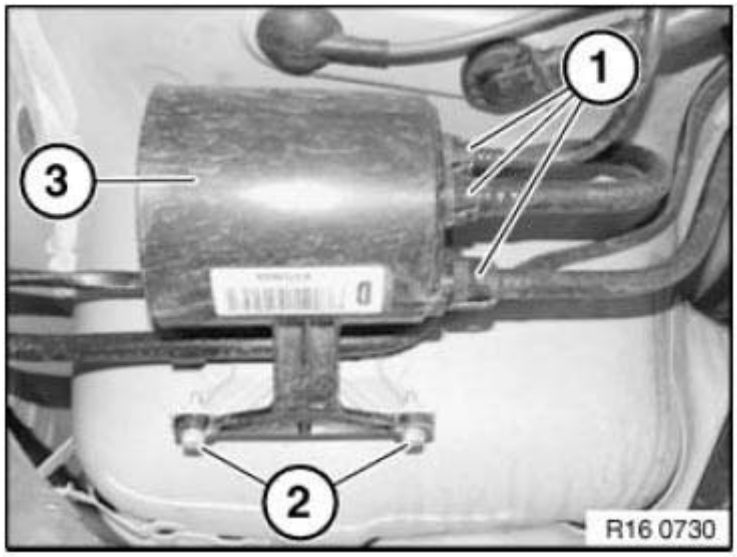


Fig. 259: Identifying Snap Fasteners, Screws And Carbon Canister
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug (1) and pull cable through luggage compartment floor.

Release screw (2).

Remove positive point.

Unscrew nut (3).

Remove earthing cable.

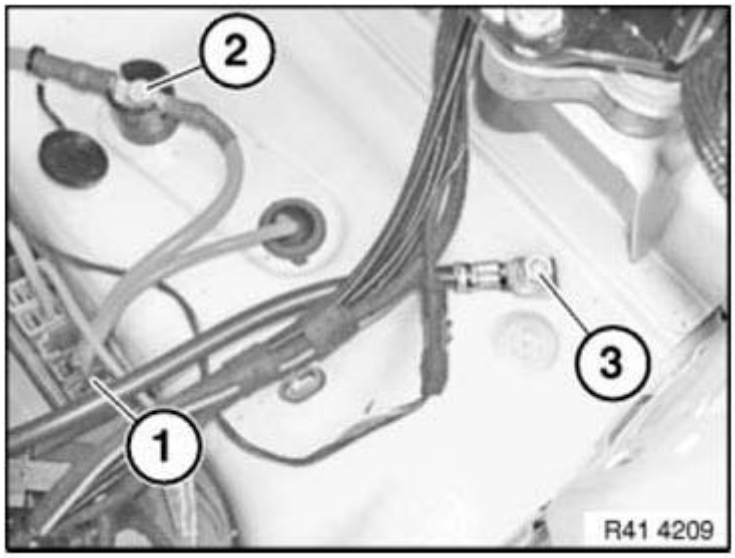


Fig. 260: Identifying Plug, Screw And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

41 34 060 STRIPPING OPERATIONS - REPLACING TAIL PANEL

NOTE: Owing to the different engine variants and equipment specifications, not all the components are taken into consideration.
The following list basically represents the removal sequence.

- Remove rear bumper trim (job number: 5112156)
- Replace rear left side panel (job number: 4135101)
- Replace rear right side panel (job number: 4135111)
- Remove left luggage compartment wheel arch panel (job number: 5147151)
- Remove right luggage compartment wheel arch panel (job number: 5147161)
- Remove luggage compartment floor trim panel (job number: 5147131)
- Remove battery (job number: 6121010)
- Upper tail panel trim (job number: 5146050)
- Release tailgate seal

Release left and right screws (1).

NOTE: Do not adjust barrel screws.

Installation note:

Refer to installation notes on removing and installing rear module (5437160).

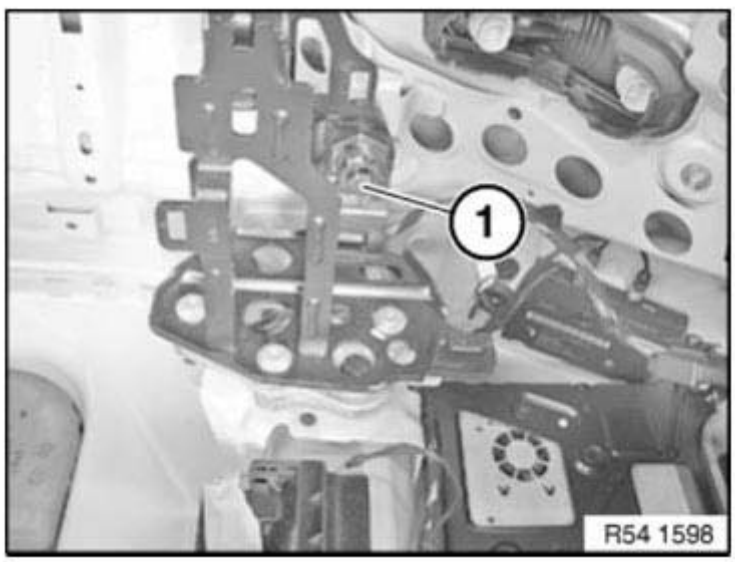


Fig. 261: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Graphic shows the left side, the procedure for the right side is identical.

Disconnect connector (1).

Slacken nut (2).

Remove amplifier (3).

Remove guide (4).

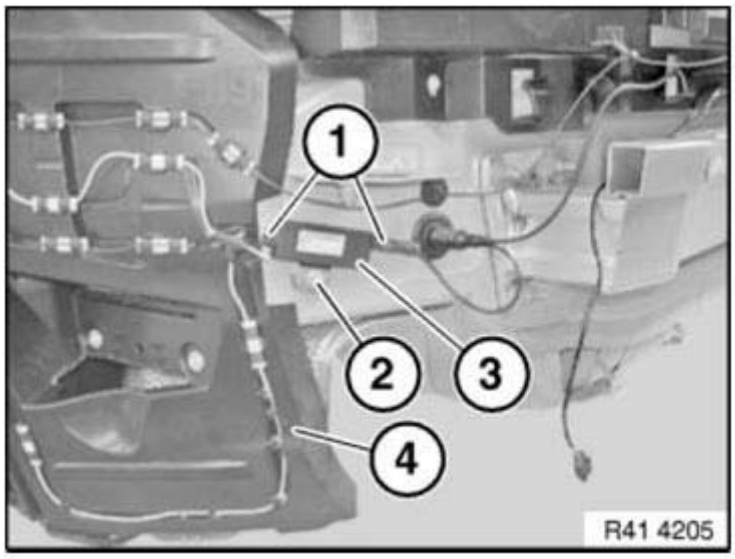


Fig. 262: Identifying Slacken Nut, Connector, Amplifier And Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect connector (1).

Release cable (2) from holders.

Remove guide (3).

Remove bumper carrier (4).

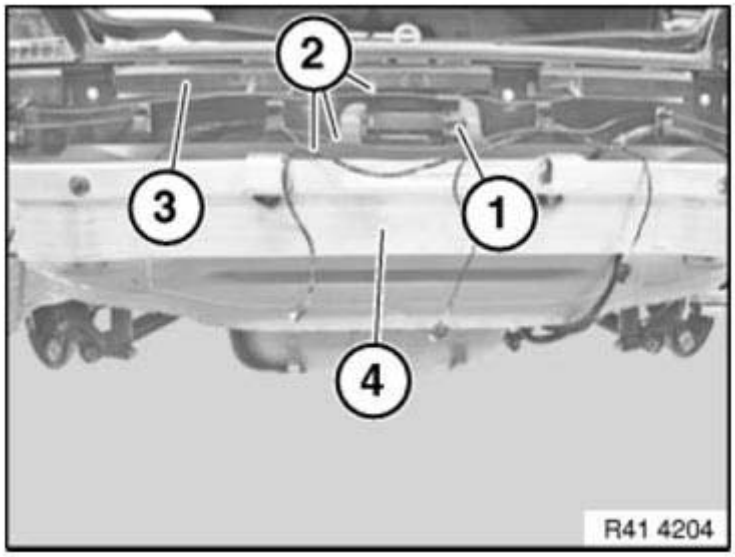


Fig. 263: Identifying Cable, Connector, Bumper Carrier And Guide
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect cable (1) on left and right from parking brake actuator.

Lay loose wiring harnesses through tail panel inwards.

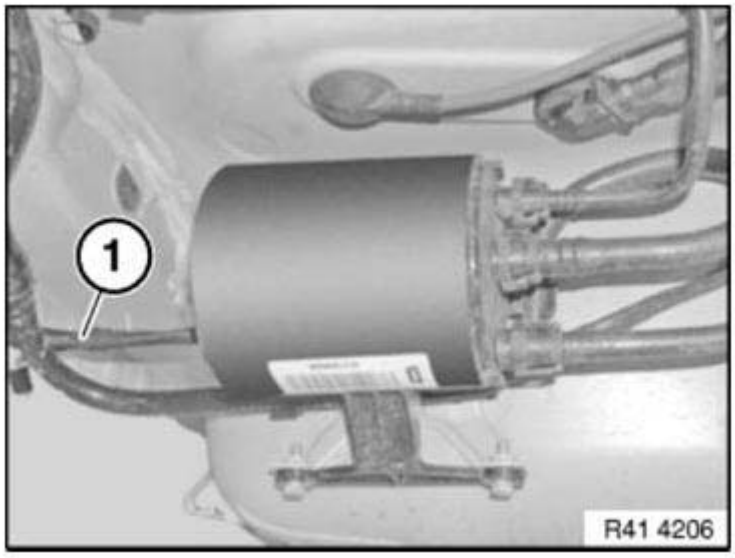


Fig. 264: Identifying Parking Brake Actuator Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect connector (1).

Remove control unit (2).

Remove guard plate (3).

Remove DAB tuner (4).

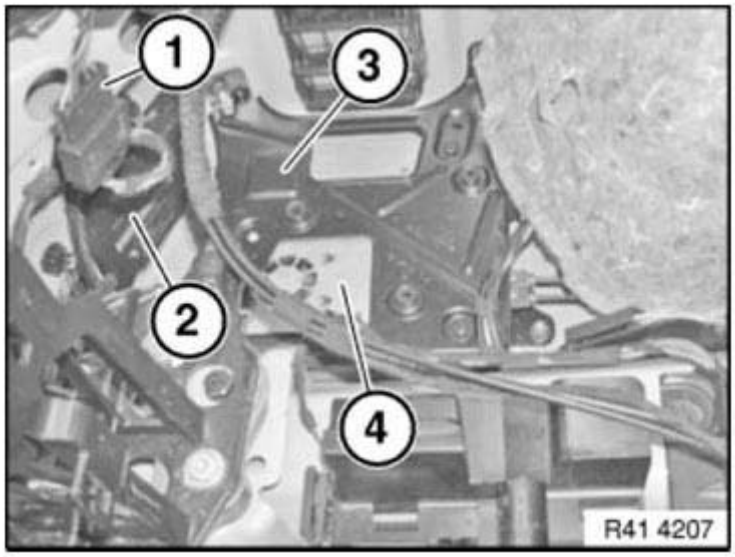


Fig. 265: Identifying Connector, Control Unit, Guard Plate And DAB Tuner
Courtesy of BMW OF NORTH AMERICA, INC.

Lay wiring harnesses (1) with control units towards front.

Remove storage trays (2).

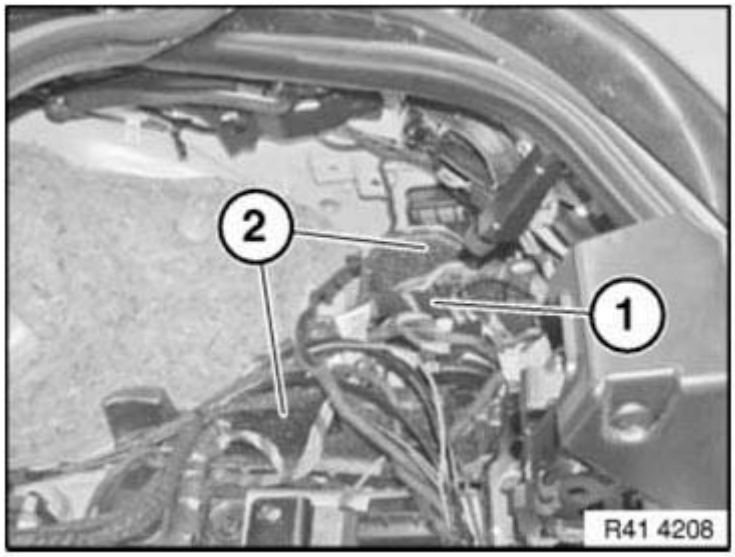


Fig. 266: Identifying Wiring Harnesses And Storage Trays
Courtesy of BMW OF NORTH AMERICA, INC.

4135 SIDE PANELS

41 00 ... REINFORCEMENT PLATE WITH STUD BOLT (BONDED)

In the case of a partial replacement piece, a body component is cut at a point described in the repair instructions.

A reinforcement plate is bonded in to ensure sufficient strength.

Reinforcement plates are available as new parts and must also be used.

NOTE: The following graphics serve as general illustrations of reinforcement plate repair work. They are applicable to sectional repairs in the outer skin area.

Overview of reinforcement plates:

1. Reinforcement plate, sill
2. Reinforcement plate, C-pillar
3. Reinforcement plate, universal
4. Reinforcement plate, C- or D-pillar
5. Lock nuts (not pictured)
    - Plastic nut _ 18 mm, part number 1 943 122
    - Clip nut _ 30 mm, part number 7 139 081

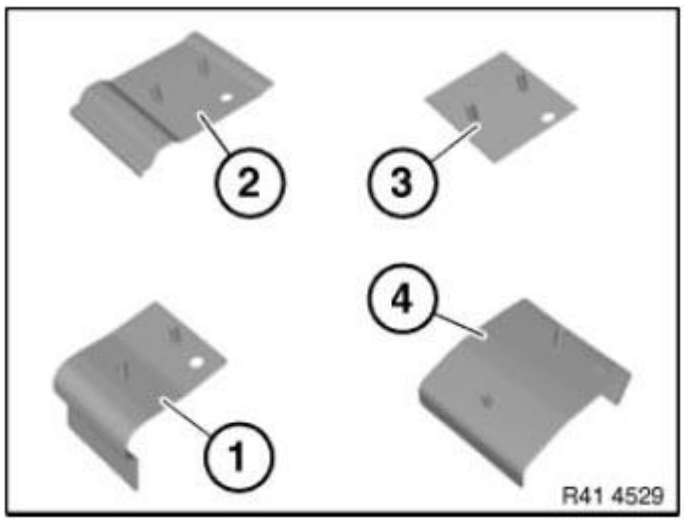


Fig. 267: Identifying Reinforcement Plate Sill, C-Pillar, Universal And C- Or D-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Mark component in accordance with dimension a and cut.

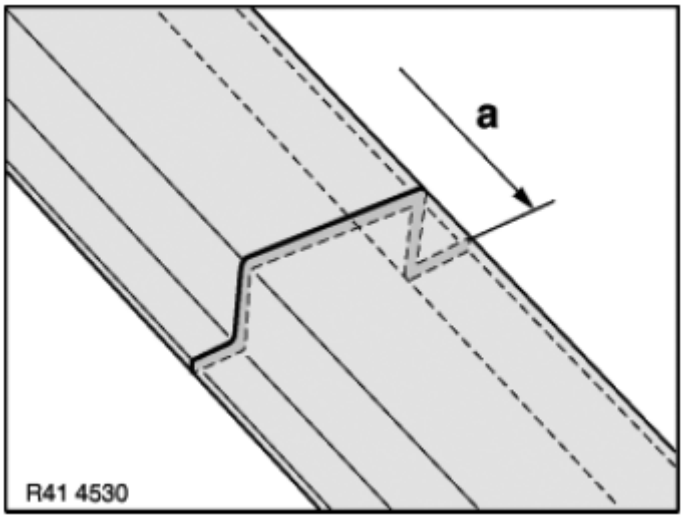


Fig. 268: Identifying Component Cutting Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

The reinforcement plates must if necessary be reworked and cut to size.

Adjust reinforcement plate (1) to fit in component (2) on vehicle.

Make recesses (3) for stud bolts (4) in a semicircular shape.

Diameter of recesses approx. 10 - 12 mm.

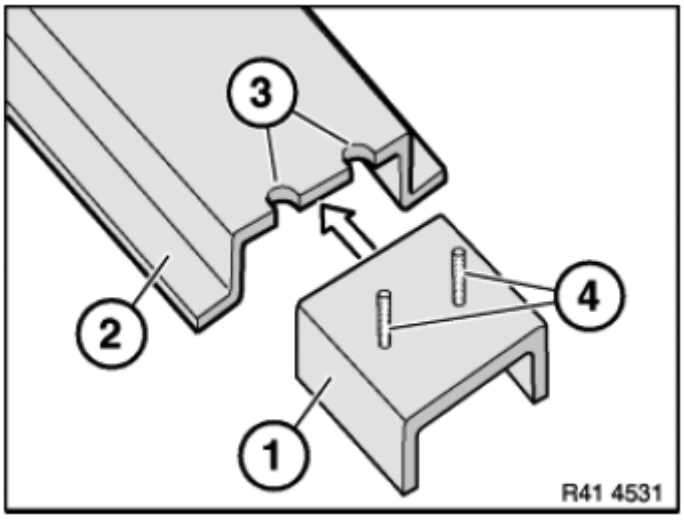


Fig. 269: Adjusting Reinforcement Plate On Components Of Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

Secure reinforcement plate by screwing on lock nuts (1).

Fit new part (2). Make recesses (3) in new part in a semicircular shape.

Diameter of recesses approx. 10 - 12 mm.

Remove reinforcement plate again.

NOTE: Width of joint between new part and component on vehicle approx. 3 - 8 mm (at least 30 mm flange width per side).
Plastic nuts should be screwed on once before applying adhesive (no thread in new plastic nut)!

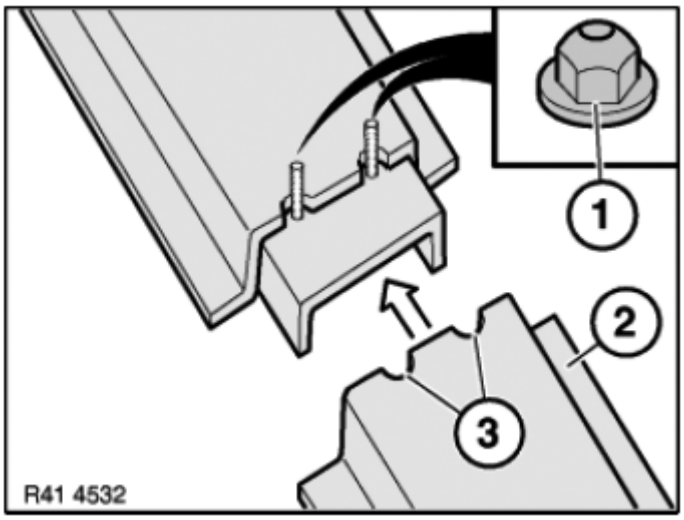


Fig. 270: Fitting New Part
Courtesy of BMW OF NORTH AMERICA, INC.

Round off cutting edges (1) on joint by grinding.

(2) Component on vehicle
(3) New part

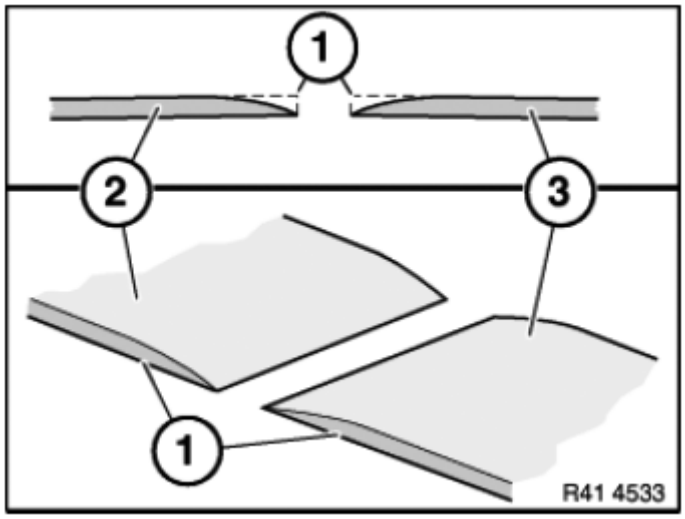


Fig. 271: Identifying Cutting Edges, Vehicle Component And New Part
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Procedure for using universal reinforcement plate

The universal reinforcement plate needs to be adapted. The plate must be divided if the distance between the pins is too great.

Dimension a is between 40 and 80 mm depending on the space available.

Secure plates with N4 punch rivets.

NOTE: Ensure the rivet is positioned correctly! Rivet head is on the adhesion side!

Rivet the plate to the inside of the flange!

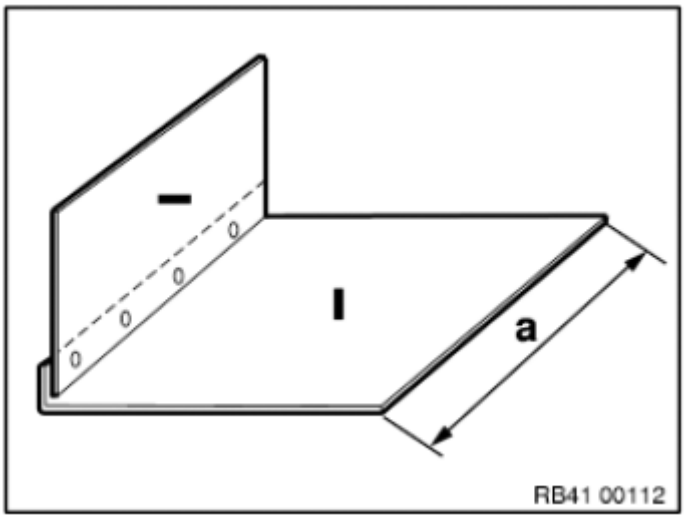


Fig. 272: Identifying Universal Reinforcement Plate Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Installing reinforcement plate

Clean all bonding surfaces.

Apply adhesive to reinforcement plate in area (1). Apply more adhesive in the radii to avoid air pockets.

Carefully slide reinforcement plate into component on vehicle and secure by screwing on nuts (2). Screw on nuts a few turns only.

IMPORTANT: When joining reinforcement plate, make sure there is sufficient adhesive on bonding surfaces.

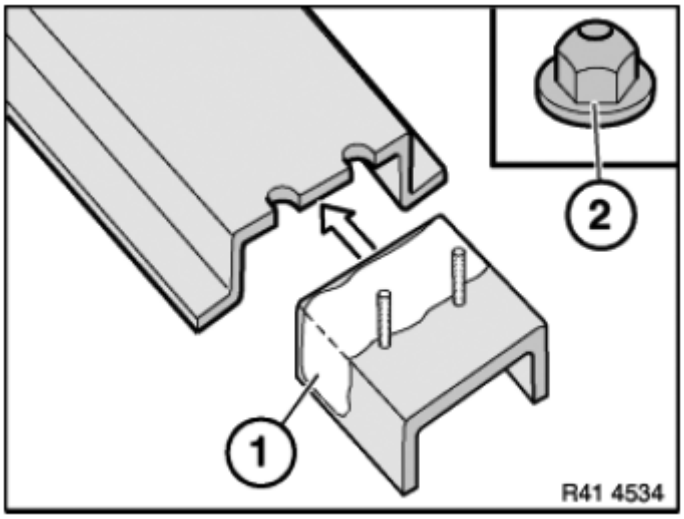


Fig. 273: Applying Adhesive To Reinforcement Plate Adhesive

Courtesy of BMW OF NORTH AMERICA, INC.

Apply adhesive to reinforcement plate bonding surface (1). Apply more adhesive in the radii to avoid air pockets.

Fit new part (2).

Align new part to adjoining component and secure with gripping pliers.

Tighten nuts.

Tightening torque **41 14 1AZ.**

IMPORTANT: Check that the transition of the components is OK at the separation point. Corrections can only be made before the adhesive has hardened. Straightening at a later stage is not possible.

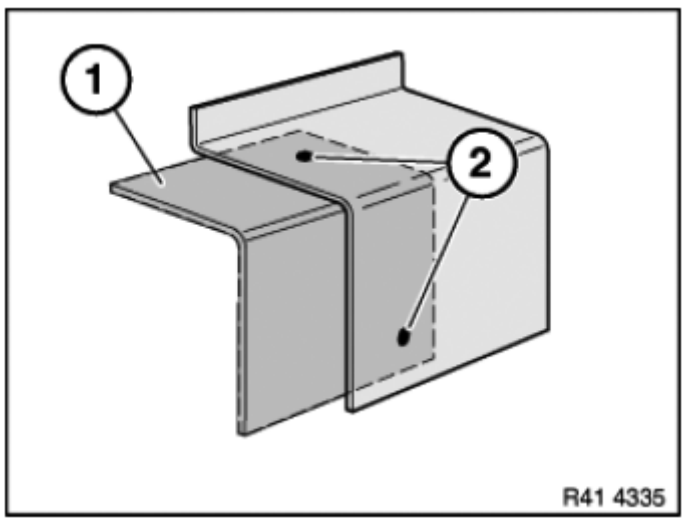


Fig. 274: Sliding Reinforcement Plate Into Body Component
Courtesy of BMW OF NORTH AMERICA, INC.

Concluding tasks at separation point:

After adhesive has hardened:

In area visible to customer:

Cut off stud bolts with bodywork saw.

Completely remove adhesive residue in joint (1).

Round off sharp edges by grinding.

IMPORTANT: Avoid heating the separation point by excessive grinding. Reworking by pressing not permitted!

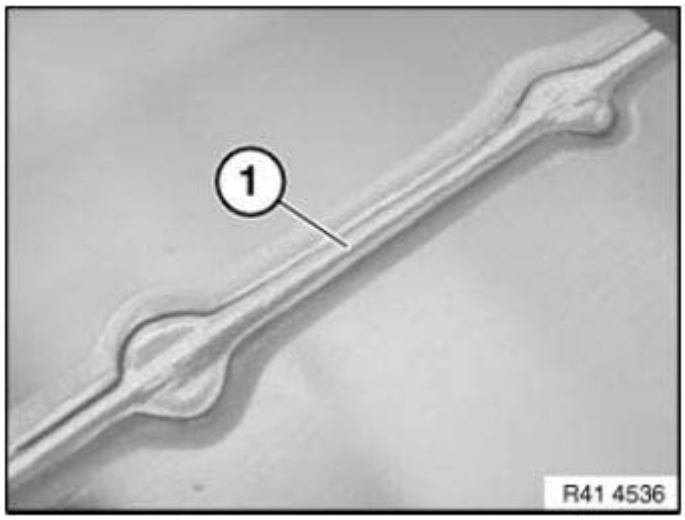


Fig. 275: Identifying Reinforcement Plate Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Only the BMW-approved **METAL FILLER** should be used on the joint.

METAL FILLER - INSTRUCTIONS FOR USE

Not in area visible to customer:

Examples: The joint is covered by sill trim panel, windows, seals, etc.

Grind off stud bolts and surplus adhesive flush. Do not use metal filler. Paint area as specified in BMW Painting Handbook.

NOTE: After painting, the joint becomes visible as the adhesive shrinks. This has no affect on the quality.

41 35 000 REMOVING AND INSTALLING/REPLACING FRONT SIDE PANEL, LEFT OR RIGHT

Read contents of **BODY, GENERAL** .

Observe **GAP DIMENSIONS** .

IMPORTANT: Do not damage adjoining body components.

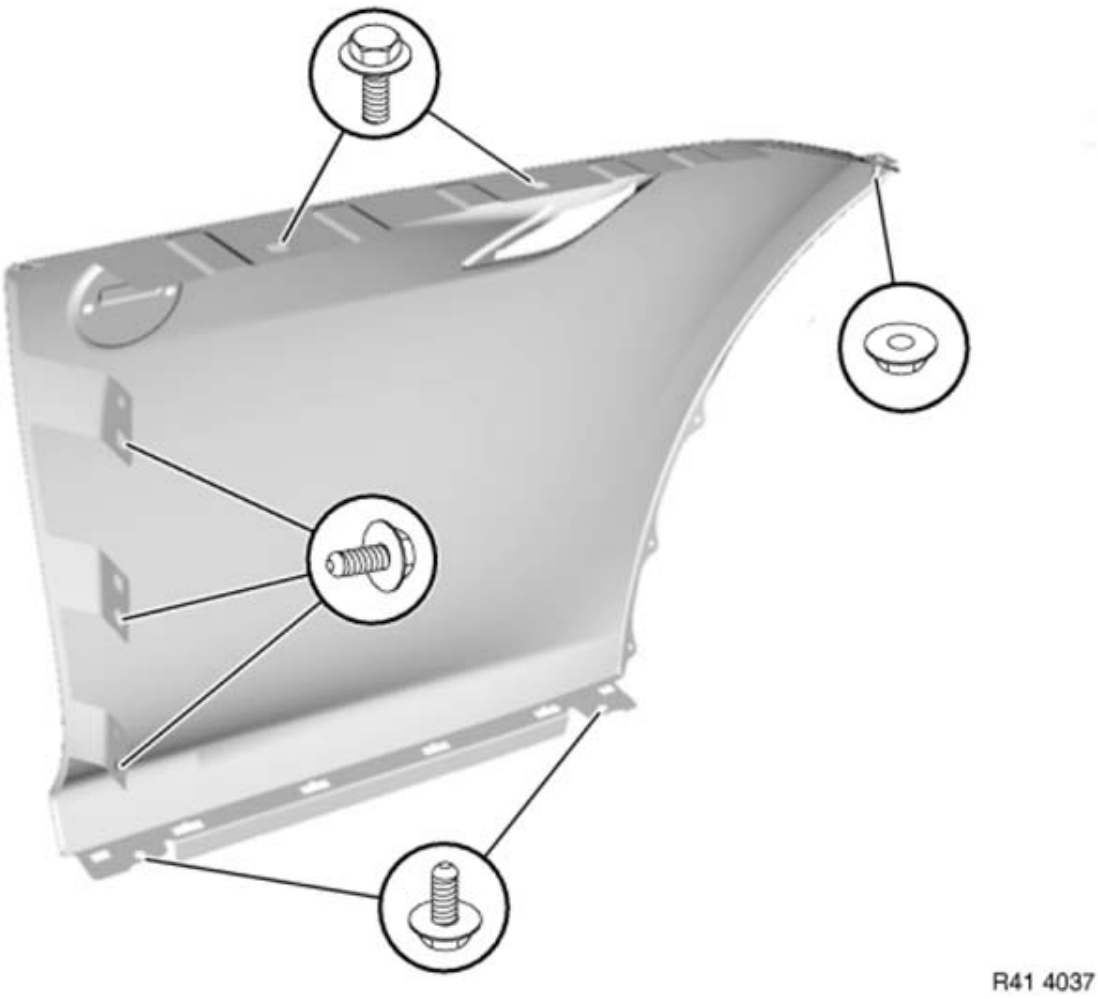


Fig. 276: Inner View Of Front Side Panel With Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Inner view of front side panel with holders.

Tightening torque **41 35 1AZ** .

41 11 516 REPLACING FRONT LEFT OR RIGHT SUPPORT CARRIER (PARTIAL REPLACEMENT, FRONT SIDE PANEL REMOVED)

Read contents of **BODY, GENERAL** .

STRIP DOWN VEHICLE .

NOTE: Observe new procedure for bonding and riveting (REPAIR STAGE 2) .

Following new body parts are required:

- (1) Support carrier, wheel arch, front,

- (2) Carrier support, wheel arch, inner
- (3) Bracket, diagonal strut, carrier support

R41 4138

Fig. 277: Identifying Support Carrier, Wheel Arch, Front And Carrier Support, Wheel Arch, Inner
Courtesy of BMW OF NORTH AMERICA, INC.

Following **CONSUMABLES** are required:

CONSUMABLES REFERENCE CHART

Material	Quantity
Adhesive K5a	1
Blind rivets N1	12
Punch rivets N5	12
CleanerR1	1
Cavity sealing wax remover	1
Sealing compoundD1	

Removing carrier support

View from below.

Mark severance cut (1) in accordance with specified measurements and cut.

Measurement a = 80 mm

Measurement b = 50 mm

IMPORTANT: Cut outer metal sheet only.

Open weld joints in areas (2).

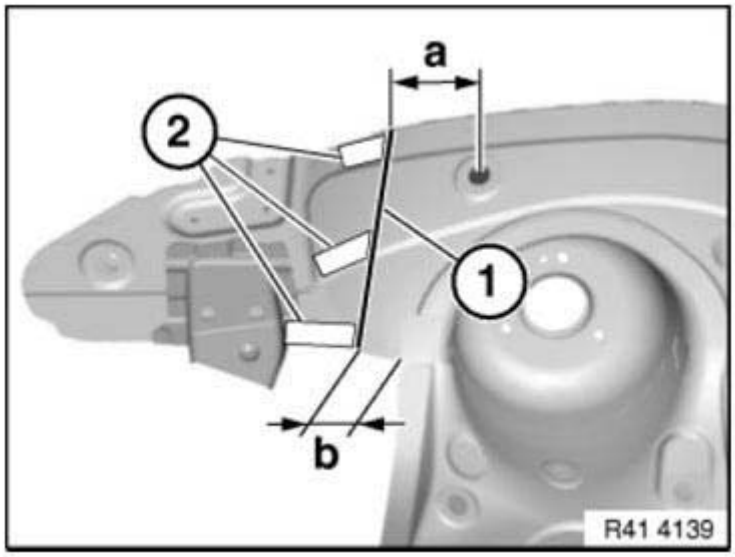


Fig. 278: Identifying Weld Joint Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Roughly mark severance cut (1) and cut.

Remove carrier support section (2).

Open weld joints in area (3) from below.

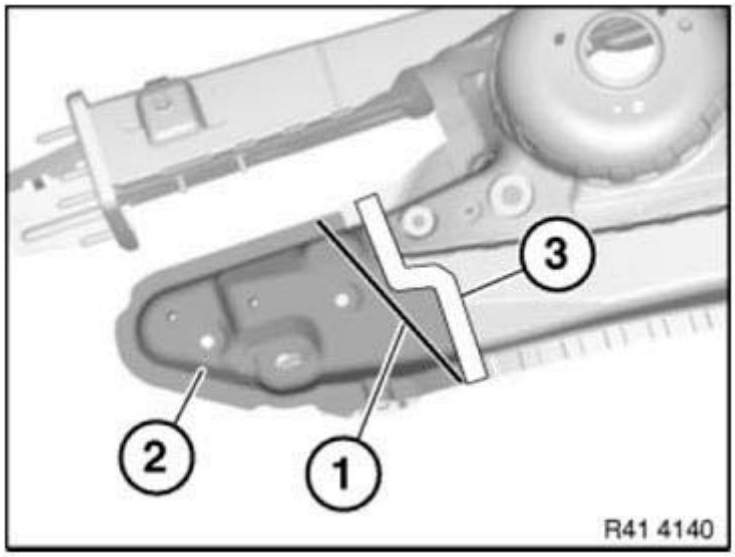


Fig. 279: Removing Carrier Support Section With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Preparation of new part

Open weld joints in area (1).

Mark severance cut (2) in accordance with severance cut on vehicle + 20 mm extra material and cut.

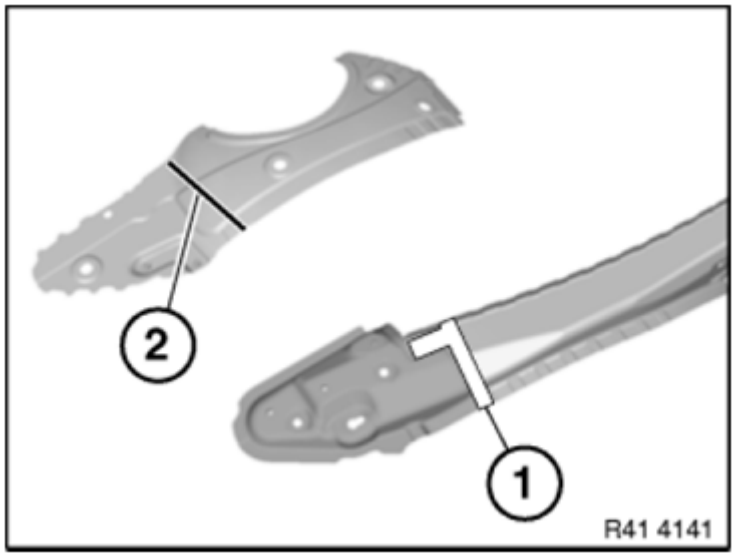


Fig. 280: Identifying Weld Joints Area With Severance Cut
Courtesy of BMW OF NORTH AMERICA, INC.

Offer up new parts with attachments and fix in place.

Set four 6.8 mm dia. holes for blind rivets N1 in area (1).

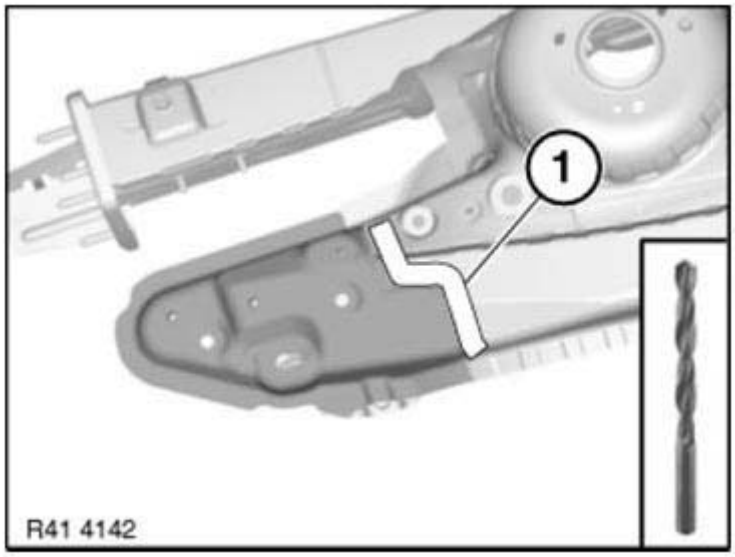


Fig. 281: Setting Four Diameter Holes For Blind Rivets N1
Courtesy of BMW OF NORTH AMERICA, INC.

View from below

Diagonal strut must be fitted in order to adjust holder (1) to fit.

In areas (2) set eight 6.8 mm dia. holes for blind rivets N1.

Remove new parts again and deburr holes.

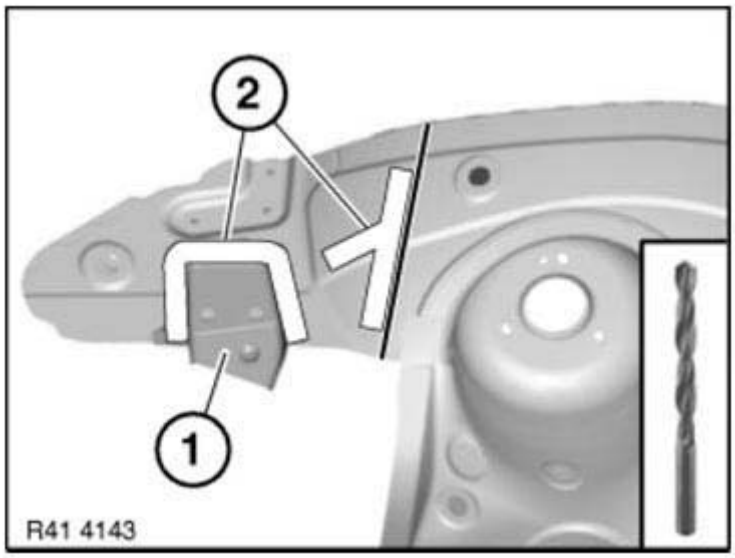


Fig. 282: Identifying Holder And Rivets Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not grind new part and body in area of bonding surfaces.

Installing carrier support

Clean all bonding surfaces on vehicle and on new part with cleaning agent R1.

Apply adhesive K5a to bonding surfaces.

Attach new part and attachments and rivet with blind rivets (1).

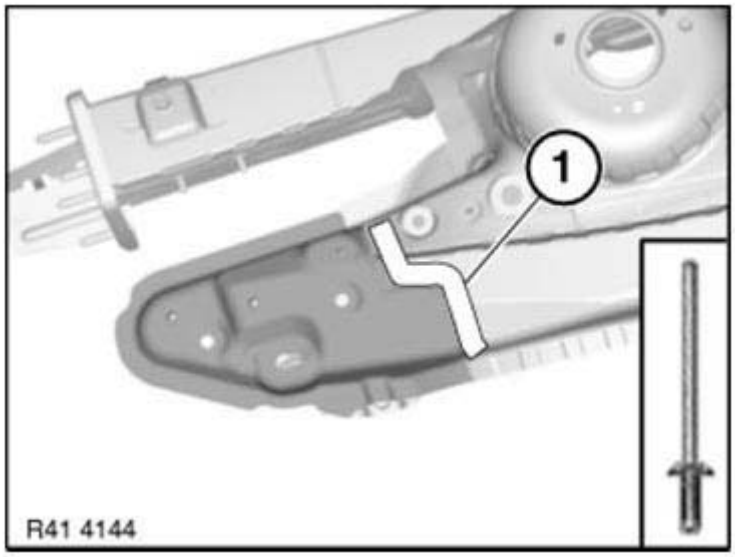


Fig. 283: Installing New Part, Attachments And Rivet Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Clean all bonding surfaces on vehicle and on new part with cleaning agent R1.

Apply adhesive K5a to bonding surfaces.

Mount new part and rivet with blind rivets (1).

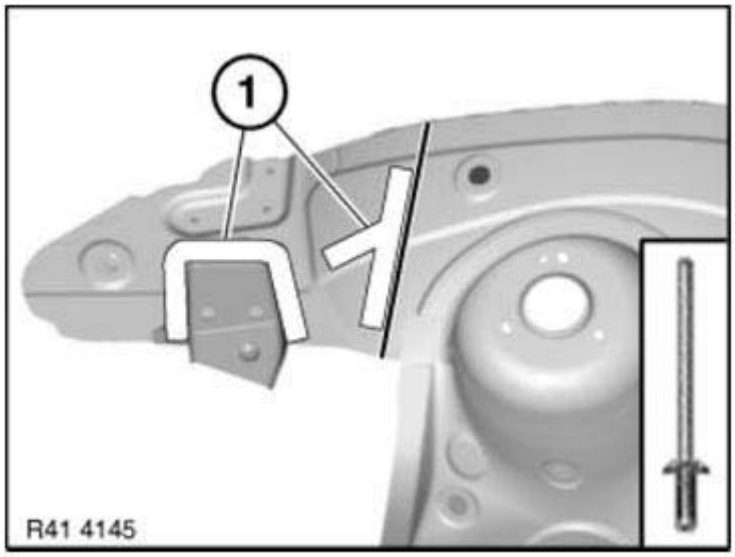


Fig. 284: Mounting New Part And Rivet Using Blind Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

In area (1) rivet new parts with 12 punch rivets N5.

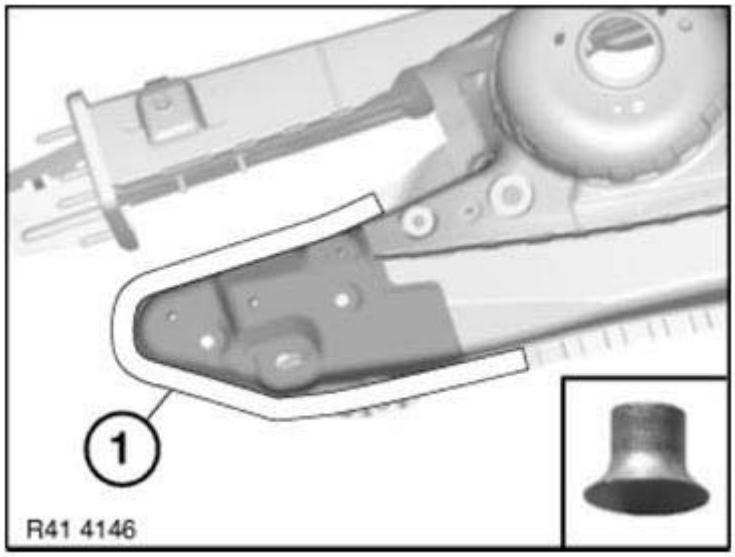


Fig. 285: Identifying Rivet Area With 12 Punch Rivets N5
Courtesy of BMW OF NORTH AMERICA, INC.

Seal adhesive areas and blind rivets in accordance with right side of vehicle with sealant.

41 35 101 REPLACING REAR LEFT SIDE PANEL

IMPORTANT: Do not damage adjoining body parts.

Installation information:

GAP DIMENSIONS serve as basis for adjustment tasks.

Partially detach trim panel (1).

Unlock and disconnect plug (2) for aerial.

Feed aerial line through hole (3).

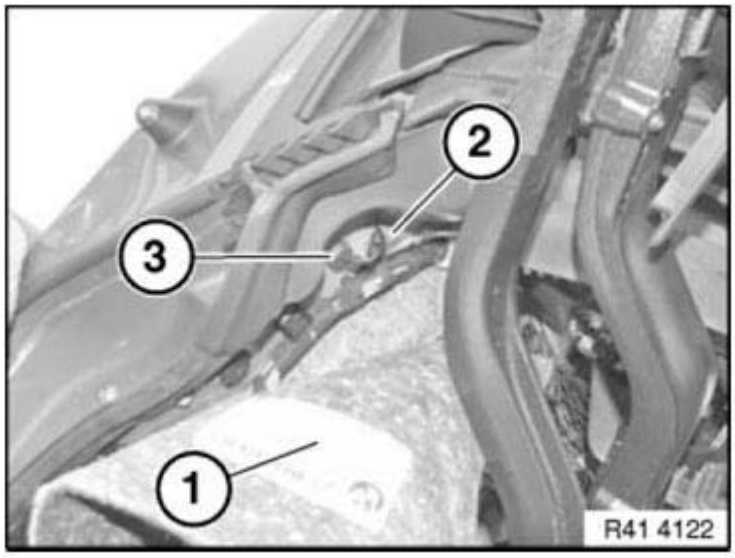


Fig. 286: Identifying Trim Panel, Aerial Line And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

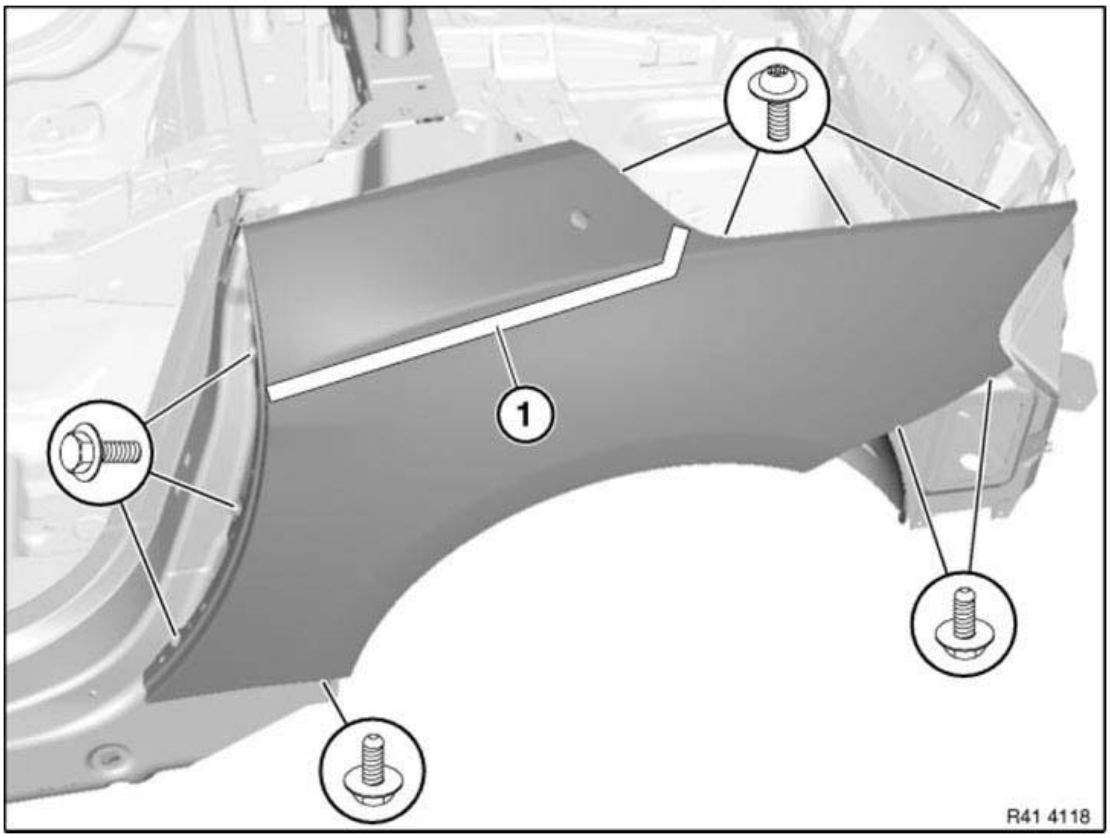


Fig. 287: Removing Cavity Acoustic Baffle With Hot-Air Blower
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque 41 35 5AZ .

IMPORTANT: Risk of damage!

Heat side panel in area of cavity acoustic baffle (2) with hot-air blower and carefully remove.

Installation:

Apply sealant to cavity acoustic baffle.

Also apply sprayable sealing compound on inside of side panel in area (1). Width approx. 50 mm.

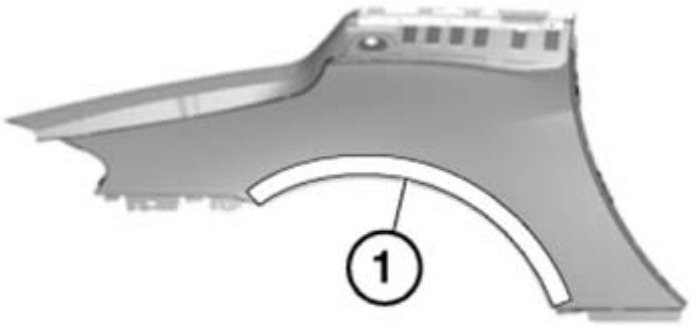


Fig. 288: Identifying Side Panel Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 35 111 REPLACING REAR RIGHT SIDE PANEL

IMPORTANT: Do not damage adjoining body parts.

Installation information:

GAP DIMENSIONS serve as basis for adjustment tasks.

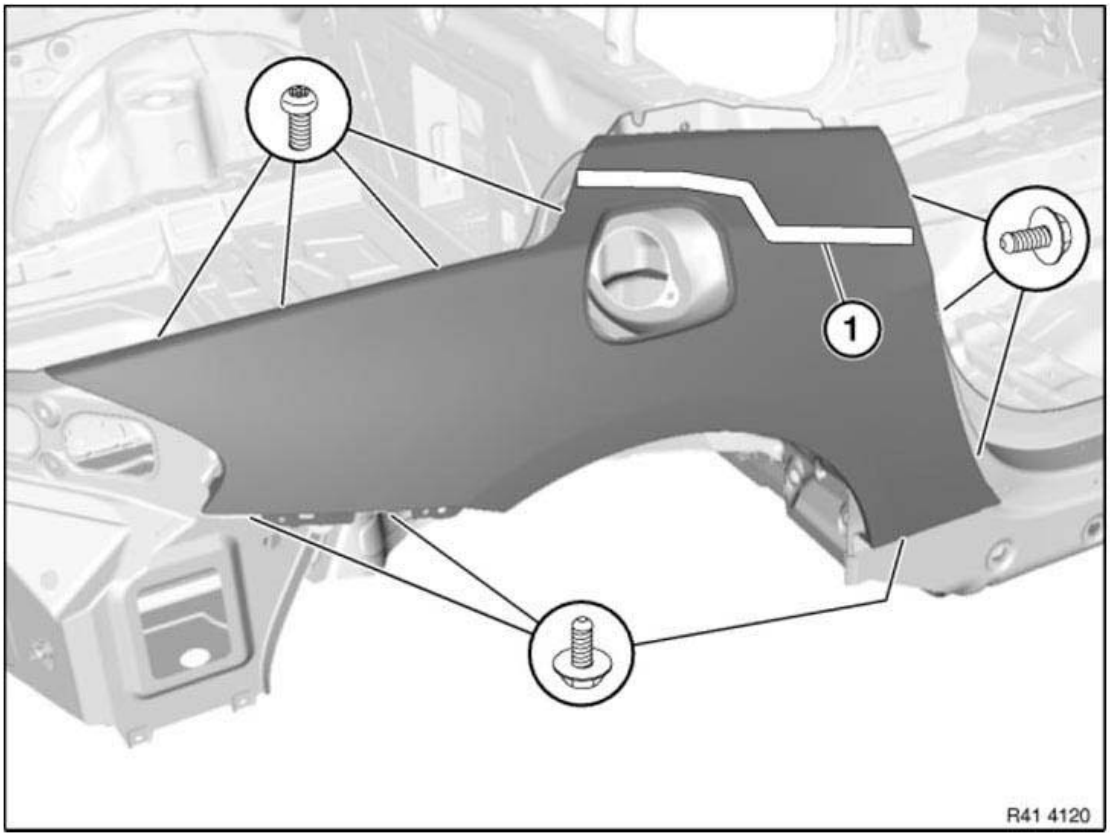


Fig. 289: Removing Cavity Acoustic Baffle With Hot-Air Blower
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Tightening torque 41 35 5AZ .

IMPORTANT: Risk of damage!
Heat side panel in area of cavity acoustic baffle (2) with hot-air blower and carefully remove.

Installation:

Apply sealant to cavity acoustic baffle.

Also apply sprayable sealing compound on inside of side panel in area (1). Width approx. 50 mm.

When reusing the side panel:

- If necessary, apply sealing compound in area (2) between side panel and reinforcement (3).

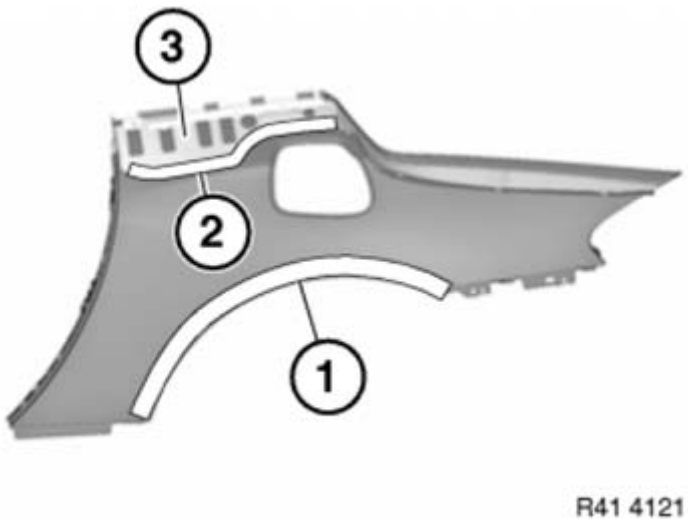


Fig. 290: Identifying Side Panel With Area Between Side Panel And Reinforcement
Courtesy of BMW OF NORTH AMERICA, INC.

4151 FRONT SIDE DOORS

41 51 004 ADJUSTING LEFT OR RIGHT FRONT DOOR

IMPORTANT: Do not damage adjoining body parts.
Minor corrections (realignment work) are permitted if the existing adjustment options are not sufficient.

NOTE: Observe GAP DIMENSIONS .
The door must be provided with all attachment parts for correct adjustment.
Adjust screwed body parts from rear to front.

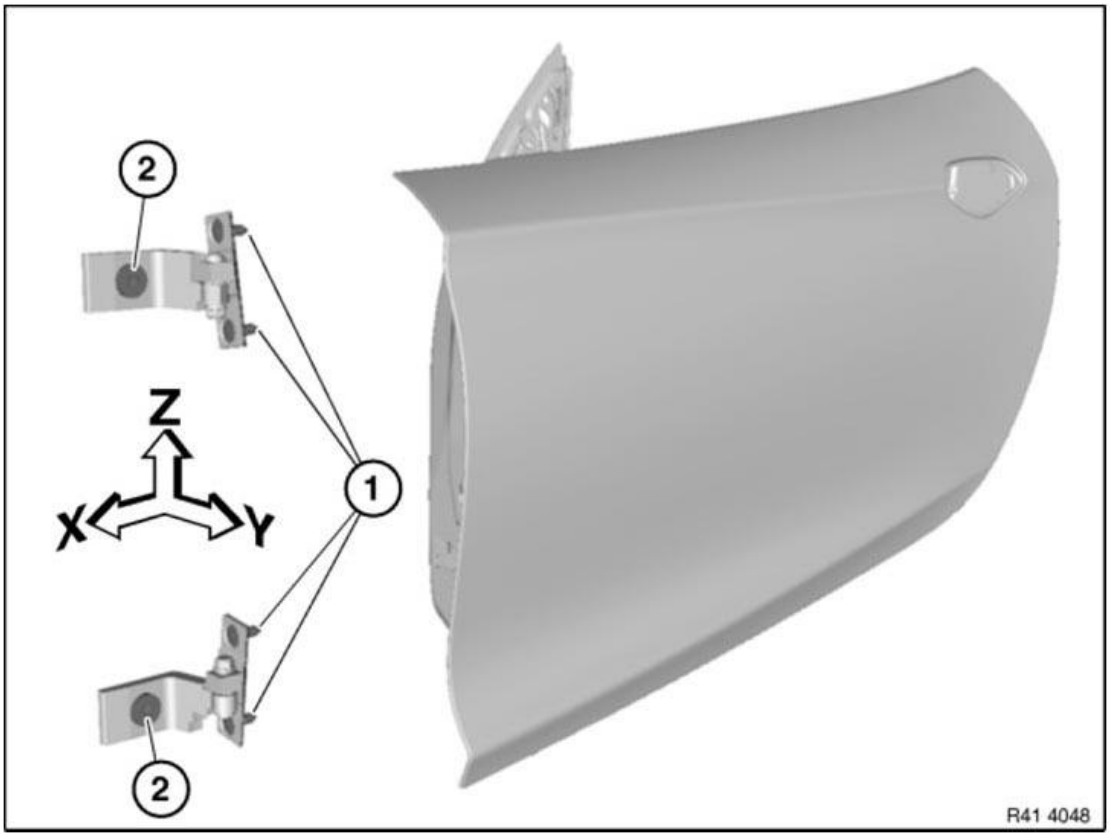


Fig. 291: Identifying Slacken Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken lock striker, remove if necessary.

Height adjustment (Z) :

Slacken screws (1) until door can still just be moved. Adjust height of door.

If the range of adjustment is not sufficient, also slacken screws (2) and adjust height of door.

NOTE: Carry out adjustment in longitudinal direction (X) and in transition to side panel (Y) for hinges only, as otherwise height adjustment is lost.

Adjusting in longitudinal direction (X):

Slacken screw (2) on upper hinge and adjust door in longitudinal direction. Then adjust door at lower hinge in longitudinal direction.

Adjusting in transition to side panel (Y):

Slacken screws (1) on upper hinge and adjust door in transition to side panel. Then adjust door at lower hinge in transition to side panel.

Tightening torque **41 51 2AZ AND 41 51 3AZ** .

Check that adjoining body parts are flush in terms of height and correct if necessary.

NOTE: Vertical adjustment of door must not be influenced by lock striker. When the door is closed, the lock striker must not touch or scrape against the door lock. Look out for scratches.

Fig. 292: Identifying Door Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1) until lock striker can still just be moved.

Move lock striker sideways in order to adjust transition between door and rear side panel.

Tightening torque **51 21 3AZ** .

NOTE: When the door is closed, the lock striker must not touch or scrape against the door lock. Look out for scratches.

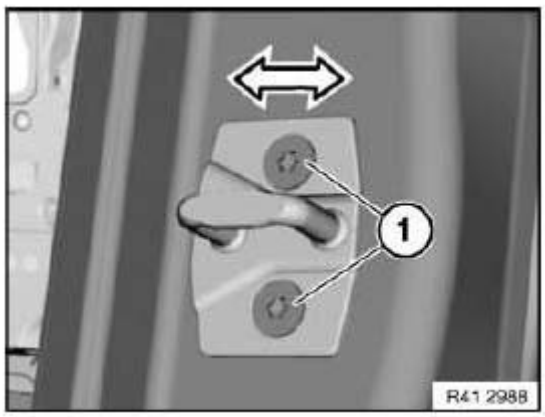


Fig. 293: Adjusting Transition Between Door And Rear Side Panel

Courtesy of BMW OF NORTH AMERICA, INC.

After installation

If the hinge is slackened on the body side, the area of the hinge must be sealed in a u-shape with sealant (1).

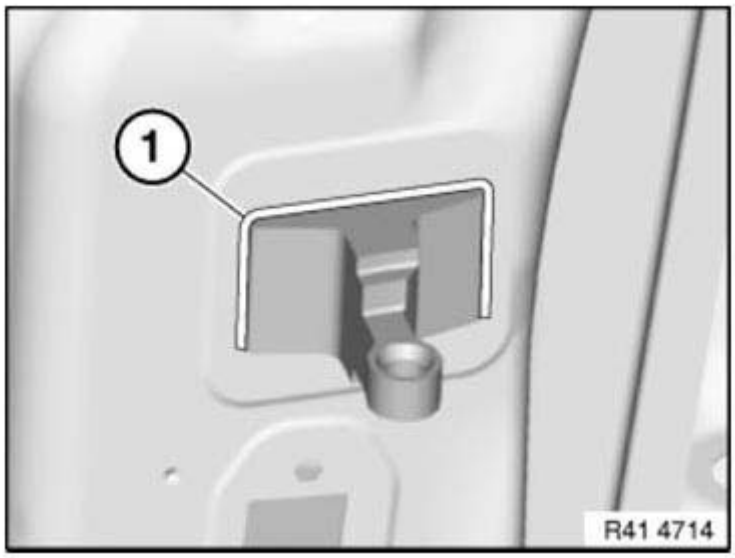


Fig. 294: Identifying Hinge Sealant Applying Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 5. ... REMOVING AND INSTALLING DOOR

IMPORTANT: Do not damage adjoining body parts.

The illustrations are schematic representations and are to be applied to the relevant vehicle type.

Release screw on connector frame.

Tightening torque **41 51 4AZ** .

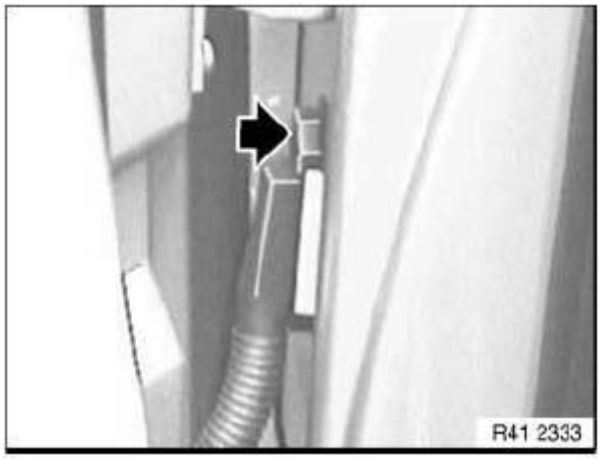


Fig. 295: Locating Screw On Connector Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Secure door against closing.

Release screw (1) on door retainer.

Tightening torque **51 21 3AZ** .

Open door up to stop.

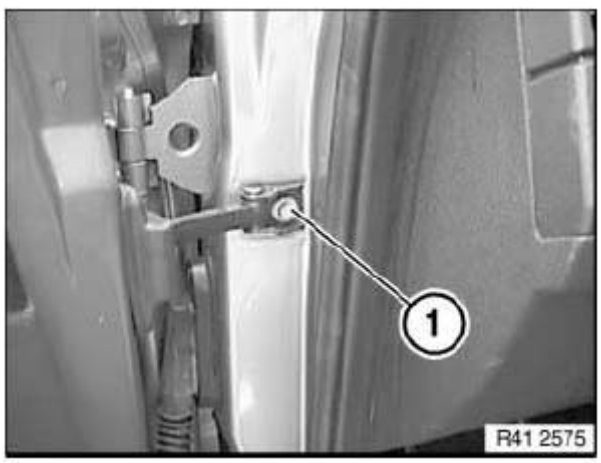


Fig. 296: Identifying Screw On Door Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts between both hinge elements at top and bottom.

Tightening torque **41 51 1AZ** .

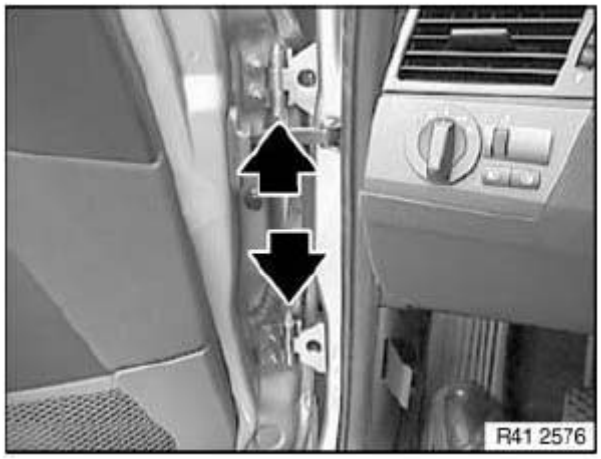


Fig. 297: Locating Hinge Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Pull plug connection from door pillar, unlock by pulling out bar and detach.

Unhinge door by moving upwards and placing it on a suitable surface.

Installation:

If necessary, adjust **DOOR** .

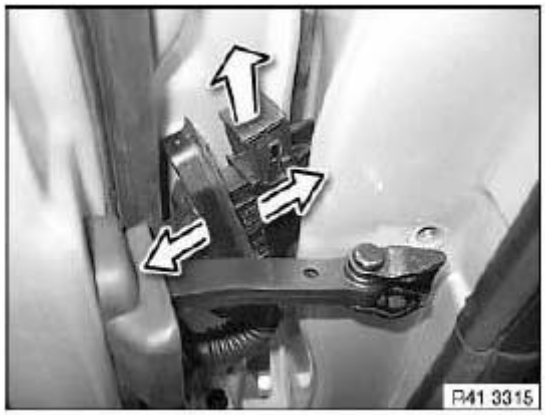


Fig. 298: Pulling Plug Connection From Door Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

4152 REAR SIDE DOORS

41 5. ... REMOVING AND INSTALLING DOOR

IMPORTANT: Do not damage adjoining body parts.

The illustrations are schematic representations and are to be applied to the relevant vehicle type.

Release screw on connector frame.

Tightening torque **41 51 4AZ** .

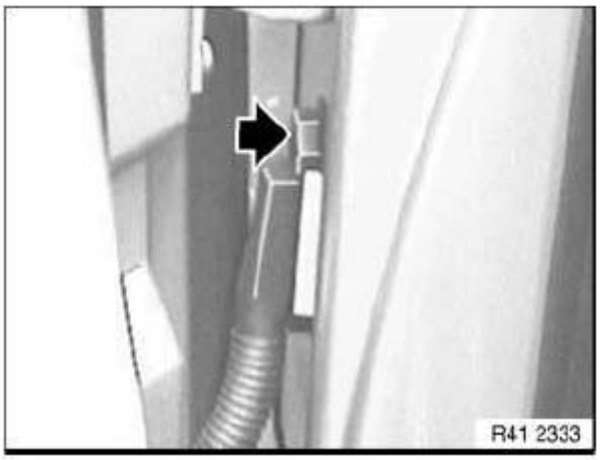


Fig. 299: Locating Screw On Connector Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Secure door against closing.

Release screw (1) on door retainer.

Tightening torque **51 21 3AZ** .

Open door up to stop.

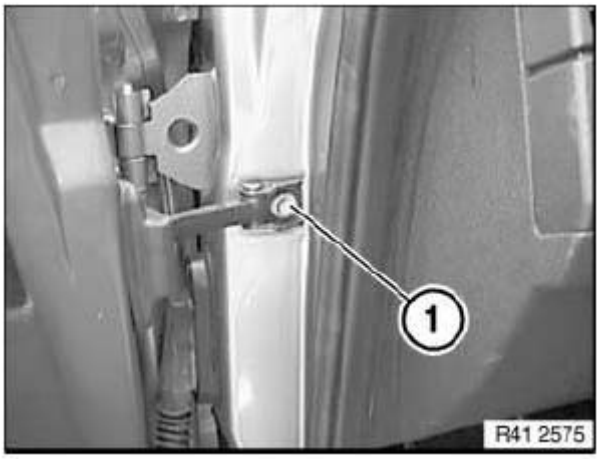


Fig. 300: Identifying Screw On Door Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts between both hinge elements at top and bottom.

Tightening torque **41 51 1AZ** .

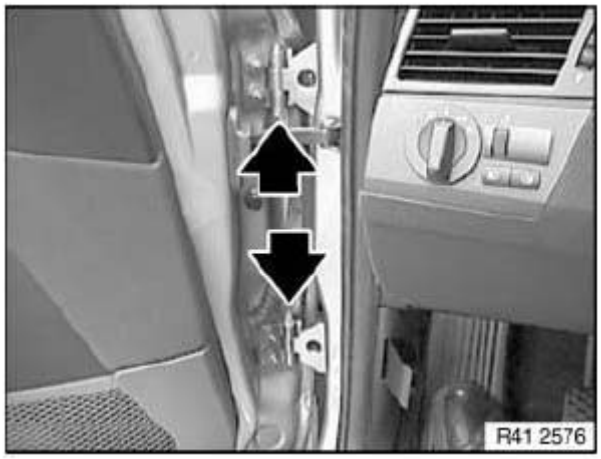


Fig. 301: Locating Hinge Elements
Courtesy of BMW OF NORTH AMERICA, INC.

Pull plug connection from door pillar, unlock by pulling out bar and detach.

Unhinge door by moving upwards and placing it on a suitable surface.

Installation:

If necessary, adjust **DOOR** .

Fig. 302: Pulling Plug Connection From Door Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

4161 FRONT LID

41 61 014 ADJUSTING ENGINE BONNET/HOOD

Do not damage adjoining body parts.

Minor corrections (rework) are permitted if the existing adjustment options are not sufficient.

NOTE: Observe GAP DIMENSIONS .
Carry over schematic representation to the relevant vehicle type.

Check stop screw of bonnet hinge on left and right.

NOTE: Pressure spring of stop screw must not be damaged or missing, replace hood/bonnet hinge if necessary.

The stop screw is preset at the factory and must not be used for adjustment!

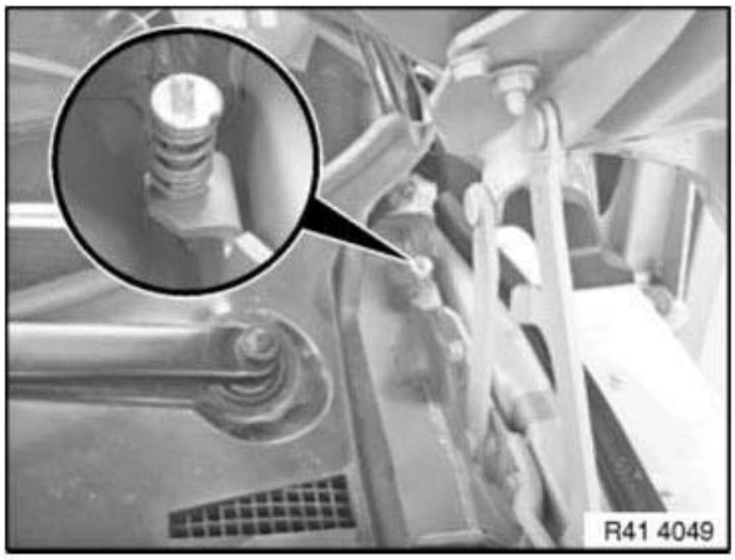


Fig. 303: Identifying Bonnet Hinge Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Loosen screws (1) and (2) on left and right hinges.

Hood lid must be able to be moved.

Tightening torque **41 61 1AZ** .

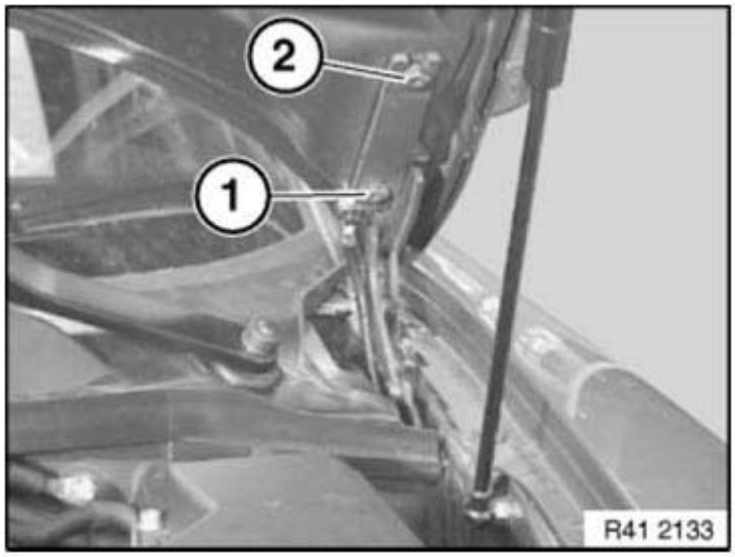


Fig. 304: Identifying Hinge Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the adjustment range is not sufficient, release retaining screws of engine hood hinge on body and move hinge.
Tightening torque 41 61 2AZ .

Adjust height to front panel by turning nut (1).

NOTE: Arrester hooks must snap into place in locks!

The engine hood/bonnet is correctly adjusted in the front area by a combination of pulling the arrester hooks and pressing the stop buffers.

Adjust **BUMP STOPS** .

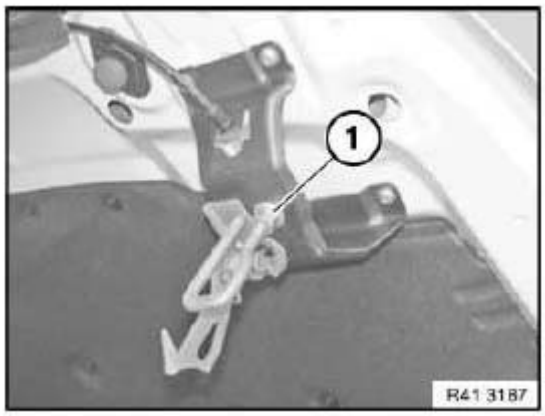


Fig. 305: Adjusting Height Using Turning Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust transition of hood/bonnet to side panel by means of buffers (1) and (2).

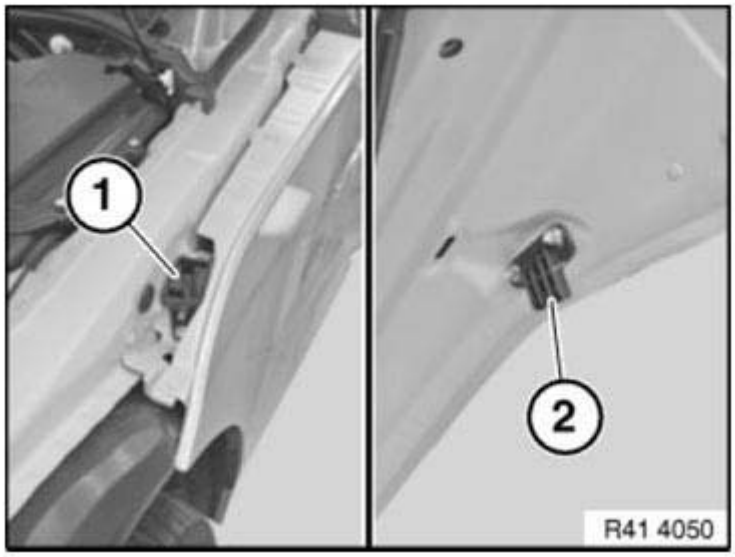


Fig. 306: Identifying Side Panel Buffers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check function of arrester hook.

After installation

41 61 000 REMOVING AND INSTALLING HOOD/BONNET

Read contents of **BODY, GENERAL** .

Necessary preliminary tasks:

- Disconnect all cable plug connections

WARNING: Risk of injury!
Support engine hood in fully opened position with suitable apparatus.

IMPORTANT: Removal of the hood/bonnet must be carried out with the assistance of a second person.

NOTE: Carry over schematic representation to the relevant vehicle type.

Disconnect gas-pressure damper from engine hood/bonnet (1).

Release nuts (2) and (3).

Tightening torque **41 61 1AZ** .

Remove hood lid.

Installation:

Install engine hood at screw locations to on hinge. This dispenses with the need for adjustment after installation.

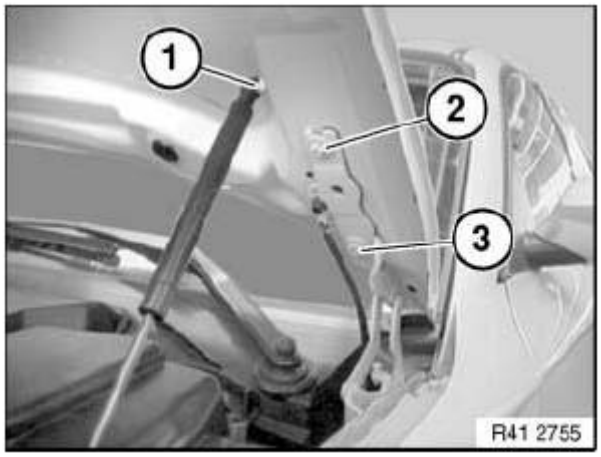


Fig. 307: Identifying Gas-Pressure Damper With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If this is not possible, **ADJUST ENGINE HOOD** .

4162 REAR LID

41 62 014 ADJUSTING REAR LID

Read contents of BODY, GENERAL .

The E89 GAP DIMENSIONS serve as the basis for adjustment work.

NOTE: Stop screw (1) must not be damaged or missing.

The stop screw is preset and must not be used to adjust the rear lid.

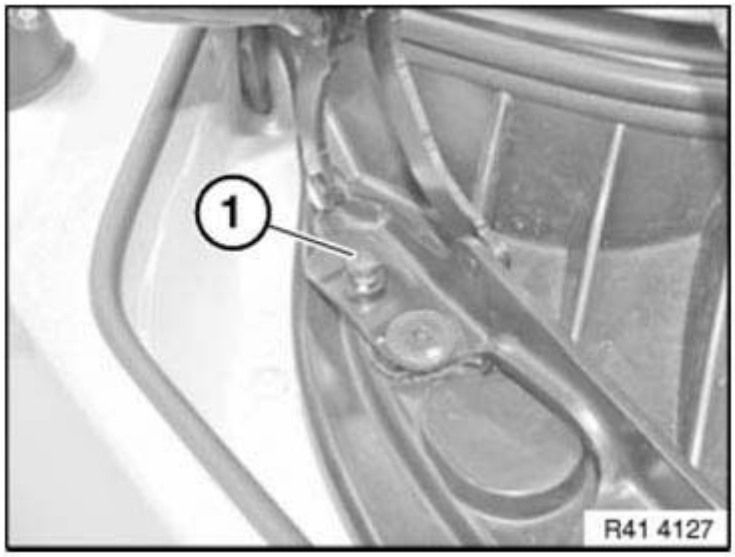


Fig. 308: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1) until such stage that the rear lid can still be moved.

Adjust rear lid laterally and longitudinally.

Height adjustment of rear lid with spacer plates. If this is not sufficient, adjust **KINEMATICS BOX** .

Retighten all screws.

Tightening torque **41 62 1AZ** .

Adjust **REAR LID LOCK** .

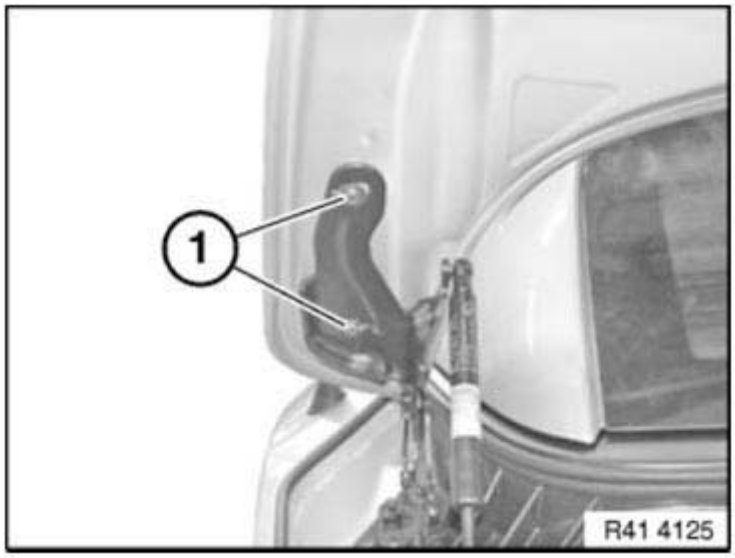


Fig. 309: Identifying Slacken Screws
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 505 CHECKING FRONT BODY STRUCTURE

Necessary preliminary tasks:

- Remove **FRONT UNDERBODY PROTECTION**

Structural damage can be identified by measuring with a beam trammel.

Here, symmetrically arranged points on the vehicle are measured in diagonal sequence.

If the two measured values are identical, there is no damage to the vehicle.

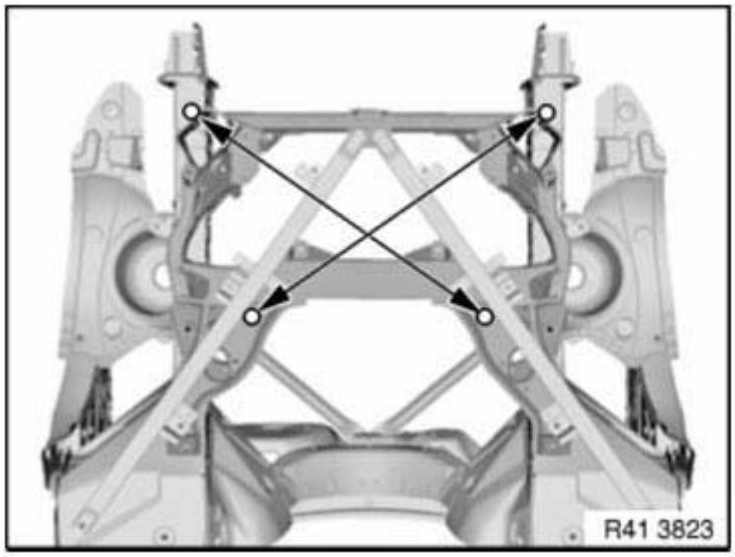


Fig. 310: Measuring Symmetrically Arranged Points In Diagonal Sequence On Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

In front area use conical adapter (2) at bore hole (1).

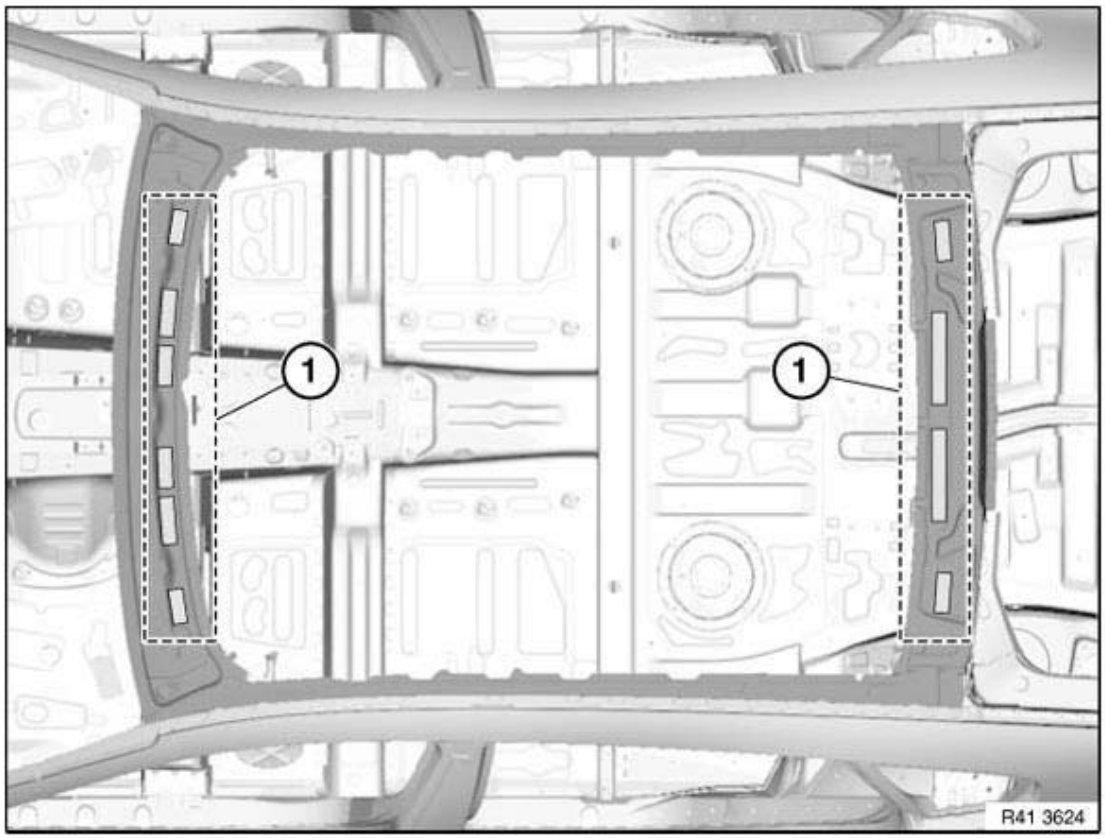


Fig. 311: Identifying Conical Adapter And Bore Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Use 8 mm dia. bore hole (1) on front axle support.

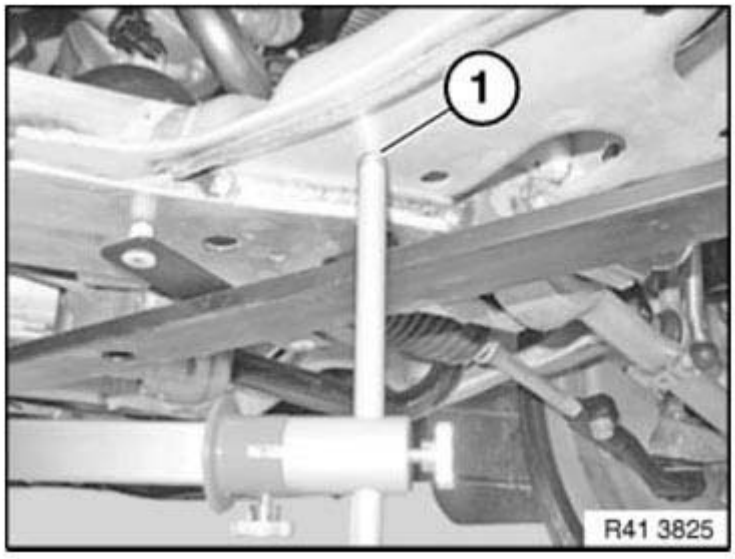


Fig. 312: Identifying Bore Hole On Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 510 CHECKING REAR BODY STRUCTURE

Necessary preliminary tasks:

- Remove **REINFORCEMENT PLATE FROM REAR AXLE**

Structural damage can be identified by measuring with a beam trammel.

Here, symmetrically arranged points on the vehicle are measured in diagonal sequence.

If the two measured values are identical, there is no damage to the vehicle.

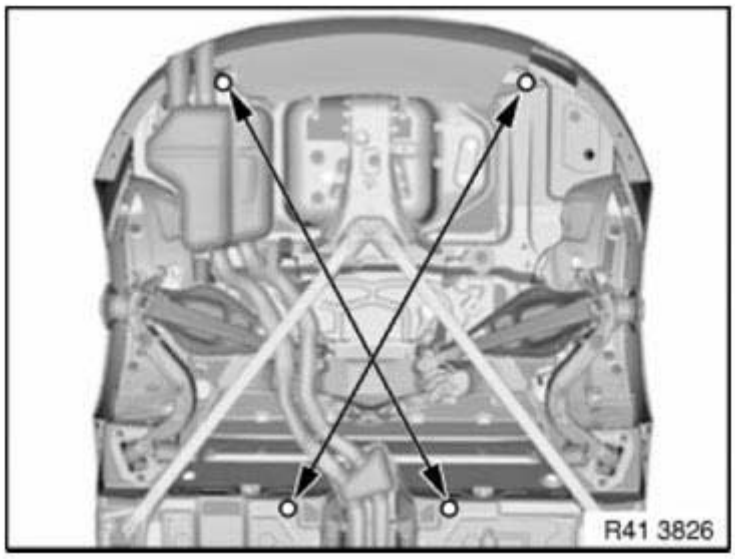


Fig. 313: Measuring Symmetrically Arranged Points In Diagonal Sequence On Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

In rear area use adapter (2) on threaded bolt of impact plate (1).

NOTE: If necessary, make recess in adapter yourselves.

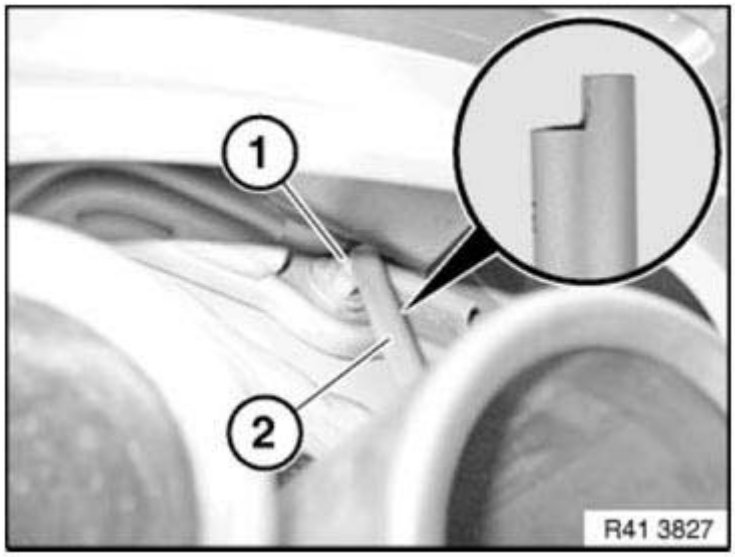


Fig. 314: Identifying Adapter And Impact Plate Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Use conical adapter (1) at attachment point of reinforcement plate.

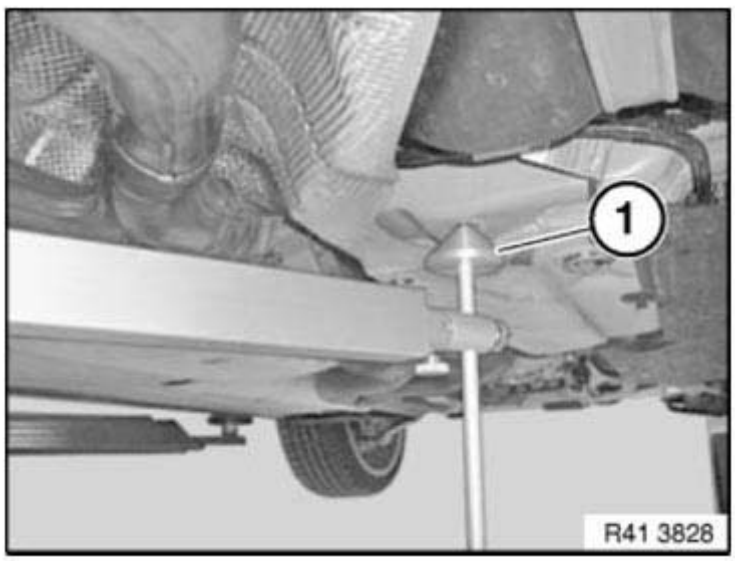


Fig. 315: Identifying Conical Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

41 62 519 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HINGE FOR REAR LID

Read contents of BODY, GENERAL .

Remove **GAS PRESSURE SPRING** (1).

Unfasten screws (2).

Tightening torque **41 62 1AZ** .

IMPORTANT: Secure rear lid against falling down, remove if necessary.

Release screws (3).

Tightening torque **41 62 3AZ** .

Remove hinge.

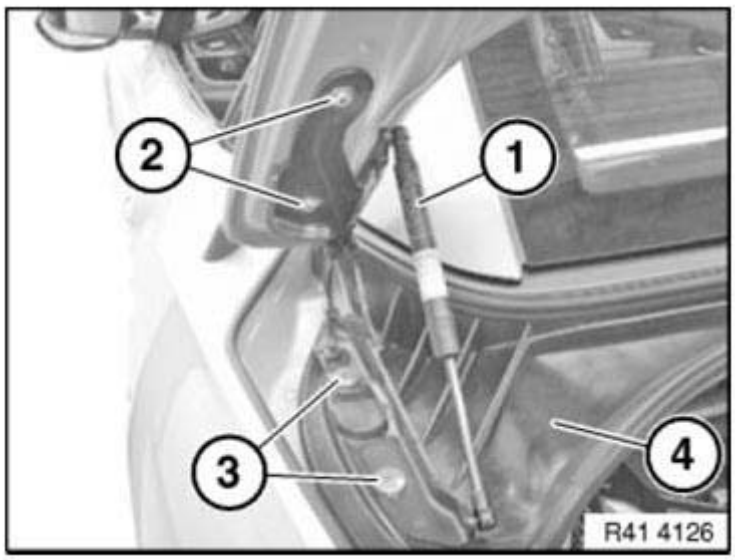


Fig. 316: Identifying Gas Pressure Spring, Screws And Sealing Compound
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing compound between hinge and rear module (4).

Adjust rear lid on the basis of the **E89 BODY GAP DIMENSIONS** .

41 62 000 REMOVING AND INSTALLING REAR LID

Read contents of **BODY, GENERAL** .

Necessary preliminary tasks:

- Remove **PANEL FOR REAR LID**
- Disconnect all plug and socket cable connections on rear lid.

Operation is described on the left side. Right side identical.

Release screws (1).

Tightening torque **41 62 1AZ** .

Remove rear lid.

Installation:

Adjust **REAR LID** .

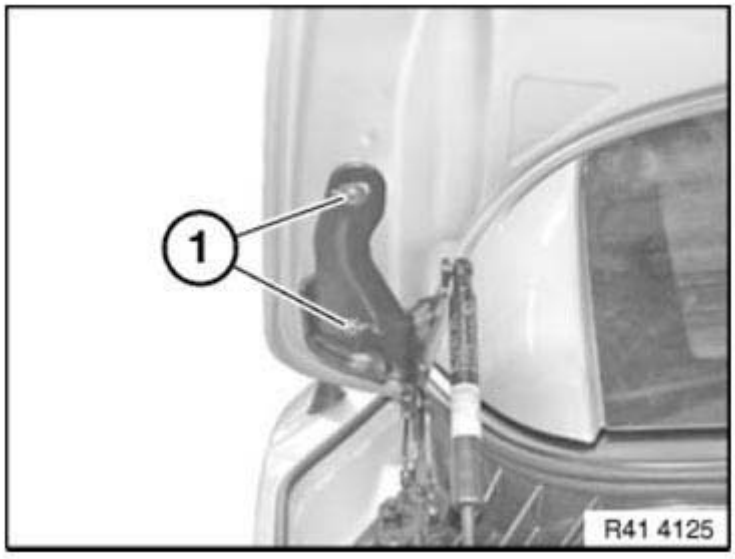


Fig. 317: Identifying Slacken Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing rear lid

On vehicles without an additional aerial, designated opening (1) must be sealed with 40 x 40 mm masking foil.

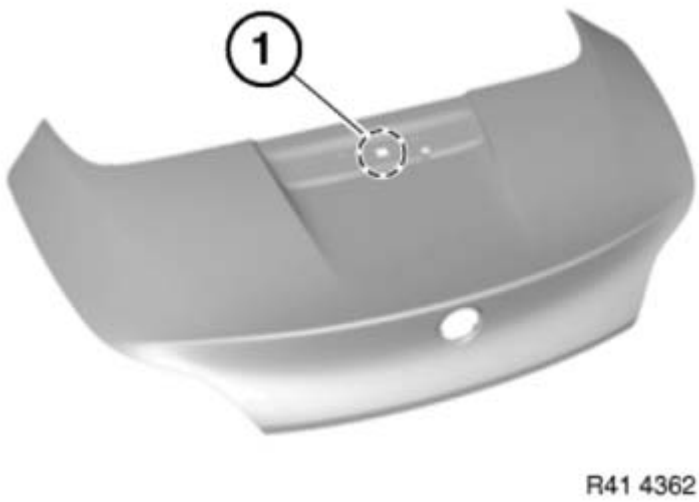


Fig. 318: Identifying Rear Lid
Courtesy of BMW OF NORTH AMERICA, INC.

4163 OTHER FLAPS

41 63 000 REMOVING AND INSTALLING FLAP FOR FUEL FILLER NECK

NOTE: The illustration is a schematic representation and is to be applied to the relevant vehicle type.

Open fuel filler flap.

Lever out lock (2) and detach fuel filler flap (1) in direction of arrow.

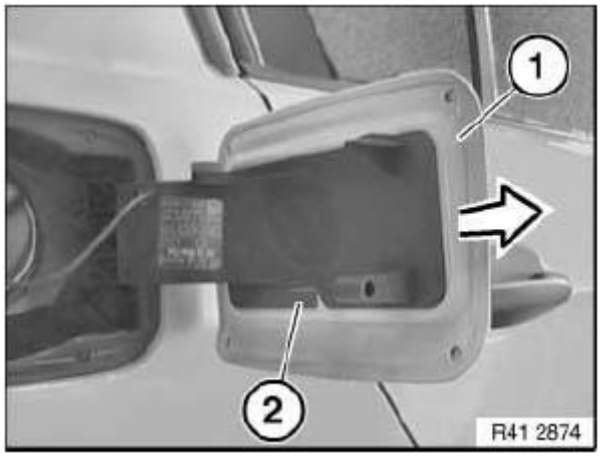


Fig. 319: Removing Lock And Fuel Filler Flap
Courtesy of BMW OF NORTH AMERICA, INC.

41 63 060 REMOVING AND INSTALLING SOFT TOP COMPARTMENT LID

Necessary preliminary work

- Connect battery charger
- Remove **TRIM PANEL FOR TAILGATE**

Close both locks by hand.

NOTE: On closing the second door lock, the Soft Close function must lock audibly. Closing the locks is necessary so that the soft top system remains ready for operation.

Slowly close the tailgate until the tailgate locks are at the strikers.

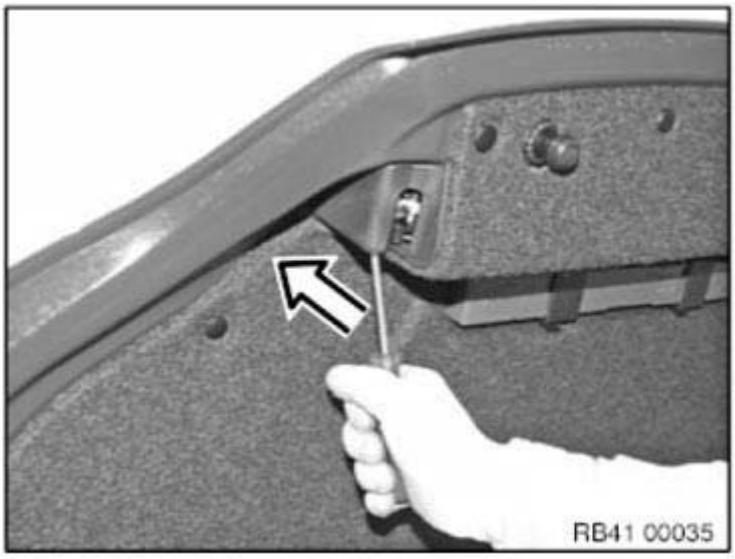


Fig. 320: Closing Both Locks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
A tailgate that is not properly closed can damage the soft top!
Only move the soft top with extreme caution.

Open soft top.

Stop opening procedure in the position shown.

Fig. 321: Opening Soft Top
Courtesy of BMW OF NORTH AMERICA, INC.

Open tailgate. (without operating the opener)

Fig. 322: Opening Tailgate
Courtesy of BMW OF NORTH AMERICA, INC.

Detach wiring harness (1) from tailgate and guide through soft top compartment lid.

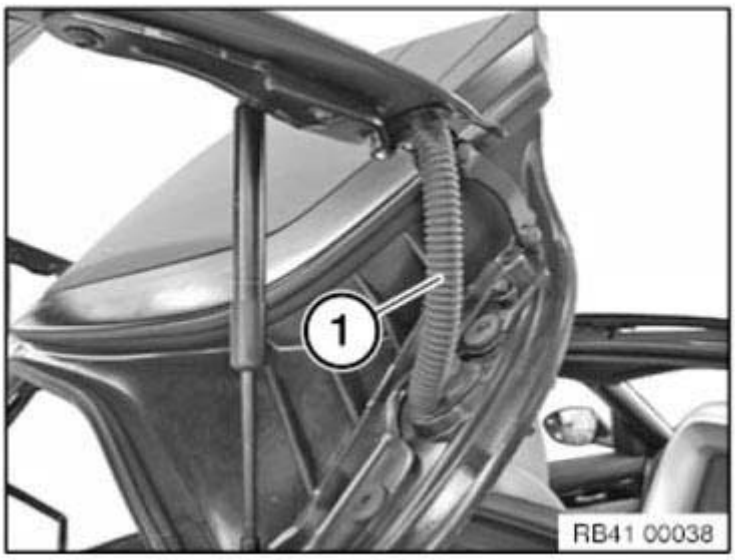


Fig. 323: Identifying Wiring Harness With Tailgate
Courtesy of BMW OF NORTH AMERICA, INC.

Carry over the work step shown symmetrically to the other side of the vehicle.

Pay attention to the spacer plates on the underside of the soft top compartment lid!

Release bolts (1) and remove soft top compartment lid in combination with the tailgate.

Tightening torque **41 62 3AZ** .

Place soft top compartment lid and tailgate on a suitable surface.

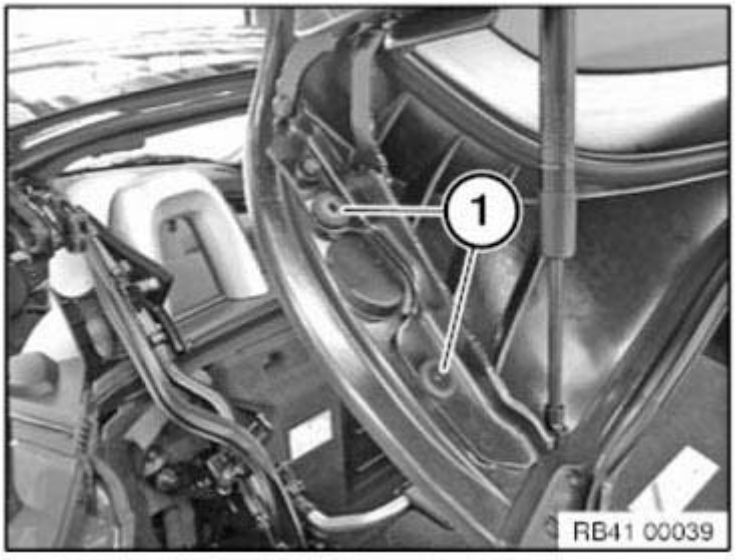


Fig. 324: Identifying Soft Top Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

General view of underside of soft top compartment lid.

Release nuts (1) and take the tailgate off the soft top compartment lid.

Tightening torque **41 63 3AZ** .

Installation note:

- For pre-adjustment, carry over the spacer plates. If necessary, adjust soft top compartment lid according to **GAP DIMENSIONS** . Prerequisite: Tailgate correct preadjusted on soft top compartment lid.
- After installation, unlock the locks of the tailgate by operating the opener.

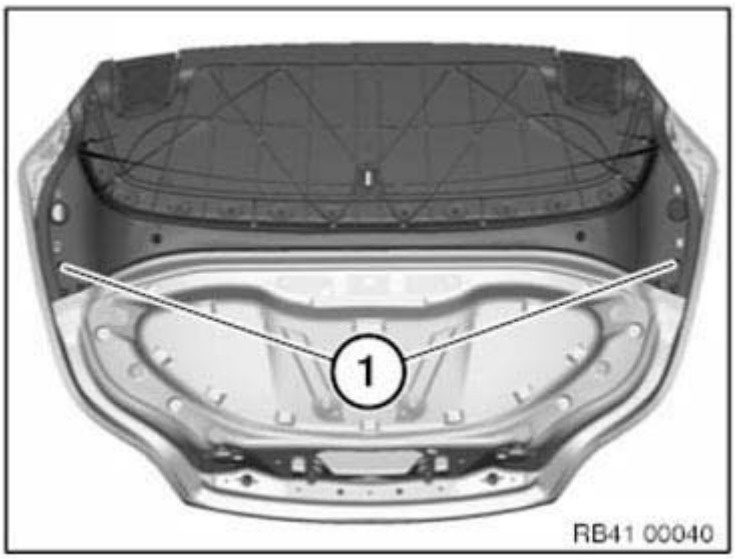


Fig. 325: Identifying Tailgate Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 360 REMOVING AND INSTALLING/REPLACING SEAL FOR REAR LID

Necessary preliminary tasks

- If necessary, open folding roof
- If necessary, open luggage compartment lid

The right side is removed in the same way as the left side.

Release screws (1).

Remove seal (2).

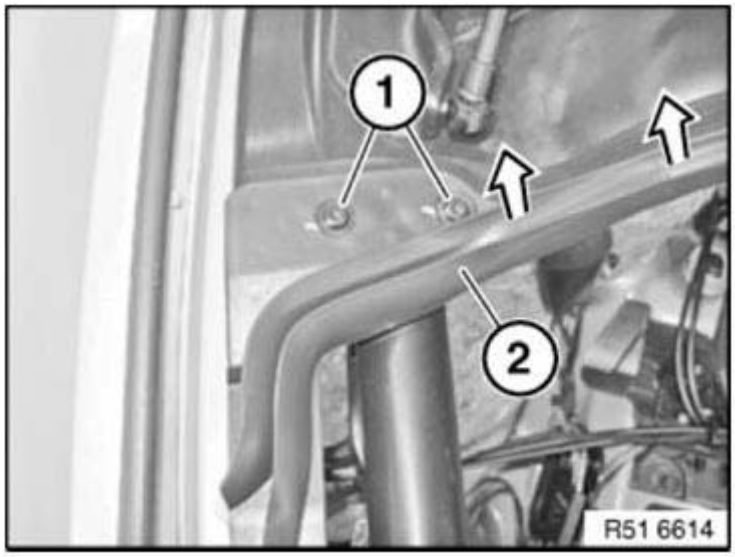


Fig. 326: Removing Screws With Seal
Courtesy of BMW OF NORTH AMERICA, INC.

The right side is removed in the same way as the left side.

Release screw (1).

Lever off seal (2).

Lever off seal (3).

Installation:

- Observe **FITTING OF SEALS**

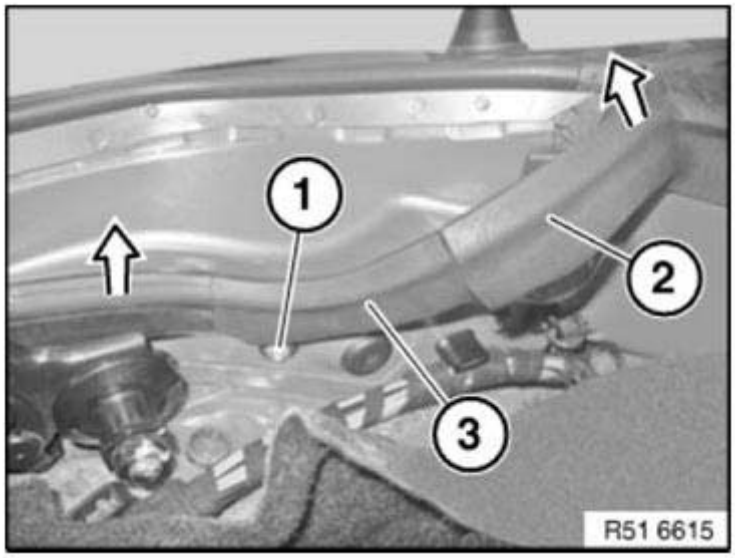


Fig. 327: Removing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

41 63 002 REPLACING COVER BOWL

Necessary preliminary tasks

Remove **FLAP FOR FUEL FILLER NECK (1)** .

Turn cover (1) through approx. 90° and lever out in direction of arrow.

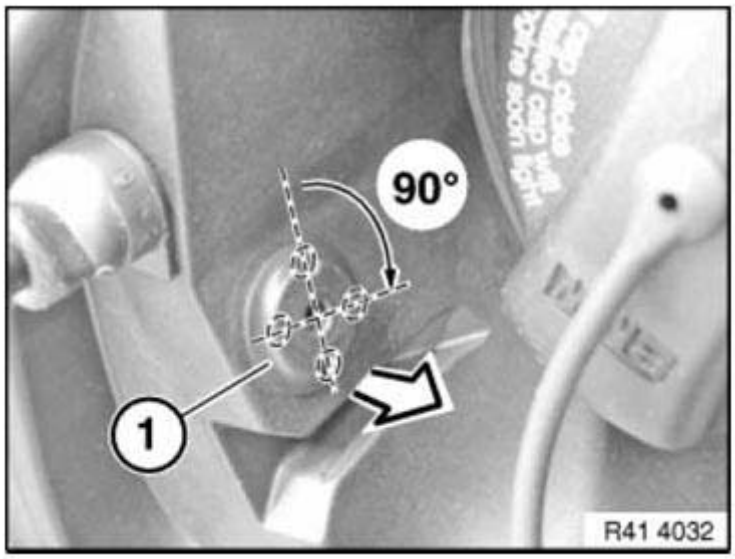


Fig. 328: Removing Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Press retaining strap (1) inwards and remove.

Remove fuel tank cap.

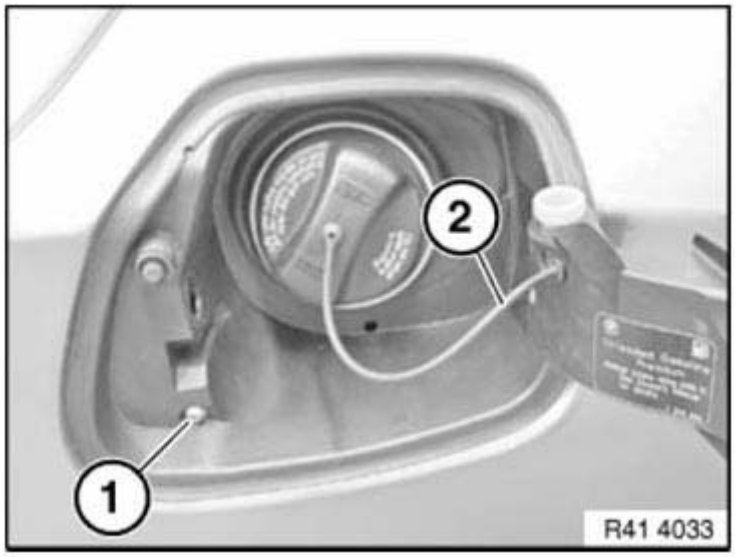


Fig. 329: Identifying Screw And Retaining Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Press rear cover housing in direction of arrow downwards a little and then pull outwards.

In so doing, lift seal (1) over fuel filler neck ().

If necessary, apply suitable antiseize agent between seal and fuel filler neck.

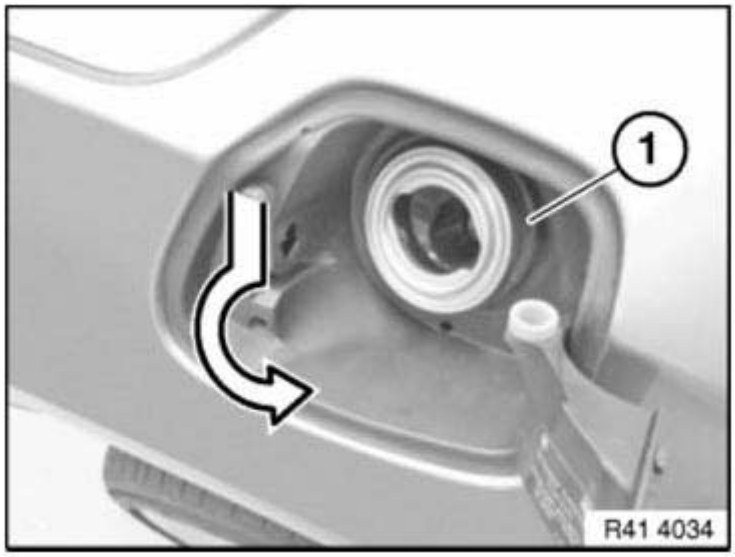


Fig. 330: Lifting Seal Over Fuel Filler Neck
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Locks (1) on left/right of cover (2) must not be damaged.

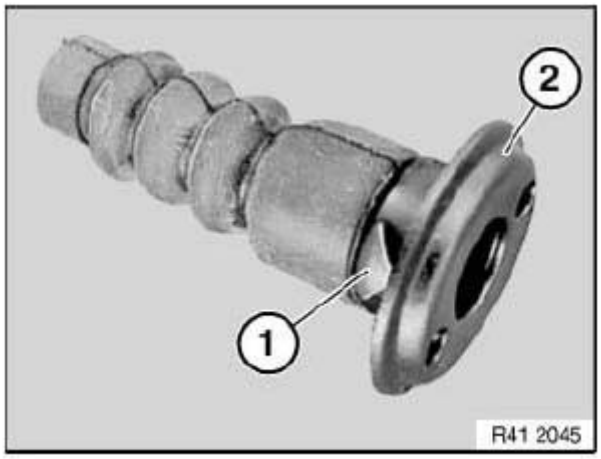


Fig. 331: Identifying Locks And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Following parts of cover housing not be damaged or missing:

1. Catches, top/bottom
2. Spring
3. Catch, fuel tank flap
4. Seal

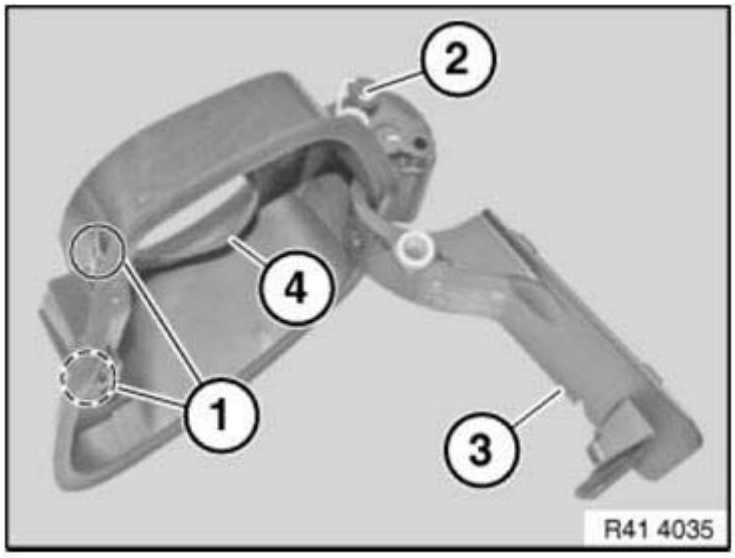


Fig. 332: Identifying Catches, Spring, Fuel Tank Cap And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, apply suitable antiseize agent to seal and fuel filler neck.

1.0 GENERAL INFORMATION ON PRESERVATION MEASURES

The classic quality of BMW automobiles is based on the long-term comprehensive research and testing, the design, the applied materials and the manufacturing procedures in modern production plants.

BMW recommends cleaning the engine, engine compartment, vehicle underside, axles and engine/transmission at least twice annually, and then waxing the car or repairing the wax coating. This should be performed before or after the period of salt usage on streets.

New cars parked outdoors should be waxed at BMW centers before delivery to customers. This is to avoid deposits damaging to the paint finish, such as air-born rust particles, chemical dust, oil saturated soot, sulfur dioxide (acid) rain, etc. settling on the horizontal surfaces. Bird and insect droppings as well as tree resin could mar the paint finish, forming spots, swelling and pitting in the paint coat.

Wax films on the engine, engine compartment and A pillars (hinge areas) are intentional and prevent corrosion. Such wax film should not be removed.

Unwaxed cars should be washed at least once each week. Parked cars must never be protected with plastic or other nonporous material covers. This will damage the paint finish due to condensed water in conjunction with plastic softener diffusion and scratching.

2.0 BODY CAVITY SEALING

It is only necessary to rewax or seal the affected area after repairing the body.

Only BMW approved products may be used to comply with the six year warranty against rust perforation. These products protect cavities effectively and permanently against corrosion. Their excellent coating and waterproofing properties let them flow into all inaccessible corners and folds for unsurpassed overall protection.

Underbody and Body Cavity Sealing Compound

For sealing of body cavities, such as doors, A-pillars, front, side and cross members, etc.

(Former BMW Part No. 81 22 9 407 479)

3M Part No. 8891

Wurth Part No. 892080

Also: Wurth "Brushable Seam Sealer", Part No. 8901021.

3.0 BODY CORROSION PROTECTION

To comply with the six year warranty against rust, specially selected waxes and additives produce an elastic, temperature-proof, corrosion inhibiting protectant. The corrosion protection thickness should measure a maximum of 30 microns, but can be varied as desired by repeating the spraying procedures accordingly.

Procedure:

Clean underside of car to remove grease, oil and dirt. Cover rotating parts and parts not undercoated, such as driveshaft, brake discs, brake hoses, springs, exhaust pipes, etc.

After completion of body repairs, the affected areas must have corrosion protection reapplied. This applies, also, if the BMW Annual Check shows that the corrosion protection has to be repaired.

UNDERBODY SEALING

Quick-drying, rubber-based, paintable. Compatible with PVC-based undercoat, front apron and door sill coatings. (Former BMW Part Nos. 81 22 9 407 001, 81 22 9 407 521/522)

3M Part No. 8883

Wurth Part No. 892072

Loctite Part No. 81833 (or PX135EA)

CRC Part No. Siloo 28A

Also: Wurth "Body Seal, beige", Part No. 0892091 U.

BODY SEALANT, LIGHT

Sealing compound for all joints and seams, can be painted over. Good adhesion, free of shrinkage, resistant to heat and cold temperatures, permanently elastic.

(Former BMW Part Nos. 81 22 9 400 013 and 81 22 9 407 313)

3M Part No. 8361

Wurth Part No. 893430

SEAM SEALER, WHITE

Elasto-plastic sealing compound based on polyacrylate.

Applications: Protection of door and hood panel seams.

(Former BMW Part No. 81 22 9 407 675)

3M Part No. 8361

Wurth Part No. 890100025

Also: Wurth "Gray Seam Sealer", Part No. 089228 U.

TRANSPARENT WAX

Prevents corrosion on painted and non-painted metal surfaces. Serves mainly for treating edges and folded-over seams. (Former BMW Part No. 81 22 9 400 711)

3M Part No. 8892

Wurth Part No. 893082

ANTI-CHIP COMPOUND

Sprayable coating compound for outside and inside. For sealing, noise-insulation and as protection against flying stones.

Quick-drying can be painted over, permanently elastic, heat and cold-resistant.

(Former BMW Part Nos. 81 22 9 407 001 and 81 22 9 407 416)

3M Part No. 8964

Wurth Part No. 893075

Loctite Part No. 81833/PX135EA

4.0 OTHER FLUIDS

ADHESIVE REMOVER

(Former BMW Part No. 81 22 9 407 388)

3M Part No. 8984

RUST REMOVER

(Former BMW Part No. 81 22 9 407 121)

Wurth Part No. 89091801

1.0 ADHESIVES/SEALANTS FOR GLASS

Sikaflex 255 Adhesive is a single component polyurethane with a minimum curing time of 4 hours at 72°F/22° C and 38% relative humidity.

The windshield or rear window must be installed within 10 minutes of applying the adhesive or a skin will form on the adhesive's surface and reduce the adhesive effectiveness.

Sikaflex 255, BMW Part No. 81 22 9 407 497 Cold Kit, or

Sika Ultrafast, BMW Part No. 83 19 9 407 714 in conjunction with Heater, BMW Part No. 83 19 9 407 820.

2.0 OTHER FLUIDS

Cleaning E53 black glossy exterior ornamental trim please use Meguiar's Mirror Glaze Number 9 Professional Swirl Remover 2.0

Glass treatment, all models: Aquapel® Glass Treatment, BMW Part No. 83 19 9 408 523.

3.0 CONTACT CEMENT

A powerful adhesive for leather and leatherette, rubber moldings, felt linings, insulating materials, convertible top adhesive, etc.

(former BMW Part No. 81 22 9 407 524)

3M 1357High Performance Contact Adhesive

4.0 INSTANT ADHESIVE FOR RUBBER, METAL AND PLASTIC SURFACES.

Applications: Rubber profiles on windows, doors, bumpers (soft and hard rubber), seals, inner covers, buttons and controls (plastic/plastic, plastic/steel), circuit elements (electronics), rear lights, turn indicators, ornamental strips and moldings.

(former BMW Part No. 81 22 9 407 143)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8155
Loctite	Part No. 49450

5.0 LOCTITE 380

Black cyanacrylate adhesive for joining metals, but also rubber, PVC etc.

Particularly recommended for attaching rubber door seals on the BMW 5 Series (E34). (former BMW Part No. 81 22 9 407 394)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8155
Wurth	Part No. 893 4103
Loctite	Part No. 38050

6.0 GLASS ADHESIVE

BMW Part No. 81 22 9 407 497.

7.0 PREMIUM LEATHER CARE KIT

BMW Part No. 81 11 024 455.

5100 GENERAL

51 00 ... NOTES ON COMPONENT BONDING ADHESIVE TAPE

1. General notes

- Bonding at room and object temperature of >+18 °C.
- Newly painted parts may only be bonded after a drying time of at least 24 hours.
- Optimal bonding/attachment to the background surface is achieved after approx. 48 hours. Components must not be exposed to mechanical strain beforehand (car wash, strength test, etc.).
- Do not touch bonding surface.
- It is not the length of time that pressure is applied but rather the force of pressure applied that is crucial.
- Detaching the adhesive tape after pressing destroys the adhesive layer.
- After being pressed on gently, adhesive tape can be pulled off again up to 3 times.

2. Auxiliary materials and tools

- **CLEANING AGENT R1 OR CLEANING AGENT R2** (sourcing reference: BMW Parts Department)
- Fluff-free cleaning cloths
- Pressure roller

3. Preparations

- Remove all adhesive residue or clean new part thoroughly
- Clean the areas to be bonded immediately before bonding to remove silicone and grease residues.

NOTE: Observe air drying time > or =1 minute.

4. Bonding

4.1 Components without pre-fitted adhesive tape

- Pull off liner* from adhesive tape
- Position adhesive tape on component and stick on
- Press down adhesive tape over entire adhesive area
- Continue with Point 4.2

* Liner is the protective film on the adhesive tape

4.2 Components with pre-fitted adhesive tape

- Pull off liner* from adhesive side (if adhesive area is large, do not pull off liner completely)
- Align component in correct position on vehicle
- Press down component over entire adhesive area

* Liner is the protective film on the adhesive tape

51 00 ... NOTES ON FITTING WINDOW GUIDE SEALS

1. Work safety when handling anti-friction agent G13*

- Wear protective goggles, protective gloves and if necessary an apron.
- Do not eat, drink or smoke in the area of processing/application
- Ensure rooms are well ventilated.
- Keep heat and ignition sources well away
- In event of skin contact: Wash areas of skin affected with soap and water immediately, change work clothing which has been fouled with anti-friction agent immediately (keep spare work clothing in reserve)
- In event of eye contact: Rinse eyes immediately with plenty of water and seek medical advice
- Observe safety data sheet (see Aftersales Assistance Portal (ASAP) Service/Technology Safety Data Sheet 7 digit part number)

2. General notes

- Use only the BMW-approved anti-friction agent for fitting
- Application only at room and object temperatures between 18 and 25 °C
- Anti-friction agent dries at different rates depending on the quantity, temperature and ventilation and becomes sticky
- Anti-friction agent can only be used for fitting and not for fault elimination (e.g. grating)
- Newly painted parts may only be brought into contact with the anti-friction agent after cooling
- Optimal bonding/attachment to the background surface is achieved after approx. 48 hours. The window guide seal must not be exposed to mechanical strain beforehand (car wash, strength test, etc.).

IMPORTANT: To avoid grating noises, do not use soapy water (low-surface-tension water with washing-up liquid) or anti-friction agent containing silicone

3. Auxiliary materials and tools

- Spirit, cleaning cloth, plastic squeegee, needle
- Anti-friction agent G13* (manufactured by Zestron) part no. 83 23 0441 032

(*sourcing reference: BMW Parts Service)

4. Preparations

- Heat and remove anti-friction agent residues with a hot air blower or clean new part thoroughly

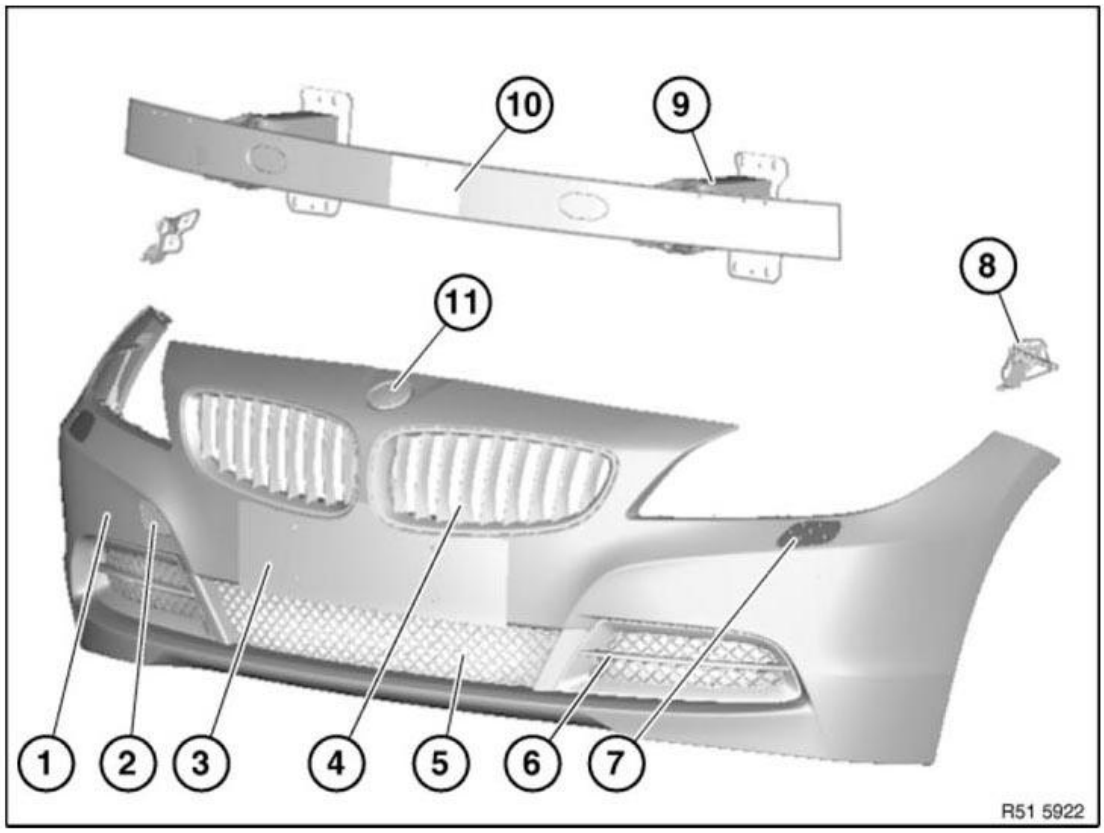
- Immediately prior to fitting, clean the work area with spirit in order to remove silicone and grease residues

NOTE: Air drying time approx. 1 minute

5. Assembly

- Apply a thin coating of anti-friction agent to the reverse side of the window guide seal only
- Perform fitting within 30 minutes of applying anti-friction agent
- Anti-friction agent dries after fitting and becomes sticky

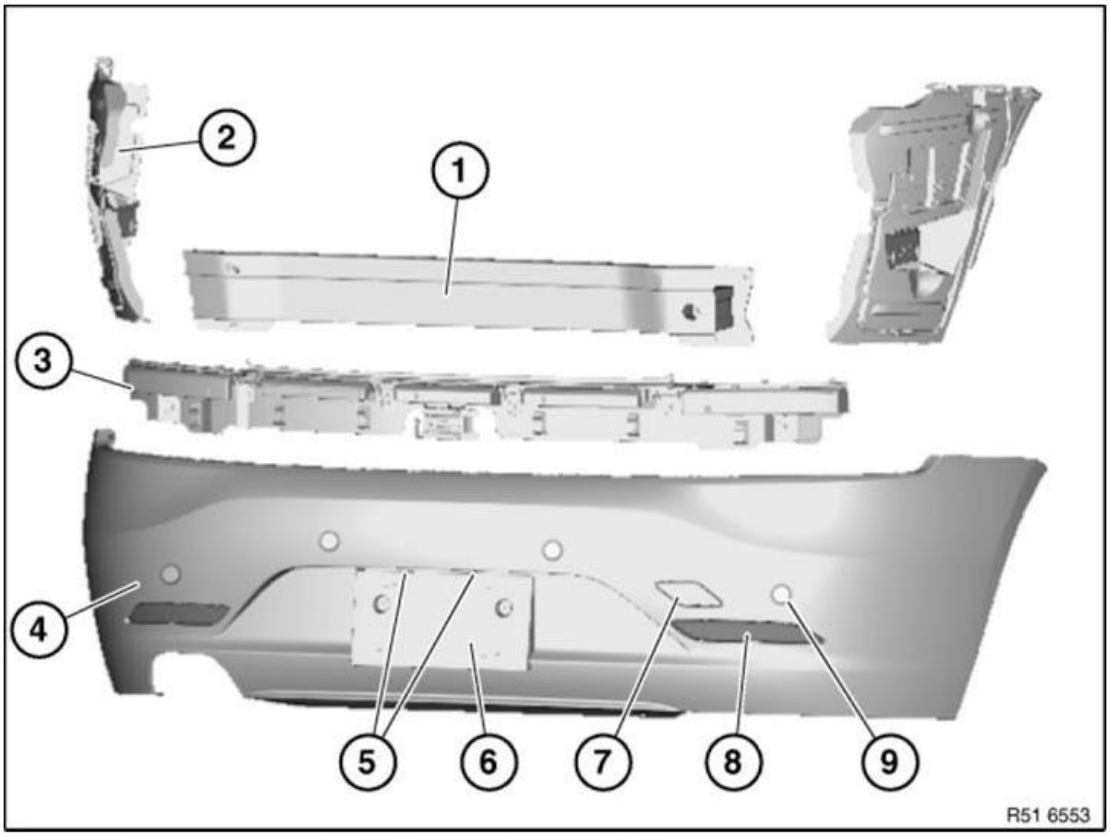
51 11 ... OVERVIEW OF FRONT BUMPER



1 Bumper trim
2 Cover on towing eye
3 License plate baseplate
4 Trim grille
5 Trim grille, bottom
6 If necessary: fog lamp
7 Cover for headlight washer system
8 Holder for bumper
9 Deformation element
10 Carrier/absorber
11 Badge

Fig. 1: Overview Of Front Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

51 12 ... OVERVIEW OF REAR BUMPER



1 Carrier
2 Guide, side
3 Guide, middle
4 Bumper trim
5 License plate lights
6 Baseplate for license plate (US/Japan only)
7 Cover on towing eye
8 Reflector
9 Ultrasonic transducer

Fig. 2: Overview Of Rear Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 ... REMOVING AND INSTALLING/REPLACING STORAGE COMPARTMENT IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **FRONT DOOR TRIM PANEL**

Release screws (1) on door trim panel (2).

Open storage compartment and remove.

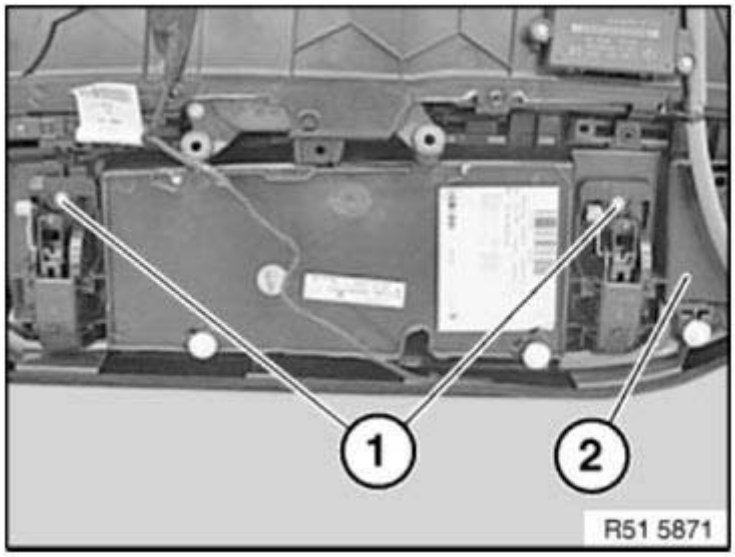


Fig. 3: Identifying Screws On Door Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

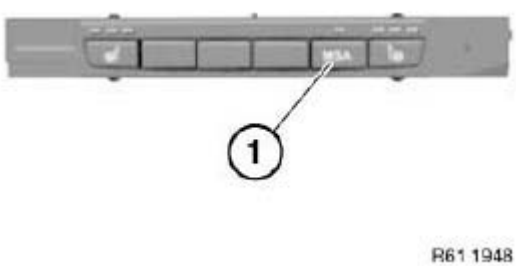


Fig. 4: Identifying MSA Button

Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

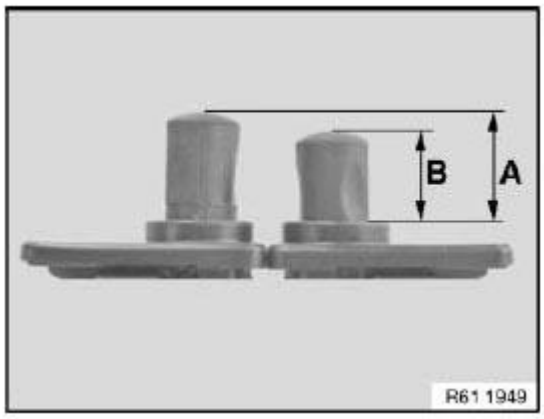


Fig. 5: Identifying Basic Setting For Engine Hood/Bonnet Open
Courtesy of BMW OF NORTH AMERICA, INC.

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

When working with diagnosis tools

- Observe instructions in diagnosis tool

NOTE: For further information on automatic engine start stop function (MSA):

51 00 ... SAFETY INSTRUCTIONS FOR WORKING ON CARS WITH AIRBAG SYSTEMS

WARNING: If work is carried out in area of airbag systems, e.g. on:

- **Door trim panels**
- **Interior trims**
- **Instrument panel etc.**

the ignition must be turned off in each case.

- **The ignition must always be off.**
- **The ignition key must be removed from the ignition lock.**

This eliminates the risk of injury.

51 00 ... SERVICE POSITION OF ENGINE HOOD/BONNET

NOTE: Only the special tool pertaining to the model series can be selected.

SPECIAL TOOL REFERENCE CHART

Model series	Special tool
E89	**51 2 170 SUPPORT**

WARNING: Risk of injury and damage!

Engine hood/bonnet must be held by a second person helping.

NOTE: The right side is removed in the same way as the left side.

Special tool can only be used on housing (1) of gas spring strut.

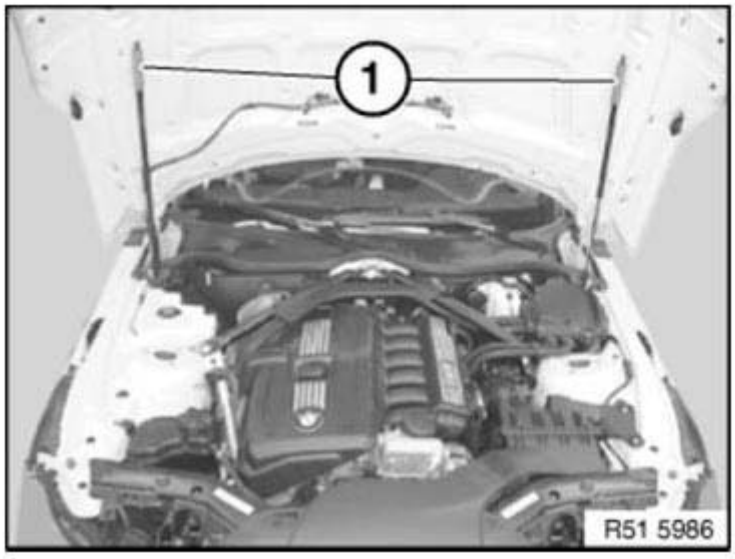


Fig. 6: Identifying Housing Of Gas Spring Strut
Courtesy of BMW OF NORTH AMERICA, INC.

Release **GAS SPRING STRUT** on left/right housing side.

Slide special tool (1) over housing (2) of gas spring strut.

Clip ball socket of special tool on ball stud.

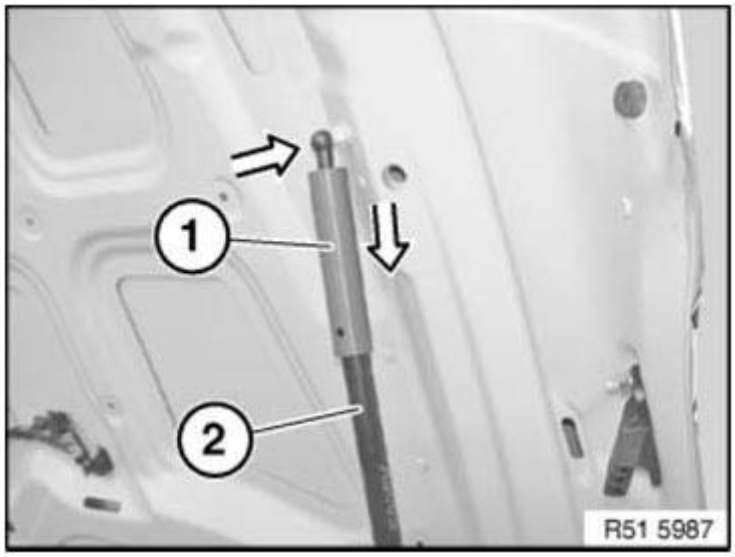


Fig. 7: Sliding Special Tool Over Housing Of Gas Spring Strut
Courtesy of BMW OF NORTH AMERICA, INC.

5111 FRONT BUMPER

51 11 158 FITTING NUMBER/LICENSE PLATE

Align drilling hole template blank (1) to front radiator grille middle (2) and stick on.

NOTE: Make the marking on adhesive tape so as to avoid damaging the vehicle.

Mark holes in accordance with number/license plate baseplate.

Secure number/license plate baseplate with corresponding screws.

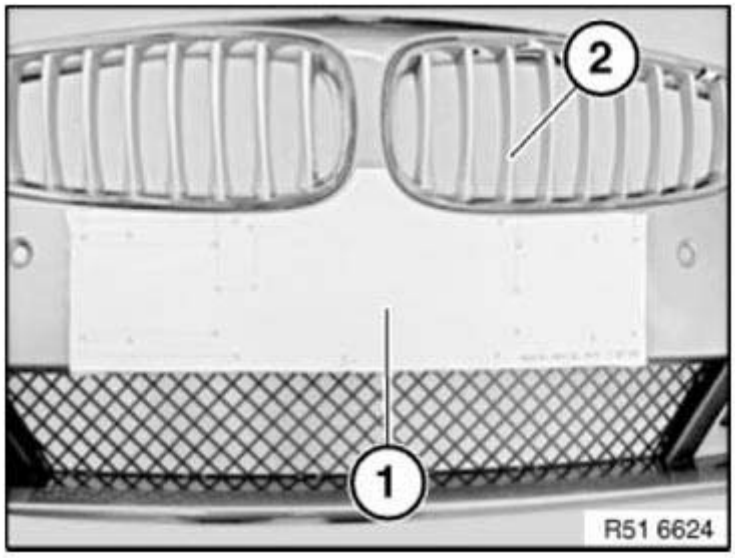
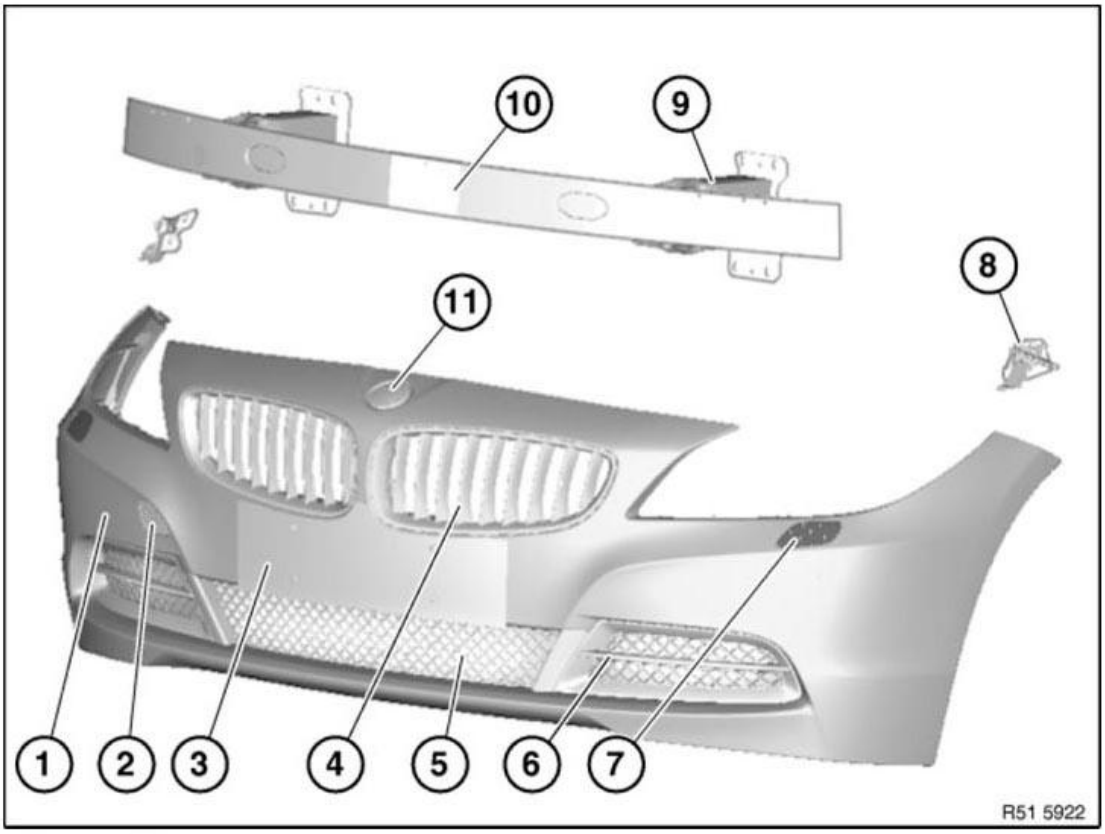


Fig. 8: Identifying Drilling Hole Template Blank And Front Radiator Grille Middle
Courtesy of BMW OF NORTH AMERICA, INC.

51 11 ... OVERVIEW OF FRONT BUMPER



1 Bumper trim
2 Cover on towing eye
3 License plate baseplate
4 Trim grille
5 Trim grille, bottom
6 If necessary: fog lamp
7 Cover for headlight washer system
8 Holder for bumper
9 Deformation element
10 Carrier/absorber
11 Badge

Fig. 9: Overview Of Front Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

51 11 156 REMOVING AND INSTALLING FRONT BUMPER TRIM

Necessary preliminary tasks

- Remove **COVER FOR HEADLIGHT WASHER SYSTEM** on left and right

Remove seal in area (1).

Release screws in area (1).

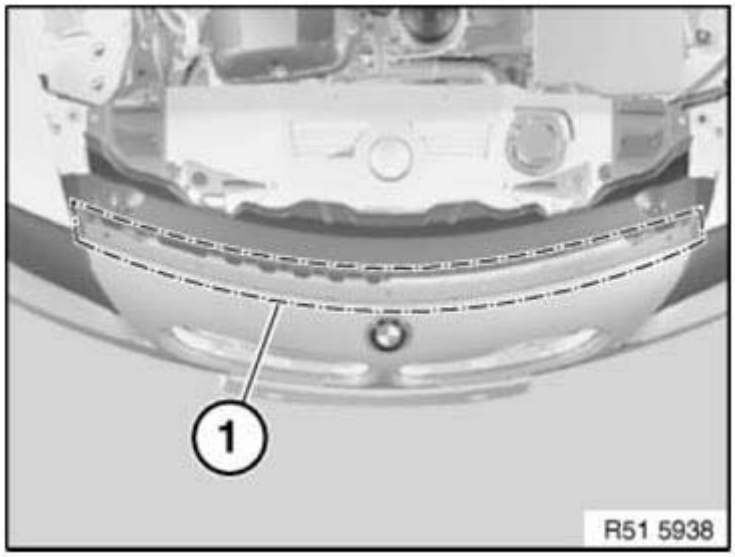


Fig. 10: Identifying Seal And Screws Areas
Courtesy of BMW OF NORTH AMERICA, INC.

The right side is removed in the same way as the left side.

Release screws (1).

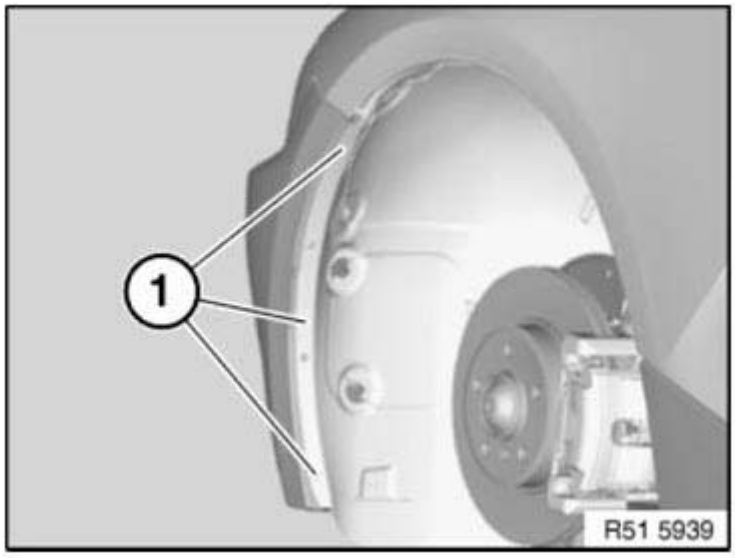


Fig. 11: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

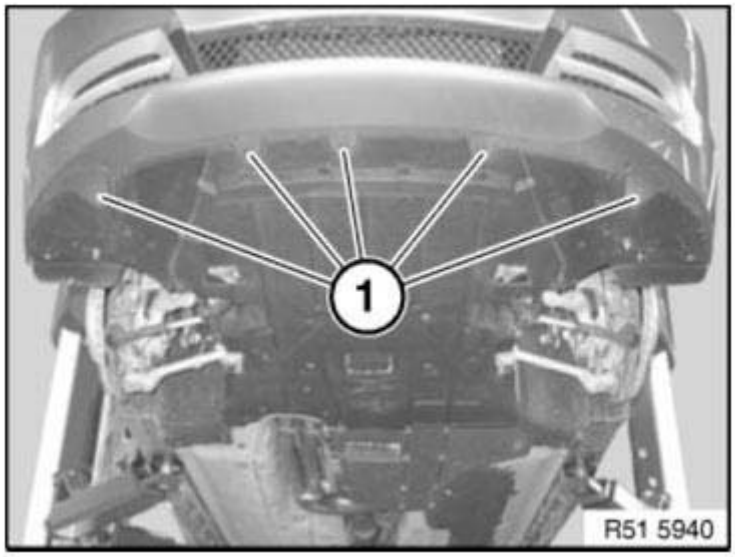


Fig. 12: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

The right side is removed in the same way as the left side.

Lift off wheel arch cover (1) in upper area.

Unfasten screws (2).

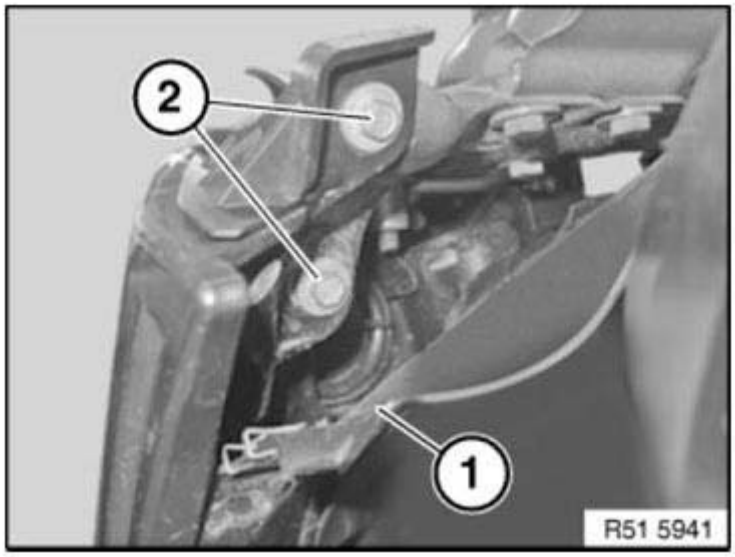


Fig. 13: Identifying Wheel Arch Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

The right side is removed in the same way as the left side.

Unclip bumper trim (1) in area (2) in direction of arrow.

Pull bumper trim (1) forwards slightly and disconnect plug connections.

Remove bumper trim (1) straight forwards with a 2nd person helping.

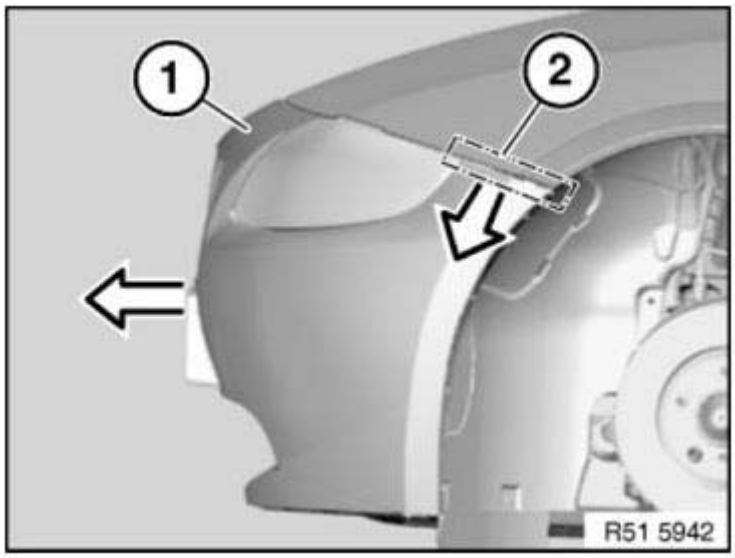


Fig. 14: Removing Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 11 050 REMOVING AND INSTALLING/REPLACING CARRIER FOR FRONT BUMPER TRIM

Necessary preliminary tasks

- Remove front **BUMPER TRIM**

Remove shock absorber (1).

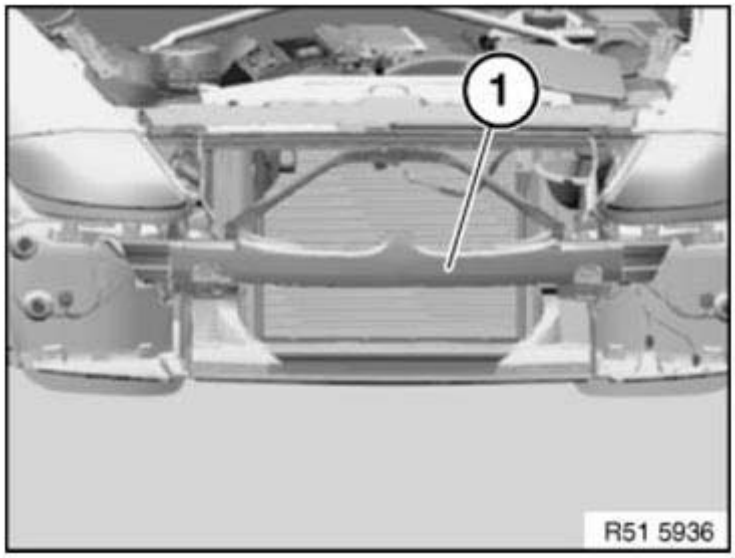


Fig. 15: Identifying Shock Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) on left/right.

Tightening torque **51 11 5AZ** .

Remove carrier (3).

Installation:

Insert spacer element (2) in bumper carrier on left side of vehicle.

Guide screws through spacer element (2).

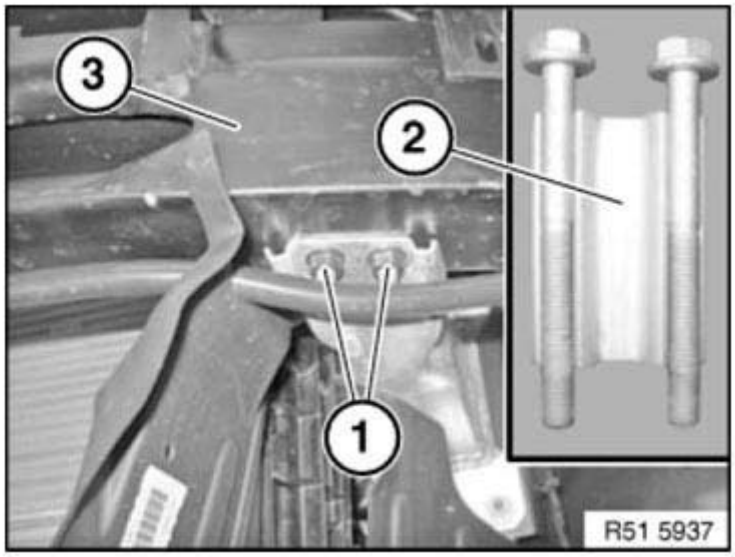


Fig. 16: Identifying Spacer Elements With Nuts And Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

51 11 ... REMOVING AND INSTALLING/REPLACING COVER FOR HEADLIGHT WASHER UNIT ON LEFT

Pull out spray nozzle (1) by cover (2) slightly.

IMPORTANT: When releasing cover (2), grip spray nozzle (1) firmly and then allow to slide back slowly (risk of damage).

Release cover (2) from spray nozzle (1).

Installation:

Retaining lugs (3) must not be damaged.

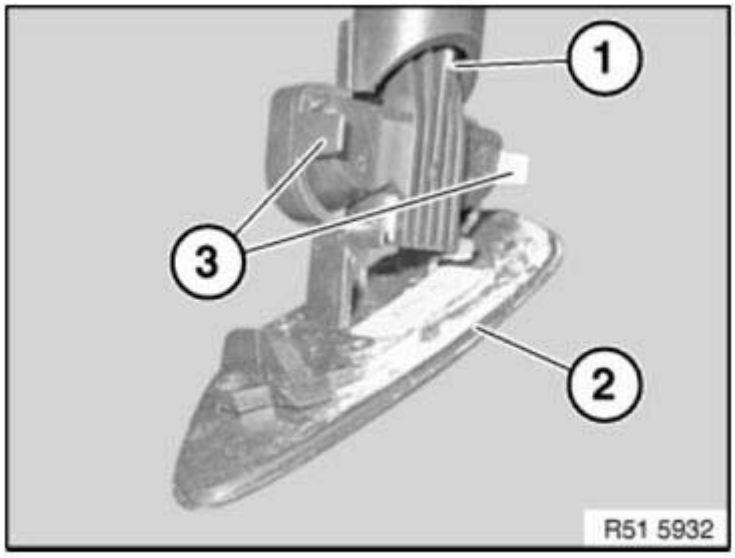


Fig. 17: Identifying Spray Nozzle With Cover And Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

51 64 035 REMOVING AND INSTALLING/REPLACING CROSS-MEMBER UPPER SECTION (CONNECTION OF BOTH FRONT WHEEL ARCHES)

Necessary preliminary tasks

- Remove intake duct on intake silencer housing. See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N52K)** or **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)**

Release screws (1).

Tightening torque **51 71 23AZ** .

Remove cross-member (2).

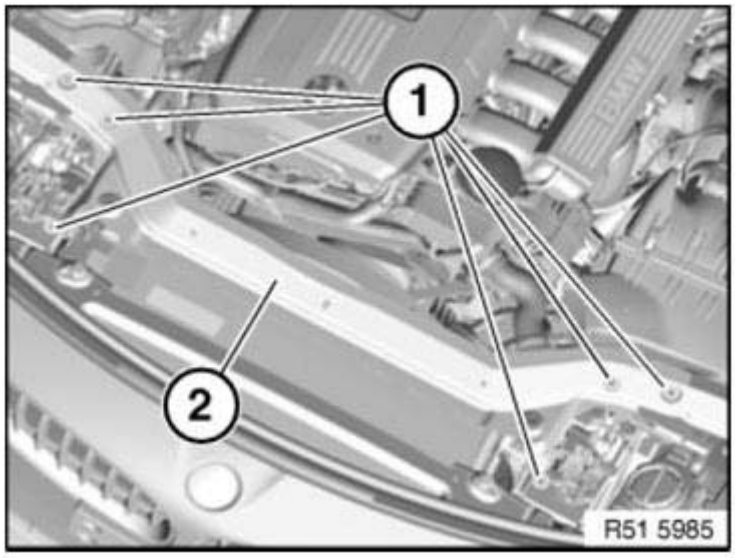


Fig. 18: Identifying Cross-Member With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 64 040 REMOVING AND INSTALLING/REPLACING FRONT BUMPER MOUNTING

Necessary preliminary tasks

- Remove **BUMPER TRIM**
- Remove intake duct on intake silencer housing. See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N52K)** or **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)**

Release screws (1).

Tightening torque **51 11 2AZ** .

V-support (2) remains on vehicle.

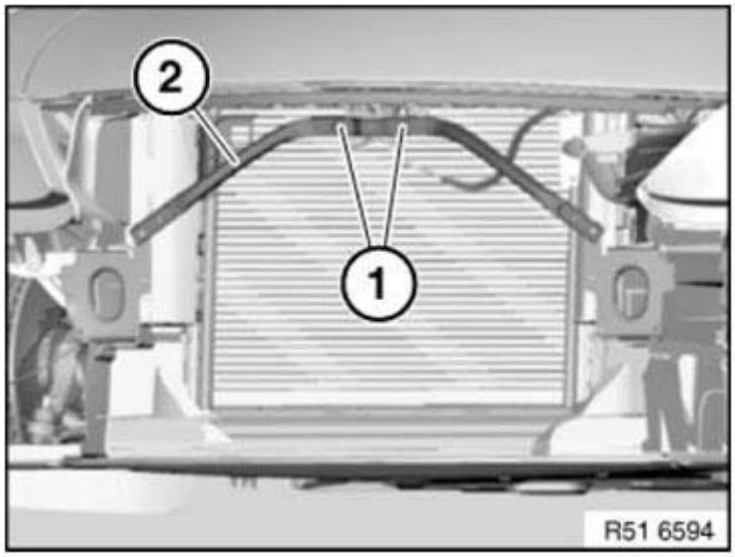


Fig. 19: Identifying V-Support With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 11 1AZ** .

Remove bumper mounting (2).

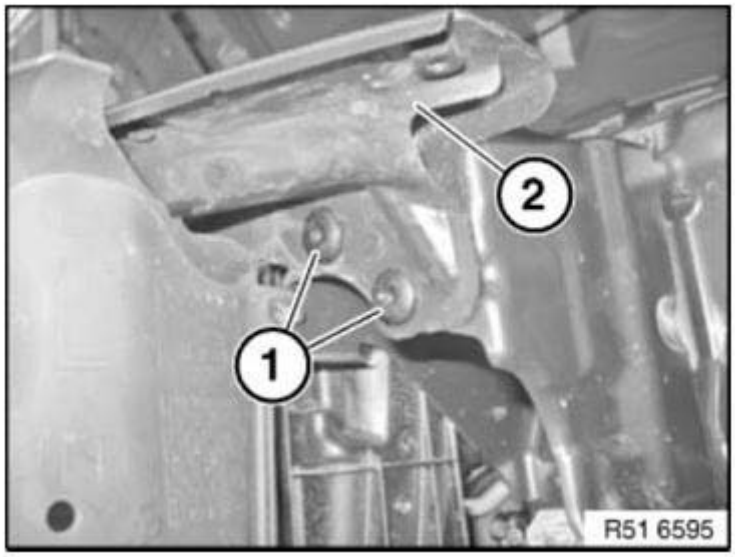


Fig. 20: Identifying Bumper Mounting And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 038 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)

NOTE: **Prior to removing, pay attention to the exact installation position with respect to the adjoining components.**

Necessary preliminary tasks:

- Remove **FRONT WHEEL**

Unscrew all bolts.

Unscrew nuts (1).

Remove cover (2).

Installation:

Make sure cover (2) is correctly seated.

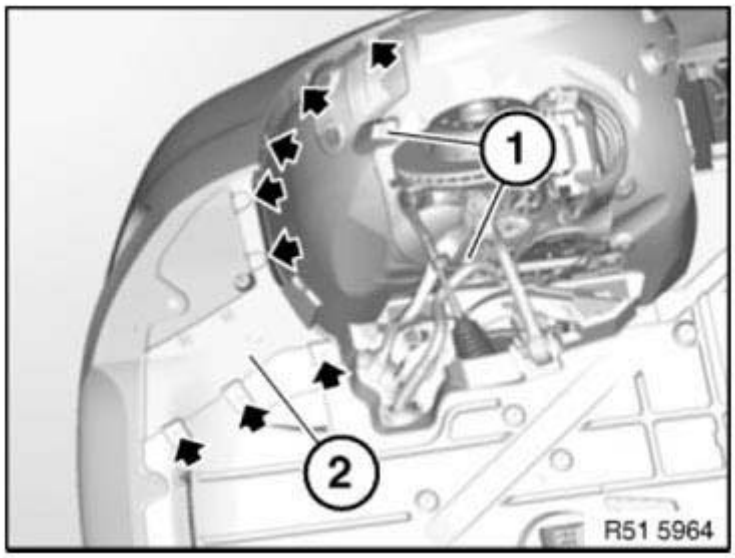


Fig. 21: Identifying Wheel Arch Cover With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed out wheel arch cover (2) towards bottom.

Installation:

Make sure wheel arch cover (2) is exactly seated.

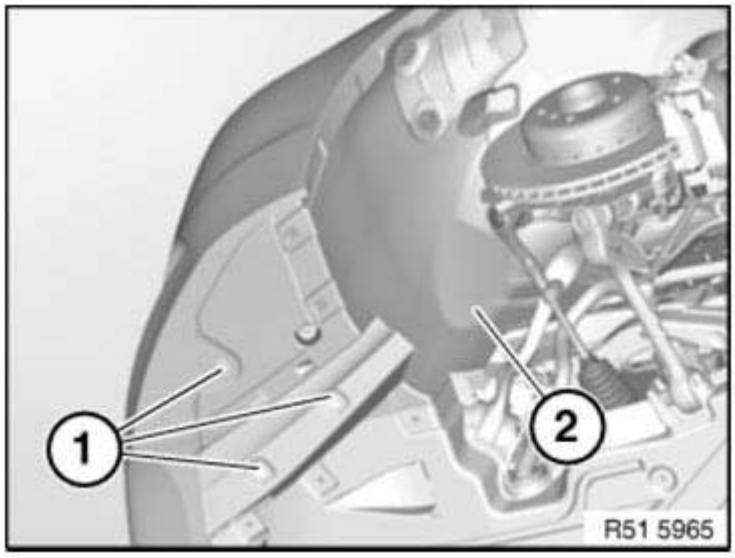


Fig. 22: Identifying Wheel Arch Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 039 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (REAR SECTION)

NOTE: Prior to removing, pay attention to the exact installation position with respect to the adjoining components.

Necessary preliminary tasks:

- Remove **FRONT WHEEL**

Release all nuts.

Release screw (1).

Lever out clips (2).

Remove cover (3).

Installation:

Make sure cover (3) is correctly seated.

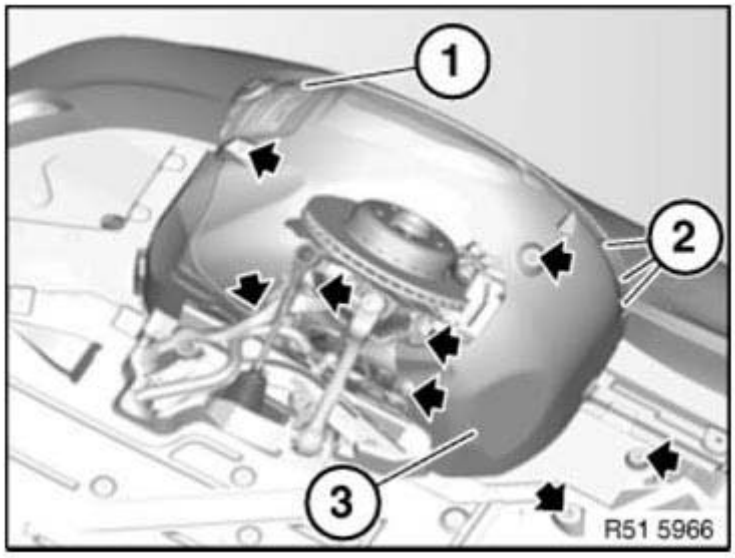


Fig. 23: Identifying Wheel Arch Cover With Screw And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 64 010 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT V-SUPPORT

Necessary preliminary tasks

- Remove **BUMPER TRIM**

NOTE: Pictured without bumper trim carrier.

Release screws (1).

Remove V-support (2).

Tightening torque **51 11 2AZ** .

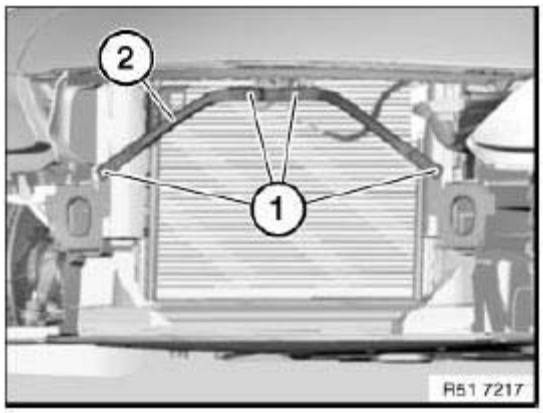


Fig. 24: Identifying V-Support And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

51 11 770 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT DEFORMATION ELEMENT FOR FRONT BUMPER

Necessary preliminary tasks

- Disconnect **BATTERY NEGATIVE TERMINAL**
- Remove **CARRIER** for bumper trim at front
- Remove **HEADLIGHT**

Release screws (1).

Tightening torque **51 11 2AZ** .

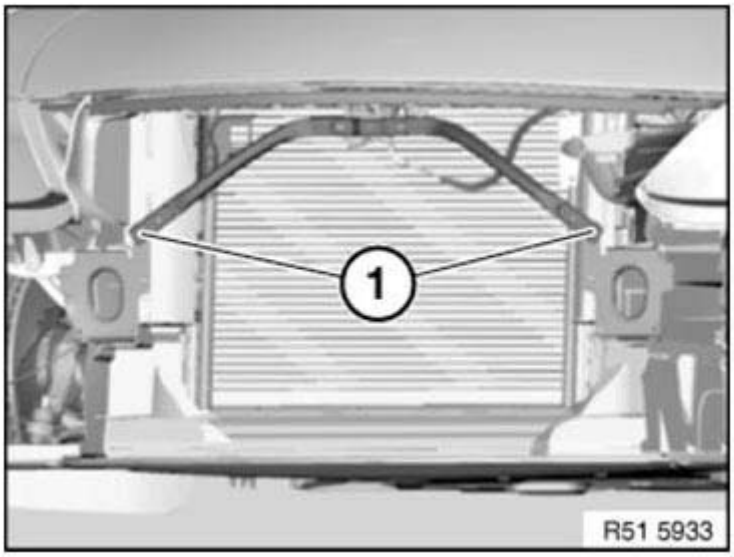


Fig. 25: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove expander rivets (1).

Remove and replace expander rivets (2).

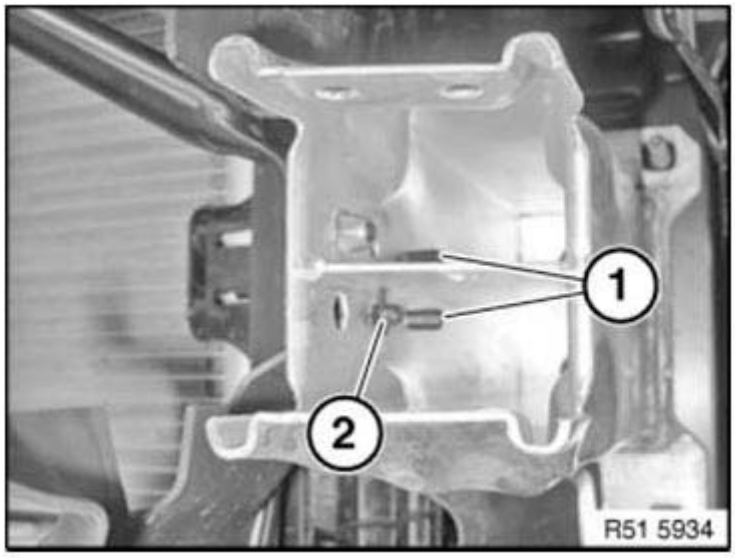


Fig. 26: Identifying Expander Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **51 11 3AZ** .

Drill out rivets (2) and do not replace any more.

Remove deformation element (3) towards front.

IMPORTANT: After assembly: Adjust headlight.

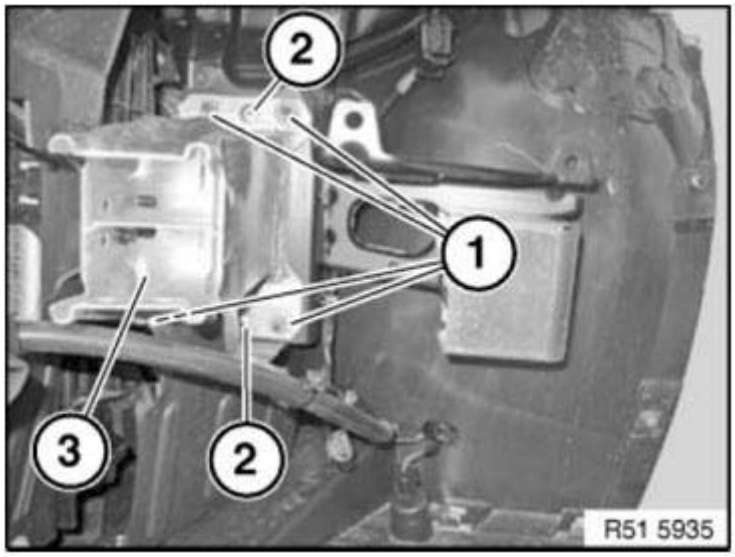


Fig. 27: Identifying Deformation Element With Nut And Rivets

Courtesy of BMW OF NORTH AMERICA, INC.

51 71 ... REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT DIAGONAL STRUT

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**
- Remove **COOLANT EXPANSION TANK**
- Remove **INTAKE FILTER HOUSING**

Release screws and nuts (1).

Tightening torque **51 71 27AZ** .

Remove diagonal struts (2).

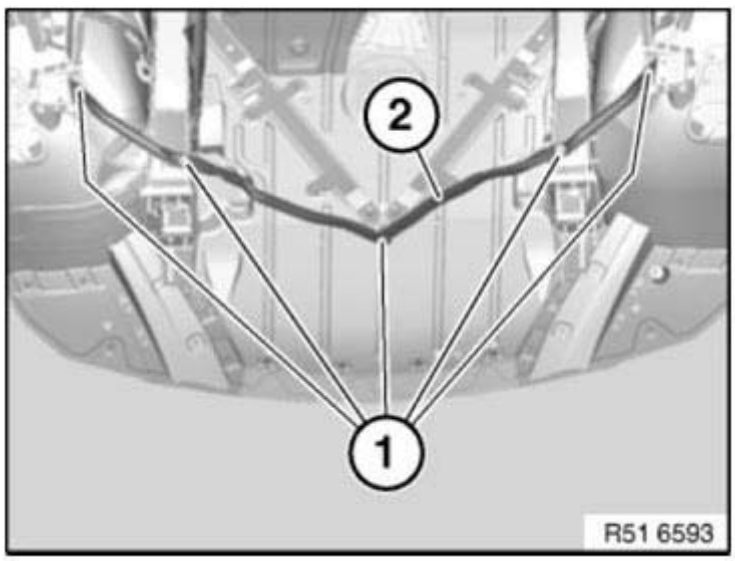


Fig. 28: Identifying Diagonal Struts With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

51 11 180 REMOVING AND INSTALLING/REPLACING TRIM GRILLE IN BUMPER TRIM

Necessary preliminary tasks

- Remove front **BUMPER TRIM**

Release fastening elements in area (1).

Separate cable holder (2) from trim grille (3).

Remove trim grille (3).

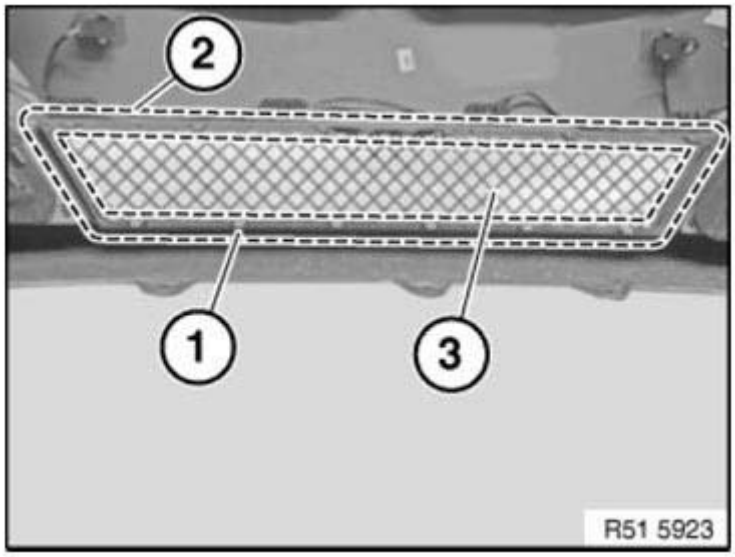


Fig. 29: Identifying Fastening Elements Area With Cable Holder And Trim Grille
Courtesy of BMW OF NORTH AMERICA, INC.

51 11 183 REMOVING AND INSTALLING/REPLACING ORNAMENTAL GRILLE IN BUMPER TRIM (SIDE LEFT OR RIGHT)

Necessary preliminary tasks

- Remove front **BUMPER TRIM**

Unclip trim rod (1) and trim frame (2) in area (3) and remove towards front.

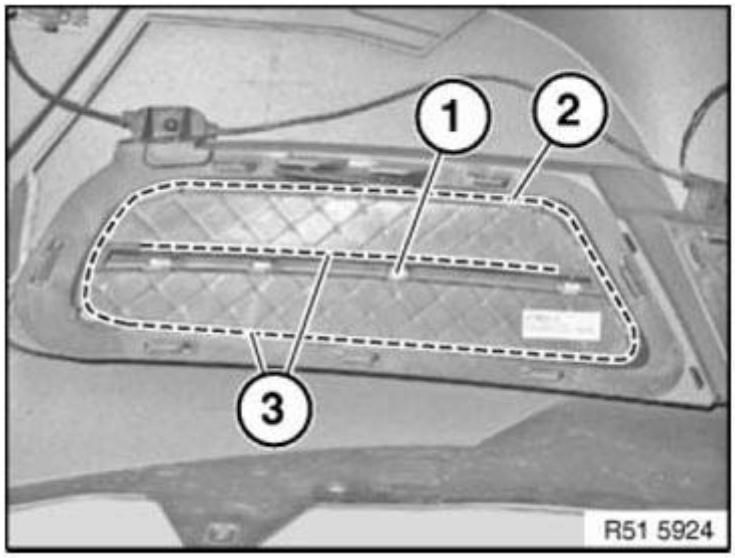


Fig. 30: Identifying Trim Rod And Trim Frame Area
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable connection (1).

Unclip ornamental grille (2) in area (3) and remove.

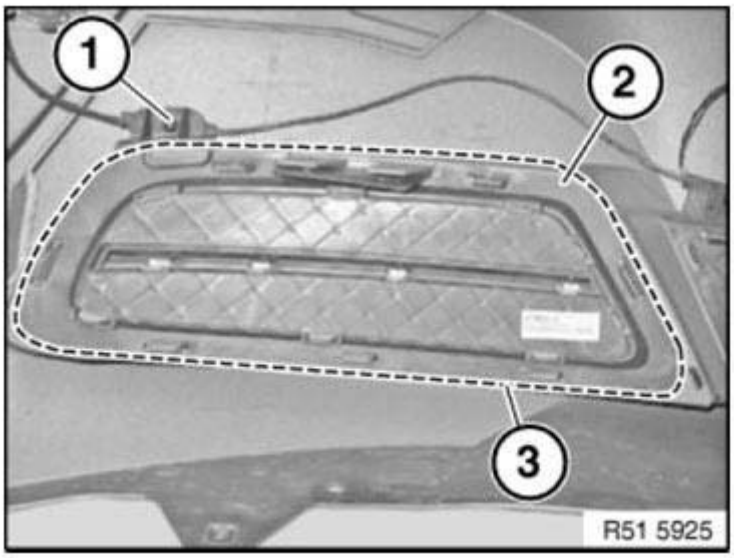


Fig. 31: Identifying Cable Connection With Ornamental Grille Area
Courtesy of BMW OF NORTH AMERICA, INC.

51 11 157 REPLACING FRONT BUMPER TRIM

Necessary preliminary tasks

- Remove front **BUMPER TRIM**

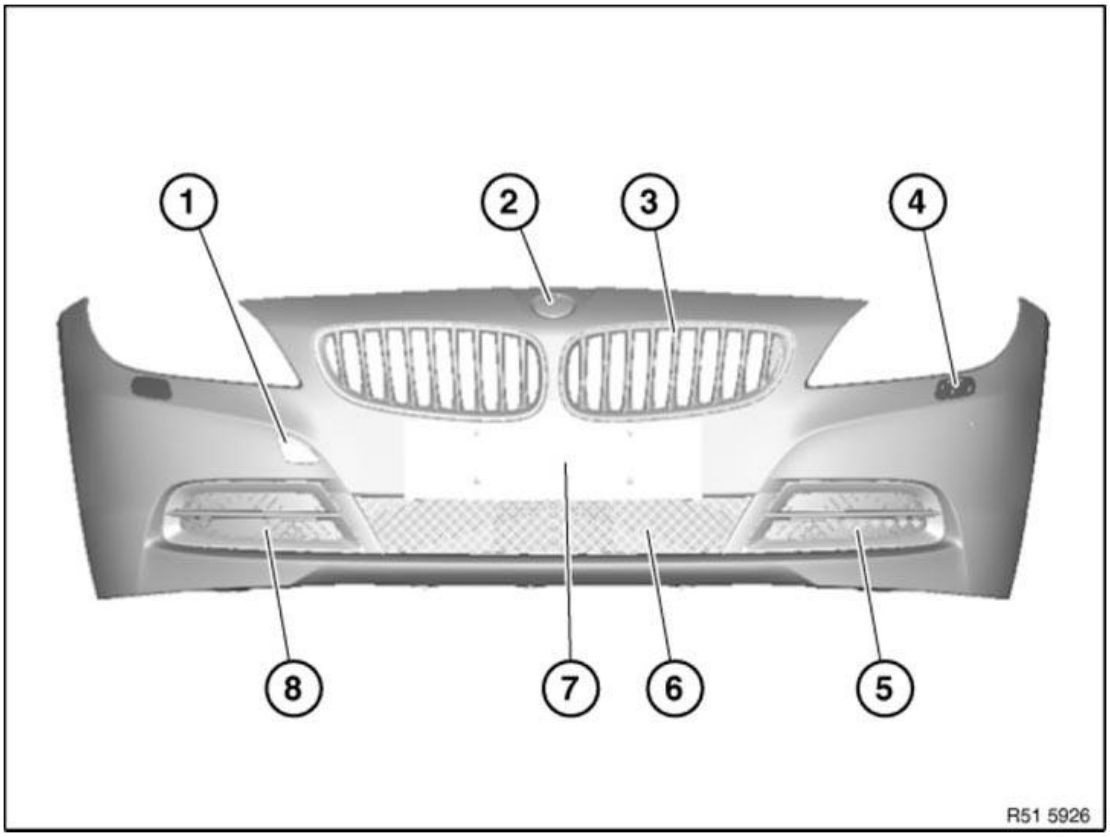


Fig. 32: Identifying Front Bumper Trim Components
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover cap (1) for tow lug.

Remove **BMW BADGE (2)** .

Remove **FRONT RADIATOR GRILLE (3)** on left/right.

If necessary, remove **HIGH-PRESSURE NOZZLE (4)** of left/right headlight cleaning system.

Remove **ornamental grille in bumper trim (side left or right)** on left/right.

Remove **MIDDLE TRIM GRILLE (6)** .

Remove **LICENSE PLATE HOLDER (7)** .

If necessary, remove fog lamp (8) on left/right.

If necessary, remove side reflector or dummy part on left/right.

51 11 701 REPLACING HOLDER FOR FRONT BUMPER AT FRONT LEFT OR RIGHT

Necessary preliminary tasks

- Remove front **BUMPER TRIM**

Release screws (1).

Tightening torque **51 11 4AZ** .

Remove holder (2).

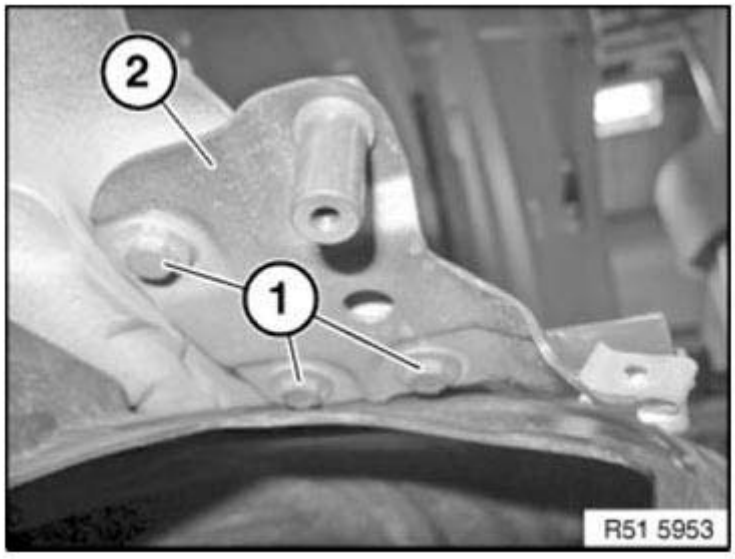
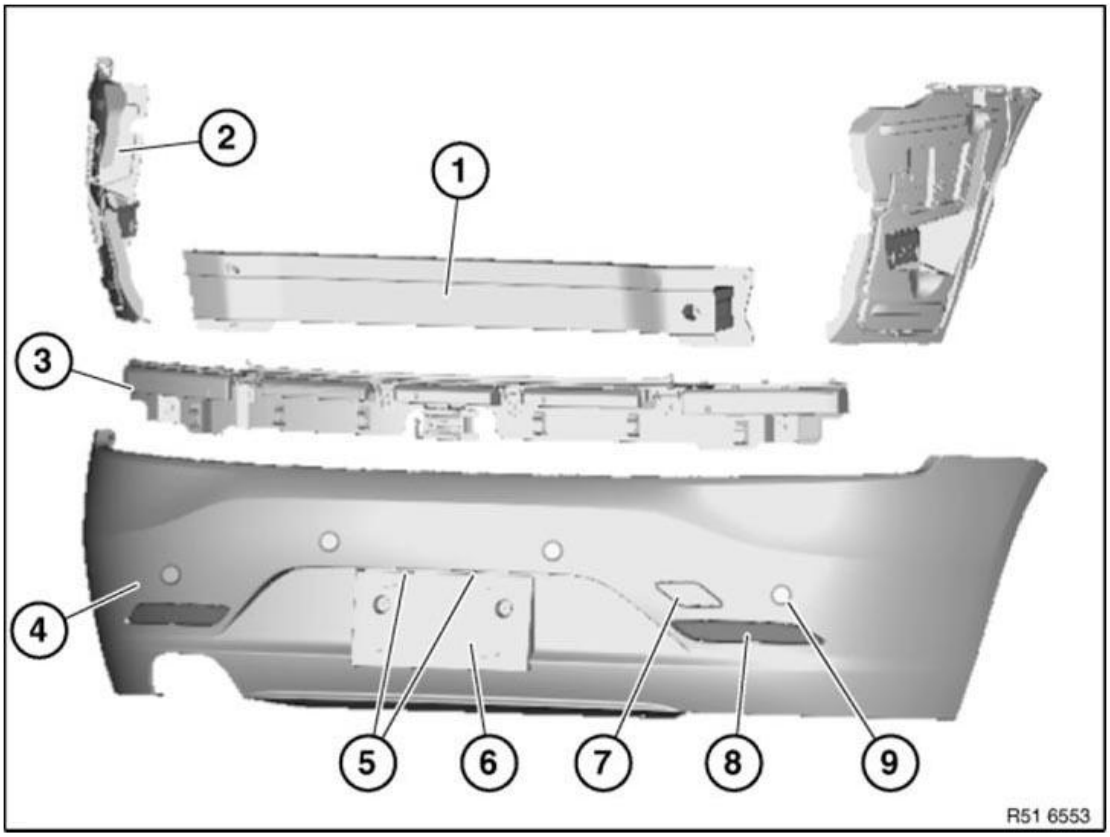


Fig. 33: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

5112 REAR BUMPER

51 12 ... OVERVIEW OF REAR BUMPER



1 Carrier
2 Guide, side
3 Guide, middle
4 Bumper trim
5 License plate lights
6 Baseplate for license plate (US/Japan only)
7 Cover on towing eye
8 Reflector
9 Ultrasonic transducer

Fig. 34: Overview Of Rear Bumper
Courtesy of BMW OF NORTH AMERICA, INC.

51 12 156 REMOVING AND INSTALLING REAR BUMPER TRIM PANEL

NOTE: The right side is removed in the same way as the left side. Shown here with removed wheel for a better overview.

Release screws (1) on bumper trim (2) (number of screws varies, depending on engine version).

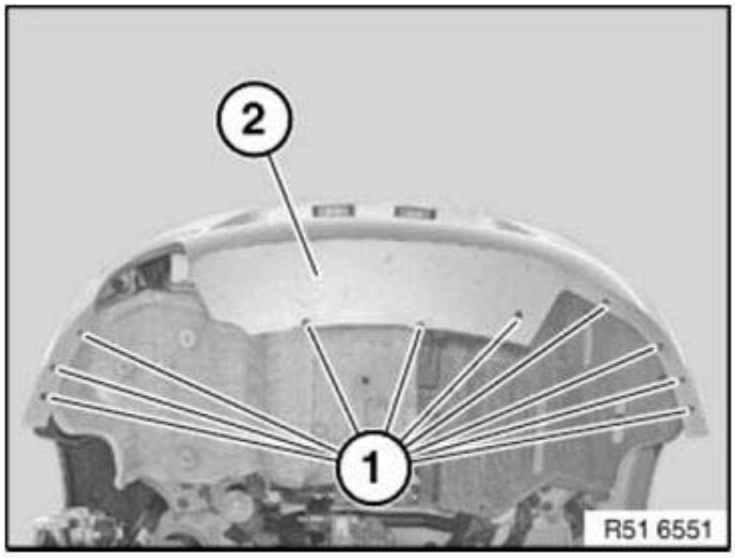


Fig. 35: Identifying Screws On Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Loosen screws (1) on wheel arch panel (3).

Fold wheel arch panel (3) slightly to the side.

Loosen vertically mounted bolts (2) located inside behind it from the bumper trim.

Repeat the work step on the right.

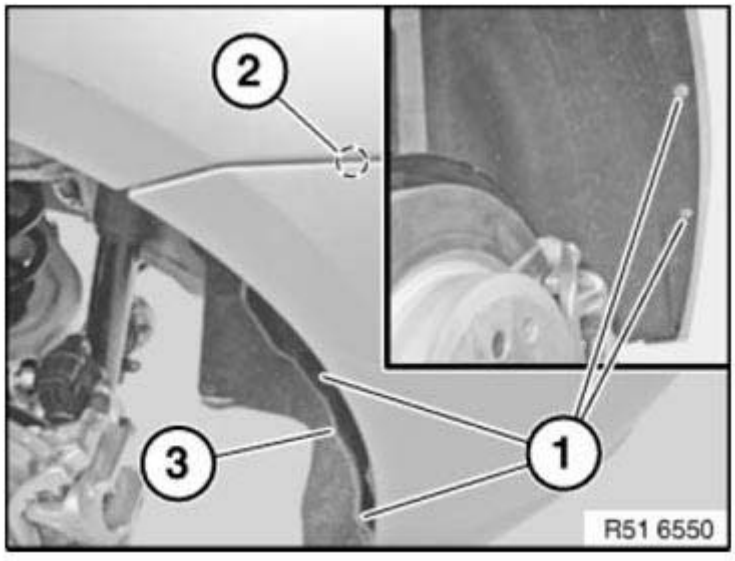


Fig. 36: Identifying Wheel Arch Panel With Mounting Bolts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Proceed with special caution due to a risk of damage to the retaining tabs (3).

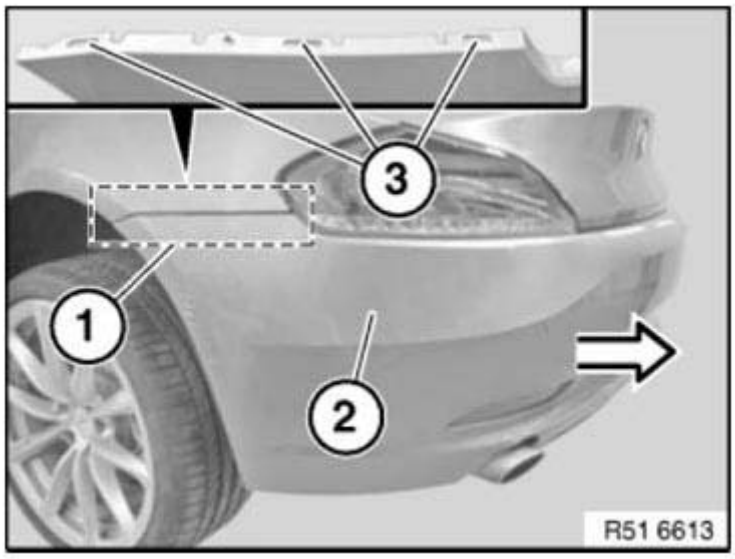


Fig. 37: Pulling Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Pre-treat the zero gap in area (1) left and right with universal lubricate spray (sourcing reference BMW Parts Department). Immediately wipe off any excess universal lubricant spray (sourcing reference BMW Parts Department).

Heating with hot air blower or IR radiator, etc., is not permitted.

Carefully unclip retaining tabs (3) from the left and right bumper trim (2) outward.

IMPORTANT: First, ensure that the right and left retaining tabs (3) have been unclipped and then pull the bumper trim (2) to the rear (direction of arrow).

Slightly pull the bumper trim (2) back with an assistant to disconnect the plug connections on license plate lamps and reversing sensors, if available.

Completely remove bumper trim panel (2).

Installation note:

Visually inspect the gap dimensions after installing the bumper trim panel (2).

51 99 510 REMOVING AND INSTALLING REAR NUMBER/LICENSE PLATE

Release screws (1) and remove number/license plate.

Installation:

Screw number/license plate directly onto rear bumper (2).

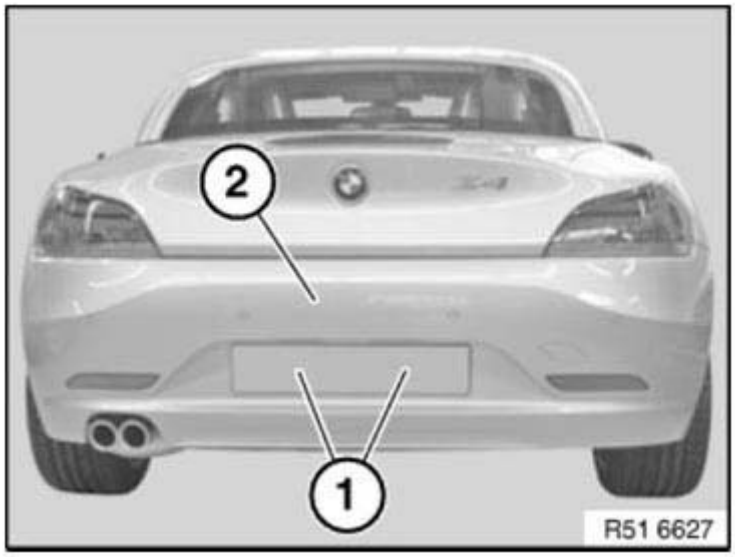


Fig. 38: Identifying Rear Bumper With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 12 050 REMOVING AND INSTALLING/REPLACING CARRIER FOR REAR BUMPER TRIM

Necessary preliminary tasks

- Remove rear **BUMPER TRIM**

Release nuts (1) on left and right.

Remove carrier (2) straight towards rear.

Tightening torque **51 12 3AZ** .

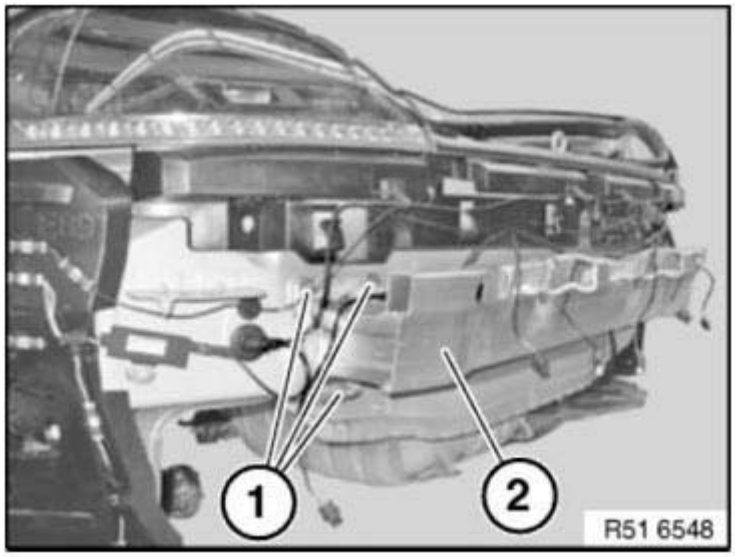


Fig. 39: Identifying Rear Bumper Trim Nuts And Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, remove sealing plate (1) between carrier and body (2).

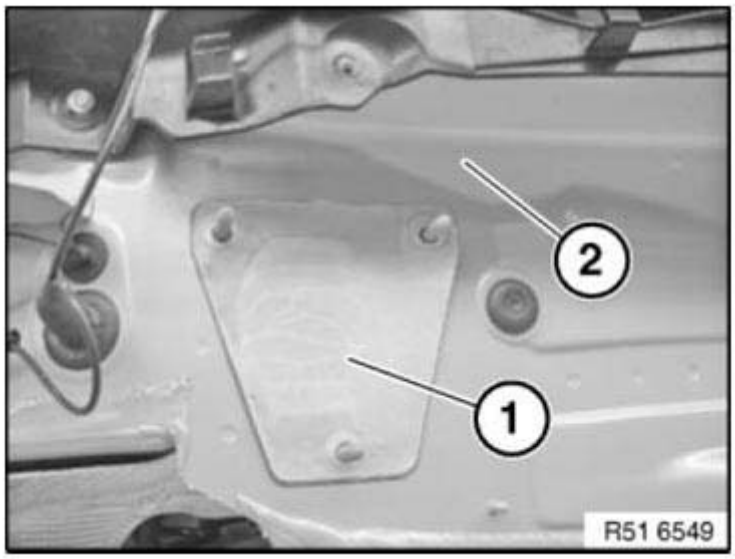


Fig. 40: Identifying Sealing Plate On Body
Courtesy of BMW OF NORTH AMERICA, INC.

51 12 825 REMOVING AND INSTALLING/REPLACING GUIDE FOR REAR CENTRE BUMPER

Necessary preliminary tasks

- Remove rear **BUMPER TRIM**

Detach wiring harness (1).

Unfasten screws (2).

Remove guide for bumper (3).

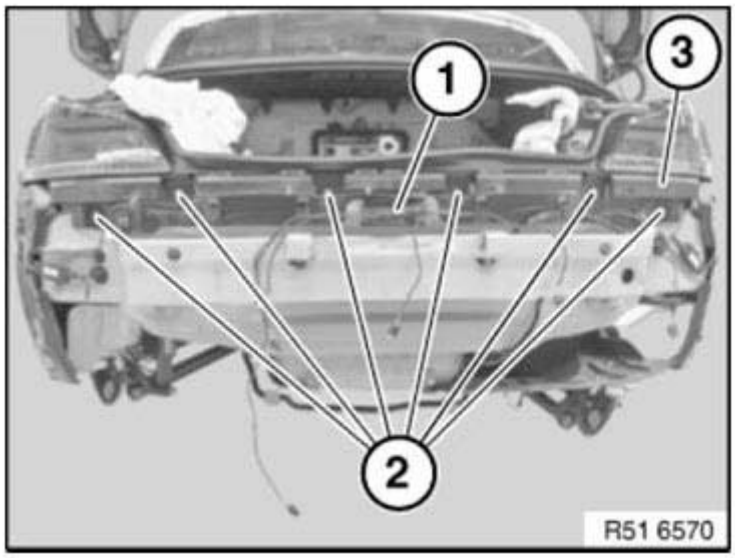


Fig. 41: Identifying Rear Center Bumper With Wiring Harness And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 12 828 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT GUIDE FOR REAR BUMPER

Necessary preliminary tasks

- Remove rear **BUMPER TRIM**

Detach wiring harness (1).

Unfasten screws (2).

Remove guide for bumper (3).

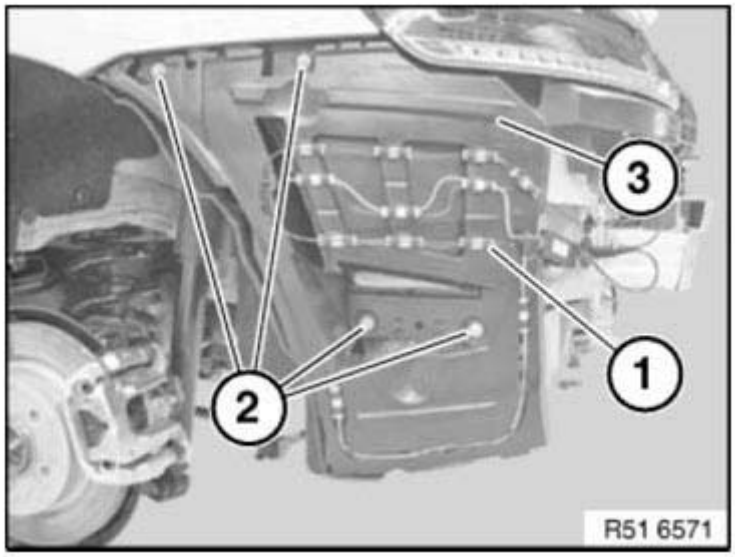


Fig. 42: Identifying Rear Bumper With Wiring Harness And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 041 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT WHEEL ARCH COVER

Necessary preliminary tasks

- Remove **REAR WHEEL**

Release all nuts (1).

Remove cover (2).

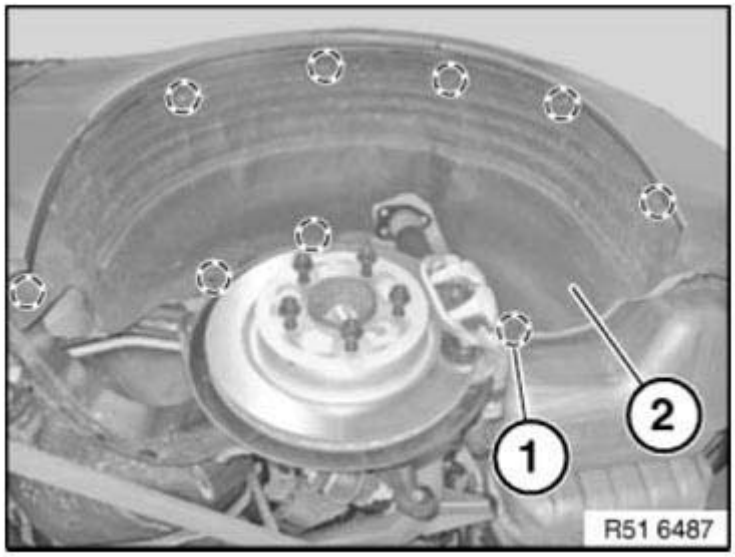


Fig. 43: Identifying Wheel Arch Cover And Nuts

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carefully lift in wheel arch cover (1) with special tool 00 9 317 .

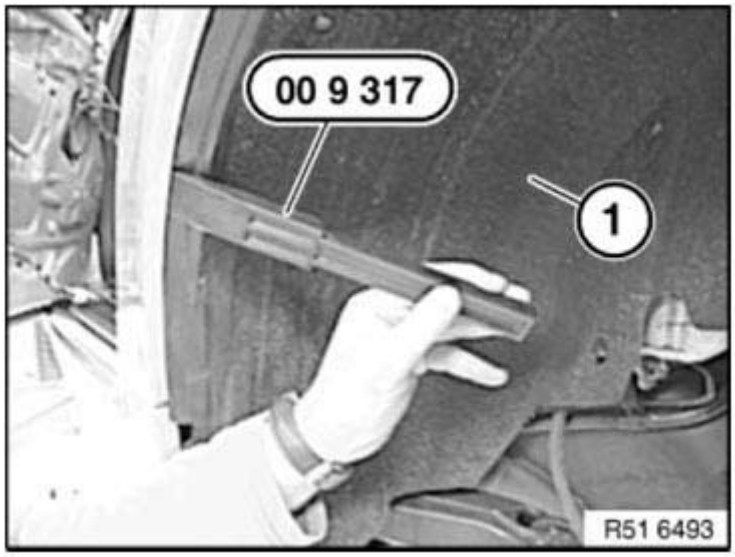


Fig. 44: Lifting Wheel Arch Cover Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

51 12 157 REPLACING REAR BUMPER TRIM

Necessary preliminary tasks

- Remove rear **BUMPER TRIM**

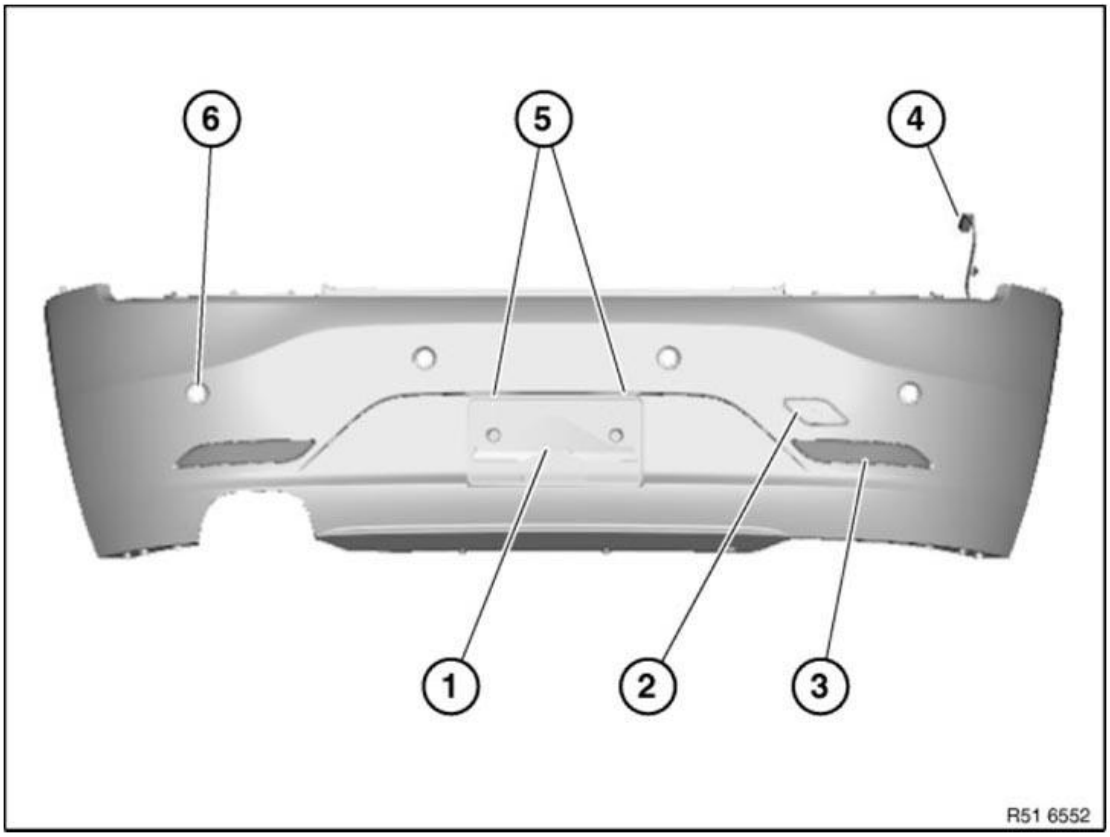


Fig. 45: Identifying Rear Bumper Trim Components
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **LICENSE PLATE HOLDER (1)** .

Remove cover cap (2) for tow lug.

Remove **REAR REFLECTOR (3)** .

Remove **LICENCE PLACE LIGHTS (5)** .

Version with PDC:

Remove all **ULTRASONIC TRANSDUCERS (6)** .

Remove wiring harness (4) for ultrasonic transducers.

5113 TRIM, COVERS, HANDLE TRIM

51 13 ... ADJUSTING WINDSCREEN FRAME SEAL TO ROOF SHELL SEAL

Release outer screw (1) of windscreen frame seal (3).

2 = banjo nut

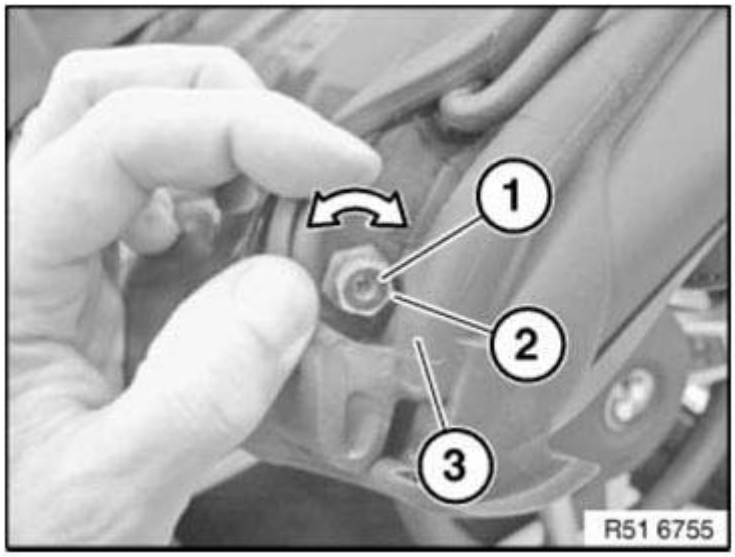


Fig. 46: Removing Outer Screw Of Windscreen Frame Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Turn banjo nut top adjust windscreen frame seal (1) flush with roof shell seal (2).

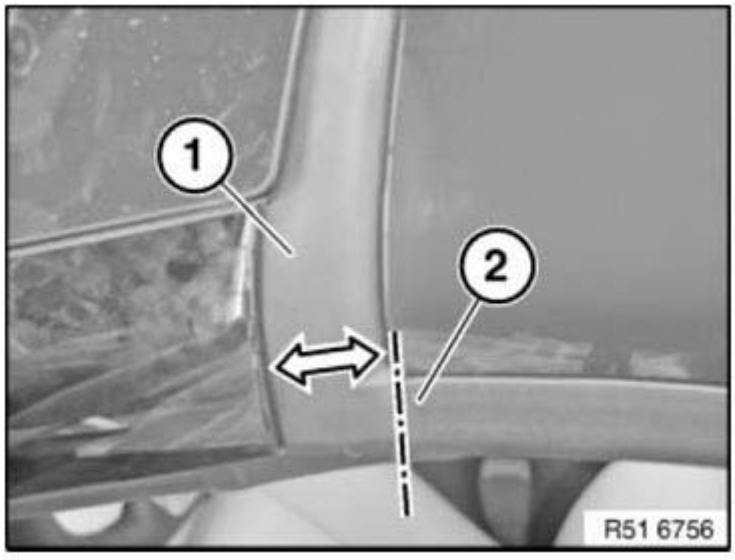


Fig. 47: Adjusting Windscreen Frame Seal With Roof Shell Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Sectional view for improved clarity

Banjo bolt (1) alters the relative position of vulcanized aluminum sheet (2) to windscreen frame edge (3).

Installation:

After adjustment, secure banjo bolt (1) again against twisting with Loctite.

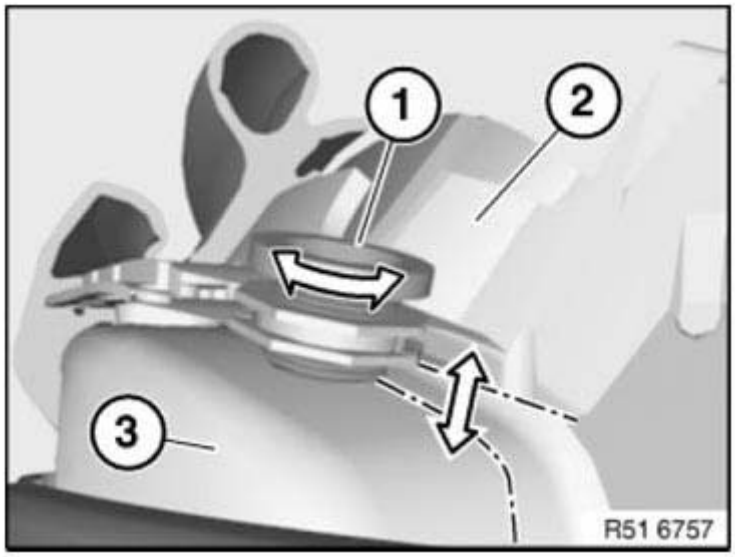


Fig. 48: Securing Banjo Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

51 13 115 REMOVING AND INSTALLING/REPLACING COWL PANEL COVER

Necessary preliminary tasks

- Remove **BOTH WINDSCREEN WIPER ARMS**

Disengage catch (1).

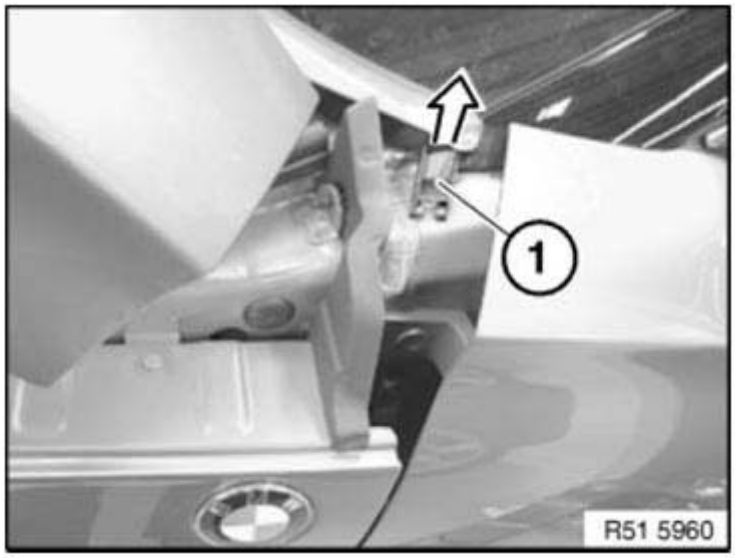


Fig. 49: Removing Catch
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable from cable holder (1).

Remove clips (2) and remove cowl panel cover.

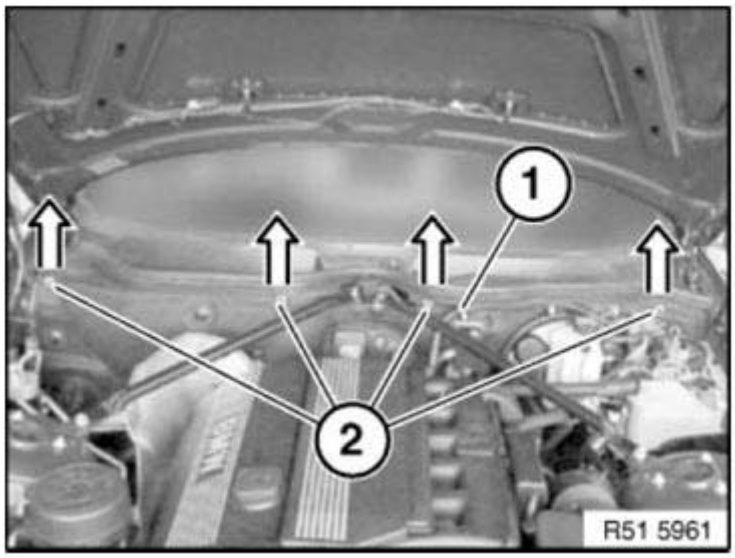


Fig. 50: Removing Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace defective grommets (1).

Check holder (2) for correct seating.

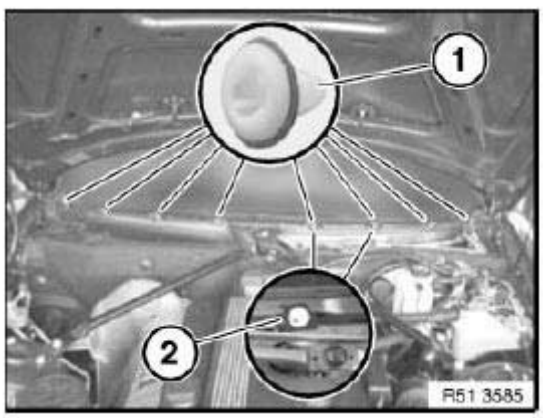


Fig. 51: Identifying Defective Grommets With Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clips (1) must not be missing or damaged.

Retaining tabs (2) must not be damaged

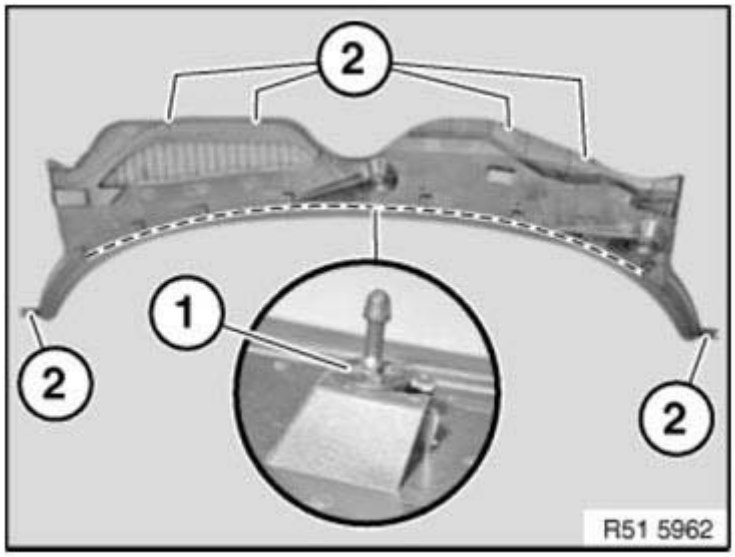


Fig. 52: Identifying Clips And Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

51 13 312 REMOVING AND INSTALLING OR REPLACING TRIM STRIP ON ROOF GUTTER AT LEFT OR RIGHT

Release screws (1) on windscreen frame seal (2).

Remove windscreen frame seal (2) at side from A-pillar trim panel (3).

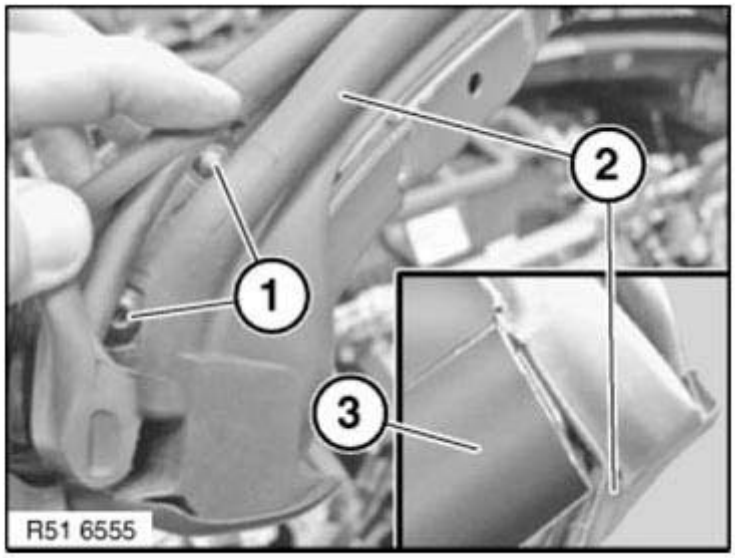


Fig. 53: Removing Windscreen Frame Seal From A-Pillar Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Release main seal (1) from A-pillar (2).

Release screws (3).

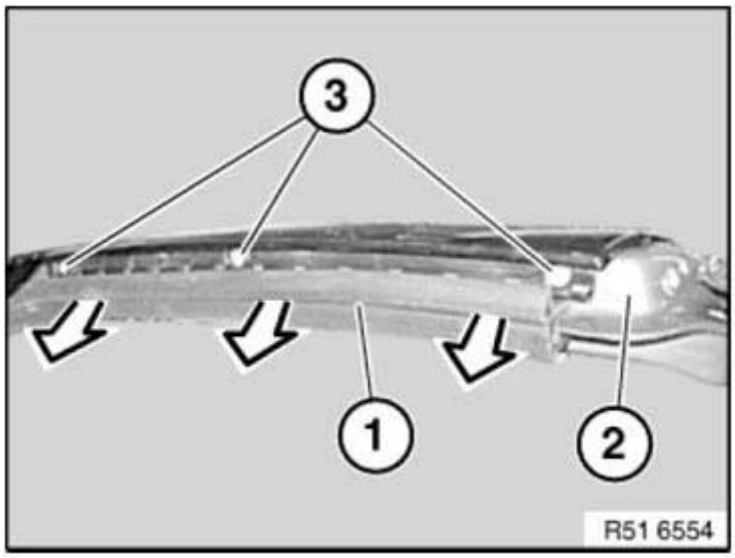


Fig. 54: Removing Main Seal From A-Pillar
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip A-pillar trim panel (1) from strip clips (2).

Installation:

Strip clips (2) must not be missing or damaged.

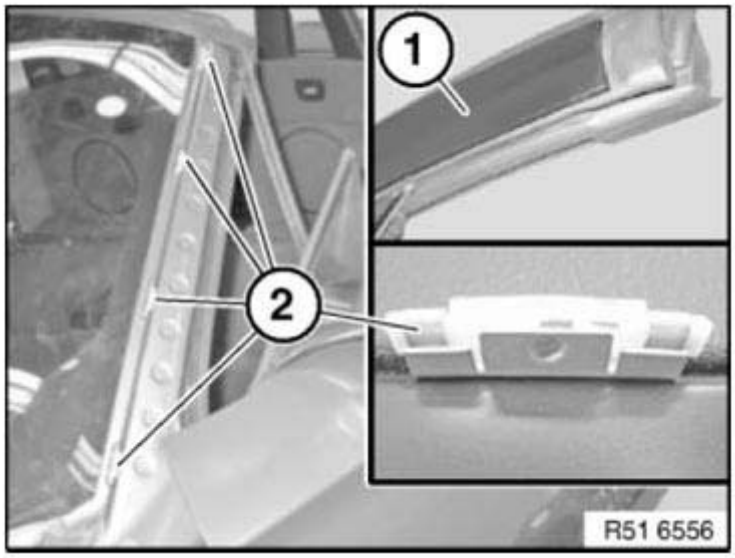


Fig. 55: Identifying A-Pillar Trim Panel With Strip Clips
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: A-pillar trim panel rib (1) must not trap sealing lip (2). Only then will gutter strip (3) function properly.

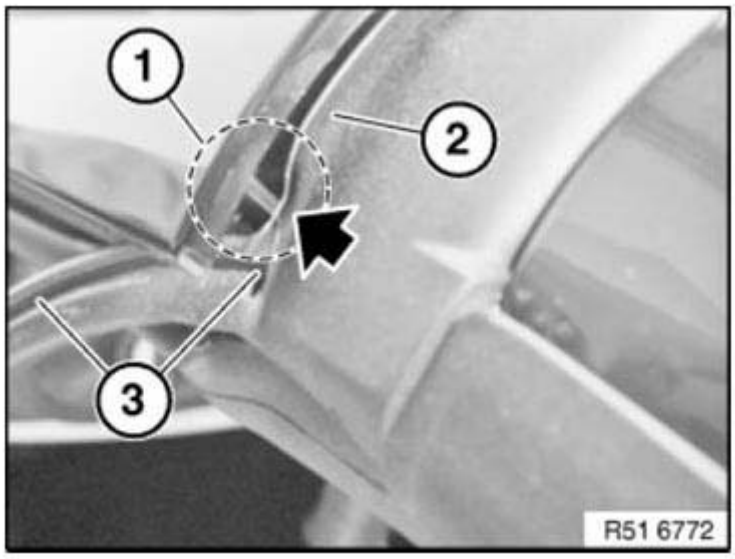


Fig. 56: Identifying A-Pillar Trim Panel Rib, Sealing Lip And Gutter Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

First clip in A-pillar trim panel (1), then screw down. Here, A-pillar trim panel (1) rests cleanly and is flush with windscreen frame seal (2).

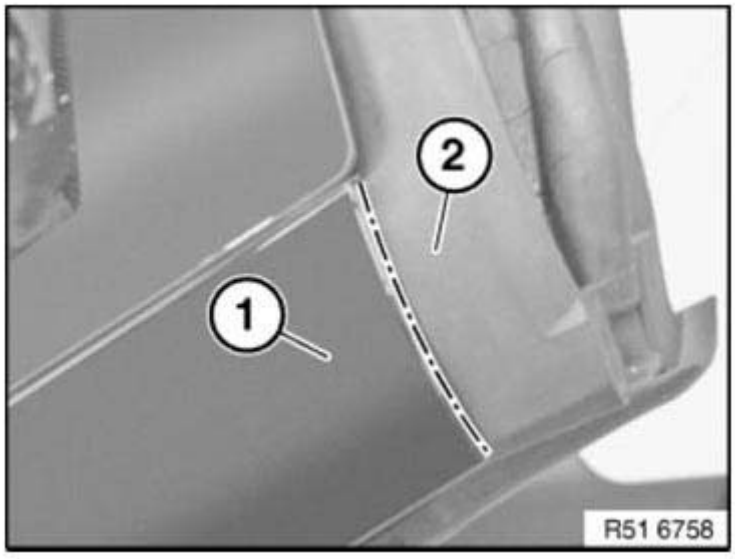


Fig. 57: Identifying A-Pillar Trim Panel And Windscreen Frame Seal
Courtesy of BMW OF NORTH AMERICA, INC.

51 13 435 REMOVING AND INSTALLING/REPLACING ADDITIONAL BRAKE LIGHT, REAR LID COVER

Necessary preliminary tasks

- Remove **REAR LID TRIM**

Unscrew nuts (1).

Tightening torque **51 13 8AZ** .

Unfasten plug connection (2) and disconnect.

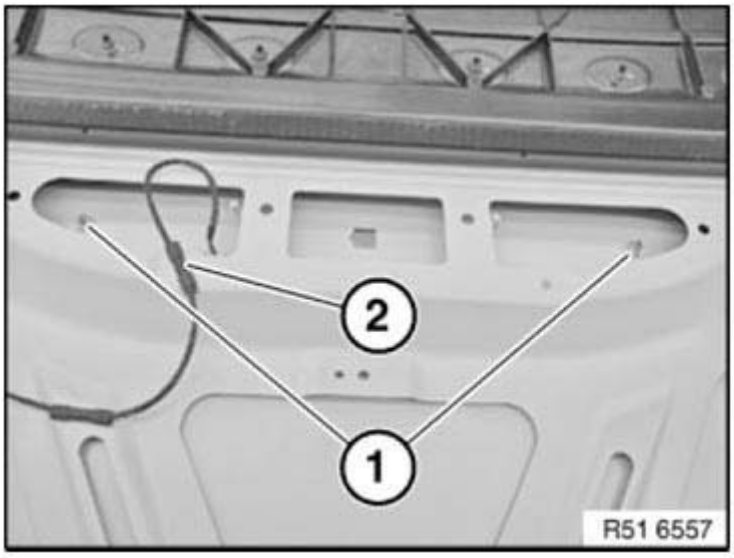


Fig. 58: Identifying Plug Connection And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Raise and unclip additional brake light (1) with special tool 00 9 317 .

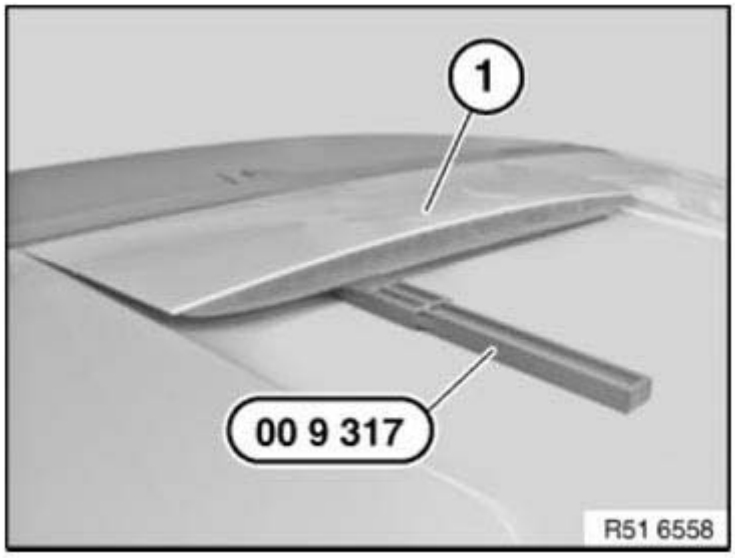


Fig. 59: Removing Additional Brake Light Using Special Tool (009 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove additional brake light (1).

Replacement:

Subsequent operation described in **REMOVING ADDITIONAL BRAKE LIGHT** .

51 13 001 REMOVING AND INSTALLING/REPLACING FRONT RADIATOR GRILLE, MIDDLE LEFT OR RIGHT

NOTE: Protect bumper trim against paint damage.

Release catches at marked point by pulling gently in direction of arrow and remove front radiator grille middle (1).

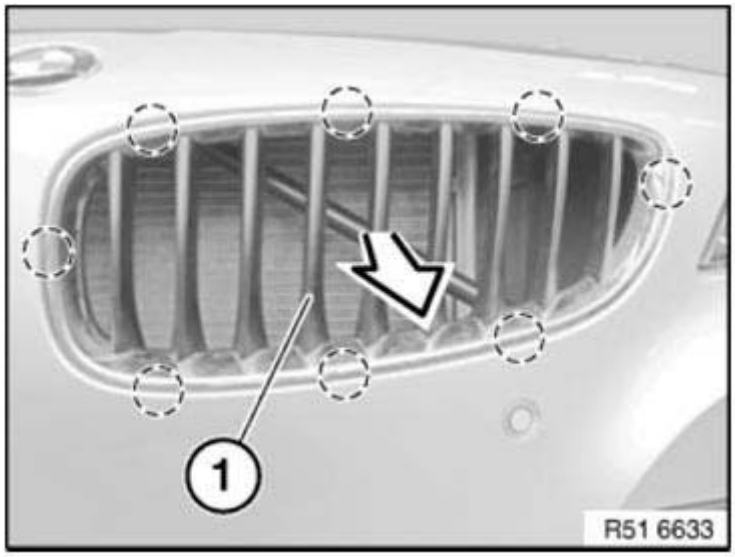


Fig. 60: Pulling Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All catches and guides on middle front grille must not be damaged.

Press on chrome ring to push front radiator grille (2) into bumper trim.

Fixtures (1) must engage correctly.

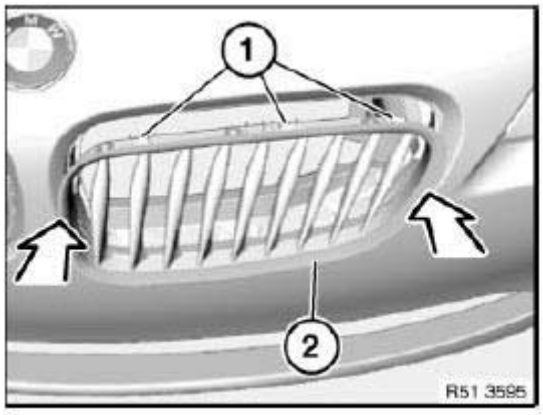


Fig. 61: Pushing Front Radiator Grille Into Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 46 072 REMOVING AND INSTALLING/REPLACING LOWER PARTITION PANEL

Necessary preliminary tasks

- Clamp off **BATTERY LEAD FROM NEGATIVE TERMINAL**

- Remove **CENTRE CONSOLE** .
- Remove **UPPER PARTITION TRIM PANEL**
- Remove **REAR SIDE TRIM PANEL (BOTTOM)**

NOTE: Both seats are shown removed for purposes of clarity.

Professional HiFi system only:

Release mid-range speaker screws (2).

Unlock plug connection for mid-range speaker and disconnect.

Remove mid-range speaker.

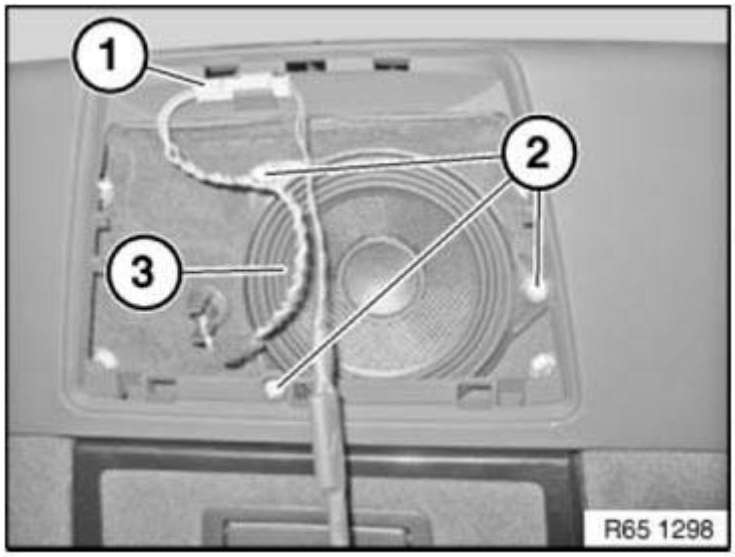


Fig. 62: Identifying Mid-Range Speaker Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 46 7AZ** .

Remove clips (2).

Raise protective caps for storage net holder and release screws (3).

Tightening torque **51 46 7AZ** .

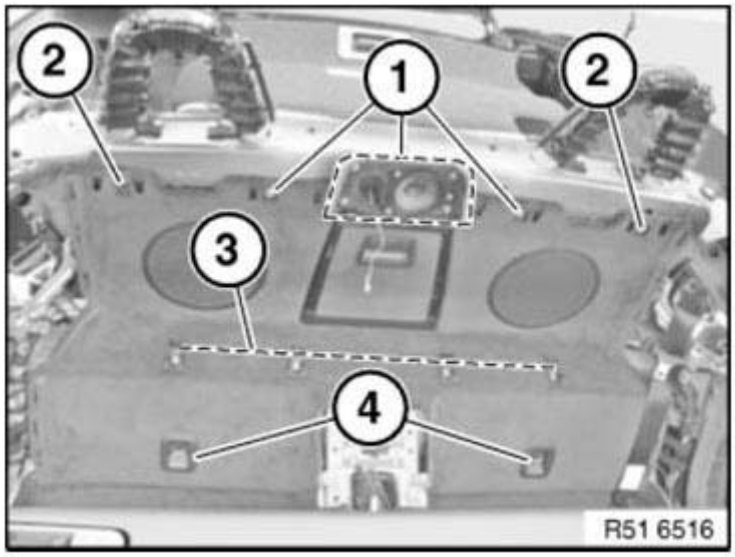


Fig. 63: Identifying Screws And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release partition panel (1) at catches (2). Disconnect necessary plug connections.

Remove partition panel (1).

Replacement

Modify covers or lashing eyes (4).

Professional HiFi system only:

Modify speaker covers of bass speaker on left and right.

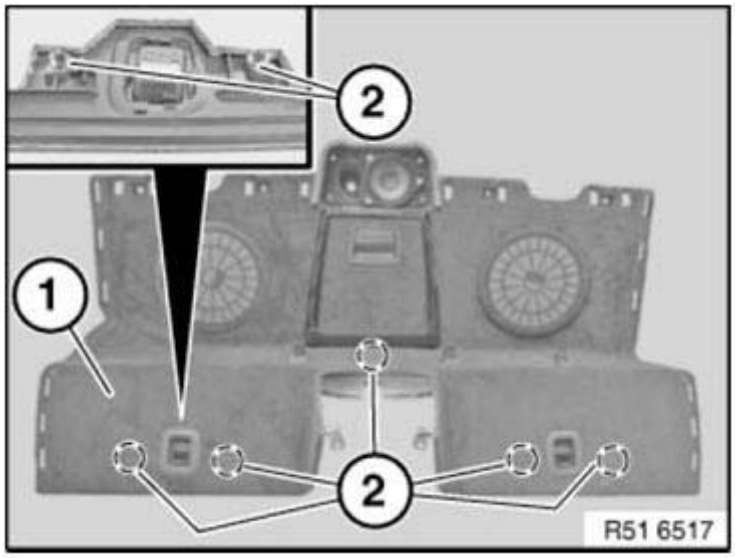


Fig. 64: Identifying Partition Panel With Catches
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 125 REMOVING AND INSTALLING/REPLACING REAR BOTTOM LEFT OR RIGHT SIDE TRIM PANEL

Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Necessary preliminary tasks

- Remove **REAR SIDE TRIM PANEL**
- Remove **FRONT DOOR SILL COVER STRIP**

Release screw (1).

Partially detach door seal (2).

Carefully pull out trim panel (3) and remove.

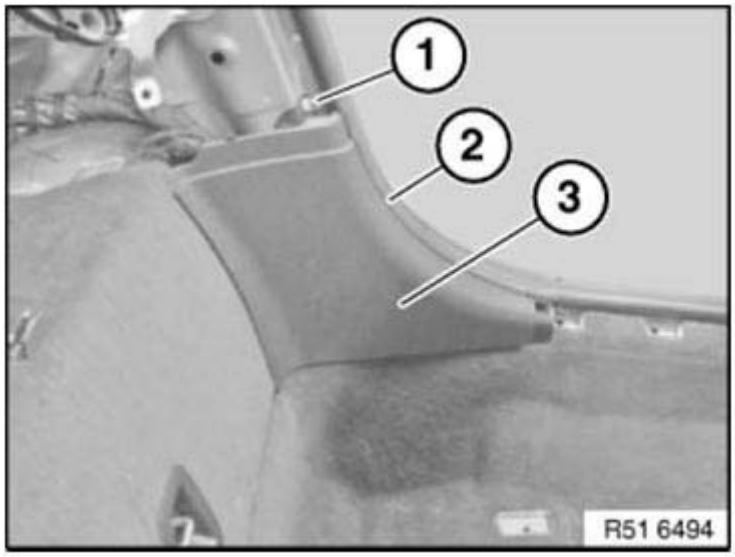


Fig. 65: Identifying Door Seal, Trim Panel And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, reattach clip (1) prior to installation.

Clip (1) and retaining lugs (2) must not be damaged.

If necessary, replace side trim panel.

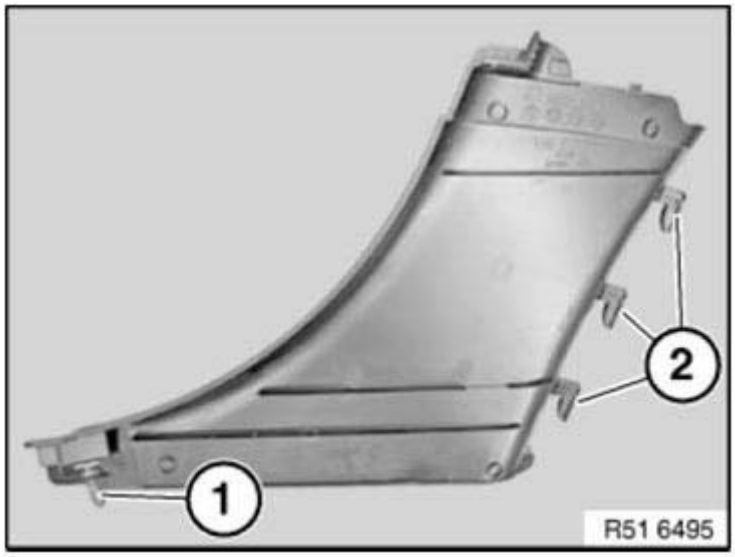


Fig. 66: Identifying Clip And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 ... REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT WHEEL ARCH SPLASH GUARD

Release screw and nut (1).

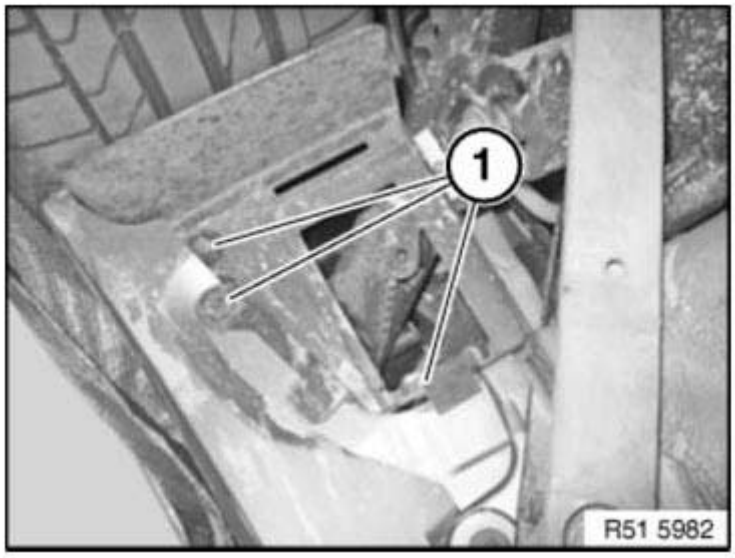


Fig. 67: Identifying Wheel Arch Splash Guard Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable holder (1).

Remove splash guard (2).

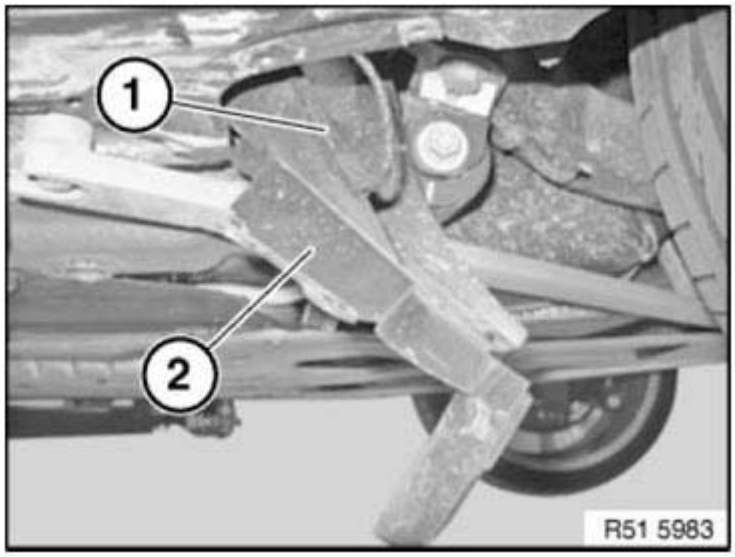


Fig. 68: Identifying Cable Holder And Splash Guard
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Engage lug for cable (1) on stud (2).

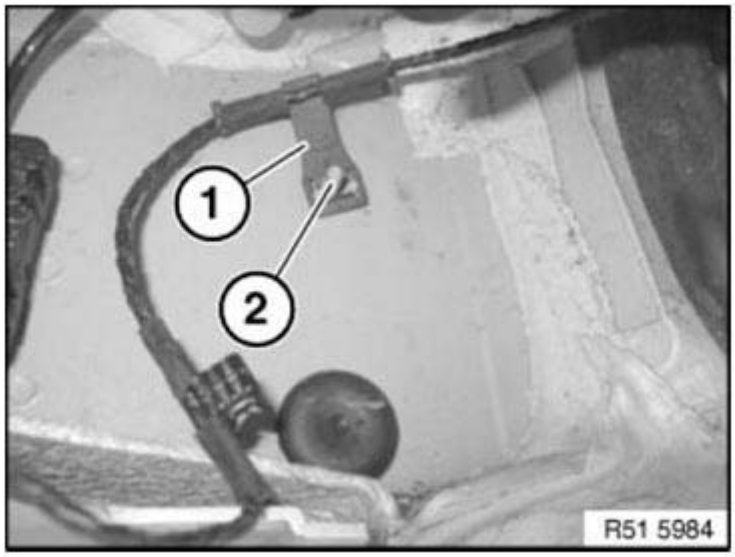


Fig. 69: Identifying Cable On Stud
Courtesy of BMW OF NORTH AMERICA, INC.

51 46 070 REMOVING AND INSTALLING/REPLACING UPPER PARTITION PANEL

Necessary preliminary tasks

- Remove **REAR SIDE TRIM PANELS**

- Remove **ROLLOVER PROTECTION COVER BRACKET**
- If necessary, place backrests in vertical position and move seats fully forwards

Release screws (1).

Lever out caps for lashing eyes and release screws (2).

Tightening torque **51 46 6AZ** .

Professional HiFi system only:

Remove **TWEETER** (3)

Lift out upper partition wall panel (4) at an angle.

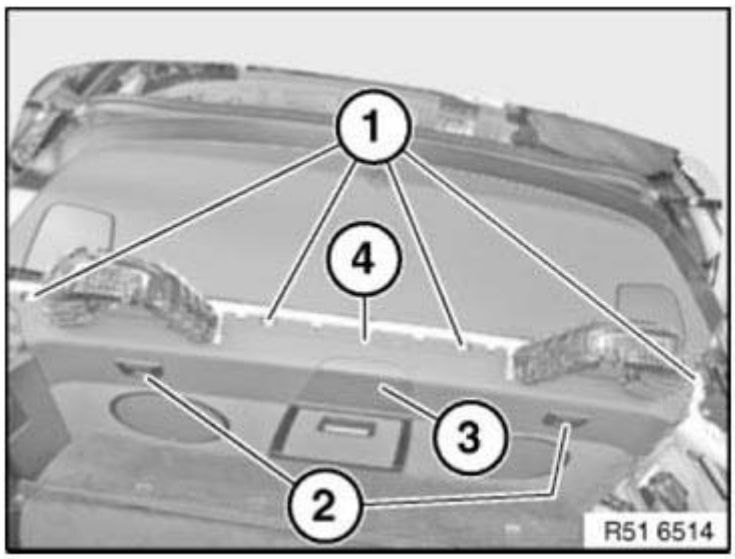


Fig. 70: Identifying Middle Trim And Upper Partition Wall Panel With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

If necessary, replace middle trim (3).

Installation:

Locking hooks (1) on front partition wall panel (2) must not be broken.

If necessary, replace upper partition wall panel (2).

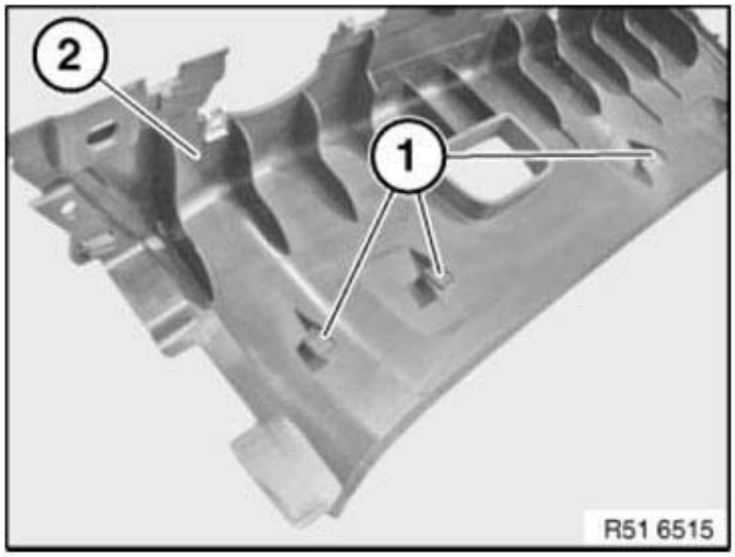


Fig. 71: Identifying Hooks On Front Partition Wall Panel
Courtesy of BMW OF NORTH AMERICA, INC.

5114 BMW EMBLEMS, MODEL EMBLEMS

51 14 013 REMOVING AND INSTALLING/REPLACING BMW BADGE ON FRONT LEFT OR RIGHT SIDE PANEL

Fig. 72: Removing BMW Badge Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

51 14 000 REPLACING FRONT BMW BADGE (REMOVING AND REPLACING)

Necessary preliminary tasks

- Remove **CENTRE RADIATOR GRILLE**

Release sheet metal nuts (1).

Remove badge towards front.

Installation:

Carefully tighten sheet metal nuts (1).

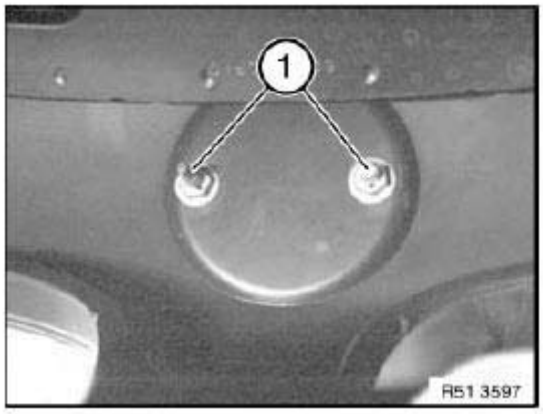


Fig. 73: Identifying Sheet Metal Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

5115 BUMPER STRIP

51 71 447 REMOVING AND INSTALLING OR REPLACING PANEL FOR COVER ON LEFT OR RIGHT SIDE MEMBER

Release screws (1 and 2).

Release clips (3).

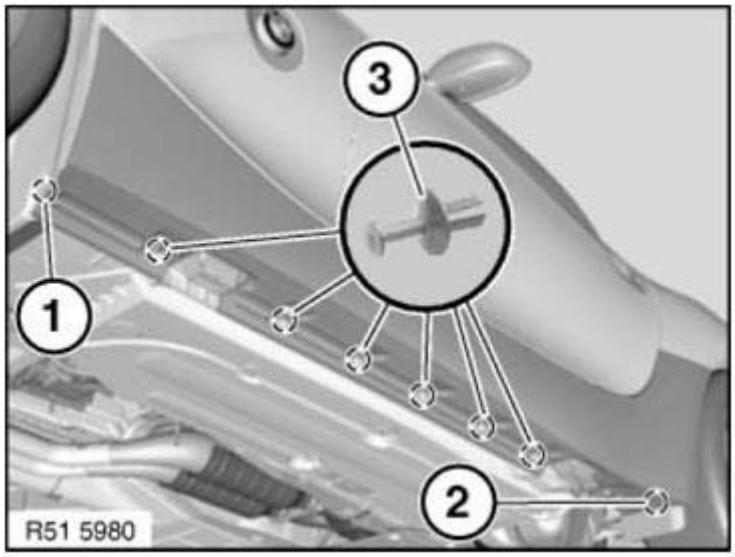


Fig. 74: Identifying Screws And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip panel (1) in areas (A and B) from holders in direction of arrow.

Release panel (1) at clips (2) and remove in direction of arrow.

Installation:

Catches of panel (1) in areas (A and B) must not be damaged.

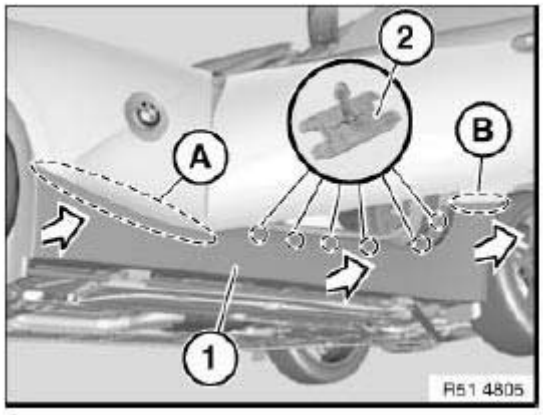


Fig. 75: Removing Panel From Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Holders (1 and 2) must not be damaged.

If necessary, detach clips (3) from body and attach to panel for cover on side member.

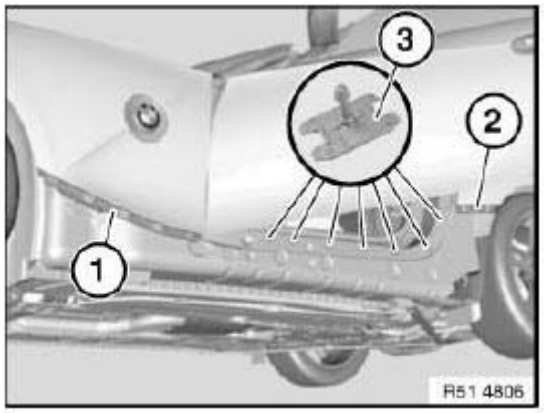


Fig. 76: Identifying Holders And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure seal (1) is correctly seated on body and after assembly pay attention to **GAP DIMENSIONS** .

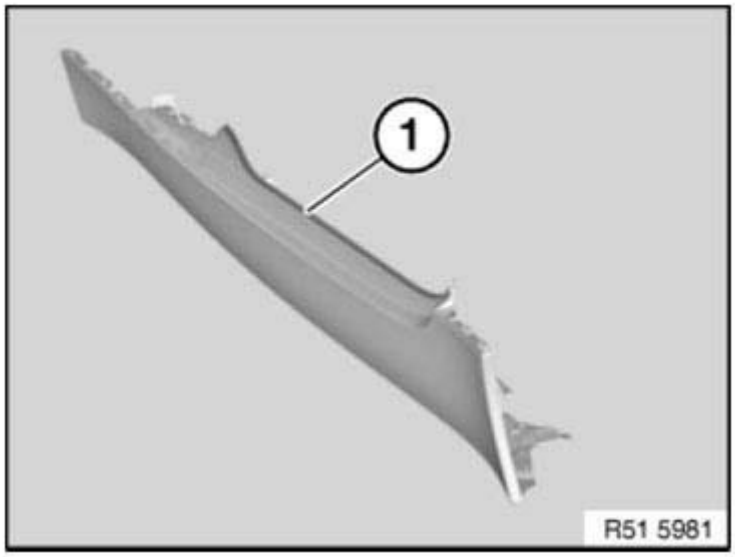


Fig. 77: Identifying Seal On Body
Courtesy of BMW OF NORTH AMERICA, INC.

5116 MIRRORS COVER SASH TRAYS SHELVES TRAYS

51 16 165 REMOVING AND INSTALLING COMPLETE CENTRE CONSOLE

Necessary preliminary tasks

- Remove **TRIM FOR STORAGE COMPARTMENT**

IMPORTANT: Read and comply with notes on HANDLING WIRING HARNESSES and cables.

Switch off ignition before disconnecting plug connections.

NOTE: Seats are shown removed for purposes of clarity.

Remove rear cover (1) from centre console (2) towards top.

Disconnect plug connection underneath.

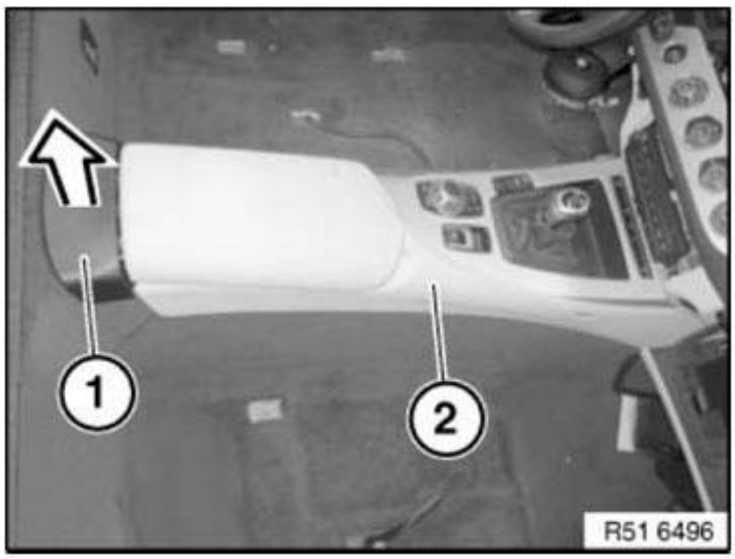


Fig. 78: Removing Rear Cover From Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Release front screws (1).

Tightening torque **51 16 16AZ** .

Unlock and disconnect cable (2).

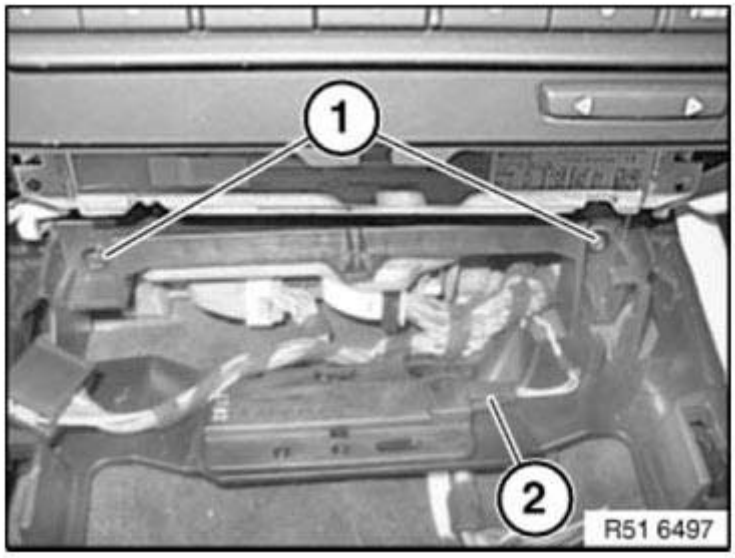


Fig. 79: Identifying Front Screws And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Release rear nuts (1).

Tightening torque **51 16 16AZ** .

Release screw (2).

Tightening torque **51 16 17AZ** .

Raise centre console (3) and unlock and disconnect plug connections underneath.

NOTE: Height of fastening point can be regulated by compensating bush underneath screw connection for centre console.

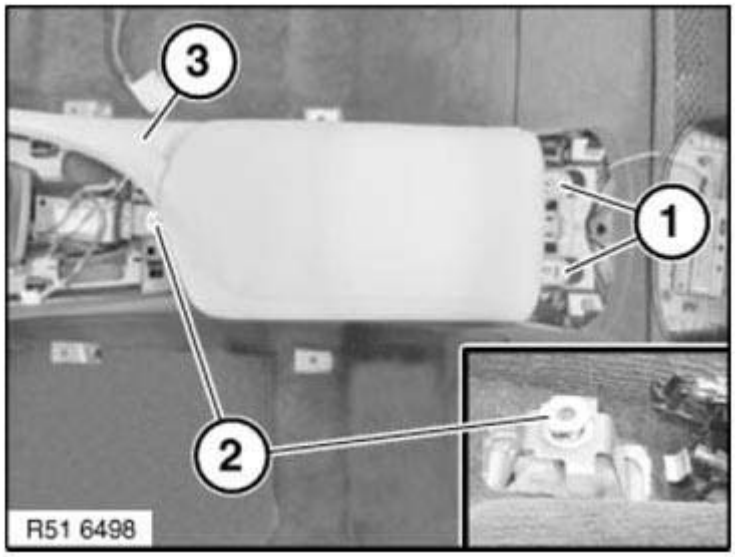


Fig. 80: Identifying Centre Console With Rear Nuts And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable guide (1) from centre console (2).

Raise centre console (2) and unlock and disconnect plug connections on underside.

Remove centre console (2).

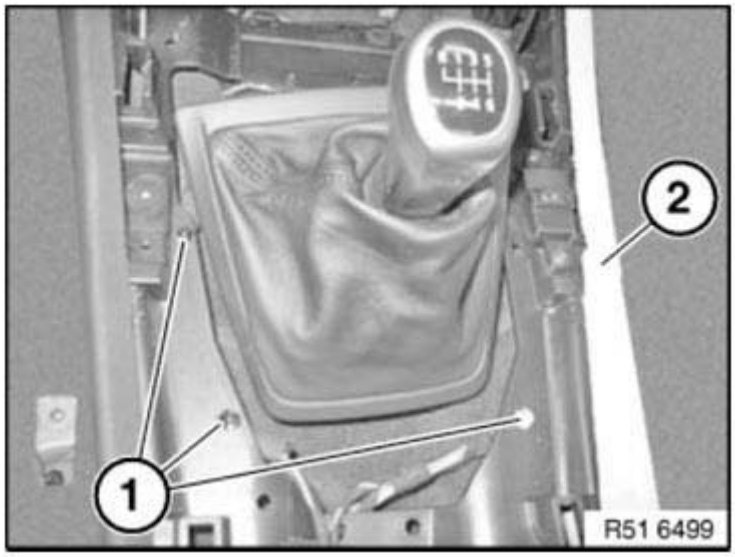


Fig. 81: Identifying Cable Guide Of Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

51 16 063 REMOVING AND INSTALLING OR REPLACING INTERIOR REARVIEW MIRROR

Version with remote control for central locking:

If necessary, disconnect negative lead from **BATTERY** .

Expand two-part cover (1) by pressing from below. Feed out split cover (1) on mirror base plate in each case remove in outward direction.

If necessary, disconnect plug connection underneath.

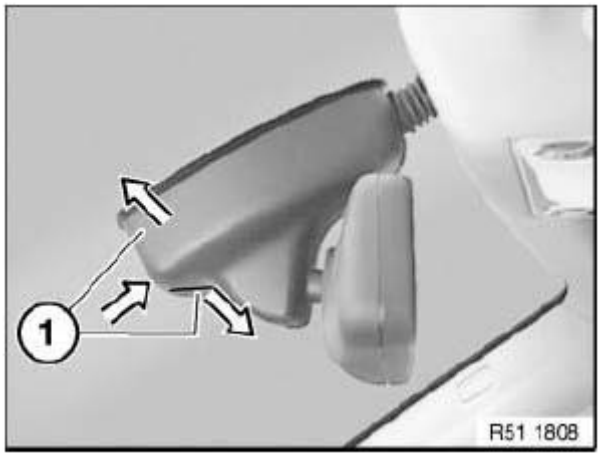


Fig. 82: Expanding Two-Part Cover
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Do not pull mirror (1) off windscreen; instead, carefully turn approx. 45° clockwise to snap out of mirror base (2).

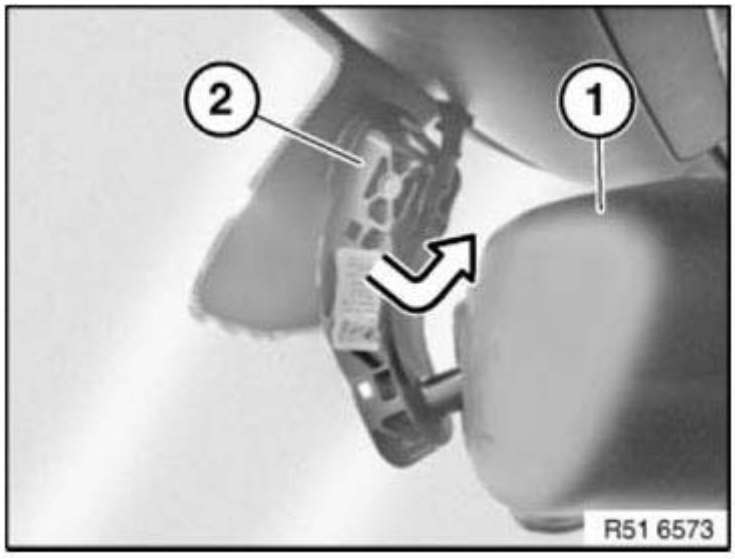


Fig. 83: Pulling Mirror Off Windscreen From Mirror Base
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit mirror base plate on mirror base turned through approx. 45° (see graphic) and snap audibly into place by turning anti-clockwise carefully in direction of arrow.

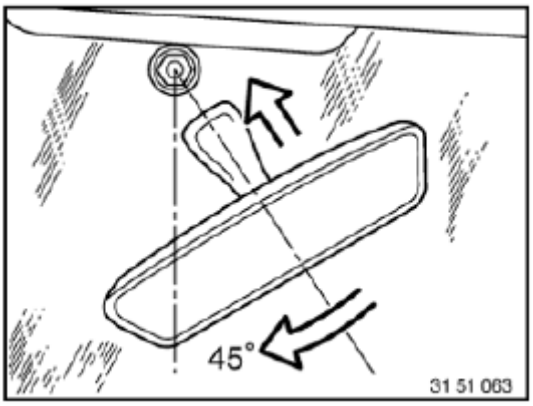


Fig. 84: Turning Mirror Base Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Only replace with version with remote control for central locking

Initialize all transmitters (ignition keys), refer to Owner's Handbook.

Only when replacing mirror with FLA (high-beam assistance) for vehicles from build date 09/2009 onward

Replace CAN connector (3-pin).

Unpin and dispose of existing connector.

Install newly coded connector part number 6 905 977 (sourcing reference: BMW Parts Department) in same way as existing connector.

51 16 000 REMOVING AND INSTALLING OR REPLACING MIRROR ON LEFT OR RIGHT FRONT DOOR

Remove corner trim (2) in upward direction from triangular mirror section (1).

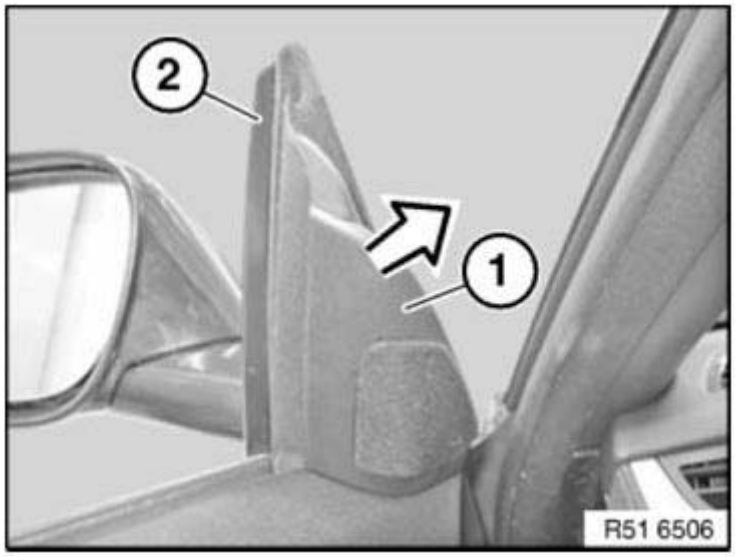


Fig. 85: Removing Corner Trim From Triangular Mirror Section
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 16 1AZ** .

Unlock and disconnect plug (2).

Remove mirror (3).

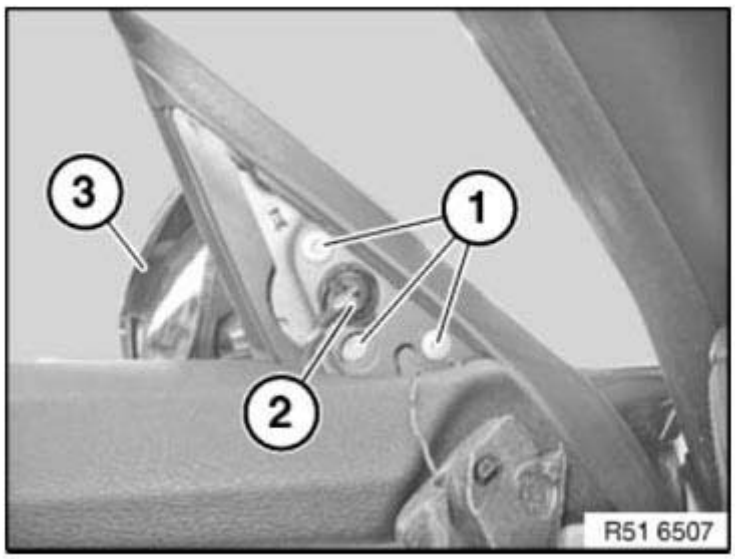


Fig. 86: Identifying Mirror, Plug With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only

Due to the thread-tapping screws, the tightening torque of the new mirror is increased by 2 Nm.

Tightening torque **51 16 1AZ** .

Installation:

Check function.

51 16 080 REMOVING AND INSTALLING OR REPLACING SUN VISOR AND LEFT OR RIGHT COUNTER SUPPORT

Release screws (1) and remove counter support (2) in direction of arrow.

Installation:

Make sure fixtures (3) of sun visor and counter support (2) are correctly seated in mountings.

Check function.

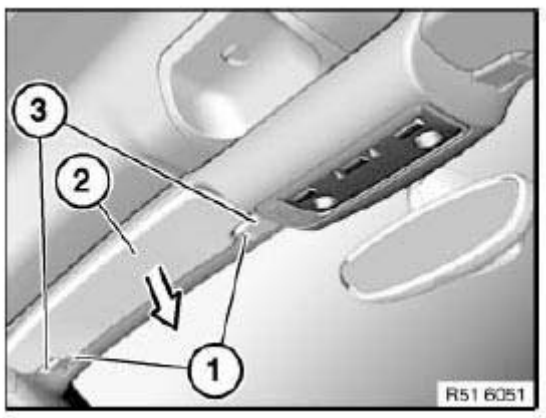


Fig. 87: Removing Counter Support
Courtesy of BMW OF NORTH AMERICA, INC.

51 16 366 REMOVING AND INSTALLING RIGHT GLOVEBOX WITH HOUSING

Necessary preliminary tasks

- Remove **LOWER INSTRUMENT PANEL TRIM**

Release screws (1).

Remove lower glovebox trim (2).

Remove side trim (3).

- If necessary, remove **AIRBAG FRONT PASSENGER KNEE PROTECTION**

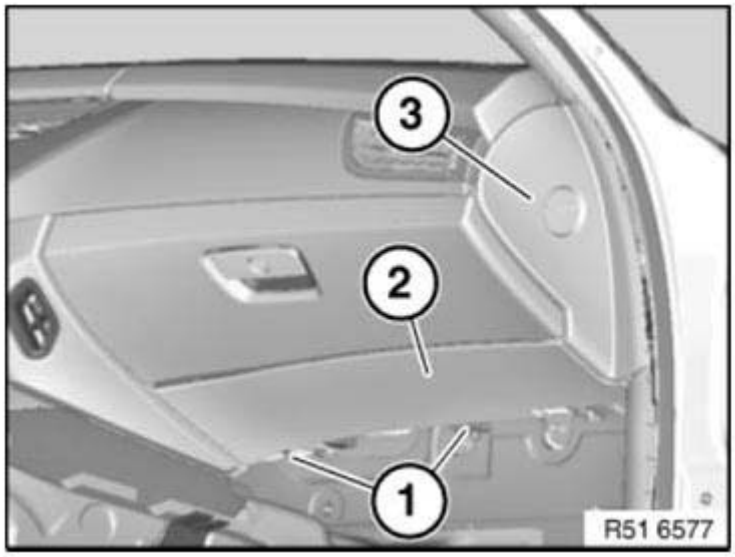


Fig. 88: Identifying Lower Glovebox Trim With Side Trim And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To be able to show screw position better, graphic shows glovebox cover removed.

Release screws (1).

Remove glovebox (2).

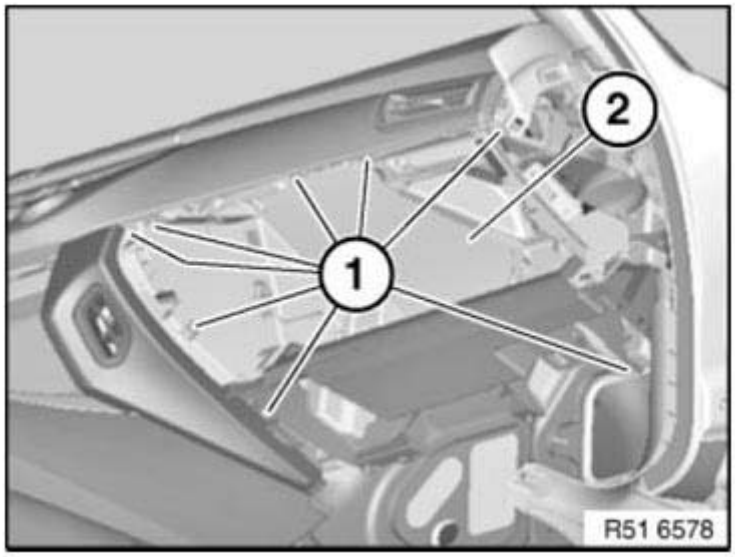


Fig. 89: Identifying Lower Glovebox Trim With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 16 212 REMOVING AND INSTALLING TRIM FOR STORAGE COMPARTMENT

Lever off gaiter trim (1) upwards with special tool 00 9 317 .

Lever off trim for storage compartment (2) towards top.

Unlock cable connections underneath and disconnect.

Remove trim for storage compartment (2).

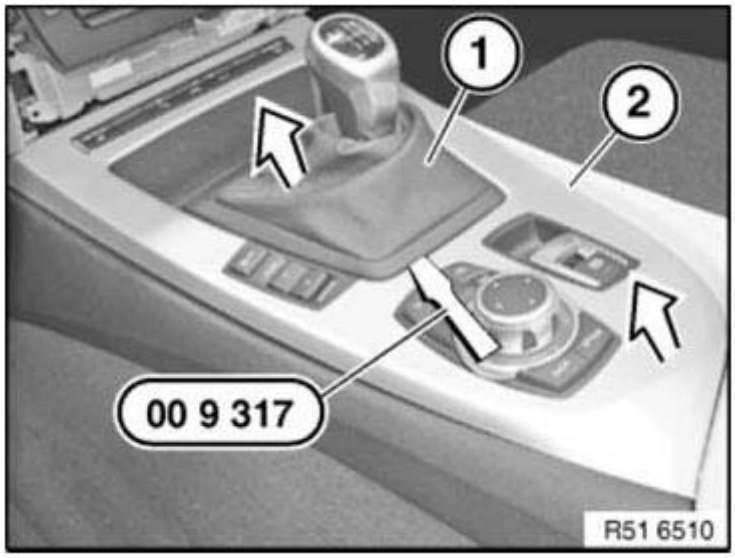


Fig. 90: Removing Gaiter Trim Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 314 REMOVING AND INSTALLING/REPLACING CARPET FOR PASSENGER COMPARTMENT

Necessary preliminary tasks:

- Remove **SEATS**
- Remove footwell side trim panels See **5143075 REMOVING AND INSTALLING/REPLACING SIDE TRIM PANEL, FOOTWELL, ON A-PILLAR, RIGHT** or **5143070 REMOVING AND INSTALLING/REPLACING SIDE TRIM PANEL, FOOTWELL, ON A-PILLAR, LEFT** on left and right
- Remove **HEATER/AIR CONDITIONER**
- Remove **ACCELERATOR PEDAL MODULE**
- Remove **LOWER PARTITION TRIM PANEL**

Replacement

Unclip footwell net (1) on front passenger side.

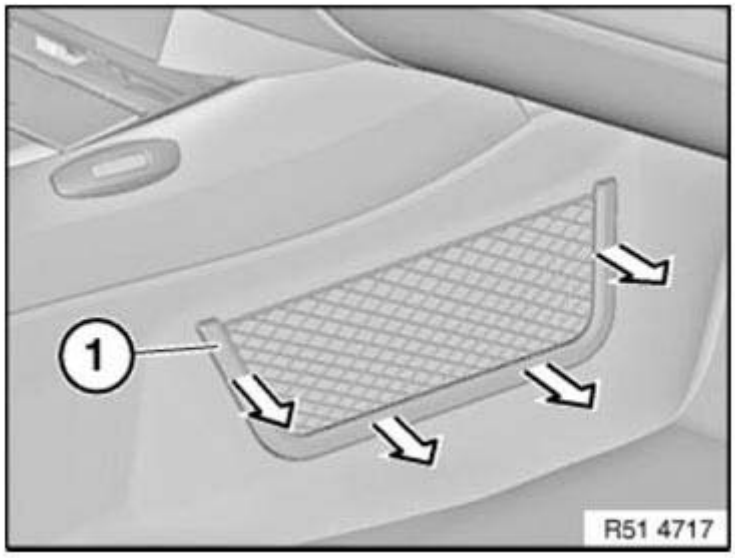


Fig. 91: Removing Footwell Net
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace damaged retaining clips.

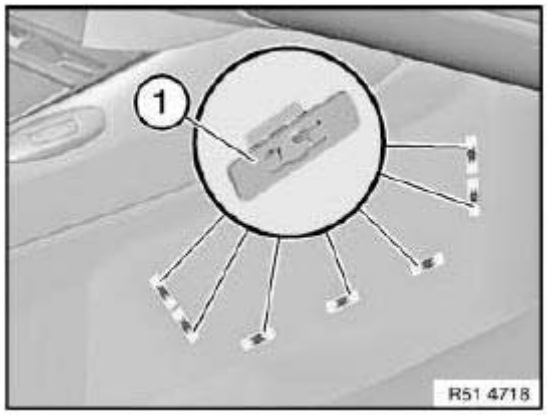


Fig. 92: Identifying Damaged Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 16 206 REMOVING AND INSTALLING/REPLACING CENTRE ARMREST

Necessary preliminary tasks

- Remove **CENTRE CONSOLE** .

If telephone optional equipment installed:

- Remove **EJECT BOX**

Raise mat insert (1) with suitable tool and remove.

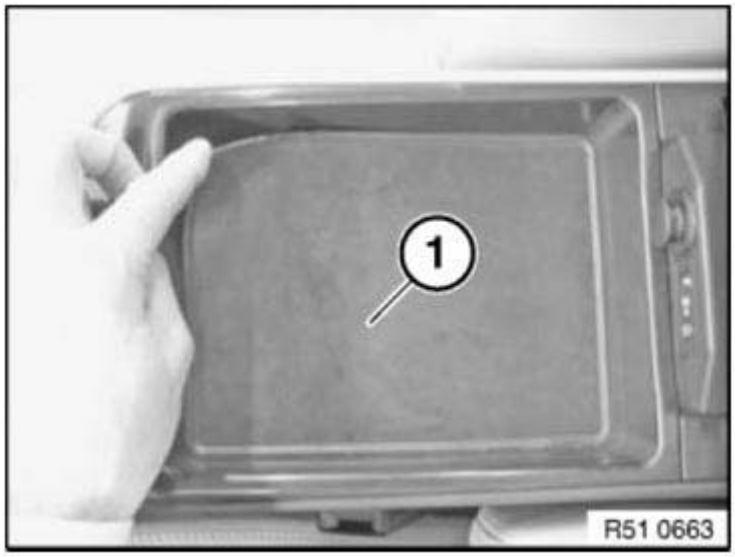


Fig. 93: Raising Mat Insert
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove storage compartment (2).

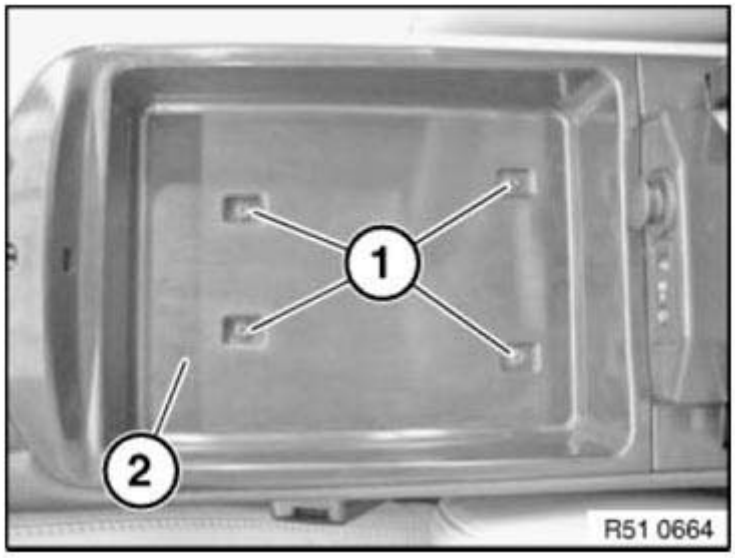


Fig. 94: Identifying Storage Compartment With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If telephone optional equipment installed

Raise both mat inserts (1) with suitable tool and remove.

Installation:

Mat inserts (1) are installation-encoded (2).

Note different diameters when installing.

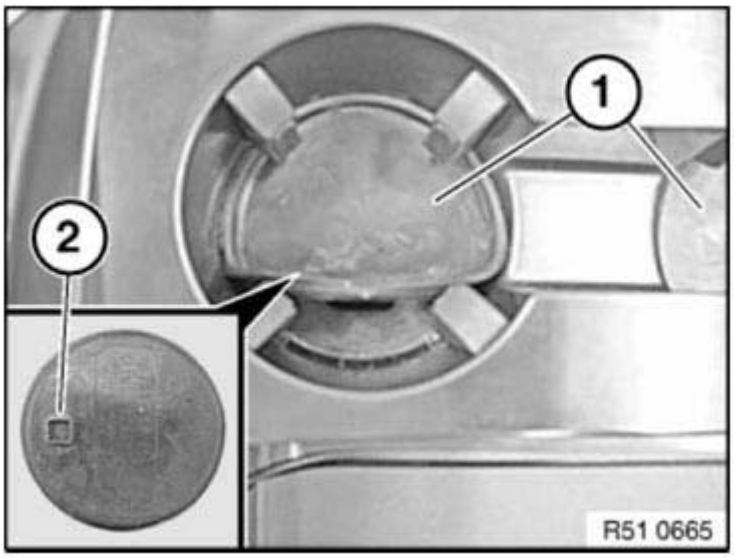


Fig. 95: Identifying Installation-Encoded Mat Inserts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove storage compartment (2) from centre console (3).

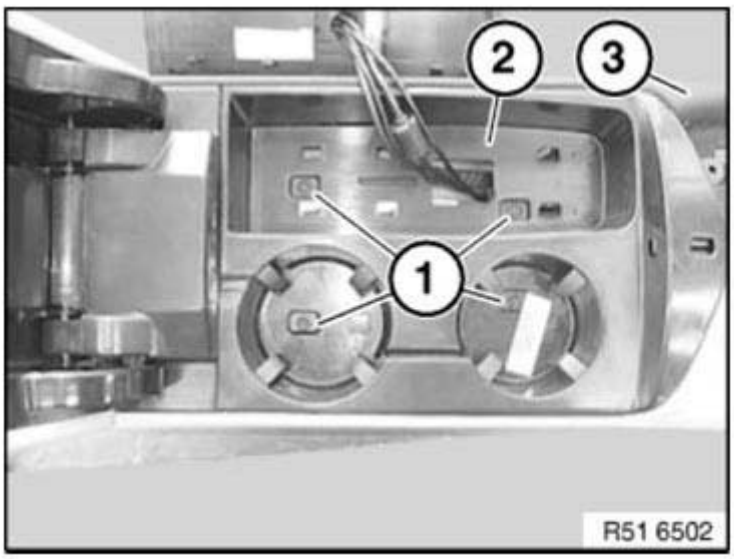


Fig. 96: Identifying Storage Compartment, Centre Console With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) from underside of centre console.

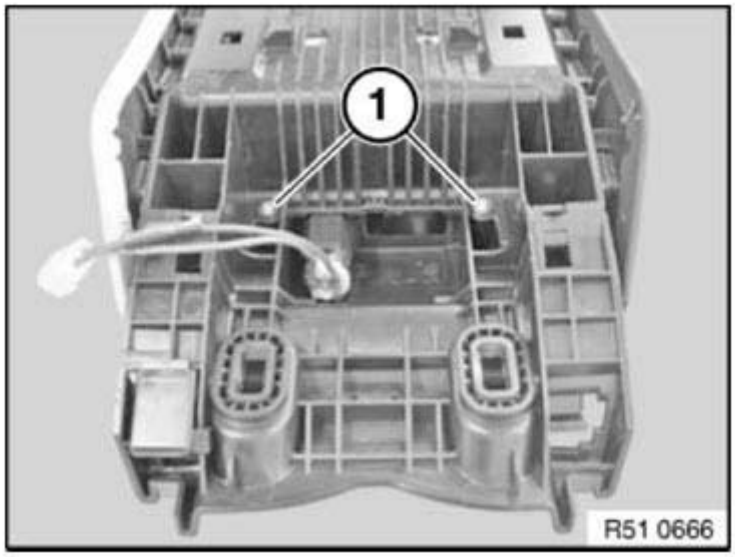


Fig. 97: Identifying Centre Console Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Raise cover (1) slightly and remove.

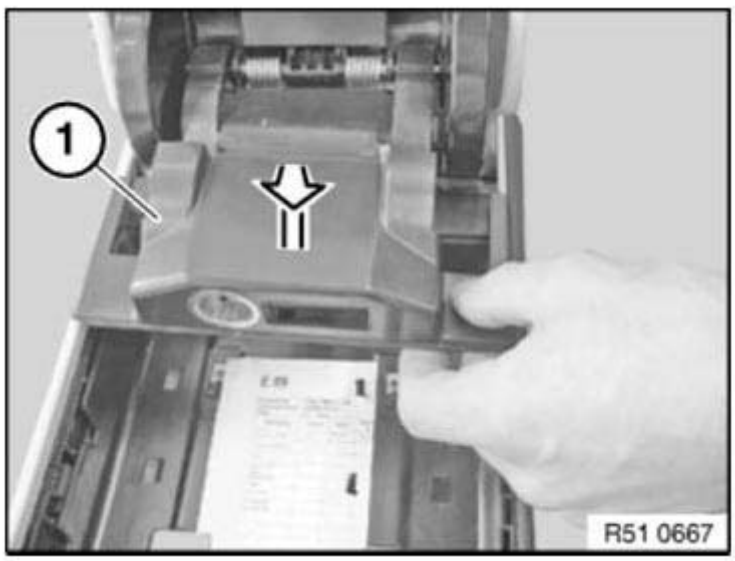


Fig. 98: Raising Cover
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Centre armrest shown closed for purposes of clarity.

WARNING: Spring (1) is under pre-tension.

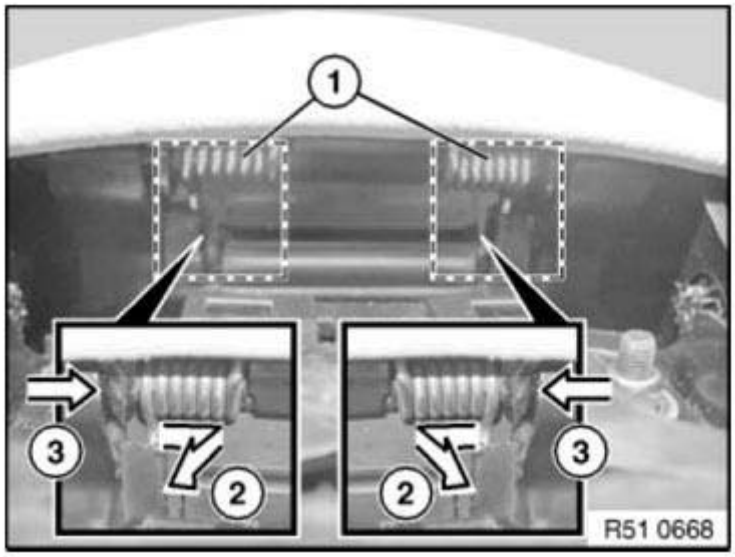


Fig. 99: Detaching Spring Legs Of Left And Right Side
Courtesy of BMW OF NORTH AMERICA, INC.

Open centre armrest fully to minimize spring pre-tension.

Unhook spring legs on left and right in direction of arrow (2) from housing body, then slide spring coil in each case in direction of arrow (3) from hinge axes. Use a suitable tool for this.

Pull spring with spring retainer (2) towards rear out of centre armrest (1). If necessary, fold centre armrest (1) shut for this purpose.

Installation:

Spring retainer (2) must lock correctly in recess in centre armrest (1).

The spring legs must be engaged up to the stop in the centre console housing.

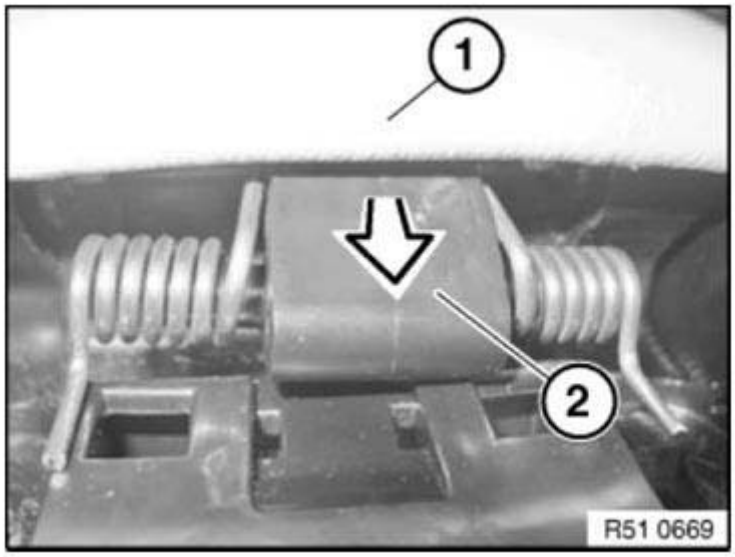


Fig. 100: Pulling Spring With Spring Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Pull hinge axes (2) in direction of arrow in inward direction out of bearing supports and remove centre armrest (1).

Installation:

Toothing of hinge axes points inwards.

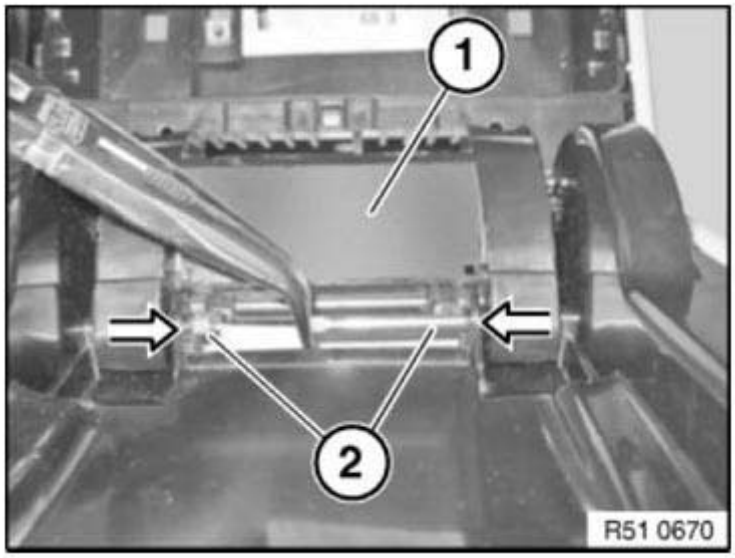


Fig. 101: Pulling Hinge Axes
Courtesy of BMW OF NORTH AMERICA, INC.

51 16 383 REMOVING AND INSTALLING/REPLACING DAMPER FOR GLOVEBOX

Unclip damper (1).

Turn damper (1) through 90° to right and remove.

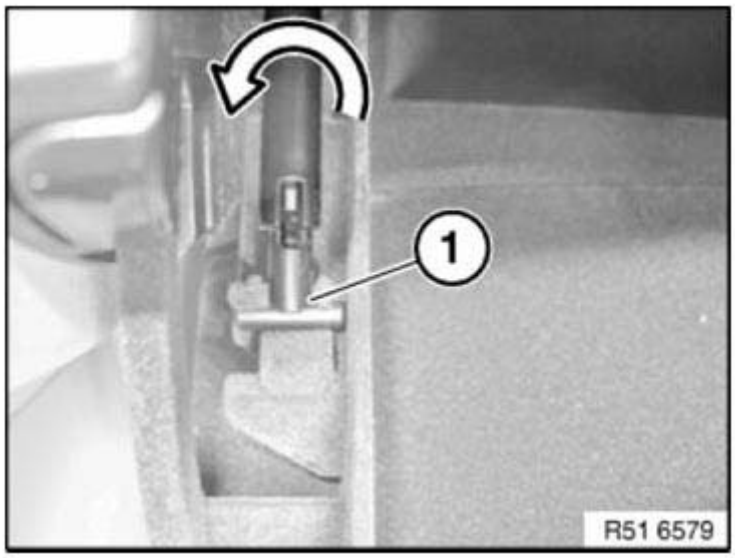


Fig. 102: Turning Damper
Courtesy of BMW OF NORTH AMERICA, INC.

51 16 365 REMOVING AND INSTALLING/REPLACING GLOVEBOX COVER

Necessary preliminary tasks

- Remove **RIGHT GLOVEBOX WITH HOUSING**
- Remove **DAMPER FOR GLOVEBOX**

Release screws (1).

Remove glovebox housing (2).

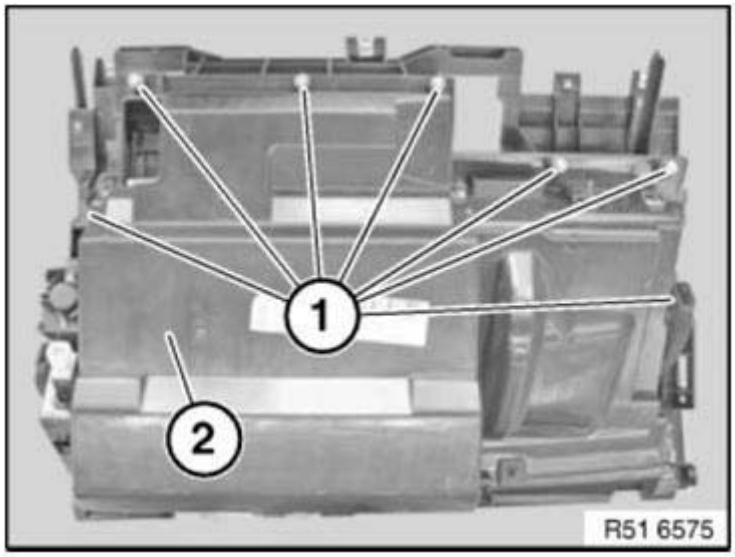


Fig. 103: Identifying Glovebox Housing With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Drive out hinge axle (1) on left and right with a suitable tool.

Remove glovebox cover (2).

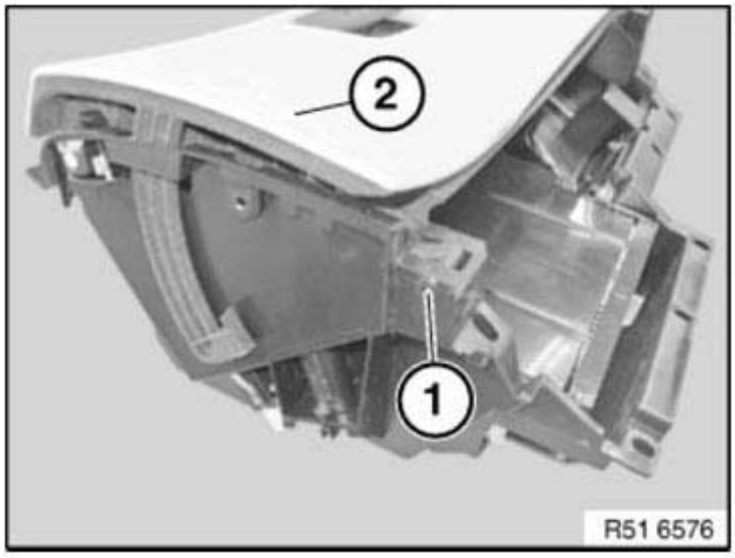


Fig. 104: Identifying Glovebox Cover And Hinge Axle
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Remove **GLOVEBOX LOCK**

51 16 040 REMOVING AND INSTALLING/REPLACING HOUSING ON LEFT OR RIGHT OUTSIDE

MIRROR

Necessary preliminary tasks

- Remove **MIRROR GLASS FOR MIRROR**

Using special tool 00 9 317 , press mirror housing (1) off mirror and at same time bend open retaining hooks (3) with suitable tool.

In so doing, always position special tool 00 9 317 close to retaining hooks.

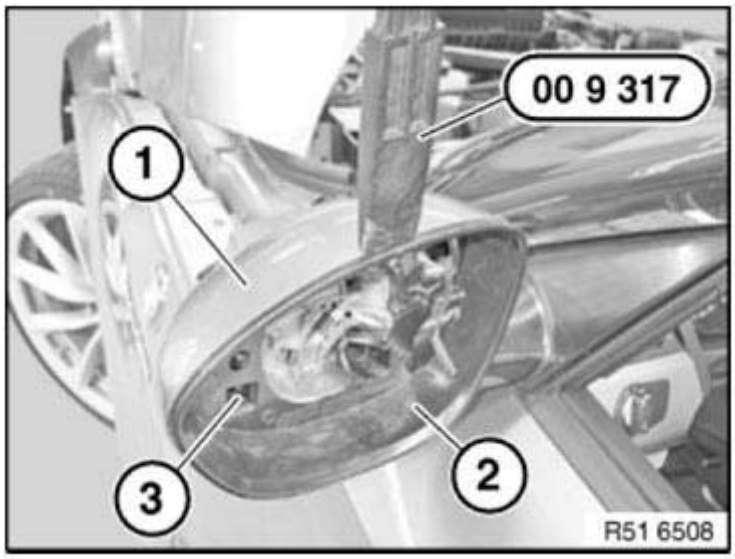


Fig. 105: Pressing Mirror Housing Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) on mirror housing (2) must not be damaged.

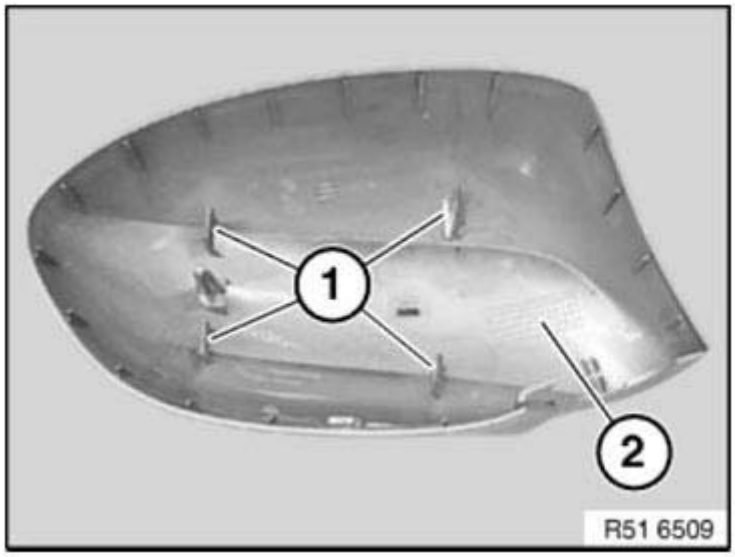


Fig. 106: Identifying Catches On Mirror Housing
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 261 REMOVING AND INSTALLING/REPLACING LEFT INSTRUMENT PANEL TRIM

Unclip instrument panel cover (1) in direction of arrow.

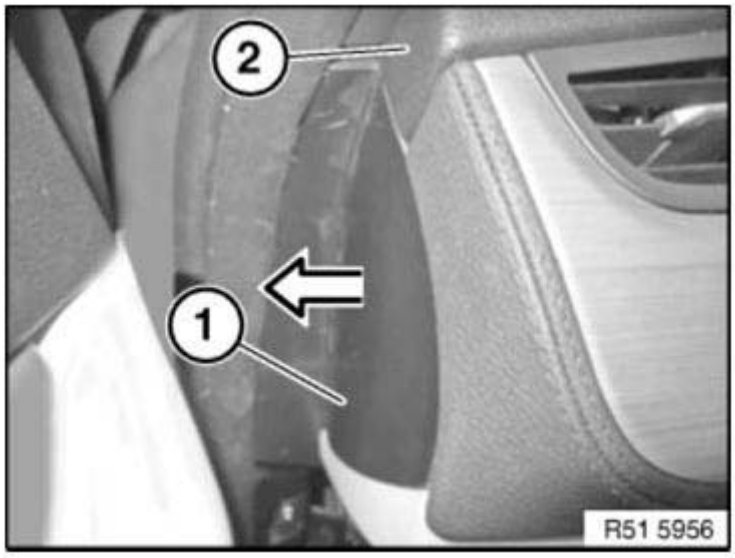


Fig. 107: Removing Instrument Panel Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on trim (2).

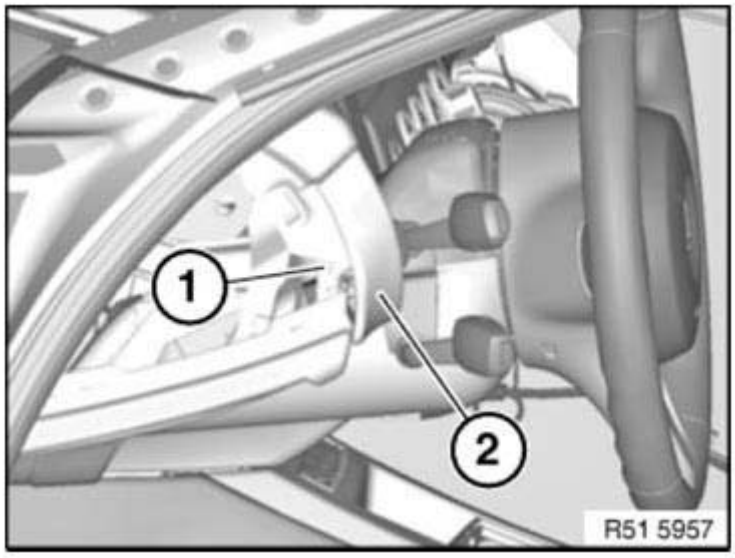


Fig. 108: Identifying Screw On Trim
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Tape off working area. Risk of damage!

Painted trims are particularly sensitive to damage.

Lever out trim (1) with special tool 00 9 317 at mounting points (2) and remove.

Unlock plug connection behind and disconnect.

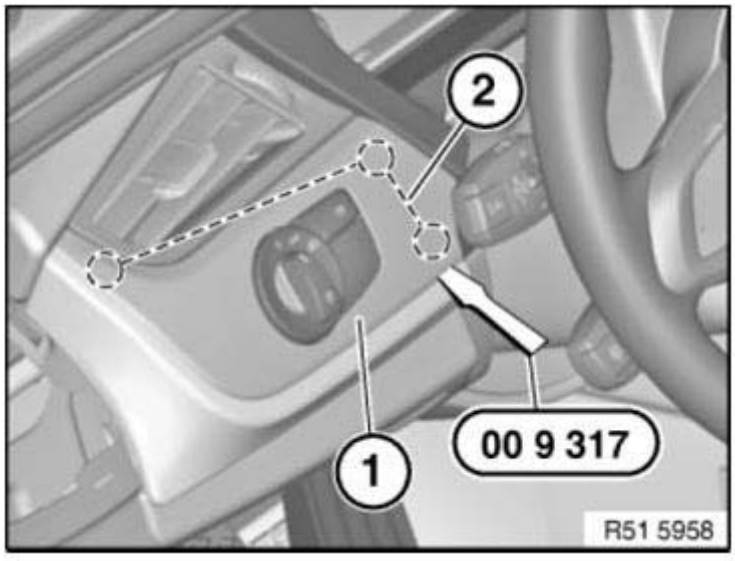


Fig. 109: Removing Trim Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace retainers (1).

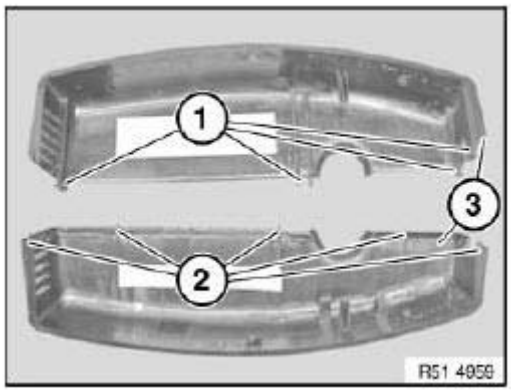


Fig. 110: Identifying Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove **LIGHT SWITCH UNIT** .

51 16 340 REMOVING AND INSTALLING/REPLACING LOCK FOR RIGHT GLOVEBOX

Open glove compartment (2).

Release screws (1) on inside of glovebox (2).

Remove lock from glovebox (2).

Installation:

Carry out function check with glovebox open.

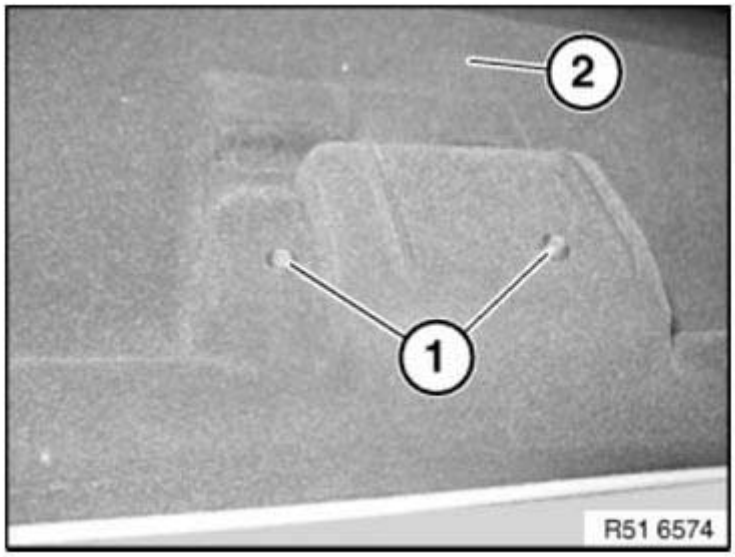


Fig. 111: Identifying Screws On Inside Of Glovebox
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove lock barrel.

To do so, remove upper lock section (1) by expanding catches (2) with a suitable tool.

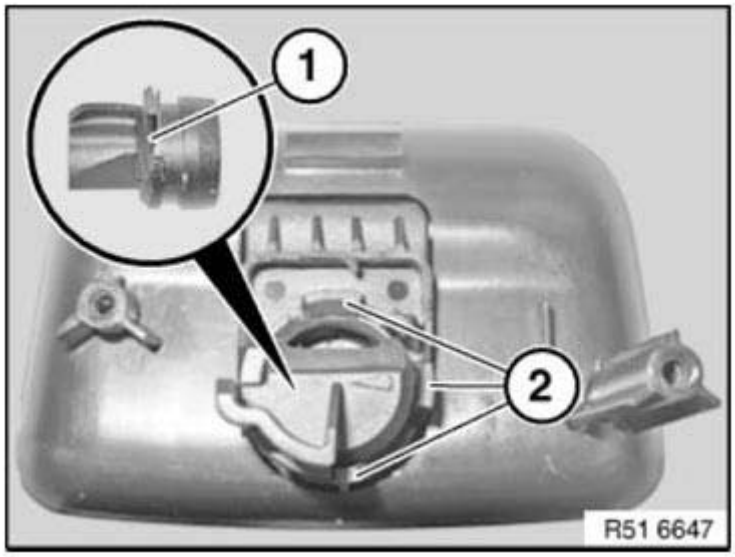


Fig. 112: Identifying Upper Lock Section With Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Slide lock barrel (2) out of glovebox lock (3) by expanding catches (1) with a suitable tool.

NOTE: The emergency key in the lock barrel prevents the lock wedges from falling out.

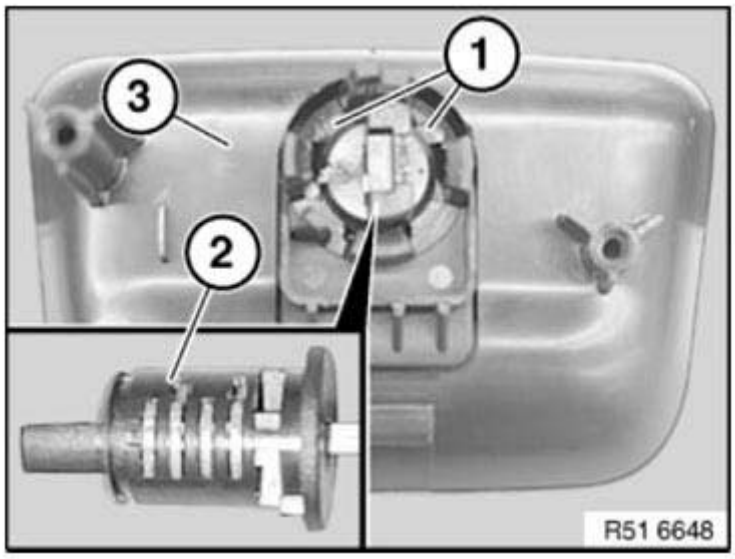


Fig. 113: Identifying Lock Barrel With Catches And Glovebox Lock
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 266 REMOVING AND INSTALLING/REPLACING RIGHT INSTRUMENT PANEL TRIM

IMPORTANT: Risk of damage!

A hard disk is installed in the Car Information Computer (CIC).

Carry out mechanical work on the CIC and adjacent components with care.

Avoid subjecting the CIC to shaking/shocks.

Necessary preliminary tasks

(Only with Radio Business or Radio Professional equipment specification)

- Remove **RADIO RECEIVER**

NOTE: Carry out following work step only in case of optional equipment with Car Information Computer (CIC)

Unclip trim (1) with special tool 00 9 323 .

Fig. 114: Removing Trim Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For clearer illustration, shown with front trim on CIC removed.

Release screws (1).

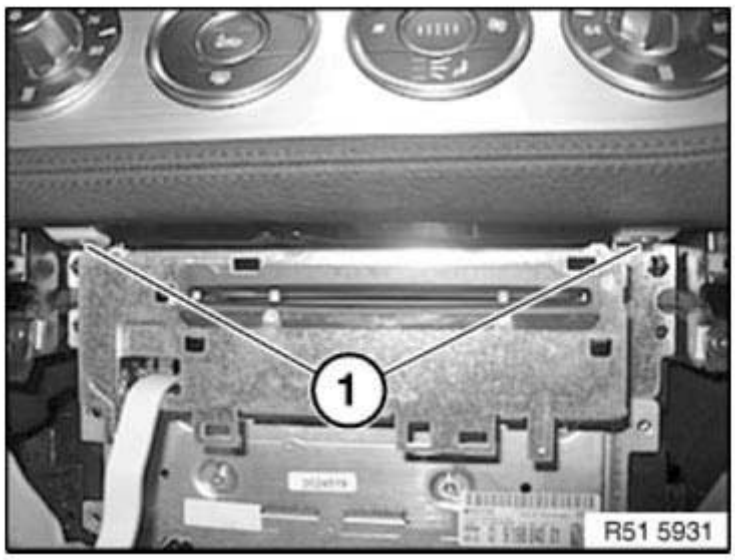


Fig. 115: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Open glovebox cover (1).

Release screws (2) at marked points in upper area of glovebox.

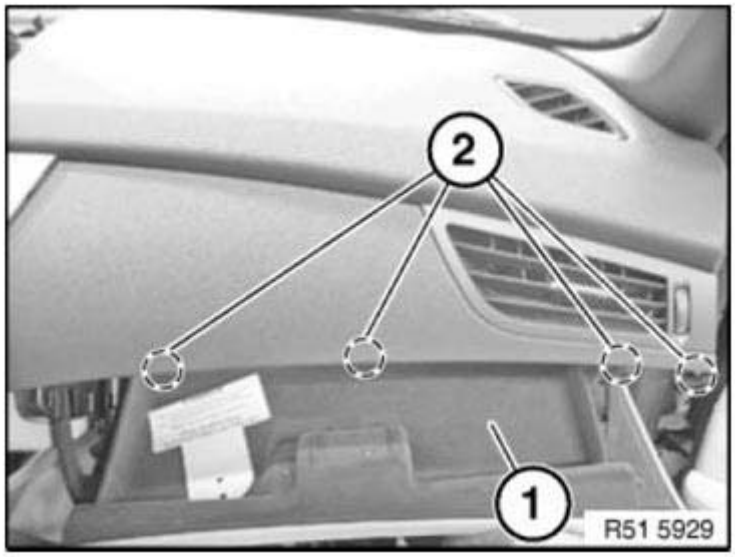


Fig. 116: Identifying Glovebox Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out insertion slot (1) with special tool 00 9 323 and remove.

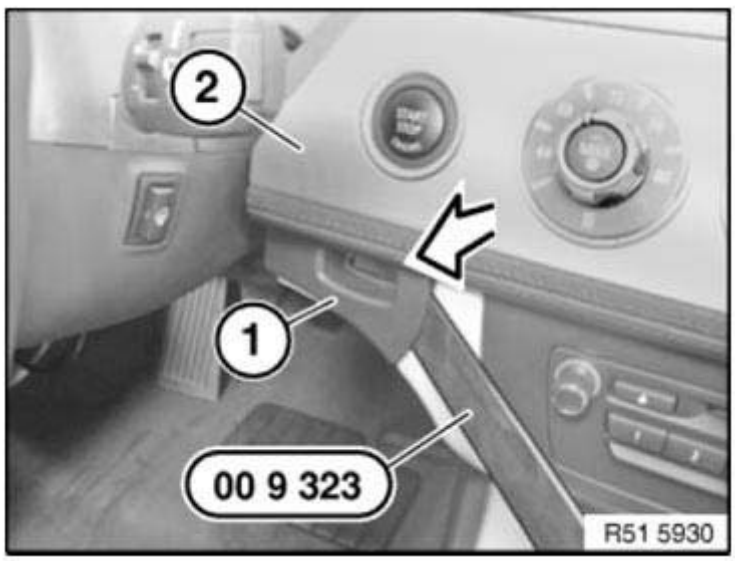


Fig. 117: Removing Insertion Slot Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw behind.

Carefully lever out instrument panel trim (2) towards front.

Unlock associated plug connections and disconnect.

Remove instrument panel pipe trim (2).

Replacement

- Remove **CONTROL PANEL FOR HEATING - A/C SYSTEM**
- Remove **START/STOP SWITCH**

61 31 172 REMOVING AND INSTALLING/REPLACING SWITCH FOR ELECTROMECHANICAL PARKING BRAKE

Necessary preliminary tasks:

- **DISCONNECT NEGATIVE BATTERY LEAD** (to avoid fault memory entries)
- Remove **TRIM FOR STORAGE TRAY**

Release screws (1).

Remove switch for electromechanical parking brake (2) from trim for storage compartment (3).

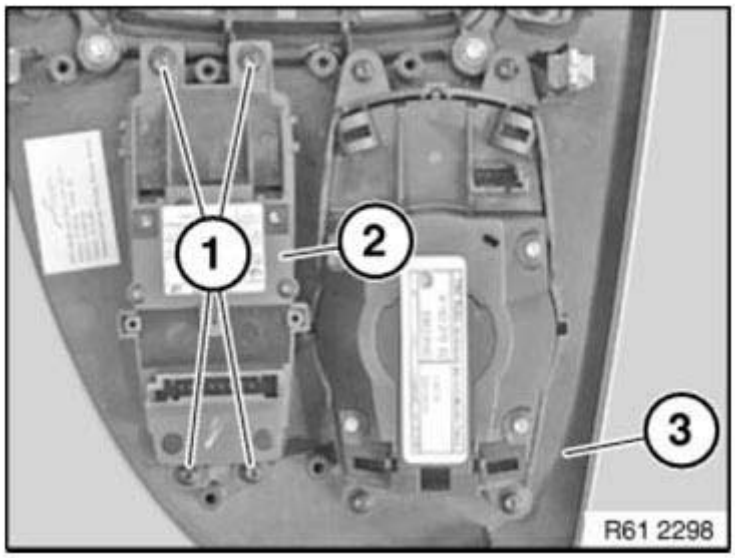


Fig. 118: Identifying Electromechanical Parking Brake, Storage Compartment And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 16 368 REPLACE RIGHT GLOVE BOX WITH HOUSING

Necessary preliminary tasks

- Modify glove box lid See **5145195 REMOVING AND INSTALLING/REPLACING TRIM FOR INSTRUMENT PANEL, BOTTOM RIGHT** or **5116365 REMOVING AND INSTALLING/REPLACING GLOVEBOX COVER**
- Modify footwell light

  If the replacement smart card (supplied with the new glove box) does not correspond to the original

smart card of the vehicle, then

- the original smart card should continue to be used.
- the replacement smart card should be disposed.

51 16 166 REPLACING CENTRE CONSOLE

Necessary preliminary tasks

- Remove **ACTUATOR DRIVE IN STORAGE COMPARTMENT**

Additionally if telephone optional equipment installed:

- Remove **EJECT BOX**

Raise mat insert (1) with suitable tool and remove.

Fig. 119: Raising Mat Insert
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove storage compartment (2).

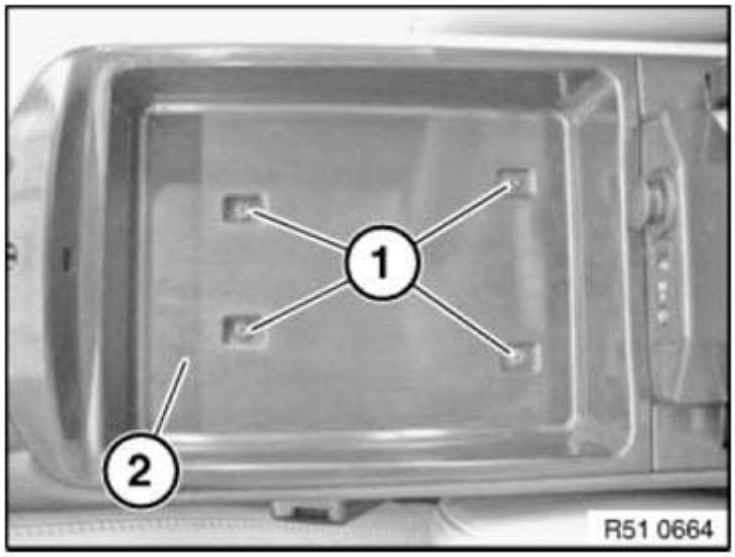


Fig. 120: Identifying Storage Compartment With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

If telephone optional equipment installed

Raise both mat inserts (1) with suitable tool and remove.

Installation:

Mat inserts (1) are installation-encoded (2). Note different diameters when installing.

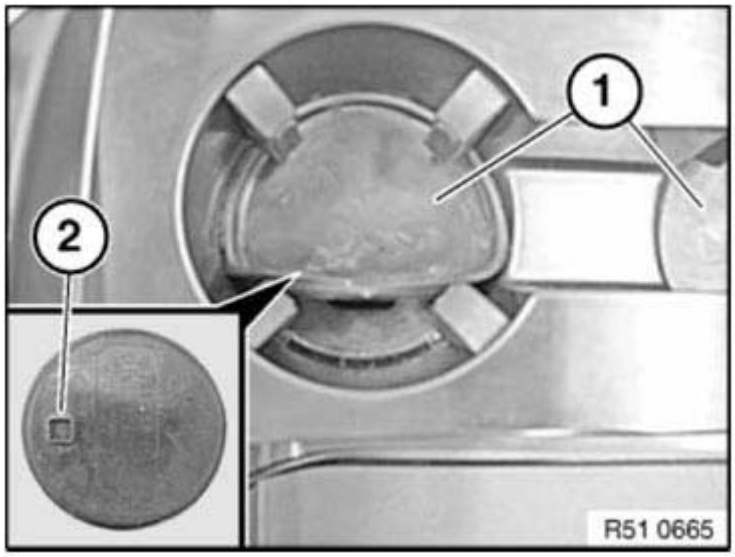


Fig. 121: Identifying Installation-Encoded Mat Inserts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove storage compartment (2) from centre console (3).

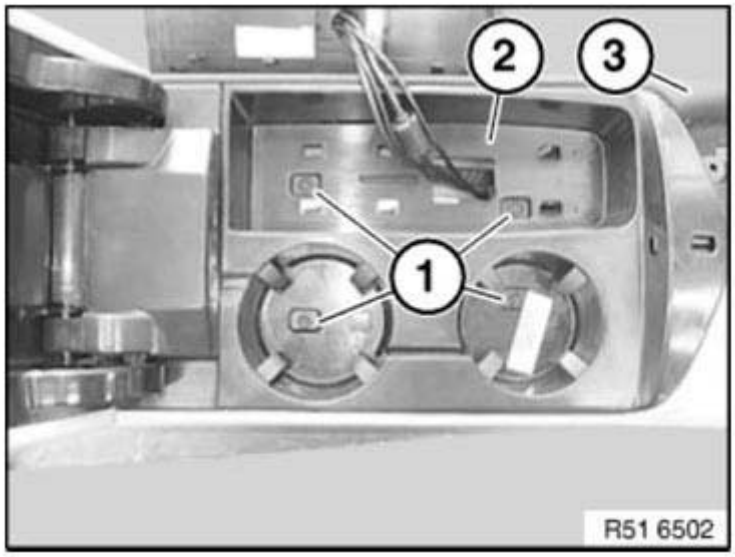


Fig. 122: Identifying Storage Compartment, Centre Console With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove trim for drinks holder (2) and holder for drinks holder (2) from centre console (3).

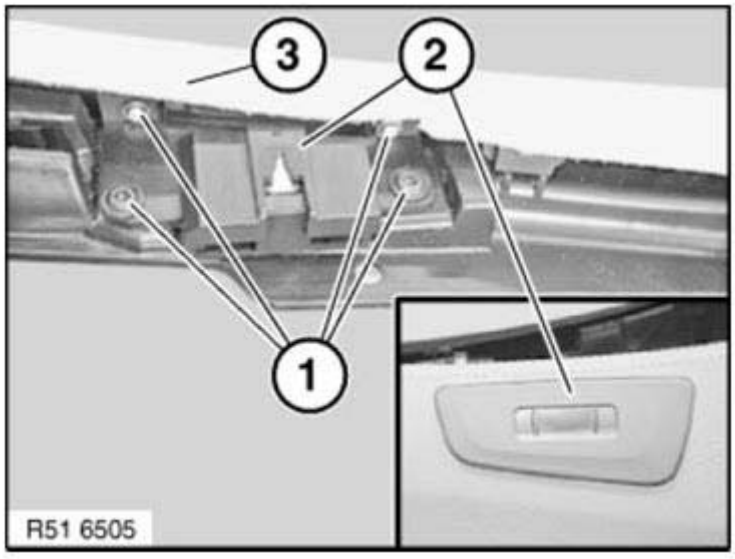


Fig. 123: Identifying Drinks Holder With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 ... REPLACING DEFROSTER COVERS

When working on trim panel components, make sure that the sensitive surfaces are not scratched or damaged.

Carefully lever out and remove speaker cover (1) using special tool 00 9 325 .

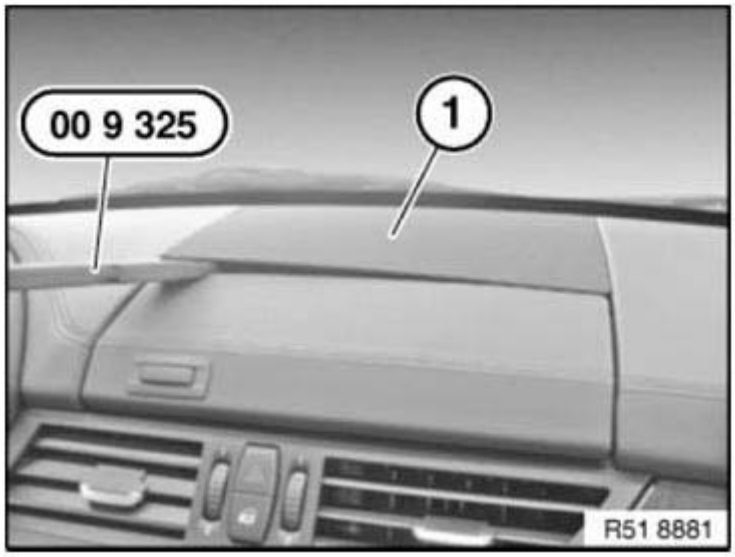


Fig. 124: Removing Speaker Cover Using Special Tool (00 9 325)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining clips (1) on speaker cover (2) must be correctly seated on associated lugs and must not be damaged.

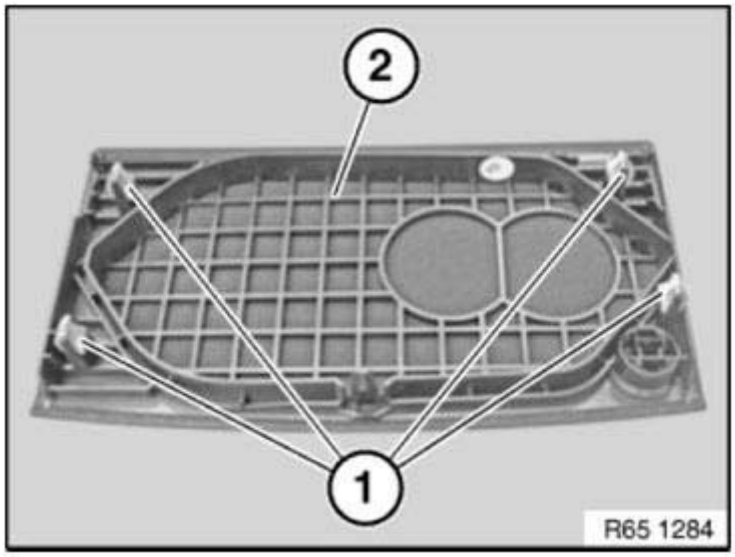


Fig. 125: Identifying Retaining Clips On Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure that no parts fall into the air duct (risk of noise).

Using special tool 00 9 327 , first lever out right defroster cover (1) in the centre and release inner catch.

If necessary, twist special tool 00 9 327 as shown in order to do so.

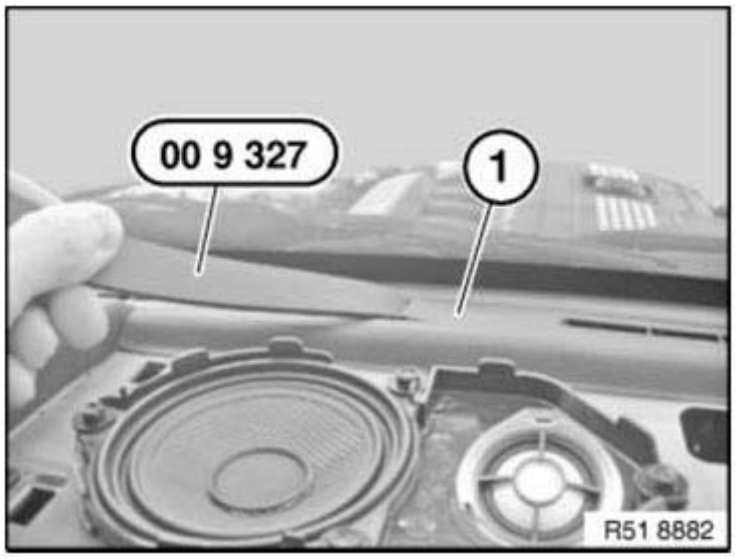


Fig. 126: Removing Right Defroster Cover Using Special Tool (00 9 327)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The catch positions (arrow) can be determined by counting off the ribs (2) on the defroster cover (1) in each case.

Lever out all other catches from the inside outwards using special tool 00 9 327 .

To do so, carefully lever up defroster cover (1) in the centre using special tool 00 9 325 (see illustration).

Remove defroster cover.

Repeat operation on left defroster cover.

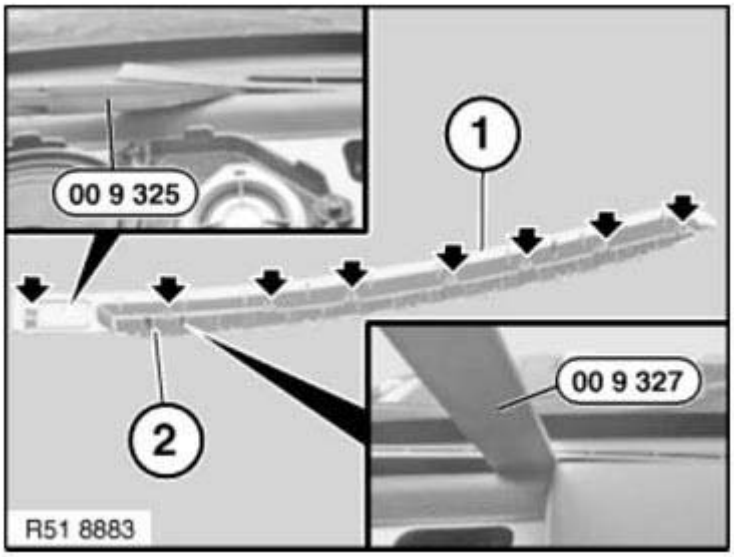


Fig. 127: Removing Catches Using Special Tool (00 9 327)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit left defroster cover first.

Leather interior only:

- A2Apply 2-component Araldite 2021 TN 2 149 520 adhesive drops (sourcing reference BMW parts service) to marked points (2) of the (1) left and right defroster panel.
- Read and comply with safety data sheet!

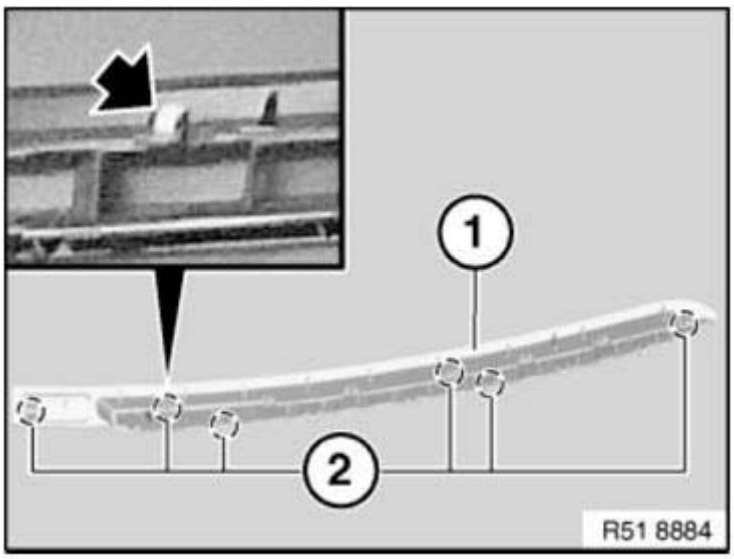


Fig. 128: Identifying Araldite 2021 TN 2 149 520 Adhesive Drops Applying Areas

Courtesy of BMW OF NORTH AMERICA, INC.

51 16 026 REPLACING MIRROR GLASS

WARNING: If mirror glass is damaged:

Wear protective goggles and tearproof gloves during the removal operation.

Risk of injury by flaking-off glass splinters.

The right side is removed in the same way as the left side.

Tilt mirror glass (1) upwards.

Bend visible wire ends (2) with a suitable tool in each case towards middle and then move in direction of arrow and disengage.

Release mirror glass (1) by tilting and remove.

NOTE: Look out for possible damage to mirror by tool.

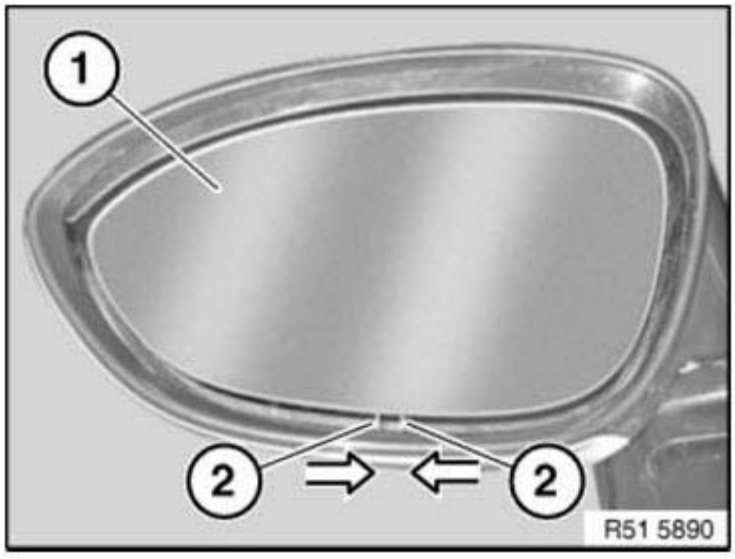


Fig. 129: Moving Visible Wire Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) for mirror heating from mirror glass (2).

If necessary, disconnect plug connection for automatic anti-glare control from mirror glass (2).

Remove wire (3) from mirror glass (2).

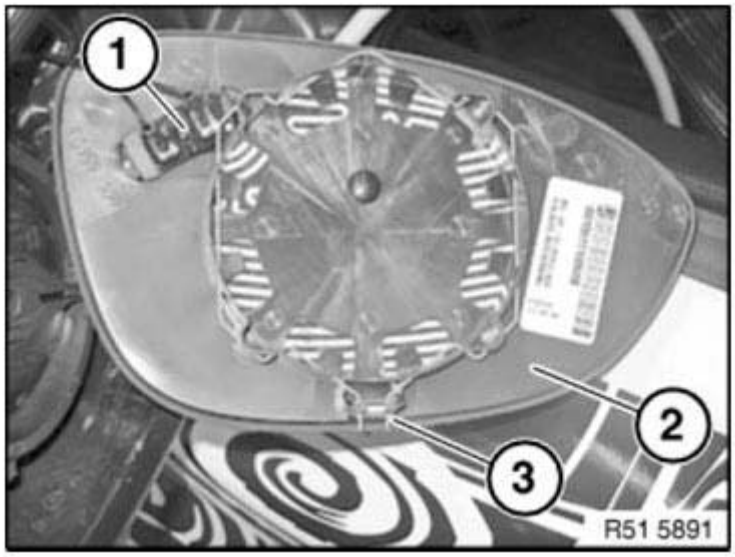


Fig. 130: Identifying Plug Connection, Mirror Glass And Wire
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Following parts of mirror glass must not be damaged or missing:

- Connections for mirror heating
- If necessary: guides for automatic anti-glare control cable
- Guides for spring wire clip
- Spring wire clip

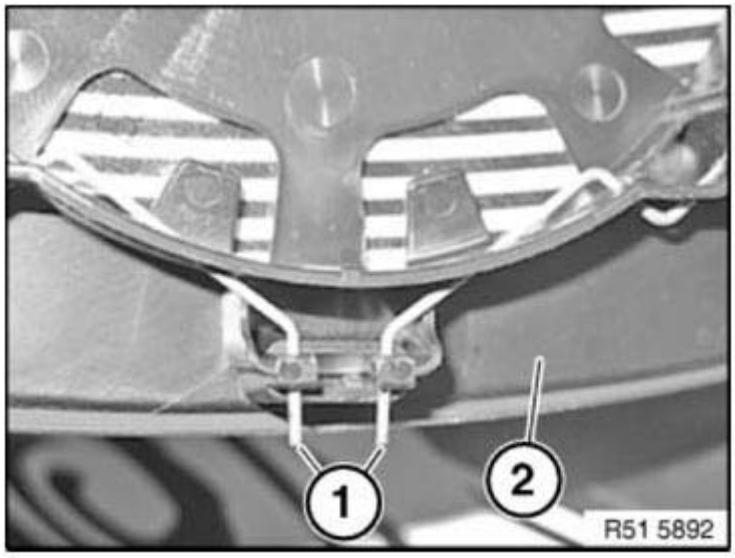


Fig. 131: Identifying Mirror Glass With Spring Wire Clip Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Connect plug connection to mirror glass (2).

Clip both spring wire clip ends (1) into mirror glass (2).

Clip mirror glass (2) into mirror housing.

NOTE: Check function.

51 16 213 REPLACING TRIM FOR STORAGE COMPARTMENT

Necessary preliminary tasks

- Remove **TRIM FOR STORAGE COMPARTMENT**
- Remove **SWITCH FOR PARKING BRAKE**
- Remove **CONTROLLER**
- Remove **DRIVING DYNAMICS SWITCH**
- Remove **ROOF OPERATING UNIT**

Unscrew storage compartment (1) from trim for storage compartment (2).

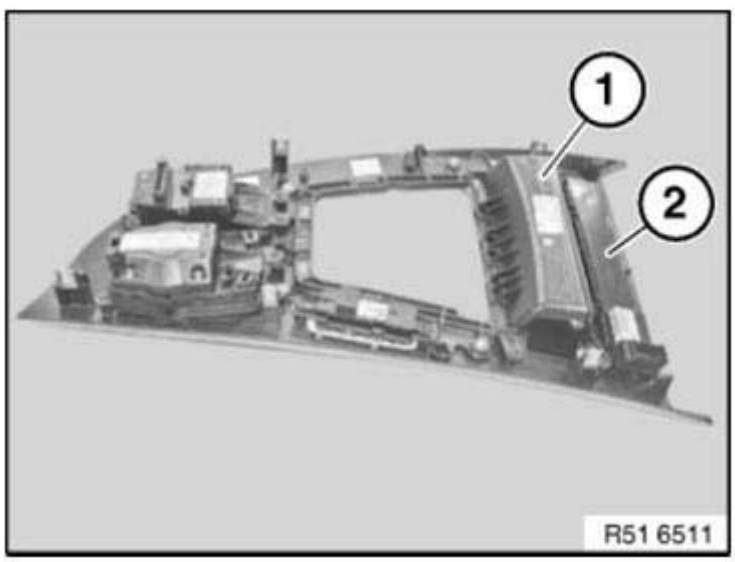


Fig. 132: Identifying Storage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

5117 LIDS

51 21 ... REMOVING AND INSTALLING/REPLACING STORAGE COMPARTMENT IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **FRONT DOOR TRIM PANEL**

Release screws (1) on door trim panel (2).

Open storage compartment and remove.

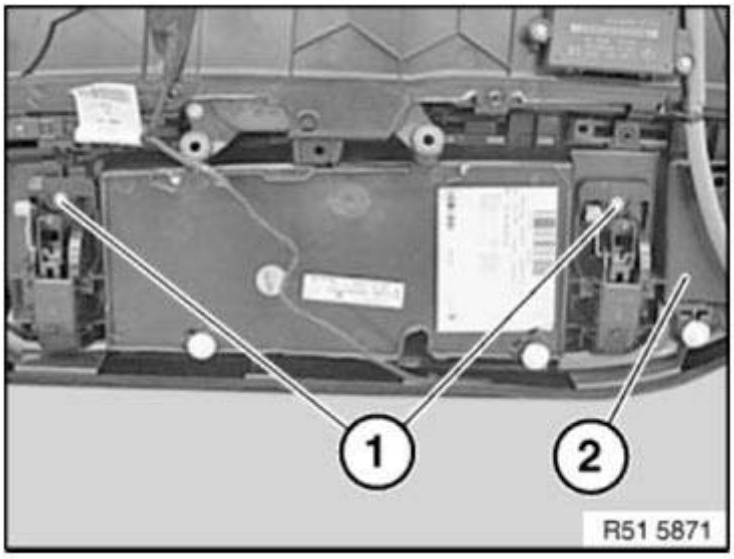


Fig. 133: Identifying Screws On Door Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

41 63 002 REPLACING COVER BOWL

Necessary preliminary tasks

Remove **FLAP FOR FUEL FILLER NECK (1)** .

Turn cover (1) through approx. 90° and lever out in direction of arrow.

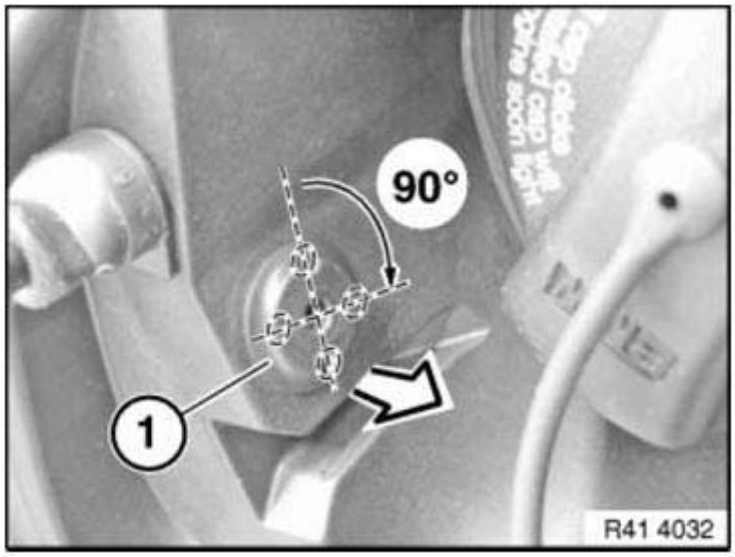


Fig. 134: Removing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Press retaining strap (1) inwards and remove.

Remove fuel tank cap.

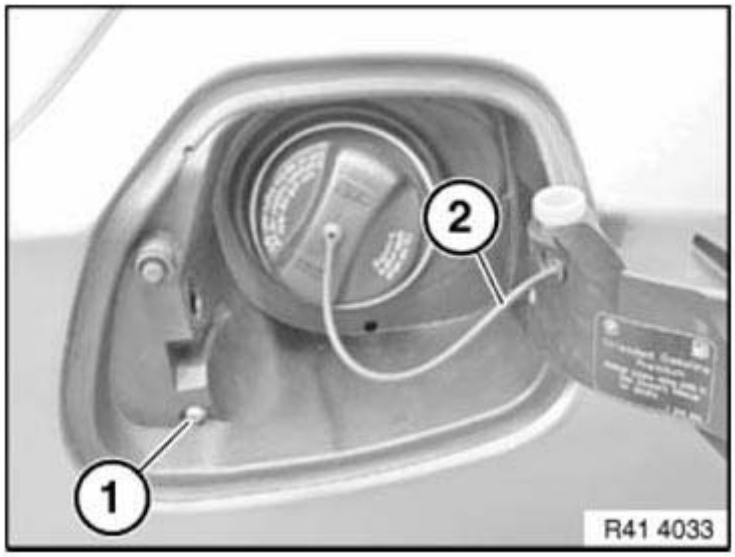


Fig. 135: Identifying Retaining Strap With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Press rear cover housing in direction of arrow downwards a little and then pull outwards.

In so doing, lift seal (1) over fuel filler neck ().

If necessary, apply suitable antiseize agent between seal and fuel filler neck.

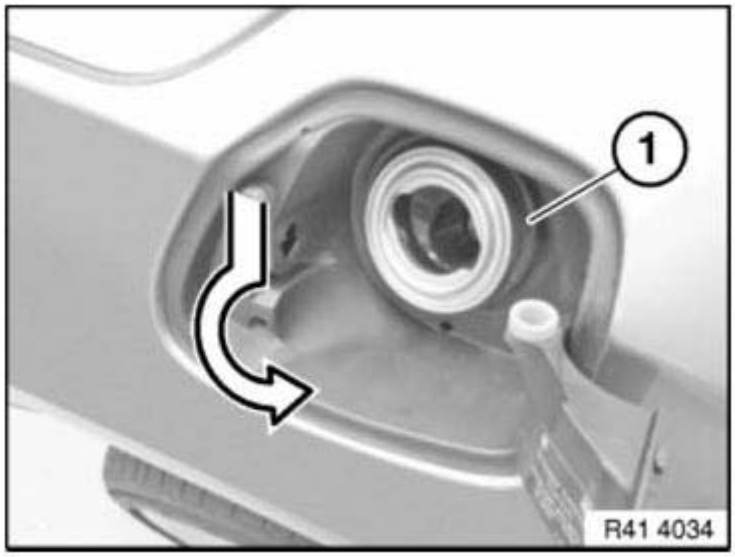


Fig. 136: Pressing Rear Cover Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Locks (1) on left/right of cover (2) must not be damaged.

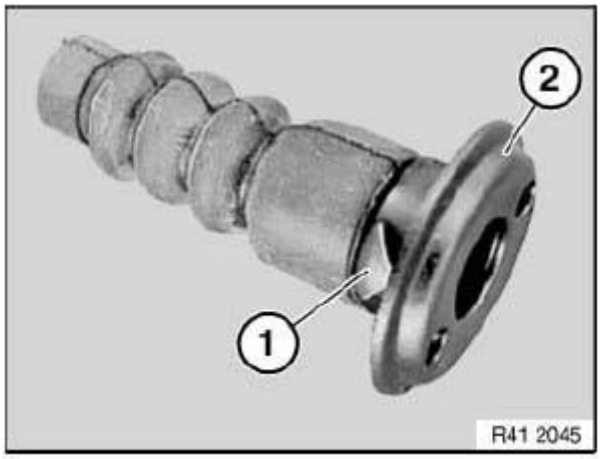
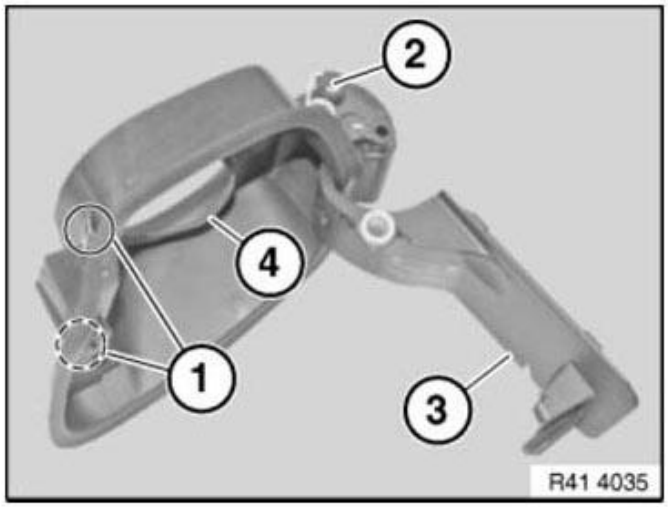


Fig. 137: Identifying Locks And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Following parts of cover housing not be damaged or missing:

If necessary, apply suitable antiseize agent to seal and fuel filler neck.



1. Catches, top/bottom
2. Spring
3. Catch, fuel tank flap
4. Seal

Fig. 138: Identifying Catches, Spring And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

5121 FRONT DOOR LOCKS, HANDLES, FITTINGS

51 21 004 ADJUSTING FRONT LEFT OR RIGHT DOOR LOCK STRIKER

Adjusting door lock striker, see **ADJUSTING FRONT DOOR** .

51 21 280 REMOVING AND INSTALLING OR REPLACING DOOR BRAKE ON LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Close door windows
- Remove **FRONT DOOR TRIM**
- Remove **SOUND INSULATION** in front area

Release screws (1).

Tightening torque **51 21 13AZ** .

Remove H-strut (2).

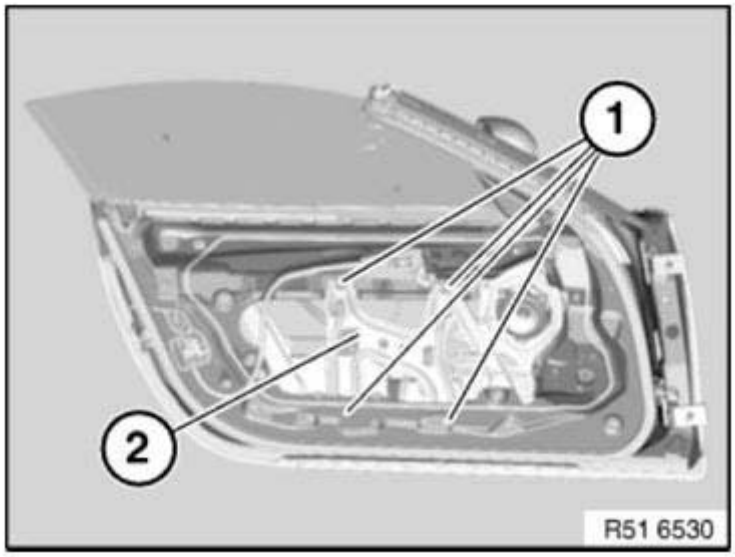


Fig. 139: Identifying H-Strut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 21 16AZ** .

Remove adapter for door speaker (2).

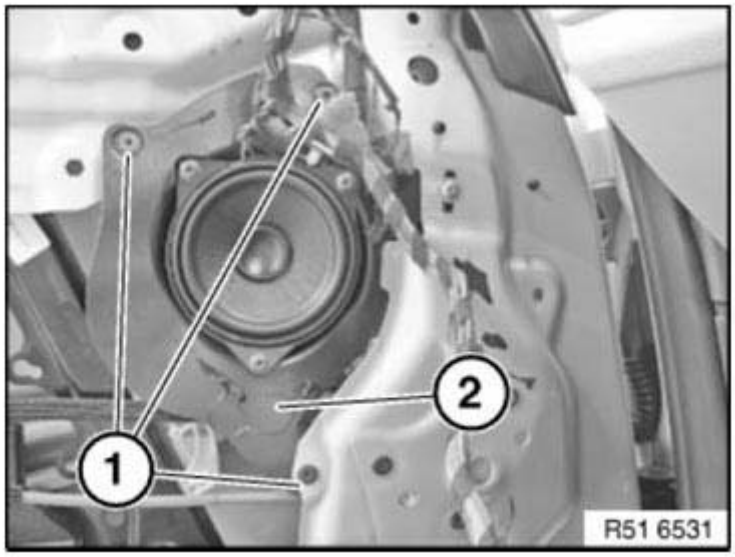


Fig. 140: Identifying Door Speaker And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 21 17AZ** .

Remove power window motor (2) from pole retainer (3).

Power window motor (2) remains in door (4).

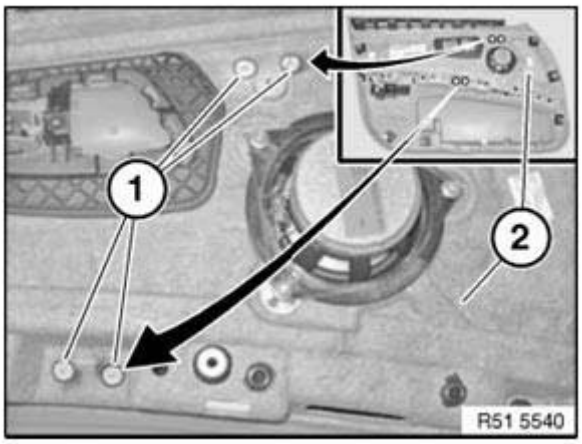


Fig. 141: Identifying Power Window Motor, Pole Retainer, Door With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Secure front door against falling closed.

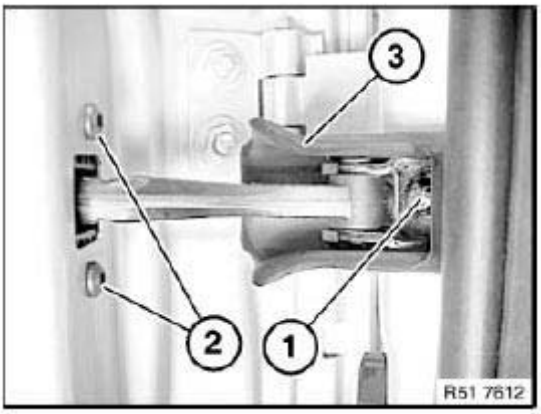


Fig. 142: Identifying Seal And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **51 21 9AZ** .

Unfasten screws (2).

Tightening torque **51 21 10AZ** .

Remove seal (3).

Installation:

Seal (3) must not be damaged.

Remove door retainer (1) via cutout (2).

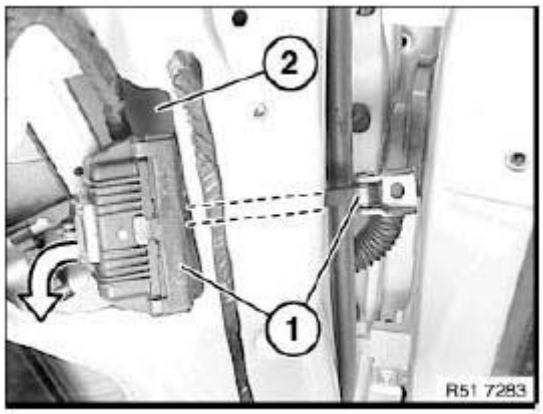


Fig. 143: Removing Door Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Following parts of door retainer (3) must not be damaged:

1. Hinge
2. Thread

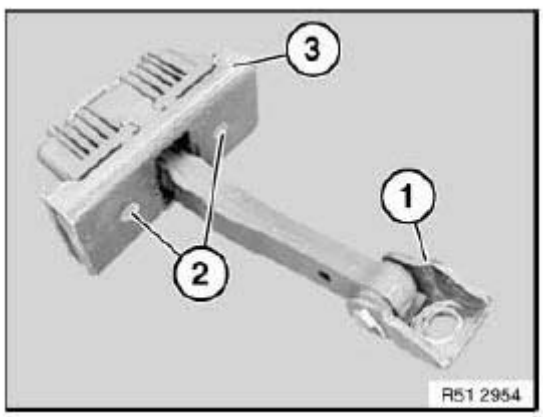


Fig. 144: Identifying Door Retainer With Hinge And Thread
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 225 REMOVING AND INSTALLING OR REPLACING INSIDE DOOR OPENER IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **FRONT DOOR TRIM PANEL**

Release screws (1).

Unlock and disconnect plug (2).

Unhook Bowden cable (3) from door trim panel (4).

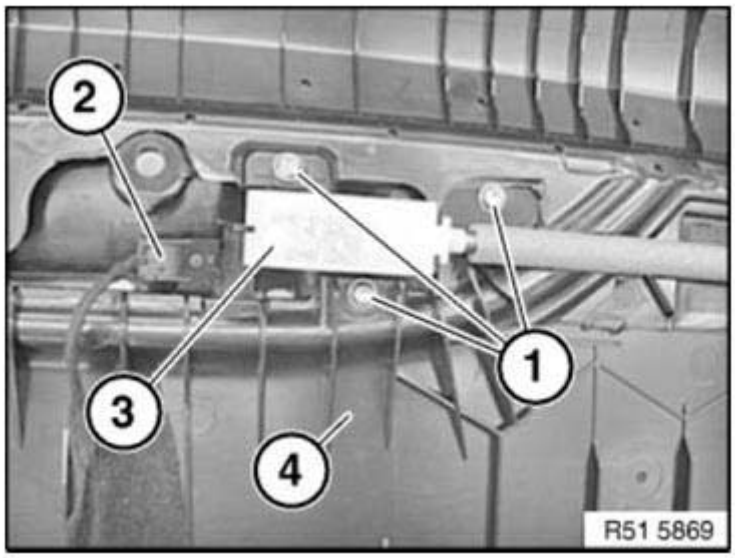


Fig. 145: Identifying Bowden Cable, Door Trim Panel With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Snap trim with inner door opener (2) out of door trim panel (1).

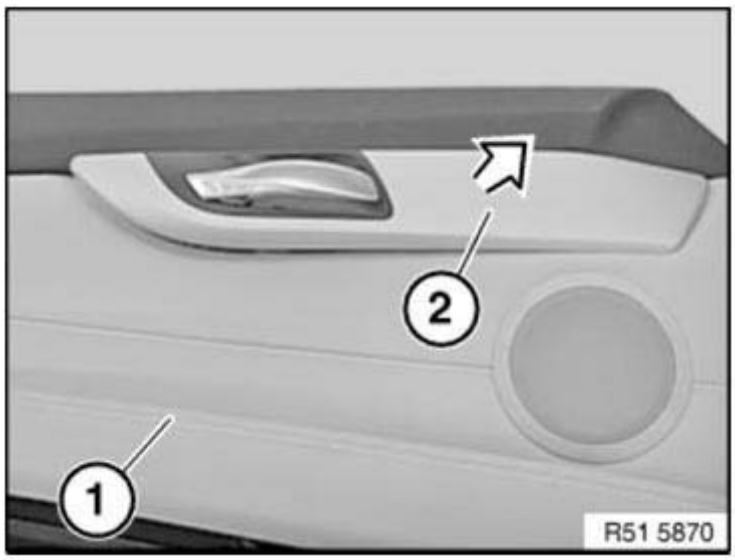


Fig. 146: Removing Trim With Inner Door Opener Out Of Door Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 170 REMOVING AND INSTALLING OR REPLACING OUTSIDE DOOR HANDLE FROM LEFT OR RIGHT FRONT DOOR

Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Measure dimension aeon special tool 51 3 340 and mark accordingly (1).

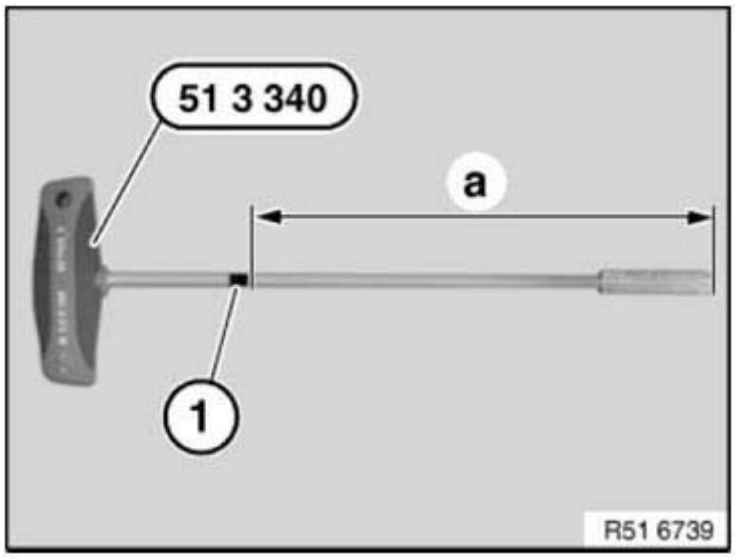


Fig. 147: Identifying Dimension On Special Tool (51 3 340)
Courtesy of BMW OF NORTH AMERICA, INC.

"a" = 140 mm.

Lever seal plug (1) out of mounting hole (2).

NOTE: To avoid paintwork damage, use a suitable tool and tape off area around mounting hole.

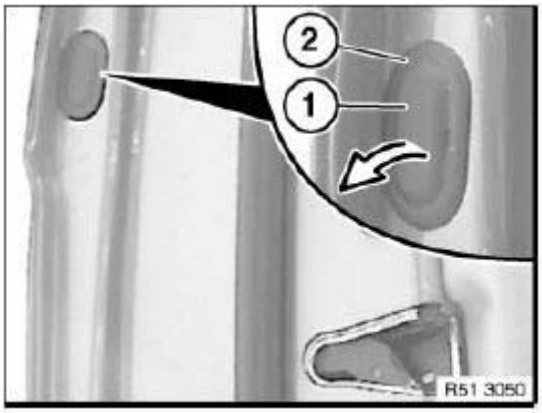


Fig. 148: Removing Seal Plug Out Of Mounting Hole
Courtesy of BMW OF NORTH AMERICA, INC.

For overview

- Carrier plate, outside door handle (1)
- Locking plate (2)
- Positioning of special tools 51 3 252 and 51 3 340

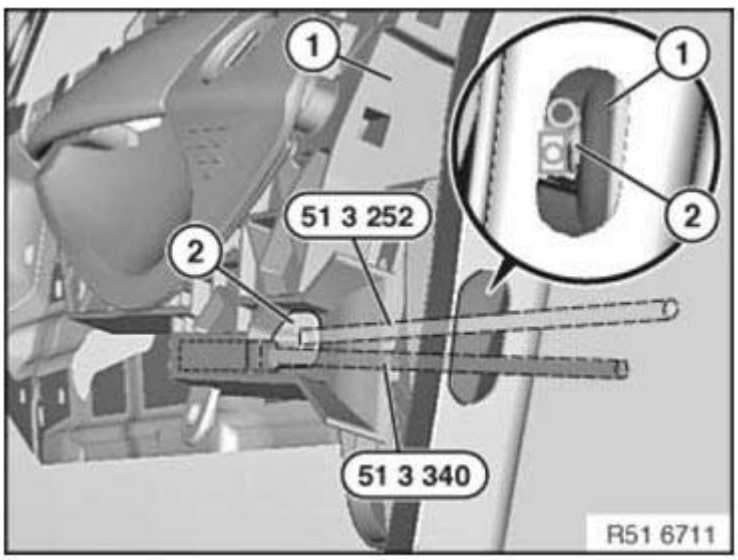


Fig. 149: Positioning Of Special Tools (51 3 252 And 51 3 340)
Courtesy of BMW OF NORTH AMERICA, INC.

For purposes of clarity, the following operations are shown with the component removed:

To raise retaining tab (2) of locking plate (1) over retaining rib (3) ...

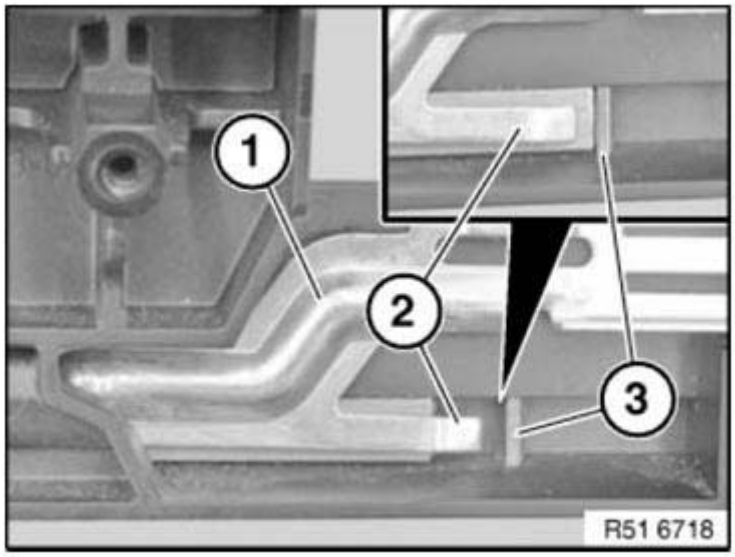


Fig. 150: Identifying Retaining Tab Of Locking Plate And Retaining Rib
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 51 3 340 from below, outside locking plate (2), along marked edge of carrier plate (1) up to point "X".

NOTE: If special tool 51 3 340 can only be slid in with difficulty from point "X" onwards, check the tool geometry per SI 01 32 09 (606).

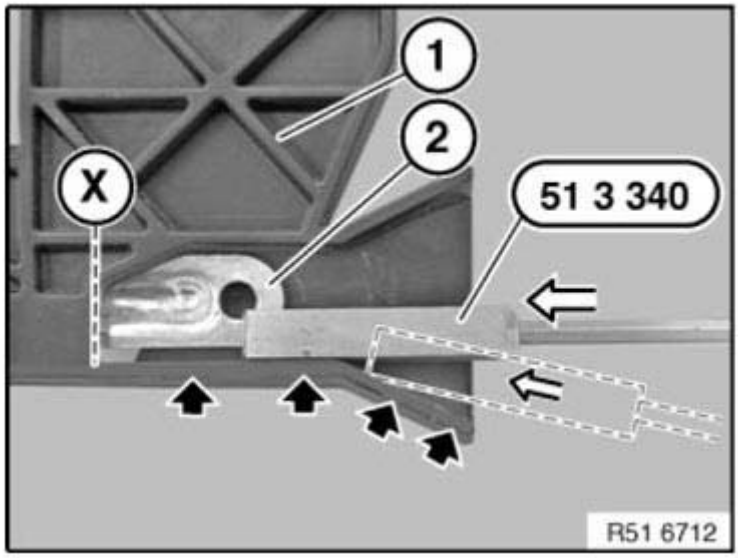


Fig. 151: Inserting Special Tool (51 3 340)
Courtesy of BMW OF NORTH AMERICA, INC.

For checking

Marking (1) on special tool 51 3 340 is flush with outer door panel.

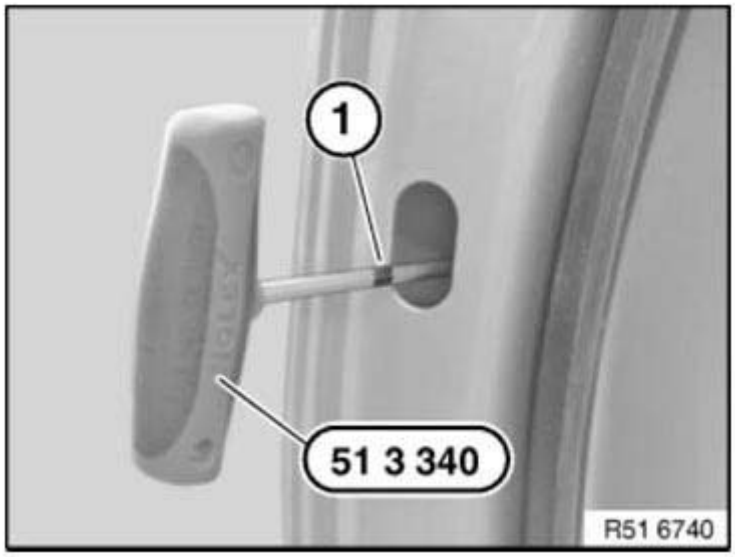


Fig. 152: Identifying Marking On Special Tool (51 3 340)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 51 3 252 from above, as illustrated, along marked edge. Screw in tool hook inwards no later than at point "Y".

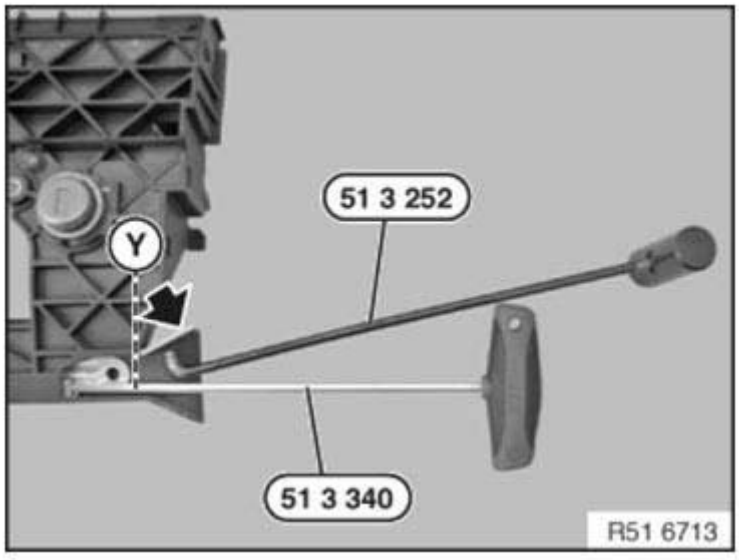


Fig. 153: Inserting Special Tool (51 3 252)
Courtesy of BMW OF NORTH AMERICA, INC.

Continue to insert special tool 51 3 252 along marked edge. Here the special tool hook recedes into recess (2) of locking plate (1).

By pulling back, (see line guidance) special tool 51 3 252 engages in bore hole of locking plate (1).

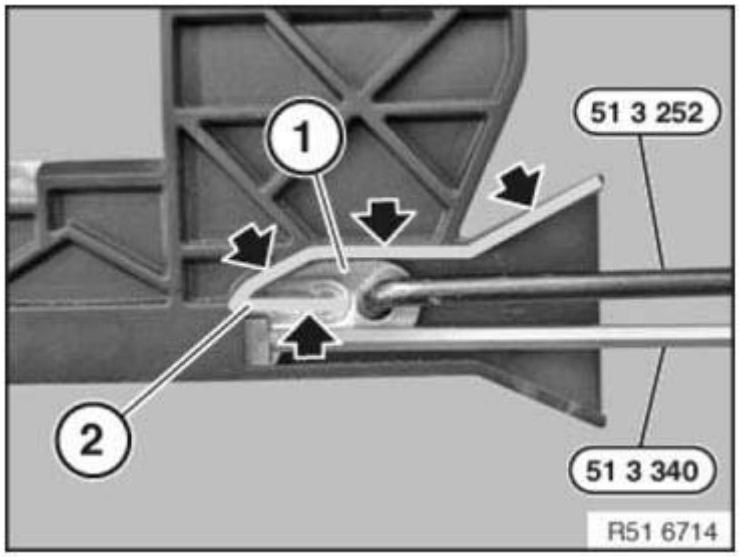


Fig. 154: Inserting Special Tool (51 3 252)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide locking plate (1) with special tool 51 3 252 inwards up to stop "A".

Installation:

Special tool 51 3 340 is not needed for installation.

Locking plate retaining tab (1) must lock. It must no longer be possible to push locking plate (1) inwards.

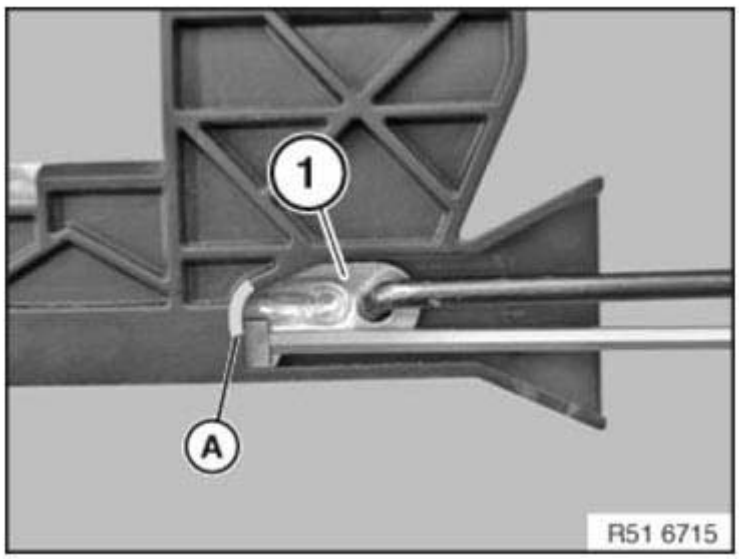


Fig. 155: Sliding Locking Plate Using Special Tool (51 3 252)
Courtesy of BMW OF NORTH AMERICA, INC.

Here locking plate (1) releases retaining hooks (arrowed) of outer door handle.

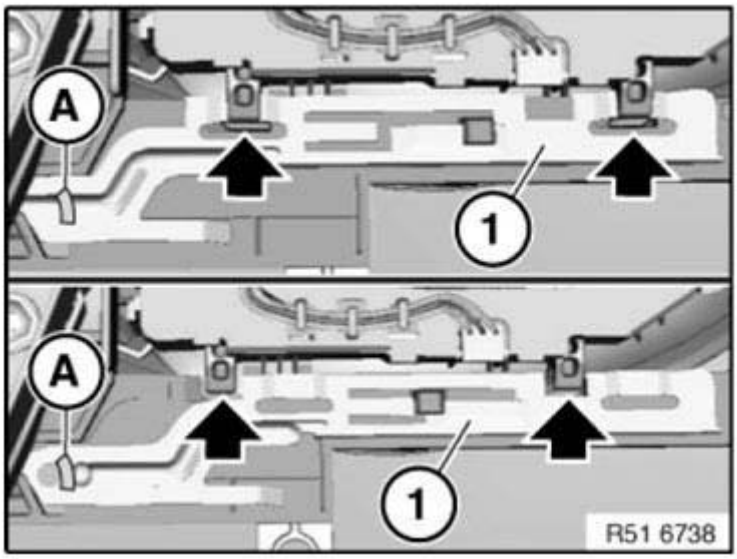


Fig. 156: Identifying Locking Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out outer door handle (1) first at bottom. Then feed out at an angle towards bottom.

Installation:

Rotary striker lock must be open to enable outer door handle (1) to be correctly fed in. Ensure correct installation position.

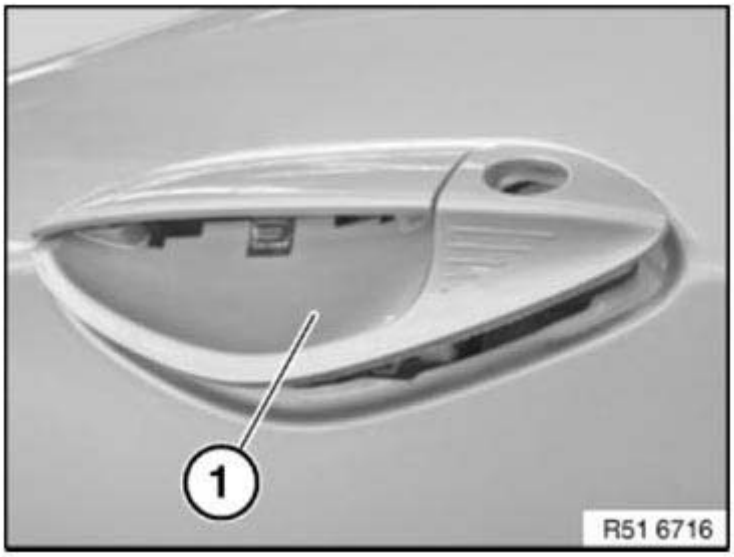


Fig. 157: Identifying Outer Door Handle
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

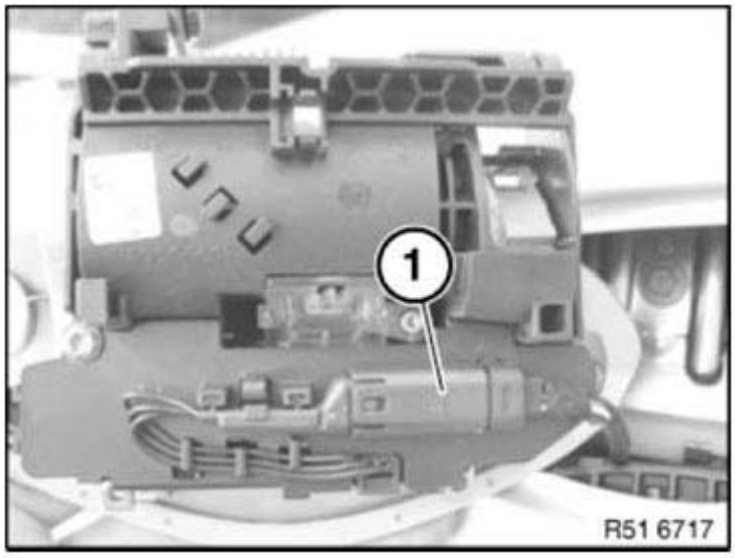


Fig. 158: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Following parts on outer handle (4) must not be damaged or missing (graphic similar):

1. Seal
2. Guide
3. Rubber mount

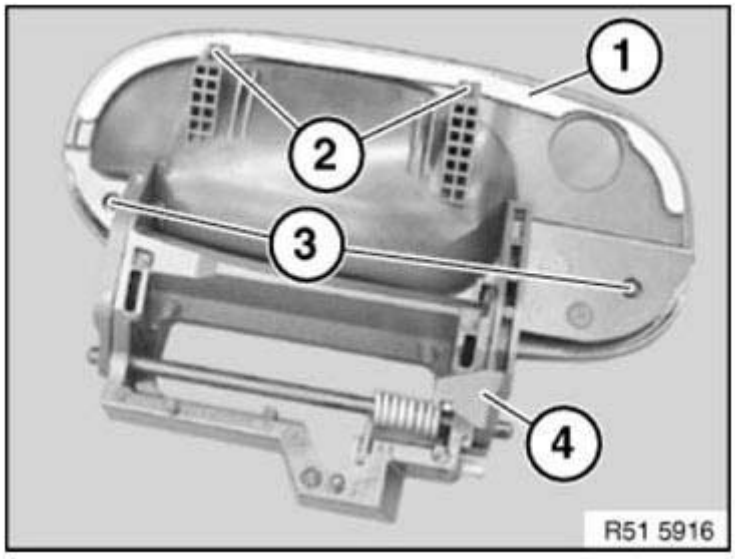


Fig. 159: Identifying Outer Handle With Seal, Guide And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carry out function check with door open.

To do so, close rotary striker lock by hand.

51 21 300 REMOVING AND INSTALLING OR REPLACING WINDOW CAVITY COVER STRIP ON OUTSIDE OF LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **MIRROR ON FRONT DOOR**

IMPORTANT: Observe PROCEDURE for using special tool 00 9 324 .

NOTES ON INSTALLING WINDOW GUIDES are the basis of this repair instruction.

IMPORTANT: Risk of damage!

If reusing the existing window cavity cover strip (1), make sure it is not bent.

Lever out window cavity cover strip (1) with special tool 00 9 324 (starting at B-pillar).

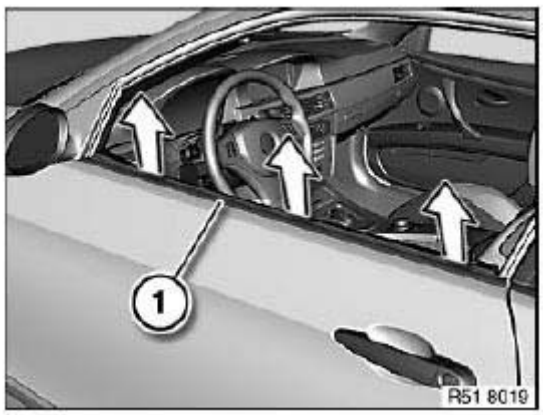


Fig. 160: Removing Window Cavity Cover Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat window cavity cover strip (1) prior to fitting with **APPROVED ANTI-FRICTION AGENT** and fit with precision under exterior mirror (2).

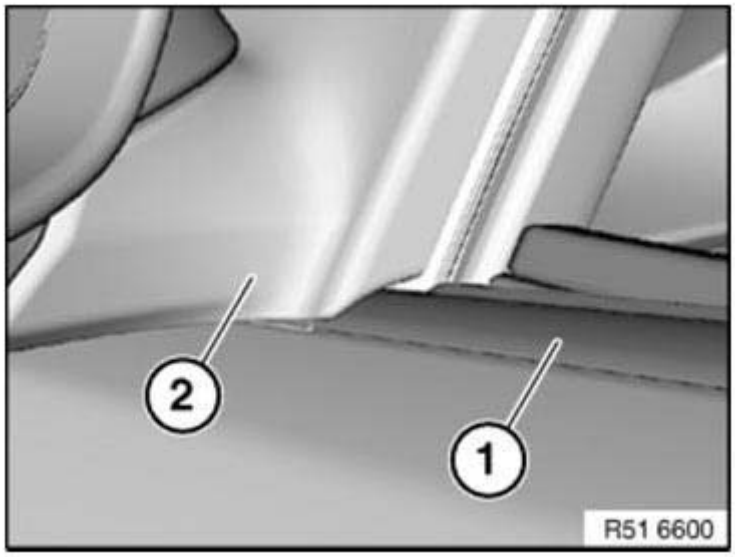


Fig. 161: Identifying Window Cavity Cover Strip And Exterior Mirror
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 235 REMOVING AND INSTALLING/REPLACING BOWDEN CABLE FOR INSIDE DOOR OPENER ON LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **FRONT DOOR TRIM**

Unhook Bowden cable for release lever:

- Tighten release lever (1).
- Lever out lock (2).
- Detach Bowden cable (3) towards rear/top.

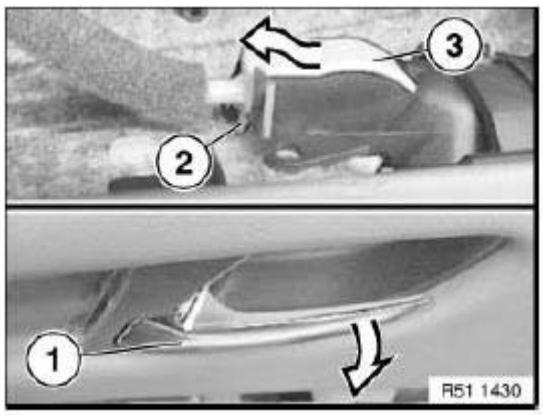


Fig. 162: Detaching Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

For fitting, press release lever (1) fully onto door trim panel.

Installation:

Slide nipple (1) fully forwards in blade (2) and engage Bowden cable in release lever.

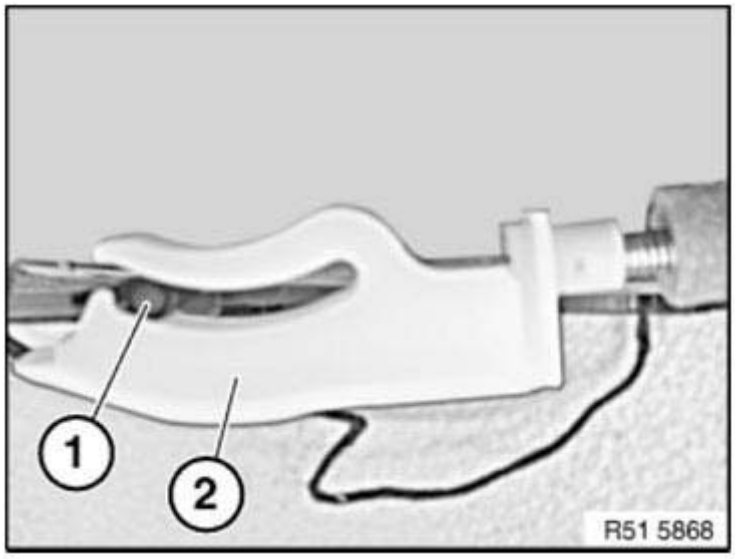


Fig. 163: Identifying Nipple And Blade
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 233 REMOVING AND INSTALLING/REPLACING BOWDEN CABLE FOR OUTER DOOR HANDLE ON LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **CARRIER FOR OUTER DOOR HANDLE**

NOTE: For a better overview, door lock and outer door handle are shown removed.

Remove Bowden cable (1) from outer door handle (2) and door lock (3).

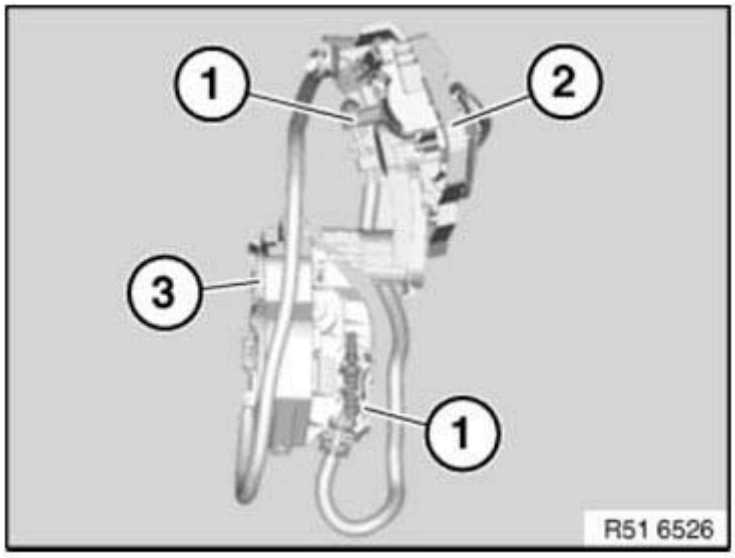


Fig. 164: Identifying Bowden Cables, Outer Door Handle And Door Lock
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 125 REMOVING AND INSTALLING/REPLACING CARRIER FOR LEFT OR RIGHT OUTSIDE DOOR HANDLE WITH LOCK CYLINDER

Necessary preliminary tasks

- Remove **FRONT OUTSIDE HANDLE**
- Remove **DOOR LOCK** on front door

Release screws (1).

Tightening torque **51 21 15AZ** .

Unclip outside door handle carrier (2) at catch (3).

Remove outside door handle carrier (2) from door (4).

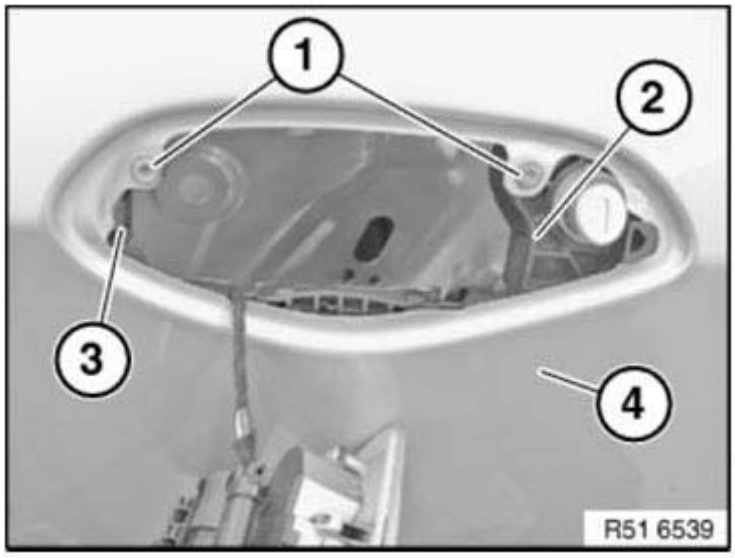


Fig. 165: Identifying Door With Outside Door Handle Carrier, Catches And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 126 REMOVING AND INSTALLING/REPLACING CARRIER FOR LEFT OR RIGHT OUTSIDE DOOR HANDLE WITHOUT LOCK CYLINDER

NOTE: This operation is described in section on: Removing and installing/replacing CARRIER FOR OUTSIDE DOOR HANDLE WITH LOCK CYLINDER .

51 21 140 REMOVING AND INSTALLING/REPLACING COMPLETE LOCK CYLINDER IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **OUTSIDE HANDLE ON FRONT DOOR**

Release screws (1).

Remove gearing cover (2).

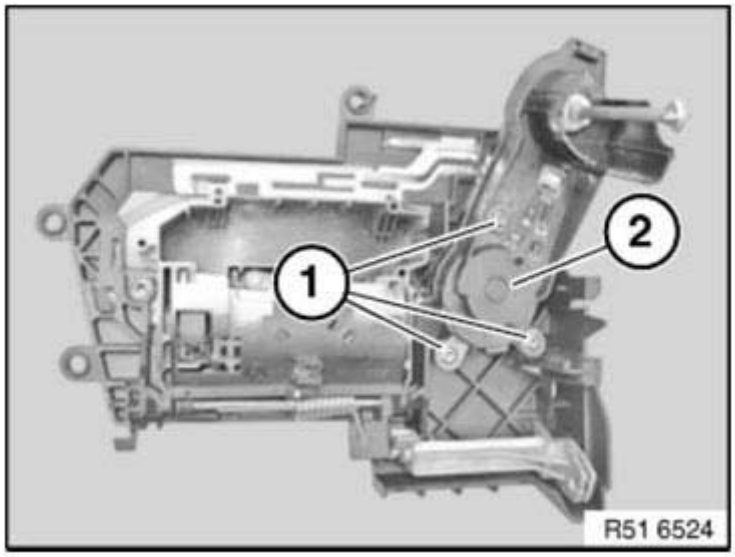


Fig. 166: Identifying Gearing Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach retaining clip (1).

Remove lock cylinder (2).

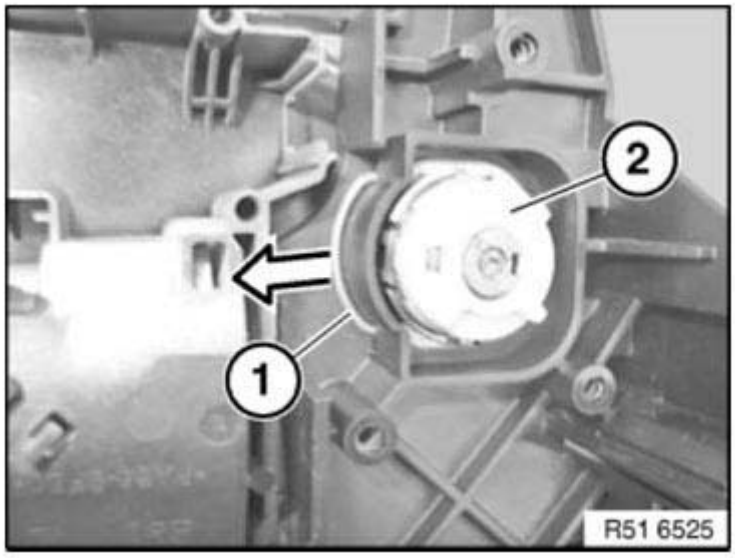


Fig. 167: Detaching Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 090 REMOVING AND INSTALLING/REPLACING DOOR LOCK IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **FRONT DOOR WINDOW GLASS**

Release screws (1) on H-strut.

Tightening torque **51 21 13AZ** .

Remove H-strut (2).

Release screw (3) with special tool 51 3 300 .

Tightening torque **51 21 14AZ** .

Release screw (4).

Tightening torque **51 21 14AZ** .

Window rail (5) remains in door.

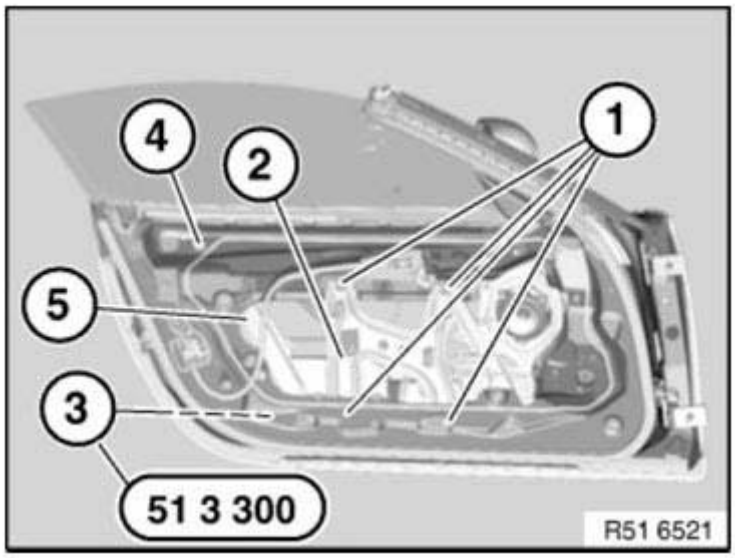


Fig. 168: Removing Screw Using Special Tool (51 3 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug connection (2) at tabs (1).

Disengage Bowden cable (3) from door lock (4).

Unclip lock knob control rod (5).

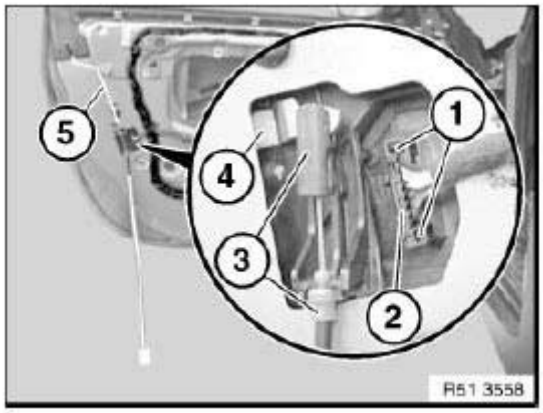


Fig. 169: Identifying Plug Connection With Tabs, Bowden Cable, Door Lock And Control Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Door crashpad (2) remains in door.

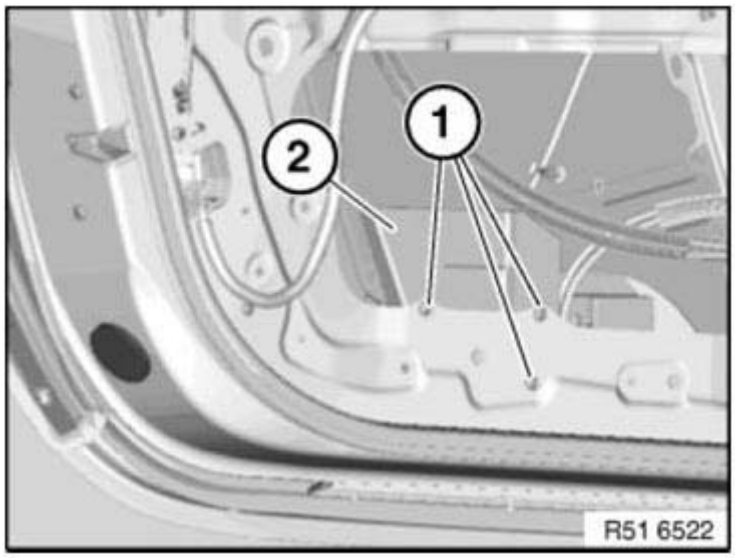


Fig. 170: Identifying Door Crashpad With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not damage door lock seal during removal.

Release screws (1).

Tightening torque **51 21 1AZ** .

Remove door lock (2) from door (3).

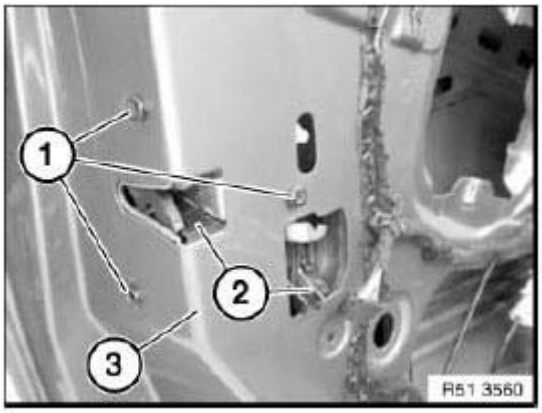


Fig. 171: Identifying Door With Lock And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage Bowden cable (1) from door lock (2).

IMPORTANT: Bowden cable (1) must:

- **correctly located in mountings on door lock (2)**
- **be laid without kinks in bend to door lock (2)**

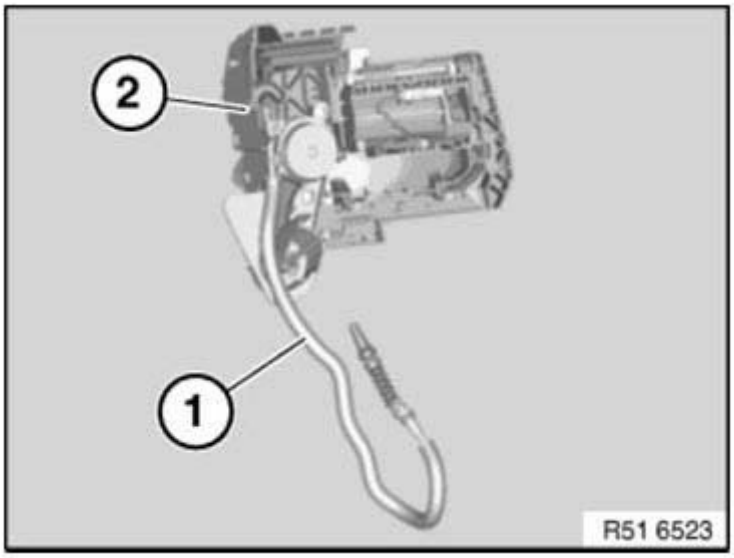


Fig. 172: Identifying Bowden Cable With Door Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Seal (1) on door lock (2) must not be damaged.

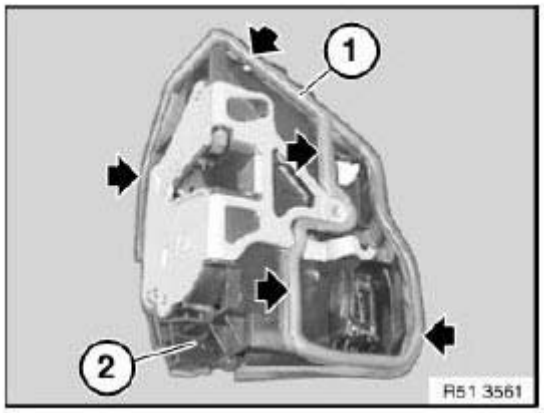


Fig. 173: Identifying Seal On Door Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Install door lock and insert screws (1), do not tighten down.
- Slide special tool 51 2 190 into opened rotary striker until striker engages in first stage

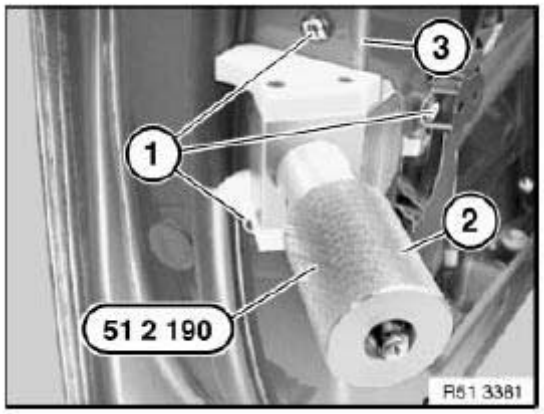


Fig. 174: Sliding Special Tool (51 2 190) Into Opened Rotary Striker
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Pre-tension door lock (1) with knurled screw (2) until special tool 51 2 190 just contacts corner points (3)

IMPORTANT: To tension door lock (1), it is only permitted to turn knurled screw (2) by a further 1 to 1.5 turns (max.) (risk of damage).

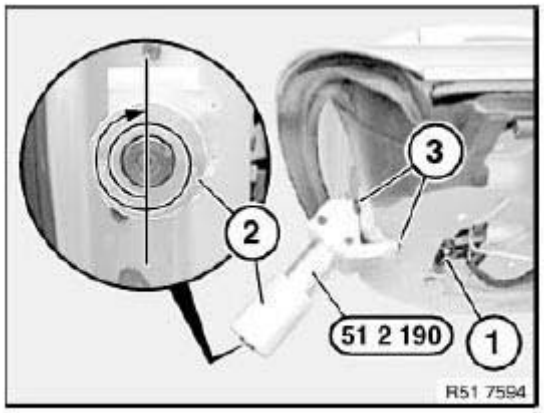


Fig. 175: Installing Door Lock Using Special Tool (51 2 190)
Courtesy of BMW OF NORTH AMERICA, INC.

Door lock seal must rest uniformly on inner door panel (water ingress).

- Tighten down door lock screws, tightening torque **51 21 1AZ** .

51 21 ... REMOVING AND INSTALLING/REPLACING STORAGE COMPARTMENT IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Remove **FRONT DOOR TRIM PANEL**

Release screws (1) on door trim panel (2).

Open storage compartment and remove.

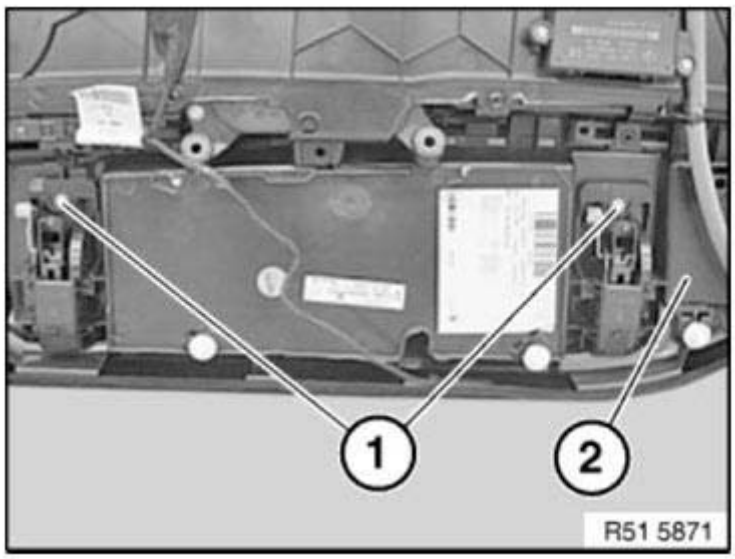


Fig. 176: Identifying Screws On Door Trim Panel

Courtesy of BMW OF NORTH AMERICA, INC.

51 21 330 REMOVING AND INSTALLING/REPLACING WINDOW CAVITY COVER STRIP ON INNER FRONT DOOR

IMPORTANT: NOTES ON INSTALLING WINDOW GUIDES are the basis of this repair instruction.

Necessary preliminary tasks

- Remove **FRONT DOOR TRIM PANEL**

Pull window cavity cover strip (1) in direction of arrow off front door.

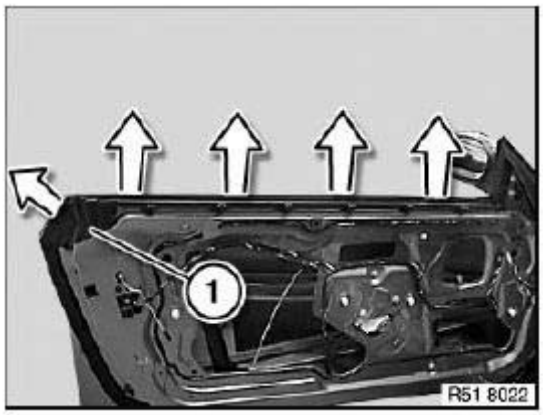


Fig. 177: Pulling Window Cavity Cover Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Moulded section (1) and retaining elements (2) of window cavity cover strip (3) must not be damaged.

Moulded section (1) must be correctly fed into door.

Moisten window cavity cover strip (3) prior to fitting with **APPROVED ANTI-FRICTION AGENT** .

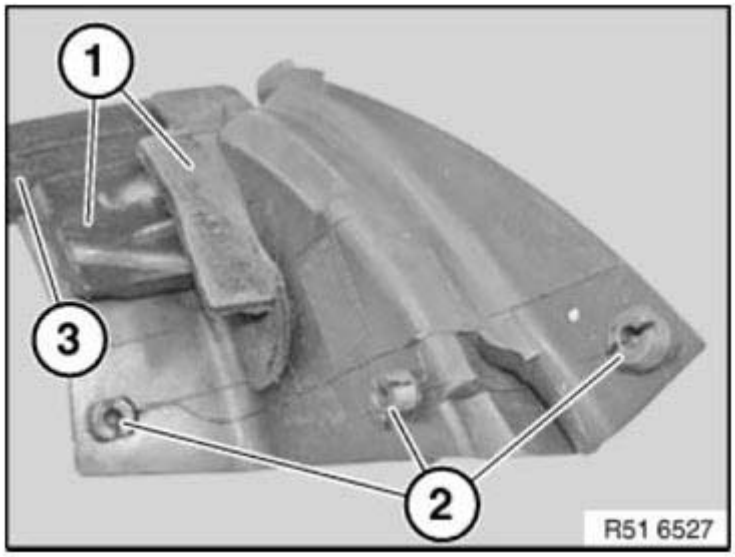


Fig. 178: Identifying Moulded Section And Retaining Elements Of Window Cavity Cover Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure window cavity cover strip (1) is installed in correct position on door (2) and door window glass (3).

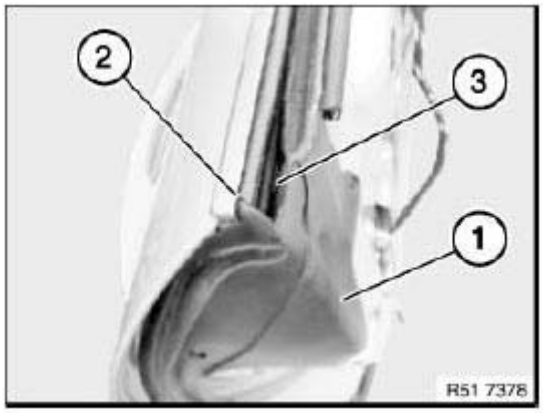


Fig. 179: Identifying Window Cavity Cover Strip On Door And Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

51 21 ... REMOVING WEATHER STRIP WITH SPECIAL TOOL 00 9 324 AT FRONT OR REAR

Open side window completely.

Front door:

Insert special tool 00 9 324 at front (at A-pillar) in window cavity (1) (TOP label pointing upwards).

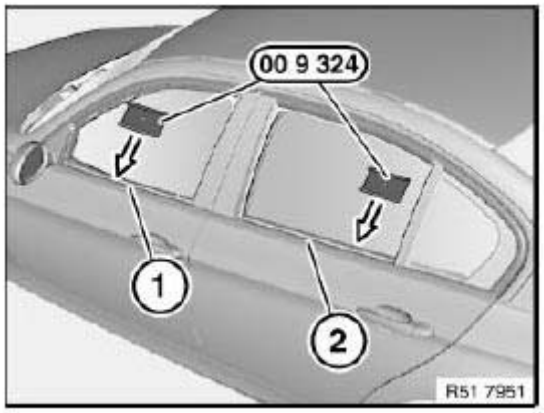


Fig. 180: Inserting Special Tool (00 9 324) At Front And Rear Window Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

Rear door:

Insert special tool 00 9 324 at rear (at C-pillar) in window cavity (2) (TOP label pointing upwards).

NOTE: For purposes of clarity, graphic shows inner door panel and side window removed.

Special tool 00 9 324 must be correctly guided under weather strip (1).

2 Short leg, bottom

3 Long leg, top (TOP)

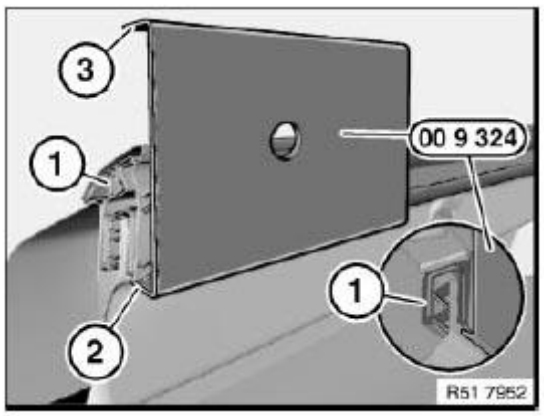


Fig. 181: Identifying Special Tool (00 9 324) Under Weather Strip With Short And Long Legs
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Start at the front or rear, depending on the model.

IMPORTANT: Risk of damage!

Raise weather strip (3) no more than 5 mm in each levering operation, otherwise the strip will be bent.

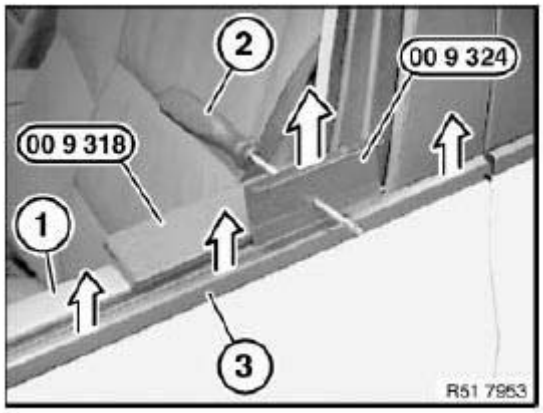


Fig. 182: Raising Weather Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 00 9 318 on door trim panel (1).

Slide screwdriver (2) into special tool 00 9 324 and weather strip (3) upwards no more than 5 mm.

Guide special tools 00 9 324 and 00 9 318 towards front/rear and lever out weather strip (3).

51 21 003 REPLACING FRONT LEFT OR RIGHT DOOR LOCK STRIKER

Release screws (1).

Tightening torque **51 21 3AZ** .

Remove door lock striker (2).

Installation:

Adjusting door lock striker, see **ADJUSTING FRONT DOOR** .

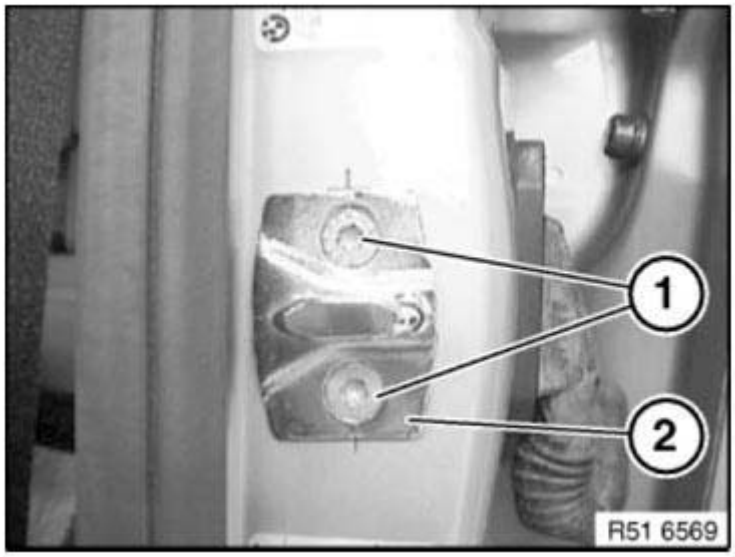


Fig. 183: Identifying Door Lock Striker With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

5123 HOOD LATCH, LOCKS

51 23 004 ADJUSTING ENGINE COMPARTMENT LID CATCH

Adjusting engine compartment lid catch, see also **ADJUSTING ENGINE COMPARTMENT LID** .

51 23 131 ADJUSTING LEFT OR RIGHT STRIKER ON ENGINE HOOD/BONNET

Operation is described in:

- **ADJUSTING HOOD/BONNET**

51 23 ... ADJUSTING/REPLACING BUMP STOPS

The illustrations are schematic representations and are to be applied to the relevant vehicle type.

Version 1:

Following parts must not be damaged:

- (1) Bump stop

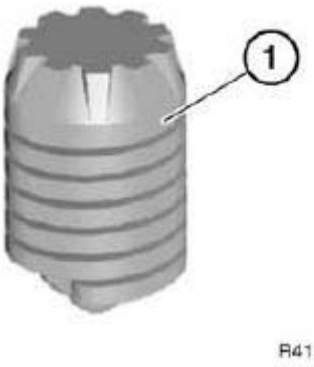


Fig. 184: Identifying Bump Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust bump stop (1) to correct height by turning left or right.

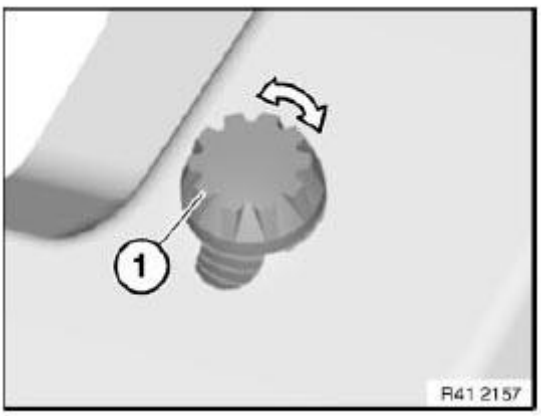


Fig. 185: Turning Bump Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2:

Replace damaged bump stops (refer to EPC):

- (1) Bump stop with ejector

Fig. 186: Identifying Bump Stop With Ejector
Courtesy of BMW OF NORTH AMERICA, INC.

Press ejector (1) into bump stop and, in this position, twist approx. 90° counterclockwise with a Phillips screwdriver.

This locks the ejectors (1) in the bump stops.

Adjust bump stop (2) to correct height by turning left or right.

Unlock the ejector (1) again after completing adjustment.

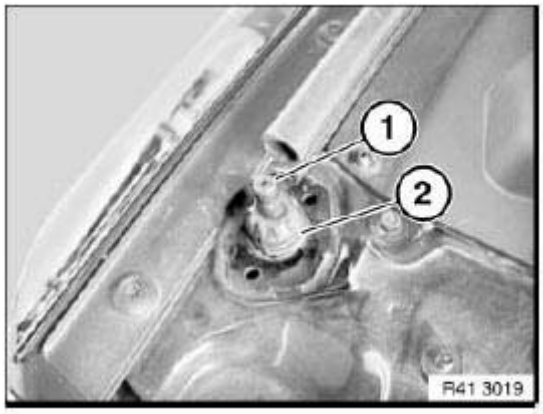


Fig. 187: Identifying Bump Stop With Ejector
Courtesy of BMW OF NORTH AMERICA, INC.

Version 3:

Replace damaged bump stops (refer to EPC):

- (1) Bump stop

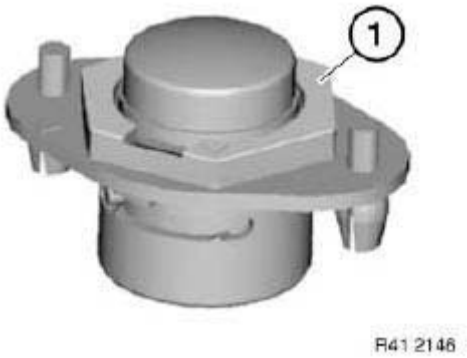


Fig. 188: Identifying Bump Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Turn lock (1) 45° counterclockwise.

Pull bump stop (2) upwards.

Close lid slowly until it is at the same height as the side panel.

Open lid and turn lock (1) clockwise.

Installation:

Press bump stop into panel and drive in expanding pins (3).

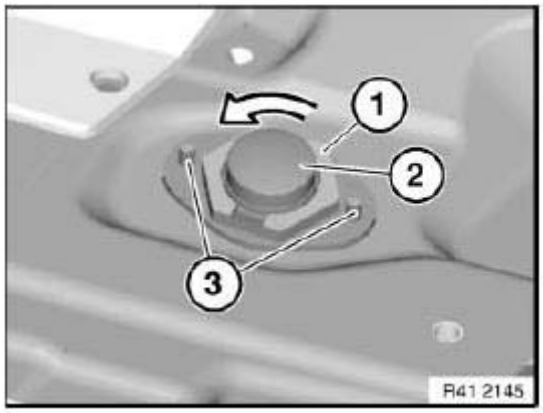


Fig. 189: Turning Lock
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 ... ADJUSTING/REPLACING BUMP STOPS

The graphics are schematic representations and are to be applied to the relevant vehicle type.

Prerequisite: Lid must be correctly adjusted.

Version 1:

Following parts must not be damaged:

- (1) Bump stop

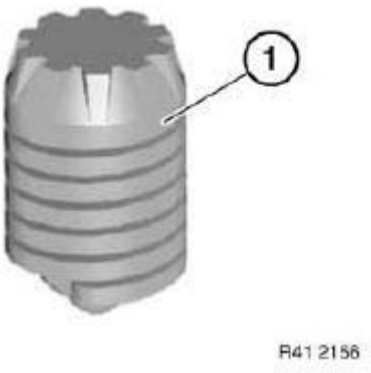


Fig. 190: Identifying Bump Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust bump stop (1) to correct height by turning left or right.

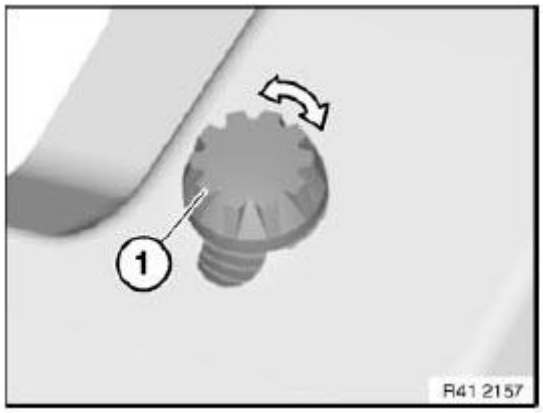


Fig. 191: Turning Bump Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Type 2:

Replace damaged bump stops (refer to EPC):

- (1) Bump stop

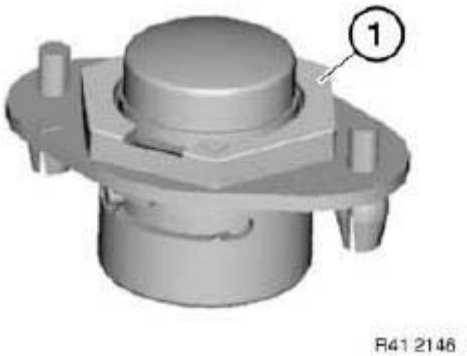


Fig. 192: Identifying Bump Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting version 2:

Turn lock (1) 45° anticlockwise.

Pull bump stop (2) upwards.

Close lid slowly until it is at the same height as the side wall.

Open lid and turn lock (1) clockwise.

Installation note:

Press bump stop into sheet metal part and drive in expanding pins (3).

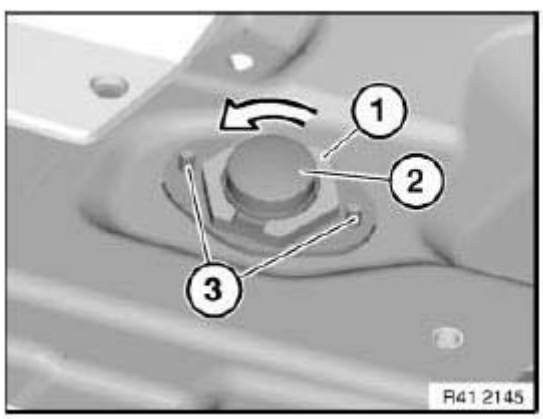


Fig. 193: Turning Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Version 3:

Lever out expanding rivets (1).

Remove bump stop (2).

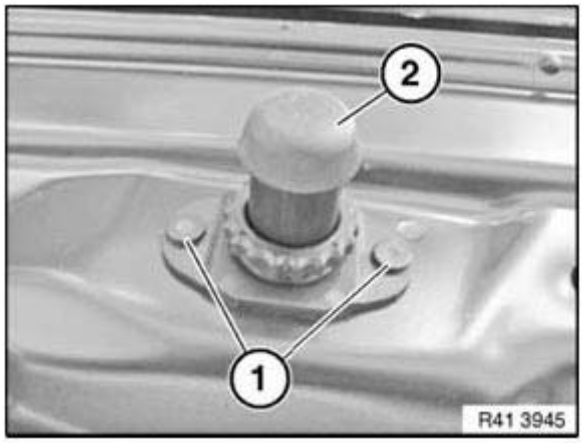


Fig. 194: Identifying Bump Stop And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting version 3:

Checking correct adjustment:

- Insert a strip of paper (normal writing paper) between bump stop and stop on body.
- Close lid. Make sure that the paper strip remains between bump stop and stop.
- The bump stop is correctly adjusted when the paper strip can be pulled out "with slight resistance".

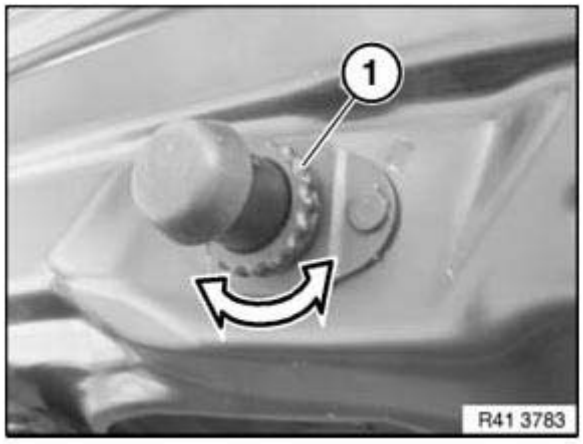


Fig. 195: Turning Bump Stop (Version 3)
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting procedures

Screw in bump stop until the paper strip can be easily pulled out.

Then unscrew bump stop until the paper strip cannot be pulled out any more.

Screw in bump stop until the paper strip can be pulled out "with slight resistance".

Version 4:

Lever out expanding rivets (1).

Remove bump stop (2).

Adjusting version 4:

Set bump stop to the correct height by turning to the left or right.

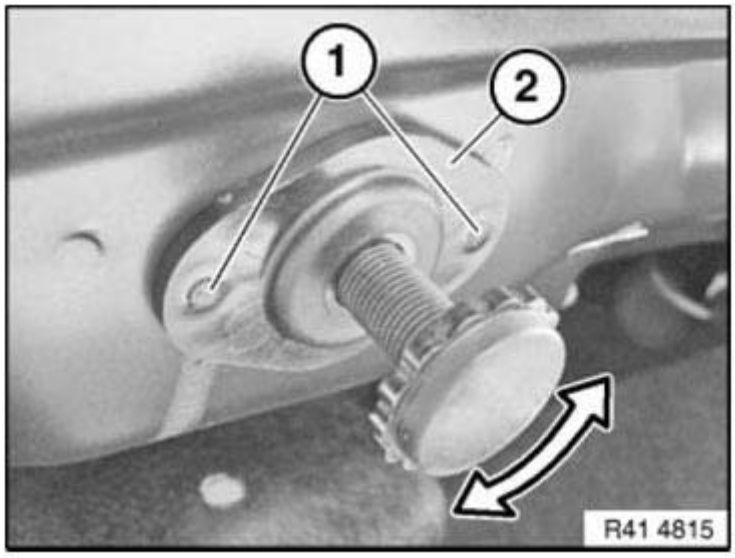


Fig. 196: Turning Bump Stop (Version 4)
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 131 ADJUSTING/REPLACING LEFT OR RIGHT STRIKER ON ENGINE HOOD/BONNET

Raise bonnet/hood.

Disengage nipple (1).

Unfasten screws (2).

Tightening torque **51 23 1AZ** .

Installation:

Replace self-locking screws.

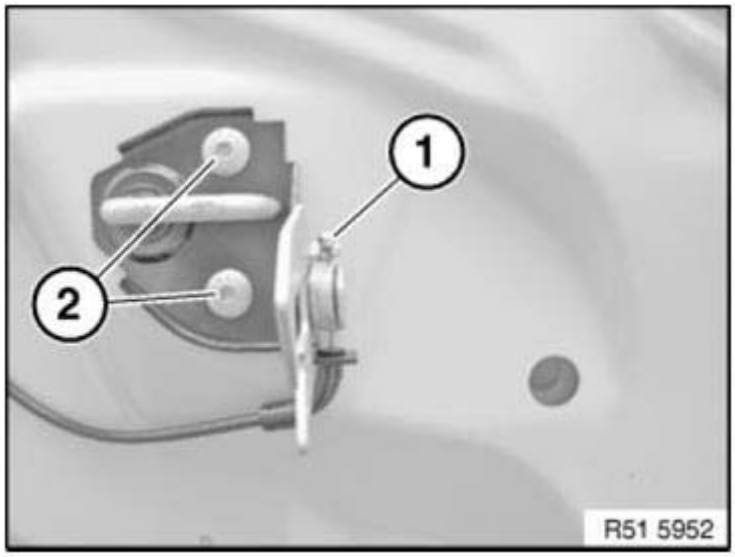


Fig. 197: Identifying Nipple And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 110 REMOVING AND INSTALLING/REPLACING LEFT BONNET LOCK

Release screws (1) and pull out engine compartment lid lock (2) in upward direction.

Tightening torque **51 23 2AZ** .

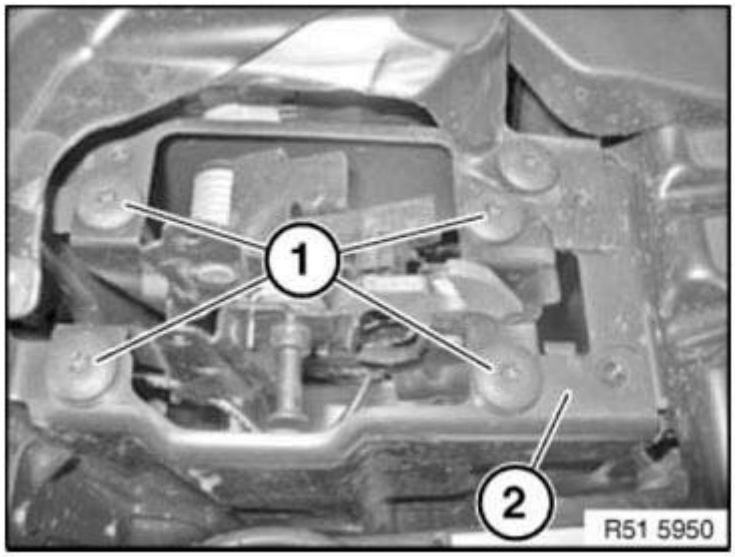


Fig. 198: Identifying Engine Compartment Lid Lock With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage Bowden cable (1) in direction of arrow from engine compartment lid lock (2).

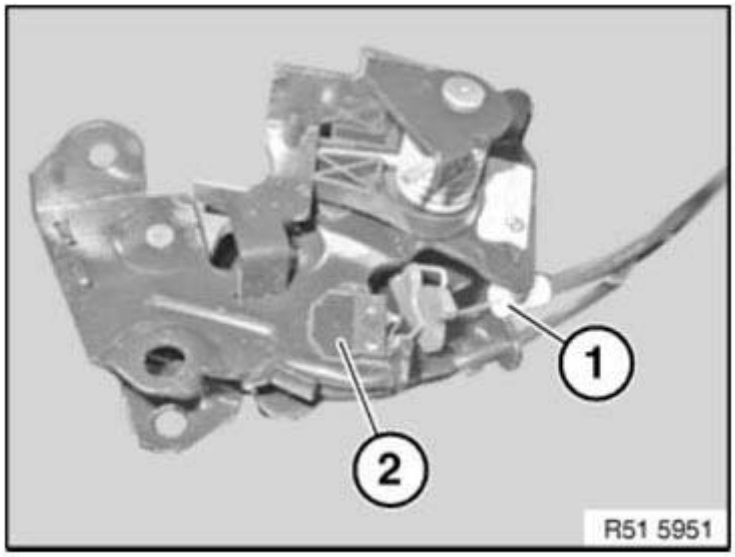


Fig. 199: Identifying Engine Compartment Lid Lock With Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 265 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT GAS-FILLED STRUT FOR ENGINE BONNET/HOOD

WARNING: Risk of injury and damage!

For the following tasks, you must take the appropriate measures to support the engine bonnet/hood.

As an alternative, you can enlist the help of a second person to hold the bonnet/hood.

Raise bonnet/hood.

Removing gas-filled strut at top and bottom:

NOTE: If necessary, release cable tie on gas-filled strut

- **1) Push retaining spring to end of gas-filled strut**
- **2) Remove gas-filled strut from ball head**

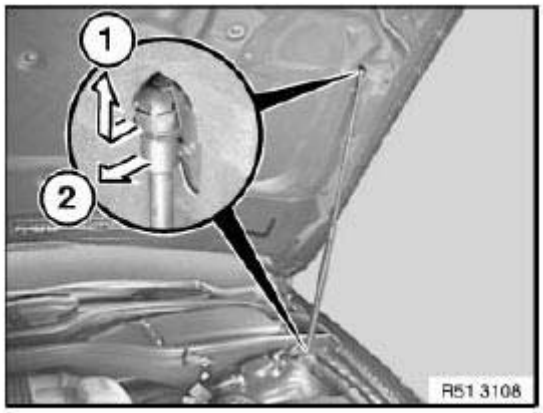


Fig. 200: Pushing Retainer Spring Of Gas Spring Strut
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 211 REMOVING AND INSTALLING/REPLACING PULL CABLE FOR HOOD/BONNET LOCKS AT FRONT

Necessary preliminary tasks

- Remove **CROSS-MEMBER UPPER SECTION**
- Remove hood/bonnet locks See **5123110 REMOVING AND INSTALLING/REPLACING LEFT BONNET LOCK** or **5123100 REMOVING AND INSTALLING/REPLACING RIGHT ENGINE HOOD/BONNET LOCK**

Lever coupler (2) out of front panel, open and lever out Bowden cable.

Release Bowden cable (1) from holder (3).

Remove Bowden cable (1).

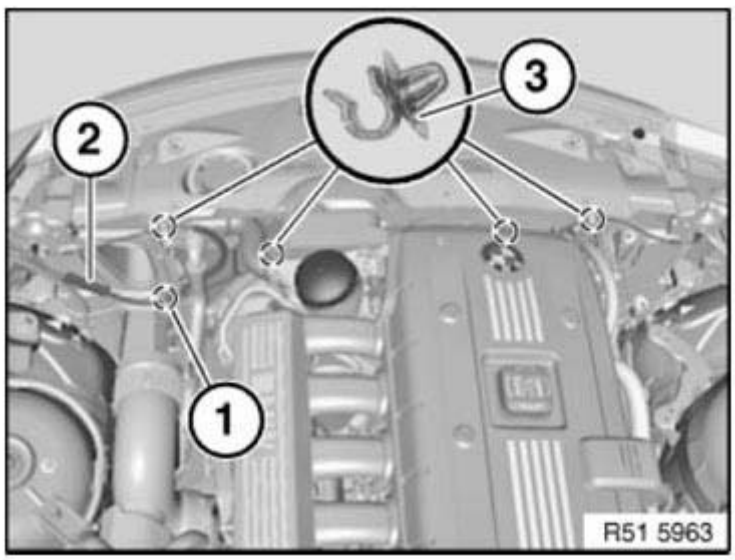


Fig. 201: Identifying Bowden Cable With Holders And Coupler
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 201 REMOVING AND INSTALLING/REPLACING RELEASE MECHANISM FOR CATCH ON ENGINE HOOD/BONNET

Release screws (1) on hood/bonnet (2).

Disengage Bowden cable (4) from hood/bonnet release mechanism (3).

Remove hood/bonnet release mechanism (3).

Installation:

Replace self-locking screws.

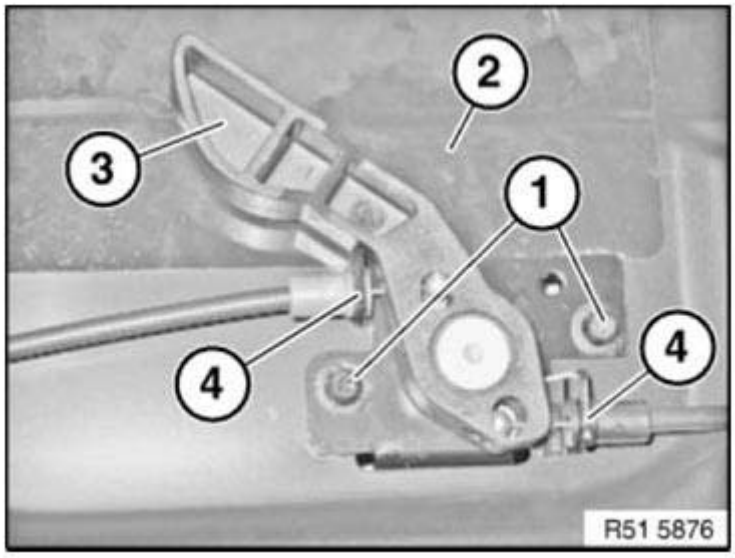


Fig. 202: Identifying Bowden Cable Of Hood/Bonnet Release Mechanism And Screws On Hood/Bonnet
Courtesy of BMW OF NORTH AMERICA, INC.

51 23 100 REMOVING AND INSTALLING/REPLACING RIGHT ENGINE HOOD/BONNET LOCK

Disconnect plug connection (1) from microswitch.

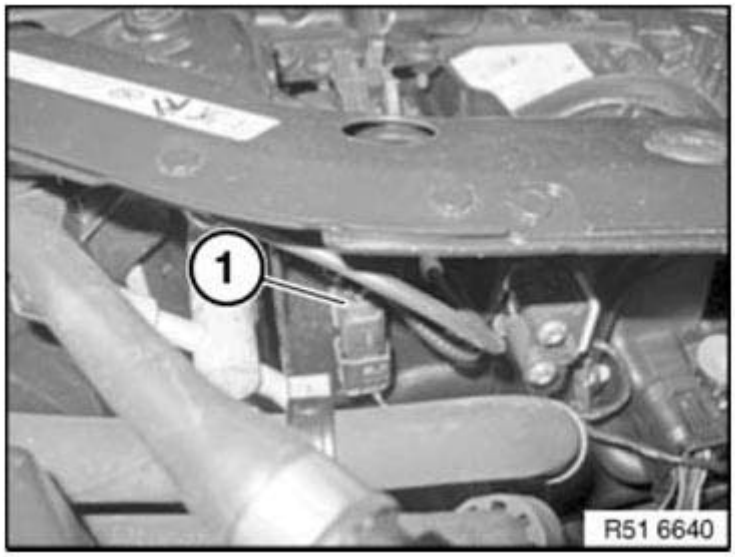


Fig. 203: Identifying Microswitch Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and feed out engine compartment lid lock (2) including plug and wiring harness for microswitch towards top.

Tightening torque **51 23 2AZ** .

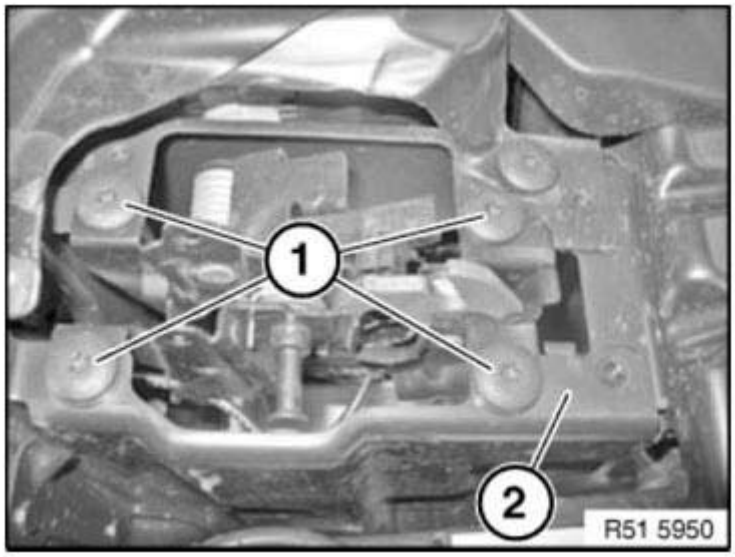


Fig. 204: Identifying Engine Compartment Lid Lock With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage Bowden cable (1) in direction of arrow from engine compartment lid lock (2).

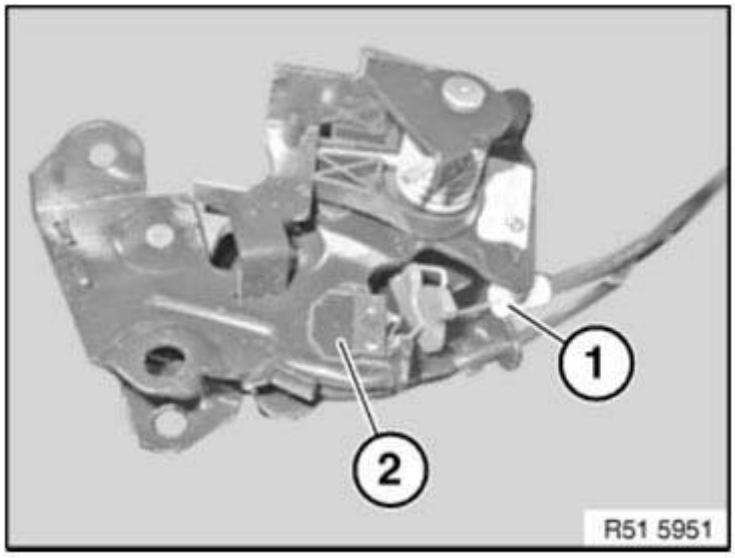


Fig. 205: Identifying Engine Compartment Lid Lock With Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

5124 TRUNK LATCH, LOCKS

51 24 004 ADJUSTING REAR LID LOCK (ADJUSTING BOTH STRIKERS)

Precondition:

Rear lid must be correctly adjusted to fit; if necessary, **ADJUST REAR LID**

Installation:

- Microencapsulated screws (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use

NOTE: Rear lid is shown removed.

Screw in elements (1) for adjusting rear lid (2) completely.

For ideal adjustment, refer to **BODY GAP DIMENSIONS** .

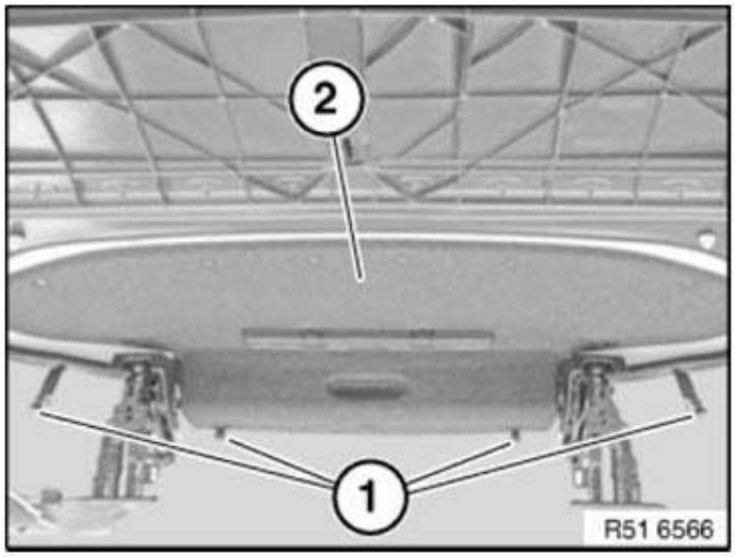


Fig. 206: Identifying Rear Lid With Elements
Courtesy of BMW OF NORTH AMERICA, INC.

The right side is removed in the same way as the left side.

Lever out expansion rivets (1).

Remove trim (2).

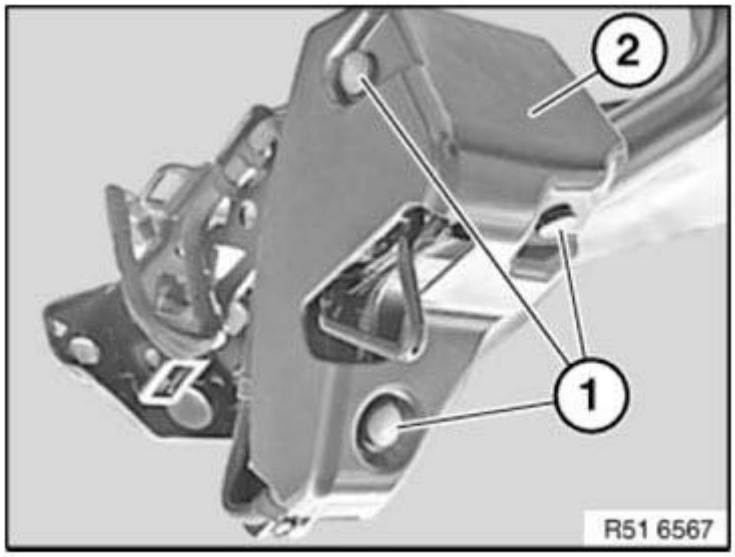


Fig. 207: Identifying Trim With Expansion Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1) on striker (2) until striker (2) can still just be moved.

Tightening torque **51 24 14AZ** .

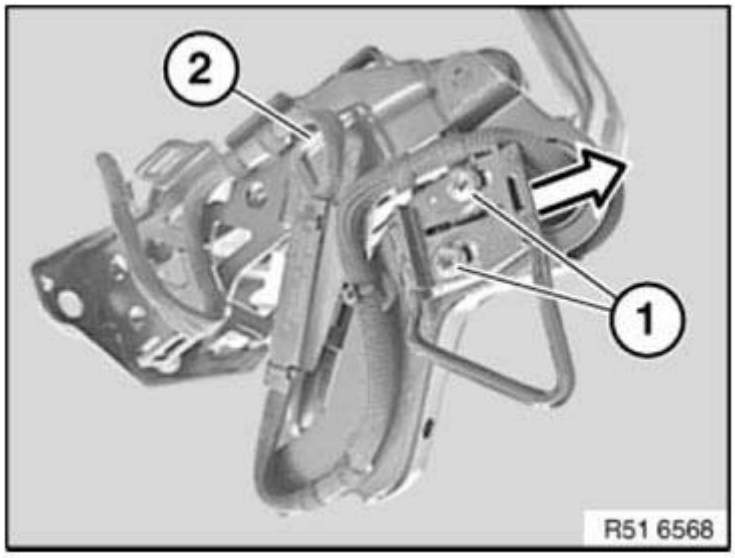


Fig. 208: Identifying Slacken Screws On Striker
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Replace screws.

Adjust striker:

Close rear lid.

This automatically adjusts the striker correctly.

Open rear lid.

Tighten down screws (1) on striker (2).

Check adjustment of rear lid and rear lid lock, repeating adjustment if necessary.

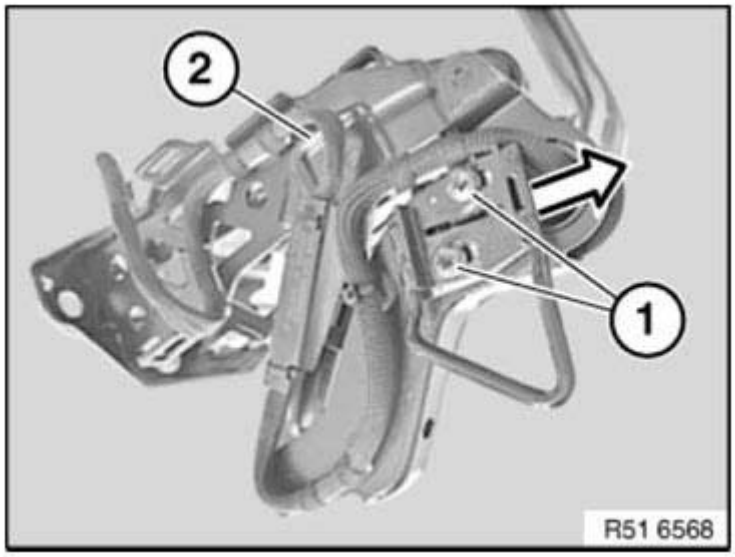


Fig. 209: Identifying Screws On Striker
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew stop buffers (1) to the point where left and right sides of closed rear lid (2) rest on stop buffers.

NOTE: The rear lid must not be higher than the side panels, otherwise there is preload on height adjustment!

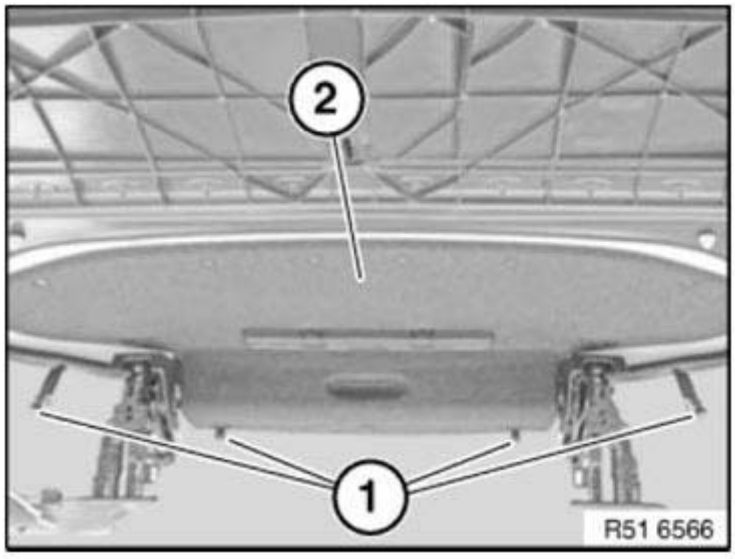


Fig. 210: Identifying Rear Lid With Stop Buffers
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carry out operational check until

BODY GAP DIMENSIONS are obtained.

51 24 146 REMOVING AND INSTALLING BUTTON FOR ACTUATING REAR LID

Necessary preliminary tasks

- Remove **REAR LID LOCK**

Disconnect plug connection (1) at microswitch.

Slacken screws (2) until retaining ring (3) can be turned.

Tightening torque **51 24 11AZ** .

Turn retaining ring (3) in direction of arrow and remove button (4) from rear lid.

Installation:

Perform function check with rear lid open.

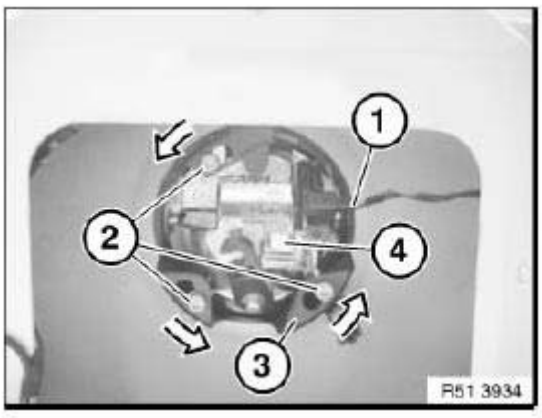


Fig. 211: Turning Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

51 24 300 REMOVING AND INSTALLING OR REPLACING LEFT OR RIGHT GAS STRUT FOR TRUNK LID

> **WARNING: Support rear lid in fully opened position with suitable apparatus. Risk of injury.**

Slide stop spring (1) to end of gas-filled strut (2) and lever out gas strut.

Repeat the procedure at the other end of the gas-filled strut (2) and remove.

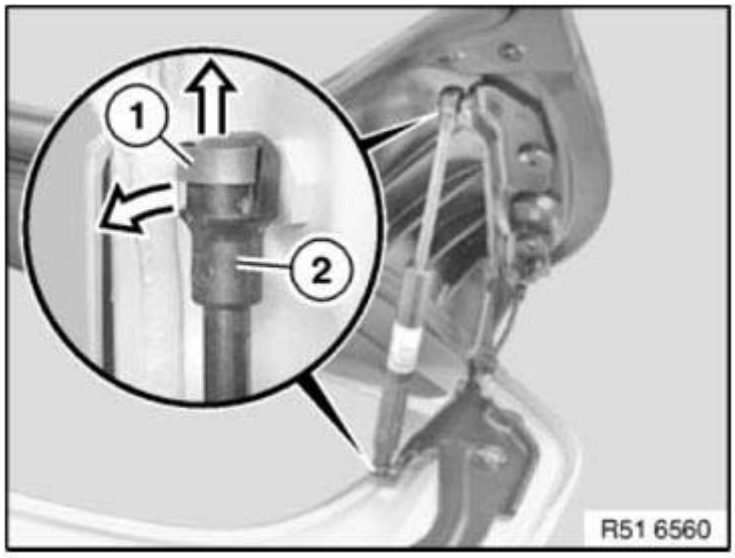


Fig. 212: Sliding Stop Spring Of Gas-Filled Strut
Courtesy of BMW OF NORTH AMERICA, INC.

51 24 100 REMOVING AND INSTALLING/REPLACING REAR LID LOCK (UPPER SECTION)

Necessary preliminary tasks

- Remove **PANEL FOR REAR LID**

Release screws (1).

Tightening torque **51 24 12AZ** .

Release screw (2).

Tightening torque **51 24 13AZ** .

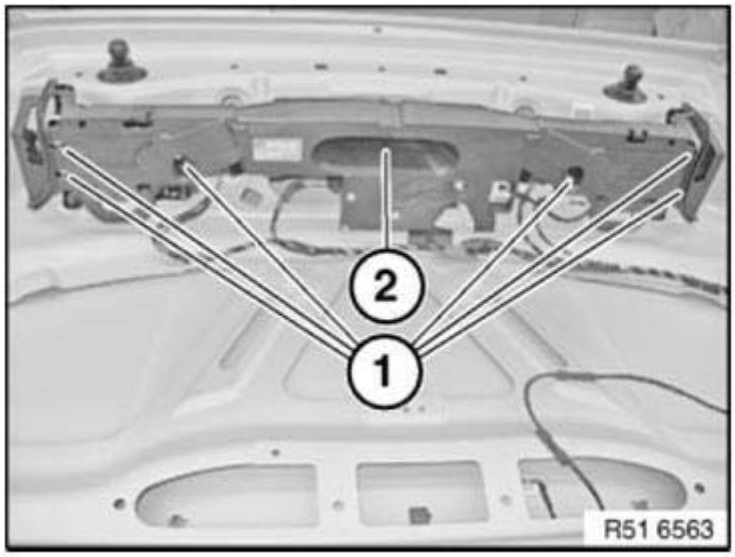


Fig. 213: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unfasten screws (2).

Remove rear lid lock upper section (3).

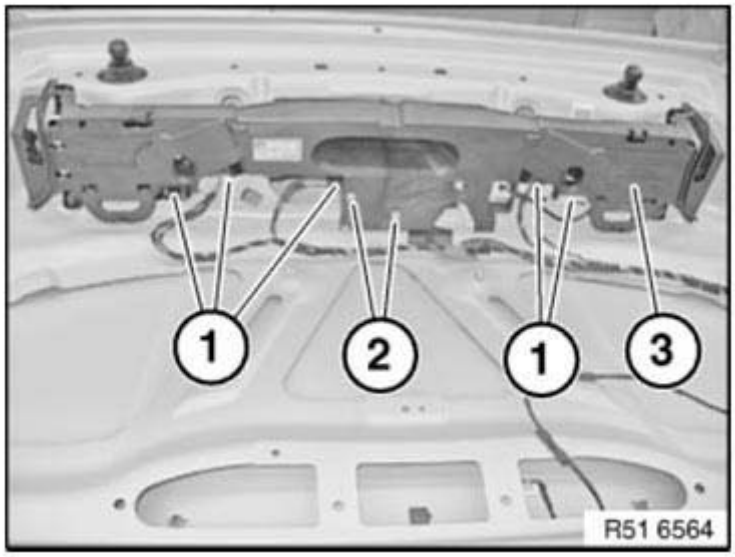


Fig. 214: Identifying Rear Lid Lock Upper Section With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

US version only:

Disengage Bowden cable (1) for emergency release mechanism.

Remove rear lid lock (2).

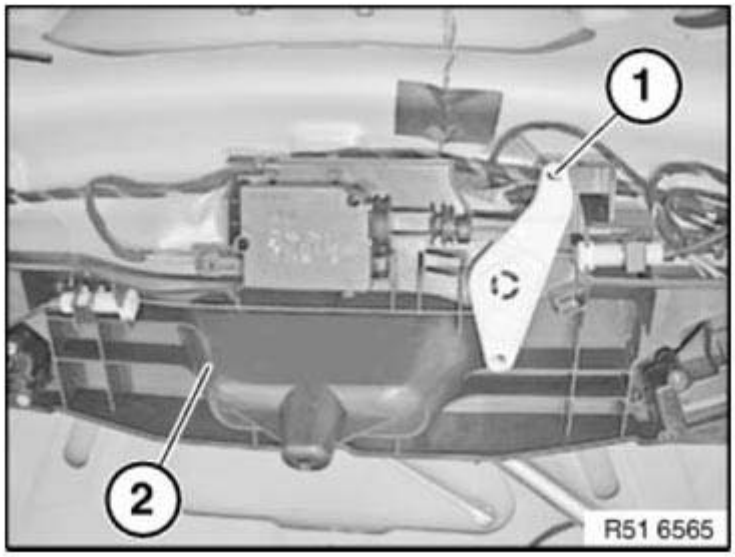


Fig. 215: Identifying Rear Lid Lock And Bowden Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Perform function check with rear lid open.

5131 FRONT AND REAR WINDOW

51 70 ... FITTING SEALS

NOTE: All seals on the vehicle must be removed with the utmost care. Incorrect fitting may result in among other things wind noises and water ingress, and may compromise closing and opening comfort.

- **The following instructions always apply:**

  Seals which are attached to the side frame can be removed and fitted as often as desired.

- Seals must not be damaged or cracked.
- The clamping area must be pressed together by hand to such an extent that rigid attachment to the side flange is still possible. The sides of the seal are permitted to touch each other slightly. A fully compressed seal is not permitted.

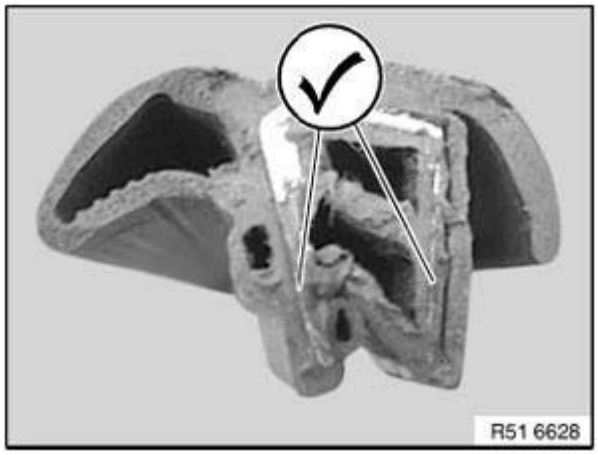


Fig. 216: Identifying Correct Position For Fitting Seals
Courtesy of BMW OF NORTH AMERICA, INC.

- A special tool to press the clamping area together is not needed. Careful fitting by hand is sufficient.
- The seals must always be fitted over their full extent. There is no defined pressing force.
- If seals are repeatedly removed and fitted in the rear lid area, a new seal must be fitted (water ingress in event of sheet flaws).

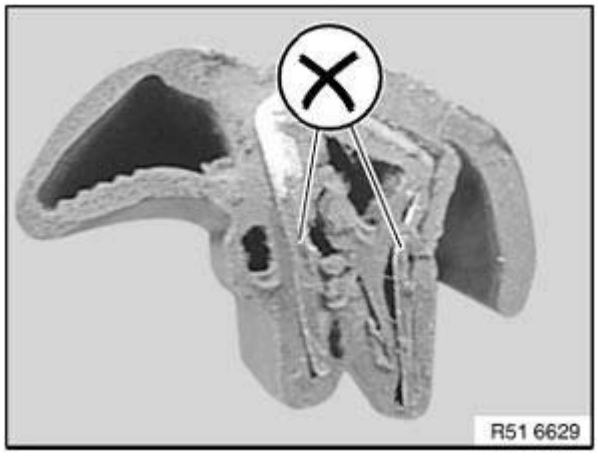


Fig. 217: Identifying Improper Position For Fitting Seals
Courtesy of BMW OF NORTH AMERICA, INC.

- Seals must be checked after fitting for correct seating. If necessary, the seals must be lifted over the adjacent components with a suitable tool. Adjacent components must not be damaged.
- Seals must be replaced when the metal insert in the seal is visible (corrosion).
- The clamping area must be uniform.

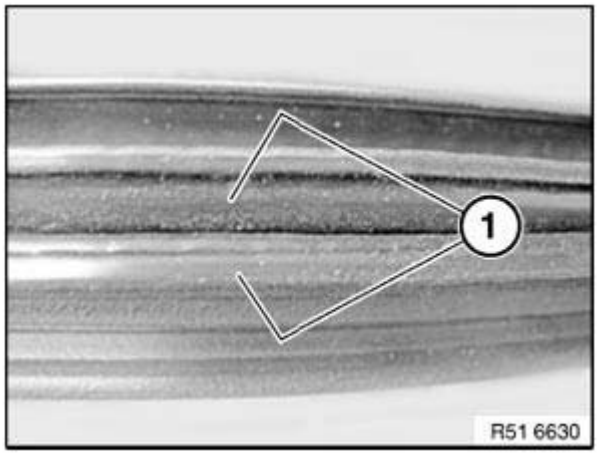


Fig. 218: Identifying Clamping Area
Courtesy of BMW OF NORTH AMERICA, INC.

- Joint seals which are fitted with plastic clips must rest rigidly on the body. Otherwise, the clips or the joint seal must be replaced.

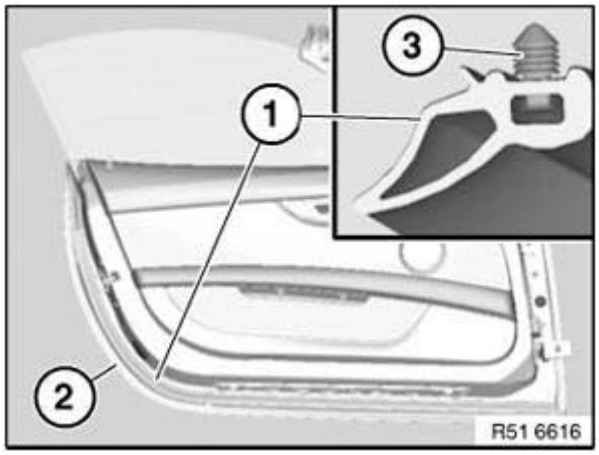


Fig. 219: Identifying Joint Seal With Plastic Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 31 ... NOTES FOR BONDING SOUND INSULATION (SI), DOORS

IMPORTANT: Do not pull on the sound insulation in jerks (risk of damage)

Work steps for removing and installing sound insulation

- Click on "underlined cross-reference" to display at the end of this document

General

Sound insulation is bonded to the inner door panel.

Bonded sound insulation must not be subjected to load (e.g. leak test) before 5 hours have elapsed.

On-the-job safety

When working with bonding products (adhesive, cleaning agent, etc.):

- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure rooms are well ventilated.
- Change work clothing contaminated with adhesive immediately.
- Change work clothing contaminated with solvents and swelling agents immediately (keep spare work clothing on hand).
- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams
- Provide eye douche facilities, change water regularly (once a month).
- Comply with the relevant safety regulations

Handling adhesive area on inner door panel

HANDLING PROCEDURE FOR INNER DOOR PANEL

Adhesive	Cleaning
a. Butyl bead applied to sound insulation with protective film b. Butyl mini-round profile 3 mm from the roller c. Butyl round profile 6 mm from the roller	a. Isohexane (benzine) b. 2-propanol (isopropanol) *Under no circumstances: paint thinning* c. Carry out bonding only after an air drying time > or = 1 min. Air drying time may be omitted if the entire bonding surface is wiped with a dry cloth d. After cleaning, the bonding surface may not be touched with hands or fouled again

Repair in area of sound insulation, door

REPAIR FOR SOUND INSULATION AREA (DOOR)

Repair in the event of damaged sound	• Cut the butyl rope between the sound insulation and the inner door panel with a sharp knife • After the repair is finished, position a new butyl rope 3 mm directly on the original adhesive bead • Heat the butyl bead with a standard hot air blower until the butyl rope strings when touched slightly. Do not damage the sound insulation in the process • Press down with special tool **51 0 300** . Perform this work extremely carefully because the increased amount of adhesive requires pressure of >

insulation or leakage	or = 20 N/cm^2 (compared to firm thumb pressure ~ 30 N/cm^2) • Visually check the adhesive bead and its compression (no capillaries or broken adhesive bead permitted) • In the cases mentioned, the complete sound insulation must be replaced. After removing the sound insulation, removal all butyl remnants from the inner door panel. Apply 6 mm butyl rope to new sound insulation • Press down with special tool **51 0 300** to > or = 20 N/cm^2 (compare to firm thumb pressure ~ 30 N/cm^2)

The sound insulation must be bonded watertight below the door lock

- Flat bonding surface required all round
- No bonding in event of moisture (e.g. condensation, etc.)
- Bonding area must not show any traces of adhesion-reducing residues (e.g. separating agents, greases, oils, paraffins, plastisols, cavity wax, polishing dust residues, etc.)
- Remove the protective film directly before joining (under no circumstances remove earlier, since the butyl, because of its stickiness, will very quickly pick up adhesion-reducing dirt contaminants)
- The sound insulation must be attached with positional accuracy to the inner door panel, because it is no longer possible to change the position without damaging the butyl bead
- With repainted areas, the maximum permitted temperature of 90°C may not be exceeded in the area of the sound insulation. Otherwise, the sound insulation must be removed (and replaced, if necessary).

Expiry date of adhesive

24 months, see label on packaging

Disposal of the cleaning cloth

Cleaning cloths and cleaning agent residues are hazardous waste (see also safety data sheet)

Disposal of adhesive

Hazardous waste (see also safety data sheet)

Work steps for removing and installing sound insulation

SEE REPAIR INSTRUCTIONS

51 31 ... NOTES ON WINDOW BONDING

IMPORTANT: For 03-2009

- **the "1 Hour System" was introduced.**

Two different adhesive systems are described and identified accordingly

in the following:

"1-day system"

"1-hour system"

For 01-2010

- **the information for the Expiry date (Best Before) on the repair kit and window glue cartridge was changed and now refers to Calendar week and Year (CW/YYYY).**

For 03-2010

- **a "Repair kit, large" was introduced for the "1 Hour System" under part number 83 19 0 444 145.**

  In addition to the "Repair kit, small" delivery, this kit includes a second window glue cartridge.

  Recommended for 5-Series, 6-Series, 7-Series, X3, X5.

These instructions are not applicable to side window bonding (door "centre") on the E38/L7:

Work steps for removing and installing window glass

- Is located at the end of the document under the cross reference "Refer to repair instructions"

General

- It is possible to tow or drive without windscreen or rear window.

The windscreen, rear window and side windows are glued to the body. This bonding will increase the torsional rigidity of the vehicle. To obtain perfect bonding, comply with the installation procedure described in the following.

- The adhesive must be applied at room temperatures > 15 °C to avoid negatively affecting the bonded connection.

  Adjust the component and interior temperature accordingly.

- An air humidity of < 30% significantly slows hardening.
- The window glass must be secured against slipping with yellow plastic adhesive tape (sourcing reference: BMW Parts Department) after being installed. The paint must be completely hardened after painting work.

- Always apply the adhesive in such a way as to achieve tension-free bonding!

On-the-job safety

When working with bonding products (adhesive, cleaning agent, bonding agent, etc.):

- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure rooms are well ventilated.
- Change work clothing contaminated with adhesive immediately.
- Change work clothing contaminated with solvents and swelling agents immediately (keep spare work clothing on hand).
- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams
- Provide eye douche facilities, change water regularly (once a month).
- Comply with the relevant safety regulations
- Do not eat, drink or smoke in areas of polyurethane processing.
- All use and safety information of the safety data sheet (SDB) for the applicable product apply. The safety data sheet (SDB) can be obtained from the Aftersales Assistance Portal (ASAP)

Replacement of windscreens

Version with Head-Up Display (HUD):

- Marking for HUD must be present on the windscreen

Version with front passenger airbag:

- Stick on **LABEL**

Tools for cutting through adhesive bead:

ADHESIVE BEAD CUTTING TOOL REFERENCE CHART

Type	Type	Order/part number
Special cutter (manufacturer: Fein) with oscillating knife	Compressed air operated Electrically operated	7 23 63 100 23 8 7 53 60 200 00 4
BMW knife set	All required knives	PN 81 43 9 428 596 or 6 39 03 167 05 4
Knife (U-shape)	19.5 mm (1) 24 mm 36 mm 45 mm	6 39 03 118 01 3 6 39 03 076 01 6 6 39 03 079 01 2 6 39 03 154 01 0
	16 to 35 mm (adjustable)	6 39 03 143 01 3

Knife (straight with stop roller)	10 mm (fixed)(1) 14 mm (fixed)	6 39 03 189 01 0 6 39 03 082 01 6
" **ROLL OUT 2000** " Window glass repair	Wire cutting system (1)	PN 81 62 0 301 768
Cutting wire	Wire cutting system (1)	PN 83 19 2 150 267
Scalpel	for heavy-duty applications (1)	
Handles for cutting wire	Self-locking (1)	Special tool 51 3 270
(1) not included in BMW blade set		

Storage temperature

1-day system: Storage temperature of all adhesive products of 5 °C to 25 °C must be observed.

1-hour system: Storage temperature of all adhesive products of more than 15 °C must be observed.

Adhesive

The BMW approved polyurethane adhesive must be used for bonding:

- **1-day system:** Window glass adhesive (Part number 83 19 0 444 144*)

1-hour system: Repair kit, small (part number 83 19 0 444 141*) or large (part number 83 19 0 444 145*)

The repair kit, large contains a second window glass glue cartridge.

* Sourcing reference: BMW Parts Department

Adhesive is applied to window glass with cartridge gun (compressed airy or electrically operated, sourcing reference: BMW Workshop Equipment and Planning Documentation).

When using accelerator (hot working, 3-hour system)

- Temperature (min. 80 ± 5 °C) of cartridge oven must be checked every morning. Connect temperature sensor to diagnosis system
- Heat adhesive for one hour in cartridge oven (sourcing reference: BMW Parts Department) to 80 ±5 °C
  - Write date and time on cartridge when inserting into cartridge oven
  - Insufficient heating (< 1 hour) results in the formation of bubbles/blisters (bonding not permitted)
  - Temperature < 80 ± 5 °C results in the formation of bubbles/blisters (bonding not permitted)
- Remove hardened adhesive prior to further processing.
- Mistake in mixing in event of an interruption in application > 1 minute (bonding not permitted)
  - A sample bead of 50...70 mm must be rejected after an interruption in application
- Expiry dates of accelerator and adhesive must not be more than 3 months apart
  - Expiry date >3 months results in the formation of bubbles/blisters (bonding not permitted)

Sealed adhesive:

- May only be stored for a maximum of 8 hours once it has been heated up to 80 ±5 °C
- The adhesive will be damaged if this time is exceeded (bonding not permitted)
- Damaged adhesive must not be used and must be disposed of in compliance with national regulations
- The glue cartridge may only be heated up once
    - If the lower label is black, this adhesive may only still be used cold without accelerator while adhering to the expiry date.

IMPORTANT: Not all window glass may be bonded with accelerator (hot working).

If hot working is not permitted, this is described in the relevant document.

Adhesive expiry date

Repair kit (A) and glue cartridges (B) are marked with a date (best before).

Date (1) refers to the calendar week and year (KW/JJJJ).

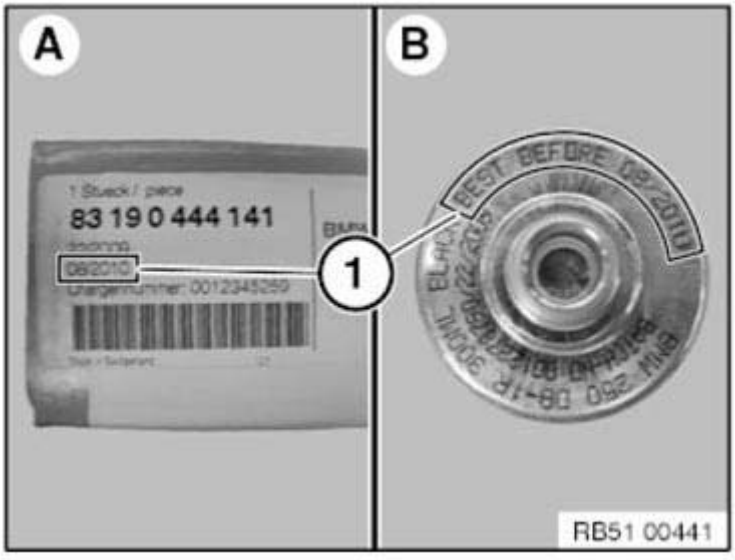


Fig. 220: Identifying Date On Kit And Glue Cartridges
Courtesy of BMW OF NORTH AMERICA, INC.

The adhesive cannot be used after this date (1).

Adhesive disposal

Pure hardened adhesive is handled as normal waste.

The adhesive is disposed of in paper sacks so that it can react with moisture.

Non-hardened adhesive, cartridges and mixtures of adhesive and solvents and the like must be disposed of as hazardous waste.

Accelerator (3-hour system)

Accelerator is screwed onto the glue cartridge and contains a reaction paste which is mixed with the heated adhesive.

IMPORTANT: The accelerator may only be paired with the glue cartridge of an unopened package (formation of bubbles/blisters).

Adhesive and accelerator must be paired while taking into account the expiry dates.

The accelerator may no longer be used if the expiry dates are more than 3 months apart.

Bonding agent (activator)

The BMW-approved bonding agents must be used to treat adhesive areas:

1-day system:

- "Glass Activator 1" (on ceramic glass)
- "Paint Activator A" (on sheet metal flange or residual adhesive bead)

1-hour system:

- "Glass Activator (2)" (on ceramic glass), yellow stick, BMW part number: 83 19 0 444 142
- "Paint Activator (B)" (on sheet metal flange), blue stick, BMW part number: 83 19 2 154 458

WARNING: Wear cut resistant gloves when breaking the glass ampoule

Prepare Glass Activator (2) and Paint Activator (B) for application by shaking and kinking (breaking glass ampoule).

Apply Glass Activator (2) by pressing gently. There is no need for final wiping. Air drying time approx. 2 minutes.

Apply Paint Activator (B) by pressingly gently. Then wipe dry with a paper towel (included in the set).

Bonding agent expiry date

Repair kit and bonding agent are marked with a date (Best Before).

- The bonding agent may only be used up to this date (if not already opened previously).
- Once it has been opened (circlip broken), use for 1 week only even if the expiry date has not been reached.

NOTE: Write the date on the bottle when opening the bonding agent for the first time. Close the bottle immediately after extracting the bonding agent (reaction with air).

Application of bonding agent

The bonding agent is used for adhesion between glass or ceramic glass and the adhesive. Therefore, a thin, homogeneous and continuous line of bonding agent must be applied.

After compressing the adhesive bead, make sure that there is 1 to 2 mm wide bonding agent trace is on the ceramic glass next to the adhesive bead (serves visual inspection).

The adhesive bead may become up to 15 mm wide in compressed condition. The width of the adhesion agent is therefore at least 17mm with windscreens and rear windows and at least 9 mm with door window glass.

The bonding agent may not be applied in the visible area or the point grid. Fresh bonding agent in the visible area must immediately be wiped off with solvent because hardened bonding agent will leave a haze behind.

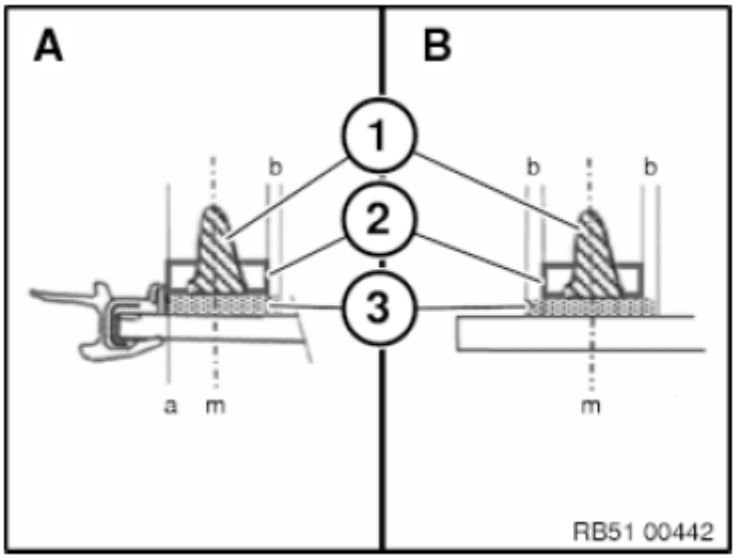


Fig. 221: Identifying Adhesive Bead And Bonding Agent Bead
Courtesy of BMW OF NORTH AMERICA, INC.

ADHESIVE BEAD REFERENCE CHART

Graphic A	Graphic B
Window glass with cover	Window glass without cover.
If the adhesive bead (1) cannot expand further (a = 0 mm) into one direction when pressing down, the	If the adhesive bead (1) can expand into both directions while pressing down, the bonding agent

outer edge of the bonding agent bead (3) will run through Point a.	(3) and adhesive bead (2) will run toward each other in the center (m).

Removal of window glass

IMPORTANT: As of E63 and E87 it will only be possible to remove the rear window with the "ROLL OUT 2000 ".

Cover side walls, roof-mounted aerial and if necessary interior equipment with protective covers.

Tape off body with fabric adhesive tape (e.g. Tesa) in those areas where the oscillating blade could damage the window glass or the paint.

When using the cutting wire, pull the cutting wire ends through special tool 51 3 270, bend and tape off with fabric adhesive tape (e.g. Tesa) (risk of injury and damage).

When removing the window glass:

- Wear safety goggles and protective gloves.

Cut through adhesive bead of window glass:

- With "**ROLL OUT 2000** " * (wire cutting system); no paint is damaged here in the case of narrow gaps
- with special cutter* and oscillating knife*

*Sourcing reference: BMW Workshop Equipment and Planning Documentation

Prior to each use, regrind the knife with a grindstone while the machine is running (new knives also).

Avoid paintwork damage on body aperture.

Guide knife carefully between body and window glass.

Run blade of knife parallel to window glass.

Cut through adhesive bead as closely as possible to window glass.

To remove residual adhesive bead in body aperture (and on window glass if reusing):

- Use a scalpel for heavy-duty applications
- Cut off adhesive residue to a thickness of approx. 0.5 mm
- Remove residual adhesive bead only briefly before bonding

Damage to paintwork in body aperture

To ensure long-term corrosion protection, it is absolutely essential to touch up damage to paintwork!

The "BMW Color System" painting handbook forms the basis of these repair instructions and must be observed without fail.

Touch up damage to paintwork on body aperture with BMW multibase filler.

Grind out scratches in non-visible areas and touch up with BMW multibase filler.

Grind extensive areas of damage down to the bare metal and coat with BMW multibase filler (layer thickness 30 ... 40 µm).

Hardening time:

- With infrared, at least 10 minutes
- Without infrared for at least 60 °C, at least 30 minutes
- Without infrared for at least 20 °C, at least 24 hours

If a complete build-up of paint is required in the visible area:

- Tape off primed adhesive flange before applying top coat

IMPORTANT: Observe hardening time of BMW multibase filler otherwise a perfect bond cannot be guaranteed!

Treatment of adhesive area in body aperture:

TREATMENT PROCEDURE FOR ADHESIVE

Adhesive	Treatment
Bonding and sealant for car window glass	a. Clean with cleaning agent R2 (sourcing reference: BMW Parts Department, part number 83 19 0 417 324) b. Observe an air drying time of at least 5 minutes (at least 15 minutes when applied to residual adhesive bead) c. **1-day system:** Apply "Paint Activator A" to paint and residual adhesive bead c) **1-hour system:** Apply "Paint Activator B" (blue stick) to paint d) Observe an air drying time of at least 1 minute (at least 10 minutes when applied to residual adhesive bead)

IMPORTANT: Do not use Sika remover 208 for cleaning in the adhesive area.

Preparation for installation

Prepare plastic nozzle(s) for shaping adhesive bead (when not using the standard nozzle C), can be cut to size during the air drying time.

Lay a sample bead of approx. 50 mm - watch out for formation of bubbles/blisters when hot bonding; if OK, apply immediately to window glass.

- Interruption must be < 5 seconds (incorrect mixture ratio).

Glue cartridge must be vertical to window glass.

Black ceramic glass impermeable to UV light is located on the peripheral zone of the inside edge of the window to protect the adhesive bead.

Ceramic glass must not be damaged and must be treated as follows.

1-day system: Treatment of ceramic glass surface (inside of window):

TREATMENT FOR CERAMIC GLASS SURFACE (1-DAY SYSTEM)

Adhesive (with part numbers)	**Treatment**
Repair kit Cold/Hot Bonding: - 83 19 0 444 141/145 Glue cartridge: - 83 19 0 444 144	a. Clean with cleaning agent R2 (sourcing reference: BMW Parts Department, part number 83 19 0 417 324) b. Observe an air drying time of at least 5 minute c. Apply a thin coating of "Glass Activator (2)" d. Observe an air drying time of at least 2 minutes

1-hour system: Treatment of ceramic glass surface (inside of window):

TREATMENT FOR CERAMIC GLASS SURFACE (1-HOUR SYSTEM)

Adhesive (with part numbers)	**Treatment**
Repair kit: - 83 19 0 444 141/145 Glue cartridge: - 83 19 0 444 144	a. Clean with cleaning agent R2 (sourcing reference: BMW Parts Department, part number 83 19 0 417 324) b. Observe an air drying time of at least 5 minutes c. Apply a thin coating of "Glass Activator (2)" d. Observe an air drying time of at least 2 minutes

Version with inspection glass for vehicle identification number in windscreen only

- Close inspection glass (left bottom) with Sika bonding base VP 206 (part number 83 19 9 407 777*)

(*sourcing reference: BMW Parts Department)

Except for:

All US/GB models. In addition, all models or models on which the black I-panel cover means that the body color can not be seen through the inspection glass.

Adhesive quantities

Approx. 1 1/4 glue cartridges are required to bond the windscreen on the following vehicles:

- 7 Series
- 5 Series from E60
- X5
- X3

In the case of hot bonding (with accelerator), the missing residual adhesive bead is applied from a second glue cartridge but while cold and without accelerator (formation of bubbles/blisters).

Minimum hardening time is thus not increased.

IMPORTANT: If a second cartridge is required for bonding:

- **First apply cold adhesive to cowl panel at bottom (skin formation time)**
- **Accelerator from repair kit must not be used with the second glue cartridge (formation of bubbles/blisters)**

Formation of bubbles/blisters results in leakage and insufficient bonding strength (torsional rigidity, front passenger airbag).

Effect of differing adhesive quantities:

ADHESIVE QUANTITIES REFERENCE CHART

Too little adhesive:	Too much adhesive:
○ Window glass rests too low in body aperture ○ Strains/tensions may occur (window glass breakage) ○ Insufficient squeezing of adhesive bead (leaking)	○ Window glass rests too high in body aperture ○ Wind noise may occur ○ Strains/tensions may occur (window glass breakage) ○ Dirt contamination of add-on parts by emerging adhesive ○ Adhesive on uninsulated strainer pressure lines of aerial(s) (interference of reception)

Spacer buffers

Before sticking on new spacer buffers, remove all remaining traces of old spacer buffers completely.

Position of spacer buffers must be observed exactly.

Incorrectly fitted spacer buffers will result in:

- Windscreen glass breakage
- Leakage (if the spacer buffer is in the adhesive area)
- Wind noises

Installation

To prevent a pressure build-up in the passenger compartment when the doors are closed:

- Open a side window

IMPORTANT: 1-day system:

After the adhesive bead has been applied, the window glass must be fitted within 5 to 10 minutes (depending on air humidity, temperature and use of accelerator).

After 5 to 10 minutes the adhesive bead forms a skin which can no longer guarantee a perfect bond.

1-hour system:

Once the adhesive bead has been applied, the window glass must be installed within 7 minutes (depending on air humidity, temperature).

After 7 minutes the adhesive bead forms a skin which can no longer guarantee a perfect bond.

The general rule is:

To secure the window glass, use only the yellow plastic adhesive tape (sourcing reference: BMW Parts Department, part number 83 19 9 410 979).

The window glass will slip down if other adhesive tapes are used.

Window glass slippage will result in leaks and wind noises.

Remove adhesive residue immediately with adhesive remover (Sika remover 208, sourcing reference: BMW Parts Department). Do not press out the window glass again.

Hardened adhesive can only be removed mechanically.

Check height of windscreen/rear window with special tool 51 0 010 or 51 3 210.

Assemble vehicle.

Hardening

The adhesive hardens as it reacts with air humidity (with accelerator also due to mixed-in reaction paste) at room temperature.

Minimum hardening time (table) is obtained from 22 °C and 38 % relative air humidity.

At ambient temperatures above 23 °C and 50 % relative air humidity (hot countries), the adhesive open time is shortened to approx. 5 minutes (skin formation time).

The adhesive hardening process is interrupted completely at ambient temperatures below 5 °C. In this event, there will be no increase in the strength of the bonded connection.

Do not subject the vehicle to load on one side during the minimum hardening time (see table, without front passenger airbag), such as e.g.:

- one wheel on curb
- vehicle hoist
- etc.

Maneuvering inside garage/workshop:

- only permitted on level ground
- do not under any circumstances drive over approach ramps, e.g. into multistorey car parks

Remove adhesive tapes after hardening time.

If you fail to adhere to the minimum hardening times (see table, without front passenger airbag):

- Leaks and/or wind noises may occur at the window glass

1-day system: Adhesives and their minimum hardening times:

ADHESIVES AND HARDENING TIMES (1-DAY SYSTEM) REFERENCE CHART

Adhesive	**Minimum hardening time "without front passenger airbag" (after which vehicle can be moved)**	**Minimum hardening time "with front passenger airbag" (countries where seatbelt use is not required by law)**
Hot working with accelerator	2 hours	3 hours()
Cold processing	9 hours	20 hours()

1-hour system: Adhesives and their minimum hardening times:

ADHESIVES AND HARDENING TIMES (1-HOUR SYSTEM) REFERENCE CHART

Adhesive	Minimum hardening time "without front passenger airbag" (after which vehicle can be moved)	Minimum hardening time "with front passenger airbag" (countries where seatbelt use is not required by law)
Cold processing	1 hour	2 hours(1)

(1) Note

Vehicles with front passenger airbag:
The vehicle can be handed over to the customer after the hardening time (vehicle can be moved, adhesive-dependent) with the following warning:
Once the windscreen glass has been bonded, all occupants must travel with their seatbelts attached for "... hours"!
The time is taken from the "Minimum hardening time" table for countries where seatbelt use is not required by law.

IMPORTANT: If the minimum hardening time is not adhered to:

- **the front passenger together with the windscreen may fall out of the vehicle in the event of an accident after the front passenger airbag has been triggered**

Locate leaks

- by spraying water underneath sealing lips
- with ultrasonic leak detector (sourcing reference: BMW Parts Department)

If necessary, seal leakage with appropriate nozzle.

Version with GPS navigation system 1 (up to 9/97)

After installation of rear window:

- Recalibrate magnetic field probe
- Refer to functional description in ISID (Integrated Service Information Display/Diagnosis and Information System)

Version with rain sensor, rain/light sensor or rain/light solar sensor

Remove complete rain sensor, rain/light sensor or rain/light solar sensor, **SEE REPAIR INSTRUCTIONS** .

After replacing windscreen:

- Initialize rain sensor, rain/light sensor or rain/light solar sensor
- Refer to functional description in ISID (Integrated Service Information Display/Diagnosis and Information System)

Version with automatic air conditioning

After replacing windscreen:

If condensation sensor is not mounted on new windscreen:

Replace condensation sensor, **REFER TO REPAIR INSTRUCTIONS** .

Version with Head-Up Display (HUD)

When replacing windscreen in vehicles with **rain/light solar sensor,** replace this completely: See repair instructions See **6135177 REMOVING AND INSTALLING (REPLACING) RAIN/LIGHT SENSOR** or **6135679 INITIALIZING RAIN/LIGHT (SOLAR) SENSOR** .

Before bonding, install windscreen with seal(s) and check HUD; if necessary, press expanding foam tape down with hand roller.

After bonding windscreen, check and if necessary adjust HUD.

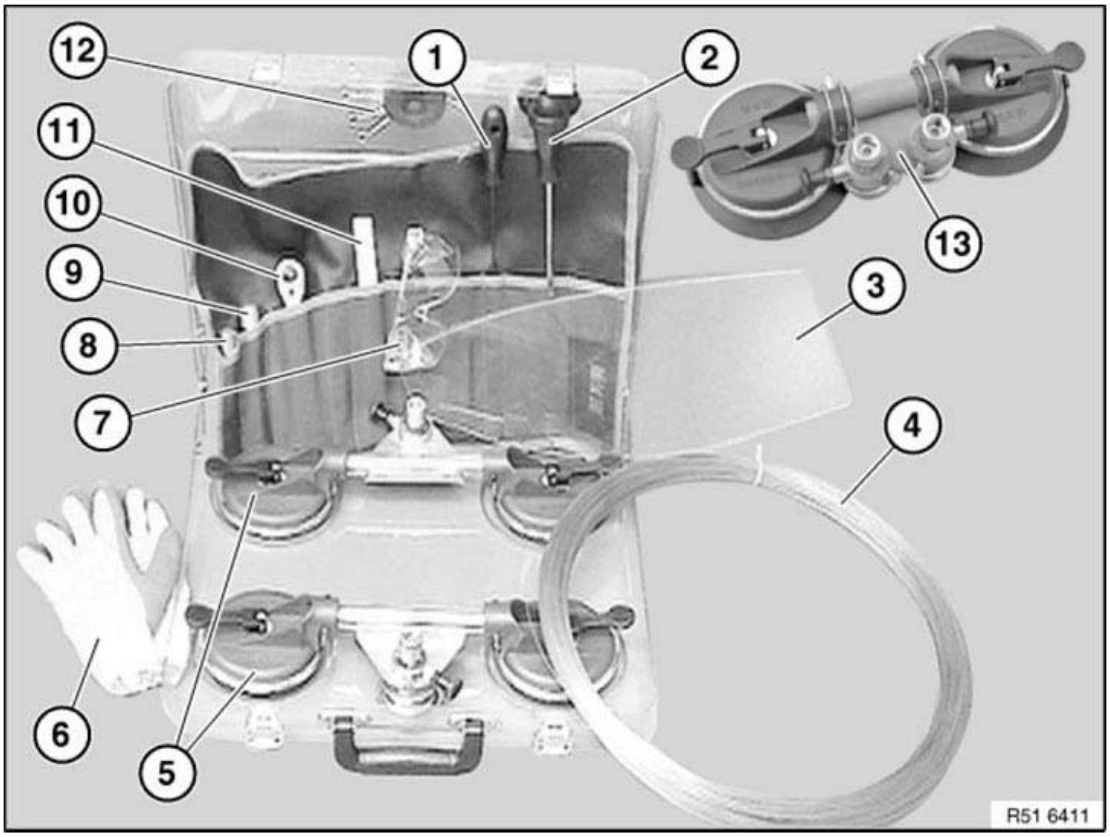
Work steps for removing and installing window glass

See repair instructions See **5131000 REMOVING AND INSTALLING/RENEWING WINDSCREEN** or **5131200 REMOVING AND INSTALLING/REPLACING REAR WINDOW**.

NOTE: **If the document for the selected model is not required or not approved, the following message will be displayed when clicking on the "cross-reference": "No additional documents available in the current vehicle context".**

51 31 ... REMOVE WINDSCREEN WITH "ROLL OUT 2000"

Windscreen removal system "Roll Out 2000"



1 Wire starter
2 Parabolic tool
3 Plastic washer
4 Wire cutting roller
5 Suction cup lifters
6 Protective gloves
7 Safety goggles
8 Extension (short)
9 Extension (long)
10 Reversible ratchet
11 Plastic wedge
12 Guide needles
13 Suction cup lifter with double spool

Fig. 222: Identifying Windscreen Removal System Components (Roll Out 2000)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Both paint and ergonomic and health-endangering damage is minimized with the "Roll Out 2000" system.
Sourcing reference:

WARNING: Follow safety instructions See 5100... SAFETY INSTRUCTIONS FOR WORKING ON CARS WITH AIRBAG SYSTEMS or 72 SAFETY PRECAUTIONS AND GENERAL INFORMATION for working on vehicles with airbag systems (risk of injury).

IMPORTANT: Take care when handling sharp-edged tools and cutting wire (risk of damage to head airbag and window glass).

IMPORTANT: Always keep both suction cups dry and clean to ensure their optimum adhesion on the windscreen.

Lubricate spool if lock rattling becomes too loud.

Always wear safety goggles and protective gloves for your own safety.

Mounting suction cup lifters on windscreen or rear window:

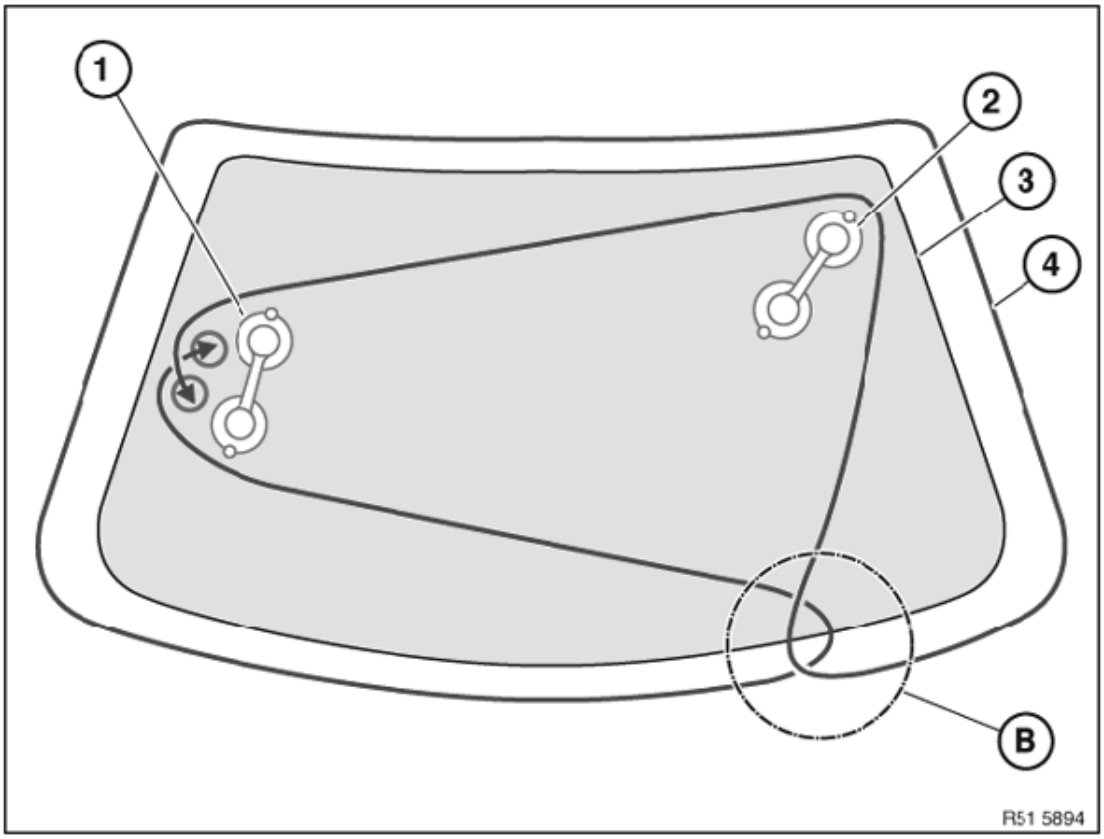


Fig. 223: Identifying Suction Cup Lifters Position On Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

- Secure position of suction cup lifters as shown:

1. Suction cup lifter with double spool
2. Suction cup lifter with single spool
3. Window
4. Cutting wire

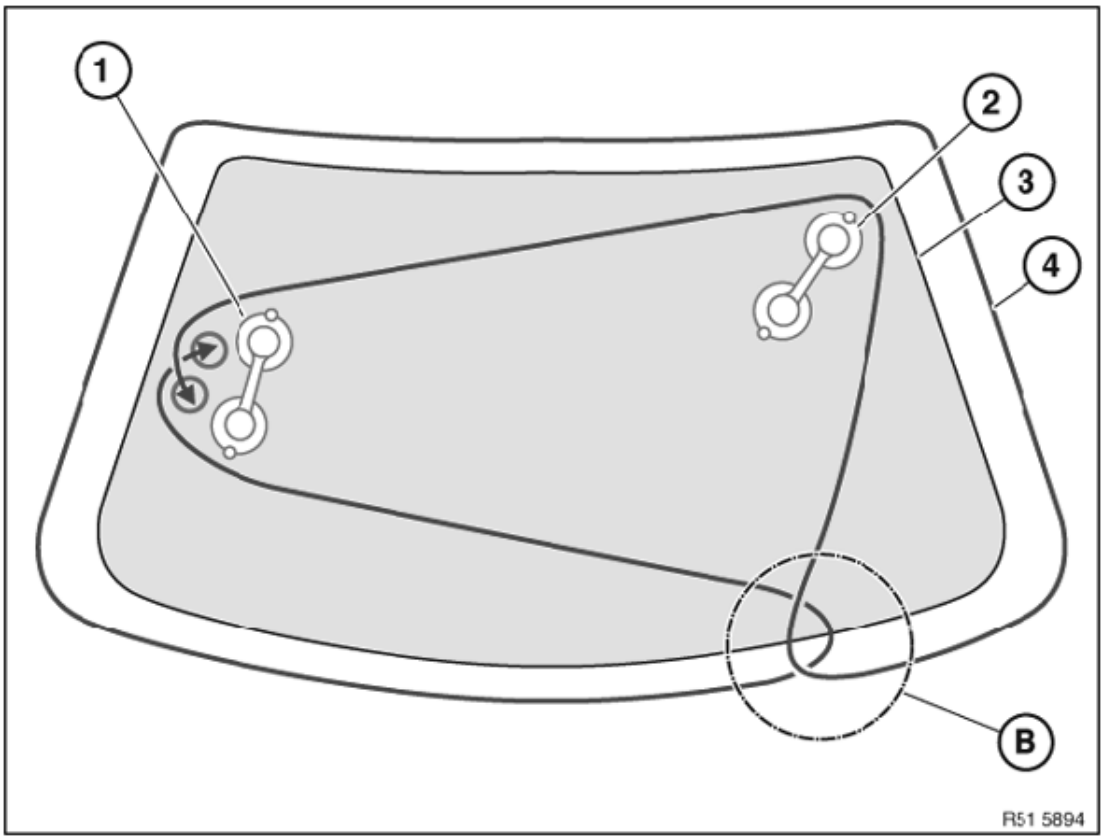


Fig. 224: Identifying Suction Cup Lifters Position On Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

Preparatory work

- Cut off required cutting wire length:

  Length = 6 x window glass diagonal

- The cutting wire loops must lie on top of each other in area (B).

They must not get caught up in each other. (Otherwise no possibility of cutting the adhesive bead/wire will break.)

Overlapping of cutting wire loops approx. 10 cm.

Distance from right window edge approx. 30 cm.

Pulling cutting wire into vehicle

- Cut off wire end (1) at an angle and pierce adhesive bead (2) with it.
- Wire end must be bent towards window glass.

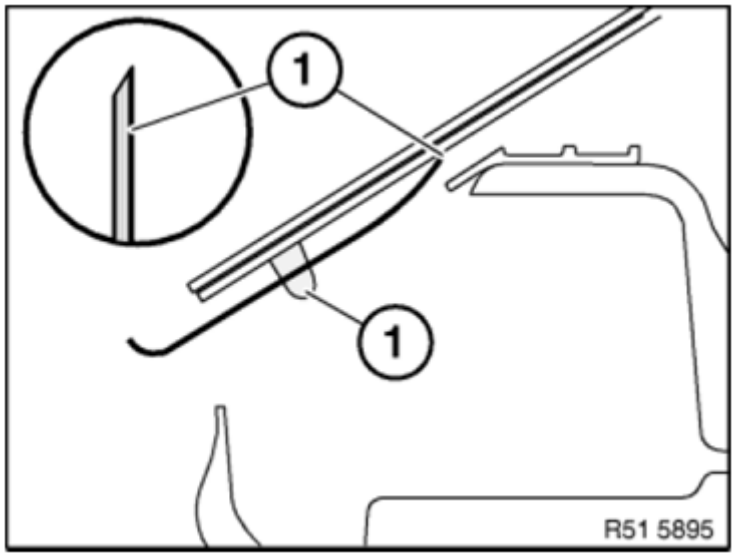


Fig. 225: Identifying Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Laying cutting wire around window glass

- Starting from pull-in point, lay wire eyelet created on the outside around the window glass
- Pull excess wire into passenger compartment

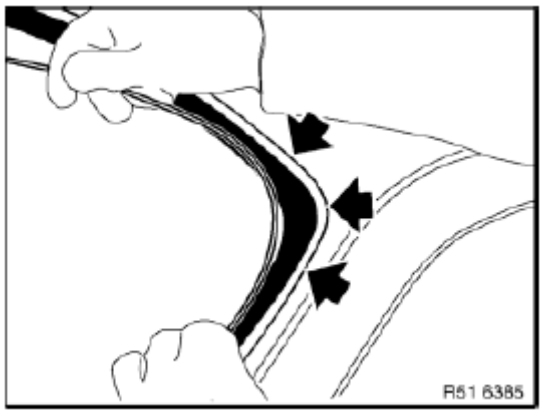


Fig. 226: Securing Cutting Wire Around Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure the cutting wire is located at all four corner points below the window glass.

Check that the cutting wire is not caught on clamps or body.

Secure window glass on outside with adhesive tape against sliding.

NOTE: Window glass (1) with installed seals (3) or moulded-on surrounds:

- **Moisten cutting wire (4) and seals (3) on window glass (1) with water**
- **Insert cutting wire (4) in bend (without kinking) between window glass(1) and body aperture (2)**

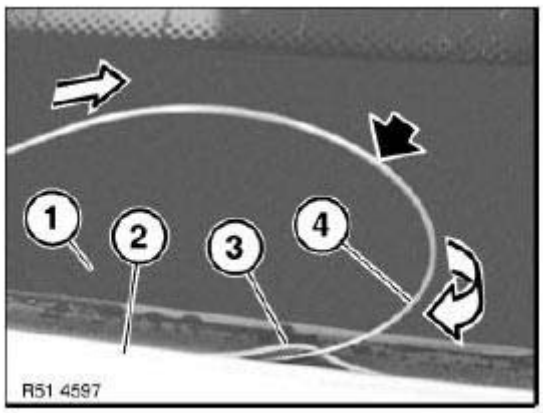


Fig. 227: Inserting Cutting Wire Between Window Glass And Body Aperture
Courtesy of BMW OF NORTH AMERICA, INC.

Protecting vehicle passenger compartment

- To avoid damage and possible dirt contamination, protect A-pillars, roof and dashboard trim panel (3) by means of plastic washer (1)
- Always carry plastic washer (1) between respective wire (2) being tightened and trim panel components

Fig. 228: Identifying Plastic Washer, Wire And Dashboard Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Attaching wire in hoisting winch with double coil

- Bend over cutting wire end (1) and insert into slot of spool (2)

- Repeat process with other end of wire (1) and second spool (2)
- Wind cutting wire (1) onto spools by hand until cutting wire (1) is under slight tension

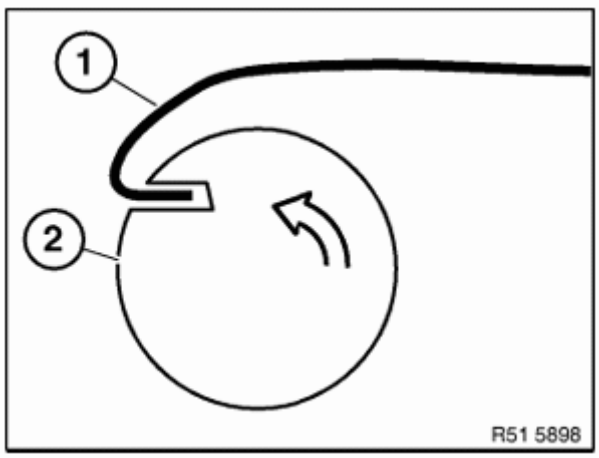


Fig. 229: Bending Cutting Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Starting the dismantling

NOTE: Spools can only be rotated in one direction.

- **Make sure the wire is always situated in the guide channel of the suction cup lifter (1)**
- **Fit reversible ratchet onto top spool shaft (2) and tighten wire**
- **Start by cutting lower adhesive bead**

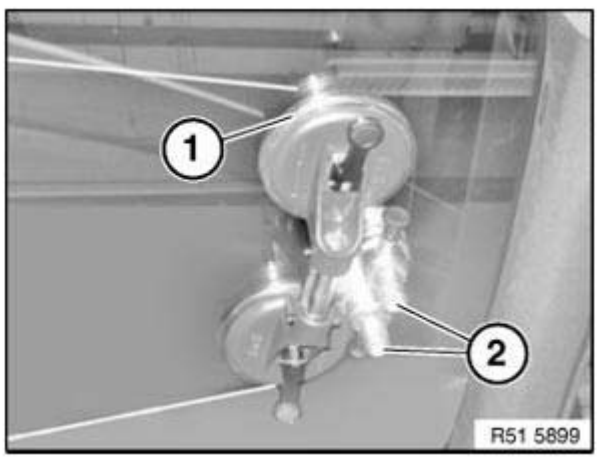


Fig. 230: Identifying Suction Cup Lifter On Spool Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

- **At the end of the cutting process, the two wire loops join up at the lifting**

winch (1)

- **Remove "Roll Out 2000"**
- **Remove window glass**

51 31 000 REMOVING AND INSTALLING/RENEWING WINDSCREEN

IMPORTANT: INSTRUCTIONS ON CEMENTING WINDSCREEN serve as the basis for this repair instruction and must be observed without fail.

Cover front side walls with protective covers.

NOTE: Removal is performed with ROLL OUT 2000 . Only use an oscillating blade when replacing the windscreen.

Necessary preliminary work

- Remove **TRIM PANELS FOR ROOF PILLARS**
- Remove **INTERIOR REAR-VIEW MIRROR**
- Remove **WINDSCREEN FRAME SEAL**
- Remove **COVER FOR COWL PANEL**

Replacement:

- If necessary, remove **RAIN/LIGHT SENSOR**
- If necessary, remove **SOLAR RAIN/LIGHT SENSOR**
- If necessary, remove **FOGGING/CONDENSATION SENSOR**

Replacement only

Fit 36 mm blade (sourcing reference: BMW Parts Department) to the tool.

Regrind blade with a grinding stone while machine is running (new blades also).

Carefully insert blade between body aperture and windscreen.

Guide handle of knife parallel to windscreen.

Cut through adhesive bead as closely as possible to windscreen.

Fig. 231: Identifying 36 mm Blade On Tool
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: When cutting is carried out at the bottom, the engine compartment lid must be in the service position.

Cables and hoses remain connected.

Move **ENGINE BONNET/HOOD INTO SERVICE POSITION** .

Cut through windscreen adhesive bead at bottom.

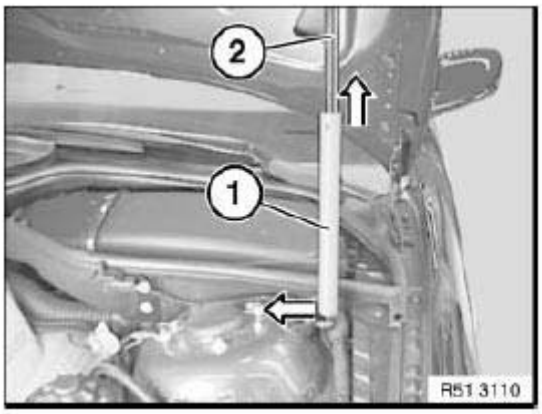


Fig. 232: Lifting Out Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out windscreen with special tools 51 3 010.

Pull off adhesive tapes all round.

Installation note:

If necessary, replace defective **EXPANDING FOAM TAPE** (1).

IMPORTANT: Press down or bond the expanding foam tape (1) right before installing the windscreen with special tool 51 0 300 . Relaxed expanding foam tape could crush cement bead (leaks, wind noises).

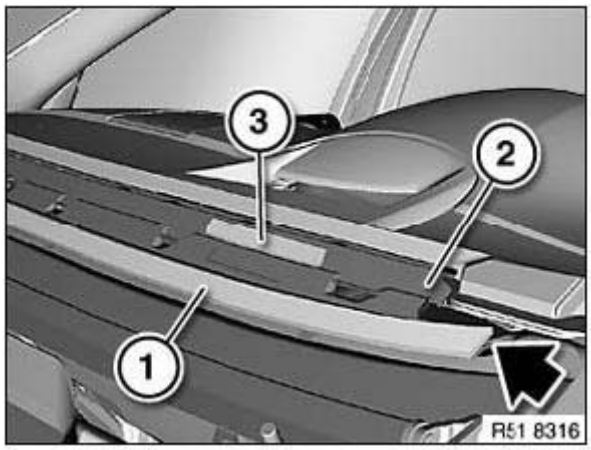


Fig. 233: Identifying Expanding Foam Tape On Lower Edge Of Defroster Channel
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Attach new expanding foam tape (1) to lower edge of defroster channel (2).

Expanding foam tape (1) may only be stuck up to corner points of defroster channel (2).

Stick on expanding foam tape (3) (120 mm long) above vehicle identification number.

Fitting spacer buffers

IMPORTANT: Completely remove remnants of semicircular spacer buffers still present (2) (windscreen breakage).

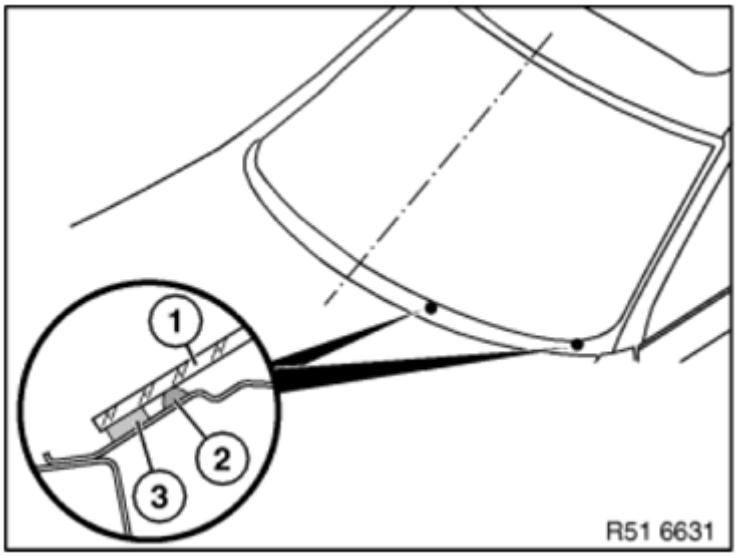


Fig. 234: Identifying Windscreen, Semicircular Spacer Buffer And Adhesive Bead
Courtesy of BMW OF NORTH AMERICA, INC.

Stick on two new semicircular spacer buffers (2) as follows:

- 310 mm to left/right of centre window frame aperture
- on right and left sides in window corner

1. Windscreen
2. Semicircular spacer buffer
3. Adhesive bead

Installing the windscreen frame sealing

Refer to removing and installing/replacing **WINDSCREEN FRAME SEALING** .

Section, cowl panel, top

Preventing wind noise on top of windscreen:

Windscreen (1) must be lower than roof outer skin (2). The bridge (3) of the windscreen frame sealing therefore serves as a spacer buffer for the top windscreen (1).

Dimension A ~ 8 mm.

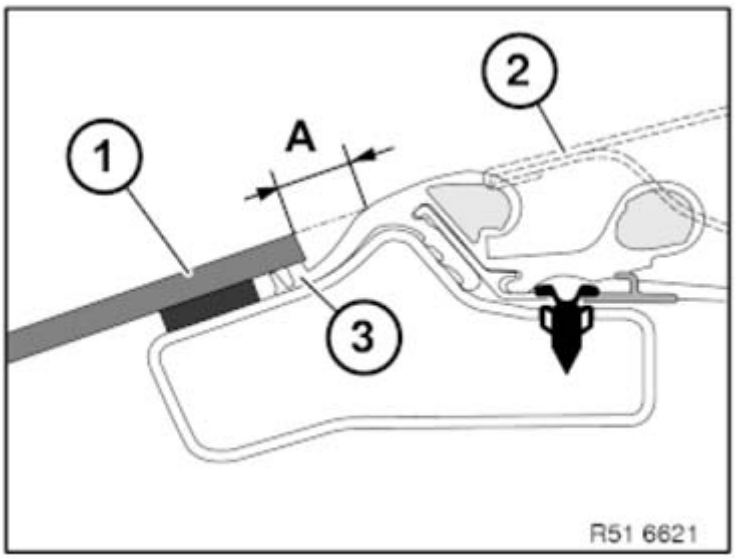


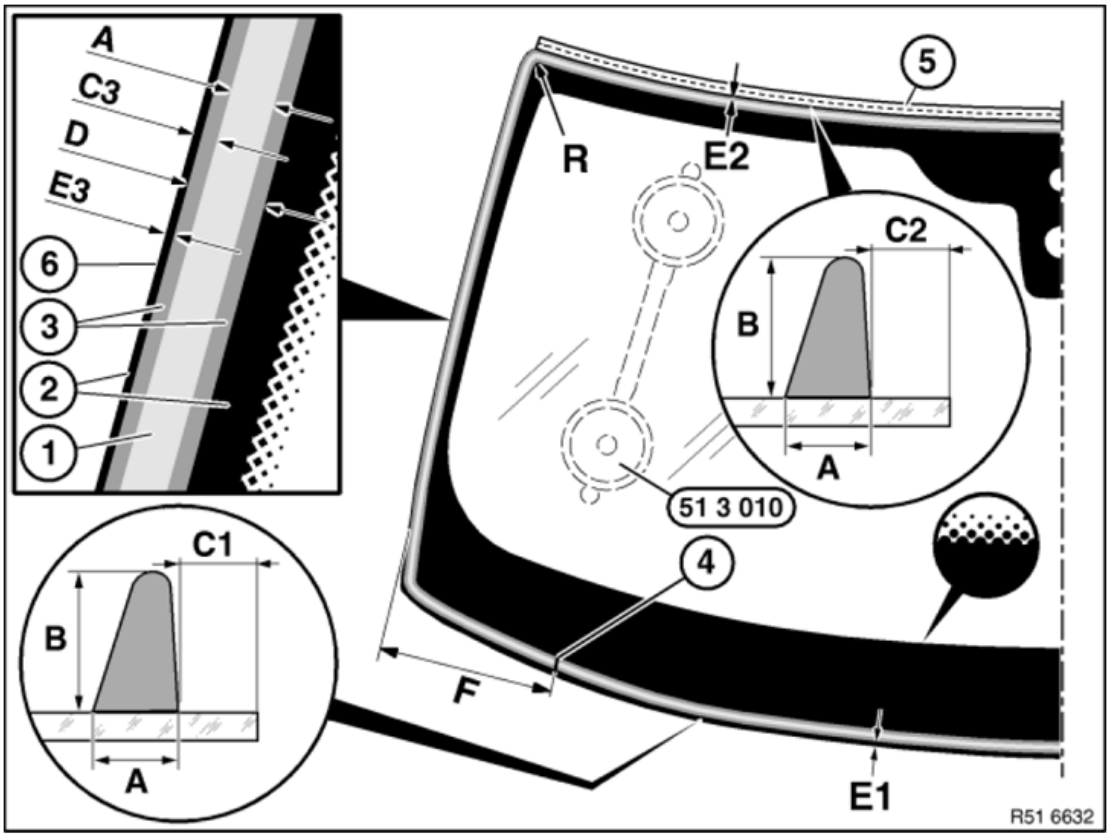
Fig. 235: Identifying Windscreen And Roof Outer Screen With Bridge
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Depending on the installation position of the windscreen frame sealing (later installation), dimension A may slightly deviate from the design specifications.

Installation note:

Keep the contact pressure when bonding the windscreen (1) light enough so that a later removal of the windscreen frame sealing can be ensured.

Overview for windscreen cementing (E89):



1	Adhesive bead	C1	5 ±1 mm (distance 1 to 6 bottom)
2	Ceramic layer	C2	12 ±1 mm (distance from 1 to 6, top)
3	Primer coat	C3	5 ±1 mm (distance 1 to 6 side)
4	Application point of adhesive bead	D	20+2 mm (width of primer trace)
5	Rubber frame, top	E1	1 mm (distance from 3 to 6, bottom)
6	Windscreen outer edge	E2	7 mm (distance from 3 to 6, top)
A	8 ±2 mm (width of adhesive bead)	E3	1 mm (distance from 3 to 6 side)
B	12 -2 mm (height of adhesive bead)	F	approx. 300 mm (distance from 4 to 6)
		R	approx. 15 mm (radius of 1)

Fig. 236: Overview For Windscreen Cementing (E89)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 51 3 010 twice to tool trolley. Moisten suction surfaces and tension windscreen from outside.

If reusing removed windscreen, remove residual adhesive down to 0.5 mm.

If necessary, mount new rubber frame (5). Observe centre markings in so doing.

If necessary, press expanding foam tape down with hand roller.

Virtually vertical part (B) of adhesive bead (1) must be positioned to rubber frame (5) and windscreen outer edge (6).

Spread bead joint with special tool. 00 9 322

NOTE: Adhesive area for plastic adhesive tapes (1) must be free from grease and dust.

Stick two yellow plastic adhesive tapes (1) to roof at distance (A) from outside corners.

Length: 400 mm

A = 250 mm

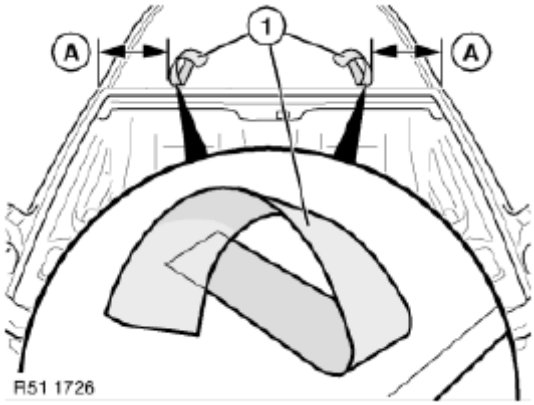


Fig. 237: Identifying Plastic Adhesive Tapes Position On Roof
Courtesy of BMW OF NORTH AMERICA, INC.

Working on windscreen (1) carefully with special tool 51 3 010 :

- position windscreen first at top
- Align sides evenly
- then insert at bottom and press down
- secure in terms of height in this position at top with two yellow plastic adhesive tapes (2)

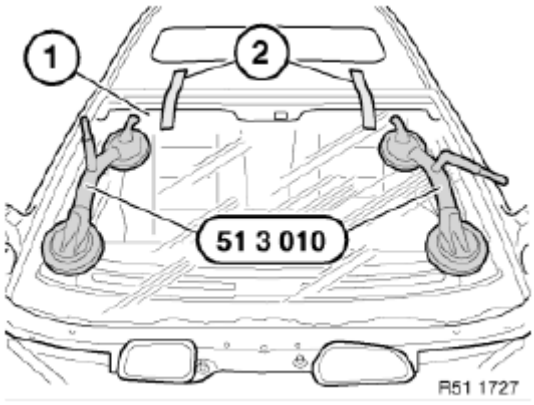


Fig. 238: Identifying Plastic Adhesive Tapes And Special Tool (51 3 210) On Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

51 31 000 REMOVING AND INSTALLING/RENEWING WINDSCREEN

IMPORTANT: The "INSTRUCTIONS FOR WINDOW CEMENTING " serve as the basis for these repair instructions and must be followed without fail.

51 31 200 REMOVING AND INSTALLING/REPLACING REAR WINDOW

IMPORTANT: The "INSTRUCTIONS FOR WINDOW CEMENTING " serve as the basis for these repair instructions and must be followed without fail.

51 48 ... REMOVING AND INSTALLING/REPLACING SOUND INSULATION ON COWL PANEL OR WINDSCREEN

Sound insulation can only be replaced with the following removed:

- **INSTRUMENT PANEL** or
- **WINDSCREEN**

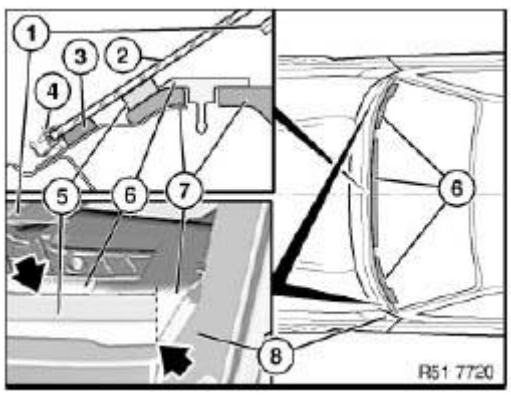


Fig. 239: Identifying Expanding Foam Tape, Adhesive Bead And Sound Insulation On Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Press down, or with replacement bond, expanding foam tape (5) just before installing the windscreen (2) with special tool 51 0 300 . Relaxed expanding foam tape could crush cement bead (3) (leaks, wind noises).

Replacement

Stick new expanding foam tape (5) on sound insulation (7) along press-down elements (6).

Expanding foam tape (5) may only be stuck up to corner point of sound insulation (7).

1. Dashboard trim panel
2. Windscreen
3. Adhesive bead

4. Retaining strip, bottom
5. Expanding foam tape (sound insulation, cowl panel)
6. Press-down for sound insulation (7)
7. Sound insulation, bulkhead upper section
8. Side frame

51 48 ... REMOVING AND INSTALLING/REPLACING SOUND INSULATION ON COWL PANEL/WINDSCREEN

NOTE: Sound insulation is only fitted in vehicles with diesel engines.

Sound insulation can only be replaced with the following removed:

- Instrument panel or
- **WINDSCREEN**

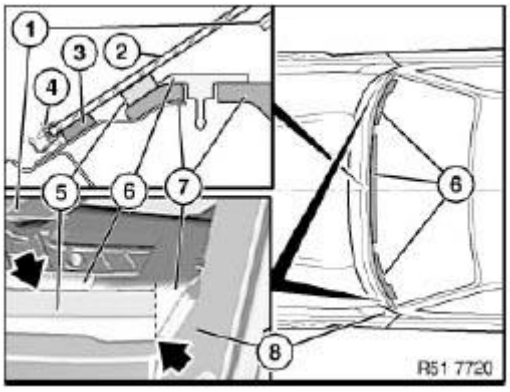


Fig. 240: Identifying Expanding Foam Tape, Adhesive Bead And Sound Insulation On Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Press down expanding foam tape (5) shortly before installing windscreen (2) (with hand roller) or stick on if replacing. Relaxed expanding foam tape could crush cement bead (3) (leaks, wind noises).

Replacement

Stick new expanding foam tape (5) on sound insulation (7) along press-down elements (6).

Expanding foam tape (5) may only be stuck up to corner point of sound insulation (7).

1. Dashboard trim panel
2. Windscreen
3. Adhesive bead
4. Retaining strip, bottom

5. Expanding foam tape (sound insulation, cowl panel)
6. Press-down elements for (7)
7. Sound insulation, bulkhead upper section
8. Side frame

51 31 015 REPAIRING DAMAGE TO WINDSCREENS CAUSED BY STONE CHIPS (CLEAR AND TINTED LAMINATED SAFETY GLASS)

Field of vision (no repairs acceptable):

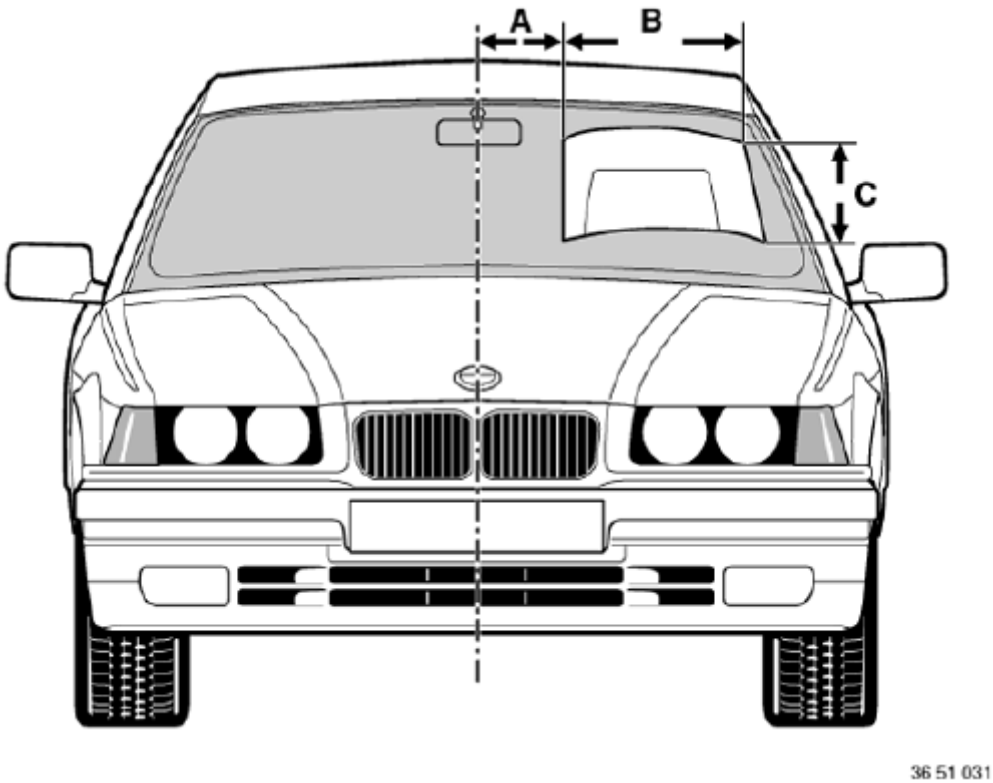


Fig. 241: Identifying Field Of View Width \ Height
Courtesy of BMW OF NORTH AMERICA, INC.

A. 50 mm (gap between field of view/centre of vehicle)
B. Up to end of wiper range, outside (field of view width)
C. Restriction by wiper range (height of field of view)

IMPORTANT: Repairs must only be carried out outside of the field of vision (refer to sketch).

5132 FRONT MANUALLY OPERATED WINDOWS

51 32 154 ADJUSTING LEFT OR RIGHT FRONT DOOR WINDOW GLASS

Precondition:

- Vehicle must be standing on its wheels on a level floor
- **FRONT DOOR** correctly adjusted to fit
- If necessary, close retractable hardtop

IMPORTANT: When closing, the door window glass must not jam on the trim strip in any area of the window (window glass breakage).

If necessary, incoming check

The following incoming checks must be carried out prior to every adjustment operation:

NOTE: Incoming check must be carried out with the window cavity cover strip fitted.

- **Denormalize POWER WINDOW**
- **Measure retraction depths with special tool 51 3 080 .**
- **Initialize power windows**

Necessary preliminary tasks

- Denormalize **POWER WINDOW**
- Remove **FRONT DOOR TRIM PANEL**
- Remove **SOUND INSULATION**
- Remove **OUTER WINDOW CAVITY COVER STRIP** (not for checking pre-tension)

Ideal adjustment, longitudinal direction

Open door window.

Fit special tool 51 0 360 in front door and press back as far as it will go.

NOTE: Special tool 51 0 360 must rest against door and reach stop on guide (1).

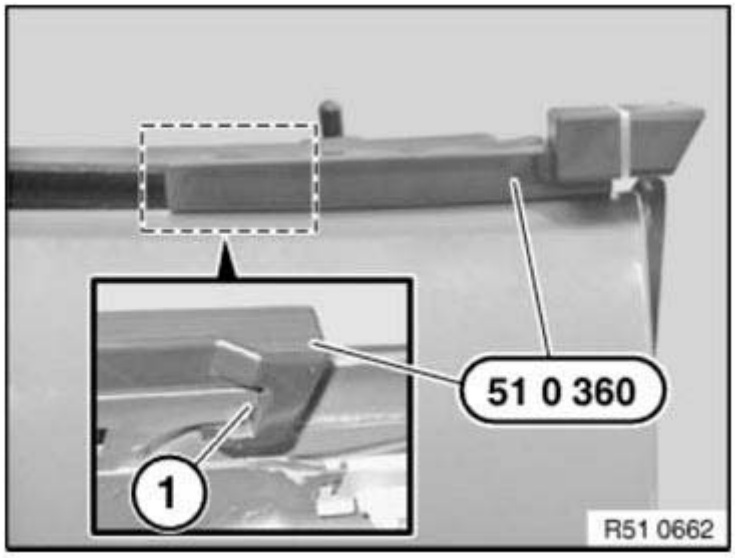


Fig. 242: Fitting Special Tool (51 0 360) On Front Door
Courtesy of BMW OF NORTH AMERICA, INC.

Ideal adjustment, retraction depth

- Open door window
- Attach special tool 51 3 080 to door window glass
- Close front door and door window
- Measure retraction depth

NOTE: 2 items of special tool 51 3 080 are required for adjustment of retraction depths.

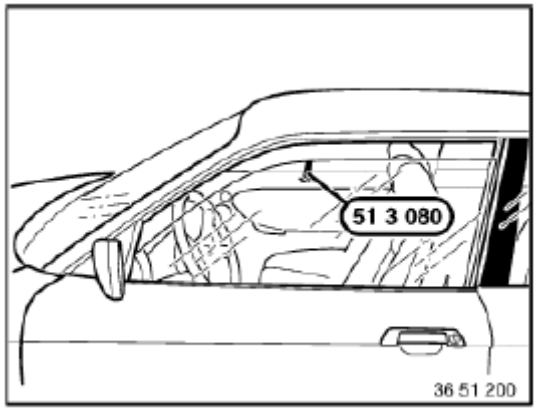


Fig. 243: Identifying Special Tool (51 3 080)
Courtesy of BMW OF NORTH AMERICA, INC.

Use fabric adhesive tape in area A to tape special tool 51 3 310 . Place suitable foil between glass and special tool (paint and window may get damaged)

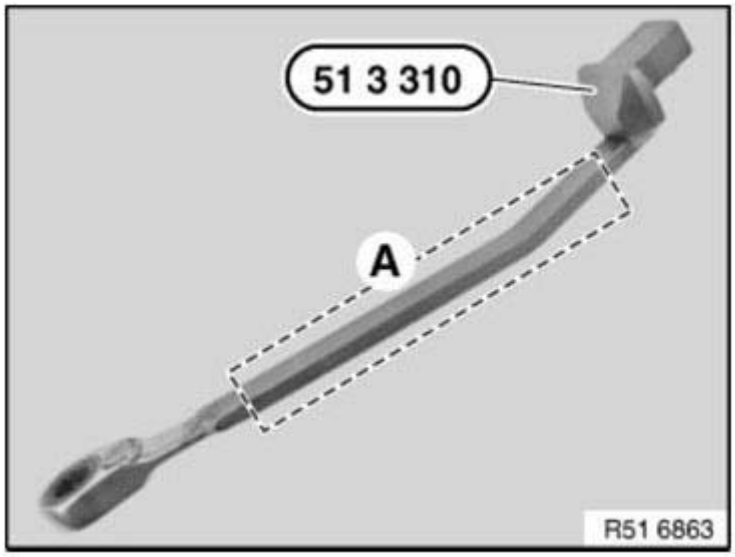


Fig. 244: Identifying Fabric Adhesive Tape On Special Tool (51 3 310)
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting longitudinal direction/retraction depth

Slacken screws (1) with special tool until door window glass can just be moved.

Tightening torque **51 32 2AZ** .

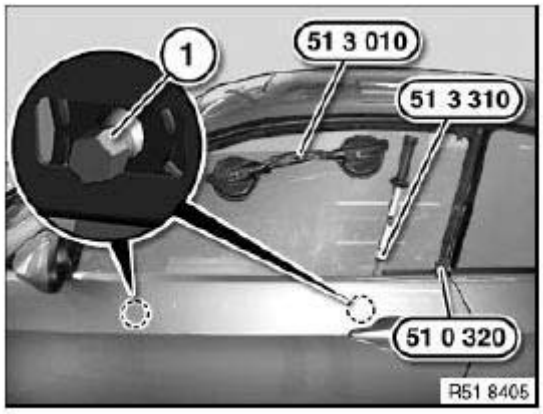


Fig. 245: Removing Screws Using Special Tool (51 3 310)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Ensure window glass does not become bonded to support (1) in the blue area (A).

(increased breakaway torque)

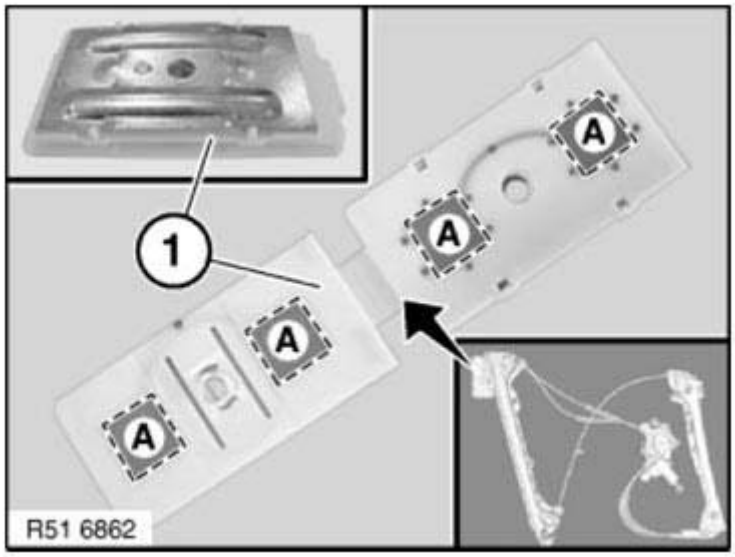


Fig. 246: Identifying Window Glass Support Area
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 51 3 010 to door window glass (1).

Adjust retraction depth and longitudinal direction of door window glass (1) by moving door window glass with special tool 51 3 010 .

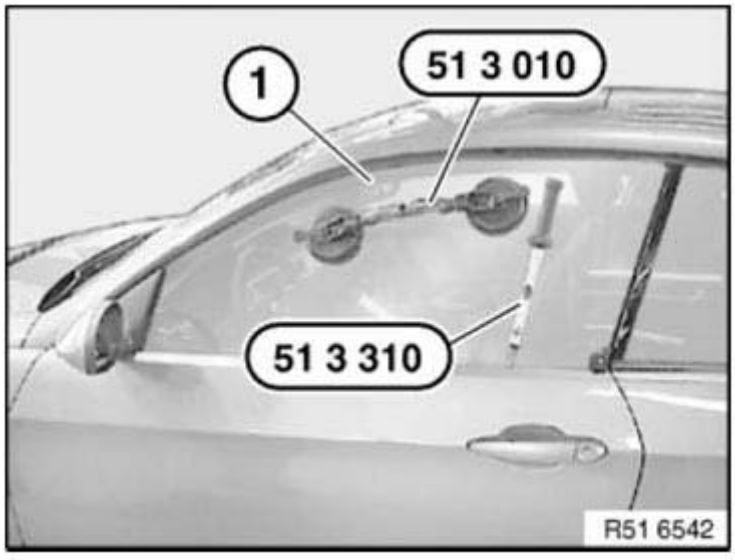


Fig. 247: Attaching Special Tool (51 3 310) To Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting retraction depth

Measure retraction depth "C" in areas A and B.

Retraction depth C:

C = 4.3 ± 1 mm in area A

(measuring point distance 30 mm to mirror triangle)

C = 8.5 ± 1 mm in area B

(measuring point distance next to dot screen)

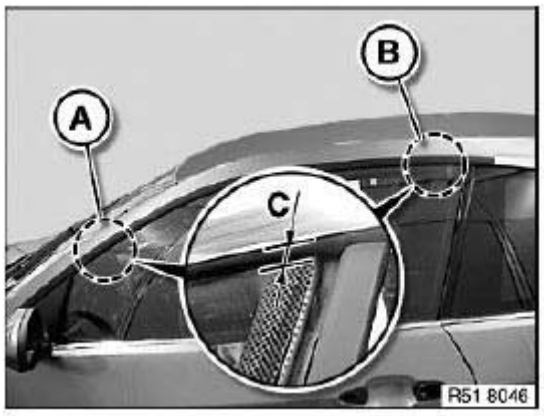


Fig. 248: Identifying Retraction Depth
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Front door must open and close without the door window glass touching the roof trim strip.

Adjusting longitudinal direction

Close door and door window glass.

Door window glass (1) must touch seal (2) in area of B-pillar in accordance with measurement "A".

Measurement A:

A = 12 ± 1 mm

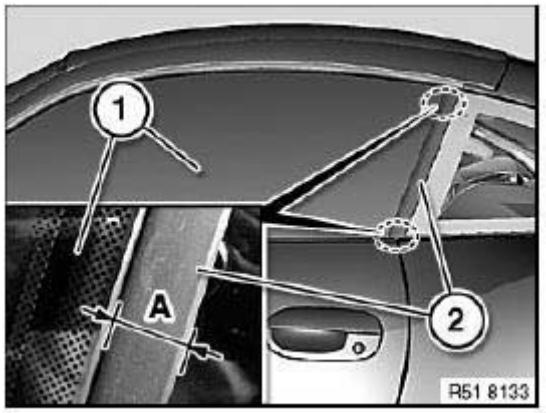


Fig. 249: Identifying Door Window Glass And Seal Touching Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The tightening torque to be set **51 32 1AZ** (MDE) is reduced when special tool 51 3 310 is used. Depending on the torque wrench used, this must be calculated in accordance with the adjacent overview:

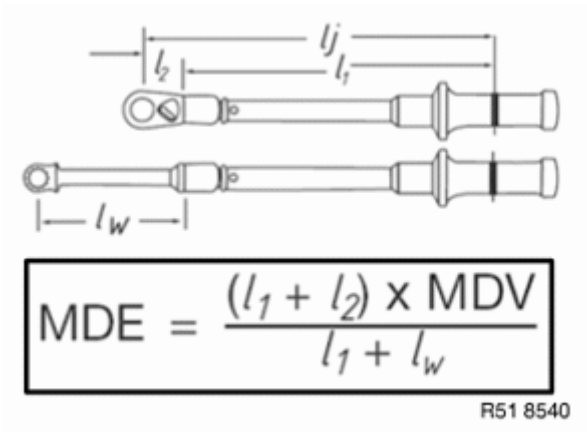


Fig. 250: MDE Calculation Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

MDE = Torque to be set

MDV = Prescribed torque (without special tool)

lj = Standard adjustment length with adjusting tool

l1 = Effective length of torque wrench

l2 = Inside dimension of adjusting tool

lw = Inside dimension of insertion tool (here lw = 145 mm)

Tighten down screws (1) with special tool 51 3 310 .

Tightening torque **51 32 2AZ** .

Remove special tool 51 3 010 from door window glass.

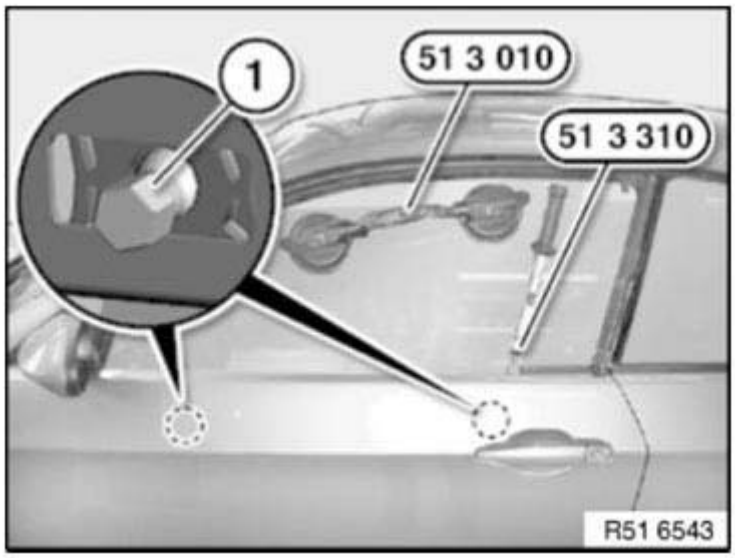


Fig. 251: Identifying Special Tools (51 3 010 And 51 3 310) On Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

Top edge of door window glass (1) must be adjusted parallel to contour (2) of water drain.

Seals on A-pillar and on retractable hardtop must not be damaged.

When the door window glass is retracted into the seals, the seals must not distorted.

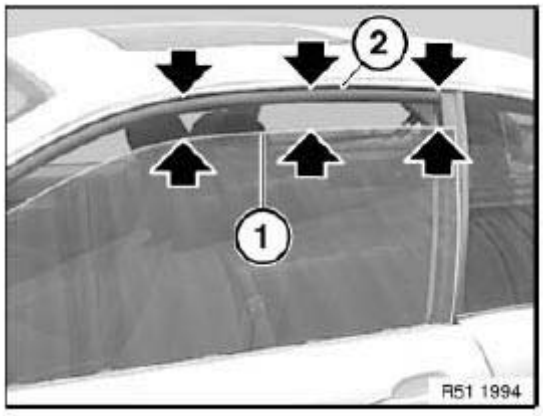


Fig. 252: Identifying Door Window Glass And Water Drain Counter
Courtesy of BMW OF NORTH AMERICA, INC.

Ideal adjustment, pre-tension

NOTE: **Pretension can be checked with or without window cavity cover strip. Pretension is 1.0 mm less with window cavity cover strip. Magnet in special tool 51 0 341 creates the correct door window glass pre-tension on the seal system for measurement. No force must be exerted on the door or door window glass during measurement.**

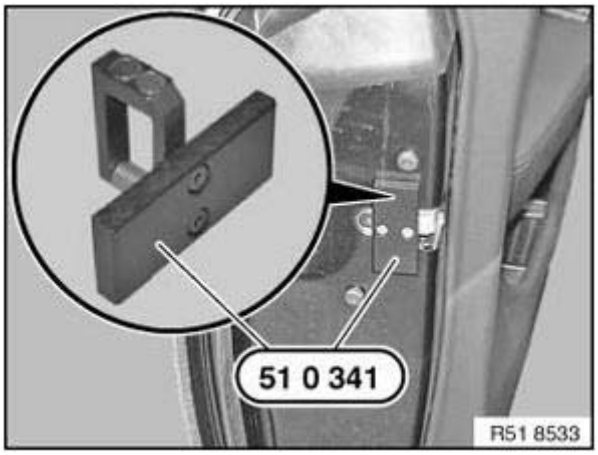


Fig. 253: Identifying Special Tool (51 0 341) On Rotary Striker Of Door Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 51 0 341 in rotary striker of door lock and close rotary striker manually. Carefully close door

Slide special tool 51 0 342 at distance "B" to door window glass side edge into seal (1) and measure dimension (A) to outside edge of door window glass (2).

Dimension "A" with window cavity cover strip:

A = 30 ± 1 mm

Dimension "A" without window cavity cover strip:

A = 29 ± 1 mm

B = 40 mm

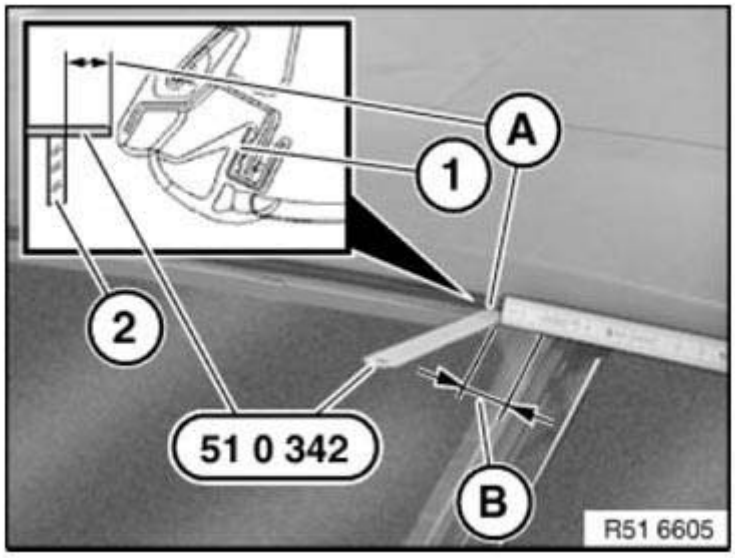


Fig. 254: Sliding Special Tool (51 0 342) On Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting pre-tension

Slacken nut (3) with reversible ratchet (2) of special tool 51 3 300 (consisting of 51 3 301, 51 3 303 and 51 3 304).

Turn knob (1) on special tool 51 3 300 to turn stud (4) and thereby alter the pretension.

Tighten nut (3).

Tightening torque **51 32 6AZ** .

Check adjustment, repeat procedure if necessary.

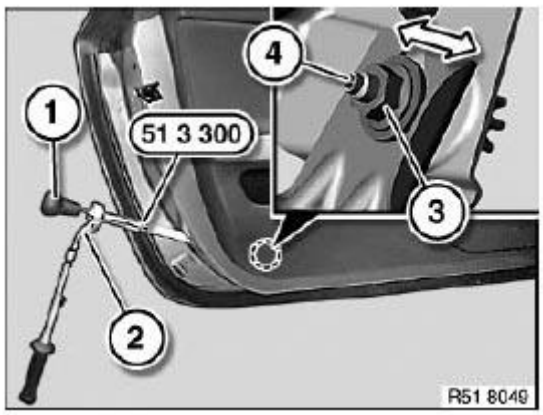


Fig. 255: Turning Knob On Special Tool (51 3 304)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **After completing adjustment work, it is essential to INITIALIZE the power window regulator.**
Checking run-in of door window glass:
Door window glass must strike the inside of the seal.

51 32 170 REMOVING AND INSTALLING/REPLACING DOOR WINDOW GLASS, FRONT LEFT OR RIGHT

Necessary preliminary tasks

- Remove **INNER WINDOW CAVITY COVER STRIP**
- Remove **OUTER WINDOW CAVITY COVER STRIP**
- Remove **FRONT DOOR TRIM**
- Remove **ACOUSTIC INSULATION**

WARNING: **Risk of injury!**

Carry out work on the power window unit only when the power window motor is de-energized.

Door window glass (1) must be opened to dimension (A).

A= approx. 110 mm

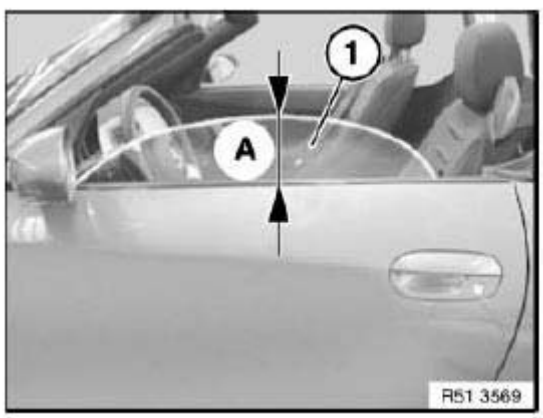


Fig. 256: Identifying Door Window Glass Opening Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 21 16AZ** .

Remove adapter (2).

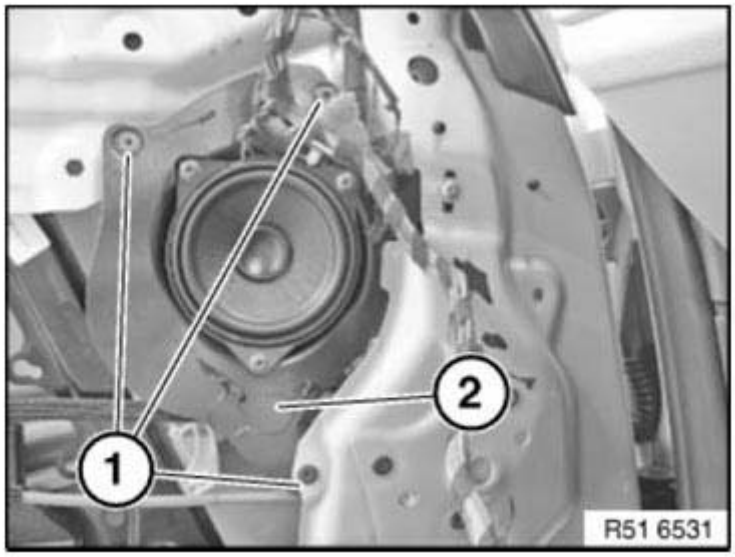


Fig. 257: Identifying Adapter With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 21 13AZ** .

Remove H-strut (2).

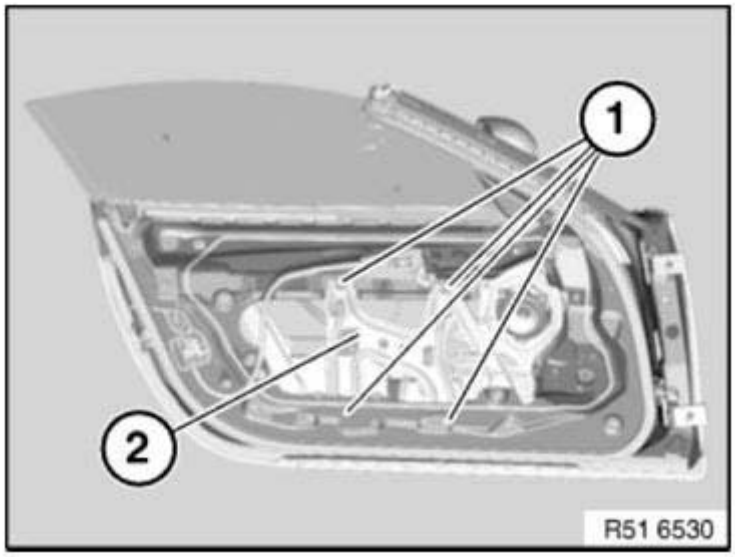


Fig. 258: Identifying H-Strut With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Power window unit is shown removed.

Release screws (1).

Tightening torque **51 32 2AZ** .

Remove door window glass (2).

Installation:

Insert door window glass (2) in clamping plates (3).

ADJUST DOOR WINDOW GLASS .

Check function.

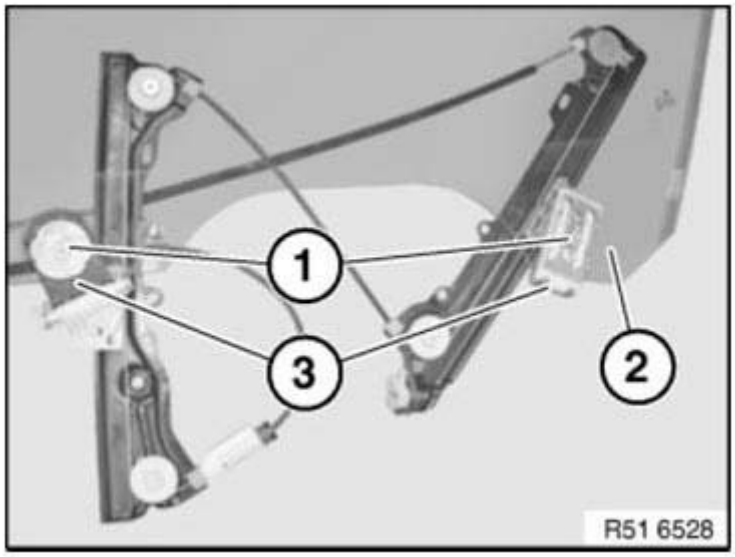


Fig. 259: Identifying Door Window Glass And Clamping Plates With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing door window glass

Remove clamping plate (1) from door window glass (2).

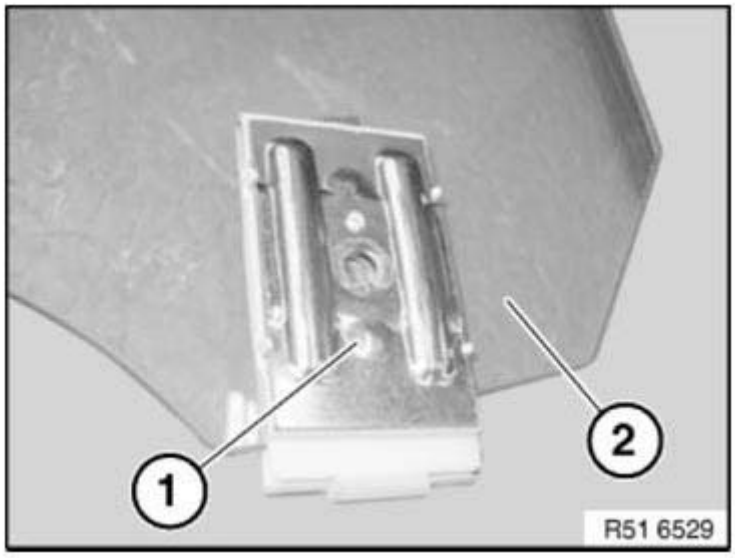


Fig. 260: Identifying Clamping Plate Of Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

51 32 211 REPLACING FRONT LEFT OR RIGHT RUBBER GUIDE FOR LEFT OR RIGHT DOOR WINDOW

Necessary preliminary tasks

- Remove **INNER WINDOW CAVITY COVER STRIP**
- Remove **OUTER WINDOW CAVITY COVER STRIP**
- Remove **SOUND INSULATION** in front area

Pop rubber guide (1) in area (A) out of door.

Pull rubber guide (1) out of window guide rail and remove towards top.

Installation:

Moisten rubber guide (1) with water before fitting.

Slide rubber guide (1) from above into window guide rail and if necessary retighten at bottom.

Make sure rubber guide (1) is correctly seated on door and door window glass.

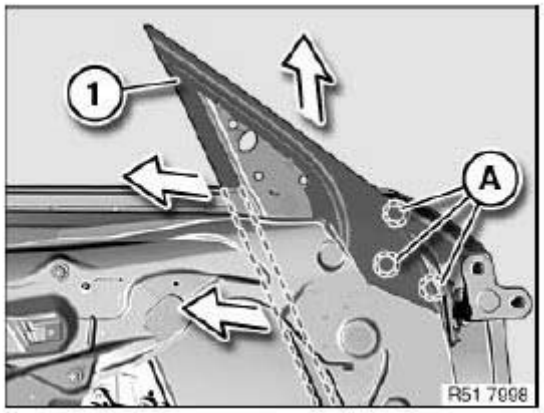


Fig. 261: Pulling Rubber Guide Out Of Window Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact surface of window glass with Vaseline, especially in top corner (2).

Rubber guide (1) must not be damaged in corners (2).

If necessary, replace rubber guide.

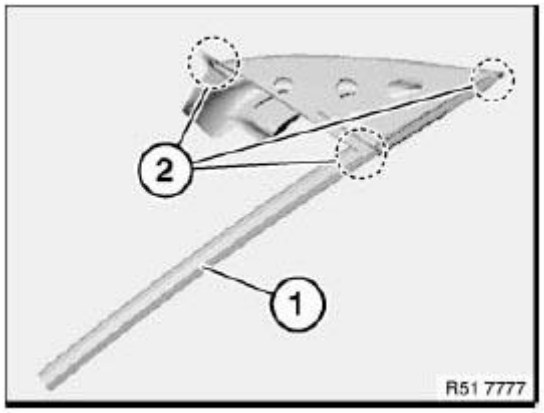


Fig. 262: Identifying Rubber Guide On Corners
Courtesy of BMW OF NORTH AMERICA, INC.

5133 FRONT ELECTRICALLY OPERATED WINDOWS

51 32 154 ADJUSTING LEFT OR RIGHT FRONT DOOR WINDOW GLASS

Precondition:

- Vehicle must be standing on its wheels on a level floor
- **FRONT DOOR** correctly adjusted to fit

- If necessary, close retractable hardtop

IMPORTANT: When closing, the door window glass must not jam on the trim strip in any area of the window (window glass breakage).

If necessary, incoming check

The following incoming checks must be carried out prior to every adjustment operation:

NOTE: Incoming check must be carried out with the window cavity cover strip fitted.

- **Denormalize POWER WINDOW**
- **Measure retraction depths with special tool 51 3 080 .**
- **Initialize power windows**

Necessary preliminary tasks

- Denormalize **POWER WINDOW**
- Remove **FRONT DOOR TRIM PANEL**
- Remove **SOUND INSULATION**
- Remove **OUTER WINDOW CAVITY COVER STRIP** (not for checking pre-tension)

Ideal adjustment, longitudinal direction

Open door window.

Fit special tool 51 0 360 in front door and press back as far as it will go.

NOTE: Special tool 51 0 360 must rest against door and reach stop on guide (1).

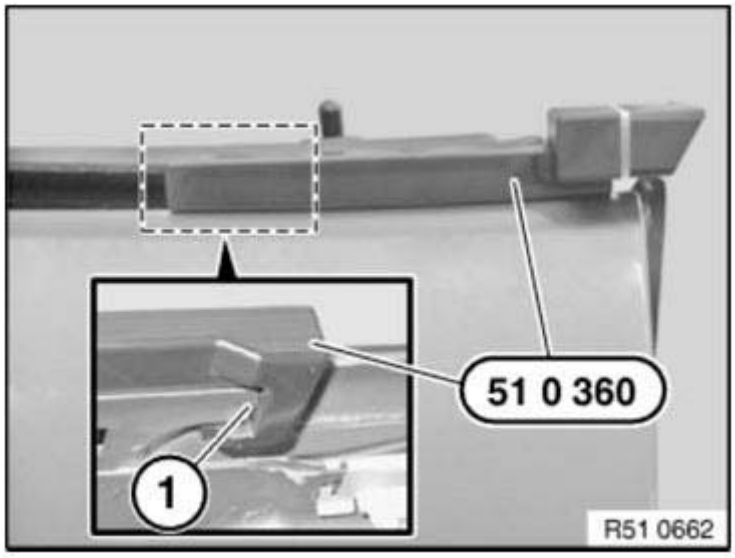


Fig. 263: Fitting Special Tool (51 0 360) On Front Door
Courtesy of BMW OF NORTH AMERICA, INC.

Ideal adjustment, retraction depth

- Open door window
- Attach special tool 51 3 080 to door window glass
- Close front door and door window
- Measure retraction depth

NOTE: 2 items of special tool 51 3 080 are required for adjustment of retraction depths.

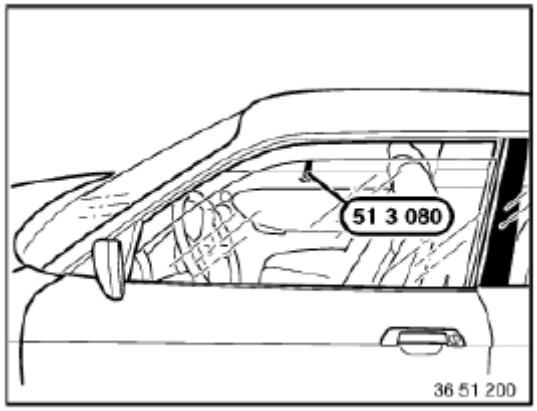


Fig. 264: Identifying Special Tool (51 3 080)
Courtesy of BMW OF NORTH AMERICA, INC.

Use fabric adhesive tape in area A to tape special tool 51 3 310 . Place suitable foil between glass and special tool (paint and window may get damaged)

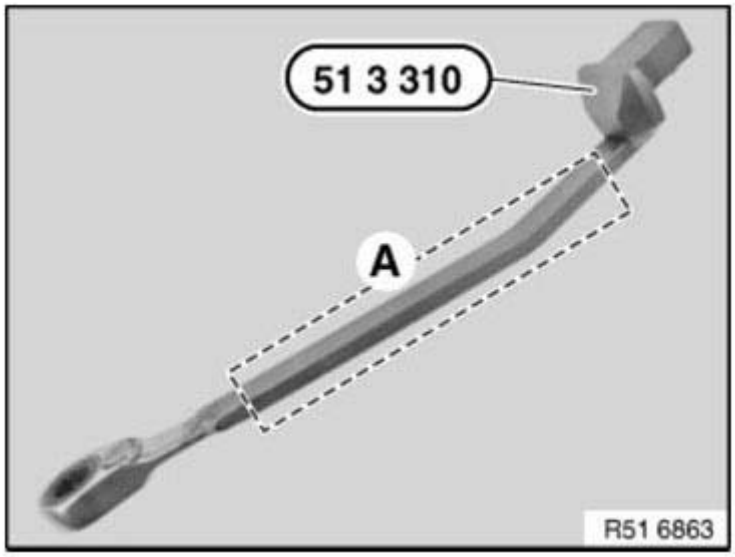


Fig. 265: Identifying Fabric Adhesive Tape On Special Tool (51 3 310)
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting longitudinal direction/retraction depth

Slacken screws (1) with special tool 51 3 310 until door window glass can just be moved.

Tightening torque **51 32 2AZ** .

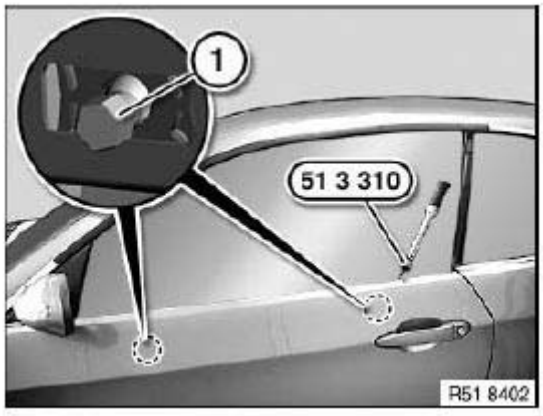


Fig. 266: Removing Screws Using Special Tool (51 3 310)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Ensure window glass does not become bonded to support (1) in the blue area (A).

(increased breakaway torque)

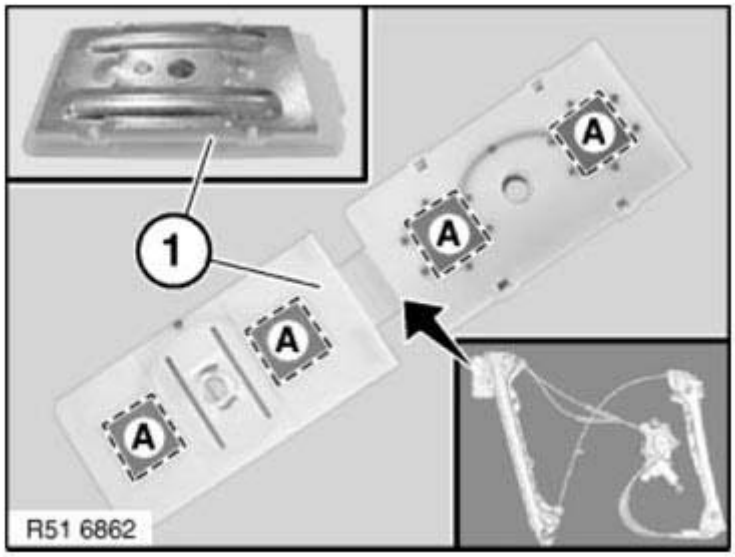


Fig. 267: Identifying Window Glass Support Area
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 51 3 010 to door window glass (1).

Adjust retraction depth and longitudinal direction of door window glass (1) by moving door window glass with special tool 51 3 010 .

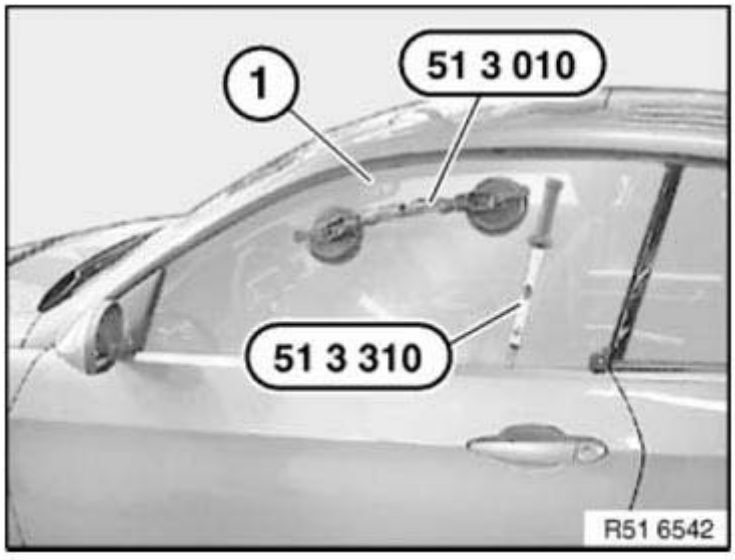


Fig. 268: Attaching Special Tool (51 3 310) To Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting retraction depth

Measure retraction depth "C" in areas A and B.

Retraction depth C:

C = 4.3 ± 1 mm in area A

(measuring point distance 30 mm to mirror triangle)

C = 8.5 ± 1 mm in area B

(measuring point distance next to dot screen)

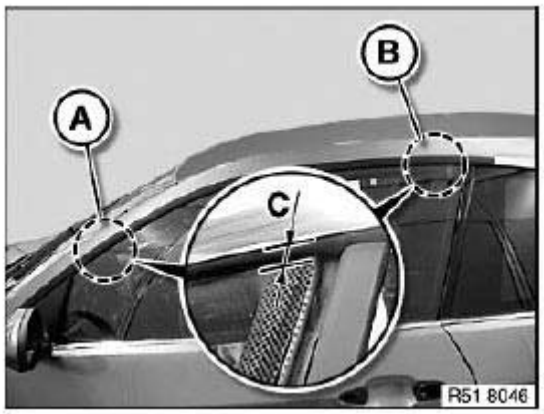


Fig. 269: Identifying Retraction Depth
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Front door must open and close without the door window glass touching the roof trim strip.

Adjusting longitudinal direction

Close door and door window glass.

Door window glass (1) must touch seal (2) in area of B-pillar in accordance with measurement "A".

Measurement A:

A = 12 ± 1 mm

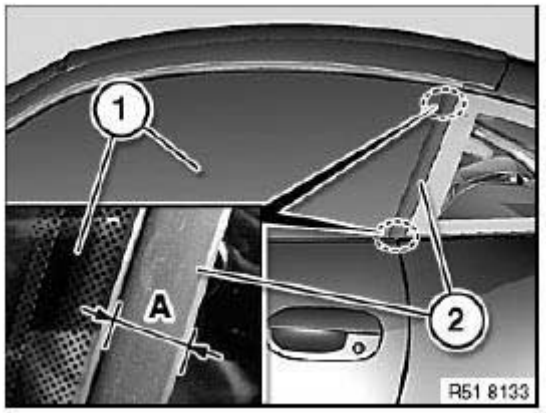


Fig. 270: Identifying Door Window Glass And Seal Touching Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The tightening torque to be set **51 32 1AZ** (MDE) is reduced when special tool 51 3 310 is used. Depending on the torque wrench used, this must be calculated in accordance with the adjacent overview:

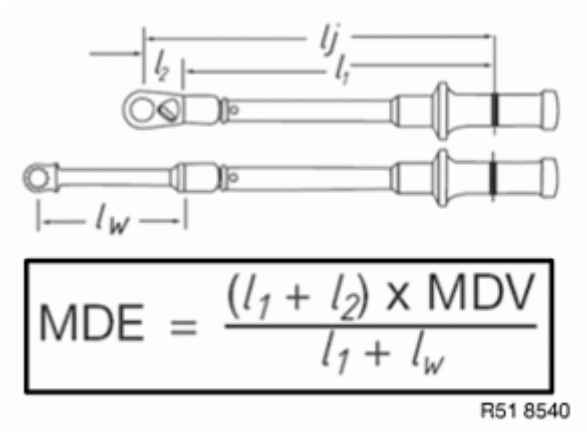


Fig. 271: MDE Calculation Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

MDE = Torque to be set

MDV = Prescribed torque (without special tool)

lj = Standard adjustment length with adjusting tool

l1 = Effective length of torque wrench

l2 = Inside dimension of adjusting tool

lw = Inside dimension of insertion tool (here lw = 145 mm)

Tighten down screws (1) with special tool 51 3 310 .

Tightening torque **51 32 2AZ** .

Remove special tool 51 3 010 from door window glass.

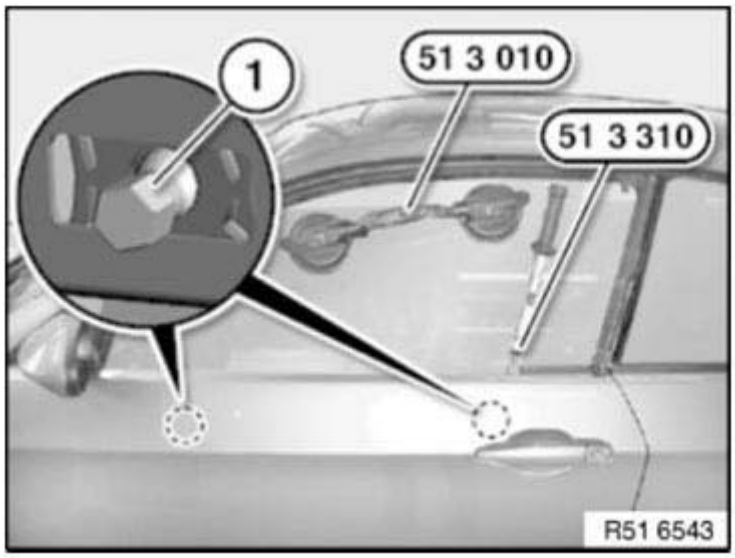


Fig. 272: Identifying Special Tools (51 3 010 And 51 3 310) On Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

Top edge of door window glass (1) must be adjusted parallel to contour (2) of water drain.

Seals on A-pillar and on retractable hardtop must not be damaged.

When the door window glass is retracted into the seals, the seals must not distorted.

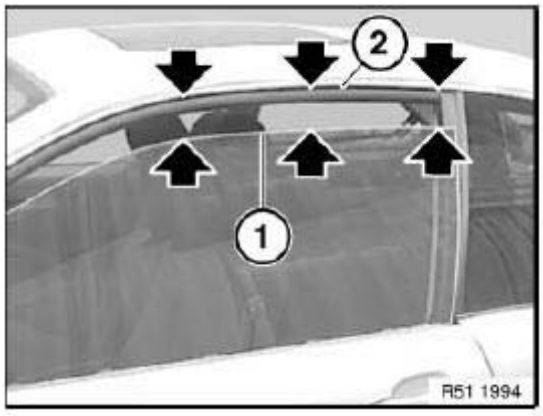


Fig. 273: Identifying Door Window Glass And Water Drain Counter
Courtesy of BMW OF NORTH AMERICA, INC.

Ideal adjustment, pre-tension

NOTE: **Pretension can be checked with or without window cavity cover strip. Pretension is 1.0 mm less with window cavity cover strip. Magnet in special tool 51 0 341 creates the correct door window glass pre-tension on the seal system for measurement. No force must be exerted on the door or door window glass during measurement.**

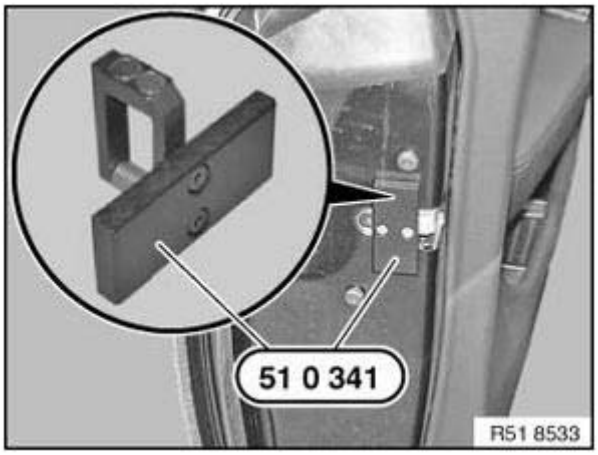


Fig. 274: Identifying Special Tool (51 0 341) On Rotary Striker Of Door Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 51 0 341 in rotary striker of door lock and close rotary striker manually. Carefully close door

Slide special tool 51 0 342 at distance "B" to door window glass side edge into seal (1) and measure dimension (A) to outside edge of door window glass (2).

Dimension "A" with window cavity cover strip:

A = 30 ± 1 mm

Dimension "A" without window cavity cover strip:

A = 29 ± 1 mm

B = 40 mm

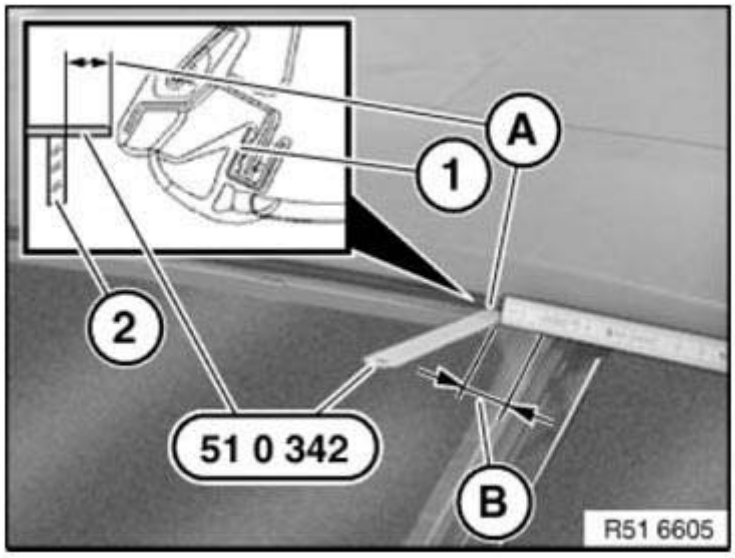


Fig. 275: Sliding Special Tool (51 0 342) On Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting pre-tension

Slacken nut (3) with reversible ratchet (2) of special tool 51 3 300 (consisting of 51 3 301, 51 3 303 and 51 3 304).

Turn knob (1) on special tool 51 3 300 to turn stud (4) and thereby alter the pretension.

Tighten nut (3).

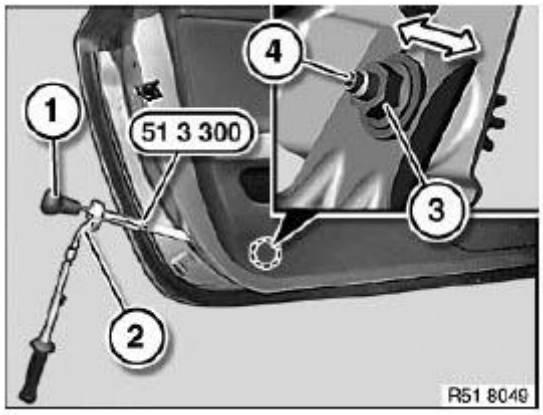


Fig. 276: Turning Knob On Special Tool (51 3 304)
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **51 32 6AZ** .

Check adjustment, repeat procedure if necessary.

NOTE: **After completing adjustment work, it is essential to INITIALIZE the power window regulator.**
Checking run-in of door window glass:
Door window glass must strike the inside of the seal.

51 33 000 REMOVING AND INSTALLING/REPLACING POWER WINDOW REGULATOR IN LEFT OR RIGHT FRONT DOOR

WARNING: **Risk of injury!**

Carry out work on the power window regulator only when the power window motor is de-energized.

Necessary preliminary tasks

- Remove **DOOR WINDOW GLASS**

Release screws (1).

Tightening torque **51 21 16AZ** .

Remove adapter for door speaker (2).

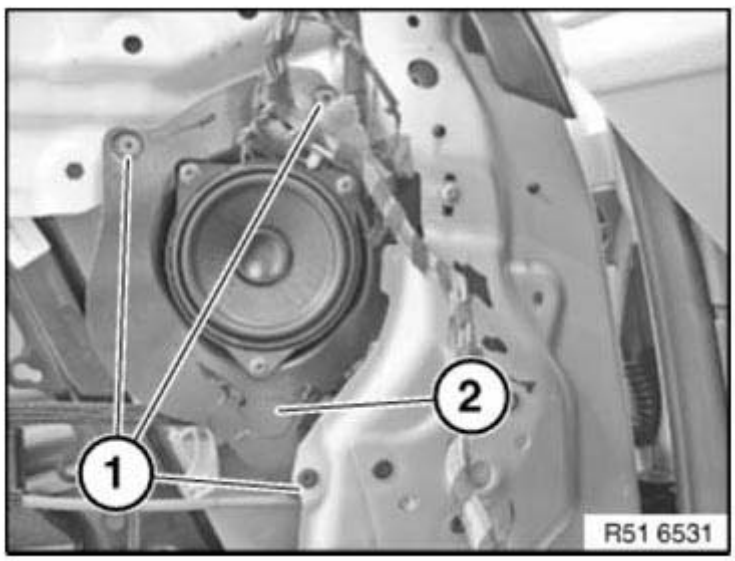


Fig. 277: Identifying Door Speaker With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 21 17AZ** .

Remove power window regulator flat motor (2) from door (3).

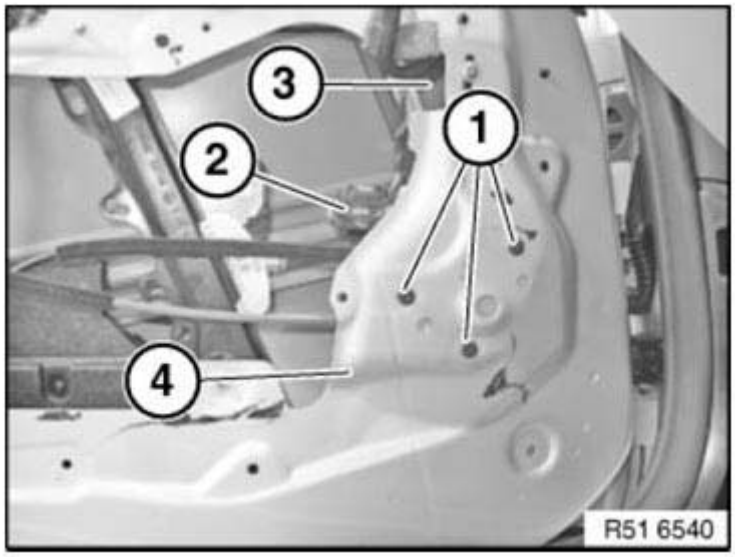


Fig. 278: Identifying Power Window Regulator Flat Motor And Door With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug connection (1) from power window regulator flat motor (2).

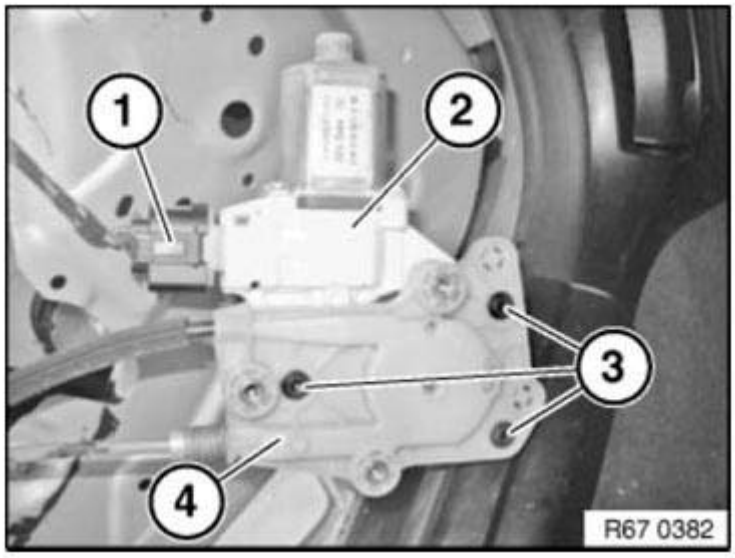


Fig. 279: Identifying Power Window Regulator Flat Motor With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out assembly plug (1).

Unfasten screws (2).

Tightening torque **51 33 4AZ** .

Release screw (3) with special tool 51 3 300 .

Tightening torque **51 33 4AZ** .

Remove power window regulator (4).

Installation:

Engage drive cable (1) correctly in clips (2).

Adjust **POWER WINDOW REGULATOR** .

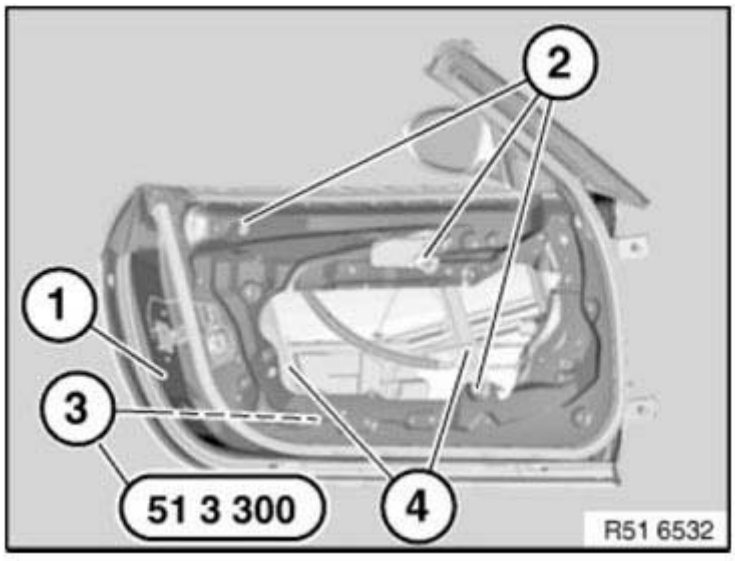


Fig. 280: Removing Screw Using Special Tool (51 3 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Release screws (3).

Tightening torque **67 62 1AZ** .

Detach power window regulator flat motor (2) from power window regulator adapter plate (4).

Installation:

INITIALIZE POWER WINDOW .

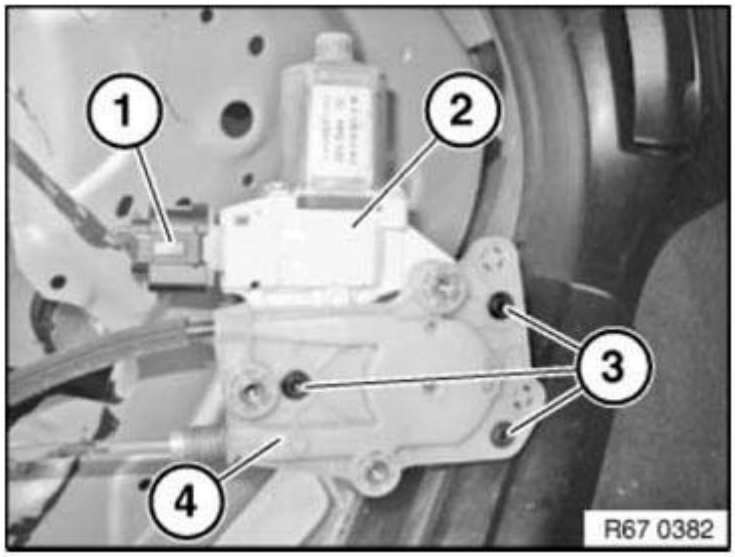


Fig. 281: Identifying Power Window Regulator Flat Motor And Adapter Plate With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 32 170 REMOVING AND INSTALLING/REPLACING DOOR WINDOW GLASS, FRONT LEFT OR RIGHT

Necessary preliminary tasks

- Remove **INNER WINDOW CAVITY COVER STRIP**
- Remove **OUTER WINDOW CAVITY COVER STRIP**
- Remove **FRONT DOOR TRIM**
- Remove **ACOUSTIC INSULATION**

WARNING: Risk of injury!

Carry out work on the power window unit only when the power window motor is de-energized.

Door window glass (1) must be opened to dimension (A).

A= approx. 110 mm

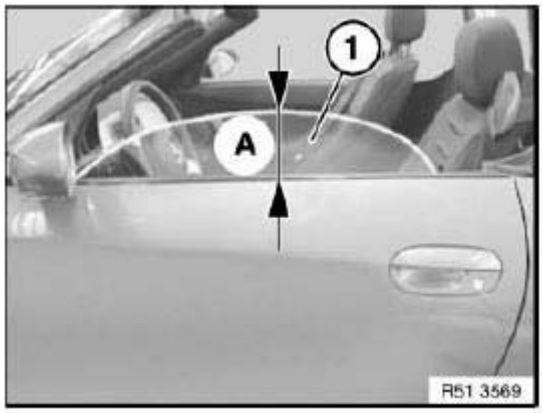


Fig. 282: Identifying Door Window Glass Opening Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 21 16AZ** .

Remove adapter (2).

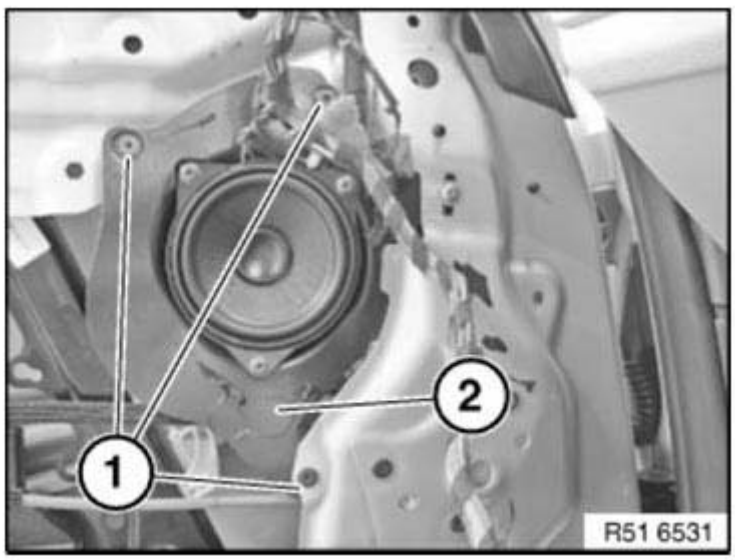


Fig. 283: Identifying Adapter With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 21 13AZ** .

Remove H-strut (2).

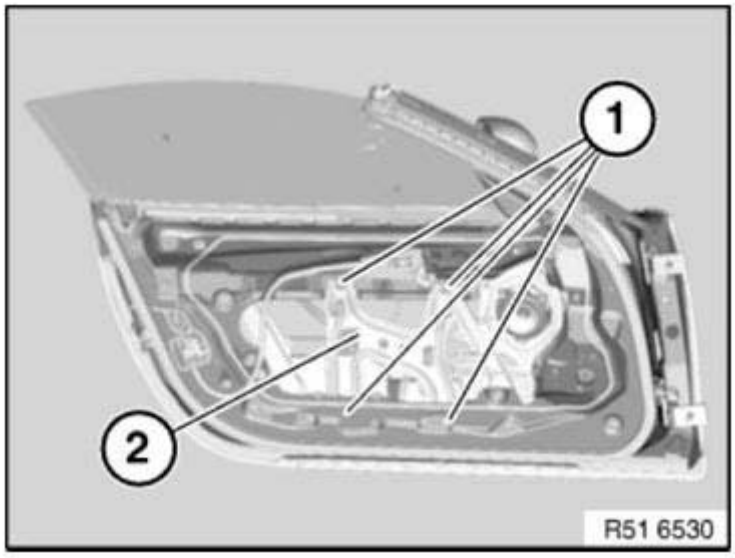


Fig. 284: Identifying H-Strut With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Power window unit is shown removed.

Release screws (1).

Tightening torque **51 32 2AZ** .

Remove door window glass (2).

Installation:

Insert door window glass (2) in clamping plates (3).

ADJUST DOOR WINDOW GLASS .

Check function.

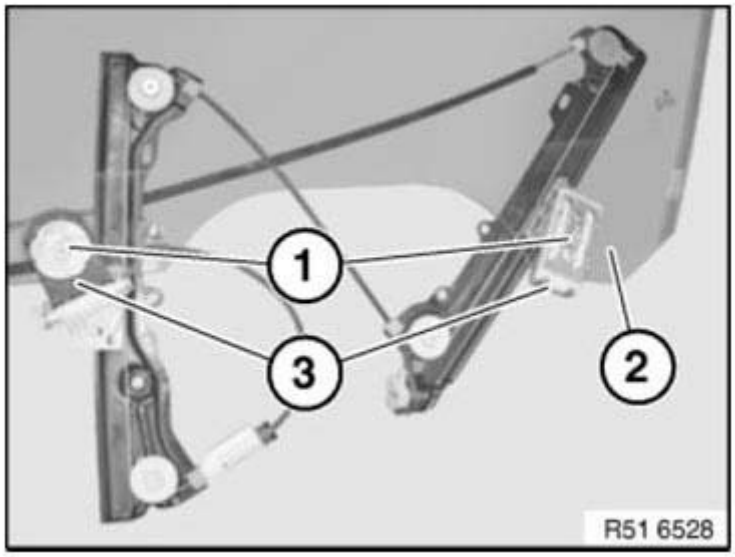


Fig. 285: Identifying Door Window Glass And Clamping Plates With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing door window glass

Remove clamping plate (1) from door window glass (2).

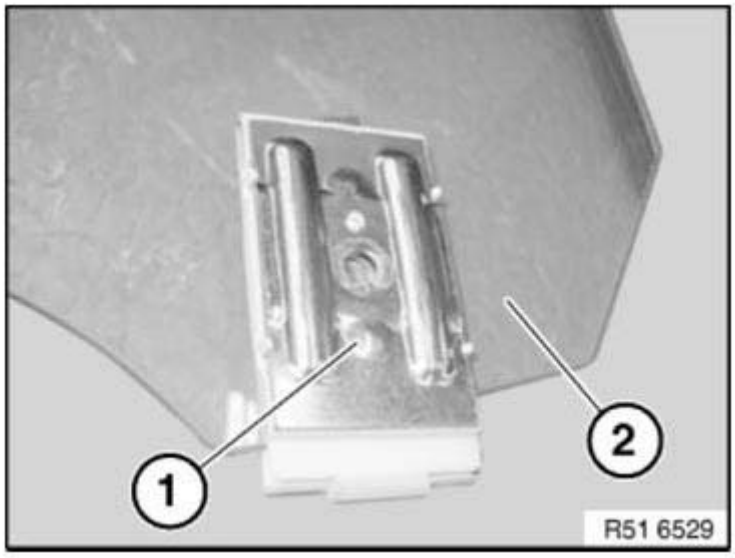


Fig. 286: Identifying Clamping Plate Of Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

51 32 211 REPLACING FRONT LEFT OR RIGHT RUBBER GUIDE FOR LEFT OR RIGHT DOOR WINDOW

Necessary preliminary tasks

- Remove **INNER WINDOW CAVITY COVER STRIP**
- Remove **OUTER WINDOW CAVITY COVER STRIP**
- Remove **SOUND INSULATION** in front area

Pop rubber guide (1) in area (A) out of door.

Pull rubber guide (1) out of window guide rail and remove towards top.

Installation:

Moisten rubber guide (1) with water before fitting.

Slide rubber guide (1) from above into window guide rail and if necessary retighten at bottom.

Make sure rubber guide (1) is correctly seated on door and door window glass.

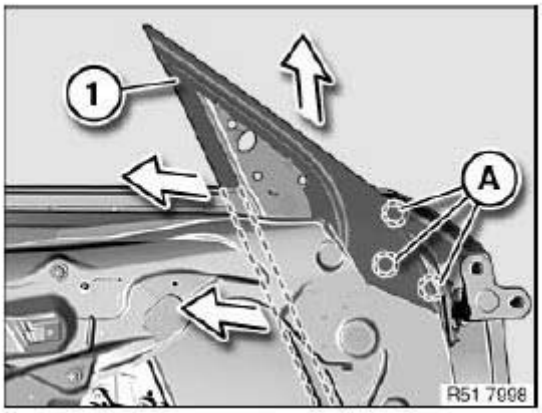


Fig. 287: Pulling Rubber Guide Out Of Window Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact surface of window glass with Vaseline, especially in top corner (2).

Rubber guide (1) must not be damaged in corners (2).

If necessary, replace rubber guide.

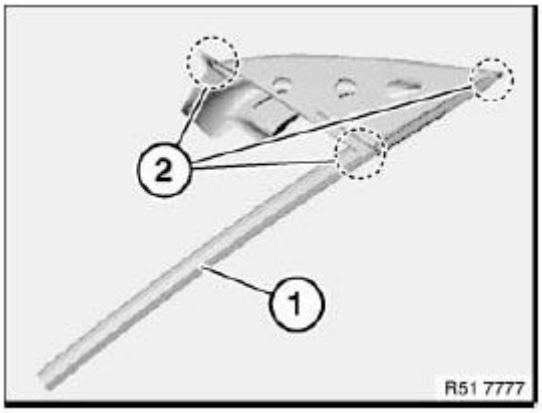


Fig. 288: Identifying Rubber Guide On Corners
Courtesy of BMW OF NORTH AMERICA, INC.

5137 ELECTRICAL POWER WINDOWS, BODY

51 37 154 ADJUSTING REAR LEFT OR RIGHT SIDE WINDOW

Prerequisite:

- Vehicle must be standing on its wheels on a level floor
- **DOOR WINDOW GLASS** correctly adjusted

Necessary preliminary tasks

- Remove rear window cavity seal See **5137261 REMOVING AND INSTALLING/REPLACING WINDOW CAVITY COVER STRIP FOR DOOR WINDOW, REAR LEFT OR RIGHT** or **5137240 REMOVING AND INSTALLING/REPLACING OUTER WINDOW CAVITY COVER STRIP FOR REAR SIDE WINDOW**
- Open retractable hardtop
- Move side window upwards (close)

Ideal adjustment, transversal direction

Side window glass (1) must be situated at distance (A) to body (2).

Distance A = 9±1 mm

Measuring points in area of B-pillar and at end of side window glass (1).

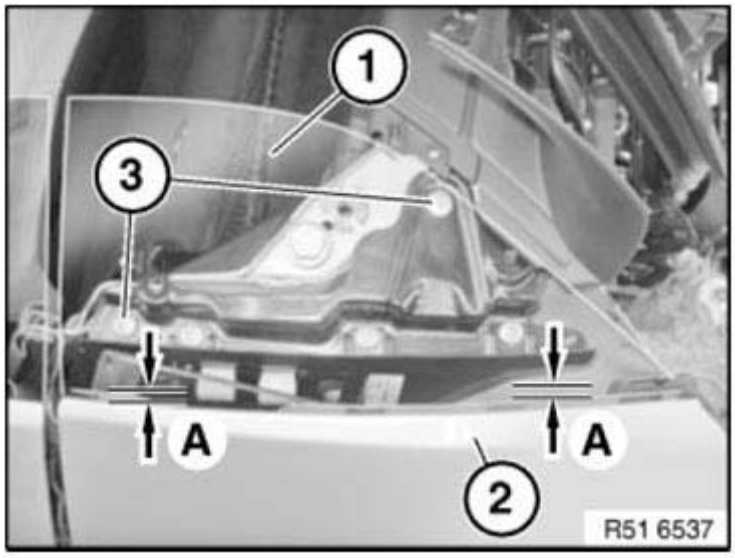


Fig. 289: Identifying Side Window Glass Distance To Body
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting transversal direction

Remove **SEAT BELT COVER** .

Slacken screws (3) and adjust distance (A).

Tightening torque **51 37 4AZ** .

Ideal adjustment, longitudinal direction

Side window glass (1) must be positioned at distance (A) to door window glass (2).

Measurement (A) = 12 ± 1 mm

Parallelism deviation ± 1 mm.

Side window glass (1) may have a max. underprotrusion (B) to door window glass (2).

Dimension (B) = 0 ±1 mm

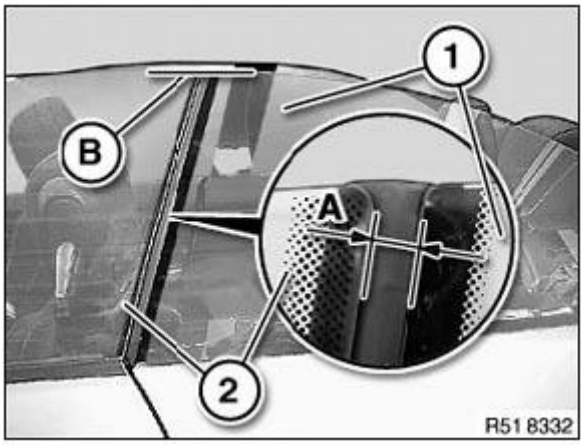


Fig. 290: Identifying Side Window Glass Distance To Door Window Glass
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting longitudinal direction

Slacken screws (1) with special tool 51 3 310 .

Adjust longitudinal direction by moving side window glass (2).

Tightening torque **51 37 2AZ** .

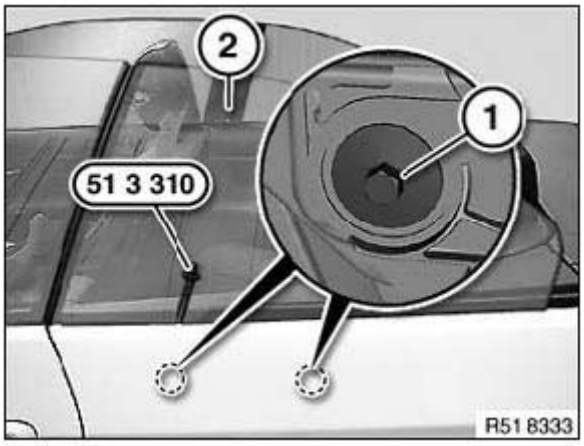


Fig. 291: Removing Screws Using Special Tool (51 3 310)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The tightening torque to be set **51 37 2AZ** (MDE) is reduced when special tool 51 3 310 is used. Depending on the torque wrench used, the torque must be calculated in accordance with the adjacent overview:

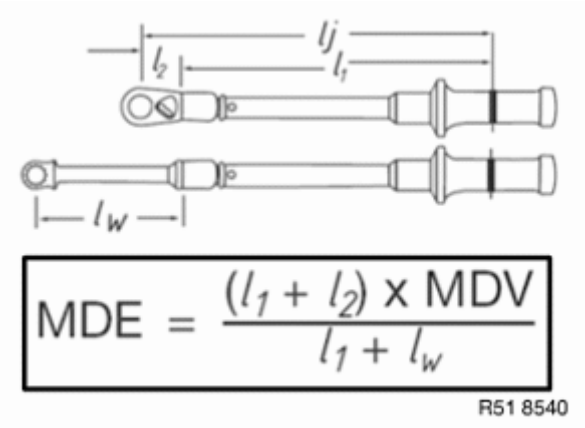


Fig. 292: MDE Calculation Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

MDE = Torque to be set

MDV = Prescribed torque (without special tool)

lj = Standard adjustment length with adjusting tool

l1 = Effective length of torque wrench

l2 = Inside dimension of adjusting tool

lw = Inside dimension of insertion tool (here lw = 145 mm)

Checking retraction depth

- Close retractable hardtop
- Open door window
- Attach special tool 51 3 080 to door window glass
- Close side window completely
- Measure retraction depth

NOTE: 2 items of special tool 51 3 080 are required for adjustment of retraction depths.

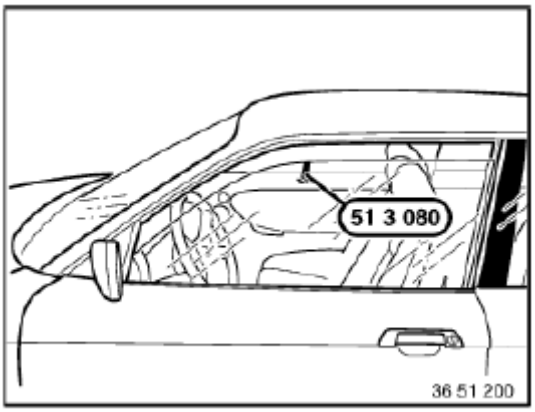


Fig. 293: Identifying Special Tool (51 3 080)
Courtesy of BMW OF NORTH AMERICA, INC.

Measure retraction depth (A) in areas (1 to 2).

Measurement (A):

(1) = 8 ± 3 mm

(2) = 8 ± 3 mm

If necessary, check or readjust settings on:

- **DOOR WINDOW GLASS, REAR**
- Side window

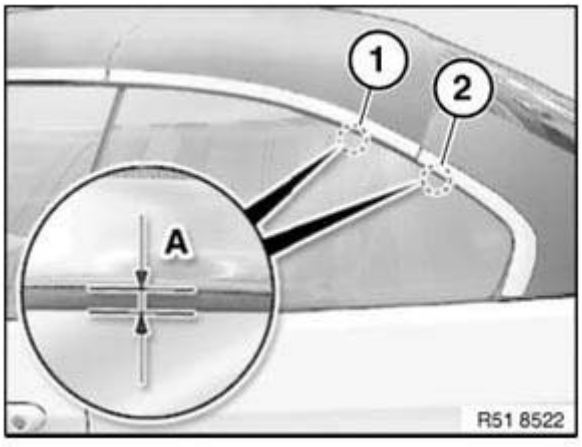


Fig. 294: Identifying Retraction Depth
Courtesy of BMW OF NORTH AMERICA, INC.

Ideal adjustment, pretension

NOTE: **Pretension can be checked with or without window cavity cover strip. Pretension is 1.0 mm greater with window cavity cover strip. Magnet in special tool 51 0 341 creates the correct door window glass pretension on the seal system for measurement. No force must be exerted on the door or door window glass during measurement.**

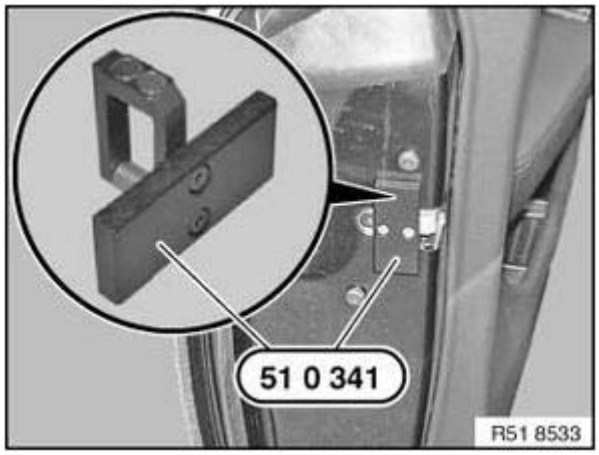


Fig. 295: Identifying Special Tool (51 0 341) On Rotary Striker Of Door Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 51 0 341 in rotary striker of door lock and close rotary striker manually. Carefully close door.

Measure gap (A) between side window glass (1) and inside edge of door window glass (2).

NOTE: **Measuring point 10 mm below top edge of window glass.**

With window cavity cover strip fitted (front and rear): A = 35 +1 mm

Without window cavity cover strip fitted (rear): A = 35 +1 mm

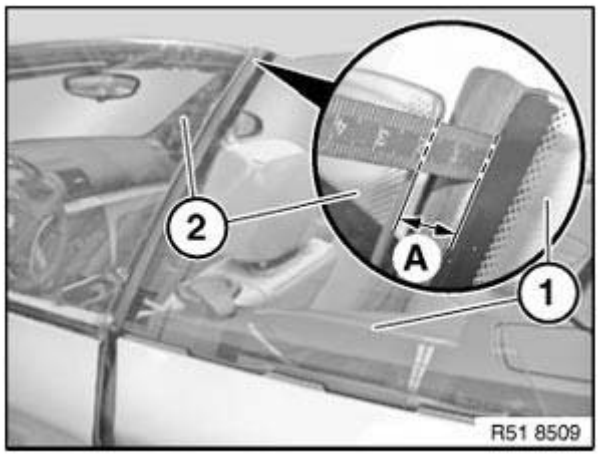


Fig. 296: Identifying Gap Between Side Window Glass And Inside Edge Of Door Window Glass

Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting pretension

Remove rear window cavity cover strip See **5137261 REMOVING AND INSTALLING/REPLACING WINDOW CAVITY COVER STRIP FOR DOOR WINDOW, REAR LEFT OR RIGHT** or **5137240 REMOVING AND INSTALLING/REPLACING OUTER WINDOW CAVITY COVER STRIP FOR REAR SIDE WINDOW**.

Turn adjusting screw (1) with special tool **51 2 220** until correct pretension is reached.

NOTE: With hardtop closed, side window glass (2) must run correctly into hardtop seals (check only when window cavity cover strip fitted).

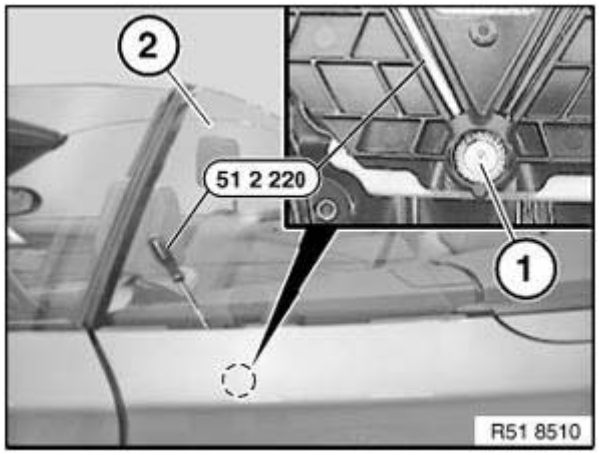


Fig. 297: Turning Adjusting Screw Using Special Tool (51 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking adjustment

Open door window and side window.

Close both windows simultaneously and check run-in of side window glass to door window glass.

Close retractable hardtop.

Hardtop seals must not be damaged.

Check run-in of both windows in hardtop seals.

51 31 ... NOTES ON WINDOW BONDING

IMPORTANT: For 03-2009

- **the "1 Hour System" was introduced.**

  Two different adhesive systems are described and identified accordingly in the following:

  "1-day system"

  "1-hour system"

For 01-2010

- **the information for the Expiry date (Best Before) on the repair kit and window glue cartridge was changed and now refers to Calendar week and Year (CW/YYYY).**

For 03-2010

- **a "Repair kit, large" was introduced for the "1 Hour System" under part number 83 19 0 444 145.**

  In addition to the "Repair kit, small" delivery, this kit includes a second window glue cartridge.

  Recommended for 5-Series, 6-Series, 7-Series, X3, X5.

These instructions are not applicable to side window bonding (door "centre") on the E38/L7:

Work steps for removing and installing window glass

- Is located at the end of the document under the cross reference "Refer to repair instructions"

General

- It is possible to tow or drive without windscreen or rear window.

The windscreen, rear window and side windows are glued to the body. This bonding will increase the torsional rigidity of the vehicle. To obtain perfect bonding, comply with the installation procedure described in the following.

- The adhesive must be applied at room temperatures > 15 °C to avoid negatively affecting the bonded connection.

  Adjust the component and interior temperature accordingly.

- An air humidity of < 30% significantly slows hardening.
- The window glass must be secured against slipping with yellow plastic adhesive tape (sourcing reference: BMW Parts Department) after being installed. The paint must be completely hardened after painting

work.

- Always apply the adhesive in such a way as to achieve tension-free bonding!

On-the-job safety

When working with bonding products (adhesive, cleaning agent, bonding agent, etc.):

- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure rooms are well ventilated.
- Change work clothing contaminated with adhesive immediately.
- Change work clothing contaminated with solvents and swelling agents immediately (keep spare work clothing on hand).
- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams
- Provide eye douche facilities, change water regularly (once a month).
- Comply with the relevant safety regulations
- Do not eat, drink or smoke in areas of polyurethane processing.
- All use and safety information of the safety data sheet (SDB) for the applicable product apply. The safety data sheet (SDB) can be obtained from the Aftersales Assistance Portal (ASAP)

Replacement of windscreens

Version with Head-Up Display (HUD):

- Marking for HUD must be present on the windscreen

Version with front passenger airbag:

- Stick on **LABEL**

Tools for cutting through adhesive bead:

ADHESIVE BEAD CUTTING TOOL REFERENCE CHART

Type	Type	Order/part number
Special cutter (manufacturer: Fein) with oscillating knife	Compressed air operated Electrically operated	7 23 63 100 23 8 7 53 60 200 00 4
BMW knife set	All required knives	PN 81 43 9 428 596 or 6 39 03 167 05 4
Knife (U-shape)	19.5 mm (1) 24 mm 36 mm 45 mm	6 39 03 118 01 3 6 39 03 076 01 6 6 39 03 079 01 2 6 39 03 154 01 0
	16 to 35 mm (adjustable)	6 39 03 143 01 3

Knife (straight with stop roller)	10 mm (fixed)(1) 14 mm (fixed)	6 39 03 189 01 0 6 39 03 082 01 6
" **ROLL OUT 2000** " Window glass repair	Wire cutting system (1)	PN 81 62 0 301 768
Cutting wire	Wire cutting system (1)	PN 83 19 2 150 267
Scalpel	for heavy-duty applications (1)	
Handles for cutting wire	Self-locking (1)	Special tool 51 3 270
(1) not included in BMW blade set		

Storage temperature

1-day system: Storage temperature of all adhesive products of 5 °C to 25 °C must be observed.

1-hour system: Storage temperature of all adhesive products of more than 15 °C must be observed.

Adhesive

The BMW approved polyurethane adhesive must be used for bonding:

- **1-day system:** Window glass adhesive (Part number 83 19 0 444 144*)

1-hour system: Repair kit, small (part number 83 19 0 444 141*) or large (part number 83 19 0 444 145*)

The repair kit, large contains a second window glass glue cartridge.

* Sourcing reference: BMW Parts Department

Adhesive is applied to window glass with cartridge gun (compressed airy or electrically operated, sourcing reference: BMW Workshop Equipment and Planning Documentation).

When using accelerator (hot working, 3-hour system)

- Temperature (min. 80 ± 5 °C) of cartridge oven must be checked every morning. Connect temperature sensor to diagnosis system
- Heat adhesive for one hour in cartridge oven (sourcing reference: BMW Parts Department) to 80 ±5 °C
  - Write date and time on cartridge when inserting into cartridge oven
  - Insufficient heating (< 1 hour) results in the formation of bubbles/blisters (bonding not permitted)
  - Temperature < 80 ± 5 °C results in the formation of bubbles/blisters (bonding not permitted)
- Remove hardened adhesive prior to further processing.
- Mistake in mixing in event of an interruption in application > 1 minute (bonding not permitted)
  - A sample bead of 50...70 mm must be rejected after an interruption in application
- Expiry dates of accelerator and adhesive must not be more than 3 months apart
  - Expiry date >3 months results in the formation of bubbles/blisters (bonding not permitted)

Sealed adhesive:

- May only be stored for a maximum of 8 hours once it has been heated up to 80 ±5 °C
- The adhesive will be damaged if this time is exceeded (bonding not permitted)
- Damaged adhesive must not be used and must be disposed of in compliance with national regulations
- The glue cartridge may only be heated up once
    - If the lower label is black, this adhesive may only still be used cold without accelerator while adhering to the expiry date.

IMPORTANT: Not all window glass may be bonded with accelerator (hot working).

If hot working is not permitted, this is described in the relevant document.

Adhesive expiry date

Repair kit (A) and glue cartridges (B) are marked with a date (best before).

Date (1) refers to the calendar week and year (KW/JJJJ).

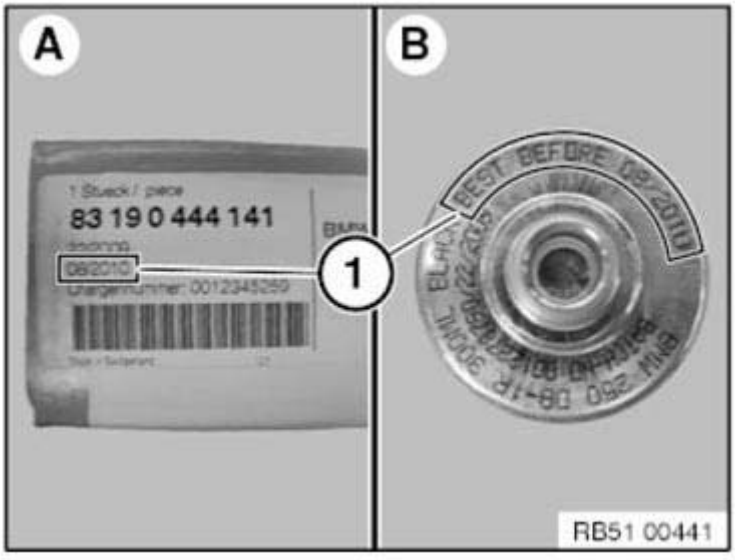


Fig. 298: Identifying Date On Kit And Glue Cartridges
Courtesy of BMW OF NORTH AMERICA, INC.

The adhesive cannot be used after this date (1).

Adhesive disposal

Pure hardened adhesive is handled as normal waste.

The adhesive is disposed of in paper sacks so that it can react with moisture.

Non-hardened adhesive, cartridges and mixtures of adhesive and solvents and the like must be disposed of as hazardous waste.

Accelerator (3-hour system)

Accelerator is screwed onto the glue cartridge and contains a reaction paste which is mixed with the heated adhesive.

IMPORTANT: The accelerator may only be paired with the glue cartridge of an unopened package (formation of bubbles/blisters).

Adhesive and accelerator must be paired while taking into account the expiry dates.

The accelerator may no longer be used if the expiry dates are more than 3 months apart.

Bonding agent (activator)

The BMW-approved bonding agents must be used to treat adhesive areas:

1-day system:

- "Glass Activator 1" (on ceramic glass)
- "Paint Activator A" (on sheet metal flange or residual adhesive bead)

1-hour system:

- "Glass Activator (2)" (on ceramic glass), yellow stick, BMW part number: 83 19 0 444 142
- "Paint Activator (B)" (on sheet metal flange), blue stick, BMW part number: 83 19 2 154 458

WARNING: Wear cut resistant gloves when breaking the glass ampoule

Prepare Glass Activator (2) and Paint Activator (B) for application by shaking and kinking (breaking glass ampoule).

Apply Glass Activator (2) by pressing gently. There is no need for final wiping. Air drying time approx. 2 minutes.

Apply Paint Activator (B) by pressingly gently. Then wipe dry with a paper towel (included in the set).

Bonding agent expiry date

Repair kit and bonding agent are marked with a date (Best Before).

- The bonding agent may only be used up to this date (if not already opened previously).
- Once it has been opened (circlip broken), use for 1 week only even if the expiry date has not been reached.

NOTE: Write the date on the bottle when opening the bonding agent for the first time. Close the bottle immediately after extracting the bonding agent (reaction with air).

Application of bonding agent

The bonding agent is used for adhesion between glass or ceramic glass and the adhesive. Therefore, a thin, homogeneous and continuous line of bonding agent must be applied.

After compressing the adhesive bead, make sure that there is 1 to 2 mm wide bonding agent trace is on the ceramic glass next to the adhesive bead (serves visual inspection).

The adhesive bead may become up to 15 mm wide in compressed condition. The width of the adhesion agent is therefore at least 17mm with windscreens and rear windows and at least 9 mm with door window glass.

The bonding agent may not be applied in the visible area or the point grid. Fresh bonding agent in the visible area must immediately be wiped off with solvent because hardened bonding agent will leave a haze behind.

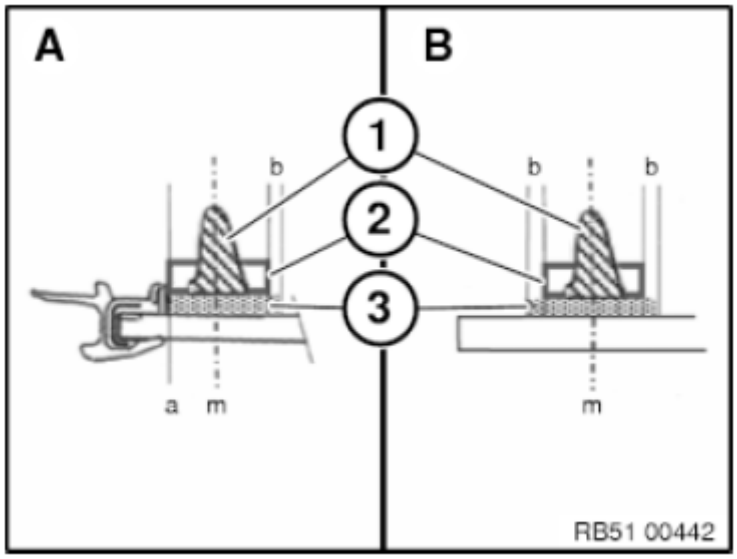


Fig. 299: Identifying Adhesive Bead Position And Bonding Agent Bead
Courtesy of BMW OF NORTH AMERICA, INC.

ADHESIVE BEAD REFERENCE CHART

Graphic A	Graphic B
Window glass with cover	Window glass without cover.
If the adhesive bead (1) cannot expand further (a = 0 mm) into one direction when pressing down, the	If the adhesive bead (1) can expand into both directions while pressing down, the bonding agent

outer edge of the bonding agent bead (3) will run through Point a.	(3) and adhesive bead (2) will run toward each other in the center (m).

Removal of window glass

IMPORTANT: As of E63 and E87 it will only be possible to remove the rear window with the "ROLL OUT 2000 ".

Cover side walls, roof-mounted aerial and if necessary interior equipment with protective covers.

Tape off body with fabric adhesive tape (e.g. Tesa) in those areas where the oscillating blade could damage the window glass or the paint.

When using the cutting wire, pull the cutting wire ends through special tool 51 3 270 , bend and tape off with fabric adhesive tape (e.g. Tesa) (risk of injury and damage).

When removing the window glass:

- Wear safety goggles and protective gloves.

Cut through adhesive bead of window glass:

- With "**ROLL OUT 2000** " * (wire cutting system); no paint is damaged here in the case of narrow gaps
- with special cutter* and oscillating knife*

*Sourcing reference: BMW Workshop Equipment and Planning Documentation

Prior to each use, regrind the knife with a grindstone while the machine is running (new knives also).

Avoid paintwork damage on body aperture.

Guide knife carefully between body and window glass.

Run blade of knife parallel to window glass.

Cut through adhesive bead as closely as possible to window glass.

To remove residual adhesive bead in body aperture (and on window glass if reusing):

- Use a scalpel for heavy-duty applications
- Cut off adhesive residue to a thickness of approx. 0.5 mm
- Remove residual adhesive bead only briefly before bonding

Damage to paintwork in body aperture

To ensure long-term corrosion protection, it is absolutely essential to touch up damage to paintwork!

The "BMW Color System" painting handbook forms the basis of these repair instructions and must be observed without fail.

Touch up damage to paintwork on body aperture with BMW multibase filler.

Grind out scratches in non-visible areas and touch up with BMW multibase filler.

Grind extensive areas of damage down to the bare metal and coat with BMW multibase filler (layer thickness 30 ... 40 µm).

Hardening time:

- With infrared, at least 10 minutes
- Without infrared for at least 60 °C, at least 30 minutes
- Without infrared for at least 20 °C, at least 24 hours

If a complete build-up of paint is required in the visible area:

- Tape off primed adhesive flange before applying top coat

IMPORTANT: Observe hardening time of BMW multibase filler otherwise a perfect bond cannot be guaranteed!

Treatment of adhesive area in body aperture:

TREATMENT FOR CERAMIC GLASS SURFACE

Adhesive	Treatment
Bonding and sealant for car window glass	a. Clean with cleaning agent R2 (sourcing reference: BMW Parts Department, part number 83 19 0 417 324) b. Observe an air drying time of at least 5 minutes (at least 15 minutes when applied to residual adhesive bead) c. **1-day system:** Apply "Paint Activator A" to paint and residual adhesive bead c) **1-hour system:** Apply "Paint Activator B" (blue stick) to paint d) Observe an air drying time of at least 1 minute (at least 10 minutes when applied to residual adhesive bead)

IMPORTANT: Do not use Sika remover 208 for cleaning in the adhesive area.

Preparation for installation

Prepare plastic nozzle(s) for shaping adhesive bead (when not using the standard nozzle C), can be cut to size during the air drying time.

Lay a sample bead of approx. 50 mm - watch out for formation of bubbles/blisters when hot bonding; if OK, apply immediately to window glass.

- Interruption must be < 5 seconds (incorrect mixture ratio).

Glue cartridge must be vertical to window glass.

Black ceramic glass impermeable to UV light is located on the peripheral zone of the inside edge of the window to protect the adhesive bead.

Ceramic glass must not be damaged and must be treated as follows.

1-day system: Treatment of ceramic glass surface (inside of window):

TREATMENT FOR CERAMIC GLASS SURFACE (1-DAY SYSTEM)

Adhesive (with part numbers)	**Treatment**
Repair kit Cold/Hot Bonding: - 83 19 0 444 141/145 Glue cartridge: - 83 19 0 444 144	a. Clean with cleaning agent R2 (sourcing reference: BMW Parts Department, part number 83 19 0 417 324) b. Observe an air drying time of at least 5 minute c. Apply a thin coating of "Glass Activator (2)" d. Observe an air drying time of at least 2 minutes

1-hour system: Treatment of ceramic glass surface (inside of window):

TREATMENT FOR CERAMIC GLASS SURFACE (1-HOUR SYSTEM)

Adhesive (with part numbers)	**Treatment**
Repair kit: - 83 19 0 444 141/145 Glue cartridge: - 83 19 0 444 144	a. Clean with cleaning agent R2 (sourcing reference: BMW Parts Department, part number 83 19 0 417 324) b. Observe an air drying time of at least 5 minutes c. Apply a thin coating of "Glass Activator (2)" d. Observe an air drying time of at least 2 minutes

Version with inspection glass for vehicle identification number in windscreen only

- Close inspection glass (left bottom) with Sika bonding base VP 206 (part number 83 19 9 407 777*)

(*sourcing reference: BMW Parts Department)

Except for:

All US/GB models. In addition, all models or models on which the black I-panel cover means that the body color can not be seen through the inspection glass.

Adhesive quantities

Approx. 1 1/4 glue cartridges are required to bond the windscreen on the following vehicles:

- 7 Series
- 5 Series from E60
- X5
- X3

In the case of hot bonding (with accelerator), the missing residual adhesive bead is applied from a second glue cartridge but while cold and without accelerator (formation of bubbles/blisters).

Minimum hardening time is thus not increased.

IMPORTANT: If a second cartridge is required for bonding:

- **First apply cold adhesive to cowl panel at bottom (skin formation time)**
- **Accelerator from repair kit must not be used with the second glue cartridge (formation of bubbles/blisters)**

Formation of bubbles/blisters results in leakage and insufficient bonding strength (torsional rigidity, front passenger airbag).

Effect of differing adhesive quantities:

ADHESIVE QUANTITIES REFERENCE CHART

Too little adhesive:	Too much adhesive:
○ Window glass rests too low in body aperture ○ Strains/tensions may occur (window glass breakage) ○ Insufficient squeezing of adhesive bead (leaking)	○ Window glass rests too high in body aperture ○ Wind noise may occur ○ Strains/tensions may occur (window glass breakage) ○ Dirt contamination of add-on parts by emerging adhesive ○ Adhesive on uninsulated strainer pressure lines of aerial(s) (interference of reception)

Spacer buffers

Before sticking on new spacer buffers, remove all remaining traces of old spacer buffers completely.

Position of spacer buffers must be observed exactly.

Incorrectly fitted spacer buffers will result in:

- Windscreen glass breakage
- Leakage (if the spacer buffer is in the adhesive area)
- Wind noises

Installation

To prevent a pressure build-up in the passenger compartment when the doors are closed:

- Open a side window

IMPORTANT: 1-day system:

After the adhesive bead has been applied, the window glass must be fitted within 5 to 10 minutes (depending on air humidity, temperature and use of accelerator).

After 5 to 10 minutes the adhesive bead forms a skin which can no longer guarantee a perfect bond.

1-hour system:

Once the adhesive bead has been applied, the window glass must be installed within 7 minutes (depending on air humidity, temperature).

After 7 minutes the adhesive bead forms a skin which can no longer guarantee a perfect bond.

The general rule is:

To secure the window glass, use only the yellow plastic adhesive tape (sourcing reference: BMW Parts Department, part number 83 19 9 410 979).

The window glass will slip down if other adhesive tapes are used.

Window glass slippage will result in leaks and wind noises.

Remove adhesive residue immediately with adhesive remover (Sika remover 208, sourcing reference: BMW Parts Department). Do not press out the window glass again.

Hardened adhesive can only be removed mechanically.

Check height of windscreen/rear window with special tool 51 0 010 or 51 3 210.

Assemble vehicle.

Hardening

The adhesive hardens as it reacts with air humidity (with accelerator also due to mixed-in reaction paste) at room temperature.

Minimum hardening time (table) is obtained from 22 °C and 38 % relative air humidity.

At ambient temperatures above 23 °C and 50 % relative air humidity (hot countries), the adhesive open time is shortened to approx. 5 minutes (skin formation time).

The adhesive hardening process is interrupted completely at ambient temperatures below 5 °C. In this event, there will be no increase in the strength of the bonded connection.

Do not subject the vehicle to load on one side during the minimum hardening time (see table, without front passenger airbag), such as e.g.:

- one wheel on curb
- vehicle hoist
- etc.

Maneuvering inside garage/workshop:

- only permitted on level ground
- do not under any circumstances drive over approach ramps, e.g. into multistorey car parks

Remove adhesive tapes after hardening time.

If you fail to adhere to the minimum hardening times (see table, without front passenger airbag):

- Leaks and/or wind noises may occur at the window glass

1-day system: Adhesives and their minimum hardening times:

ADHESIVES AND HARDENING TIMES (1-DAY SYSTEM) REFERENCE CHART

Adhesive	**Minimum hardening time "without front passenger airbag" (after which vehicle can be moved)**	**Minimum hardening time "with front passenger airbag" (countries where seatbelt use is not required by law)**
Hot working with accelerator	2 hours	3 hours()
Cold processing	9 hours	20 hours()

1-hour system: Adhesives and their minimum hardening times:

ADHESIVES AND HARDENING TIMES (1-HOUR SYSTEM) REFERENCE CHART

Adhesive	Minimum hardening time "without front passenger airbag" (after which vehicle can be moved)	Minimum hardening time "with front passenger airbag" (countries where seatbelt use is not required by law)
Cold processing	1 hour	2 hours(1)

(1) Note

Vehicles with front passenger airbag:
The vehicle can be handed over to the customer after the hardening time (vehicle can be moved, adhesive-dependent) with the following warning:
Once the windscreen glass has been bonded, all occupants must travel with their seatbelts attached for "... hours"!
The time is taken from the "Minimum hardening time" table for countries where seatbelt use is not required by law.

IMPORTANT: If the minimum hardening time is not adhered to:

- **the front passenger together with the windscreen may fall out of the vehicle in the event of an accident after the front passenger airbag has been triggered**

Locate leaks

- by spraying water underneath sealing lips
- with ultrasonic leak detector (sourcing reference: BMW Parts Department)

If necessary, seal leakage with appropriate nozzle.

Version with GPS navigation system 1 (up to 9/97)

After installation of rear window:

- Recalibrate magnetic field probe
- Refer to functional description in ISID (Integrated Service Information Display/Diagnosis and Information System)

Version with rain sensor, rain/light sensor or rain/light solar sensor

Remove complete rain sensor, rain/light sensor or rain/light solar sensor, **SEE REPAIR INSTRUCTIONS** .

After replacing windscreen:

- Initialize rain sensor, rain/light sensor or rain/light solar sensor
- Refer to functional description in ISID (Integrated Service Information Display/Diagnosis and Information System)

Version with automatic air conditioning

After replacing windscreen:

If condensation sensor is not mounted on new windscreen:

Replace condensation sensor, **REFER TO REPAIR INSTRUCTIONS** .

Version with Head-Up Display (HUD)

When replacing windscreen in vehicles with **rain/light solar sensor,** replace this completely: See repair instructions See **6135177 REMOVING AND INSTALLING (REPLACING) RAIN/LIGHT SENSOR** or **6135679 INITIALIZING RAIN/LIGHT (SOLAR) SENSOR** .

Before bonding, install windscreen with seal(s) and check HUD; if necessary, press expanding foam tape down with hand roller.

After bonding windscreen, check and if necessary adjust HUD.

Work steps for removing and installing window glass

See repair instructions See **5131000 REMOVING AND INSTALLING/RENEWING WINDSCREEN** or **5131200 REMOVING AND INSTALLING/REPLACING REAR WINDOW**.

NOTE: **If the document for the selected model is not required or not approved, the following message will be displayed when clicking on the "cross-reference": "No additional documents available in the current vehicle context".**

51 37 000 REMOVING AND INSTALLING COMPLETE REAR LEFT OR RIGHT POWER WINDOW UNIT

WARNING: **Risk of injury!**

Power window unit has no anti-trapping mechanism.

Necessary preliminary tasks

- Remove **REAR TOP SIDE TRIM PANEL**
- Remove **OUTER WINDOW CAVITY COVER STRIP**
- Remove **INNER WINDOW CAVITY COVER STRIP**
- Remove **REAR WHEEL ARCH COVER**
- Remove **SEAT BELT COVER**

Remove foam material (1).

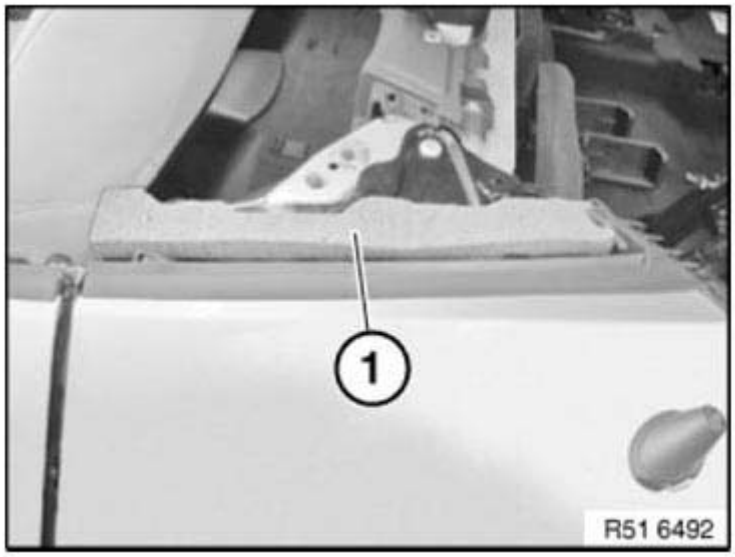


Fig. 300: Identifying Foam Material
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 37 4AZ** .

NOTE: Replace self-locking screws.

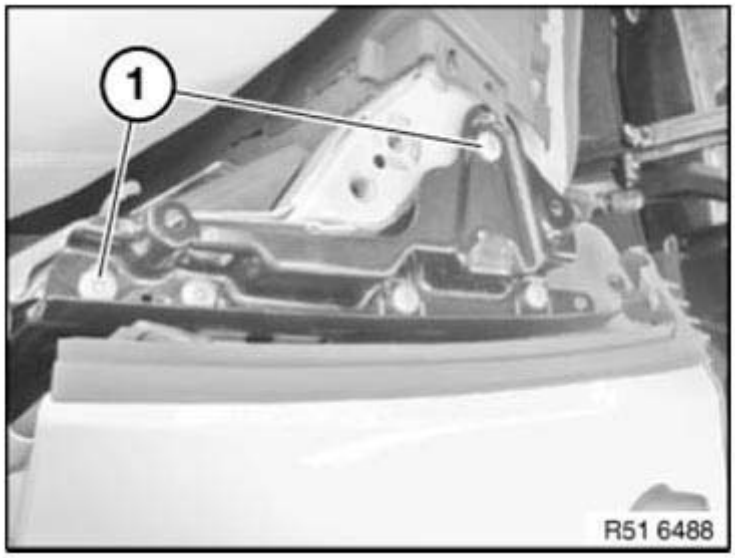


Fig. 301: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1).

Tightening torque **51 37 5AZ** .

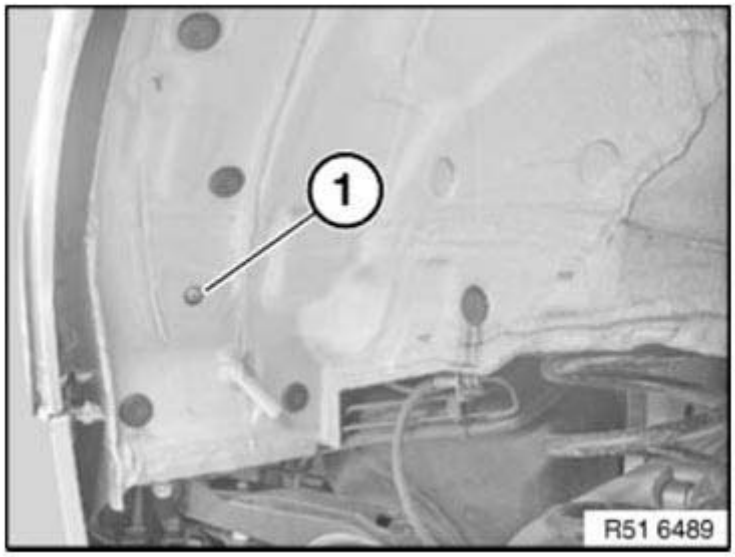


Fig. 302: Identifying Power Window Unit Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Raise power window unit slightly.

Unclip cable connection (1).

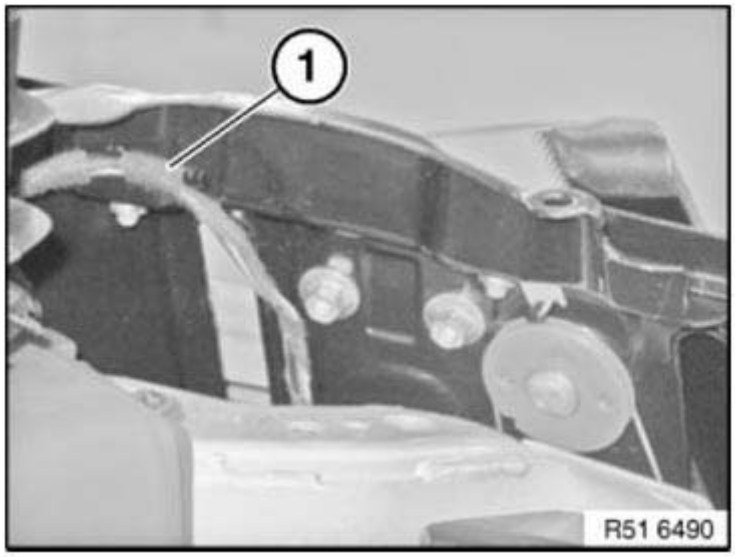


Fig. 303: Identifying Power Window Unit Cable Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Move power window unit (1) with electric switch in door trim panel to roughly half height and feed out power window in upward direction.

Installation:

Reinstall power window unit (1) in half-opened position in body and move power window unit (1) with electric switch in door trim panel downwards again.

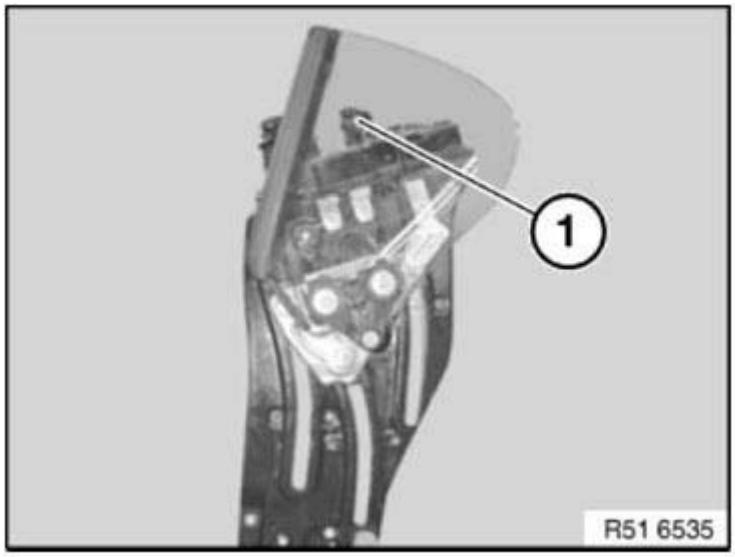


Fig. 304: Identifying Power Window Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect electric motor (1) and cable clip (2).

Installation:

Check function.

Adjust **REAR SIDE WINDOW** .

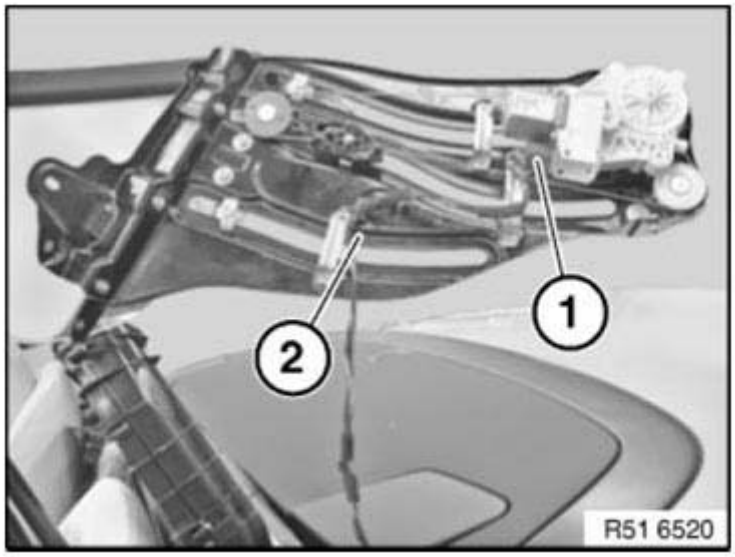


Fig. 305: Identifying Electric Motor And Cable Clip
Courtesy of BMW OF NORTH AMERICA, INC.

51 37 240 REMOVING AND INSTALLING/REPLACING OUTER WINDOW CAVITY COVER STRIP FOR REAR SIDE WINDOW

IMPORTANT: The "INSTRUCTIONS ON FITTING WINDOW GUIDES " serve as the basis for this repair instruction and must be observed without fail.

Necessary preliminary tasks

- Partially open folding roof
- If necessary, open side window glass

NOTE: Prior to removing, pay attention to the exact installation position with respect to the adjoining components.

Unclip belt deflector trim (1).

Release outer window cavity cover strip (2) from side panel.

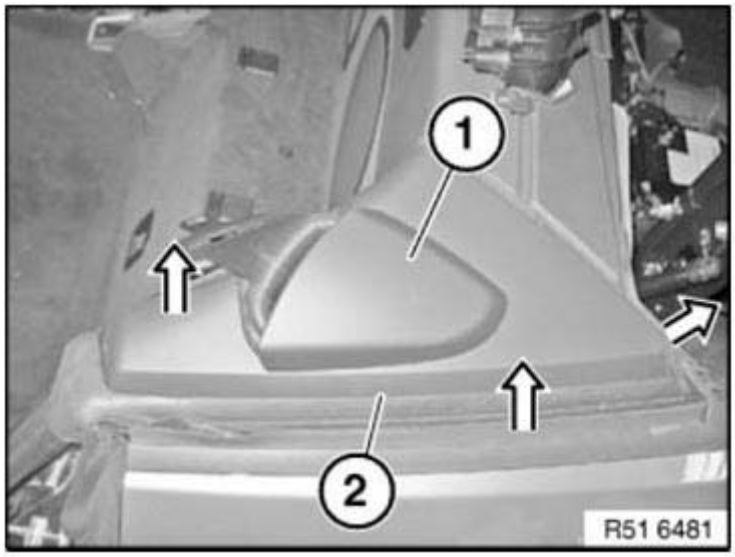


Fig. 306: Removing Outer Window Cavity Cover Strip From Side Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure window cavity cover strip (1) is correctly seated.

Window cavity cover strip (1) must not be damaged.

If necessary, moisten window cavity cover strip (1) prior to fitting with **APPROVED ANTI-FRICTION AGENT** .

Secure window cavity cover strip (1) with clip (2) to body (3).

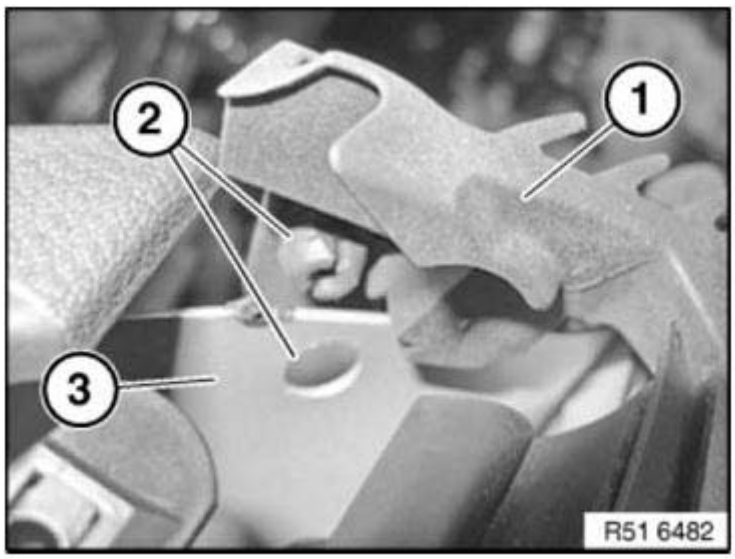


Fig. 307: Identifying Window Cavity Cover Strip With Clip

Courtesy of BMW OF NORTH AMERICA, INC.

51 37 261 REMOVING AND INSTALLING/REPLACING WINDOW CAVITY COVER STRIP FOR DOOR WINDOW, REAR LEFT OR RIGHT

IMPORTANT: The "INSTRUCTIONS ON FITTING WINDOW GUIDES " serve as the basis for this repair instruction and must be observed without fail.

Necessary preliminary tasks

- Partially open folding roof
- If necessary, open side window glass

NOTE: Prior to removing, pay attention to the exact installation position with respect to the adjoining components.

Unclip belt deflector trim (1).

Release inner window cavity cover strip (2) from side panel.

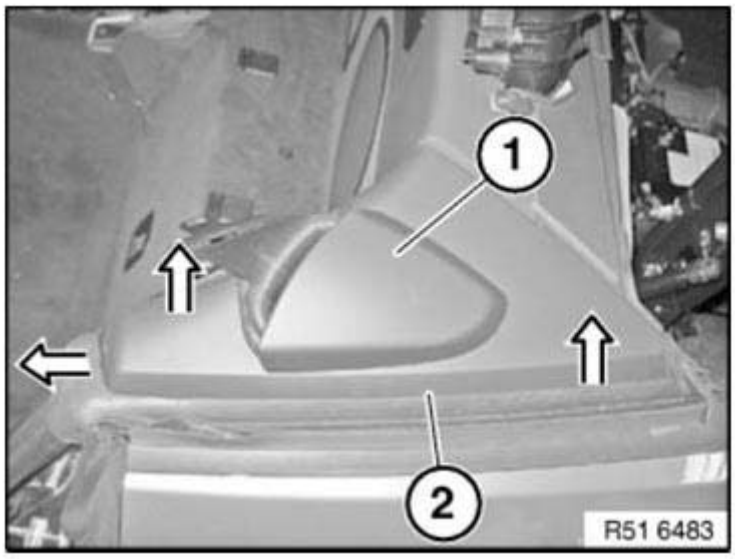


Fig. 308: Removing Outer Window Cavity Cover Strip From Side Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure window cavity cover strip (1) is correctly seated.

Window cavity cover strip (1) must not be damaged.

If necessary, moisten window cavity cover strip (1) prior to fitting with **APPROVED ANTI-FRICTION**

AGENT.

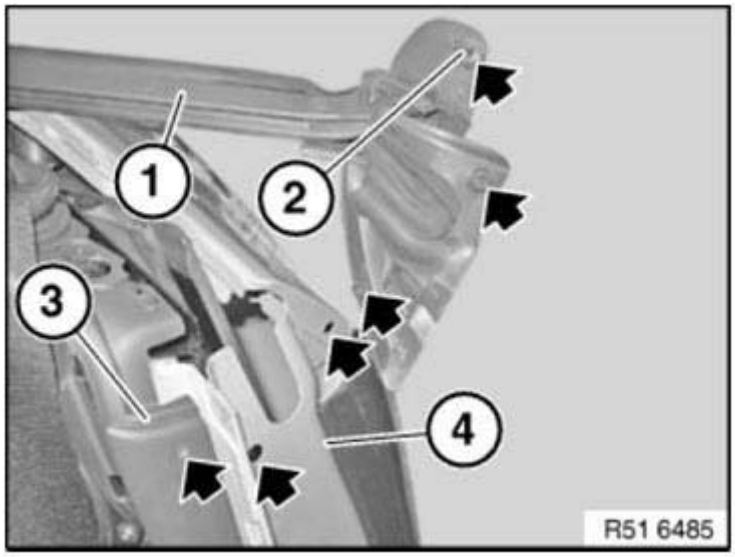


Fig. 309: Identifying Window Cavity Cover Strip With Trim And Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Insert clip (2) in window cavity cover strip (1) if this remains on trim (3) during removal.

Clip window cavity cover strip (1) on trim (3) and body (4).

51 37 003 REPLACING REAR LEFT OR RIGHT POWER WINDOW UNIT

Necessary preliminary tasks

- Remove **REAR POWER WINDOW UNIT**
- Remove **FLAT MOTOR FOR REAR POWER WINDOW UNIT**

Release screws (1).

Tightening torque **51 37 2AZ** .

Remove side window glass (2) from power window unit (3).

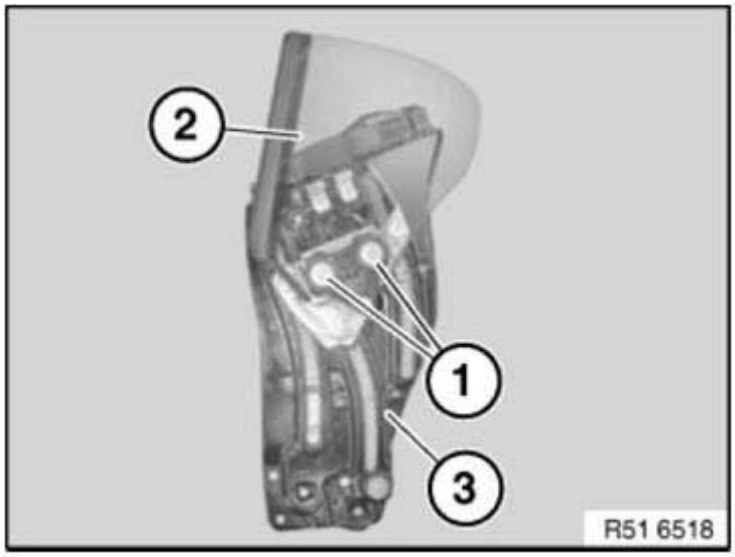


Fig. 310: Identifying Side Window Glass Of Power Window Unit With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Initial adjustment of pretension:

Attach adjusting screw (1) until flush on outside.

Check function.

Adjust **REAR SIDE WINDOW** .

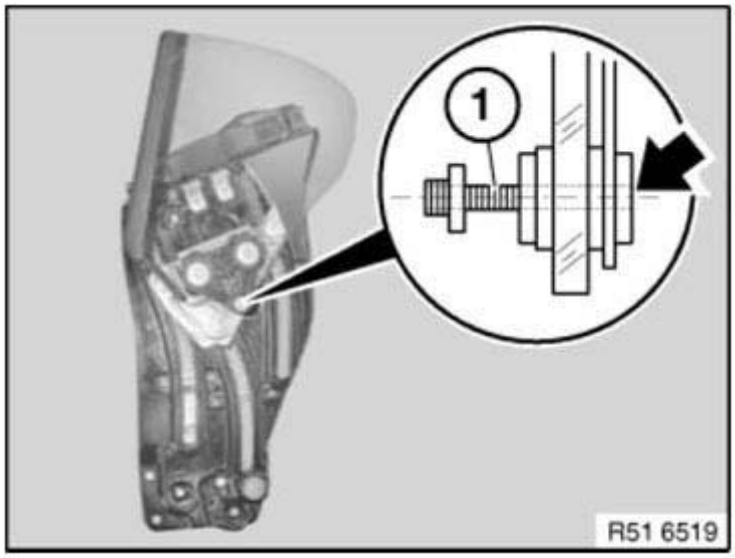


Fig. 311: Identifying Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

51 37 171 REPLACING REAR LEFT OR RIGHT SIDE WINDOW

WARNING: Power window unit has no anti-trapping mechanism.

Necessary preliminary tasks

- Remove **REAR POWER WINDOW UNIT**

Release screws (1).

Tightening torque **51 37 2AZ** .

Feed side window glass (2) out of power window unit (3).

Installation:

Position screws (1) centrally in window bore holes.

Check function.

Adjust **REAR DOOR WINDOW** .

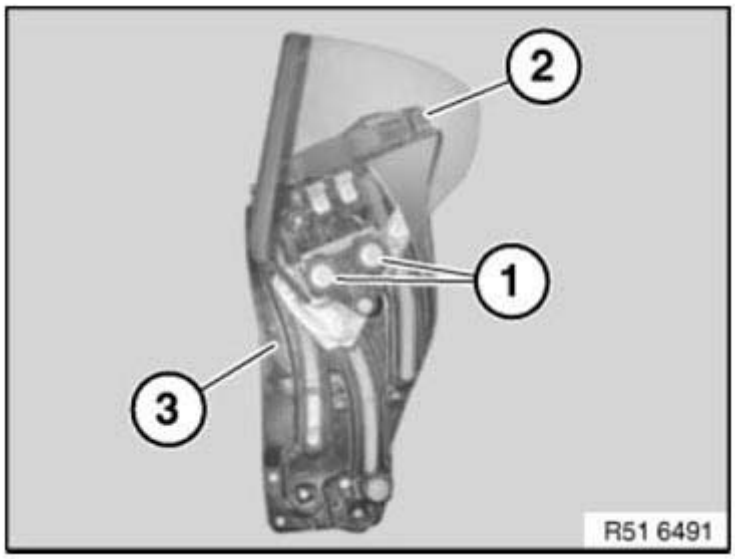


Fig. 312: Identifying Side Window Glass Of Power Window Unit With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

5141 FRONT DOOR TRIM PANEL WITH ARM REST

51 31 ... NOTES FOR BONDING SOUND INSULATION (SI), DOORS

IMPORTANT: Do not pull on the sound insulation in jerks (risk of damage)

Work steps for removing and installing sound insulation

- Click on "underlined cross-reference" to display at the end of this document

General

Sound insulation is bonded to the inner door panel.

Bonded sound insulation must not be subjected to load (e.g. leak test) before 5 hours have elapsed.

On-the-job safety

When working with bonding products (adhesive, cleaning agent, etc.):

- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure rooms are well ventilated.
- Change work clothing contaminated with adhesive immediately.
- Change work clothing contaminated with solvents and swelling agents immediately (keep spare work clothing on hand).
- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams
- Provide eye douche facilities, change water regularly (once a month).
- Comply with the relevant safety regulations

Handling adhesive area on inner door panel

HANDLING PROCEDURE FOR INNER DOOR PANEL

Adhesive	Cleaning
a. Butyl bead applied to sound insulation with protective film b. Butyl mini-round profile [] 3 mm from the roller c. Butyl round profile [] 6 mm from the roller	a. Isohexane (benzine) b. 2-propanol (isopropanol) *Under no circumstances: paint thinning* c. Carry out bonding only after an air drying time > or = 1 min. Air drying time may be omitted if the entire bonding surface is wiped with a dry cloth d. After cleaning, the bonding surface may not be touched with hands or fouled again

Repair in area of sound insulation, door

REPAIR FOR SOUND INSULATION AREA (DOOR)

Repair in the event of damaged sound insulation or leakage	• Cut the butyl rope between the sound insulation and the inner door panel with a sharp knife • After the repair is finished, position a new butyl rope [] 3 mm directly on the original adhesive bead • Heat the butyl bead with a standard hot air blower until the butyl rope strings when touched slightly. Do not damage the sound insulation in the process • Press down with special tool **51 0 300** . Perform this work extremely carefully because the increased amount of adhesive requires pressure of = 20 N/cm^2 (compared to firm thumb pressure ~ 30 N/cm^2) • Visually check the adhesive bead and its compression (no capillaries or broken adhesive bead permitted) • In the cases mentioned, the complete sound insulation must be replaced. After removing the sound insulation, removal all butyl remnants from the inner door panel. Apply 6 mm [] butyl rope to new sound insulation • Press down with special tool **51 0 300** to > or = 20 N/cm^2 (compare to firm thumb pressure ~ 30 N/cm^2)

The sound insulation must be bonded watertight below the door lock

- Flat bonding surface required all round
- No bonding in event of moisture (e.g. condensation, etc.)
- Bonding area must not show any traces of adhesion-reducing residues (e.g. separating agents, greases, oils, paraffins, plastisols, cavity wax, polishing dust residues, etc.)
- Remove the protective film directly before joining (under no circumstances remove earlier, since the butyl, because of its stickiness, will very quickly pick up adhesion-reducing dirt contaminants)
- The sound insulation must be attached with positional accuracy to the inner door panel, because it is no longer possible to change the position without damaging the butyl bead
- With repainted areas, the maximum permitted temperature of 90°C may not be exceeded in the area of the sound insulation. Otherwise, the sound insulation must be removed (and replaced, if necessary).

Expiry date of adhesive

24 months, see label on packaging

Disposal of the cleaning cloth

Cleaning cloths and cleaning agent residues are hazardous waste (see also safety data sheet)

Disposal of adhesive

Hazardous waste (see also safety data sheet)

Work steps for removing and installing sound insulation

SEE REPAIR INSTRUCTIONS

51 41 000 REMOVING AND INSTALLING LEFT OR RIGHT FRONT DOOR TRIM PANEL

NOTE: Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Necessary preliminary tasks

- Open side window completely.

Switch off ignition before disconnecting plug connections.

Lever out plug (1) with a suitable tool and release screw underneath.

Tightening torque **51 41 1AZ** .

Unfasten screws (2).

Tightening torque **51 41 1AZ** .

Release bolt (3).

Tightening torque **51 41 1AZ** .

Unclip door trim panel (5) with special tool 00 9 317 at points (4).

Installation:

Replace self-locking screw.

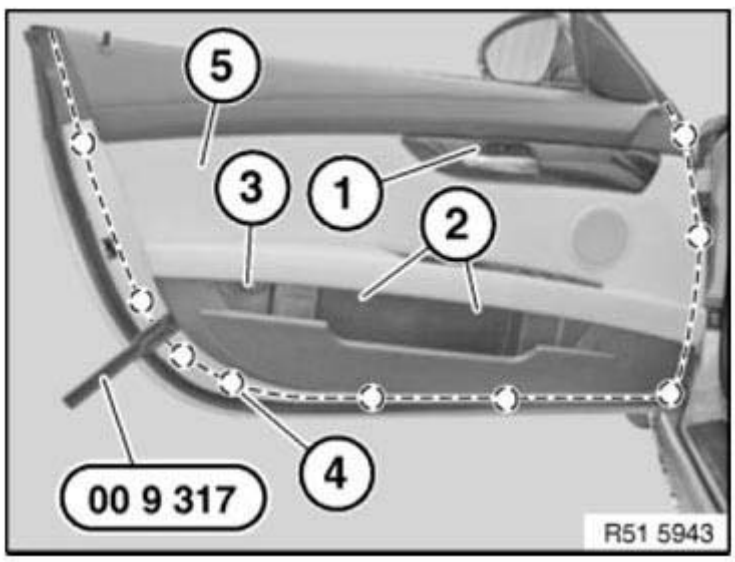


Fig. 313: Removing Door Trim Panel Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Ensure that the clips are correctly fitted.

1. Blue clips
2. White clips
3. Yellow clips

Installation:

Always replace blue clip (1) (clip with sealing ring)

If necessary, replace further faulty clips.

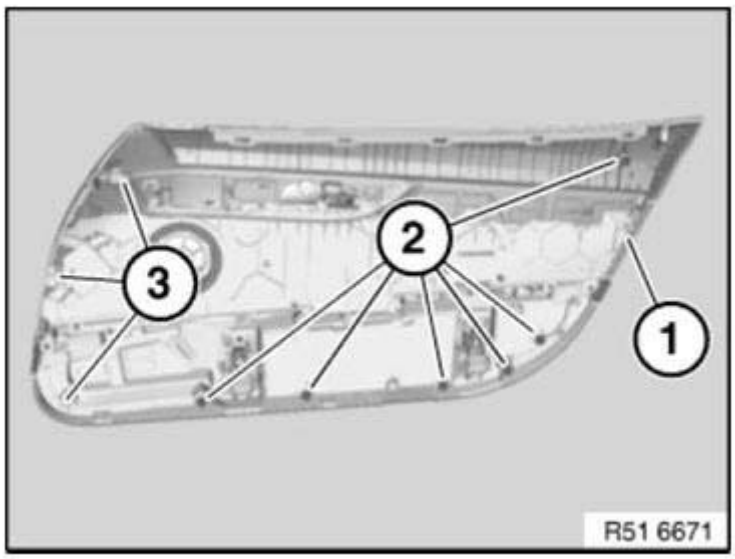


Fig. 314: Identifying Blue, Yellow And White Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip door trim (1) at top.

Feed out door trim (1) from unlocking button (2).

Installation:

If necessary, replace defective retaining elements.

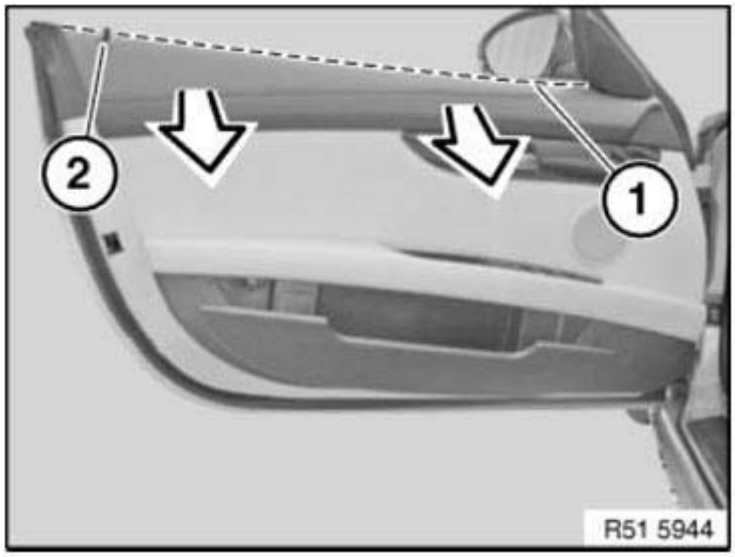


Fig. 315: Removing Door Trim From Unlocking Button
Courtesy of BMW OF NORTH AMERICA, INC.

Unhook Bowden cable (1) from door lock (2).

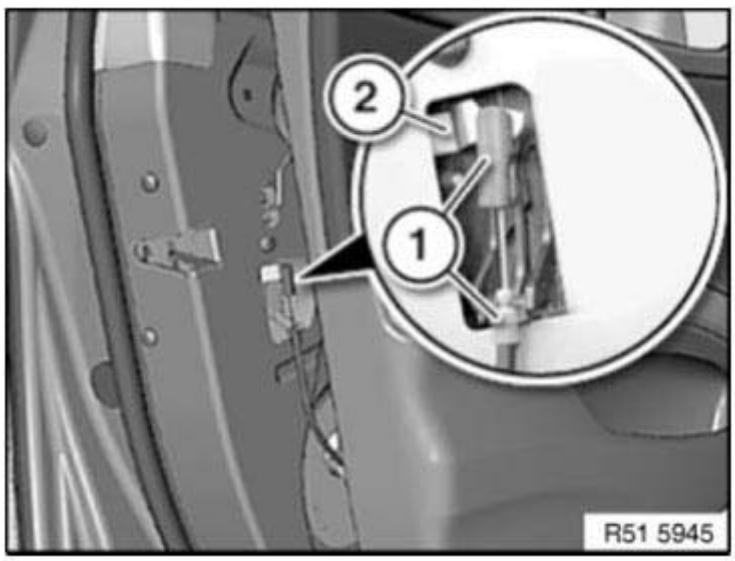


Fig. 316: Identifying Bowden Cable Of Door Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Depending on equipment specification:

Disconnect plug connection (1).

Remove cable (2) with retaining clips.

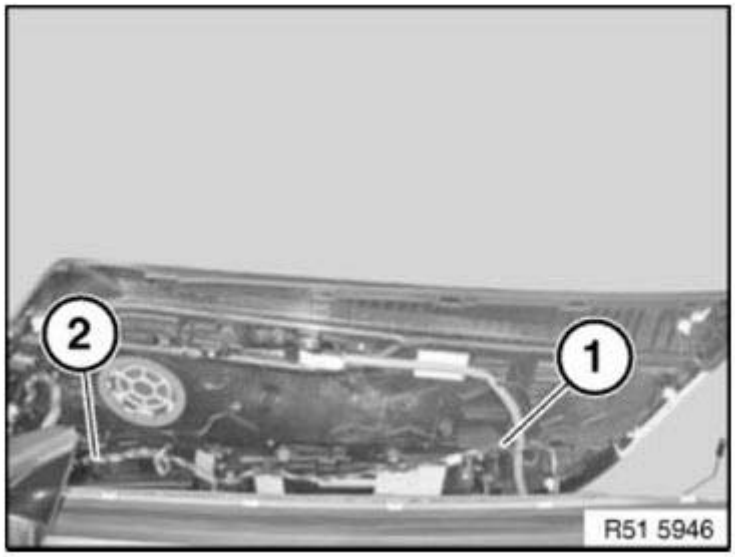


Fig. 317: Identifying Plug Connection And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carry out following function checks with door opened:

- Close rotary striker lock with a suitable tool. Check freedom of movement of locking button and linkage by actuating the locking system several times on the ignition key.

  If necessary, align linkage and repeat check procedure.

- Open rotary striker lock above inside door handle. Check correct opening by means of visual inspection.

51 48 060 REMOVING AND INSTALLING/REPLACING SOUND INSULATION IN FRONT DOOR, LEFT OR RIGHT

IMPORTANT: INSTRUCTIONS FOR SOUND INSULATION are an essential part of these repair instructions and must be followed without fail.

Do not detach sound insulation in jerks (risk of damage).

After every repair, check that the sound insulation is water-tight (water ingress).

Necessary preliminary tasks

- Remove **DOOR TRIM PANEL**

Release speaker cable (1).

Guide speaker cable (1) through sound insulation (2).

Position of sealing bead (3).

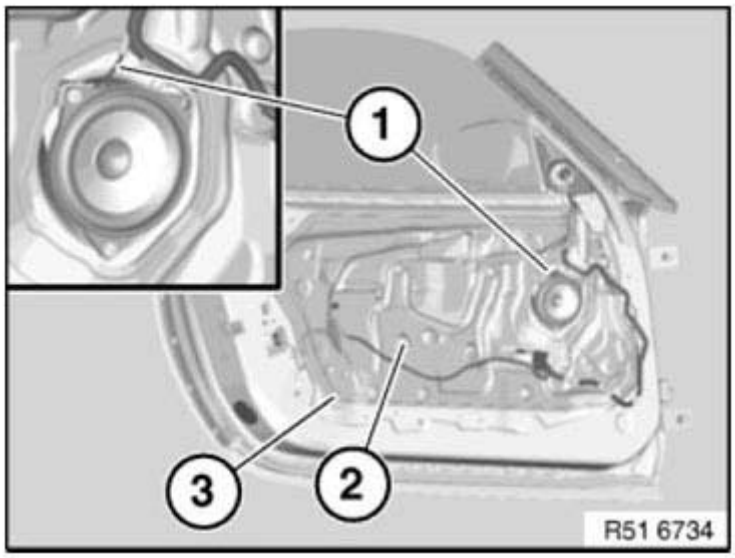


Fig. 318: Identifying Speaker Cable With Sound Insulation And Sealing Bead
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When cutting through sealing bead (1), do not damage sound insulation (2) and if necessary cable.

With a suitable sharp cutting tool (3) cut through sealing bead (1) of sound insulation (2) in the area to be detached.

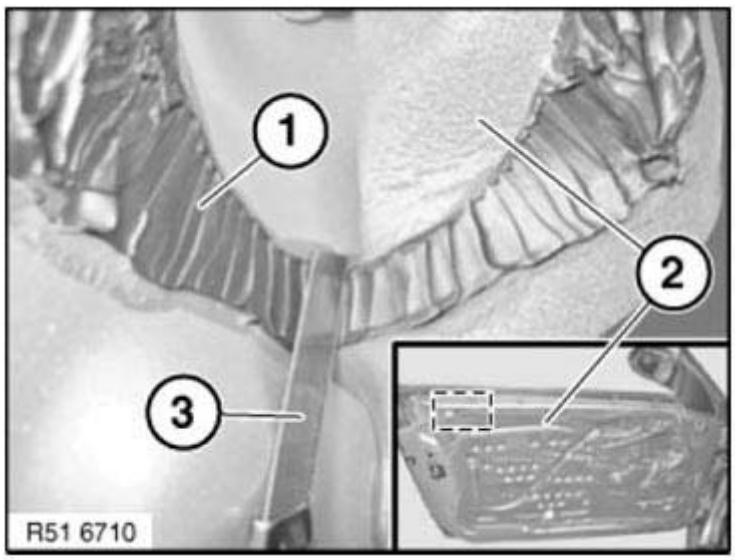


Fig. 319: Cutting Sealing Bead Of Sound Insulation Using Sharp Cutting Tool

Courtesy of BMW OF NORTH AMERICA, INC.

Clean bonding area with adhesive remover (sourcing reference: BMW Parts Service).

Air drying time: 1 minute

IMPORTANT: Adhesive areas must be dry and free of dust and grease.

Once it has been cleaned, do not touch the adhesive area with bare hands.

NOTE: Replacement:

Lay 6 mm dia. butyl cord (sourcing reference: BMW Parts Department) in specified adhesive area.

Heat butyl cord (hot air blower) and press down firmly on sound insulation all round.

Contact pressure with hand roller: approx. 20 N/cm ^{2}

Manual contact pressure: approx. 10 N/cm^2

NOTE: Firm thumb pressure has approx. 30 N/cm^2

NOTE: Position of butyl cord (1) on sound insulation (2).

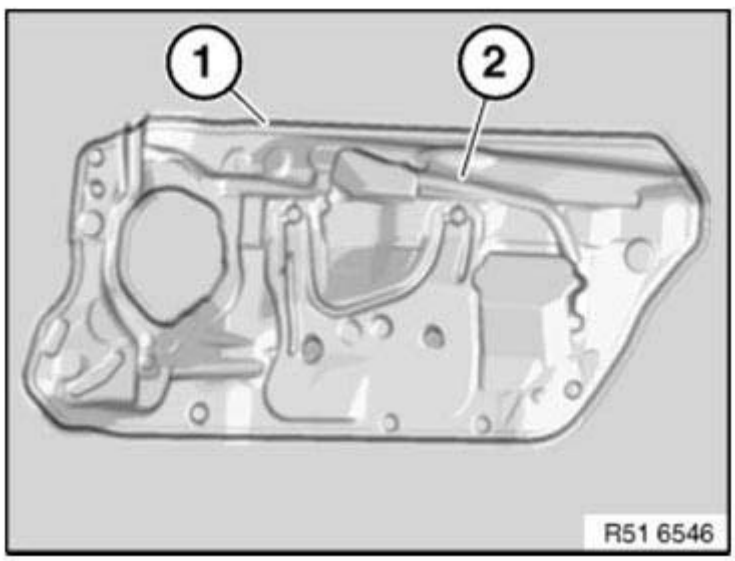


Fig. 320: Identifying Butyl Cord On Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: There is a 2 cm wide edge (2) all round on sound insulation (1).

Stick on butyl cord (3) centrally in this area.

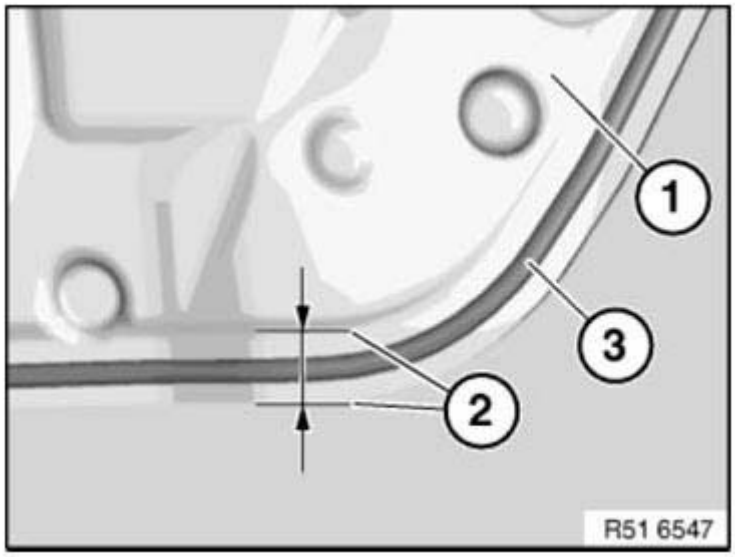


Fig. 321: Identifying 2 cm Wide Edge On Sound Insulation And Butyl Cord
Courtesy of BMW OF NORTH AMERICA, INC.

51 41 001 REPLACING FRONT LEFT OR RIGHT DOOR TRIM PANEL

NOTE: Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Necessary preliminary tasks

- Remove **DOOR TRIM PANEL**
- Remove **BOWDEN CABLE**
- Remove switch centre See **6131117 REMOVING AND INSTALLING/REPLACING POWER WINDOW SWITCH (DRIVER'S SIDE)** or **6131118 REPLACING FRONT PASSENGER POWER WINDOW SWITCH**
- Remove **SPEAKER COVER**
- Remove **CENTRE CONSOLE**
- Remove **INSIDE DOOR OPENER**
- If necessary, remove **FOOTWELL LIGHT**
- If necessary, remove **ANTI-THEFT ALARM INDICATOR**
- Remove **LED IN DOOR TRIM PANEL**

Lever out locking button trim (1) from door shoulder (2) with a suitable tool.

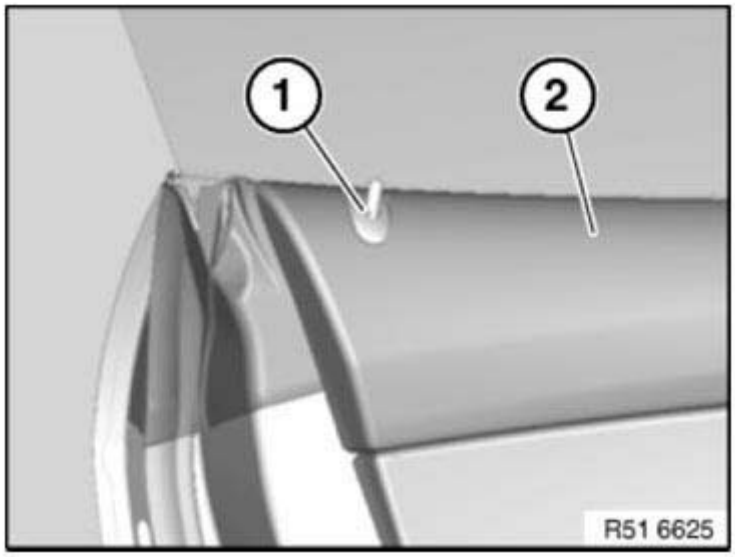


Fig. 322: Identifying Button Trim On Door Shoulder
Courtesy of BMW OF NORTH AMERICA, INC.

51 41 ... REPLACING SPEAKER COVER ON LEFT OR RIGHT DOOR TRIM PANEL

Partially fit special tool 00 9 317 as illustrated.

Carefully lever speaker cover (2) out of door trim panel (1).

IMPORTANT: Tape off working area. Risk of damage!

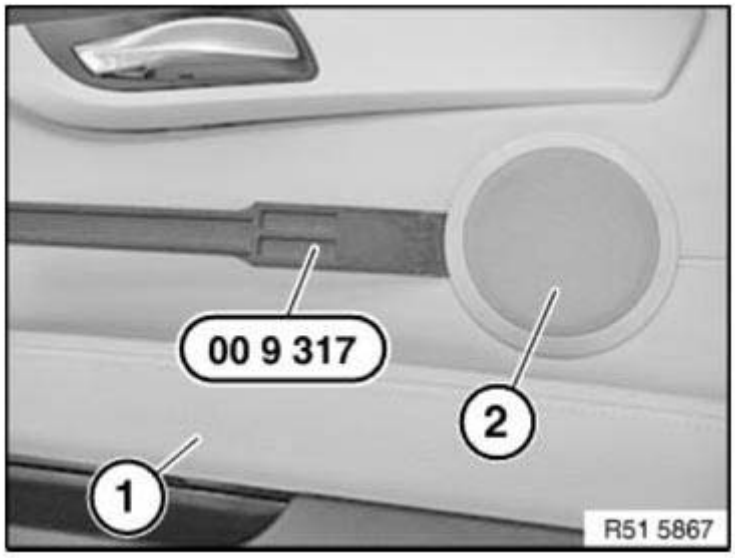


Fig. 323: Fitting Special Tool (00 9 317) On Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Guide (2) and catch along line (3) must not be damaged.

Insert guide (2) of speaker cover (1) correctly in opening (5) of door trim panel (4) and carefully engage speaker cover (1) on edge.

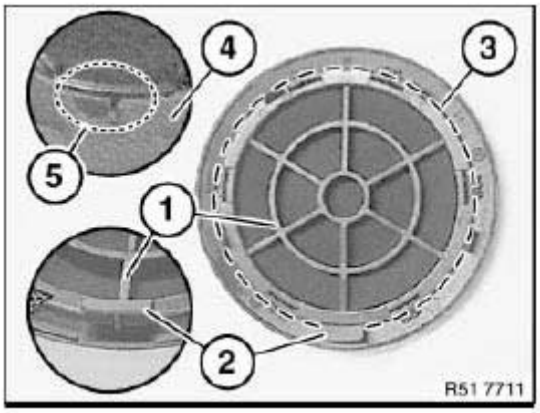


Fig. 324: Identifying Guides Of Speaker Cover And Door Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

5142 REAR DOOR TRIM PANEL WITH ARM REST

51 31 ... NOTES FOR BONDING SOUND INSULATION (SI), DOORS

IMPORTANT: Do not pull on the sound insulation in jerks (risk of damage)

Work steps for removing and installing sound insulation

- Click on "underlined cross-reference" to display at the end of this document

General

Sound insulation is bonded to the inner door panel.

Bonded sound insulation must not be subjected to load (e.g. leak test) before 5 hours have elapsed.

On-the-job safety

When working with bonding products (adhesive, cleaning agent, etc.):

- Wear safety goggles, protective gloves and if necessary an apron.
- Ensure rooms are well ventilated.
- Change work clothing contaminated with adhesive immediately.
- Change work clothing contaminated with solvents and swelling agents immediately (keep spare work

clothing on hand).

- Take skin protection measures, provide washing facilities including hot water, use silicone-free skin creams
- Provide eye douche facilities, change water regularly (once a month).
- Comply with the relevant safety regulations

Handling adhesive area on inner door panel

HANDLING PROCEDURE FOR INNER DOOR PANEL

Adhesive	Cleaning
a. Butyl bead applied to sound insulation with protective film b. Butyl mini-round profile 3 mm from the roller c. Butyl round profile 6 mm from the roller	a. Isohexane (benzine) b. 2-propanol (isopropanol) *Under no circumstances: paint thinning* c. Carry out bonding only after an air drying time > or = 1 min. Air drying time may be omitted if the entire bonding surface is wiped with a dry cloth d. After cleaning, the bonding surface may not be touched with hands or fouled again

Repair in area of sound insulation, door

REPAIR FOR SOUND INSULATION AREA (DOOR)

Repair in the event of damaged sound insulation or leakage	• Cut the butyl rope between the sound insulation and the inner door panel with a sharp knife • After the repair is finished, position a new butyl rope 3 mm directly on the original adhesive bead • Heat the butyl bead with a standard hot air blower until the butyl rope strings when touched slightly. Do not damage the sound insulation in the process • Press down with special tool **51 0 300** . Perform this work extremely carefully because the increased amount of adhesive requires pressure of > or = 20 N/cm^2 (compared to firm thumb pressure ~ 30 N/cm^2) • Visually check the adhesive bead and its compression (no capillaries or broken adhesive bead permitted) • In the cases mentioned, the complete sound insulation must be replaced. After removing the sound insulation, removal all butyl remnants from the inner door panel. Apply 6 mm butyl rope to new sound insulation • Press down with special tool **51 0 300** to > or = 20 N/cm^2 (compare to firm thumb pressure ~ 30 N/cm^2)

The sound insulation must be bonded watertight below the door lock

- Flat bonding surface required all round
- No bonding in event of moisture (e.g. condensation, etc.)
- Bonding area must not show any traces of adhesion-reducing residues (e.g. separating agents, greases, oils, paraffins, plastisols, cavity wax, polishing dust residues, etc.)
- Remove the protective film directly before joining (under no circumstances remove earlier, since the butyl, because of its stickiness, will very quickly pick up adhesion-reducing dirt contaminants)
- The sound insulation must be attached with positional accuracy to the inner door panel, because it is no longer possible to change the position without damaging the butyl bead
- With repainted areas, the maximum permitted temperature of 90°C may not be exceeded in the area of the sound insulation. Otherwise, the sound insulation must be removed (and replaced, if necessary).

Expiry date of adhesive

24 months, see label on packaging

Disposal of the cleaning cloth

Cleaning cloths and cleaning agent residues are hazardous waste (see also safety data sheet)

Disposal of adhesive

Hazardous waste (see also safety data sheet)

Work steps for removing and installing sound insulation

SEE REPAIR INSTRUCTIONS

5143 SIDE COVERING WITH ARMRESTS

51 43 075 REMOVING AND INSTALLING/REPLACING SIDE TRIM PANEL, FOOTWELL, ON A-PILLAR, RIGHT

Necessary preliminary tasks

- Remove **FRONT INNER ENTRANCE COVER STRIP**
- Remove **TRIM FOR INSTRUMENT PANEL, BOTTOM LEFT**

Detach mucket See **5170... FITTING SEALS** or **5171000 REMOVING AND INSTALLING/REPLACING SEAL ON FRONT DOOR, LEFT OR RIGHT** (1) in area of trim (2).

Unclip panel (2) in direction of arrow at retaining points (3) and remove.

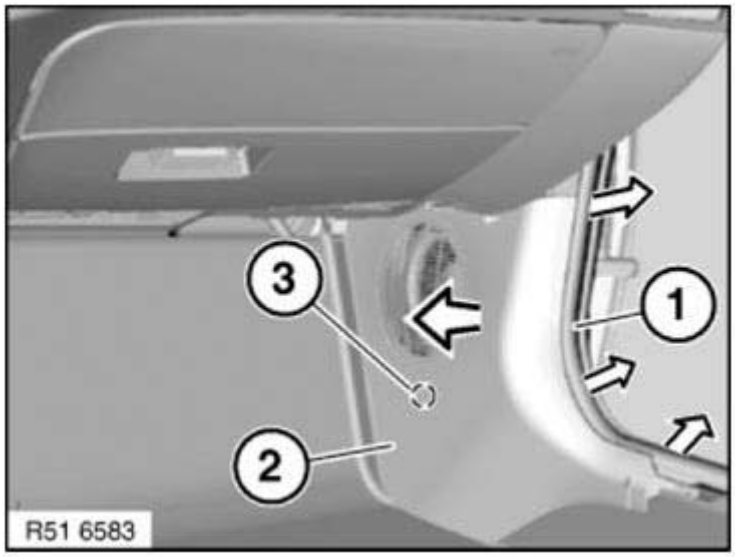


Fig. 325: Removing Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, lever out clips (1) remaining in bores.

If necessary, replace faulty clips (1).

Preinstall clip (1) in trim (2).

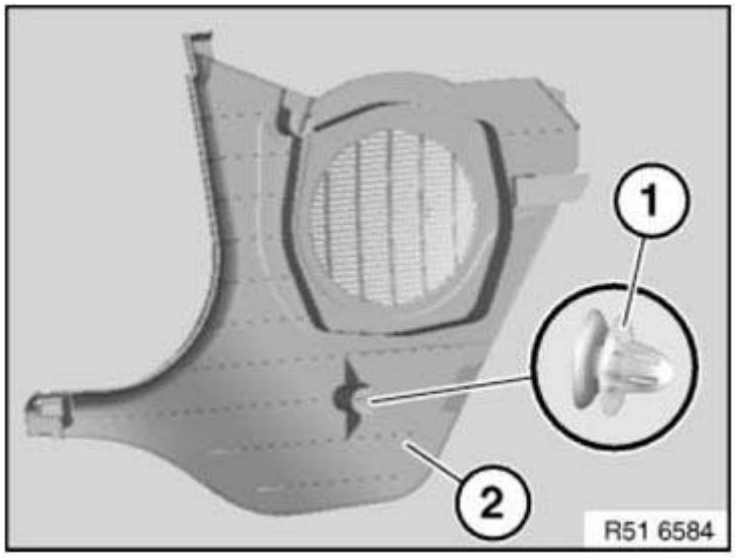


Fig. 326: Identifying Clip On Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 030 REMOVING AND INSTALLING/REPLACING COVER ON FRONT LEFT OR RIGHT

ROLLOVER BAR

NOTE: Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.
For purposes of clarity, operations show component removed.

Necessary preliminary tasks

- Partially open folding roof
- If necessary, remove wind deflector

Insert special tool 00 9 327 in marked area from an angle at rear in direction of arrow A between front (1) and rear covers (2).

By rotating special tool in direction of arrow B, lever cover (1) out of retaining nipple of rear cover (2).

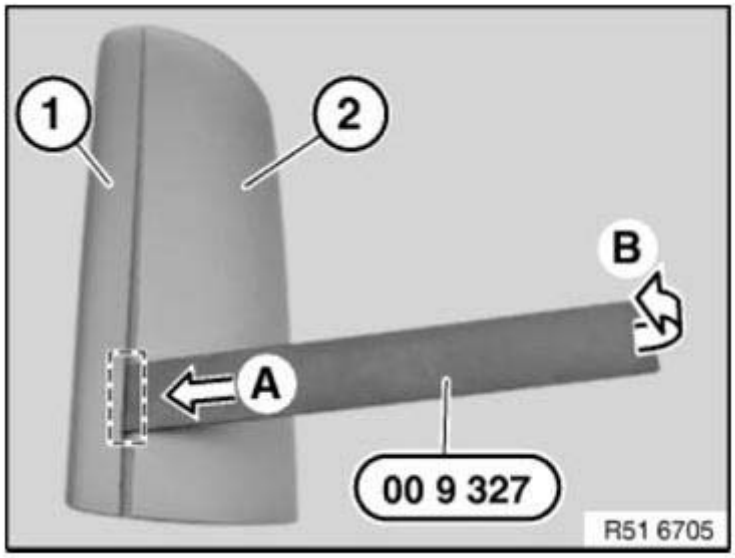


Fig. 327: Inserting Special Tool (00 9 327)
Courtesy of BMW OF NORTH AMERICA, INC.

Repeat procedure, as described above.

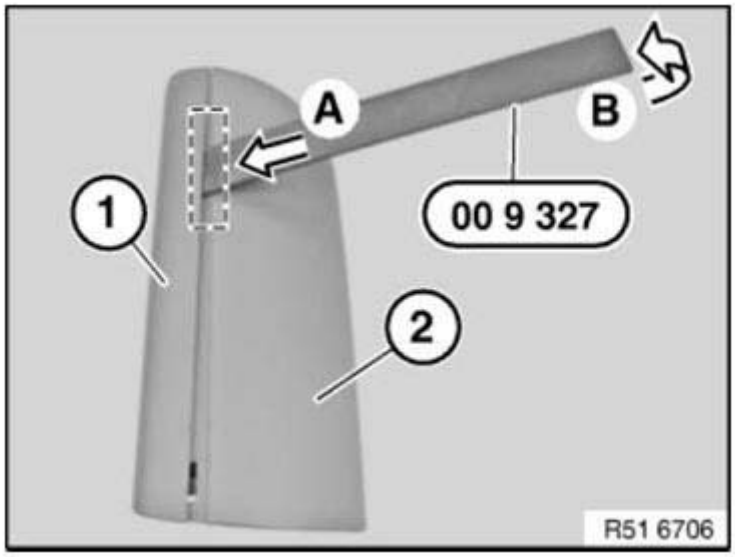


Fig. 328: Inserting Special Tool (00 9 327)
Courtesy of BMW OF NORTH AMERICA, INC.

Now carefully lever front cover (2) out of remaining retaining nipples by hand and remove cover (2).

Installation:

Replace missing or damages fixing grommets (1).

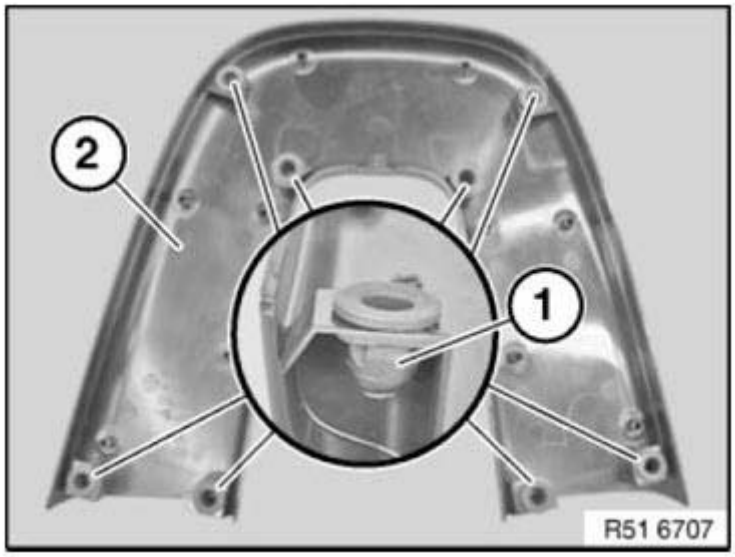


Fig. 329: Identifying Cover With Fixing Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining nipples (1) on rear cover (2) must not be damaged. If necessary, replace rear cover (2).

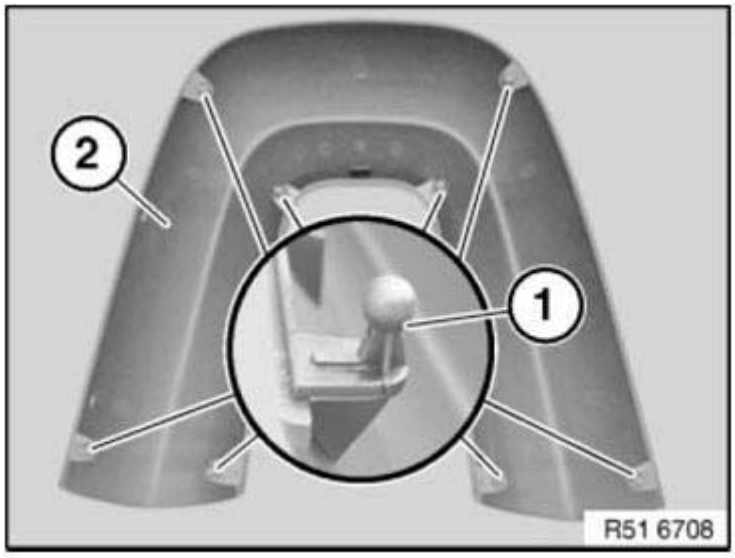


Fig. 330: Identifying Retaining Nipples On Rear Cover
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 031 REMOVING AND INSTALLING/REPLACING COVER ON REAR LEFT OR RIGHT ROLLOVER BAR

NOTE: Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Necessary preliminary tasks

- Remove **COVER ON FRONT ROLLOVER BAR**

Release screws (1) and remove windbreak mount.

Remove rear cover (2) in direction of arrow from rollover bar.

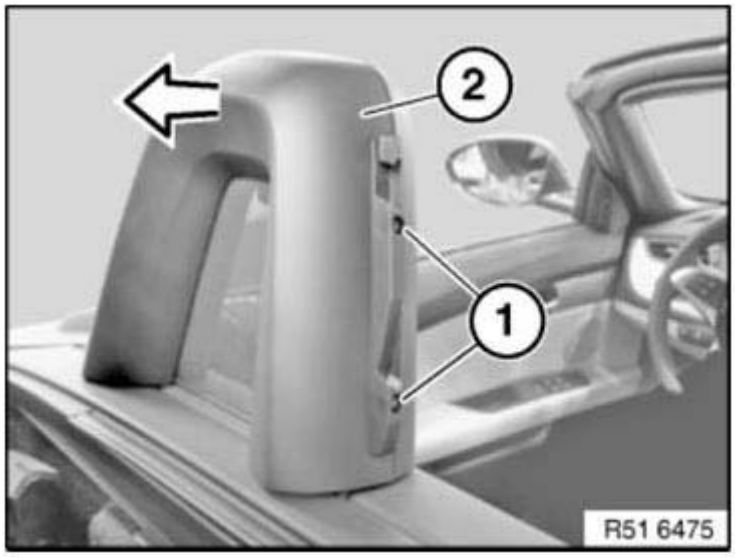


Fig. 331: Removing Rear Cover From Rollover Bar
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 ... REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT ROLLOVER PROTECTION COVER BRACKET

Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Necessary preliminary tasks

- Remove **UPPER (REAR) PARTITION PANEL**

Release screws (1) and (2).

Remove split rollover protection cover bracket (3).

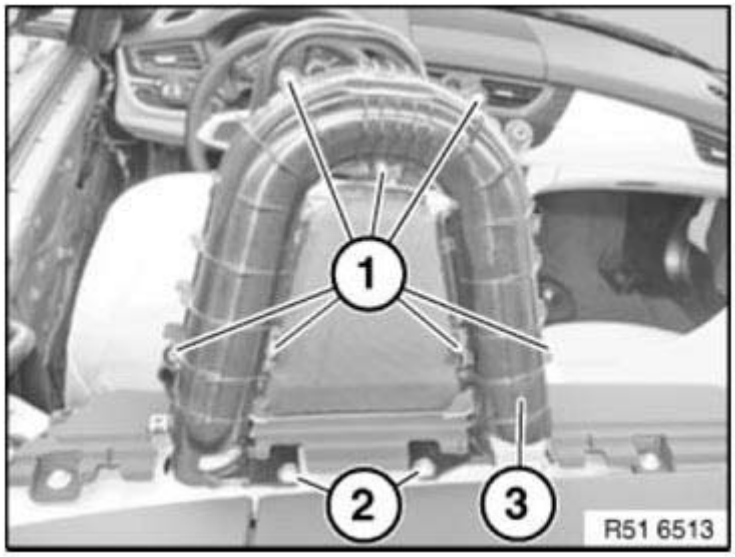


Fig. 332: Identifying Split Rollover Protection Cover Bracket With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Modify wind deflector (1) and coat hook (2).

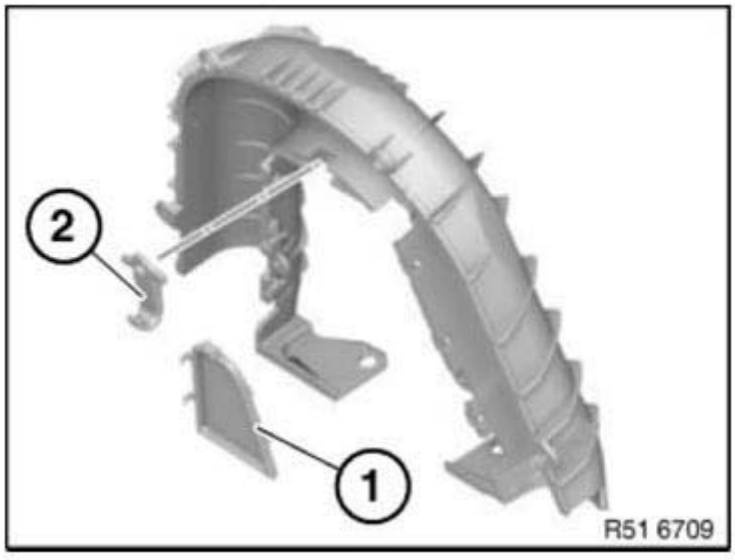


Fig. 333: Identifying Wind Deflector And Coat Hook
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 125 REMOVING AND INSTALLING/REPLACING REAR BOTTOM LEFT OR RIGHT SIDE TRIM PANEL

Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Necessary preliminary tasks

- Remove **REAR SIDE TRIM PANEL**
- Remove **FRONT DOOR SILL COVER STRIP**

Release screw (1).

Partially detach door seal (2).

Carefully pull out trim panel (3) and remove.

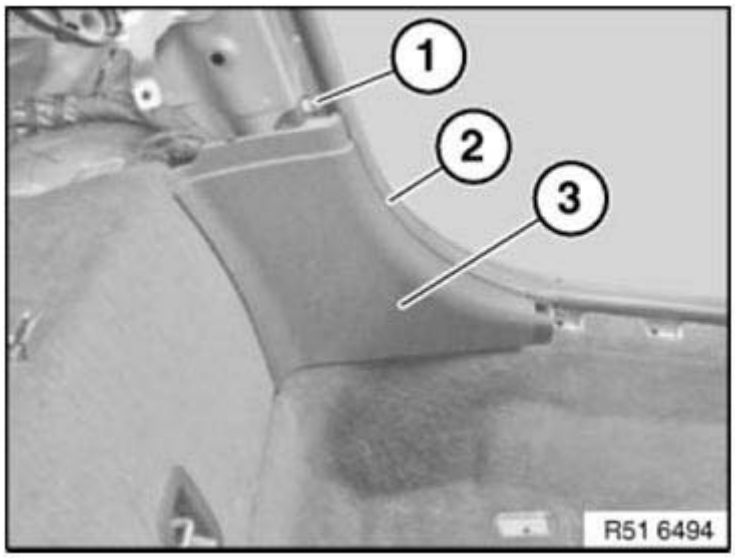


Fig. 334: Identifying Door Seal, Trim Panel And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, reattach clip (1) prior to installation.

Clip (1) and retaining lugs (2) must not be damaged.

If necessary, replace side trim panel.

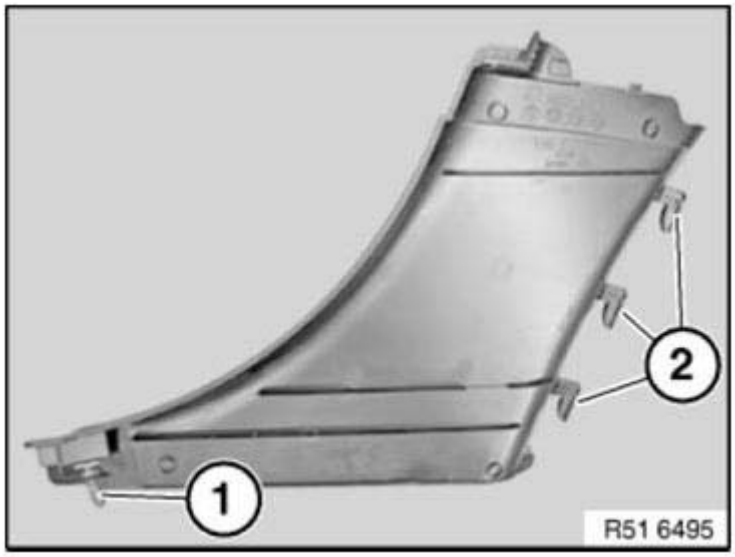


Fig. 335: Identifying Clip And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 120 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SIDE TRIM PANEL

Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Necessary preliminary tasks

- Remove **REAR TOP SIDE TRIM PANEL**

Installation:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

Snap out speaker cover (1) with a suitable tool.

Lever out fixing rivet (2) from rubber skirt for inner window cavity cover strip.

NOTE: For purposes of clarity, fixing rivet (2) shown with rubber skirt detached.

Installation:

If necessary, replace fixing rivet (2).

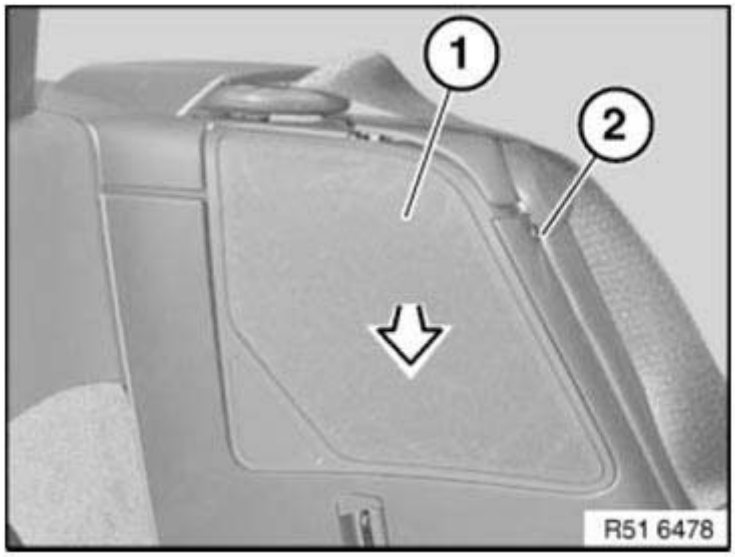


Fig. 336: Removing Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Partially remove door seal (4).

Lift off cover (2).

Remove storage net (3) with rod.

Release screw (1).

Installation:

Make sure door seal (4) is correctly seated.

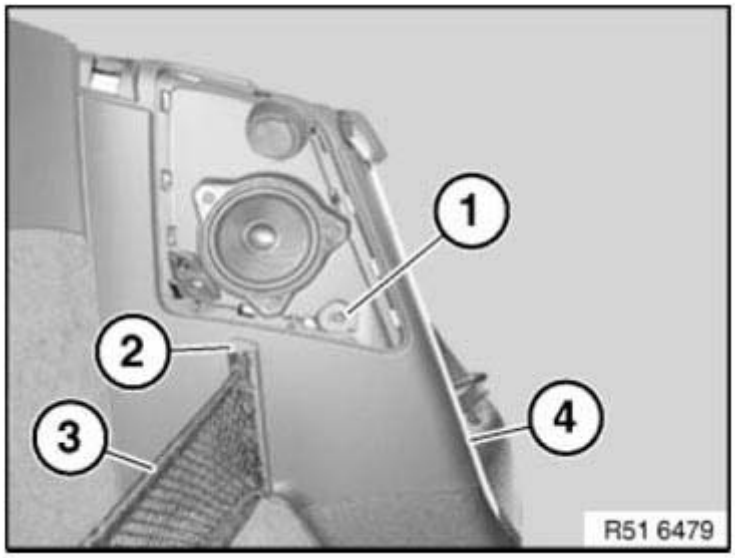


Fig. 337: Identifying Cover, Storage Net, Door Seal And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out retaining clips (1) with a suitable tool.

Release screw (2).

Tightening torque **72 11 03AZ** .

Remove reversing clip (3).

Installation:

Deflection fitting (3) is encoded against incorrect installation.

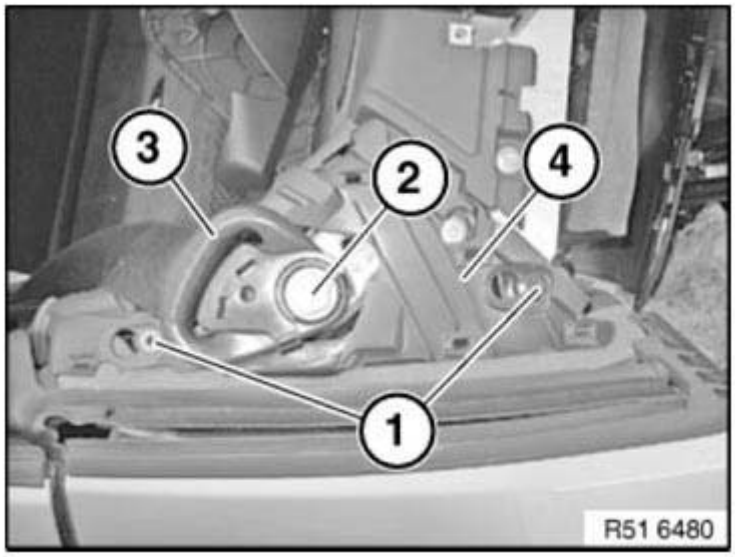


Fig. 338: Identifying Retaining Clips And Reversing Clip With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove side trim panel (1), as pictured, in direction of arrow.

Unlock and disconnect plug connection behind.

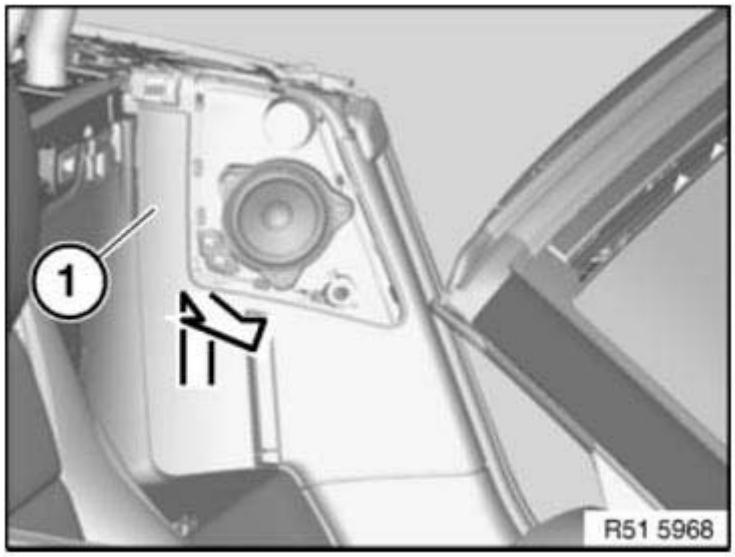


Fig. 339: Removing Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure side trim panel (3) is correctly seated.

Retaining lugs (1) and (2) must not be damaged.

If necessary, replace side trim panel (3).

Replacement

Modify **MID-RANGE SPEAKER** .

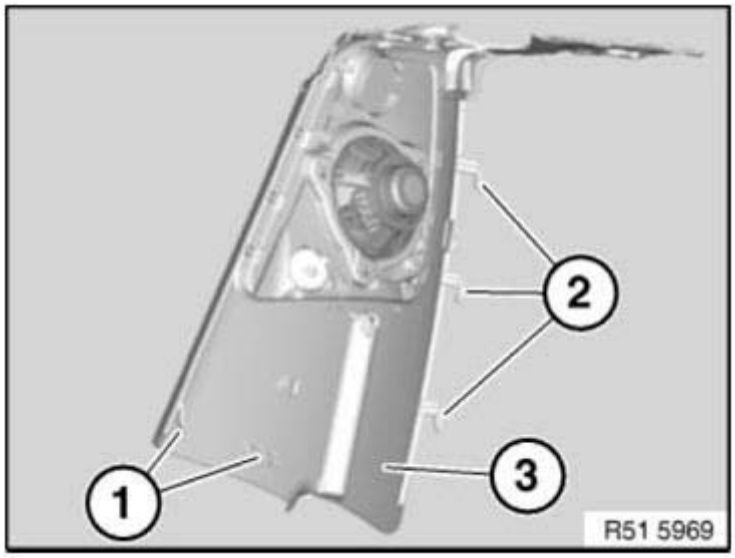


Fig. 340: Identifying Side Trim Panel With Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 ... REMOVING AND INSTALLING/REPLACING REAR TOP LEFT OR RIGHT SIDE TRIM PANEL

Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Unclip side trim panel (1) towards top.

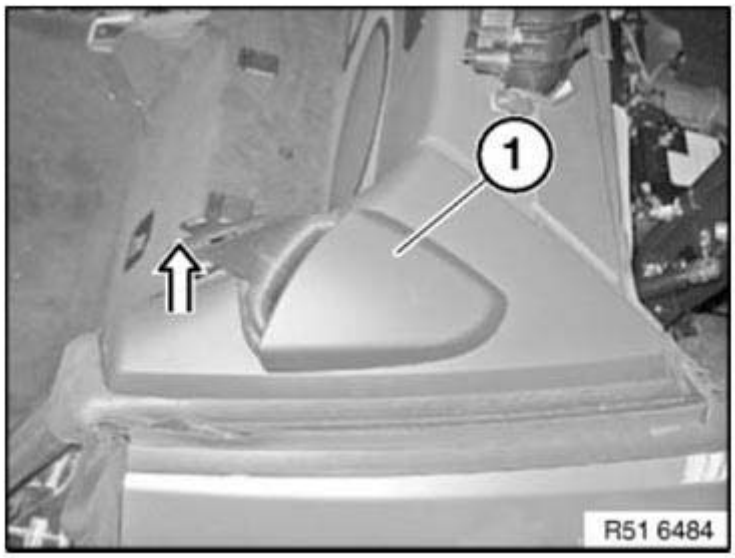


Fig. 341: Removing Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure seal (2) is correctly seated in relation to side trim panel (1).

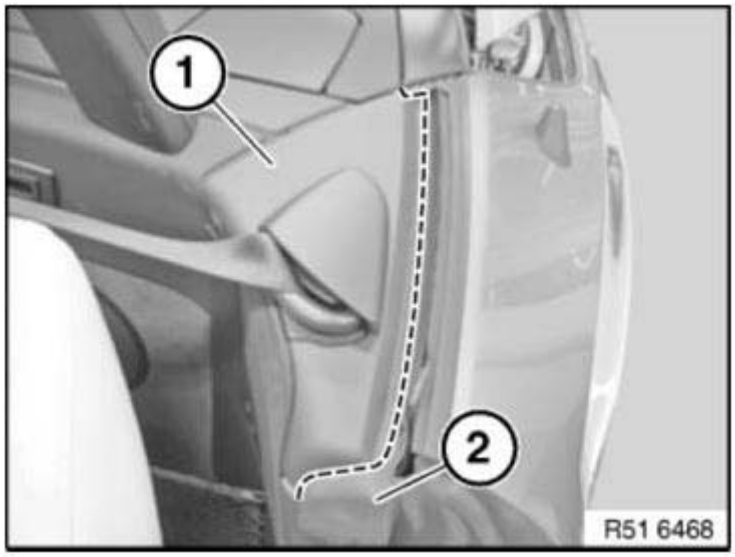


Fig. 342: Identifying Side Trim Panel With Seal
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 070 REMOVING AND INSTALLING/REPLACING SIDE TRIM PANEL, FOOTWELL, ON A-PILLAR, LEFT

Necessary preliminary tasks

- Remove **FRONT INNER ENTRANCE COVER STRIP**
- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

Release screw (1).

Remove hood/bonnet actuating lever (2) in direction of arrow from panel (3).

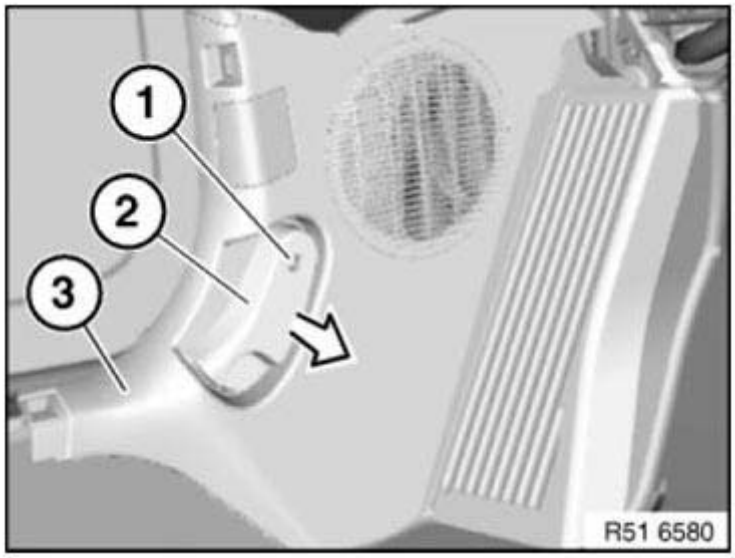


Fig. 343: Removing Hood/Bonnet Actuating Lever From Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Detach mucket See **5170... FITTING SEALS** or **5171000 REMOVING AND INSTALLING/REPLACING SEAL ON FRONT DOOR, LEFT OR RIGHT** (2) in area of trim (5).

Release screw (1).

Unclip panel (5) in direction of arrow from retaining points (4).

If necessary, unlock plug connection of switch (3) and disconnect.

Remove trim (5).

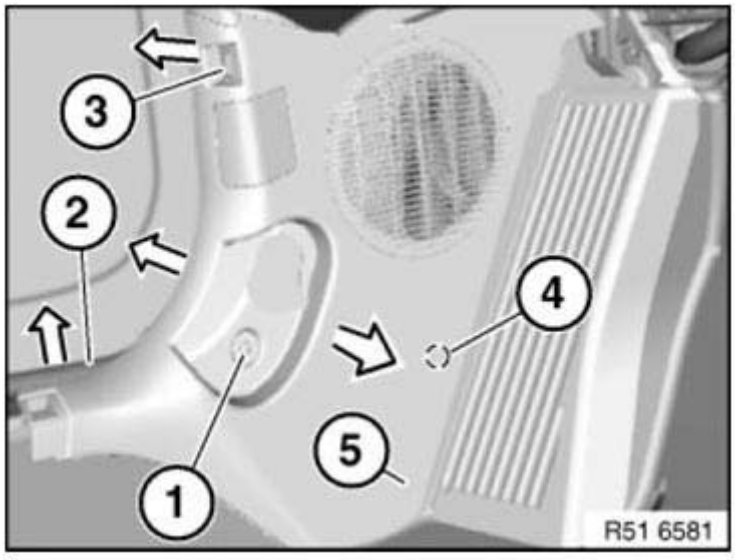


Fig. 344: Removing Panel From Retaining Points
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, lever out clips (1) remaining in bores.

If necessary, replace faulty clips (1).

Preinstall clip (1) in trim (2).

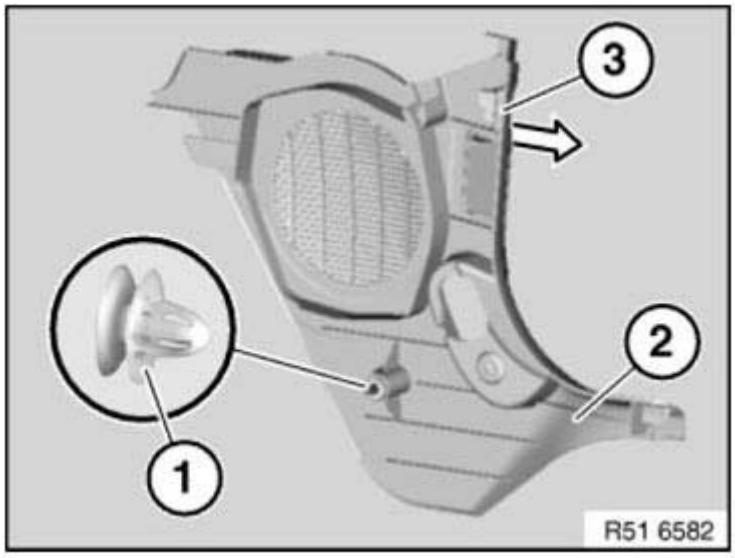


Fig. 345: Removing Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Press catches and remove switch (3) in direction of arrow.

51 43 201 REMOVING AND INSTALLING/REPLACING TRIM PANEL FOR LEFT OR RIGHT ROOF PILLAR

Necessary preliminary tasks

- Remove **FRONT ROOFLINER TRIM**

Unclip trim (1) at top and remove from instrument panel.

Installation:

Make sure panel (1) is correctly seated on instrument panel.

Make sure mucket (2) is correctly seated on panel (1).

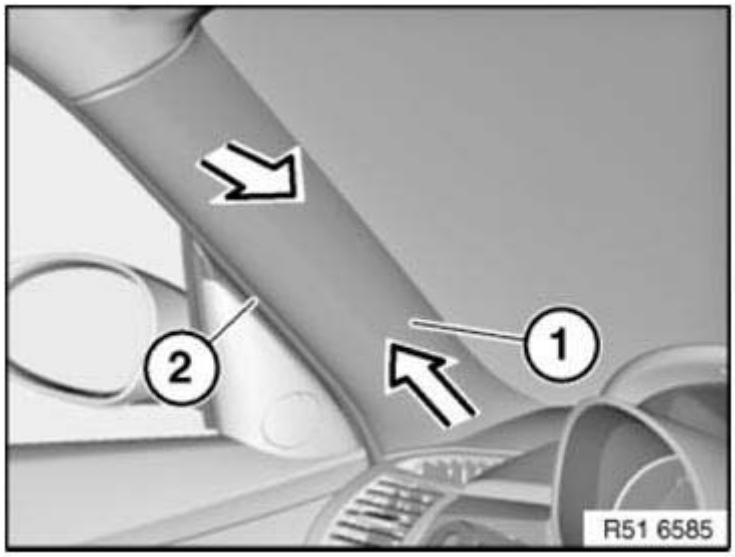


Fig. 346: Removing Front Roofliner Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 46 070 REMOVING AND INSTALLING/REPLACING UPPER PARTITION PANEL

Necessary preliminary tasks

- Remove **REAR SIDE TRIM PANELS**
- Remove **ROLLOVER PROTECTION COVER BRACKET**
- If necessary, place backrests in vertical position and move seats fully forwards

Release screws (1).

Lever out caps for lashing eyes and release screws (2).

Tightening torque **51 46 6AZ** .

Professional HiFi system only:

Remove **TWEETER** (3)

Lift out upper partition wall panel (4) at an angle.

Replacement

If necessary, replace middle trim (3).

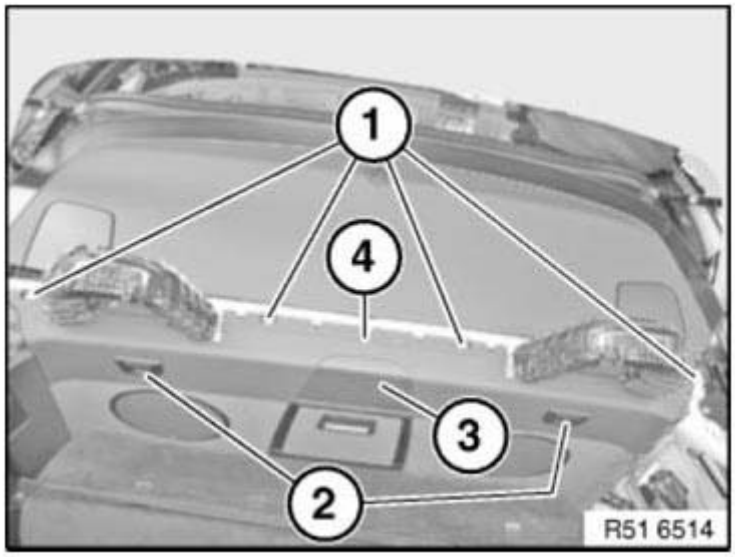


Fig. 347: Identifying Middle Trim And Upper Partition Wall Panel With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Locking hooks (1) on front partition wall panel (2) must not be broken.

If necessary, replace upper partition wall panel (2).

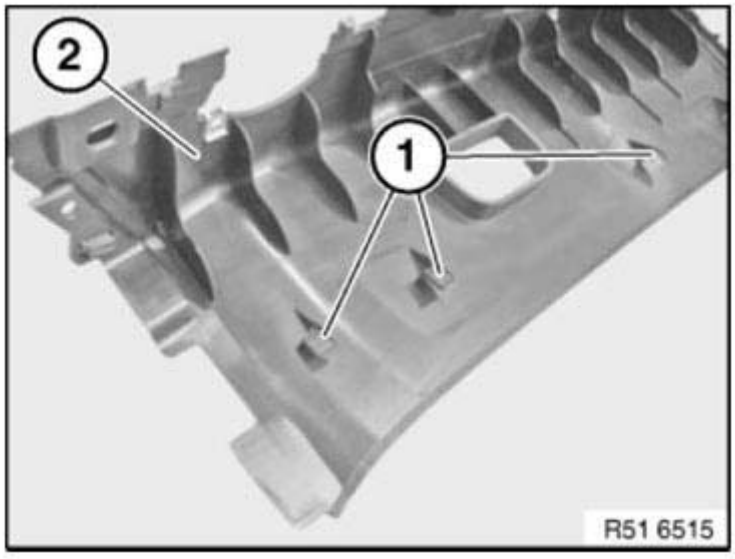


Fig. 348: Identifying Locking Hooks On Front Partition Wall Panel
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 122 REPLACING REAR (TOP) LEFT OR RIGHT SIDE TRIM PANEL

Necessary preliminary tasks

- Remove **REAR SIDE TRIM PANEL**
- Remove SPEAKER. See **65 13 090 REMOVING AND INSTALLING/REPLACING SPEAKER (MIDRANGE SPEAKER IN REAR SIDE TRIM PANEL)** .

Installation:

None of the retaining lugs (1) or clips (2) may be damaged.

If necessary, replace side trim panel.

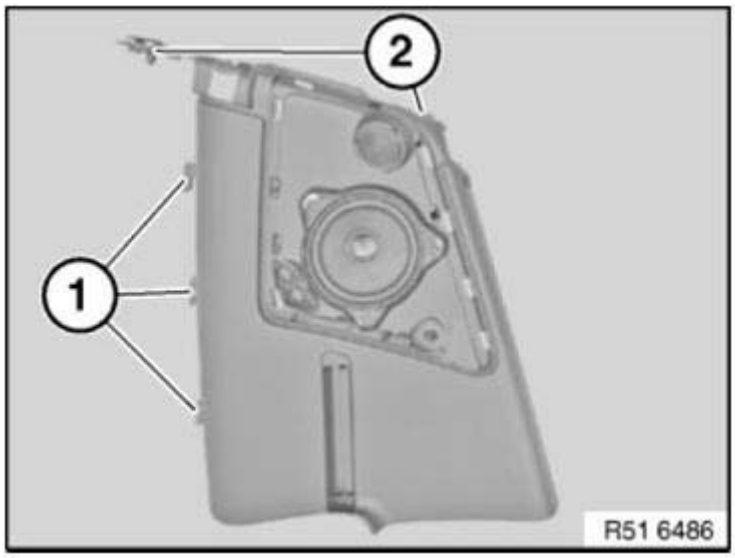


Fig. 349: Identifying Retaining Lugs And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

5144 ROOF TRIM PANEL

51 44 150 REMOVING AND INSTALLING/REPLACING FRONT ROOFLINER TRIM

Necessary preliminary tasks

- Open convertible top
- Remove **SUN VISORS**

Pull back trim (1) in direction of arrow.

Disconnect plug connection for ceiling light (5).

Remove trim for roofliner (1).

Installation:

Make sure seal (4) is correctly seated on roofliner trim (1).

Make sure trim (1) is correctly seated on panels (3) on left and right.

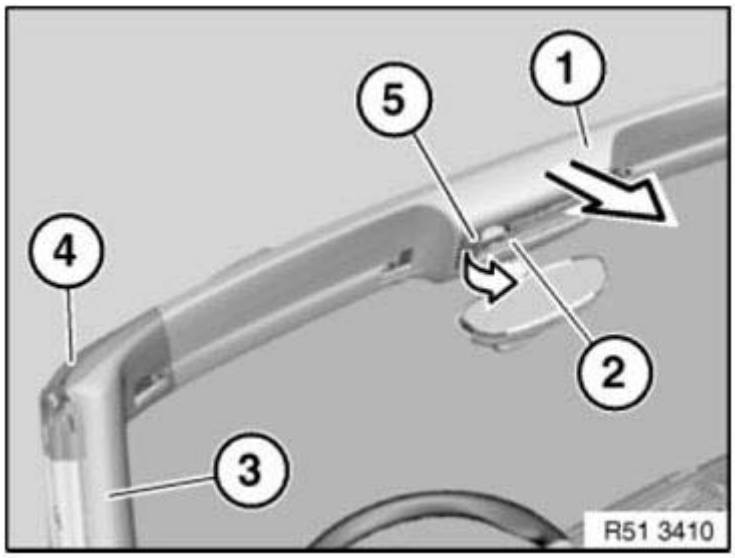


Fig. 350: Pulling Back Trim
Courtesy of BMW OF NORTH AMERICA, INC.

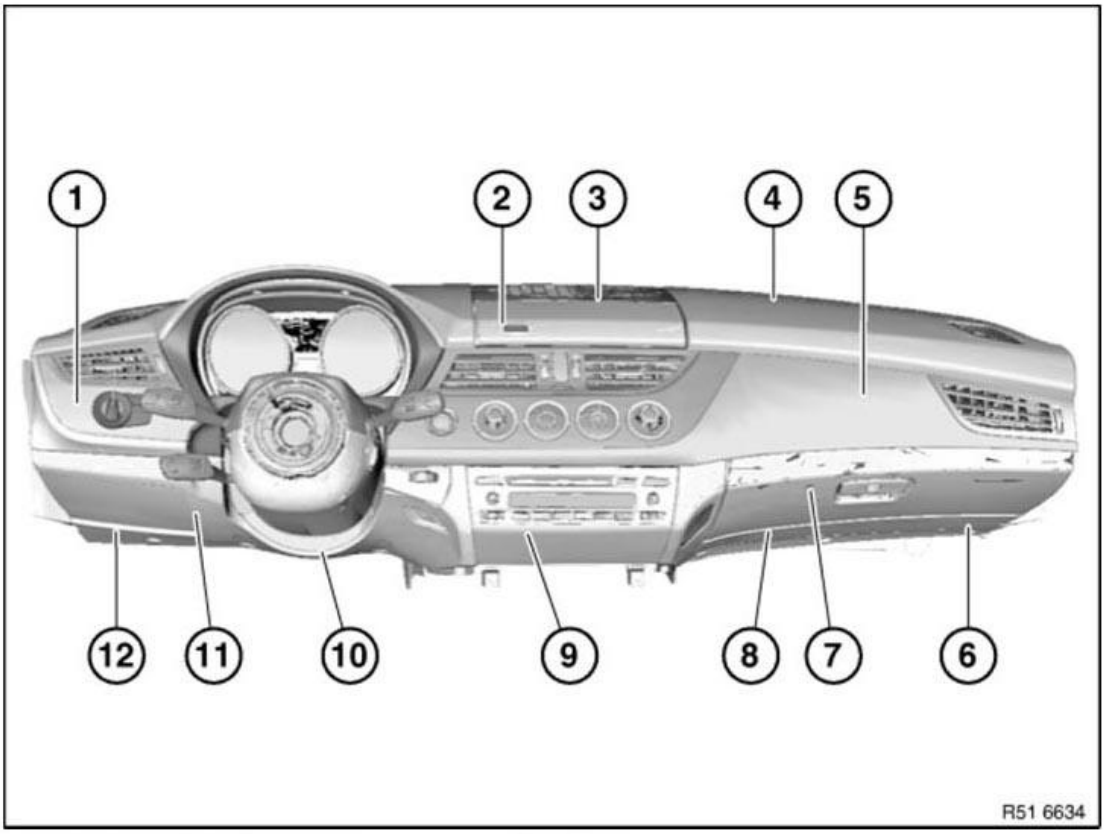
Replacement

NOTE:

- **Remove CEILING LIGHT**

5145 INSTRUMENT CLUSTER TRIM PANEL

51 45 .. OVERVIEW OF DASHBOARD



1 Instrument panel trim, left
2 Central Information Display (CID)
3 Speaker trim
4 Dashboard trim panel
5 Instrument panel trim, right
6 Instrument panel trim, bottom right
7 Glovebox
8 Airbag module for front passenger knee protection
9 Radio receiver
10 Airbag module for driver's knee protection
11 Instrument panel trim, bottom left
12 Trim for pedal assembly

Fig. 351: Overview Of Dashboard
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 025 REMOVING AND INSTALLING INSTRUMENT PANEL TRIM

Necessary preliminary work

- Remove **TRIM PANELS FOR ROOF PILLAR AT FRONT**
- Remove **INSTRUMENT PANEL TRIM AT BOTTOM LEFT**
- Remove **RIGHT GLOVEBOX WITH HOUSING**
- Remove **CENTRE FRESH-AIR GRILLE**
- Remove speaker. See **65 13 060 REMOVING AND INSTALLING/REPLACING SPEAKER (MIDRANGE SPEAKER, IN INSTRUMENT PANEL)** .
- Remove **CENTRAL INFORMATION DISPLAY (CID)**

- Remove **INSTRUMENT CLUSTER**

NOTE: Observe the following instructions to facilitate removal of the instrument panel trim:

- **Move front seats back completely and lower**
- **Move steering column into "lower" and "extended" position**

Release screws (1) on right panel (2).

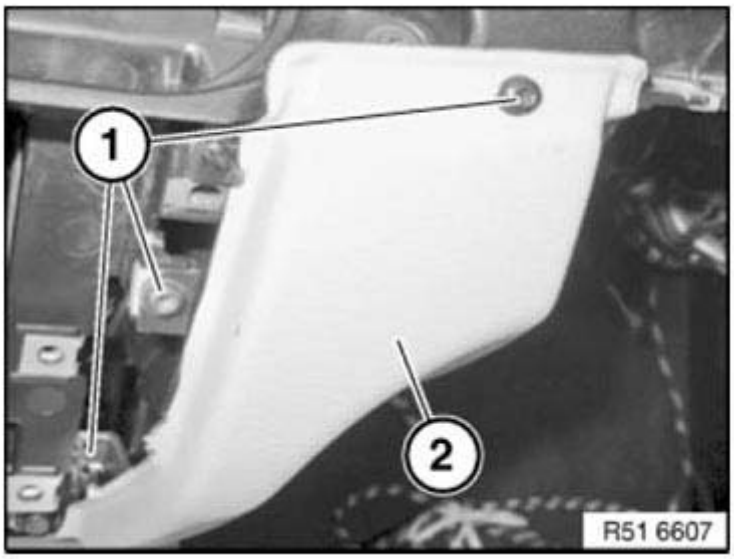


Fig. 352: Removing Screws On Right Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Insert locator (1) of panel (2) correctly in lug of instrument panel carrier.

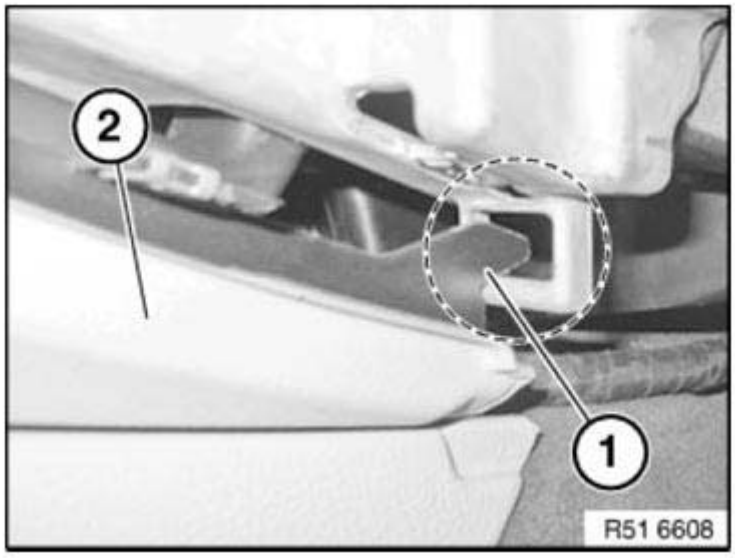


Fig. 353: Identifying Locator Of Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip wiring harness (1) to steering column on instrument panel carrier (2).

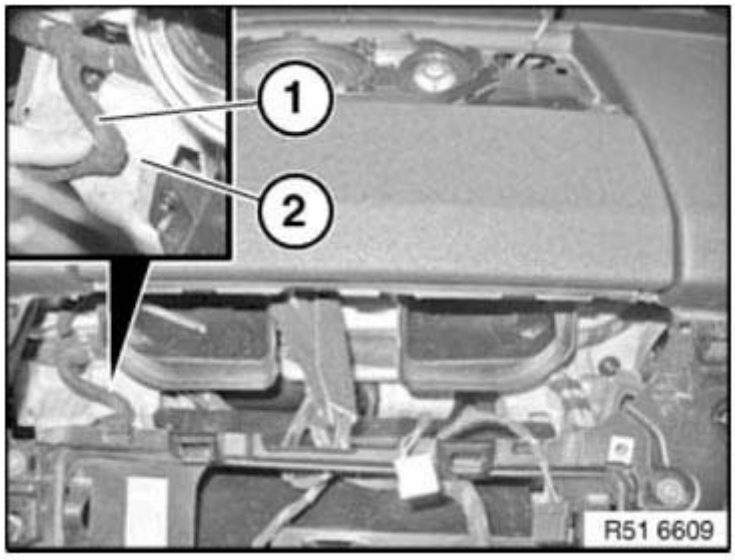


Fig. 354: Identifying Instrument Panel Carrier With Wiring Harness
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) from temperature sensor (2).

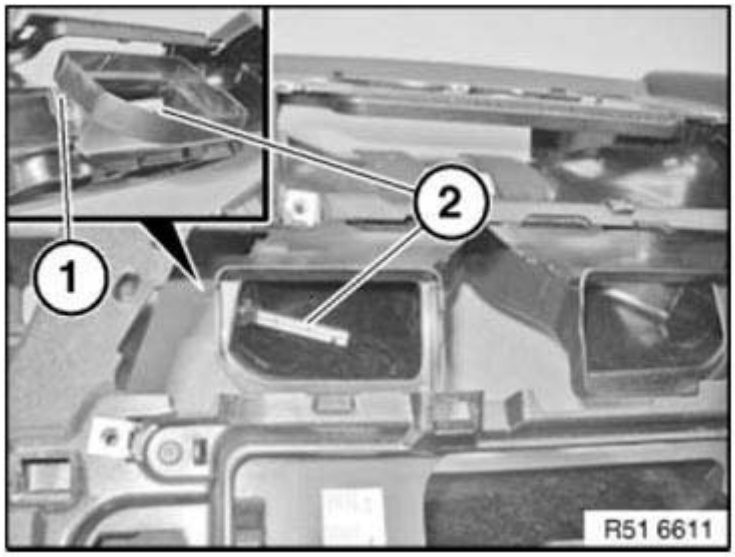


Fig. 355: Identifying Temperature Sensor With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Secure steering column against falling out.

Release screws (1).

Tightening torque **32 31 3AZ** .

Installation note:

Check steering column sleeve.

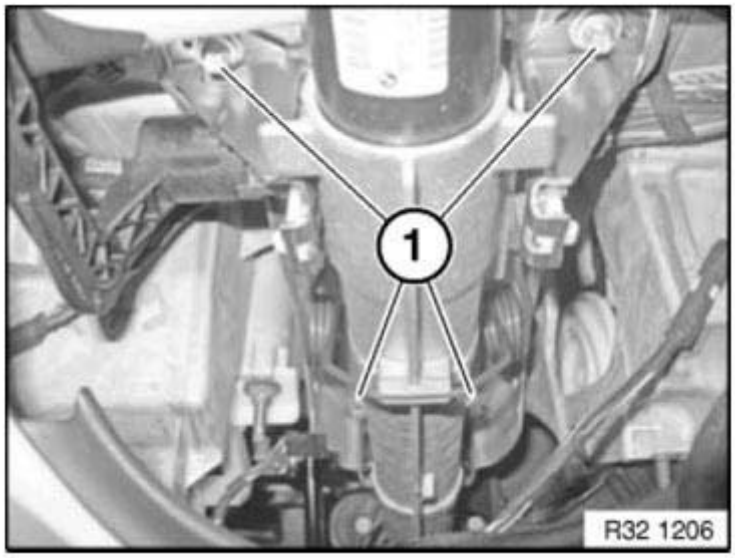


Fig. 356: Identifying Steering Column Screws
Courtesy of BMW OF NORTH AMERICA, INC.

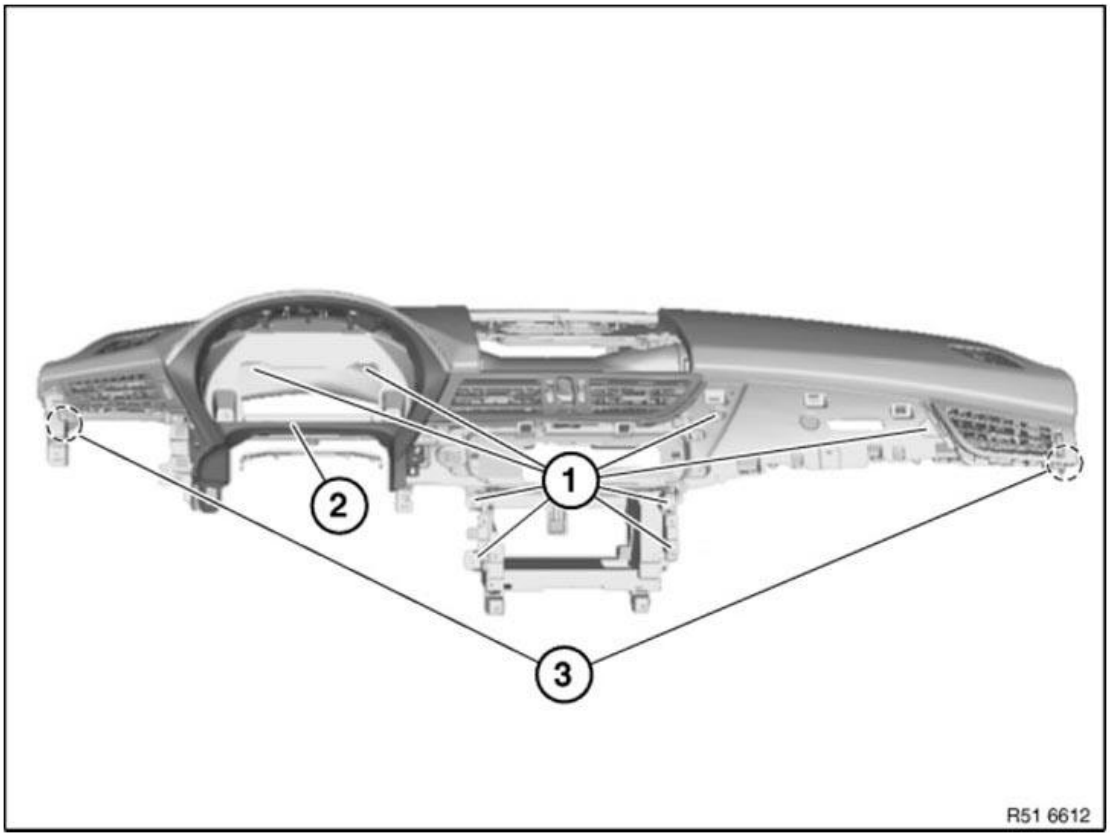


Fig. 357: Identifying Instrument Panel With Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1) and nuts (3).

Remove trim for instrument panel (2)

NOTE: Graphic shows already removed instrument panel trim for better clarity.

If the instrument panel trim jams during removal, loosen the left and right studs (1).

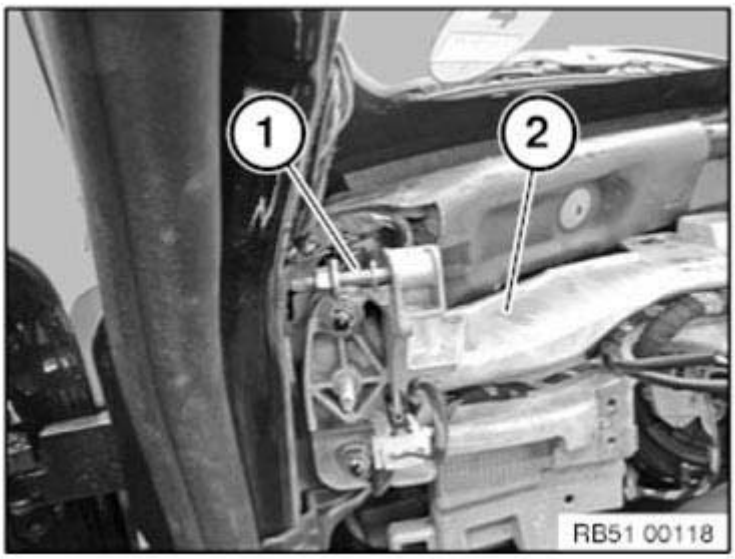


Fig. 358: Identifying Studs
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure guides (1) on instrument panel trim (2) are correctly seated in respective mountings.

Make sure gaskets are correctly seated on air ducts.

Make sure electrical leads are correctly laid.

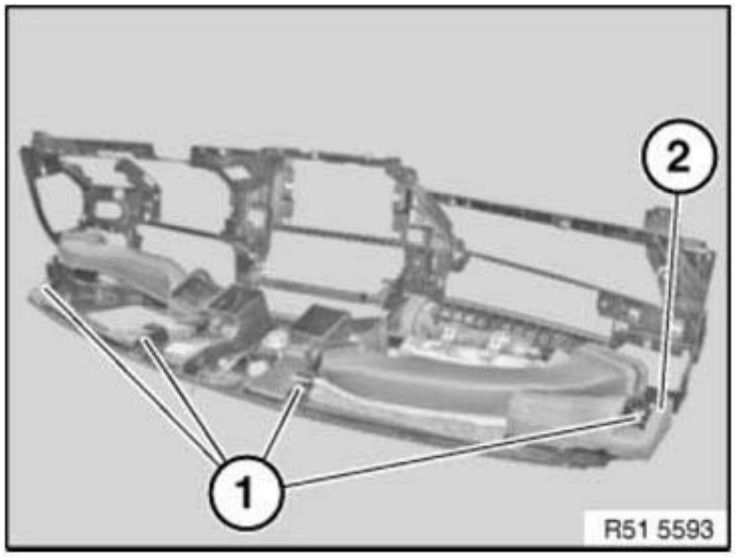


Fig. 359: Identifying Guides On Instrument Panel Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 115 REMOVING AND INSTALLING SPEAKER FRAME ON PANEL FOR INSTRUMENT

PANEL AT TOP

Unclip trim (1) with special tool 00 9 317 from catches and remove towards top.

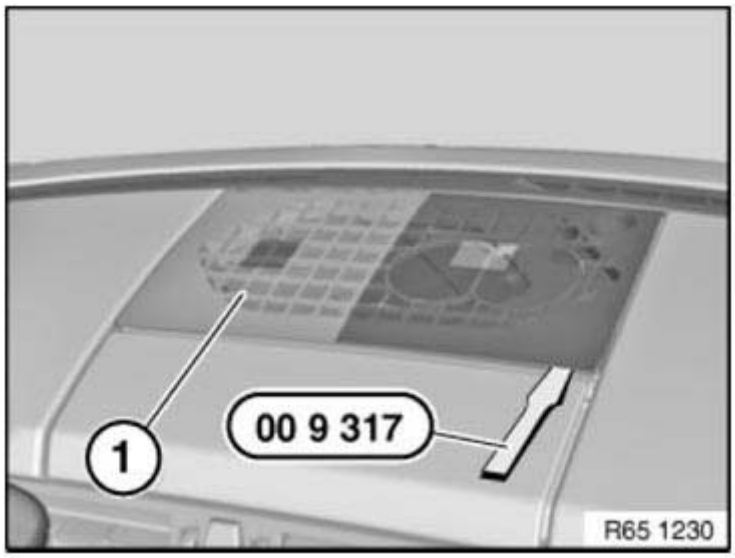


Fig. 360: Removing Trim Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect solar sensor plug connection.

Installation:

Retainers (1) on speaker trim (2) must be correctly seated on associated lugs and must not be damaged.

Replacement:

Modify solar sensor and replace retainers.

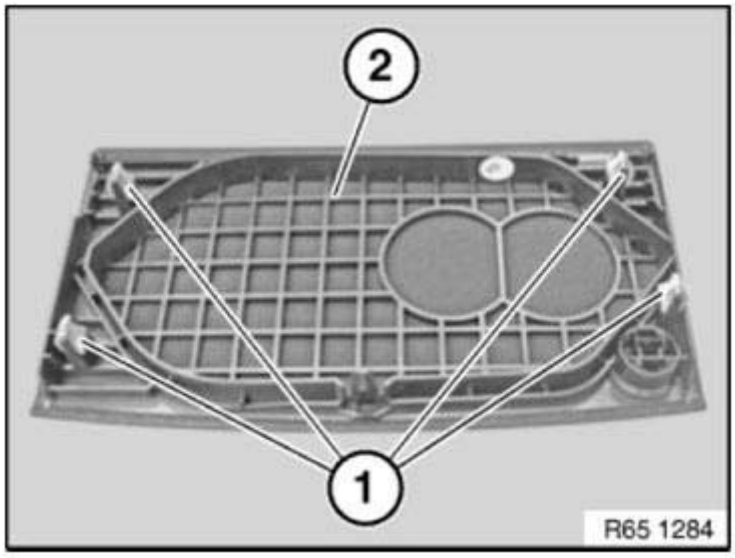


Fig. 361: Identifying Retainers On Speaker Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 075 REMOVING AND INSTALLING/REPLACING CARRIER FOR INSTRUMENT PANEL

Necessary preliminary tasks

- Remove **INSTRUMENT PANEL TRIM**
- Unclip wiring harness

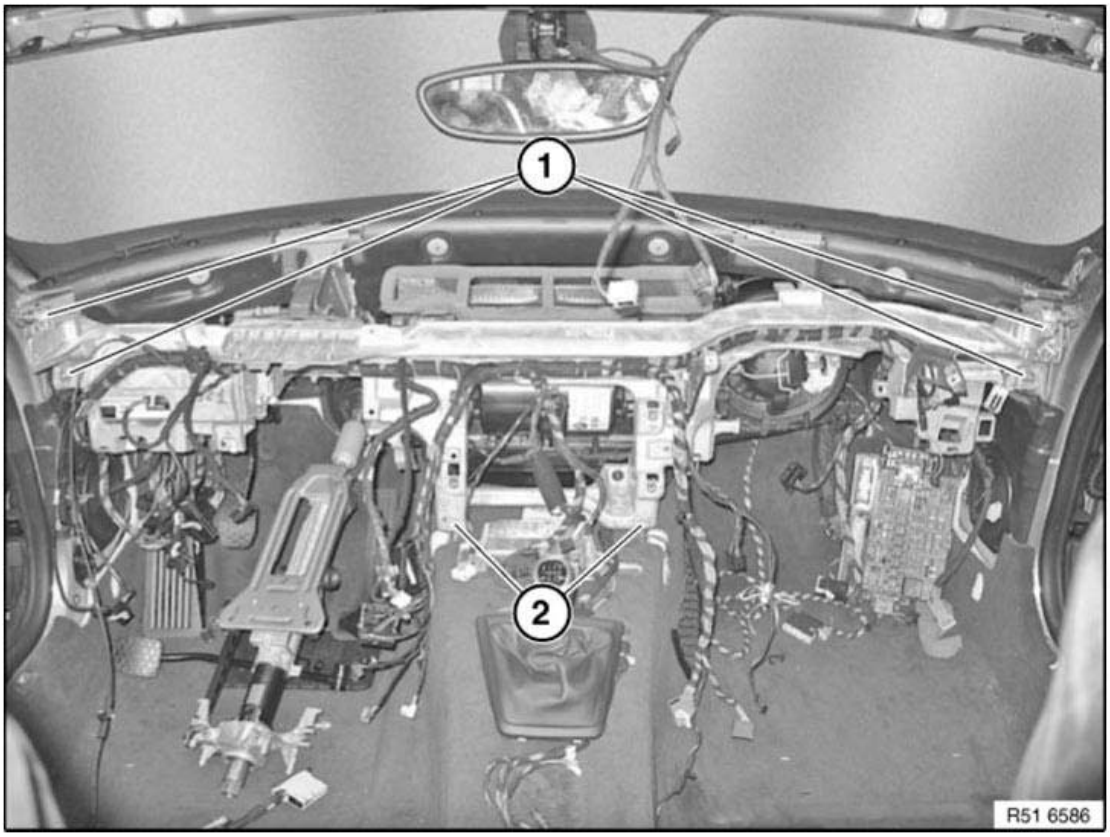


Fig. 362: Identifying A-Pillar Nuts And Tunnel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) on A-pillar.

Tightening torque **51 45 4AZ** .

Release screws (2) on tunnel.

Tightening torque **51 45 3AZ** .

Release screws (1) on instrument panel carrier (2).

Tightening torque **51 45 3AZ** .

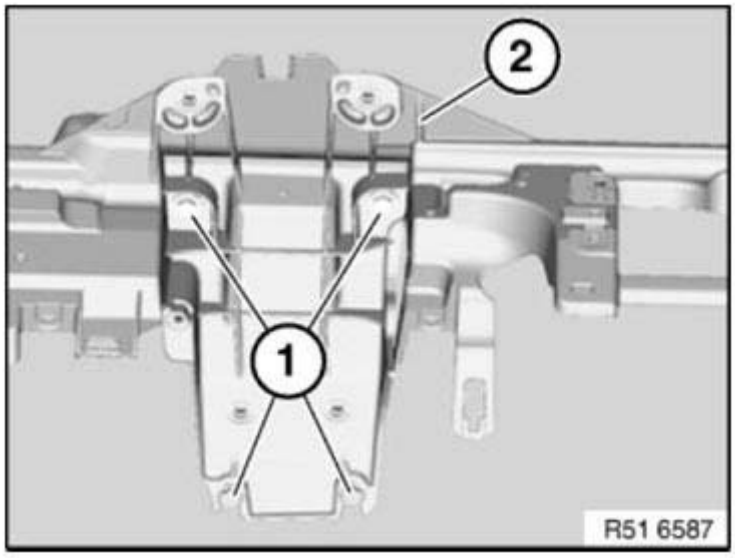


Fig. 363: Identifying Screws On Instrument Panel Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on heater/air conditioner (2).

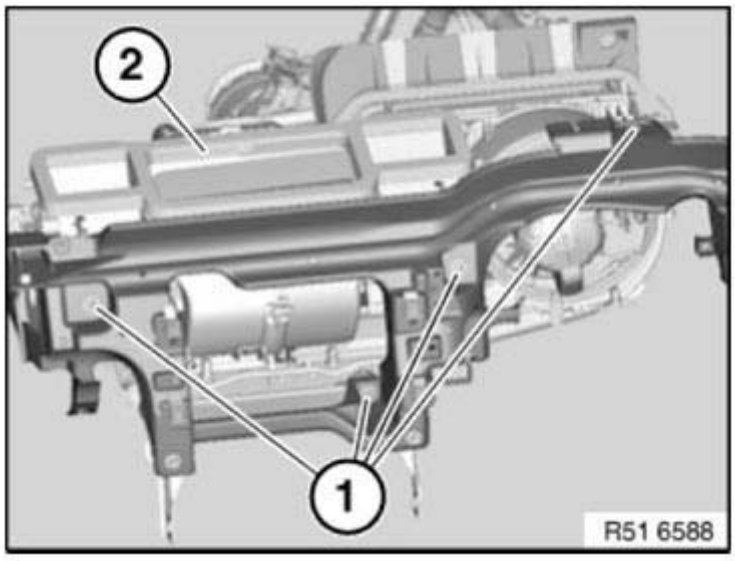


Fig. 364: Identifying Screws On Heater/Air Conditioner
Courtesy of BMW OF NORTH AMERICA, INC.

Remove expander rivets (1).

Remove air duct on left side (2).

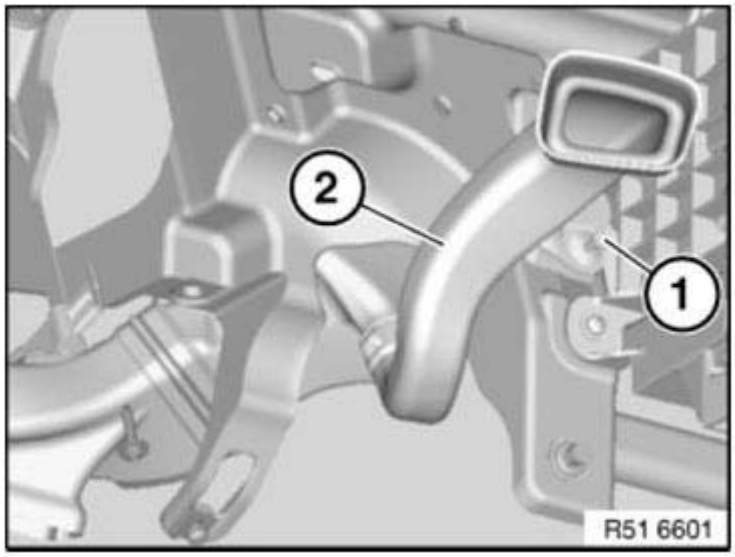


Fig. 365: Identifying Expander Rivets And Air Duct On Left Side
Courtesy of BMW OF NORTH AMERICA, INC.

Remove expander rivets (1).

Remove air duct on right side (2).

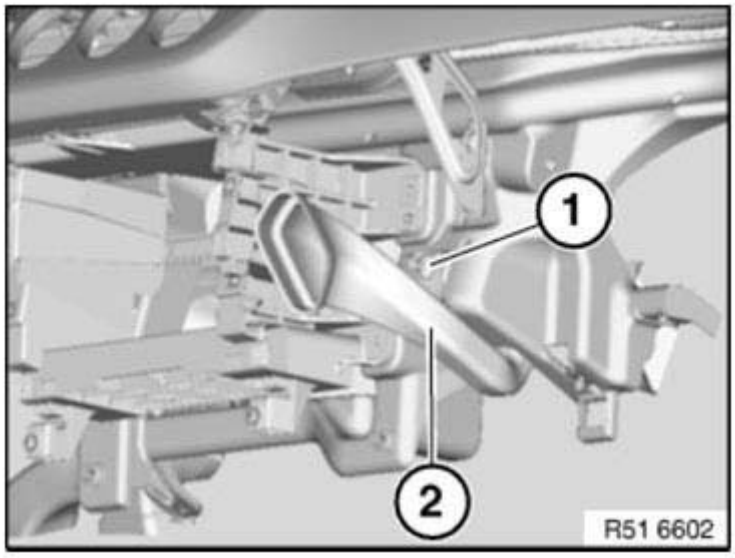


Fig. 366: Identifying Expander Rivets And Air Duct On Right Side
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 180 REMOVING AND INSTALLING/REPLACING INSTRUMENT PANEL TRIM, BOTTOM LEFT

Necessary preliminary tasks

- Remove **LEFT INSTRUMENT PANEL TRIM**
- Remove **RIGHT INSTRUMENT PANEL TRIM**
- Remove **TRIM PANEL FOR PEDAL ASSEMBLY**
- Remove **TRIM FOR STORAGE TRAY**

  US version only:

- Remove **AIRBAG MODULE FOR DRIVER KNEE PROTECTION**

Release screws (1) on trim (2) and unclip left trim from steering column.

Carefully disconnect plug connection for ribbon cable on insert slot.

Installation:

Make sure trim is correctly seated.

Replacement

Remove **INSERT FOR RADIO CONTROL KEY** .

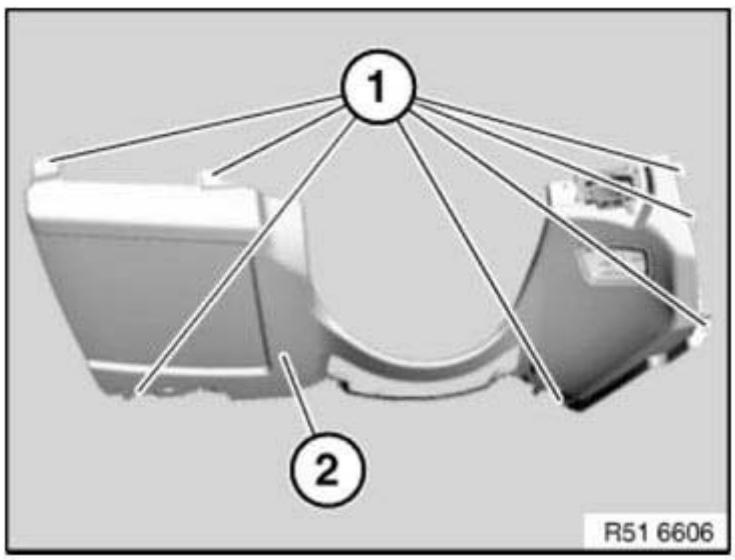


Fig. 367: Identifying Screws On Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 261 REMOVING AND INSTALLING/REPLACING LEFT INSTRUMENT PANEL TRIM

Unclip instrument panel cover (1) in direction of arrow.

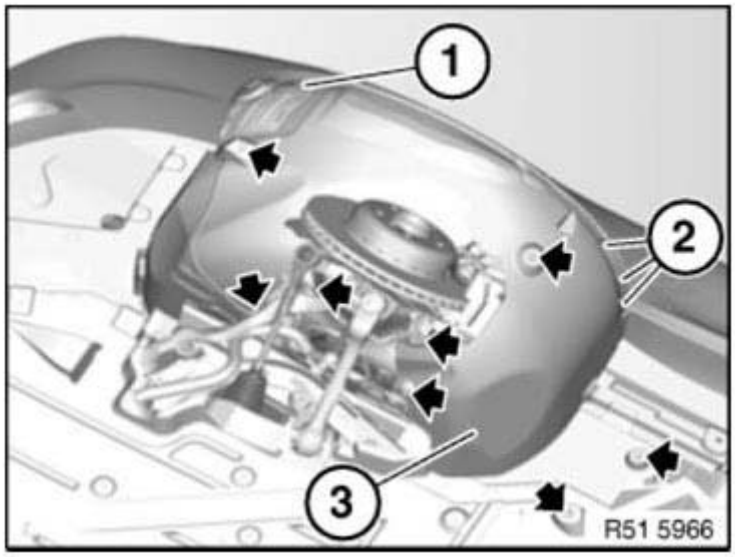


Fig. 368: Removing Instrument Panel Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on trim (2).

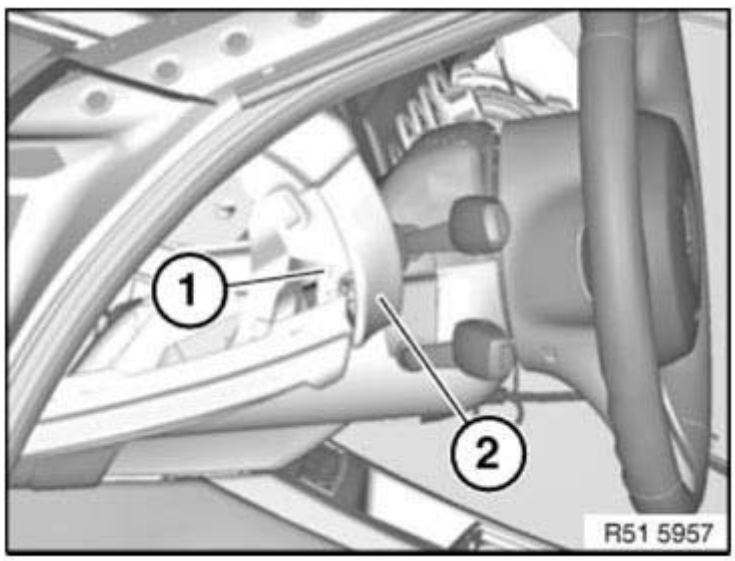


Fig. 369: Identifying Screw On Trim
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Tape off working area. Risk of damage!

Painted trims are particularly sensitive to damage.

Lever out trim (1) with special tool 00 9 317 at mounting points (2) and remove.

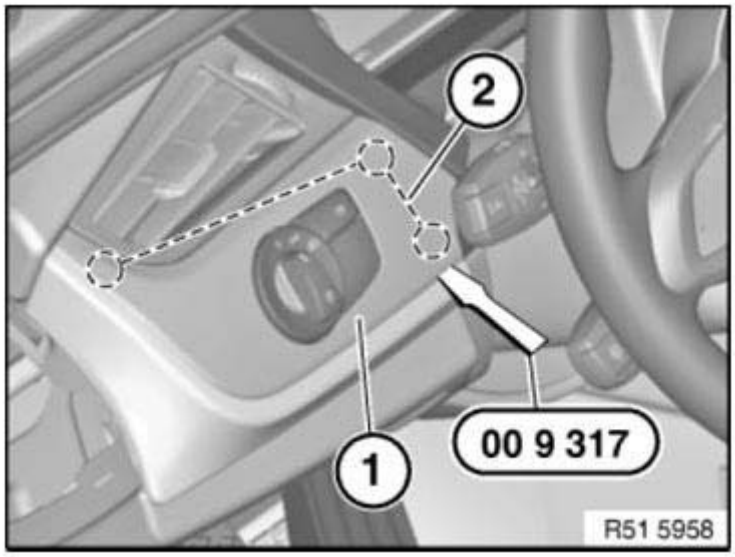


Fig. 370: Removing Trim Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connection behind and disconnect.

Installation:

If necessary, replace retainers (1).

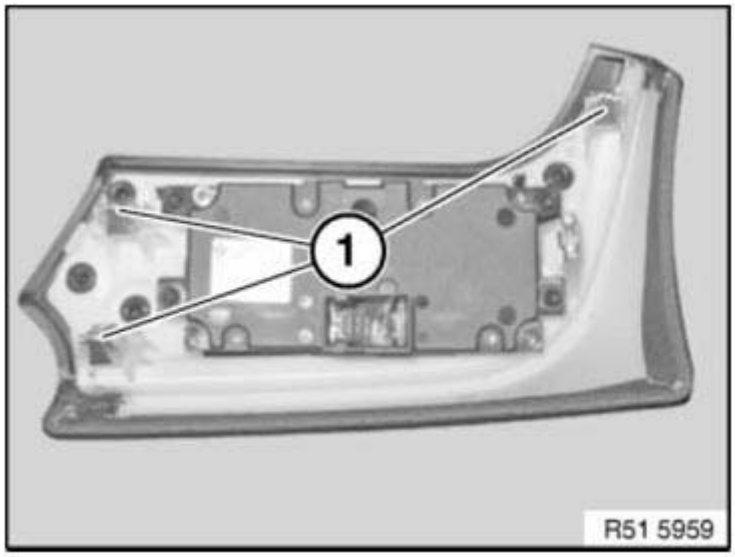


Fig. 371: Identifying Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove **LIGHT SWITCH UNIT** .

51 45 184 REMOVING AND INSTALLING/REPLACING PANEL FOR PEDALS

Necessary preliminary tasks

- Move driver's seat completely towards rear

ECE only:

Release screws (1).

Pull back trim for pedal assembly (2).

Disconnect and unlock all plug connections.

Remove trim for pedal assembly (2).

Installation:

Make sure trim for pedal assembly (2) is correctly seated on footwell air outlet above.

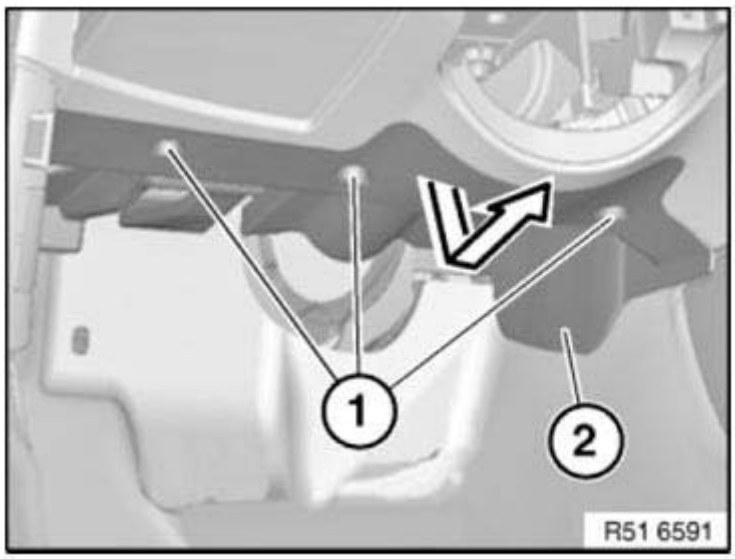


Fig. 372: Pulling Back Trim For Pedal Assembly (ECE)
Courtesy of BMW OF NORTH AMERICA, INC.

US only:

Release screws (1).

Pull back trim for pedal assembly (2).

Disconnect and unlock all plug connections.

Remove trim for pedal assembly (2).

Installation:

Make sure trim for pedal assembly (2) is correctly seated on footwell air outlet above.

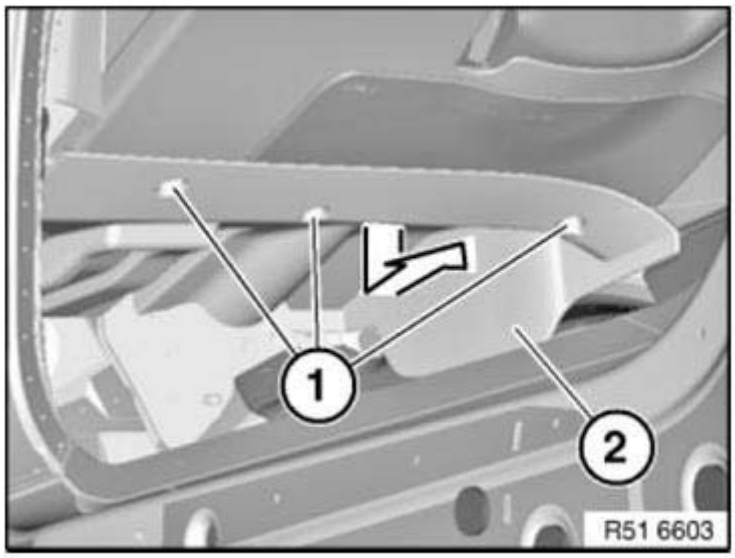


Fig. 373: Pulling Back Trim For Pedal Assembly (US)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove **FOOTWELL LIGHT** (1).

Remove **SPEAKER** (2).

Remove **AERIAL** (3).

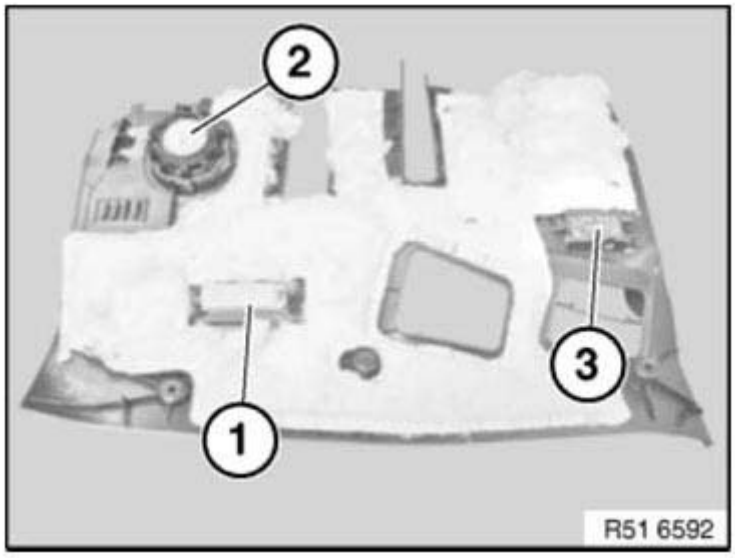


Fig. 374: Identifying Footwell Light, Speaker And Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 266 REMOVING AND INSTALLING/REPLACING RIGHT INSTRUMENT PANEL TRIM

IMPORTANT: Risk of damage!

A hard disk is installed in the Car Information Computer (CIC).

Carry out mechanical work on the CIC and adjacent components with care.

Avoid subjecting the CIC to shaking/shocks.

Necessary preliminary tasks

(Only with Radio Business or Radio Professional equipment specification)

- Remove **RADIO RECEIVER**

NOTE: Carry out following work step only in case of optional equipment with Car Information Computer (CIC)

Unclip trim (1) with special tool 00 9 323 .

Fig. 375: Removing Trim Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For clearer illustration, shown with front trim on CIC removed.

Release screws (1).

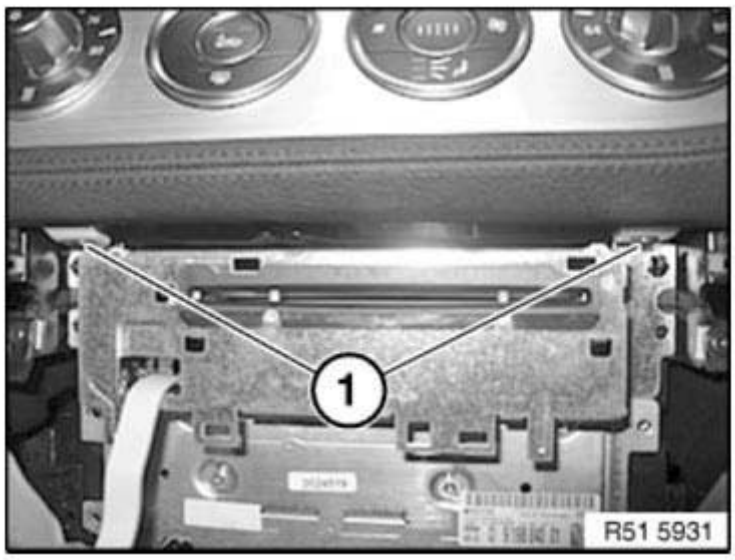


Fig. 376: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Open glovebox cover (1).

Release screws (2) at marked points in upper area of glovebox.

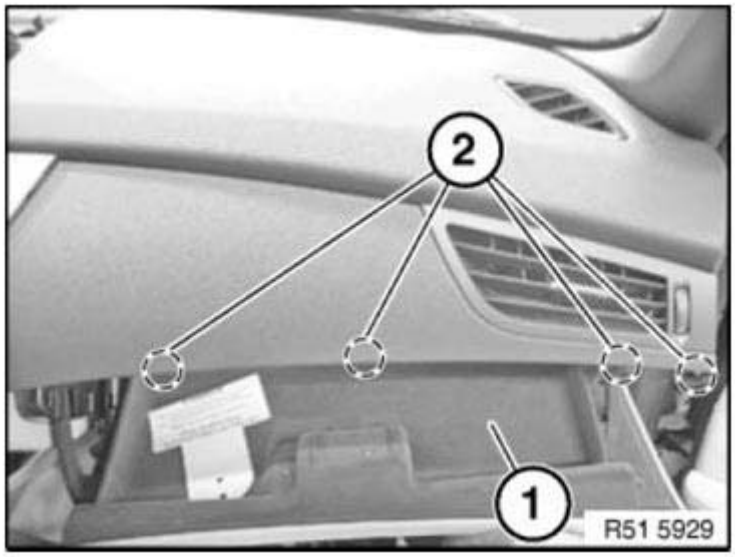


Fig. 377: Identifying Glovebox Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out insertion slot (1) with special tool 00 9 323 and remove.

Release screw behind.

Carefully lever out instrument panel trim (2) towards front.

Unlock associated plug connections and disconnect.

Remove instrument panel pipe trim (2).

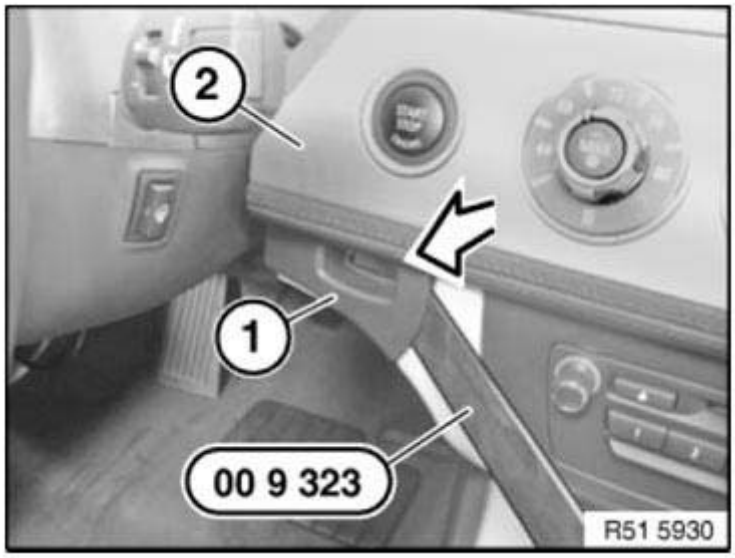


Fig. 378: Removing Instrument Panel Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Remove **CONTROL PANEL FOR HEATING - A/C SYSTEM**
- Remove **START/STOP SWITCH**

51 45 195 REMOVING AND INSTALLING/REPLACING TRIM FOR INSTRUMENT PANEL, BOTTOM RIGHT

Necessary preliminary tasks

- Move front passenger seat completely towards rear

ECE only:

Release screws (1).

Pull back trim for instrument panel (2)

Disconnect and unlock all plug connections.

Remove trim for instrument panel (2)

Installation:

Make sure trim for instrument panel (2) is correctly seated on footwell air outlet above.

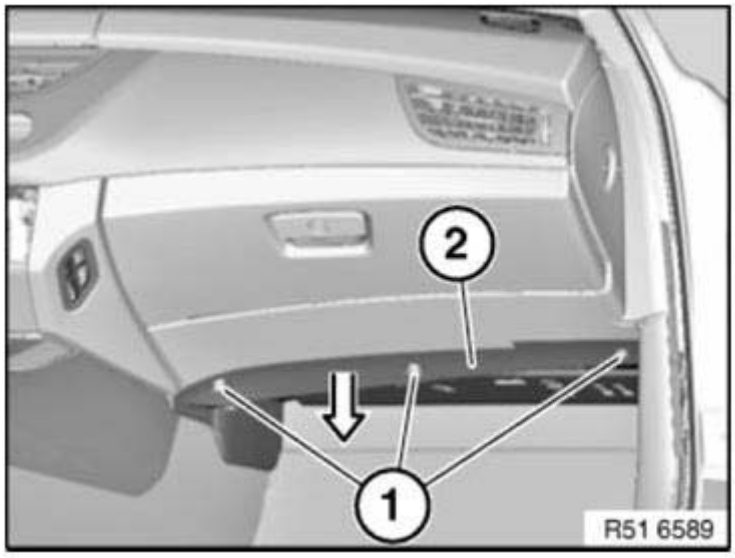


Fig. 379: Removing Trim For Instrument Panel
Courtesy of BMW OF NORTH AMERICA, INC.

US only:

Release screws (1).

Pull back trim for instrument panel (2)

Disconnect and unlock all plug connections.

Remove trim for instrument panel (2)

Installation:

Make sure trim for instrument panel (2) is correctly seated on footwell air outlet above.

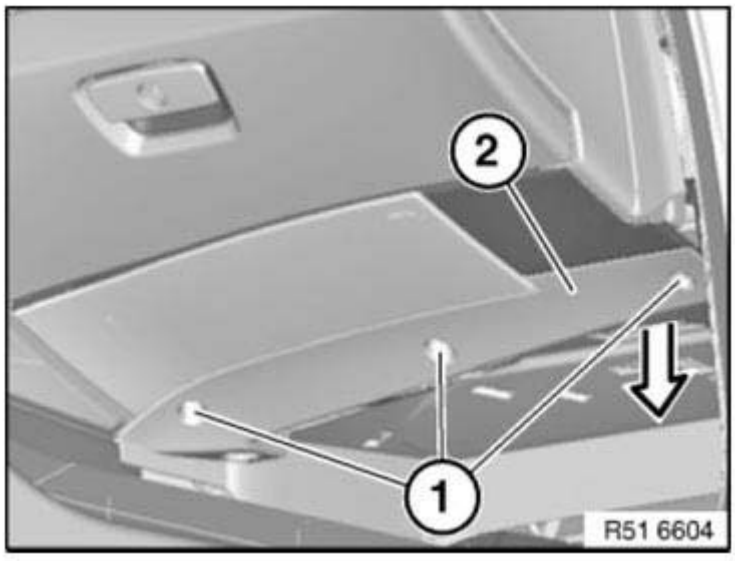


Fig. 380: Removing Trim For Instrument Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove **FOOTWELL LIGHT** (1).

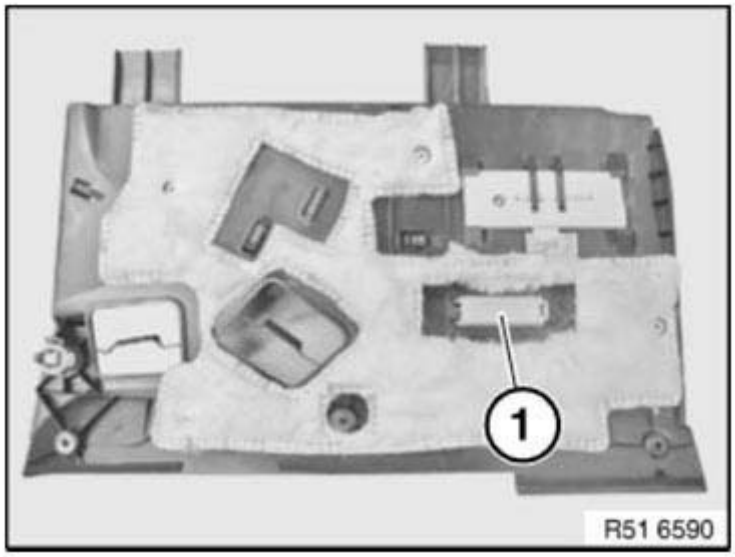


Fig. 381: Identifying Footwell Light
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 ... REPLACING DEFROSTER COVERS

When working on trim panel components, make sure that the sensitive surfaces are not scratched or damaged.

Carefully lever out and remove speaker cover (1) using special tool 00 9 325 .

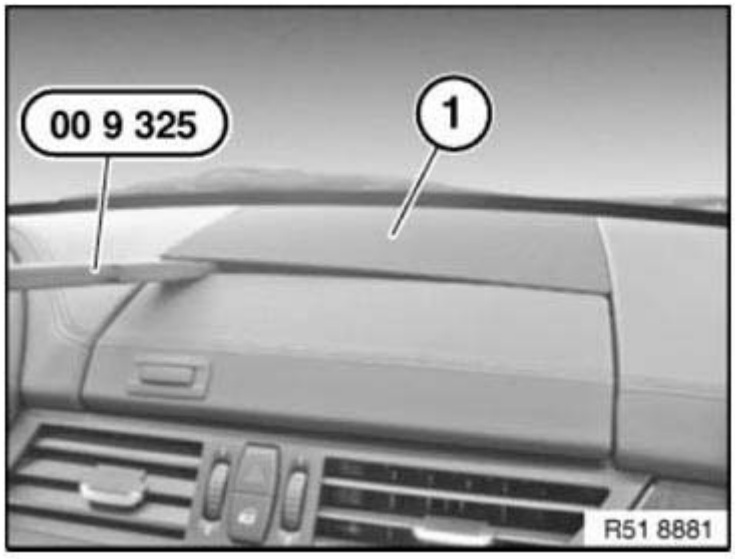


Fig. 382: Removing Speaker Cover Using Special Tool (00 9 325)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining clips (1) on speaker cover (2) must be correctly seated on associated lugs and must not be damaged.

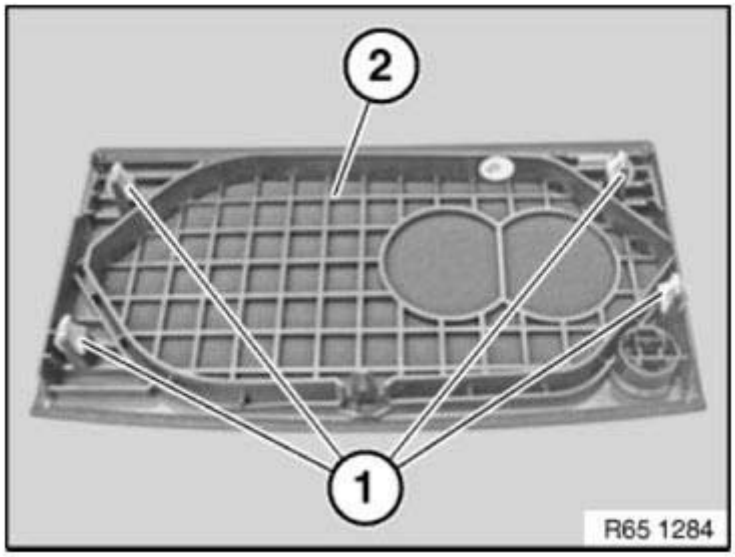


Fig. 383: Identifying Retainers On Speaker Cover
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure that no parts fall into the air duct (risk of noise).

Using special tool 00 9 327, first lever out right defroster cover (1) in the centre and release inner catch.

If necessary, twist special tool 00 9 327 as shown in order to do so.

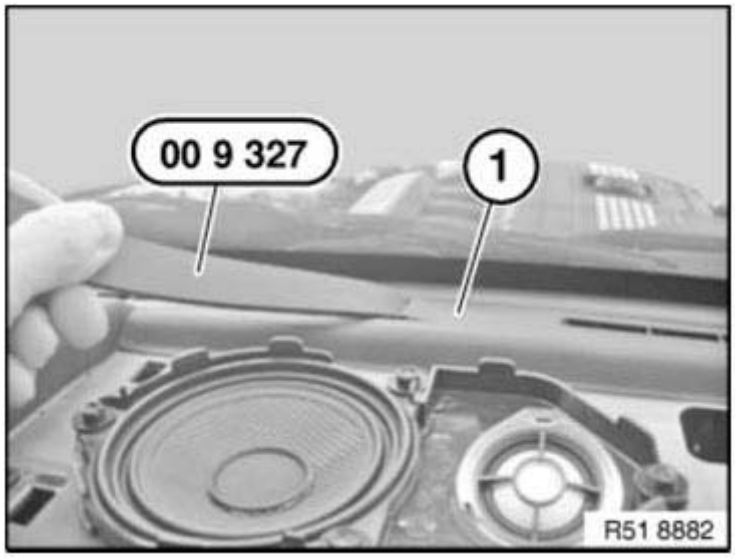


Fig. 384: Removing Right Defroster Cover Using Special Tool (00 9 327)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The catch positions (arrow) can be determined by counting off the ribs (2) on the defroster cover (1) in each case.

Lever out all other catches from the inside outwards using special tool 00 9 327 .

To do so, carefully lever up defroster cover (1) in the centre using special tool 00 9 325 (see illustration).

Remove defroster cover.

Repeat operation on left defroster cover.

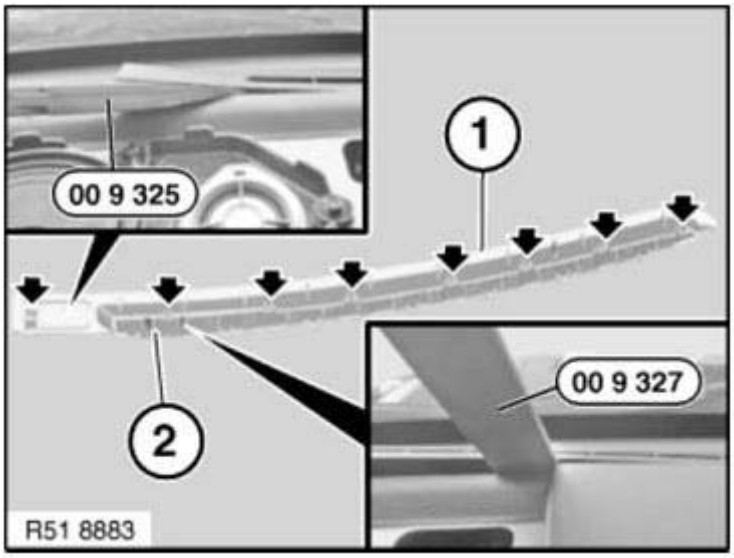


Fig. 385: Removing Catches Using Special Tool (00 9 327)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit left defroster cover first.

Leather interior only:

- A2Apply 2-component Araldite 2021 TN 2 149 520 adhesive drops (sourcing reference BMW parts service) to marked points (2) of the (1) left and right defroster panel.
- Read and comply with safety data sheet!

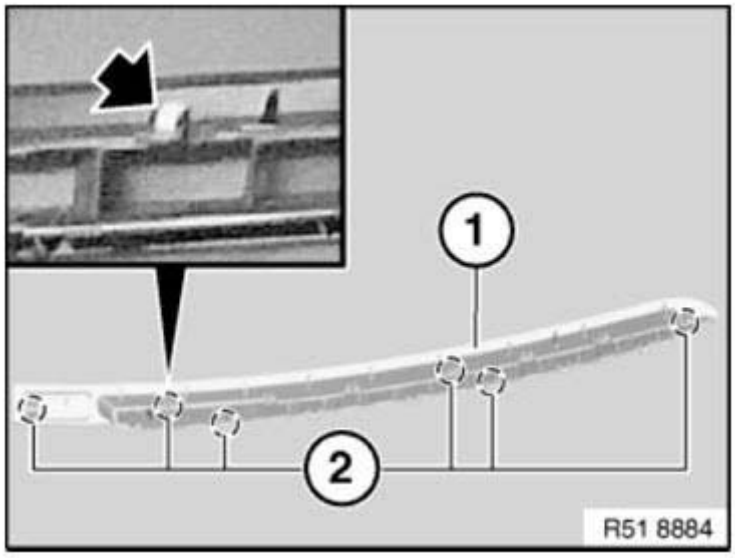


Fig. 386: Identifying Araldite 2021 TN 2 149 520 Adhesive Drops Applying Areas
Courtesy of BMW OF NORTH AMERICA, INC.

51 45 031 REPLACING INSTRUMENT PANEL TRIM

Necessary preliminary tasks

- Remove **INSTRUMENT PANEL TRIM**
- Remove **LEFT FRESH-AIR GRILLE**
- Remove **RIGHT FRESH-AIR GRILLE**

5146 PARCEL SHELF TRIM PAN ROLLER SUN BLIND

51 46 ... REMOVING AND INSTALLING/REPLACING COVER FOR SEAT BELT ON LEFT OR RIGHT

Lever out cover (1) in upward direction with plastic wedge.

Installation:

Make sure cover (1) is correctly seated in seal (2).

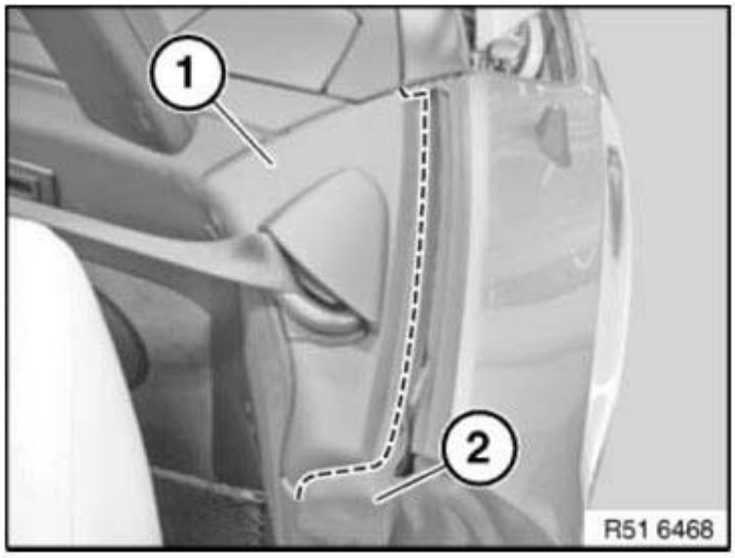


Fig. 387: Identifying Cover With Seal
Courtesy of BMW OF NORTH AMERICA, INC.

51 46 072 REMOVING AND INSTALLING/REPLACING LOWER PARTITION PANEL

Necessary preliminary tasks

- Clamp off **BATTERY LEAD FROM NEGATIVE TERMINAL**
- Remove **CENTRE CONSOLE** .
- Remove **UPPER PARTITION TRIM PANEL**
- Remove **REAR SIDE TRIM PANEL (BOTTOM)**

NOTE: Both seats are shown removed for purposes of clarity.

Professional HiFi system only:

Release mid-range speaker screws (2).

Unlock plug connection for mid-range speaker and disconnect.

Remove mid-range speaker.

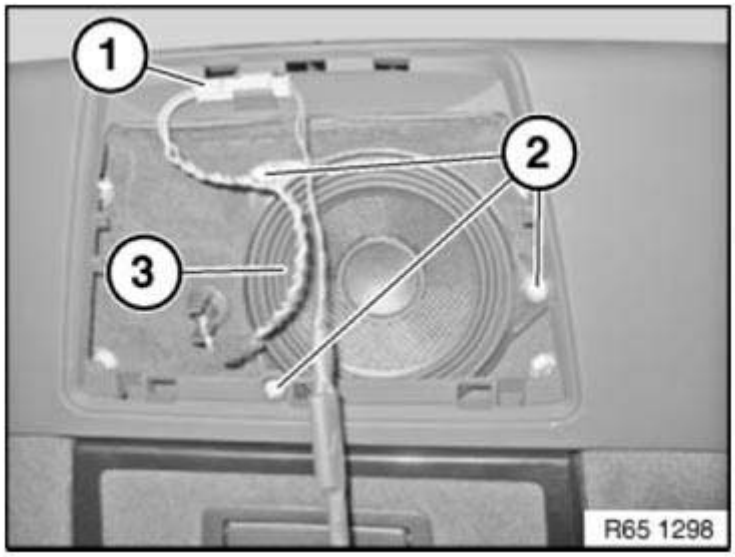


Fig. 388: Identifying Mid-Range Speaker Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 46 7AZ** .

Remove clips (2).

Raise protective caps for storage net holder and release screws (3).

Tightening torque **51 46 7AZ** .

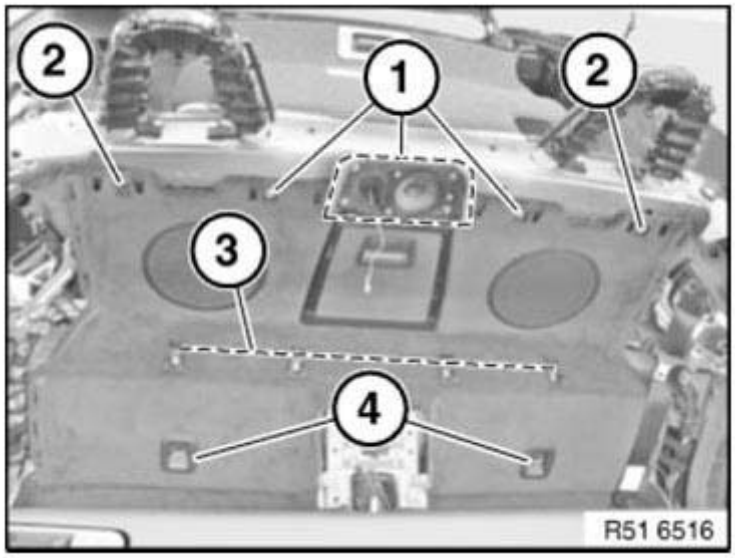


Fig. 389: Identifying Screws And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Release partition panel (1) at catches (2).

Disconnect necessary plug connections.

Remove partition panel (1).

Replacement

Modify covers or lashing eyes (4).

Professional HiFi system only:

Modify speaker covers of bass speaker on left and right.

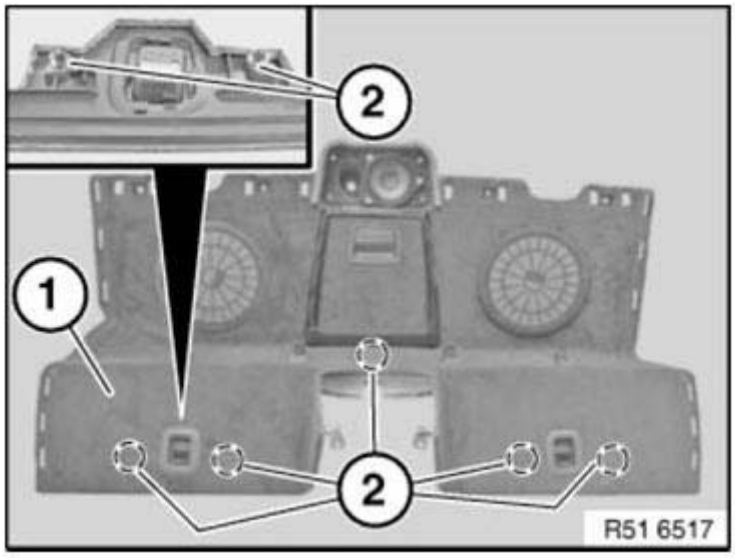


Fig. 390: Identifying Partition Panel With Catches
Courtesy of BMW OF NORTH AMERICA, INC.

51 43 ... REMOVING AND INSTALLING/REPLACING REAR TOP LEFT OR RIGHT SIDE TRIM PANEL

Operations on right side analogous to left side shown. Use graphics in a mirror-inverted way.

Unclip side trim panel (1) towards top.

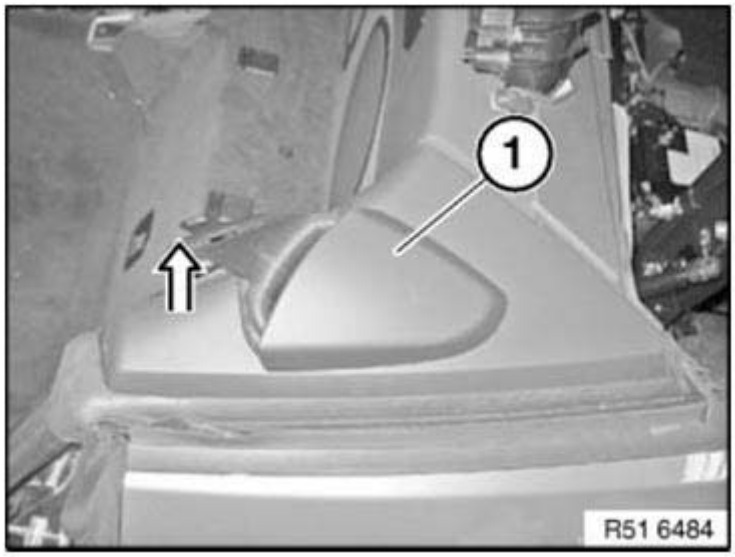


Fig. 391: Removing Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure seal (2) is correctly seated in relation to side trim panel (1).

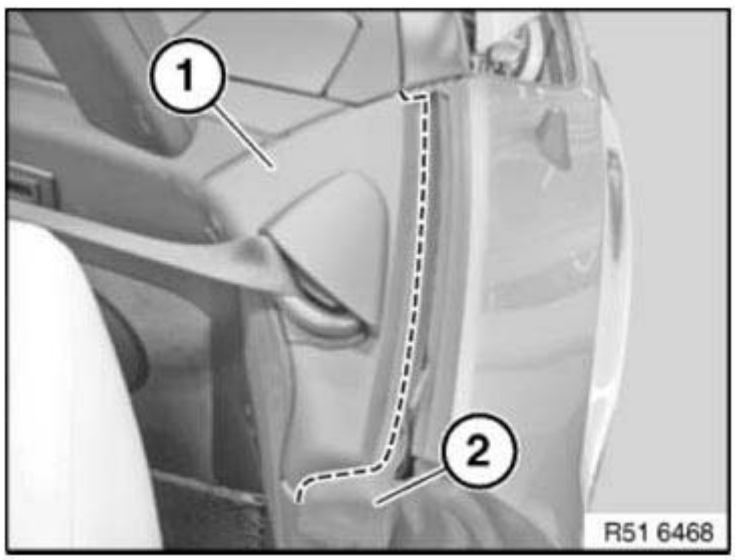


Fig. 392: Identifying Side Trim Panel With Seal
Courtesy of BMW OF NORTH AMERICA, INC.

51 46 050 REMOVING AND INSTALLING/REPLACING TOP TRIM ON REAR APRON

Necessary preliminary tasks

- Remove **FRONT LUGGAGE COMPARTMENT FLOOR TRIM**

- Remove **LOADING SILL END COVER**

Release screws with special tool 51 2 040 on rear apron trim (1).

Partially lift off seal (2).

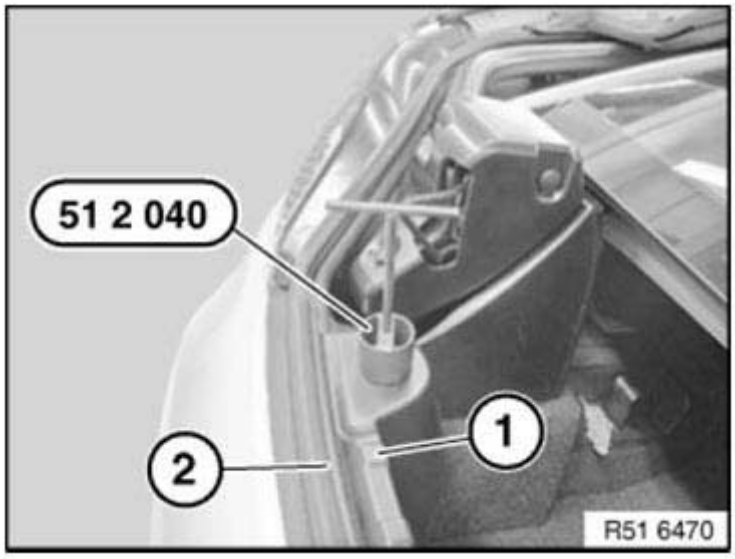


Fig. 393: Removing Screws Using Special Tool (51 2 040)
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out expansion rivets (1).

Remove panel for rear apron trim (2).

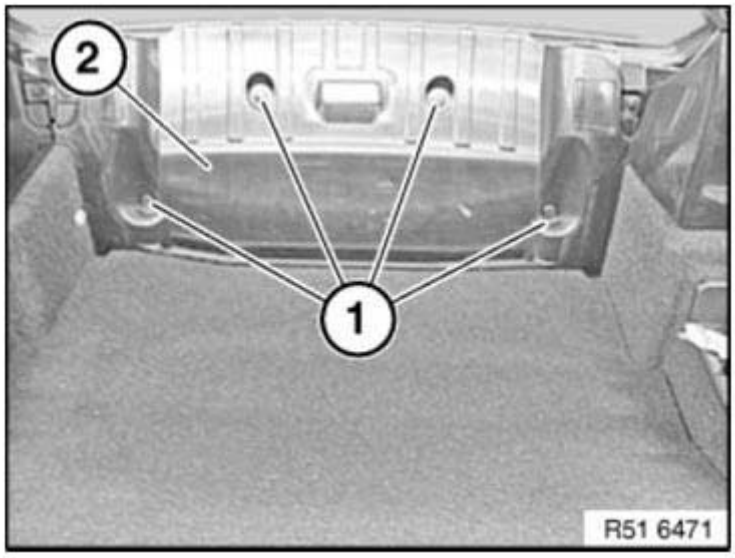


Fig. 394: Identifying Rear Apron Trim With Expansion Rivets

Courtesy of BMW OF NORTH AMERICA, INC.

Unclip lights (1) on rear apron trim (2).

Remove rear apron trim (2).

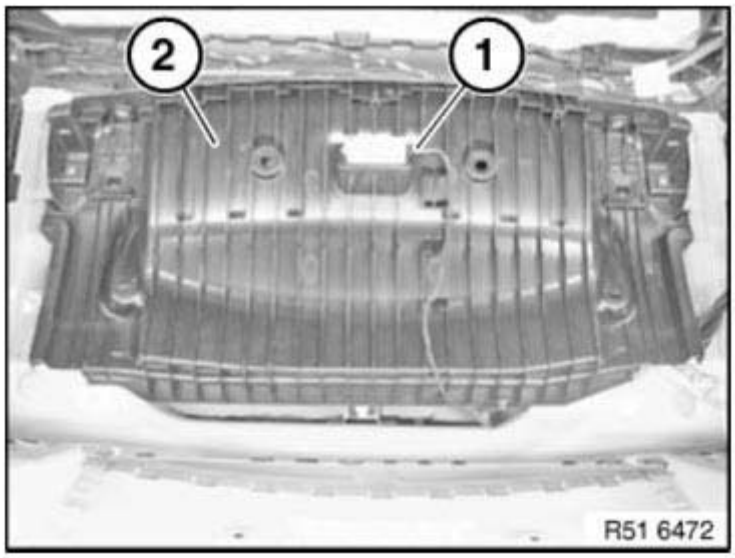


Fig. 395: Identifying Lights On Rear Apron Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 46 ... REMOVING AND INSTALLING/REPLACING UPPER (REAR) PARTITION PANEL

Necessary preliminary tasks

- Remove **COVERS ON ROLLOVER BAR**

Release screws (1).

Lever out expander rivets (2).

Remove rear upper partition panel (3).

Installation:

Feed in retaining tabs for expanding rivets (2) between partition and luggage compartment trim panel.

Replace faulty expanding rivets (2).

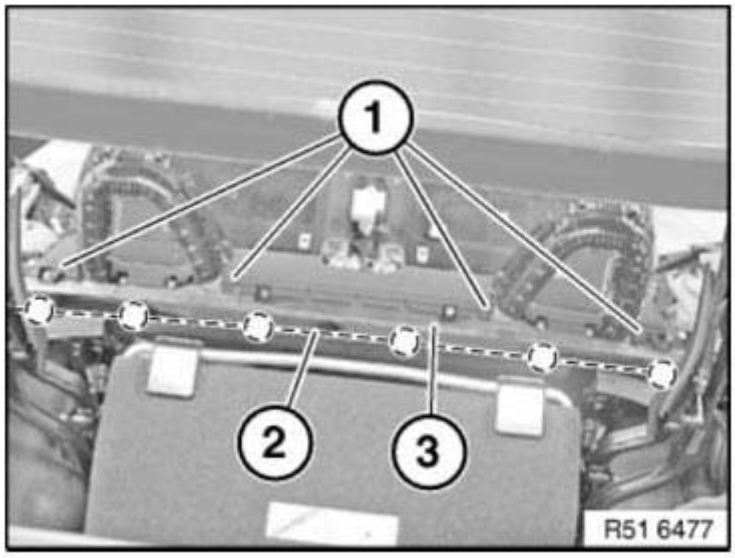


Fig. 396: Identifying Rear Upper Partition Panel With Expanding Rivets And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 46 070 REMOVING AND INSTALLING/REPLACING UPPER PARTITION PANEL

Necessary preliminary tasks

- Remove **REAR SIDE TRIM PANELS**
- Remove **ROLLOVER PROTECTION COVER BRACKET**
- If necessary, place backrests in vertical position and move seats fully forwards

Release screws (1).

Lever out caps for lashing eyes and release screws (2).

Tightening torque **51 46 6AZ** .

Professional HiFi system only:

Remove **TWEETER** (3)

Lift out upper partition wall panel (4) at an angle.

Replacement

If necessary, replace middle trim (3).

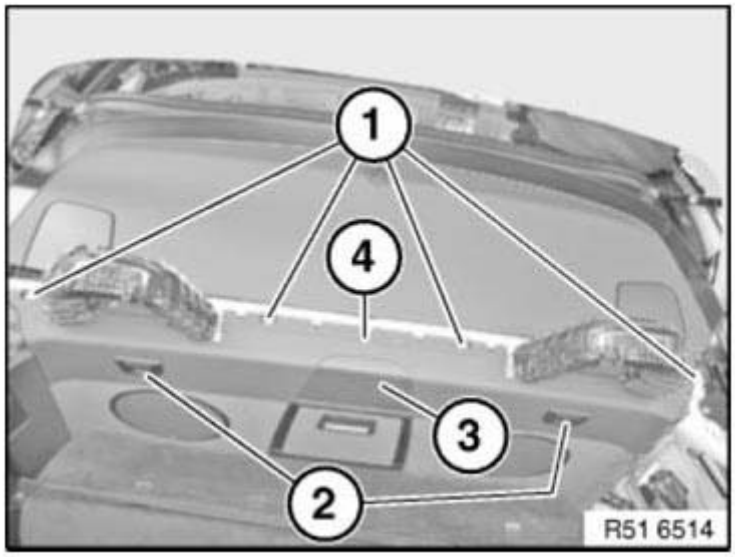


Fig. 397: Identifying Middle Trim And Upper Partition Wall Panel With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Locking hooks (1) on front partition wall panel (2) must not be broken.

If necessary, replace upper partition wall panel (2).

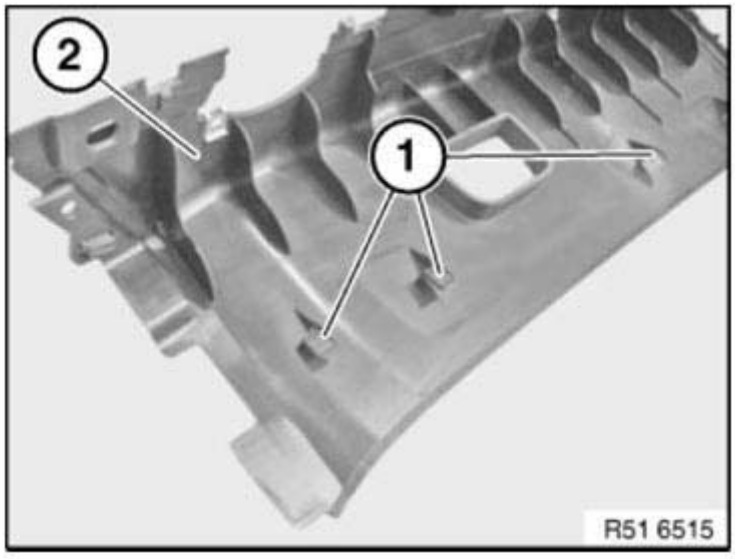


Fig. 398: Identifying Locking Hooks On Front Partition Wall Panel
Courtesy of BMW OF NORTH AMERICA, INC.

5147 FLOOR, LUGGAGE COMPARTMENT, ENGINE COMPARTMENT, TRIM PANELS

51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION

NOTE: Illustration shows one example only.
There may be differences in detail in the case of other engine variants.

Release all screws (1) on underbody protection (2).

Remove underbody protection (2).

Installation

Centre underbody protection (2) and tighten down screws (1).

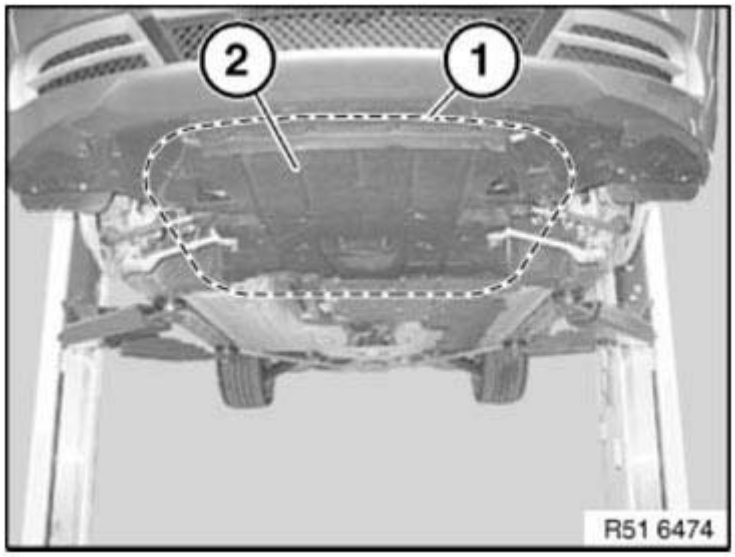


Fig. 399: Identifying Screws On Underbody Protection
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 000 REMOVING AND INSTALLING/REPLACING (INSIDE) FRONT LEFT OR RIGHT DOOR SILL COVER STRIP

Disengage retaining lugs (5) of door sill cover strip (2) from both adjoining panels.

IMPORTANT: Lever out door sill cover strip (2) at front retaining points (3).

Slide door sill cover strip (2) back approx. 2 cm to feed clips out of rear retaining points (1).

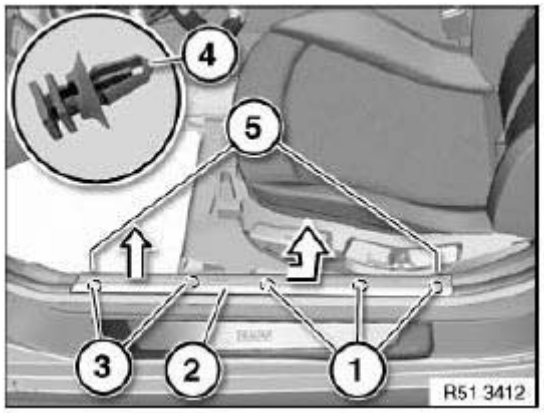


Fig. 400: Removing Door Sill Cover Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, lever out clips (1) remaining in floor panel and push into clip mounts of door sill cover strip (2).

Replace faulty clips (1).

Clip mountings of door sill cover strip (2) must not be damaged.

Retaining lugs (3) of door sill cover strip (2) must not be damaged.

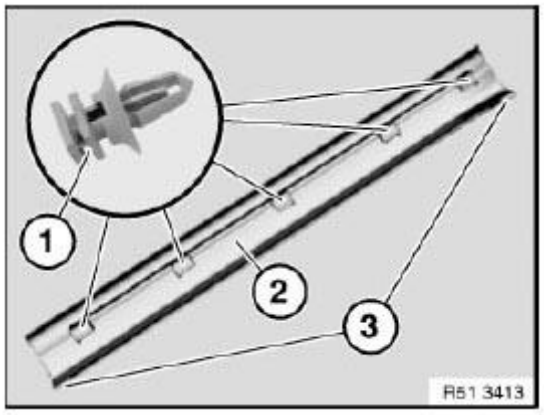


Fig. 401: Identifying Door Sill Cover Strip With Clips And Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 314 REMOVING AND INSTALLING/REPLACING CARPET FOR PASSENGER COMPARTMENT

Necessary preliminary tasks:

- Remove **SEATS**

- Remove footwell side trim panels See **5143075 REMOVING AND INSTALLING/REPLACING SIDE TRIM PANEL, FOOTWELL, ON A-PILLAR, RIGHT** or **5143070 REMOVING AND INSTALLING/REPLACING SIDE TRIM PANEL, FOOTWELL, ON A-PILLAR, LEFT** on left and right
- Remove **HEATER/AIR CONDITIONER**
- Remove **ACCELERATOR PEDAL MODULE**
- Remove **LOWER PARTITION TRIM PANEL**

Replacement

Unclip footwell net (1) on front passenger side.

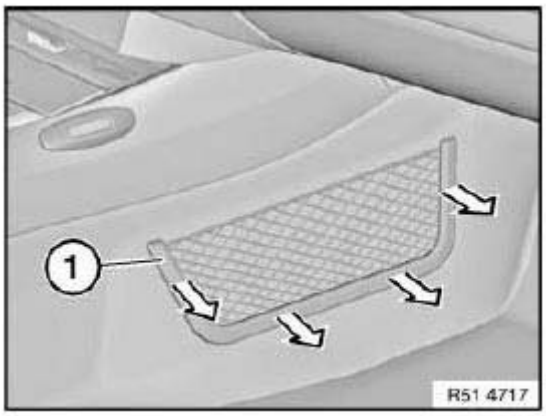


Fig. 402: Removing Footwell Net
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace damaged retaining clips.

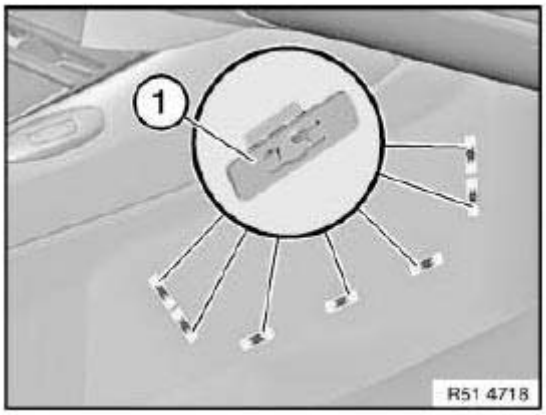


Fig. 403: Identifying Retaining Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 065 REMOVING AND INSTALLING/REPLACING COVER AT FRONT LEFT OR RIGHT ENTRANCE

IMPORTANT: Risk of damage!

Do not raise cover (2) over entire length simultaneously.

Unclip clips (1) for cover (2) with special tool 00 9 317 .

Remove cover (2).

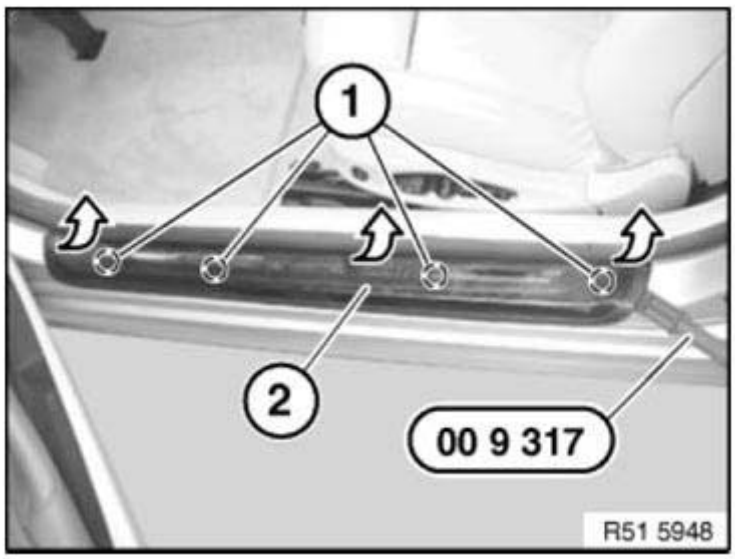


Fig. 404: Removing Cover Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Lever out remaining clips (1) in retaining holes with a suitable tool.

If necessary, slide missing clips (1) into clip mounts of cover.

Clip cover into retaining holes.

NOTE: Clips (1), clip mounts and retaining lugs of cover must not be damaged.

If necessary, replace faulty clips (1) or cover.

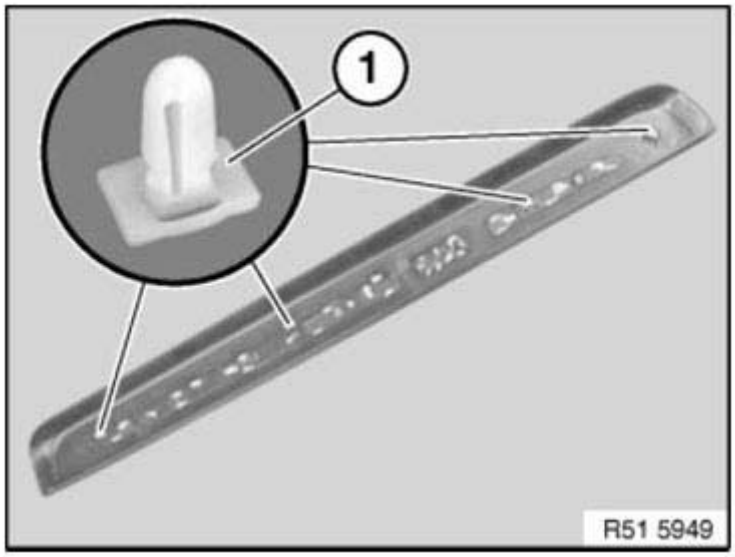


Fig. 405: Identifying Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 038 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)

NOTE: Prior to removing, pay attention to the exact installation position with respect to the adjoining components.

Necessary preliminary tasks:

- Remove **FRONT WHEEL**

Unscrew all bolts.

Unscrew nuts (1).

Remove cover (2).

Installation:

Make sure cover (2) is correctly seated.

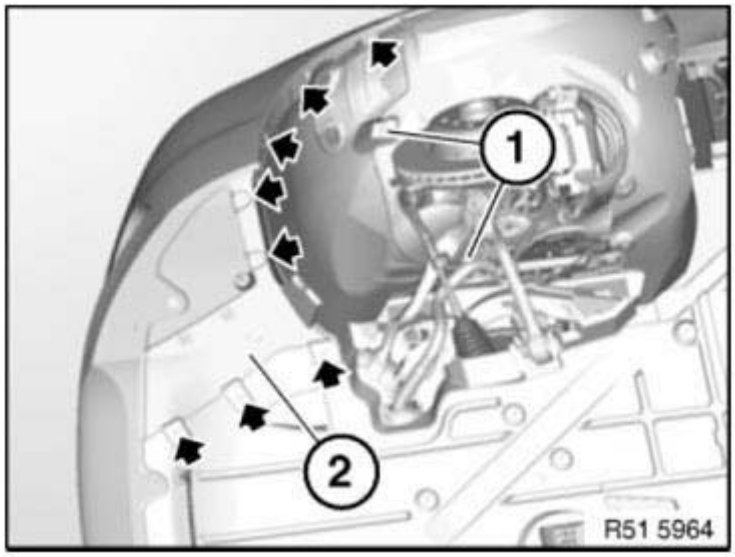


Fig. 406: Identifying Wheel Arch Cover With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed out wheel arch cover (2) towards bottom.

Installation:

Make sure wheel arch cover (2) is exactly seated.

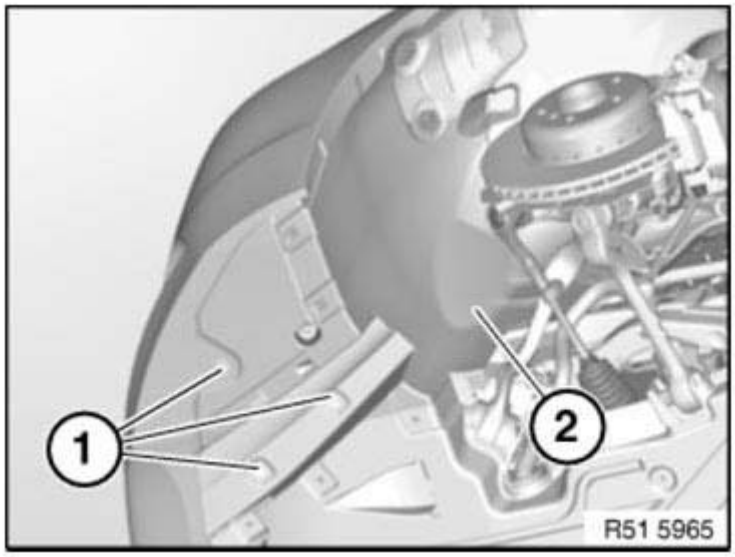


Fig. 407: Identifying Wheel Arch Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 039 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH

COVER (REAR SECTION)

NOTE: Prior to removing, pay attention to the exact installation position with respect to the adjoining components.

Necessary preliminary tasks:

- Remove **FRONT WHEEL**

Release all nuts.

Release screw (1).

Lever out clips (2).

Remove cover (3).

Installation:

Make sure cover (3) is correctly seated.

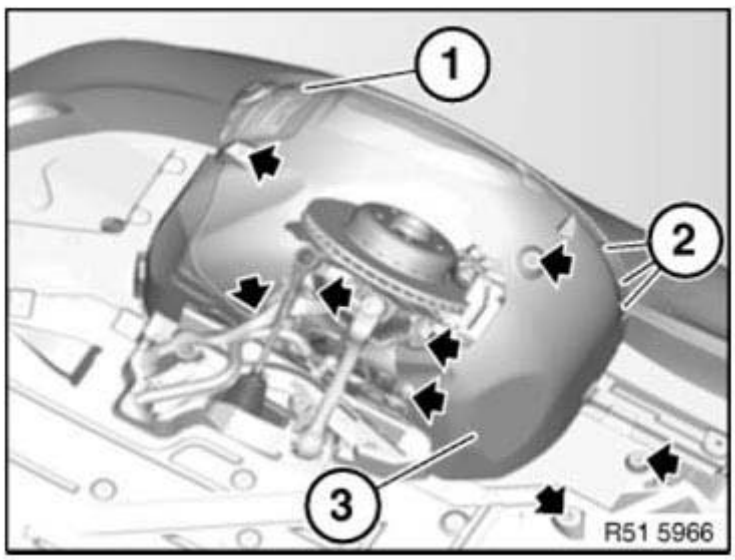


Fig. 408: Identifying Wheel Arch Cover With Screw And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 151 REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH PANEL

Necessary preliminary tasks

- Remove **PANEL FOR LUGGAGE COMPARTMENT SIDE MEMBER**

Partially detach seal (1).

Lift out expanding rivets (2).

Remove panel for luggage compartment wheel arch panel (3).

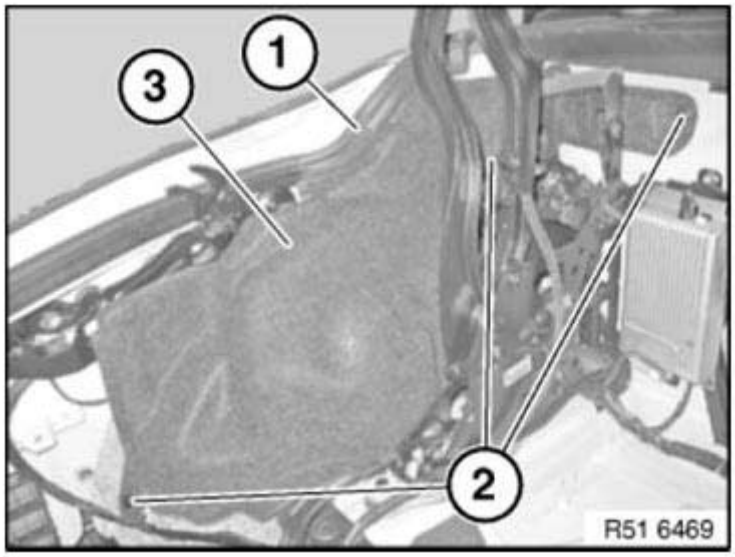


Fig. 409: Identifying Luggage Compartment Wheel Arch Panel With Expanding Rivets And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 217 REMOVING AND INSTALLING/REPLACING LOADING SILL END COVER (REAR LIGHT) ON LEFT OR RIGHT

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT TRIM ON SIDE PANEL**
- Move Convertible top into half-opened position
- Support Convertible top compartment lid with suitable tool

Remove luggage compartment cover (1) from roof fastener mechanism (2).

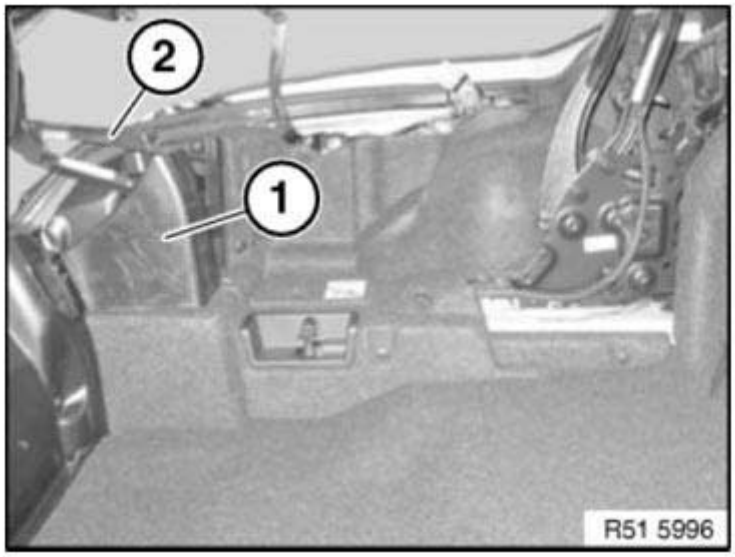


Fig. 410: Identifying Luggage Compartment Cover Of Roof Fastener Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

Partially lift off seal (1).

Lift out expanding rivets (2).

Remove end cover (3).

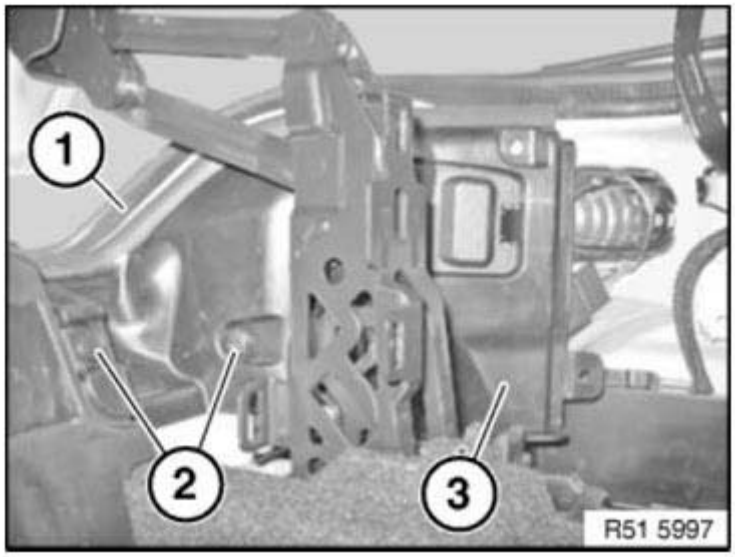


Fig. 411: Identifying Cover With Seal And Expanding Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

51 75 515 REMOVING AND INSTALLING/REPLACING LOWER PEDESTRIAN PROTECTION

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

Release screws (1).

Remove pedestrian protection (2).

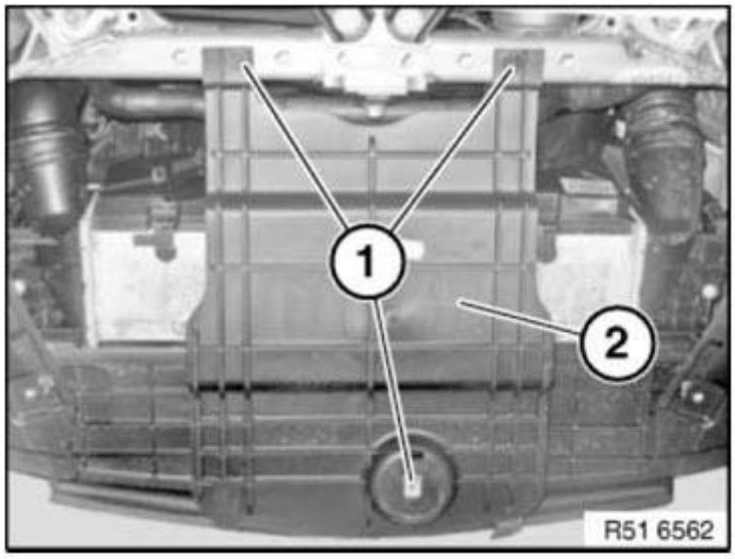


Fig. 412: Identifying Pedestrian Protection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 101 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT FLOOR TRIM PANEL

Remove luggage compartment floor trim (1).

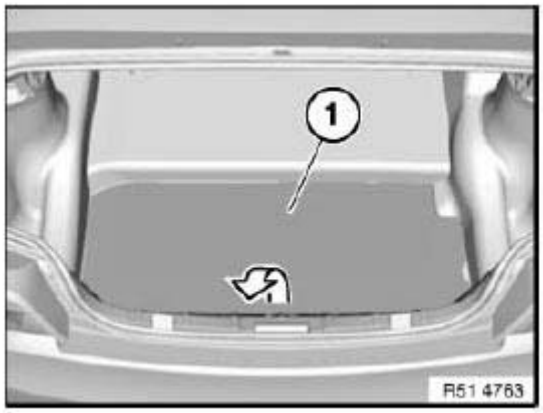


Fig. 413: Removing Luggage Compartment Floor Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 220 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT TRIM

PANEL ON RIGHT SIDE PANEL

Lever out expansion rivets (1).

Feed out luggage compartment trim panel (3), unclipping at marked points (2).

Installation:

Rubber seal (4) must be correctly seated over luggage compartment trim panel (3).

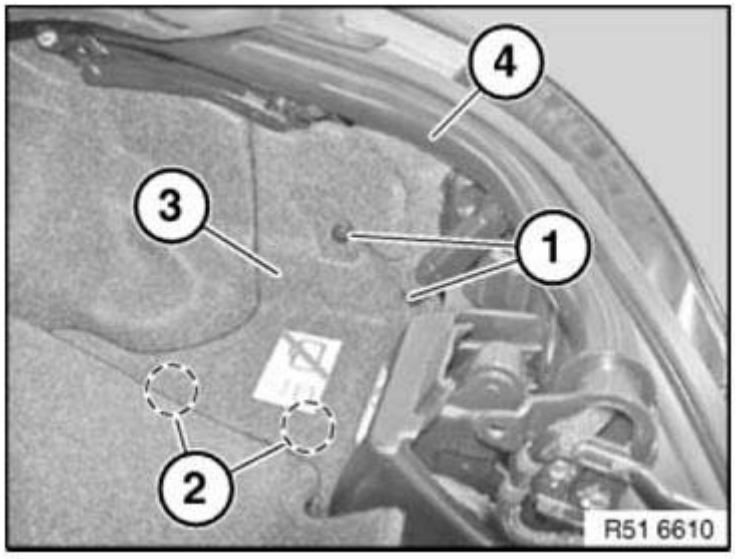


Fig. 414: Identifying Luggage Compartment Trim Panel With Expansion Rivets And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 140 REMOVING AND INSTALLING/REPLACING PANEL FOR LUGGAGE COMPARTMENT PARTITION WALL

Necessary preliminary tasks

- Move soft top into half-opened position
- Support soft top compartment lid with suitable tool
- Remove **FRONT LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

Lever out expansion rivets (1).

Remove panel for luggage compartment partition wall (2).

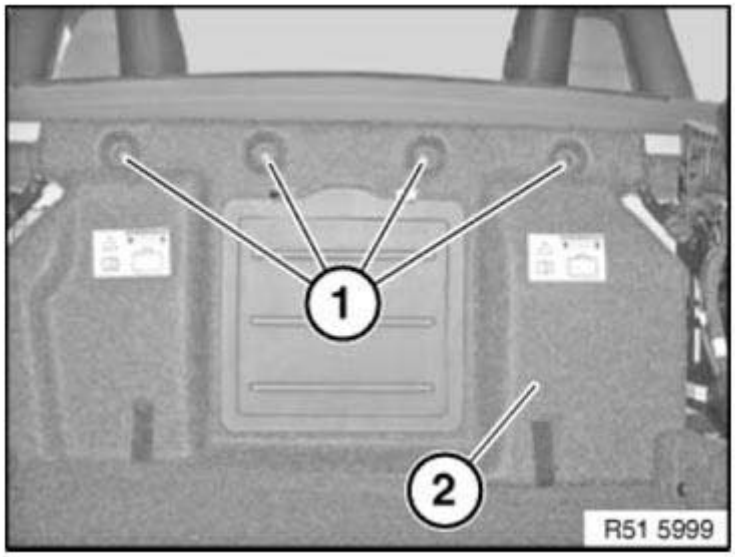


Fig. 415: Identifying Luggage Compartment Partition Wall With Expansion Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 215 REMOVING AND INSTALLING/REPLACING PANEL FOR LUGGAGE COMPARTMENT SIDE MEMBER ON LEFT

Necessary preliminary tasks

- Remove **PANEL FOR LUGGAGE COMPARTMENT PARTITION**

Unclip trim (1).

Lift out expanding rivets (2).

Remove panel for luggage compartment side member (3).

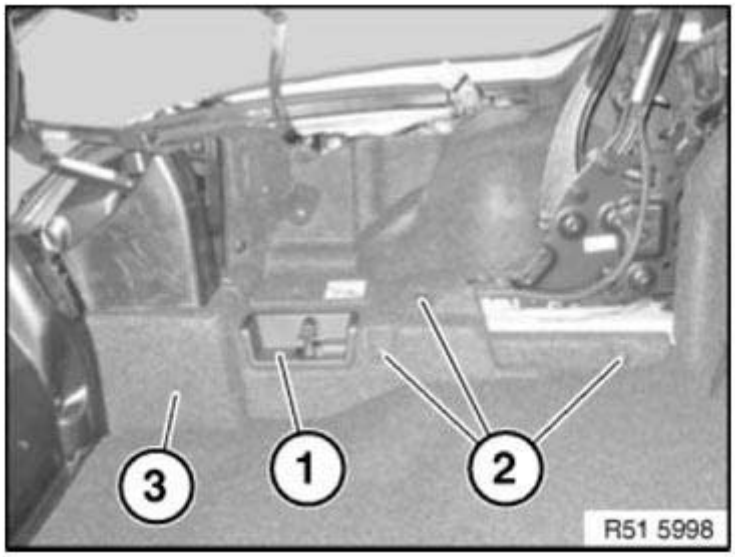


Fig. 416: Identifying Luggage Compartment Side Member With Expanding Rivets And Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 216 REMOVING AND INSTALLING/REPLACING PANEL FOR LUGGAGE COMPARTMENT SIDE MEMBER ON RIGHT

NOTE: Operation is identical to:

- **Removing and installing/replacing PANEL FOR LUGGAGE COMPARTMENT SIDE MEMBER ON LEFT**

51 71 041 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT WHEEL ARCH COVER

Necessary preliminary tasks

- Remove **REAR WHEEL**

Release all nuts (1).

Remove cover (2).

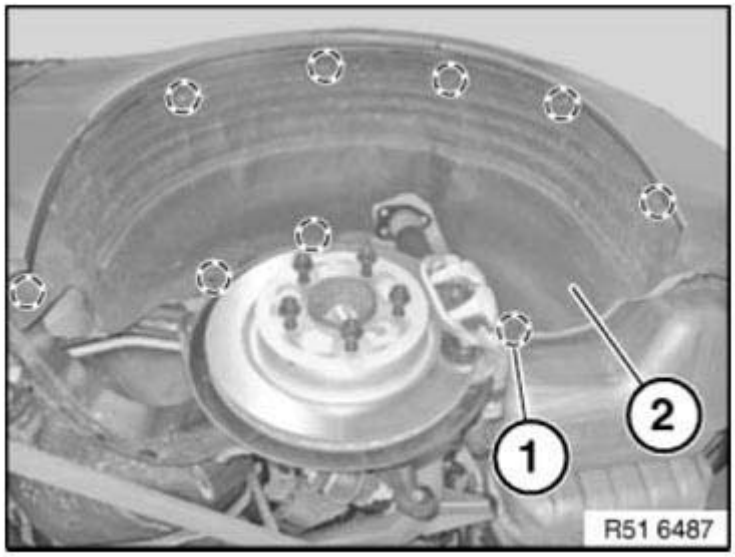


Fig. 417: Identifying Wheel Arch Cover And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carefully lift in wheel arch cover (1) with special tool 00 9 317 .

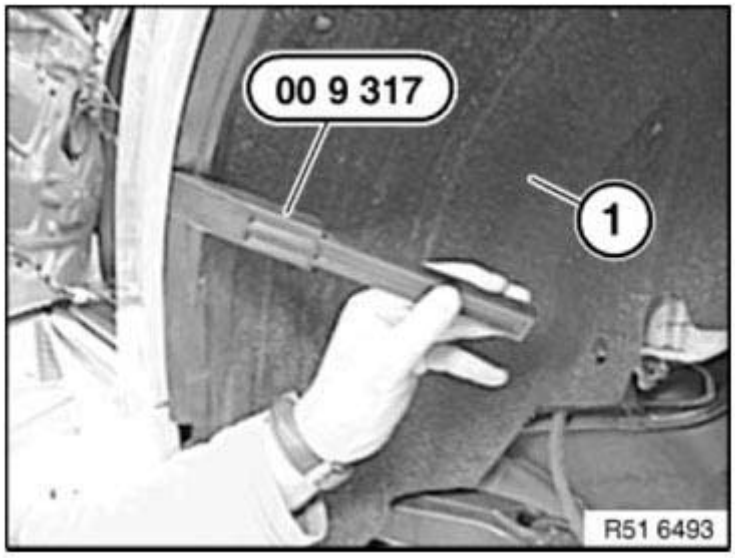


Fig. 418: Lifting Wheel Arch Cover Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION

WARNING: Scalding hazard!

This work may only be carried out on an exhaust system which has cooled down.

Release screws (1).

Pull underbody protection (2) out from under bumper trim (3).

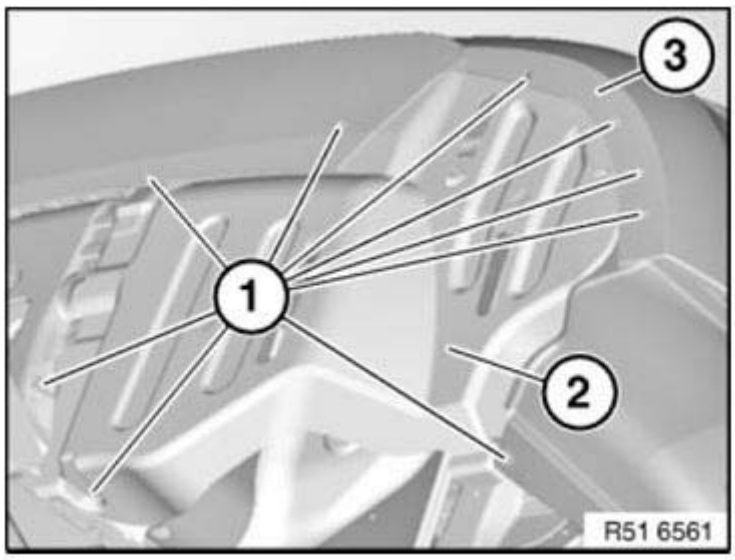


Fig. 419: Identifying Underbody Protection, Under Bumper Trim With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 161 REMOVING AND INSTALLING/REPLACING RIGHT LUGGAGE COMPARTMENT WHEEL ARCH TRIM

NOTE: Operation is identical to:

- **Removing and installing/replacing LEFT LUGGAGE COMPARTMENT WHEEL ARCH TRIM**

51 46 050 REMOVING AND INSTALLING/REPLACING TOP TRIM ON REAR APRON

Necessary preliminary tasks

- Remove **FRONT LUGGAGE COMPARTMENT FLOOR TRIM**
- Remove **LOADING SILL END COVER**

Release screws with special tool 51 2 040 on rear apron trim (1).

Partially lift off seal (2).

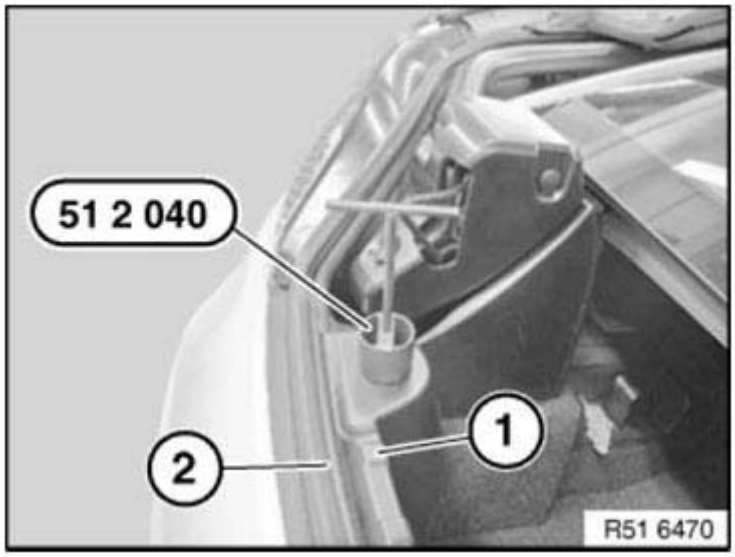


Fig. 420: Removing Screws Using Special Tool (51 2 040)
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out expansion rivets (1).

Remove panel for rear apron trim (2).

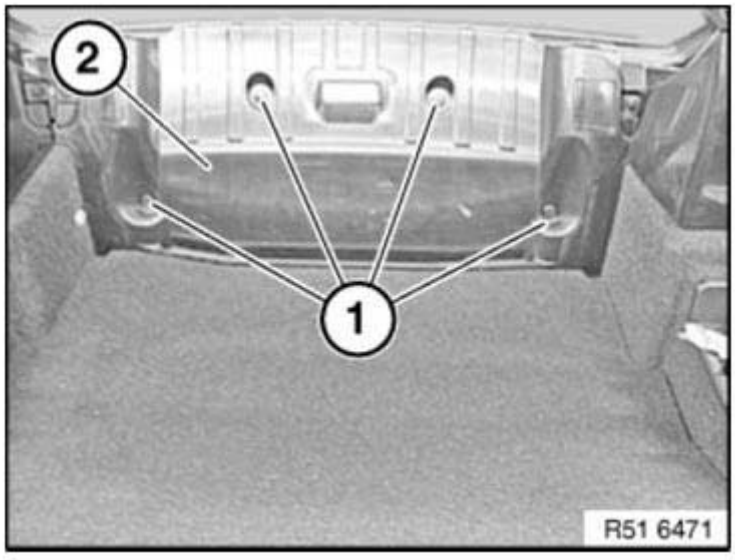


Fig. 421: Identifying Rear Apron Trim With Expansion Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip lights (1) on rear apron trim (2).

Remove rear apron trim (2).

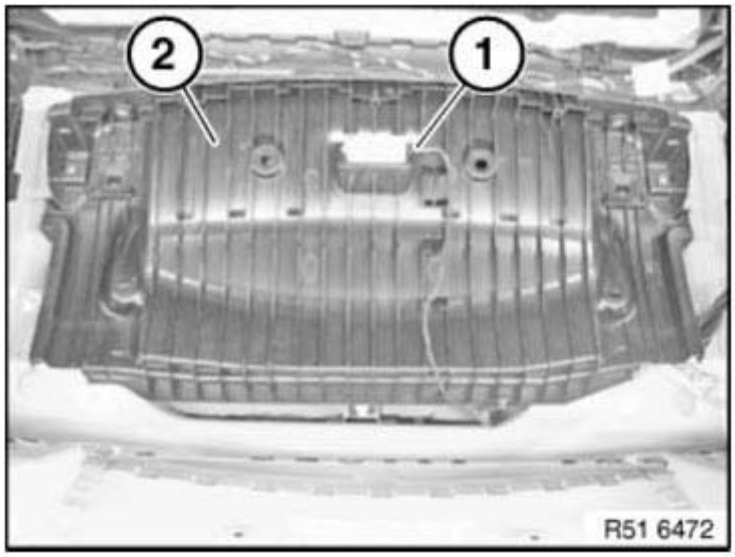


Fig. 422: Identifying Lights On Rear Apron Trim
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 210 REMOVING AND INSTALLING/REPLACING TRUNK TRIM PANEL ON LEFT SIDE PANEL

Open spagnolet fastener (1).

Lever out expander rivet underneath.

Lift out expanding rivets (2).

Feed out side trim panel (3).

Installation:

Luggage compartment rubber seal must be correctly seated over luggage compartment trim panel (3).

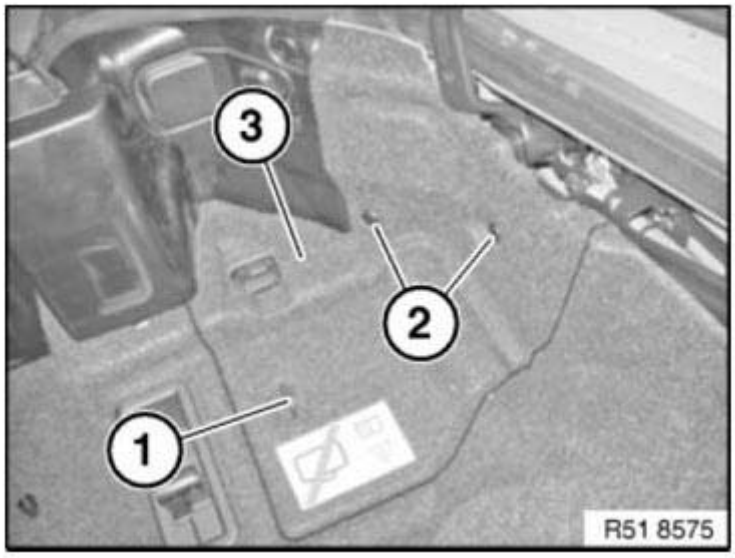


Fig. 423: Identifying Spagnolet Fastener, Side Trim Panel And Expanding Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

51 47 131 REPLACING FRONT PANEL FOR LUGGAGE COMPARTMENT FLOOR

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

Lever out expansion rivets (1).

Remove front luggage compartment floor trim (2).

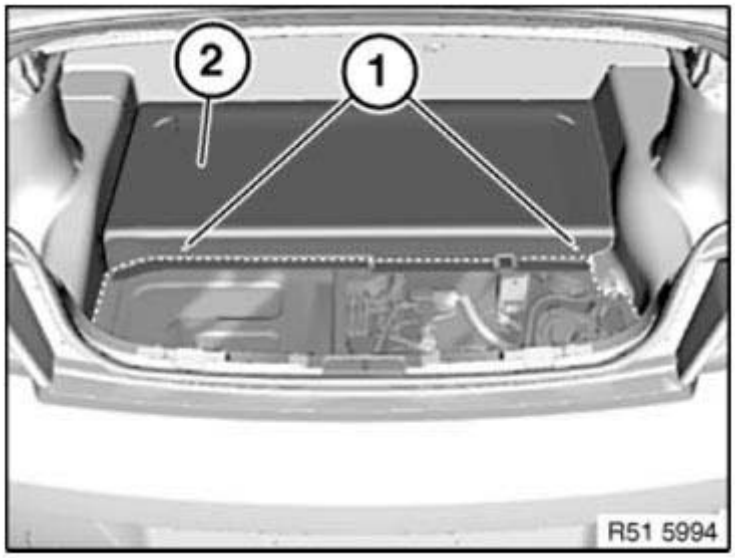


Fig. 424: Identifying Front Luggage Compartment Floor Trim With Expansion Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

5148 FRONT LID INSULATION LINING

51 48 060 REMOVING AND INSTALLING/REPLACING SOUND INSULATION IN FRONT DOOR, LEFT OR RIGHT

IMPORTANT: INSTRUCTIONS FOR SOUND INSULATION are an essential part of these repair instructions and must be followed without fail.

Do not detach sound insulation in jerks (risk of damage).

After every repair, check that the sound insulation is water-tight (water ingress).

Necessary preliminary tasks

- Remove **DOOR TRIM PANEL**

Release speaker cable (1).

Guide speaker cable (1) through sound insulation (2).

Position of sealing bead (3).

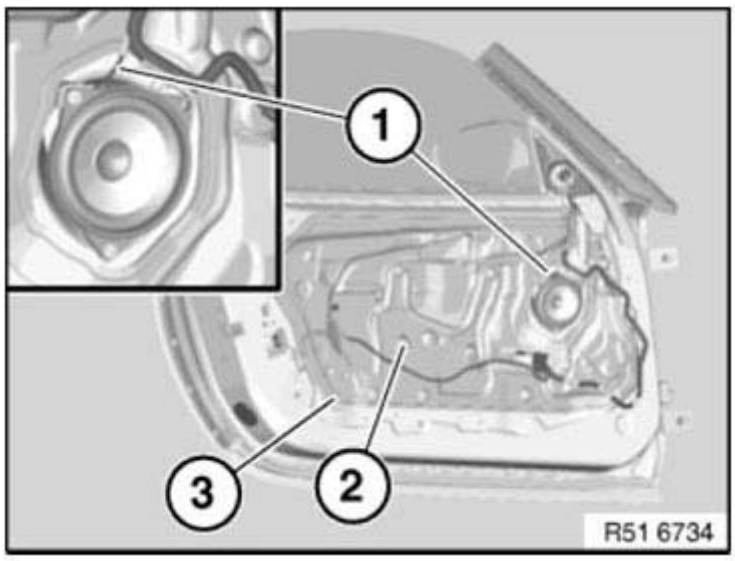


Fig. 425: Identifying Speaker Cable With Sound Insulation And Sealing Bead
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: When cutting through sealing bead (1), do not damage sound insulation (2) and if necessary cable.

With a suitable sharp cutting tool (3) cut through sealing bead (1) of sound insulation (2) in the area to be

detached.

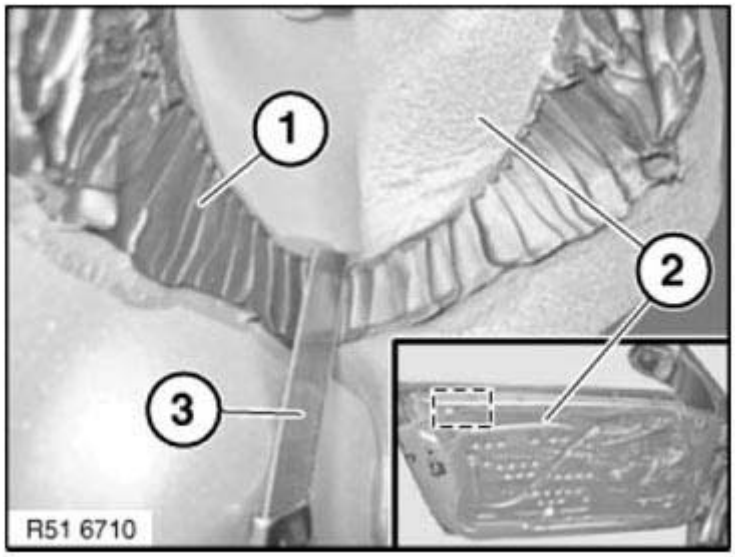


Fig. 426: Cutting Sealing Bead Of Sound Insulation Using Sharp Cutting Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Clean bonding area with adhesive remover (sourcing reference: BMW Parts Service).

Air drying time: 1 minute

IMPORTANT: Adhesive areas must be dry and free of dust and grease.

Once it has been cleaned, do not touch the adhesive area with bare hands.

NOTE: Replacement:

Lay 6 mm dia. butyl cord (sourcing reference: BMW Parts Department) in specified adhesive area.

Heat butyl cord (hot air blower) and press down firmly on sound insulation all round.

Contact pressure with hand roller: approx. 20 N/cm^2

Manual contact pressure: approx. 10 N/cm^2

NOTE: Firm thumb pressure has approx. 30 N/cm^2

NOTE: Position of butyl cord (1) on sound insulation (2).

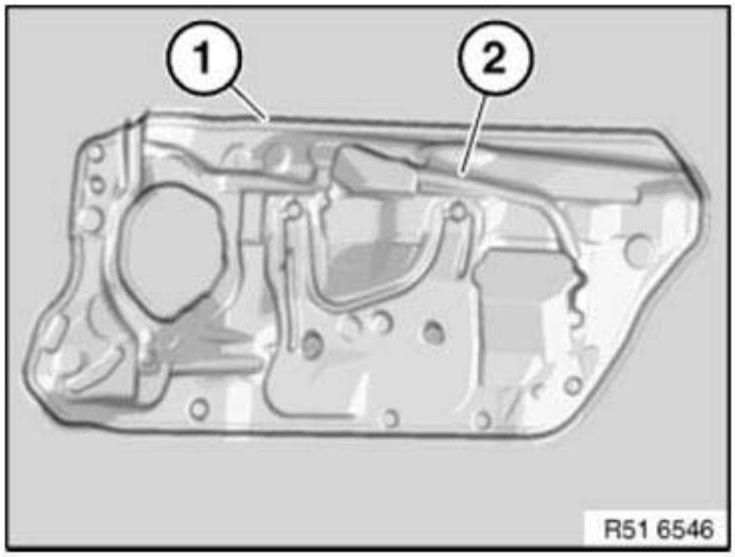


Fig. 427: Identifying Butyl Cord On Sound Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: There is a 2 cm wide edge (2) all round on sound insulation (1).

Stick on butyl cord (3) centrally in this area.

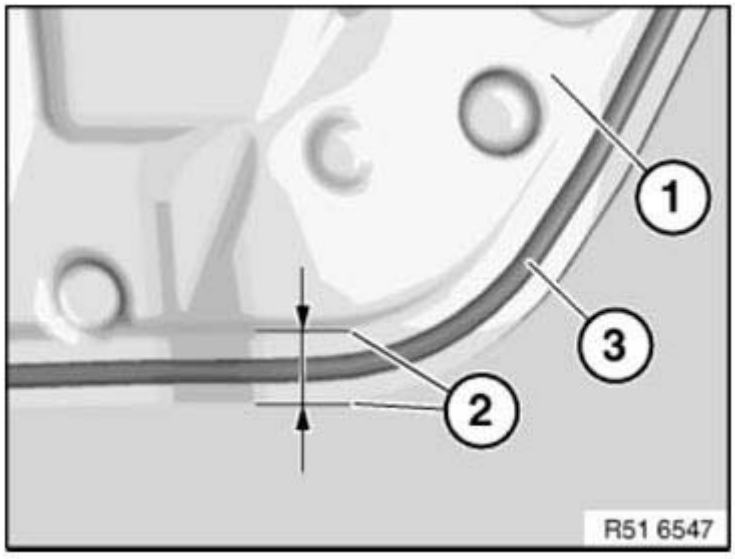


Fig. 428: Identifying 2 cm Wide Edge On Sound Insulation And Butyl Cord
Courtesy of BMW OF NORTH AMERICA, INC.

51 48 ... REMOVING AND INSTALLING/REPLACING SOUND INSULATION ON COWL PANEL OR WINDSCREEN

Sound insulation can only be replaced with the following removed:

- **INSTRUMENT PANEL** or
- **WINDSCREEN**

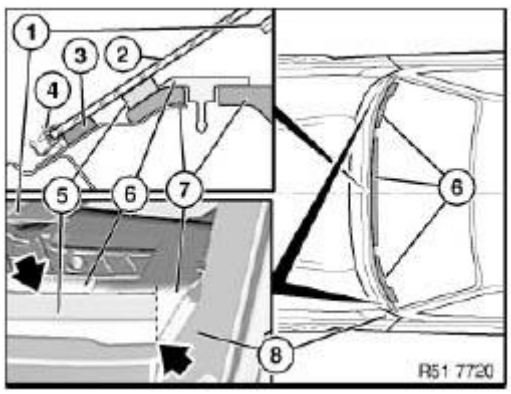


Fig. 429: Identifying Expanding Foam Tape, Adhesive Bead And Sound Insulation On Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Press down, or with replacement bond, expanding foam tape (5) just before installing the windscreen (2) with special tool 51 0 300 . Relaxed expanding foam tape could crush cement bead (3) (leaks, wind noises).

Replacement

Stick new expanding foam tape (5) on sound insulation (7) along press-down elements (6).

Expanding foam tape (5) may only be stuck up to corner point of sound insulation (7).

1. Dashboard trim panel
2. Windscreen
3. Adhesive bead
4. Retaining strip, bottom
5. Expanding foam tape (sound insulation, cowl panel)
6. Press-down for sound insulation (7)
7. Sound insulation, bulkhead upper section
8. Side frame

51 48 ... REMOVING AND INSTALLING/REPLACING SOUND INSULATION ON COWL PANEL/WINDSCREEN

NOTE: Sound insulation is only fitted in vehicles with diesel engines.

Sound insulation can only be replaced with the following removed:

- **Instrument panel or**
- **WINDSCREEN**

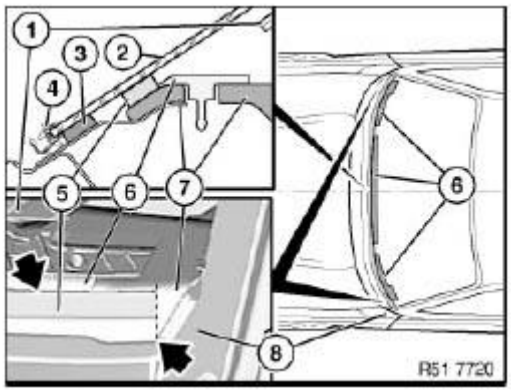


Fig. 430: Identifying Expanding Foam Tape, Adhesive Bead And Sound Insulation On Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Press down expanding foam tape (5) shortly before installing windscreen (2) (with hand roller) or stick on if replacing. Relaxed expanding foam tape could crush cement bead (3) (leaks, wind noises).

Replacement

Stick new expanding foam tape (5) on sound insulation (7) along press-down elements (6).

Expanding foam tape (5) may only be stuck up to corner point of sound insulation (7).

1. Dashboard trim panel
2. Windscreen
3. Adhesive bead
4. Retaining strip, bottom
5. Expanding foam tape (sound insulation, cowl panel)
6. Press-down elements for (7)
7. Sound insulation, bulkhead upper section
8. Side frame

5149 REAR LID TRIM PANEL

51 49 000 REMOVING AND INSTALLING OR REPLACING TRIM FOR REAR LID

Remove warning triangle (1).

Release screws underneath.

Lift out expanding rivets (2).

US version only:

Pass emergency release (3) through rear lid trim (4).

Remove rear lid trim (4).

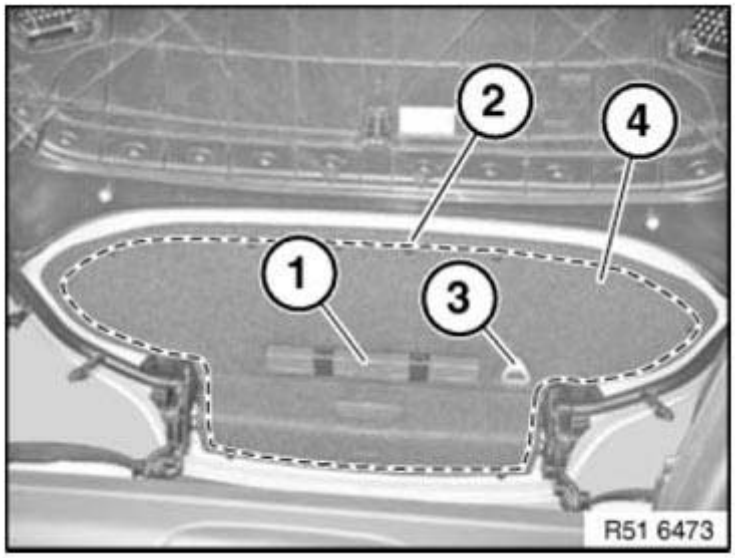


Fig. 431: Identifying Warning Triangle, Expanding Rivets, Emergency Release And Rear Lid Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace faulty expanding rivets (2).

5161 REINFORCEMENT, BODY

51 61 011 REMOVING AND INSTALLING/REPLACING V-STRUT, FRONT AXLE CARRIER, LEFT OR RIGHT

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle

Driving without V-struts is not permitted!

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

Release bolt (1).

Tightening torque **51 71 10AZ** .

Release bolt (2).

Tightening torque **51 71 10AZ** .

Release bolt (3).

Tightening torque **51 71 10AZ** .

Remove V-strut (4) towards front.

Installation:

Replace bolts.

Make sure bolts are installed in correct positions.

- Bolt (1) M12x30
- Bolt (2) M10x33
- Bolt (3) M10x45

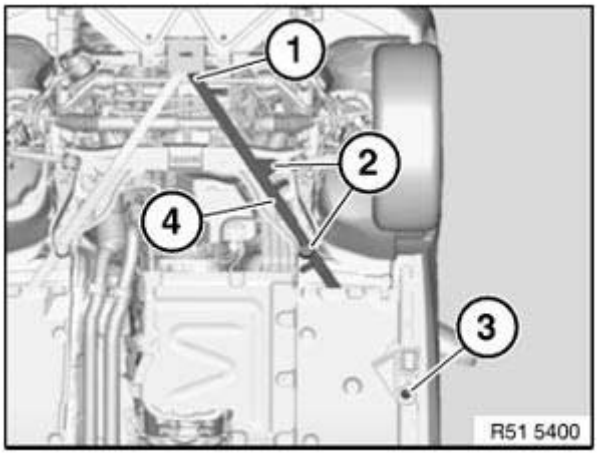


Fig. 432: Identifying V-Strut With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 482 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT

IMPORTANT: Vehicles must not be driven without tension struts.

Driving without tension struts may damage the vehicle body.

Tension strut bolts must be tightened to torque and then tightened down with special tool 00 9 120 .

Tension strut, left and right

Release bolts (1, 2) and nuts (3) and remove tension strut (4).

Installation:

Replace bolts (1 and 2).

- Bolt (1) M10x50

  Tightening torque **51 71 29AZ** .

- Bolt (2) M8x35

  Tightening torque **51 71 30AZ** .

- Nut (3)

Tightening torque **51 71 31AZ** .

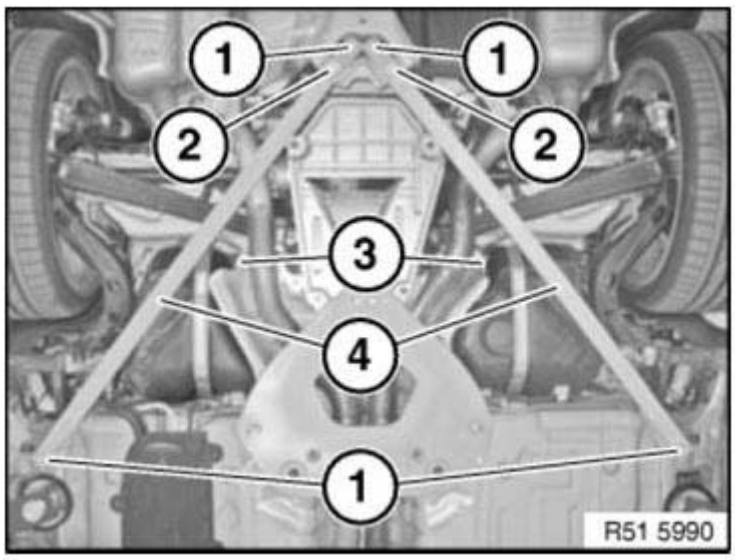


Fig. 433: Identifying Tension Strut With Bolts And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 390 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE ON REAR AXLE

IMPORTANT: Vehicles must not be driven without reinforcement plates.

Driving without the reinforcement plate may damage the vehicle body.

Screws of reinforcement plate must be tightened to torque and then tightened

down with special tool 00 9 120 .

Release screws (1) and remove heat shield (2).

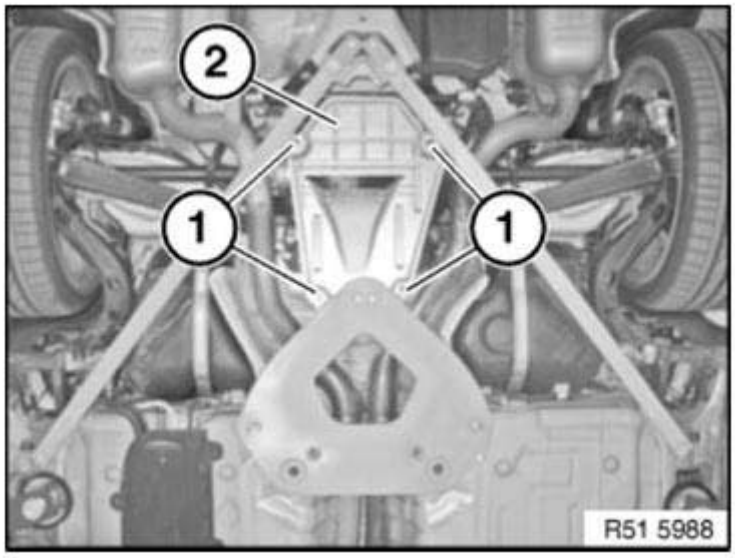


Fig. 434: Identifying Heat Shield With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 71 24AZ** .

Unscrew nuts (2).

Tightening torque **51 71 25AZ** .

Unscrew nuts (3).

Tightening torque **51 71 26AZ** .

Remove thrust panel (reinforcement plate) (4).

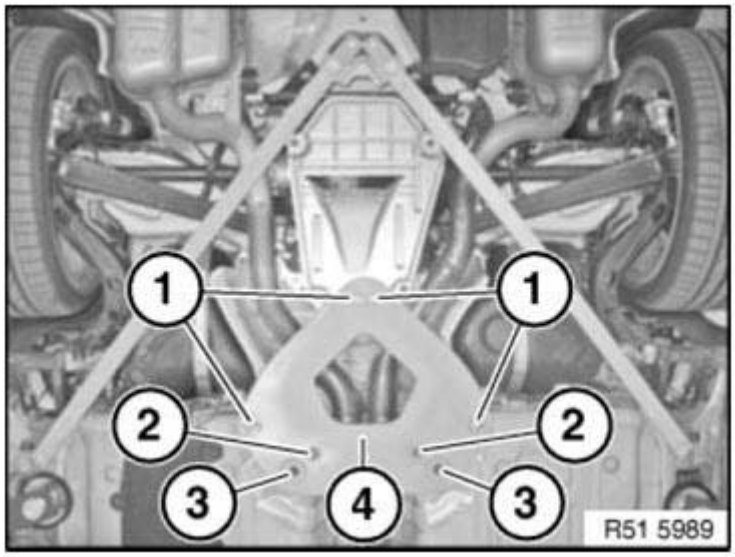


Fig. 435: Identifying Thrust Panel (Reinforcement Plate) With Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace screw (1).

- Tighten down screws (1) to specified torque and then to angle of rotation.

51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME

IMPORTANT: Vehicles must not be driven without tension struts.

Driving without tension struts may damage the vehicle body.

Tension struts can be secured with screws or nuts.

Screws must be tightened to specified torque and then tightened down with special tool 00 9 120 .

Release screw (1).

Lift out expanding rivets (2).

Remove cable holder (3).

Release screws (4).

Tightening torque **51 71 4AZ** .

Installation:

Replace screws (4), tighten to specified torque and then to angle of rotation.

Remove tension strut (5).

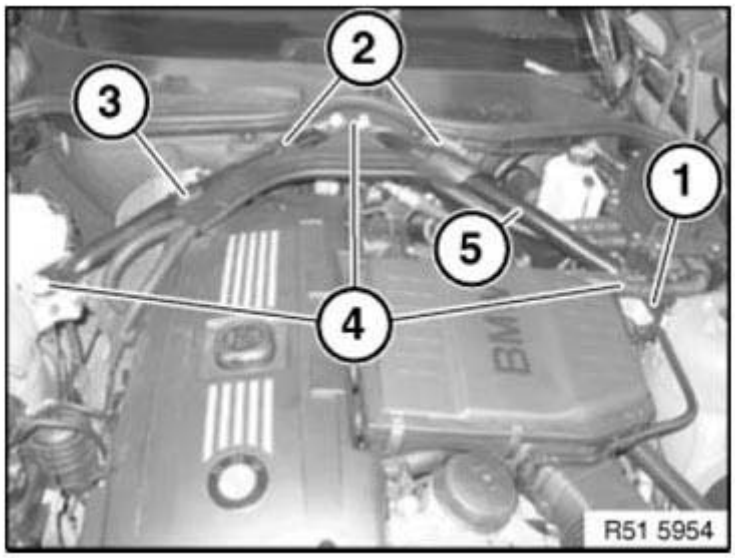


Fig. 436: Identifying Tension Strut With Expanding Rivets, Cable Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

5164 FRONT PANEL, FRONT END

51 64 035 REMOVING AND INSTALLING/REPLACING CROSS-MEMBER UPPER SECTION (CONNECTION OF BOTH FRONT WHEEL ARCHES)

Necessary preliminary tasks

- Remove **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N52K)** or **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)** .

Release screws (1).

Tightening torque **51 71 23AZ** .

Remove cross-member (2).

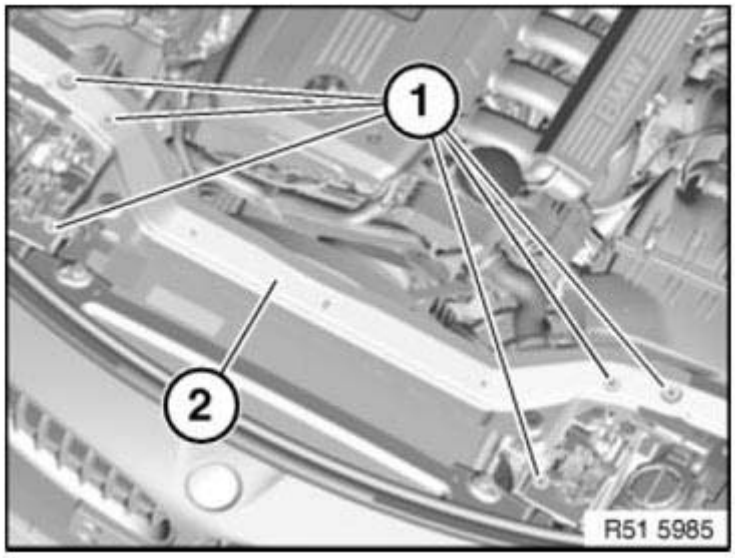


Fig. 437: Identifying Cross-Member With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 64 040 REMOVING AND INSTALLING/REPLACING FRONT BUMPER MOUNTING

Necessary preliminary tasks

- Remove **BUMPER TRIM**
- Remove intake duct on intake silencer housing. See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N52K)** or **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)** .

Release screws (1).

Tightening torque **51 11 2AZ** .

V-support (2) remains on vehicle.

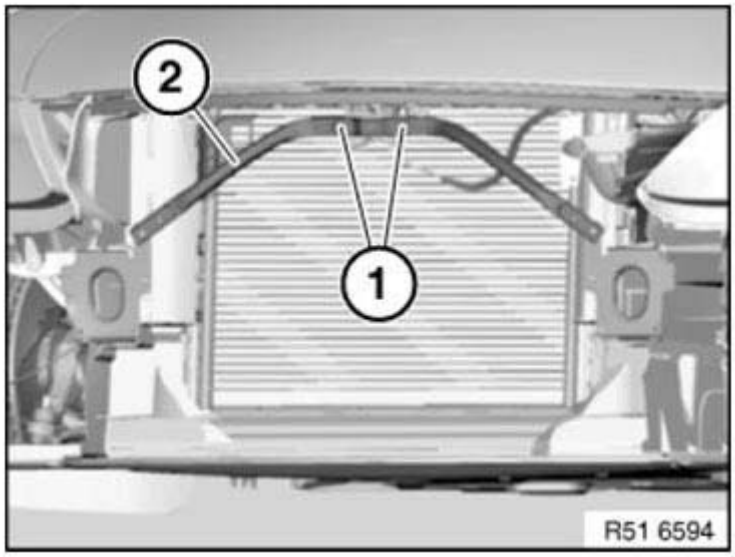


Fig. 438: Identifying V-Support With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 11 1AZ** .

Remove bumper mounting (2).

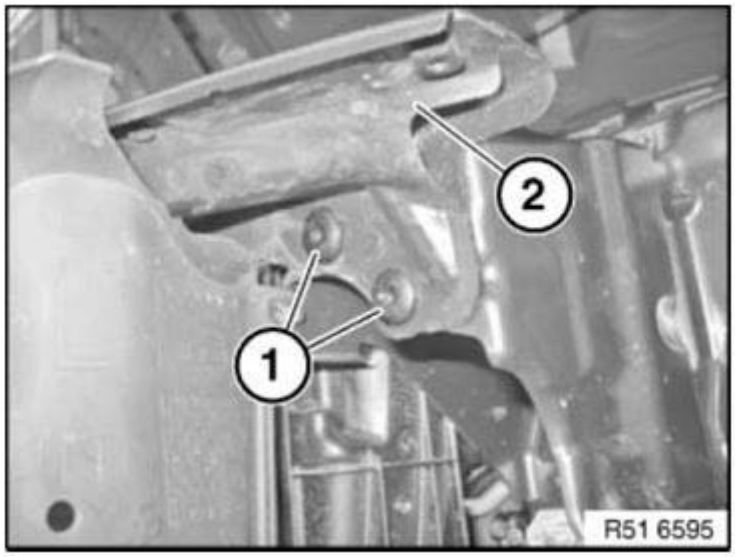


Fig. 439: Identifying Bumper Mounting And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 64 010 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT V-SUPPORT

Necessary preliminary tasks

- Remove **BUMPER TRIM**

NOTE: Pictured without bumper trim carrier.

Release screws (1).

Remove V-support (2).

Tightening torque **51 11 2AZ** .

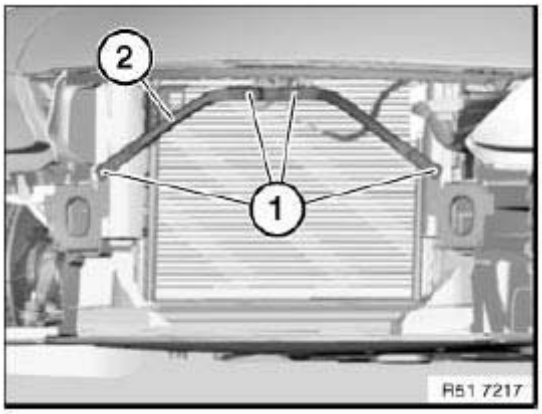


Fig. 440: Identifying V-Support And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

41 33 051 REPLACING LEFT FRONT PANEL

Necessary preliminary tasks

- Remove **DEFORMATION ELEMENT FOR BUMPER**
- Remove **CROSS-MEMBER UPPER SECTION**
- Remove **FRONT BUMPER MOUNTING**
- Remove engine compartment lid lock See **5123110 REMOVING AND INSTALLING/REPLACING LEFT BONNET LOCK** or **5123100 REMOVING AND INSTALLING/REPLACING RIGHT ENGINE HOOD/BONNET LOCK**
- Remove sensor . See **6577532 REMOVING AND INSTALLING/REPLACING FRONT LEFT SENSOR (US VERSION ONLY)** or **6577534 REMOVING AND INSTALLING/REPLACING FRONT RIGHT SENSOR (US VERSION ONLY)** .

Release screws (1).

Tightening torque **51 64 1AZ** .

Remove headlight mounting (2).

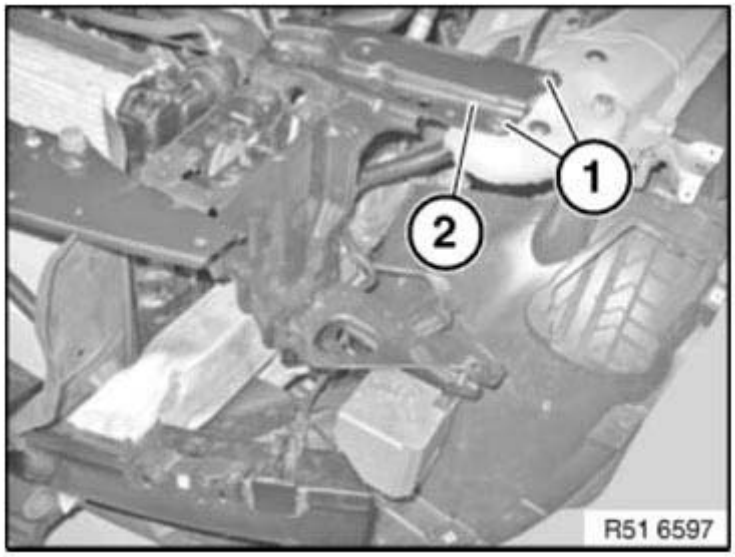


Fig. 441: Identifying Headlight Mounting With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

41 33 052 REPLACING RIGHT FRONT PANEL

Operations correspond to:

REPLACING LEFT FRONT PANEL

5171 GASKETS, SEALS, LOOSE BODY COMPONENTS

51 70 ... FITTING SEALS

NOTE: All seals on the vehicle must be removed with the utmost care. Incorrect fitting may result in among other things wind noises and water ingress, and may compromise closing and opening comfort.

- **The following instructions always apply:**

  Seals which are attached to the side frame can be removed and fitted as often as desired.

- Seals must not be damaged or cracked.

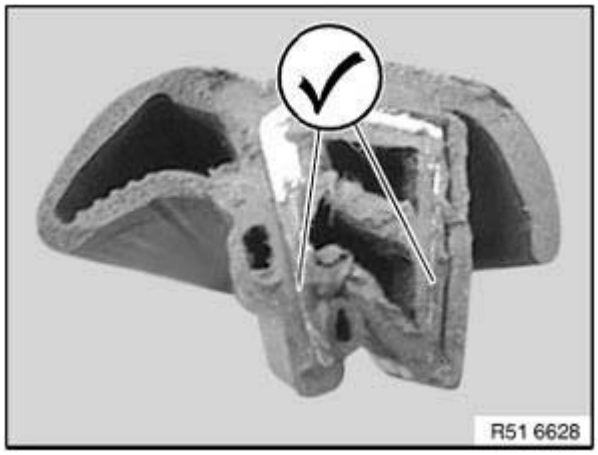


Fig. 442: Identifying Correct Position For Fitting Seals
Courtesy of BMW OF NORTH AMERICA, INC.

- The clamping area must be pressed together by hand to such an extent that rigid attachment to the side flange is still possible. The sides of the seal are permitted to touch each other slightly. A fully compressed seal is not permitted.
- A special tool to press the clamping area together is not needed. Careful fitting by hand is sufficient.
- The seals must always be fitted over their full extent. There is no defined pressing force.
- If seals are repeatedly removed and fitted in the rear lid area, a new seal must be fitted (water ingress in event of sheet flaws).

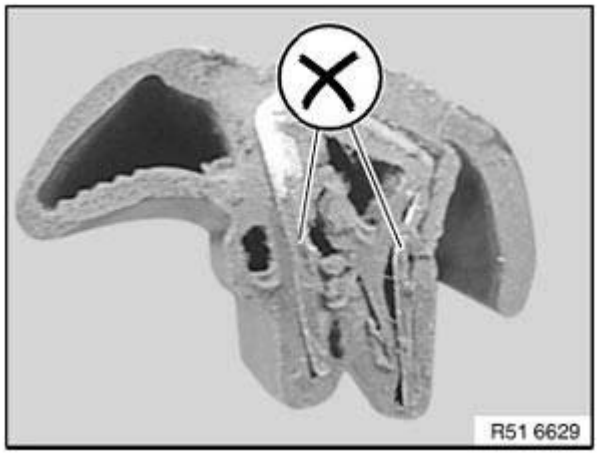


Fig. 443: Identifying Improper Position For Fitting Seals
Courtesy of BMW OF NORTH AMERICA, INC.

- Seals must be checked after fitting for correct seating. If necessary, the seals must be lifted over the adjacent components with a suitable tool. Adjacent components must not be damaged.
- Seals must be replaced when the metal insert in the seal is visible (corrosion).
- The clamping area must be uniform.

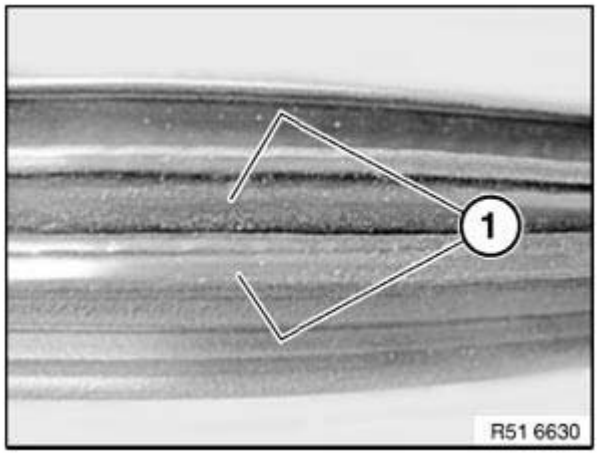


Fig. 444: Identifying Clamping Area
Courtesy of BMW OF NORTH AMERICA, INC.

- Joint seals which are fitted with plastic clips must rest rigidly on the body. Otherwise, the clips or the joint seal must be replaced.

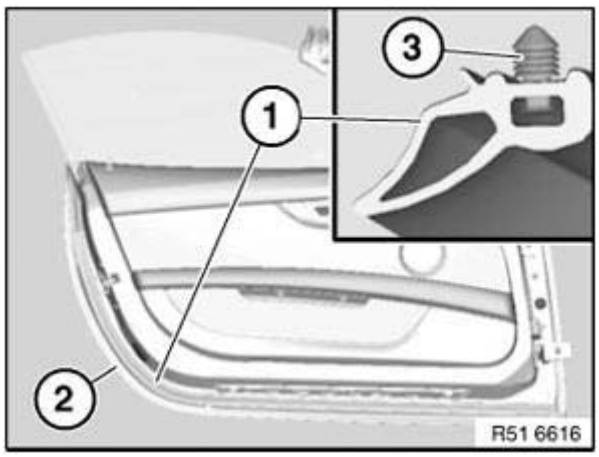


Fig. 445: Identifying Joint Seal With Plastic Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 13 115 REMOVING AND INSTALLING/REPLACING COWL PANEL COVER

Necessary preliminary tasks

- Remove **BOTH WINDSCREEN WIPER ARMS**

Disengage catch (1).

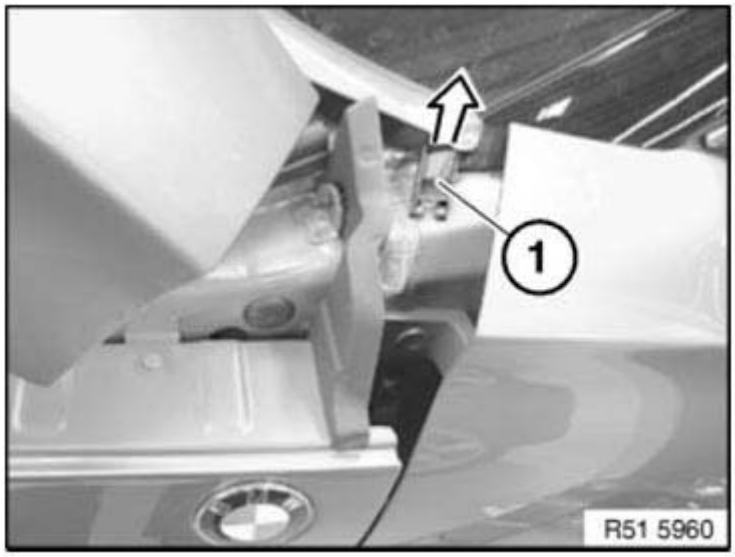


Fig. 446: Removing Catch
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable from cable holder (1).

Remove clips (2) and remove cowl panel cover.

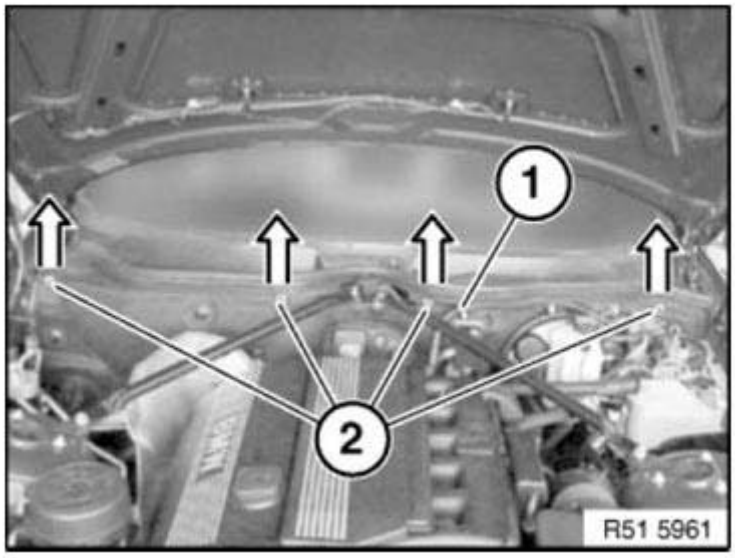


Fig. 447: Removing Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, replace defective grommets (1).

Check holder (2) for correct seating.

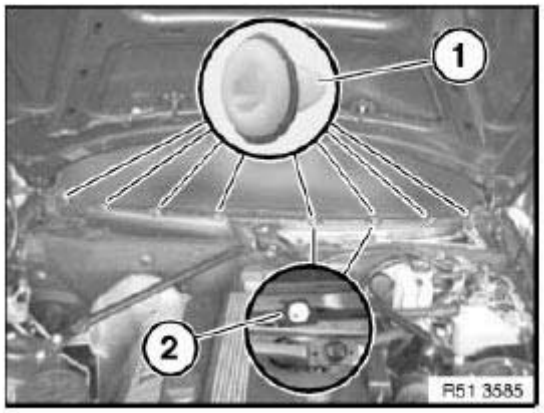


Fig. 448: Identifying Defective Grommets With Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clips (1) must not be missing or damaged.

Retaining tabs (2) must not be damaged

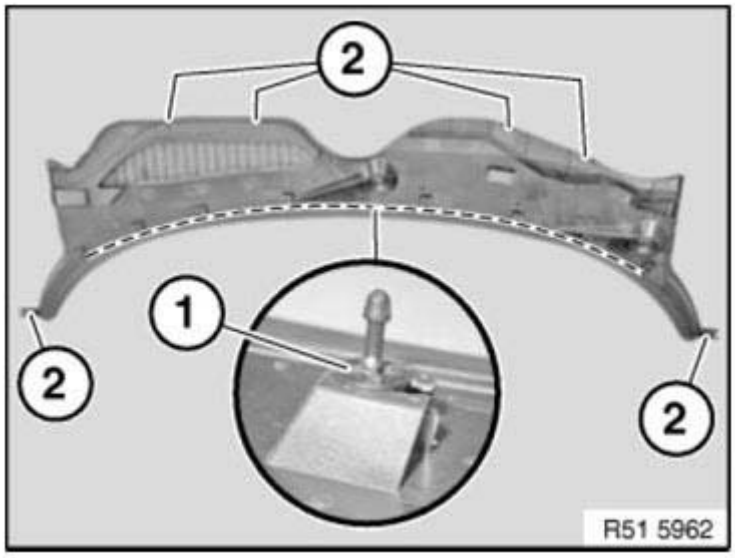


Fig. 449: Identifying Clips And Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 000 REMOVING AND INSTALLING/REPLACING SEAL ON FRONT DOOR, LEFT OR RIGHT

Pull joint seal (1) off door (2).

Installation:

If necessary, lever out clips (3) remaining in door.

If necessary, replace faulty clips (3).

Slide clips (3) into joint seal (1).

Clip joint seal (2) onto bodyshell.

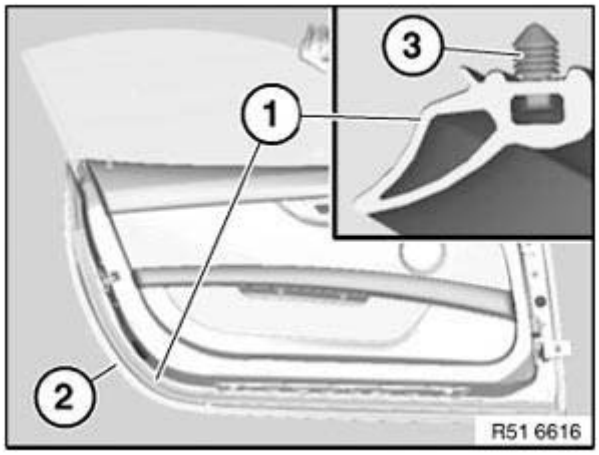


Fig. 450: Identifying Joint Seal With Plastic Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Lever off side panel shaft seal (1) towards top and unclip.

Remove door seal (2) from body (3).

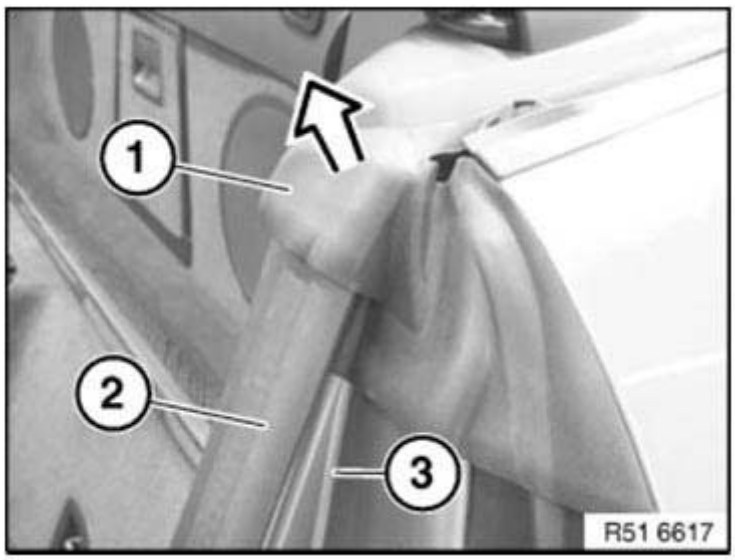


Fig. 451: Removing Side Panel Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert clip (2) in window cavity cover strip (1) if this remains on trim (3) during removal.

Clip window cavity cover strip (1) on trim (3) and body (4).

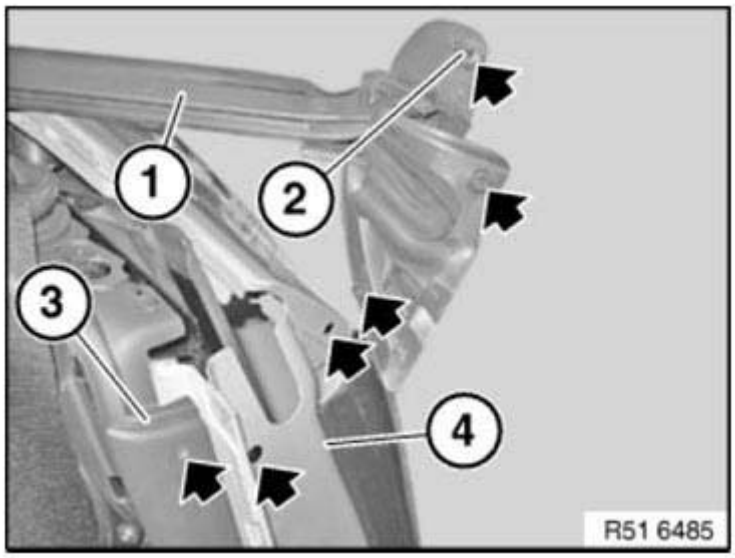


Fig. 452: Identifying Window Cavity Cover Strip With Trim And Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Lever off A-pillar seal (1) towards top.

Remove door seal (2) from body (3).

Installation:

- Observe **FITTING OF SEALS**

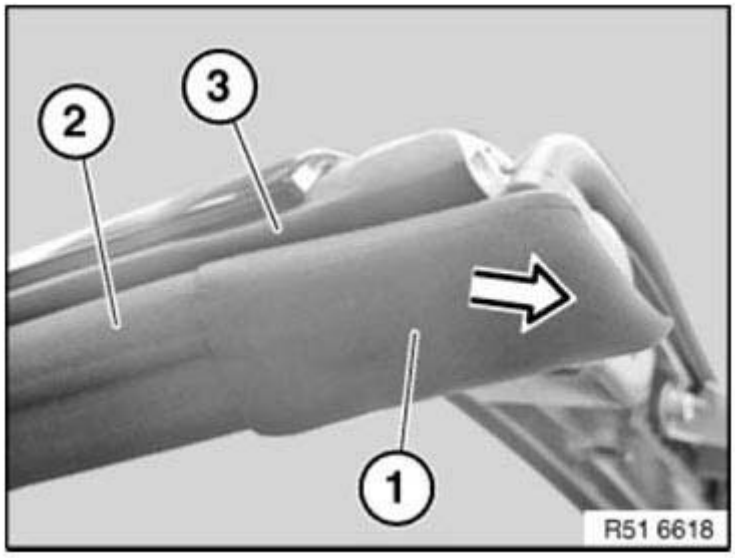


Fig. 453: Removing A-Pillar Seal
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 447 REMOVING AND INSTALLING OR REPLACING PANEL FOR COVER ON LEFT OR RIGHT SIDE MEMBER

Release screws (1 and 2).

Release clips (3).

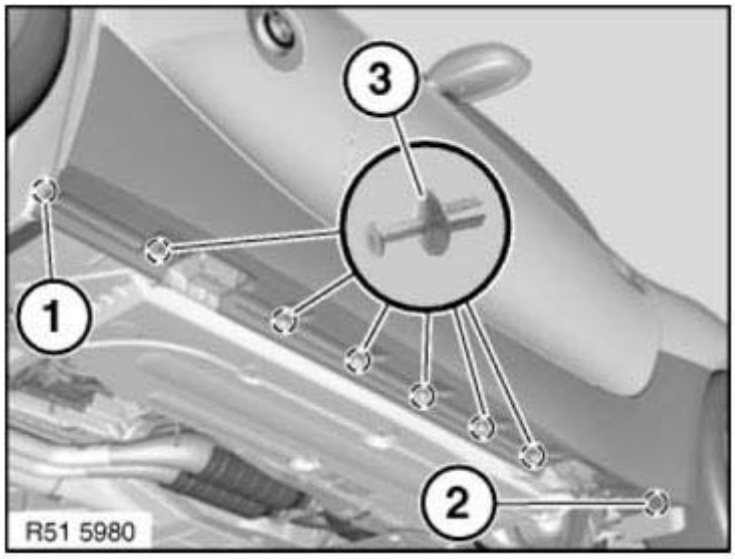


Fig. 454: Identifying Screws And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip panel (1) in areas (A and B) from holders in direction of arrow.

Release panel (1) at clips (2) and remove in direction of arrow.

Installation:

Catches of panel (1) in areas (A and B) must not be damaged.

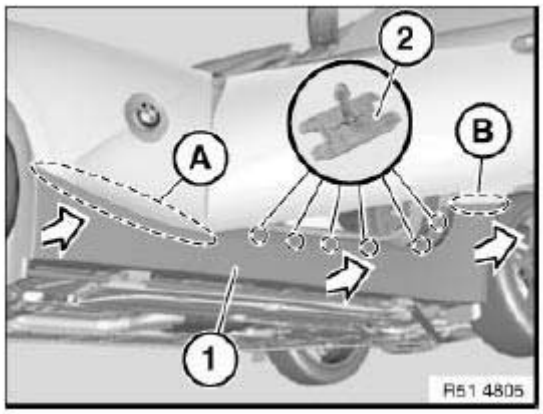


Fig. 455: Removing Panel From Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Holders (1 and 2) must not be damaged.

If necessary, detach clips (3) from body and attach to panel for cover on side member.

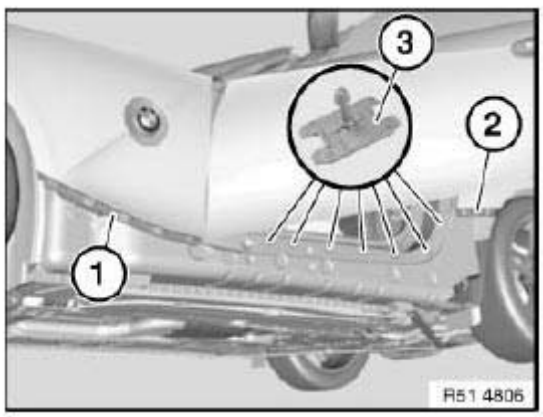


Fig. 456: Identifying Holders And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure seal (1) is correctly seated on body and after assembly pay attention to **GAP DIMENSIONS** .

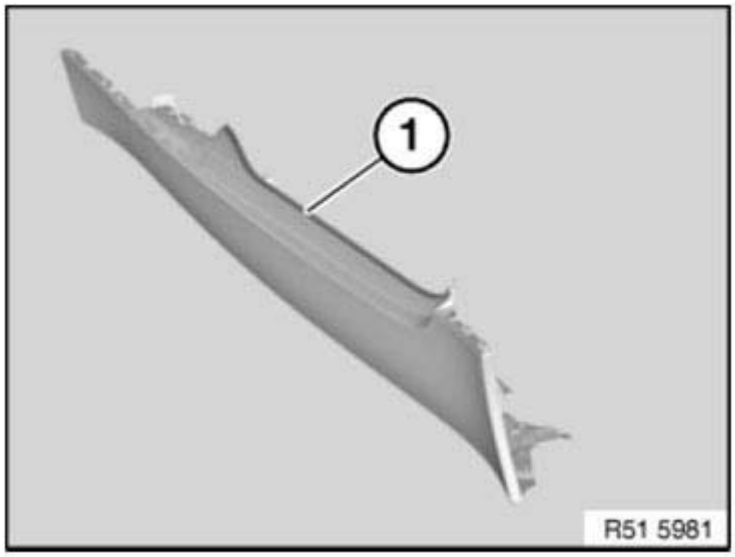


Fig. 457: Identifying Seal On Body
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 038 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH COVER (FRONT SECTION)

NOTE: Prior to removing, pay attention to the exact installation position with respect to the adjoining components.

Necessary preliminary tasks:

- Remove **FRONT WHEEL**

Unscrew all bolts.

Unscrew nuts (1).

Remove cover (2).

Installation:

Make sure cover (2) is correctly seated.

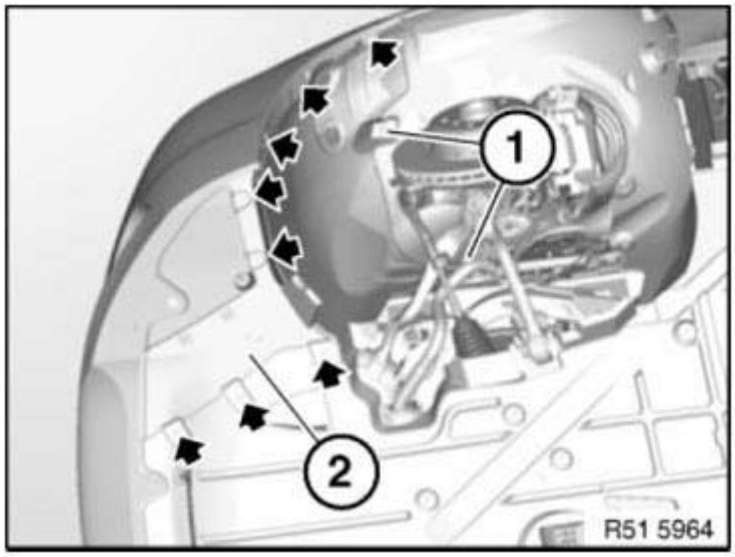


Fig. 458: Identifying Wheel Arch Cover With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Feed out wheel arch cover (2) towards bottom.

Installation:

Make sure wheel arch cover (2) is exactly seated.

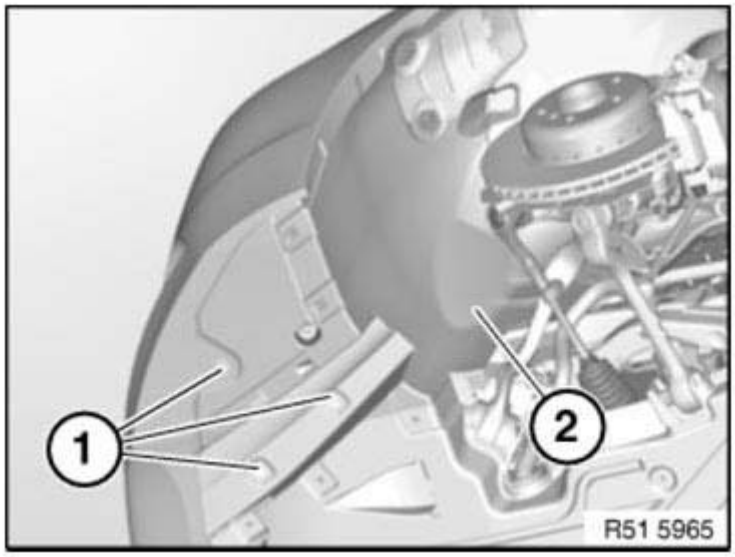


Fig. 459: Identifying Wheel Arch Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 039 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT WHEEL ARCH

COVER (REAR SECTION)

NOTE: Prior to removing, pay attention to the exact installation position with respect to the adjoining components.

Necessary preliminary tasks:

- Remove **FRONT WHEEL**

Release all nuts.

Release screw (1).

Lever out clips (2).

Remove cover (3).

Installation:

Make sure cover (3) is correctly seated.

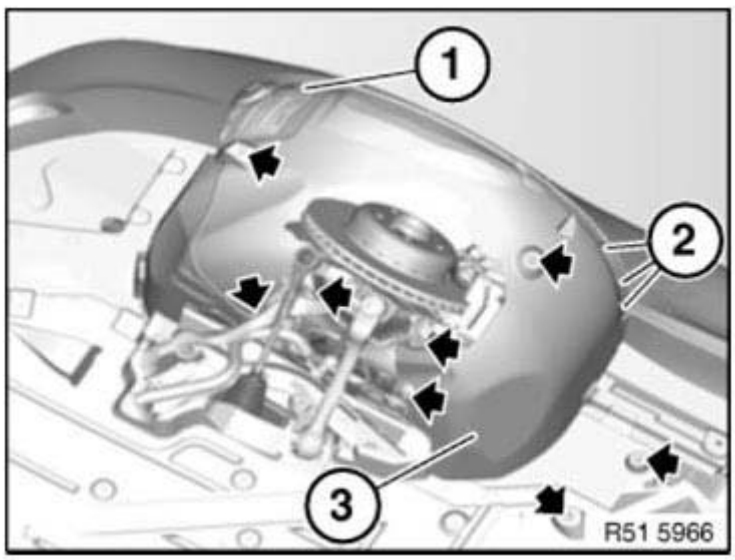


Fig. 460: Identifying Wheel Arch Cover With Screw And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 ... REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT DIAGONAL STRUT

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**
- Remove **COOLANT EXPANSION TANK**

- Remove **INTAKE FILTER HOUSING**

Release screws and nuts (1).

Tightening torque **51 71 27AZ** .

Remove diagonal struts (2).

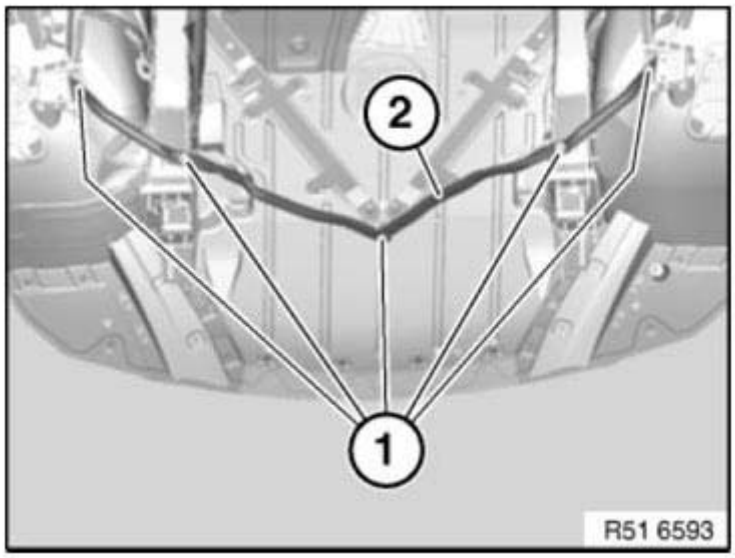


Fig. 461: Identifying Diagonal Struts With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 482 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT

IMPORTANT: Vehicles must not be driven without tension struts.

Driving without tension struts may damage the vehicle body.

Tension strut bolts must be tightened to torque and then tightened down with special tool 00 9 120.

Tension strut, left and right

Release bolts (1, 2) and nuts (3) and remove tension strut (4).

Installation:

Replace bolts (1 and 2).

- Bolt (1) M10x50

Tightening torque **51 71 29AZ** .

- Bolt (2) M8x35

  Tightening torque **51 71 30AZ** .

- Nut (3)

Tightening torque **51 71 31AZ** .

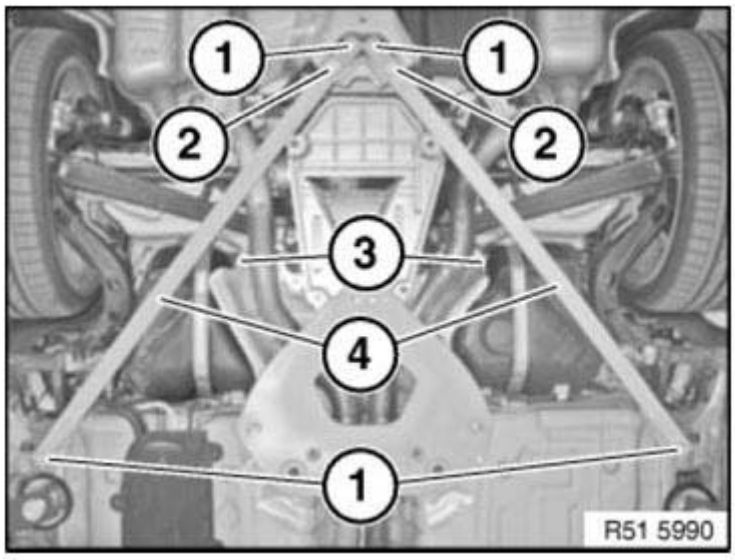


Fig. 462: Identifying Tension Strut With Bolts And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 041 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT WHEEL ARCH COVER

Necessary preliminary tasks

- Remove **REAR WHEEL**

Release all nuts (1).

Remove cover (2).

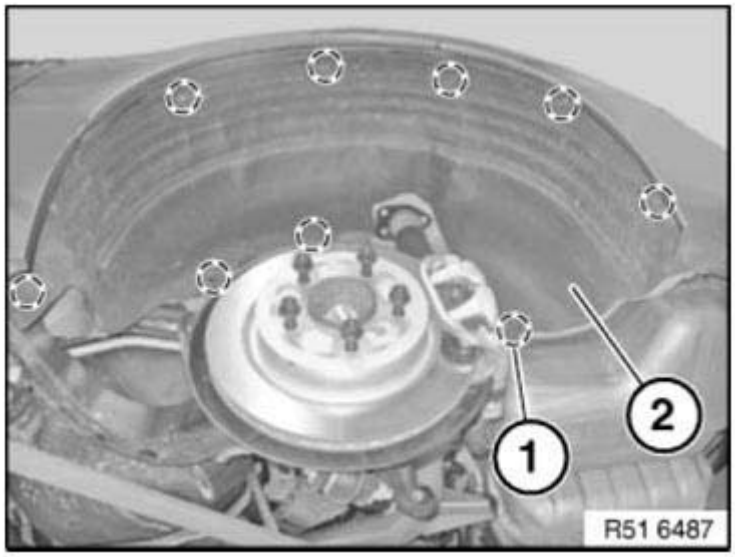


Fig. 463: Identifying Wheel Arch Cover And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carefully lift in wheel arch cover (1) with special tool 00 9 317 .

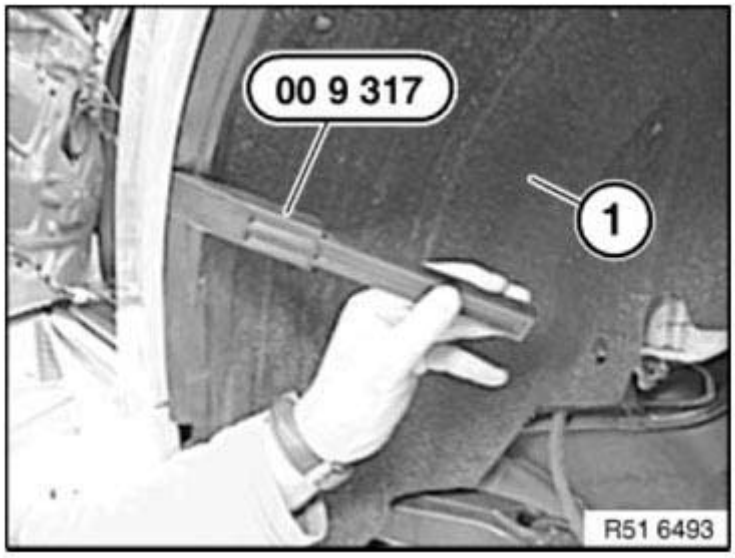


Fig. 464: Lifting Wheel Arch Cover Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 ... REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT WHEEL ARCH SPLASH GUARD

Release screw and nut (1).

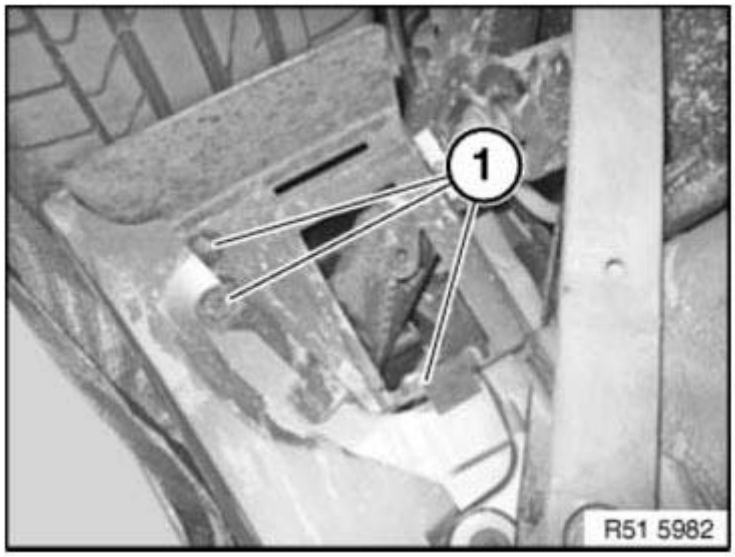


Fig. 465: Identifying Wheel Arch Splash Guard Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable holder (1).

Remove splash guard (2).

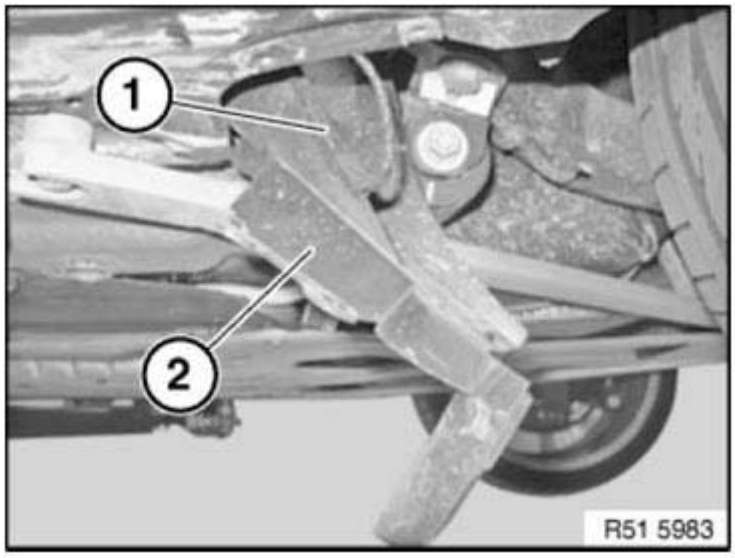


Fig. 466: Identifying Splash Guard With Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Engage lug for cable (1) on stud (2).

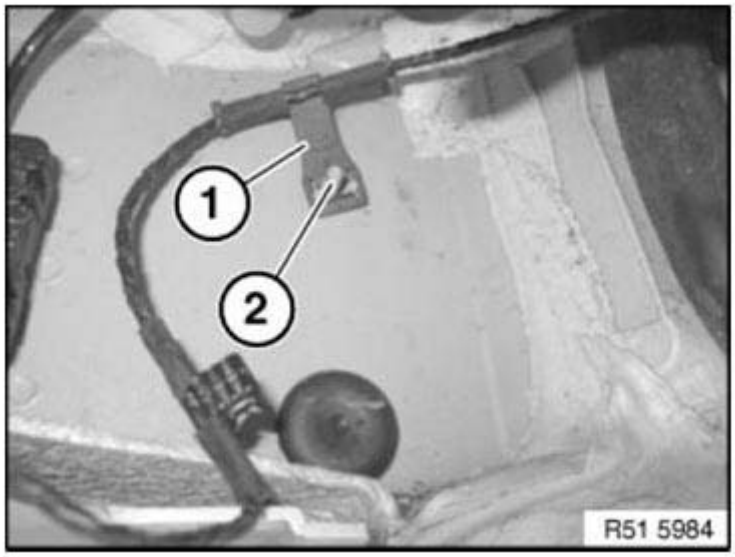


Fig. 467: Identifying Cable On Stud
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 390 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE ON REAR AXLE

IMPORTANT: Vehicles must not be driven without reinforcement plates.

Driving without the reinforcement plate may damage the vehicle body.

Screws of reinforcement plate must be tightened to torque and then tightened down with special tool 00 9 120 .

Release screws (1) and remove heat shield (2).

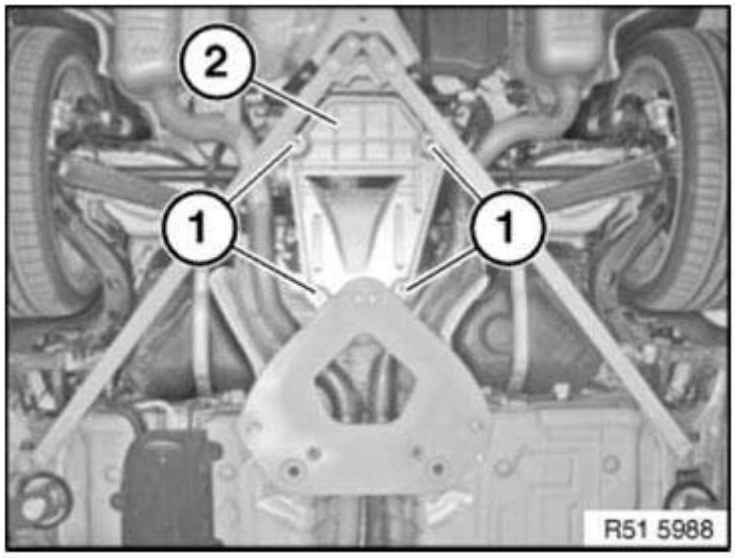


Fig. 468: Identifying Heat Shield With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 71 24AZ** .

Unscrew nuts (2).

Tightening torque **51 71 25AZ** .

Unscrew nuts (3).

Tightening torque **51 71 26AZ** .

Remove thrust panel (reinforcement plate) (4).

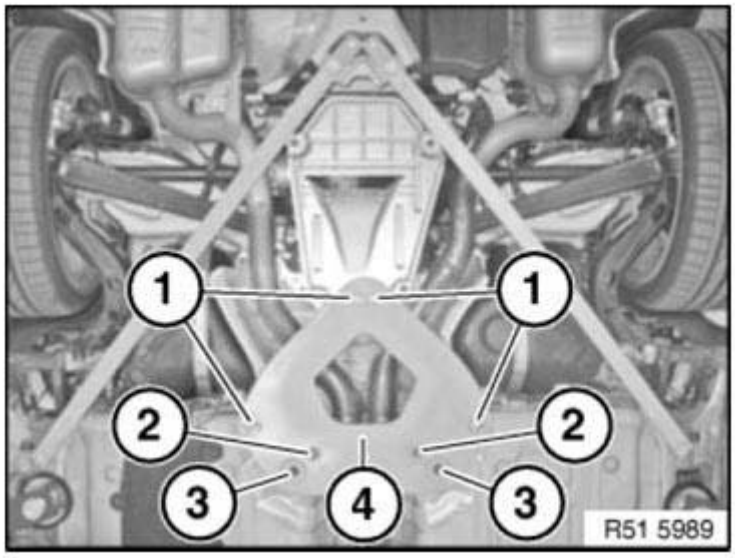


Fig. 469: Identifying Thrust Panel (Reinforcement Plate) With Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace screw (1).

- Tighten down screws (1) to specified torque and then to angle of rotation.

51 71 360 REMOVING AND INSTALLING/REPLACING SEAL FOR REAR LID

Necessary preliminary tasks

- If necessary, open folding roof
- If necessary, open luggage compartment lid

The right side is removed in the same way as the left side.

Release screws (1).

Remove seal (2).

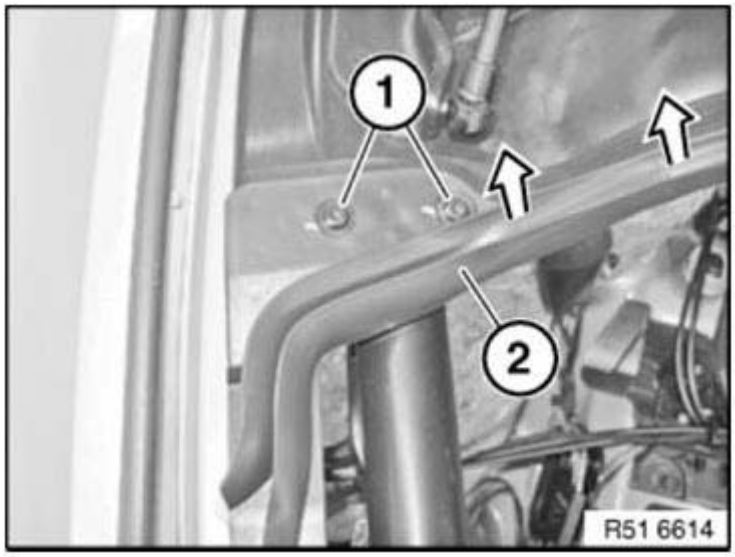


Fig. 470: Removing Seal
Courtesy of BMW OF NORTH AMERICA, INC.

The right side is removed in the same way as the left side.

Release screw (1).

Lever off seal (2).

Lever off seal (3).

Installation:

- Observe **FITTING OF SEALS**

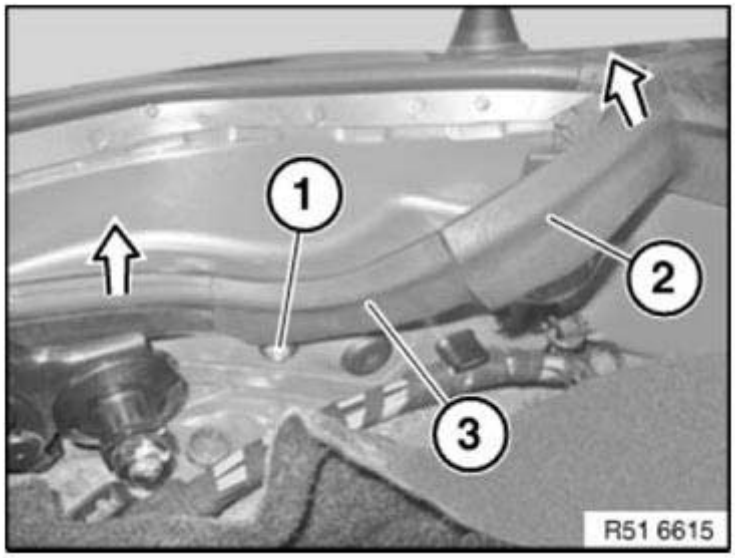


Fig. 471: Removing Seal
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME

IMPORTANT: Vehicles must not be driven without tension struts.

Driving without tension struts may damage the vehicle body.

Tension struts can be secured with screws or nuts.

Screws must be tightened to specified torque and then tightened down with special tool 00 9 120 .

Release screw (1).

Lift out expanding rivets (2).

Remove cable holder (3).

Release screws (4).

Tightening torque **51 71 4AZ** .

Installation:

Replace screws (4), tighten to specified torque and then to angle of rotation.

Remove tension strut (5).

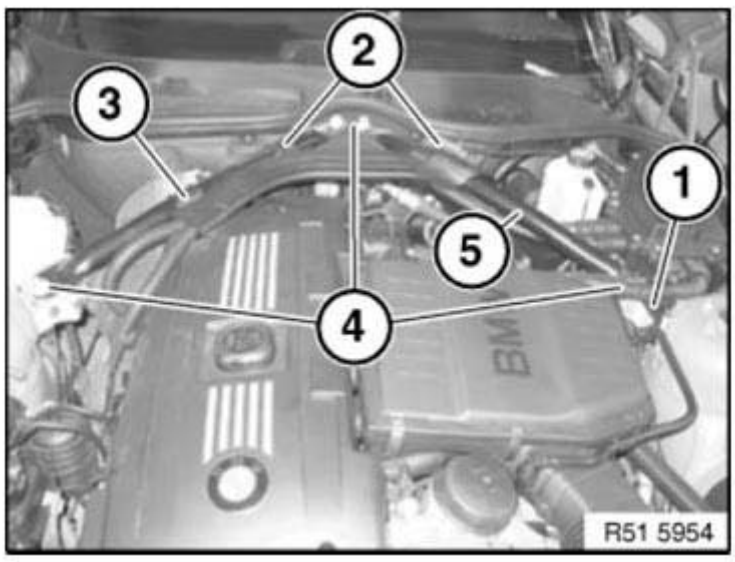


Fig. 472: Identifying Tension Strut With Expanding Rivets, Cable Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

51 76 040 REMOVING AND INSTALLING/REPLACING WINDOW FRAME SEAL

Necessary preliminary tasks

- Open folding roof
- Remove **TRIM STRIPS FROM WATER GUTTER**

IMPORTANT: Seal (1) features an aluminum strip (3).

Carefully wind out seal (1) (windscreen breakage).

Release all screws (2) on windscreen frame strip (3).

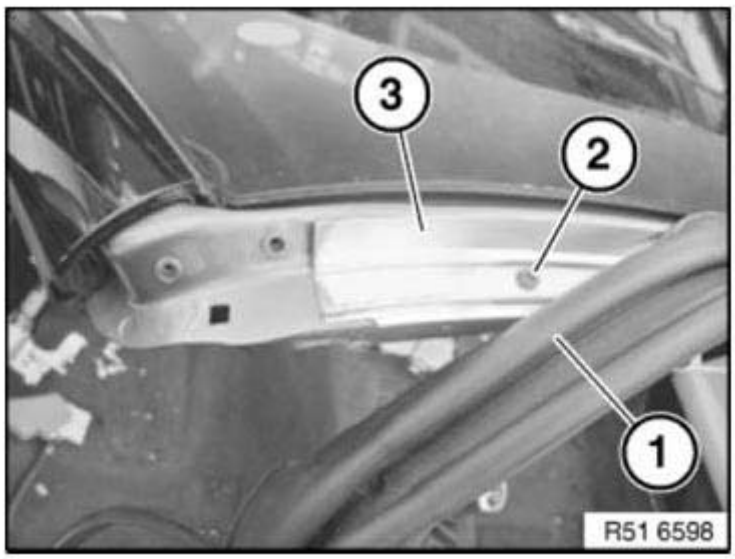


Fig. 473: Identifying Seal And Screws On Windscreen Frame Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

In order to ensure tightness, the butyl rope (1) must be placed between the upper and lateral aluminum profiled insert (2), see diagram.

Butyl rope:

Length = 60 mm

Dia. = 4 mm

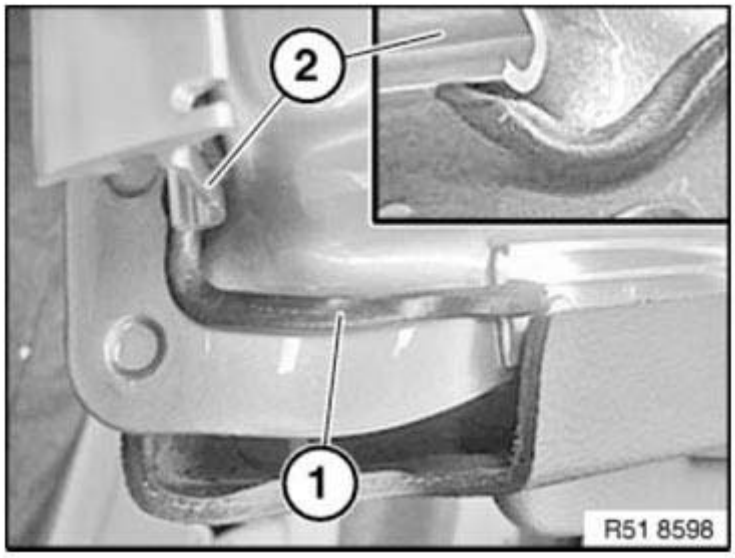


Fig. 474: Identifying Butyl Rope And Aluminum Profiled Insert
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert windscreen frame strip (1) over entire length into

A-pillar seal (2).

NOTE: Tear-off lip (3) can be stuck on adhesive.

When seal (2) is removed, tear-off lip (3) can tear off and remain in vehicle.

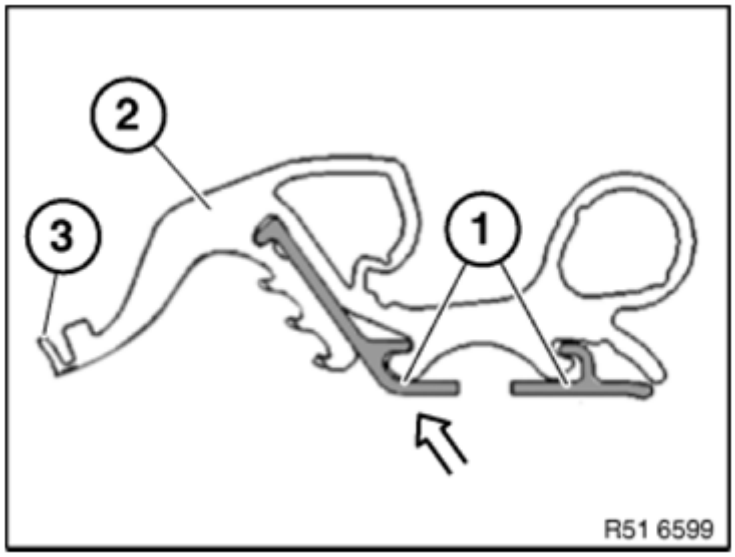


Fig. 475: Inserting Windscreen Frame Strip Over Entire Length

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement of seal without windscreen removal

Detach tear-off lip (3) from seal (2).

If adhesive leaks over tear-off lip (3), this area must be cut out partially.

To facilitate installation, coat seal (2) and body aperture with water.

Pay attention to centre marking when installing seal (2).

1 Aluminum strip

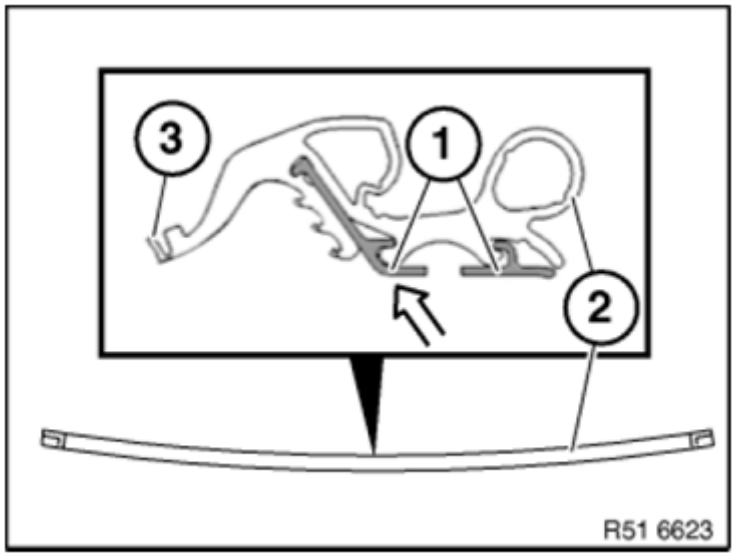


Fig. 476: Inserting Windscreen Frame Strip Over Entire Length
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement of seal frame with removed or new windscreen

Pay attention to centre marking when installing seal (2) with tear-off lip (3).

1 Aluminum strip

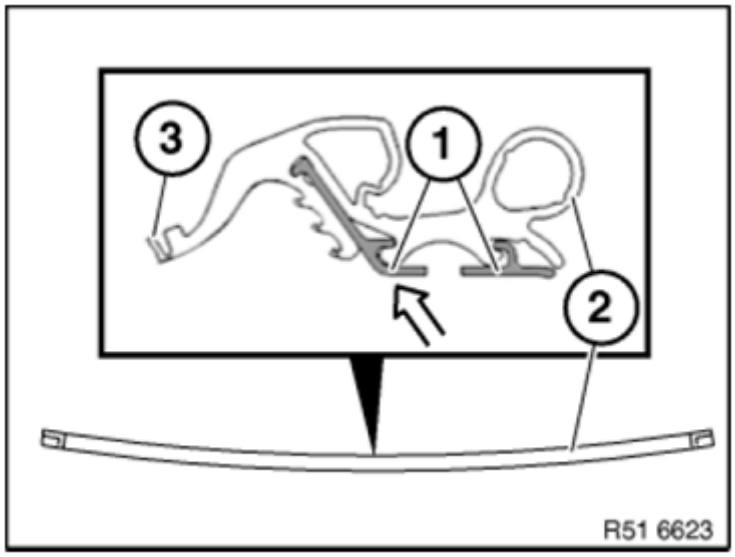


Fig. 477: Inserting Windscreen Frame Strip Over Entire Length
Courtesy of BMW OF NORTH AMERICA, INC.

Check and if necessary adjust adjustment of windscreen frame seal to roof shell seal.

For necessary operations, refer to:

ADJUSTMENT OF WINDSCREEN FRAME SEAL

51 32 211 REPLACING FRONT LEFT OR RIGHT RUBBER GUIDE FOR LEFT OR RIGHT DOOR WINDOW

Necessary preliminary tasks

- Remove **INNER WINDOW CAVITY COVER STRIP**
- Remove **OUTER WINDOW CAVITY COVER STRIP**
- Remove **SOUND INSULATION** in front area

Pop rubber guide (1) in area (A) out of door.

Pull rubber guide (1) out of window guide rail and remove towards top.

Installation:

Moisten rubber guide (1) with water before fitting.

Slide rubber guide (1) from above into window guide rail and if necessary retighten at bottom.

Make sure rubber guide (1) is correctly seated on door and door window glass.

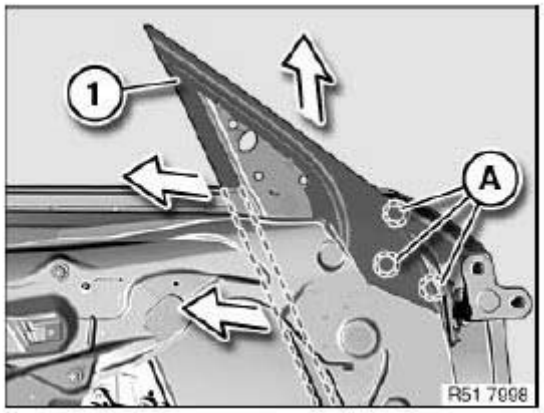


Fig. 478: Pulling Rubber Guide Out Of Window Guide Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat contact surface of window glass with Vaseline, especially in top corner (2).

Rubber guide (1) must not be damaged in corners (2).

If necessary, replace rubber guide.

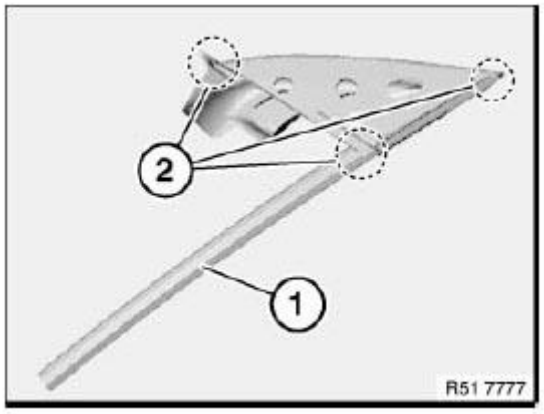


Fig. 479: Identifying Rubber Guide On Corners
Courtesy of BMW OF NORTH AMERICA, INC.

5172 MUCKET FOR DOORS

51 70 ... FITTING SEALS

NOTE: All seals on the vehicle must be removed with the utmost care. Incorrect fitting may result in among other things wind noises and water ingress, and may compromise closing and opening comfort.

- **The following instructions always apply:**

  Seals which are attached to the side frame can be removed and fitted as often as desired.

- Seals must not be damaged or cracked.

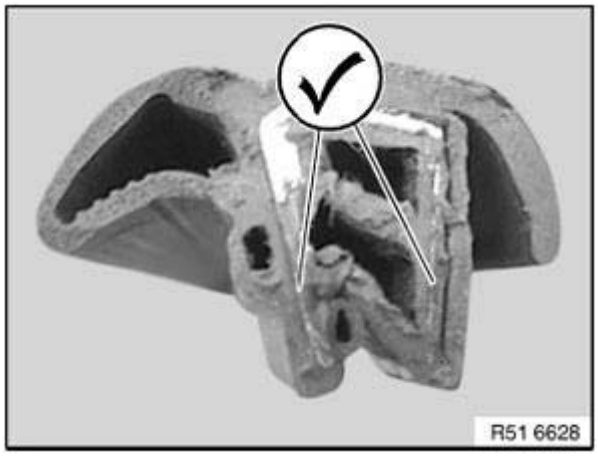


Fig. 480: Identifying Correct Position For Fitting Seals
Courtesy of BMW OF NORTH AMERICA, INC.

- The clamping area must be pressed together by hand to such an extent that rigid attachment to the side flange is still possible. The sides of the seal are permitted to touch each other slightly. A fully compressed seal is not permitted.
- A special tool to press the clamping area together is not needed. Careful fitting by hand is sufficient.
- The seals must always be fitted over their full extent. There is no defined pressing force.
- If seals are repeatedly removed and fitted in the rear lid area, a new seal must be fitted (water ingress in event of sheet flaws).

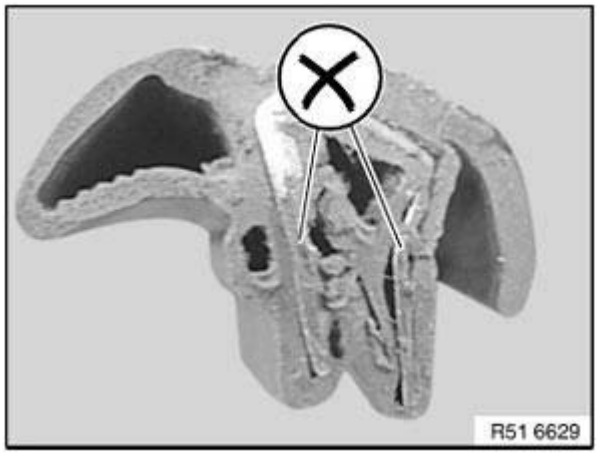


Fig. 481: Identifying Improper Position For Fitting Seals
Courtesy of BMW OF NORTH AMERICA, INC.

- Seals must be checked after fitting for correct seating. If necessary, the seals must be lifted over the adjacent components with a suitable tool. Adjacent components must not be damaged.
- Seals must be replaced when the metal insert in the seal is visible (corrosion).
- The clamping area must be uniform.

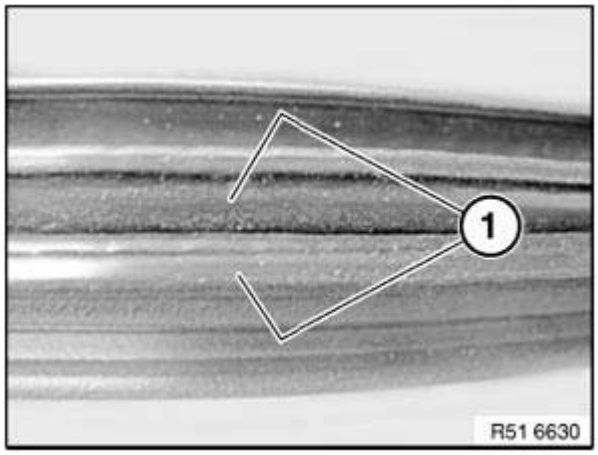


Fig. 482: Identifying Clamping Area
Courtesy of BMW OF NORTH AMERICA, INC.

- Joint seals which are fitted with plastic clips must rest rigidly on the body. Otherwise, the clips or the joint seal must be replaced.

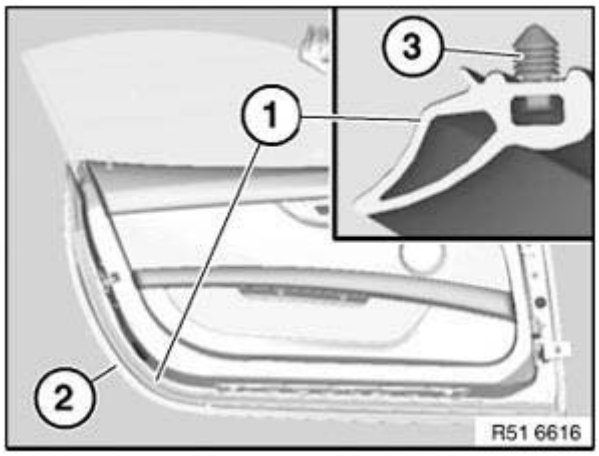


Fig. 483: Identifying Joint Seal With Plastic Clips
Courtesy of BMW OF NORTH AMERICA, INC.

51 BODY EQUIPMENT

51-2190 ADJUSTER

0494325 512190 Adjuster Minimum set: Mechanical tools MW

NOTE: (Door lock tensioner) For pre-tensioning front and rear door locks when installing. Change to tool through use of noise-optimised locks from 02/2004. Illustration items: 1 = knurled nut 51 2 191 2 = support 51 2 192 3 = protection 51 2 196 4 = mandrel 51 2 197

Storage Location

B44

C44

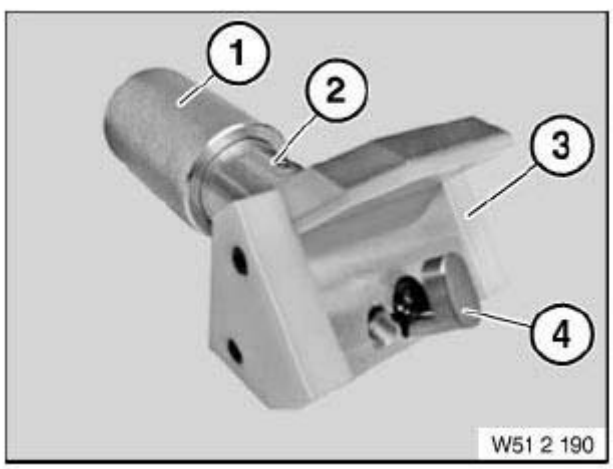


Fig. 1: Identifing Adjuster (512190)

SI number

01 06 02 (864)

Consisting of:

2 = 0494472 Guard

NOTE: Is replaced by 51 2 196 with the use of noise-optimised locks from 02/2004 Replaced by 51 2 196 (0 494 906)

2 = 0494473 Mandrel

NOTE: Is replaced by 51 2 197 with the use of noise-optimised locks from 02/2004 Replaced by 51 2 197 (0 494 907)

4 = 0494907 Mandrel

NOTE: Replaces mandrel 51 2 194

1 = 0494470 Nut

NOTE: (Knurled nut)

2 = 0494471 Support

2 = 0494474 Shaped element

NOTE: E85 (discontinued)

3 = 0494906 Guard

NOTE: Replaces guard 51 2 193

51-3300 ADJUSTER

0495590 513300 Adjuster Minimum set: Mechanical tools MW

NOTE: (special tool for door window glass adjustment) For adjusting door window glass in "Y" direction

Storage Location

A18

B18

C18

SI number

01 14 06 (280)

Consisting of:

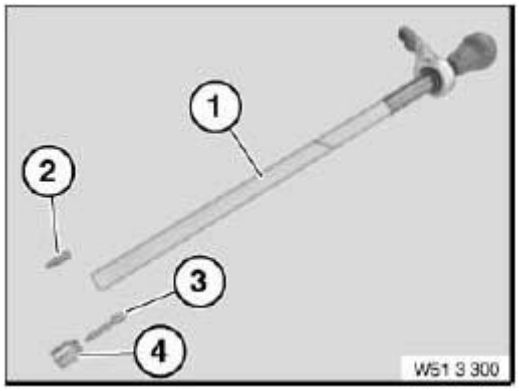


Fig. 2: Identifing Adjuster (513300)

3 = 0496201 Torx

NOTE: (Torx bit, long)

1 = 0495624 Handle

NOTE: (shank)

2 = 0495625 Torx

NOTE: (Torx bit (15))

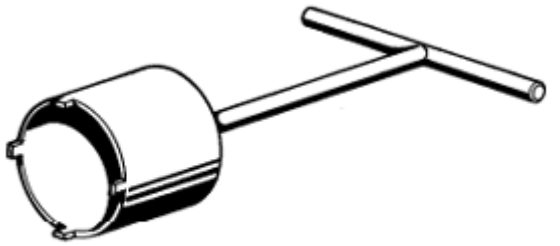
4 = 0496202 Socket

NOTE: (socket SW13 (adapter))

51-2040 BOX WRENCH

0492594 512040 Box Wrench MW

NOTE: For lock barrel screw connection (threaded ring) of tailgate E93 impact plate, tailgate



W51 2 040

Fig. 3: Identifing Box Wrench (512040)

51-0103 BRIDGE

51 0 103 Bridge

NOTE: Gantry crane

SI number

6 04 03 (046)

51-2197 DRIFT

51 2 197 Drift

NOTE: Replaces drift 51 2 194

51-0360 FITTING AID

0496614 510360 Fitting aid Minimum set: Mechanical tools MW

NOTE: For adjusting door window in X-axis

Storage Location

A26

B26

SI number

01 09 09 (532)

Consisting of:

1 = 0496619 Fitting aid

NOTE: **(Fitting aid, left)**

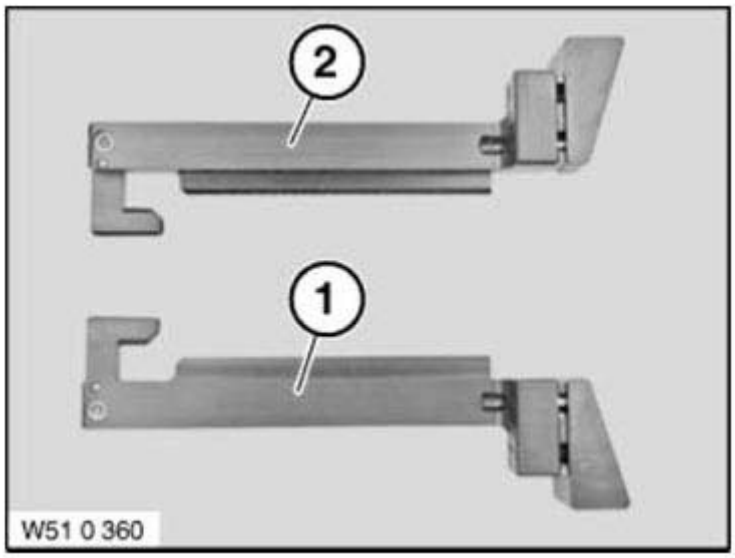


Fig. 4: Identifing Fitting Aid (510360)

2 = 0496620 Fitting aid

NOTE: **(Fitting aid, right)**

51-0000 GAUGE

0496710 510000 Gauge Minimum set: Mechanical tools MW

NOTE: **For measurement of retraction depth of window glass (replaces special tool 51 3 080 as of 10/2009).**

SI number

01 22 09 (587)

Fig. 5: Identifing Gauge (510000)

51-0010 GAUGE

0495259 510010 Gauge Minimum set: Mechanical tools MW

NOTE: (test gauge for installing windscreen and rear window) (replaces special tool 51 3 210 from 06/2005)

Storage Location

B2

SI number

01 10 05 (189)

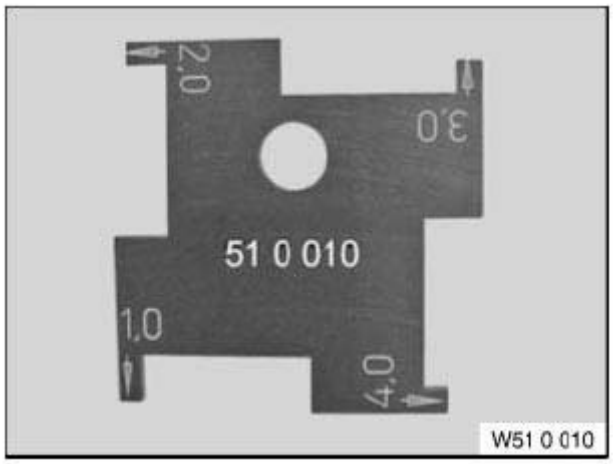


Fig. 6: Identifing Gauge (510010)

51-3270 HANDLE

0494633 513270 Handle MW

NOTE: (pull handles) Cutting wire pull handles fore removing rear, quarterlight and side windows

SI number

01 13 03 (001)

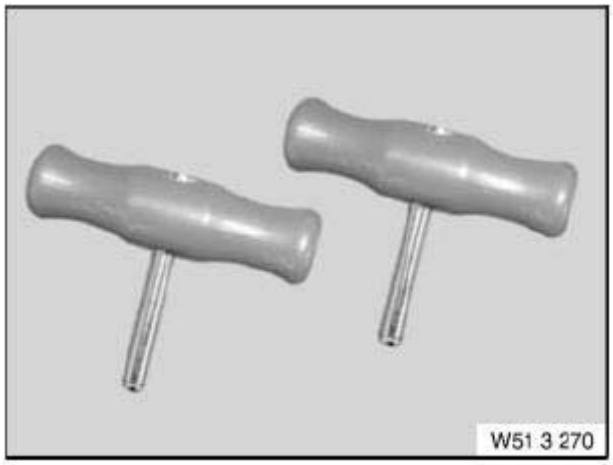


Fig. 7: Identifing Handle (513270)

51-0107 HOISTING WINCH

51 0 107 Hoisting winch

NOTE: for windscreen/rear window locating fixture on gantry crane

SI number

6 04 03 (046)

51-0108 HOISTING WINCH

51 0 108 Hoisting winch

NOTE: for side window locating fixture on gantry crane

SI number

6 04 03 (046)

51-3000 HOLDER

0492608 513000 Holder MW

NOTE: (Window glass holder) For holding the front and rear window glass when mounting the window glass/replaced by 51 3 010. (0 492 609)

51-2196 PROTECTION

51 2 196 Protection

NOTE: Replaces protection 51 2 193

51-3340 RELEASE TOOL

0496577 513340 Release tool Minimum set: Mechanical tools MW

NOTE: (release slide) For removing outer door handle.

Storage Location

C26

SI number

01 09 09 (532)

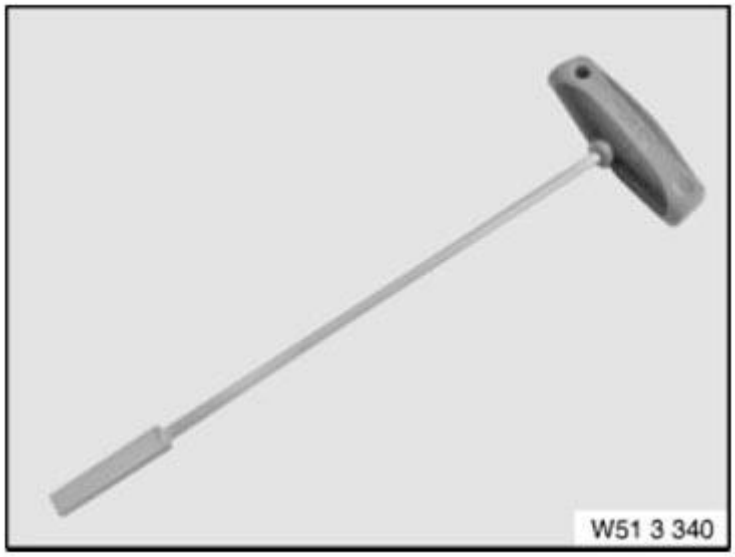


Fig. 8: Identifing Release Tool (513340)

51-3310 REVERSIBLE RATCHET

0495591 513310 Reversible ratchet Minimum set: Mechanical tools MW

NOTE: (ratchet wrench) For adjusting door window glass in x- and z-axes

Storage Location

A18

SI number

01 14 06 (280)

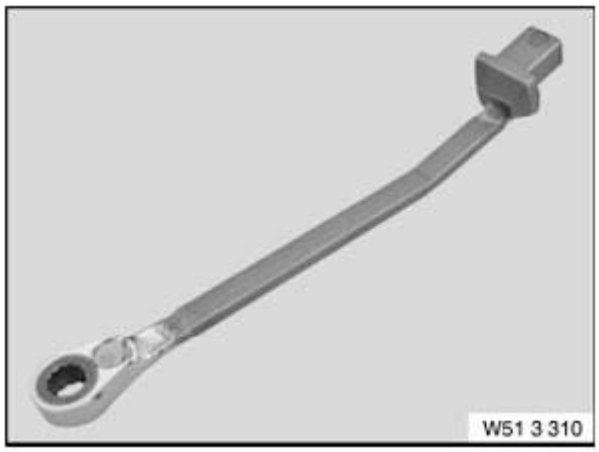


Fig. 9: Identifing Reversible Ratchet (513310)

51-0300 ROLLER

0495505 510300 Roller MW

NOTE: (Contact roller) For pressing sound insulation into doors; various rubber seals and covers

Storage Location

B19

SI number

01 07 06 (271)

Consisting of:

1 = 0495843 Handle

2 = 0495844 Roller

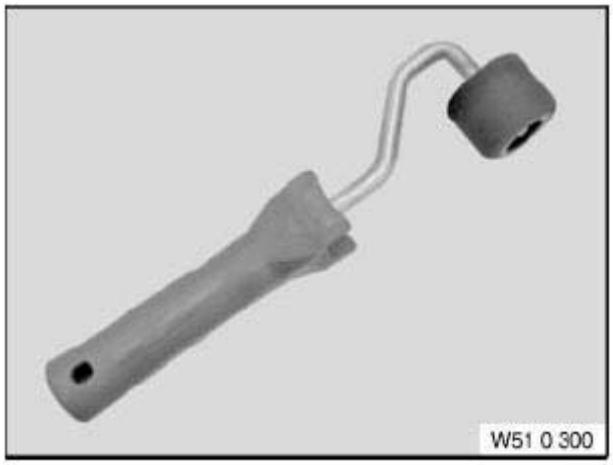


Fig. 10: Identifing Roller (510300)

51-0105 SIDE WINDOW LOCATING FIXTURE

51 0 105 Side window locating fixture

NOTE: for gantry crane

SI number

6 04 03 (046)

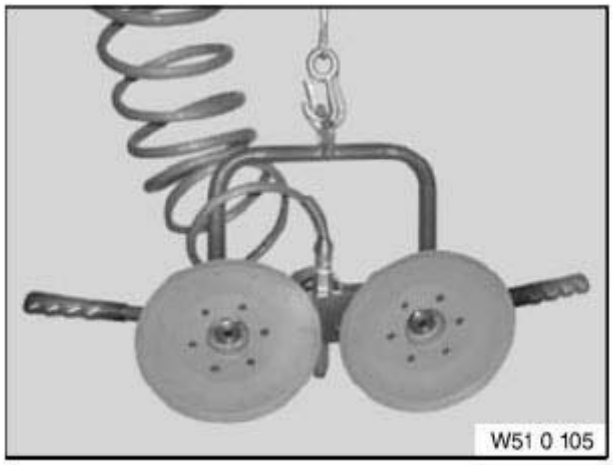


Fig. 11: Identifing Side Window Locating Fixture (510105)

51-3010 SIPHON

0492609 513010 Siphon MW

NOTE: **(Siphon (2 pieces)) For removal and installation of the window glass. Is replaced by 81 64 2 184 377, see Service Information (bulletin) 08 01 10 (635).**

SI number

01 05 86 (604)

Consisting of:

1 = 0493119 Suction cup

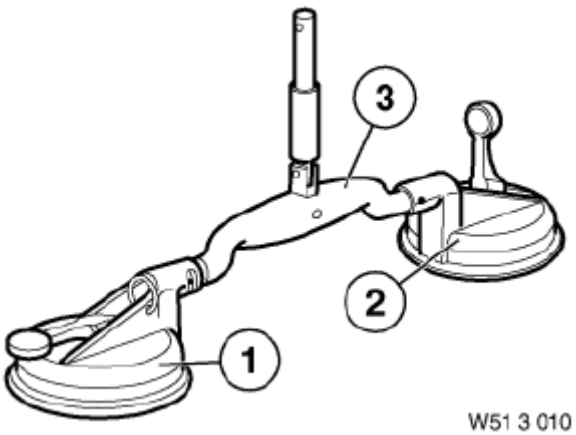


Fig. 12: Identifing Siphon (513010)

NOTE: **With elongated hole, suspension can be moved around all axles. Is replaced by 81 64 2 184 377, see Service Information (bulletin) 08 01 10 (635)**

2 = 0493120 Suction cup

NOTE: **With bore hole, suspension can only be moved in longitudinal direction. Is replaced by 81 64 2 184 377, see Service Information (bulletin) 08 01 10 (635).**

3 = 0493121 Handle

NOTE: **(Grab handle): Is replaced by 81 64 2 184 377, see Service Information (bulletin) 08 01 10 (635).**

2 = 0493267 Plate

NOTE: **(rubber plate without joint)**

2 = 0493268 Joint

NOTE: **(joint without rubber plate)**

51-0109 SUCTION CUP

51 0 109 Suction cup

NOTE: **Gantry crane**

SI number

6 04 03 (046)

51-2110 SUPPORT

0492600 512110 Support MW

NOTE: **For the engine compartment lid when removing the engine/Replaced by 51 2 140.(0 492 603)**

W51 2 110

Fig. 13: Identifing Support (512110)

51-2170 SUPPORT

0493647 512170 Support Minimum set: Mechanical tools MW

NOTE: (Bonnet support (2 x)) For retaining the engine compartment lid in the working position

Storage Location

A2

SI number

01 15 99 (483)

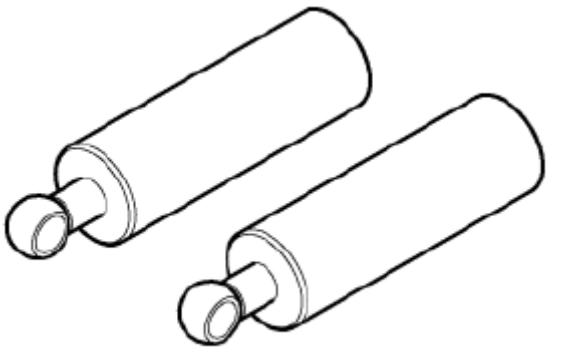


Fig. 14: Identifing Support (512170)

51-0102 SUPPORT, LEFT

51 0 102 Support, left

NOTE: Gantry crane

SI number

6 04 03 (046)

51-0101 SUPPORT, RIGHT

51 0 101 Support, right

NOTE: Gantry crane

SI number

6 04 03 (046)

51-3080 TOOL

0492634 513080 Tool MW

Replaced by: 0496710

NOTE: **For checking retraction depth when installing side window. From 10/2009 Replaced by 51 0 000.(0 496 710)**

Storage Location

B6

SI number

01 05 90 (207)

W51 3 080

Fig. 15: Identifing Tool (513080)

51-0340 TOOL

0496386 510340 Tool Minimum set: Mechanical tools MW

NOTE: **(Adapter striker) For adjusting disc pretension on frameless BMW door windows**

Storage Location

A25

SI number

01 13 08 (456)

Consisting of:

1 = 0496455 Adapter

2 = 0496456 Steel tape measure

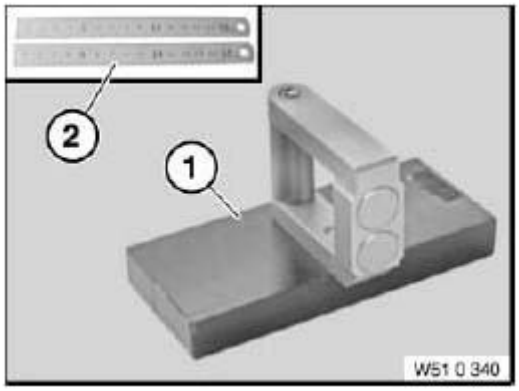


Fig. 16: Identifing Tool (510340)

NOTE: Delivery 2 pcs.

51-2220 TORX

0494645 512220 Torx Minimum set: Mechanical tools MW

NOTE: For removing door handles and window and side window glass

Storage Location

B47

C47

SI number

01 08 03 (988)

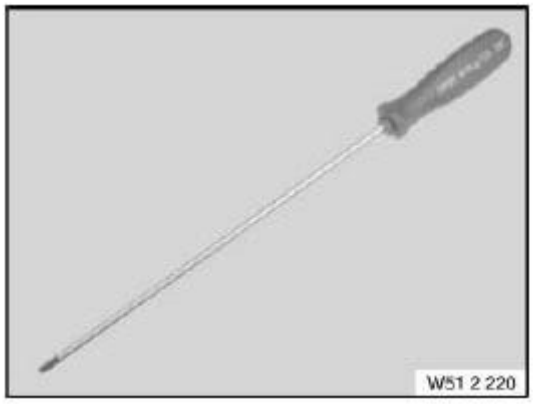


Fig. 17: Identifing Torx (512220)

51-0106 VACUUM PUMP

51 0 106 Vacuum pump

NOTE: for gantry crane

SI number

6 04 03 (046)

51-0104 WINDSCREEN/REAR WINDOW LOCATING FIXTURE

51 0 104 Windscreen/rear window locating fixture

NOTE: Gantry crane

SI number

6 04 03 (046)

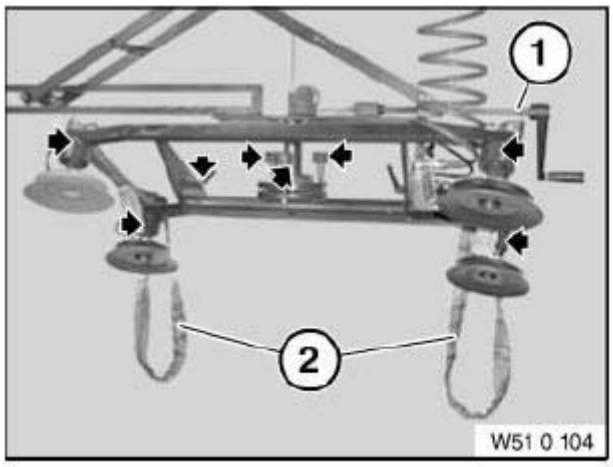


Fig. 18: Identifing Windscreen/Rear Window Locating Fixture (510104)

ELECTRICAL WINDOW SYSTEMS OPERATION FRONT

51 33 ELECTRICAL WINDOW SYSTEMS OPERATION FRONT

TIGHTENING TORQUE SPECIFICATION - ELECTRICAL WINDOW SYSTEMS OPERATION FRONT

		Type	Thread	Tightening specifications	Value
1AZ	Flat motor to power window regulator	E31, E36, E65, E66			5 Nm
		E46, E85, E86			4.5 Nm
		E83			3 Nm
		E60, E61, E63, E64			6 Nm
2AZ	Power window regulator to door	E38, E39, E60, E61, E65, E66, E83			8 Nm
		E36			9 Nm
		E46		Replace nut (self-locking)	9.5 Nm
		E63, E64			9.5 Nm
3AZ	Power window regulator to door	E85, E86			13.3 Nm
4AZ	Power window unit to door	E85/E86			9.5 Nm
5AZ	Flat motor to inner door panel	E89			7.6 Nm
6AZ	Support (terminal clamp) flat motor to inner door panel	E89			9.5 Nm

FRONT BUMPER

51 11 FRONT BUMPER

TIGHTENING TORQUE SPECIFICATION - FRONT BUMPER

		Type	Thread	Tightening specification	Measure
1AZ	Amplifier, mounting,	E89			8 Nm

	bumper, to support, outer				
2AZ	Strut, front panel, to front end	E89,			8 Nm
3AZ	Deformation element to body	E89			21 Nm
4AZ	Carrier to deformation element	E89	M6		8 Nm
5AZ	Carrier to deformation element	E89			23 Nm

FRONT DOOR LOCKS

51 21 FRONT DOOR LOCKS

TIGHTENING TORQUE SPECIFICATION - FRONT DOOR LOCKS

		Type	Thread	Tightening specification	Measure
1AZ	Door lock to front door	E31/E36/E89		Install bolt with bolt cement.	9 Nm
		E46/E53/E60/E61/			9.5 Nm
		E63/E64/E65/E66/E67/E85/E86			8 Nm
		E83			10 Nm
2AZ	Outside handle to front door	E31/E36			10 Nm
3AZ	Door striker to body	E24/E30			24 Nm
		E31/E32/E34			28 Nm
		E65/E66/E67/E85/E86/			19 Nm
		E60/E61/E63/E64/E89/			21 Nm
		E83		Screw length 18 mm	25 Nm
				Screw length 20 mm	18.5 Nm
4AZ	Adjustment screw to door lock	E46			3 Nm
5AZ	Outside handle to lock actuator	E53			3.2 Nm
		E46/E63/E64/E83			2 Nm
		E60/E61			3 Nm
6AZ	Inside door	E46/Saloon/Touring			4 Nm

	opener to front door	E46/Compact			2.7 Nm
		E65/E66/E85/E86			3 Nm
		E67			4 Nm
7AZ	Lock actuator/front cover to front door	E60/E61/E63/E64			2.5 Nm
8AZ	Lock actuator/rear cover to front door	E60/E61/E63/E64			3.3 Nm
9AZ	Door retainer to A-pillar	E85/E86			24 Nm
		E60/E61			21 Nm
		E89			27 Nm
10AZ	Door retainer to door	E60/E61/E85/E86			10 Nm
		E89			12 Nm
11AZ	Adapter plate, drive, to door	E60/E61			7.6 Nm
12AZ	Drive to adapter plate	E60/E61			4 Nm
13AZ	H-strut to inner door plate	E89		Replace screw (self-locking)	7 Nm
14AZ	Power window rail to door	E89			9.5 Nm
15AZ	Carrier, outside door handle, to door outer skin	E89			4.4 Nm
16AZ	Adapter, speaker, to inner door plate	E89			2 Nm
17AZ	Power window motor to inner door plate	E89		Replace screws (self-locking)	7.6 Nm

FRONT DOOR WINDOWS

51 32 FRONT DOOR WINDOWS

TIGHTENING TORQUE SPECIFICATION - FRONT DOOR WINDOWS

		Type	Thread	Tightening specification	Measure
1AZ	Door window glass to power window unit	E88/E92/E93		with special tool **51 3 310**	10 Nm 7 Nm
		E81		with special tool 51 3 240 (longer lever arm, follow formula in repair instructions!)	12 Nm 6 Nm
		E82/E88		with special tool 51 3 240 (longer lever arm, follow formula in repair instructions!)	10 Nm 5 Nm

FRONT DOOR WINDOWS

51 32 FRONT DOOR WINDOWS

TIGHTENING TORQUE SPECIFICATION - FRONT DOOR WINDOWS

		Type	Thread	Tightening specification	Measure
1AZ	Door window glass holder to roller guide	E31/E36/Coupe/Convertible			9 Nm
2AZ	Door window glass to holder	E31/E36/Coupe/Convertible			6 Nm
		E38/E39/E46/E60/E61/E85/E86			8 Nm
		E63/E64/E65/E66/E89/			10 Nm
3AZ	Main stop to window regulator	E31/E36			9 Nm
4AZ	Window guide to body	E36			10 Nm
5AZ	Window winder	E36			6 Nm
6AZ	Power window rail to door	E89			9.5 Nm

FRONT DOOR TRIM PANEL WITH ARMRESTS

51 41 FRONT DOOR TRIM PANEL WITH ARMRESTS

TIGHTENING TORQUE SPECIFICATION - FRONT DOOR TRIM PANEL WITH ARMRESTS

		Type	Thread	Tightening specification	Measure
1AZ	Door trim panel to front door (screw under airbag sticker)	E46/Convertible/Coupe			2.5 Nm
		E85/E86/E46/Compact			4 Nm
		E89			5.0 Nm
		E60/E61/E65/E66/E67/E83			8.0 Nm
2AZ	Door trim panel to front door (screw to armrest or door handle)	E46/Saloon/Touring			2.5 Nm
		E46/Convertible/Coupe			3.0 Nm
		E46/Compact			4 Nm
		E63/E64			3.5 Nm
		E65/E66/E67/E83			8.0 Nm
		E85/E86			7.0 Nm
3AZ	Armrest to door trim panel	E46/Convertible/Coupe			2.5 Nm
4AZ	Door trim panel to front door	E46/Compact			1.1 Nm
		E60/E61			0.8 Nm
		E65/E66/E67			1.5 Nm
		E63/E64			3.0 Nm
5AZ	Wood/decorative strip to door trim	E65/E66/E67			1.2 Nm
		E60/E61			0.4 Nm
6AZ	Speaker frame to door trim	E65/E66/E67			0.5 Nm
7AZ	Sheet metal nut	E65/E66/E67			1.0 Nm
8AZ	Door handle to door trim panel	E85/E86			0.5 Nm
9AZ	Carrier to door trim panel	E60/E61			7.0 Nm

GASKETS AND LOOSE BODY COMPONENTS

51 71 GASKETS AND LOOSE BODY COMPONENTS

TIGHTENING TORQUE SPECIFICATION - GASKETS AND LOOSE BODY COMPONENTS

		Type	Thread	Tightening specifications	Dimension
1AZ	Front spoiler to bumper	E36/M3			3 Nm
2AZ	Rear spoiler	E34/touring, E36/Z3 coupe/M coupe	M6		6 Nm
		E36/M3	M6		7 Nm
		E53			3 Nm

		E83	M6		10 Nm
		E61			8 Nm
3AZ	Reinforcement plate to front axle support/engine support	E46/ohne Allrad, E85, E86		Replace screws Jointing torque Angle of rotation	 59 Nm 90 °
4AZ	Trailing link in engine compartment	E85, E86		Nut Replace screw Angle of rotation	41 Nm 56 Nm 105 ± 15 °
		E83	M8		19 Nm
		E89		Replace screws Angle of rotation	100 Nm 105 ± 15 °
5AZ	Reinforcement plate/trailing link to rear axle	E46/Cabrio, E85, E86	M10	Replace screws Jointing torque Angle of rotation	 59 Nm 90 °
6AZ	Reinforcement plate to body	E85, E86	M8		21 Nm
7AZ	Trailing link to rear axle	E46/Cabrio	M8		24 Nm
		E85, E86		Replace nut	24 Nm
8AZ	Cross member, A-pillar, to bracket	E52	M8		19 Nm
9AZ	Cross member, A-pillar, middle	E52	M8		10 Nm
10AZ	Strut to transmission tunnel	E52	M8		19 Nm
11AZ	Cross member, A-pillar, bottom, to bracket	E52	M6		11 Nm
12AZ	Support tube to support, steering column upper section	E65, E66, E67	M8		21 Nm
13AZ	Support tube to body	E85/E86	M8		20 Nm
14AZ	Heating unit to support tube	E85, E86			4 Nm
15AZ	Support tube to body	E60, E61, E63, E64, E83	M8		21 Nm
16AZ	Mounting, cover,	E83	M8		5 Nm

	sill to body				
17AZ	Cover, partition, to body, front	E61			2.5 Nm
18AZ	Retaining strip, sill trim, to side panel	E61			5 Nm
19AZ	Multifunction pan to body	E60/M5			3 Nm
		E86			12 Nm
20AZ	Underride protection to retaining bracket	E60, E61	M8	Replace bolts	8 Nm
21AZ	Retaining bracket for underride protection to frame side member	E60, E61	M8	Replace bolts	8 Nm
22AZ	Protective mat/protective cover to body	E60/Security	M6	Screw	10 Nm
23AZ	Cross connection (engine compartment) to upper section, support, front panel	E89		Screw	7.6 Nm
24AZ	Stiffening plate to body	E89	M10	Replace screws	
				Jointing torque	56 Nm
				Angle of rotation	105 ±15 °
25AZ	Stiffening plate to exhaust system	E89		Nut	20 Nm
26AZ	Stiffening plate to body	E89		Nut	24 Nm
27AZ	Diagonal strut in engine compartment	E89		Nut	56 Nm
				Screw	56 Nm

GASKETS AND LOOSE BODY COMPONENTS

51 71 GASKETS AND LOOSE BODY COMPONENTS

TIGHTENING TORQUE SPECIFICATION - GASKETS AND LOOSE BODY COMPONENTS

	Type	Thread	Tightening specifications	Dimension

1AZ	Rear spoiler	E91		Screw Nut	3 Nm 7 Nm
2AZ	Trailing link in engine compartment	E81, E82, E84, E87, E88, E90, E91, E92, E93	M10	Replace bolts Jointing torque Angle of rotation	 40 Nm 60 °
		E81, E82, E84, E87, E88, E90, E91, E92, E93	M12 x 1.5	Replace bolts Jointing torque Angle of rotation	 100 Nm 100 °
3AZ	Trailing link to rear axle	E91	M12	Replace bolts Jointing torque Angle of rotation	 100 Nm 90 °
		E91, E84	M10		50 Nm
4AZ	Support tube to support, steering column upper section	E84, E87, E90, E91, E92, E93	M8		19 Nm
5AZ	Support tube to body	E84, E87, E90, E91, E92, E93	M8		21 Nm
6AZ	Heating unit to support tube	E84, E87, E90, E91, E92, E93			4 Nm
7AZ	Bracket, handle, to body	E82/E87/E90/E91		Sheet metal screw	3.5 Nm
		E84			6 Nm
8AZ	Bracket, suspension, load area net to body	E91			11 Nm
9AZ	Multifunction pan to body	E81, E82, E87, E90, E91, E92, E93	M6		8 Nm
10AZ	V-strut, front axle support	E88	M10 to front axle support, front		50 Nm
		E88, E93	M10 to blind rivet nut	Jointing torque Angle of rotation	60 Nm 105 °
		E88, E93	M10 to captive nut	Replace cage nut	50 Nm
		E89	M10	Jointing torque	56 Nm

		E88, E89, E93	M12	Jointing torque Angle of rotation	100 Nm 105 °
11AZ	Diagonal strut, front end	E88, E93	Nut	Replace nut	56 Nm
		E88, E93	Screw	Replace bolts Jointing torque Angle of rotation	56 Nm 90 °
12AZ	Protecting skid/mounting bracket to front axle support	E88, E93	M10		50 Nm
13AZ	Rear middle trailing link to underbody bracket	E93/ab 03_2007	M8		28 Nm
14AZ	Battery tray to body	E93	M8		19 Nm
15AZ	Vibration absorber to battery tray	E93	M8		19 Nm
16AZ	Grounding strap to body	E93	M6		8 Nm
17AZ	Bulkhead connection, suspension cross-brace, to holder, spring suspension cross-brace	E92/M3	M12 x 1.5	Replace screw Jointing torque Angle of rotation	 100 Nm 100 °
18AZ	Suspension cross-brace to bulkhead connection, suspension cross-brace	E92/M3	M8	Replace bolts	34 Nm
19AZ	Suspension cross-brace to bulkhead connection, suspension cross-brace/ring, suspension cross-brace	E92/M3	M8	Replace nuts	34 Nm
20AZ	Trailing link, left/right to	E88, E93	M10x40	Replace bolts	66 Nm

	vehicle underbody				
21AZ	Trailing link to side member locating bushing	E88, E93	M12x35	Replace screw Jointing torque Angle of rotation	 100 Nm 105 °
22AZ	Trailing link to triangle/vehicle underbody	E88, E93	M12x35 M12x50	Replace bolts Jointing torque Angle of rotation	 105 Nm 105 °
23AZ	Trailing link to rack (rear axle)	E88, E93	M12x35 M12x50	Replace bolts Jointing torque Angle of rotation	 100 Nm 105 °
24AZ	Rear middle trailing link to underbody bracket/triangle bracket	E93/bis 03_2007	M8	Jointing torque	19 Nm
25AZ	Trailing link to side member locating bushing	E93/bis 03_2007	M12	Jointing torque Angle of rotation	100 Nm 90 °
26AZ	Left and right trailing link to underbody triangle	E93/bis 03_2007	M12	Jointing torque Angle of rotation	100 Nm 90 °
27AZ	Strut, rollover protection system, to rollover protection system	E88, E93	M10	Jointing torque Angle of rotation	56 Nm 100 °
28AZ	Strut, rollover protection system, to body	E88, E93	M10	Jointing torque Angle of rotation	56 Nm 100 °

29AZ	Trailing link strut, left and right, to body (rear axle)	E89	M10	Jointing torque Angle of rotation	56 Nm 105 ± 15 °
30AZ	Trailing link, rear left and rear right, to triangle bracket (rear axle)	E89	M8	Jointing torque	28 Nm
31AZ	Shutoff, trailing link, rear left and rear right, to body (rear axle)	E89	M8	Jointing torque	24 Nm
32AZ	Trailing link, rear left and right, to compression strut	E92, E93	M8x25		24 Nm
33AZ	Trailing links, rear left/right, to holder	E93/M3	M10x25		56 Nm
34AZ	Holder, trailing link, to triangle	E93/M3	M12x1.5x50	Jointing torque Angle of rotation	100 Nm 105 °
35AZ	Holder, trailing link, to triangle	E93/M3	M12x1.5x35	Jointing torque Angle of rotation	100 Nm 105 °

HOOD/BONNET LOCKS

51 23 HOOD/BONNET LOCKS

TIGHTENING TORQUE SPECIFICATION - HOOD/BONNET LOCKS

		Type	Thread	Tightening specification	Mea
1AZ	Retaining hook to engine hood/bonnet (replace microencapsulated screws)	E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E86/E89			10 N
		E38/E39			12 N
		E36		Hexagon screw Torx bolt	10 N 12 N
2AZ	Lock to body (replace microencapsulated screws)	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E83			10 N
		E65/E66/E85/E86			8 Nr
		E89			12 N

3AZ	Lock to engine hood/bonnet (replace microencapsulated screws)	E36/E46/E52			10 N
		E39			12 N

MIRRORS, FINISHERS, ASHTRAYS, CONSOLES

51 16 MIRRORS, FINISHERS, ASHTRAYS, CONSOLES

TIGHTENING TORQUE SPECIFICATION - MIRRORS, FINISHERS, ASHTRAYS, CONSOLES

		Type	Thread	Tightening specifications	D
1AZ	Exterior mirror to front door	E31/E36/Z3/E38/E39/E52			6
		E46/E53/E60/E61/E63/E64/E65/E66/E67/E83/E84/E85/E86/E89			6
				First screw connection for new mirror (cutting process of self-tapping screws)	8
2AZ	Centre console (plastic nut)	E30			5
3AZ	Wooden finisher on carrier	E38			0
4AZ	Wooden finisher on carrier	E38			0
5AZ	Wooden finisher on carrier	E38			0
6AZ	Front drinks holder to function carrier	E38			1
7AZ	Wooden finisher to front drinks holder	E38			0
8AZ	Screw-in pin to wooden finisher of	E46			0

	instrument panel and door panel				
9AZ	Housing for exterior mirror to support	E46 M3 Coupe			1
		E60 M5/E63 M6			0
		E85/E86			1
10AZ	Brush cable unit to function carrier	E65/E66/E67			0 N
11AZ	Roller sunblind to function carrier	E65/E66/E67			0 N
12AZ	Roller sunblind to brush cable unit	E65/E66/E67			1 N
13AZ	Flap to storage box	E85/E86			0
14AZ	Rearview mirror retaining ring on reinforcement plate	E60 M5/E63 M6			1
15AZ	Notch adapter to mirror base plate	E60 M5/E63 M6			3
16AZ	Centre console to body	E89	M6/Torx		2
17AZ	Centre console to body	E84/E89			4
18AZ	Glove box housing	E84			2
19AZ	Bracket, handle, to body	E84			6

PANEL, REAR PARCEL SHELF, ROLLER SUN BLIND

51 46 PANEL, REAR PARCEL SHELF, ROLLER SUN BLIND

TIGHTENING TORQUE SPECIFICATION - PANEL, REAR PARCEL SHELF, ROLLER SUN BLIND

		Type	Thread	Tightening specification	Measure
1AZ	Rear parcel shelf to body	E65, E66, E67			2.5 Nm
2AZ	Roller sun blind to rear parcel shelf	E38, E39			3 Nm
		E65, E66, E67			2 Nm
3AZ	Roller sun blind with rear parcel shelf to body	E38, E39			6 Nm
		E60, E65, E66, E67, E90, E92			4 Nm
4AZ	Cover, rollover bar	E88, E93			4.4 Nm
5AZ	Trim grille, air outlet, to rollover protection system	E88			3 Nm
		E93			8 Nm
6AZ	Lashing eye to trim panel, partition	E89	M6		6 Nm
7AZ	Trim panel, partition, to body	E89	M6		3.5 Nm

REAR BUMPER

51 12 REAR BUMPER

TIGHTENING TORQUE SPECIFICATION - REAR BUMPER

		Type	Thread	Tightening specification	Measure
1AZ	Bumper to carrier	E31	M10		40 Nm
		E32/E34/E36	M8		22 Nm
		E34	M10		42 Nm
2AZ	Bumper/carrier to impact absorber	E36	M10	Install bolts with bolt cement.	42 Nm
		E38	M12		45 Nm
		E39	M10		45 Nm
		E46	M10		41 Nm
		E31/E32/E34/E30/Mod. 88	M12		48 Nm

		E52	M10		38 Nm
		E53	M12		55 Nm
		E85/E86			19 Nm
		E60/E61/E63/E64	M10		36 Nm
3AZ	Impact absorber/carrier to body	E30/E24			23 Nm
		E31/E32/E34	M6		9 Nm
		E36/E46	M8		22 Nm
		E39	M8		20 Nm
		E53	M8		24 Nm
		E65/E66/E67			38 Nm
		E52/E85/E86/E89/			19 Nm
		E60/E61/E63/E64	M10		36 Nm
		E83	M12		71 Nm
4AZ	Bumper to side panel	E30			7 Nm
5AZ	Bracket to side panel	E36/E46			3 Nm
		E39			6 Nm
6AZ	Holder, bottom, to body	E36			8.5 Nm
7AZ	Screw for lower panel	E36			2.5 Nm
8AZ	Bumper to tail panel	E60	M6	Replace screw with sealing washer	2.5 Nm
9AZ	Guide to side panel	E83			2 Nm
		E61			3 Nm
10AZ	Guide to rear trim panel	E83			2.8 Nm
		E61			4.5 Nm

REAR LID LOCKS

51 24 REAR LID LOCKS

TIGHTENING TORQUE SPECIFICATION - REAR LID LOCKS

		Type	Thread	Tightening specification	Measure
1AZ	Banjo bolt to hydraulic unit and to hydraulic cylinder	E39/Touring			$10^{+2.5}$ Nm
		E65/E66/E67			15 Nm
2AZ	Oil filler plug to	E65/E66/E67/E39/Touring			8^{+2} Nm

	hydraulic unit	E61			$1^{+0.3}$ Nm
3AZ	Engine bolt to hydraulic unit	E65/E66/E67			$5^{+1.5}$ Nm
4AZ	Hydraulic unit to bracket	E61			$2^{+1.5}$ Nm
		E65/E66/E67			10 Nm
5AZ	Rear lid lock to rear lid	E60/E63/E64/E65/E66/E67/E85/E86			10 Nm
6AZ	Striker to body	E60/E63/E64/E65/E66/E67/E85/E86			10 Nm
7AZ	Bracket, hydraulic unit, to body	E65/E66/E67			10 Nm
8AZ	Bracket, angle sensor, to body	E65/E66/E67			7 Nm
9AZ	Valve to hydraulic unit	E65/E66/E67			14 Nm
10AZ	Ball pin for hydraulic cylinder to body	E61		Install with Loctite 270	41 Nm
11AZ	Emblem actuator to holder, emblem actuator	E89			4 Nm
12AZ	Rear lid lock to rear inner plate	E89			10 Nm
13AZ	Rear lid lock to rear inner plate	E89			1.5 Nm
14AZ	Striker to body	E89			10 Nm

REINFORCEMENT, BODY

51 64 REINFORCEMENT, BODY

TIGHTENING TORQUE SPECIFICATION - REINFORCEMENT, BODY

			Tightening	

		Type	Thread	specification	Measure
1AZ	Upper section, support, to support carrier, wheel arch	E89			18 Nm

SIDE WINDOWS, ELECTRICALLY ACTUATED

51 37 SIDE WINDOWS, ELECTR. ACTUATED

TIGHTENING TORQUE SPECIFICATION - SIDE WINDOWS, ELECTR. ACTUATED

		Type	Thread	Tightening specification	Measure
1AZ	Motor to window regulator	E93		Replace thread-tapping screw with metric screw	3.5 Nm
		E88			4 Nm
2AZ	Side window glass to window regulator	E88		On hook screw (removed window cavity cover strip) with special tool 51 3 240 (longer lever arm, observe formula in repair instruction)	12 Nm 5 Nm
		E93, E89		On hexagon screw (removed window cavity cover strip) with special tool 51 3 310 (longer lever arm, observe formula in repair instruction)	10 Nm 5.6 Nm
		E89			9.5 Nm
3AZ	Power window unit to body	E88			18.5 Nm
		E93			7.6 Nm
4AZ	Connecting bracket to body	E88			10 Nm
		E93			7.6 Nm
		E89			7.6 Nm
5AZ	Power window	E89			7.6 Nm

	unit in area of wheel arch to body				

TRIM PARTS, COVERS, HANDLE TRIM

51 13 TRIM PARTS, COVERS, HANDLE TRIM

TIGHTENING TORQUE SPECIFICATION - TRIM PARTS, COVERS, HANDLE TRIM

		Type	Thread	Tightening specification	Measure
1AZ	Bracket, roof luggage rack on body	E39/E46/E81/E82/E87/E90/E91/E92/E36/Z3 and M Coupe	M10		20 Nm
2AZ	Water drain to body (plastic nut)	E46			1 Nm
Water drain to body (metal nut or rivet nut)		E46			1.8 Nm
3AZ	Roof railing to body	E39		Centre, front, rear	24 Nm
		E61	M8	 settling time Check	16 Nm 15 min 16 Nm
		E83	M8	Front Jointing torque Release nut after settling time Jointing torque Torque angle	 21 Nm 15 min 21 Nm 120 ± 10°
		E83	M8	Centre, rear settling time Check	21 Nm 15 min 21 Nm
		E84			19 Nm
		E91			25 Nm
		E70			19 Nm
		E71/E72			16 Nm
4AZ	Handle strip to rear lid	E39/Touring			3 Nm
		E46/E53			2.5 Nm
		E83			1.8 Nm
5AZ	Cowl panel	E60/E61/E63/E64			2.5 Nm

	cover to body				
6AZ	Centre trim to rear lid	E65/E66/E67	M8		2.5 Nm
7AZ	Trim to engine compartment lid	E90/E91			2 Nm
8AZ	Additional brake light to rear lid	E89			5 Nm
9AZ	Threaded bolt on sliding carriage (roof railing)	E84			15 Nm
10AZ	Decorative trim, side, to cowl panel	E88/E93			1.8 Nm

TRIM, INSTRUMENT PANEL

51 45 TRIM, INSTRUMENT PANEL

TIGHTENING TORQUE SPECIFICATION - TRIM, INSTRUMENT PANEL

		Type	Thread	Tightening specification	Measure
1AZ	Knee protection, driver, to support tube	E65/E66/E67	M6		8 Nm
2AZ	Wooden finisher to instrument panel trim, nut	E65/E66/E67			2.5 Nm
3AZ	Support structure, cockpit, to body	E89			21 Nm
4AZ	Support structure to instrument panel upper section	E89			3 Nm

99 PAINTWORK

99 00 ... GENERAL INSTRUCTIONS ON PAINTING

General instructions and classification of paint stages are described on the KSD CD (notes general information on flat rate unit data, passenger car explanation for FR specifications for painting).

For further information, please refer to BMW Painting Handbook.

The marked area serves as the starting point for painting. This area may differ from the illustration for technical painting reasons.

Touching-up areas are taken into account.

99 00 ... INDIVIDUAL PARTS/PAINTING

Follow **GENERAL INSTRUCTIONS ON PAINTING** .

Inside mirror

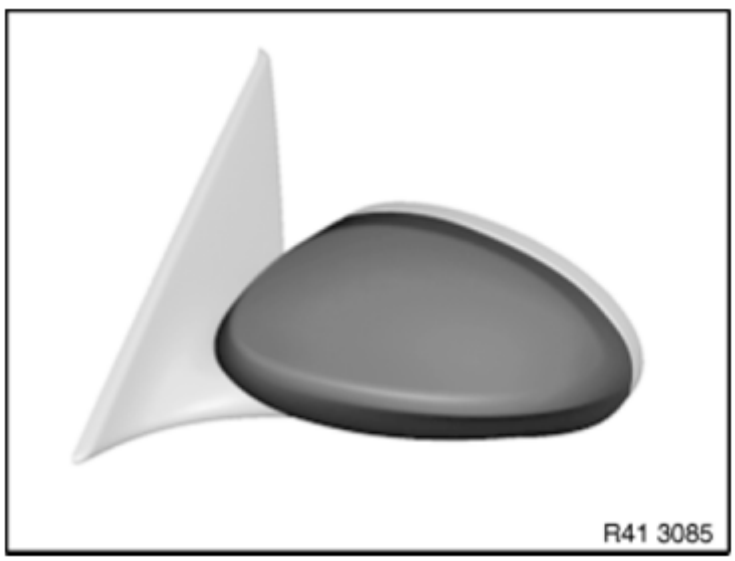


Fig. 1: Identifying Inside Mirror
Courtesy of BMW OF NORTH AMERICA, INC.

Outer door handle

Area specification applies to all paint stages.

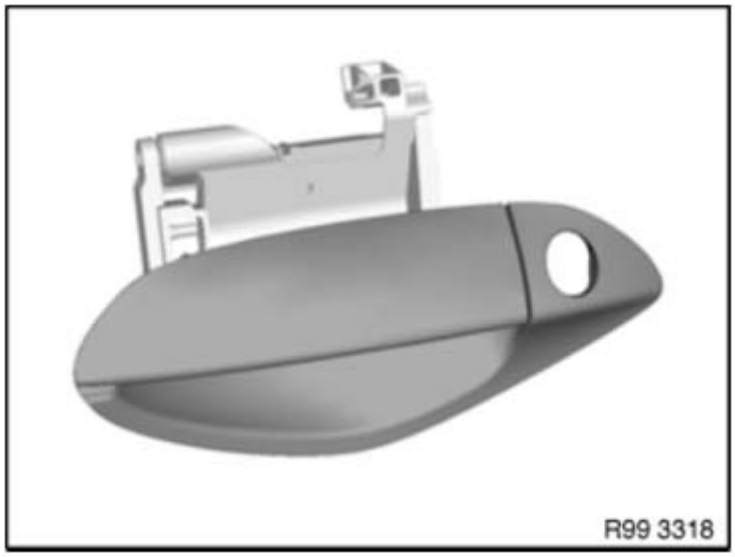


Fig. 2: Identifying Outer Door Handle
Courtesy of BMW OF NORTH AMERICA, INC.

Roof shell, front

Area specification applies to all paint stages.

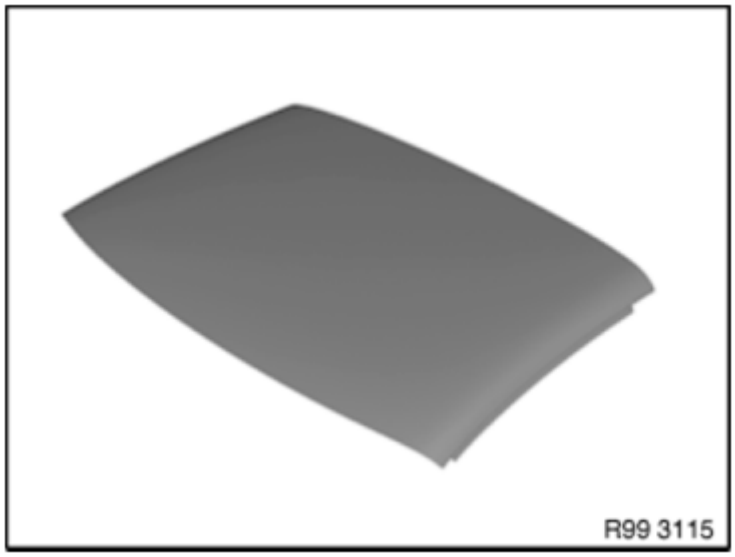


Fig. 3: Identifying Front Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Roof shell, rear

Area specification applies to all paint stages.

Fig. 4: Identifying Rear Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Rear cross panel

Area specification applies to all paint stages.

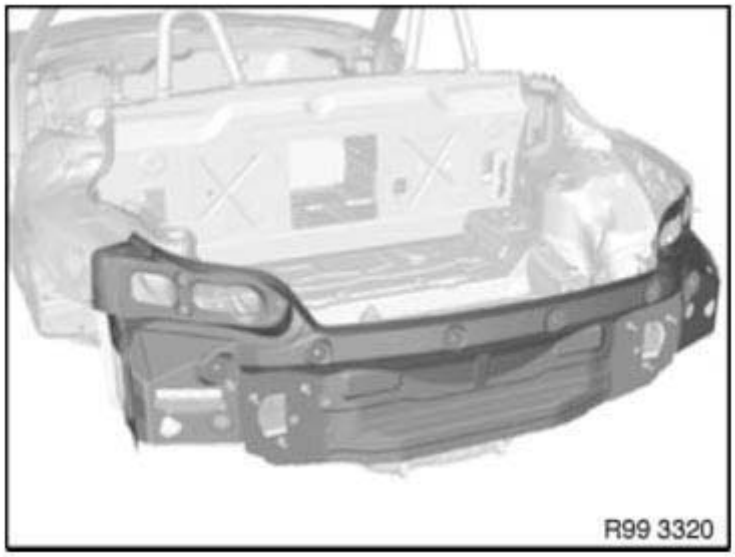


Fig. 5: Identifying Rear Cross Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Side wall, front

Area specification applies to all paint stages.

Fig. 6: Identifying Front Side Wall
Courtesy of BMW OF NORTH AMERICA, INC.

Rear side panels

Area specification applies to paint stage 1.

Fig. 7: Identifying Rear Side Panels
Courtesy of BMW OF NORTH AMERICA, INC.

Cover for entrance

Area specification applies to all paint stages.

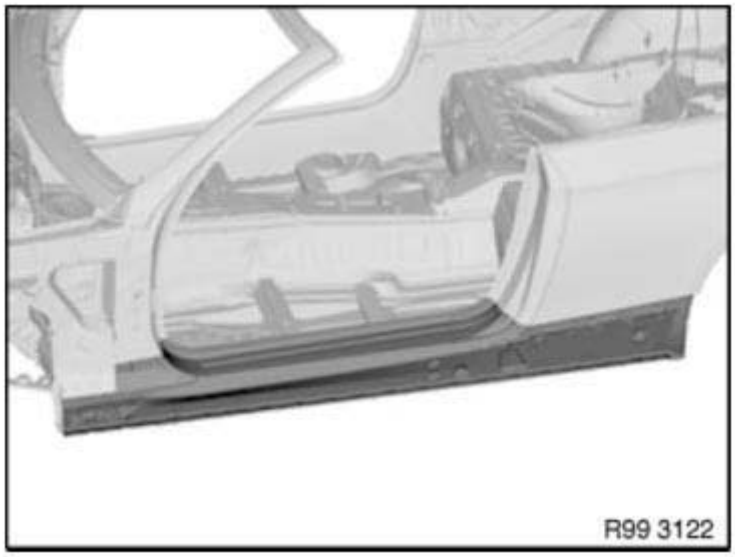


Fig. 8: Identifying Cover For Entrance
Courtesy of BMW OF NORTH AMERICA, INC.

Front door

Area specification applies to all paint stages.

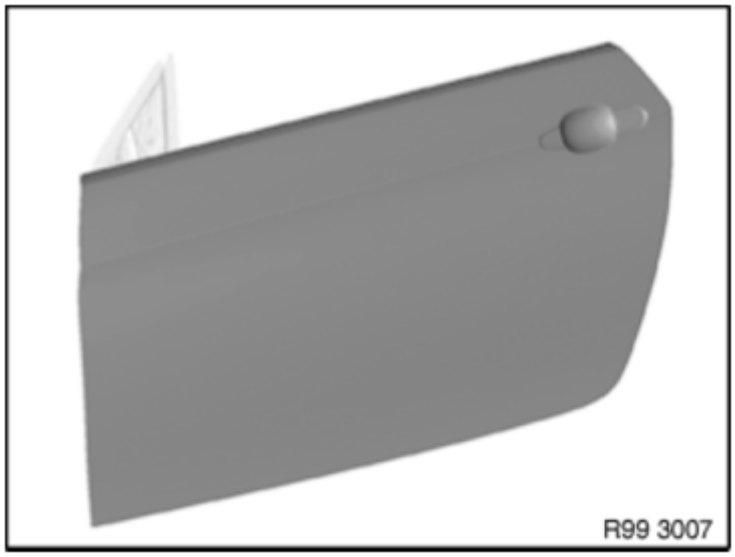


Fig. 9: Identifying Front Door Paint Area
Courtesy of BMW OF NORTH AMERICA, INC.

Front door

Additional area specification inner plate for paint stages 2 and 3.

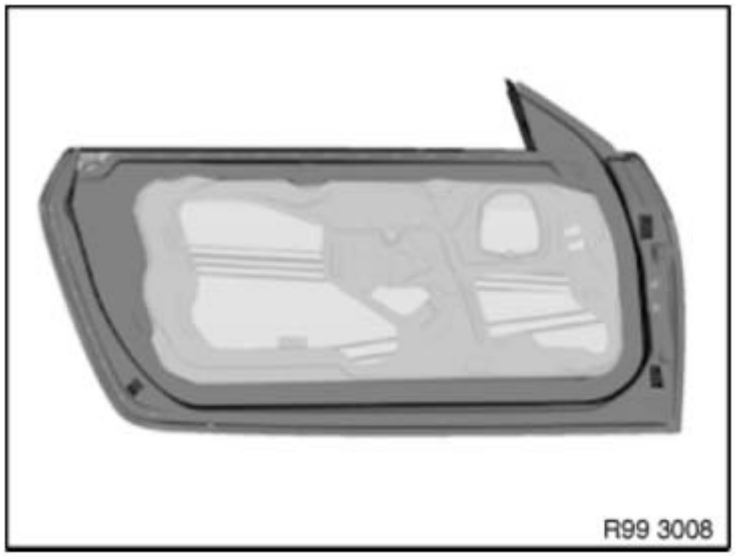


Fig. 10: Identifying Front Door Inner Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Bonnet

Area specification applies to all paint stages.

Additionally complete inner plate for paint stages 2 and 3.

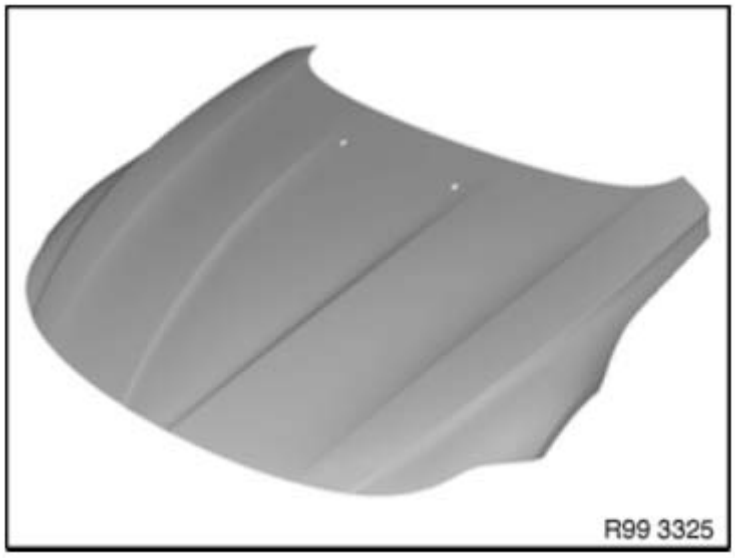


Fig. 11: Identifying Bonnet Paint Area
Courtesy of BMW OF NORTH AMERICA, INC.

rear lid

Area specification applies to all paint stages.

Fig. 12: Identifying Rear Lid Paint Area
Courtesy of BMW OF NORTH AMERICA, INC.

rear lid

Additional area specification inner plate for paint stages 2 and 3.

Fig. 13: Identifying Rear Lid Inner Plate Paint Area
Courtesy of BMW OF NORTH AMERICA, INC.

Trim panel for cover on side member

Area specification applies to all paint stages.

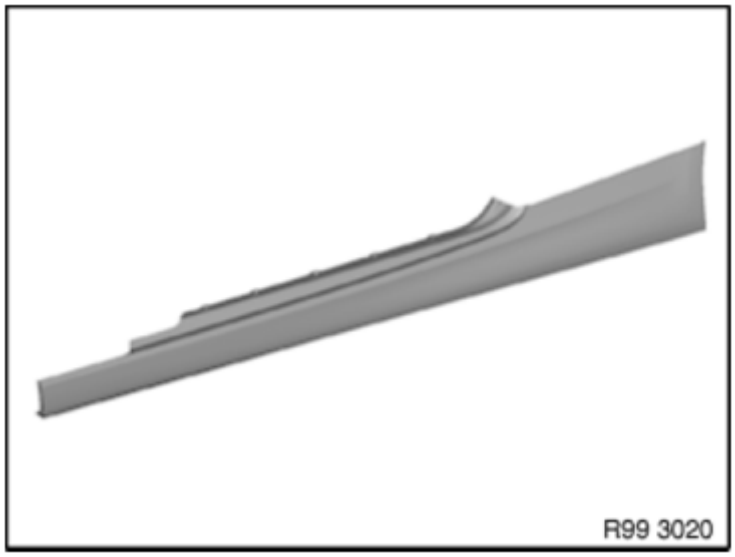


Fig. 14: Identifying Paint Applying Areas On Trim Panel For Cover On Side Member
Courtesy of BMW OF NORTH AMERICA, INC.

Panel, bumper, front

Area specification applies to all paint stages.

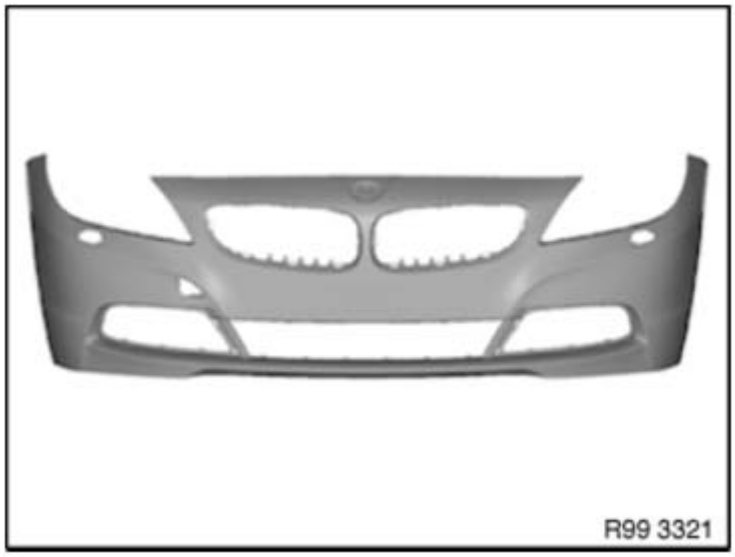


Fig. 15: Identifying Front Bumper Panel Paint Area
Courtesy of BMW OF NORTH AMERICA, INC.

Panel, bumper, rear

Area specification applies to all paint stages.

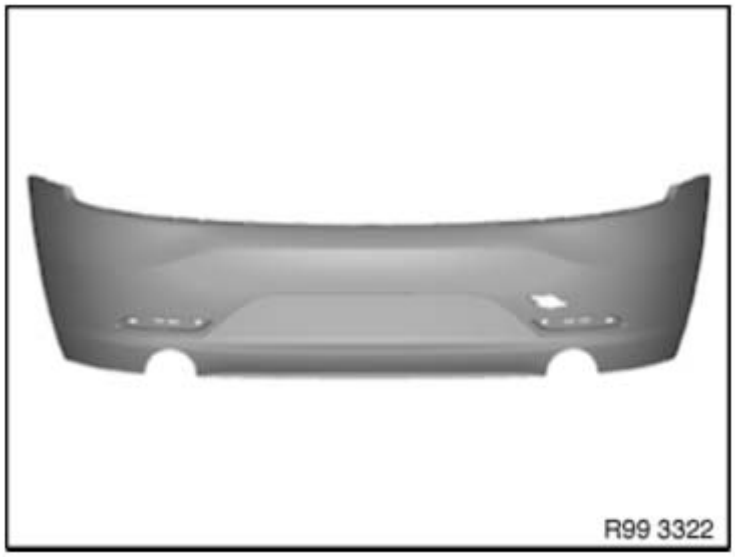


Fig. 16: Identifying Rear Bumper Panel Paint Area
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... INFORMATION/WARNING LABELS

Missing or damaged information/warning labels (e.g. tire inflation pressure) must be replaced.

- Overview of **INSTALLATION LOCATIONS**

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

36 00 ... INFORMATION/RECOMMENDATIONS AND REPAIR METHODS FOR ALUMINUM WHEELS

Cosmetic repairs of aluminum wheels using Color System

Recommendations and repair methods for aluminum wheels are described in the ASAP system under the following link:

- Aftersales Assistance Portal
  - Service/Technology
    - Color System
      - Repair recommendations for aluminum wheels

99 00 ... INTERIOR PAINTING

Follow **GENERAL INSTRUCTIONS ON PAINTING** .

Engine compartment, complete

Carry over the area shown symmetrically to the other side of the car.

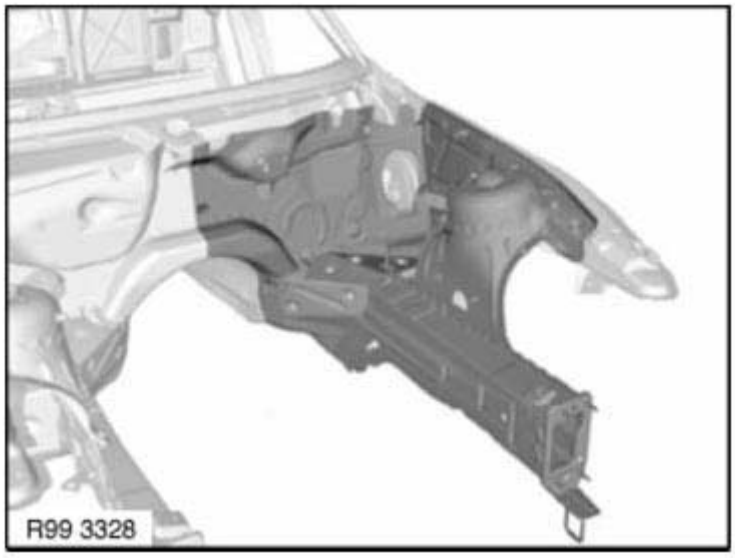


Fig. 17: Identifying Engine Compartment Complete
Courtesy of BMW OF NORTH AMERICA, INC.

Engine compartment partition

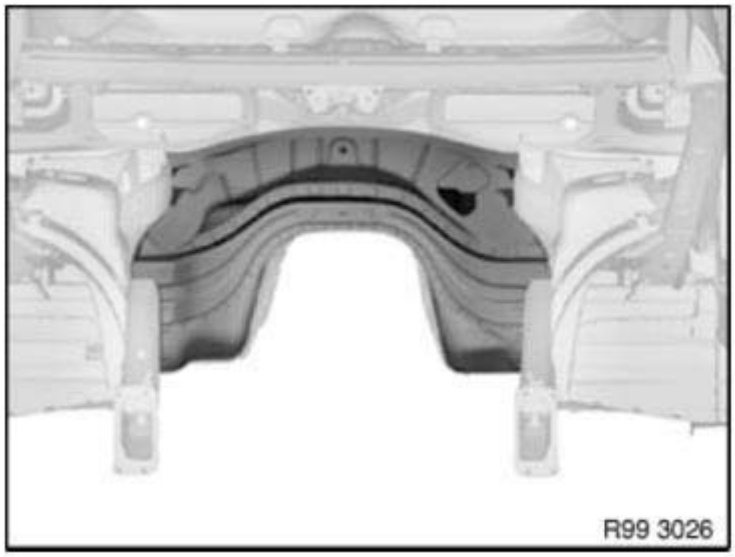


Fig. 18: Identifying Engine Compartment Partition
Courtesy of BMW OF NORTH AMERICA, INC.

Engine carrier (inside only)

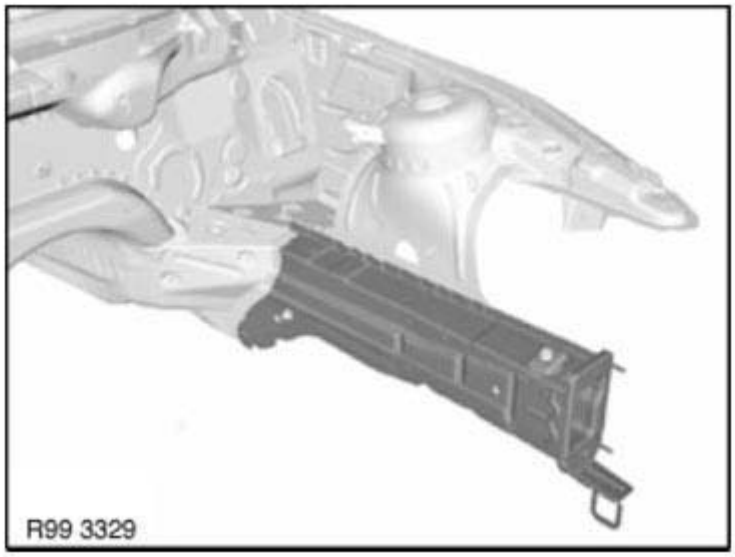


Fig. 19: Identifying Engine Carrier (Inside)
Courtesy of BMW OF NORTH AMERICA, INC.

Engine carrier (partial replacement before front axle)

Inner side shown

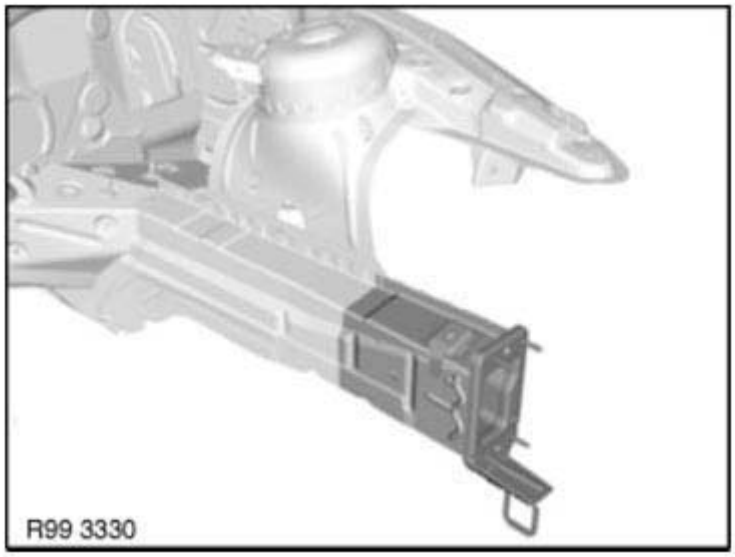


Fig. 20: Identifying Engine Carrier Inner Side
Courtesy of BMW OF NORTH AMERICA, INC.

Engine carrier, complete

Inner side shown

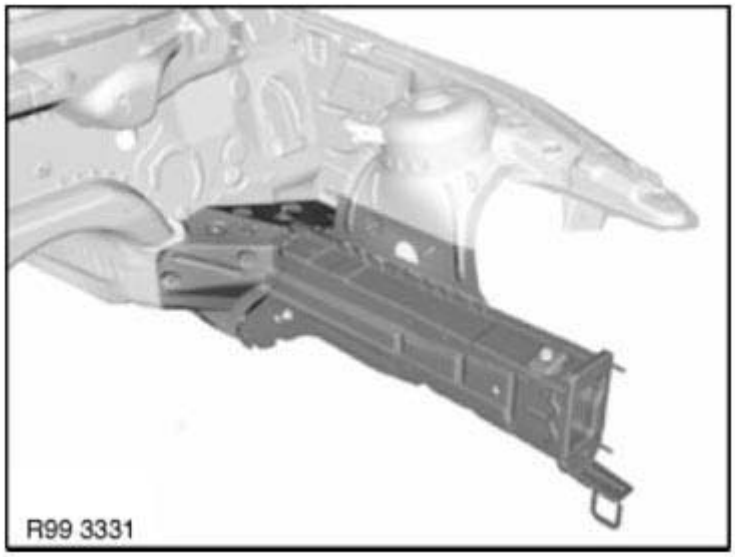


Fig. 21: Identifying Engine Carrier Complete Inner Side
Courtesy of BMW OF NORTH AMERICA, INC.

Engine carrier, complete

Outer side shown

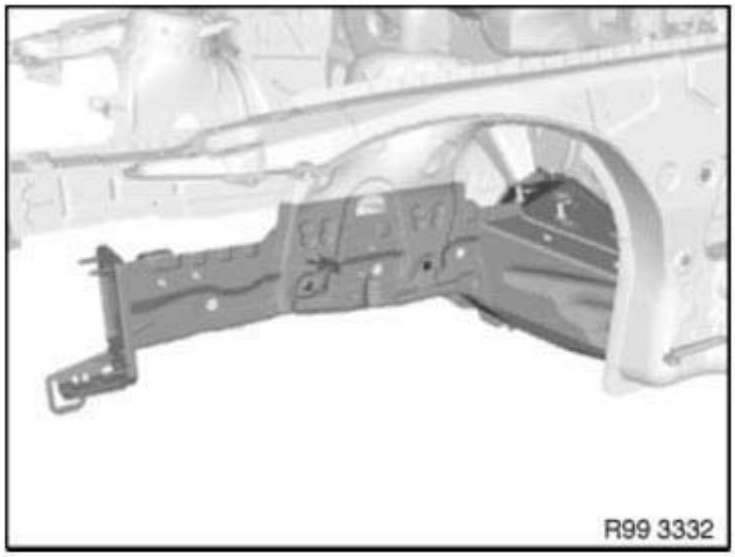


Fig. 22: Identifying Engine Carrier Complete Outer Side
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel arch, front, complete

Inner side shown

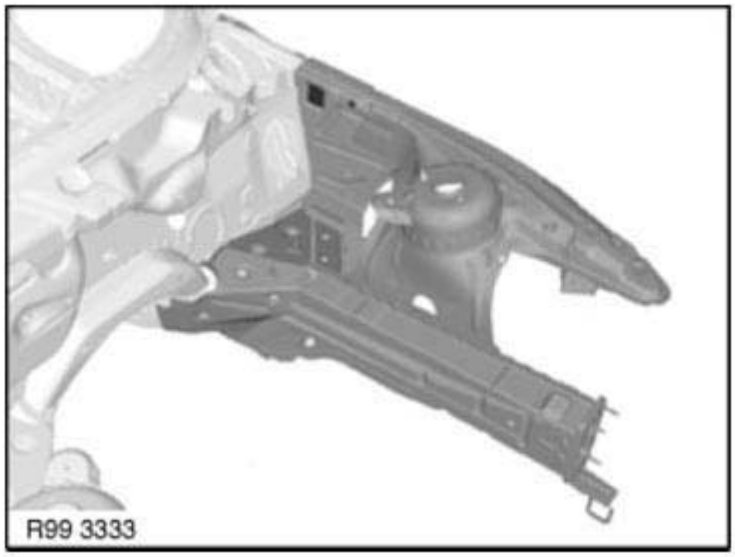


Fig. 23: Identifying Front Wheel Arch Complete Inner Side
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel arch, front, complete

Outer side shown

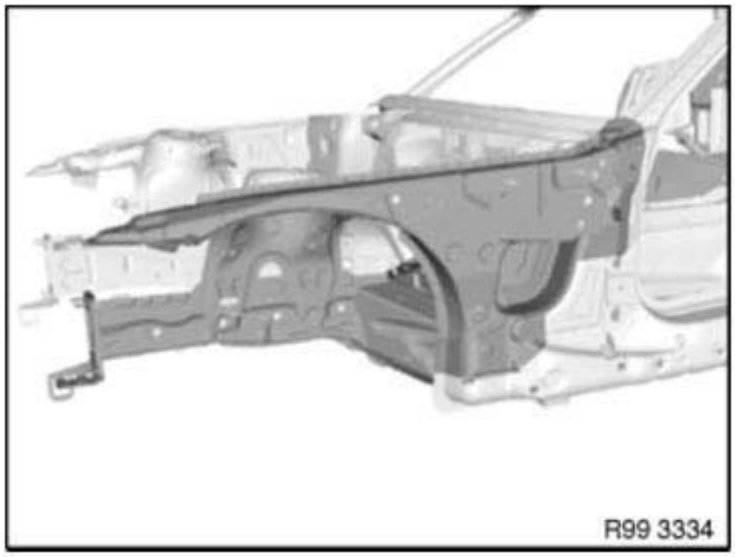


Fig. 24: Identifying Front Wheel Arch Complete Outer Side
Courtesy of BMW OF NORTH AMERICA, INC.

Luggage compartment floor

Carry over the area shown symmetrically to the other side of the car.

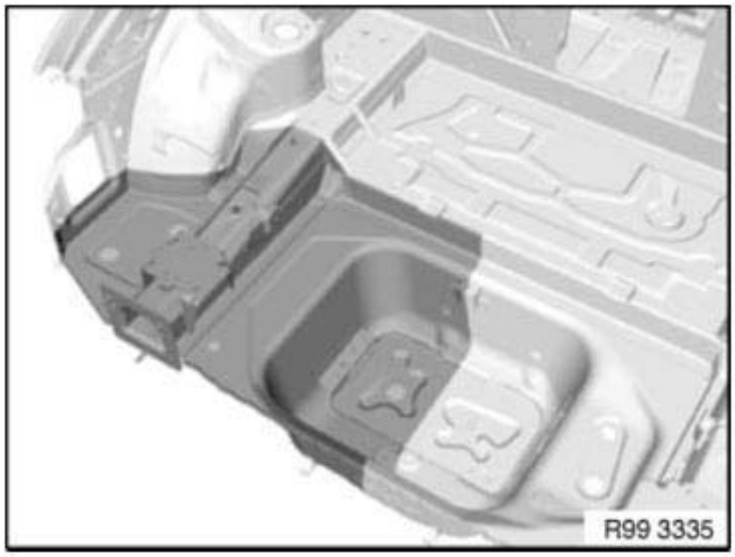


Fig. 25: Identifying Luggage Compartment Floor
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel arch, rear

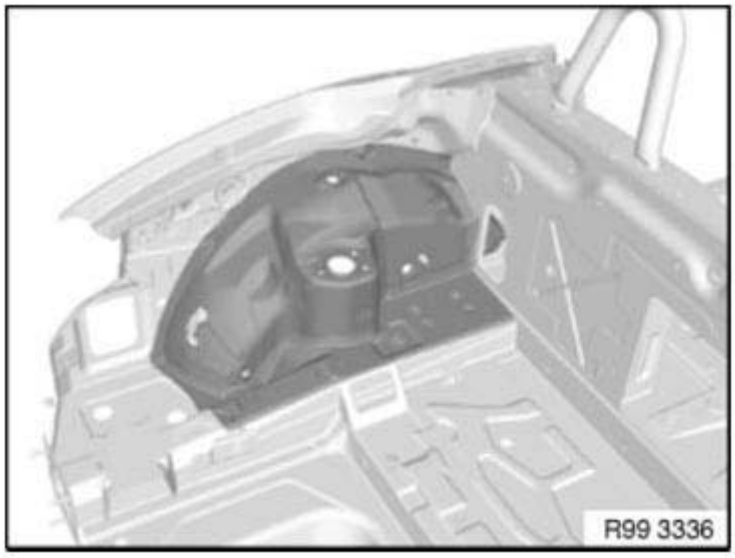


Fig. 26: Identifying Rear Wheel Arch
Courtesy of BMW OF NORTH AMERICA, INC.

RETRACTABLE HARDTOP

The retractable hardtop consists of two aluminum roof panels. They are operated by means of an internal linkage. The retractable hardtop and the rear module are driven hydraulically. The hydraulic system consists of 6 hydraulic cylinders that are supplied with pressure by the hydraulic unit via the hydraulic lines. The cylinders are always actuated in pairs. The retractable hardtop is equipped with a headliner without tensioning cables.

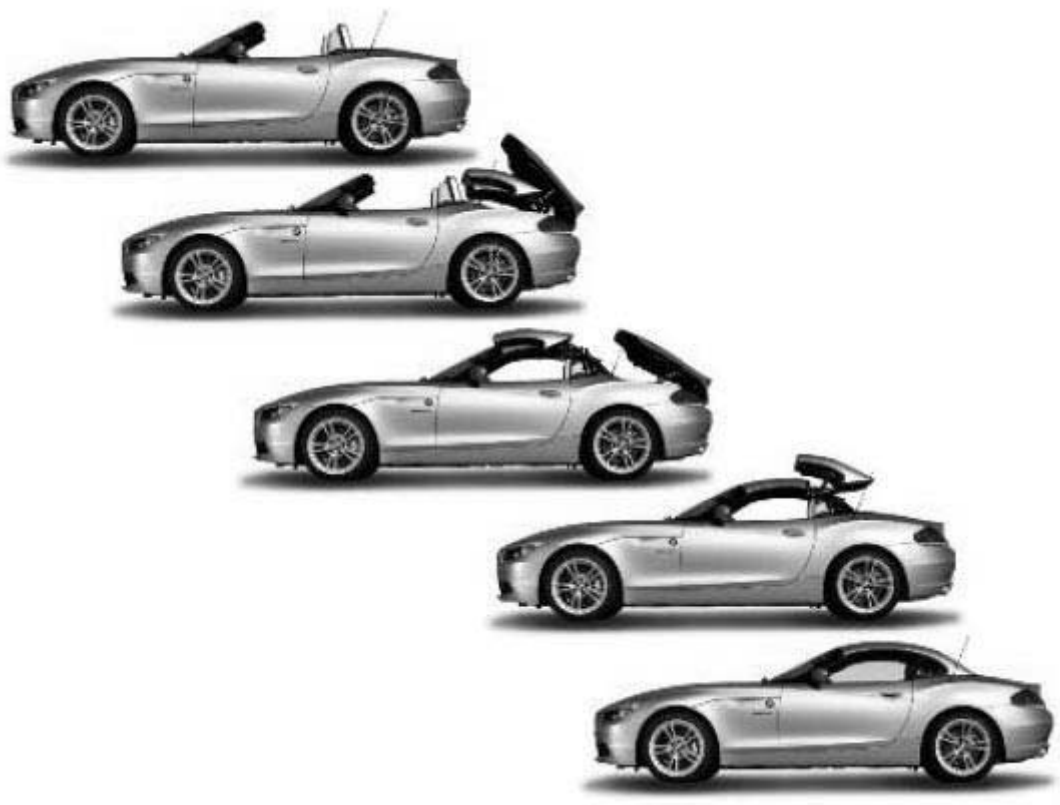


Fig. 1: Identifying Retractable Hardtop Operation
Courtesy of BMW OF NORTH AMERICA, INC.

HYDRAULIC SYSTEM CIRCUIT SCHEMATIC

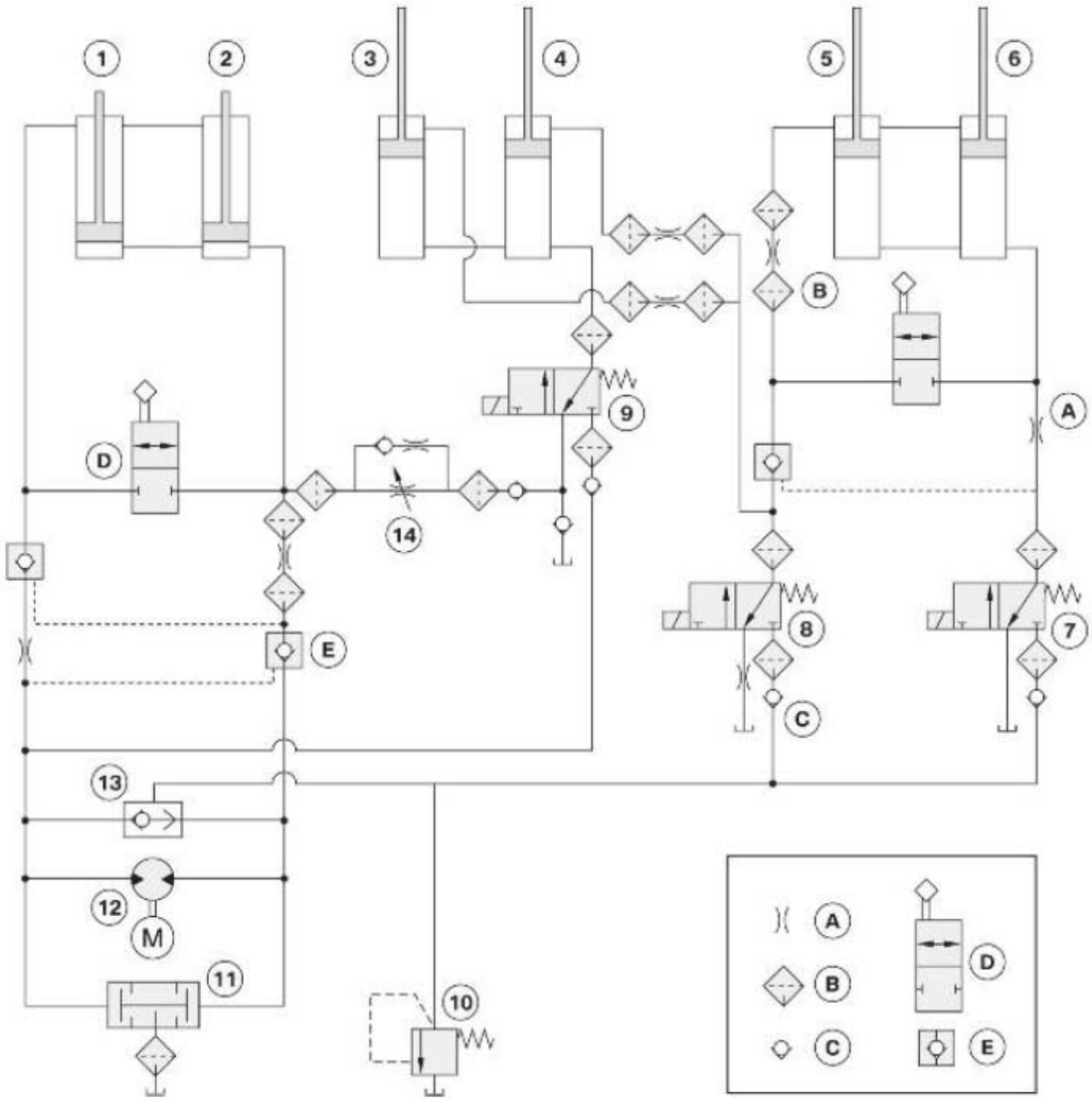


Fig. 2: Hydraulic System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
A	Throttle
B	Filter
C	Non-return valve
D	Emergency operating valve
E	Pilot-controlled non-return valve
1	LH hydraulic cylinder, main pillar
2	RH hydraulic cylinder, main pillar
3	LH hydraulic cylinder, roof panel
4	RH hydraulic cylinder, roof panel

5	LH hydraulic cylinder, rear module
6	RH hydraulic cylinder, rear module
7	Valve for rear module
8	Valve for roof panel and rear module
9	Valve for main cylinder and roof panel
10	Pressure relief valve
11	Changeover valve
12	Hydraulic pump
13	Changeover valve
14	Two-way flow control valve

HYDRAULICS AND LOCKING MECHANISM

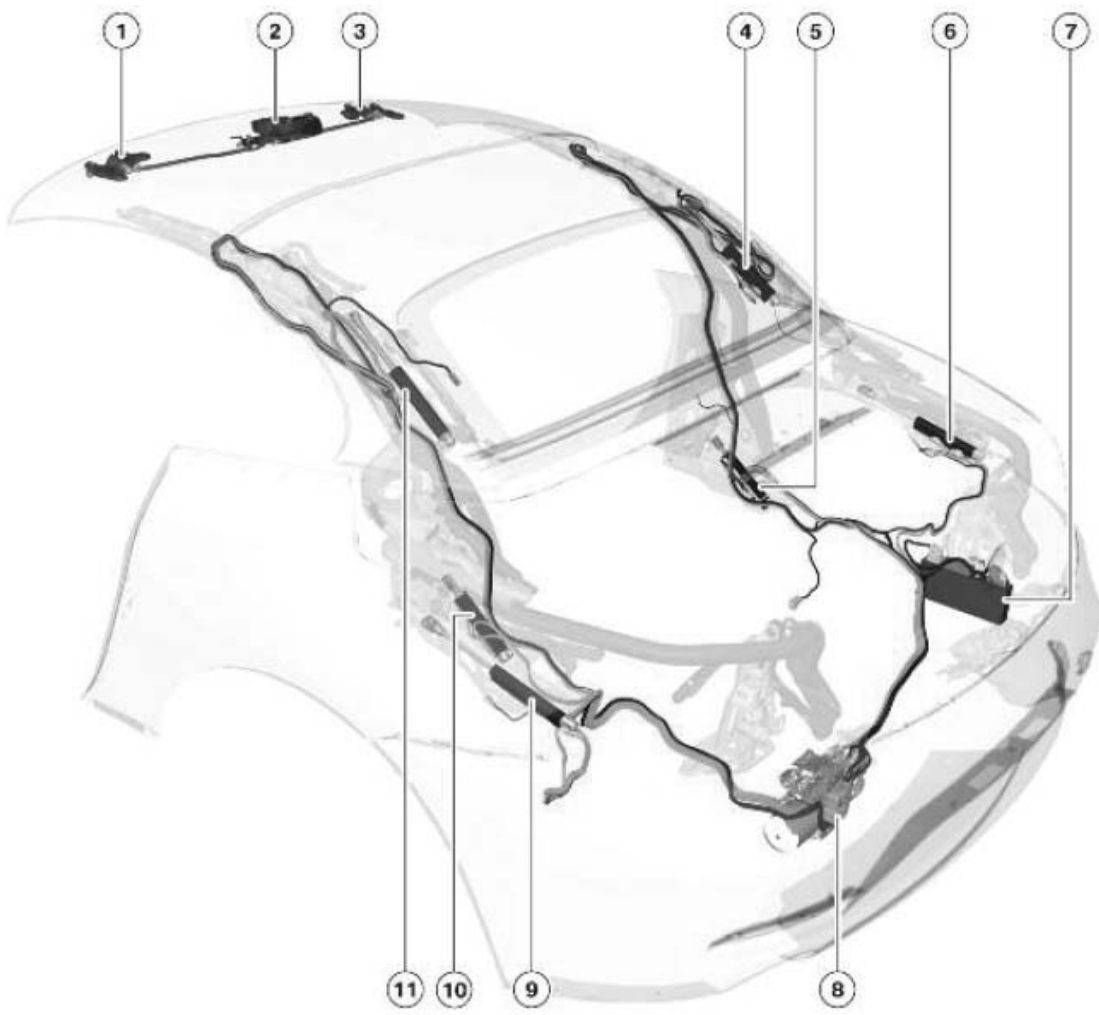


Fig. 3: Identifying Hydraulics And Locking Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	LH latch, windscreen cowl panel
2	Drive for locking retractable hardtop
3	RH latch, windscreen cowl panel
4	RH hydraulic cylinder, roof panel
5	RH hydraulic cylinder, main pillar
6	RH hydraulic cylinder, rear module
7	Convertible top module
8	Hydraulic unit
9	LH hydraulic cylinder, rear module
10	LH hydraulic cylinder, main pillar
11	LH hydraulic cylinder, roof panel

MECHANICAL SYSTEM OVERVIEW

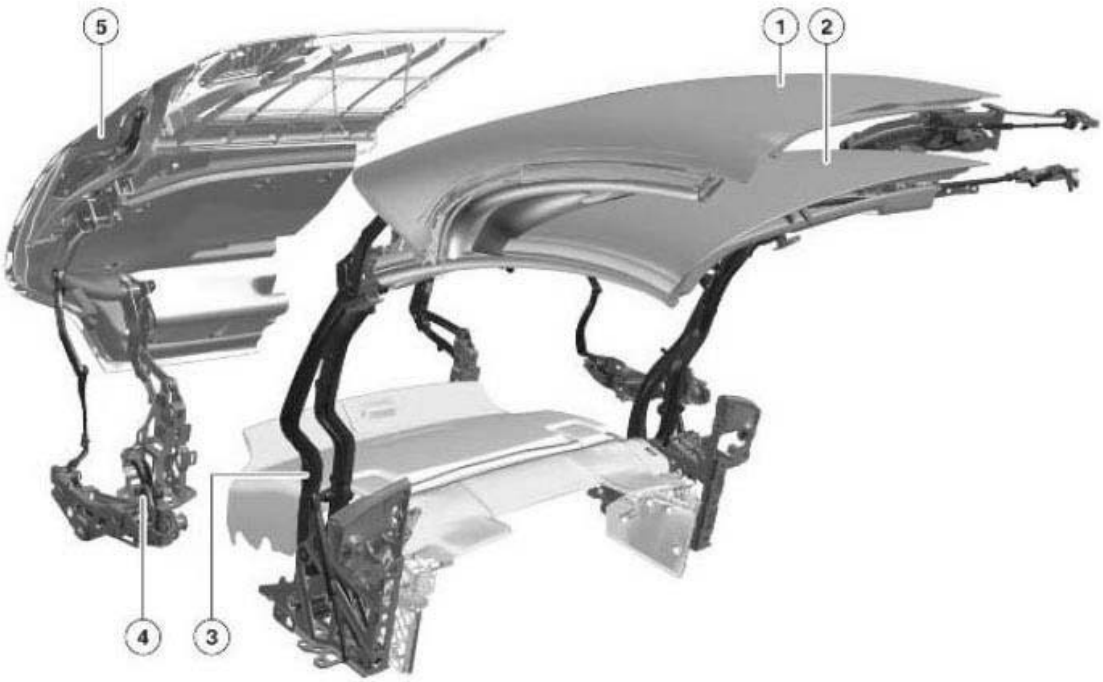


Fig. 4: Mechanical System Overview
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Roof panel 2
2	Roof panel 1
3	Main pillar mechanism
4	Rear module mechanism
5	Rear module

SENSORS

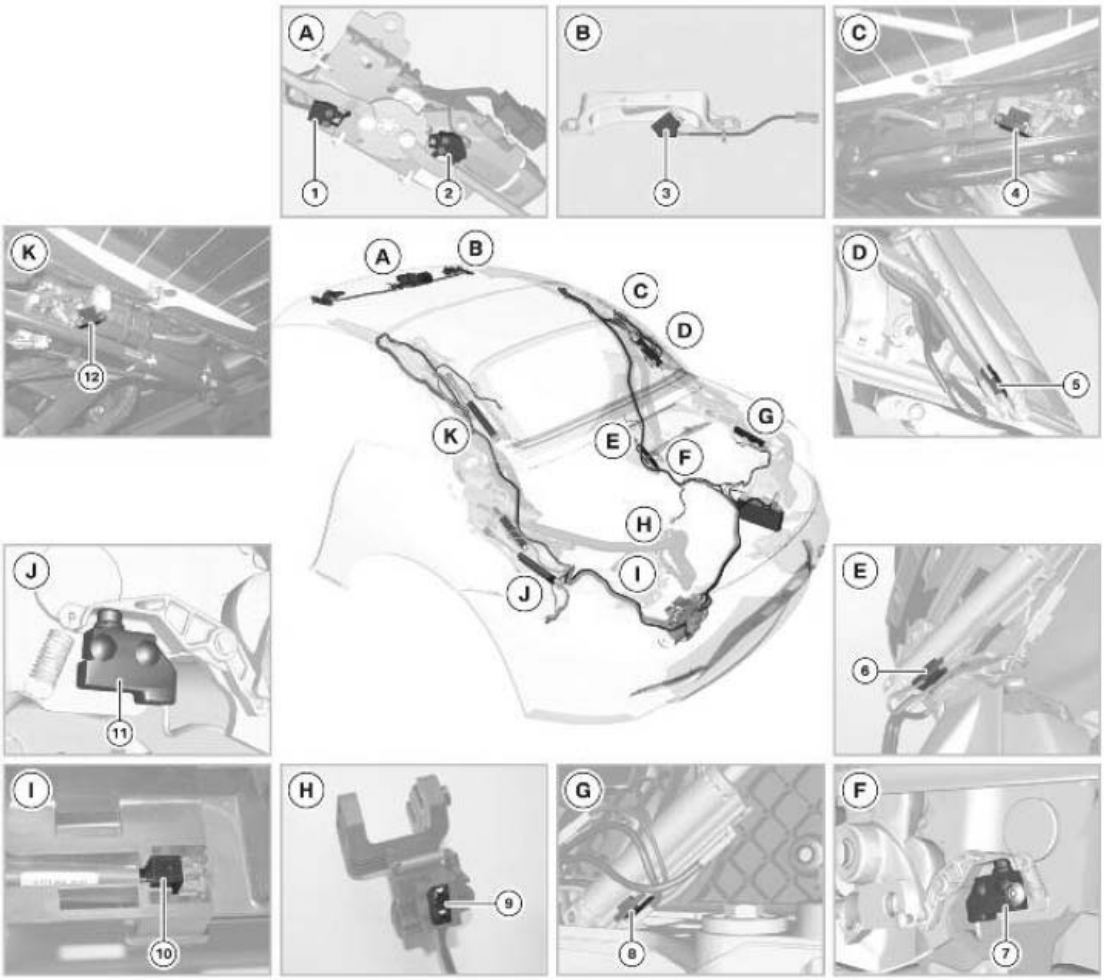


Fig. 5: Identifying Sensor Locations
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
A - K	Locations
1	Microswitch, cowl panel unlocked
2	Microswitch, cowl panel locked
3	Microswitch, cowl panel reached
4	RH microswitch, roof panel closed
5	Hall sensor, roof panel packed
6	Hall sensor, roof panel opened
7	RH microswitch, rear module closed
8	Hall sensor, roof package extended
9	Microswitch, roof module compartment locked

10	Hall sensor, luggage compartment partition
11	LH microswitch, rear module closed
12	LH microswitch, roof panel closed

CIRCUIT DIAGRAM - CONVERTIBLE TOP MODULE

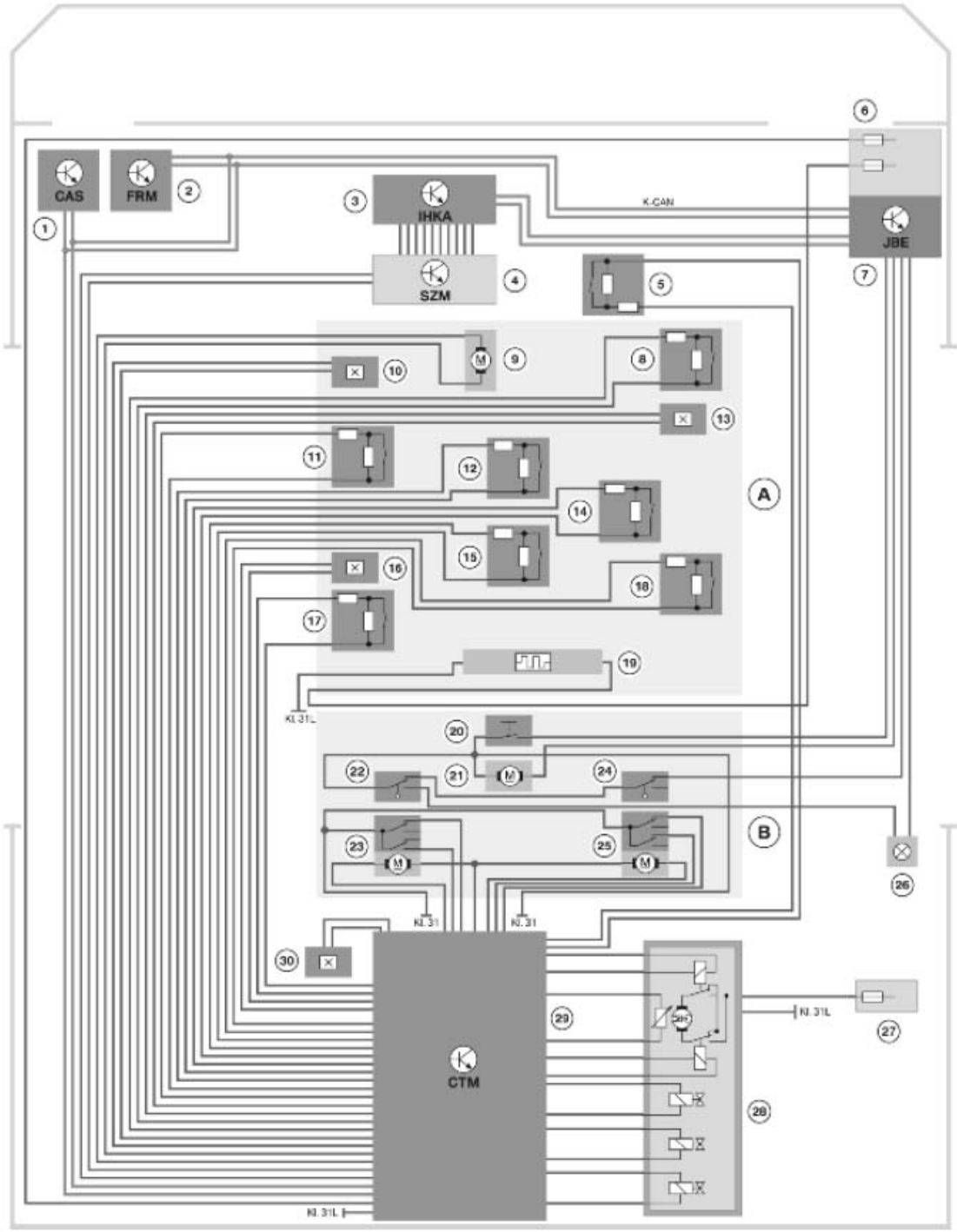


Fig. 6: Convertible Top Module - Circuit Diagram

Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
A	Roof module
B	Rear module
1	Car Access System (CAS)
2	Footwell module (FRM)
3	Integrated automatic climate control (IHKA)
4	Center console control panel (SZM)
5	"Cowl panel reached" microswitch
6	Front power distribution box
7	Junction box electronics (JBE)
8	RH microswitch, roof panel closed
9	Drive for locking retractable hardtop
10	Hall sensor, roof package extended
11	LH microswitch, roof panel closed
12	Microswitch, cowl panel unlocked
13	Hall sensor, roof panel packed
14	Microswitch, cowl panel locked
15	Microswitch, roof module compartment locked
16	Hall sensor, rear module opened
17	LH microswitch, rear module closed
18	RH microswitch, rear module closed
19	Heated rear window
20	Rear lid button
21	Release drive
22	Rear lid lock switch
23	LH automatic soft close drive
24	Rear lid lock switch
25	RH automatic soft close drive
26	Luggage compartment light
27	Battery power distribution box
28	Hydraulic unit
29	Convertible top module (CTM)
30	Hall sensor, luggage compartment partition

SYSTEM COMPONENTS

Microswitches and Hall Sensors

The various positions of the retractable hardtop and of the rear module are detected by 8 microswitches and 4

Hall sensors and signalled to the convertible top module CTM. All microswitches and Hall sensors receive their voltage supply from the convertible top module and have diagnostic capabilities.

After loss of terminal 30 or after emergency operation, the retractable hardtop can still be operated without the need for re-initialization. The microswitches and Hall sensors ensure the convertible top module reliably detects the position of the retractable hardtop.

Buttons for Operating the Hardtop

Two buttons are provided in the center console for the purpose of operating the retractable hardtop. These buttons are wired to the convertible top module. When a button is pressed, the convertible top module receives the information and executes the corresponding command. Movement of the retractable hardtop or side windows stops if the button is released while the hardtop is moving. Operation is indicated by a red LED in one button and a green LED in the other. The convertible top module actuates the LEDs via the K-CAN.

Fig. 7: Identifying Hardtop Buttons
Courtesy of BMW OF NORTH AMERICA, INC.

The green LED in the button lights up during the opening/closing operation. The red LED signals an operating error or incorrect conditions (e.g. luggage compartment partition not in lower position). The red LED flashes as soon as the retractable hardtop is in an intermediate position and not operated. The LED flashing does not indicate a fault. The flashing LED draws attention to the fact that the vehicle cannot be driven in this situation.

A fault code that cannot be read out is stored under following conditions:

- Terminal R On while the button is pressed
- When the button is pressed for longer than 20 seconds after roof operation has concluded.

The retractable hardtop is then temporarily inoperative. The retractable hardtop can be operated again after pressing the Open button once.

Convertible Top Module

The Convertible top module (CTM) is the central electronic control unit for all functions of the retractable hardtop. The convertible top module is installed on the right in the luggage compartment. The convertible top module controls the retractable hardtop, the rear module, the automatic soft close system and the drive unit for locking the hardtop.

The CTM also controls the hydraulic pump and the six hydraulic cylinders by way of the three valves in the hydraulic unit. The K-CAN connects the convertible top module to other control units. Information on outside temperature, driving speed and rear lid status etc., is received via the K-CAN. The convertible top module ends a signal to the car access system (CAS) when the retractable hardtop is opened or closed. The car access system is the master for the power windows. In certain situations, the convertible top module outputs information in the form of check control messages in the instrument cluster.

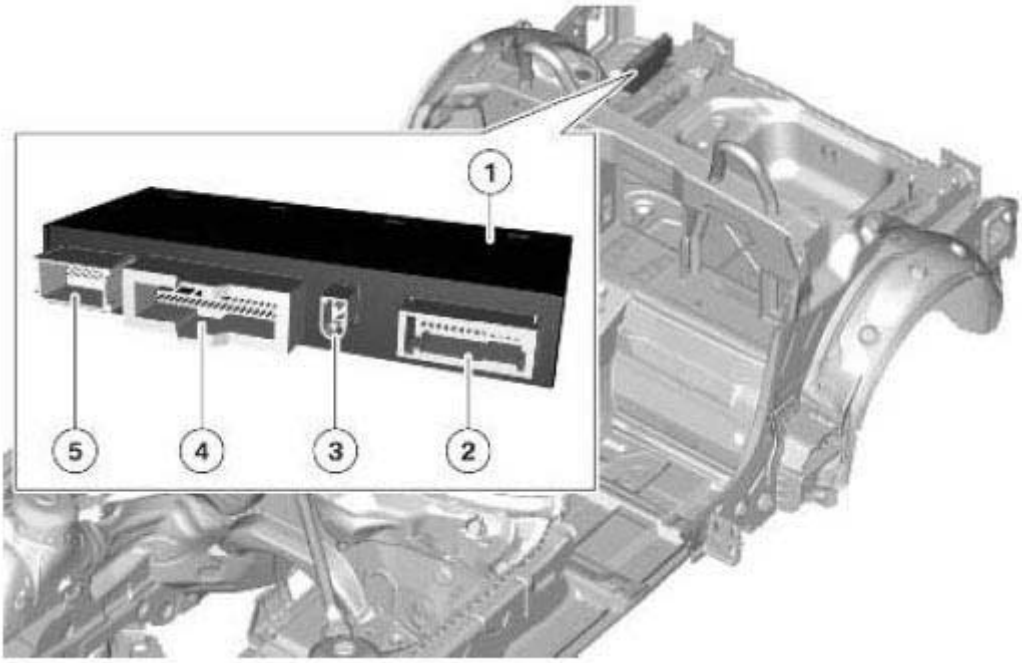


Fig. 8: Identifying Convertible Top Module Location And Connections
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Convertible top module
2	26-pin connector for Hall sensors and microswitches
3	2-pin connector to drive unit for locking retractable hardtop
4	41-pin connector for voltage supply, automatic soft close system, and K-CAN
5	18-pin connector for actuating hydraulic unit

NOTE: ISTA-P must be used to encoded the new module after replacement.

Drive for Locking the Retractable Hardtop

The drive unit, consisting of an electric motor with gear mechanism, locks and unlocks the retractable hardtop with the cowl panel at the upper windscreen frame. The convertible top module actuates the electric motor. The drive unit is arranged in the middle. The retaining hooks on the right and left are moved by a rotary plate and push rods. The two Hall sensors 'cowl panel locked and unlocked' monitor the locking procedure.

When the retractable hardtop is opened, the drive unit locks the hardtop on the base plate in the rear module. This is a crash-lock function, which prevents the retracted hardtop from folding forward in the event of a crash.

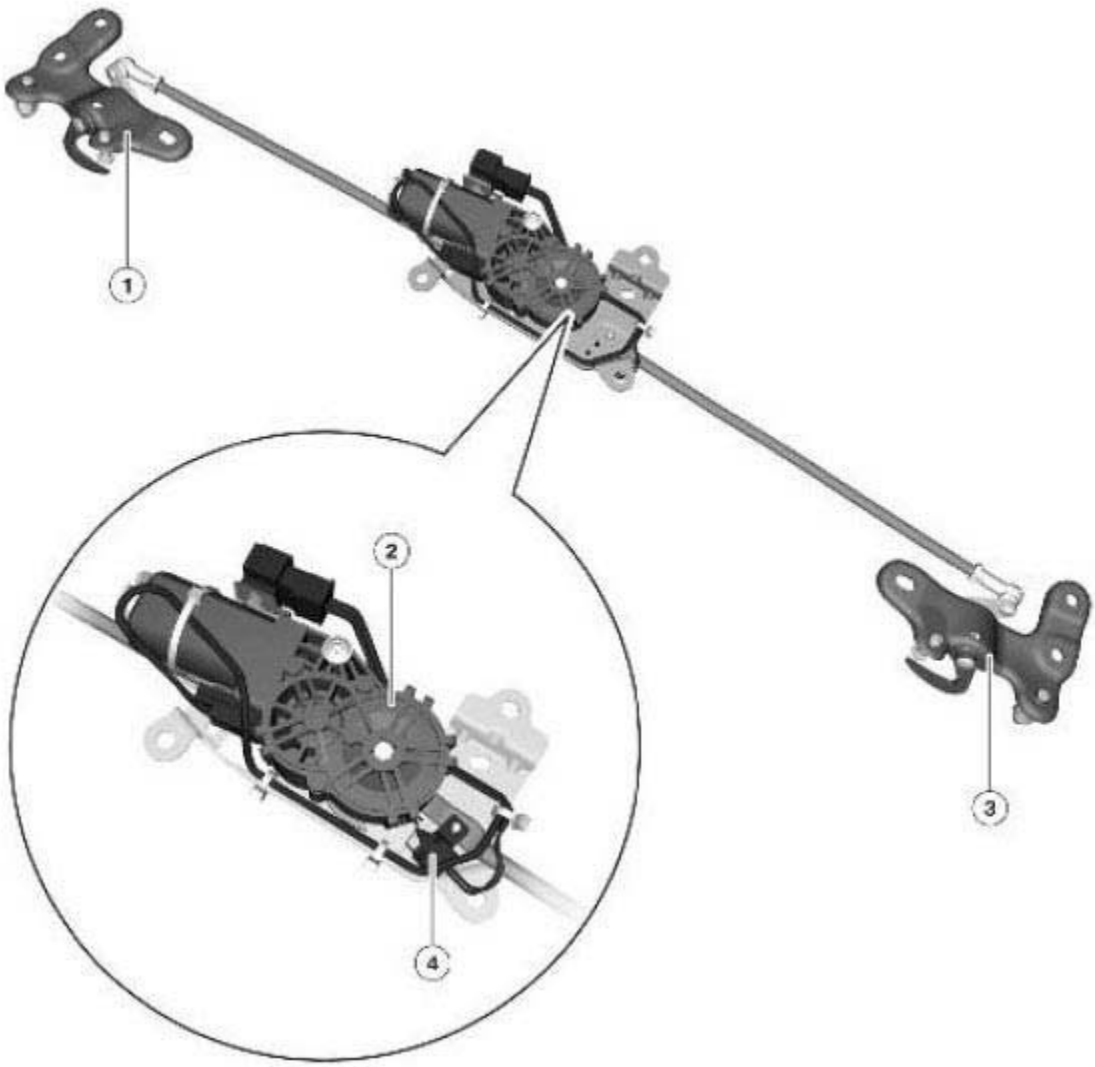


Fig. 9: Identifying Drive For Locking Retractable Hardtop
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Retaining hook, left

2	Drive for locking retractable hardtop
3	Retaining hook, right
4	'Cowl panel unlocked' microswitch and 'cowl panel locked' microswitch

Hydraulic Unit

The hydraulic unit is located in a pan in the luggage compartment floor. The movement direction of the retractable hardtop and rear module are determined by corresponding valve positions and the direction of rotation of the hydraulic pump. The direction of rotation of the hydraulic pump is controlled by two relays.

The hydraulic pump generates an operating pressure from 150 to 200 bar.

The temperature in the hydraulic pump is measured to avoid the pump overheating during frequent use of the retractable hardtop. Two cables connect the temperature sensor ground-free to the convertible top module. A line break (open circuit) results in a fault code being entered in the fault code memory. At from a temperature of 90°C, hardtop closing movement already started is continued up to the secure end position. The movement of the retractable hardtop is stopped immediately at a temperature of 105°C.

The movement can be continued after the temperature has dropped below 90°C. The hydraulic unit is protected by a 50 amp slow-blow fuse.

Other than topping the hydraulic system off, the hydraulic fluid does not require any servicing. Add only the approved hydraulic fluid to the mark on the reservoir.

Fig. 10: Identifying Hydraulic Unit Location
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Excessive noise during top operation may be due to aerated hydraulic lines. If excessive operating noise is heard during operation, the retractable hardtop should be opened and closed several times in order to automatically bleed the hydraulic system via the fluid reservoir.**

Instrument Cluster - KOMBI

The instrument cluster provides the outside temperature (bus signal). The instrument cluster uses the check control symbol to show check control messages relating to the retractable hardtop.

Footwell Module - FRM

The footwell module FRM actuates the front power window regulators. The side windows must be lowered in order to open the retractable hardtop (bus signal to convertible top module).

Junction Box Electronics - JBE

The junction box electronics JBE actuates the rear power window regulators. The side windows must be lowered in order to open the retractable hardtop (bus signal to convertible top module). The junction box electronics provides the signal indicating whether the rear lid is closed (bus signal).

The power distribution box in the junction box supplies terminal 30g to the convertible top module. The convertible top module additionally receives terminal 15 from the car access system. This still enables adequate communication with the BMW diagnosis system when, for example, the voltage supply from the junction box is interrupted.

Car Access System - CAS

The car access system is the master control unit for the power window regulators. On request of the convertible top module, the car access system lowers or raises the side windows. In addition, the car access system prevents the rear lid from being opened and movement of the power windows when the retractable hardtop is in an intermediate position. The car access system controls the auto-remote opening function for the retractable hardtop. The signals from the remote control are received by the remote control receiver and sent to the car access system.

Antenna Diversity

The convertible top module sends a corresponding signal to the antenna diversity module depending on whether the retractable hardtop is closed or open. The antenna diversity function then correspondingly switches over the antennas.

PRINCIPLES OF OPERATION

The following options are available for operating the hardtop:

- Using the button (close and open)
- Using the key in the lock cylinder in the driver's door handle (close and open)

- Using the remote control (open only)
- Using the ID transmitter with Comfort Access option (close, as long as the ID transmitter is within range of the comfort access antennas and open as with the remote control).

Operating Pre-Conditions

The retractable hardtop can be opened and closed using the button in the center console only if the following conditions are met:

- Terminal R ON
- Outside temperature above -12°C
- Boot lid closed
- Vehicle stationary (driving speed < 0.7 km/h)
- Luggage compartment partition in lowest position
- Lateral inclination of vehicle < 11°
- Power windows initialized
- Battery voltage > 11.5 V
- Less than five successive opening/closing operations
- Hydraulic fluid temperature for opening < 90°C and for closing < 105°C
- Electrical system check successful
- Production, transport and workshop mode (FeTraWe) not set.

It is not possible to open and close the retractable hardtop while driving. Due to the high current consumption of the retractable hardtop of up to 40 amps, the hardtop should only be operated when the battery charger is connected or the engine is running.

NOTE: The rear power window regulators do not have an anti-trap system. There is also no one-touch function for closing the rear windows.

Opening the Retractable Hardtop

The retractable hardtop is normally operated by pressing the open or close button in the center console. The hardtop moves for as long as the button is pressed. The green LED in the button lights up while the retractable hardtop is moving. Movement of the retractable hardtop, rear module or side windows is stopped immediately if the button is released while the retractable hardtop is moving. The red LED then flashes in the button.

Movement of the hardtop can be resumed by pressing the button again. Movement of the side windows can be resumed within 10 seconds. If one of the conditions is not met, the red LED will light continuously.

The convertible top module checks the conditions for opening the retractable hardtop when the Open button in the center console is pressed. If the check is successful, the hardtop is opened as follows:

- Lower side windows (if closed or in intermediate position)
- Release hardtop at cowl panel

- Switch off heated rear window (takes place via junction box electronics)
- Unlock and open rear module
- Roof panel 2 is released and packed over roof panel 1
- Stow roof panel package in rear module and lock
- Close and lock rear module
- Close side windows.

The hardtop is closed automatically in the reverse order.

Operating Conditions with Comfort Access

The following functions can be performed only when the ID transmitter is less than 4 m away:

- Open
- Close
- Easy Load feature

Automatic Soft Close System

The automatic soft close function is installed as standard to conveniently close the rear [trunk] lid. The automatic soft close system consists of two drive units. The drive units lock the rear lid on the left and right on the rear module carrier. This increases the stability of the rear end.

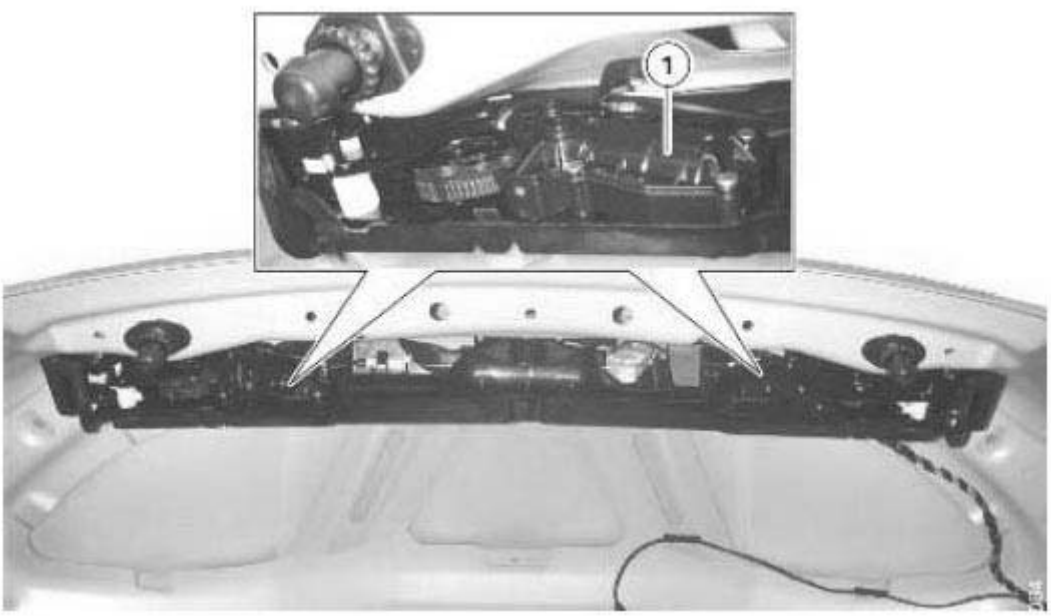


Fig. 11: Identifying Automatic Soft Close Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Each trunk lid latch assembly has a microswitch. These two microswitches are operated when the rear lid locks on the left and right have reached the lock strikers. The signals are hard wired to the junction box electronics

which then makes the signal available to the convertible top module via the K-CAN-bus. The convertible top module then actuates the two drive units of the automatic soft close system until the rear lid is locked.

Manually shutting the rear lid would make closing via the automatic soft close system unnecessary. For safety reasons, steps must be taken to ensure that the rear lid is completely closed. For this reason, the drive units of the automatic soft close system are still actuated.

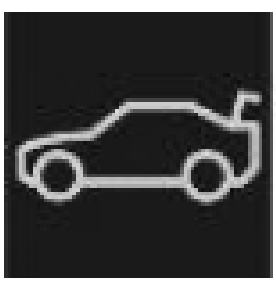
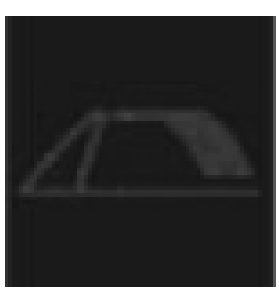
Both drive units feature a repeat interlock to avoid overheating. The repeat interlock allows the automatic soft close system to be actuated up to 20 times (counter up to 20 increments). The automatic soft close system is then inhibited electrically for approximately 2 minutes.

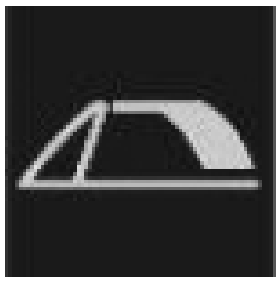
Check Control Messages

It is not possible to open or close the retractable hardtop in certain situations. In such cases, corresponding messages are shown in the instrument cluster in the form of check control messages.

A short message and additional information are shown on vehicles equipped with a central information display (CID). The check control messages provide explanatory information relating to the red LED in the button that lights up in the case of fault. An active check control message is shown every 5 seconds.

CHECK CONTROL MESSAGES REFERENCE CHART

Check Control Symbol	Check Control Message	Additional Information
	Luggage compartment open!	-
	Roof malfunction!	No roof movement possible. If the retractable hardtop does not lock, contact the nearest BMW dealer.
	Roof operation!	Roof movement not completed. Check whether roof movement is blocked. Then press button again.
	Roof control failed!	Roof position and roof locking are not detected. Trip can be continued if roof is locked securely.
	Roof not locked!	Roof not locked. First open or close roof completely before continuing trip.

	Luggage compartment partition!	No roof movement possible. Move luggage compartment partition into required position.
	Roof drive overheated!	Roof drive overheated.
	Roof operation not possible!	Roof operation only possible when vehicle is stationary.
	Vehicle not parked on level ground!	Vehicle not parked on level ground. No roof movement possible.

SENSOR STATUS

SENSOR STATUS REFERENCE CHART

	Retractable hardtop open	**Intermediate position1**	**Intermediate position2**	**Retractable hardtop closed**
"Roof package stowed" Hall sensor	• On	o Off	o Off	o Off
LH microswitch, roof panel closed	o Off	o Off	o Off	• On
RH microswitch, roof panel closed	o Off	o Off	o Off	• On
Hall sensor, roof panel packed	• On	• On		o Off
Microswitch, cowl panel locked	• On	o Off	• On	• On
Microswitch, cowl panel unlocked	o Off	• On	o Off	o Off
LH microswitch, rear module closed	• On	o Off	• On	• On
"Rear module open" Hall sensor	o Off	• On	o Off	o Off
RH microswitch, rear module closed	• On	o Off	• On	• On
Microswitch, roof module compartment locked	• On	o Off	o Off	o Off

"Cowl panel reached" microswitch	o Off	o Off	• On	• On
"Luggage compartment divider" Hall sensor	• On	• On	• On	• On

Convenient Loading Function of Rear Lid

The retractable hardtop can be opened and closed using the ID transmitter on vehicles equipped with the Comfort Access option.

The new auto-remote function for loading and unloading provides fast access to the luggage compartment when the retractable hardtop is down. This function makes it easier to load larger items of luggage for instance. The auto-remote function is activated as follows:

- Briefly press the rear lid button on the remote control
- Then, press and hold the rear lid button on the remote control (no more than one second may pass between releasing and pressing the rear lid button).

Initially, the rear module is unlocked and fully opened. The roof package is swivelled out of the luggage compartment. The rear module is then closed and locked. The rear lid is unlocked by the automatic soft close system. The boot lid opens a little. The auto-remote functions via the remote control conform to national market specifications.

Emergency Opening of Rear Lid

As there is no lock cylinder and Bowden cable assembly, the rear lid cannot be released in the event of the rear lid lock being defective. At the same time, movement of the retractable hardtop is inhibited by the unknown status of the rear lid.

The lid can be opened if the Bowden cable (emergency glow in the dark) handle can be reached from the through load compartment.

The rear lid can also be forced to open by using the diagnostic tester. The rear lid activation via the JBE component activation function. This activation request ignores all status that would typically inhibit rear lid operation such as top position.

Emergency Actuation of the Retractable Hardtop

An emergency actuation facility for releasing the retractable hardtop by the customer is not possible. Emergency actuation is, however, possible in the service workshop. The emergency actuation procedure is described in detail in the repair instructions.

5410 SLIDETILT SUNROOF AND CONVERTIBLE TOP

54 0 ... REPAIR INSTRUCTIONS FOR BONDED SEALS

1. General information on handling rubber seal profiles

- If seals reveal partly detached protective film on delivery, they must not be bonded.
- Store seals at 15 °C to 25 °C.
- If, during the handling, the protective film has come off before bonding, it can still be bonded.
- Bonding at room and object temperature >20 °C. Temperatures between 40 and 50 °C significantly increase initial adhesion.
- Seals, which are subjected to temperatures above 80 °C after gluing, will be very difficult to remove.

2. Damage pattern and repair

2.1 Partially detached bond (rubber-adhesive tape or adhesive tape-paint)

- Up to 120 mm for retouching without auxiliary resources
- Up to 200 mm repaired with pressing-on tools on straight surfaces

a. Cleaning damaged areas:

- Degrease bonded area with adhesive cleaner (refer to BMW Parts Service) and remove other residues.

NOTE: Use necessary cotton- or fluff-free paper towel once only.

When using solvent:

expose repair area to air for at least 2 minutes.

b. Applying adhesive:

- With a fine nozzle, apply a wafer-thin bead to adhesive tape.

NOTE: Use contact adhesive (e.g. Terokal 2444)

CAUTION: Avoid contact to skin!
Do not apply adhesive to visible painted surfaces.

c. Pressing on rubber seal:

- Press down seal using contact pressure (forced pressure not necessary) for at least 1 minute.

CAUTION: Load can only be applied to the bond after a period of 2 minutes. This waiting time is absolutely essential.

2.2 Larger defects (mechanical damage and larger separations of seal)

- Complete replacement of rubber seal necessary

a. Peeling off damaged rubber seal:

- Pull off rubber seal slowly at an angle up to 20° under uniformly strong tension.

NOTE: Make sure the connection between adhesive tape and seal is retained.

If the connection between adhesive tape and seal is detached: Carefully and slowly detach adhesive tape at an angle of 20° from roof opening or lid.

When existing seals are being peeled off with a hot air blower: Do not damage paintwork.

Do not detach rubber-adhesive tape connection if at all possible.

b. Cleaning bonded area:

- Degrease bonded area with adhesive cleaner (refer to BMW Parts Service) and remove other residues.

NOTE: Use necessary cotton- or fluff-free paper towel once only.

When using solvent:

expose repair area to air for at least 2 minutes.

c. Detaching protective film from bonded area:

- Detach protective film from rubber seal in sections.

CAUTION: Once the protective film has been removed, do not under any circumstances touch the exposed bonded area.

d. Applying rubber seal:

- Apply rubber seal on roof opening edge beginning at rear centre. Use upper lip as application edge. Press on seal continuously by hand. Carefully unwrap seal at radii without tension and press down (critical area).

NOTE: If positioned incorrectly, the seal can still be pulled off, repositioned and pressed on again.

e. Establishing seal joint:

- Mark contact point at joint by pressing down loose end on seal of already bonded end. Then cut and press down loose end at same height.

NOTE: Small areas of seal can remain stuck to adhesive tape of loose end.

f. Pressing on seal:
   - Press on seal using a roller
   - Adhesive tape width up to 5 mm Application pressure approx. 5 N
   - Adhesive tape width up to 10 mm Application pressure approx. 10 N
   - Press against seal strongly with a roller. Application pressure approx. 70 N.
   - Application pressure approx. 30 N.
   - Tear off tear-off lip at rear and side in area of narrower flange.

Sliding sunroof seal only:

E36 sliding sunroof seal only:

NOTE: Firm thumb pressure has approx. 35 N/cm^2

3. Checking rubber seal

- Check the bonded seals for correct positioning and perfect adhesion. The bonding can be checked by pressing back the sealing lip.
- The force required to peel off the seal immediately after gluing must be greater than 10 N/cm.

5431 CONVERTIBLE TOP LINKAGE/OPERATION

54 34 001 CHECKING FUNCTION OF ELECTRO-HYDRAULIC CONVERTIBLE TOP

WARNING: You are exposed to the risk of trapping body parts when working on the installed or removed convertible top.

Convertible top is centered by pin (2) during insertion into guide and locked by rotary striker (1).

Carefully close convertible top until rotary striker (1) has retracted by approx. 1/3 into striker.

Rotary striker (1) and pin (2) must close correctly and virtually silently.

Open and close convertible top at least 3 times.

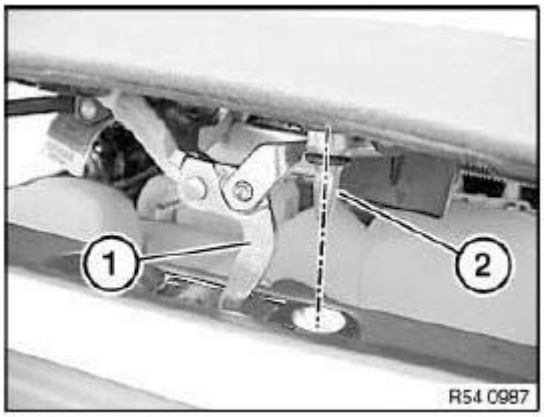


Fig. 1: Identifying Rotary Striker And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Check all line connections for fluid leaks.

If necessary, **CHECK FLUID LEVEL** .

NOTE: The drive has an additional function.

With the hardtop opened, the drive locks the hardtop on the base plate in the rear module.

The purpose of this function is crash locking.

In the event of a crash, the stored hardtop cannot fold forwards.

Function actuation, convertible top:

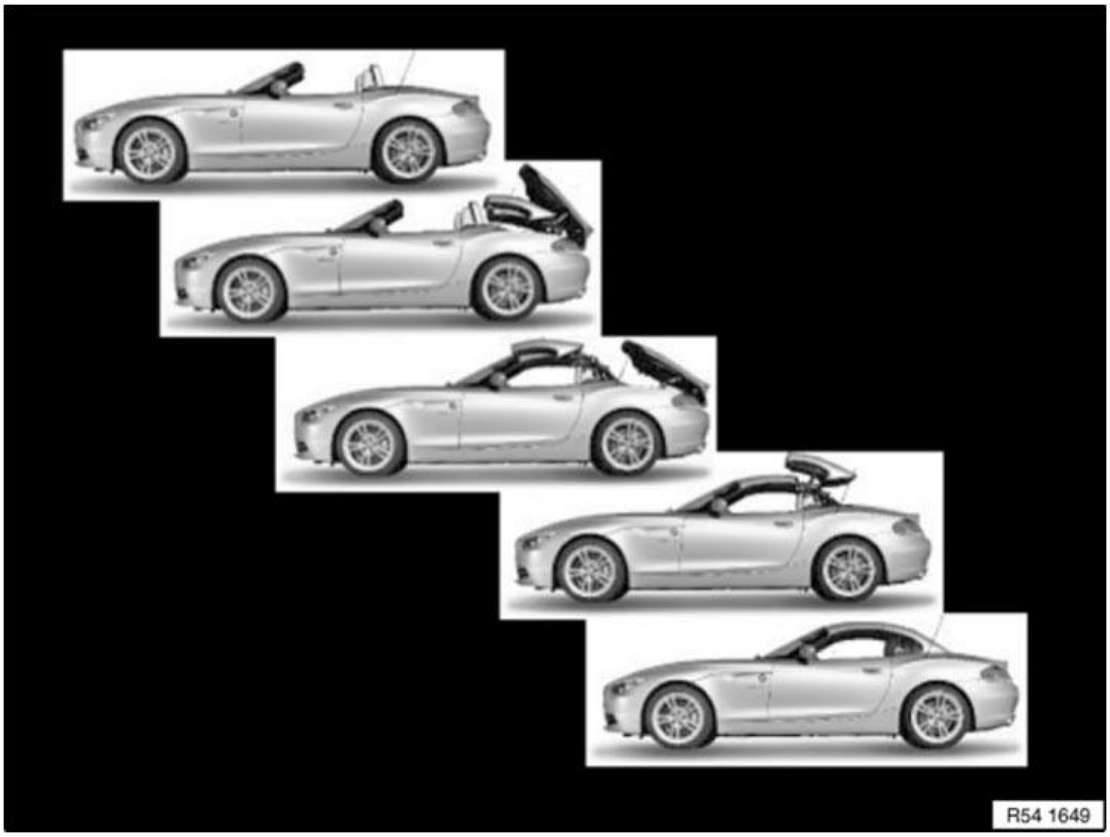


Fig. 2: Function Actuation, convertible top
Courtesy of BMW OF NORTH AMERICA, INC.

Closing convertible top is only possible under following conditions:

- from ignition lock position "R" (radio setting)
- outside temperature is above -20 °C
- rear lid (rear module) closed
- vehicle stationary (driving speed 0 kph)
- luggage compartment partition is in lower position
- lateral inclination of the vehicle less than 11°
- power windows are initialized
- battery voltage greater than 11.5 volts
- fewer than 5 opening and closing operations in succession (pump protection inactive)
- temperature of hydraulic fluid for opening max. 90 °C and for closing max. 105 °C
- hydraulic pump motor is not overheated
- control switch is pressed

Automatic opening runs as follows:

- Side windows are lowered
- Unlock hardtop at the cowl panel
- Switch off heated rear window (via the junction box electronics)
- Unlock and open rear module
- Pack rear roof shell on front roof shell
- Store roof panel package in the rear module and lock
- Close and lock rear module
- Close side windows

Check-control messages

It is not possible to open and close the convertible top in certain situations.

Corresponding Check Control messages are displayed in the instrument cluster for this purpose.

The Check Control messages serve to explain in closer detail the red or yellow LED on the button which lights up in the event of a fault.

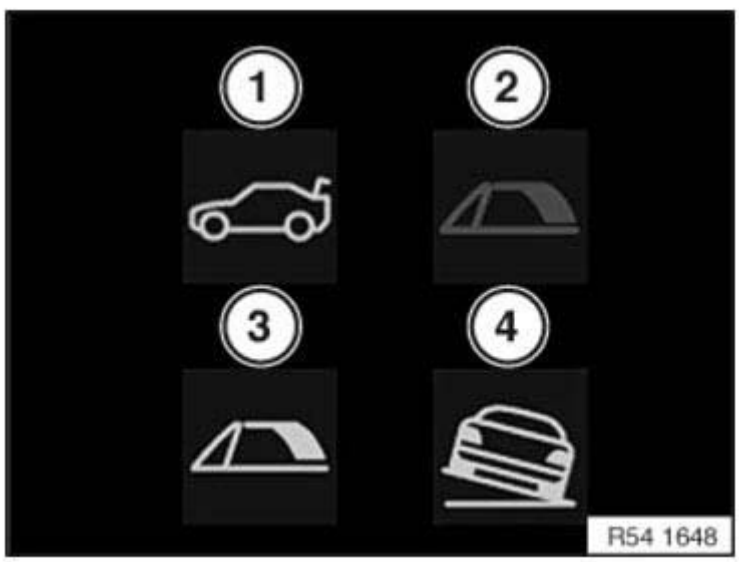


Fig. 3: Identifying Check Control Messages
Courtesy of BMW OF NORTH AMERICA, INC.

CHECK CONTROL MESSAGES REFERENCE CHART

No.	Colour:	ID	Check Control message	Supplementary note:
1	yellow	19	Boot open!	
2	Red	401	Roof mechanism function failure!	Roof mechanism No roof movement possible. If the soft hardtop is not locked,

				contact the nearest BMW Service.
		447	Roof mechanism!	Roof mechanism Roof movement not completed. Please check whether roof movement is blocked. Then press button again.
		558	Roof control failure!	Roof control Roof position and interlock cannot be detected. If the roof locks safely, driving can continue. For information on checking the interlock, see Owner's Handbook.
		562	Roof not locked!	Roof Roof not locked. First open or close the roof completely, then continue driving.
3	yellow	416	Luggage-compartment partition!	Luggage compartment partition No roof movement possible. Move luggage compartment partition to the position required, refer to Owner's Handbook.
		432	Roof drive overheating!	Roof mechanism Roof operation overheated. Temporarily only closing function available.
		516	No roof operation possible!	Roof Roof operation only possible with vehicle at a standstill.
4	yellow	445	Vehicle not standing on level surface!	Roof mechanism Vehicle not standing on level surface! No roof movement possible.

Only when you have excluded the function conditions as fault sources can you start convertible top diagnosis.

5434 MOTOR-OPERATED CONVERTIBLE TOP

54 34 001 CHECKING FUNCTION OF ELECTRO-HYDRAULIC CONVERTIBLE TOP

WARNING: You are exposed to the risk of trapping body parts when working on the installed or removed convertible top.

Convertible top is centered by pin (2) during insertion into guide and locked by rotary striker (1).

Carefully close convertible top until rotary striker (1) has retracted by approx. 1/3 into striker.

Rotary striker (1) and pin (2) must close correctly and virtually silently.

Open and close convertible top at least 3 times.

Check all line connections for fluid leaks.

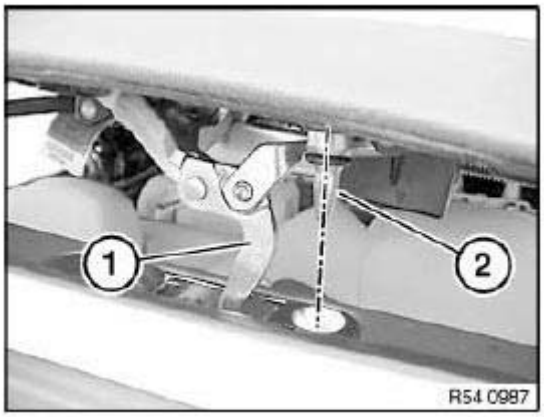


Fig. 4: Identifying Rotary Striker And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, **CHECK FLUID LEVEL** .

NOTE: The drive has an additional function.

With the hardtop opened, the drive locks the hardtop on the base plate in the rear module.

The purpose of this function is crash locking.

In the event of a crash, the stored hardtop cannot fold forwards.

Function actuation, convertible top:

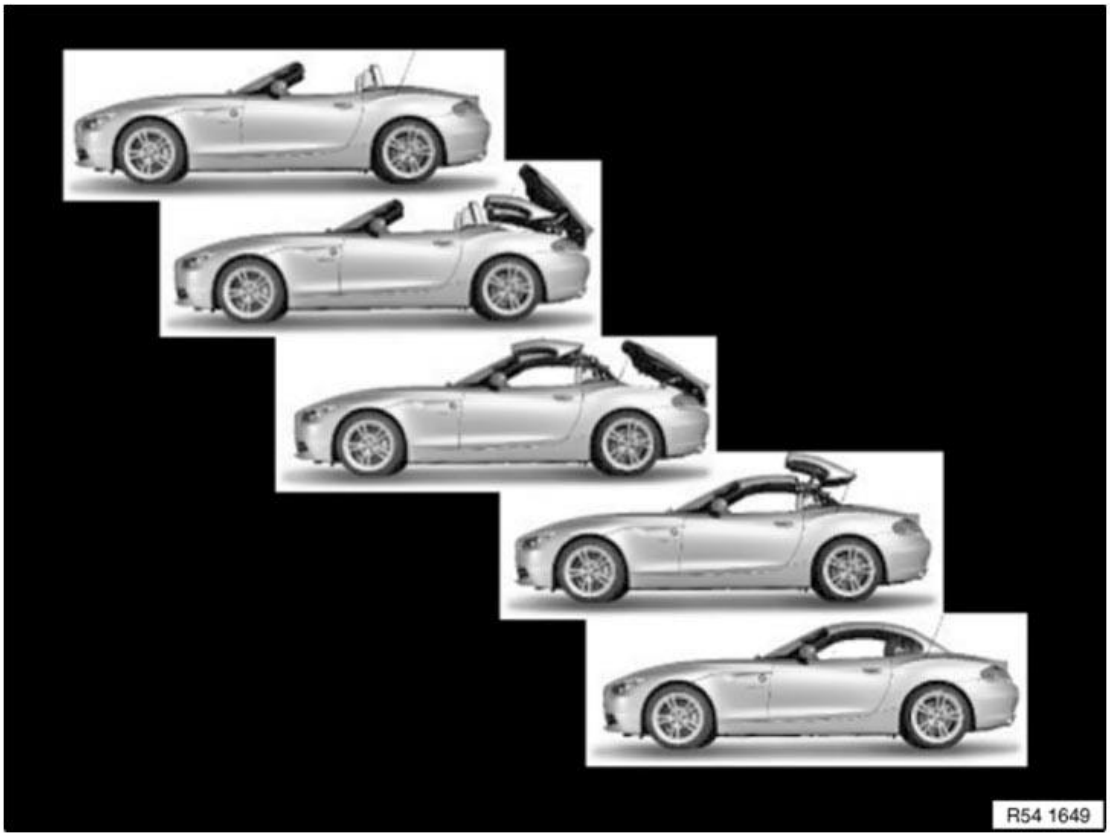


Fig. 5: Function Actuation, Convertible Top
Courtesy of BMW OF NORTH AMERICA, INC.

Closing convertible top is only possible under following conditions:

- from ignition lock position "R" (radio setting)
- outside temperature is above -20 °C
- rear lid (rear module) closed
- vehicle stationary (driving speed 0 kph)
- luggage compartment partition is in lower position
- lateral inclination of the vehicle less than 11°
- power windows are initialized
- battery voltage greater than 11.5 volts
- fewer than 5 opening and closing operations in succession (pump protection inactive)
- temperature of hydraulic fluid for opening max. 90 °C and for closing max. 105 °C
- hydraulic pump motor is not overheated
- control switch is pressed

Automatic opening runs as follows:

- Side windows are lowered

- Unlock hardtop at the cowl panel
- Switch off heated rear window (via the junction box electronics)
- Unlock and open rear module
- Pack rear roof shell on front roof shell
- Store roof panel package in the rear module and lock
- Close and lock rear module
- Close side windows

Check-control messages

It is not possible to open and close the convertible top in certain situations.

Corresponding Check Control messages are displayed in the instrument cluster for this purpose.

The Check Control messages serve to explain in closer detail the red or yellow LED on the button which lights up in the event of a fault.

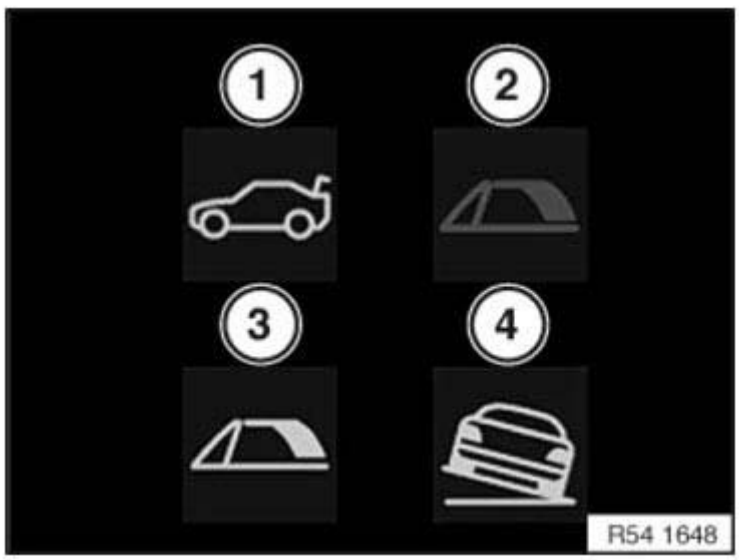


Fig. 6: Identifying Check Control Messages
Courtesy of BMW OF NORTH AMERICA, INC.

CHECK CONTROL MESSAGES REFERENCE CHART

No.	Colour:	ID	Check Control message	Supplementary note:
1	yellow	19	Boot open!	
2	Red	401	Roof mechanism function failure!	Roof mechanism No roof movement possible. If the soft hardtop is not locked,

				contact the nearest BMW Service.
		447	Roof mechanism!	Roof mechanism Roof movement not completed. Please check whether roof movement is blocked. Then press button again.
		558	Roof control failure!	Roof control Roof position and interlock cannot be detected. If the roof locks safely, driving can continue. For information on checking the interlock, see Owner's Handbook.
		562	Roof not locked!	Roof Roof not locked. First open or close the roof completely, then continue driving.
3	yellow	416	Luggage-compartment partition!	Luggage compartment partition No roof movement possible. Move luggage compartment partition to the position required, refer to Owner's Handbook.
		432	Roof drive overheating!	Roof mechanism Roof operation overheated. Temporarily only closing function available.
		516	No roof operation possible!	Roof Roof operation only possible with vehicle at a standstill.
4	yellow	445	Vehicle not standing on level surface!	Roof mechanism Vehicle not standing on level surface! No roof movement possible.

Only when you have excluded the function conditions as fault sources can you start convertible top diagnosis.

54 34 820 REMOVING AND INSTALLING KINEMATICS BOX

Necessary preliminary tasks

- Remove hydraulic cylinder for Convertible top compartment lid See **5437225 REMOVING AND INSTALLING/REPLACING RIGHT CONVERTIBLE TOP COMPARTMENT LID HYDRAULIC CYLINDER** or **5437220 REMOVING AND INSTALLING/REPLACING LEFT CONVERTIBLE TOP COMPARTMENT LID HYDRAULIC CYLINDER** on left and right

Open convertible top compartment lid.

IMPORTANT: Convertible top compartment lid can tilt forwards when hydraulic cylinders are removed and must be supported with suitable apparatus.

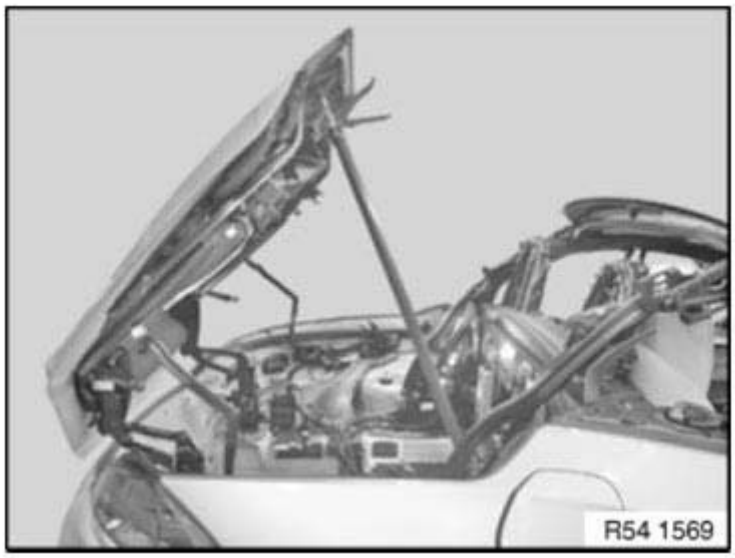


Fig. 7: Identifying Top Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten and detach retaining clip (1).

Drive out pin.

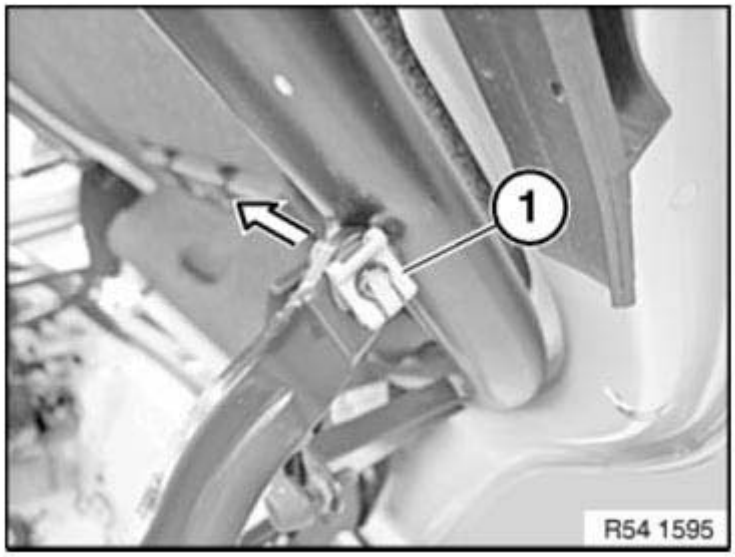


Fig. 8: Disconnecting Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove kinematics box.

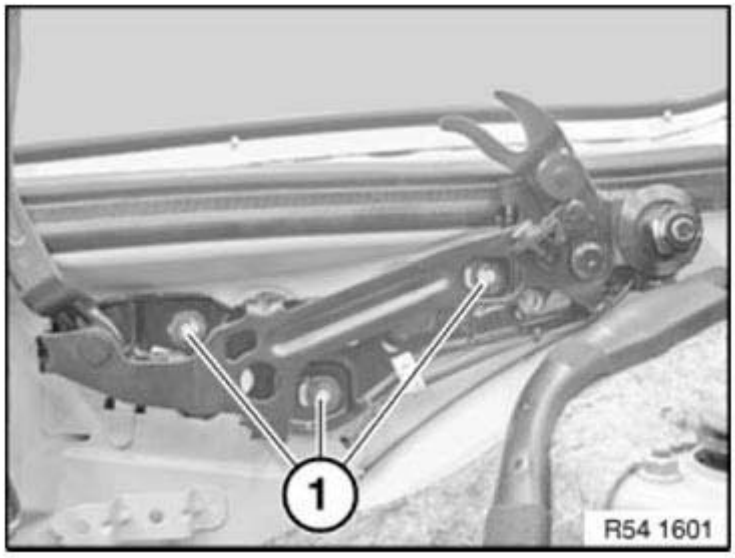


Fig. 9: Identifying Kinematics Box Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting kinematics box

NOTE: Kinematics box must not be at top dead centre.

Insert screws (1).

Kinematics box should still be able to be slid in order to centre itself.

Close Convertible top compartment lid.

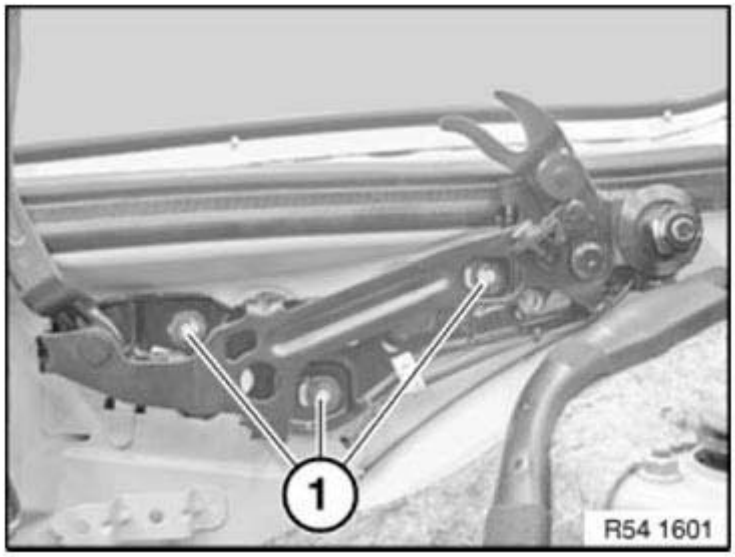


Fig. 10: Identifying Kinematics Box Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Open rear lid.

Tighten down screws (1).

Tightening torque **54 37 02AZ** .

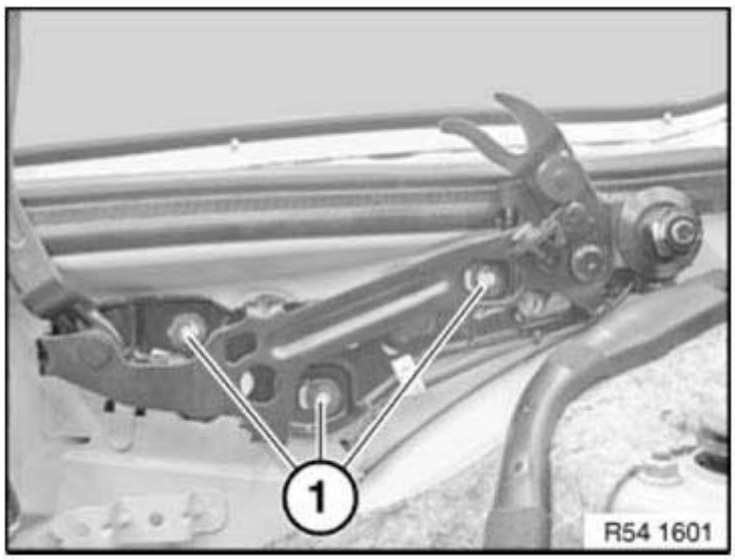


Fig. 11: Identifying Kinematics Box Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check **GAP DIMENSIONS** .

If necessary, manually adjust the kinematics box.

54 34 ... REMOVING AND INSTALLING/REPLACING GAS PRESSURIZED PROP ON LEFT OR RIGHT MAIN MOUNT

Open convertible top compartment lid.

IMPORTANT: Convertible top compartment lid may tilt forwards and must be supported with suitable apparatus.

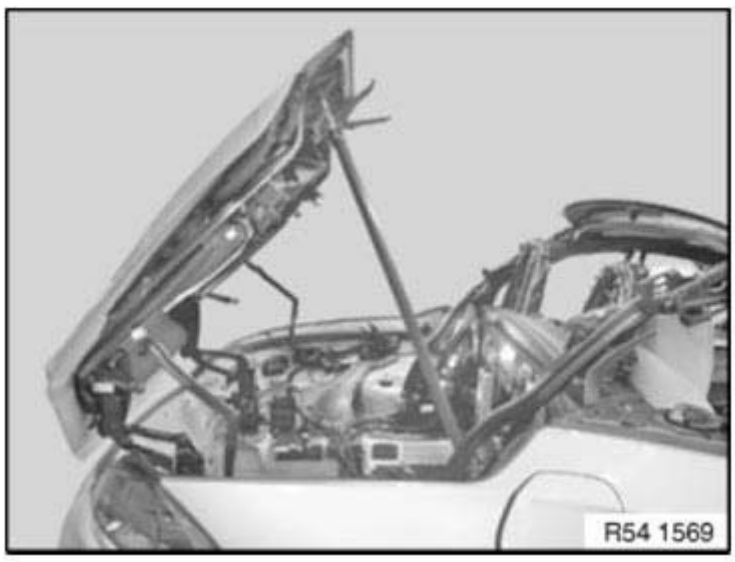


Fig. 12: Identifying Top Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Make a written record of the alignment of gas pressure spring (1) before removing.

Slide retaining spring (2) to end of gas pressurized prop (1) and lever gas pressurized prop (1).

Repeat procedure at other end of gas strut (1).

Installation:

Check that retaining spring is fitted correctly and replace if necessary.

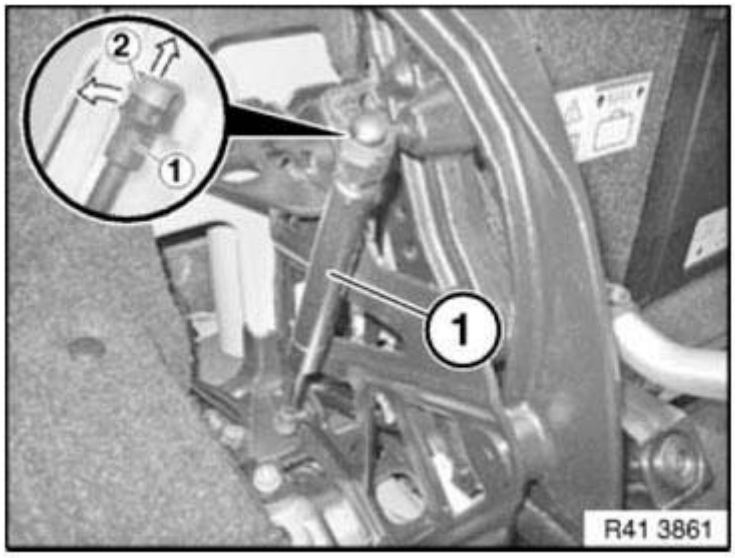


Fig. 13: Sliding Retaining Spring To End Of Gas Pressurized Prop
Courtesy of BMW OF NORTH AMERICA, INC.

Place special tool 54 0 210 on both ends of gas pressurized prop (1) and lightly tighten screw (2).

Remove gas pressurized prop from the ball heads.

Mark length of tensioned gas pressurized prop with felt pen on special tool 54 0 210 .

The tension in the gas pressurized prop can be completely relieved by releasing screw (2).

Repeat procedure on right-hand side of car.

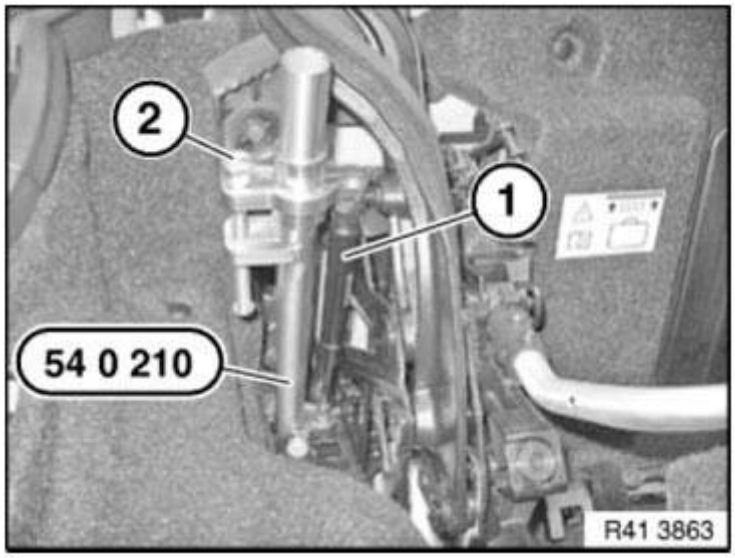


Fig. 14: Positioning Special Tool 54 0 210 On Both Ends Of Gas Pressurized Prop
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Always replace gas pressurized props in pairs.

Tension gas pressurized prop up to marking and install.

54 37 185 REMOVING AND INSTALLING/REPLACING HYDRAULIC UNIT (DRIVE) FOR RETRACTABLE HARDTOP

Necessary preliminary work

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

IMPORTANT: Hydraulic fluid may emerge from the disconnected lines and the open connections on the hydraulic unit (drive).
Protect components and work area with suitable materials (e.g. cloths).
Follow REPAIR INSTRUCTIONS for hydraulic system.
Do not fit hydraulic lines in kinked, crushed or transposed condition.

Release screws (1).

Tightening torque **54 37 09AZ** .

Remove battery rollover protection (2).

Remove insulating mat (3).

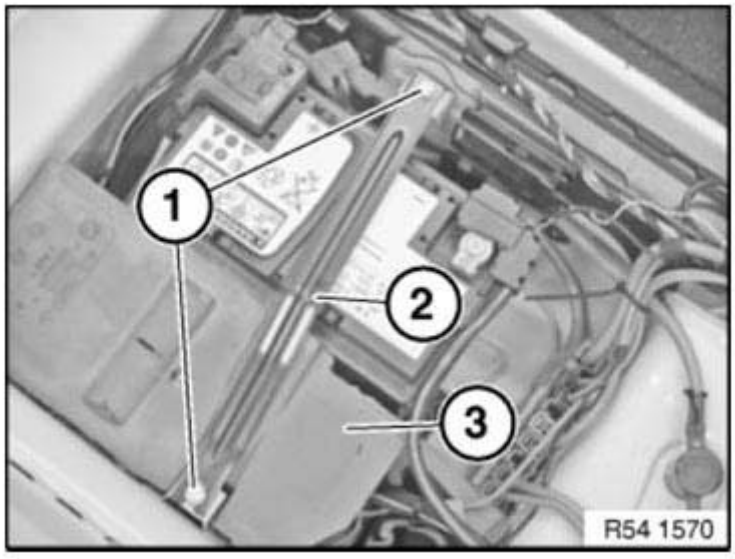


Fig. 15: Identifying Insulating Mat And Battery Rollover Protection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

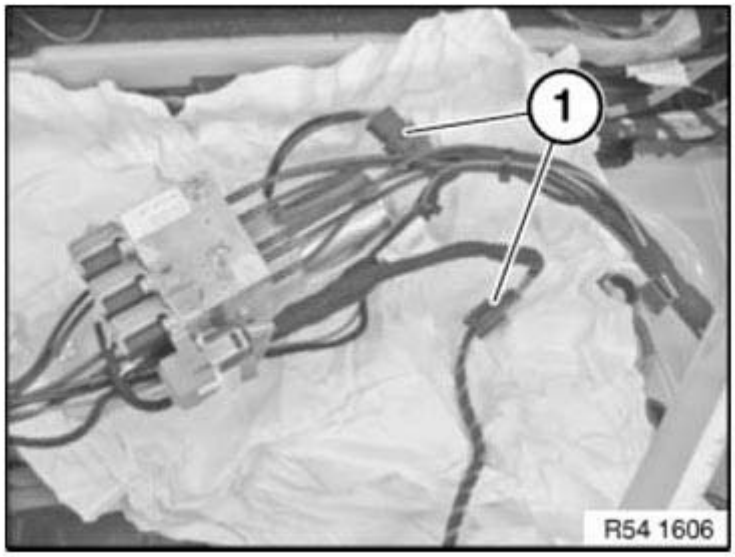


Fig. 16: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Press release and detach relay (1) from holder.

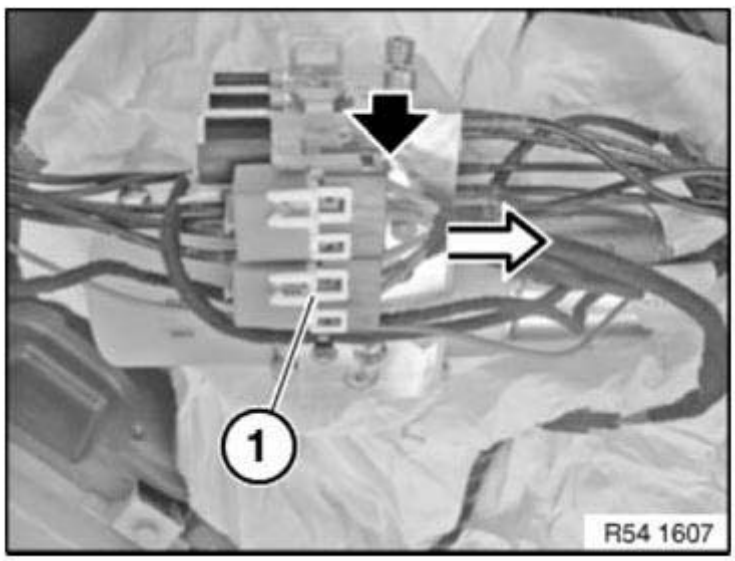


Fig. 17: Disconnecting Relay From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release plug connections (1) and disconnect.

Cut cable straps.

Installation note:

Plug connections are coded against incorrect assembly.

Replace defective cable strap.

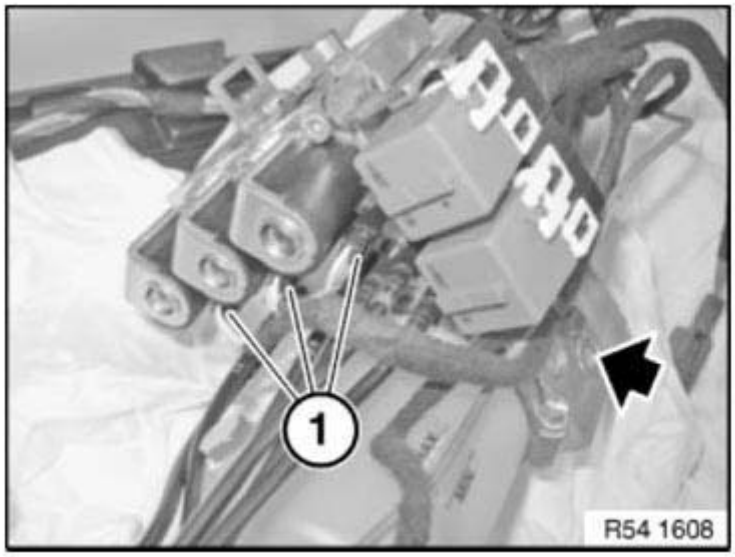


Fig. 18: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Protect joints (lines and hydraulic unit) against dripping fluid, e.g. with a cleaning cloth.

Disconnect hydraulic lines from hydraulic unit:

- Release screws.
- Detach hydraulic lines

Installation note:

Hydraulic lines and connections are marked with numbers to prevent mix-ups.

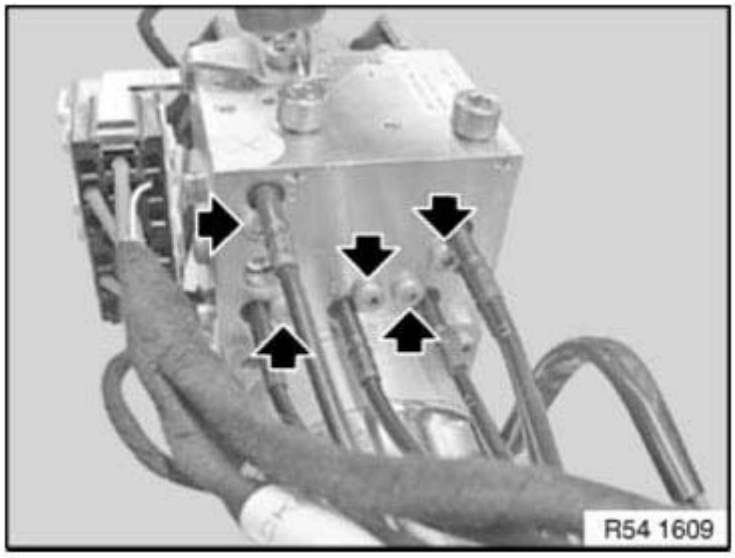


Fig. 19: Locating Screws Of Hydraulic Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect hydraulic lines from hydraulic unit:

- Release screws.
- Detach hydraulic lines
- Remove hydraulic unit (drive).

Installation note:

Hydraulic lines and connections are marked with numbers to prevent mix-ups.

Check **FLUID LEVEL** or top up if necessary.

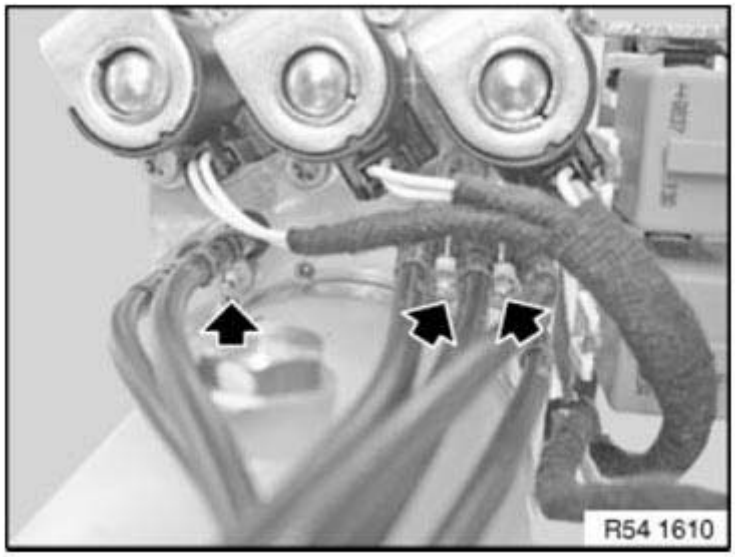


Fig. 20: Locating Screws Of Hydraulic Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

Use Allen key to close shutoff valve on hydraulic unit.

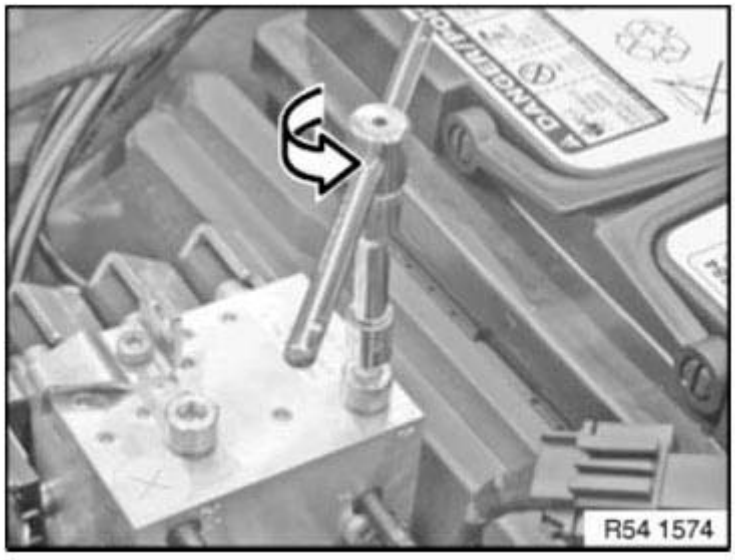


Fig. 21: Closing Shutoff Valve On Hydraulic Unit Using Allen Key
Courtesy of BMW OF NORTH AMERICA, INC.

54 34 503 REMOVING AND INSTALLING/REPLACING HYDRAULIC VALVE (SOLENOID VALVE)

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

IMPORTANT: Hydraulic fluid may emerge from the open connections on the hydraulic unit.
Protect components and work area with suitable materials (e.g. cloths).
Make sure that dirt cannot get into the hydraulic circuit.
Follow REPAIR INSTRUCTIONS for hydraulic system.
Do not fit hydraulic lines in kinked, crushed or transposed condition.

Release screws (1).

Tightening torque **54 37 09AZ** .

Remove battery rollover protection (2).

Remove insulating mat (3).

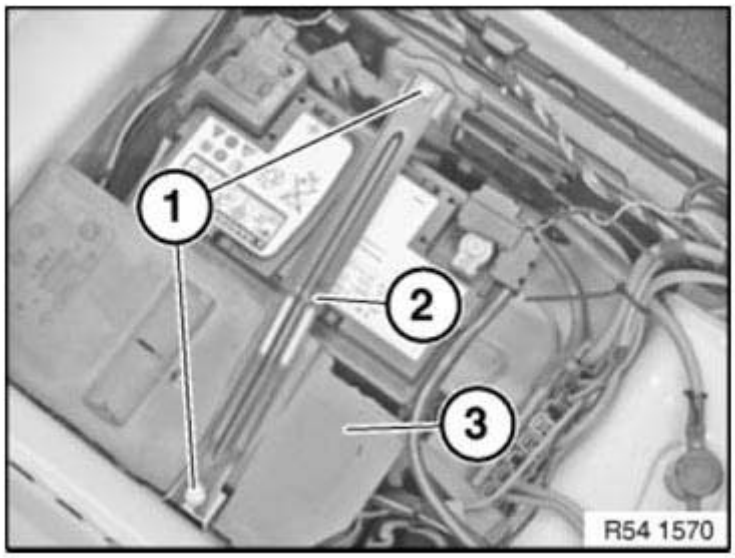


Fig. 22: Identifying Battery Rollover Protection And Insulating Mat
Courtesy of BMW OF NORTH AMERICA, INC.

Overview, hydraulic valves F1, F2 and F3:

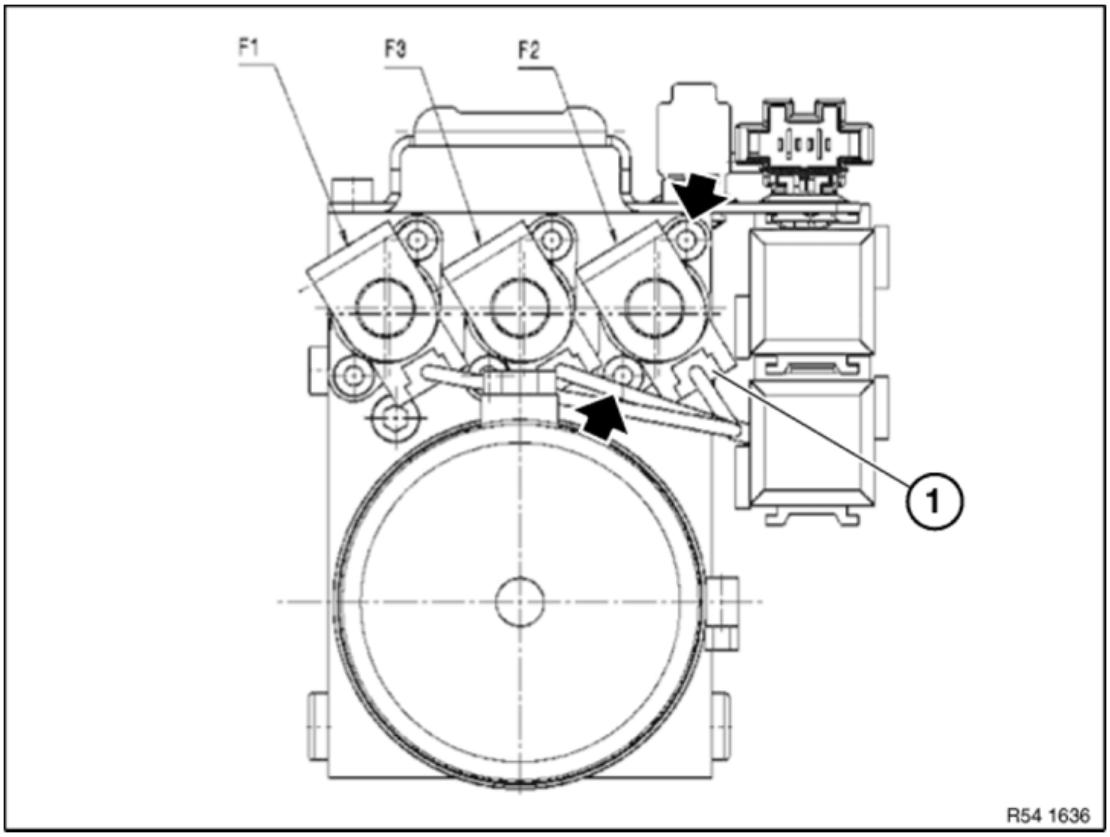


Fig. 23: Overview Of Hydraulic Valves F1, F2 And F3
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Hydraulic unit must be held in the vertical position, otherwise fluid will escape.**
Change shown on hydraulic valve F2. Analogous procedure for hydraulic valve F1 and F3.
When removing several hydraulic valves, mark the plugs at the respective slots.
Unfasten plug connection (1) and disconnect.
Release screws.
Tightening torque 54 37 15AZ .
Detach hydraulic valve.

IMPORTANT: Protect exposed bores against dirt contamination.
Do not mix up plug connections.

Check **FLUID LEVEL** or top up if necessary.

Check function.

Fully open and close convertible top a minimum of 3 times in order to bleed the hydraulic system.

54 34 ... REPAIR INSTRUCTIONS FOR HYDRAULIC SYSTEM OF CONVERTIBLE TOP AND CONVERTIBLE TOP COMPARTMENT LID

1. Definitions of terms

REPAIR INSTRUCTIONS FOR HYDRAULIC SYSTEM OF SOFT TOP AND SOFT TOP COMPARTMENT LID

Hydraulic system at zero pressure or Untensioned state:	• Turn ignition lock to "0" position. • E46c: Wait 15 secondsE52: Wait 2 minutesE85: Emergency operation or wait 2 minutesE64: Wait 5 seconds.	Hydraulic system has no or only very low pressure
Mechanical operation: Emergency operation:	• Soft top is opened or closed by hand • Always move soft top with aid of a second person	Observe Point 3
Closed system:	• All lines are connected	Even "short circuiting" of lines is possible
Function check:	• Open and close soft top several times (min. 3 times) • Check fluid level in hydraulic unit; if necessary, top up fluid	Refer to Operating Instructions
Short circuit (E46c only):	• Unfastening of quick-release couplings • Connection of supply and return lines	Hydraulic system cannot build up pressure Soft top can be moved
Function check:	• Checking of soft top function if possible on removed soft top	Soft top must be secured! Move 2-3 times
Soft top stowed:	• Soft top fully open (folded together)	When the soft top is installed, it is in the closed soft top compartment

2. When working on hydraulic system, observe the following

- Once it has been removed, the convertible top must be safely stowed or tensioned (e.g. with screw clamps to workbench).

  On some models, the special tool must be used.

  The **UNIVERSAL LEVER** is required here.

- When the hydraulic system is open (unscrewing of lines, topping up of fluid, etc.), always provide sufficient cloths to catch leak-off fluid.

  Also provide an adherent protective cover to cover/protect fittings.

- Hydraulic system must be at zero pressure.
- E46c only: The disconnected supply and return lines to the convertible top can be connected to each other (establish "short circuit"). The system is thereby closed again. The clutches are protected against damage. The hydraulic system cannot build up a high pressure. The convertible top can be moved.

- Disconnect or unscrew feed and return lines if possible at a later stage, when the convertible top is stowed and untensioned (check fluid, see also Point 3).
- Once the hydraulic system has been opened, first check the fluid level after completing the tasks before carrying out a function test.
- After disconnecting the hydraulic lines from hydraulic components, do not move the convertible top if at all possible (fluid can escape from joints).
- Piston rods must not be damaged (e.g. scratches). Even paint mist and welding spots are harmful.

  When working in the vicinity of hydraulic cylinders, cover the cylinders with suitable materials.

- If the hydraulic unit or the lines stay removed for an extended period of time, the bores on the hydraulic unit and the hose connections must be sealed off (observe installation instructions).

3. Mechanical operation of convertible top

- E46c: only with ignition switched off.

  If lines are disconnected, connect them to each other if at all possible.

- E52/E85: Emergency operation
- In the event of repeated operation, the system fluid is pumped into the supply tank of the hydraulic unit. If hydraulic components are now replaced, there will be too much fluid in the system. This may cause damage to the system in event of operation. (Checking fluid level, see Points 4 and 5).

4. Check oil level

- E46c: only when convertible top is stowed and convertible top compartment lid is closed. E52, E85: with closed convertible top only
- Observe brief instructions.
- Fluid level must be within the markings (circle/cross).
- Fluid is supplied with the repair kits (e.g. banjo bolts/seals, hoses, cylinders) and is available separately (refer to BMW Parts Department).

5. Topping up/extracting fluid

- E46c: only when convertible top is stowed and convertible top compartment lid is closed. E52E85only with convertible top closed
- E64 The hydraulic fluid does not have to be changed because the system is filled with life-time fluid. Only the approved hydraulic fluid may be used in the event of leaks.
- Observe brief instructions.
- Remove hydraulic unit without detaching lines.
- Fluid is supplied with the repair kits (e.g. banjo bolts/seals, hoses, cylinders) and is available separately (refer to BMW Parts Department).
- Pour in fluid with bottle through filler opening.

- Hydraulic unit must be removed if overfilled. Allow fluid to escape through filler opening and collect.

6. Bleeding hydraulic system

- E64if there is a significant build-up of noise while the convertible top is moving, the convertible top must be opened and closed several times. The hydraulic system is automatically bled in the fluid reservoir in the process.

54 34 ... TOPPING UP/EXTRACTING FLUID, CHECKING FLUID LEVEL

NOTE: No changing of the hydraulic fluid necessary.

- The hydraulic fluid does not have to be changed because the system is filled with life-time fluid.
- Only the approved hydraulic fluid may be used in the event of leaks.
- All hydraulic cylinders must be completely extended.

Checking fluid level:

Fluid level must be within the markings (arrow) when the unit is horizontal.

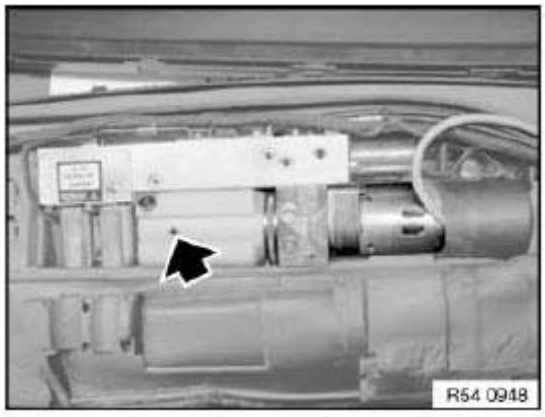


Fig. 24: Locating Fluid Level Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Topping up fluid:

Align hydraulic unit horizontally.

Open oil filler plug.

Pour in required amount of fluid from fluid bottle.

Installation:

Check fluid level in the meantime.

Pour in hydraulic fluid only up to marking on fluid reservoir.

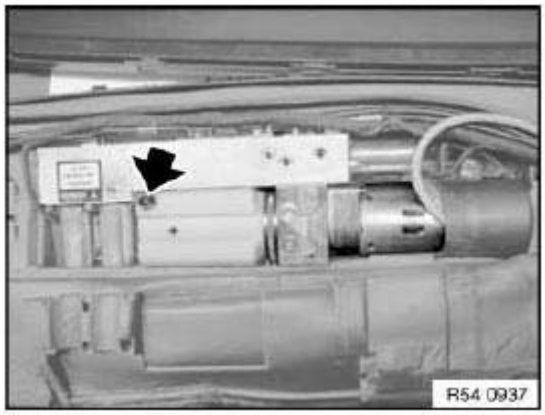


Fig. 25: Locating Oil Filter Plug
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Protect components and work area with suitable materials (e.g. cloths).

Extracting fluid:

Open oil filler plug.

Tilt hydraulic unit and let fluid flow out or draw off with a suitable auxiliary apparatus.

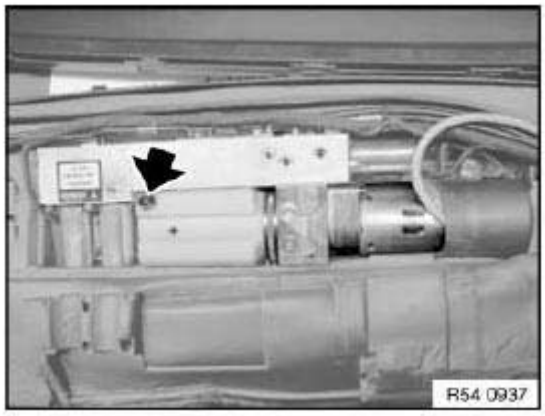


Fig. 26: Locating Oil Filter Plug
Courtesy of BMW OF NORTH AMERICA, INC.

5437 FOLDING ROOF

54 37 ... 0 GENERAL NOTES REGARDING REPAIR AND TROUBLESHOOTING ON THE HARDTOP

The hardtop is a complex mechanical system. Proper function is achieved through precise adjustments of

all components at the works.

Not all components can be adjusted at the works.

To avoid secondary problems after repairs, only repairs and adjustments that are explicitly approved by BMW may be performed.

Thorough troubleshooting must always be completed prior to beginning with hardtop repairs.

In addition to the diagnosis system and repair instructions, video sequences are available on DVD.

VHT E93 Analysis and repair instructions Part 1 (01 69 0 038 434).

VHT E93 Analysis and repair instructions Part 2 (01 69 0 038 662).

NOTE: Troubleshoot in the event of water penetration according to the specifications on the DVD.

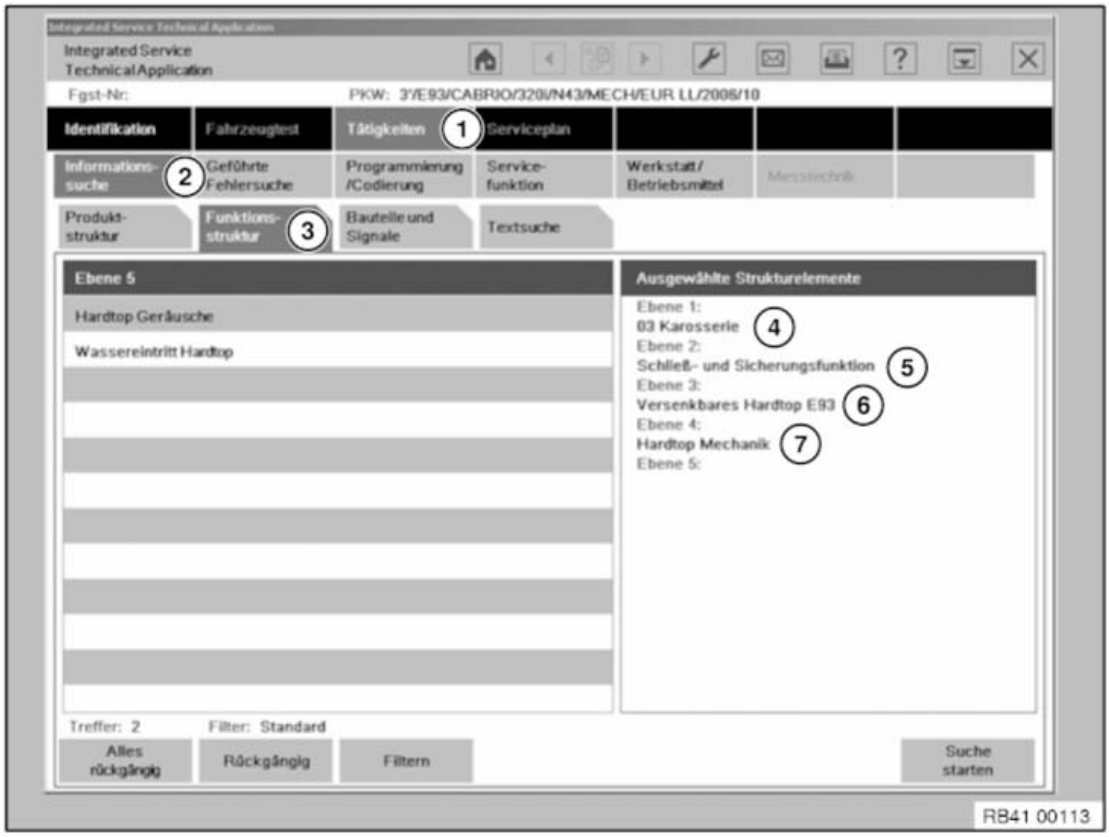


Fig. 27: Display - Repair And Troubleshooting On Hardtop
Courtesy of BMW OF NORTH AMERICA, INC.

The required procedures in the diagnosis system are found under:

1. **Activities**
2. **Information search**
3. **Function structure**
4. **Level 1: 03 Body**
5. **Level 2: Locking and security functions**
6. **Level 3: Retractable hardtop**
7. **Level 4: Hardtop mechanism (E93 only)**

54 37 295 EMERGENCY CLOSING HARDTOP

Necessary preliminary tasks

- Open rear lid
- **REMOVE TRUNK FLOOR**

IMPORTANT: Always perform the emergency closing procedure with the aid of an assistant. The applied force must always be even on the left and right otherwise the linkage will bend.

Always execute all movements of the roof module with the assistance of a second person.

Risk of injury by trapping!

Remove foam cover.

Open screws on hydraulic unit 1.5 turns.

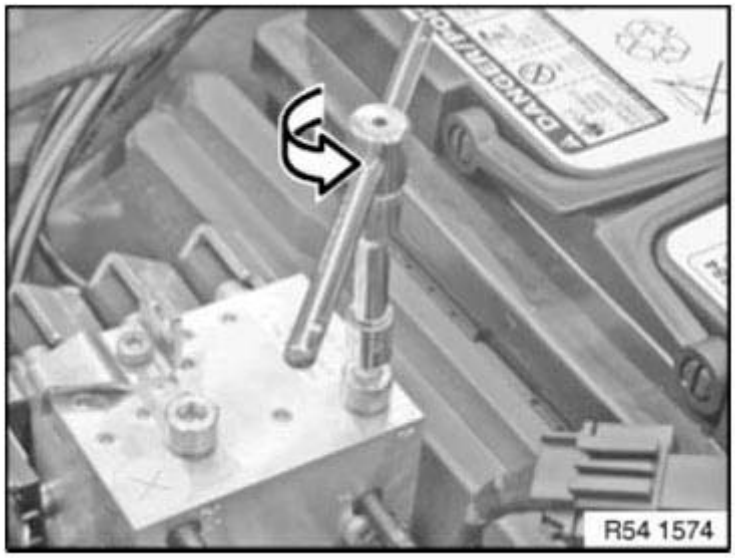


Fig. 28: Opening Screw Of Hydraulic Unit
Courtesy of BMW OF NORTH AMERICA, INC.

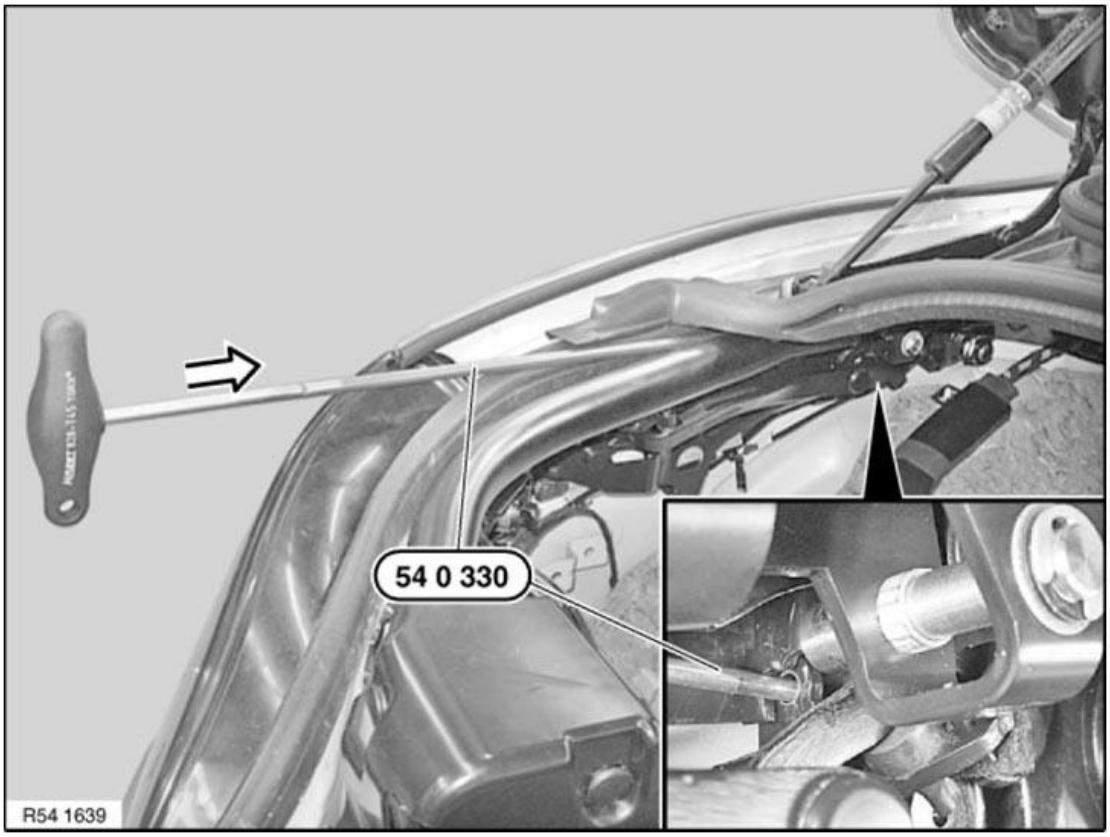


Fig. 29: Inserting Special Tool 54 0 330 Between Convertible Top Compartment Lid Frame And Side Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 54 0 330 at rear left and right between convertible top compartment lid frame and side panel.

Feed in tip of special tool through bore hole.

NOTE: Bore hole is visible from direction of special tool with a torch.

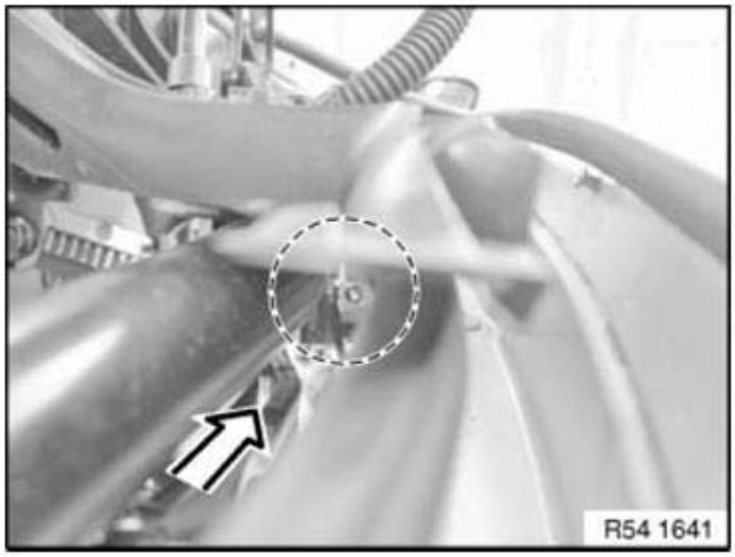


Fig. 30: Installing Tip Of Special Tool Through Bore Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Tip of special tool 54 0 330 must butt against joint for hydraulic cylinder (1).

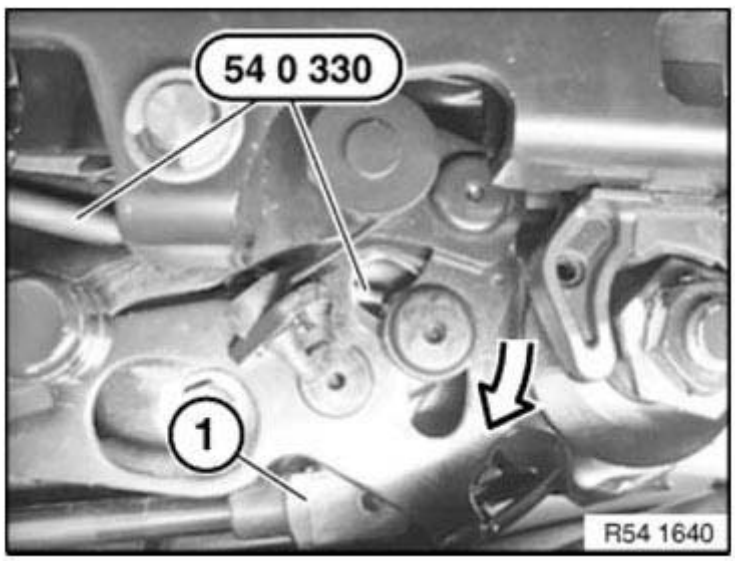


Fig. 31: Identifying Hydraulic Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

For the ideal pressure point of special tool on joint, proceed as follows:

1. Press outwards
2. Pull tool upwards
3. Press tool to unlock convertible top compartment lid latch

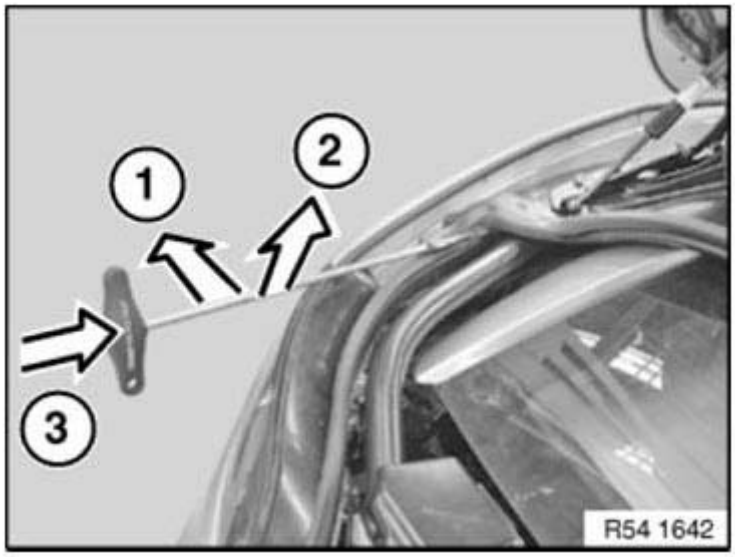


Fig. 32: Pressing Tool To Unlock Convertible Top Compartment Lid Latch
Courtesy of BMW OF NORTH AMERICA, INC.

Open convertible top compartment lid.

IMPORTANT: Convertible top compartment lid may tilt forwards and must be supported with suitable apparatus.

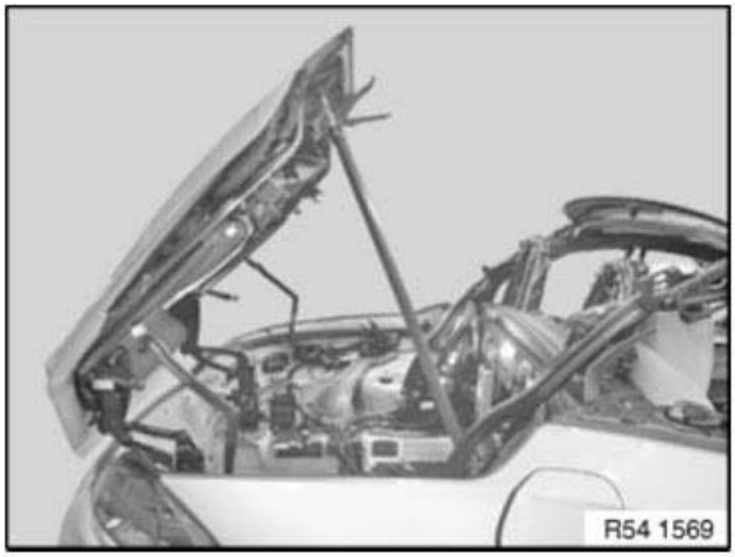


Fig. 33: Opening Convertible Top Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on left and right from holder.

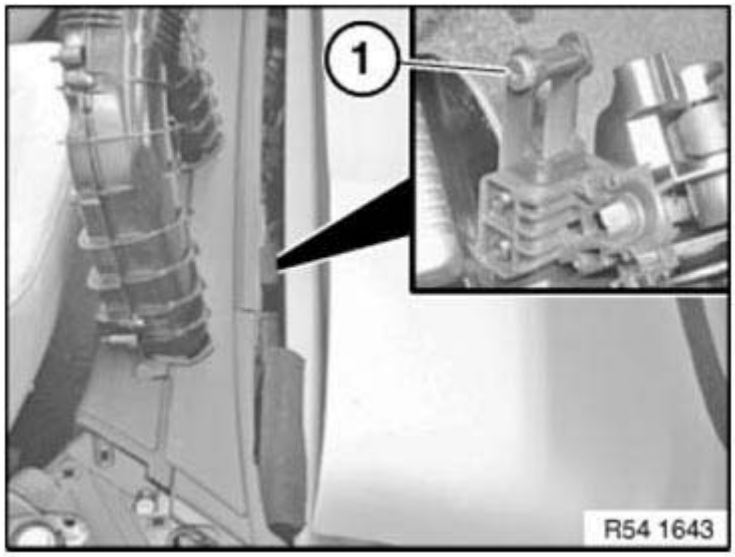


Fig. 34: Identifying Holder Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out roof shells uniformly with a 2nd person helping and set down.

NOTE: Only grasp the front roof shell when raising the roof shells.

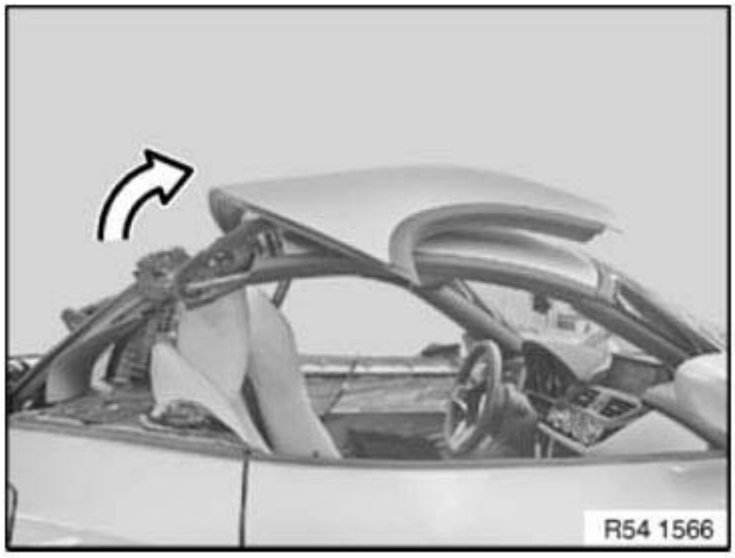


Fig. 35: Lifting Of Roof Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Remove support for convertible top compartment lid (1) and set down convertible top compartment lid.

Raise rear roof shell (2) and remove **ROOFLINER** .

Set down roof shell (2) towards rear (convertible top closed).

Remove **ROOFLINER** for roof shell at front.

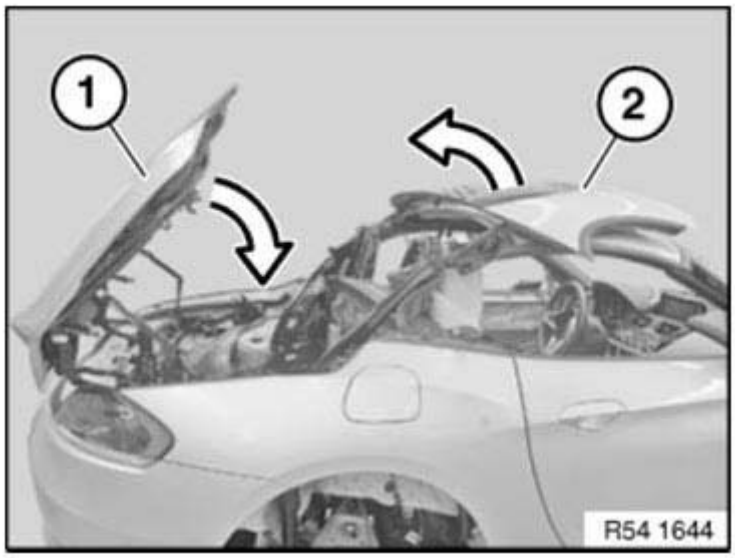


Fig. 36: Raising Rear Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Slide open retaining clip (1) and unclip ball head.

Secure control rod on left and right with cable tie to prevent them hanging down and rattling.

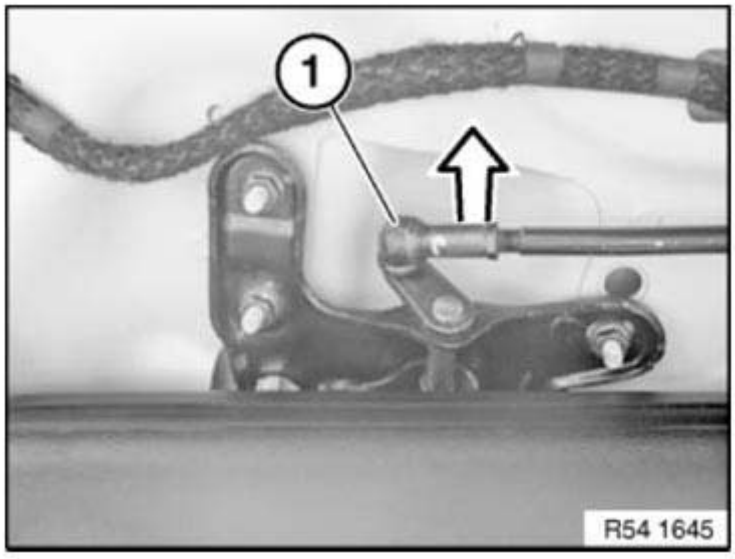


Fig. 37: Sliding Open Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Lock retaining hook (1) on left and right.

Turn retaining hook (1) with pliers over dead centre.

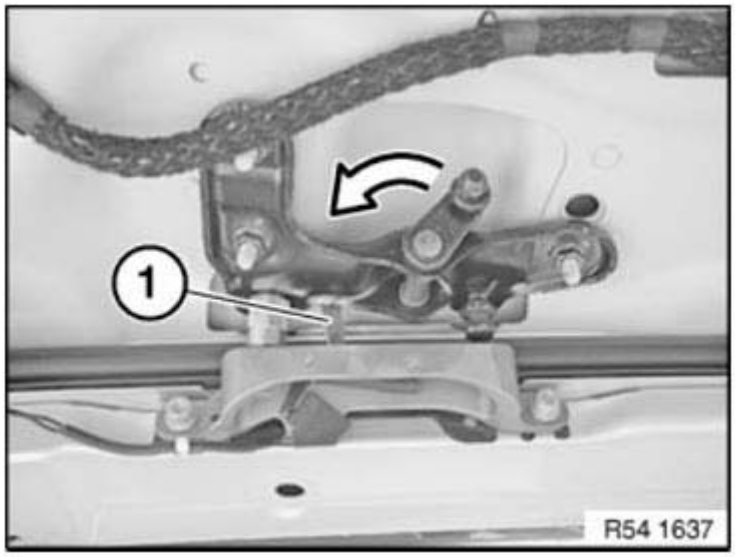


Fig. 38: Turning Retaining Hook Using Pliers Over Dead Centre
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 54 0 320 in convertible top frame and lock rear roof shell on left and right.

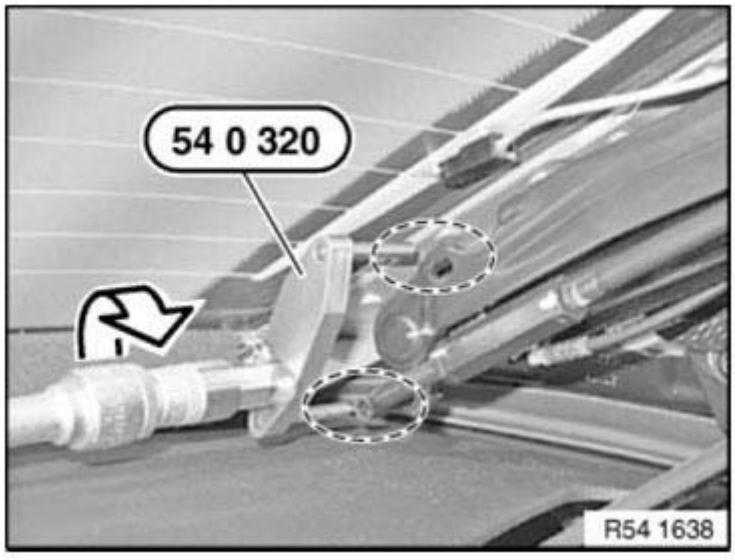


Fig. 39: Inserting Special Tool 54 0 320 On Convertible Top Frame
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The customer must no longer operate the convertible top after it has been closed with the emergency closing procedure!
To prevent operation, remove fuse 12 for convertible top.
Place removed individual parts in vehicle.

54 37 290 HARDTOP EMERGENCY OPENING

Necessary preliminary tasks

- Remove **ROOFLINER FOR ROOF SHELL AT FRONT**
- Remove **ROOFLINER FOR ROOF SHELL AT REAR**
- Remove **LUGGAGE COMPARTMENT FLOOR TRIM**

NOTE: Roofliner for roof shell at rear can not be removed without sustaining damage.

IMPORTANT: Always perform the emergency opening procedure with the aid of an assistant.
The applied force must always be even on the left and right otherwise the linkage will bend.
Always execute all movements of the roof module with the assistance of a second person.
Risk of injury by trapping!

Step 1: Open rear roof shell

Open rear lid.

Remove foam cover.

Open screws on hydraulic unit 1.5 turns.

NOTE: System is now depressurised and can be moved manually.

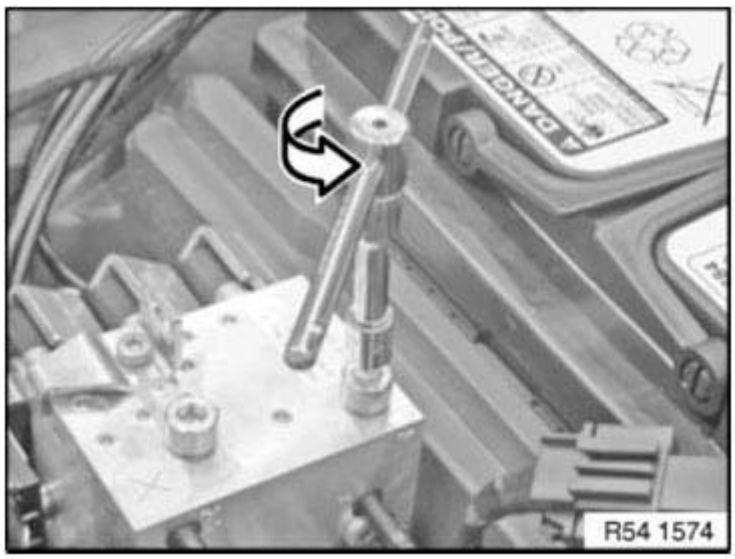


Fig. 40: Opening Screws On Hydraulic Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **54 0 320** in convertible top linkage and unlock rear roof shell on left and right.

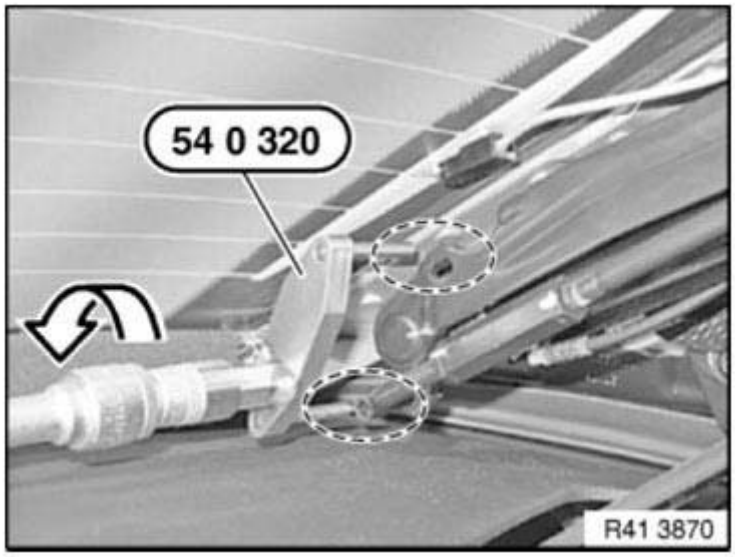


Fig. 41: Inserting Special Tool 54 0 320
Courtesy of BMW OF NORTH AMERICA, INC.

Evenly lift up rear roof shell with an assistant and set down on front roof shell.

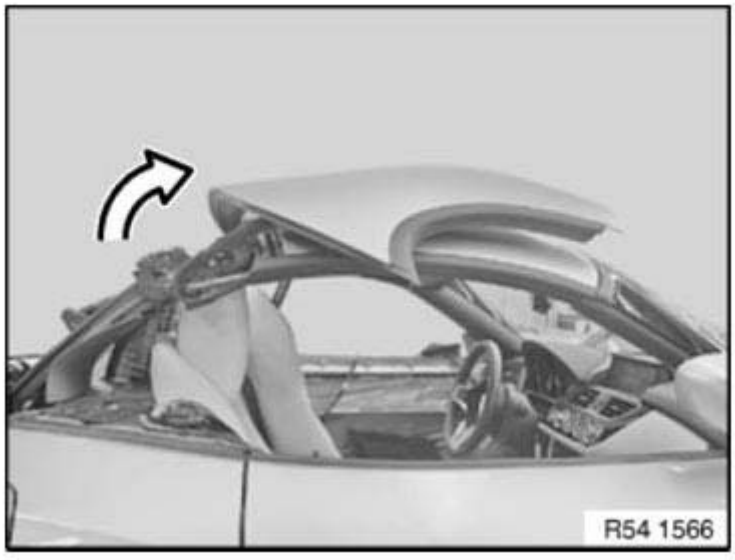


Fig. 42: Lifting Rear Roof Shell With Assistant On Front Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Step 2: Open cowl panel lock

Slide open retaining clip (1) and unclip ball head.

IMPORTANT: Risk of damage!
Secure control rod on left and right with cable tie to prevent them hanging down and rattling.

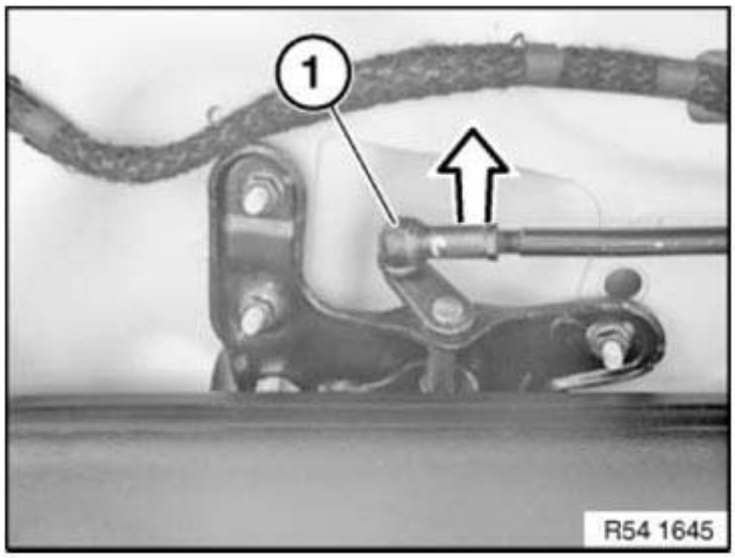


Fig. 43: Sliding Open Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining hook (1) on left and right.

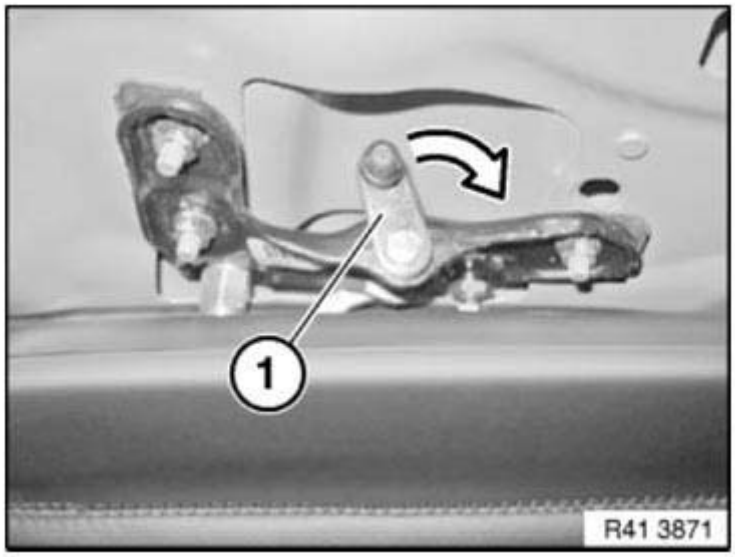


Fig. 44: Removing Retaining Hook
Courtesy of BMW OF NORTH AMERICA, INC.

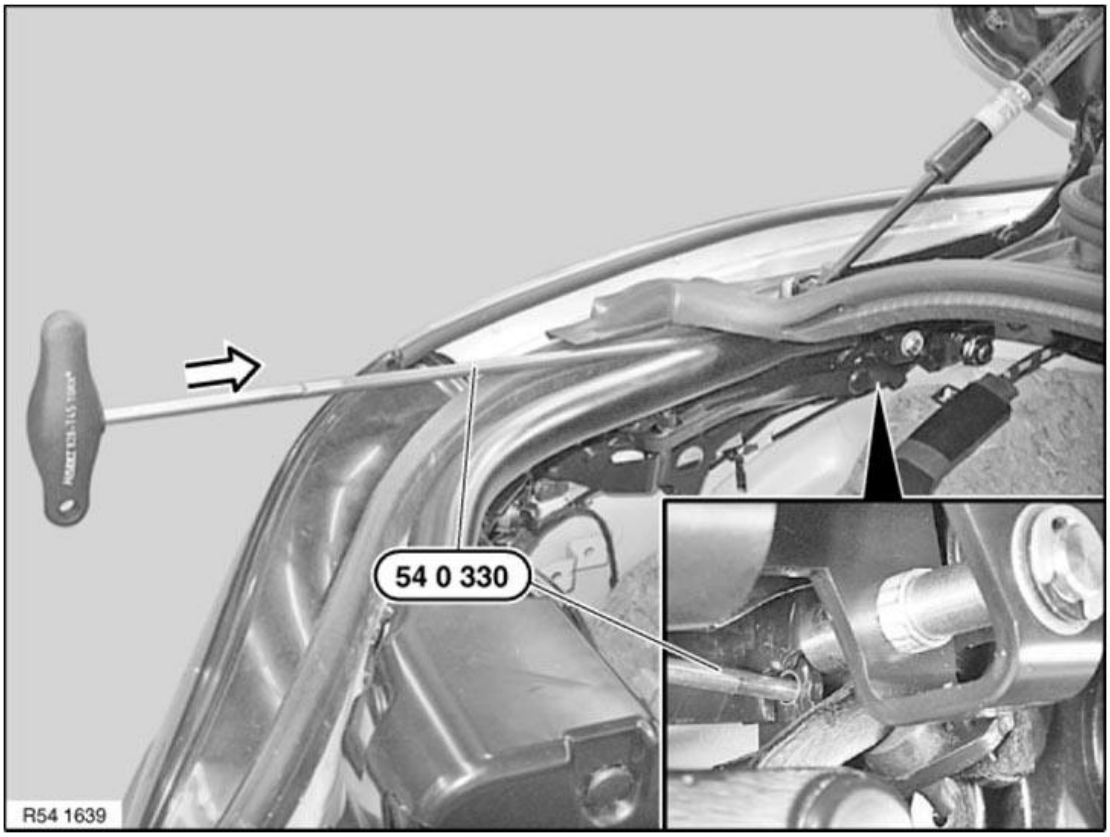


Fig. 45: Inserting Special Tool 54 0 330 Between Convertible Top Compartment Lid Frame And Side Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Step 3: Open rear module lock

Open rear lid.

Insert special tool **54 0 330** at rear left and right between convertible top compartment lid frame and side panel.

Feed in tip of special tool through bore hole.

NOTE: Bore hole is visible from direction of special tool with a torch.

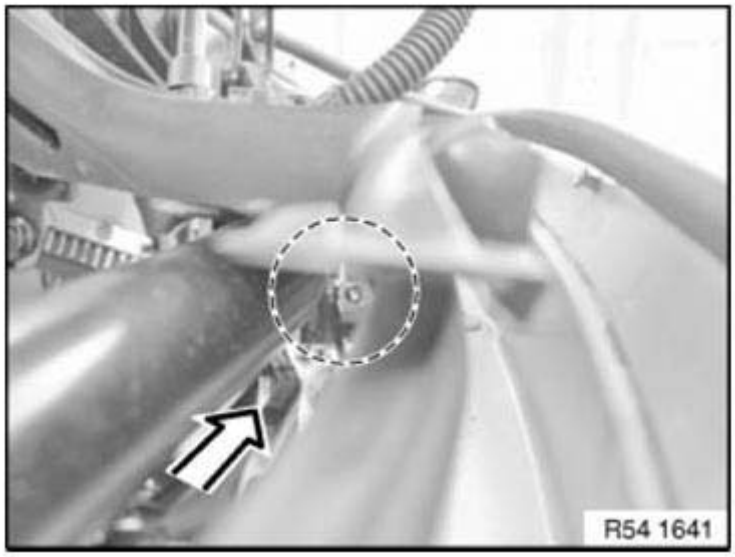


Fig. 46: Installing Tip Of Special Tool Through Bore Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Tip of special tool **54 0 330** must butt against joint for hydraulic cylinder (1).

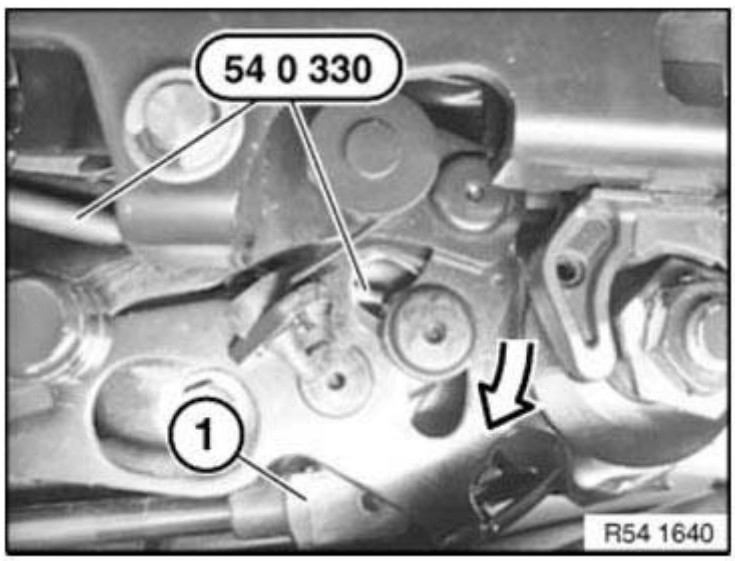


Fig. 47: Identifying Hydraulic Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

For the ideal pressure point of special tool on joint, proceed as follows:

1. Press outwards
2. Pull tool upwards
3. Press tool to unlock convertible top compartment lid latch

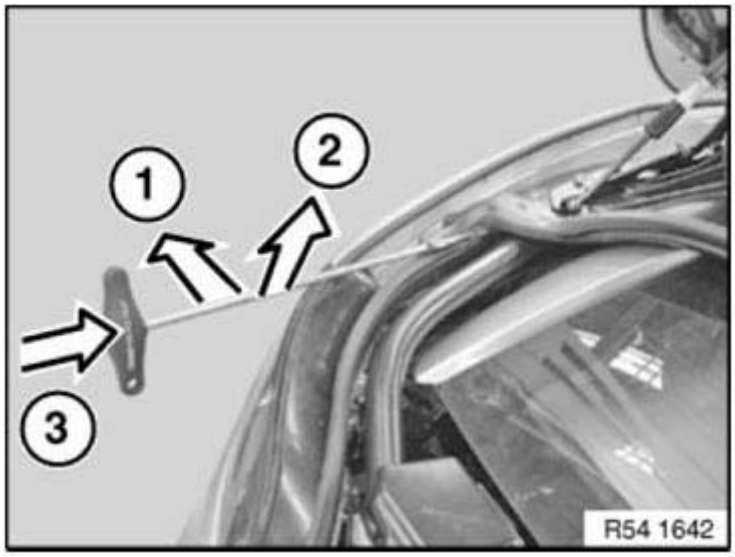


Fig. 48: Pressing Tool To Unlock Convertible Top Compartment Lid Latch
Courtesy of BMW OF NORTH AMERICA, INC.

Open rear module.

IMPORTANT: Rear module can tip.
Have an assistant support the rear module.

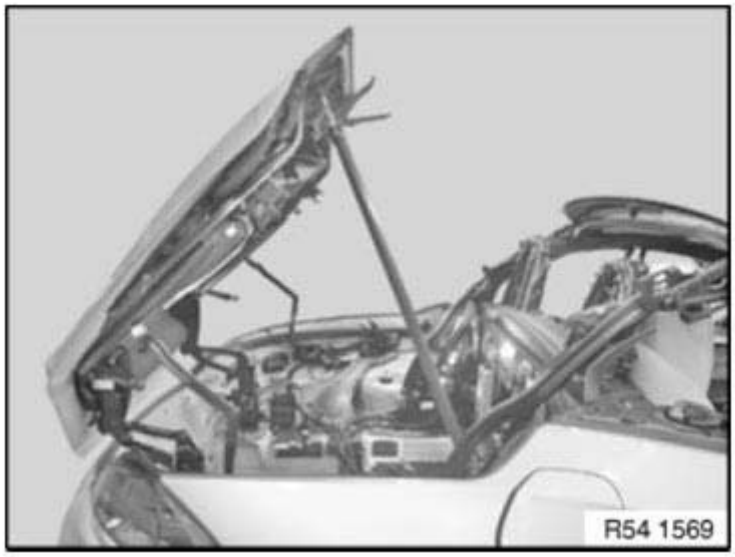


Fig. 49: Opening Rear Module
Courtesy of BMW OF NORTH AMERICA, INC.

Evenly lift up roof module (2) with an assistant and set down in vehicle.

NOTE: Only grasp the front roof shell when raising the roof shells.

Close rear module.

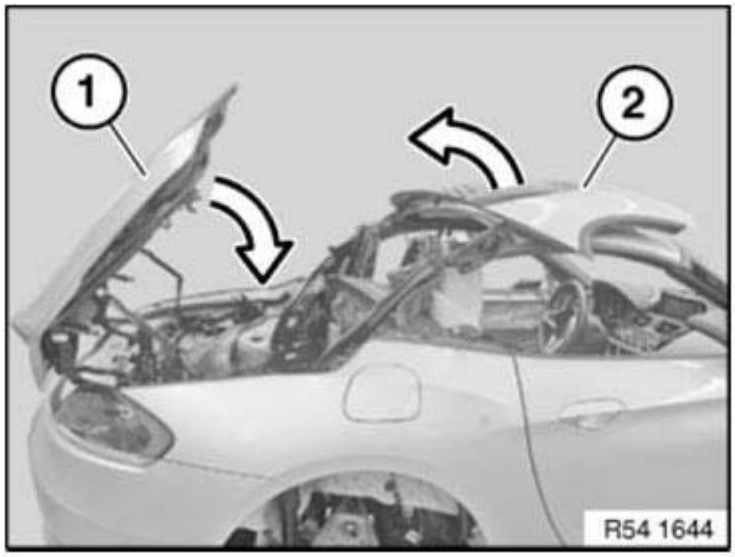


Fig. 50: Lifting Roof Module With Assistant On Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The convertible top must not be moved any further after emergency opening.
Move the vehicle as little as possible to prevent vibrations.
Roof shells which are not locked may cause irreparable damage.

54 37 ... INSTALLING/REPLACING MAIN BEARING CONSOLES

IMPORTANT: The main bearing consoles factory prepared.
Removing the main bearing consoles is only necessary in the event of body repair in area of attachment points.

Adjust both consoles (1) with barrel screws (2) to dimension a.

Measurement a = 35 mm

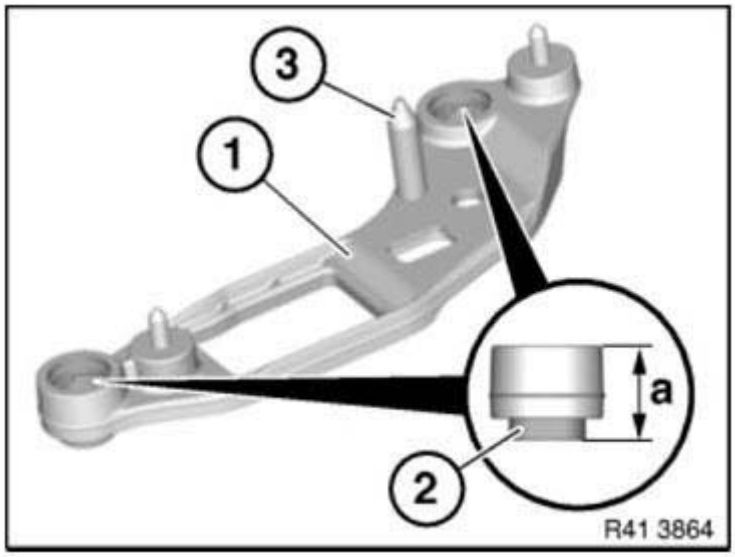


Fig. 51: Identifying Consoles With Barrel Screws Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Centre console (1) and tighten with screws (2).

Tightening torque **54 37 5AZ** .

Repeat procedure on other side of car.

Installation:

Distance of dowel pins must match distance of bore holes on roof module, correct if necessary.

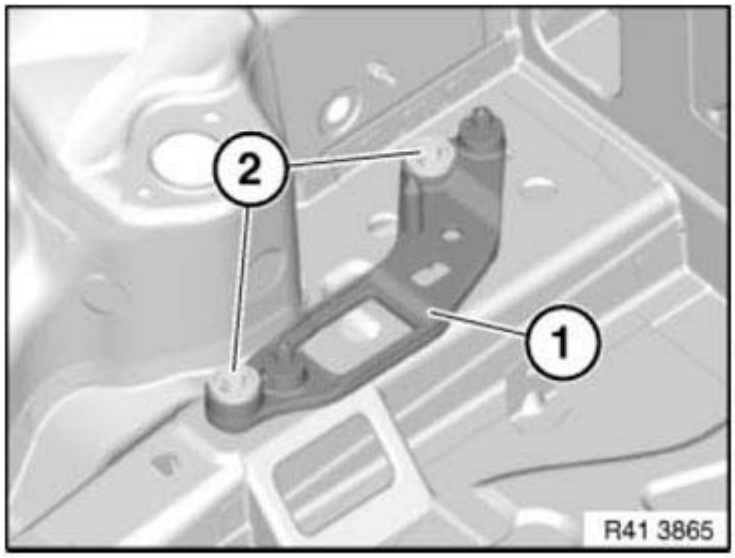


Fig. 52: Identifying Centre Console With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Install **ROOF MODULE** and manually move to position shown.

Install **REAR MODULE** .

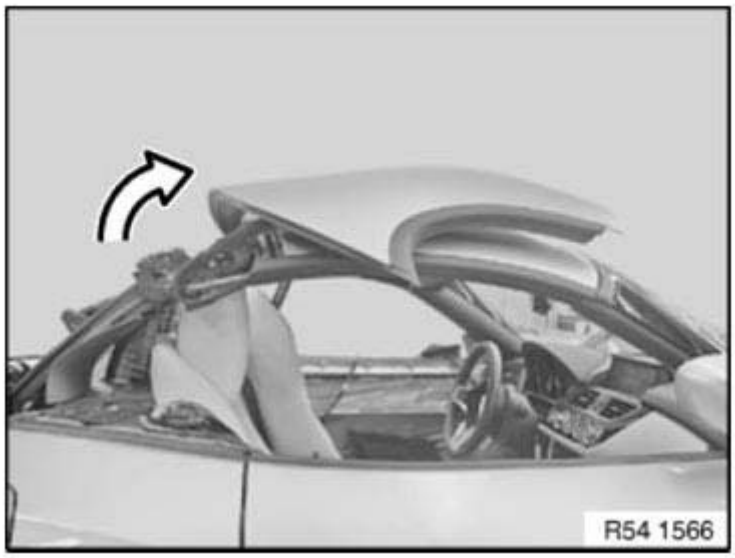


Fig. 53: Installing Roof Module
Courtesy of BMW OF NORTH AMERICA, INC.

Prior to performing further adjusting procedures on consoles, the following components must be adjusted:

- Rear module
- Rear side panels
- Tailgate

After adjusting all components, manually See **5437290 HARDTOP EMERGENCY OPENING** or **5437295 EMERGENCY CLOSING HARDTOP** run a complete convertible top cycle and check components for collision.

The convertible top can then be moved electrically.

WARNING: Risk of injury by trapping!
During adjusting procedures, support convertible top or secure with a second person helping.

Before releasing the roof module screws, move convertible top until weight is resting centrally on consoles.

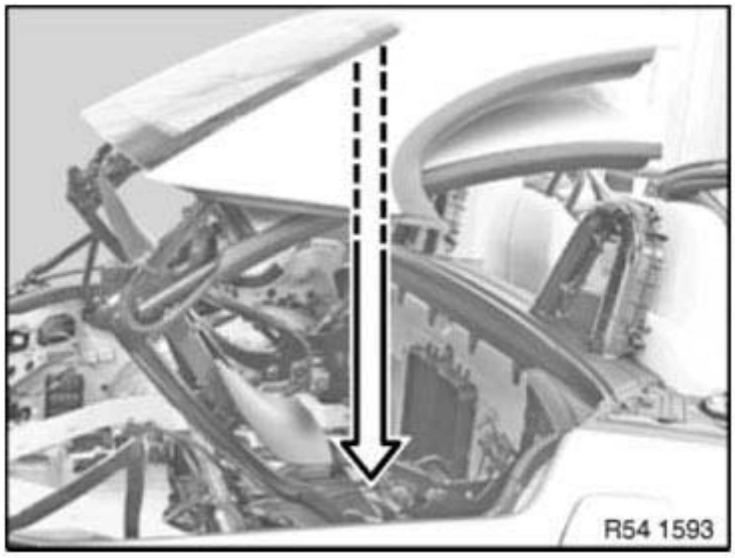


Fig. 54: Positioning For Moving Convertible Top
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting in longitudinal direction (X):

Release X screw connections (1) and slacken lock nut with special tool 54 0 190 .

Tightening torques **54 37 3AZ AND 54 37 1AZ** .

IMPORTANT: To prevent twisting, release Z screw connection.

Adjust roof module by turning barrel screw (2). Turn barrel screw with special tool 54 0 180 .

Pre-adjustment to dimension a= 19 mm.

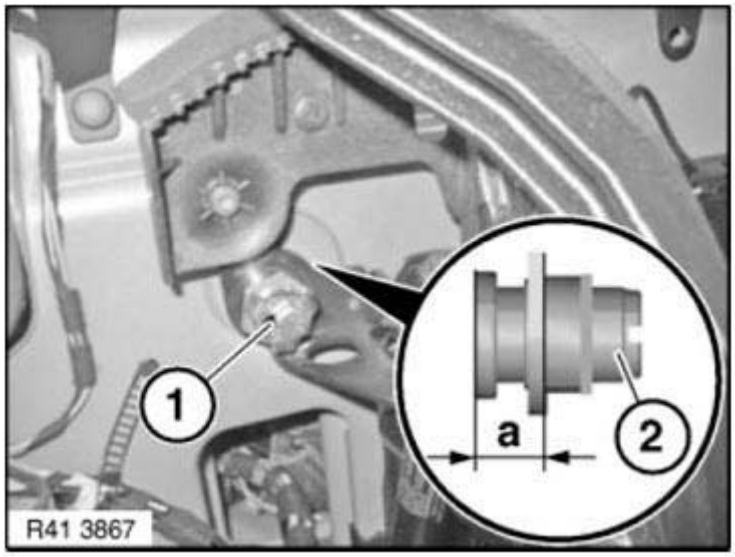


Fig. 55: Identifying Barrel Screw Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting in transverse direction (Y):

Release X and Z screw connections.

Centre roof module.

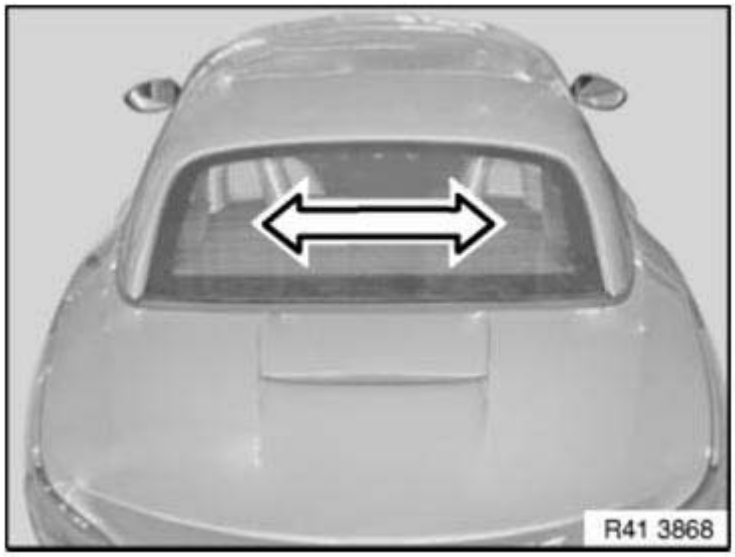


Fig. 56: Releasing X And Z Screw Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Height adjustment (Z):

Release screws (1).

Tightening torque **54 37 5AZ** .

IMPORTANT: To prevent twisting, release X screw connection.

Tightening torque **54 37 3AZ** .

Installation:

Always adjust barrel screws evenly on each side.

Maximum difference between link and right side 1 mm

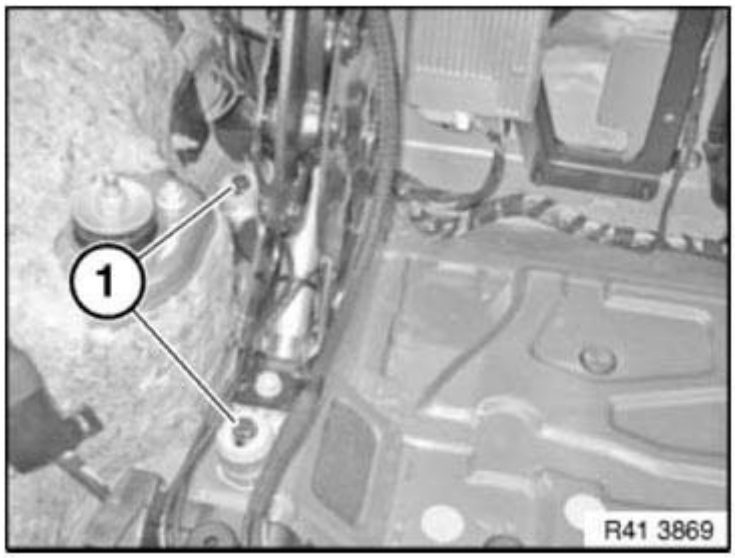


Fig. 57: Identifying Barrel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Completely close convertible top.

Check **GAP DIMENSIONS** at marked points.

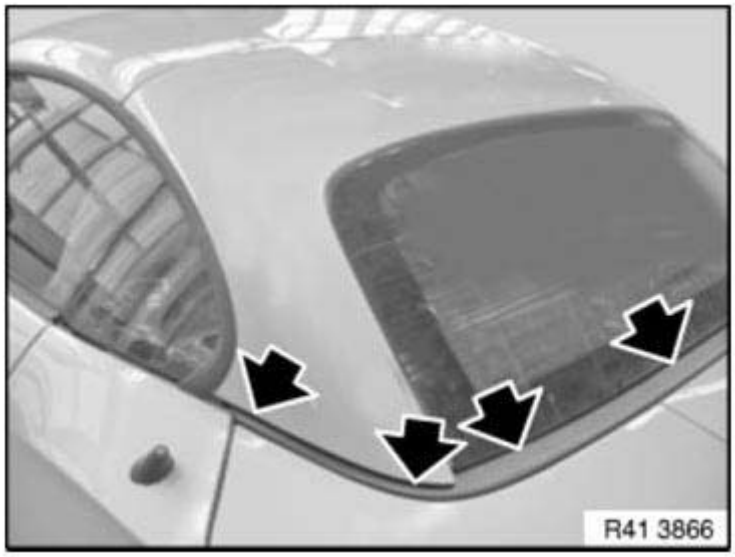


Fig. 58: Locating Gap Dimensions At Marked Points
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If there are problems after installing the convertible top, process fault diagnosis tree in BMW diagnosis system.

41 00 ... PROCEDURE FOR FOLDING HARDTOP AFTER AN ACCIDENT

The hardtop may be under tension after the vehicle has incurred damage following an accident. Moving the hardtop by hydraulic means may result in irreparable damage. For this reason, the hardtop may only be moved manually until the damaged has been repaired.

IMPORTANT: It is not possible to check the correct operation of the folding roof on the damaged vehicle.

Different procedures are required, depending on the degree of damage which the vehicle has incurred. The repair instructions for emergency operation See **5437290 HARDTOP EMERGENCY OPENING** or **5437295 EMERGENCY CLOSING HARDTOP** describe only the complete sequences for manually opening and closing the hardtop.

When removing the roof module and/or the rear module, it is possible to move the hardtop manually into the necessary intermediate positions in each case.

WARNING: Risk of injury due to the heavy weight of the hardtop!
Since the hydraulic system may have to be depressurized during manual movement of the hardtop, there is an increased risk of injury by trapping. Secure the hardtop permanently and adequately against unintentional movement.

After body repairs to the vehicle

All the hardtop components screwed/bolted to the body are precisely screwed/bolted to the vehicle at the factory by means of gauges. This affects above all the base plates and consoles of the roof and rear modules. To minimize extensive adjustment work after a body repair as much as possible, only remove those components which are screwed/bolted to a damaged body part.

- Gauge the base plates *only* after a body repair to the cowl panel.

54 37 130 REMOVING AND INSTALLING ROOF MODULE

Necessary preliminary tasks

- Connect battery charger
- Remove **REAR MODULE**
- Remove hydraulic cylinder for convertible top compartment lid See **5437225 REMOVING AND INSTALLING/REPLACING RIGHT CONVERTIBLE TOP COMPARTMENT LID HYDRAULIC CYLINDER** or **5437220 REMOVING AND INSTALLING/REPLACING LEFT CONVERTIBLE TOP COMPARTMENT LID HYDRAULIC CYLINDER**

IMPORTANT: Convertible top may only be electrically operated when the main bearing is screwed down.
Otherwise only perform roof movements manually with a 2nd person helping.

Move convertible top for following work into position.

Rear roof shell stowed above front roof shell.

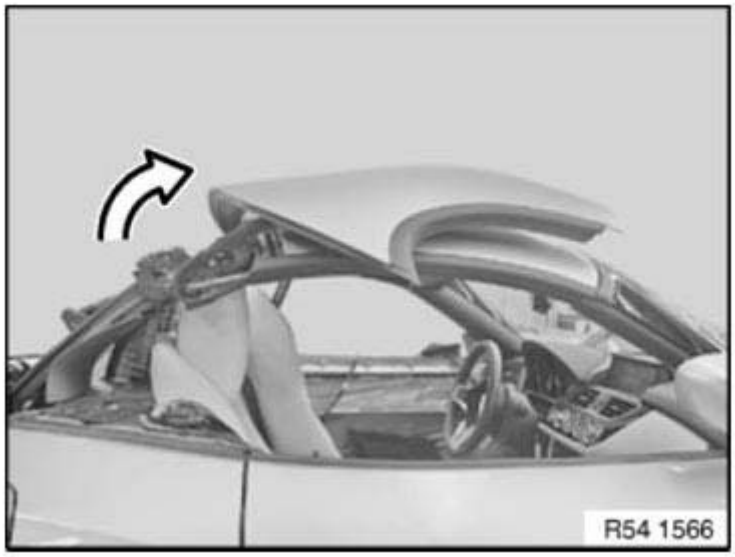


Fig. 59: Lifting Rear Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Set down device holder towards rear.

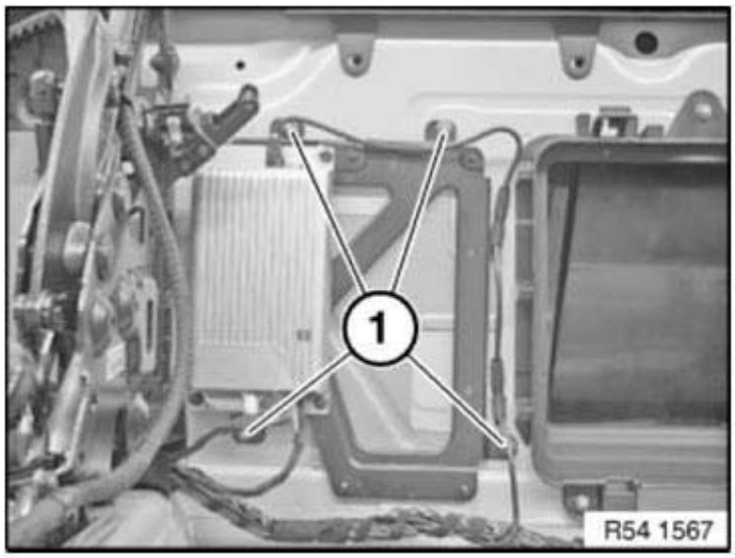


Fig. 60: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Set down device holder towards rear.

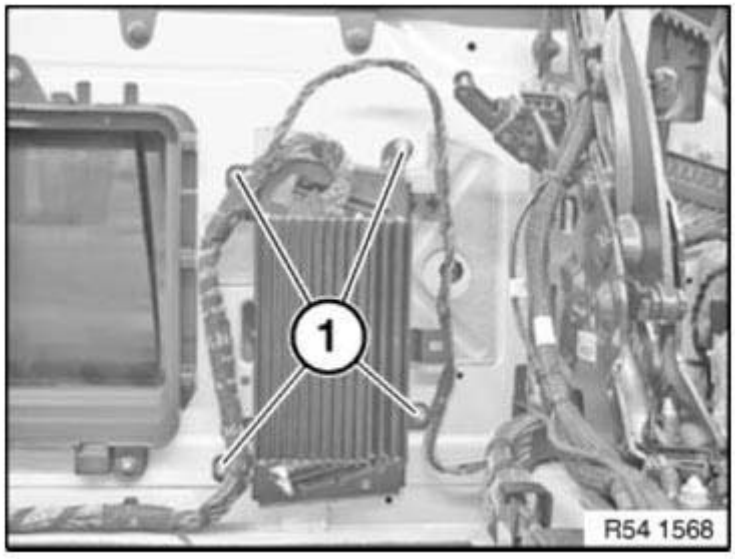


Fig. 61: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **54 37 09AZ** .

Remove battery rollover protection (2).

Remove insulating mat (3).

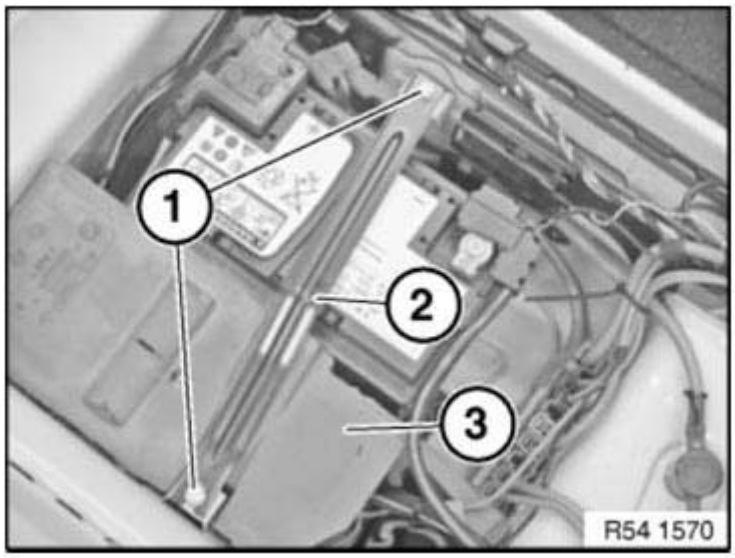


Fig. 62: Identifying Insulating Mat And Battery Rollover Protection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip all cable holders on hydraulic lines on left.

Installation:

If necessary, replace faulty cable holders.

Detach retainer (1).

Installation:

If necessary, replace faulty retainers (1).

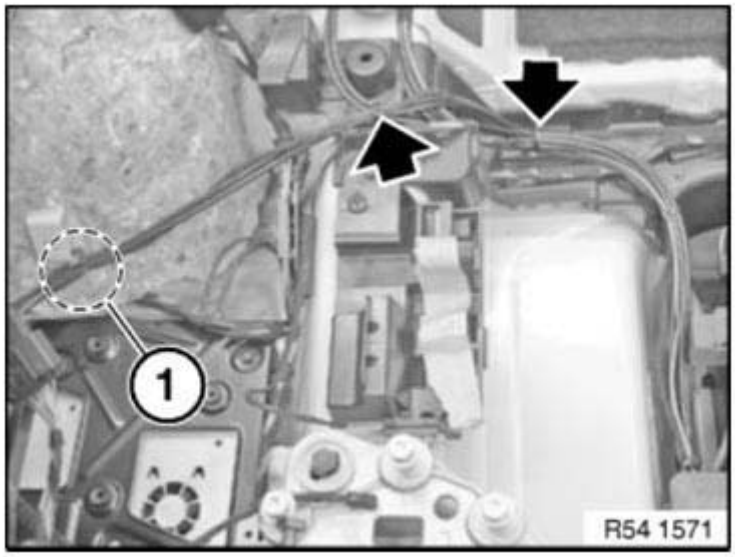


Fig. 63: Identifying Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip all cable holders on hydraulic lines on right.

Installation:

If necessary, replace faulty cable holders.

Detach retainer (1).

Installation:

If necessary, replace faulty retainers (1).

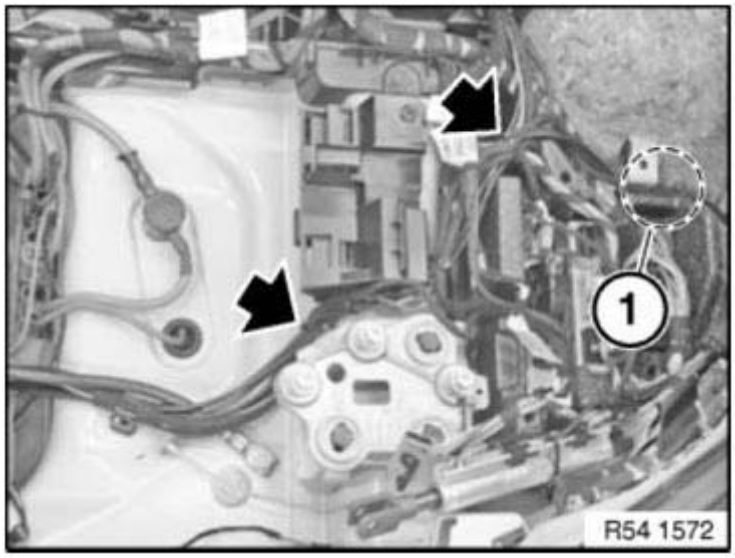


Fig. 64: Identifying Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) from cable holder on left and right.

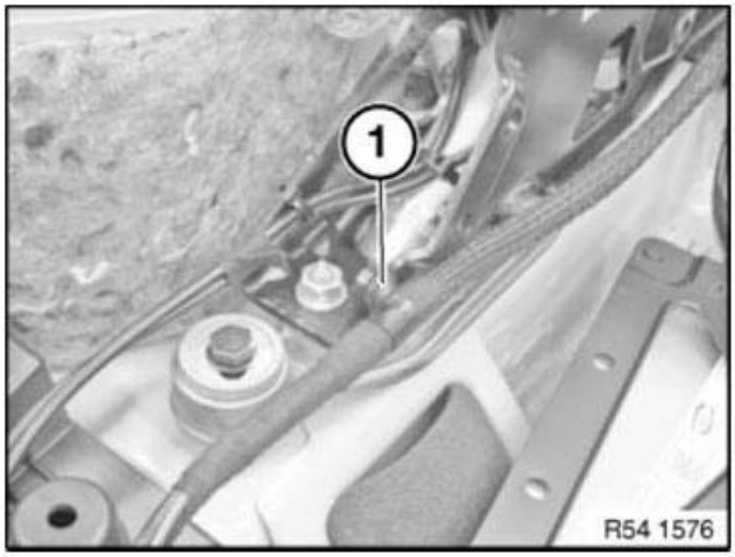


Fig. 65: Identifying Cable Holder Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove control unit (1) on right from device holder.

Unfasten plug connection (2) and disconnect.

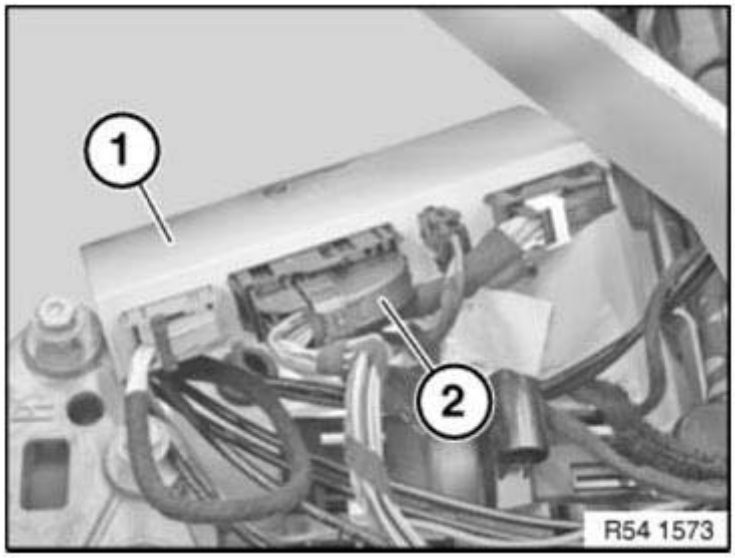


Fig. 66: Identifying Plug Connection And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect plug

connections (1) for hydraulic control unit.

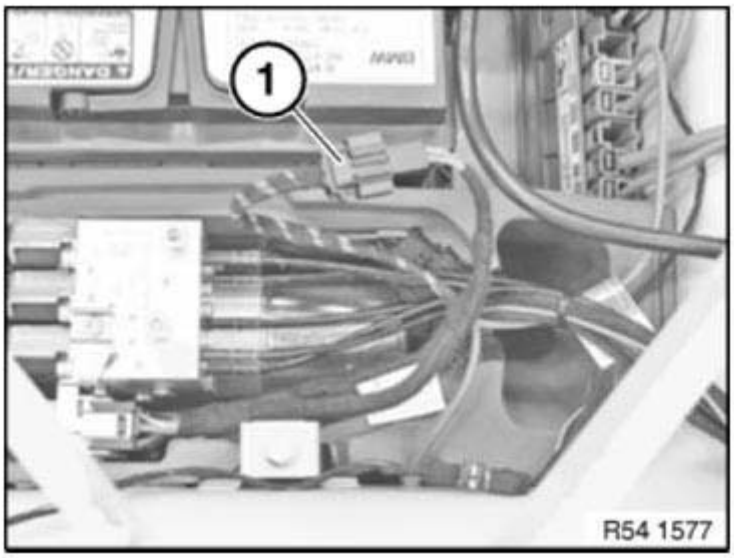


Fig. 67: Identifying Plug Connections For Hydraulic Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

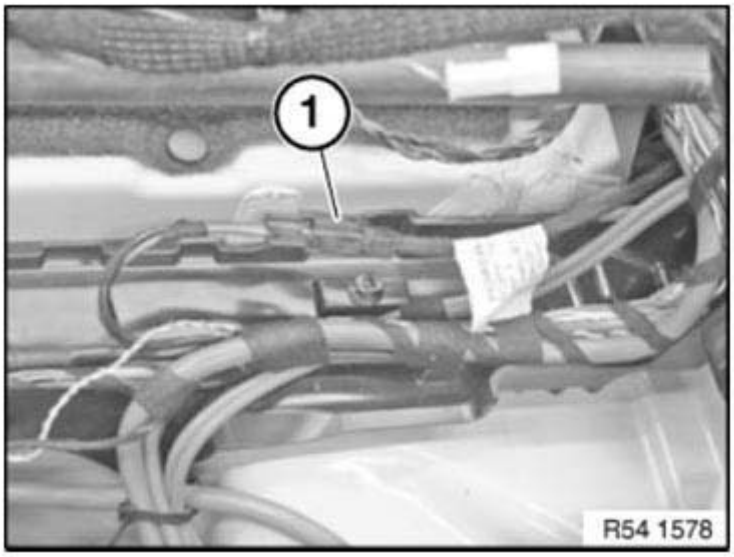


Fig. 68: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Mount adapter plate 54 0 300 with bolts (1) on special tool 54 0 101.

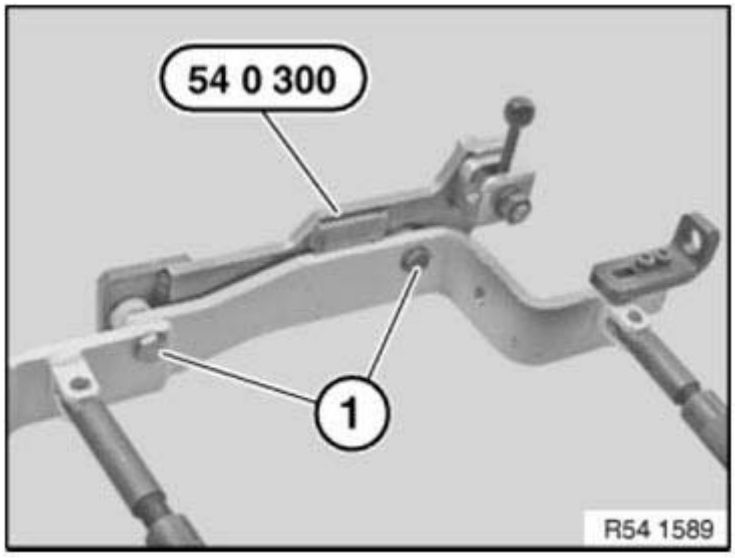


Fig. 69: Mounting Adapter Plate 54 0 300 With Bolts On Special Tool 54 0 101
Courtesy of BMW OF NORTH AMERICA, INC.

Place legs of special tool 54 0 101 as close together as possible.

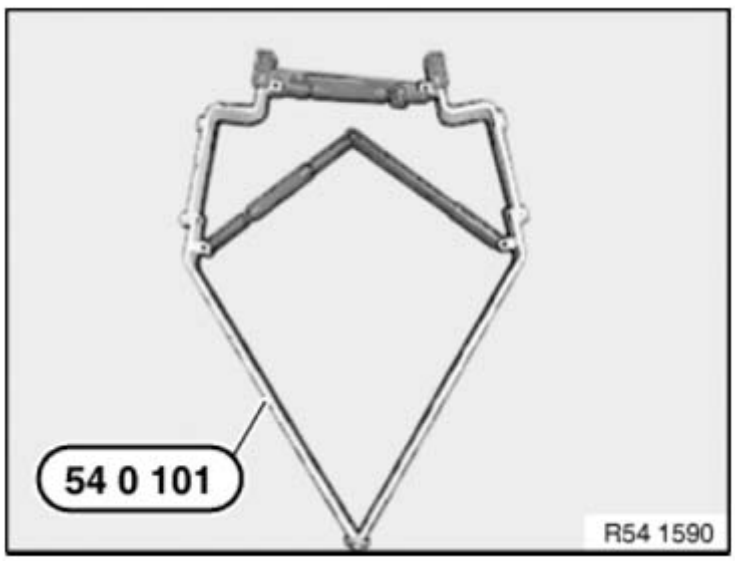


Fig. 70: Positioning Legs Of Special Tool 54 0 101
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully insert folded special tool 54 0 101.

Place leg on main bearing.

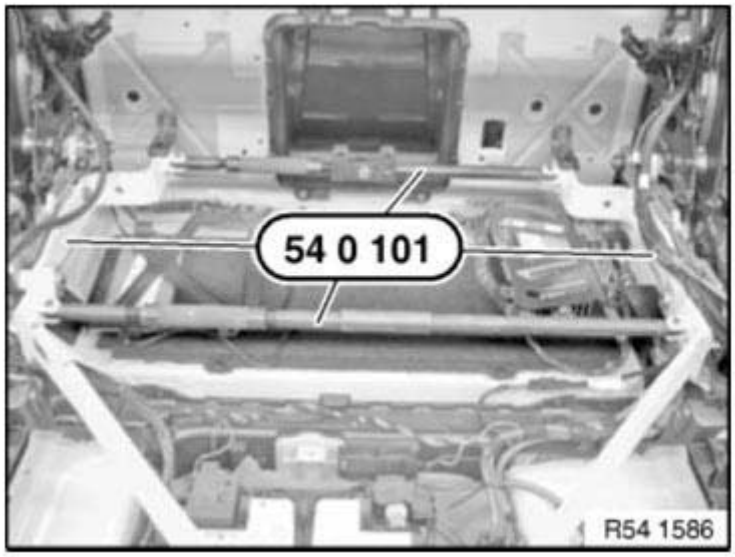


Fig. 71: Inserting Folded Special Tool 54 0 101
Courtesy of BMW OF NORTH AMERICA, INC.

Insert clamping piece (1) in main bearing.

Reposition lever (2).

Tighten nut (3).

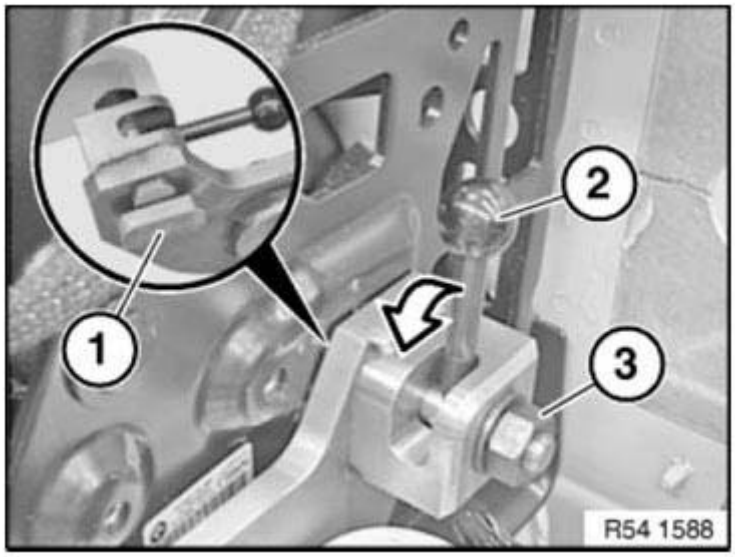


Fig. 72: Inserting Clamping Piece On Main Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screws (1) on main bearing on left and right.

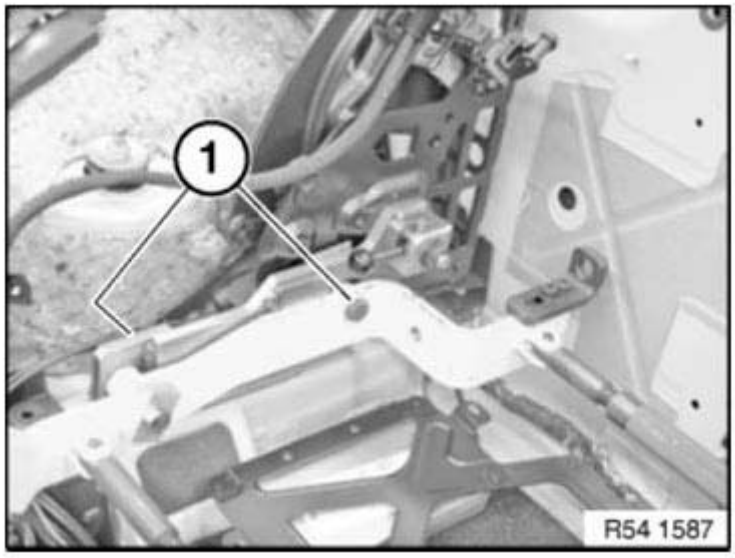


Fig. 73: Identifying Main Bearing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble linkage and screw down.

Adjust rotary sleeve (1) if necessary.

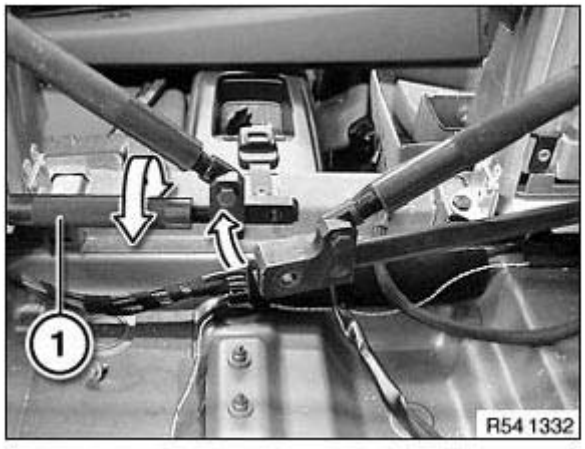


Fig. 74: Adjusting Rotary Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

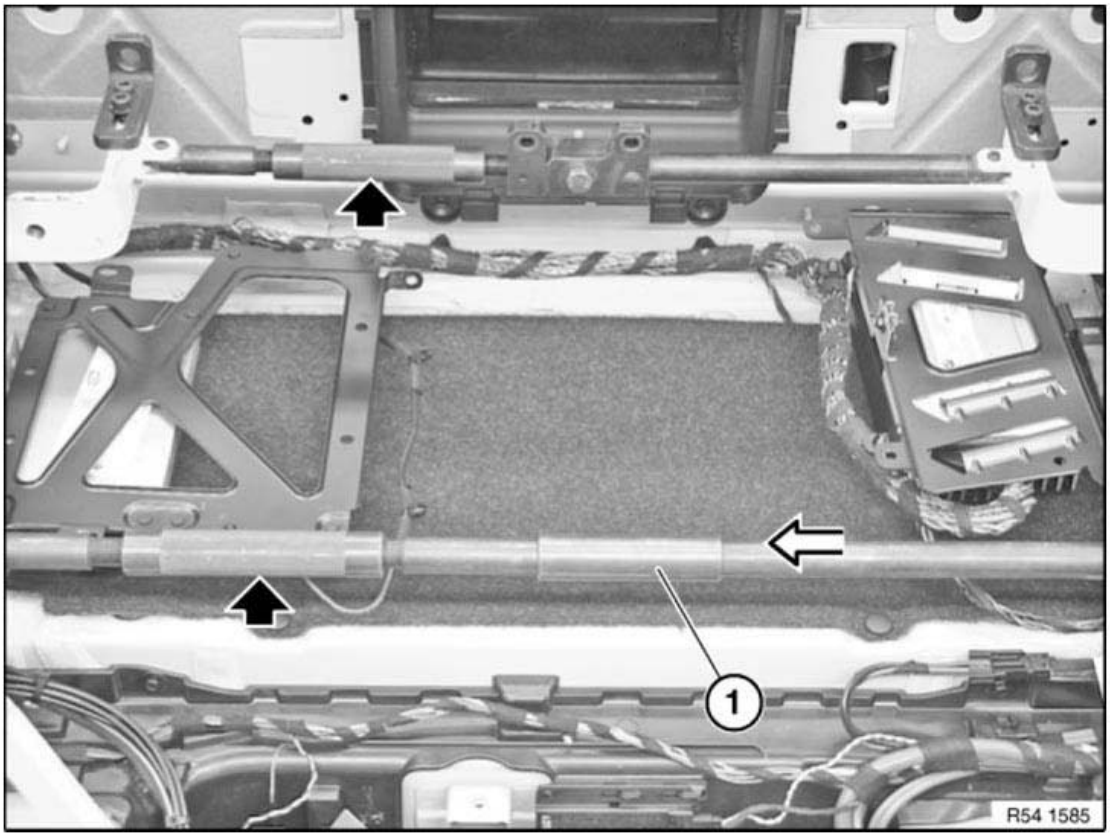


Fig. 75: Locating Locking Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The assembly carrier must rest free of tension on the main mount. Otherwise stress may occur at the main mount that could cause faulty installation.

Without using excessive force, pull tensioning rods outwards over rotary sleeves.

Slide locking sleeve (1) over pivot joint.

Secure hydraulic control unit (1) with cable ties to assembly carrier.

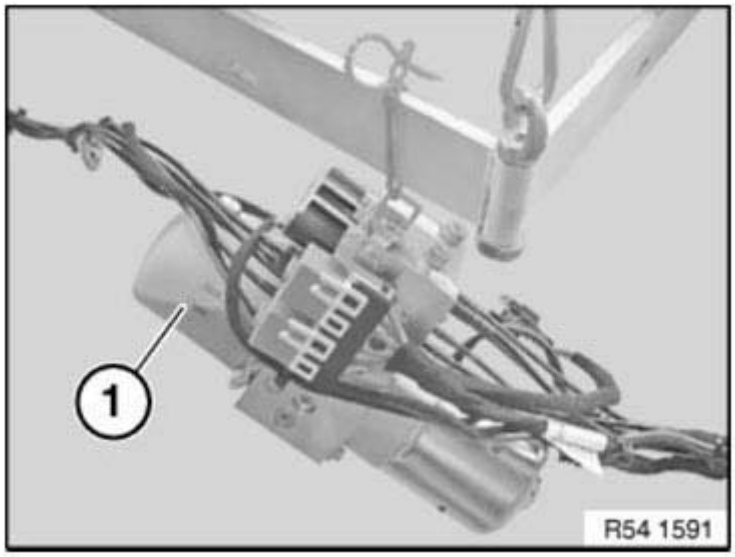


Fig. 76: Identifying Hydraulic Control Unit With Cable Ties
Courtesy of BMW OF NORTH AMERICA, INC.

Secure hydraulic cylinders (1) on left and right to assembly carrier with cable tie.

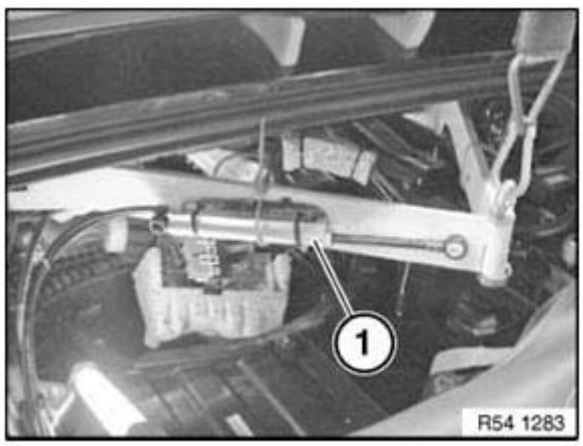


Fig. 77: Identifying Hydraulic Cylinders
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **54 37 03AZ** .

Replacement only:

Slacken lock nuts with special tool 54 0 190 .

Tightening torque **54 37 01AZ** .

Turn back barrel screws by approx. 3 mm.

Installation:

Tighten barrel screws only with special tool 54 0 180 in conjunction with 00 9 450 .

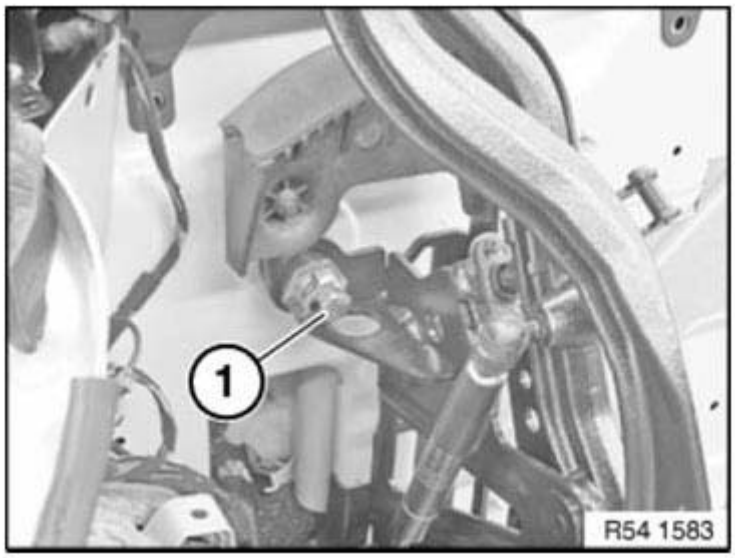


Fig. 78: Identifying Barrel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

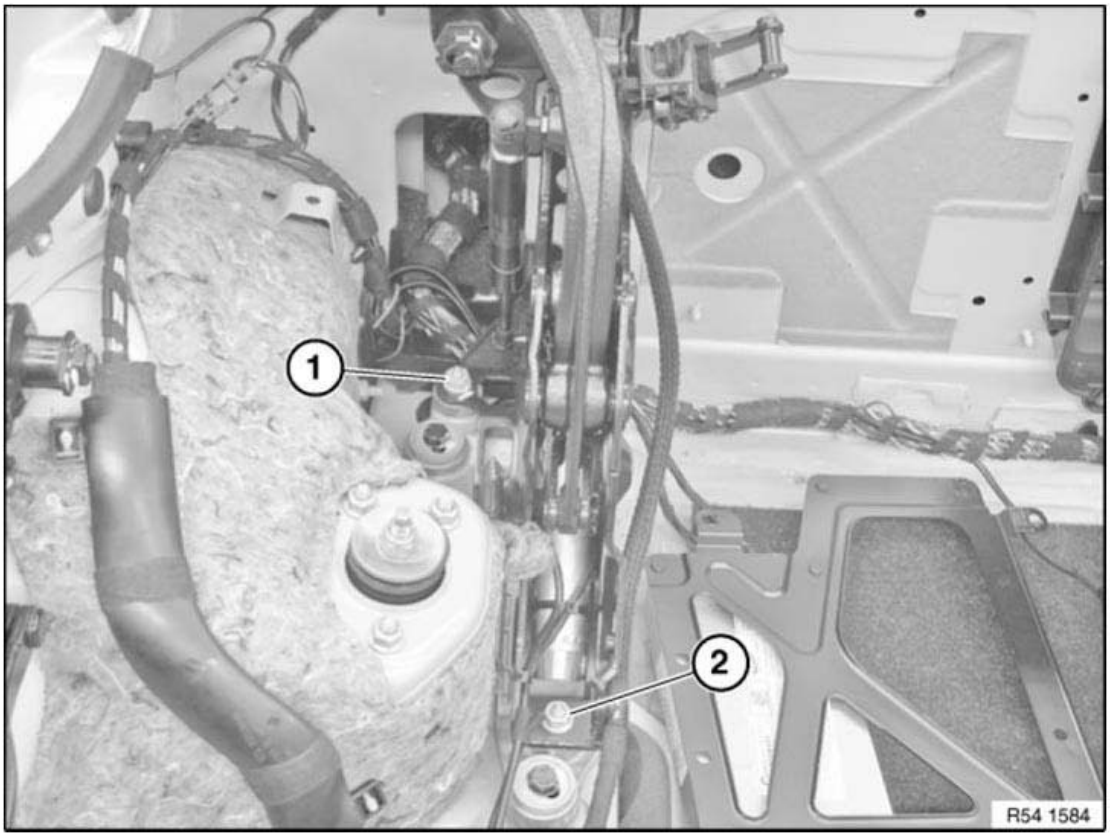


Fig. 79: Identifying Roof Module Main Bearings Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release front nuts (1) on left and right roof module main bearings.

Tightening torque **54 37 08AZ** .

NOTE: Rear nuts (2) on left and right main bearing - release torque only .
Slacken nuts only, do not release fully.
Tightening torque 54 37 08AZ .

IMPORTANT: Convertible top must not be electrically operated after the nuts on the main bearing have been released.

IMPORTANT: Risk of damage!

Reposition joint of kinematics box on left and right towards rear.

Roof shells (2) must not be set down beforehand.

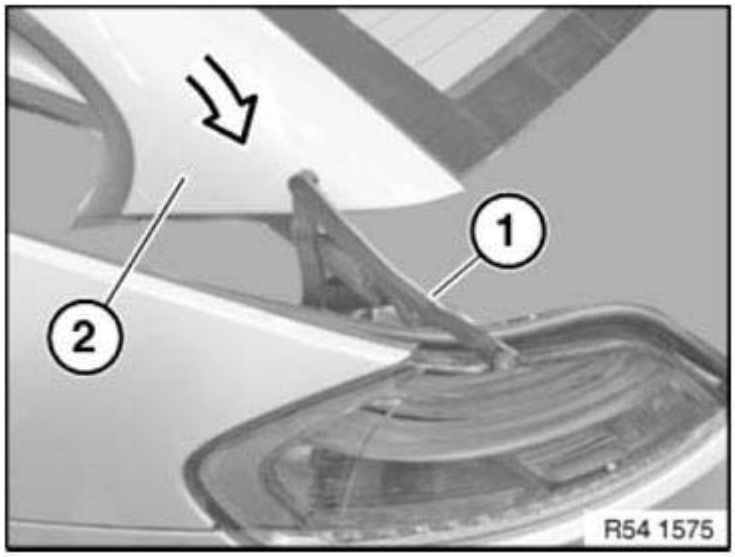


Fig. 80: Identifying Roof Shells Position
Courtesy of BMW OF NORTH AMERICA, INC.

Open screw on hydraulic unit 1.5 turns.

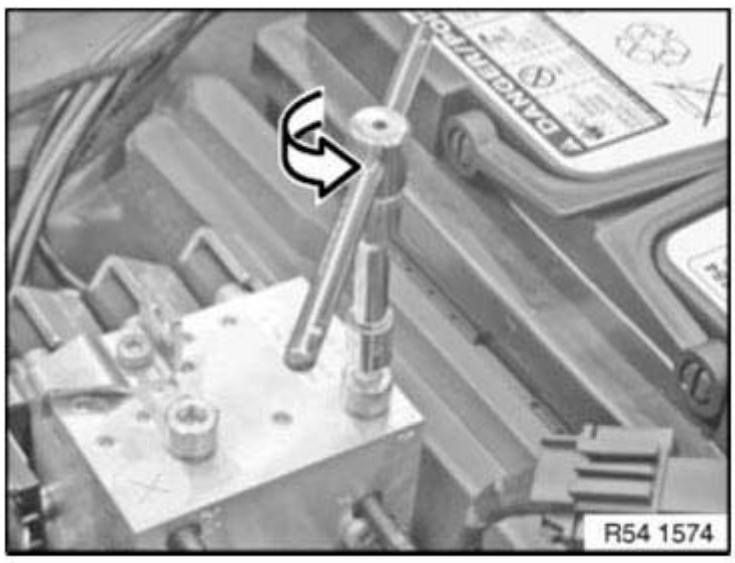


Fig. 81: Opening Screw On Hydraulic Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully raise roof shells with two people helping.

Move roof shells until weight acts centrally on main bearing.

Close screw on hydraulic control unit.

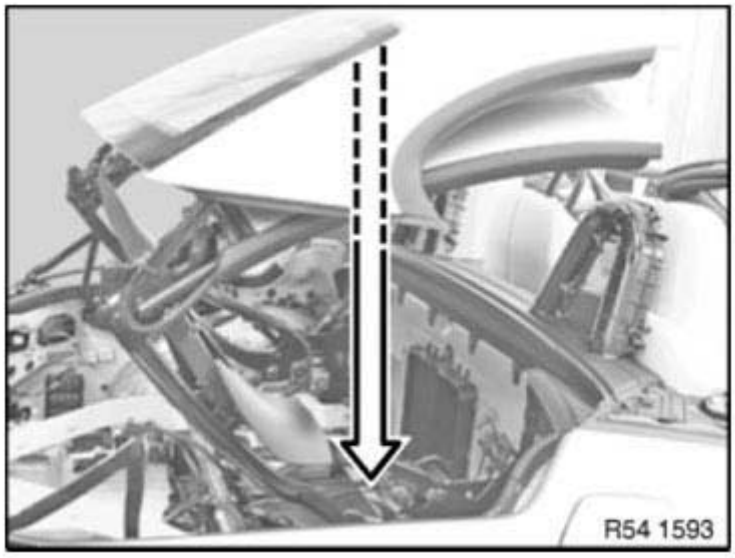


Fig. 82: Positioning For Moving Roof Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Support roof shells on left and rights with two helpers.

Slacken nut (1).

Only then set roof shells down.

Open hydraulic control unit screw.

Slowly set roof shells down.

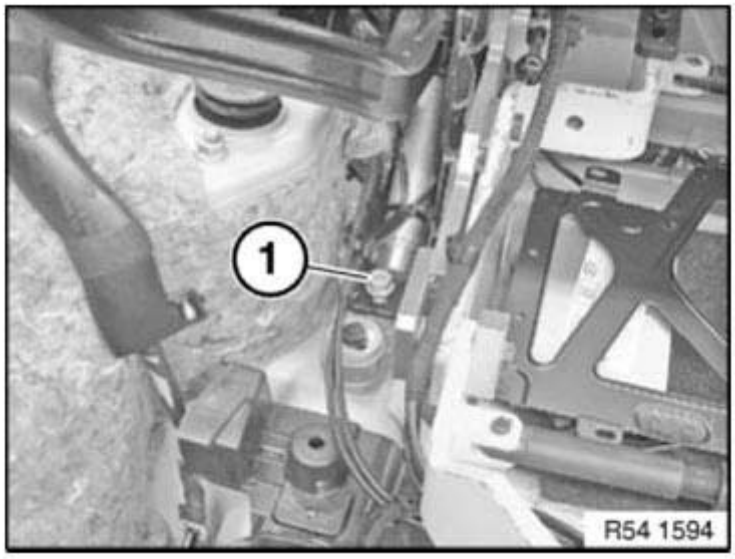


Fig. 83: Identifying Roof Shells Nut
Courtesy of BMW OF NORTH AMERICA, INC.

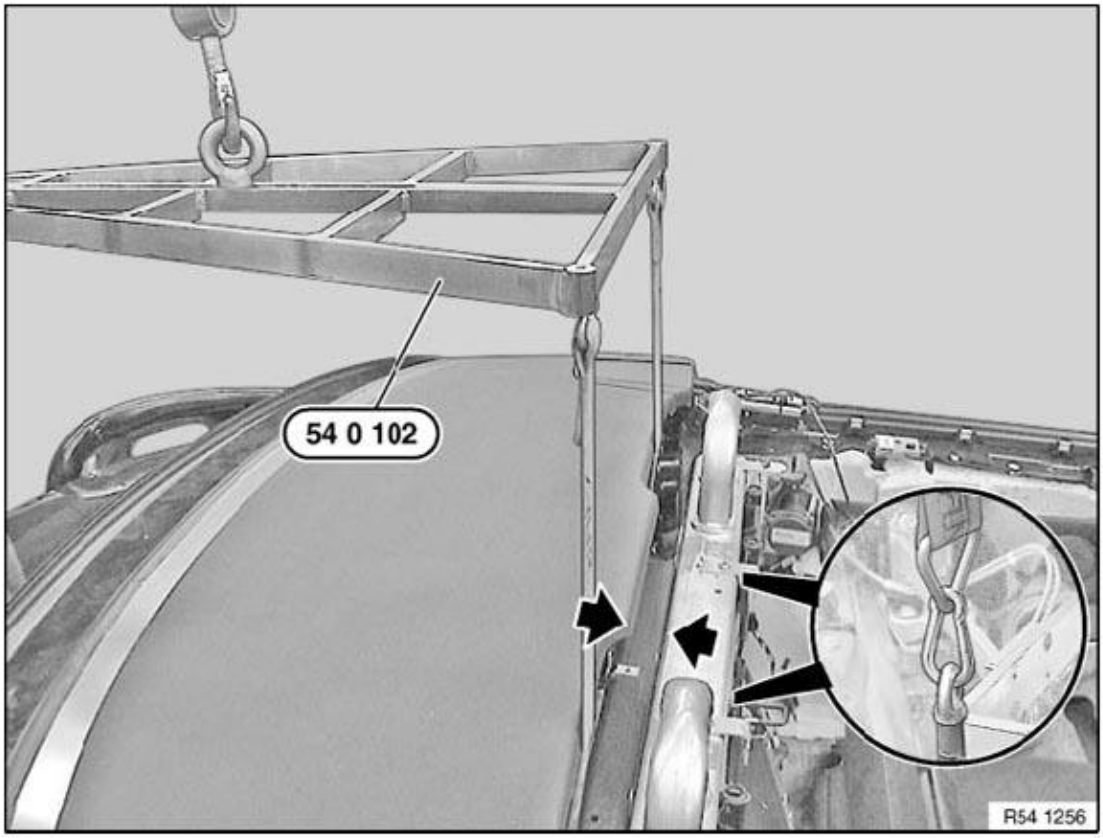


Fig. 84: Positioning Special Tool 54 0 102 With Workshop Crane Over Roof Module
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Carry out this part of the work with the assistance of two other persons. Position special tool 54 0 102 with workshop crane over roof module.

IMPORTANT: Use lifting gear and assembly carrier only in conjunction with BMW WJN.10 workshop crane (special lifting arm with 1690 mm arm length - refer to BMW Workshop Equipment Catalogue) or a crane with comparable specifications. Feed in belts between rollover protection system and roof module. Do not twist straps!

Installation:

The assembly carrier including the roof shell can be tilted towards the rear to slot in the karabiners.

Slot karabiners into assembly carrier.

Slot karabiner at rear into assembly carrier.

IMPORTANT: Straps must not be twisted!

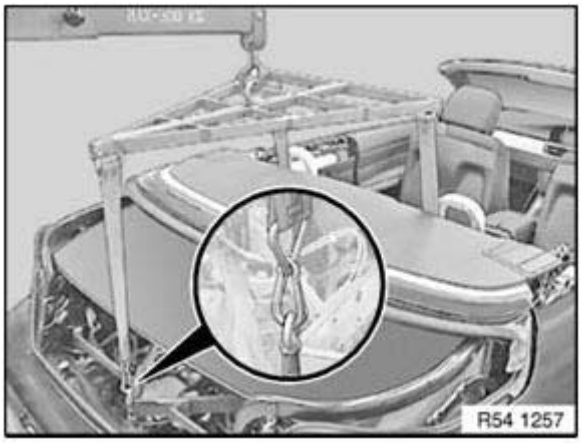


Fig. 85: Ensure Straps Are Not Twisted
Courtesy of BMW OF NORTH AMERICA, INC.

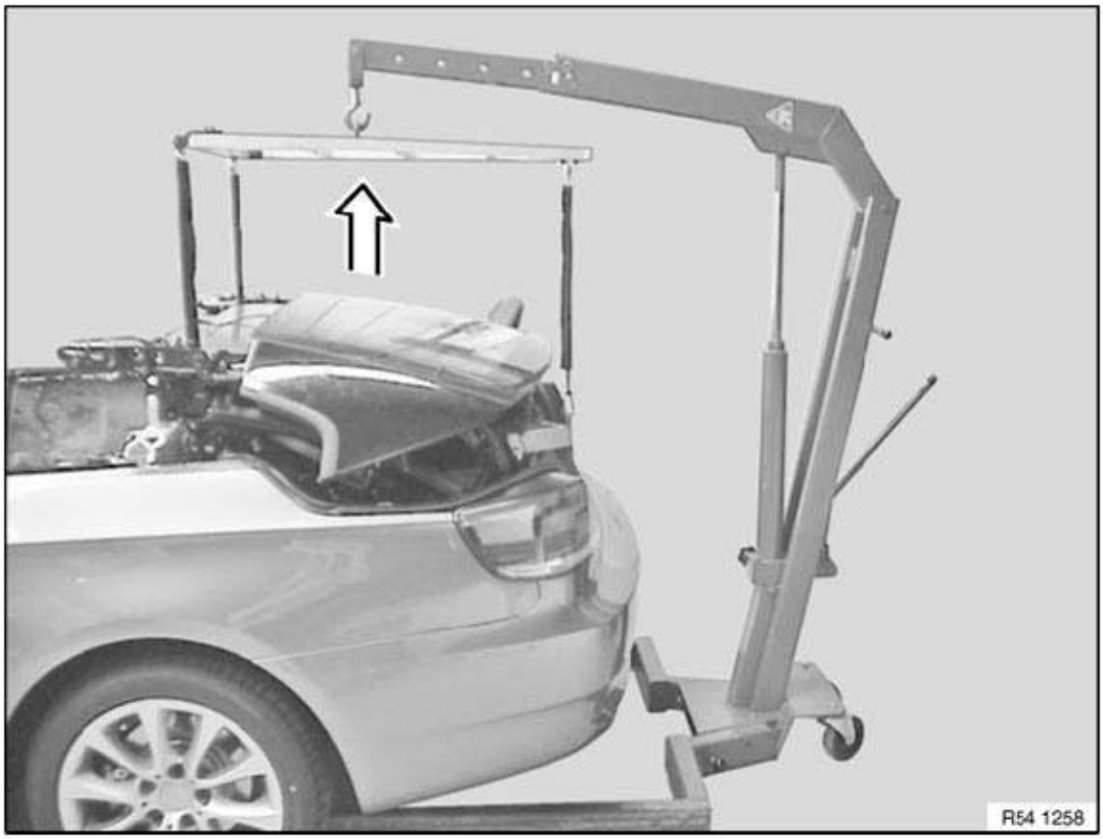


Fig. 86: Lifting Convertible Top Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

To lift out the Convertible top uniformly, make sure the special tool is aligned parallel to the roof module.

Lifting out roof module carefully and in stages with lifting gear.

Check freedom of movement of roof module with respect to body.

Carefully set roof module down on a suitable surface (e.g. squared beams on pallet).

Replacement only:

Change assembly carrier to new roof module and install roof module in vehicle.

Place the removed roof module in transport crate and screw down.

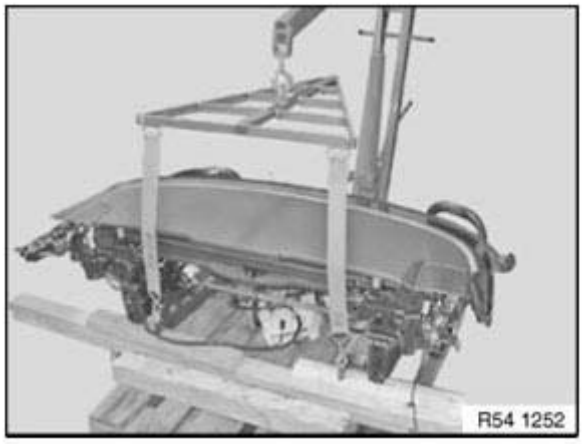


Fig. 87: Setting Roof Module Down On Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Carry out function check on roof module with rear module removed:

IMPORTANT: Convertible top may only be operated when the main bearing is screwed down.

Special tool 61 4 250 must be connected.

Contact bridge simulates a closed convertible top compartment lid.

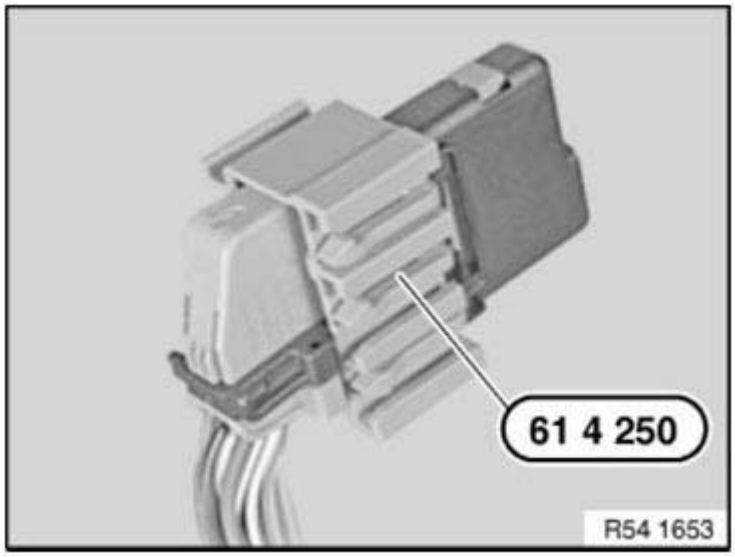


Fig. 88: Identifying Special Tool 61 4 250
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check **GAP DIMENSIONS** and if necessary adjust

Carry out diagnosis.

54 37 100 REMOVING AND INSTALLING ROOF SHELL FASTENER MOTOR (DRIVE)

Necessary preliminary tasks

- Remove **ROOFLINER**

Installation:

- Microencapsulated nuts (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated nuts must not be retightened
- Threaded bolts must be cleaned beforehand in event of repeated use

Slide open retaining clip (1) and unclip ball head.

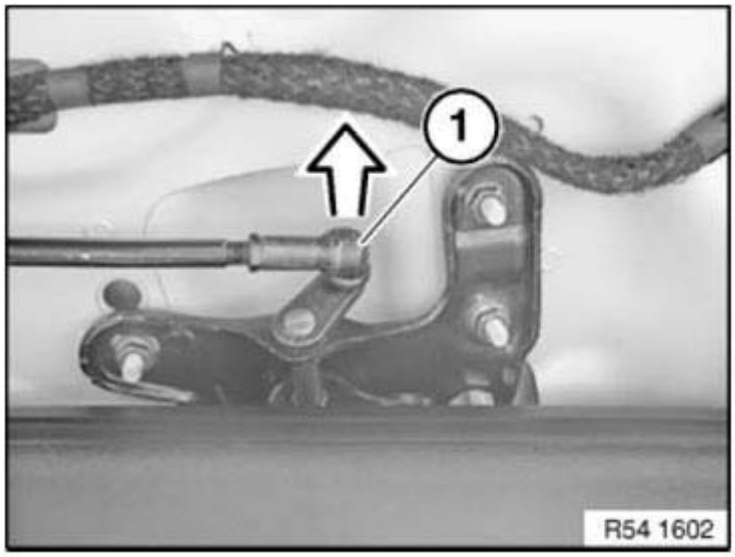


Fig. 89: Sliding Open Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Unscrew nuts.

Tightening torque **54 37 12AZ** .

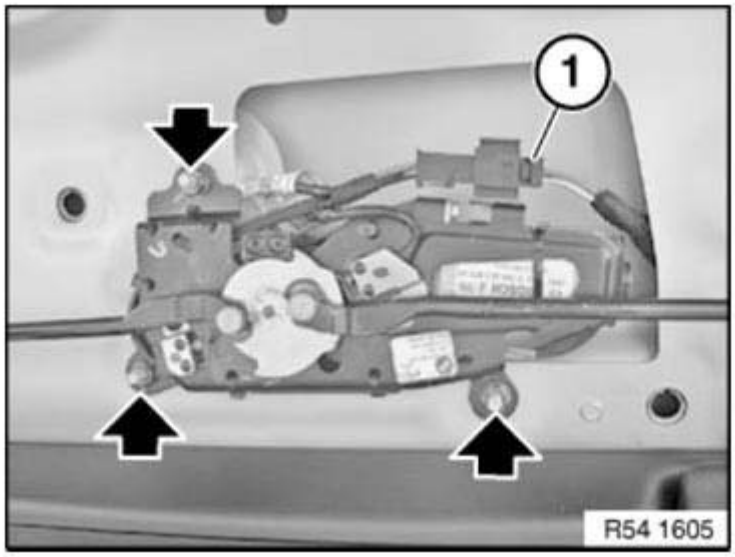


Fig. 90: Locating Plug Connection Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check GAP DIMENSIONS and if necessary adjust at front.

54 37 185 REMOVING AND INSTALLING/REPLACING HYDRAULIC UNIT (DRIVE) FOR RETRACTABLE HARDTOP

Necessary preliminary work

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

IMPORTANT: Hydraulic fluid may emerge from the disconnected lines and the open connections on the hydraulic unit (drive).
Protect components and work area with suitable materials (e.g. cloths).
Follow REPAIR INSTRUCTIONS for hydraulic system.
Do not fit hydraulic lines in kinked, crushed or transposed condition.

Release screws (1).

Tightening torque **54 37 09AZ** .

Remove battery rollover protection (2).

Remove insulating mat (3).

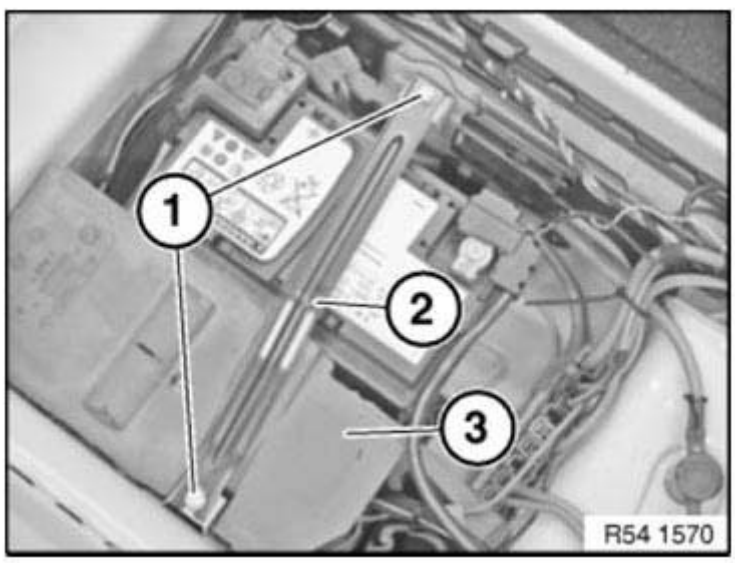


Fig. 91: Identifying Insulating Mat And Battery Rollover Protection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

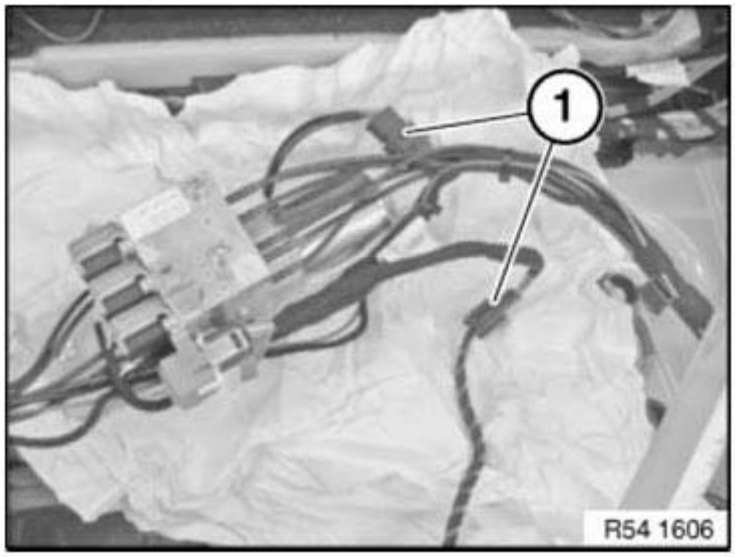


Fig. 92: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Press release and detach relay (1) from holder.

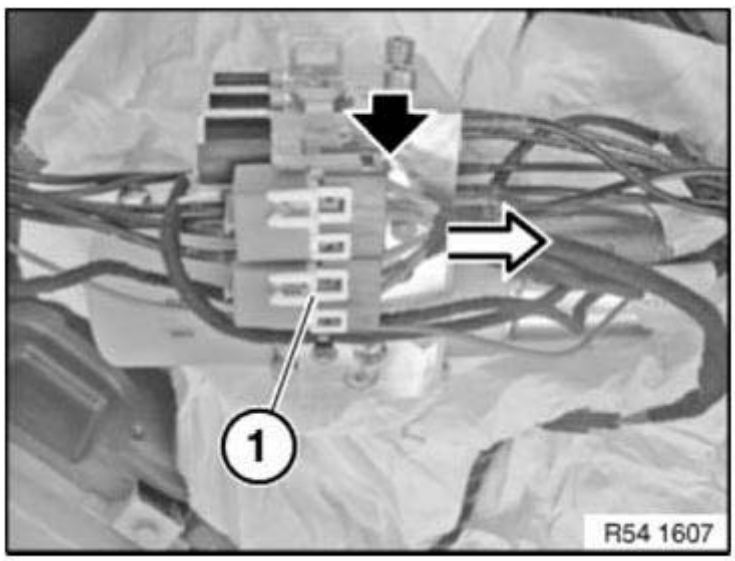


Fig. 93: Disconnecting Relay From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release plug connections (1) and disconnect.

Cut cable straps.

Installation note:

Plug connections are coded against incorrect assembly.

Replace defective cable strap.

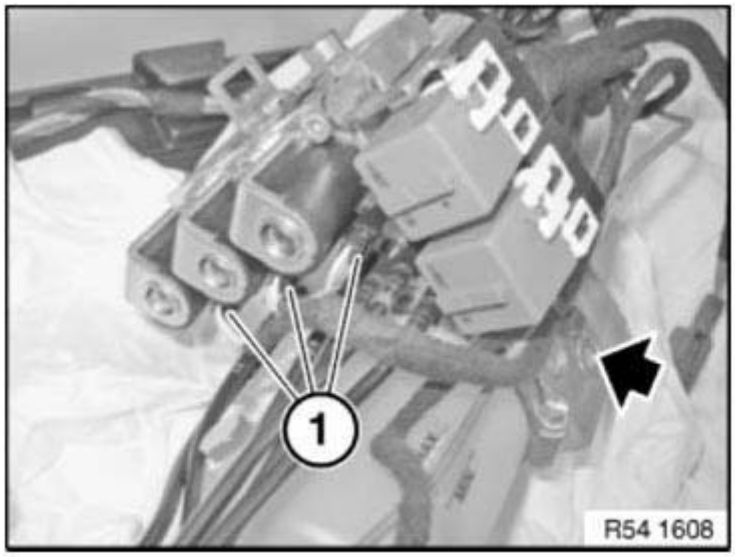


Fig. 94: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Protect joints (lines and hydraulic unit) against dripping fluid, e.g. with a cleaning cloth.

Disconnect hydraulic lines from hydraulic unit:

- Release screws.
- Detach hydraulic lines

Installation note:

Hydraulic lines and connections are marked with numbers to prevent mix-ups.

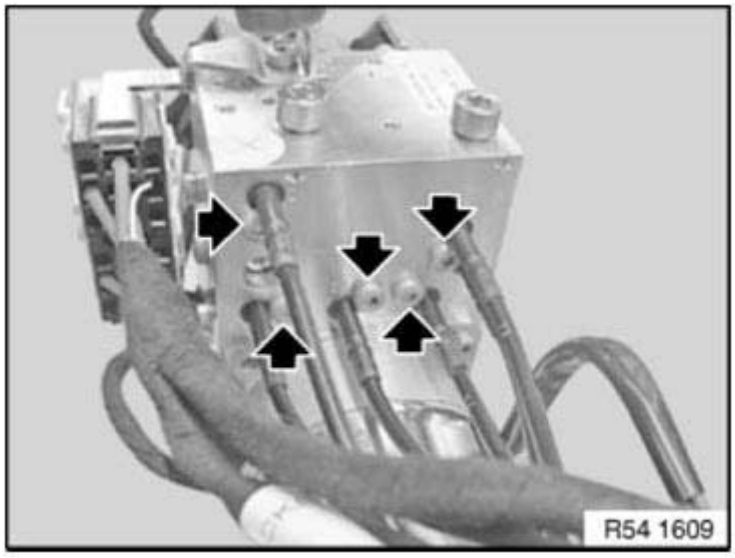


Fig. 95: Locating Hydraulic Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect hydraulic lines from hydraulic unit:

- Release screws.
- Detach hydraulic lines
- Remove hydraulic unit (drive).

Installation note:

Hydraulic lines and connections are marked with numbers to prevent mix-ups.

Check **FLUID LEVEL** or top up if necessary.

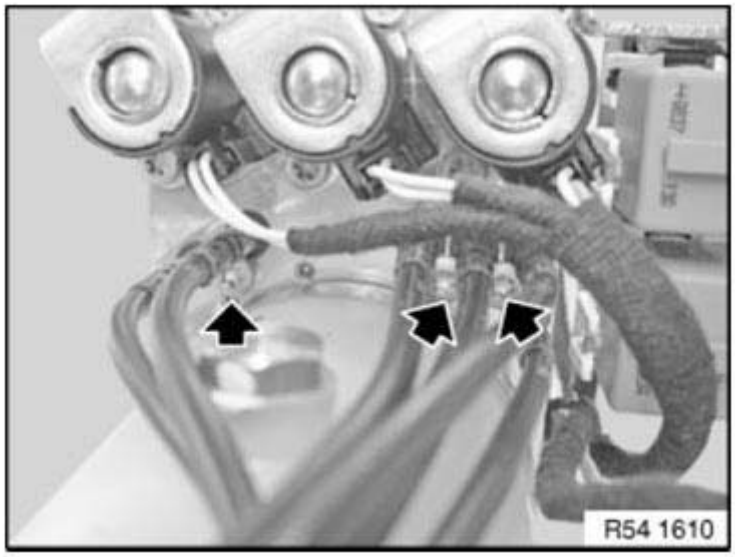


Fig. 96: Locating Hydraulic Line Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

Use Allen key to close shutoff valve on hydraulic unit.

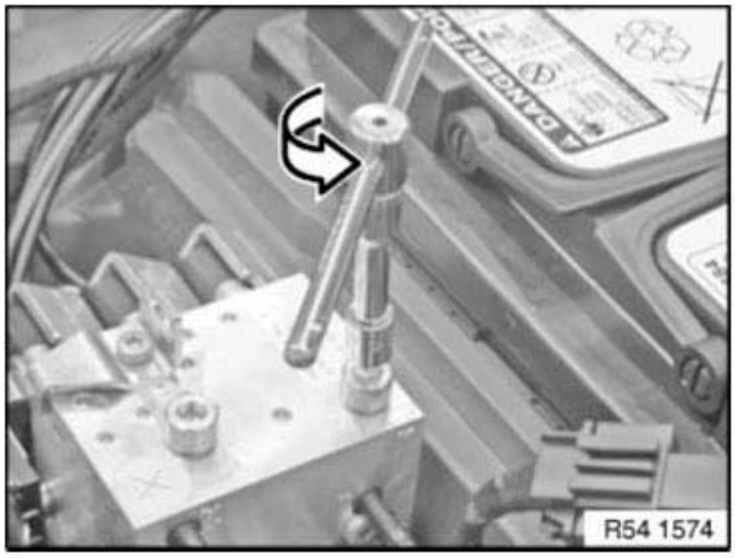


Fig. 97: Closing Shutoff Valve On Hydraulic Unit Using Allen Key
Courtesy of BMW OF NORTH AMERICA, INC.

54 37 220 REMOVING AND INSTALLING/REPLACING LEFT CONVERTIBLE TOP COMPARTMENT LID HYDRAULIC CYLINDER

NOTE: Except for the operations covering the plug connections for the Hall sensors,

this task is identical to:

- **Removing and installing/replacing right CONVERTIBLE TOP COMPARTMENT LID HYDRAULIC CYLINDER**

54 37 090 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT CONVERTIBLE LOCK

Necessary preliminary tasks

- Remove **FRONT ROOFLINER**
- Open Convertible top.

Installation:

- Microencapsulated nuts (Loctite) must be replaced and may not be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated nuts must not be retightened
- Threads of threaded bolts must be cleaned beforehand in event of repeated use

Slide open retaining clip (1) and unclip ball head.

NOTE: Before removing, mark position of nuts to ensure correct alignment when installing.

Unscrew nuts (2).

Tightening torque **54 37 12AZ** .

Installation:

Replace nuts.

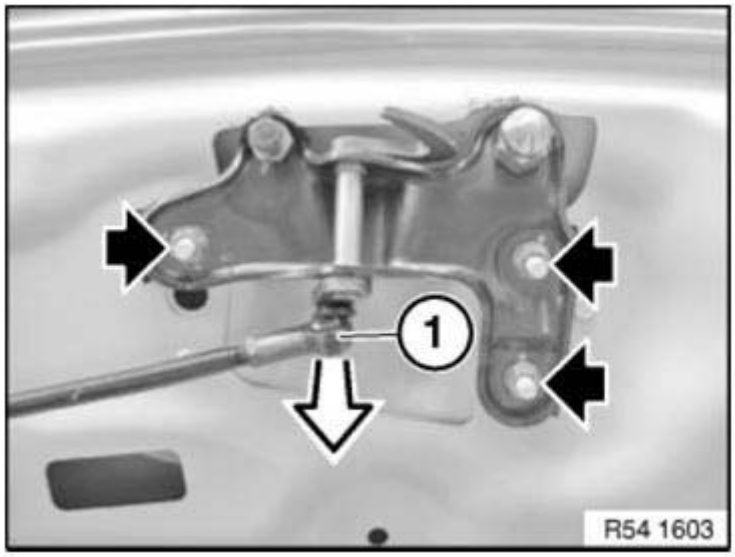


Fig. 98: Sliding Open Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

Screw on new fasteners loosely.

Fastener should still be able to be slid in order to centre itself.

Close convertible top.

Fasteners glide into place.

Tighten nuts.

Tightening torque **54 37 12AZ** .

Check **GAP DIMENSIONS** and if necessary adjust

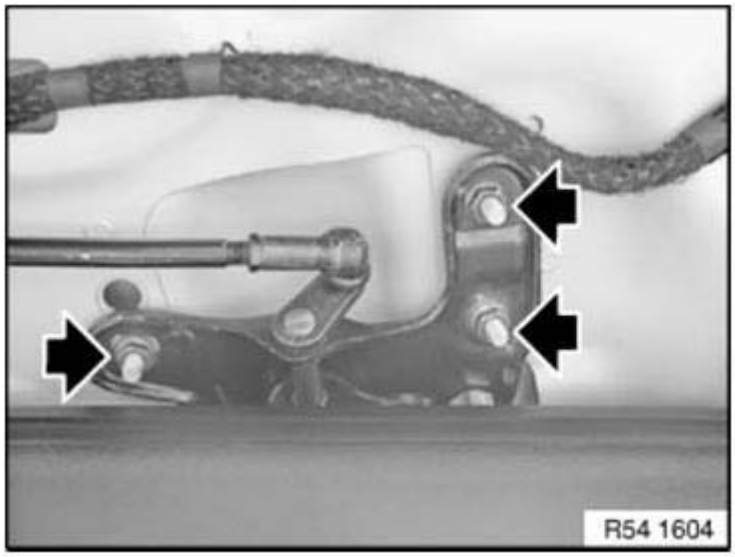


Fig. 99: Locating Screw On Fasteners
Courtesy of BMW OF NORTH AMERICA, INC.

51 31 200 REMOVING AND INSTALLING/REPLACING REAR WINDOW

IMPORTANT: The "INSTRUCTIONS ON CEMENTING WINDSCREEN" serve as the basis for this repair instruction and must be observed without fail.
Cover rear side panels with protective covers.
When reusing the rear window:
Do not damage plug soldering tags for heated rear window.

Necessary preliminary tasks

- Remove **ROOFLINER FOR ROOF SHELL**

NOTE: Removal is performed with ROLL OUT 2000 .

- **Tape off entire roof shell aperture with fabric adhesive tape (paint coat must not be damaged)**
- **All attachment parts must not be damaged**

Move rear roof shell (1) forwards until frame (1) can be engaged in openings (2) on left and right with a suitable tool.

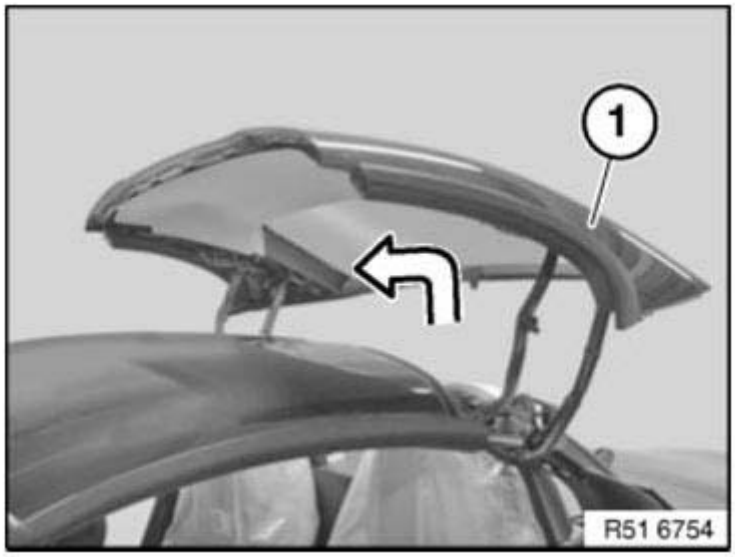


Fig. 100: Moving Rear Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

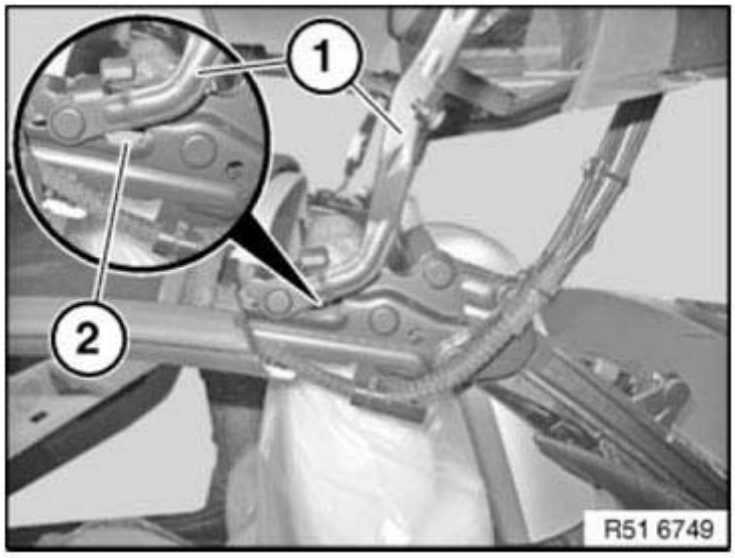


Fig. 101: Frame Engaged On Openings
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect heated rear window plug connections (1) on left and right.

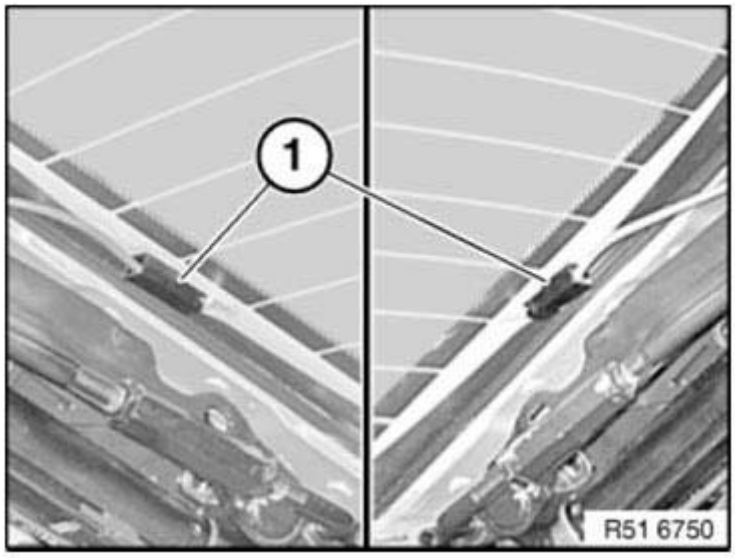


Fig. 102: Identifying Rear Window Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Tape off body area at piercing point (1) with fabric adhesive tape (risk of damage).

Push wire starter from **ROLL OUT 2000** at line (1) through adhesive bead.

Cut out rear window with **ROLL OUT 2000** .

Lift out rear window with special tool 51 3 010 .

Installation:

Bond rear window with hardtop closed.

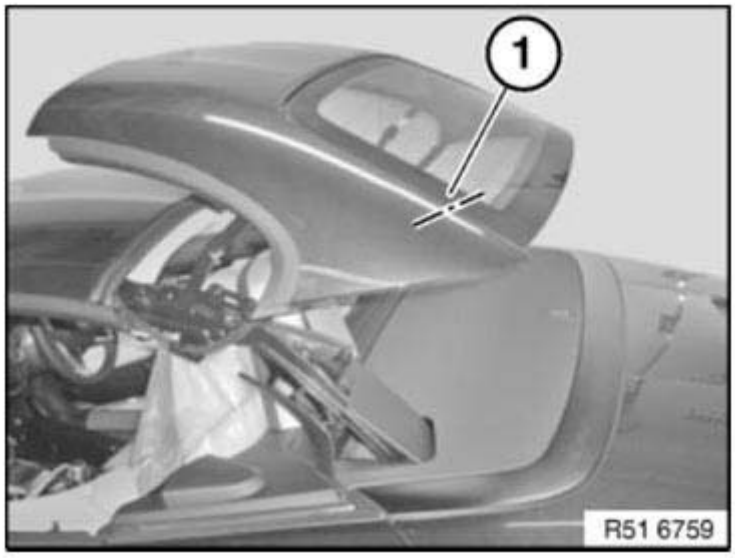


Fig. 103: Identifying Wire Starter From Roll Out 2000 At Line
Courtesy of BMW OF NORTH AMERICA, INC.

Fitting 6 spacer buffers:

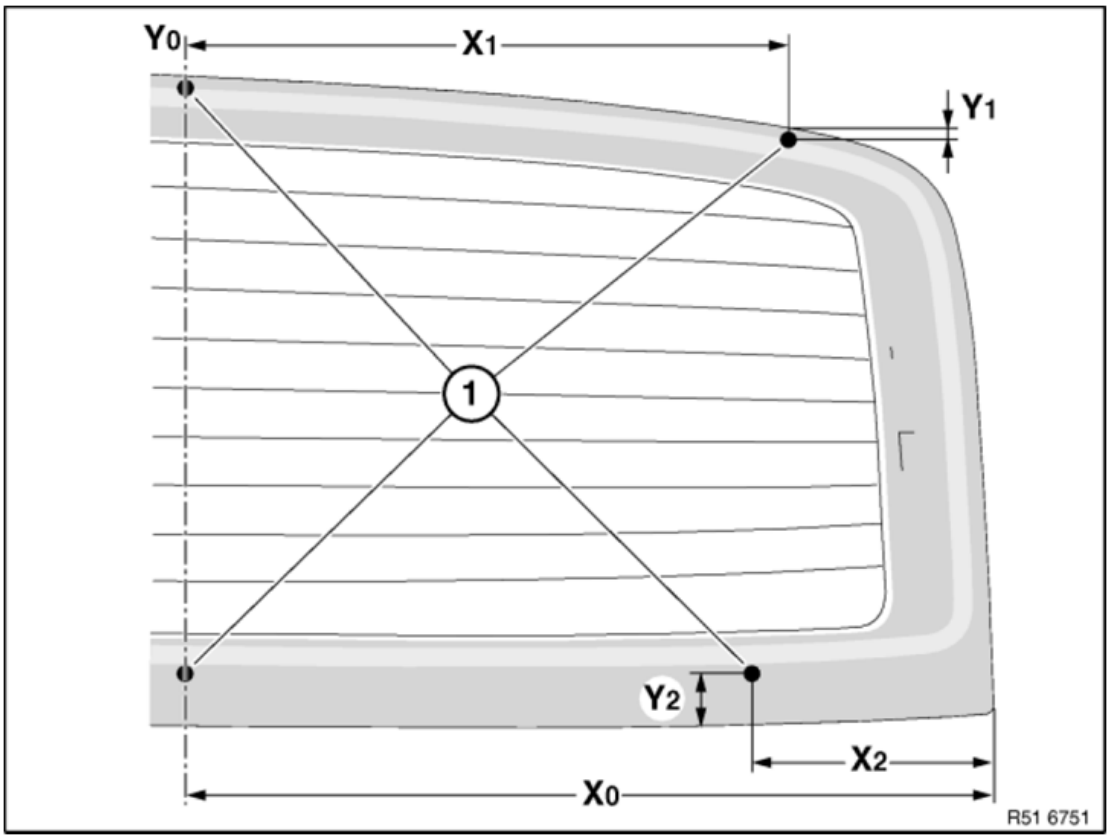


Fig. 104: Identifying Upper And Lower Spacer Buffer Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid rear window breakage and leaks, remove remnants of removed spacer buffers (1).
Position new spacer buffers (1) outside adhesive bead.
Only the following spacer buffers (1) may be used:

- Dia. 9.5 mm and 3.8 mm high

SPACER BUFFER DIMENSION SPECIFICATION

Apply dimensions to right window half in mirror-inverted fashion			
X_0 =	550	Y_0 =	All dimensions in mm Window centre
X_1 =	380	Y_1 =	6
X_2 =	165	Y_2 =	35

Y_1 = applicable to all upper spacer buffers (1)

Y_2 = applicable to all lower spacer buffers (1)

Overview of bonding agent application (primer)

Apply bonding agent in marked area (1), but not beyond the ceramic glass screen print.

NOTE: Otherwise wipe again straight away with a fluff-free cloth.

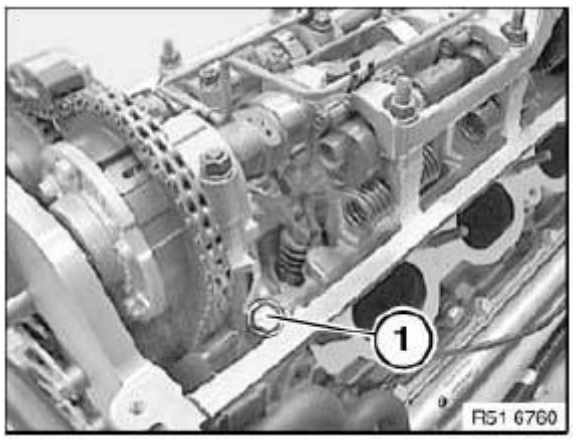


Fig. 105: Identifying Bonding Agent On Applied Marked Area
Courtesy of BMW OF NORTH AMERICA, INC.

Overview of adhesive bead trace, top and side

Adhesive bead trace (1) runs inside clinch points (2).

Adhesive bead trace

A = 7 $^{+2}$ mm (width, adhesive bead trace)

B = 7 $^{+1}$ mm (height, adhesive bead trace)

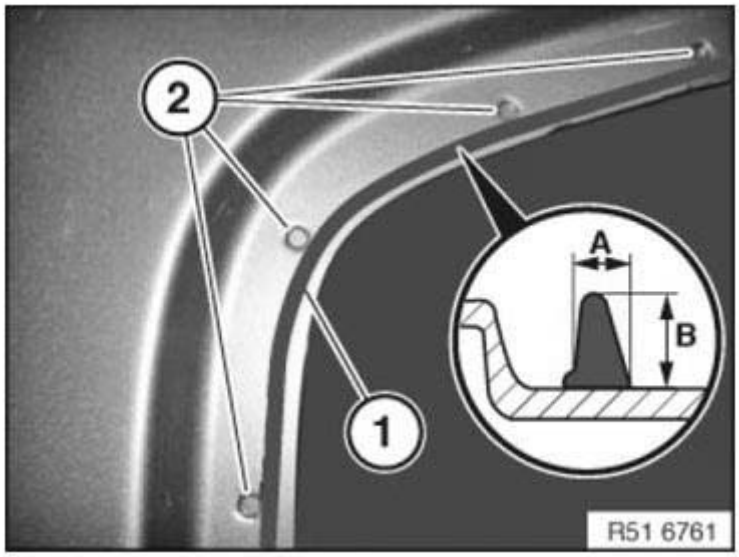


Fig. 106: Identifying Adhesive Bead Trace (Top)
Courtesy of BMW OF NORTH AMERICA, INC.

Overview of adhesive bead trace, bottom

Adhesive bead trace (1) runs in sheet recess of cross-member (2).

Spread bead joint (3) with special tool 00 9 322 .

Adhesive bead trace

A = 7 $^{+2}$ mm (width, adhesive bead trace)

B = 7 $^{+1}$ mm (height, adhesive bead trace)

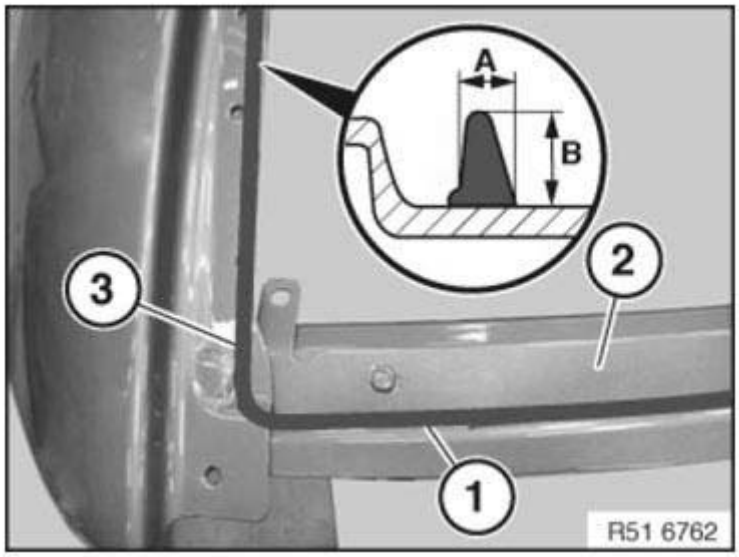


Fig. 107: Identifying Adhesive Bead Trace (Bottom)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 51 3 010 twice to tool trolley. Moisten suction surfaces and secure rear window from outside.

If reusing the removed rear window, remove the adhesive residue with a blunt scraper or knife.

Observe treatment of adhesive area in body aperture and on rear window, see **INSTRUCTIONS ON WINDOW CEMENTING**

Position and width of bead joint:

- Overlapping and closed
- Not visible from outside and inside
- The contact point becomes noticeable through an increase in the adhesive volume (approx. 1.5 - 2 x bead width after crushing).

  Position adhesive bead only where the glass ceramic material offers a sufficient overlap and the body flange offers sufficient space.

- The adhesive bead is not permitted in the window radii and in the cowl panel area

NOTE: Adhesive area for plastic adhesive tapes (1) must be free from grease and dust.

Stick two yellow plastic adhesive tapes (1) to roof at distance (A) from outside corners.

Length: 400 mm

A = 150 mm

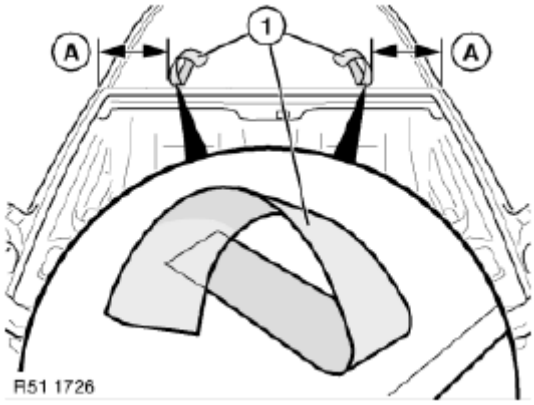


Fig. 108: Identifying Plastic Adhesive Tapes Position Onto Roof
Courtesy of BMW OF NORTH AMERICA, INC.

Gap dimensions

A = Centre rear window (2) to roof shell (1) laterally.

B = Rear window (2) to trim strip, convertible top compartment lid (3), see **GAP DIMENSIONS, BODY** .

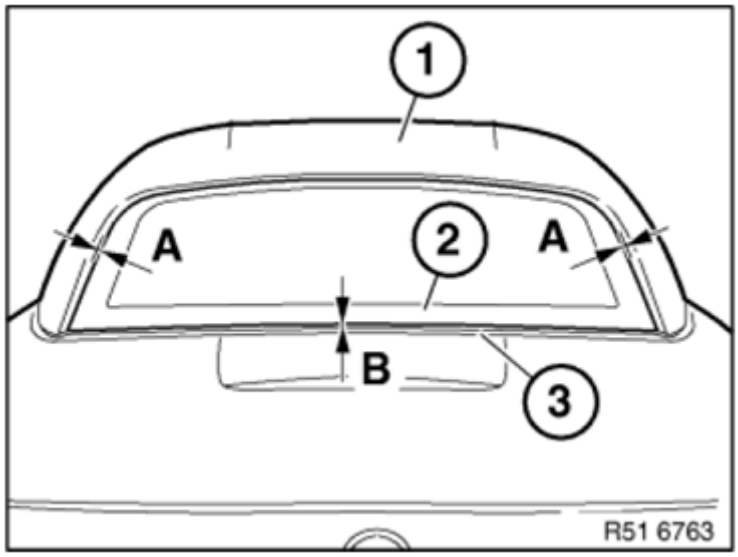


Fig. 109: Identifying Gap Dimension For Centre Rear Window To Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pre-tension on rear window

In order to avoid wind noises, rear window (1) must be lower than roof outer skin (2).

Position special tool 51 0 010 in middle of vehicle depending on measurement (A) and check underprotrusion of rear window (1).

A = 2 mm

X = measurement stages 1 ... 4 mm

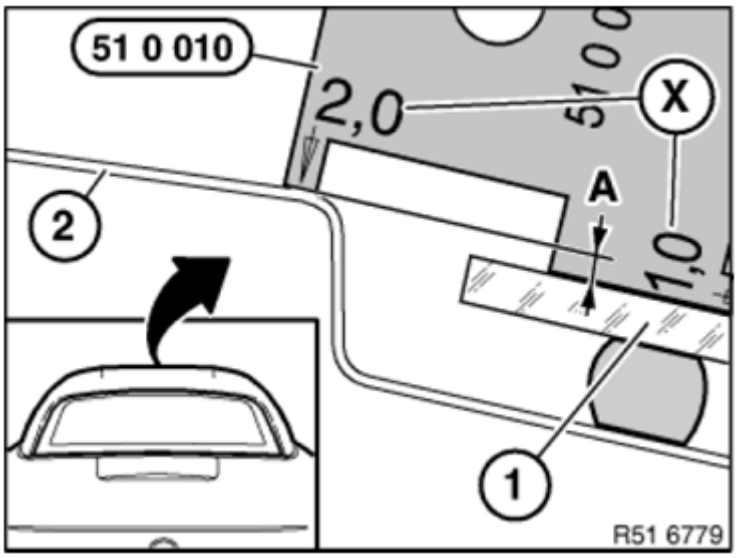


Fig. 110: Checking Pre-Tension On Rear Window Using Special Tool 51 0 010
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Underprotrusion dimension "A" is decreased by approx. 4 mm continuously from window centre to window edge on left and right.

54 37 225 REMOVING AND INSTALLING/REPLACING RIGHT CONVERTIBLE TOP COMPARTMENT LID HYDRAULIC CYLINDER

Necessary preliminary tasks

- Remove luggage compartment wheel arch trim See **5147161 REMOVING AND INSTALLING/REPLACING RIGHT LUGGAGE COMPARTMENT WHEEL ARCH TRIM** or **5147151 REMOVING AND INSTALLING/REPLACING LEFT LUGGAGE COMPARTMENT WHEEL ARCH PANEL** on left or right
- **REPAIR INSTRUCTIONS FOR HYDRAULIC SYSTEM** of Convertible top and Convertible top compartment lid

CAUTION: Hydraulic fluid may emerge from the disconnected lines and the open connections on the hydraulic cylinder.
Protect components and work area with suitable materials (e.g. cloths).

IMPORTANT: Convertible top compartment lid tilts closed when system is depressurized and must be supported with suitable apparatus.

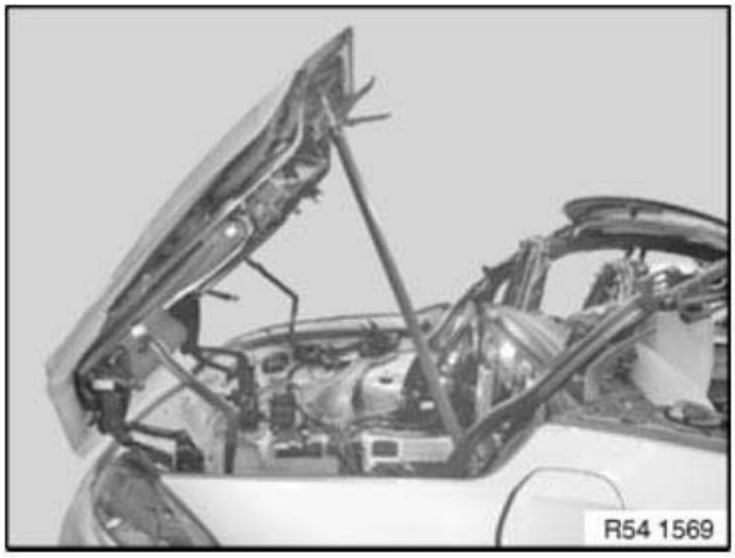


Fig. 111: Identifying Convertible Top Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Hydraulic system must be at zero pressure. Open screw on hydraulic unit 1.5 turns.

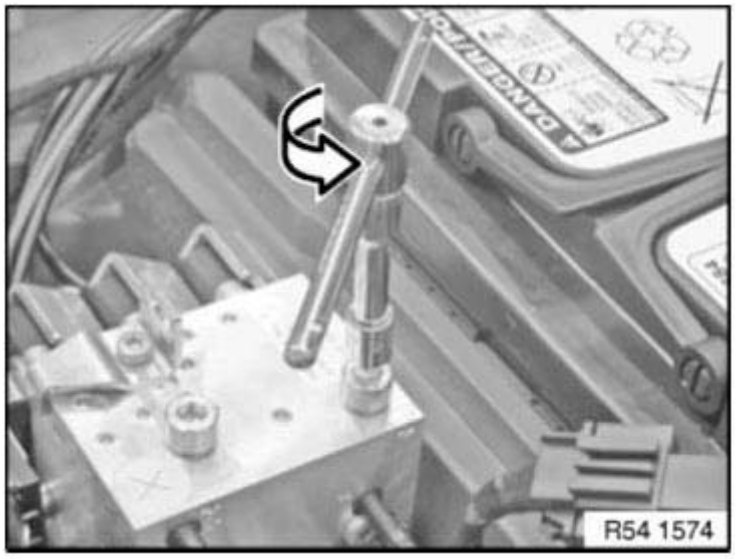


Fig. 112: Opening Screw On Hydraulic Unit
Courtesy of BMW OF NORTH AMERICA, INC.

1. Unlock retaining lug
2. Twist bearing pin downwards

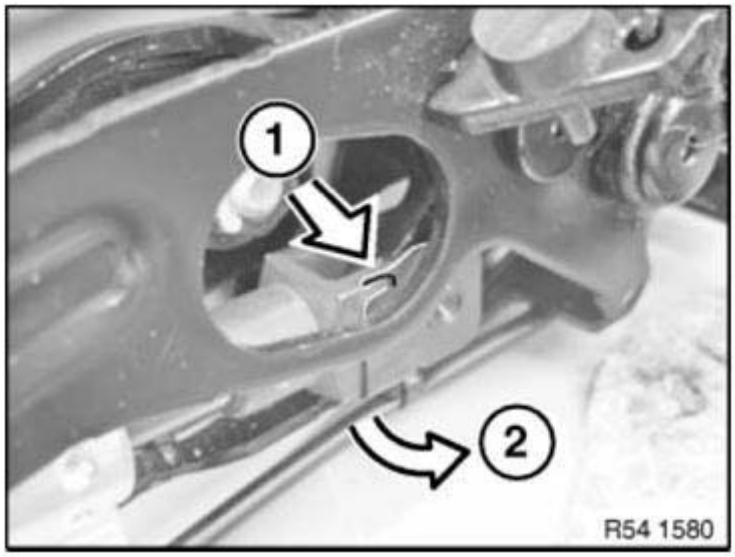


Fig. 113: Twisting Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing pin (1).

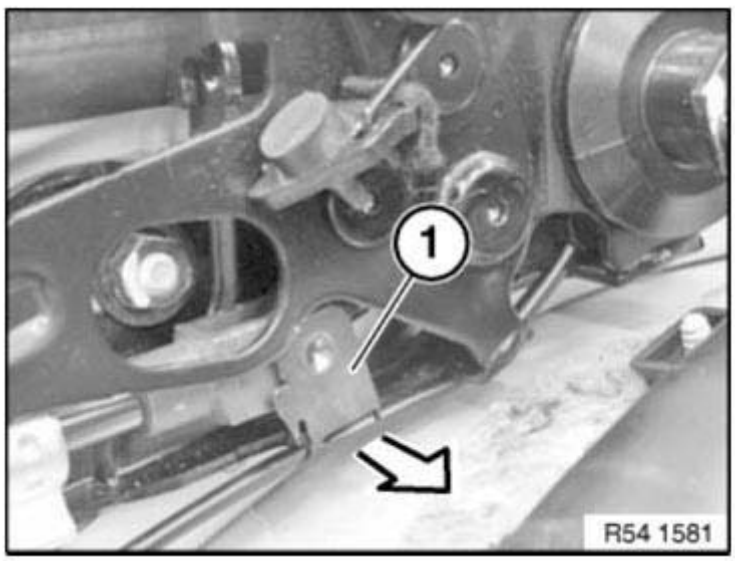


Fig. 114: Removing Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining clip (1) with a screwdriver.

Drive out pin (2) at side.

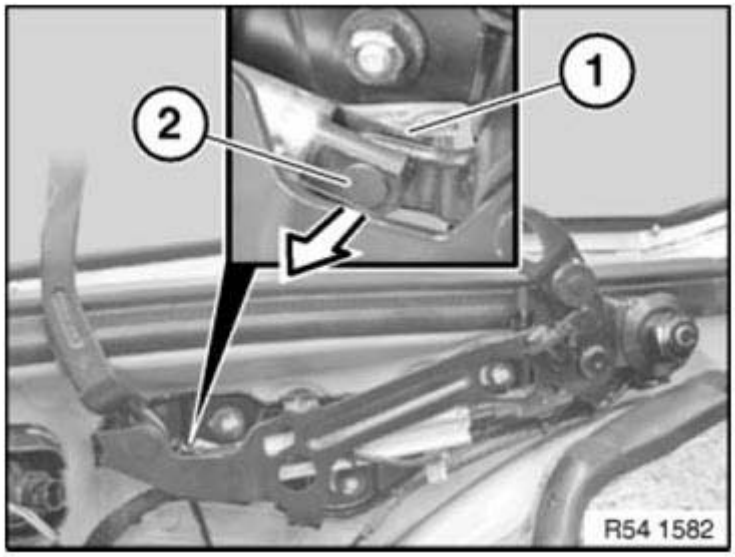


Fig. 115: Removing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out hydraulic cylinder (1).

Unfasten plug connection (2) and disconnect.

Right side only:

Unlock plug connection (3) for Hall sensor and disconnect.

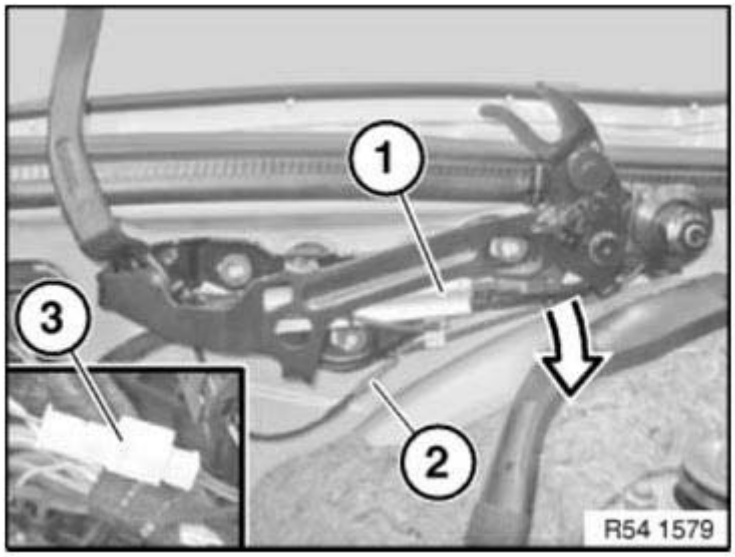


Fig. 116: Removing Hydraulic Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only:

IMPORTANT: Protect joints (lines and cylinder) against dripping fluid, e.g. with a cleaning cloth.

Detach cable tie.

Installation:

Replace faulty cable ties.

Slide open retaining rings (1) with screwdriver.

Detach hydraulic lines (2).

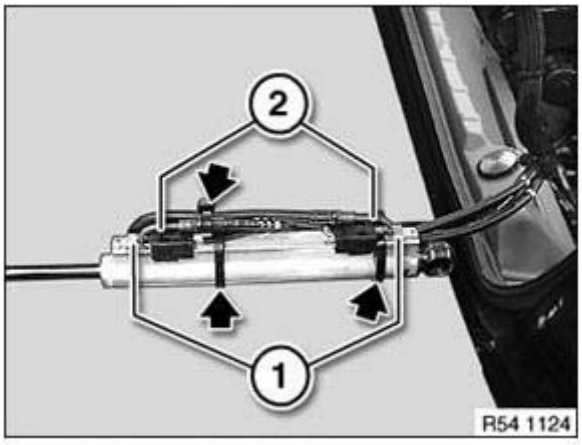


Fig. 117: Identifying Retaining Rings And Hydraulic Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Carry out operational check.
- Check **FLUID LEVEL** .

54 37 070 REMOVING AND INSTALLING/REPLACING ROOF SHELL AT FRONT

Necessary preliminary tasks

- Remove **ROOFLINER FOR ROOF SHELL AT FRONT**
- Front latch unlocked

NOTE: Removal of front roof shell must only be carried out when the rear roof shell is fitted.
Never remove the front and rear roof shell together.
An adjustment of the roof shell is specified in all directions and in this case is not possible.

Installation:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must not be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

Special tool 54 0 350 for mechanically tensioning convertible top when removing roof shell.

Insert and tension tightening hook (1) on left and right.

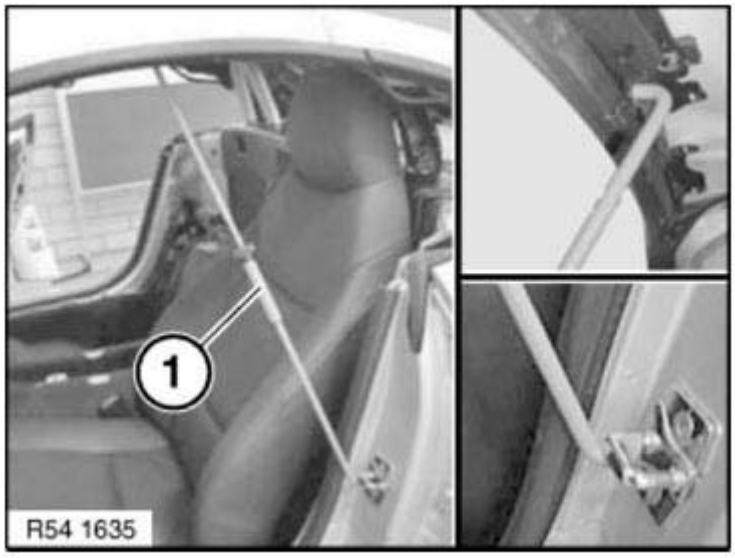


Fig. 118: Identifying Hook
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Cut open cable tie (2).

Unclip cable holder (3).

Installation:

Replace faulty cable ties and cable clips.

Feed wiring harness out of roof shell.

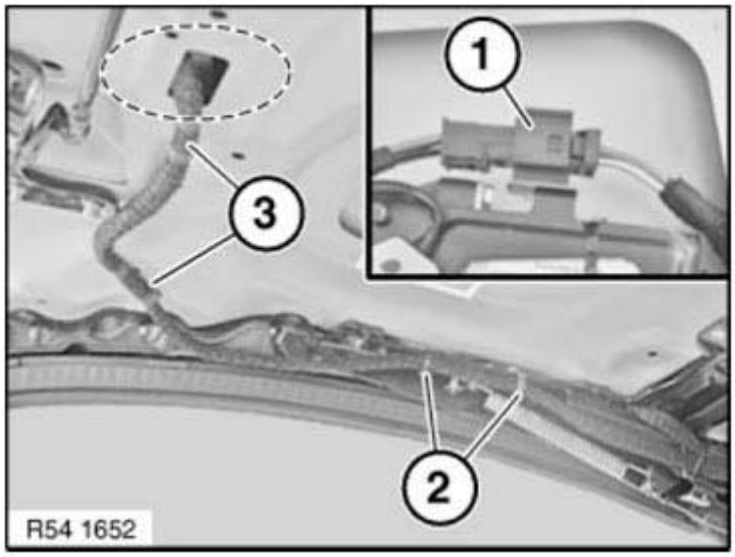


Fig. 119: Identifying Plug Connection, Cable Tie And Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Count and note the number of washers for height specification.

Release Torx screws (1).

Installation:

Replace Torx screws and insert with Loctite.

Tightening torque **54 37 11AZ** .

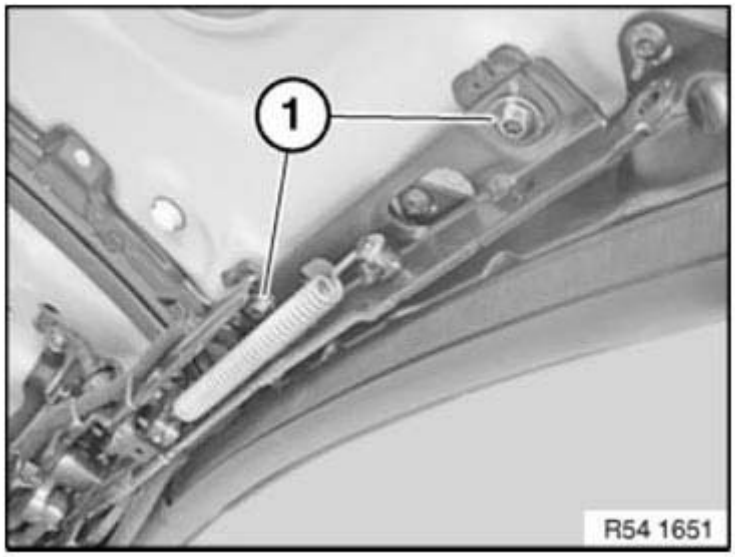


Fig. 120: Identifying Torx Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only

- Remove **FRONT LATCH**
- Remove **LATCH MOTOR**
- Remove **SEAL**

Release Torx screws (1).

Installation:

Replace Torx screws and insert with Loctite.

Tightening torque **54 37 13AZ** .

Remove seal mount.

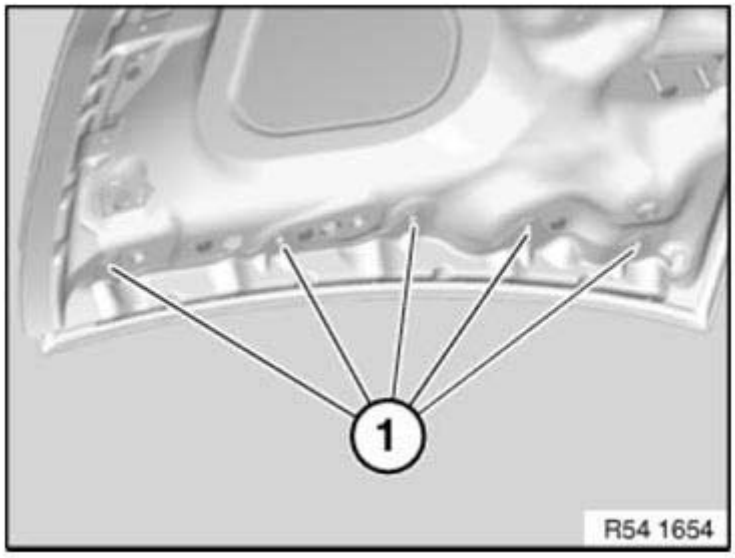


Fig. 121: Identifying Torx Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Drill out rivets (1).

Remove seal mount.

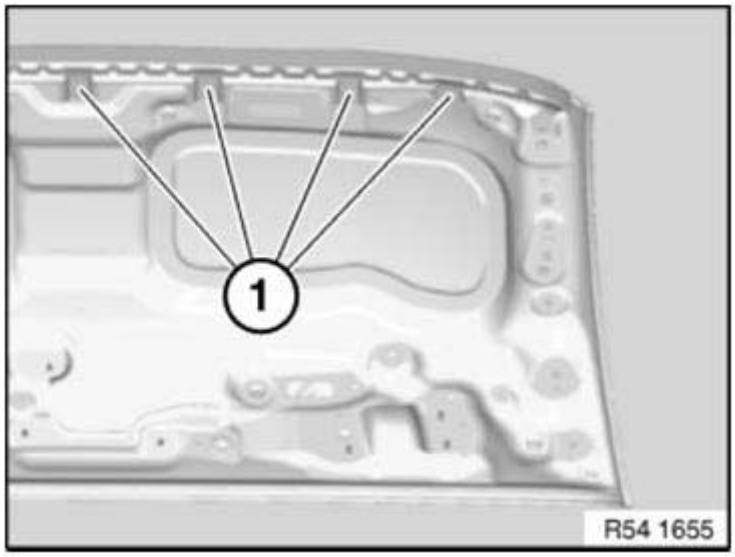


Fig. 122: Identifying Seal Mount Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check **GAP DIMENSIONS** for convertible top.

54 37 080 REMOVING AND INSTALLING/REPLACING ROOF SHELL AT REAR

Necessary preliminary tasks

- Remove **ROOFLINER FOR ROOF SHELL AT REAR**

NOTE: Removal of rear roof shell must only be carried out when the front roof shell is fitted.
Never remove the rear and front roof shell together.
An adjustment of the roof shell is specified in all directions and in this case is not possible.

Installation:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must **not** be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

Move rear roof shell (1) over front roof shell.

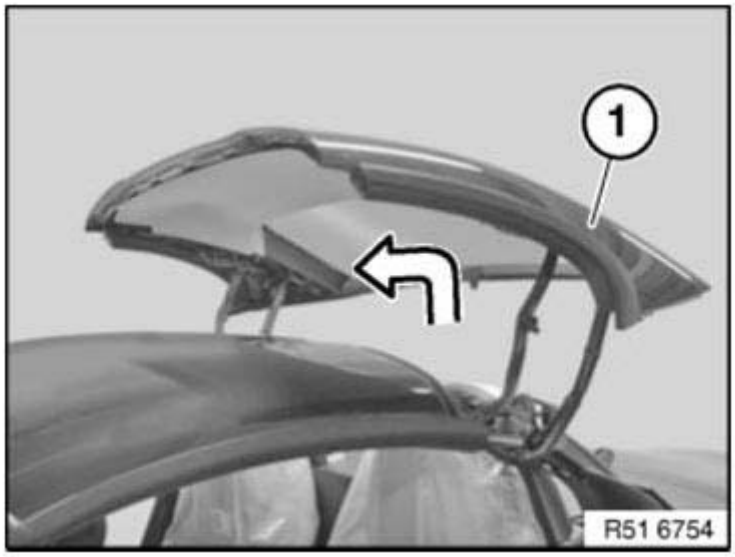


Fig. 123: Moving Rear Roof Shell Over Front Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Secure rear roof shell against sinking.

Insert auxiliary tool on left and right in bore hole (2) of convertible top frame (1).

Roof shell is blocked when hydraulic system is depressurized.

IMPORTANT: Remove auxiliary tool again without fail before moving roof. Risk of damage!

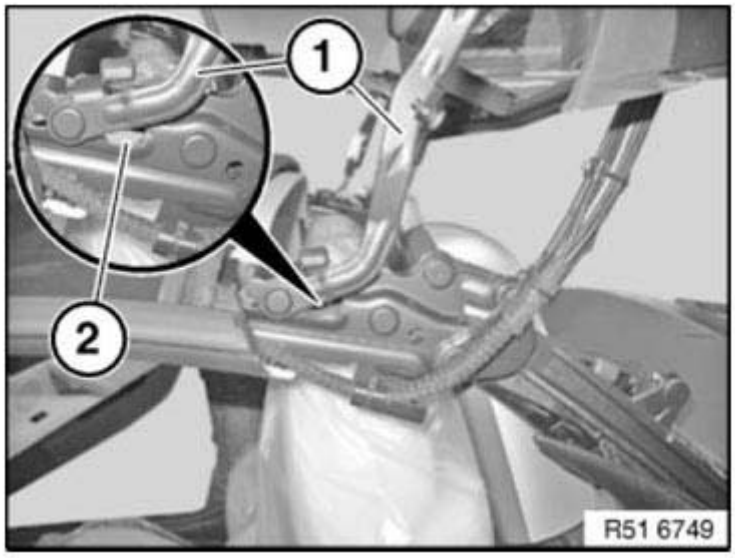


Fig. 124: Identifying Bore Hole Of Convertible Top Frame
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Count and note the number of washers for height specification.

Release Torx screws (1) on left and right.

Installation:

Replace Torx screws.

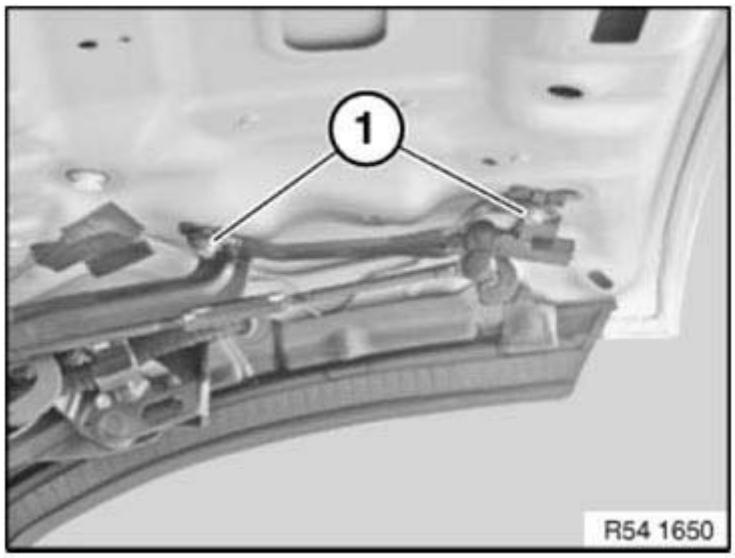


Fig. 125: Identifying Washer Torx Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Count and note the number of washers.

Release Torx screws (1) on left and right.

Installation:

Replace Torx screws.

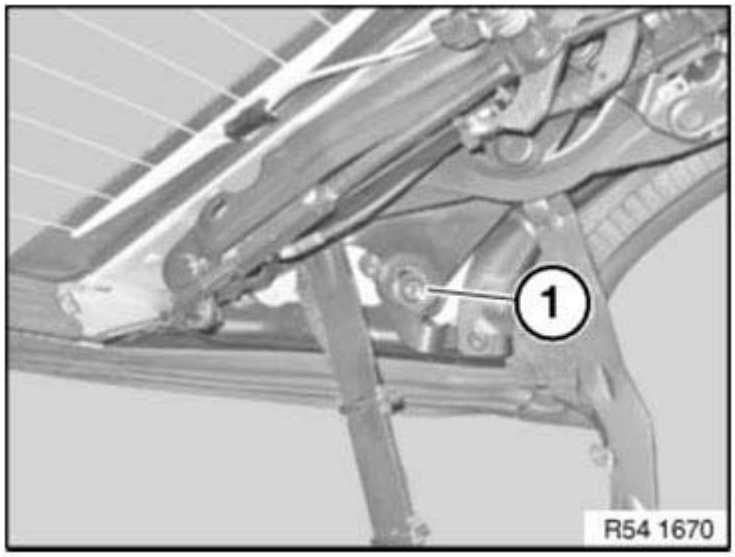


Fig. 126: Identifying Washer Torx Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install and adjust roof shell without fin.

Release screws (1).

Remove fin.

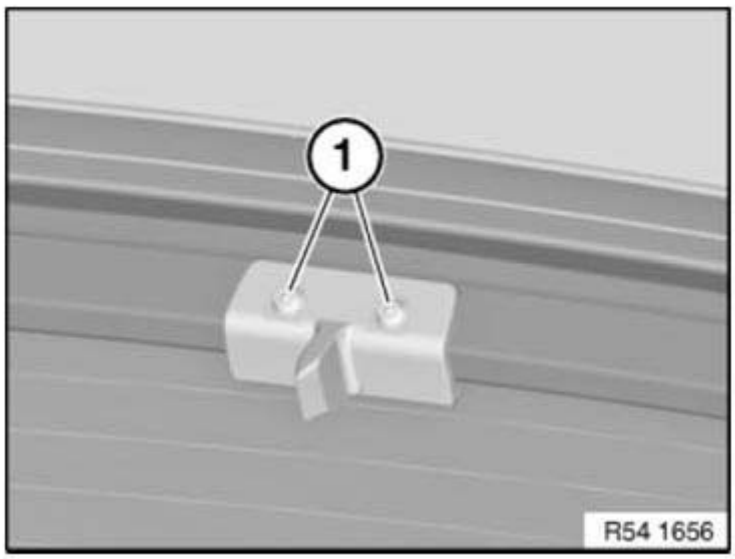


Fig. 127: Identifying Fin Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Observe installation sequence:

Screw on roof shell slack, roof shell must just still be able to be moved.

Close convertible top.

Align roof shell and check **GAP DIMENSION** .

Screw down front Torx screw (1).

Tightening torque **54 37 11AZ** .

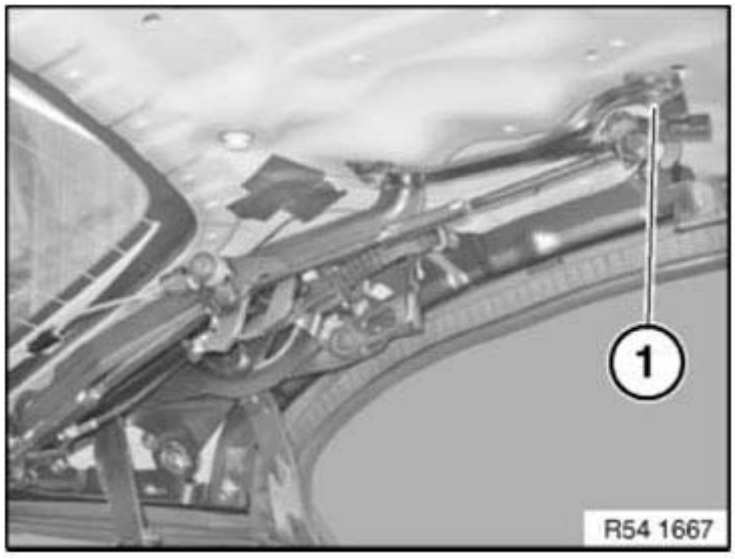


Fig. 128: Identifying Roof Shell Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Screw down Torx screw (1).

Tightening torque **54 37 11AZ** .

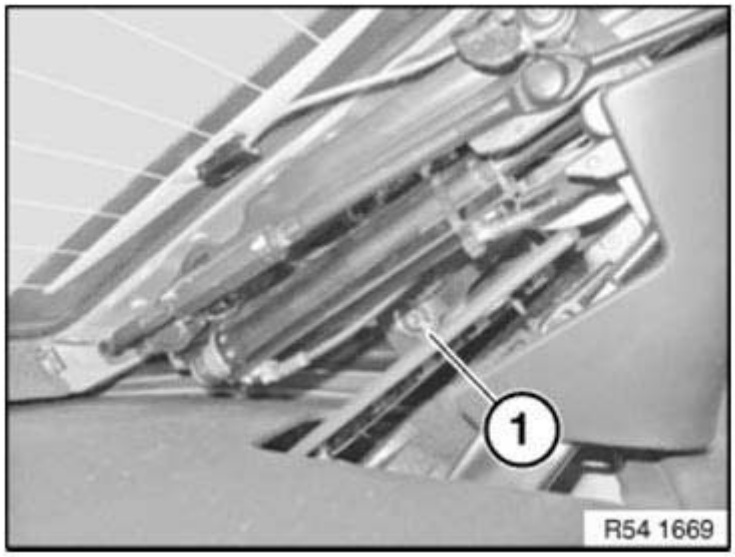


Fig. 129: Identifying Roof Shell Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Open convertible top.

Screw down rear Torx screw (1).

Tightening torque **54 37 11AZ** .

Install fin.

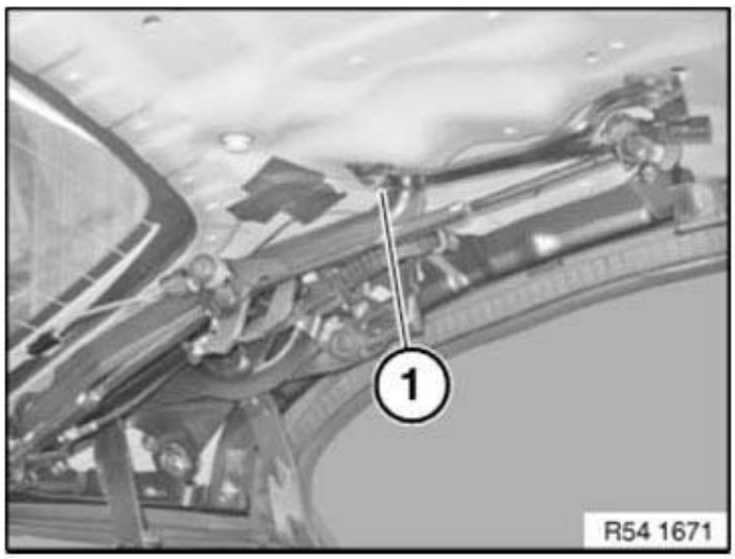


Fig. 130: Identifying Fin Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement only

- Modify **REAR WINDOW**
- Modify **SEAL**

Release screws (1).

Tightening torque **54 37 13AZ** .

Remove seal holder.

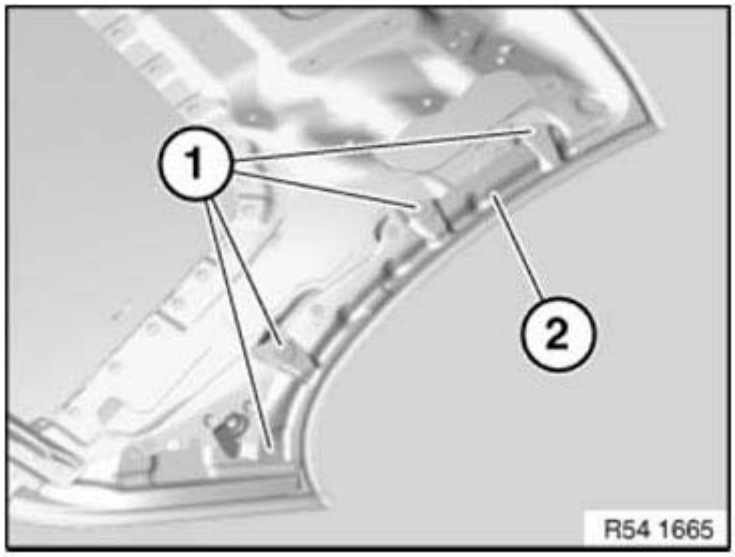


Fig. 131: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **54 37 13AZ** .

Remove seal holder.

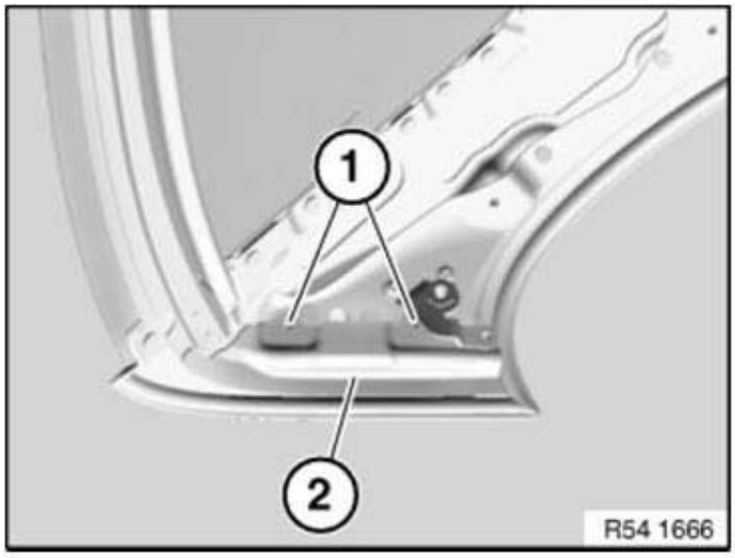


Fig. 132: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Attach Teflon tape (1) in front area of roof shell.

A. 25 mm

Installation:

Clean adhesive area with spirit.

Air drying time: > or = 2 minute

IMPORTANT: Adhesive area must be dry and free from dust and grease.
Once it has been cleaned, do not touch the adhesive area with bare hands.

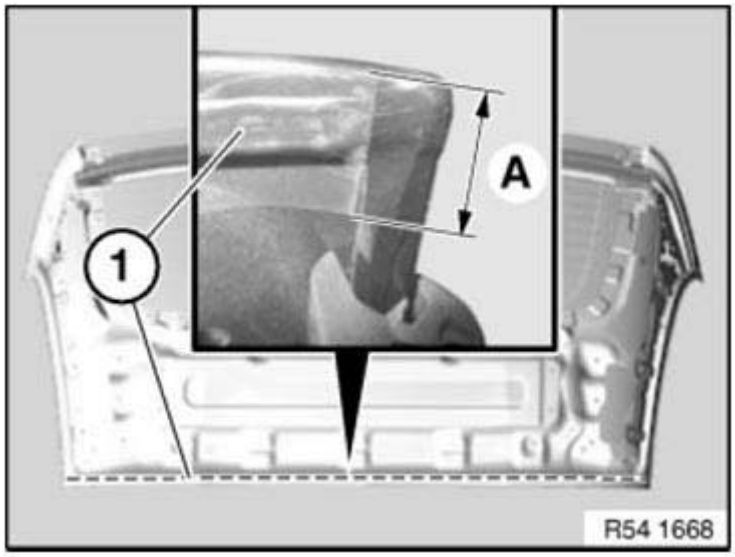


Fig. 133: Identifying Teflon Tape On Front Area Of Roof Shell Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

54 37 035 REMOVING AND INSTALLING/REPLACING ROOFLINER FOR ROOF SHELL AT FRONT

Necessary preliminary tasks

- Open convertible top

Unclip roofliner in front area (1) with special tool 51 0 310.

Unclip roofliner at rear.

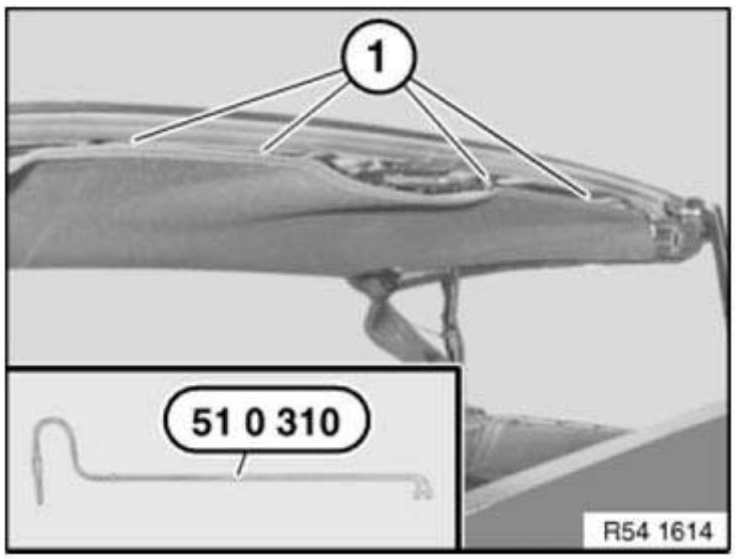


Fig. 134: Removing Roofliner On Front Area Using Special Tool 51 0 310

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pre-install clips on roofliner (1).

If necessary, replace faulty clips (1).

After installing fold out roofliner seal.

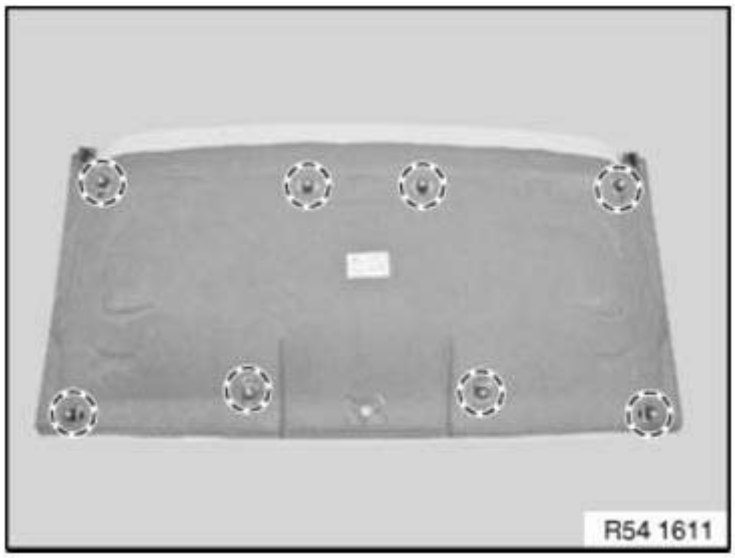


Fig. 135: Identifying Clips On Roofliner
Courtesy of BMW OF NORTH AMERICA, INC.

54 37 045 REMOVING AND INSTALLING/REPLACING ROOFLINER FOR ROOF SHELL AT REAR

Open convertible top until rear roofliner is accessible.

1. Unclip roofliner from roof shell.
2. Remove roofliner from roof shell.

Installation:

Thread in roofliner first in marked area.

Check roofliner for correct seating.

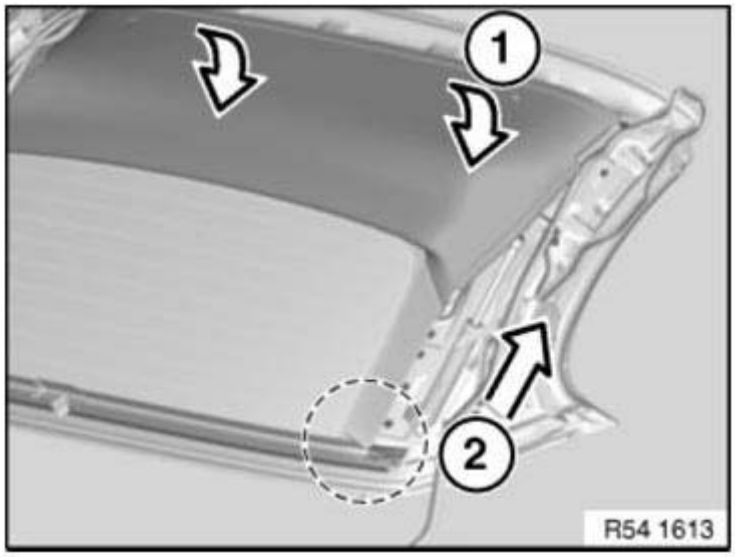


Fig. 136: Removing Roofliner From Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pre-install clips on roofliner.

After installing fold out roofliner seal.

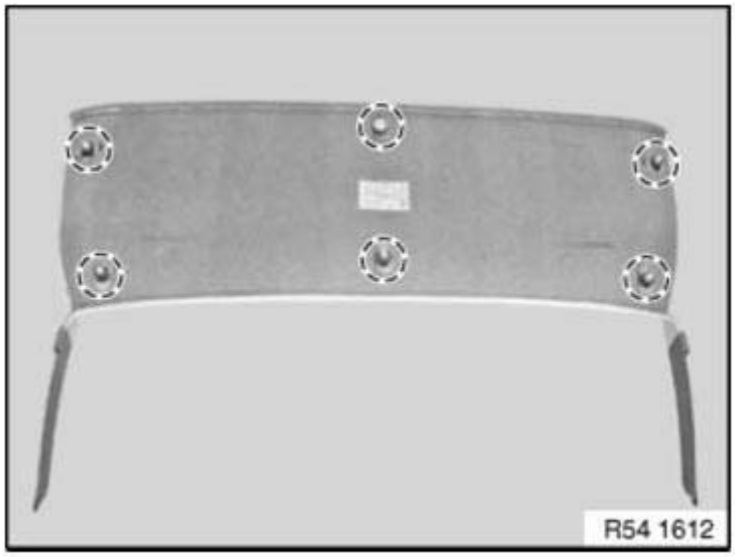


Fig. 137: Identifying Clips On Roofliner
Courtesy of BMW OF NORTH AMERICA, INC.

54 37 160 REMOVING REAR MODULE

Necessary preliminary tasks

- Connect battery charger
- Remove **LOADING SILL END COVER**
- Remove **TRIM FROM REAR APRON**

Open convertible top compartment lid.

IMPORTANT: Convertible top compartment lid may tilt forwards and must be supported with suitable apparatus.

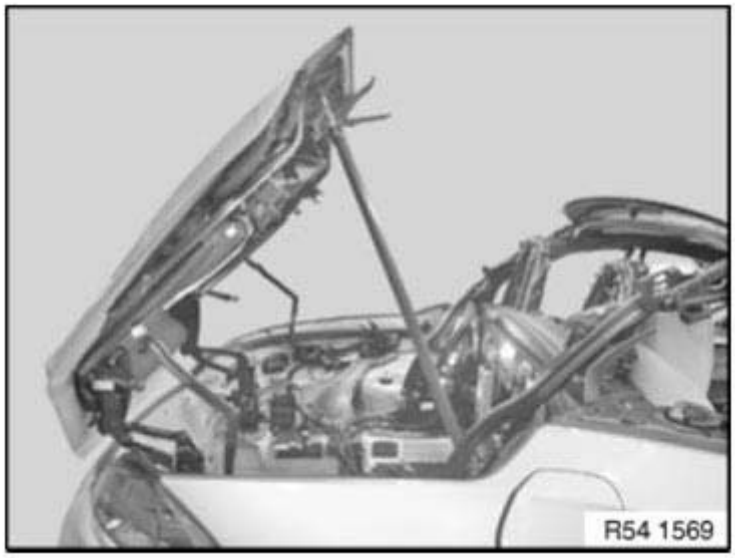


Fig. 138: Opening Convertible Top Compartment Lid
Courtesy of BMW OF NORTH AMERICA, INC.

Generously cover bumper area (loading sill) with protective covers (1).

Fig. 139: Cover Bumper Area (Loading Sill) With Protective Covers
Courtesy of BMW OF NORTH AMERICA, INC.

Measure distance A between rear module kinematics.

Installation:

Adjust distance A.

Basic adjustment dimension e.g. for replacement:

A = 770.3 mm.

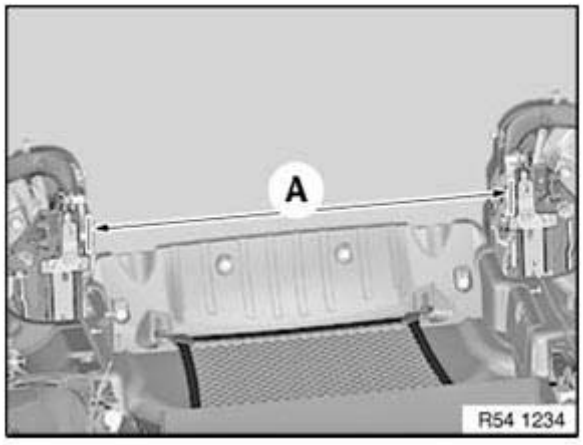


Fig. 140: Adjusting Distance Between Rear Module Kinematics
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Rear lid must be closed.

Unlock and disconnect plug connection (1) on right main bearing.

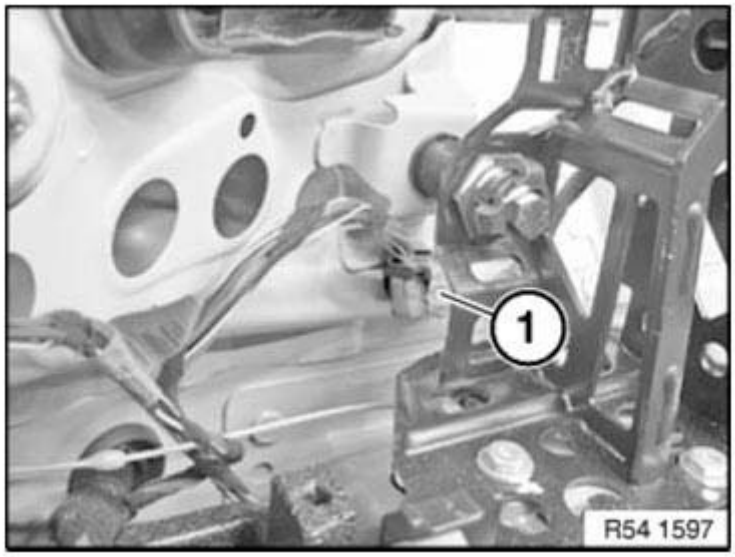


Fig. 141: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Connect special tool 61 4 250 to vehicle-side plug for rear module.

NOTE: Adapter simulates closed rear lid. Retractable hardtop without rear lid not in working order.

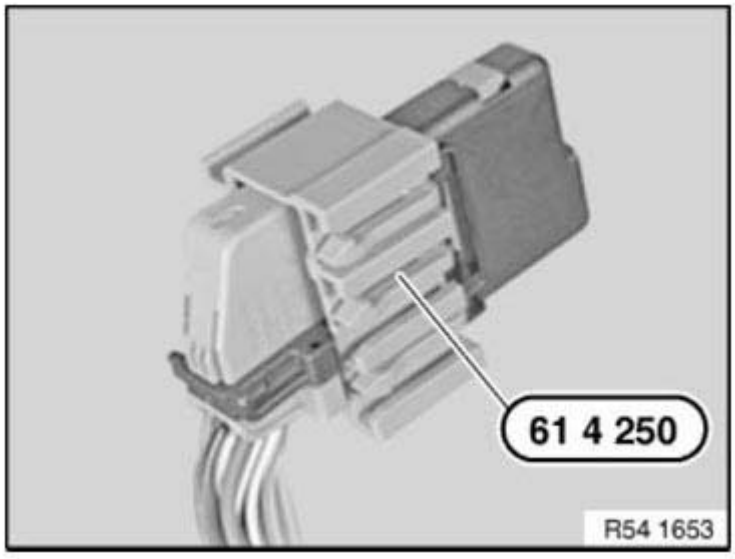


Fig. 142: Identifying Special Tool 61 4 250 To Vehicle-Side Plug For Rear Module
Courtesy of BMW OF NORTH AMERICA, INC.

Release left and right screws (1).

Tightening torque **54 34 1AZ** .

NOTE: Do not adjust barrel screws.

Replacement only:

Bring barrel screws into contact with special tool 54 0 180 in conjunction with special tool 00 9 450 .

Tightening torque **54 34 10AZ** .

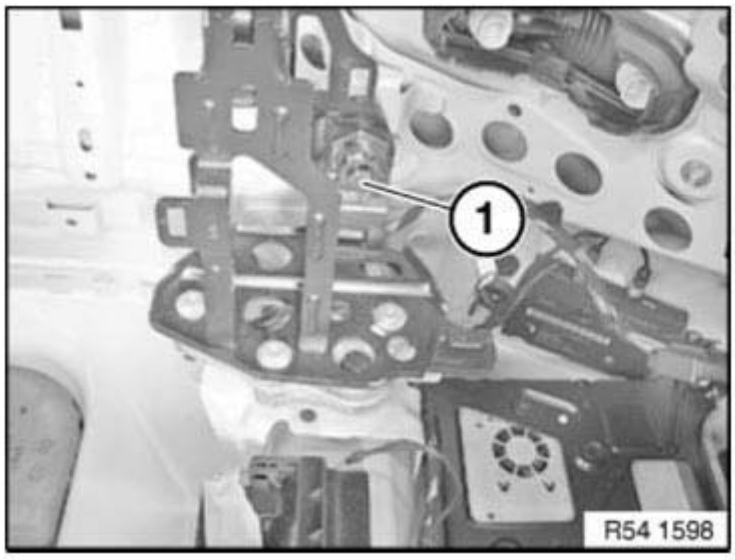


Fig. 143: Identifying Barrel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Before removing, mark position of screws (1) to ensure correct alignment during installation.

Do **not** release screws.

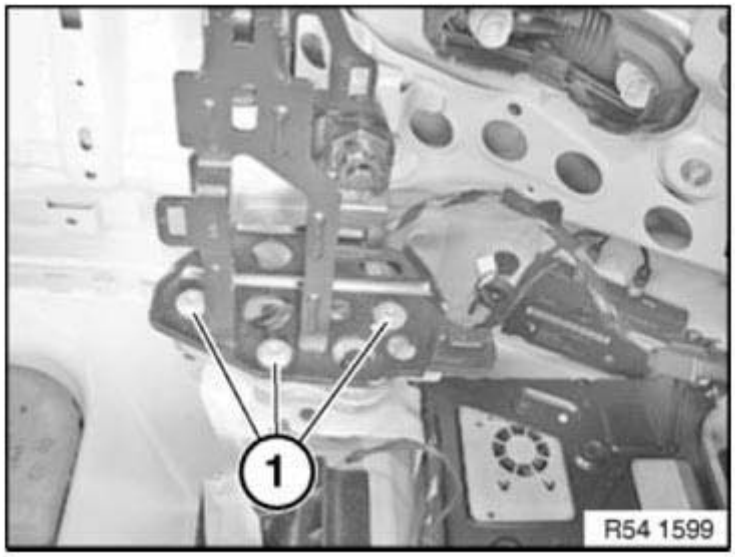


Fig. 144: Identifying Barrel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Proceed with the greatest possible caution when carrying out the following tasks.
Risk of damage!
Two persons are essential for helping to carry out the following tasks.

IMPORTANT: Rear module sinks if incorrectly supported. Risk of damage!

Position a helper on both the left and right sides of the rear module.

Grip rear module with two hands on rear module kinematic assembly and support in Z-direction.

NOTE: Bracket is double-jointed and bends.

Fig. 145: Positioning Helper On Both Sides Of Rear Module
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach retainers (1) on left and right.

Drive out pin.

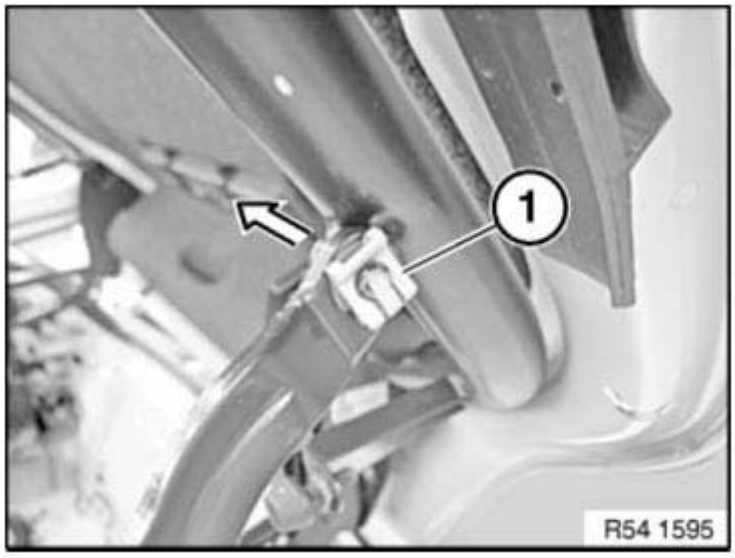


Fig. 146: Disconnecting Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on left and right from bearing support.

Tightening torque **54 34 13AZ** .

Remove rear module.

Set down rear module on a suitable surface.

IMPORTANT: Do not damage any surrounding parts.

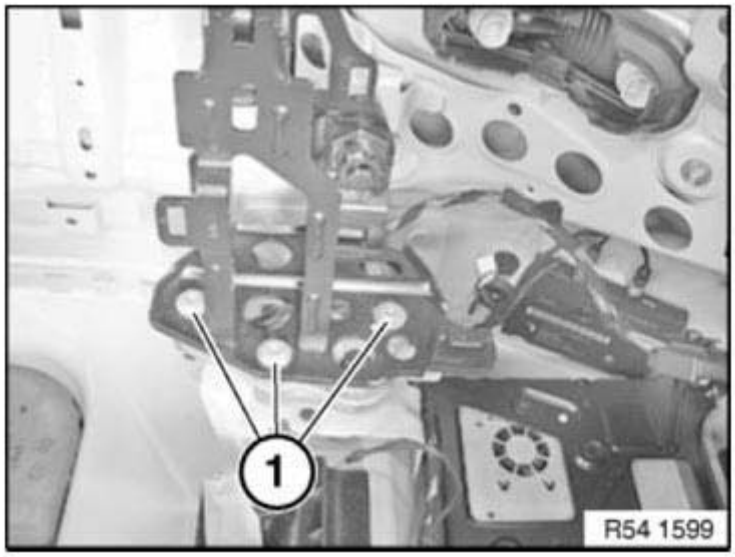


Fig. 147: Identifying Bearing Support Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check **GAP DIMENSIONS** and if necessary adjust

Carry out diagnosis.

54 37 005 REPLACING FRONT ROOF SHELL SEAL

Necessary preliminary tasks

- Remove **ROOF LINING**
- Partially open convertible top

Remove seal (1).

Installation:

Slide seal flush onto windscreen frame seal.

Make sure seal (1) is **SECURELY MOUNTED** on seal carrier.

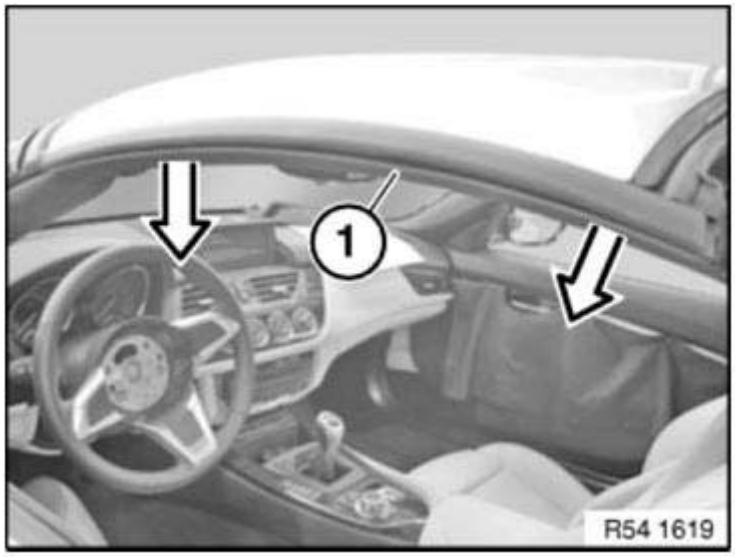


Fig. 148: Removing Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Sealing lip on windscreen frame seal must not be distorted when roof shell seal retracts.

If the sealing lip is distorted, the roof shell seal must be pushed further forwards.

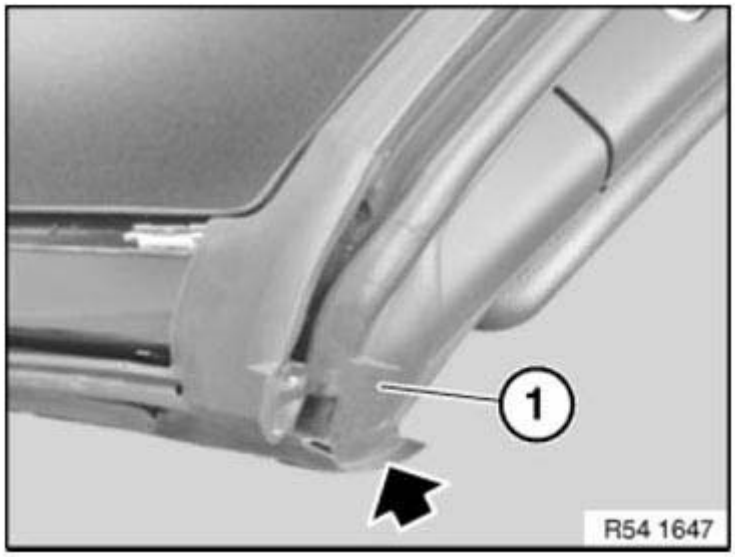


Fig. 149: Identifying Windscreen Frame Seal
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Count and make a note of washers.

Release left and right screws (1).

Installation:

Adjust gap dimension, seal carrier to roof shell.

= 2 mm ±1 mm

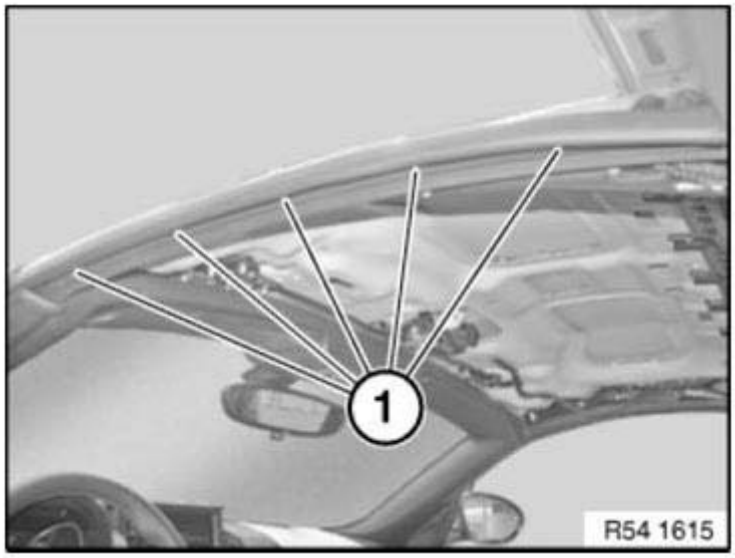


Fig. 150: Identifying Roof Shell Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before installing the seal carrier, fit a butyl pad (1) and a butyl ball (2) at the front corners of the roof shell.

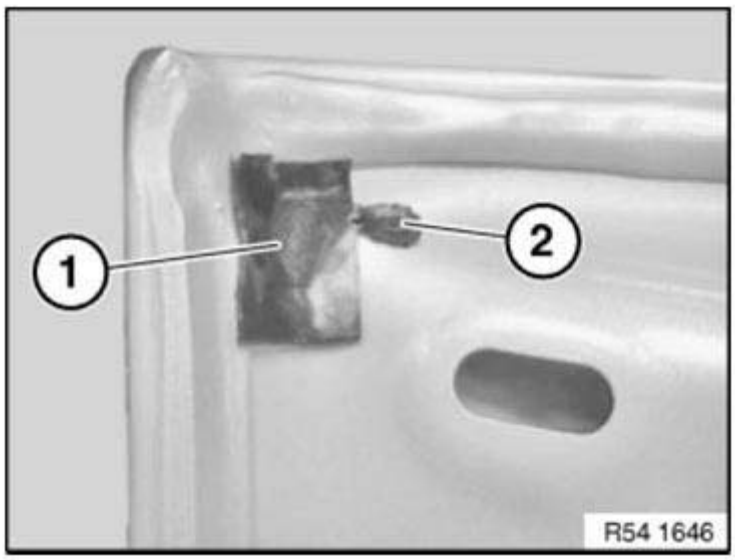


Fig. 151: Identifying Butyl Pad And Butyl Ball Of Roof Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Grease contact points of seal carrier and cowl panel seal with Vaseline.

Slide seal carrier (1) fully onto cowl panel seal and screw down.

Tightening torque **54 37 14AZ** .

If necessary, **ADJUST** windscreen frame seal to roof shell seal.

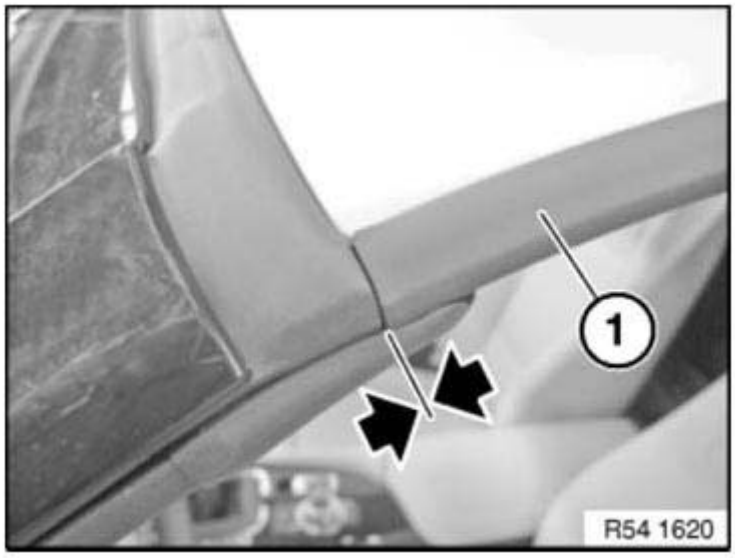


Fig. 152: Identifying Seal Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Detach seal (1) from seal carrier.

Installation:

Cleanly push on seal from rear, starting on left and right, into corners.

Push on seal in one operation, as sealing lip may kink.

Check kink-free position of sealing lip between roof shell and seal carrier using a torch.

If necessary, repeat procedure.

Make sure seal (1) is **SECURELY MOUNTED** on seal carrier.

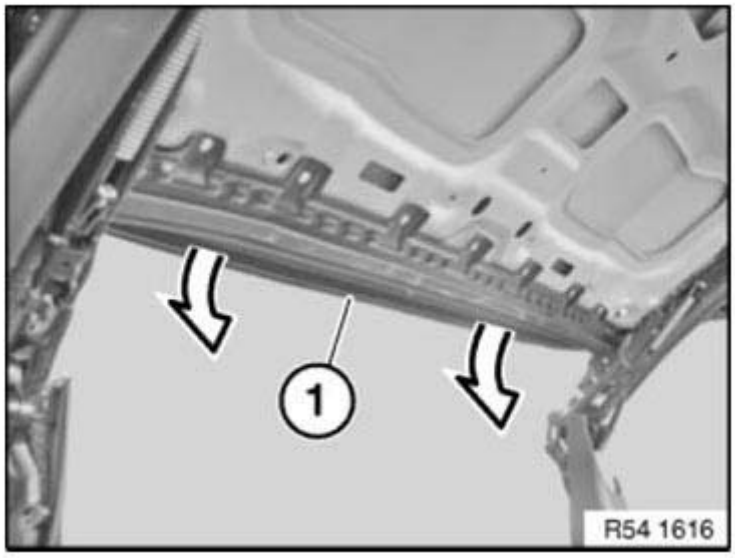


Fig. 153: Disconnecting Seal From Seal Chamber
Courtesy of BMW OF NORTH AMERICA, INC.

Check retraction depth of windows and **ADJUST** if necessary.

If necessary, adapt number of washers.

54 37 024 REPLACING REAR ROOF SHELL SEAL

Necessary preliminary tasks

- Partially open convertible top

Remove seal (1).

Installation:

Slide seal flush onto front roof shell seal.

Make sure seal (1) is **SECURELY MOUNTED** on seal carrier.

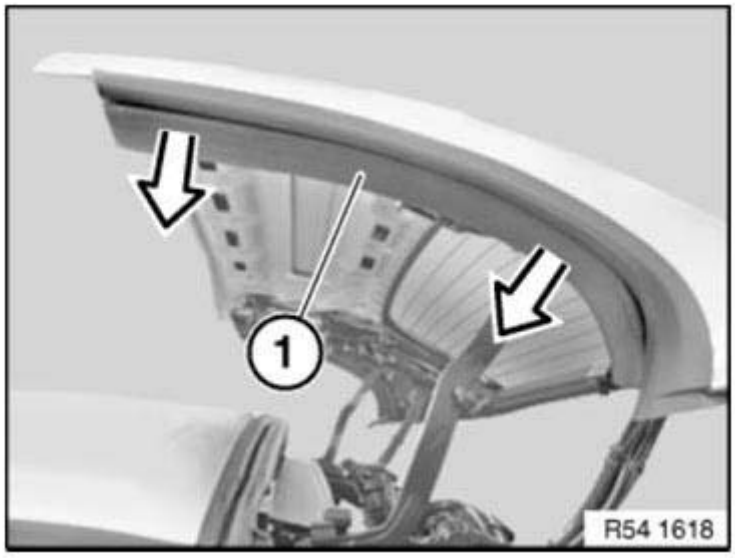


Fig. 154: Removing Seal
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Count and make a note of washers.

Release left and right screws (1).

Installation:

Adjust gap dimension, seal carrier to roof shell.

If necessary, adapt number of washers.

= 2 mm ±1 mm

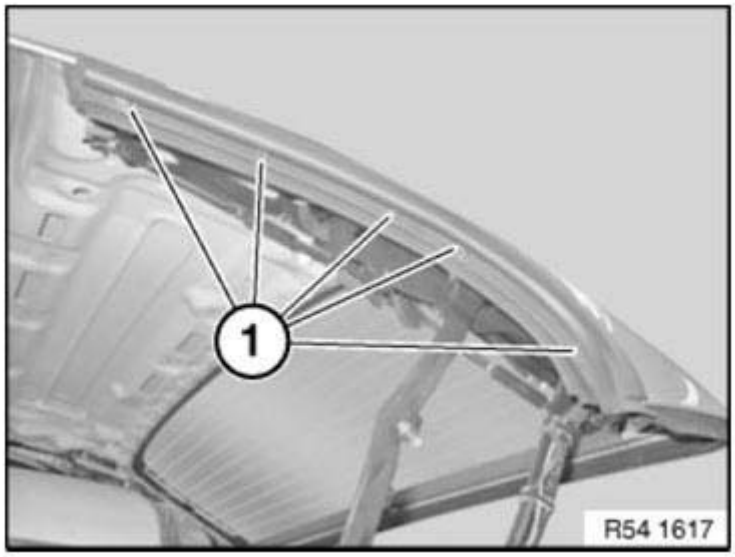


Fig. 155: Identifying Roof Shell Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Grease contact points of seal carriers with Vaseline.

Slide seal carrier (1) fully onto front roof shell seal and screw down.

If necessary, **ADJUST** seal carrier, front roof shell.

Tightening torque **54 37 14AZ** .

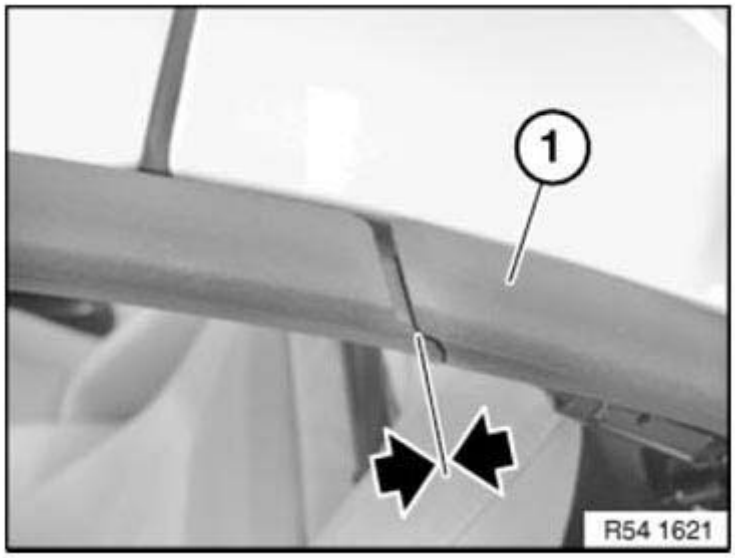


Fig. 156: Identifying Seal Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Detach seal (1) from seal carrier.

Installation:

Make sure seal (1) is correctly seated on seal carrier.

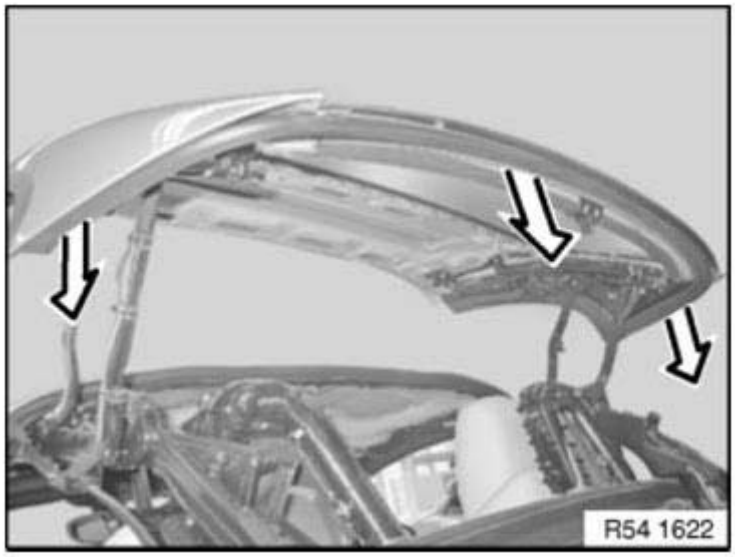


Fig. 157: Disconnecting Seal From Seal Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Check retraction depth of windows and adjust See **5137154 ADJUSTING REAR LEFT OR RIGHT SIDE WINDOW** or **5132154 ADJUSTING LEFT OR RIGHT FRONT DOOR WINDOW GLASS** if necessary.

54 SLIDE/TILT SUNROOF AND CONVERTIBLE TOP

54-0300 ADAPTER PLATE

Adapter plate MW

NOTE: 54 0 100 omitted starting 11/2009

SI number

01 09 09 (532)

Consisting of:

1 = 0496691 Adapter

NOTE: Adapter, left

2 = 0496692 Adapter

NOTE: Adapter, right

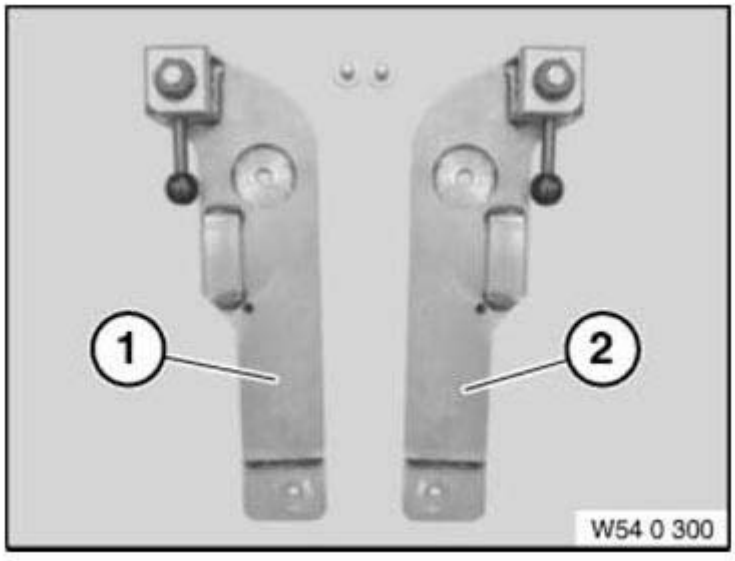


Fig. 1: Identifying Adapter Plate (540300)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0070 BELT

Belt MW

NOTE: Replaces 540103 effective 11/2009

SI number

01 30 09 (602)

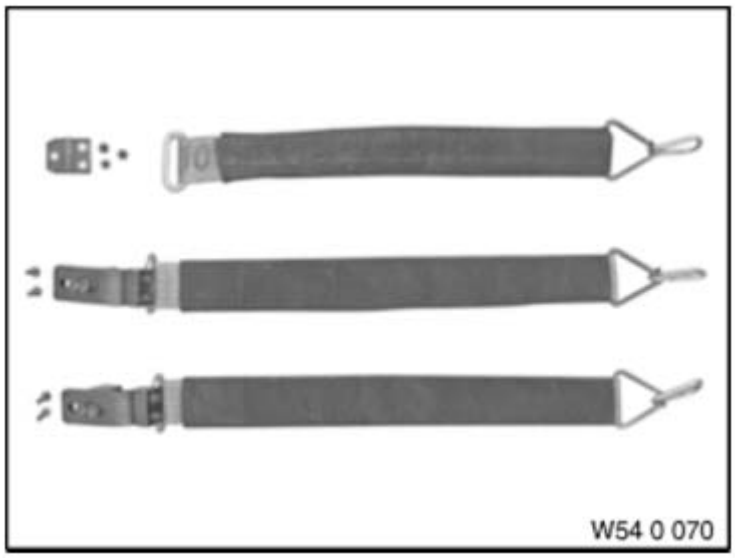


Fig. 2: Identifying Belt (540070)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0180 BIT

Bit MW

NOTE: For adjusting barrel screws (adjusting elements) on the RHT.

SI number

01 03 07 (337)

Fig. 3: Identifying Bit (540180)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0190 BIT

Bit MW

NOTE: For lock nuts on barrel screws (WAF 30) on the retractable hardtop (RHT)

SI number

01 03 07 (337)

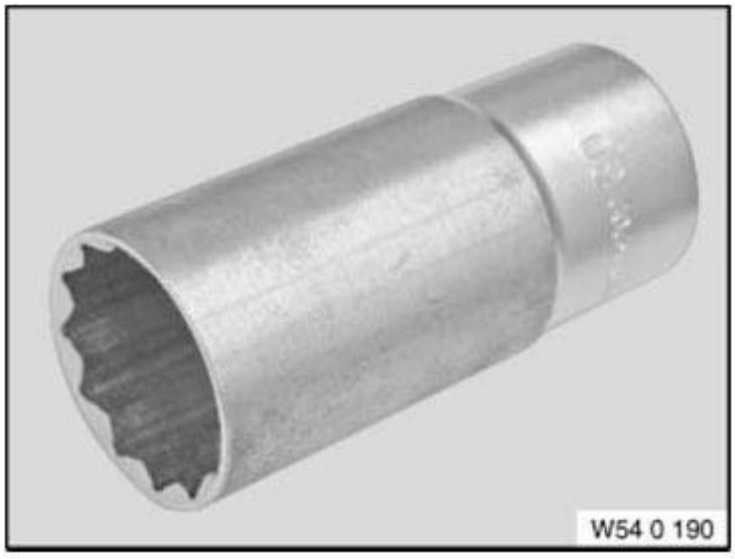


Fig. 4: Identifying Bit (540190)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0250 FITTING AID

Fitting aid MW

SI number

01 13 10 (652)

Fig. 5: Identifying Fitting Aid (540250)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0060 FIXTURE

Fixture MW

NOTE: Replaces 540101 effective 11/2009

SI number

01 30 09 (602)

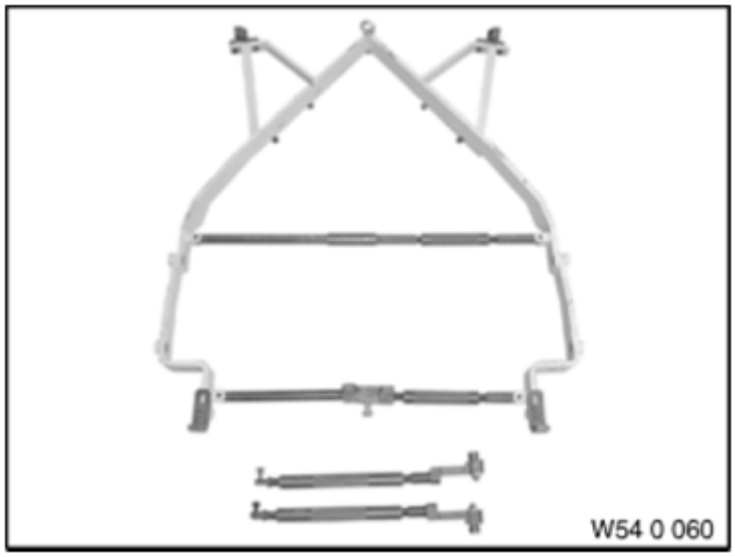


Fig. 6: Identifying Fixture (540060)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0050 LIFTING GEAR

Lifting gear MW

NOTE: Replaces 540102 effective 11/2009

SI number

01 30 09 (602)

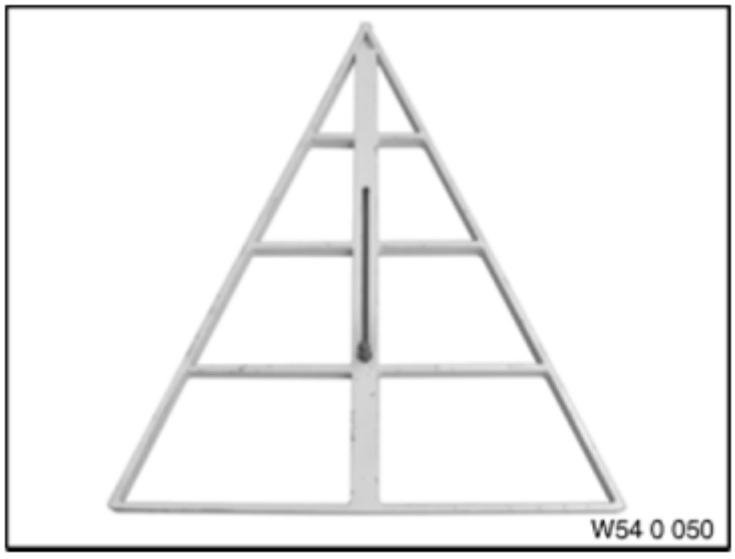


Fig. 7: Identifying Lifting Gear (540050)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0160 TOOL

Tool MW

NOTE: (Emergency closing/opening (3 tools)) For manual opening or closing of hardtop in the event of a technical defect.

SI number

01 03 07 (337)

Consisting of:

3 = 0496075 Adapter

1 = 0496051 Tool

NOTE: (Slide tool)

2 = 0496052 Tool

NOTE: (Pulling tool)

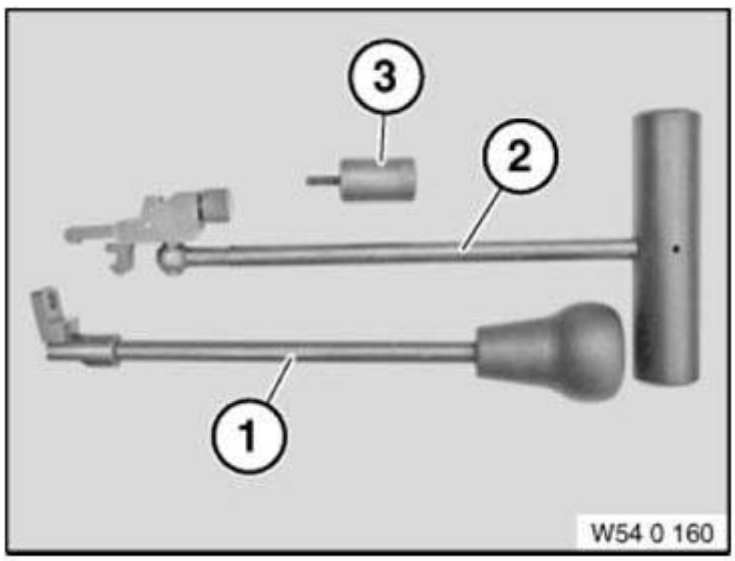


Fig. 8: Identifying Tool (540160)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0330 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: For unlocking soft top

Storage Location

C26

B26

A26

SI number

01 09 09 (532)

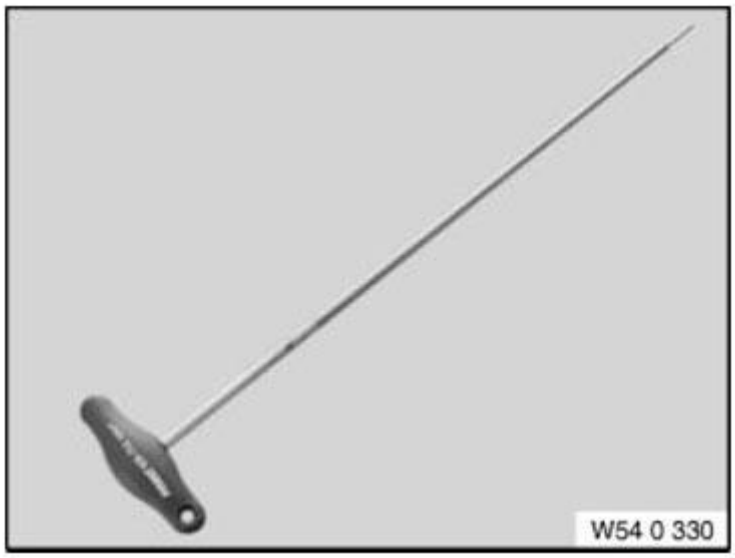


Fig. 9: Identifying Tool (540330)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0350 TOOL

Tool MW

NOTE: (clamping hook) Delivery specification 2 pieces

Storage Location

C26

A26

B26

SI number

01 09 09 (532)

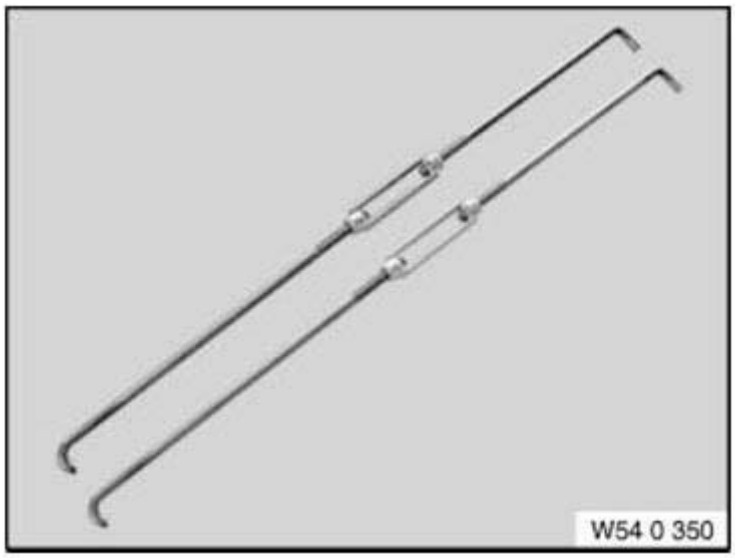


Fig. 10: Identifying Tool (540350)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0320 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: For locking soft top

Storage Location

B26

C26

SI number

01 09 09 (532)

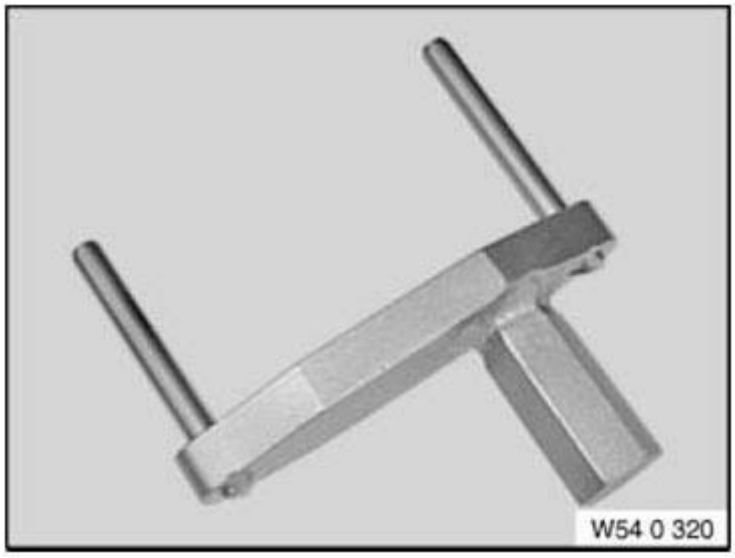


Fig. 11: Identifying Tool (540320)
Courtesy of BMW OF NORTH AMERICA, INC.

54-1240 TOOL

Tool MW

NOTE: (Tool set) For adjusting the slide/tilt sunroof

Consisting of:

1 = 0494795 Key

NOTE: Special Torx for tightening the slide/tilt sunroof screws

2 = 0494796 Template

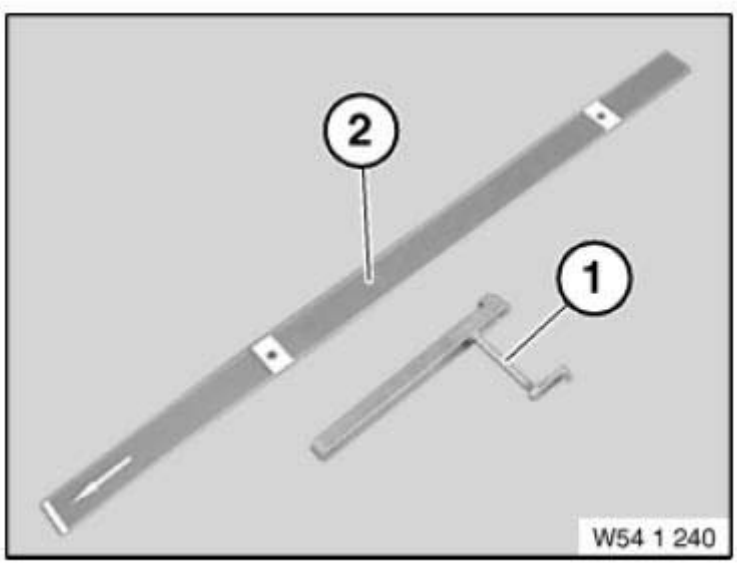


Fig. 12: Identifying Tool (541240)
Courtesy of BMW OF NORTH AMERICA, INC.

54-0210 TOOL

Tool MW

NOTE: (Clamping tool) For removal and installation of gas-filled shock absorbers on hardtop.

SI number

01 21 09 (583)

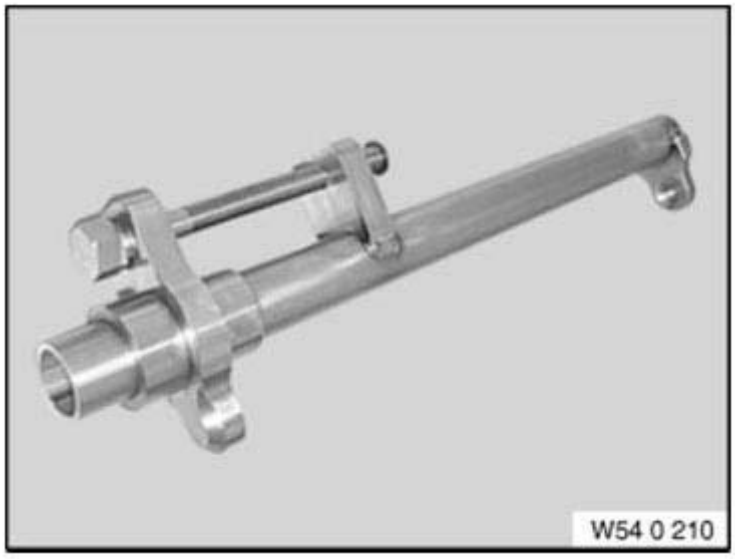


Fig. 13: Identifying Tool (540210)
Courtesy of BMW OF NORTH AMERICA, INC.

61-4250 CONNECTOR

Connector Minimum set: Measuring and testing equipment MP

NOTE: as intermediary contact on soft top

SI number

02 05 09 (549)

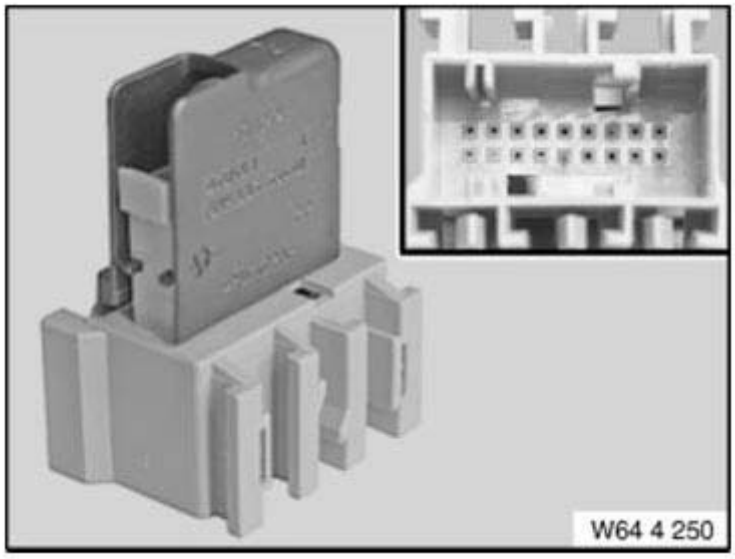


Fig. 14: Identifying Connector (614250)
Courtesy of BMW OF NORTH AMERICA, INC.

CONVERTIBLE TOP COMPARTMENT LID

41 63 CONVERTIBLE TOP COMPARTMENT LID

TIGHTENING TORQUE SPECIFICATION - CONVERTIBLE TOP COMPARTMENT LID

		Type	Thread	Tightening specifications	Dimension
1AZ	Hinge to convertible top compartment lid	E93	M8		20 Nm
2AZ	Convertible top compartment lid to convertible top compartment lid mechanism	E88	M8		20 Nm
3AZ	Convertible top compartment lid to hinge	E88	M6		8 Nm
		E89	M6		5.5 Nm
4AZ	Hinge to body	E88	M8		20 Nm
5AZ	Accumulator plate to body	E88	M6		8 Nm

POWER CONVERTIBLE TOP

54 37 POWER CONVERTIBLE TOP

TIGHTENING TORQUE SPECIFICATION - POWER CONVERTIBLE TOP

		Type	Thread	Work instruction	Measure
1AZ	Locking of X-screw connection - Main bearing, roof module to rear end module	E89			19 Nm
2AZ	Kinematics box - to body	E89			19 Nm
3AZ	X-screw connection - Rear end module/roof module	E89			19 Nm
4AZ	Base plate - to cowl panel	E89			19 Nm
5AZ	Mounting brackets - to body	E89			8 Nm

7AZ	Linkage, rear end module - to mounting bracket, rear end	E89			19 Nm
8AZ	Linkage, roof module - to mounting bracket, roof	E89			19 Nm
9AZ	Battery rollover protection	E89			6 Nm
10AZ	Barrel screws - to frame, roof and rear modules	E89		20 cNm = 0.2 Nm	20 cNm
11AZ	Roof shell to linkage	E89	M8x20		19 Nm
12AZ	Screw connection, front lock to roof shell	E89			8 Nm
13AZ	Seal holder to roof shell	E89			4.6 Nm
14AZ	Seal to seal holder	E89			2.3 Nm
15AZ	Hydraulic valve (solenoid valve)	E89			6 Nm

Sunroof and Convertible Top - Operating Fluids

1.0 CONVERTIBLE TOP MATERIAL

Cleaning Kit consists of three fluids for periodic maintenance of the top's outer surface:

- Car Shampoo

  For cleaning the entire convertible top. Add 2 to 3 capfuls of shampoo to 2.5 gallons of water. Rinse with clean water.

- Glass Cleaner

  Cleans the plastic rear window as well as the vehicle's glass windows. Spray on, wipe off with dry cloth.

- Impregnating Spray

After cleaning the top, apply this spray over a large area about 12 inches from the surface to seal the top against possible leaks.

Convertible Top Cleaning Kit

BMW Part No. 83 12 9 407 806

Impregnating Spray

BMW Part No. 83 12 9 407 802

2.0 CONVERTIBLE TOP REAR (PLASTIC) WINDOW

REAR WINDOW CLEANER

Meguiar's Mirror Glaze Professional Plastic Cleaner #17 removes hairline scratches on the surface.

BMW Part No. 82 14 1 467 128.

REAR WINDOW POLISH

Meguiar's Mirror Glaze Professional Plastic Polish #10 restores and maintains clarity, leaves surface static-free.

BMW Part No. 82 14 1 467 129

CONTACT CEMENT

Attaching soft top material to zip-out rear window trim plastic channel on E30 and E36 convertibles. (former

BMW Part No. 81 22 9 407 524)

3M 1357 High Performance Contact Adhesive

3.0 CONVERTIBLE TOP STORAGE LID ADHESIVE

E30 and E36 Convertible top storage lid covering adhesive

3M™ Super Trim Adhesive Yellow Part No. 08090

4.0 CONVERTIBLE TOP SEALING FRAME ADHESIVE

() E36 Z3 Sealing Frame Adhesive

One roll of Bostik 3/4" x 1/8" Butyl Tape, available in cases of 12 rolls from Springfield Paper Specialties.

5.0 CONVERTIBLE TOP HYDRAULIC FLUID

BMW PART NUMBER SPECIFICATION

Model	**BMW Part Number**
E36/7	54 34 8 410 306
E46	54347117733
E52	54348234324
E85	54347117733
E64	54347717733
E93	54340394395

6.0 SUNROOF

Cassette Lubricant

BMW PART NUMBER SPECIFICATION

Wurth Glide Grease	Part No. 0893898

Loctite 380

5 Series Touring double panel sunroof repairs. (former BMW Part No. 81 22 9 407 394)

BMW PART NUMBER SPECIFICATION

3M	Part No. 8155
Wurth	Part No. 893 4103
Loctite	Part No. 38050

Brakes - Operating Fluids

1.0 GENERAL INFORMATION

Brake fluid, (glycol-based) as used in BMW brake systems, must conform with the following requirements:

- High boiling point
- Good low temperature resistance
- Low compressibility
- Corrosion inhibition for all metal parts inside of brake system
- Compatibility with all rubber parts used in brake system

These requirements are fulfilled by reputable brand name DOT 4 brake fluids.

Silicone-based brake fluid has better compressibility, but because it cannot absorb moisture, is subject to vapor lock at temperatures above 212°F/ 100°C. At lower temperatures, it may even ice-up. **Silicone-based brake fluid is not approved by BMW.**

Glycol-based brake fluid absorbs moisture from the atmosphere (hygroscopicity) through the brake fluid reservoir, brake hoses, etc. This absorption of water lowers the original boiling point of brake fluid and active safety of the entire system. If there is extended use of the brakes while driving downhill at high speeds, the thermal loads could cause vapor bubbles in the brake fluid. This situation could lead to reduced braking effectiveness.

The original boiling point of factory-approved brake fluids is approximately 500°F/260°C. Due to the hygroscopic behavior of brake fluid, 2% of water within one year is permissible. The boiling point of brake fluid will drop by 100°C with 3% water absorption. It is essential to conform with brake fluid changing intervals in order to guarantee the safety and maximum effectiveness of a brake system.

It would not be sufficient simply to replace the brake fluid in the reservoir. Experience has shown that vapor bubbles will occur first on areas of the brake caliper. This area is subjected to high thermal loads and also exposed to heat transmission.

When replacing the brake fluid, the brake fluid used as the working fluid in the hydraulic clutch should also be replaced. This is done by draining the clutch operation system or bleeding with the help of the clutch slave cylinder.

The brake fluid should be replaced by filling the brake fluid reservoir. Make sure that each bleeder valve of all wheel cylinders or brake calipers is kept open until the escaping brake fluid is clear and without air bubbles. Never use brake fluid that has been drained from the system.

Storage of brake fluids also deserves your special attention. The aging process begins with the initial contact between the brake fluid and the atmosphere. This means immediately after a new container is opened.

To keep the boiling point of stored brake fluids as high as possible, we recommend conforming with the following points:

- Close all containers tightly.
- Select small size containers, which can be used up quickly.
- Avoid pouring contents of one container into a different container.

2.0 HANDLING BRAKE FLUIDS

Brake fluids could be mixed up accidentally with mineral oil products so it is important to leave them in their original containers and not pour them into a different container.

CAUTION: If brake fluid accidentally comes into contact with your skin, wash it off with soap and water immediately. Eyes should be thoroughly flushed with cold water if contacted by brake fluid. Vomiting should be induced if brake fluid is internally consumed and a physician should be consulted.

If brake fluid is spilled or drips on a painted surface, wash it off with water immediately to prevent damage to the paint finish. Never rub it off. Brake fluids should not have contact with grease or oil. Wash hands to remove grease and oil before working with brake fluids. Also make sure that grease cannot enter the brake system.

Drained brake fluid must never be discarded in the garbage, oil disposal tanks or water drains.

Read instructions on container label prior to use.

3.0 BMW TESTED AND APPROVED BRAKE FLUIDS

BMW Tested and Approved DOT 4 ESL Brake Fluid is available as follows:

BMW PARTS SPECIFICATION

12 fl. oz. bottle	BMW Part No. 81 22 0 142 156
1 gallon container	BMW Part No. 81 22 0 142 155

4.0 BRAKE FLUID CHANGE INTERVALS

All Models Brake fluid change interval every 2 years.

5.0 OTHER OPERATING FLUIDS

ANTI-SQUEAK/CORROSION PASTE

Bostik NEVER-SEEZ® to prevent disc brake squeaking. It is applied on cleaned recesses, pressure surfaces of piston crowns, brake pad backplates and possibly transfer plates-but not on friction liners.

To prevent corrosion between the ABS impulse sensor and the hole in the wheel suspension component, apply a

thin coat of Bostik NEVER-SEEZ® to cleaned sensor and hole before assembly.

BMW PARTS SPECIFICATION

Bostik NEVER-SEEZ®	Part No. NSBT-16

BRAKE CLEANER SPRAY

Non-CFC spray (former BMW Part No. 81 22 9 407 704) for cleaning brakes, brake pads, brake shoes, drums, disks and other brake components. Also suitable for clutch pressure plates.

BMW PARTS SPECIFICATION

3M	Part No. 8895
Loctite	Part No. 82220
CRC	Part No. 08088

3400 BRAKE TESTING AND BLEEDING

34 00 050 BLEEDING BRAKE SYSTEM WITH DSC

NOTE: **READ AND COMPLY WITH GENERAL INFORMATION.**
When replacing or repairing, observe the filling and bleeding instructions for the following parts:

- **Tandem brake master cylinder**
- **Hydraulic unit**
- **Components and connecting lines which are fitted between these assemblies.**

Connect bleeder unit with max. 2 bar filling pressure.

A second person is needed to help carry out this work.

Always use BMW-approved brake fluids, refer to **BRAKES - OPERATING FLUIDS**

IMPORTANT: **Under certain circumstances it is not possible after the brake system is opened to bleed the brake system fully at the rear EMF brake calipers. If there is still residual air in the rear brake calipers after normal bleeding, it will be necessary to work through an additional bleeding procedure !**

Connect BMW diagnosis system.

Select path: Service functions - Chassis/Suspension - Slip control systems - Bleeding procedure.

Connect brake fluid changer to expansion tank and switch on.

IMPORTANT: **Check relevant Operating Instructions for each device.**
Charging pressure should not exceed 2 bar.

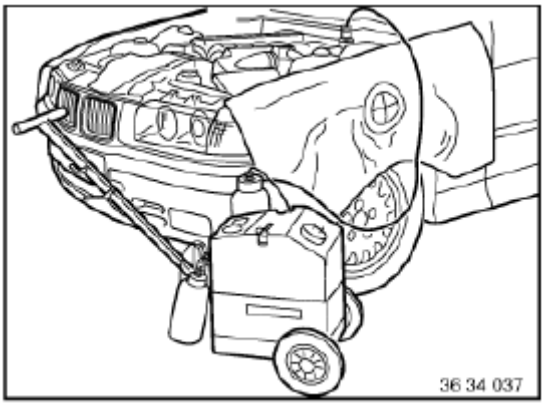


Fig. 1: Connecting Brake Fluid Changer To Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Fully rinse the brake system

Connect bleeder hose with collecting tray to bleeder valve on rear right brake calliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close bleed valve.

Follow same procedure on rear left, front right and front left wheel brake.

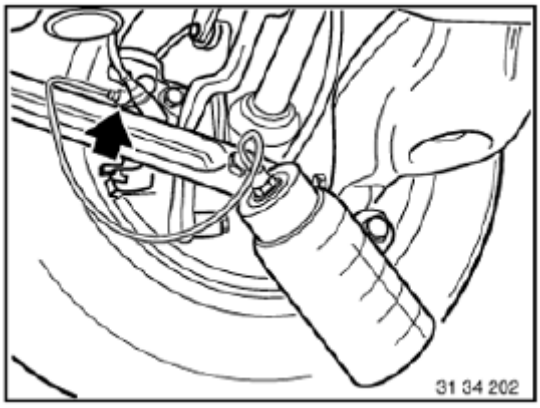


Fig. 2: Locating Bleeder Valve On Rear Right Brake Caliper
Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding rear axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on rear right brake calliper.

Close bleeder valve.

Run bleeding routine with DIS with bleeder valve open.

After completing routine, press brake pedal 5 times to floor; clear and bubble-free brake fluid must flow out.

Close bleed valve.

Repeat procedure at rear left.

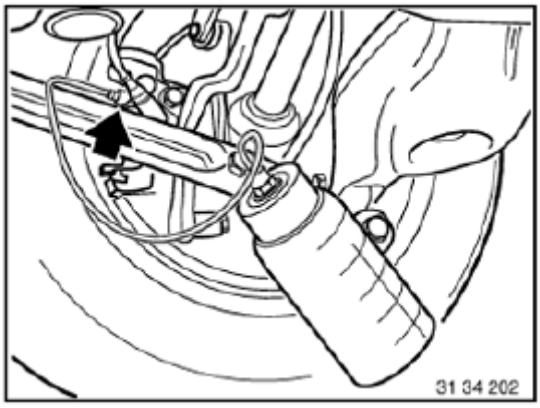


Fig. 3: Locating Bleeder Valve On Rear Right Brake Caliper
Courtesy of BMW OF NORTH AMERICA, INC.

Bleeding front axle brake circuit

Connect bleeder hose with collecting tray to bleeder valve on front right brake calliper.

Close bleeder valve.

Run bleeding routine with DIS with bleeder valve open.

After completing routine, press brake pedal 5 times to floor, clear and bubble-free brake fluid must flow out.

Close bleed valve.

Repeat procedure at front left.

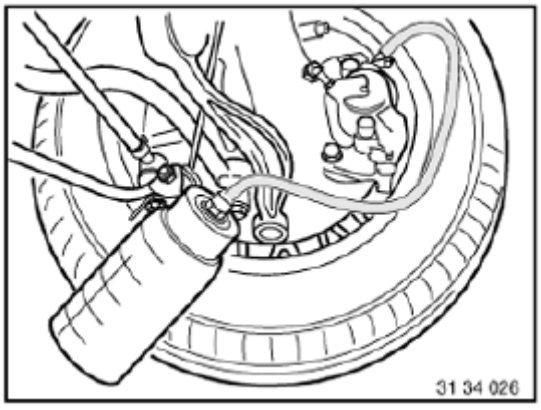


Fig. 4: Connecting Vent Hose With Collecting Vessel To Bleeder Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Switch off brake fluid changer and remove from expansion tank.

Check brake fluid level.

Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

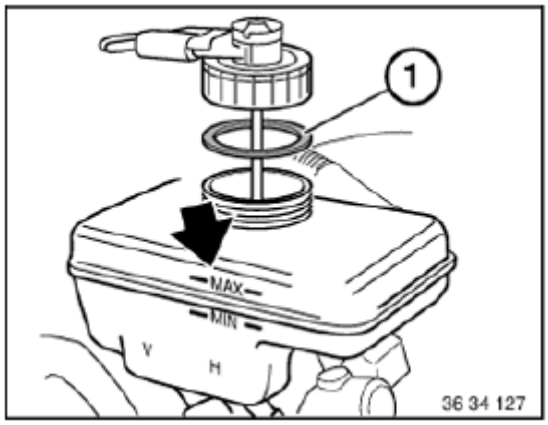


Fig. 5: Locating Brake Fluid Level Marking (Max)
Courtesy of BMW OF NORTH AMERICA, INC.

34 00 EMF ADDITIONAL BRAKE BLEEDING PROCEDURE

NOTE: This bleeding procedure serves to eliminate residual air in the brake system. Under certain circumstances it may not be possible to remove the entire residual air from the EMF brake calipers by means of the normal bleeding procedure. In these cases, the following procedure applies.

Connect brake fluid changer to expansion tank and switch on.

NOTE: Check relevant Operating Instructions for each device.

Charging pressure should not exceed 2 bar.

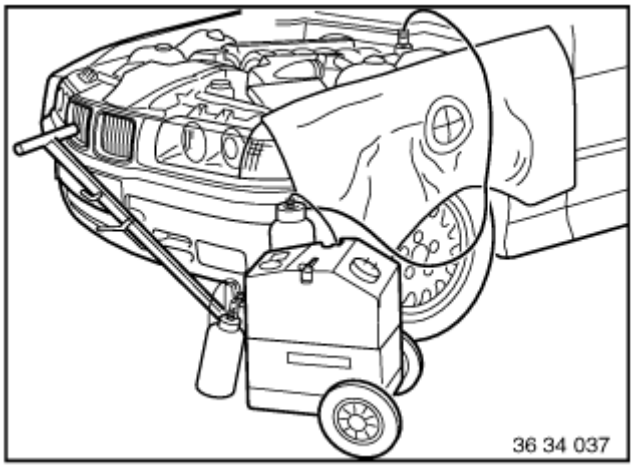


Fig. 6: Connecting Brake Fluid Changer To Expansion Tank

Close bleeder valve. Flush brake caliper in installation position. Close bleed valve.

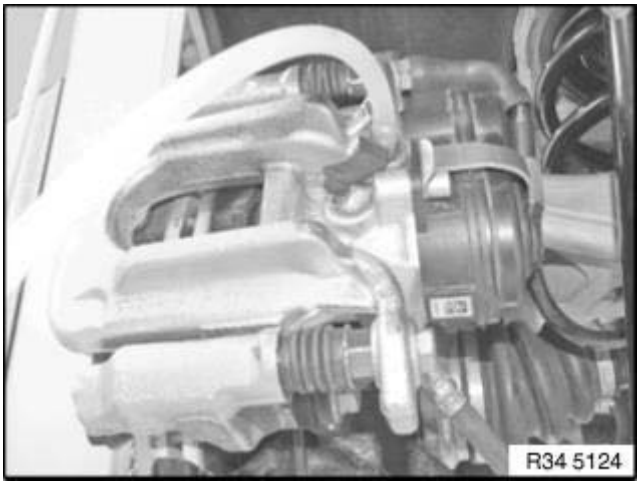


Fig. 7: Flushing Brake Caliper In Installation Position

Unscrew guide bolts (1). If necessary, grip at hexagon head (2). Remove brake caliper (3).

Installation: Replace guide screws. Tightening torque, see 34 21 4AZ in **34 21 REAR BRAKE** .

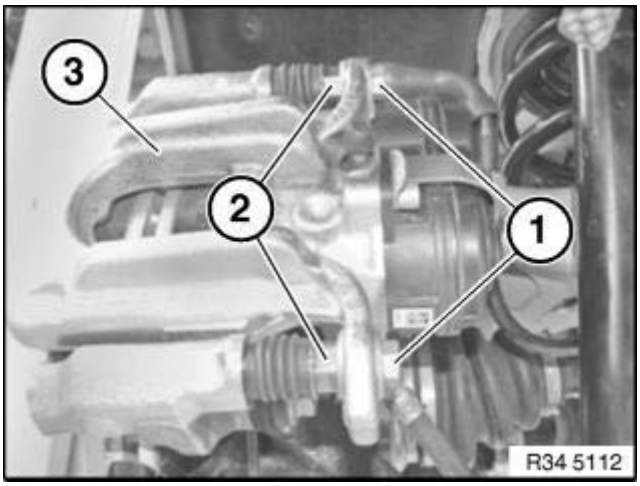


Fig. 8: Removing Brake Caliper

Disconnect plug connection on EMF actuator and disengage cable from cable tie. Turn brake caliper so that EMF actuator points downwards. Open bleed valve and flush brake caliper. Close bleed valve.

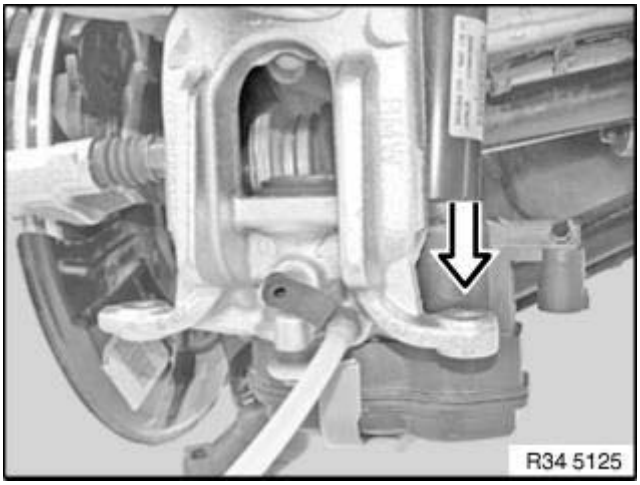


Fig. 9: Turn Brake Caliper So EMF Actuator Points Downwards

Turn brake caliper so that EMF actuator points upwards. Open bleed valve and flush brake caliper. Close bleed valve. Reinstall brake caliper in installation position and flush again.

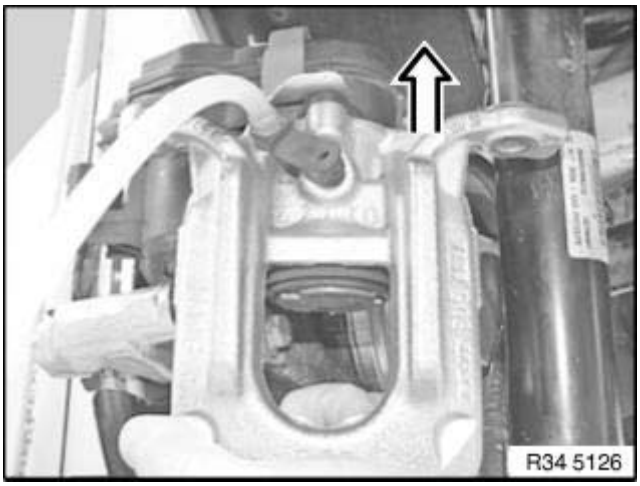


Fig. 10: Turn Brake Caliper So EMF Actuator Points Upwards

Switch off brake fluid changer and remove from expansion tank. Check brake fluid level. If necessary, top up/draw off to max. level. Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

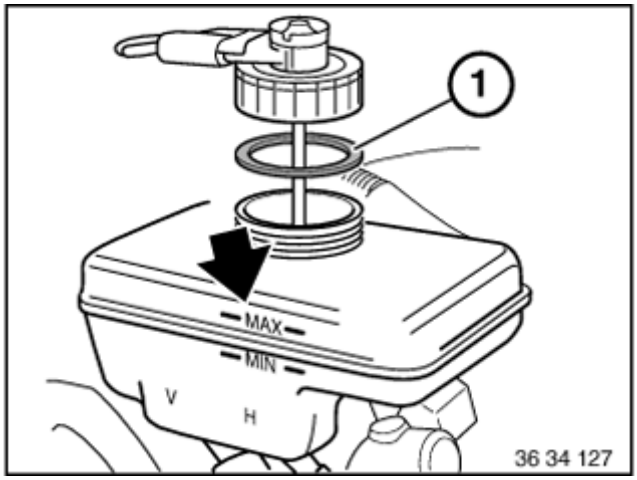


Fig. 11: Pay Attention To Rubber Seal (1) In Sealing Cap

34 00 ... CHECKING BRAKE DISCS

Necessary preliminary tasks

- Remove wheels.

Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 points (spread over the circumference) with a micrometer gauge
- Compare measurement result with setpoint value.

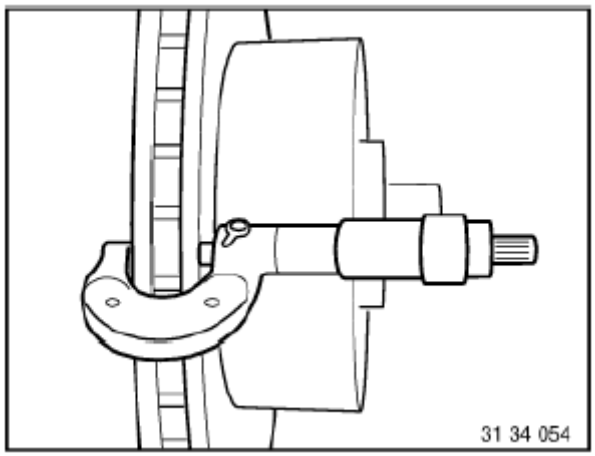


Fig. 12: Measuring Brake Surface Thickness Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with setpoint value

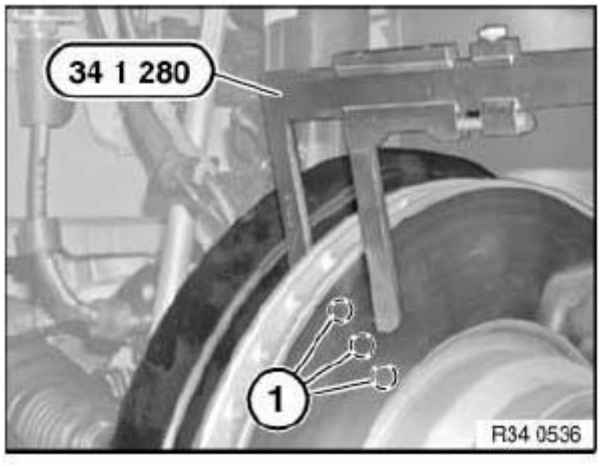


Fig. 13: Positioning Special Tool (34 1 280) At Three Measuring Points
Courtesy of BMW OF NORTH AMERICA, INC.

34 00 009 CHECKING BRAKES ON TEST STAND

Necessary preliminary tasks

- Check tires for damage
- Check tyre treads
- Check tyre pressure

IMPORTANT: The corresponding system must be deactivated on vehicles equipped with DSC.
The DSC indicator and warning light in the instrument panel must light up!

The brakes must be at normal operating temperature. To do so, gently warm up the brake discs and brake drums while dry by braking the vehicle several times.

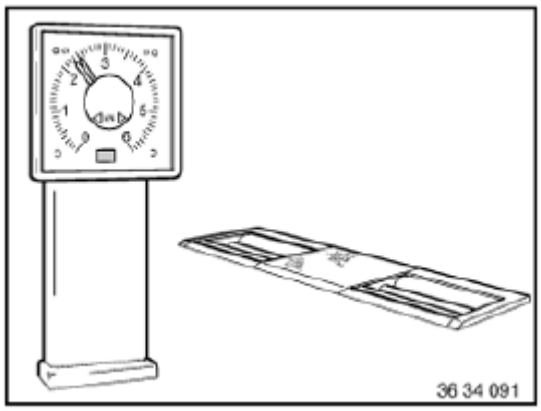


Fig. 14: Identifying Brake Test Stand
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only brake test stands with test speeds of 2.5-6 km/h may be used.
You must follow without fail the guidelines contained in the operating instructions of the relevant test stand manufacturer.
Failure to do so may result in damage to the vehicle and the system and also personal injury.

34 00 010 CHECKING THICKNESS OF BRAKE PAD

Checking thickness of brake pad

NOTE: The thickness of the outer brake pads can be determined without removing the wheels.

If necessary, move car until opening for brake pad wear indicator (brake pad) can be seen through rim styling.

Insert special tool **34 1 260** through rim into opening for brake pad wear indicator.

Press special tool onto brake pad. Slide ring (1) in direction of arrow up to stop and read off measured value.

NOTE:

A. Brake disc
B. Brake pad with backplate

Safe limit for lining wear, front brake.
Safe limit for lining wear, rear brake.

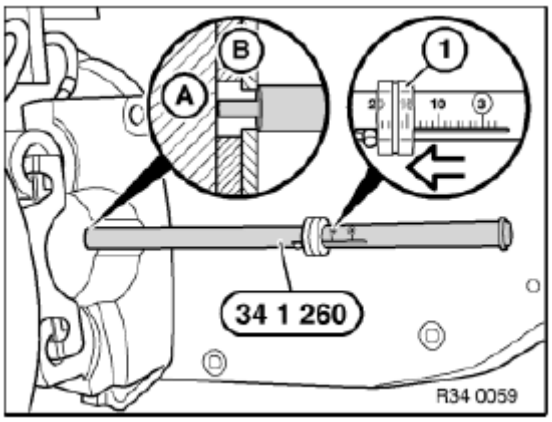


Fig. 15: Sliding Ring
Courtesy of BMW OF NORTH AMERICA, INC.

34 00 ... GENERAL INFORMATION

The brake system is one of the most important safety systems on any motor vehicle. It is therefore essential to act with utmost care when working on the brake system and to follow the instructions below.

General

- Ensure cleanliness and only use fluff-free cleaning cloths.
- Wash away or vacuum up brake dust, do not clear it away using compressed air. This dust is a health hazard.
- Do not under any circumstances allow any oil or grease to get into the brake system.

  This would result in a complete malfunction of the brake system.

- When cleaning brake components with brake cleaner, do not allow brake cleaner to get into in the brake system.
- Even the most minute traces of brake cleaner must be avoided.

Brake fluid

- Replace brake fluid at least every two years.
- Never reuse drained brake fluid.
- Always use BMW-approved brake fluid, refer to **BRAKES - OPERATING FLUIDS** .
- Dispose of brake fluid in approved appliances only.
- Do not allow brake fluid to drain into drain pipes, into the outside environment or into unsuitable facilities. This would create the risk of groundwater contamination since brake fluid is classed as a fluid that is hazardous to water.

- Do not allow brake fluid to come into contact with paintwork as this will destroy the paint.
- Brake fluid must not be allowed to remain on bare skin too long in order to avoid skin problems. Wash skin coated with brake fluid with water and soap.
- If brake fluid makes contact with eyes, immediately flush with large quantity of clean water and visit eye doctor.

Wheel brakes

- Brake pads:

Brake pads must be replaced when the warning threshold of the brake pad wear indicator See **REAR BRAKE** or **FRONT BRAKE** is reached.

Brake pads must always be replaced on both sides of any axle.

The friction surfaces of the brake pads must not come into contact with oil or grease. The brake pads must be replaced if they are fouled by such substances.

In the case of rotation-dependent brake pads, make sure the arrow marking points in the direction of rotation of the brake disc for when the vehicle is moving forward. Brake pads with left/right markings must be fitted on the relevant side of the vehicle.

One-sided angled areas on the brake pads must be located on the disc contact side of the brake caliper for when the vehicle is moving forward.

- Brake discs:

  Brake discs must not be scored or cracked. Furthermore, minimum brake disc thickness See **REAR BRAKE** or **FRONT BRAKE** , disc runout, parallelism and surface roughness of the friction surfaces must not exceed or drop below the permitted values.

  Always strip preservative off new parts before installation. With the rear brake discs, also strip preservative off brake drum on parking brake.

- Always strip preservative off new parts before installation.
- Brake calipers:

  Only approved glycol-based pastes may be used for repairs on brake calipers.

  All moving parts on the brake caliper must move freely: note grease specifications.

  Use only BMW-approved lubricants to grease caliper guides.

Brake lines, brake hoses

- Brake lines and brake hoses must be correctly routed and must not abut with body or components in a way which would cause chafing.

- To prevent damage, release and tighten brake line couplings with a special brake line wrench only.
- The system must be bled each time any brake lines have been detached.
- All connection points must be checked for leaks.
- Only tighten down brake hoses on the front axle when wheels are in straight-ahead position.
- Close off open connections of brake lines and individual components to prevent dirt from getting into the brake system.
- When tightening down brake line couplings, observe tightening torque **34 32 1AZ** .

Traction control system

The traction control system is essentially maintenance-free; however the following must be observed:

- When carrying out welding work with electric welding equipment, be sure to disconnect the plug from the electronic control unit (ignition turned off).
- During painting work, the control unit may be subjected for brief periods to loads of max. 95 °C and for long periods (approx. 2 hours) to loads of max. 85 °C.
- Terminals must be completely tight on end poles of battery.
- Brake lines on hydraulic unit must not be swapped over: if applicable, mark them prior to disassembly.

On completion of repair work, carry out swap-over test with the DIS diagnosis system.

34 00 ... GENERAL INFORMATION ON BRAKING IN NEW BRAKE DISCS/BRAKE PADS

IMPORTANT: After completing work:

- **Carry out function check on brake analyzer (test stand) to ensure that the brakes complies with legal requirements.**
- **Carry out test braking while driving at low speed; the effectiveness of the brakes may be reduced during the initial braking operations.**
- **Exaggerated drastic and continuous braking operations for faster braking in are not permitted.**
- **Advise the customer not to perform any wilful drastic braking in the first 200 km after brake replacement.**
- **Attach mirror tag to interior rearview mirror.**

34 00 012 PARKING BRAKE FUNCTION CHECK

IMPORTANT: Follow instructions for Brake testing on test stand.

Drive vehicle onto brake test stand

The parking brake control unit utilizes a plausibility check (wheel speed comparison) to detect the brake test stand within a few seconds and switches to brake test stand mode.

The parking brake indicator light flashes slowly when brake test stand mode is activated and parking brake actuators are released.

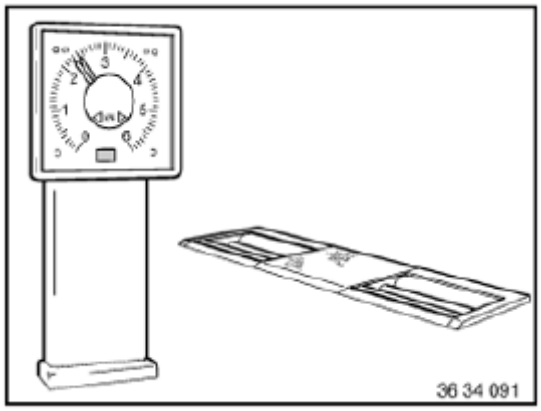


Fig. 16: Identifying Brake Test Stand (Parking Brake Function)
Courtesy of BMW OF NORTH AMERICA, INC.

Actuate parking brake switch = application of brake pads.

The parking brake indicator light flashes quickly when brake test stand mode is activated and parking brake actuators are partially locked.

Actuate parking brake switch = test force 1

Actuate parking brake switch again = test force 2

Actuate parking brake switch again = test force 3

The parking brake is released again when the button is actuated in the Release direction.

The parking brake indicator light is permanently activated when brake test stand mode is not detected and parking brake actuators are fully locked.

Brake test stand mode is automatically terminated when the vehicle is driven off the brake test stand.

Checking brake force differential at wheel:

Apply parking brake until a wheel circumferential force (measured on brake test stand) of min. 1000 N is reached.

Max. permitted brake force differential right/left < or = 35 % (referred to greater brake value).

34 00 012 PARKING BRAKE FUNCTION CHECK

IMPORTANT: Follow instructions for Brake testing on test stand.

Drive vehicle onto brake test stand

The parking brake control unit utilizes a plausibility check (wheel speed comparison) to detect the brake test stand within a few seconds and switches to brake test stand mode.

The parking brake indicator light flashes slowly when brake test stand mode is activated and parking brake actuators are released.

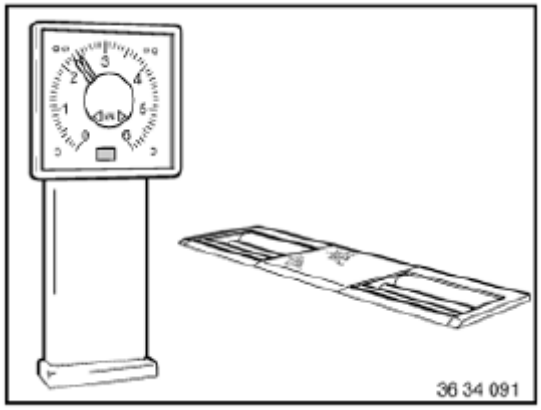


Fig. 17: Identifying Brake Test Stand (Parking Brake Function)
Courtesy of BMW OF NORTH AMERICA, INC.

Actuate parking brake switch = application of brake pads.

The parking brake indicator light flashes quickly when brake test stand mode is activated and parking brake actuators are partially locked.

Actuate parking brake switch = test force 1

Actuate parking brake switch again = test force 2

Actuate parking brake switch again = test force 3

The parking brake is released again when the button is actuated in the Release direction.

The parking brake indicator light is permanently activated when brake test stand mode is not detected and parking brake actuators are fully locked.

Brake test stand mode is automatically terminated when the vehicle is driven off the brake test stand.

Checking brake force differential at wheel:

Apply parking brake until a wheel circumferential force (measured on brake test stand) of min. 1000 N is reached.

Max. permitted brake force differential right/left < or = 35 % (referred to greater brake value).

34 00 027 REPLACING FLUID IN BRAKE SYSTEM

NOTE: **READ AND COMPLY WITH GENERAL INFORMATION.**

IMPORTANT: When carrying out repairs to the master brake cylinder or hydraulic unit, follow the procedure set out in BLEEDING BRAKE SYSTEM WITH DSC . Under certain circumstances it is not possible after the brake system is opened to bleed the brake system fully at the rear EMF brake calipers. If there is still residual air in the rear brake calipers after normal bleeding, it will be necessary to work through an additional bleeding procedure !

Use only BMW-approved brake fluids, see **BRAKES - OPERATING FLUIDS**

Connect brake fluid changer to expansion tank and switch on.

NOTE: **Check relevant equipment manufacturer's operating instructions for each device.**
Charging pressure should not exceed 2 bar.

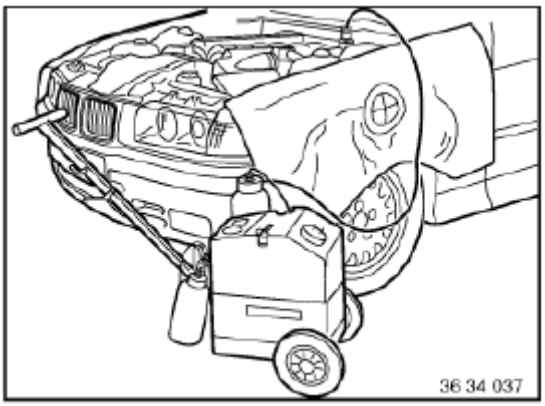


Fig. 18: Connecting Brake Fluid Changer To Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Fully rinse the brake system

Connect bleeder hose with collecting tray to bleeder valve on rear right brake caliper.

Open bleeder valve and purge until clear, bubble-free brake fluid emerges.

Close vent valve.

Follow same procedure on rear left, front right and front left wheel brake.

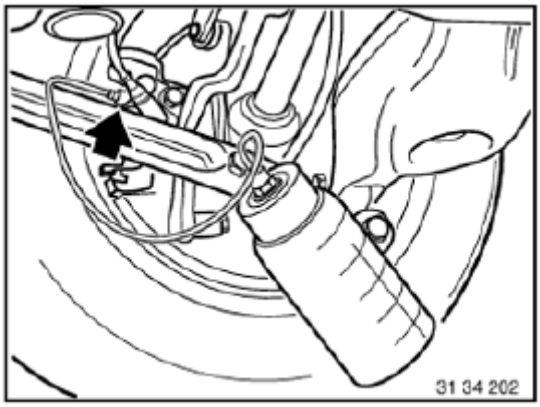


Fig. 19: Locating Bleeder Valve On Rear Right Brake Caliper
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The clutch slave cylinder must also be scavenged in vehicles with manual transmissions.

Switch off brake fluid changer and remove from expansion tank.

Check brake fluid level. If necessary, top up/draw off to max. level.

Close expansion tank.

NOTE: Pay attention to rubber seal (1) in sealing cap.

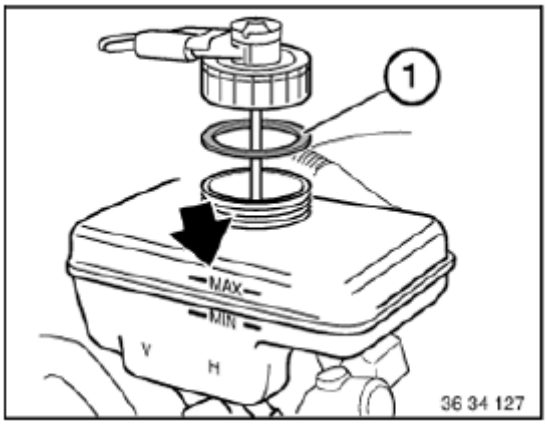


Fig. 20: Locating Brake Fluid Level Marking (Max)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Reset CBS display according to factory specification:
- Switch on the ignition (terminal 15)

- Press the trip odometer for approximately 10 seconds until the first CBS item appears. (The next item is reached by briefly pressing the button again)
- If the value is to be reset, press the button again for approximately 3 seconds until "Reset?" appears.
- Reset is confirmed by pressing the button again for 3 seconds.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

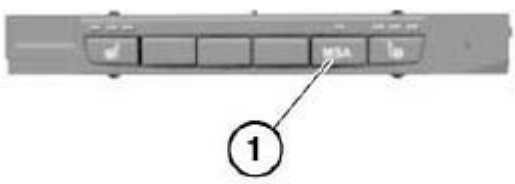
WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output.
The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 21: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

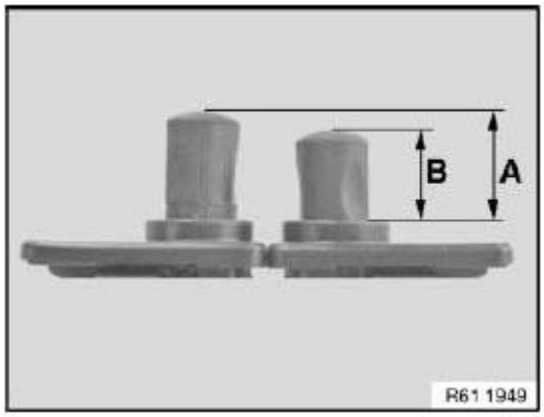


Fig. 22: Identifying Basic Setting For Engine Hood/Bonnet Open
Courtesy of BMW OF NORTH AMERICA, INC.

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

When working with diagnosis tools

- Observe instructions for diagnosis tool.

3411 FRONT BRAKES

34 00 ... CHECKING BRAKE DISCS

Necessary preliminary tasks

- Remove wheels.

Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge
- Compare measurement result with setpoint value

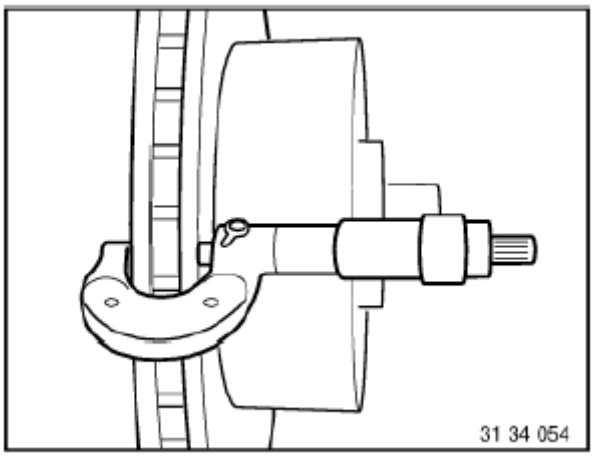


Fig. 23: Measuring Brake Disc Surface Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with setpoint value

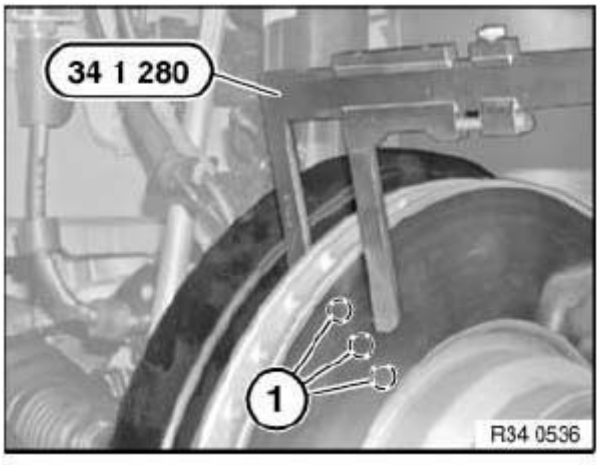
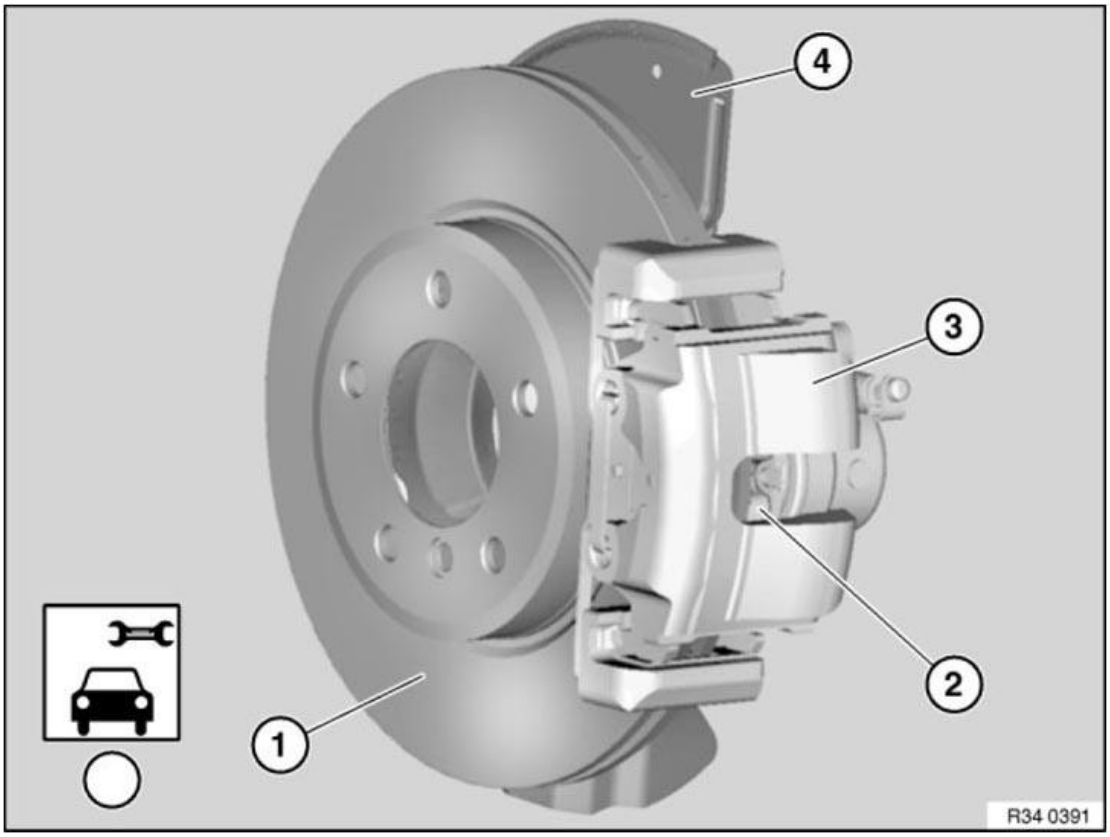


Fig. 24: Positioning Special Tool (34 1 280) At Three Measuring Points
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 ... OVERVIEW OF FRONT BRAKES



1 Brake disc
2 Brake pad
3 Brake calliper
4 Brake guard plate

Fig. 25: Overview Of Front Brakes
Courtesy of BMW OF NORTH AMERICA, INC.

1. Brake disc
2. Brake pad
3. Brake calliper
4. Brake guard plate
5. Checking thickness of brake pad

34 11 667 PRECISION-TURNING BOTH FRONT BRAKE DISCS ON BOTH SIDES

IMPORTANT: Always precision-turn both sides of both brake discs on one axle.
Observe Max. machining dimension per friction ring side
Minimum brake disc thickness (MIN TH)
Brake discs of M models (Compound brake discs) must not be machined!
Only one brake pad set may be used up on brake discs which have been lathe-turned to minimum thickness (MIN TH).

Stationary brake disc lathe

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of stationary brake disc lathes, the brake disc must be removed.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

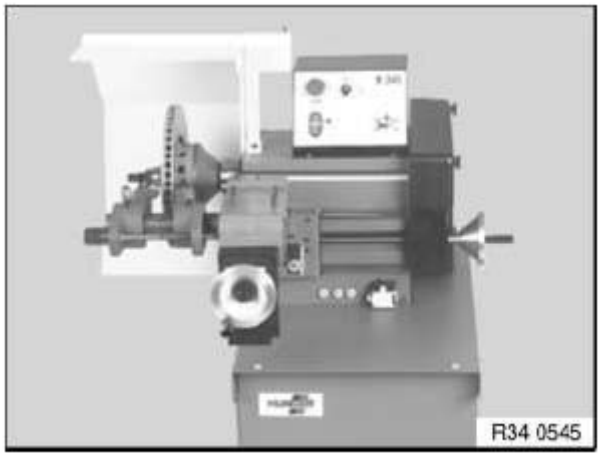


Fig. 26: Identifying Stationary Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

Mobile brake disc lathe

IMPORTANT: Only BMW-approved brake disc lathes may be used!

In the case of mobile brake disc lathes, the brake caliper and the brake anchor plate must be removed.

The brake discs remain on the car.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

Fig. 27: Identifying Mobile Brake Disc Lathe

Courtesy of BMW OF NORTH AMERICA, INC.

After fine-grinding the brake discs, measure the thickness difference inside the braking surfaces at 8 points with an external micrometer.

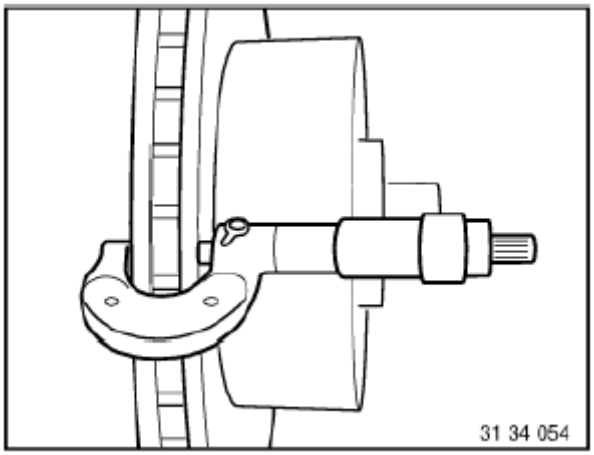


Fig. 28: Checking Brake Disc Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 250 REMOVING AND INSTALLING/REPLACING A BRAKE CARRIER/BRAKE GUARD PLATE AT FRONT

Necessary preliminary tasks

- Remove front **BRAKE DISCS**

Release screws (1) and remove brake guard plate (2).

Installation:

Tightening torque **34 11 3AZ** .

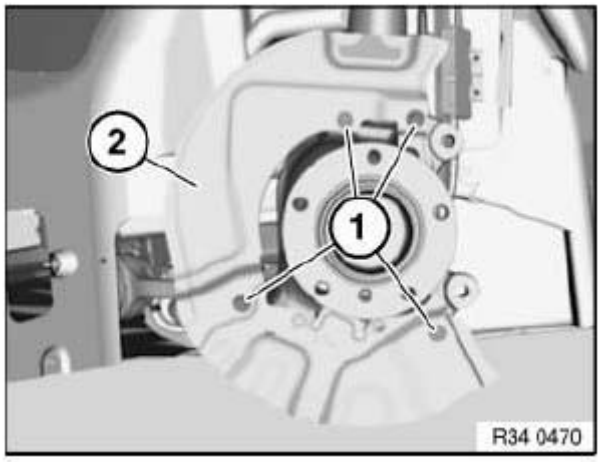


Fig. 29: Identifying Brake Guard Plate With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

34 11 000 REMOVING AND INSTALLING OR REPLACING BRAKE PADS ON BOTH FRONT DISC BRAKES (TEVES FLOATING CALIPER)

Special tools required

IMPORTANT:

- **Brake pad wear sensor: after removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).**
- **Retaining spring: for vehicles older than 48 months it is recommended to replace the retaining spring!**

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner BMW part no. 83 19 2 154 780 and apply a thin coating of brake pad paste BMW part no. 83 19 2 158 851.

Necessary preliminary work

- Remove **WHEELS** .
- Remove **BRAKE PAD WEAR SENSOR**

Lift out retaining spring (1).

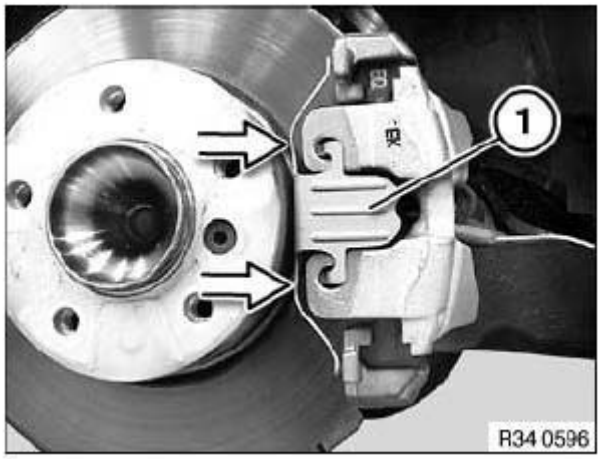


Fig. 30: Lifting Out Retaining Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plastic plugs (1).

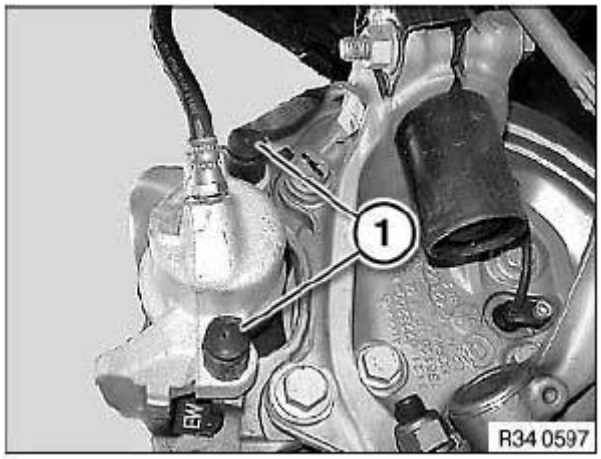


Fig. 31: Identifying Plastic Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten guide screws (1) and lift out brake caliper towards rear of vehicle.

Installation note:

Tightening torque **34 11 4AZ** .

Clean guide screws only; do not grease.

Check threads.

Replace all guide bolts which are not in perfect condition.

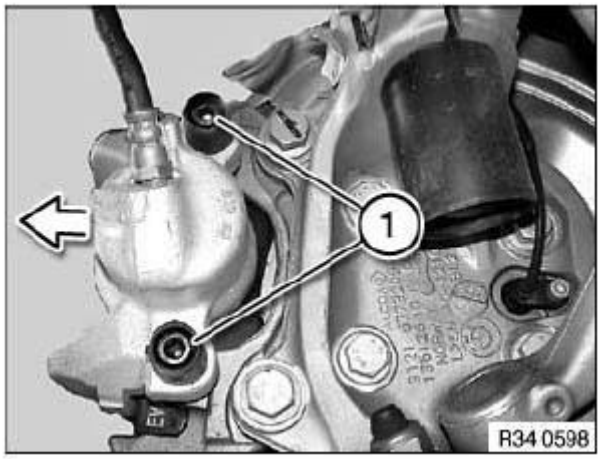


Fig. 32: Lifting Out Brake Calliper
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Tie brake caliper back and do not allow to hang from brake hose.

Remove outer brake pad.

Inner brake pad is located with its spring in the piston.

IMPORTANT: Mark any worn brake pads.
In the event of one-sided brake pad wear, do not change brake pads round.

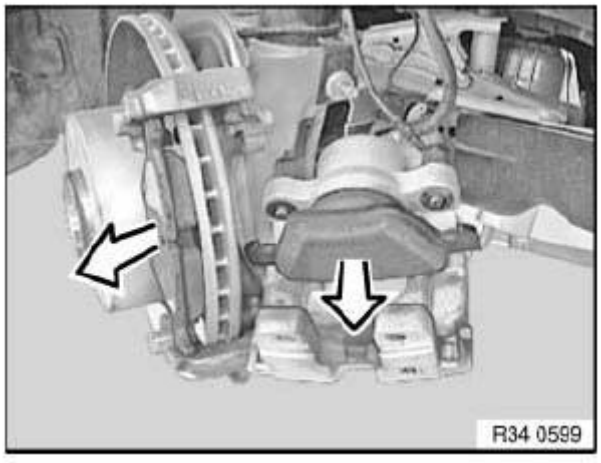


Fig. 33: Removing Outer Brake Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Observe **MINIMUM THICKNESS OF BRAKE PADS** .

Clean brake pads.

Do not grease backs of brake pads sleeve.

NOTE: The outer brake pads gradually need to be changed as well.

The previous version (A) with retaining spring (1) is replaced by brake pads of version (B) without retaining spring!

The use of pad sets of version (A) with retaining spring continues to be permissible!

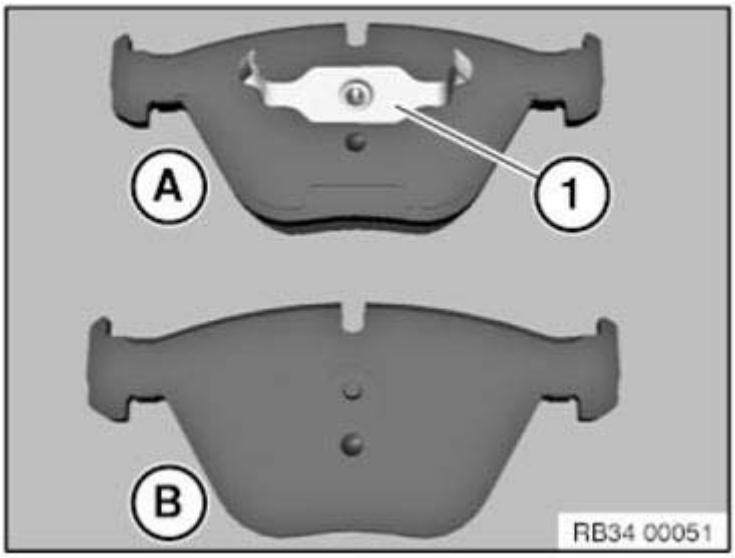


Fig. 34: Identifying Brake Pads With/Without Retaining Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **SETPOINT VALUE** .

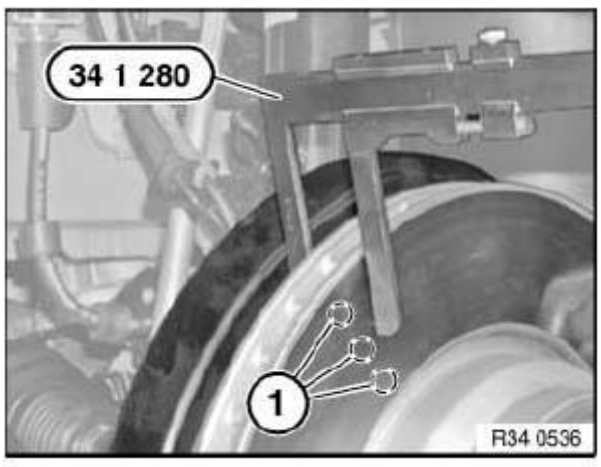


Fig. 35: Positioning Special Tool (34 1 280) At Three Measuring Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be fitted if the brake disc thickness is greater than the MINIMUM BRAKE DISC THICKNESS (MIN TH).

IMPORTANT: When pressing down piston, note brake fluid level in expansion tank.

Overflowing brake fluid will damage the paintwork.

Turn piston back fully with special tool 34 1 050.

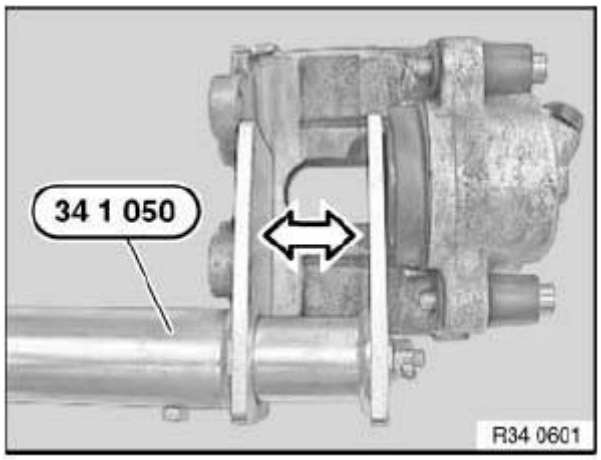


Fig. 36: Turning Piston Using Special Tool (34 1 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Check dust boot (1) for damage and replace if necessary.

IMPORTANT: Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.

Clean contact surface (2) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

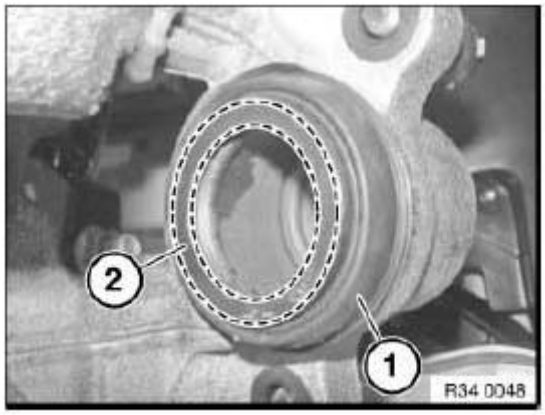


Fig. 37: Identifying Dust Boot And Brake Piston Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact surfaces (1) of brake pad tee heads/brake caliper housing with brake cleaner and apply a thin coating of brake pad paste.

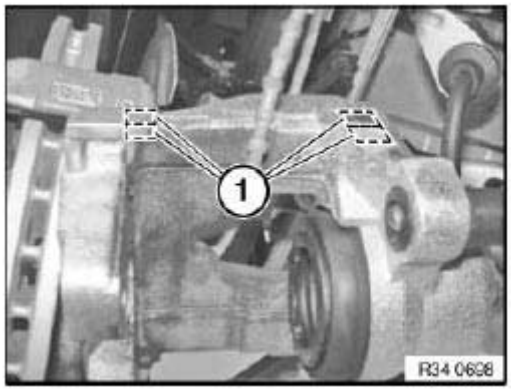


Fig. 38: Identifying Brake Pad Tee Heads/Brake Caliper Housing Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

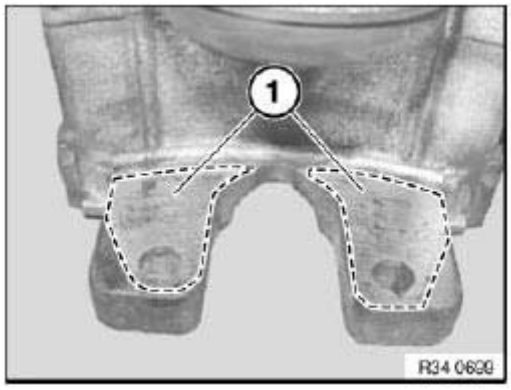


Fig. 39: Identifying Brake Caliper Contact Surface

Courtesy of BMW OF NORTH AMERICA, INC.

So as not to damage the surface coating, if **possible do not mechanically clean** the guide surfaces (1) for the brake pads on the brake caliper mounting bracket. Instead, clean with and apply a thin coating of brake pad paste.

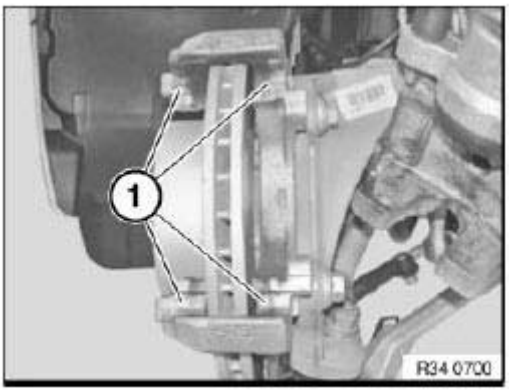


Fig. 40: Identifying Brake Pad Guide Surface
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work:

- **When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.**
- **Fully depress brake pedal several times so that brake pads contact brake discs.**
- **Read and comply with notes on braking in new brake discs/brake pads.**
- **When replacing pads, reset CBS display in accordance with factory specification.**

34 11 220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS

Special tools required

Necessary preliminary tasks

- Remove **WHEELS** .
- Remove and clean **BRAKE PADS**

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **SETPOINT VALUE** .

If the brake discs are replaced, you must also fit new brake pads.

Brake discs may only be replaced in pairs (on each axle).

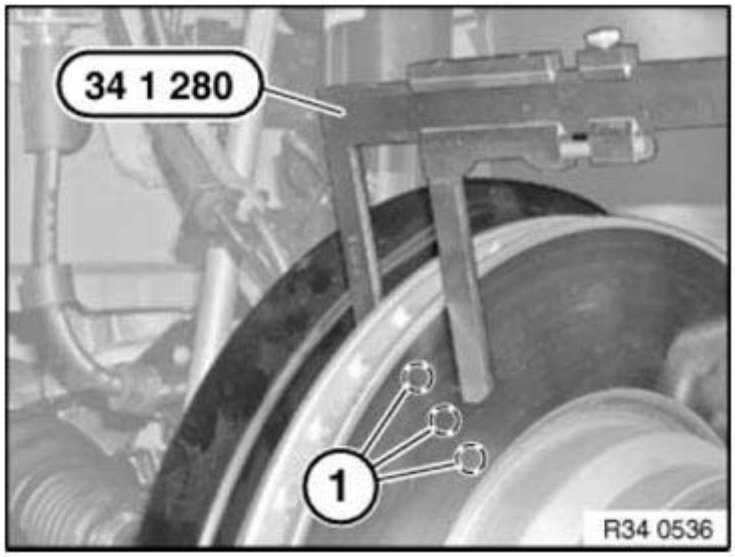


Fig. 41: Positioning Special Tool (34 1 280) At Three Measuring Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be fitted if the brake disc thickness is greater than the MINIMUM BRAKE DISC THICKNESS (MIN TH).

Release screws (1), remove brake calliper (2) with brake console (3) and tie back.

Installation:

Tightening torque **34 11 2AZ** .

Check that brake hose is correctly seated in holder.

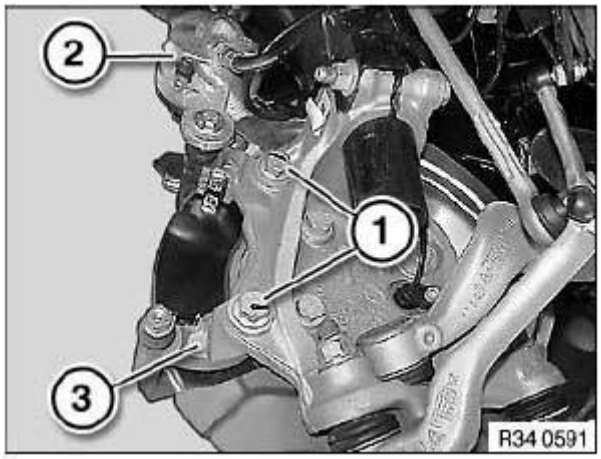


Fig. 42: Identifying Brake Calliper And Brake Console With Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar!
If necessary, carefully tap on base of brake disc chamber with a rubber mallet.
Clean contact surface of brake disc at wheel hub thoroughly and remove traces of corrosion.
Unevenness on contact surface may result in distortion of brake disc!

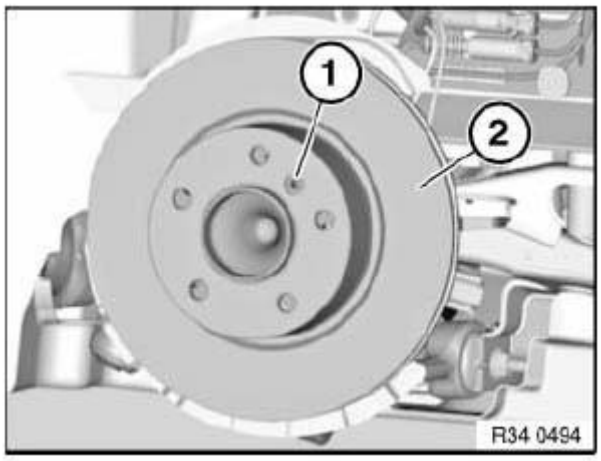


Fig. 43: Identifying Brake Disc With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove brake disc (2).

Installation:

Replace screw.

Tightening torque **34 11 1AZ** .

After installation

- Read and comply with notes on **BRAKING IN NEW BRAKE DISCS/BRAKE PADS** .

34 11 020 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT FRONT BRAKE CALIPER

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

Necessary preliminary tasks

- Remove **WHEELS** .

- Read and comply with **GENERAL INFORMATION** .

After completing work: **BLEED BRAKING SYSTEM**

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected. This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

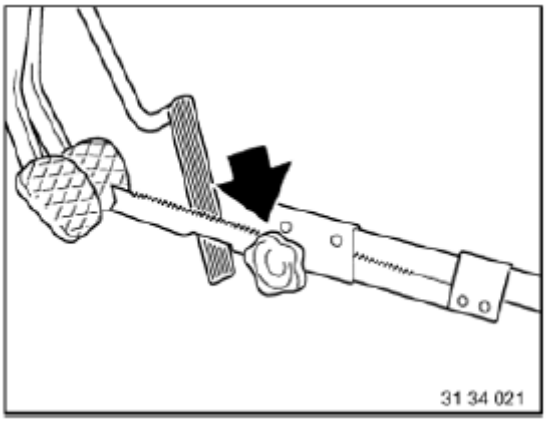


Fig. 44: Locating Brake Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Pull brake hose out of both holders (1).

IMPORTANT: Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Disconnect brake hose from brake line (3).

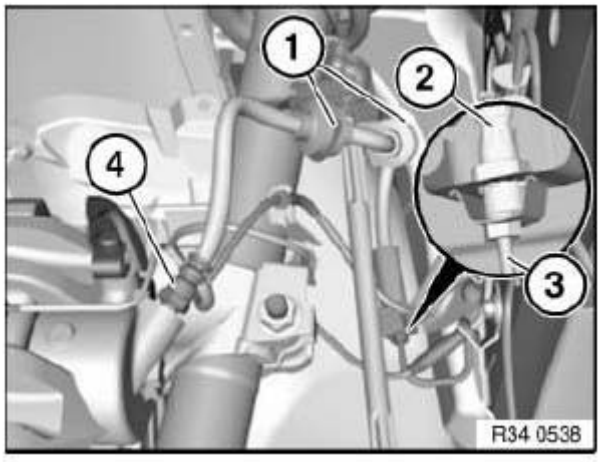


Fig. 45: Identifying Brake Caliper, Brake Line, Brake Hose Square Head And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque **34 32 1AZ** .

Detach brake hose from brake caliper (4).

Installation:

Tightening torque **34 32 2AZ** .

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

NOTE: First tighten brake hose on brake caliper.
Move wheels into straight-ahead position.
Insert brake hose in bracket and screw onto brake pipe.

Unscrew guide bolts (1).

Remove brake calliper by pulling upwards.

Installation:

Clean guide screws only; do not grease.

Check threads.

Replace all guide screws which are not in perfect condition.

Tightening torque **34 11 4AZ** .

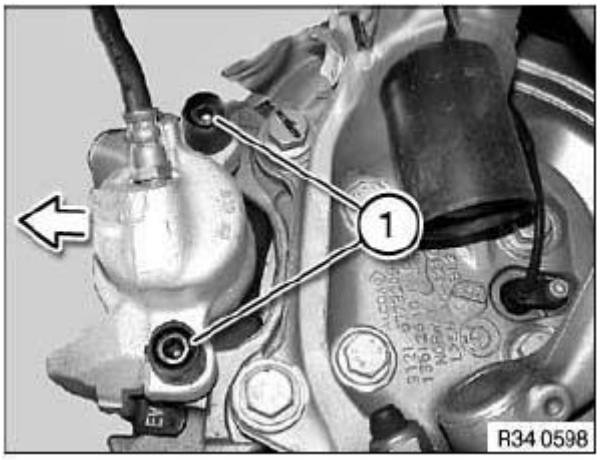


Fig. 46: Pulling Brake Calliper
Courtesy of BMW OF NORTH AMERICA, INC.

3421 REAR BRAKES

34 00 ... CHECKING BRAKE DISCS

Special tools required

Necessary preliminary tasks

- Remove wheels.

Checking thickness difference:

- Measure thickness difference within brake surfaces at 8 point (spread over the circumference) with a micrometer gauge
- Compare measurement result with setpoint value

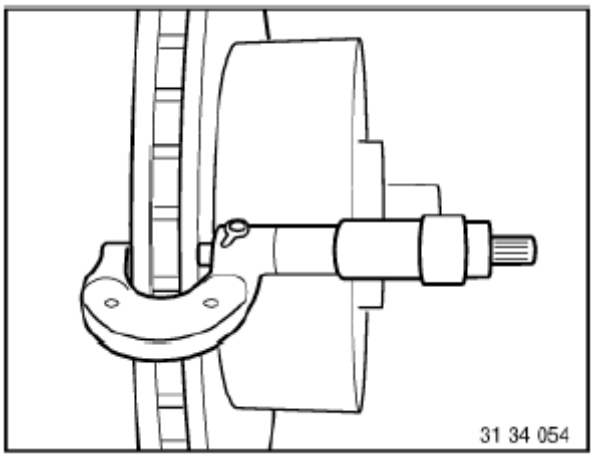


Fig. 47: Checking Brake Disc Thickness

Courtesy of BMW OF NORTH AMERICA, INC.

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with setpoint value

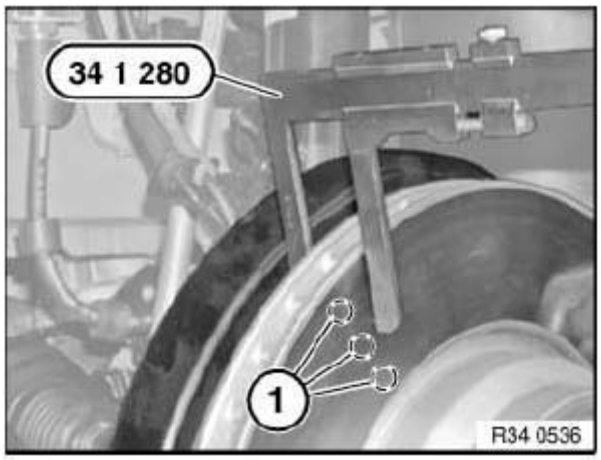
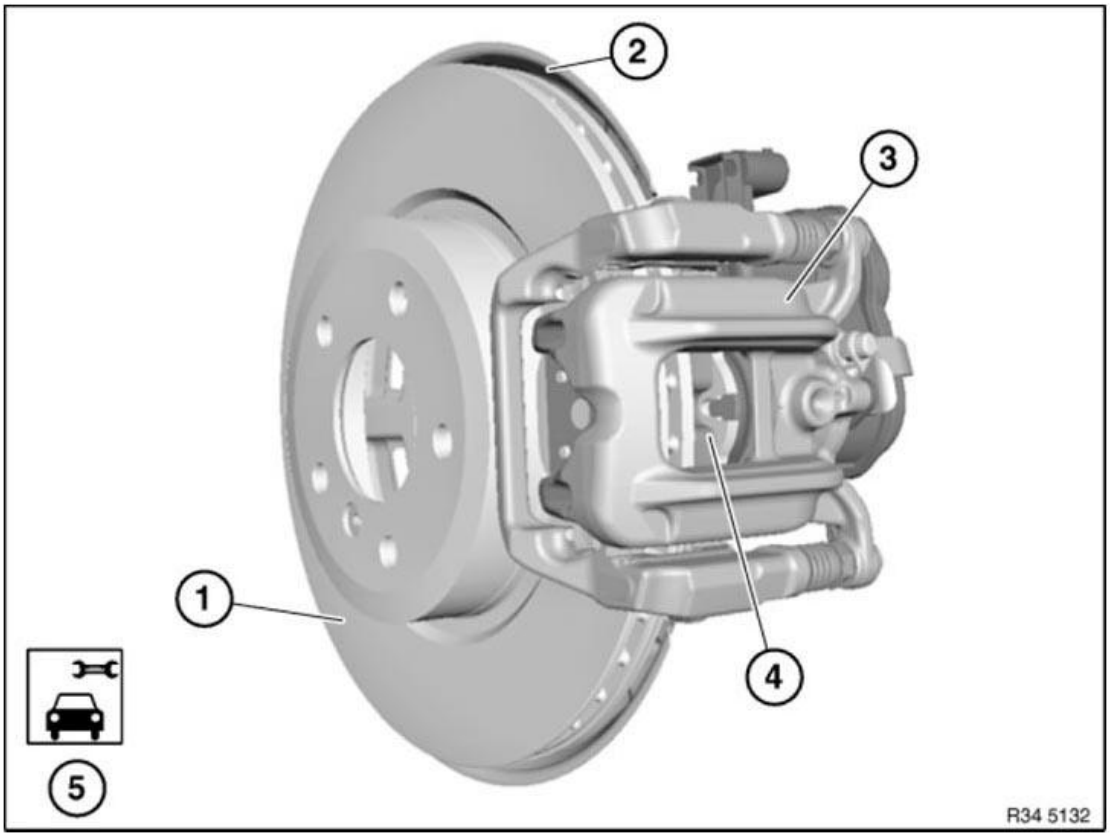


Fig. 48: Positioning Special Tool (34 1 280) At Three Measuring Points
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 ... OVERVIEW OF REAR BRAKE



1 Brake disc
2 Brake pad
3 Brake calliper
4 Brake guard plate
5 Checking thickness of brake pad

Fig. 49: Overview Of Rear Brake
Courtesy of BMW OF NORTH AMERICA, INC.

1. Brake disc
2. Brake pad
3. Brake calliper
4. Brake guard plate
5. Checking thickness of brake pad

34 21 947 PRECISION-TURNING BOTH REAR BRAKE DISCS ON BOTH SIDES

IMPORTANT: Always precision-turn both sides of both brake discs on one axle.
Observe Max. machining dimension per friction ring side
Minimum brake disc thickness (MIN TH)
Brake discs of M models (Compound brake discs) must not be machined!
Only one brake pad set may be used up on brake discs which have been lathe-turned to minimum thickness (MIN TH).

Stationary brake disc lathe

IMPORTANT: Only may be used!

In the case of stationary brake disc lathes, the brake disc must be removed.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

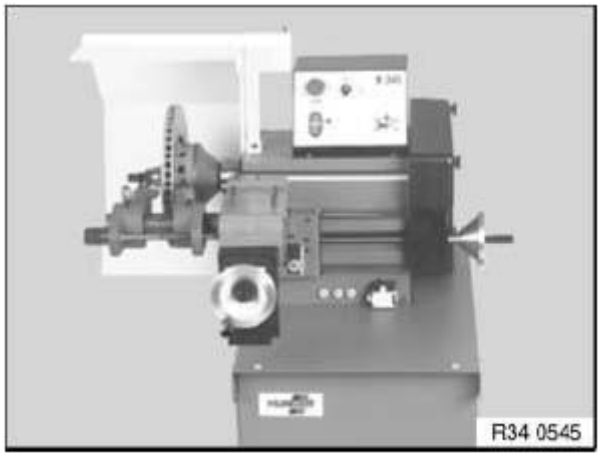


Fig. 50: Identifying Stationary Brake Disc Lathe
Courtesy of BMW OF NORTH AMERICA, INC.

Mobile brake disc lathe

IMPORTANT: Only may be used!

In the case of mobile brake disc lathes, the brake caliper and the brake anchor plate must be removed.

The brake discs remain on the car.

Please refer to the lathe manufacturer's instruction manual for the exact procedure.

Fig. 51: Identifying Mobile Brake Disc Lathe

Courtesy of BMW OF NORTH AMERICA, INC.

After fine-grinding the brake discs, measure the thickness difference inside the braking surfaces at 8 points with an external micrometer.

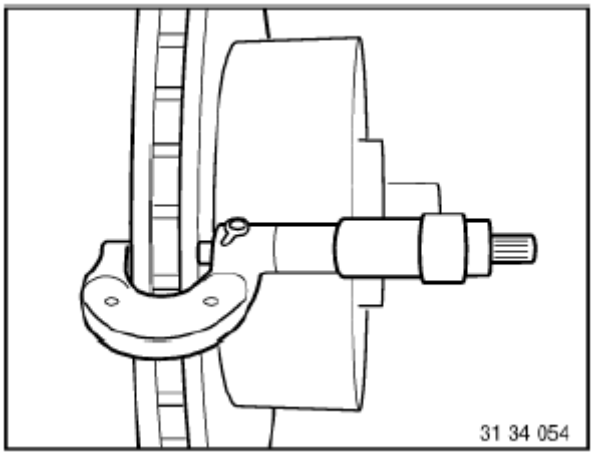


Fig. 52: Checking Brake Disc Thickness
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 320 REMOVING AND INSTALLING OR REPLACING BOTH REAR BRAKE DISCS

Necessary preliminary tasks

- Remove **WHEELS** .
- Remove **BRAKE PADS**

After completing work:

- Read and comply with notes on **BRAKING IN NEW BRAKE DISCS/BRAKE PADS** .

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **SETPOINT VALUE** .

NOTE: If the brake discs are replaced, you must also fit new brake pads. Always replace brake discs in pairs.

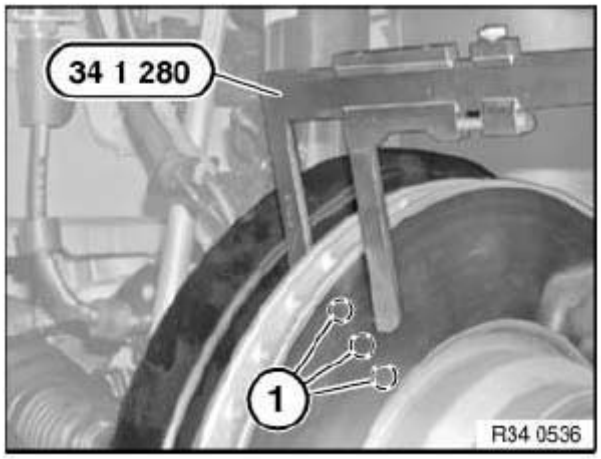


Fig. 53: Positioning Special Tool (34 1 280) At Three Measuring Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be fitted if the brake disc thickness is greater than the MINIMUM BRAKE DISC THICKNESS (MIN TH).
Release screws (1). Detach brake caliper mounting bracket.
Installation:
Tightening torque 34 21 2AZ .

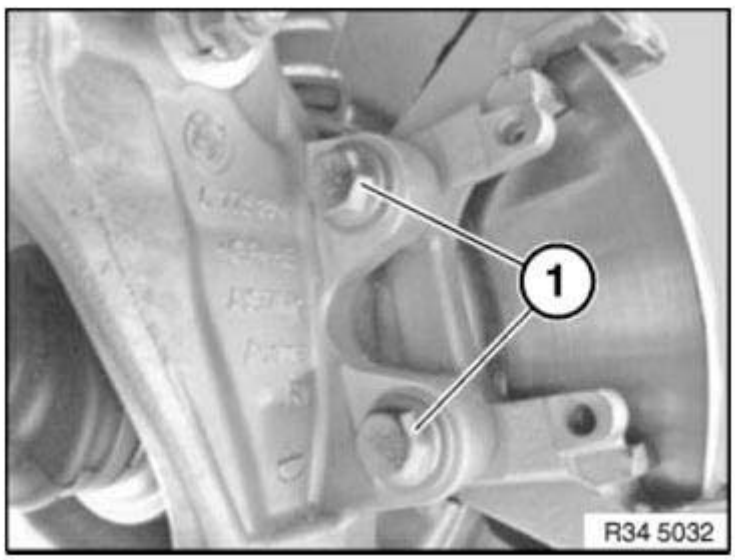


Fig. 54: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To release brake disc: Do not under any circumstances strike friction ring with a hammer or similar!
If necessary, carefully tap on base of brake disc chamber with a rubber mallet.
Clean contact surface of brake disc at wheel hub thoroughly and remove traces of corrosion.

Unevenness on contact surface may result in distortion of brake disc!

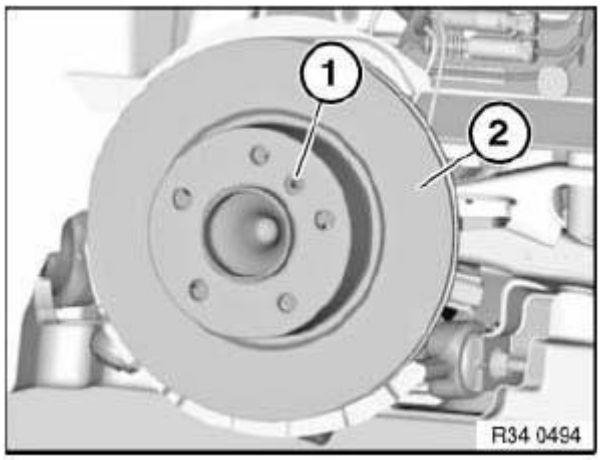


Fig. 55: Identifying Brake Disc With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove brake disc (2).

Installation:

Replace screw.

Tightening torque **34 21 1AZ** .

34 21 200 REMOVING AND INSTALLING OR REPLACING BRAKE PADS ON BOTH REAR DISC BRAKES (TRW FLOATING CALIPER)

Replacing Brake Pads

IMPORTANT:

- **Brake pad wear sensor: after removal it must be replaced (brake pad wear sensor loses its retention capability in the break pad).**
- **Retaining spring: for vehicles older than 48 months it is recommended to replace the retaining spring!**

So as not to damage the surface coating, if possible do not mechanically clean the guide surfaces for the brake pads on the brake caliper mounting bracket. Instead, clean with brake cleaner BMW part no. 83 19 2 154 780 and apply a thin coating of brake pad paste BMW part no. 83 19 2 158 851.

Before removing the brake pads, move the actuators of the electric parking brake into an installation position.

The following procedure must be carried out:

- Connect BMW diagnosis system
- Carry out vehicle test
- Carry out Service function parking brake/installation position

Necessary preliminary work

- Remove **WHEELS** .
- Remove rear **BRAKE PAD WEAR SENSOR**

Unscrew guide bolts (1).

If necessary, grip at hexagon head (2).

Remove brake caliper (3).

Installation note:

Replace guide bolts.

Tightening torque **34 21 4AZ** .

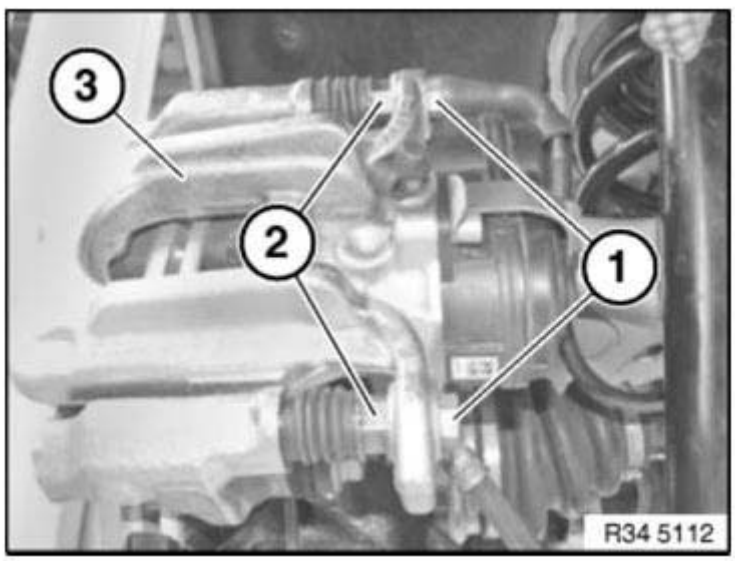


Fig. 56: Identifying Brake Caliper And Guide Bolts With Hexagon Head
Courtesy of BMW OF NORTH AMERICA, INC.

Remove brake pads (1) in direction of arrow from brake anchor plate.

IMPORTANT: Mark any worn brake pads.
In the event of one-sided brake pad wear, do not change brake pads round.

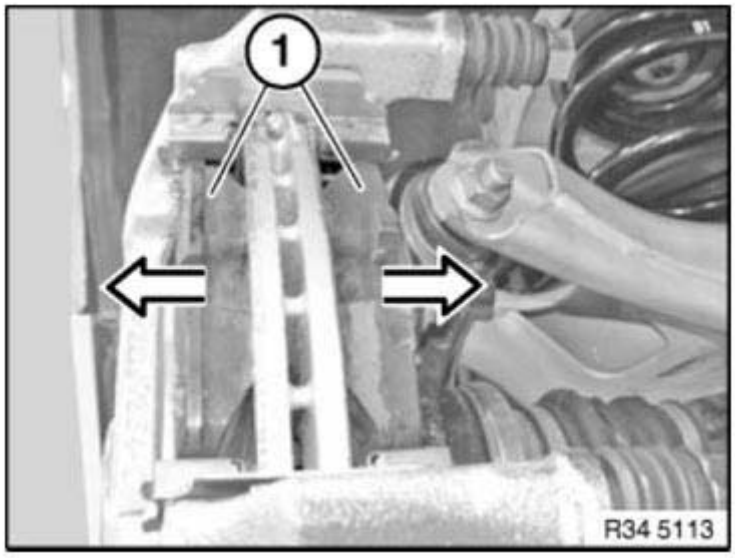


Fig. 57: Removing Brake Pads From Brake Anchor Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Observe **MINIMUM THICKNESS OF BRAKE PADS** .

Clean brake pads.

Do not apply grease to brake lining backplate.

Check minimum brake disc thickness:

- Position special tool 34 1 280 at three measuring points in area (1) and measure.
- Compare measurement result and lowest value with **SETPOINT VALUE** .

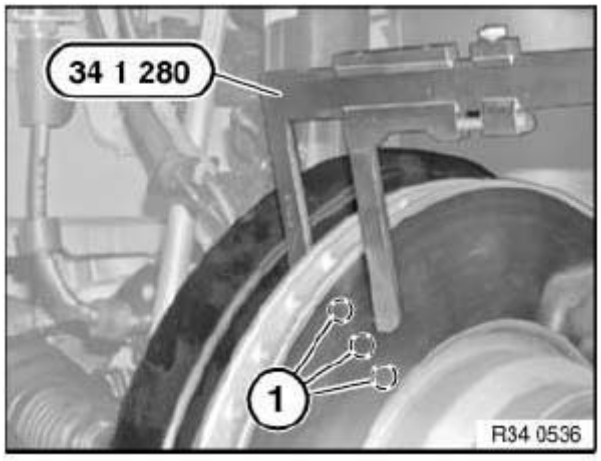


Fig. 58: Positioning Special Tool (34 1 280) At Three Measuring Points
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New brake pads may only be fitted if the brake disc thickness is greater than the MINIMUM BRAKE DISC THICKNESS (MIN TH).

Press brake piston fully back with special tool 34 1 050.

IMPORTANT: When pressing piston back, note brake fluid level in expansion tank. Overflowing brake fluid will damage the paintwork.

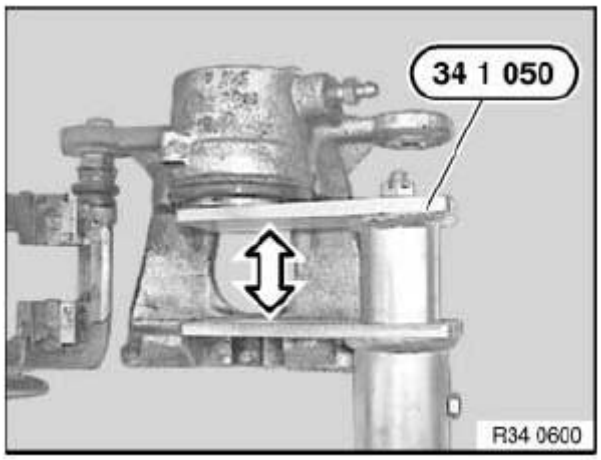


Fig. 59: Pressing Brake Piston Using Special Tool (34 1 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Check dust boot (1) for damage and replace if necessary.

Clean contact surface (2) of brake piston with brake cleaner and apply a thin coating of brake pad paste.

IMPORTANT: Dust boot must not come into contact with brake pad paste as this may cause the dust boot to swell.

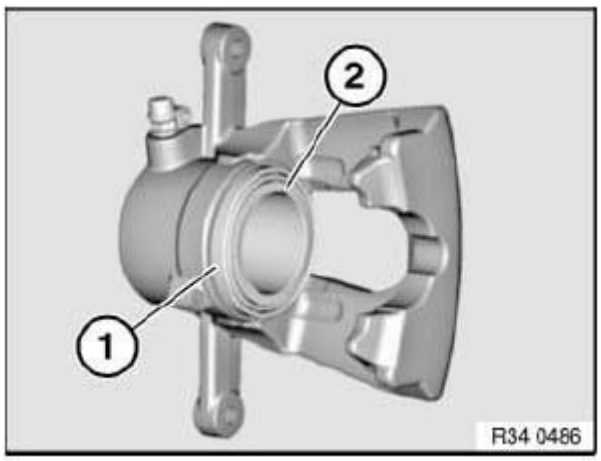


Fig. 60: Identifying Dust Boot And Brake Piston Contact Surface

Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact surface (1) of brake caliper with brake cleaner and apply a thin coating of brake pad paste.

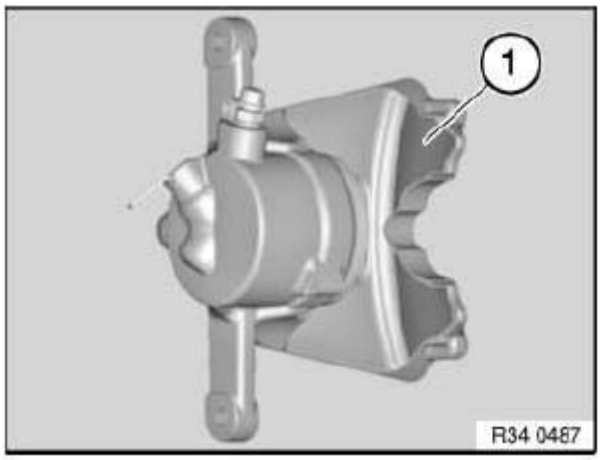


Fig. 61: Identifying Brake Caliper Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

So as not to damage the surface coating, if **possible do not mechanically clean** pad guides (1). Instead, clean with brake cleaner and apply a thin coating of brake pad paste.

IMPORTANT: Brake pad with indentation (1) is intended for accommodating the brake pad wear sensor and must be fitted on the piston side.

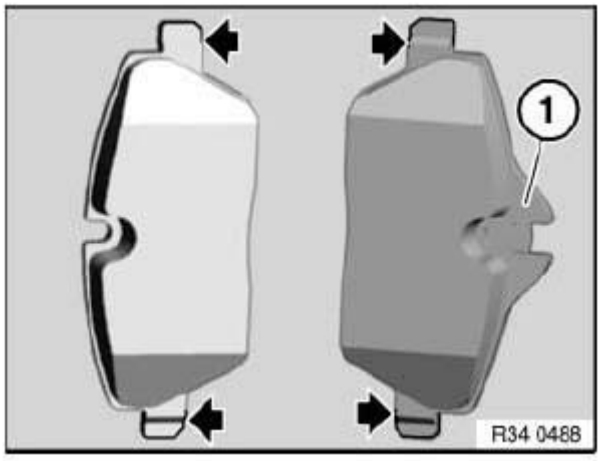


Fig. 62: Identifying Pad Guides
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work:

- **Fully depress brake pedal several times so that brake pads contact brake**

discs.

- **When installing new brake pads at front and rear axles, brake fluid level must be brought up to "MAX" marking.**
- **Read and comply with notes on BRAKING IN NEW BRAKE DISCS/BRAKE PADS .**
- **When replacing pads, reset CBS display in accordance with factory specification.**
- **The installation position of the actuator is automatically cancelled when a speed signal is detected.**

Replacement

Remove lining springs (1) and replace.

Installation note:

So as not to damage the surface coating, **if possible do not mechanically clean** the guide surfaces (1) for the brake pads on the brake caliper mounting bracket.

Instead, clean with brake cleaner and apply a thin coating of brake pad paste.

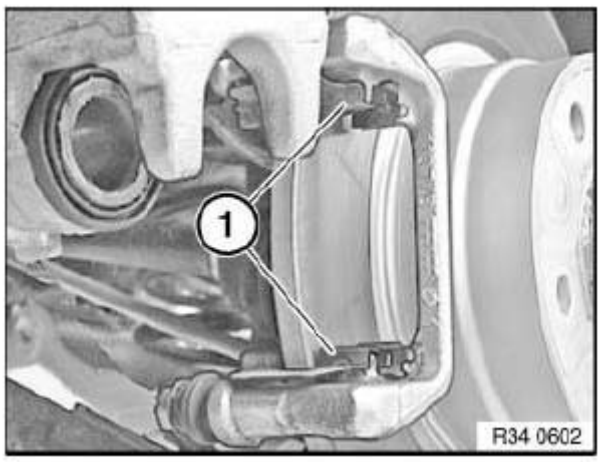


Fig. 63: Identifying Lining Springs
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 745 REMOVING AND INSTALLING OR REPLACING REAR LEFT OR RIGHT BRAKE CALLIPER (TRW)

Necessary preliminary tasks

- Remove **WHEEL**
- Read and comply with **GENERAL INFORMATION** .
- Turn off ignition

After completing work: **BLEED BRAKING SYSTEM**

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected. This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

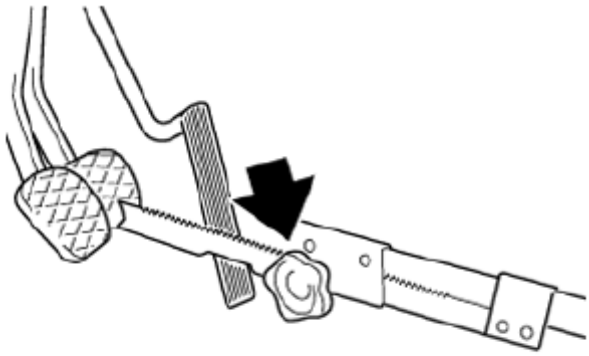


Fig. 64: Locating Brake Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Disconnect brake hose from brake line (1).

Installation:

Tightening torque **34 32 1AZ** Brake Lines.

Pull off retaining clip (3) so that brake hose can be turned.

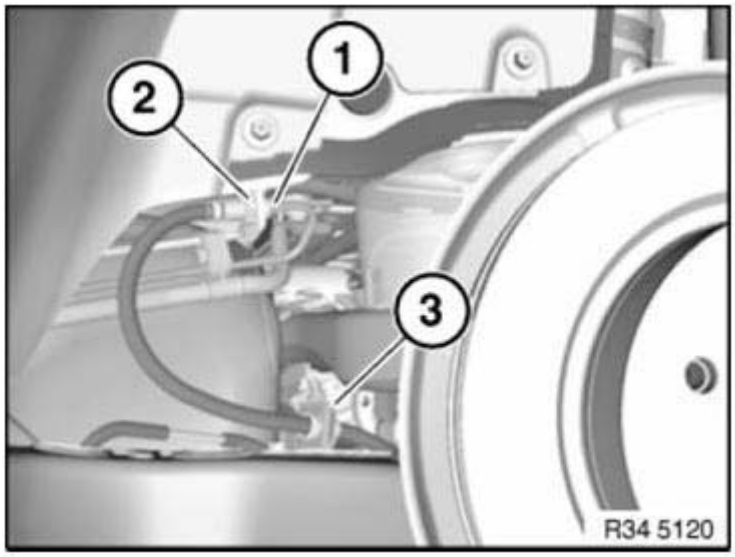


Fig. 65: Identifying Brake Line With Square Head And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off retaining clip (1) so that brake hose can be turned.

Detach brake hose from brake caliper (2).

Installation:

Tightening torque **34 32 3AZ** Brake Lines .

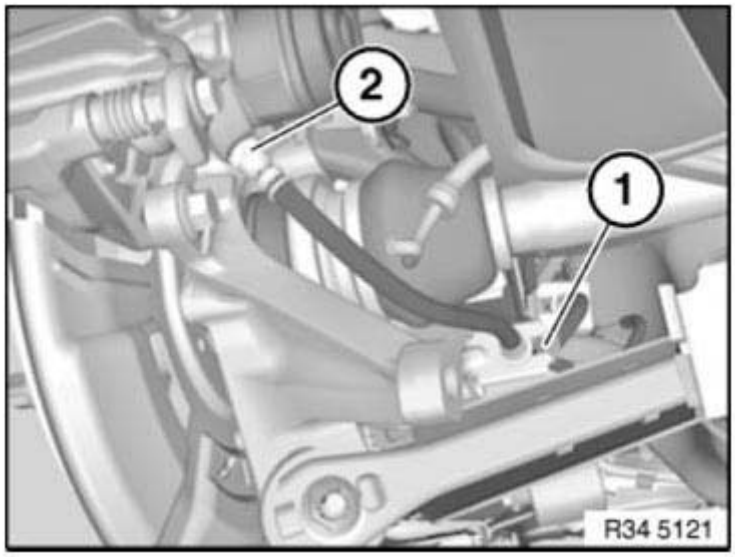


Fig. 66: Identifying Retaining Clip And Brake Caliper
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

NOTE: First tighten brake hose on brake caliper.
Insert brake hose in bracket and screw onto brake pipe.

Disconnect plug connection on parking brake actuator.

IMPORTANT: Switch off ignition at least 30 secs. before disconnecting the plug connection.

Unscrew guide bolts (1).

If necessary, grip at hexagon head (2).

Remove brake caliper (3).

Installation:

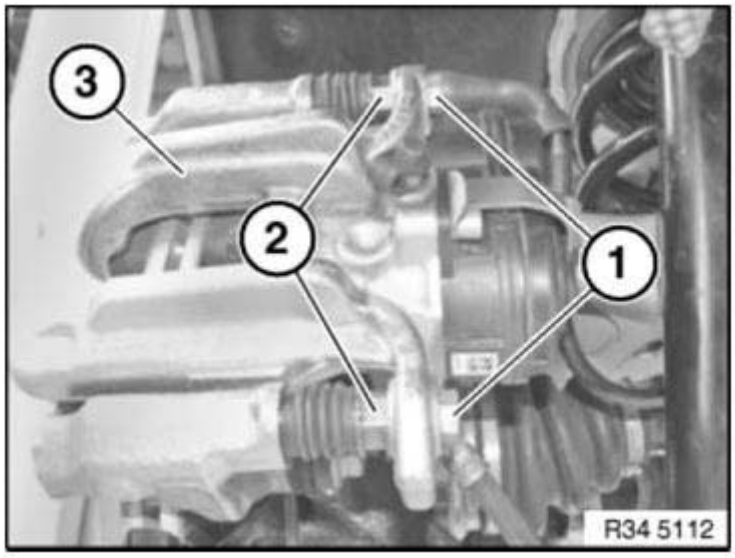


Fig. 67: Identifying Brake Caliper And Guide Bolts With Hexagon Head
Courtesy of BMW OF NORTH AMERICA, INC.

Replace guide screws.

Tightening torque **34 21 4AZ** Rear Brake .

The **PARKING BRAKE ACTUATOR** must be modified if the brake caliper is replaced.

After installation, observe the following: switch on ignition and, using parking brake operating element, open parking brake once, close once and open again.

34 21 169 REMOVING AND INSTALLING/REPLACING A BRAKE ANCHOR PLATE/BRAKE GUARD PLATE AT REAR

Necessary preliminary tasks

- Remove drive flange on rear axle shaft See **3341005 REPLACING LEFT DRIVE FLANGE ON REAR AXLE SHAFT** or **3341007 REPLACING RIGHT DRIVE FLANGE ON REAR AXLE SHAFT** .

Release screws (1).

Installation:

Replace bolts.

Tightening torque **34 21 3AZ** .

Remove retaining plate (2).

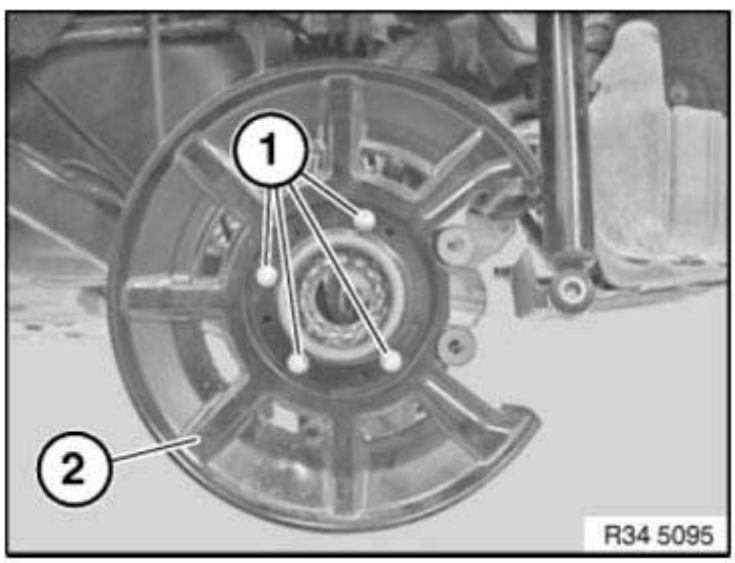


Fig. 68: Identifying Retaining Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

34 21 295 REPLACING REAR LEFT OR RIGHT DUST COLLAR ON BRAKE CALIPER

Necessary preliminary work

- Remove rear brake pads.

NOTE: Dust boot can be replaced without dismantling the brake caliper and without removing the piston.

Use original BMW repair kit.

When the repair work is complete, please pay attention to the following:

- **Check brake pads and brake discs for wear.**
- **Perform brake test on test stand**
- **Perform test drive.**

Remove dust boot (1) from brake caliper (2) in direction of arrow with a suitable tool.

IMPORTANT: Dust boot must not be re-used!

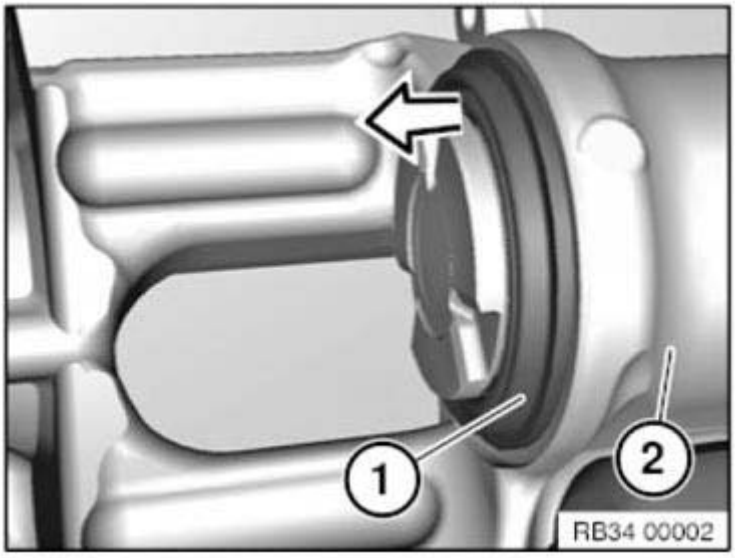


Fig. 69: Removing Dust Boot From Brake Caliper
Courtesy of BMW OF NORTH AMERICA, INC.

Clean contact surface of dust boot at brake caliper housing (1) and piston groove (2) with a lint-free cloth.

IMPORTANT: Carefully check brake caliper housing, cylinder bore and brake piston for damage and corrosion!
Corroded or damaged components must be replaced!
The contact surface on the brake caliper housing must be dry and free of grease before installing the dust boot!

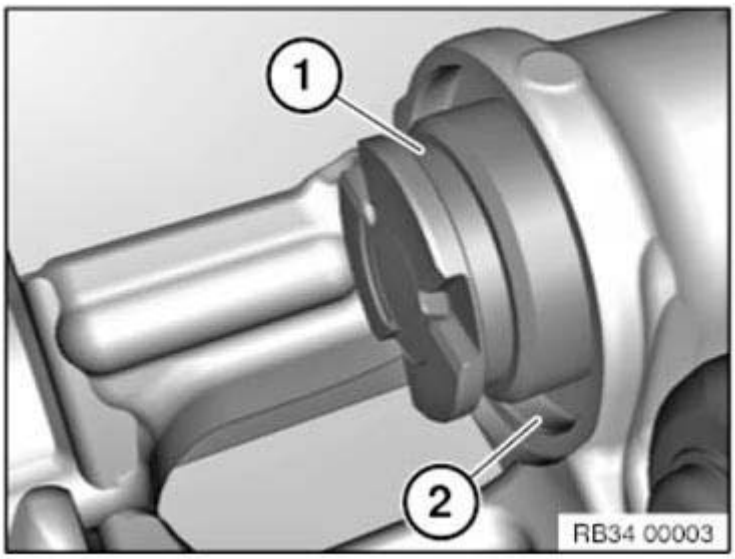


Fig. 70: Identifying Brake Caliper Housing And Piston Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Pull sealing lip (1) of dust boot over the brake piston until the dust boot (2) is properly seated in the brake piston groove.

Put dust boot (2) uniformly onto contact surface of brake caliper housing and uniformly push in.

IMPORTANT: The dust boot must be correctly lying against the entire circumference of the brake caliper housing and the brake piston groove.

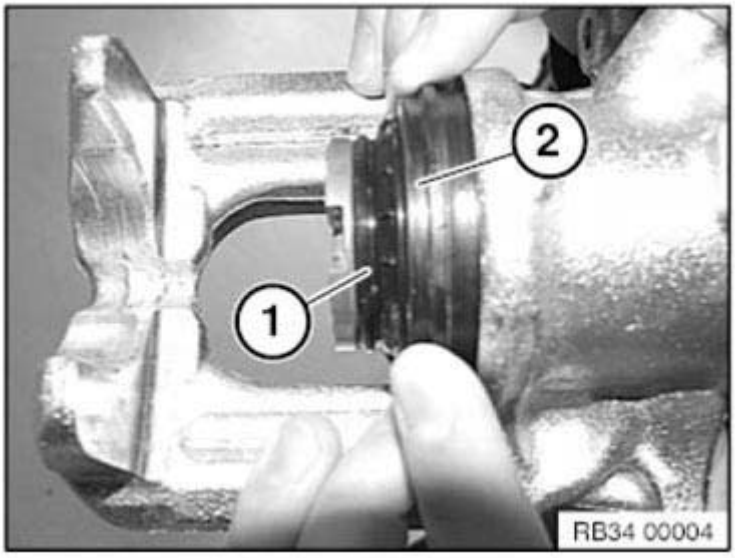
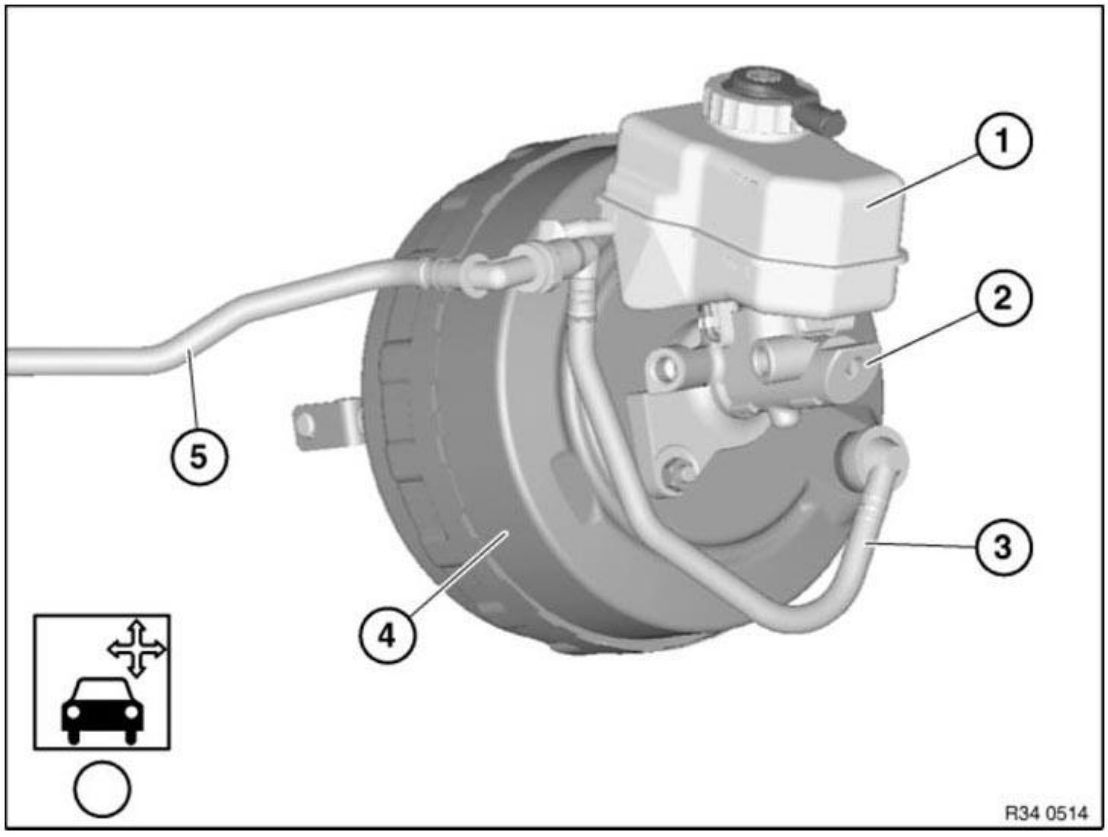


Fig. 71: Pulling Sealing Lip Of Dust Boot
Courtesy of BMW OF NORTH AMERICA, INC.

3431 MASTER BRAKE CYLINDER

34 31 ... OVERVIEW OF BRAKE MASTER CYLINDER/BRAKE BOOSTER



1 Expansion tank
2 Brake master cylinder
3 Non-return valve
4 Brake booster
5 Vacuum hose

Fig. 72: Overview Of Brake Master Cylinder / Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

1. Expansion tank
2. Brake master cylinder
3. Non-return valve
4. Brake booster
5. Vacuum hose
6. Bleed braking system

34 31 181 REMOVING AND INSTALLING/REPLACING EXPANSION TANK FOR HYDRAULIC BRAKE ACTUATION

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .
- Extract brake fluid out of expansion tank. Use a suction bottle used exclusively for drawing off brake fluid.

Do not reuse drawn out brake fluid.

If necessary, pull off supply hose of clutch hydraulic system if necessary.

Unfasten plug connection (1) and disconnect.

Release screw (2).

Pull expansion tank in direction of arrow vertically out of brake master cylinder.

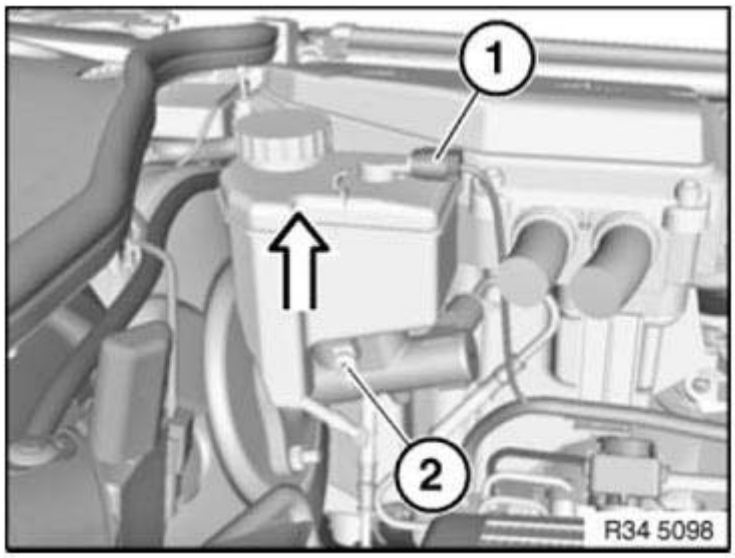


Fig. 73: Pulling Expansion Tank Out Of Brake Master Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check rubber plug in brake master cylinder for damage and replace if necessary.
Push the expansion tank vertically onto the master brake cylinder.

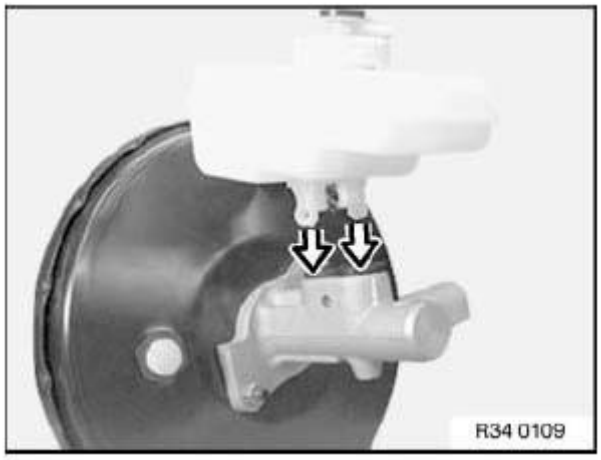


Fig. 74: Pushing Expansion Tank Onto Master Brake Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **BLEED BRAKING SYSTEM**

34 31 505 REMOVING AND INSTALLING/REPLACING MASTER BRAKE CYLINDER FOR DSC

Necessary preliminary tasks

- Remove **EXPANSION TANK** .
- Read and comply with **GENERAL INFORMATION** .

IMPORTANT: Do not bend brake lines.

Unfasten brake lines (1).

Installation:

Tightening torque **34 32 1AZ** .

Close off brake lines and brake master cylinder with plugs **32 1 270** .

Release nuts (2) and feed brake master cylinder out of brake booster.

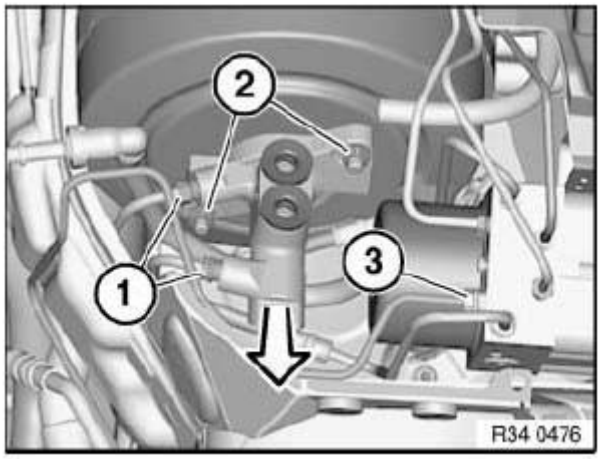


Fig. 75: Removing Brake Master Cylinder Out Of Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace self-locking nuts.

Tightening torque **34 31 1AZ** .

Installation

Replace sealing ring.

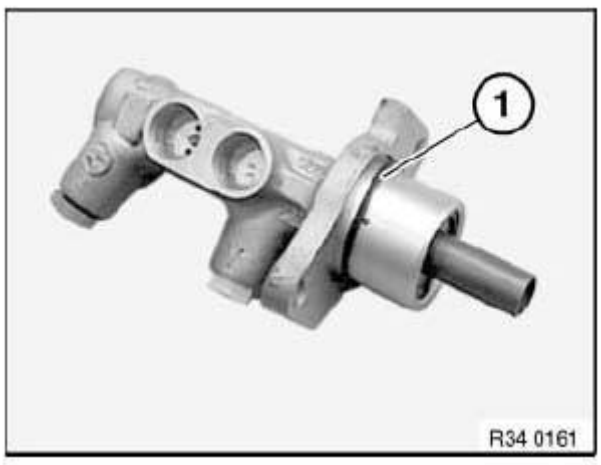


Fig. 76: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When inserting the brake master cylinder (2) into the brake booster (1), make sure the pressure rod of the brake booster and that of the brake master cylinder meet each other on one level.

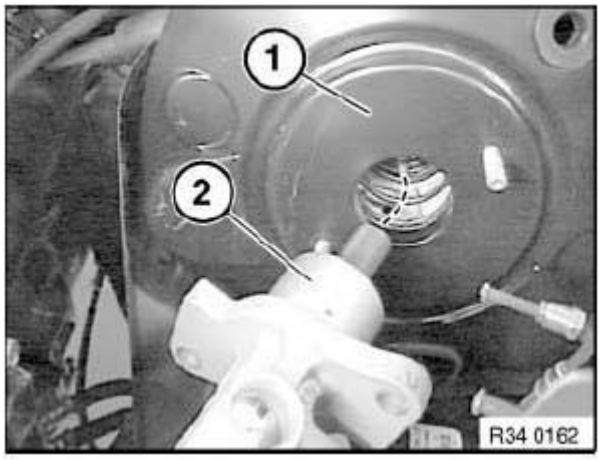


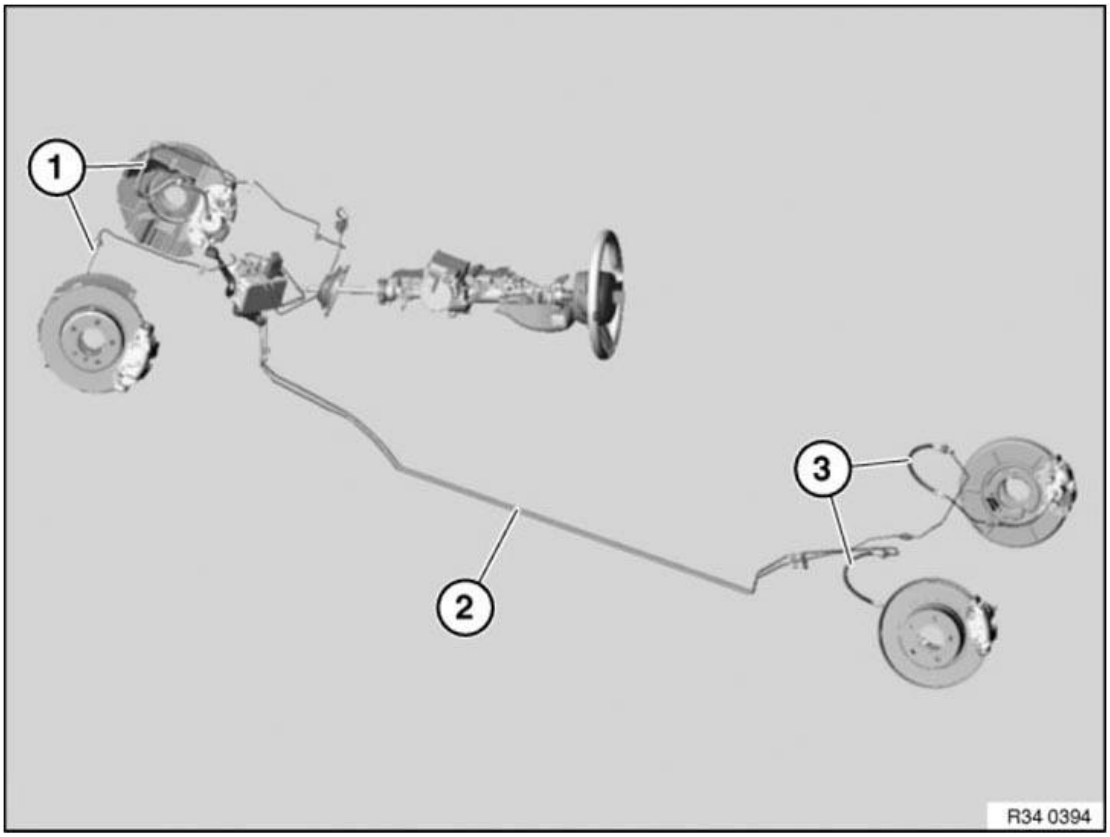
Fig. 77: Identifying Brake Master Cylinder And Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **BLEEDING BRAKE SYSTEM WITH DSC**

3432 BRAKE LINES

34 32 ... OVERVIEW OF BRAKE LINES



1 Brake hose, front 3 Brake hose, rear
2 Brake tubes

Fig. 78: Overview Of Brake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

1. Brake hose, front
2. Brake tubes
3. Brake hose, rear

34 32 861 REPLACING ALL BRAKE PIPES

Special tools required

NOTE: The brake lines are only supplied in the straight version and correct length with connecting nipple.
Read and comply with General Information.
After completing work, bleed brake system.
OBSERVE SAFETY INSTRUCTIONS ON RAISING THE VEHICLE .

New brake lines are bent into shape with bending tool 34 5 100.

Removed brake pipes can be used as templates for bending.

IMPORTANT:

- **Protective coating of brake line must not be damaged during bending.**
- **Do not kink or bend back brake lines.**
- **Watch distances to rigid and movable vehicle parts. Brake lines may not make contact or rub.**
- **Tighten down brake line couplings with torque wrench.**

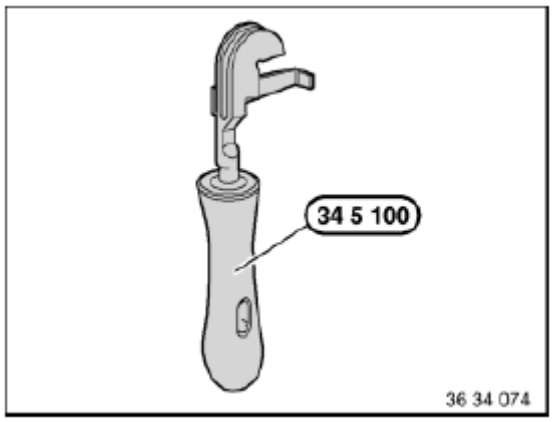


Fig. 79: Identifying Bending Tool (34 5 100)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tightening torque, see 34 32 1AZ in **34 32 BRAKE LINES** .

34 32 881 REPLACING FRONT LEFT OR RIGHT BRAKE HOSE

NOTE:

- **Read and comply with GENERAL INFORMATION .**

After completing work: **BLEED BRAKING SYSTEM**

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

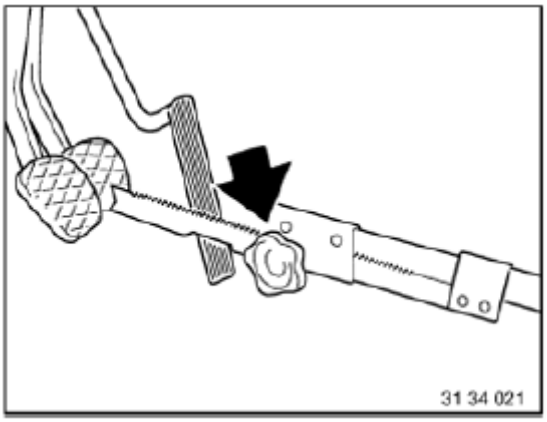


Fig. 80: Locating Brake Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Pull brake hose out of both holders (1).

IMPORTANT: Grip brake hose at square head (2) so that connecting piece cannot rotate in retaining bracket.

Detach brake hose from brake line (3).

Installation:

Tightening torque **34 32 1AZ** .

Detach brake hose from brake caliper (4).

Installation:

Tightening torque **34 32 2AZ** .

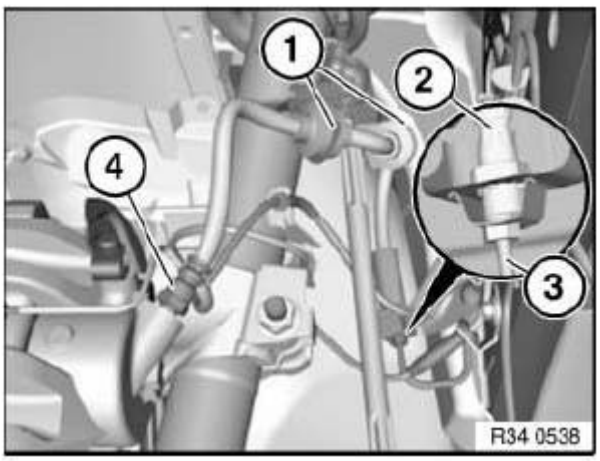


Fig. 81: Identifying Brake Caliper, Brake Line, Brake Hose Square Head And Holder

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: First tighten brake hose on brake caliper.
Move wheels into straight-ahead position.
Insert brake hose in bracket and screw onto brake pipe.
Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

34 32 951 REPLACING REAR LEFT OR RIGHT BRAKE HOSE

NOTE: Read and comply with GENERAL INFORMATION .
After completing work: BLEED BRAKING SYSTEM

Press clutch pedal down to floor and secure with pedal support.

NOTE: The pedal support may only be released when the brake lines are reconnected.

This prevents brake fluid from emerging from the expansion tank and air from entering the system when the brake lines are opened.

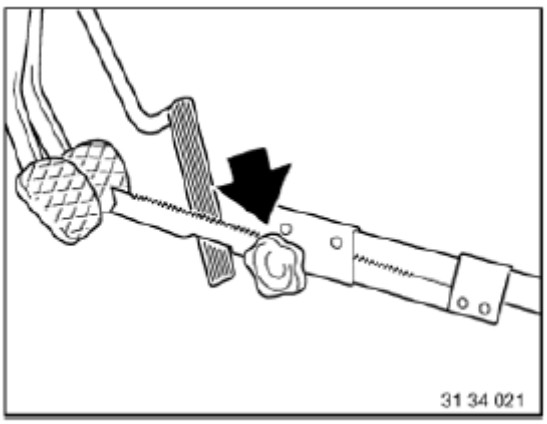


Fig. 82: Locating Brake Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Release union nut (1); to do so, grip brake hose at square (2).

Installation:

Tightening torque **34 32 1AZ** .

Remove retaining clip (3) and remove brake hose from mounting.

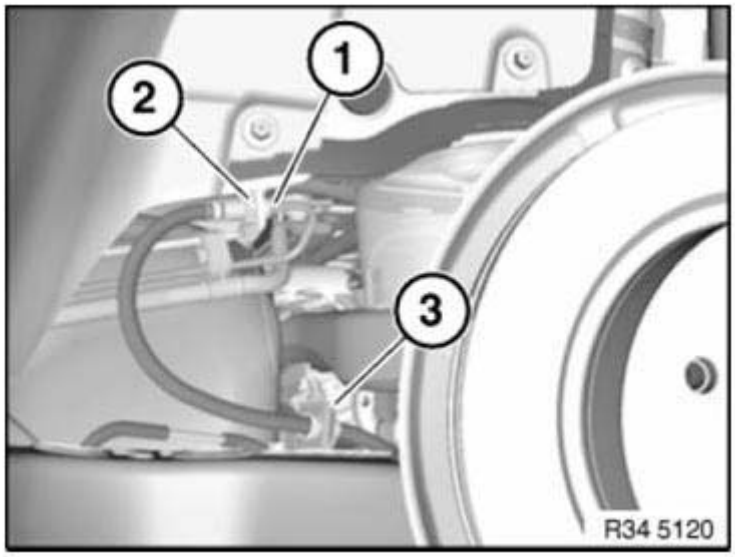


Fig. 83: Identifying Retaining Clip And Union Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining clip (1) and remove brake hose from mounting.

Disconnect brake hose (2) from brake caliper.

Installation:

Tightening torque **34 32 3AZ** .

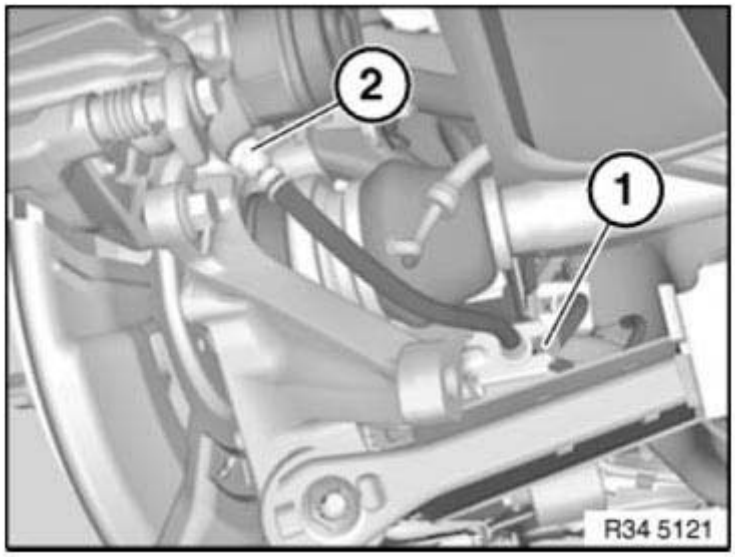


Fig. 84: Identifying Retaining Clip And Brake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mount and tighten brake hose on brake caliper first, then on brake line/brake hose point of connection.
Never twist brake hose when installing it and avoid all contact with parts attached rigidly to the body.

3433 BRAKE BOOSTER

34 33 505 REMOVING AND INSTALLING OR REPLACING BRAKE BOOSTER

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .
- Remove **BRAKE MASTER CYLINDER**
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **TRIM PANEL** for pedal assembly

Release brake lines (1) and remove.

Installation:

Tightening torque **34 32 1AZ** .

Remove non-return valve (2) in direction of arrow from brake booster.

Installation:

Check rubber seal in brake booster and replace if necessary.

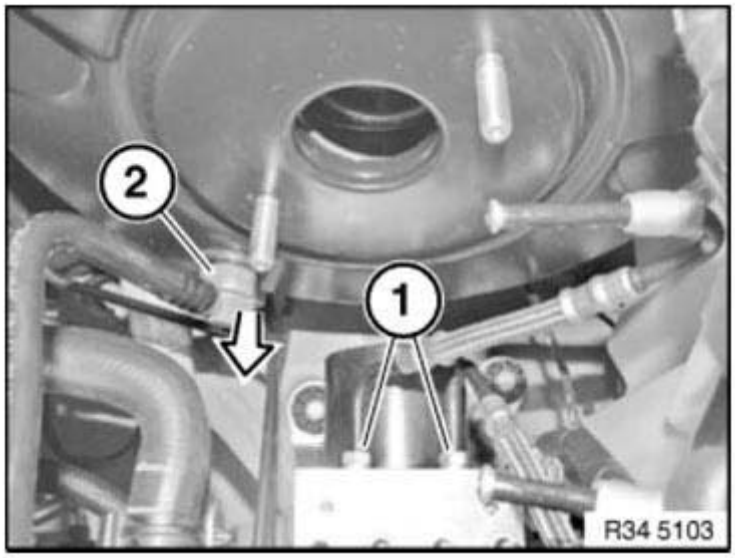


Fig. 85: Removing Non-Return Valve From Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Release screw (2) and swing out battery terminal.

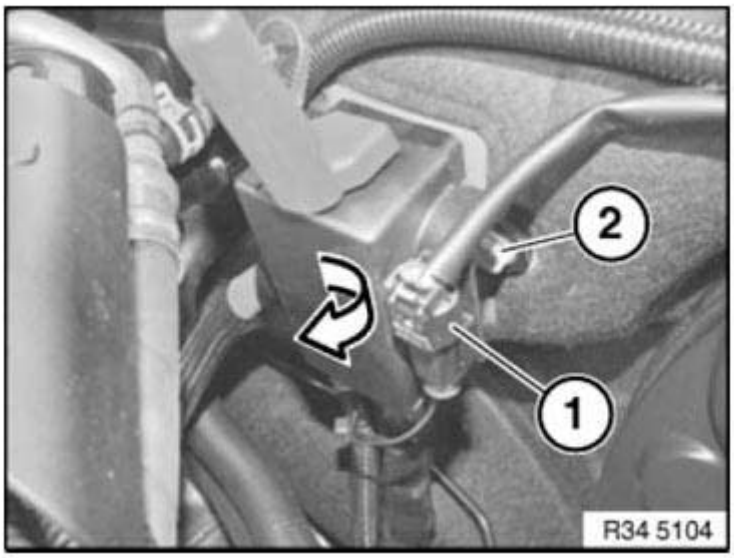


Fig. 86: Removing Battery Terminal
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unhinge the recoil spring (2).

Remove retaining clip (3).

Installation:

Replace locking clip (3).

Locking clip (3) must be seated with both legs in the pin groove.

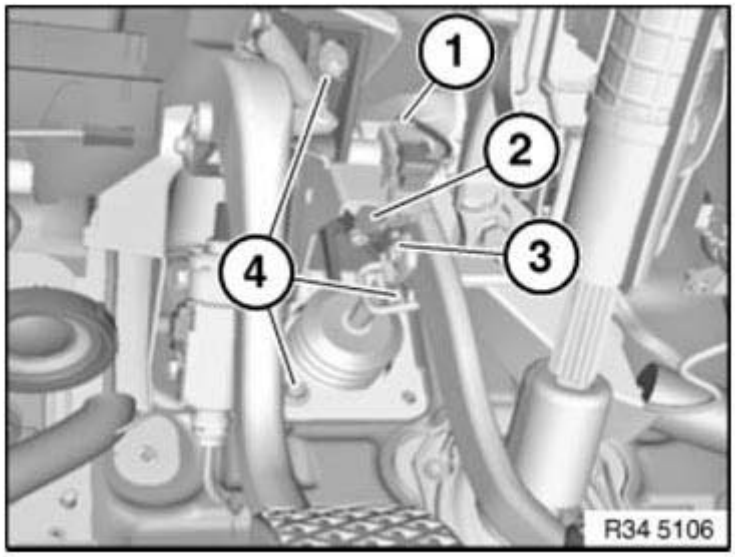


Fig. 87: Identifying Plug Connection, Recoil Spring, Locking Clip And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (4).

Installation:

Tightening torque **35 11 1AZ** .

Move brake booster a little towards engine compartment.

Feed piston rod (1) by turning bearing support out of retaining lug (2).

Installation:

Feed brake pedal in depressed position into piston rod, moving the brake booster a little towards the engine compartment.

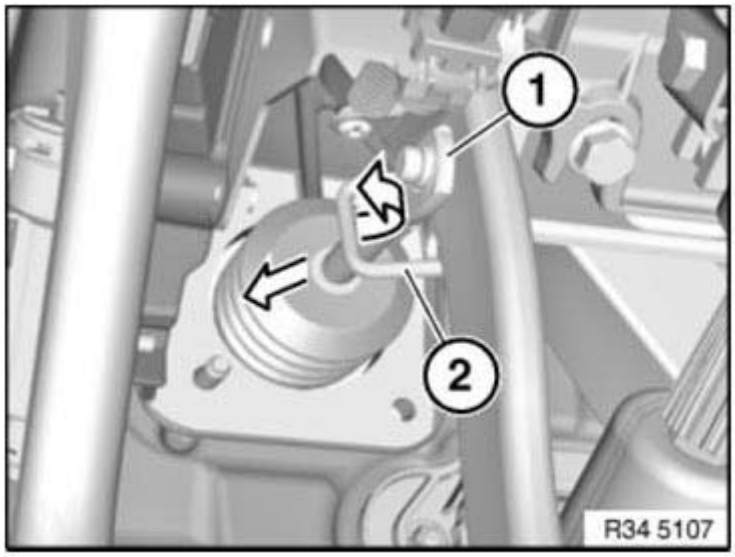


Fig. 88: Removing Piston Rod Out Of Retaining Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing support.

IMPORTANT: Do not use any force when removing and installing the brake unit; the brake unit can be damaged under certain circumstances.
Brake lines must not be bent.

Carefully pull brake booster (1) out of bulkhead and tilt out.

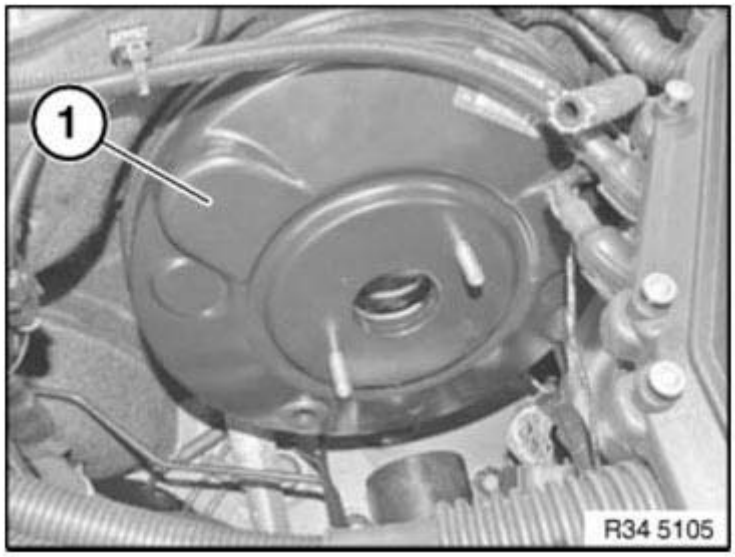


Fig. 89: Identifying Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

34 33 051 REMOVING AND INSTALLING/REPLACING NON-RETURN VALVE FOR BRAKE BOOSTER

NOTE: **This operation is described in: Replacing VACUUM HOSE FOR BRAKE BOOSTER .**

34 33 071 REPLACING VACUUM HOSE FOR BRAKE BOOSTER (N52K)

IMPORTANT: **Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to remove the vacuum hose.**
Vacuum hose and non-return valve are welded together and are replaced together as a single unit.

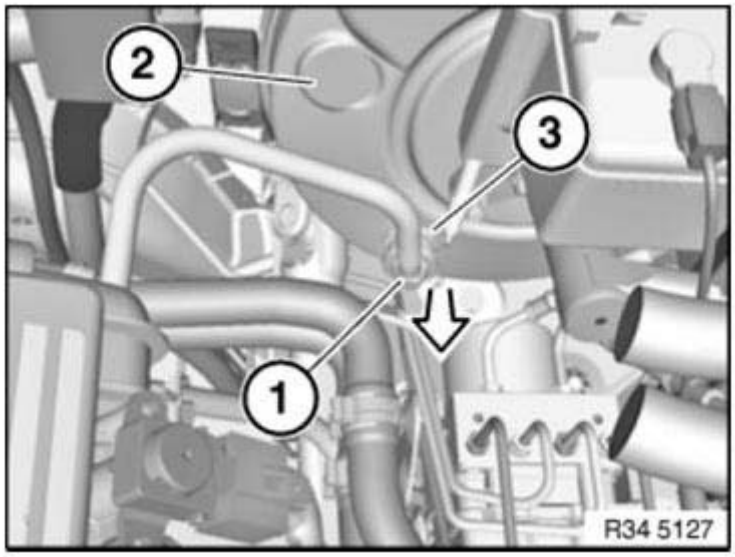


Fig. 90: Removing Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .

IMPORTANT: **Do not kink vacuum line.**
Vacuum line and brake lines must not touch each other in area of brake booster!
Contact with surrounding components is only permitted at the designated toothed rings!

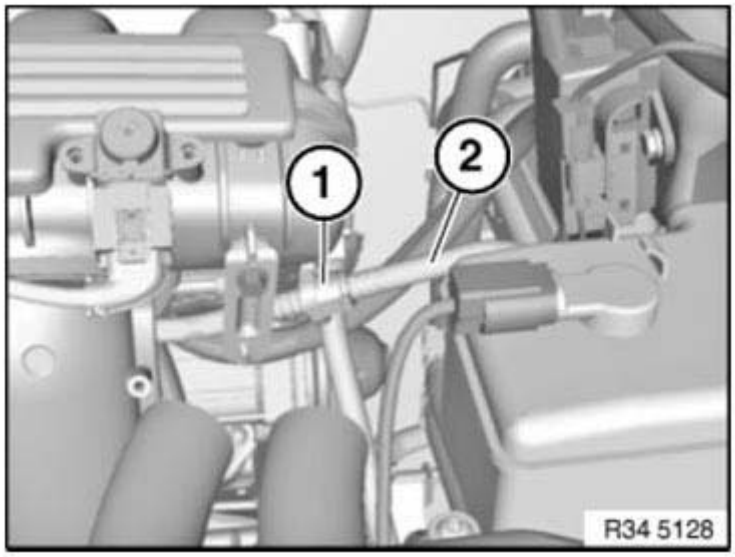


Fig. 91: Identifying Vacuum Line And Brake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Detach vacuum line (1) from brake booster (2).

Installation:

Check seal (3), replace if necessary.

Release quick-release coupling (1).

Installation:

Snap fastener must be felt and heard to snap into place.

Remove vacuum line (2).

34 33 071 REPLACING VACUUM HOSE FOR BRAKE BOOSTER (N54)

IMPORTANT: Before beginning work, fully press the brake pedal several times to reduce the vacuum pressure in the brake booster. This makes it easier to remove the vacuum hose.

Vacuum hose and non-return valve are welded together and are replaced together as a single unit.

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION**.

IMPORTANT: Do not kink vacuum line. Vacuum line and brake lines must not touch each other in area of brake booster!

Detach vacuum line from brake booster.

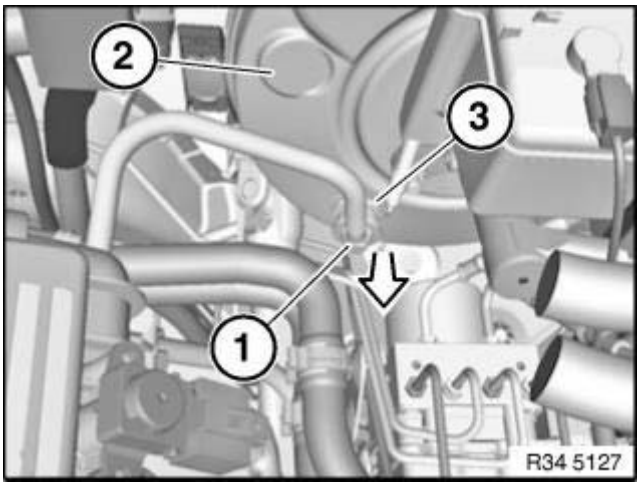


Fig. 92: Detaching Vacuum Line From Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

Installation: Check seal, replace if necessary.

Pull off vacuum hose. Unclip vacuum line from holder. Disconnect snap fastener and remove vacuum line.
Installation: Snap fastener must be felt and heard to snap into place.

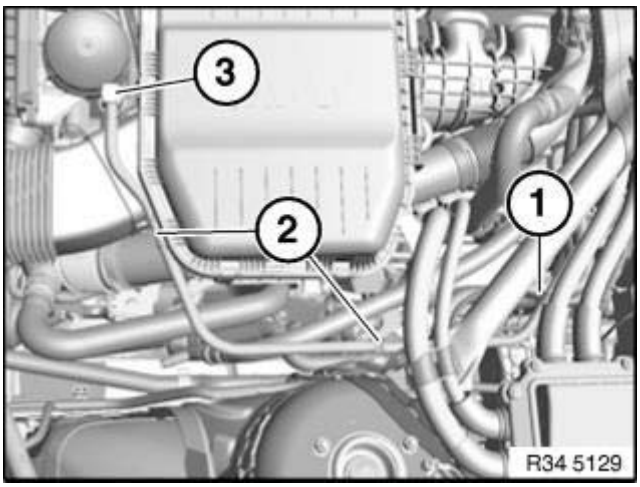


Fig. 93: Identifying Snap Fastener And Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

3435 ELECTRICAL COMPONENTS/WEAR INDICATOR

34 35 001 REPLACING A BRAKE PAD SENSOR (FRONT)

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If a brake pad sensor that has already been ground has to be replaced even though the minimum brake pad thickness has not yet been reached, you must observe the following: The new sliding contact must be filed down with a file to the same length as the ground sliding contact.

Necessary preliminary tasks

- Remove **WHEEL**

Detach brake pad sensor (1) in direction of arrow from brake pad.

Disengage line from cable guides (2).

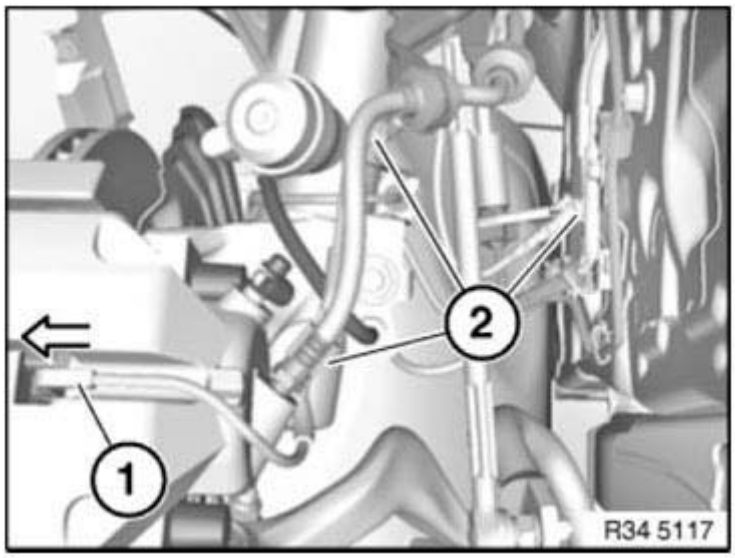


Fig. 94: Removing Brake Pad Sensor From Brake Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Press together retaining lugs (1) of cable holder on spring strut and remove cable tie in downward direction.

Installation:

Replace cable holder if retaining lugs are damaged.

Make sure retaining lugs are correctly seated.

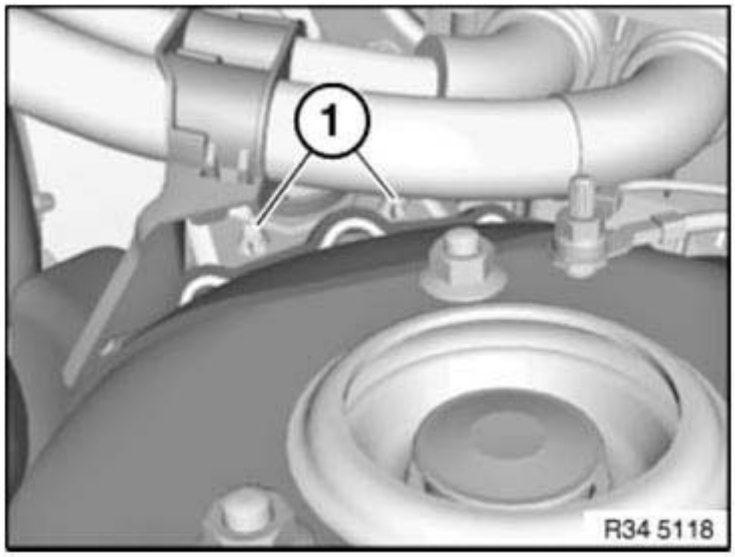


Fig. 95: Identifying Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect relevant plug connection on cable holder (1).

Unclip plug housing on cable holder.

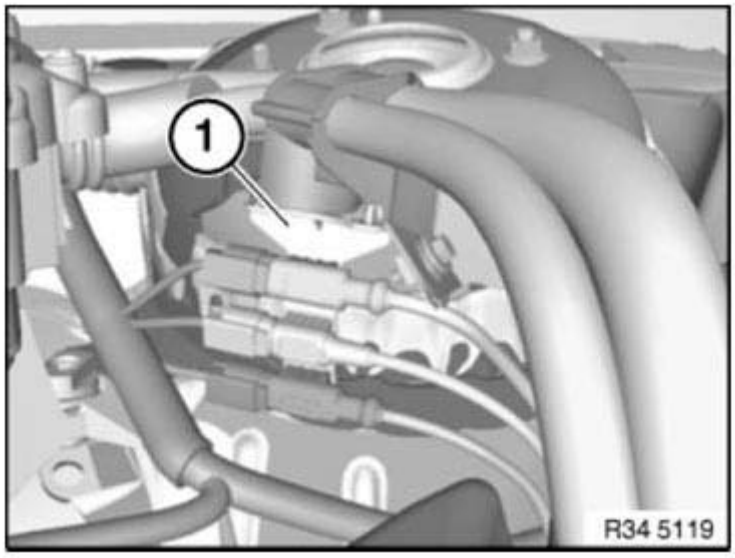


Fig. 96: Identifying Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

34 35 001 REPLACING A BRAKE PAD SENSOR (REAR)

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If an already ground brake pad wear sensor has to be replaced although the **MINIMUM BRAKE PAD THICKNESS** has not yet been reached, it is necessary to file down the new sliding contact with a file to the same length as the ground sliding contact.

Necessary preliminary tasks

- Remove rear right **WHEEL**
- Remove rear right **SPLASH GUARD**

Pull brake pad wear sensor (1) in direction of arrow out of brake pad.

Disengage line from brake pad wear sensor from holders (2).

Installation:

Make sure brake pad wear sensor (2) is correctly seated in brake pad and holder (1).

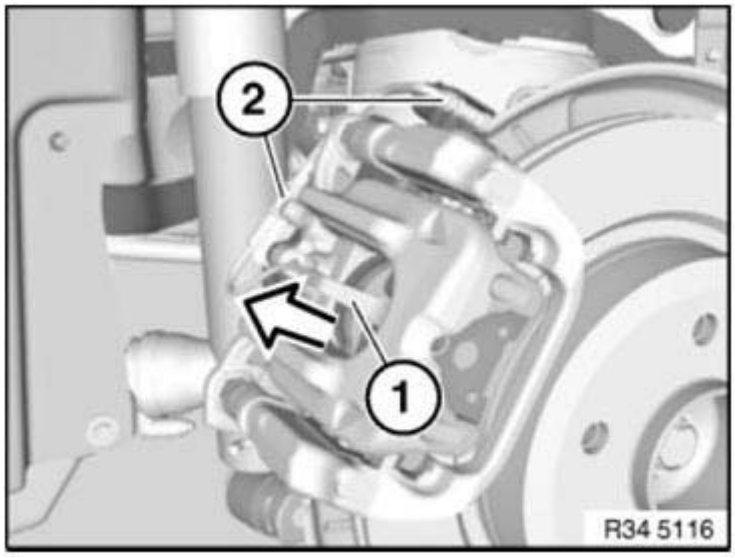


Fig. 97: Pulling Brake Pad Wear Sensor Out Of Brake Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) along cable guide.

Open housing cover (2).

Disconnect plug connection.

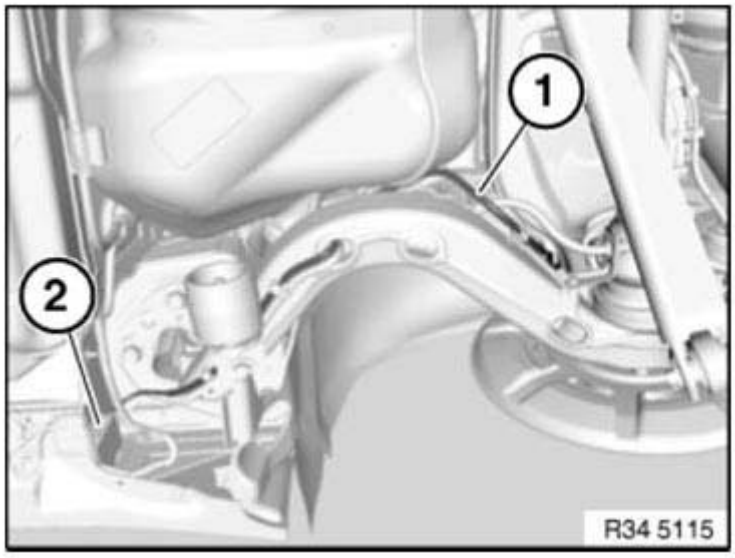


Fig. 98: Identifying Housing Cover And Line
Courtesy of BMW OF NORTH AMERICA, INC.

3441 PARKING BRAKE

34 41 ... ELECTROMECHANICAL PARKING BRAKE - EMERGENCY RELEASE

Necessary preliminary tasks

- Remove **PARKING BRAKE ACTUATOR** on left and right

IMPORTANT: Secure vehicle against rolling, e.g. with chocks.

Using an 7 mm WAF Allen key (1), turn back brake caliper spindle in clockwise direction.

Turn back until wheel can turn freely.

IMPORTANT: Do not turn the spindle to the end stop.
At the end stop a fault code is set which will cause the system to shut down!
If this is the case, clear the fault memory

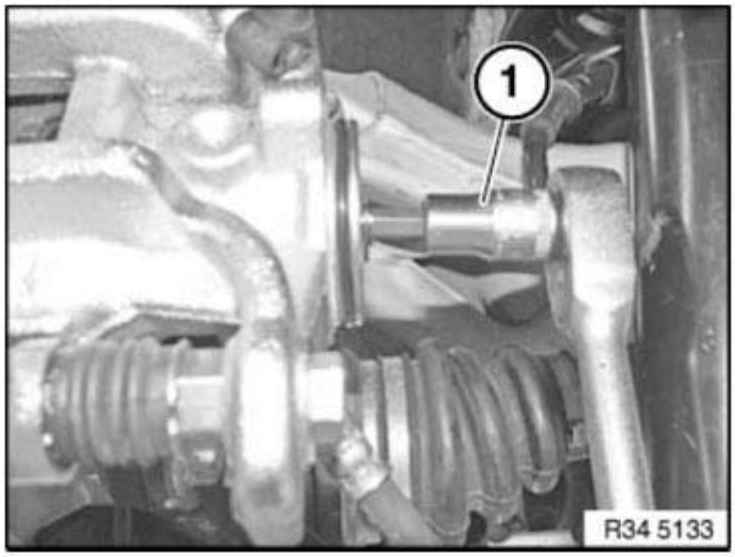
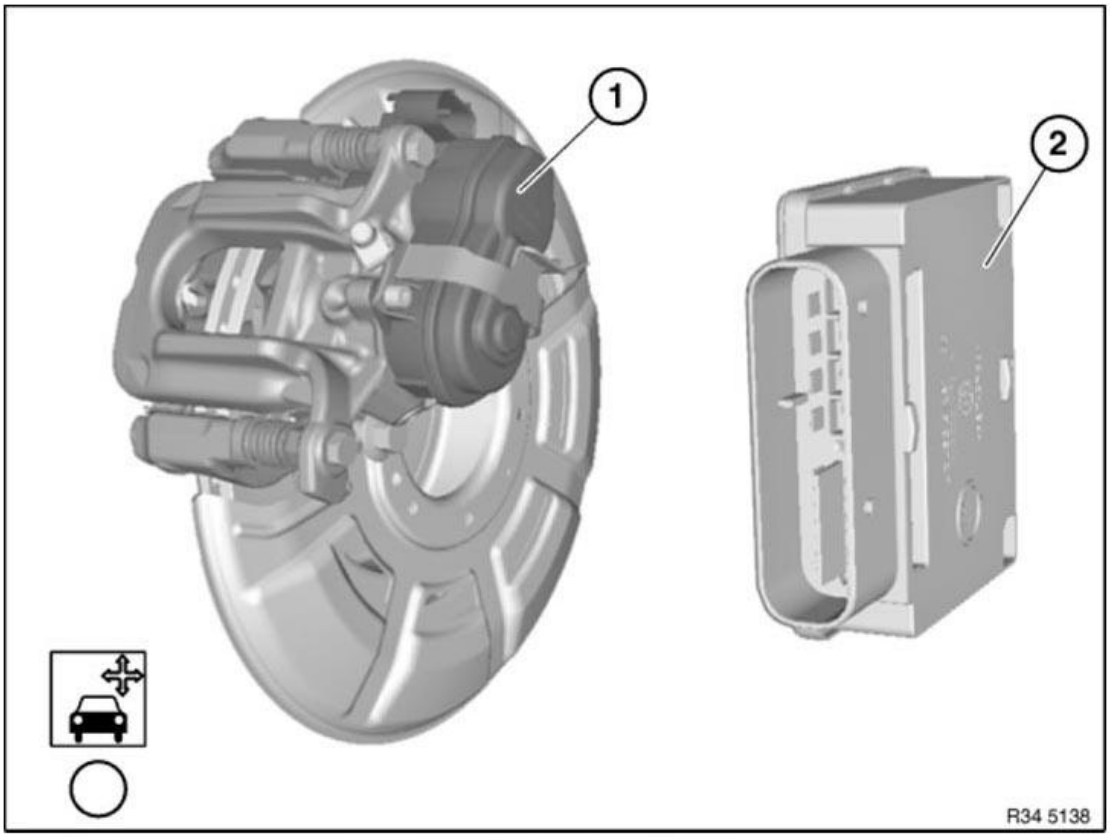


Fig. 99: Identifying WAF Allen Key
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Startup after circuit interruption:

1. **Switch on ignition.**
2. **Press brake button with brake pedal depressed.**
3. **The indicator lamp in the instrument cluster goes out as soon as the parking brake is released.**

34 41 ... OVERVIEW OF PARKING BRAKE



1 Parking brake actuator
2 Parking brake control unit

Fig. 100: Overview Of Parking Brake
Courtesy of BMW OF NORTH AMERICA, INC.

1. Parking brake actuator
2. Parking brake control unit
3. Adjusting parking brake

34 41 295 REMOVING AND INSTALLING CONTROL UNIT FOR PARKING BRAKE

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT TRIM** on side panel on right

Remove control unit (1) from electronics box.

Disconnect plug connection.

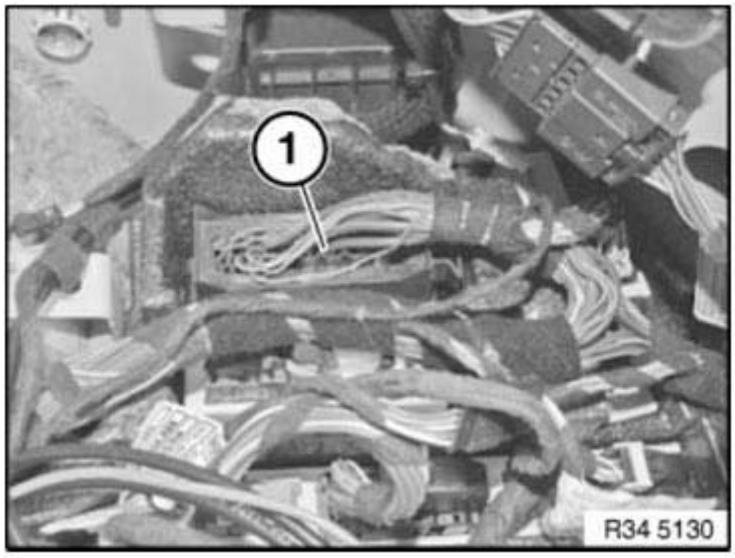


Fig. 101: Identifying Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/encoding of control units.

34 52 162 REMOVING AND INSTALLING/REPLACING PARKING BRAKE ACTUATOR

Necessary preliminary tasks

- Release parking brake
- Turn off ignition

IMPORTANT: Switch off ignition at least 30 secs. before disconnecting the plug connection.

After installation, observe the following: switch on ignition and, using parking brake operating element, open parking brake once, close once and open again.

Disconnect plug connection (1).

Disengage cable from cable holder.

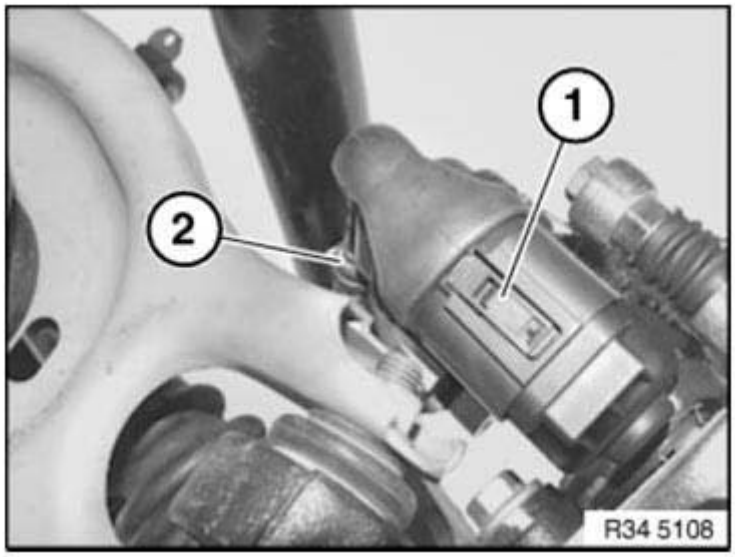


Fig. 102: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Replace screws

Tightening torque **34 41 1AZ** .

Take off holder (2).

Detach actuator drive (3) from brake caliper.

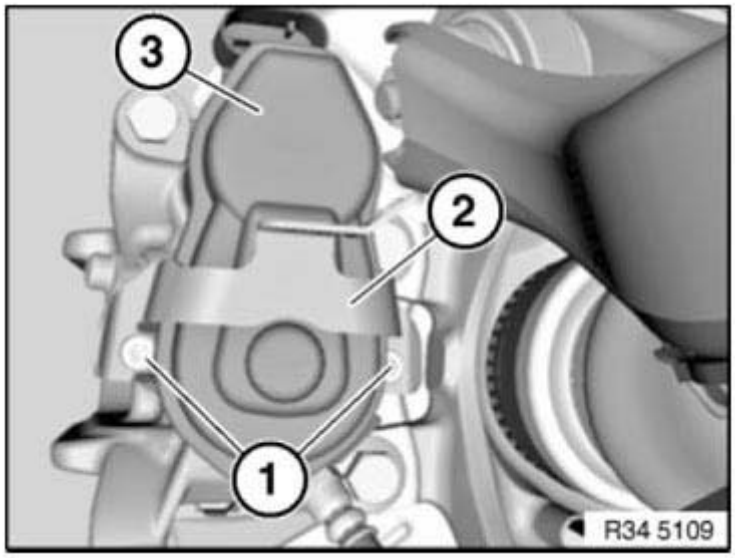


Fig. 103: Identifying Actuator Drive With Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check sealing ring (1), replace if necessary.

Apply a light coating of brake fluid to sealing ring (1) before fitting.

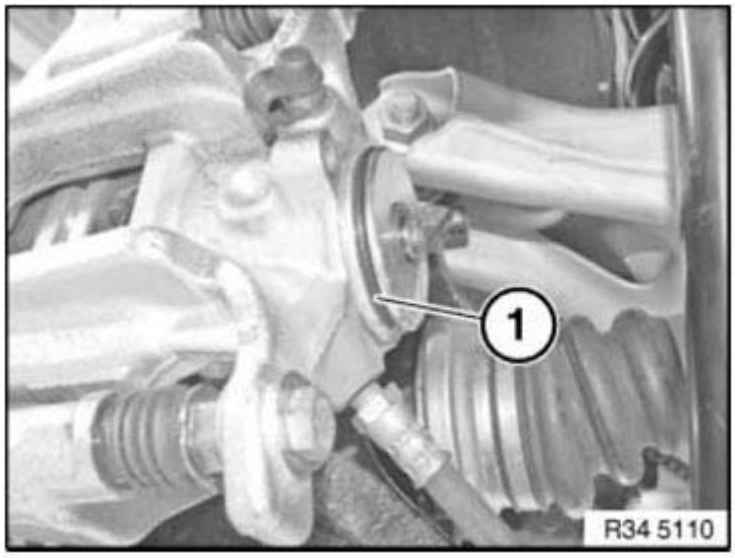


Fig. 104: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carefully fit actuator drive until teeth engage and actuator drive rests flush on brake caliper.

If necessary, turn actuator drive slightly until bore and thread are flush.

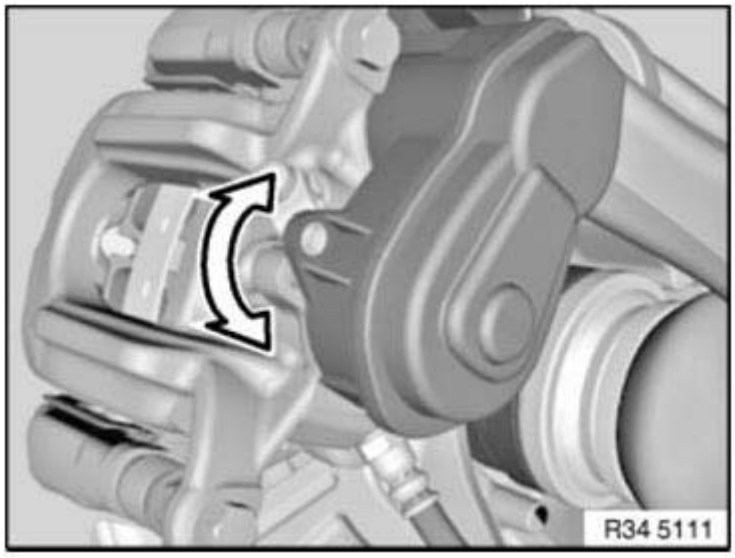


Fig. 105: Turning Actuator Drive
Courtesy of BMW OF NORTH AMERICA, INC.

3451 MECHANICAL/HYDRAULIC COMPONENTS

34 51 527 REMOVING AND INSTALLING OR REPLACING DSC HYDRAULIC UNIT

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .
- Remove left **SUSPENSION CROSS-BRACE**
- Extract brake fluid

NOTE: Extract brake fluid out of expansion tank. Use a suction bottle used exclusively for drawing off brake fluid.

Do not reuse drawn out brake fluid.

After completing work:

- Bleed **BRAKING SYSTEM**

IMPORTANT: Do not mix up brake lines.
If necessary, mark before removal.
Close off connection bores with plugs.

Disconnect plug connection (1).

Unfasten brake lines (2).

Installation:

Tightening torque **34 32 1AZ** .

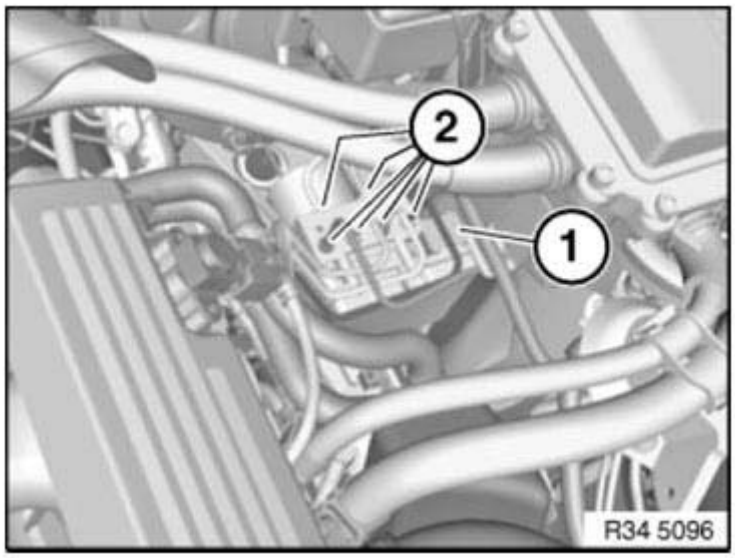


Fig. 106: Identifying Plug Connection And Brake Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip holders (1) for water hoses.

Release screw (2).

Installation:

Tightening torque **34 51 6AZ** .

Remove rear hydraulic control unit from holder and remove towards top.

IMPORTANT: Brake lines must not be bent!

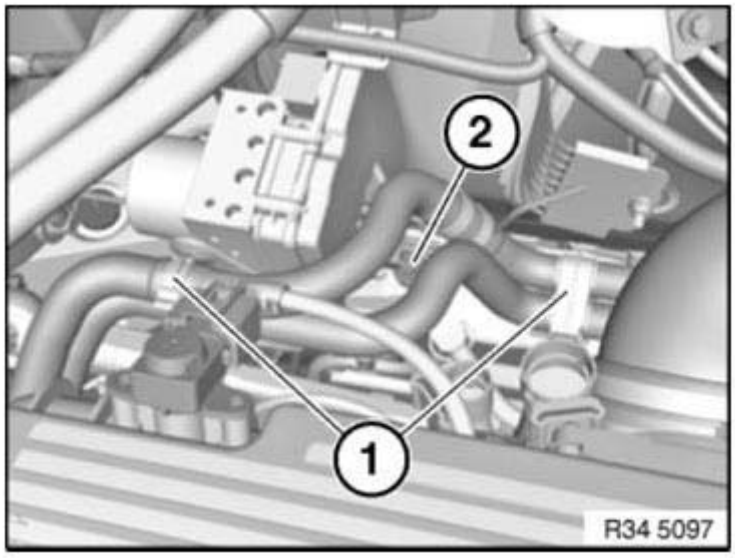


Fig. 107: Identifying Screws And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing hydraulic unit

Release screws (1) and convert holder (2).

Installation:

Tightening torque **34 51 5AZ** .

Modify **DSC CONTROL UNIT** .

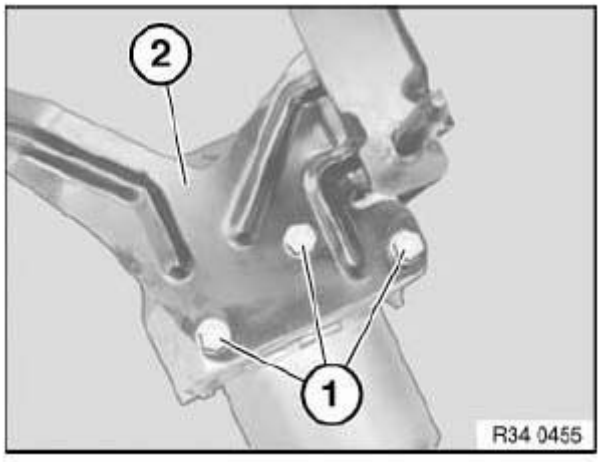


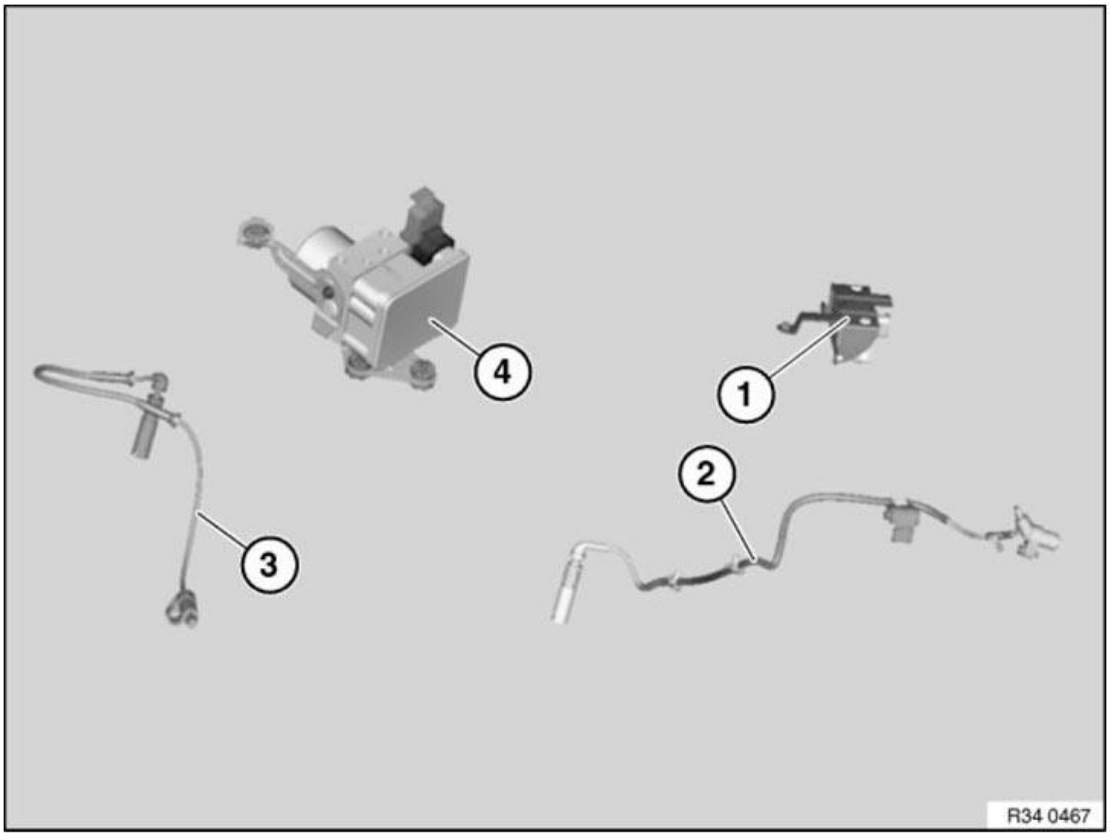
Fig. 108: Identifying Hydraulic Unit Convert Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing control unit

- Carry out programming/coding.
- **ADJUSTMENT OF STEERING ANGLE SENSOR**
- Mix-up check of brake lines

3452 ELECTRONIC COMPONENTS

34 52 ... OVERVIEW OF ELECTRONIC COMPONENTS



1 DSC sensor
2 Pulse sensor, rear
3 Pulse sensor, front
4 DSC control unit

Fig. 109: Overview Of Electronic Components
Courtesy of BMW OF NORTH AMERICA, INC.

- DSC sensor
- Pulse sensor, rear
- Pulse sensor, front
- DSC control unit

34 52 550 REMOVING AND INSTALLING/REPLACING DSC SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC

DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- **REMOVE RIGHT FRONT SEAT**
- **REMOVE FRONT RIGHT DOOR SILL COVER STRIP**
- Remove **SIDE PANEL** in right footwell

Fold carpet (1) to one side and expose DSC sensor (2).

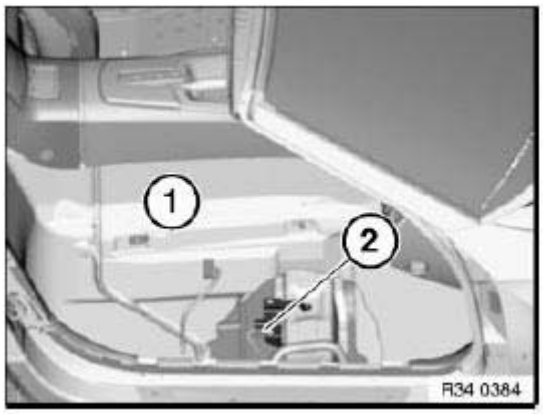


Fig. 110: Identifying Carpet And DSC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Vibration-sensitive component.
Implement screw connection correctly, otherwise there may be malfunctions in the DSC.

Unlock and disconnect plug (1).

Release screws (2) and remove DSC sensor (3) with holder.

Installation:

Tightening torque **34 51 3AZ** .

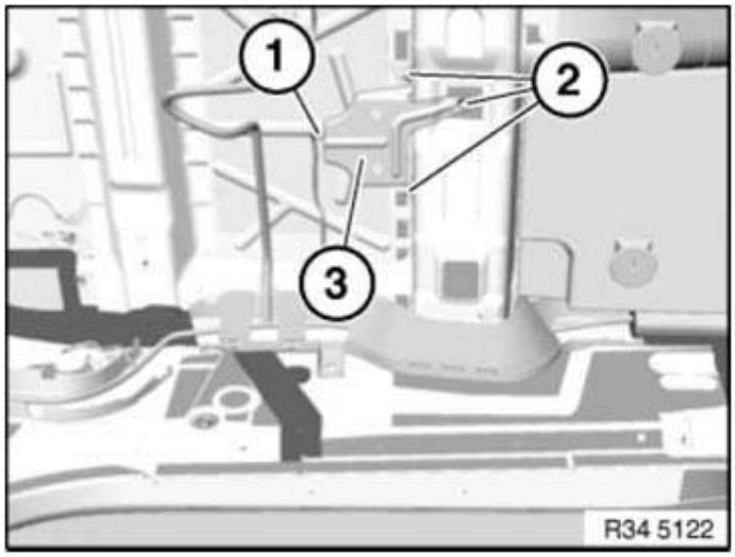


Fig. 111: Identifying DSC Sensor With Plug And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and detach DSC sensor (2) from holder.

Installation:

Tightening torque **34 51 2AZ** .

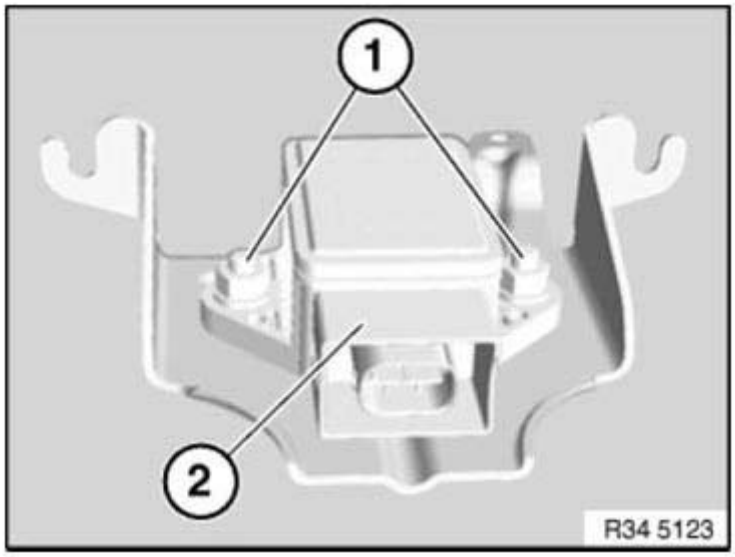


Fig. 112: Identifying DSC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Carry out calibration/adjustment of DSC sensor.

34 52 516 REMOVING AND INSTALLING/REPLACING DSC CONTROL UNIT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove left **SUSPENSION CROSS-BRACE**
- Disengage heater feed/heater return water hoses from holders

Disconnect plug connection (1).

Unfasten screws (2).

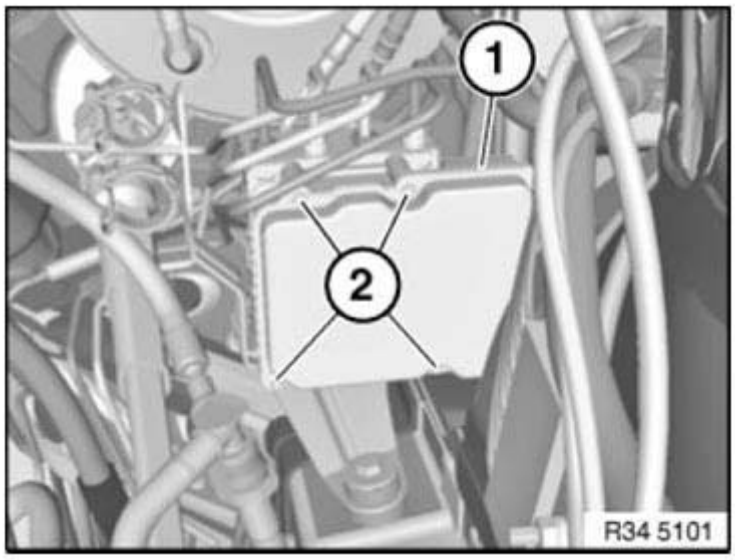


Fig. 113: Identifying Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully detach control unit (1) in direction of arrow from hydraulic control unit (2).

IMPORTANT: Risk of damage to the contacts when removing and installing the hydraulic control unit.

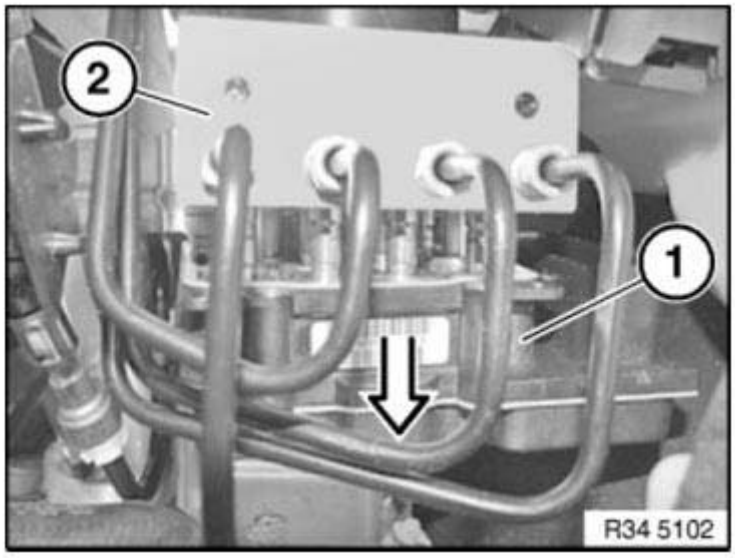


Fig. 114: Disconnecting Control Unit From Hydraulic Control
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep sealing faces clean.

Replace screws.

Observe tightening sequence (1-4).

Tightening torque **34 51 1AZ** .

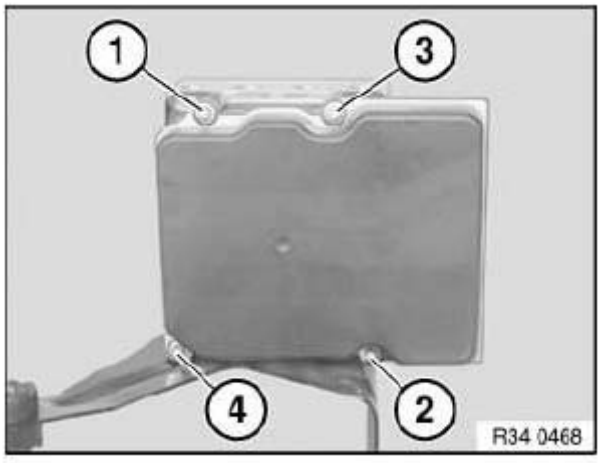


Fig. 115: Front Control Unit Screws Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Carry out programming/encoding
- **STEERING ANGLE SENSOR ADJUSTMENT**

  or

- Function check of hydraulic control unit

34 52 162 REMOVING AND INSTALLING/REPLACING PARKING BRAKE ACTUATOR

Necessary preliminary tasks

- Release parking brake
- Turn off ignition

IMPORTANT: Switch off ignition at least 30 secs. before disconnecting the plug connection.

After installation, observe the following: switch on ignition and, using parking brake operating element, open parking brake once, close once and open again.

Disconnect plug connection (1).

Disengage cable from cable holder.

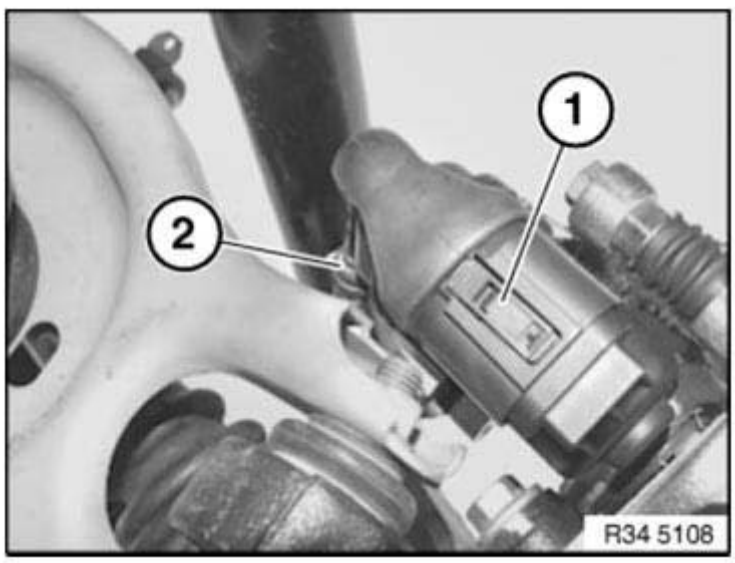


Fig. 116: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Replace screws

Tightening torque **34 41 1AZ** .

Take off holder (2).

Detach actuator drive (3) from brake caliper.

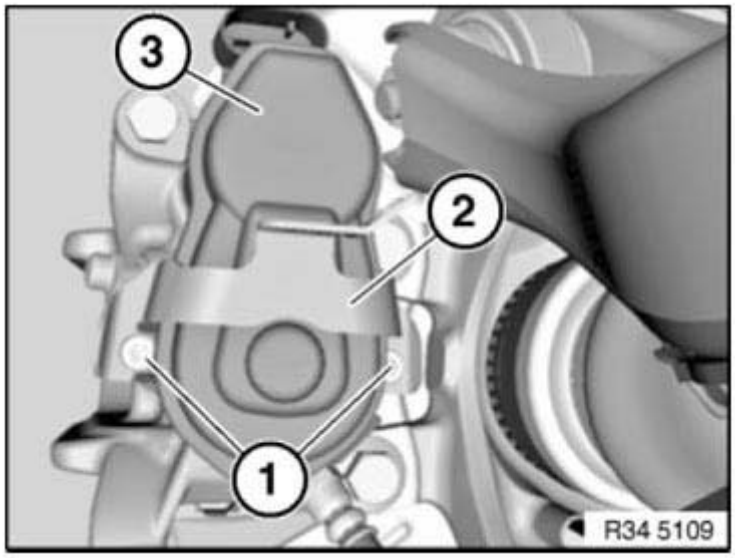


Fig. 117: Identifying Actuator Drive With Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check sealing ring (1), replace if necessary.

Apply a light coating of brake fluid to sealing ring (1) before fitting.

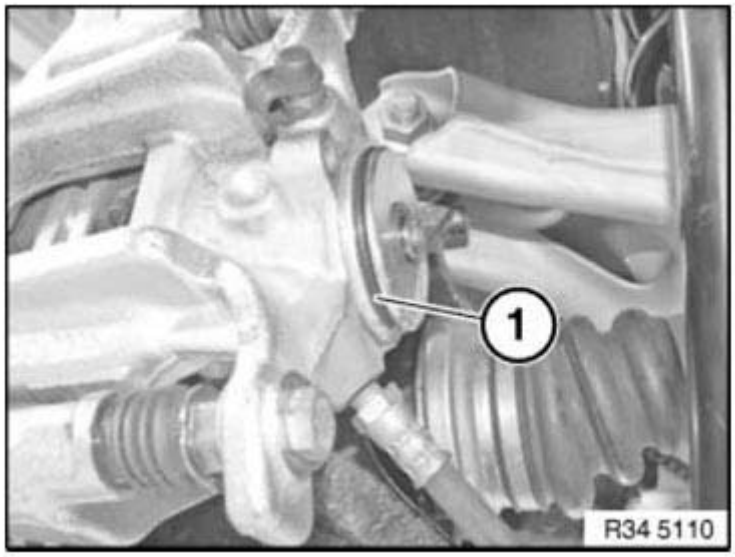


Fig. 118: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Carefully fit actuator drive until teeth engage and actuator drive rests flush on brake caliper.

If necessary, turn actuator drive slightly until bore and thread are flush.

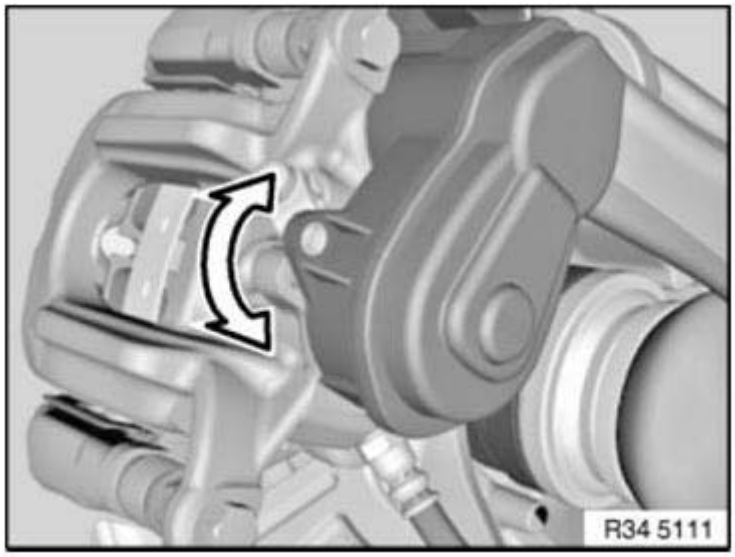


Fig. 119: Turning Actuator Drive
Courtesy of BMW OF NORTH AMERICA, INC.

34 35 001 REPLACING A BRAKE PAD SENSOR (REAR)

IMPORTANT: The brake pad wear sensor must be replaced once it has been removed (brake pad wear sensor loses its retention capability in the brake pad).

If an already ground brake pad wear sensor has to be replaced although the **MINIMUM BRAKE PAD THICKNESS** has not yet been reached, it is necessary to file down the new sliding contact with a file to the same length as the ground sliding contact.

Necessary preliminary tasks

- Remove rear right **WHEEL**
- Remove rear right **SPLASH GUARD**

Pull brake pad wear sensor (1) in direction of arrow out of brake pad.

Disengage line from brake pad wear sensor from holders (2).

Installation:

Make sure brake pad wear sensor (2) is correctly seated in brake pad and holder (1).

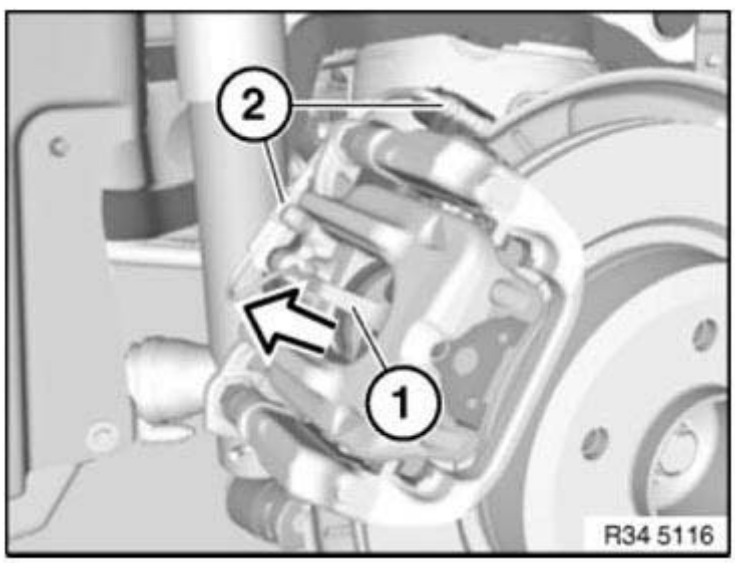


Fig. 120: Pulling Brake Pad Wear Sensor Out Of Brake Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) along cable guide.

Open housing cover (2).

Disconnect plug connection.

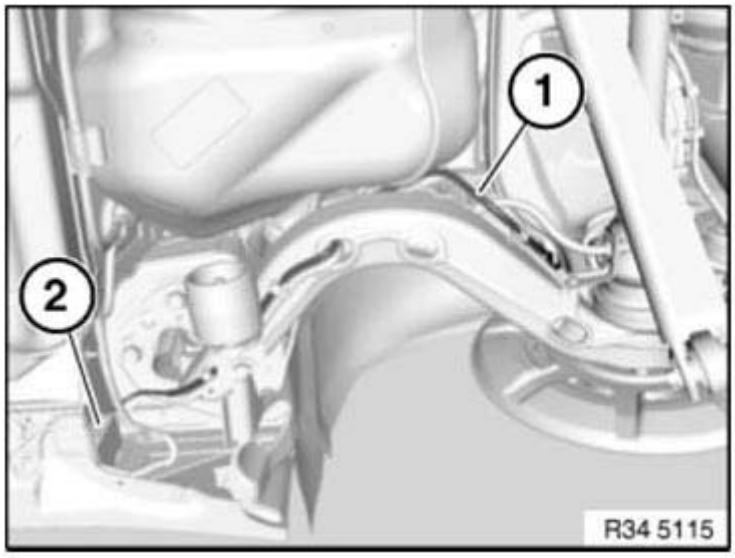


Fig. 121: Identifying Housing Cover And Line
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 535 REPLACING A REAR PULSE GENERATOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary tasks

- Remove rear **WHEEL**
- Remove rear **SPLASH GUARD**
- Read and comply with **GENERAL INFORMATION** .

Release screw (1).

Withdraw wheel speed sensor (2) from bore hole.

Installation:

Tightening torque **34 51 4AZ** .

Clean bore for pulse generator and lubricate with Staburags NBU 12/K lubricating grease.

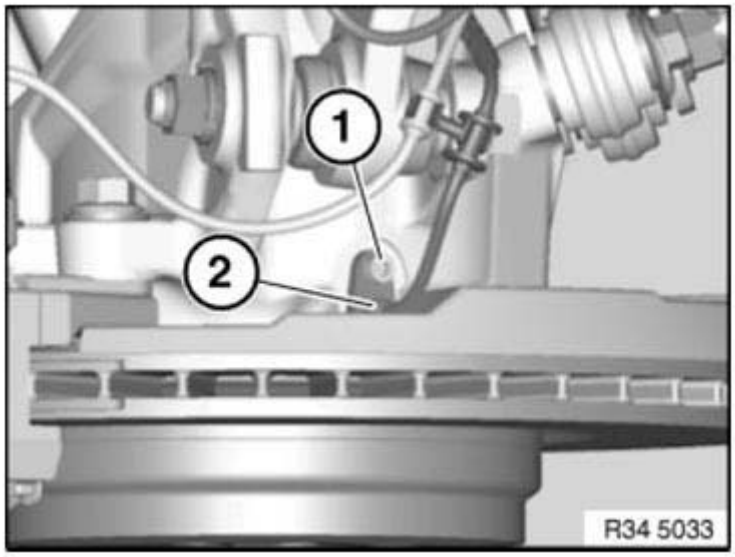


Fig. 122: Identifying Wheel Speed Sensor And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage line (1) along trailing arm from holders.

Installation:

Ensure proper locking of the holders and proper seating of the line in the holders.

Open housing cover (1).

Disconnect plug connection.

Installation:

Ensure proper locking of plug connector and proper seating of rubber grommets.

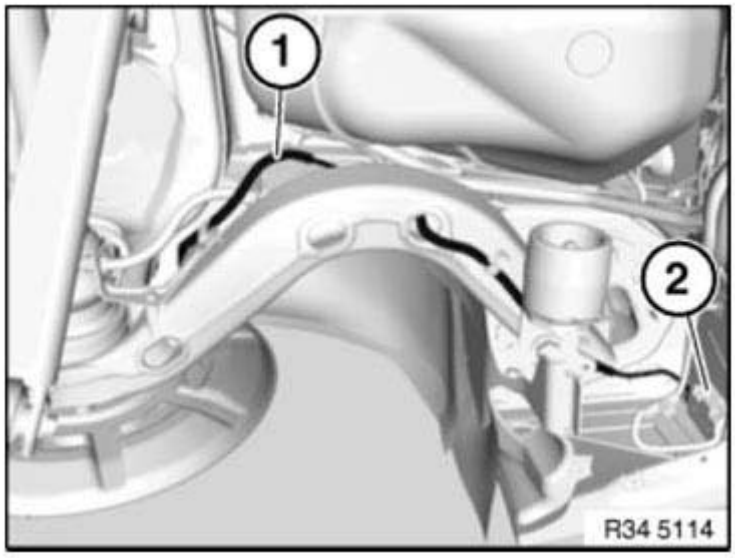


Fig. 123: Identifying Line
Courtesy of BMW OF NORTH AMERICA, INC.

34 52 525 REPLACING ONE FRONT PULSE GENERATOR

NOTE: Read and comply with GENERAL INFORMATION .

Open plug housing (1), pull plug connection (2) out of bracket and disconnect.

Pull cable with rubber grommet out of holders (3).

Installation:

Ensure proper locking of plug connector and proper seating of rubber grommets.

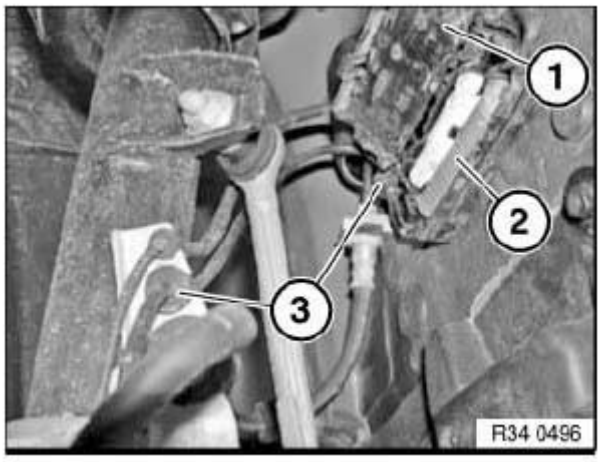


Fig. 124: Identifying Plug Housing, Plug Connection And Holders
Courtesy of BMW OF NORTH AMERICA, INC.

Release hexagon socket head cap screw (1) and pull wheel speed sensor (2) out of bore.

Installation:

Tightening torque **34 51 4AZ** .

Clean bore for pulse generator and lubricate with Staburags NBU 12/K grease.

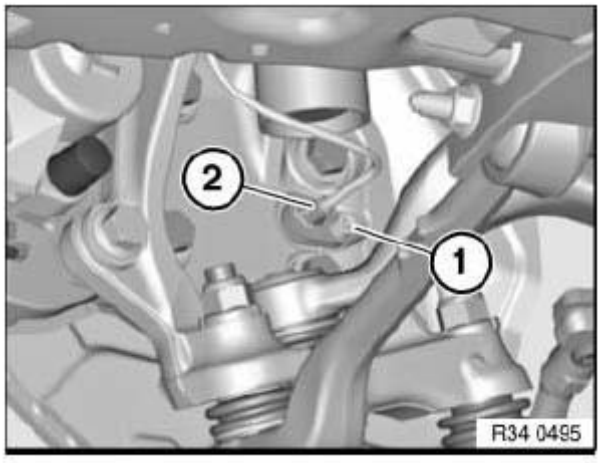


Fig. 125: Identifying Wheel Speed Sensor And Hexagon Socket Head Cap Screw
Courtesy of BMW OF NORTH AMERICA, INC.

34 BRAKES

34-1260 GAUGE

341260 Gauge Minimum set: Mechanical tools MW

NOTE: (Brake pad measuring gauge) For measuring brake pad thickness without dismantling wheels.

SI number

01 12 95 (992)

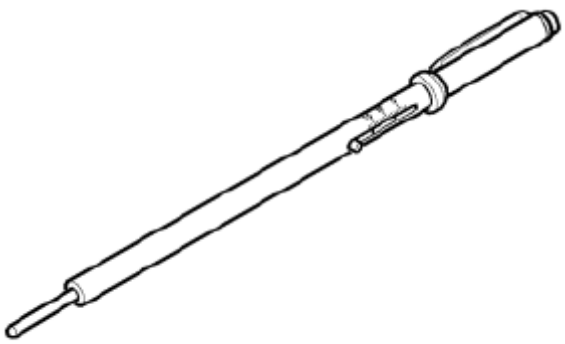


Fig. 1: Identifying Gauge (341260)
Courtesy of BMW OF NORTH AMERICA, INC.

E89 FRONT BRAKE

34 11 FRONT BRAKE E89

FRONT BRAKE SPECIFICATION

IMPORTANT:

New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).
Minimum brake disc thickness during general inspection (GI):
Nominal size thickness minus 2.4 mm
(Not applicable to perforated brake discs and M vehicles)
M vehicles and perforated brake discs:
Nominal size thickness minus 1.6 mm
Depending on:
Engine type
Transmission version
Equipment specification (e.g. maximum load increase, chassis official-use, national version, etc.) different brake discs can be fitted
The brake discs must always be assigned by way of the relevant vehicle identification number and the Electronic Parts Catalogue (ETK)!

Different thicknesses on brake linings	Max. mm	0.01
Max. machining limit per friction ring side (M vehicles and perforated brake discs must not be machined). Brake disc minimum thickness (MIN TH) must not be undershot.	mm	0.8
Nominal size (diameter x thickness)	mm	384x30
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	28.4
Nominal size (diameter x thickness)	mm	330x24
Nominal size (diameter x thickness)	mm	300x24
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	22.4
Wear warning from residual lining thickness	mm	3.7

E89 REAR BRAKE

34 21 REAR BRAKE DISCS E89

REAR BRAKE DISCS SPECIFICATION

IMPORTANT:

New brake pads may only be fitted if the brake disc thickness is greater than the minimum brake disc thickness (MIN TH).

Minimum brake disc thickness during general inspection (GI):
Nominal size thickness minus 2.4 mm
(Not applicable to perforated brake discs and M vehicles)
M vehicles and perforated brake discs:
Nominal size thickness minus 1.6 mm
Depending on:
Engine type
Transmission version
Equipment specification (e.g. maximum load increase, chassis official-use, national version, etc.)
different brake discs can be fitted
The brake discs must always be assigned by way of the relevant vehicle identification number and the Electronic Parts Catalogue (ETK)!

Different thicknesses on brake linings	Max. mm	0.01
Max. machining limit per friction ring side (M vehicles and perforated brake discs must not be machined). Brake disc minimum thickness (MIN TH) must not be undershot.	mm	0.8
Nominal size (diameter x thickness)	mm	324x20
Nominal size (diameter x thickness)	mm	300x20
Brake disk minimum thickness (MIN TH) stamped on brake disk body	mm	18.4
Wear warning from residual lining thickness	mm	3.7

Brakes - Tightening Torques - Z4

E89 BRAKE BOOSTER

34 33 BRAKE BOOSTER

TIGHTENING TORQUE SPECIFICATION - BRAKE BOOSTER

		Type	Thread	Tightening specification	Measure
1AZ	Brake booster to pedal assembly console	E89	M8	Replace self-locking nuts Retighten 1x after 5 minutes on brake booster	22 Nm

E89 BRAKE LINES

34 32 BRAKE LINES

TIGHTENING TORQUE SPECIFICATION - BRAKE LINES

		Type	Thread	Tightening specification	Measure
1AZ	Brake line screws/union screws	E89	M12 x 1		12 Nm
		E89	M10 x 1		12 Nm
2AZ	Brake hose to brake caliper, front	E89			24 Nm
3AZ	Brake hose to brake caliper, rear	E89			24 Nm
4AZ	Brake hose holder to trailing arm, rear	E89			8 Nm

E89 BRAKE MASTER CYLINDER

34 31 BRAKE MASTER CYLINDER

TIGHTENING TORQUE SPECIFICATION - BRAKE MASTER CYLINDER

		Type	Thread	Tightening specification	Measure
1AZ	Brake master	E89	M8	Replace self-	21±3 Nm

	cylinder to brake booster (vacuum)			locking nuts	

E89 FRONT BRAKE

34 11 FRONT BRAKE

TIGHTENING TORQUE SPECIFICATION - FRONT BRAKE

		Type	Thread	Tightening specification	Measure
1AZ	Brake disc to wheel hub	E89		Replace screws	16 Nm
2AZ	Brake anchor plate to swivel bearing	E89	M12x1.5		110 Nm
3AZ	Guard plate to swivel bearing	E89	M6	Replace self-locking or microencapsulated screws	12 Nm
4AZ	Guide screw (socket head cap screw)	E89	WAF 7		30 Nm
5AZ	Guide screw (hexagon screw)	E89	WAF 13	Replace self-locking or microencapsulated screws	35 Nm

E89 PARKING BRAKE

34 41 PARKING BRAKE

TIGHTENING TORQUE SPECIFICATION - PARKING BRAKE

		Type	Thread	Tightening specification	Measure
1AZ	EMF actuator to brake caliper	E89		Replace screws	11±1 Nm

E89 PEDAL ASSEMBLY CONSOLE

35 11 PEDAL ASSEMBLY CONSOLE

TIGHTENING TORQUE SPECIFICATION - PEDAL ASSEMBLY CONSOLE

		Type	Thread	Tightening specification	Measure
1AZ	Bearing pedestal	E89	M8	Replace self-	21 Nm

	to brake assembly and body			locking nuts Retighten 1x on brake booster after 5 min	

E89 REAR BRAKE

34 21 REAR BRAKE

TIGHTENING TORQUE SPECIFICATION - REAR BRAKE

		Type	Thread	Tightening specification	Measure
1AZ	Brake disc to wheel hub	E89	M8	Replace screws	16 Nm
2AZ	Brake anchor plate to wheel carrier	E89	M12x1.5		110 Nm
3AZ	Protective plate to wheel carrier	E89	M6	Replace screws	12 Nm
4AZ	Guide screw (brake caliper to brake anchor plate)	E89	wrench size 13 mm		35 Nm

E89 SLIP CONTROL SYSTEM (DSC)

34 51 SLIP CONTROL SYSTEM (DSC)

TIGHTENING TORQUE SPECIFICATION - SLIP CONTROL SYSTEM (DSC)

		Type	Thread	Tightening specification	Measure
1AZ	Control unit to hydraulic control unit	E89		Initial tightening Final tightening	2±0.5 Nm 4.3+0.5 Nm
2AZ	DSC sensor to holder	E89			8 Nm
3AZ	Bracket, DSC sensor, to body	E89			8 Nm
4AZ	Pulse generator to swivel bearing/wheel carrier	E89			8 Nm
5AZ	Bracket to hydraulic unit	E89			8 Nm
6AZ	Bracket, hydraulic unit to body	E89			8 Nm

E89 TESTING AND BLEEDING BRAKES

34 00 TESTING AND BLEEDING BRAKES

TIGHTENING TORQUE SPECIFICATION - TESTING AND BLEEDING BRAKES

				Tightening	

		Type	Thread	specification	Measure
1AZ	Vent valve	E89	wrench size 9 mm		7-11 Nm
		E89	wrench size 11 mm		12-18 Nm

1.0 GENERAL INFORMATION

For lubricating friction points on the pedal assemblies, use Syntheso Glep 1 (BMW Part No. 83 23 9 407 778).

3500 GENERAL

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!
First Aid:

- **If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.**
- **In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.**
- **If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.**
- **After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.**

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

3511 PEDAL MOUNTING BLOCK

35 11 000 REMOVING AND INSTALLING COMPLETE BEARING BLOCK FOR FOOT PEDAL

Necessary preliminary tasks

- Read and comply with **GENERAL INFORMATION** .
- Remove **BRAKE MASTER CYLINDER**
- Remove left **SUSPENSION CROSS-BRACE**
- Remove **TRIM PANEL** for pedal assembly
- Remove **CLUTCH MASTER CYLINDER** from bearing block (clutch hydraulic system remains closed)

Release brake lines (1) and remove.

Installation:

Tightening torque **34 32 1AZ** .

Remove non-return valve (2) in direction of arrow from brake booster.

Installation:

Check rubber seal in brake booster and replace if necessary.

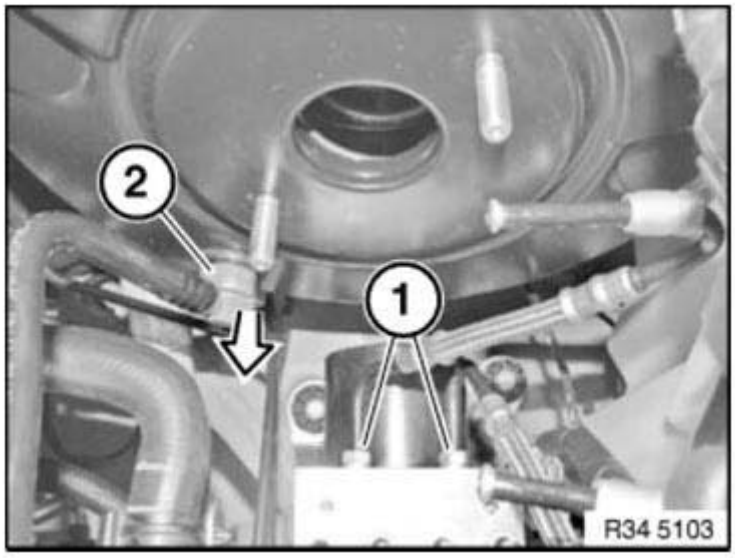


Fig. 1: Removing Non-Return Valve From Brake Booster
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unhinge the recoil spring (2).

Remove retaining clip (3).

Installation:

Replace locking clip (3).

Locking clip (3) must be seated with both legs in the pin groove.

Release screws (4).

Installation:

Tightening torque **35 11 1AZ** .

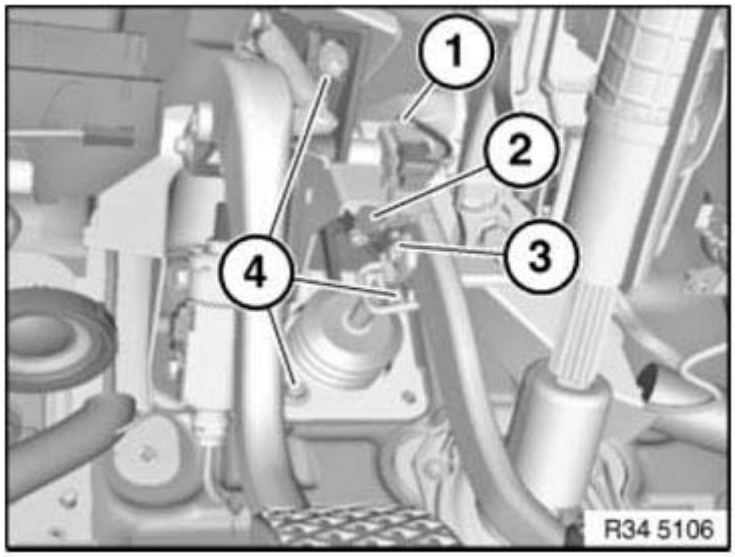


Fig. 2: Identifying Plug Connection, Recoil Spring, Locking Clip And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Move brake booster a little towards engine compartment.

Feed piston rod (1) by turning bearing block out of retaining lug (2).

Installation:

Feed brake pedal in depressed position into piston rod, moving the brake booster a little towards the engine compartment.

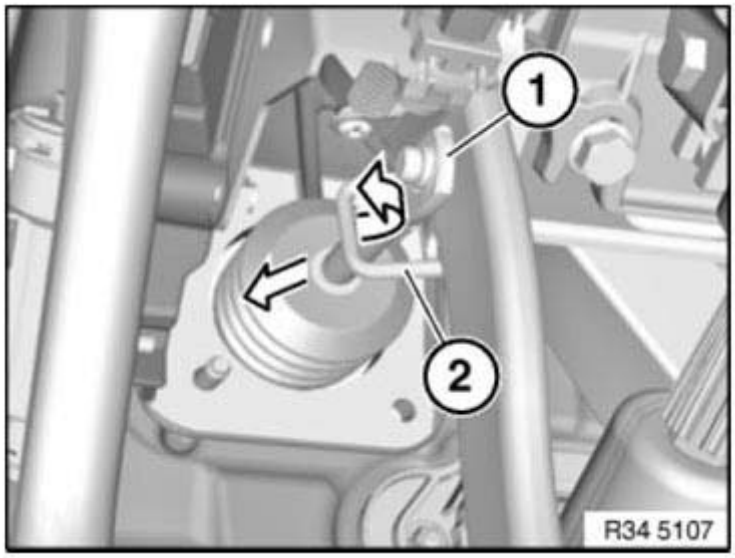


Fig. 3: Turning Bearing Block Out Of Retaining Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Remove mounting block.

**IMPORTANT: Do not use any force when removing and installing the brake unit; the brake unit can be damaged under certain circumstances.
Brake lines must not be bent.**

3540 ACCELERATOR PEDAL ACTUATION

35 40 001 REMOVING AND INSTALLING OR REPLACING ACCELERATOR PEDAL MODULE

Take off cap.

Release screw.

Pull accelerator pedal module upwards out of fixture.

Installation:

Tightening torque **35 40 1AZ** .

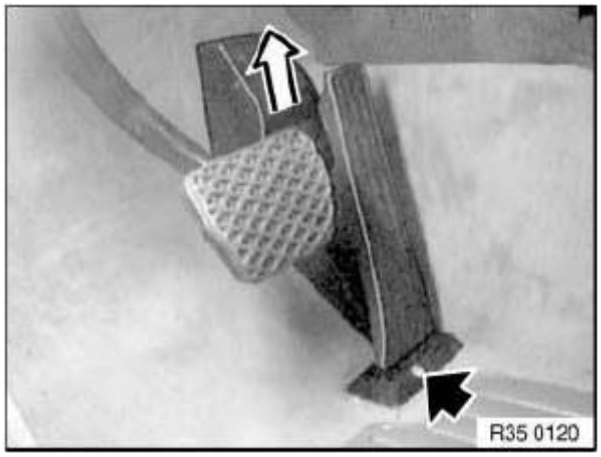


Fig. 4: Pulling Accelerator Pedal Module
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off plug (1).

Remove accelerator pedal module.

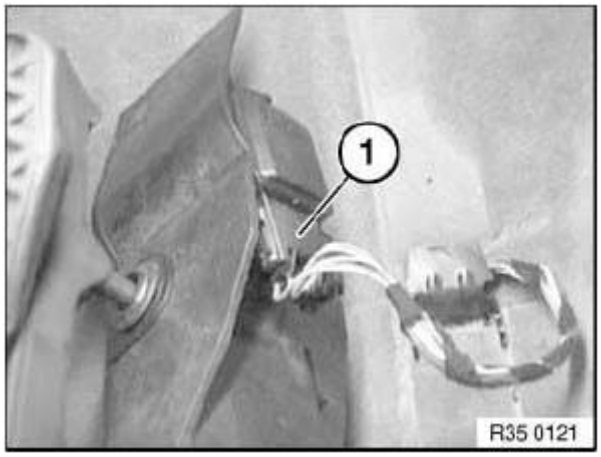


Fig. 5: Identifying Accelerator Pedal Module Plug
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Accelerator pedal module can only be replaced completely with adapter plate.

E89 PARKING BRAKE

34 41 PARKING BRAKE

TIGHTENING TORQUE SPECIFICATION - PARKING BRAKE

		Type	Thread	Tightening specification	Measure
1AZ	EMF actuator to brake caliper	E89		Replace screws	11±1 Nm

E89 PEDAL ASSEMBLY CONSOLE

35 11 PEDAL ASSEMBLY CONSOLE

TIGHTENING TORQUE SPECIFICATION - PEDAL ASSEMBLY CONSOLE

		Type	Thread	Tightening specification	Measure
1AZ	Bearing pedestal to brake assembly and body	E89	M8	Replace self-locking nuts. Retighten 1x on brake booster after 5 min.	21 Nm

E89 PEDALS

35 40 PEDALS

TIGHTENING TORQUE SPECIFICATION - PEDALS

		Type	Thread	Tightening specification	Measure
1AZ	Accelerator pedal module to body	E89	M6		8 Nm

1.0 GENERAL INFORMATION ON HIGH TEMPERATURE MULTI-PURPOSE GREASE

High temperature multi-purpose grease consists of a lithium complex soap in a mineral oil product with a selected combination of additives. Extremely fine soap is contained in the oil, and serves as the basic ingredient.

This lubricating grease possesses the following properties:

- Very good thermal resistance and penetration stability

  The structure and consistency must be maintained over long service life with temperatures from -22°F to +302°F (-30°C to +150°C) in continuous operation and very high loads.

- Oxidation stability

  A lubricating grease contains effective inhibitors (which limit or prevent chemical reactions) in order to stop oxidation at very high operating temperatures.

- Water resistance and corrosion inhibition

A high temperature multi-purpose grease is water resistant. At the same time lubricated parts are given maximum protection against rust by the corrosion inhibitors.

2.0 APPROVED HIGH TEMPERATURE MULTI-PURPOSE GREASE

High temperature multi-purpose grease is used for the lubrication of wheel bearings.

Ball Bearings (E24 from mid 1982, E28, E30, E31, E32 and all following)

Provided with lifetime lubrication.

No subsequent lubrication approved!

Tapered Roller Bearings (E23, E21)

50 grams grease packing in wheel hub and 20 grams in wheel hub grease cap per wheel.

Grease type: Retinax A

CRC Part No. SL 3131 (former BMW Part No. 81 22 9 407 710)

3.0 APPROVED FRONT AXLE FINAL DRIVE OILS

Approvals are the same as for rear axle final drive oils.

3100 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

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Protective measures/rules of conduct

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First aid measures

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  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

31 00 ... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

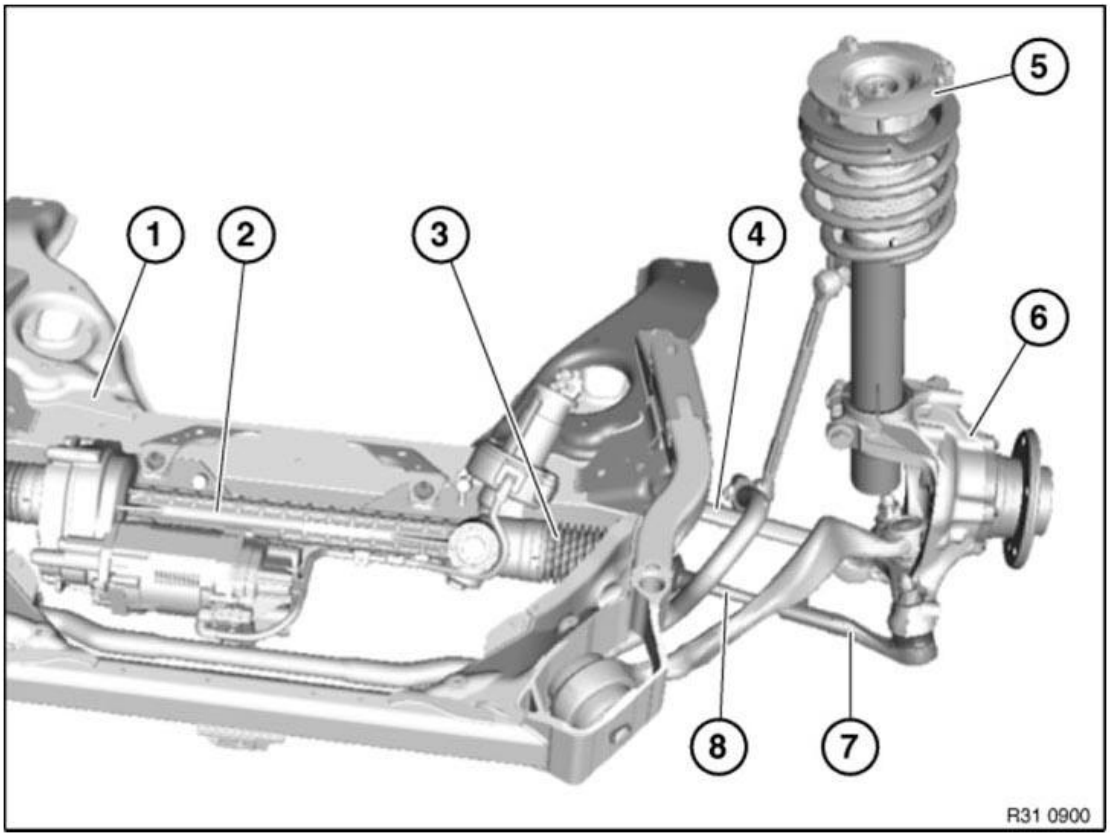
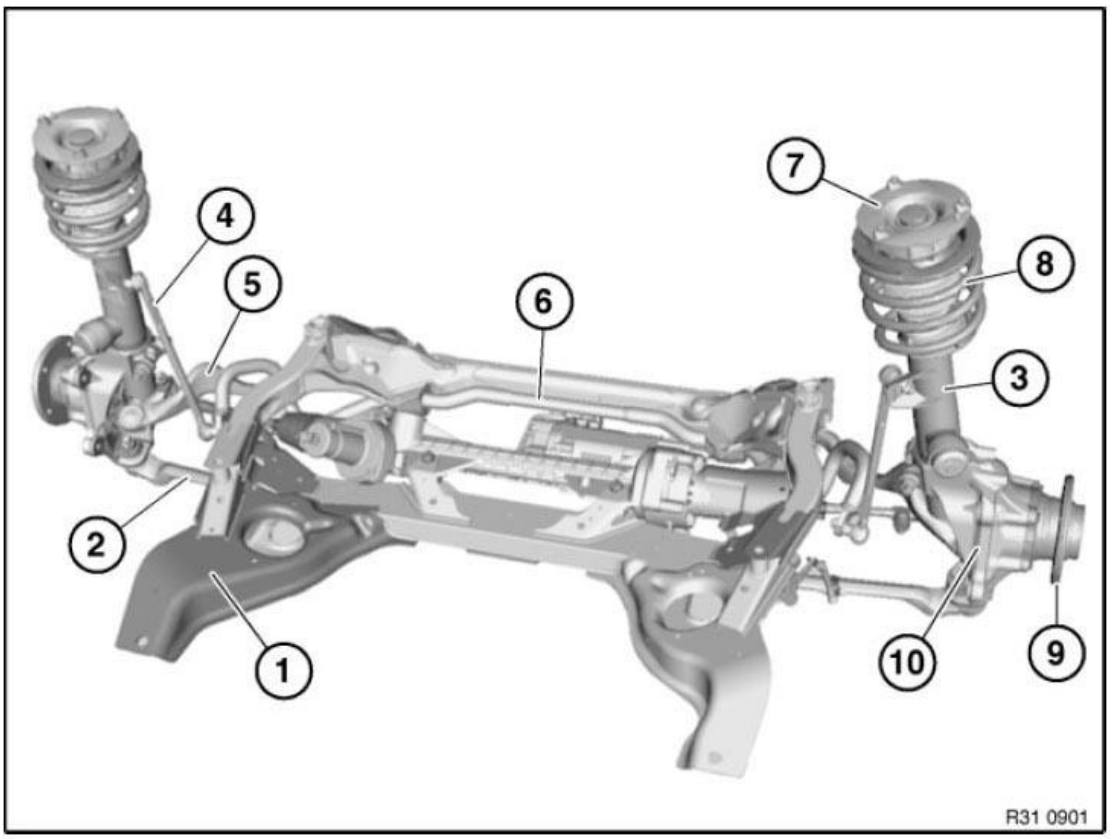


Fig. 1: Identifying Front Axle + Steering Components
Courtesy of BMW OF NORTH AMERICA, INC.

A **WHEEL/CHASSIS ALIGNMENT CHECK** must be carried out after the following work:

- **Release of following screw/bolt connections:**
  - Steering gear to front axle carrier
  - Control arm to front axle carrier
  - Support bearing to body (if centring pin is missing)
  - Tie rod end to tie rod
- **Replacement of following parts:**
  1. Front axle carrier
  2. Steering gear
  3. Gaiter (if the tie rod end has to be screwed off)
  4. Control arm
  5. Support bearing (only if centring pin is missing)
  6. Swivel bearing
  7. Tie rod end
  8. Tie rod

31 ... . FRONT AXLE OVERVIEW



1	Front axle support	7	Thrust bearing
2	Control arm, ride-height sensor	8	Coil spring
3	Spring strut shock absorber	9	Wheel bearing
4	Stabiliser link	10	Swivel bearing
5	Tension strut		
6	Stabilizer/stabilizer suspension		

Fig. 2: Overview Of Front Axle
Courtesy of BMW OF NORTH AMERICA, INC.

Safety precautions and general information

1. Front axle support
2. Control arm, ride-height sensor
3. Spring strut shock absorber

4. Thrust bearing
5. Stabiliser link
6. Tension strut
7. Stabilizer/stabilizer suspension
8. Coil spring
9. Wheel bearing
10. Swivel bearing
11. Testing/adjustment work

31 00 ... INFORMATION ON REPLACING SHOCK ABSORBERS

Situation

When a shock absorber is faulty on one side (leaking, noises, etc.), often both shock absorbers on the axle in question are replaced.

Effect

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct**

sunlight.

- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!
First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

31 00 MOBILE TABLE LIFT

WARNING: Danger of injury!
Before beginning work, position table lift with the lower frame securely on the floor.
Danger area around mechanism below platform.

- **Do not reach into or step into the danger area.**
- **Note permissible bearing capacity of table lift.**
- **Mount load centrally (danger of tipping) and secure against shifting.**

Follow the operating instructions from the equipment manufacturer.

The mobile table lift is used for collision repairs and when removing large engines.

Adaptations for mounting front axle with engine and transmission.

ADAPTATIONS FOR MOUNTING FRONT AXLE WITH ENGINE AND TRANSMISSION

No. 10	For mounting swivel bearing with brake disc
No. 20	Retaining element for adjustable fixture
No. 30	Adjustable fixture
No. 40	Distance pin 40 x 160 mm
No. 50	Distance pin 40 x 110 mm
No. 60	Distance pin 40 x 60 mm
No. 70	Fixture with U-profile
No. 80	Plate fixture Ø = 100 mm

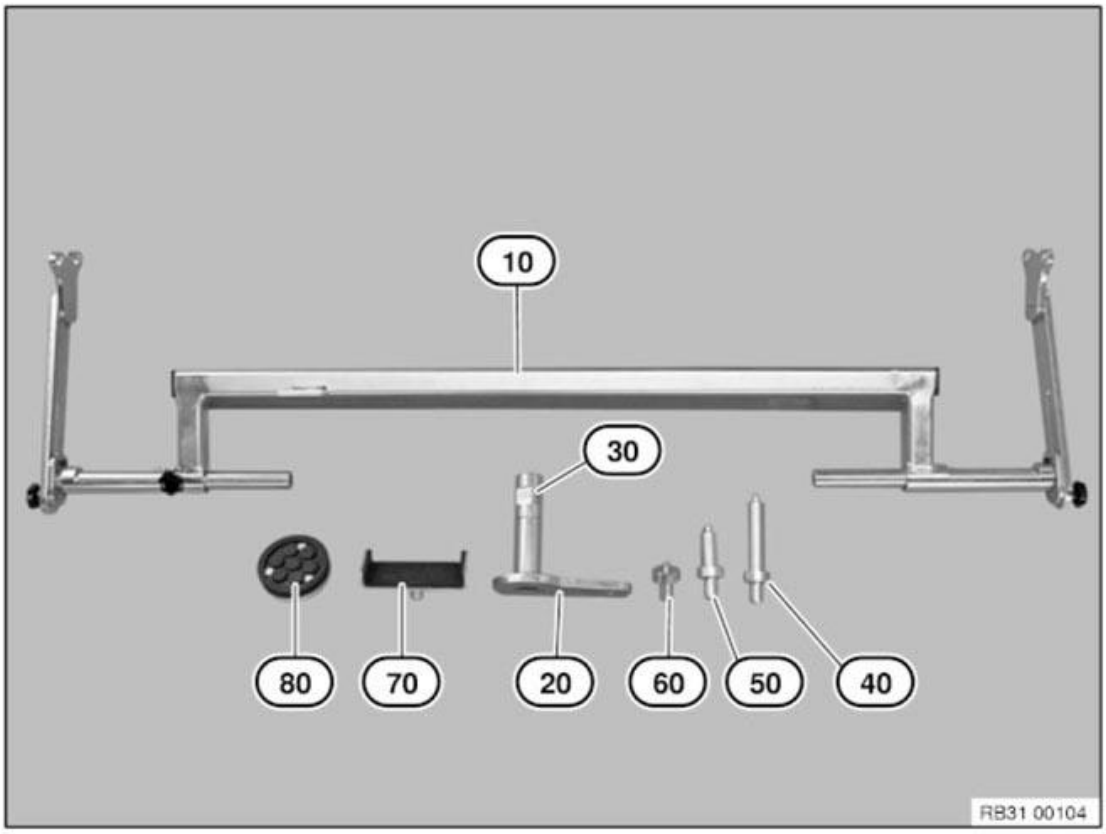


Fig. 3: Adaptations For Mounting Front Axle With Engine And Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

Release star knob screw on working plate (B) of table lift; the working surface (B) can be extended by approx. 310 mm.

Release all push-pull clamps and the working plates can be shifted by approx. 20 mm.

Working plate (A and B) can be raised and lowered by 3° on the long side and by 5° on the transverse side.

Working plate (A and B) is subdivided by a coordinate system and a possible installation position is recommended in the respective repair manual.

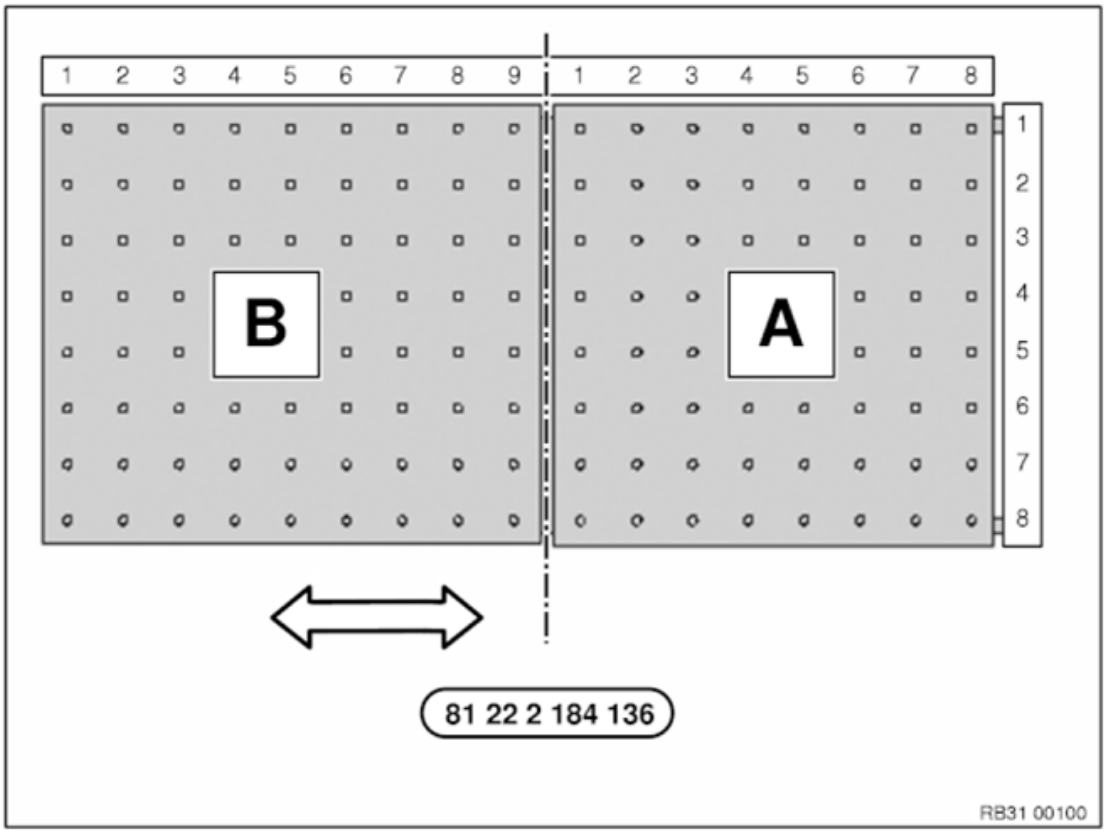


Fig. 4: Identifying Working Plates
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow the operating instructions from the equipment manufacturer.

31 00 ... NOTES (ALUMINIUM CHASSIS COMPONENTS)

Due to the chemical and corrosion characteristics of aluminum, always comply with the following points when handling aluminum components:

- Do not bring into contact with battery acid!
- Do not clean with wire brushes made of brass or iron! Always use wire brushes with stainless steel bristles!
- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures > 80 °C, even for brief periods! Temperatures in paint facilities do not have the same impact

31 00 ... NOTES ON REPAIRING THREADS

IMPORTANT: Install Helicoil thread inserts so that they are flush with the original thread.

NOTE: **Damaged threads in engine support may be repaired with Helicoil thread inserts. Comply with the procedure described in the example.**

Fig. 5: Identifying Damaged Helicoil Thread
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure

1. Create a clean core hole; if necessary, drill out screw remnants

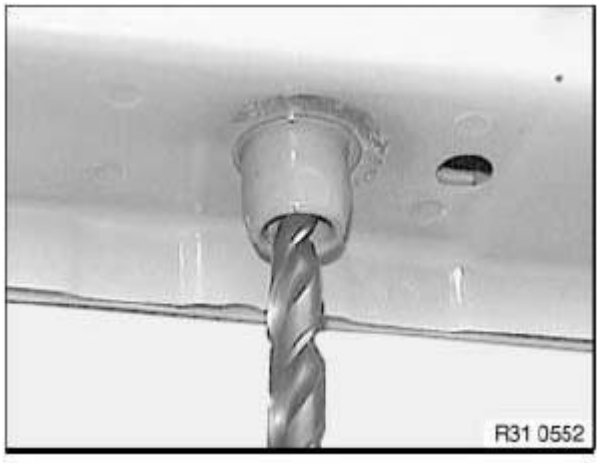


Fig. 6: Creating Clean Core Hole
Courtesy of BMW OF NORTH AMERICA, INC.

2. Create locating thread for Helicoil thread insert

Fig. 7: Inserting Helicoil Thread On Locating Thread
Courtesy of BMW OF NORTH AMERICA, INC.

3. Pick out Helicoil thread insert in accordance with the **Notes on repairing threads** and screw into the locating thread until flush with the original thread

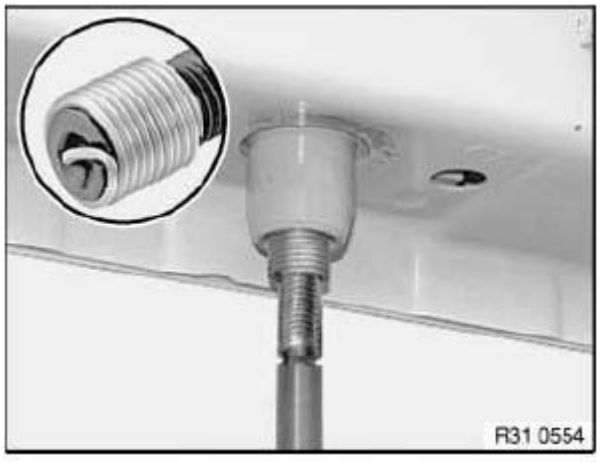


Fig. 8: Inserting Helicoil Thread On Original Thread
Courtesy of BMW OF NORTH AMERICA, INC.

4. Break drive pin and remove

Fig. 9: Breaking Drive Pin
Courtesy of BMW OF NORTH AMERICA, INC.

31 00 ... NOTES ON REPAIRING THREADS

IMPORTANT: Install Helicoil thread inserts so that they are flush with the original thread.

NOTE: Damaged threads in engine support may be repaired with Helicoil thread inserts. Comply with the procedure described in the example.

Fig. 10: Identifying Damaged Helicoil Thread
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure

1. Create a clean core hole; if necessary, drill out screw remnants

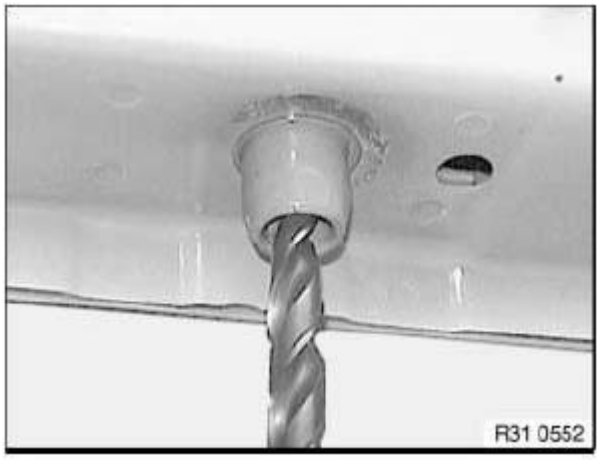


Fig. 11: Creating Clean Core Hole
Courtesy of BMW OF NORTH AMERICA, INC.

2. Create locating thread for Helicoil thread insert

Fig. 12: Inserting Helicoil Thread On Locating Thread
Courtesy of BMW OF NORTH AMERICA, INC.

3. Pick out Helicoil thread insert in accordance with the **Notes on repairing threads** and screw into the locating thread until flush with the original thread

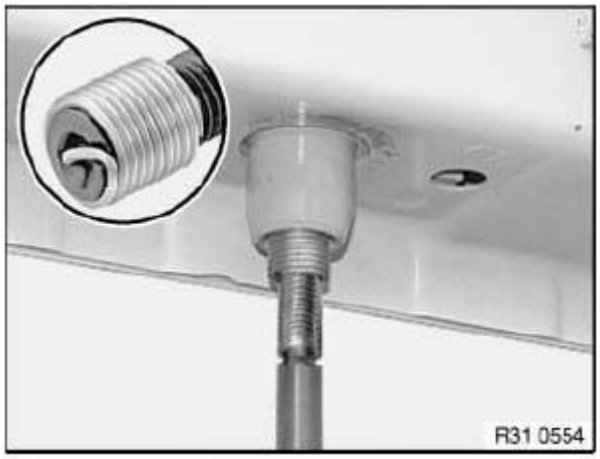


Fig. 13: Inserting Helicoil Thread On Original Thread
Courtesy of BMW OF NORTH AMERICA, INC.

4. Break drive pin and remove

Fig. 14: Breaking Drive Pin
Courtesy of BMW OF NORTH AMERICA, INC.

00 ... ... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. **Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.**
2. **Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!**
3. **Check the rubber plate on the trolley jack prior to each use, replacing if necessary.**

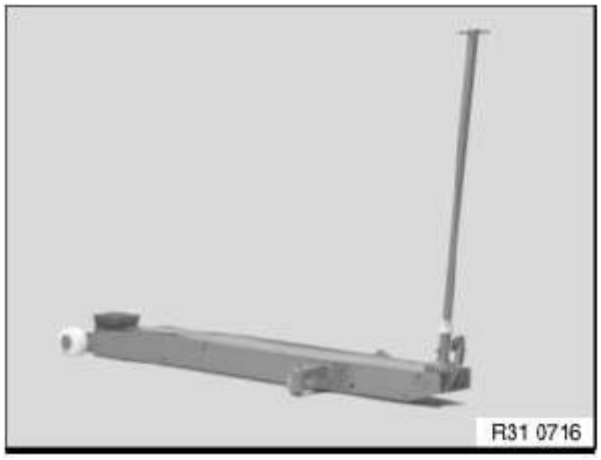


Fig. 15: Identifying Trolley Jack
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Car jacking point
2. Side car jacking points
3. Rear differential (**REMOVE HEAT SHIELD**)

   Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

4. Bolting point for rear axle tension struts

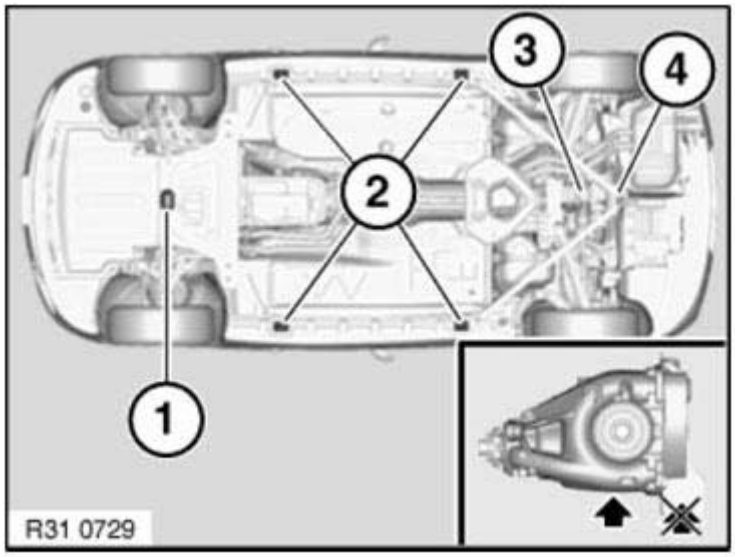


Fig. 16: Identifying Rear Differential With Car Jacking Point
Courtesy of BMW OF NORTH AMERICA, INC.

51 75 515 REMOVING AND INSTALLING/REPLACING LOWER PEDESTRIAN PROTECTION

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

Release screws (1).

Remove pedestrian protection (2).

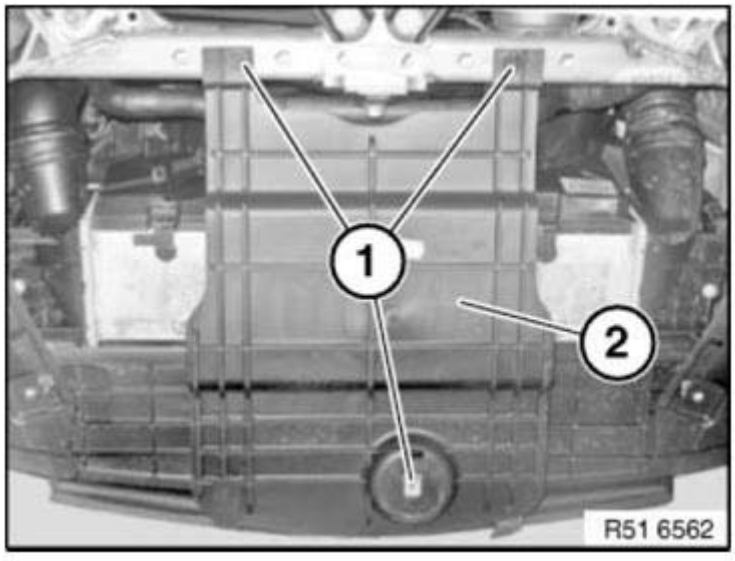


Fig. 17: Identifying Pedestrian Protection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves

- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

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First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

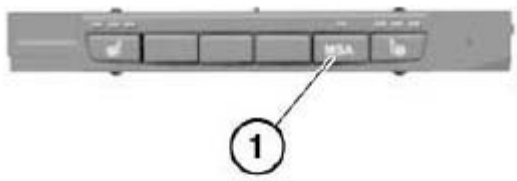


Fig. 18: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

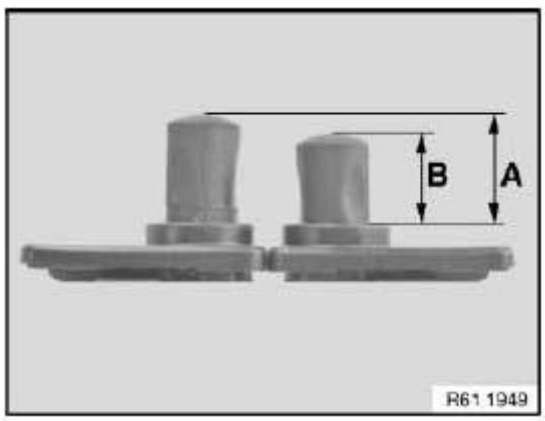


Fig. 19: Identifying Basic Setting For Engine Hood/Bonnet Open

Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

3110 FRONT AXLE SUSPENSION

51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION

NOTE: Illustration shows one example only.
There may be differences in detail in the case of other engine variants.

Release all screws (1) on underbody protection (2).

Remove underbody protection (2).

Installation:

Centre underbody protection (2) and tighten down screws (1).

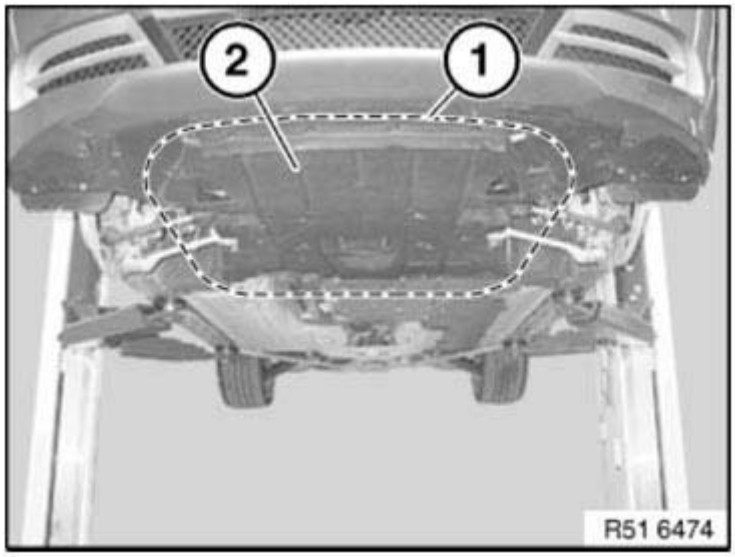


Fig. 20: Identifying Screws On Underbody Protection
Courtesy of BMW OF NORTH AMERICA, INC.

3111 FRONT SUB-FRAME

31 11 506 LOWERING/RAISING FRONT AXLE SUPPORT

IMPORTANT: Before lowering front axle support:
In order to avoid damage to lifting platform, perform weight compensation on vehicle.
Load spring strut domes with sand bags.

WARNING: Danger to life!
SECURE ENGINE IN INSTALLATION POSITION (N52) or SECURE ENGINE IN INSTALLATION POSITION (N54, N54T) to prevent it from falling down.

Necessary preliminary tasks

- Secure **ENGINE IN INSTALLATION POSITION (N52)** or **SECURE ENGINE IN INSTALLATION POSITION (N54, N54T)**
- Remove **FRONT ASSEMBLY UNDERSIDE PROTECTION**
- Remove **V-STRUT, FRONT AXLE SUPPORT**
- Remove **LOWER SECTION OF STEERING SPINDLE FROM STEERING GEAR**
- Release diagonal struts See **5161011 REMOVING AND INSTALLING/REPLACING V-STRUT, FRONT AXLE CARRIER, LEFT OR RIGHT** or **5171482 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT** on front axle support
- Release coolant pipe. See **17 00 008 DRAINING AND ADDING COOLANT (N54)** or **REMOVING AND INSTALLING/REPLACING COOLANT PIPE ON FRONT AXLE (N52K)** .
- Disconnect **PLUG CONNECTION** from ride-height sensor on right

Cut open cable tie (1) for steering connecting line on front axle support.

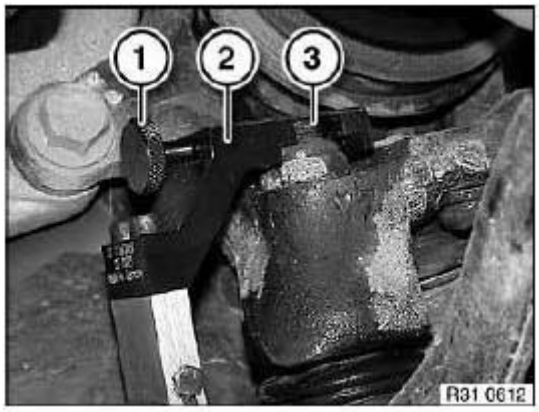


Fig. 21: Identifying Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Engage 31 5 251 with a 2nd person helping completely on workshop jack (00 2 030).

Insert special tools 31 5 253 in telescopic supports of a profile rail pair.

NOTE: In a profile rail pair two profile rails are connected to each by toothing.

Insert special tools 31 5 256 in telescopic supports of other profile rail pair.

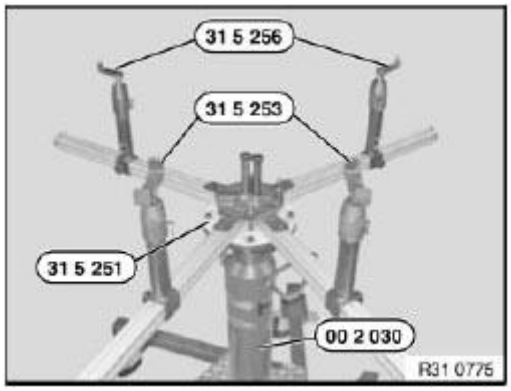


Fig. 22: Inserting Special Tool (31 5 253) On Profile Rail Pair Telescopic Supports
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The jacking points on the left side are shown.

Align special tools 31 5 253 and 31 5 256 to front axle support.

Support front axle support by operating workshop jack (00 2 030).

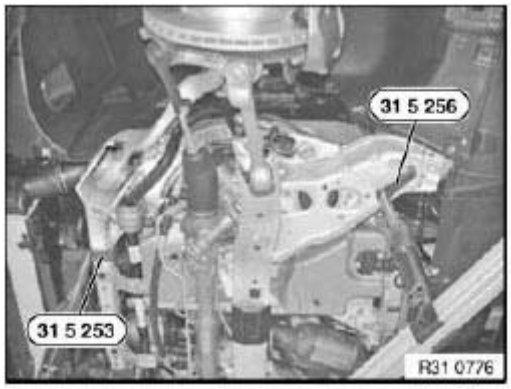


Fig. 23: Aligning Special Tools (31 5 253 And 31 5 256) To Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1-3).

Installation:

Check threads for damage; if necessary, repair with **HELICOIL THREAD INSERTS** .

Make sure screws are installed in correct positions.

- Bolt (1) M12x90
- Bolt (2) M12x145
- Bolt (3) M12x53

Tighten first bolts (1) and then bolts (2) and (3).

Tightening torque **31 10 1AZ** .

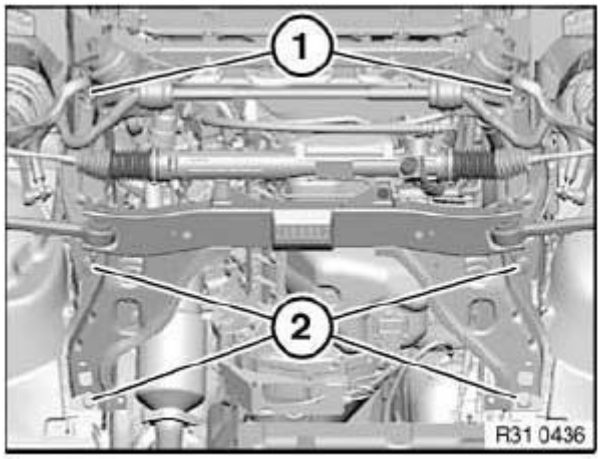


Fig. 24: Identifying Front Axle Carrier Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

51 61 011 REMOVING AND INSTALLING/REPLACING V-STRUT, FRONT AXLE CARRIER, LEFT OR RIGHT

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle
Driving without V-struts is not permitted!

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

Release bolt (1).

Tightening torque **51 71 10AZ** .

Release bolt (2).

Tightening torque **51 71 10AZ** .

Release bolt (3).

Tightening torque **51 71 10AZ** .

Remove V-strut (4) towards front.

Installation:

Replace bolts.

Make sure bolts are installed in correct positions.

- Bolt (1) M12x30
- Bolt (2) M10x33
- Bolt (3) M10x45

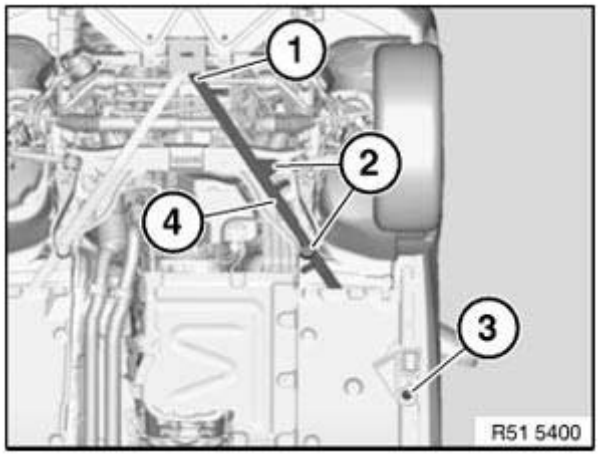


Fig. 25: Identifying V-Strut With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

51 75 515 REMOVING AND INSTALLING/REPLACING LOWER PEDESTRIAN PROTECTION

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

Release screws (1).

Remove pedestrian protection (2).

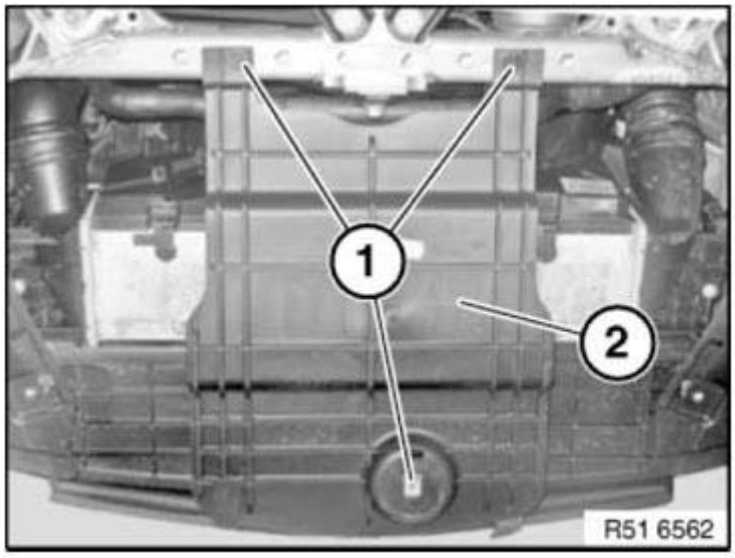


Fig. 26: Identifying Pedestrian Protection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

31 11 001 REPLACING FRONT AXLE SUPPORT

WARNING: Danger to life!
SECURE ENGINE IN INSTALLATION POSITION (N52) or SECURE ENGINE IN INSTALLATION POSITION (N54, N54T) to prevent it from falling down.

Necessary preliminary tasks

- Secure **ENGINE IN INSTALLATION POSITION (N52)** or **SECURE ENGINE IN INSTALLATION POSITION (N54, N54T)**
- Remove **FRONT ASSEMBLY UNDERSIDE PROTECTION**
- Remove **RIDE-HEIGHT SENSOR FROM FRONT AXLE SUPPORT**
- Remove **STEERING GEAR FROM FRONT AXLE SUPPORT** and tie up
- Remove **CONTROL ARM FROM FRONT AXLE SUPPORT**
- Remove **TENSION STRUTS** from front axle support
- Remove front **ANTI-ROLL BAR**
- Release coolant pipe. See **17 00 008 DRAINING AND ADDING COOLANT (N54)** or **REMOVING AND INSTALLING/REPLACING COOLANT PIPE ON FRONT AXLE (N52K)** .
- Release **DIAGONAL STRUTS** on front axle support

Engage 31 5 251 with a 2nd person helping completely on workshop jack .

Insert special tools 31 5 253 in telescopic supports of a profile rail pair.

NOTE: In a profile rail pair two profile rails are connected to each by toothing.

Insert special tools 31 5 256 in telescopic supports of other profile rail pair.

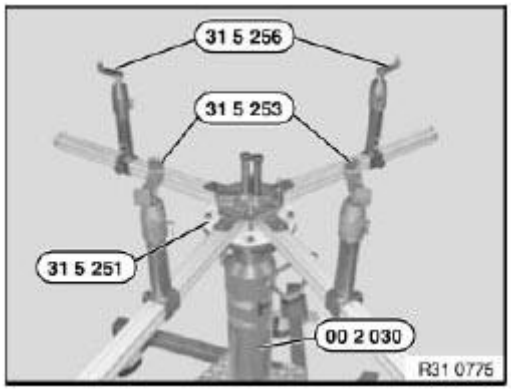


Fig. 27: Inserting Special Tool (31 5 253) On Profile Rail Pair Telescopic Supports
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The jacking points on the left side are shown.

Align special tools 31 5 253 and 31 5 256 to front axle support and support front axle support.

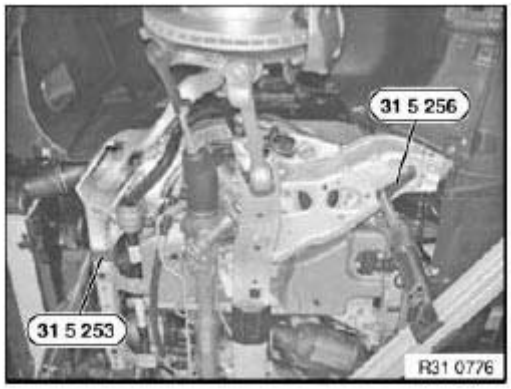


Fig. 28: Aligning Special Tools (31 5 253 And 31 5 256) To Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1-3).

Installation:

Check threads for damage; if necessary, repair with **HELICOIL THREAD INSERTS** .

Observe tightening sequence.

Tighten first bolts (1), then bolts (2) and finally bolts (3).

Make sure bolts are installed in correct positions.

- Bolts (1) M12x90
- Bolts (2) M12x145
- Bolts (3) M12x53

Tightening torque **31 10 1AZ** .

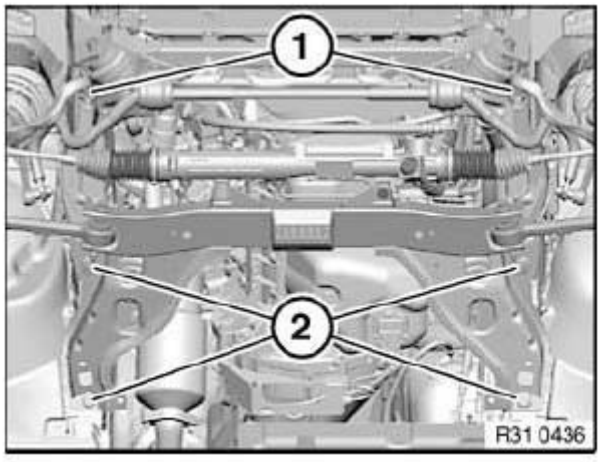


Fig. 29: Identifying Front Axle Carrier Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

3112 STRUTS WITH RUBBER MOUNTS

31 12 080 REMOVING AND INSTALLING/REPLACING BOTH TENSION STRUTS

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

Release nut (1); if necessary, grip at Torx socket (T40).

Installation:

Keep tension strut to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **31 12 2AZ** .

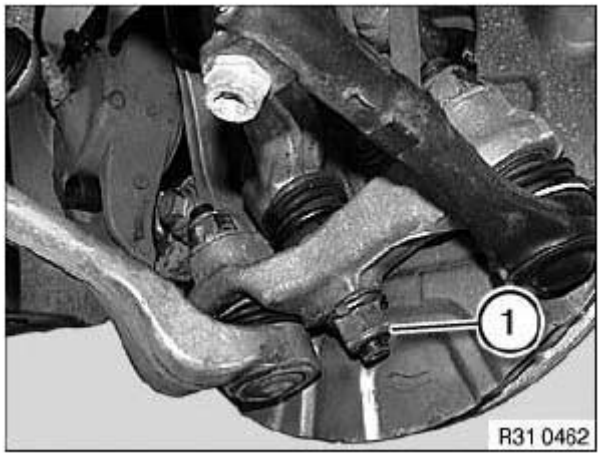


Fig. 30: Identifying Tension Strut Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) and remove tension strut.

Raise lock nut (2) in area of bore and detach from front axle carrier.

Installation:

Replace lock nut.

Tighten bolt connection in **NORMAL POSITION** .

Tightening torque **31 12 1AZ** .

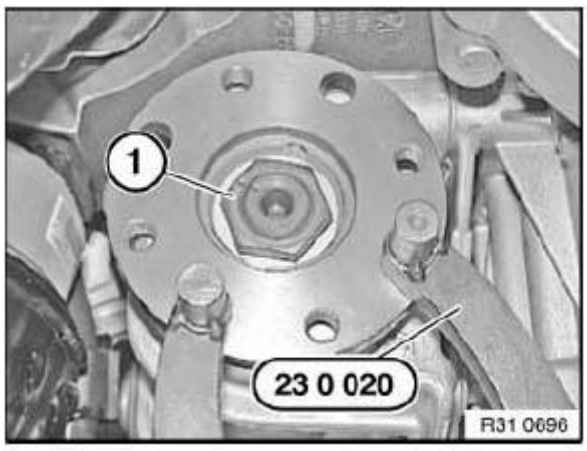


Fig. 31: Identifying Bolt And Lock Nut
Courtesy of BMW OF NORTH AMERICA, INC.

31 12 000 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT CONTROL ARM

NOTE: **If the control arm is detached from the front axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.**

Necessary preliminary tasks

- Remove **FRONT UNDERBODY PROTECTION**

Remove jointed rod of ride-height sensor from control arm on right.

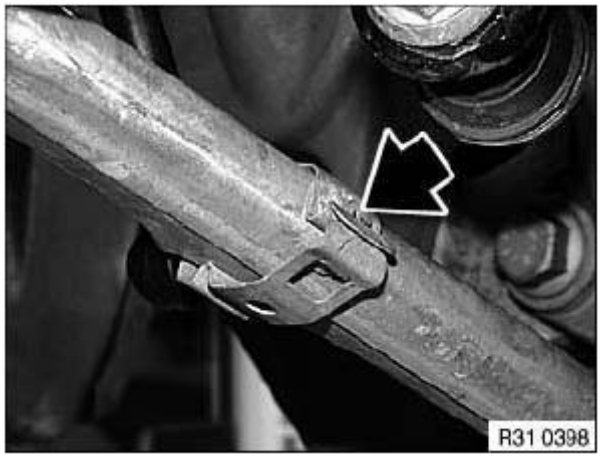


Fig. 32: Locating Jointed Rod Of Ride-Height Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1); if necessary, grip at Torx socket (T40).

Installation:

Keep control arm to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

Tightening torque **31 12 4AZ** .

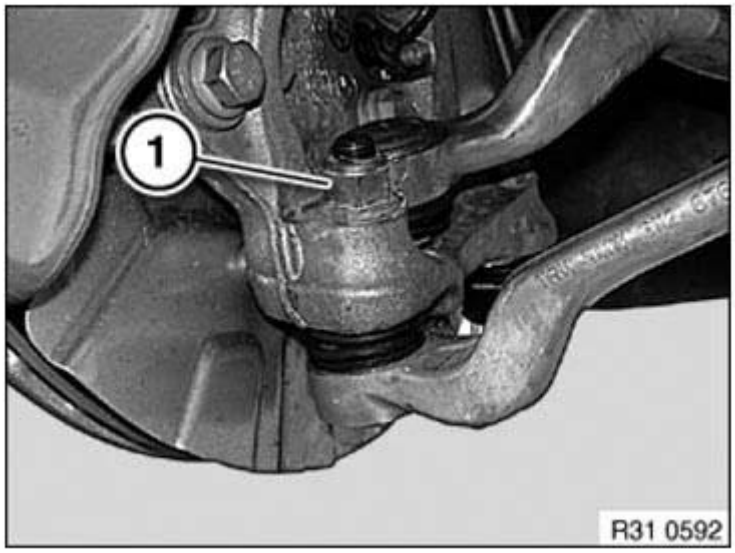


Fig. 33: Identifying Control Arm Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release **EAR CLAMP** (1).

Move gaiter (2) from tie rod (3).

Installation:

Clean rack and check surface for damage (e.g. by corrosion).

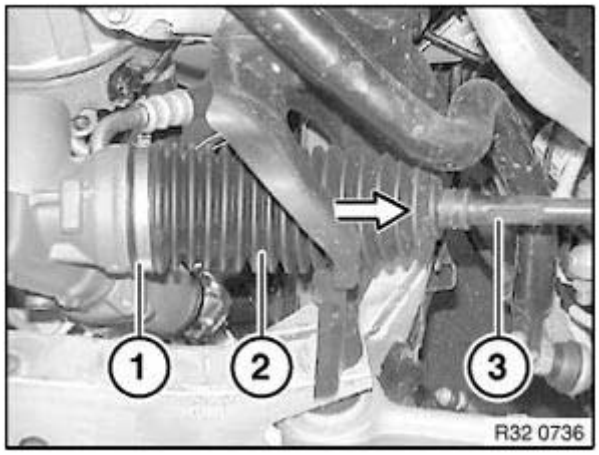


Fig. 34: Removing Gaiter From Tie Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **31 12 3AZ** .

Remove bolt (2) towards front.

Take off control arm.

Installation:

Screw head must point in direction of travel.

Replace self-locking nut.

Tighten down bolt connection in **NORMAL POSITION** .

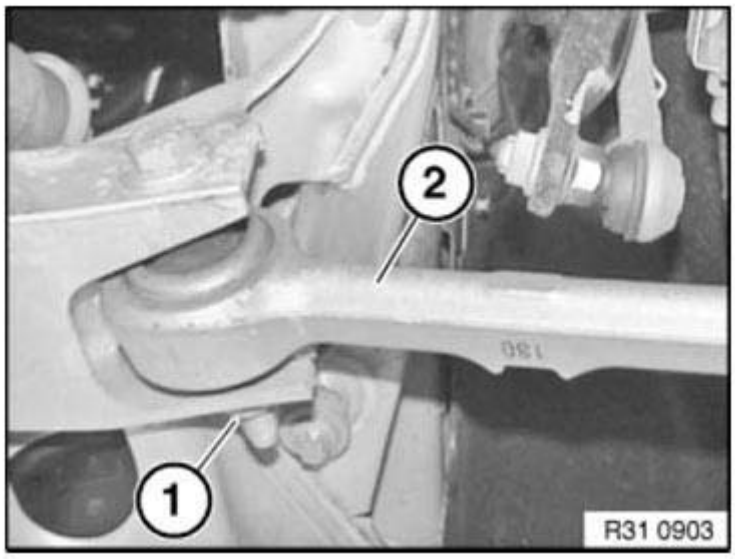


Fig. 35: Identifying Control Arm Bolt And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis alignment check See **CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

31 12 138 REPLACING RUBBER MOUNTS ON BOTH TENSION STRUTS

IMPORTANT: The mounts on both tension struts must be replaced! Mounts may only be changed once!

Necessary preliminary tasks

- Check ball joints of tension struts while installed, replace **TENSION STRUTS** if necessary

- Remove **TENSION STRUTS**

IMPORTANT: If the tension struts already feature an identification mark with a centre punch, it is necessary to replace both TENSION STRUTS !

Mark tension struts with a punch mark in area (A).

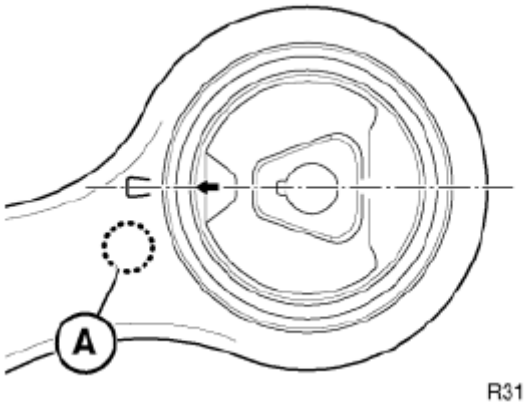


Fig. 36: Identifying Punch Mark Area On Tension Strut
Courtesy of BMW OF NORTH AMERICA, INC.

Using a press and special tools 31 3 031 and 31 3 032, press rubber mount out of tension strut.

NOTE: Special tool 31 3 031 must be exactly flush with rubber mount bushing.

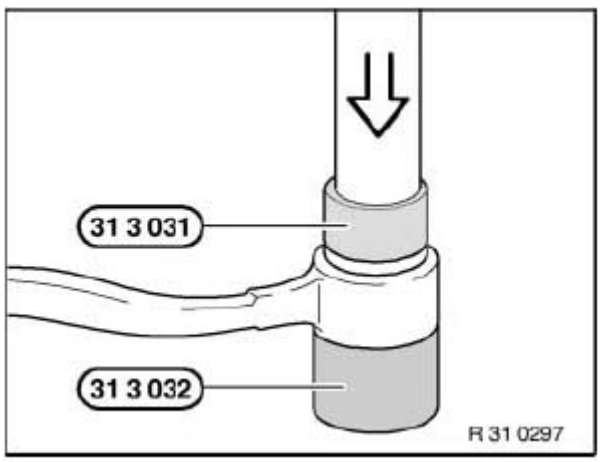


Fig. 37: Pressing Rubber Mount Out Of Tension Strut Using Press And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Keep rubber mount and bushing in tension strut clean and free from grease.

Align rubber mount by way of arrow to marking on tension strut and press in. The deviation must not exceed ± 5°.

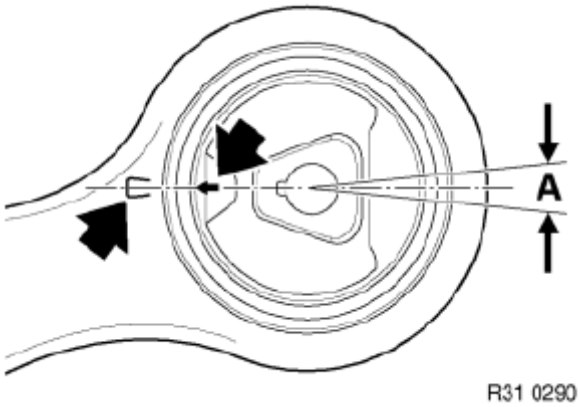


Fig. 38: Identifying Rubber Mount Aligning Arrow On Tension Strut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Protrusion (A) equally large.

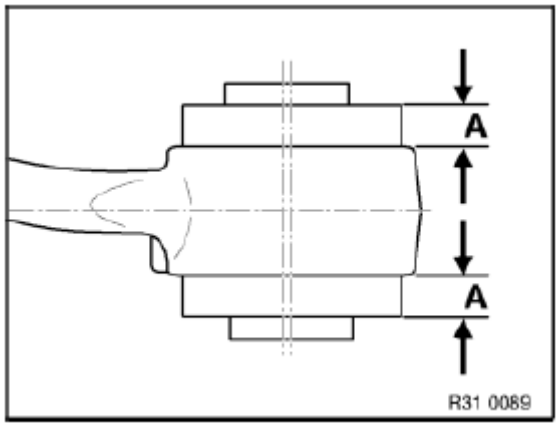


Fig. 39: Identifying Protrusion
Courtesy of BMW OF NORTH AMERICA, INC.

3121 WHEEL BEARINGS AND STUB AXLE

31 21 180 REMOVING AND INSTALLING/REPLACING BEARING FOR FRONT WHEEL

Necessary preliminary tasks

- Remove **BRAKE DISC**

NOTE:

- **Check brake pads and replace if necessary!**

Release screws (1).

Tightening torque **31 21 1AZ** .

Press wheel bearing (2) off swivel bearing with a suitable tool.

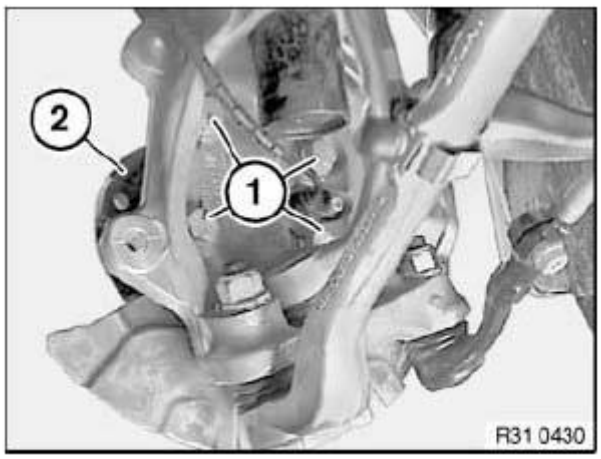


Fig. 40: Identifying Wheel Bearing With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace screws.

When reusing, recut all the threads in the wheel bearing.

Keep contact surface (1) of swivel bearing and wheel bearing clean and free from oil and grease.

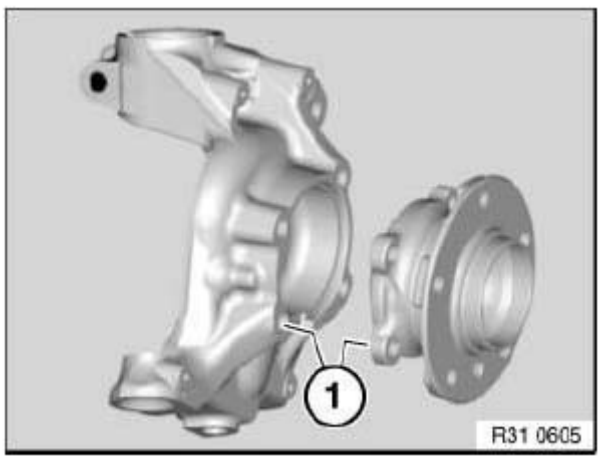


Fig. 41: Identifying Contact Surfaces Of Swivel Bearing And Wheel Bearing

Courtesy of BMW OF NORTH AMERICA, INC.

31 21 090 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT SWIVEL BEARING

Necessary preliminary tasks

- Remove **FRONT BRAKE DISC**
- Remove **FRONT PULSE GENERATOR FROM SWIVEL BEARING**

IMPORTANT: Check sensor head and line from pulse generator prior to installation for external damage, replacing if necessary.

If necessary, remove jointed rod of ride-height sensor from control arm.

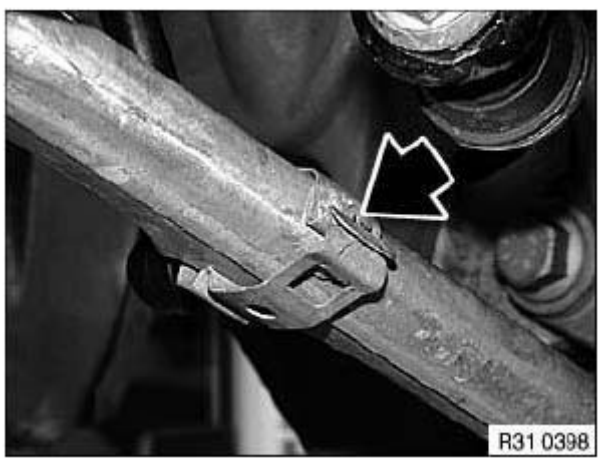


Fig. 42: Locating Jointed Rod Of Ride-Height Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken **CONTROL ARM BOLT CONNECTION ON FRONT AXLE CARRIER** in order to prevent control arm rubber mount from being overelongated.

Remove **CONTROL ARM FROM SWIVEL BEARING** .

Remove **TIE ROD END FROM SWIVEL BEARING** .

WARNING: Risk of injury!
Tension strut is under tension.

Remove **TENSION STRUT FROM SWIVEL BEARING**

Support swivel bearing with workshop jack and a suitable mounting.

Release nut (1), remove holder (2) and remove screw.

Installation:

Screw head must point in direction of travel.

Replace self-locking nut.

Tightening torque **31 31 3AZ** .

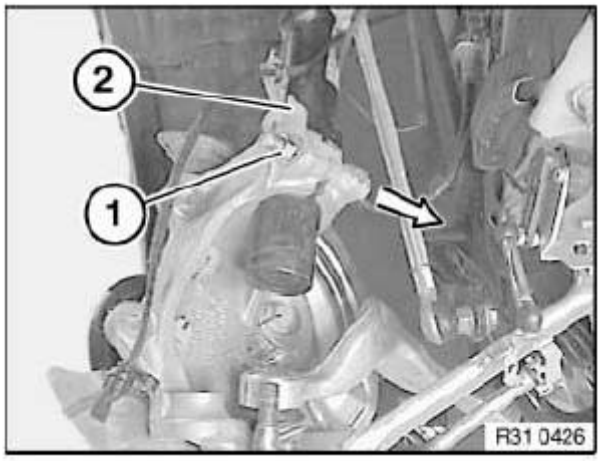


Fig. 43: Removing Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Spread swivel bearing with special tool 31 2 230.

Lower workshop jack and remove swivel bearing.

Installation:

Keep press fit of swivel gearing and spring strut in lower area clean and free from oil and grease.

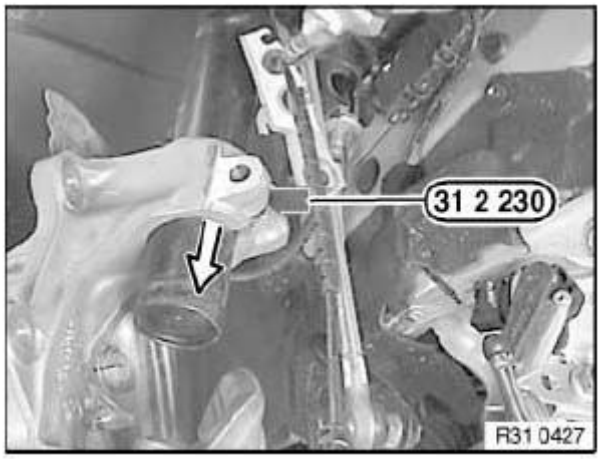


Fig. 44: Expanding Swivel Bearing Using Special Tool (31 2 230)

Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Expand swivel bearing with special tool 31 2 230, align by way of gap to positioning pins (1) on back of spring strut and raise up to stop.

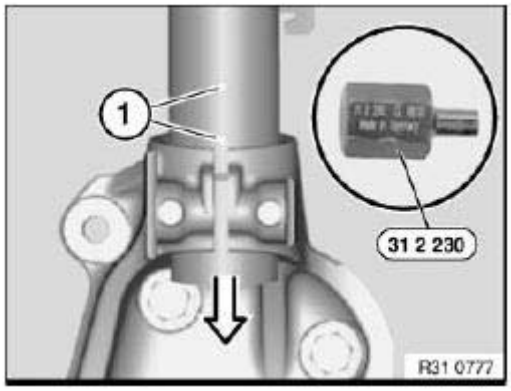


Fig. 45: Expanding Swivel Bearing Using Special Tool (31 2 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure swivel bearing contacts stop (1) correctly.

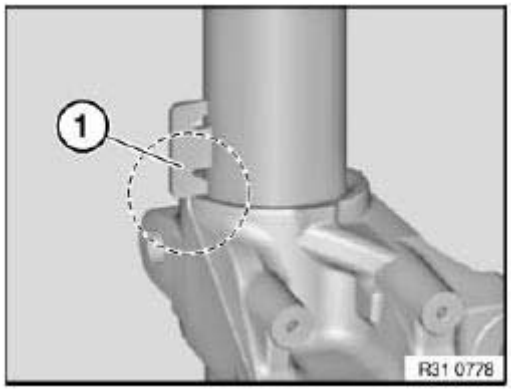


Fig. 46: Identifying Swivel Bearing Contacts Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Modify **WHEEL BEARING** or replace if necessary
- Modify **BRAKE CARRIER/BRAKE GUARD PLATE**

After installation

- Perform chassis alignment check See **CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

3131 SPRING STRUT

31 00 ... INFORMATION ON REPLACING SHOCK ABSORBERS

Situation

When a shock absorber is faulty on one side (leaking, noises, etc.), often both shock absorbers on the axle in question are replaced.

Effect

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

31 31 000 REMOVING AND INSTALLING COMPLETE LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

IMPORTANT: If the centring pin is missing from the support bearing, the position of the studs to the wheel arch must be marked so that the original camber is approximately maintained.
Only one nut may ever be released for marking.

Necessary preliminary tasks

- Remove **FRONT WHEEL**
- Remove **STABILIZER LINK FROM SPRING STRUT**
- Detach plug connection for pulse generator and expose line up to holder on spring strut
- Remove front **PULSE GENERATOR** from swivel bearing
- Remove **FRONT BRAKE DISC**

Remove jointed rod of ride-height sensor from control arm.

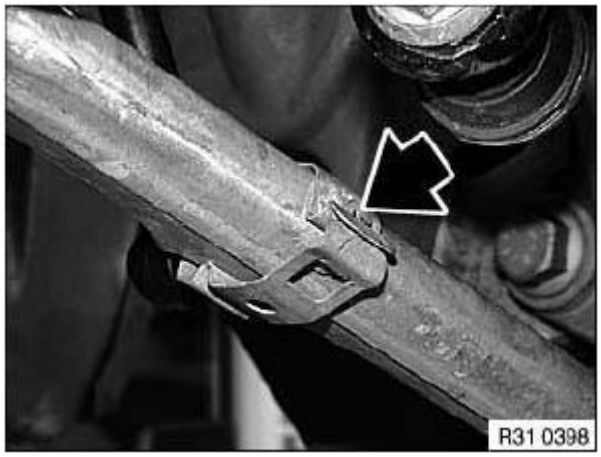


Fig. 47: Locating Jointed Rod Of Ride-Height Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken **CONTROL ARM BOLT CONNECTION ON FRONT AXLE CARRIER** in order to prevent control arm rubber mount from being damaged.

Remove **CONTROL ARM FROM SWIVEL BEARING** .

Remove **TIE ROD END FROM SWIVEL BEARING** .

Remove **TENSION STRUT FROM SWIVEL BEARING**

WARNING: Risk of injury!
Secure spring strut against falling out.

Release nuts (1) and remove spring strut with swivel bearing towards bottom.

Installation:

Clean contact surface in spring strut dome.

Align spring strut using centring pin to bore in wheel arch or studs to wheel arch and push upwards.

Replace self-locking nuts.

Tightening torque **31 31 1AZ** .

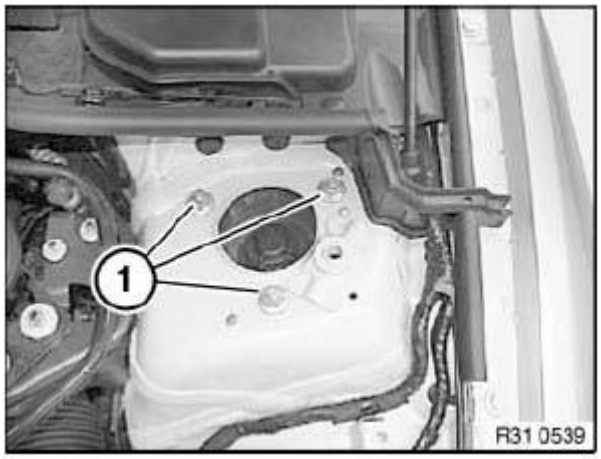


Fig. 48: Identifying Spring Strut Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

51 71 371 REMOVING AND INSTALLING/REPLACING TENSION STRUT ON LEFT OR RIGHT SPRING STRUT DOME

IMPORTANT: Vehicles must not be driven without tension struts.
Driving without tension struts may damage the vehicle body.
Tension struts can be secured with screws or nuts.
Screws must be tightened to specified torque and then tightened down with special tool 00 9 120.

Release screw (1).

Lift out expanding rivets (2).

Remove cable holder (3).

Release screws (4).

Tightening torque **51 71 4AZ** .

Installation:

Replace screws (4), tighten to specified torque and then to angle of rotation.

Remove tension strut (5).

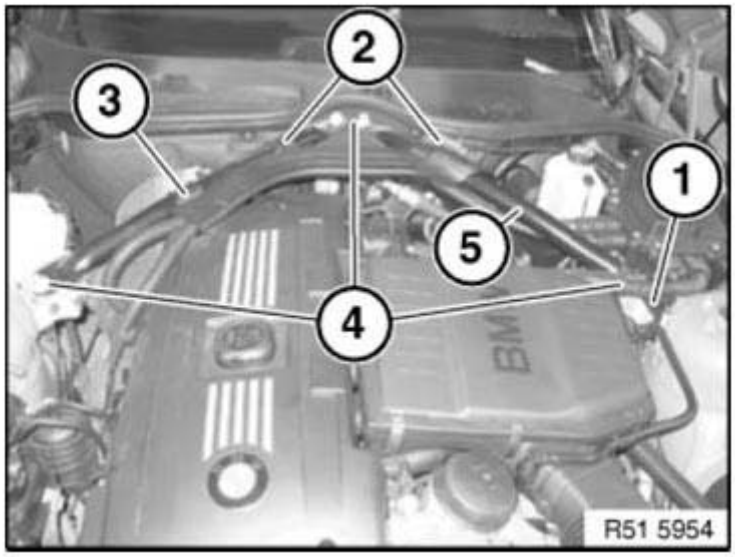


Fig. 49: Identifying Tension Strut With Expanding Rivets, Cable Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

31 31 031 REPLACING FRONT LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

IMPORTANT:

- **When replacing shock absorber/spring strut, renew auxiliary damper.**

WARNING: **Before using the special tool 31 3 340 take care to read through the Owner's Handbook!**
All the safety information and instructions contained in the Owner's Handbook must be strictly observed!
Failure to observe these safety precautions and instructions increases the risk of serious physical injury, damage to your health and damage to property and equipment!

IMPORTANT:

1. **Prior to each use, check the special tools for defects, modifications and operational reliability.**
2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **These special tools are intended solely for the purpose of tightening and relieving cylindrical and tapered suspension springs.**
5. **Keep special tools dry, clean and (down to the spindle) free from grease.**
6. **Impact screwdrivers are prohibited!**
7. **Do not compress coil spring to full extent.**

Necessary preliminary work

- Remove **FRONT SPRING STRUT** .

Release nut (1), remove holder (2) and remove screw (3).

Expand swivel bearing with special tool 31 2 230 and pull off spring strut.

Installation note:

Keep press fit of swivel bearing and spring strut in lower area clean and free from oil and grease.

Screw head must point in direction of travel.

Replace self-locking nut.

Tightening torque **31 31 3AZ** .

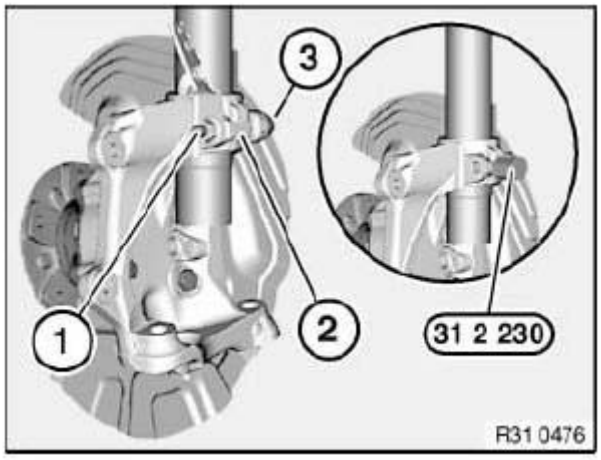


Fig. 50: Identifying Swivel Bearing Nut, Holder And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Expand swivel bearing with special tool 31 2 230, align based on gap to positioning pins (1) on rear of spring strut and push together to stop.

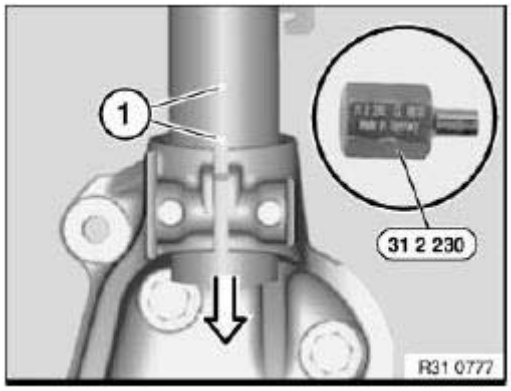


Fig. 51: Expanding Swivel Bearing Using Special Tool 31 2 230
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Make sure swivel bearing contacts stop (1) correctly.

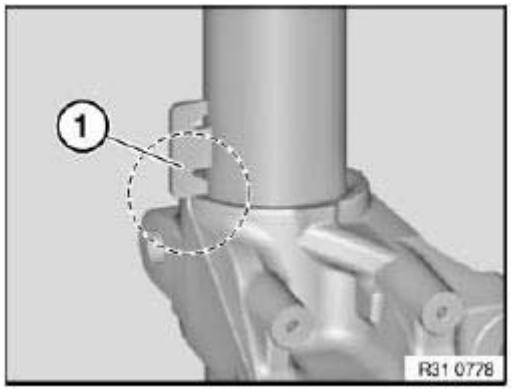


Fig. 52: Identifying Swivel Bearing Contacts Stops
Courtesy of BMW OF NORTH AMERICA, INC.

Removing

Clamp special tool 31 3 341 in vice.

Install insert 31 3 358 in special tool 31 3 354.

Position special tools 31 3 355 and 31 3 354 with insert 31 3 358 from above on special tool 31 3 341 until retaining bolts (1) can be felt and heard snapping into place.

Check seating of special tools 31 3 355 and 31 3 354 with insert 31 3 358, correct if necessary.

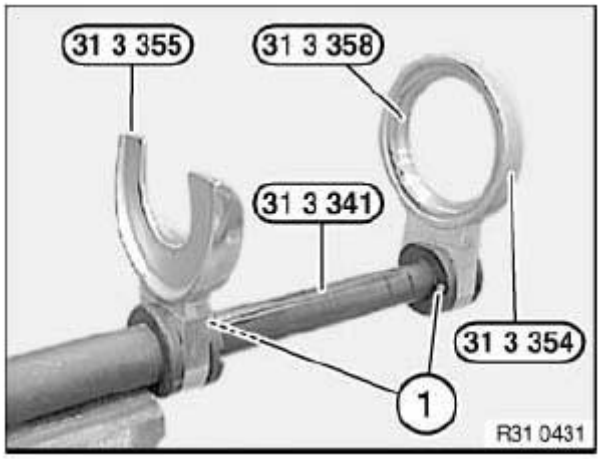


Fig. 53: Identifying Retaining Bolt And Special Tools

Courtesy of BMW OF NORTH AMERICA, INC.

Clean coil spring to remove coarse contamination and take up with special tools 31 3 355 and 31 3 354 with insert 31 3 358.

Twist spring strut until end of coil spring (1) is flush with end of special tool 31 3 355.

WARNING: Special tool 31 3 354 and centring ring 31 3 358 must rest correctly on the upper spring cup!
Bottom coil of coil spring must rest completely in recess of special tool 31 3 355!

Compress coil spring until stress on piston rod is relieved.

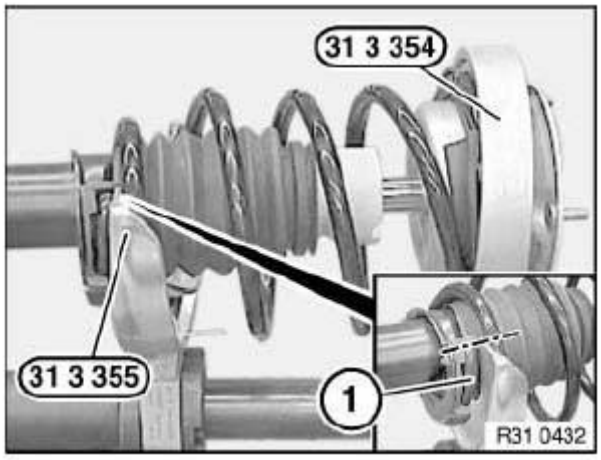


Fig. 54: Pressing Spring Strut Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Take off protective cap.

Release nut with special tool 31 2 210 (grip piston rod in the process).

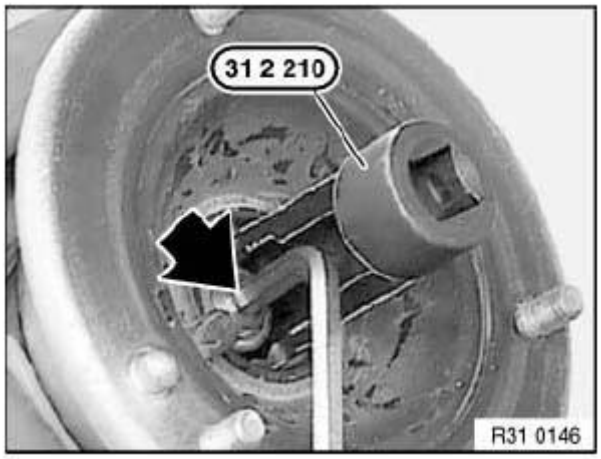


Fig. 55: Removing Nut Using Special Tool (31 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove support bearing (1), dust boot and support disc (2).

Remove shock absorber with auxiliary damper, gaiter and lower spring pad sideways from tensioned coil spring.

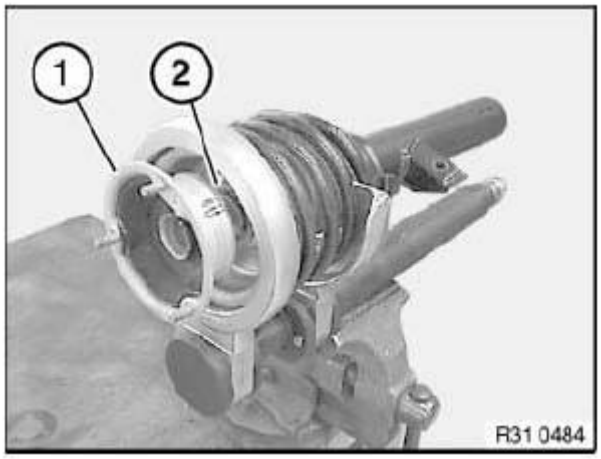


Fig. 56: Identifying Support Bearing And Support Disc
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, remove auxiliary damper (1), gaiter (2) and spring pad (3) from shock absorber.

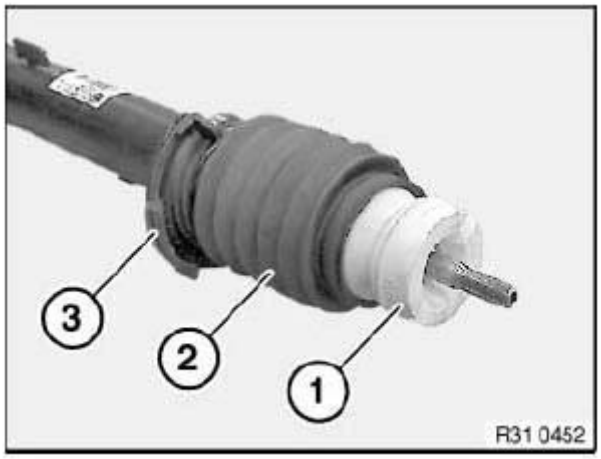


Fig. 57: Identifying Auxiliary Damper, Gaiter And Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Relieve tension on coil spring.

Remove coil spring with spring cup from special tools 31 3 355, 31 3 358 and 31 3 354.

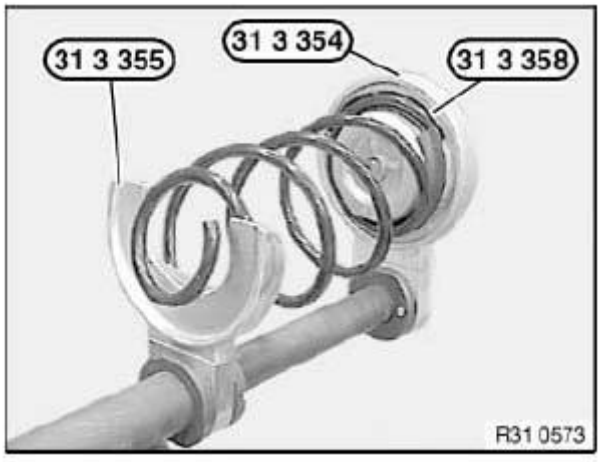


Fig. 58: Removing Coil Spring From Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check spring pad (1) for damage, replace if necessary.

Attach spring cup (2) with spring pad (1) to coil spring.

NOTE: End of coil spring must be positively aligned to spring pad (1).

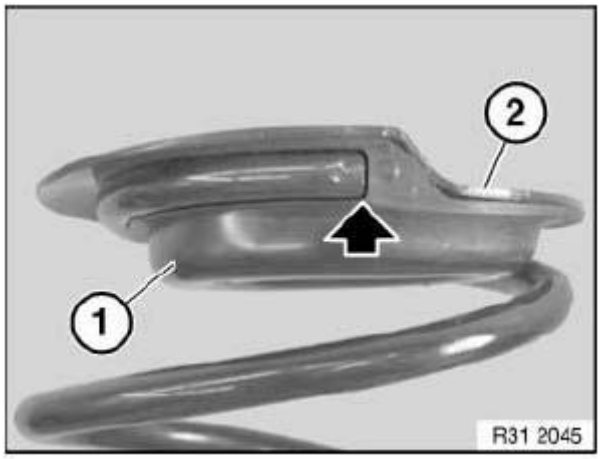


Fig. 59: Identifying Spring Cup And Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Take up coil spring with spring cup using special tools 31 3 355, 31 3 358 and 31 3 354.

Twist coil spring until lower end of coil spring (1) is flush with end (2) of special tool 31 3 355.

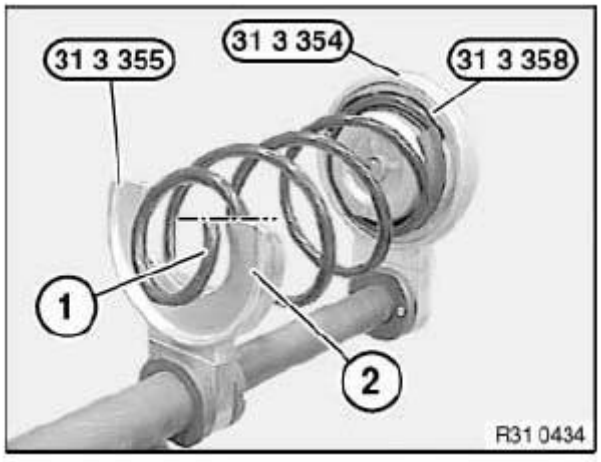


Fig. 60: Compressing Coil Spring Using Special Tool (31 3 355)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Do not compress coil spring to full extent.
Special tool 31 3 354 and centring ring 31 3 358 must rest correctly on the upper spring cup!
Bottom coil of coil spring must rest completely in recess of special tool 31 3 355!

Tension coil spring.

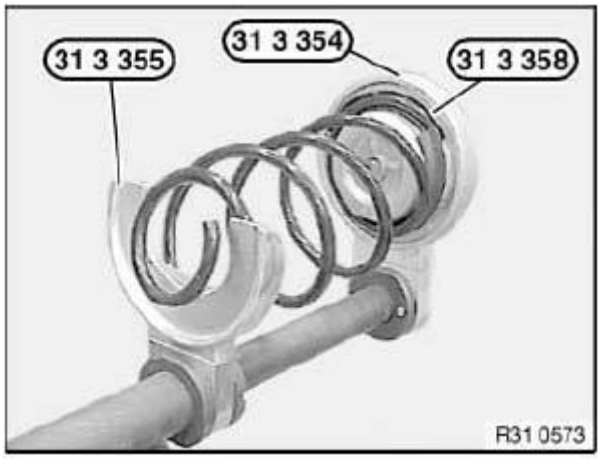


Fig. 61: Compressing Coil Spring Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Check auxiliary damper (1), gaiter (2) and spring pad (3) for damage, replace if necessary.

NOTE: Make sure spring pad (3) is correctly seated on shock absorber.

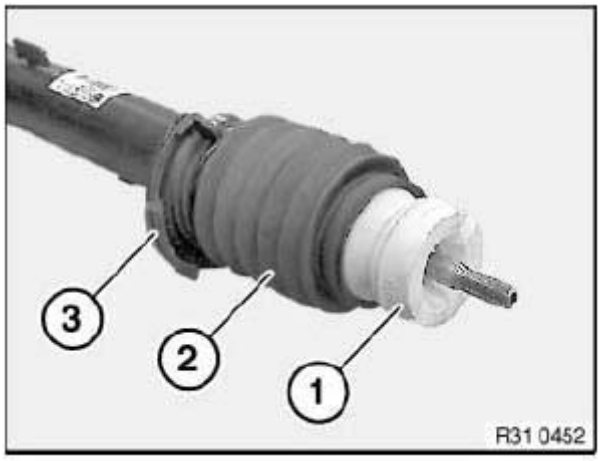


Fig. 62: Identifying Auxiliary Damper, Gaiter And Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

Insert shock absorber in tensioned coil spring.

Attach support disc (2) to piston rod.

Check support bearing (1) for damage, replace if necessary.

Attach dust boot and support bearing to piston rod.

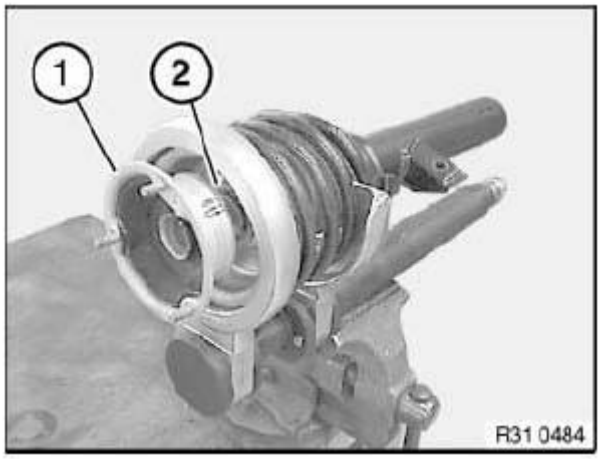


Fig. 63: Identifying Support Bearing And Supporting Disc
Courtesy of BMW OF NORTH AMERICA, INC.

Replace nut and tighten down with special tool 31 2 210 (grip piston rod in the process).

Tightening torque 31 31 2AZ.

Fit protective cap.

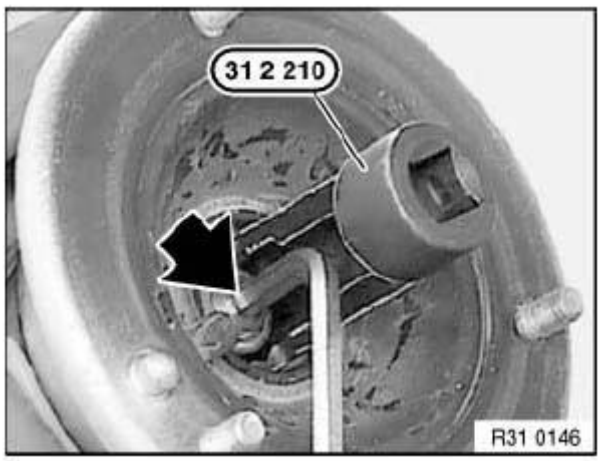


Fig. 64: Removing Nut Using Special Tool (31 2 210)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Spring pad (1) must rest positively on spring cup (2)!
Upper end of coil spring must rest on stop of spring pad (1)!

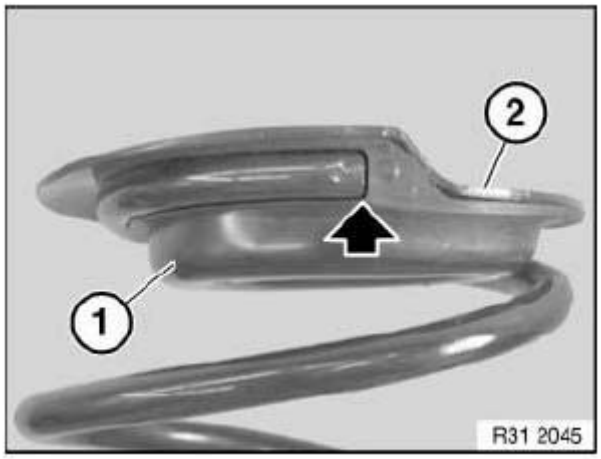


Fig. 65: Identifying Spring Cup And Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Lower end of coil spring (2) must rest on stop of spring pad (1)!

Relieve tension on coil spring.

Check installation position of gaiter, correct fold if necessary.

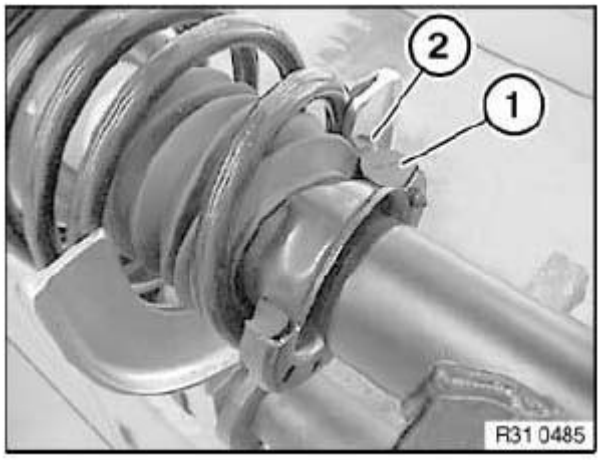


Fig. 66: Identifying Coil Spring And Spring Pad
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out **WHEEL ALIGNMENT PROCEDURE** .

3133 SPRING WITH SUSPENSION

31 33 001 (REMOVING AND INSTALLING) REPLACING FRONT LEFT OR RIGHT SPRING

STRUT SUPPORT BEARING

NOTE: Procedure is described in the document "REPLACING FRONT LEFT OR RIGHT SPRING STRUT ".

If necessary, twist/drive out centring pin (1).

NOTE: If a support bearing (2) was fitted without centring pin (1), the centring pin (1) of the new support bearing (2) must be driven or twisted out.

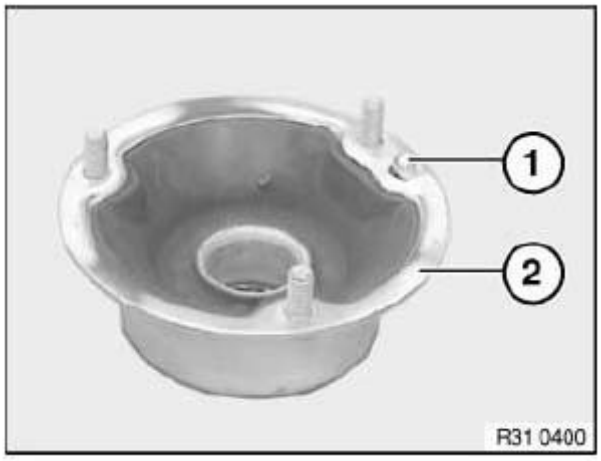


Fig. 67: Identifying Support Bearing And Centring Pin
Courtesy of BMW OF NORTH AMERICA, INC.

31 33 095 MEASURE VEHICLE RIDE HEIGHT, FRONT AXLE

Determining actual ride height (A):

To do so, attach tape measure to rim flange (2) and measure to wheel arch lower edge or engine compartment lid lower edge (1).

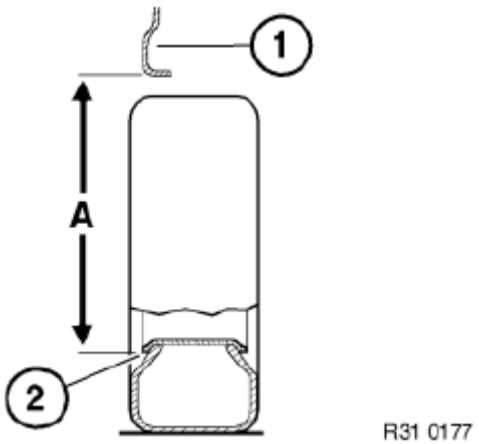


Fig. 68: Identifying Actual Ride Height From Lower Edge Of Wheel Arch To Rim Flange
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If engine compartment lid is removed or damaged, use special tool 32 0 001.

Fitting special tool 32 0 001:

Remove rubber plug next to spring strut dome.

Fasten special tool 32 0 001 in bore hole and turn in opposite direction to direction of travel (see arrow) up to stop (1).

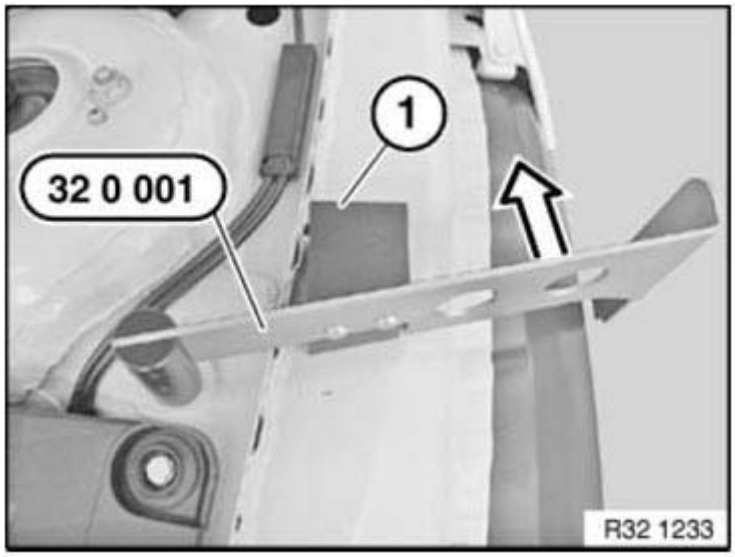


Fig. 69: Turning Special Tool (32 0 001)
Courtesy of BMW OF NORTH AMERICA, INC.

Determining actual ride height (A):

Attach tape measure to rim flange at bottom middle and measure to lower edge of special tool 32 0 001.

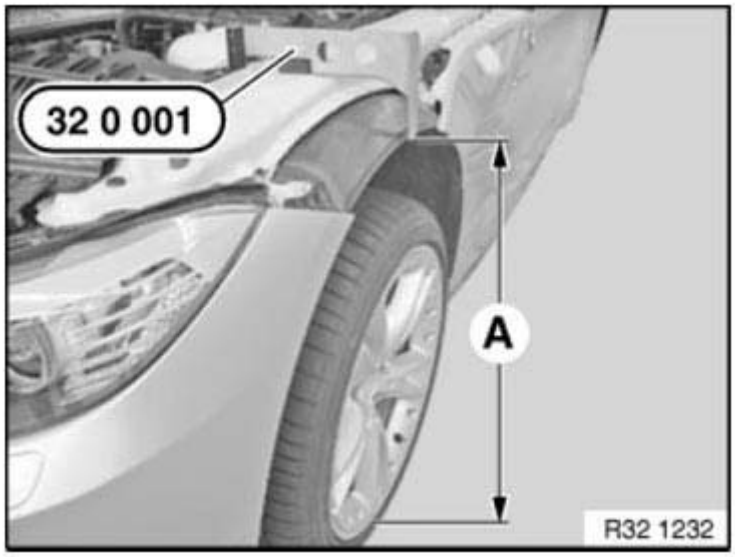


Fig. 70: Identifying Actual Ride Height
Courtesy of BMW OF NORTH AMERICA, INC.

31 33 100 REMOVING AND INSTALLING/REPLACING COIL SPRING FOR LEFT OR RIGHT FRONT SPRING STRUT

IMPORTANT: Both coil springs on the relevant axle must be replaced only in the event of corrosion breakage!

NOTE: The coil spring is allocated in the Electronic Parts Catalogue (EPC) under the menu item "Spring table" after the vehicle identification number has been entered and the relevant optional equipment of the car has been selected.

NOTE: Procedure is described in the document "REPLACING FRONT LEFT OR RIGHT SPRING STRUT ".

3135 STABILISER BAR

31 35 000 REMOVING AND INSTALLING/REPLACING FRONT STABILIZER

Necessary preliminary tasks

- Remove **FRONT ASSEMBLY UNDERSIDE PROTECTION**
- Remove **FRONT V-STRUTS**
- Remove both **STABILIZER LINKS FROM STABILIZER**

Unscrew nuts (1).

Tightening torque **31 35 1AZ** .

Remove stabilizer; if necessary, press off from engine carrier with a suitable tool.

Installation:

Check **RUBBER MOUNT ON BOTH SIDES FOR DAMAGE** , replace if necessary.

Replace self-locking nuts.

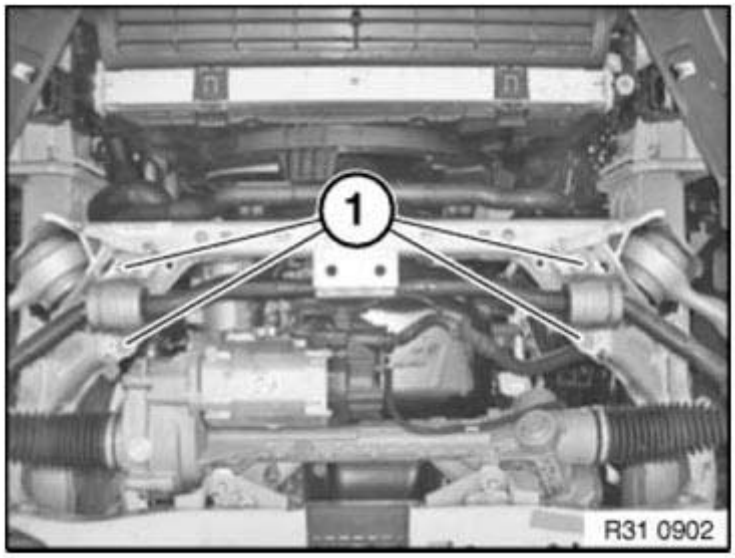


Fig. 71: Identifying Front Stabilizer Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove **RUBBER MOUNT ON BOTH SIDES FROM STABILIZER** .

31 35 005 REMOVING AND INSTALLING/REPLACING PUSH ROD (STABILIZER LINK) FOR LEFT/RIGHT STABILIZER

Release nut (1) and remove bracket for brake hose on spring strut.

Tightening torque **31 35 3AZ** .

Release nut (3) and remove stabilizer link (2).

Tightening torque **31 35 2AZ** .

Installation:

Replace self-locking nuts.

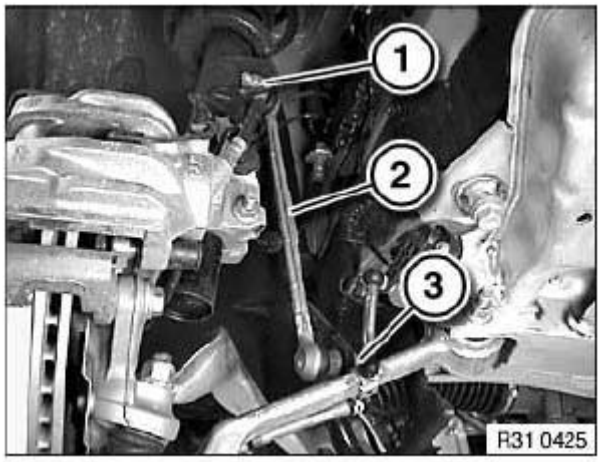


Fig. 72: Identifying Stabilizer Link With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

31 35 040 REPLACING RUBBER MOUNT FOR STABILIZER ON BODY ON LEFT OR RIGHT

Necessary preliminary tasks

- Remove **STABILIZER ON BOTH SIDES FROM ENGINE CARRIER**

Remove retaining bracket (1) and rubber mount (2) on both sides.

Installation:

Keep retaining bracket (1), rubber mount (2) and stabilizer clean and free from oil and grease.

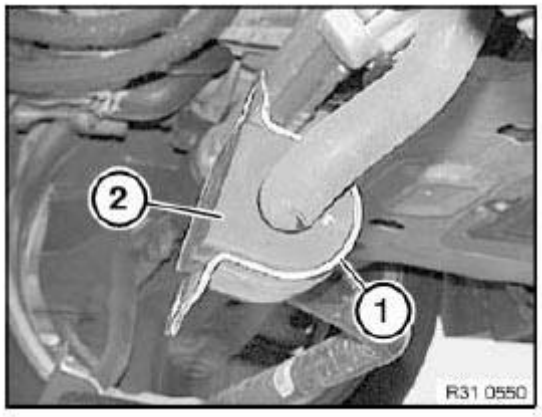


Fig. 73: Identifying Retaining Bracket And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

31 FRONT AXLE

31-5090 ADAPTER

0491982 315090 Adapter MW

NOTE: **(Adapter) For pulling off the taper roller bearings from the equalization housing in the front axle differential**

W31 5 090

Fig. 1: Identifying Adapter (315090)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5120 BUSH

0491985 315120 Bush MW

NOTE: **(impact bush) For fitting the radial sealing ring to the drive flange of the front axle differential**

Storage Location

X7

SI number

01 04 93 (664)

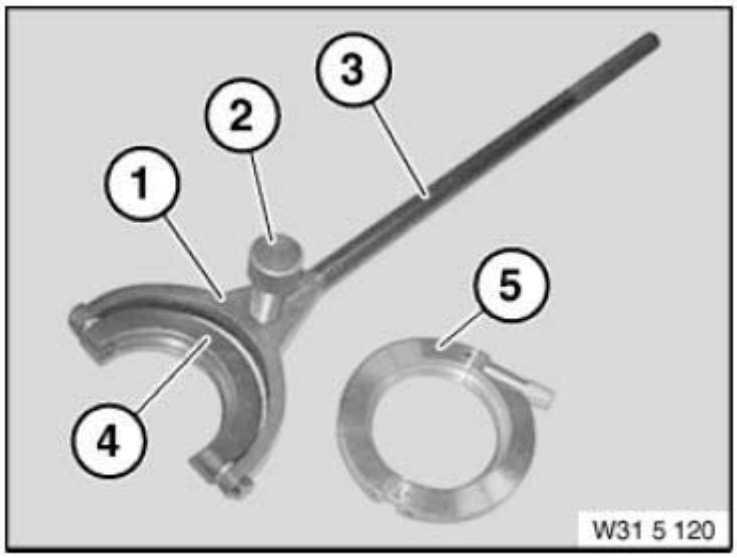


Fig. 2: Identifying Bush (315120)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5070 DEVICE

0491978 315070 Device MW

NOTE: For determining the fitting dimension at the drive bevel gear in the front axle differential

Consisting of:

1 = 0491979 Bridge

NOTE: (Measuring bridge)

2 = 0491980 Washer

NOTE: (Measuring disc 7 mm)

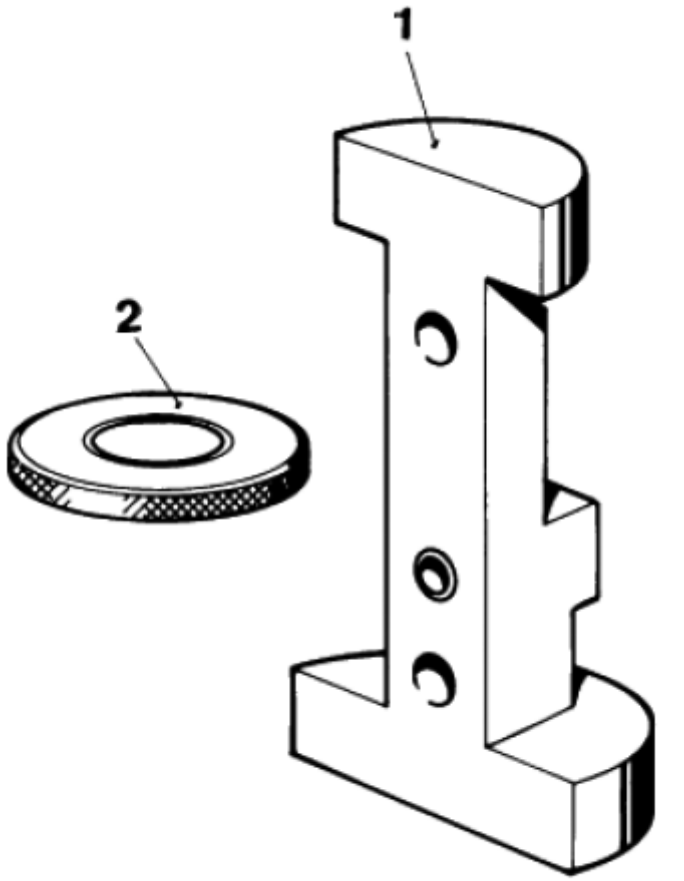


Fig. 3: Identifying Device (315070)
Courtesy of BMW OF NORTH AMERICA, INC.

31-2160 DEVICE

0491924 312160 Device MW

Replaced by: 0492053

NOTE: For pressing the wishbone off the spring strut/Replaced by 32 3 090 (0 492 053)

Consisting of:

1 = 0493260 Spindle

NOTE: Replaced by 32 3 090.(0 492 053)

2 = 0493261 Bolt

NOTE: Replaced by 32 3 090.(0 492 053)

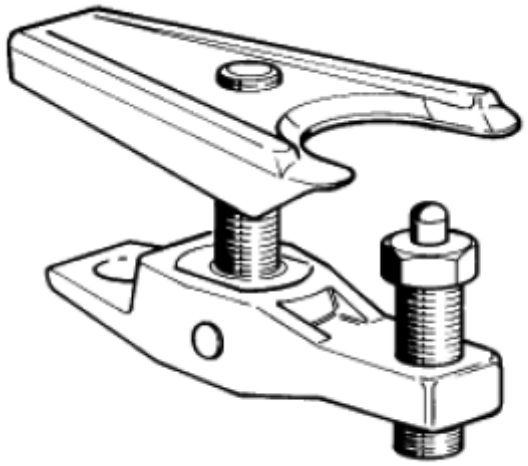


Fig. 4: Identifying Device (312160)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5250 FIXTURE

0495567 315250 Fixture MW

NOTE: (Universal axle take-up) Fixture for accommodating all front and rear axles when removing and installing.

SI number

01 24 06 (309)

Consisting of:

1 = 0495817 Basic body

NOTE: (basic body)

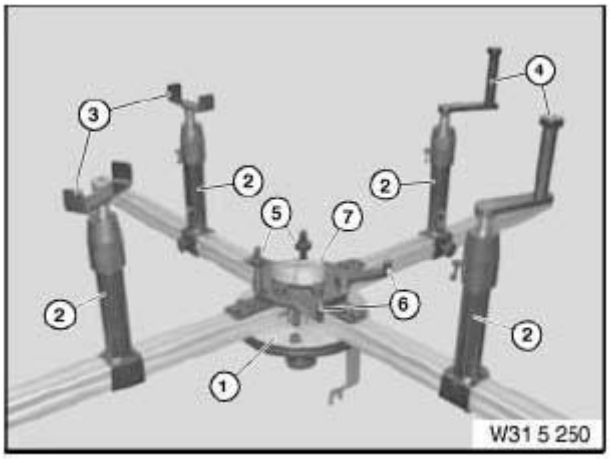


Fig. 5: Identifying Fixture (315250)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495818 Support

NOTE: (telescopic supports) 4 pieces

3 = 0495819 Adapter

NOTE: (take-up adapter U-section (2 pieces))

4 = 0495820 Adapter

NOTE: (take-up adapter (2 pieces))

5 = 0495821 Adapter

NOTE: (take-up adapter for bore holes (2 pieces))

6 = 0495822 Adapter

NOTE: (take-up adapter for bore holes (2 pieces))

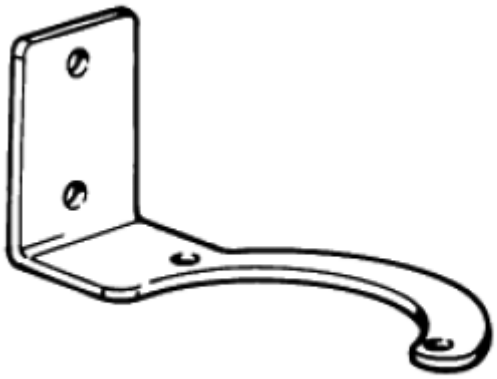
7 = 0495824 Belt

NOTE: (Tensioning strap)

31-5000 FIXTURE

0491969 315000 Fixture MW

NOTE: **(mounting fixture) For the front axle differential**



W31 5 000

Fig. 6: Identifying Fixture (315000)
Courtesy of BMW OF NORTH AMERICA, INC.

31-3358 INSERT RING

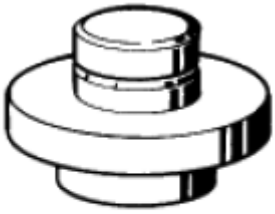
31 3 358 Insert ring

NOTE: **For inserting spring retainer ring 31 3 354 model series (PL2)**

31-5030 MANDREL

0491974 315030 Mandrel MW

NOTE: **(drift) For output shaft radial sealing ring in the front axle differential**



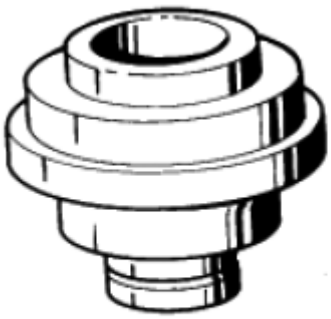
W31 5 030

Fig. 7: Identifying Mandrel (315030)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5020 MANDREL

0491973 315020 Mandrel MW

NOTE: (drift) For radial sealing ring of the drive shaft in the front axle differential



W31 5 020

Fig. 8: Identifying Mandrel (315020)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5060 PIN

0491977 315060 Pin MW

NOTE: (drive pin) For radial gears in the front axle differential for checking the coefficient of friction

W31 5 060

Fig. 9: Identifying Pin (315060)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5050 THRUST PIECE

0491976 315050 Thrust piece MW

NOTE: For press-fitting the roller bearing onto the differential casing

W31 5 050

Fig. 10: Identifying Thrust Piece (315050)
Courtesy of BMW OF NORTH AMERICA, INC.

31-3030 TOOL

0494187 313030 Tool Minimum set: Mechanical tools MW

NOTE: (Pressing-in/-out tool) For rubber mount on trailing arm

Storage Location

B46

SI number

01 14 01 (766)

Consisting of:

2 = 0494188 Bell housing

1 = 0494189 Bush

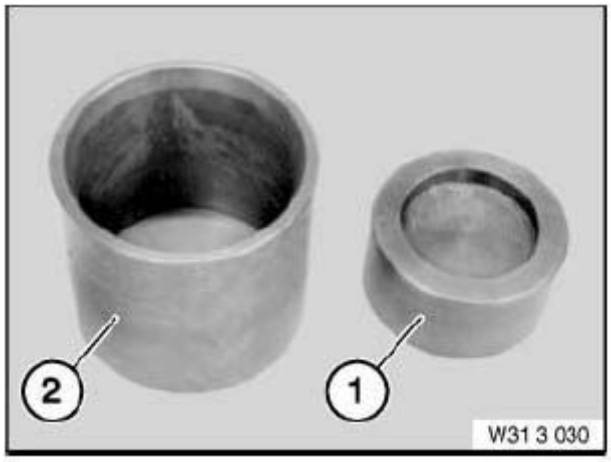


Fig. 11: Identifying Tool (313030)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5040 WASHER

0491975 315040 Washer MW

NOTE: **(Spring washer) For pretensioning the differential side gears when determining the installation size in the front axle differential**

W31 5 040

Fig. 12: Identifying Washer (315040)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5100 WASHER

0491983 315100 Washer MW

NOTE: **For pulling the outer bearing race into the bearing housing in the front axle differential**

W31 5 100

Fig. 13: Identifying Washer (315100)
Courtesy of BMW OF NORTH AMERICA, INC.

31-5080 WASHER

0491981 315080 Washer MW

NOTE: For determining the fitting clearance of the radial gears in the front axle differential

W31 5 080

Fig. 14: Identifying Washer (315080)
Courtesy of BMW OF NORTH AMERICA, INC.

FRONT AXLE - RIDE HEIGHT E89

31 00 FRONT AXLE - RIDE HEIGHT E89

FRONT AXLE - RIDE HEIGHT SPECIFICATION

Ride level height in normal position Attach tape measure to bottom middle of rim flange and measure to lower edge of wheel arch		
Tolerance ride height in ○ **NORMAL POSITION** max. 10 mm ○ **DESIGN POSITION** max. 2 mm		
Difference ride height between left/right in ○ **NORMAL POSITION** 10 mm ○ **DESIGN POSITION** 2 mm		
Series	mm	
17" rim	mm	606
18" rim	mm	619
19" rim	mm	631
Adaptive M suspension		
17" rim	mm	596
18" rim	mm	608
19" rim	mm	621

TRACK WIDTH/WHEELBASE E89/STANDARD SUSPENSION

31 00 GENERAL - TRACK WIDTH/WHEELBASE E89 STANDARD SUSPENSION

GENERAL - TRACK WIDTH/WHEELBASE SPECIFICATION

Track width for normal position and offset (ET)		
- ET29	mm	1511
Wheelbase	mm	2496

GENERAL - TRACK WIDTH/WHEELBASE E89/VDC SUSPENSION

31 00 GENERAL - TRACK WIDTH/WHEELBASE E89 VDC SUSPENSION

GENERAL - TRACK WIDTH/WHEELBASE SPECIFICATION

Track width for normal position and offset (ET)		

- ET29	mm	1513
Wheelbase	mm	2496

SHOCK ABSORBERS E89/SERIES

31 32 SHOCK ABSORBERS E89 SERIES

SHOCK ABSORBERS SPECIFICATION

Note:		Currently no details! Reason: Avoidance of incorrect assessments on account of different measurement procedures
Front Axle	mm	- -
Rear Axle	mm	- -

SHOCK ABSORBERS E89/VDC SUSPENSION

31 32 SHOCK ABSORBERS E89 VDC SUSPENSION

SHOCK ABSORBERS SPECIFICATION

Note:		Currently no details! Reason: Avoidance of incorrect assessments on account of different measurement procedures
Front Axle	mm	- -
Rear Axle	mm	- -

Front Axle - Tightening Torques - Z4

CONTROL ARMS AND STRUTS

31 12 CONTROL ARMS AND STRUTS

TIGHTENING TORQUE SPECIFICATION - CONTROL ARMS AND STRUTS

	Type	Thread	Tightening specification	Measure
1AZ Tension strut to front axle support	E89	M12 8.8	Replace screw and nut **TIGHTEN IN NORMAL POSITION** Jointing torque Torque angle	 68 Nm 90 °
2AZ Tension strut to swivel bearing	E89	M14	Replace nut	165 Nm
3AZ Control arm to front axle support	E89	M12 8.8	Replace nut **TIGHTEN IN NORMAL POSITION** Jointing torque Torque angle	 68 Nm 90 °
4AZ Control arm to swivel bearing	E89	M14	Replace nut	165 Nm

FRONT AXLE SUSPENSION

31 10 FRONT AXLE SUSPENSION

TIGHTENING TORQUE SPECIFICATION - FRONT AXLE SUSPENSION

	Type	Thread	Tightening specification	Measure
1AZ Front axle carrier to engine carrier	E89	M12x90		108 Nm
	E89	M12x125		108 Nm
	E89	M12x53		108 Nm

SPRING STRUTS

31 31 SPRING STRUTS

TIGHTENING TORQUE SPECIFICATION - SPRING STRUTS

	Type	Thread	Tightening specification	Measure
1AZ Nut and locknut/self-locking nut	E89	M8	Replace nuts	34 Nm
2AZ Spring strut shock absorber to support bearing	E89	M12	Replace nut	64 Nm
3AZ Swivel bearing to spring strut shock absorber	E89	M12	Replace nut	81 Nm

STABILIZER BAR

31 35 STABILIZER BAR

TIGHTENING TORQUE SPECIFICATION - STABILIZER BAR

	Type	Thread	Tightening specification	Measure
1AZ Retaining bar, stabilizer, to front axle carrier	E89	M8	Replace nut	22 Nm
2AZ Stabilizer link to stabilizer	E89	M10	Replace nut	58 Nm
3AZ Stabilizer link to spring strut	E89	M10	Replace nut	58 Nm

WHEEL BEARINGS AND STEERING KNUCKLE

31 21 WHEEL BEARINGS AND STEERING KNUCKLE

TIGHTENING TORQUE SPECIFICATION - WHEEL BEARINGS AND STEERING KNUCKLE

	Type	Thread	Tightening specification	Measure
1AZ Wheel bearing to swivel bearing	E89	M12	Replace screws	110 Nm

Propeller Shaft - Operating Fluids

1.0 GENERAL INFORMATION

The locating tabs of the drive shaft to the transmission output flange may be lubricated with any high temperature resistant, long-term grease (available locally).

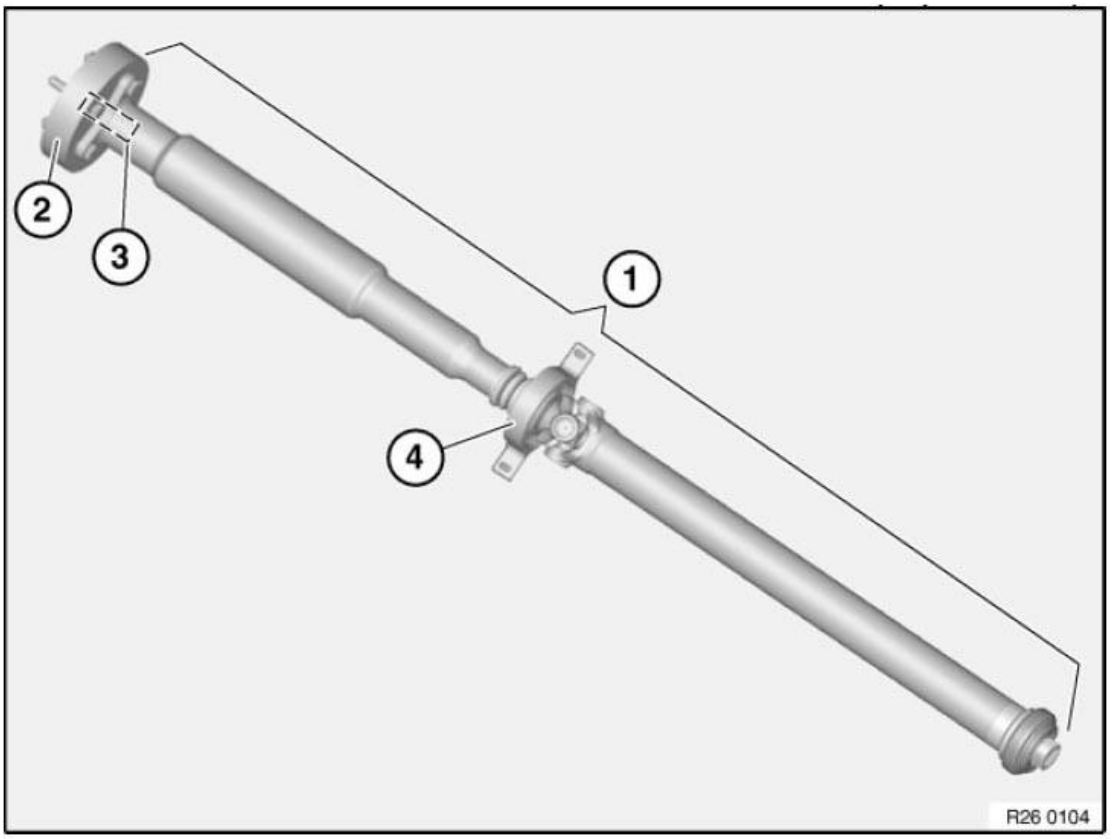
2600 PROPELLER SHAFT, GENERAL

26 00 ... PROPELLER SHAFT DEFLECTION ANGLES

IMPORTANT: Specifications on propeller shaft deflection angles are only possible on request with the vehicle identification number from the manufacturer.

2611 PROPELLER SHAFT ASSEMBLY

26 11 ... OVERVIEW (INSERTED PROPELLER SHAFT)



1 Complete propeller shaft
2 Flexible disc
3 Centring mount
4 Centre mount

Fig. 1: Overview (Inserted Propeller Shaft)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Complete propeller shaft
2. Flexible disc
3. Centering mount
4. Centre mount

26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT (INSERTED) COMPLETELY

IMPORTANT: Replacement of the sunk nut on the rear axle final drive is absolutely required!
The sunk nut already has a screw locking.
After the propeller shaft has been screwed into the rear axle final drive (sunk nut), a minimum hardening time of 2 hours must be complied with.

The hardening time may be extended at lower temperatures!
Failure to comply with these instructions may cause serious damage!

Necessary preliminary work:

- Remove complete **EXHAUST SYSTEM (N52K)**
- Remove underbody protection with holders
- Remove heat shields

Release screws.

Installation note:

- Replace ZNS bolts and self-locking nuts.
- Grip mounting bolts of flexible disc at nuts and tighten down by way of bolts.

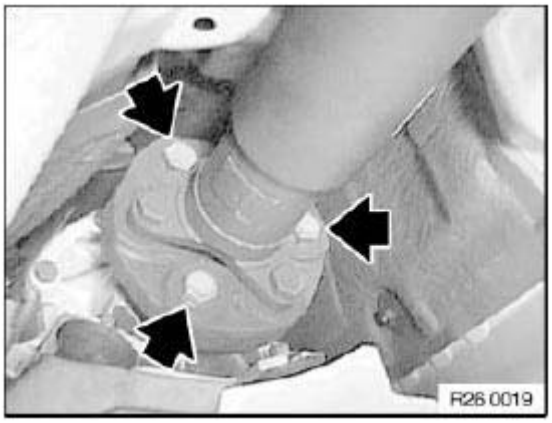


Fig. 2: Locating ZNS Bolts And Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check centering mount.

If necessary, replace damaged **CENTERING** .

Grease centering mount.

- Grease: see **PROPELLER SHAFT - OPERATING FLUIDS** .

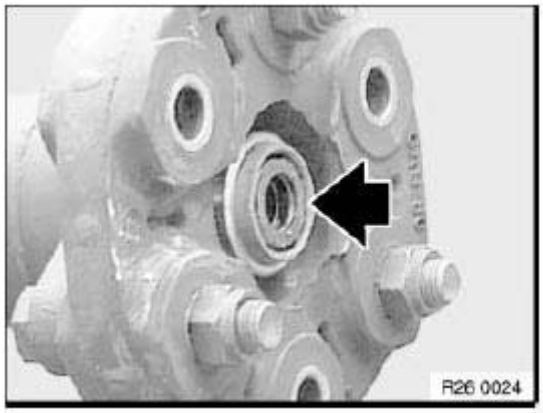


Fig. 3: Locating Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten down screws/bolts to specified torque.

Secure angle of rotation with special tool 00 9 120 with magnets **00 9 130** to vehicle underbody and screw down further according to angle of rotation.

Tightening torque **26 11 1AZ** .

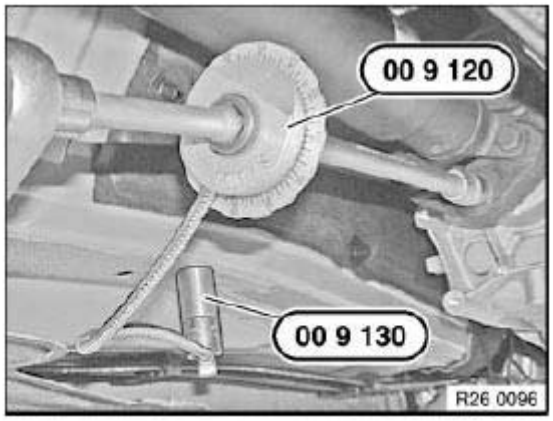


Fig. 4: Securing Angle Of Rotation Using Special Tool (00 9 120) With Magnets (009130 Magnet) To Vehicle Underbody
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1)

Tightening torque **26 11 6AZ** .

Using a suitable tool (2), secure propeller shaft at center universal joint against turning.

Remove screws of center mount fully only after opening insert nut.

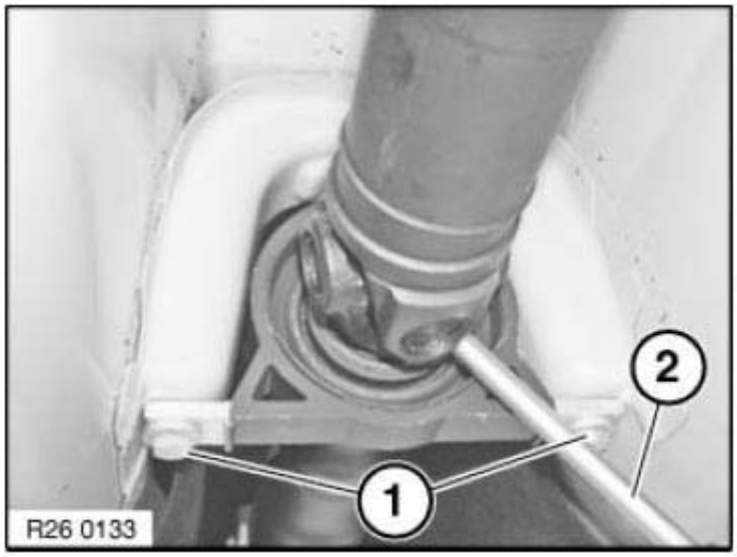


Fig. 5: Securing Propeller Shaft Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **COMPRESSION STRUT** (1) for E89.

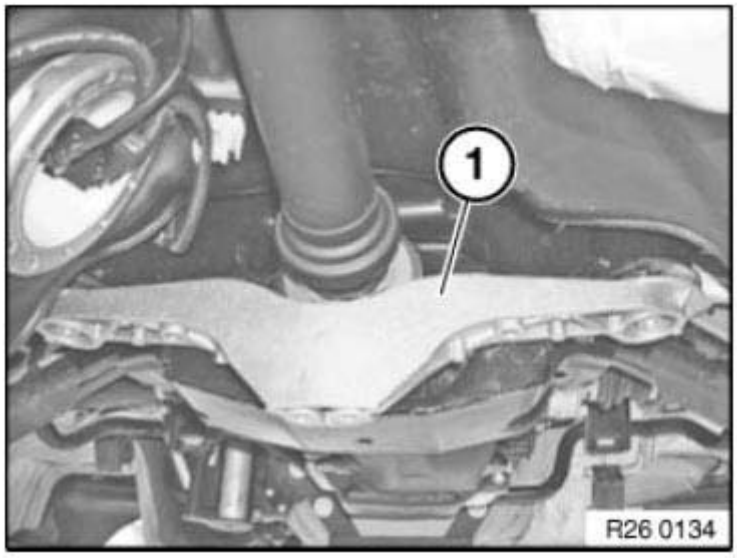


Fig. 6: Identifying Compression Strut For E89
Courtesy of BMW OF NORTH AMERICA, INC.

Release insert nut against direction of travel **in clockwise direction** with special tool 33 5 040 and 33 5 070.

Tightening torque **26 11 1AZ** .

IMPORTANT: The bi-hexagonal flange nut must not be used for bracing.

Failure to comply with this instruction may result in serious damage to the rear axle final drive.

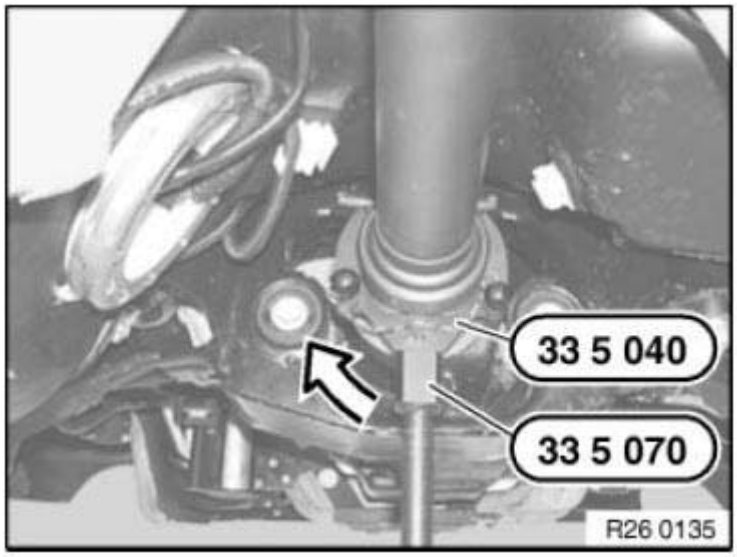


Fig. 7: Releasing Nut Using Special Tool (33 5 040) And (33 5 070)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining clip (1) and gasket (2).

Installation note:

Retaining clip and gasket must be replaced.

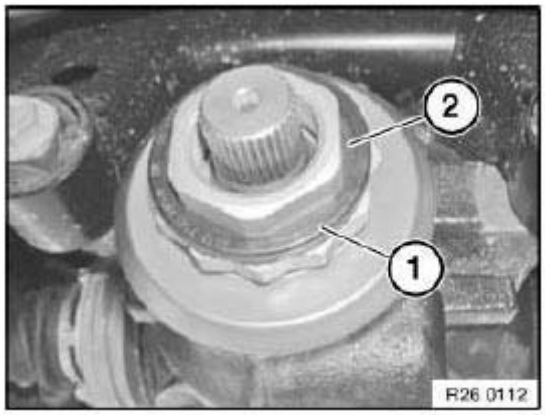


Fig. 8: Identifying Clip And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Remove insert nut (1).

Installation note:

Insert nut must be replaced.

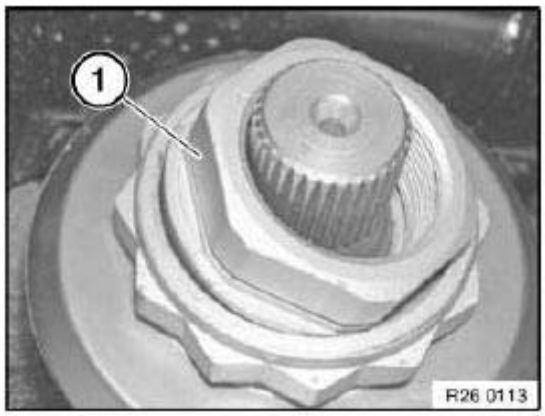


Fig. 9: Identifying Propeller Shaft Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Before installing propeller shaft:

Clean insert collar (1) on flange nut and gearing on bevel pinion (2).

Fill insert collar (1) with grease.

Grease: see **PROPELLER SHAFT - OPERATING FLUIDS** .

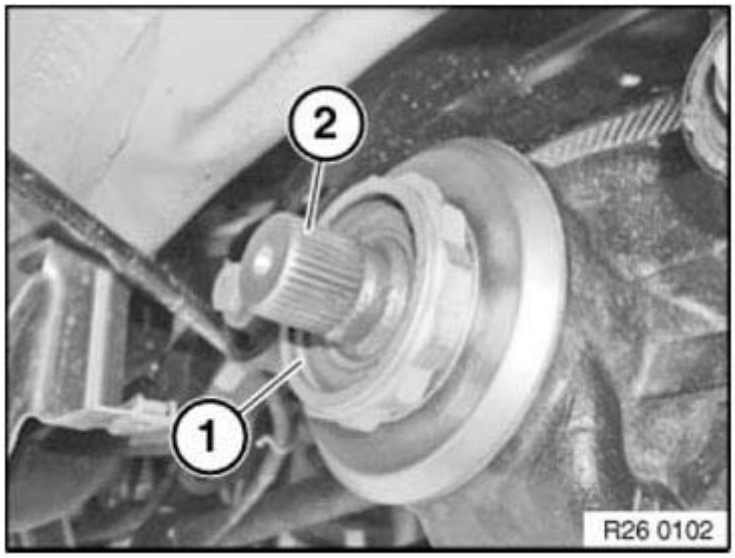


Fig. 10: Identifying Collar And Bevel Pinion
Courtesy of BMW OF NORTH AMERICA, INC.

Clean thread (1) of joint hub to remove adhesive residues.

Clean hub teeth (2), then coat with grease.

Grease: see **PROPELLER SHAFT - OPERATING FLUIDS** .

IMPORTANT: Thread of joint hub must not be fouled with grease.

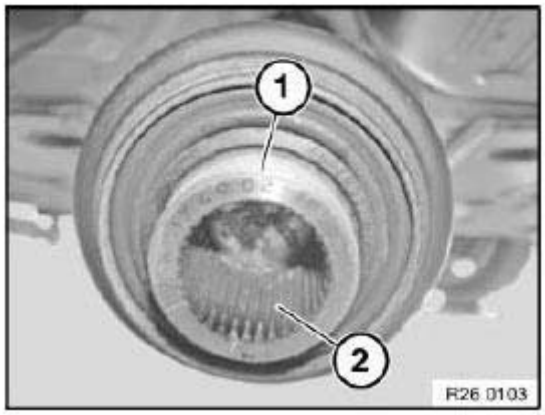


Fig. 11: Identifying Joint Hub Thread And Hub Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

Place flange nut (1) with gasket in insert collar of flange nut.

Install retaining clip (2).

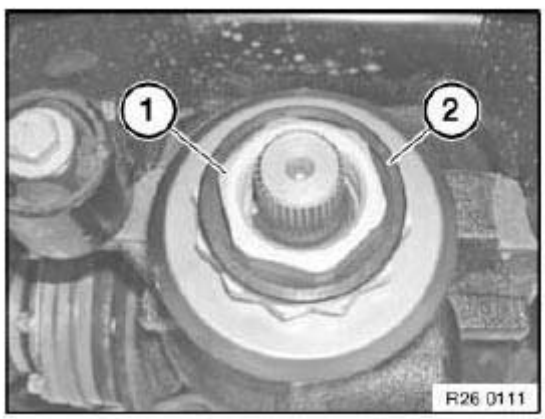


Fig. 12: Identifying Flange Nut And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Adhere without fail to installation and screw-fastening sequence.

Installation sequence:

1. Join propeller shaft to transmission
2. Join propeller shaft to rear axle final drive

3. Join center mount

Screw-fastening sequence:

1. Insert nut
2. Flexible disc to transmission
3. Centre mount

Slide propeller shaft (1) to the limit position onto insert nut and secure.

Secure propeller shaft at center universal joint against turning with a mounting lever.

IMPORTANT: The bi-hexagonal flange nut (2) must not be used for bracing.

Failure to comply with this instruction may result in serious damage to the rear axle final drive.

Insert nut must be screwed into place **within 5 minutes.**

Tightening torque **26 11 1AZ** .

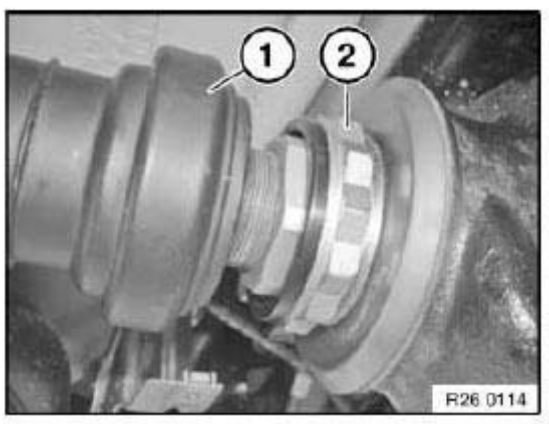


Fig. 13: Identifying Propeller Shaft With Flange Nut
Courtesy of BMW OF NORTH AMERICA, INC.

26 11 090 REMOVING AND INSTALLING/REPLACING FRONT CENTERING MOUNT FOR PROPELLER SHAFT

Necessary preliminary tasks:

- **REMOVE PROPELLER SHAFT.**

Completely fill centering bore (1) with viscous grease.

Drive special tool 11 1 310 with a plastic hammer into centering bore.

The centering mount (1) is forced out of the propeller shaft by the pressure on the grease filling.

If necessary, top up grease repeatedly.

NOTE: To drive out the mount, you can also fill the centering bore with water instead of grease.

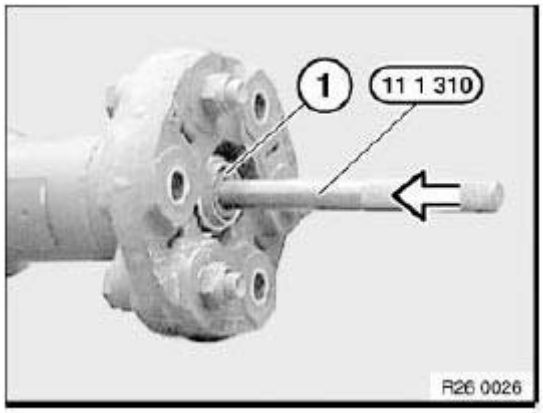


Fig. 14: Driving Centre Mount Using Special Tools 11 1 310 Into Propeller Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Remove grease/water from mount bore.

Drive in centering mount (1) with special tools 11 2 030 and 00 5 500 into propeller shaft (observe protrusion).

Grease centering mount.

- Grease: see **PROPELLER SHAFT - OPERATING FLUIDS** .

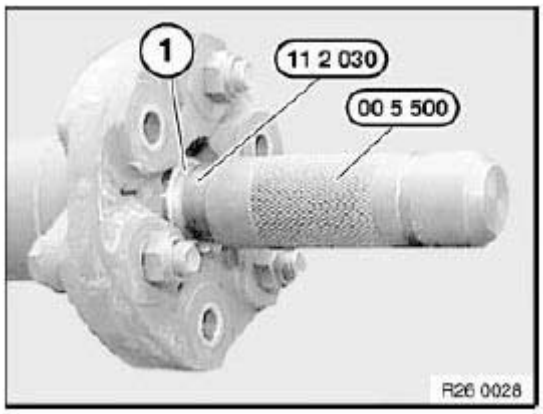


Fig. 15: Installing Centering Mount Using Special Tools (11 2 030 And 00 5 500)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Observe protrusion A = 4^{+2} mm of centering (1).

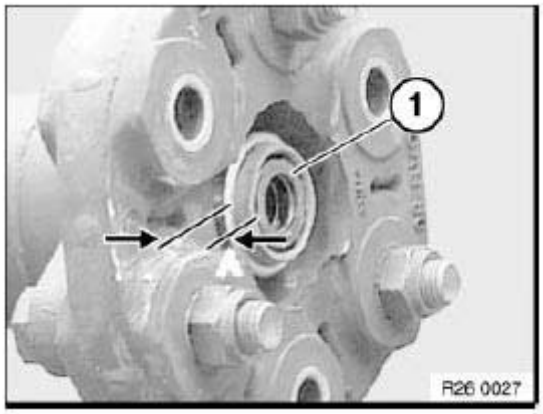


Fig. 16: Identifying Protrusion Of Centering
Courtesy of BMW OF NORTH AMERICA, INC.

26 11 020 REPLACING CENTER MOUNT GAITER

Necessary preliminary tasks

- Remove **PROPELLER SHAFT** .

NOTE: The propeller shaft is balanced. The front and rear propeller shafts must be reassembled in the same position.
Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

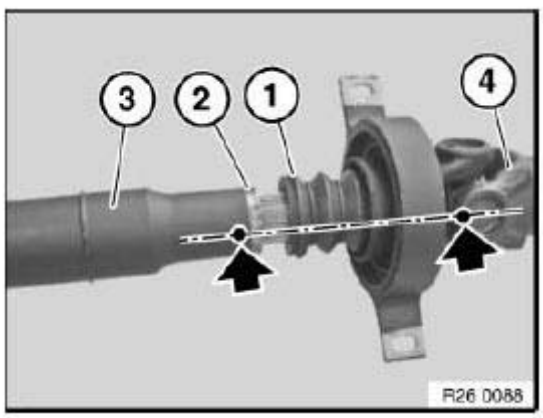


Fig. 17: Identifying Front And Rear Propeller Shaft Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull propeller shaft apart.

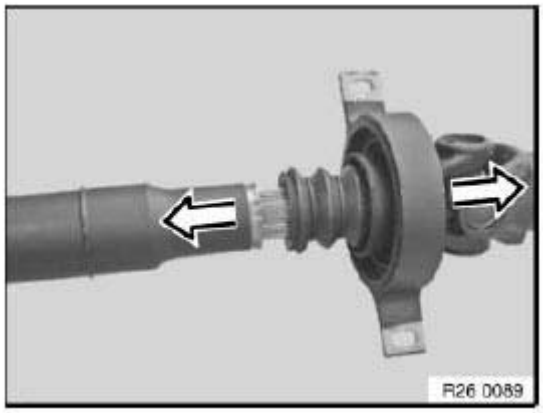


Fig. 18: Identifying Front And Rear Propeller Shaft Marks Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, insert new clamping ring (1) into front propeller shaft (2).

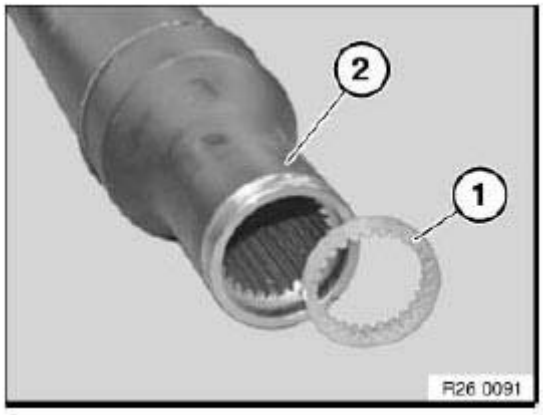


Fig. 19: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

Installation:

Apply an even coating of grease to longitudinal splines on shaft. See **PROPELLER SHAFT - OPERATING FLUIDS**

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

Push gaiter (1) during installation into groove (2) and make sure it is firmly seated.

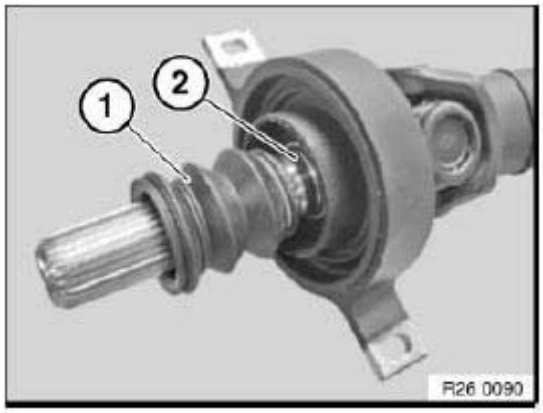


Fig. 20: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

26 11 051 REPLACING FLEXIBLE DISK FOR FRONT PROPELLER SHAFT

Necessary preliminary tasks:

- Remove **PROPELLER SHAFT** from transmission and center bearing

NOTE: To protect universal joints, tie back propeller shaft in area of center mount.

Release screws and remove flexible disc (1) from propeller shaft.

IMPORTANT: Replace shiny ZNS bolts and self-locking nuts.

Tightening torque and angle of rotation: **26 11 1AZ** .

Installation:

- Arrows (3) on circumference of flexible disk must point to flange arms (2).
- Grip mounting bolts of flexible disk at propeller shaft flange at nuts and tighten down at bolt heads.

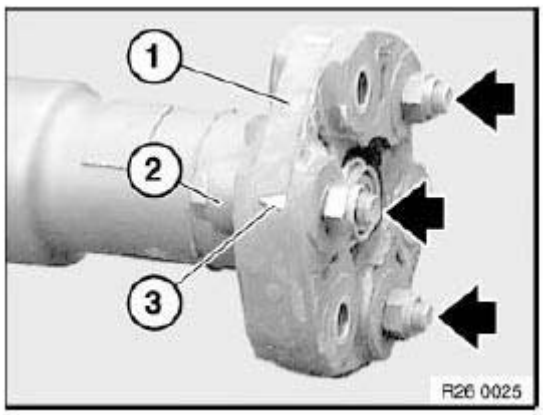


Fig. 21: Locating Flexible Disc Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check centering mount.

Replace damaged **CENTERING MOUNT** .

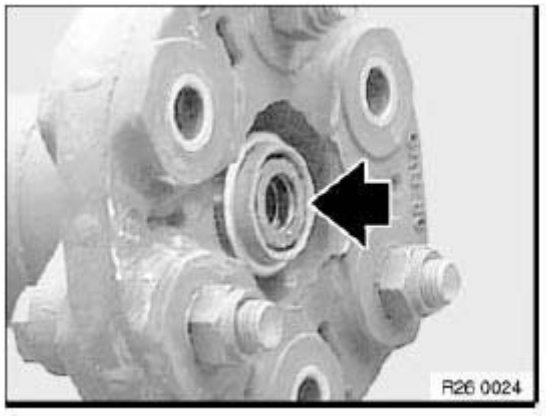


Fig. 22: Locating Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

2612 CENTER CONSOLE ASSEMBLY

26 11 020 REPLACING CENTER MOUNT GAITER

Necessary preliminary tasks

- Remove **PROPELLER SHAFT** .

NOTE: The propeller shaft is balanced. The front and rear propeller shafts must be reassembled in the same position.
Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

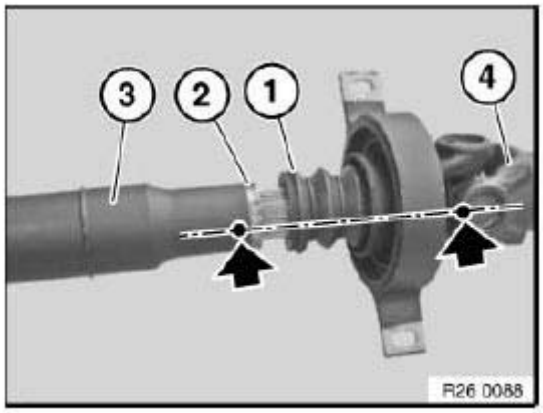


Fig. 23: Identifying Front And Rear Propeller Shaft Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull propeller shaft apart.

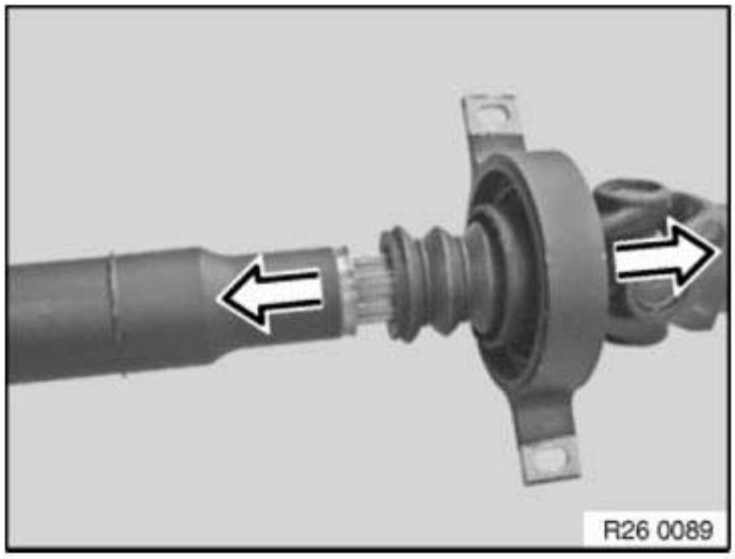


Fig. 24: Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, insert new clamping ring (1) into front propeller shaft (2).

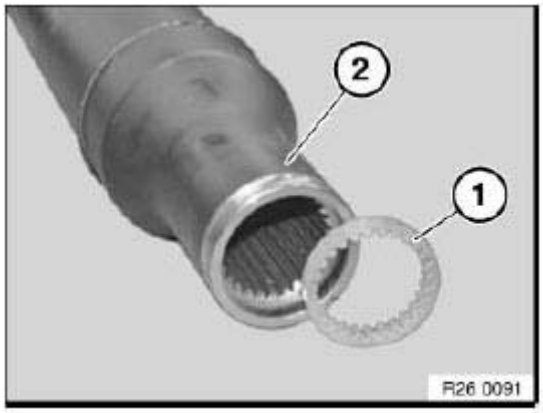


Fig. 25: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

Installation:

Apply an even coating of grease to longitudinal splines on shaft. See **PROPELLER SHAFT - OPERATING FLUIDS**

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

Push gaiter (1) during installation into groove (2) and make sure it is firmly seated.

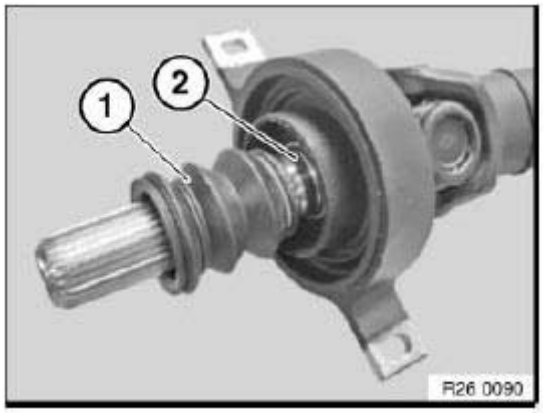


Fig. 26: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

26 12 001 REPLACING COMPLETE PROPELLER SHAFT CENTER MOUNT

Necessary preliminary tasks

- Remove **PROPELLER SHAFT** .

NOTE: The propeller shaft is balanced. The front and rear propeller shafts must be reassembled in the same position.

Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

Installation:

Make sure gaiter (1) is securely seated in groove (2).

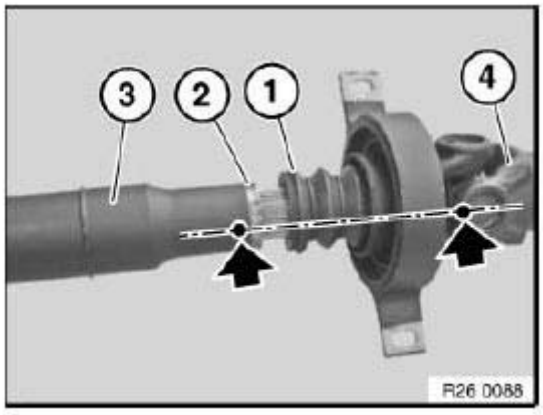


Fig. 27: Identifying Front And Rear Propeller Shaft Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull propeller shaft apart.

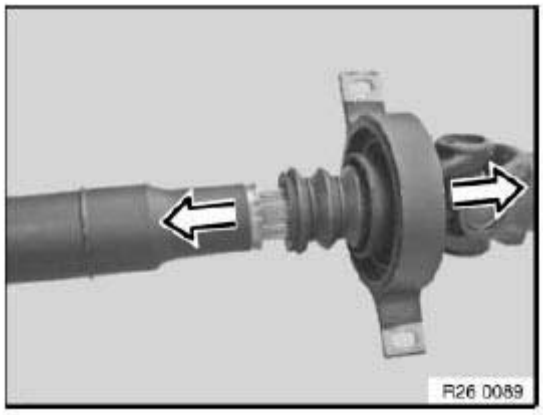


Fig. 28: Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If necessary, insert new clamping ring (1) into front propeller shaft (2).

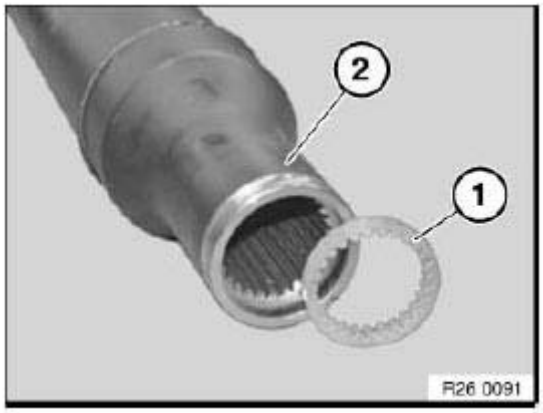


Fig. 29: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

Installation:

Apply a coating of grease to longitudinal splines on shaft. See **PROPELLER SHAFT - OPERATING FLUIDS**

Push gaiter (1) during installation into groove (2) and make sure it is firmly seated.

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

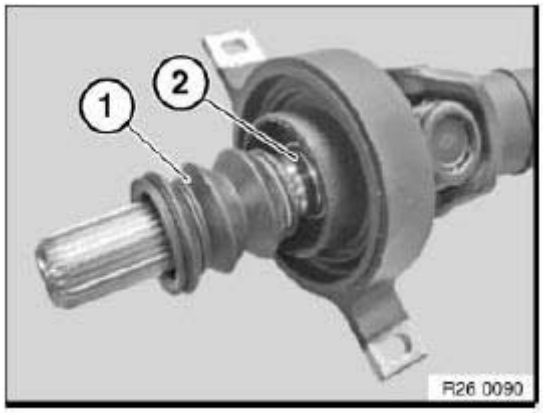


Fig. 30: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 00 7 500 between center mount (1) and universal joint (2).

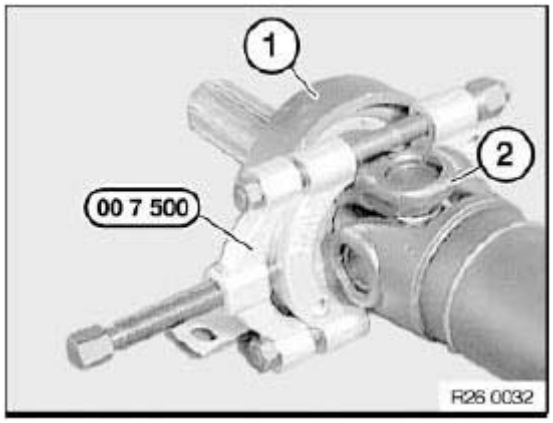


Fig. 31: Installing Special Tool (00 7 500) Between Centre Mount And Universal Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Using a hydraulic press, force center mount (1) off propeller shaft (2).

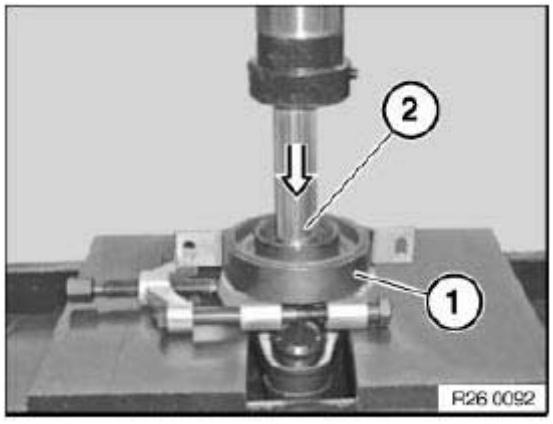


Fig. 32: Forcing Centre Mount Of Propeller Shaft Using Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.

Force new center mount (1) onto propeller shaft. Collar (2) must point in direction of travel towards front propeller shaft. Drive center mount firmly home with special tool 23 1 160.

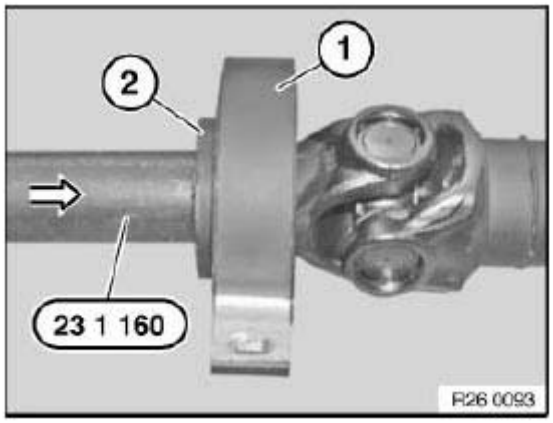


Fig. 33: Forcing Centre Mount Firmly Home Using Special Tool (23 1 160)
Courtesy of BMW OF NORTH AMERICA, INC.

26 12 011 REPLACING GROOVED BALL BEARING IN CENTER MOUNT OF PROPELLER SHAFT

Necessary preliminary tasks

- Replace **PROPELLER SHAFT CENTRE MOUNT**

Press grooved ball bearing using special tool 23 1 160 out of center mount (1).

NOTE: Illustration shows E46.

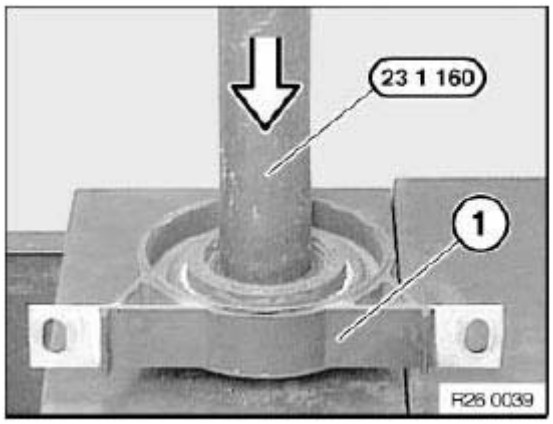


Fig. 34: Pressing Grooved Ball Bearing Using Special Tool (23 1 160)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat rubber-coated bearing seat of center mount (2) with Circolight.

Circolight, refer to BMW Parts Service.

Using special tools 33 3 202/33 3 203, press new grooved ball bearing (1) into center mount (2).

NOTE: Illustration shows E46.

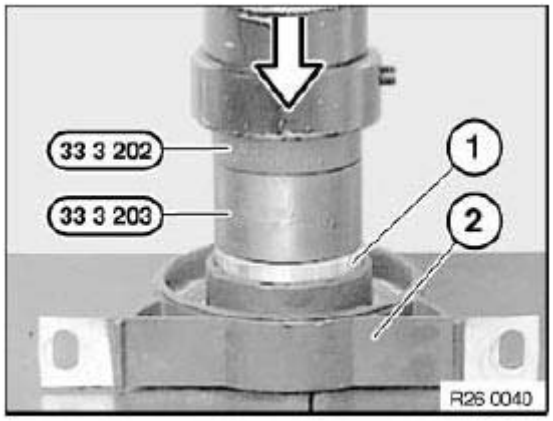


Fig. 35: Pressing Deep Groove Ball Bearing Into Centre Mount Using Special Tools (33 3 202) And (33 3 203)
Courtesy of BMW OF NORTH AMERICA, INC.

Propeller Shaft - Repair - Z4

2600 PROPELLER SHAFT, GENERAL

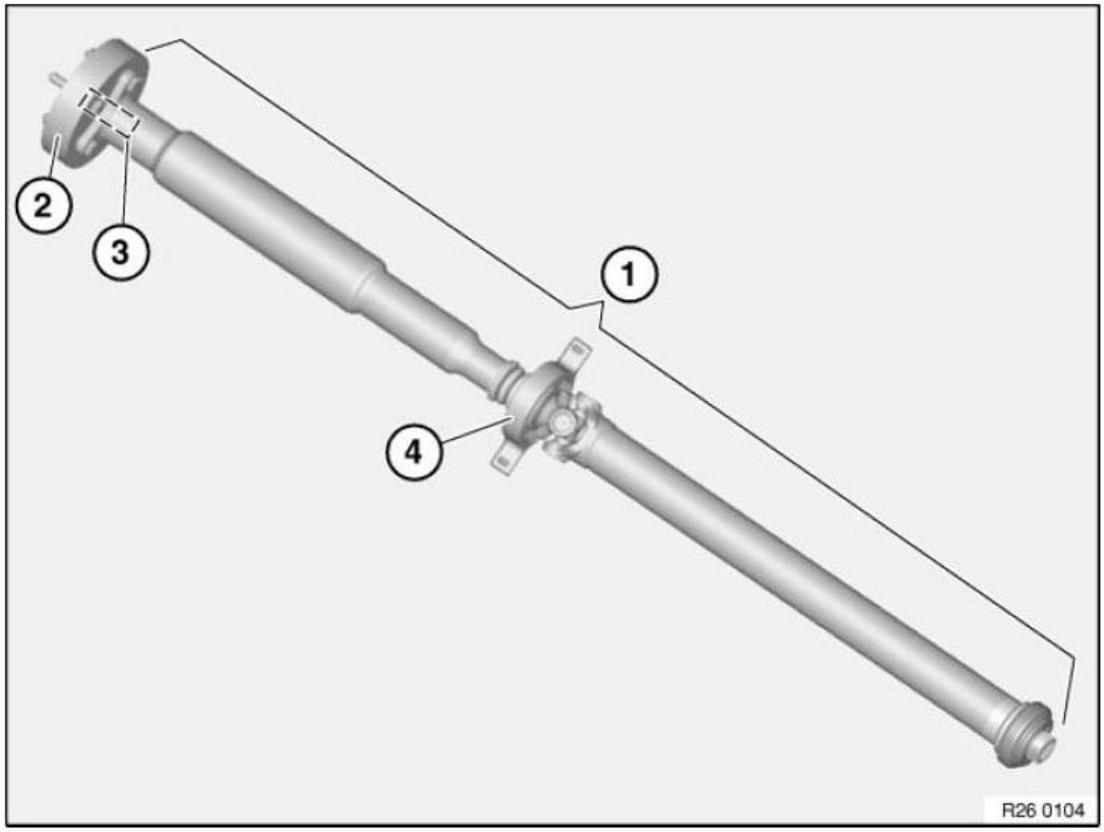
26 00 ... PROPELLER SHAFT DEFLECTION ANGLES

IMPORTANT: Specifications on propeller shaft deflection angles

Only possible on request with the vehicle identification number of the problem vehicle via PuMA.

2611 PROPELLER SHAFT ASSEMBLY

26 11 ... OVERVIEW (INSERTED PROPELLER SHAFT)



1 Complete propeller shaft
2 Flexible disc
3 Centring mount
4 Centre mount

Fig. 1: Overview (Inserted Propeller Shaft)
Courtesy of BMW OF NORTH AMERICA, INC.

26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT (INSERTED) COMPLETELY

IMPORTANT: Replacement of the sunk nut on the rear axle final drive is absolutely required!

The sunk nut already has a screw locking.

After the propeller shaft has been screwed into the rear axle final drive (sunk nut), a minimum hardening time of 2 hours must be complied with.

The hardening time may be extended at lower temperatures!

Failure to comply with these instructions may cause serious damage!

Necessary preliminary work

- Remove complete **EXHAUST SYSTEM (N54)**
- Remove underbody protection with holders
- Remove heat shields

Release screws.

Installation note:

- Replace ZNS bolts and self-locking nuts.
- Grip mounting bolts of flexible disc at nuts and tighten down by way of bolts.

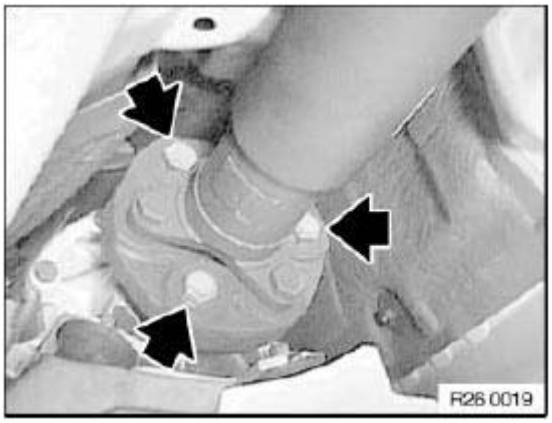


Fig. 2: Locating ZNS Bolts And Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check centering mount.

If necessary, replace damaged **CENTERING** .

Grease centering mount.

- Grease: BMW Service **PROPELLER SHAFT - OPERATING FLUIDS** .

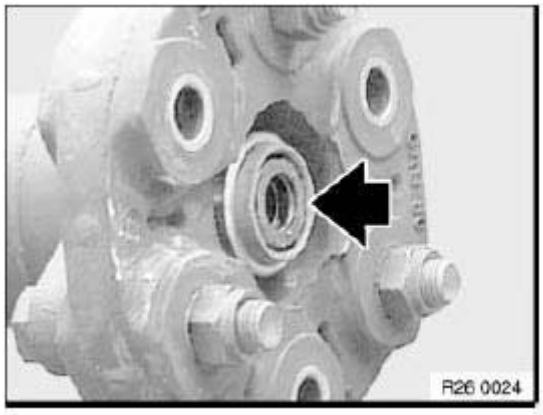


Fig. 3: Locating Propeller Shaft Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten down screws/bolts to specified torque.

Secure angle of rotation special tool **00 9 120** with magnets **00 9 130** to vehicle underbody and screw down further according to angle of rotation.

Tightening torque **26 11 1AZ** .

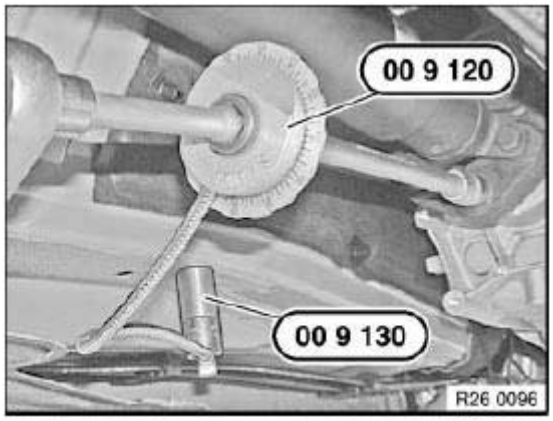


Fig. 4: Securing Angle Of Rotation Using Special Tool (00 9 120) With Magnets (009130)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken screws (1)

Tightening torque **26 11 6AZ** .

Using a suitable tool (2), secure propeller shaft at centre universal joint against turning.

Remove screws of centre mount fully only after opening insert nut.

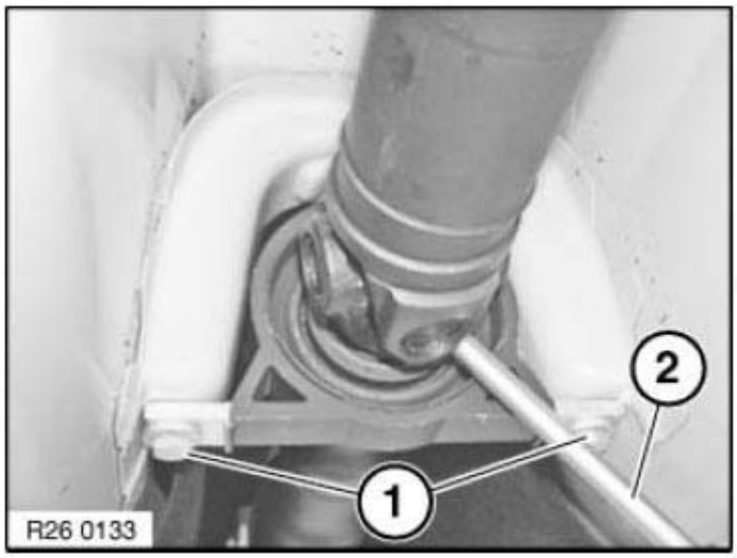


Fig. 5: Securing Propeller Shaft Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **COMPRESSION STRUT FOR REAR AXLE CARRIER** (1) for E89.

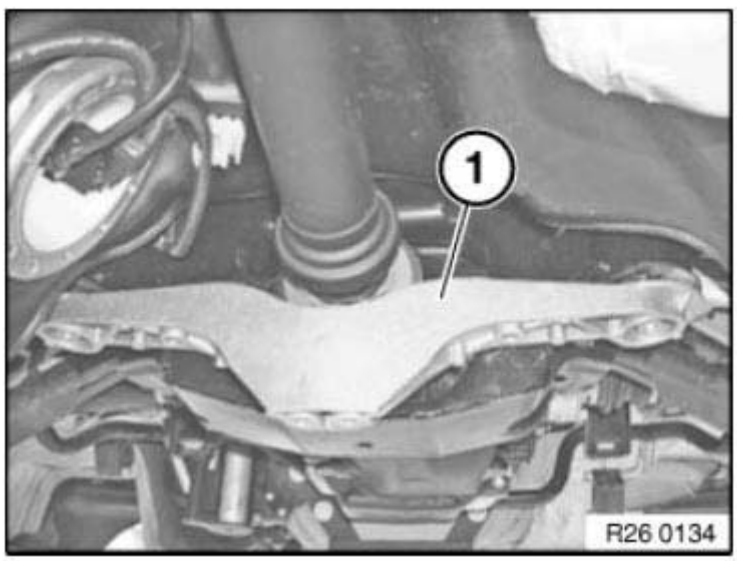


Fig. 6: Identifying Compression Strut
Courtesy of BMW OF NORTH AMERICA, INC.

Release insert nut against direction of travel **in clockwise direction** with special tool 33 5 040 and 33 5 070.

Tightening torque **26 11 1AZ** .

IMPORTANT: The bi-hexagonal flange nut must not be used for bracing.

Failure to comply with this instruction may result in serious damage to the rear axle final drive.

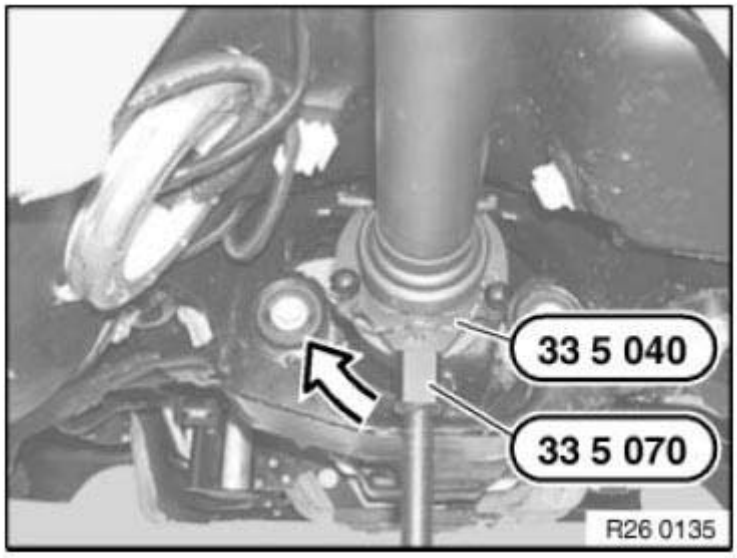


Fig. 7: Releasing Insert Nut Using Special Tool (33 5 040) And (33 5 070)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove retaining clip (1) and gasket (2).

Installation note:

Retaining clip and gasket must be replaced.

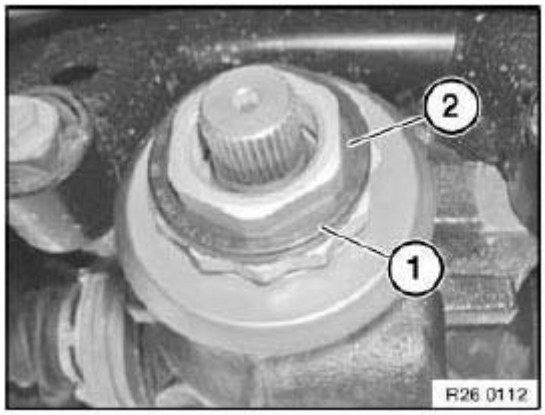


Fig. 8: Identifying Retaining Clip And Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Remove insert nut (1).

Installation note:

Insert nut must be replaced.

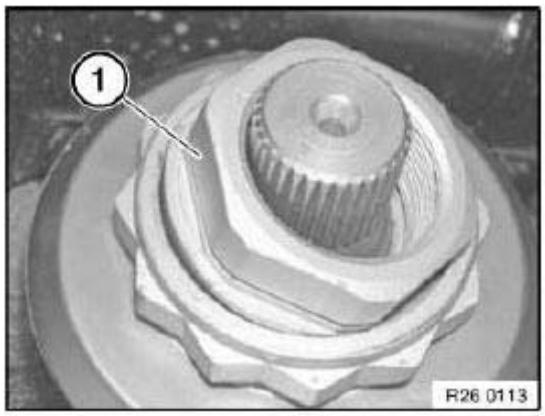


Fig. 9: Identifying Insert Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Before installing propeller shaft:

Clean insert collar (1) on flange nut and gearing on bevel pinion (2).

Fill insert collar (1) with grease.

Grease: BMW Service **PROPELLER SHAFT - OPERATING FLUIDS** .

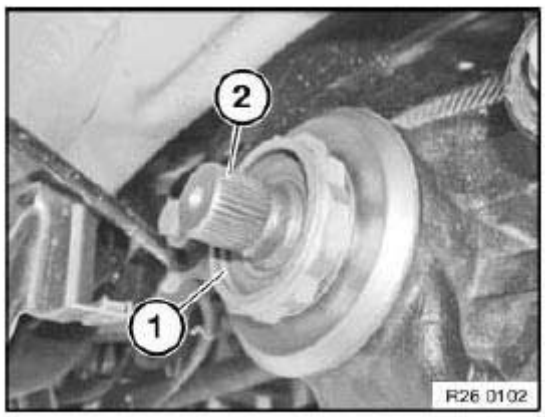


Fig. 10: Identifying Collar And Bevel Pinions
Courtesy of BMW OF NORTH AMERICA, INC.

Clean thread (1) of joint hub to remove adhesive residues.

Clean hub teeth (2), then coat with grease.

Grease: BMW Service **PROPELLER SHAFT - OPERATING FLUIDS** .

IMPORTANT: Thread of joint hub must not be fouled with grease.

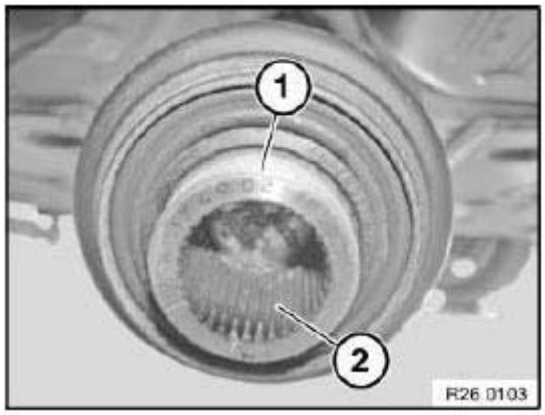


Fig. 11: Identifying Joint Hub Thread And Hub Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

Place flange nut (1) with gasket in insert collar of flange nut.

Install retaining clip (2).

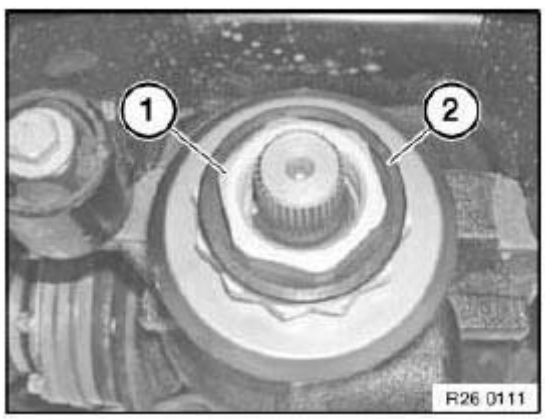


Fig. 12: Identifying Flange Nut With Seal And Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Adhere without fail to installation and screw-fastening sequence.

Installation sequence:

1. Join propeller shaft to transmission
2. Join propeller shaft to rear axle final drive

3. Join centre mount

Screw-fastening sequence:

1. Insert nut
2. Flexible disc to transmission
3. Centre mount

Slide propeller shaft (1) to the limit position onto insert nut and secure.

Secure propeller shaft at centre universal joint against turning with a mounting lever.

IMPORTANT: The bi-hexagonal flange nut (2) must not be used for bracing.

Failure to comply with this instruction may result in serious damage to the rear axle final drive.

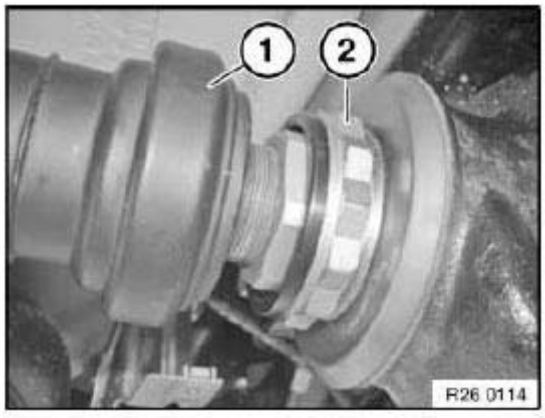


Fig. 13: Identifying Propeller Shaft With Insert Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Insert nut must be screwed into place **within 5 minutes.**

Tightening torque **26 11 1AZ** .

26 11 090 REMOVING AND INSTALLING/REPLACING FRONT CENTERING MOUNT FOR PROPELLER SHAFT

Necessary preliminary tasks

- **REMOVE PROPELLER SHAFT.**

Completely fill centering bore (1) with viscous grease.

Drive special tool 11 1 310 with a plastic hammer into centering bore.

The centering mount (1) is forced out of the propeller shaft by the pressure on the grease filling.

If necessary, top up grease repeatedly.

NOTE: To drive out the mount, you can also fill the centering bore with water instead of grease.

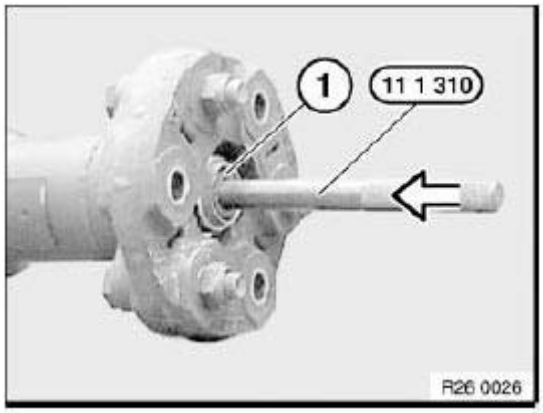


Fig. 14: Installing Special Tool (11 1 310) With Plastic Hammer Into Centering Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Remove grease/water from mount bore.

Drive in centering mount (1) with special tools 11 2 030 and 00 5 500 into propeller shaft (observe protrusion).

Grease centering mount.

- Grease: BMW Service **PROPELLER SHAFT - OPERATING FLUIDS** .

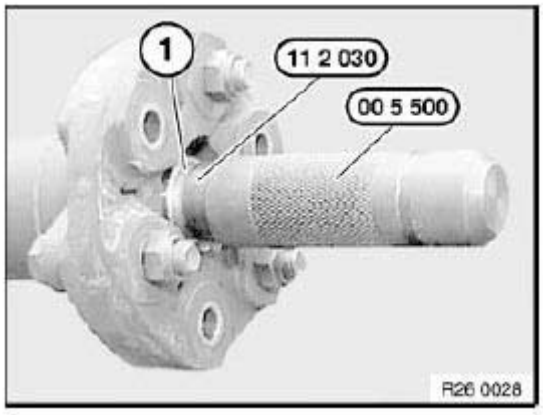


Fig. 15: Installing Centering Mount Using Special Tools (11 2 030 And 00 5 500)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Observe protrusion A = 4^{+2} mm of centering (1).

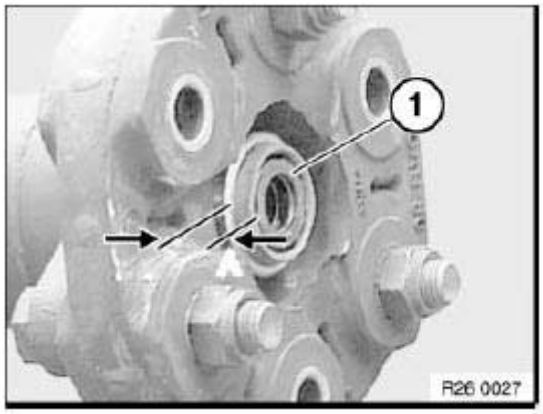


Fig. 16: Observing Protrusion Of Centering
Courtesy of BMW OF NORTH AMERICA, INC.

26 11 020 REPLACING CENTRE MOUNT GAITER

Necessary preliminary tasks

- Remove **PROPELLER SHAFT** .

NOTE: **The propeller shaft is balanced. The front and rear propeller shafts must be reassembled in the same position.**

Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

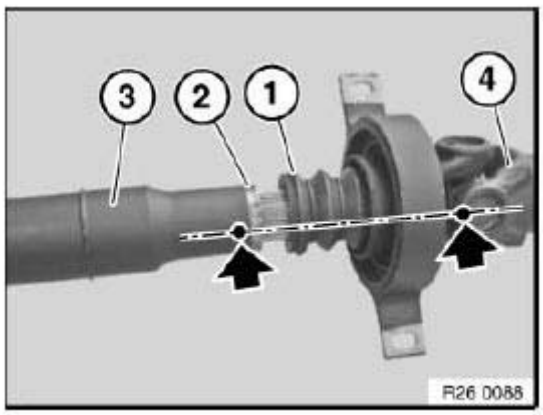


Fig. 17: Marking Front Propeller Shaft And Rear Propeller Shaft In One Plane
Courtesy of BMW OF NORTH AMERICA, INC.

Pull propeller shaft apart.

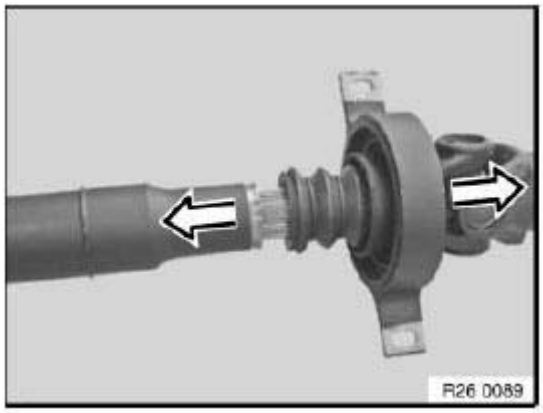


Fig. 18: Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

If necessary, insert new clamping ring (1) into front propeller shaft (2).

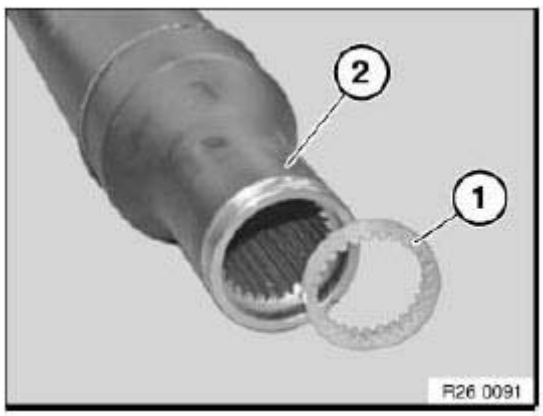


Fig. 19: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

Installation

Apply an even coating of grease to longitudinal splines on shaft.

PROPELLER SHAFT - OPERATING FLUIDS .

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

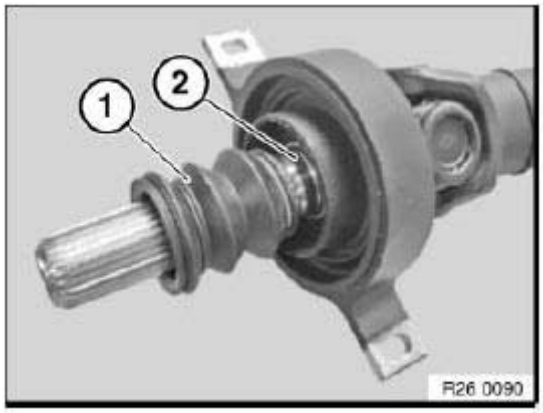


Fig. 20: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Push gaiter (1) during installation into groove (2) and make sure it is firmly seated.

26 11 051 REPLACING FLEXIBLE DISK FOR FRONT PROPELLER SHAFT

Necessary preliminary tasks

- Remove **PROPELLER SHAFT** from transmission and centre bearing

NOTE: To protect universal joints, tie back propeller shaft in area of centre mount.

Release screws and remove flexible disc (1) from propeller shaft.

IMPORTANT: Replace shiny ZNS bolts and self-locking nuts.

Tightening torque and angle of rotation: **26 11 1AZ** .

Installation

- Arrows (3) on circumference of flexible disk must point to flange arms (2).
- Grip mounting bolts of flexible disk at propeller shaft flange at nuts and tighten down at bolt heads.

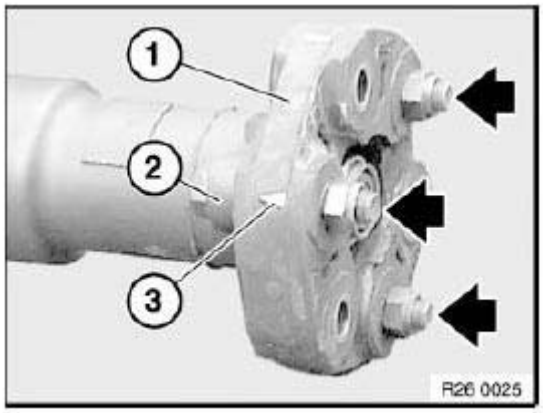


Fig. 21: Locating Propeller Shaft Flexible Disc Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check centering mount.

Replace damaged **CENTERING MOUNT** .

Grease centering mount.

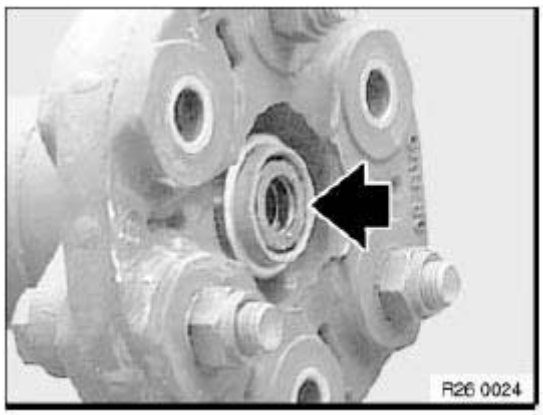


Fig. 22: Locating Propeller Shaft Centering Mount
Courtesy of BMW OF NORTH AMERICA, INC.

2612 CENTRE CONSOLE ASSEMBLY

26 11 020 REPLACING CENTRE MOUNT GAITER

Installation

Apply an even coating of grease to longitudinal splines on shaft.

PROPELLER SHAFT - OPERATING FLUIDS .

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

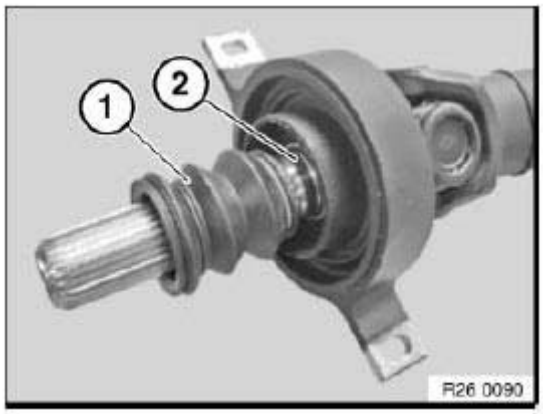


Fig. 23: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Push gaiter (1) during installation into groove (2) and make sure it is firmly seated.

If necessary, insert new clamping ring (1) into front propeller shaft (2).

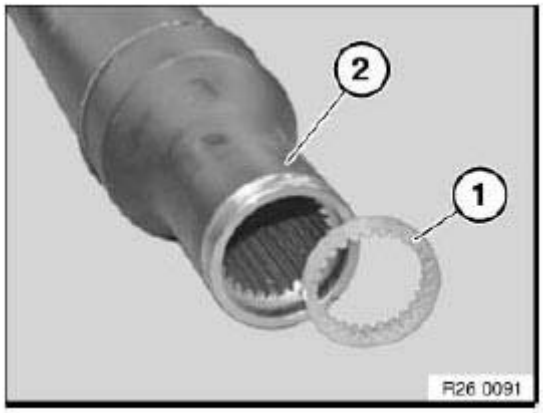


Fig. 24: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

- Remove **PROPELLER SHAFT** .

NOTE: The propeller shaft is balanced. The front and rear propeller shafts must be reassembled in the same position.

Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

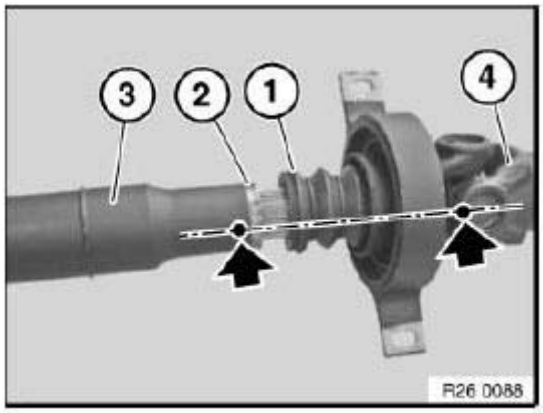


Fig. 25: Marking Front Propeller Shaft And Rear Propeller Shaft In One Plane
Courtesy of BMW OF NORTH AMERICA, INC.

Pull propeller shaft apart.

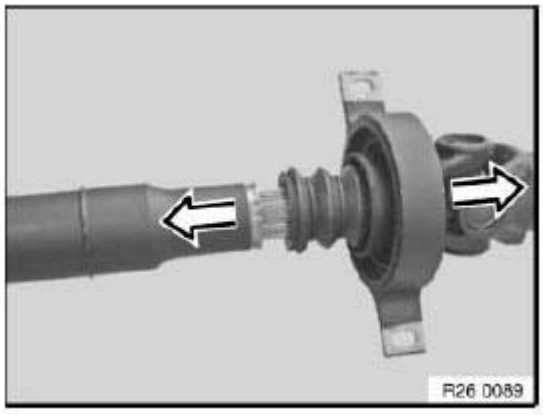


Fig. 26: Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

26 12 001 REPLACING COMPLETE PROPELLER SHAFT CENTRE MOUNT

Necessary preliminary tasks

- Remove **PROPELLER SHAFT** .

NOTE: The propeller shaft is balanced. The front and rear propeller shafts must be reassembled in the same position.

Detach gaiter (1) from groove (2).

Mark front propeller shaft (3) and rear propeller shaft (4) in one plane.

Installation:

Make sure gaiter (1) is securely seated in groove (2).

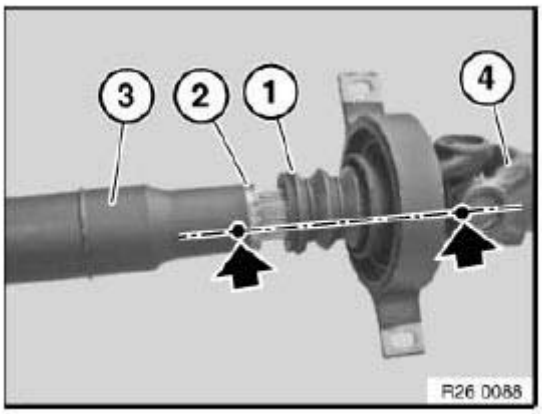


Fig. 27: Marking Front Propeller Shaft And Rear Propeller Shaft In One Plane
Courtesy of BMW OF NORTH AMERICA, INC.

Pull propeller shaft apart.

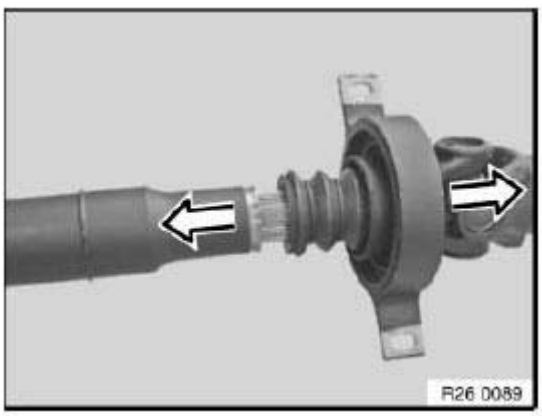


Fig. 28: Pulling Propeller Shaft Apart
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Apply a coating of grease to longitudinal splines on shaft.

PROPELLER SHAFT - OPERATING FLUIDS .

Push gaiter (1) during installation into groove (2) and make sure it is firmly seated.

Observe markings and force front propeller shaft onto longitudinal splines (markings must be flush).

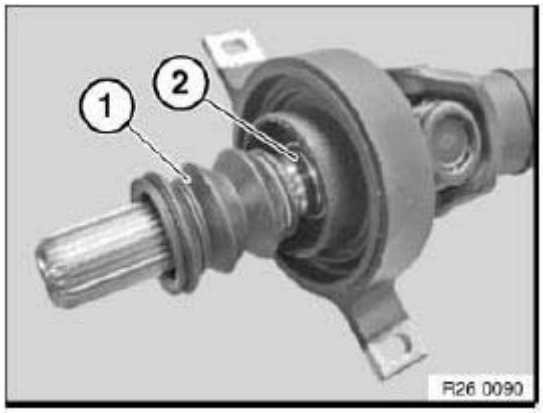


Fig. 29: Identifying Gaiter And Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 00 7 500 between centre mount (1) and universal joint (2).

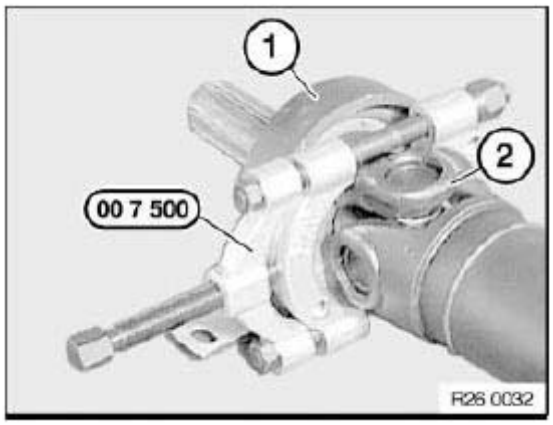


Fig. 30: Installing Special Tool (00 7 500) Between Centre Mount And Universal Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Using a hydraulic press, force centre mount (1) off propeller shaft (2).

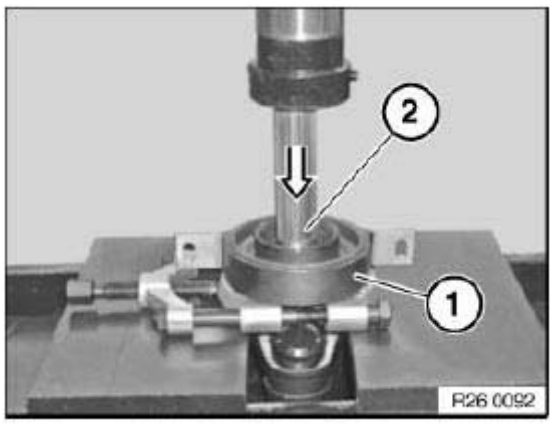


Fig. 31: Forcing Centre Mount Of Propeller Shaft Using Hydraulic Press
Courtesy of BMW OF NORTH AMERICA, INC.

Force new centre mount (1) onto propeller shaft. Collar (2) must point in direction of travel towards front propeller shaft. Drive centre mount firmly home with special tool 23 1 160.

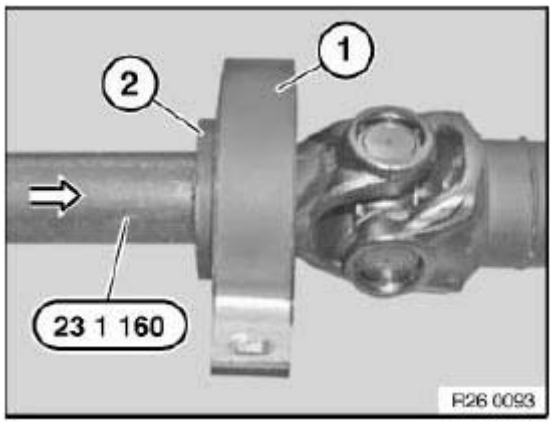


Fig. 32: Forcing Centre Mount Onto Propeller Shaft Collar Using Special Tool (33 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, insert new clamping ring (1) into front propeller shaft (2).

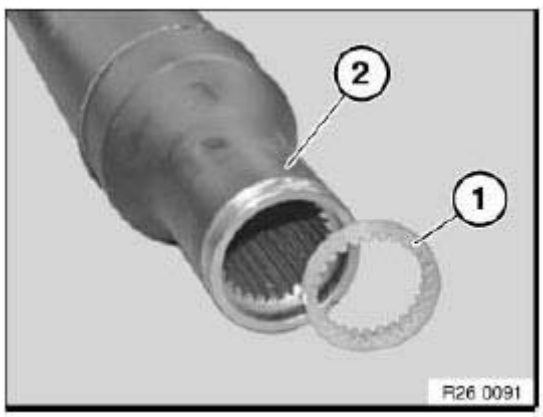


Fig. 33: Identifying Front Propeller Shaft With Clamping Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Release gaiter (1) with screwdriver from groove (2) and pull off over longitudinal splines.

26 12 011 REPLACING GROOVED BALL BEARING IN CENTRE MOUNT OF PROPELLER SHAFT

Necessary preliminary tasks

- Replace **PROPELLER SHAFT CENTRE MOUNT**

Press grooved ball bearing using special tool 23 1 160 out of centre mount (1).

NOTE: Illustration shows E46.

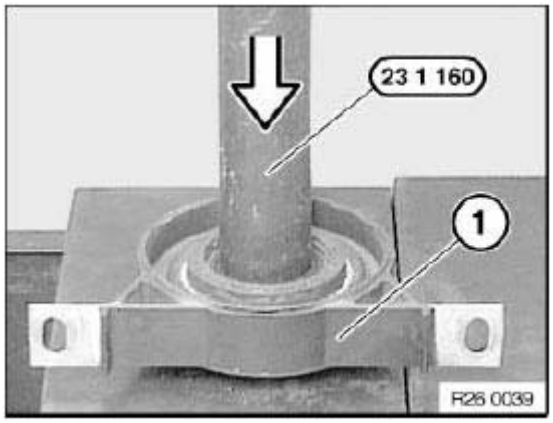


Fig. 34: Pressing Grooved Ball Bearing Using Special Tool (23 1 160)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat rubber-coated bearing seat of centre mount (2) with Circolight.

Using special tools 33 3 202/33 3 203, press new grooved ball bearing (1) into centre mount (2).

NOTE: Illustration shows E46.

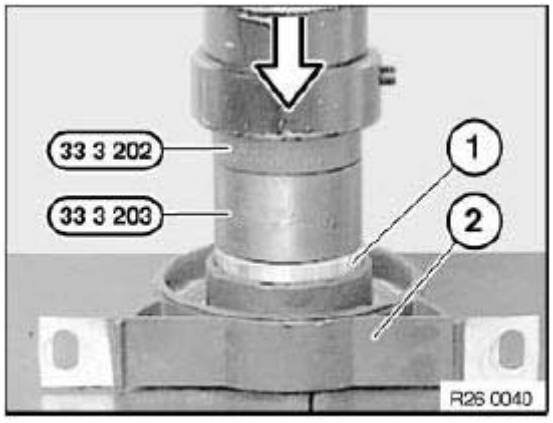


Fig. 35: Pressing Deep Groove Ball Bearing Into Centre Mount Using Special Tools (33 3 202) And (33 3 203)
Courtesy of BMW OF NORTH AMERICA, INC.

26 PROPELLER SHAFT

26-1110 WASHER

Washer Minimum set: Mechanical tools MW

NOTE: (puller disc) For pulling constant velocity joint off propeller shaft.

Storage Location

C9

SI number

01 06 94 (801)

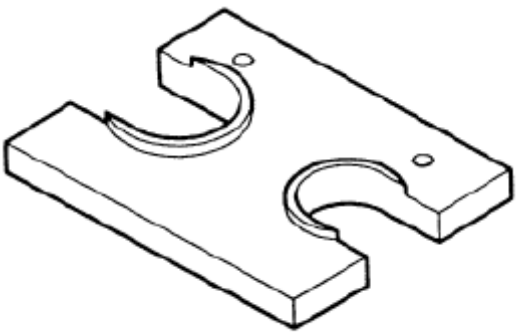


Fig. 1: Identifying Washer (26-1110)
Courtesy of BMW OF NORTH AMERICA, INC.

PROPELLER SHAFT

26 11 PROPELLER SHAFT

TIGHTENING TORQUE SPECIFICATION - PROPELLER SHAFT. COMPLETE

		Type
5AZ	Pivot fork piece to centre propeller shaft bearing journal with Loctite (Version without sliding piece)	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E86/E87/E90/E91/E92
6AZ	Centre mount to body	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E86/E87/E90/E91/E92/E93/E
7AZ	Flexible disc to front axle differential	E53
8AZ	Flexible disc on propeller shaft	E53
9AZ	Front propeller shaft to transfer box/front axle differential ZNS screws and nuts, shiny zinc coating	
		E60/E61/E90/E91/E92/E84/E70/E71

	E46
	E53/E70/E71/E72
	E46
Universal joint	E70/E71/E72/E83

PROPELLER SHAFT

26 11 PROPELLER SHAFT

TIGHTENING TORQUE SPECIFICATION - PROPELLER SHAFT. COMPLETE

	Type	Thread	Tightening specifications	Dimen
1AZ Propeller shaft plugged into rear axle final drive (insert nut)	E9x/E82N54/E82N55/E88N54/E90/E91/E92M57T2/Top/E89/E84N52K/E70/E71/E72		Torque	75 Nm
2AZ Propeller shaft plugged into rear axle final drive with universal joint (insert nut)	F25		Torque	75 Nm

PROPELLER SHAFT

26 11 PROPELLER SHAFT

TIGHTENING TORQUE SPECIFICATION - PROPELLER SHAFT. COMPLETE

	Type
Flexible disc to transmission output flange ZNS screws and nuts Shiny zinc coating All versions	
	E60/E61/E63/E64/E85/E86/E87/E90/E91/E92/E93/E81/E82/E83/E84/E88/E89
	E46/E53/E60/E61/E63/E64/E65/E85/E86/E87/E90/E91/E92/E93/E70/E71/E72/E81/E82/E83/
	E60/E61/E63/E64/E65
	E83
2AZ Coupling propeller shaft to transmission	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E87/E90/E91
	E32/E31

PROPELLER SHAFT, COMPLETE

26 11 PROPELLER SHAFT, COMPLETE

TIGHTENING TORQUE SPECIFICATION - PROPELLER SHAFT COMPLETE

	Type
4AZ Propeller shaft to drive flange (rear axle final drive)	
5AZ Pivot fork piece to centre propeller shaft bearing journal with Loctite (Version without sliding piece)	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E86/E87/E90/E91/E92
6AZ Centre mount to body	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E86/E87/E90/E91/E92/E93/E70/E
7AZ Flexible disc to front axle differential	E53
8AZ Flexible disc on propeller shaft	E53

9AZ Front propeller shaft to transfer box/front axle differential ZNS screws and nuts, shiny zinc coating	
	E60/E61/E90/E91/E92/E84/E70/E71
	E46
	E53/E70/E71/E72
	E46
Universal joint	E70/E71/E72/E83

PROPELLER SHAFT, COMPLETE

26 11 PROPELLER SHAFT, COMPLETE

TIGHTENING TORQUE SPECIFICATION - PROPELLER SHAFT COMPLETE

	Type	Thread	Tightening specifications	Dimension
1AZ Propeller shaft plugged into rear axle final drive (insert nut)	E9x/E82N54/E82N55/E88N54/E90/E91/E92M57T2/Top/E89/E84 N52K/E70/E71/E72		Torque	75 Nm

2AZ Propeller shaft plugged into rear axle final drive with universal joint (insert nut)	F25		Torque	75 Nm

PROPELLER SHAFT, COMPLETE

26 11 PROPELLER SHAFT, COMPLETE

TIGHTENING TORQUE SPECIFICATION - PROPELLER SHAFT COMPLETE

	Type
1AZ Flexible disc to propeller shaft and transmission output flange Steel propeller shaft	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E87/E90/E91
	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E87/E90/E91
	E31/E38/E39/E46
	E32/E34/E36/E38/E39
	E60/E61/E63/E64
	E32/E34/E36/E38/E39/E46/E53/E85
	E60/E61/E63/E64
	E39 (M5)/E36 (M3)/E46 (M3),
	E65
Flexible disc to transmission output flange	E46/E39/E60/Nur M57

Flexible disc to transmission output flange	E65/E66/Alle außer N73, M67
	E60/E61/E63/E64/E65/E66/E67
Flexible disc on propeller shaft	E83
Flexible disc to transmission output flange	E83
Aluminium propeller shaft: Flexible disc to transmission output flange	E39/E60
Aluminium propeller shaft: Flexible disc on propeller shaft	E39/E60
	E60/E61/E63/E64
	E60
	E63 (N52)
Flexible disc to transmission output flange ZNS screws and nuts Shiny zinc coating All versions	
	E60/E61/E63/E64/E85/E86/E87/E90/E91/E92/E93/E81/E82/E83/E84/E88/E89

	E46/E53/E60/E61/E63/E64/E65/E85/E86/E87/E90/E91/E92/E93/E70/E71/E72/E81/E82/E83/E84/
	E60/E61/E63/E64/E65
	E83
2AZ Coupling propeller shaft to transmission	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E87/E90/E91
	E32/E31
3AZ Clamping ring for slide after installation in the car	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E65/E66/E83/E85/E87/E90/E91
	E30/Allrad

1.0 GENERAL INFORMATION ON FINAL DRIVE OIL

Final Drive oil or hypoid gear lubricant must conform with the following requirements because of the high loads which occur on the profiles of the hypoid gear teeth:

- Load carrying capacity.
- Sufficient protection against seizure.
- Good wear protection.
- Optimal friction and temperature behavior.
- Seal compatibility.
- Aging resistance.

These and other properties are already contained in brand-name hypoid gear lubricants because of the high content of EP additives (EP = extreme pressure).

OIL ADDITIVES

The factory has **not approved** oil additives for hypoid gear lubricants.

All final drives are designed in such a manner that they do not require any type of oil additives. Any type of additives is fundamentally rejected by the factory. BMW NA cannot accept any liability for follow-up damage resulting from the use of additives.

2.0 APPROVED FINAL DRIVE OILS FOR FRONT AND REAR AXLE FINAL DRIVES WITH AND WITHOUT LIMITED SLIP OR VISCOUS COUPLING

Mineral based final drive oils are no longer recommended due to the release of synthetic final drive oils for all vehicles with or without limited slip differentials.

Limited Slip Differentials

With the introduction of the Z3 roadster a new synthetic final drive oil for all vehicles with a multi-plate limited-slip differential has been released. The new BMW final drive oil SAF-XJ will replace the old final drive oil SAF-XLS.

The SAF-XLS final drive oil is not to be used in the final drive of the Z3 roadster.

Use only the SAF-XJ in the final drive of the Z3 roadster.

NOTE: If a non-limited slip differential oil is used in a limited slip differential a whining or chattering sound can be heard on very tight turns and will eventually result

in a failure of the differential.

BMW PARTS NUMBER SPECIFICATION

Description	Quantity	Part Number
BMW Synthetic Final Drive Oil (with multi-plate Limited Slip Differential)	55 liter drum (SAF-XJ)	83 22 1 470 080

Motorsport Vehicles:

All E46 M3, E60 M5, E63/E64 M6 and E85 M roadster and M coupe require SAF-XJ Fluid.

Non Limited Slip Differentials

BMW PARTS NUMBER SPECIFICATION

Description	Quantity	Part Number
BMW Synthetic Final Drive Oil **(without multi-plate limited slip differential, or with viscous differential lock (325iX/iXA)**	55 liter drum (SAF-XO)	83 22 9 407 768

3.0 FINAL DRIVE OIL FOR BMW M1 MOTORSPORT COUPE

The final drive of a BMW M1 is integrated in the manual transmission and oil supply is accomplished with a mutual oil filling.

Use reputable brand SAE 80 manual transmission oil conforming with specifications MIL-L-2105 A or API-GL 4.

4.0 OIL CHANGE INTERVALS

Maintenance requirements per the vehicle's Service Booklet or the respective Service Maintenance Checklist.

Replacement final drives: same as for new vehicles.

All models as of 9/97 production are factory-filled with synthetic rear axle oil having a lifetime service rating. No oil changes are required for the life of the vehicle.

5.0 CARS WITHOUT SERVICE INDICATOR (INCLUDING BMW M1)

First oil change at 600 miles

Further oil changes at 18,000 miles

Special rule for BMW 530i, 528i (E 12):

1st oil change at 600 miles after final drive replacement

2nd oil change at 4,500 miles after final drive replacement

Further oil changes at 9,000 miles intervals, beginning at 9,000 miles.

6.0 CARS WITH SERVICE INDICATOR

BREAK-IN PROCEDURES

Drive the car with changing engine speeds and road speeds during the first 1,200 miles/2,000 km, but never faster than 2/3rds of maximum speed in a selected gear. Avoid using full throttle and kick-down positions of the accelerator pedal during this period.

BMW PARTS NUMBER SPECIFICATION

BMW M3/M5/M6	Up to 1,200 miles max. engine speed 5500 RPM Generally avoid full-throttle position of the accelerator.

These break-in procedures are, of course, also applicable to replacement final drives.

7.0 OUTPUT SHAFTS

The joints of output shafts have permanent grease lubrication and require no servicing. The amount of joint grease required after repairing is supplied in the "dust cover repair kit".

8.0 WHEEL BEARINGS

Ball Bearings E24 (Since 5/82), E28, E30, E31, E32 And All Following

Bearing unit is lubricated for its service life, cannot be disassembled and does not require subsequent lubrication.

Grooved Ball Bearings E12, E21, E23, E24 Before 5/82

Grease type: Retinax A (former BMW Part No. 81 22 9 407 710)

CRC Part No. SL 3131

9.0 DIFFERENTIAL HOUSING FINAL DRIVE COVERS AND HOUSING

On 735i/iL, 750iL, M6 and M5 (E28) models, the attaching bolts are to be installed with Hylogrip/Loctite 270 (green) thread sealant (former BMW Part No. 81 22 9 400 086).

BMW PARTS NUMBER SPECIFICATION

Wurth Loctite	Part No. 8932700

3300 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

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  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

33 00 ... INFORMATION ON REPLACING SHOCK ABSORBERS

Situation

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Effect

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION

EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.

- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

41 00 ... INSTALLATION SOLUTION FOR STRAIGHT SHANK/HEXAGON RIVET NUT

Protection measures!

- Wear safety goggles
- Wear protective gloves

Hexagon/straight shank rivet nut (up to thread 8) with hand rivet gun ZS308

IMPORTANT: Risk of damage!
Failure to comply with these instructions may result in the drill bit slipping and causing significant paintwork damage.

1. Mark position of bore and then punch-mark component

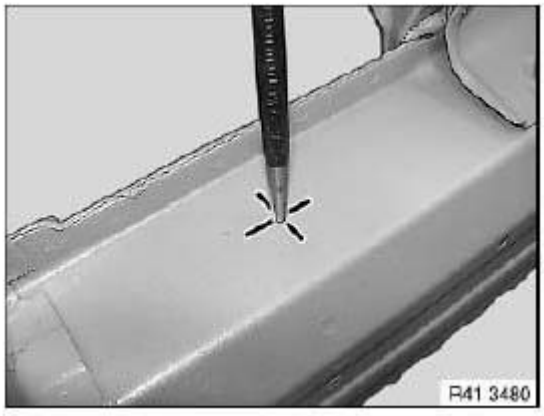


Fig. 1: Identifying Hexagon/Straight Shank Rivet Nut Installing Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If the determined drill bit diameter is not observed:

- **the knurling on the straight shank rivet nut is rendered useless**

- **the component will be damaged when the straight shank rivet nut is inserted**

Determining suitable drill bit:

Depending on the rivet nut shank diameter, the next drill bit diameter higher (5/10 step) can be used.

E.g. with a shank diameter of 10.1 mm, the 10.5 mm drill bit can be used. The 11.0 mm drill bit must not be used.

2. Drill bore with determined drill bit and deburr, pilot-drill with a smaller drill bit if necessary

Fig. 2: Drilling Bore Using Drill Bit
Courtesy of BMW OF NORTH AMERICA, INC.

3. Clean component, eliminate paintwork damage if necessary

Fig. 3: Identifying Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid corrosion, stop chips/swarf by means of cavity sealing. Follow INSTRUCTIONS ON CORROSION PROTECTION .

4. Preserving cavity

Fig. 4: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow manufacturer's operating instructions.
Make sure straight shank rivet nut correctly contacts component.

5Set rivet nut with hand rivet gun

NOTE: According to the manufacturer, the pictured tool is suitable up to an M8 thread.

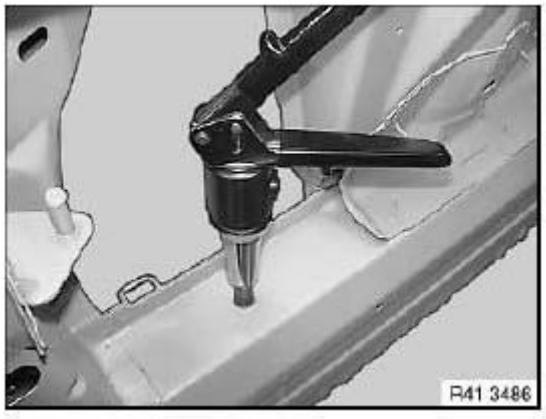


Fig. 5: Setting Rivet Using With Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

Hexagon/straight shank rivet nut (up to thread M12) with hand rivet gun MB512

IMPORTANT: Follow manufacturer's operating instructions.
Make sure hexagon rivet nut correctly contacts component.

Set rivet nut with hand rivet gun

NOTE: **According to the manufacturer, the pictured tool is suitable up to an M12 thread.**

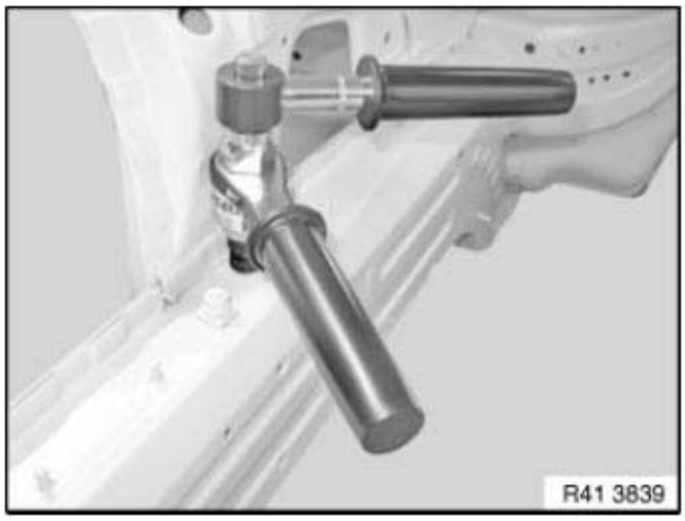


Fig. 6: Setting Rivet Nut With Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

33 00 ... INSTRUCTIONS (CHASSIS COMPONENTS MADE OF ALUMINUM)

Due to the chemical and corrosion characteristics of aluminum, always comply with the following points when handling aluminum components:

- Do not bring into contact with battery acid!
- Do not clean with wire brushes made of brass or iron! Always use wire brushes with stainless steel bristles!
- Do not expose to flying sparks when grinding/separating! Cover components!
- Do not strike with steel welding splashes! Cover components!
- Do not expose to temperatures > 80 °C, even for brief periods! Temperatures in paint facilities do not have the same impact

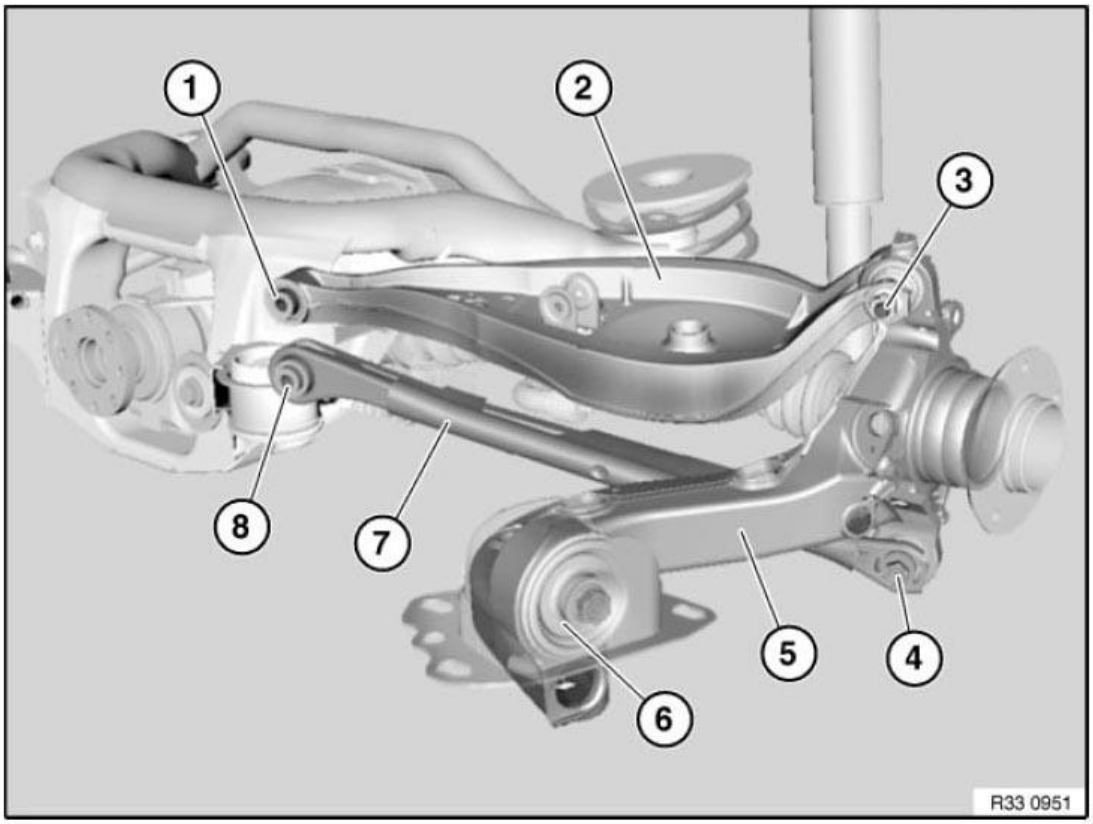
33 00 ... NOTES ON REPAIRING THREADS

IMPORTANT: Install Helicoil thread inserts so that they are flush with the original thread.

NOTE: **Damaged threads in the frame side member may be repaired with Helicoil thread inserts. Comply with the PROCEDURE described in the example.**

Fig. 7: Identifying Damaged Helicoil Thread
Courtesy of BMW OF NORTH AMERICA, INC.

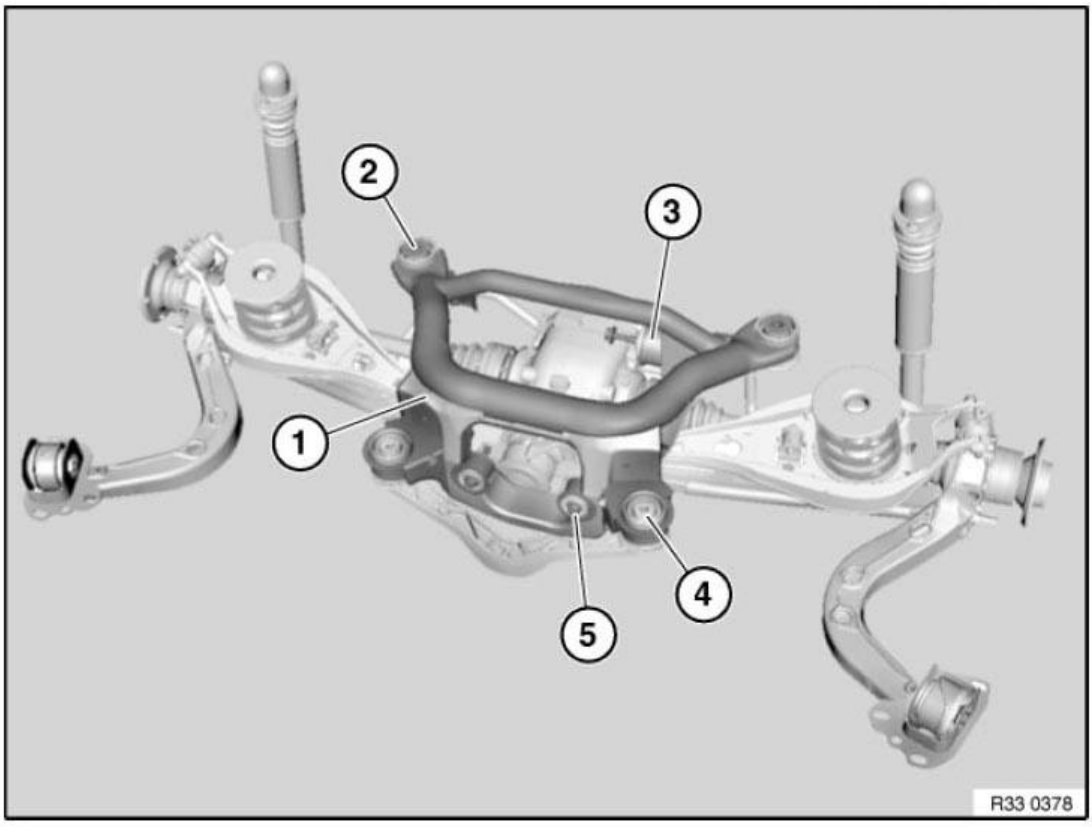
33 32 ... OVERVIEW OF CONTROL ARMS WITH RUBBER MOUNTS



1 Rubber mount in control arm, top
2 Control arm, top (left/right)
3 Ball joint in trailing arm
4 Rubber mount in trailing arm
5 Trailing arm (left/right)
6 Rubber mount in trailing arm at front
7 Control arm, bottom (left/right)
8 Rubber mount in control arm, bottom

Fig. 8: Overview Of Control Arms With Rubber Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

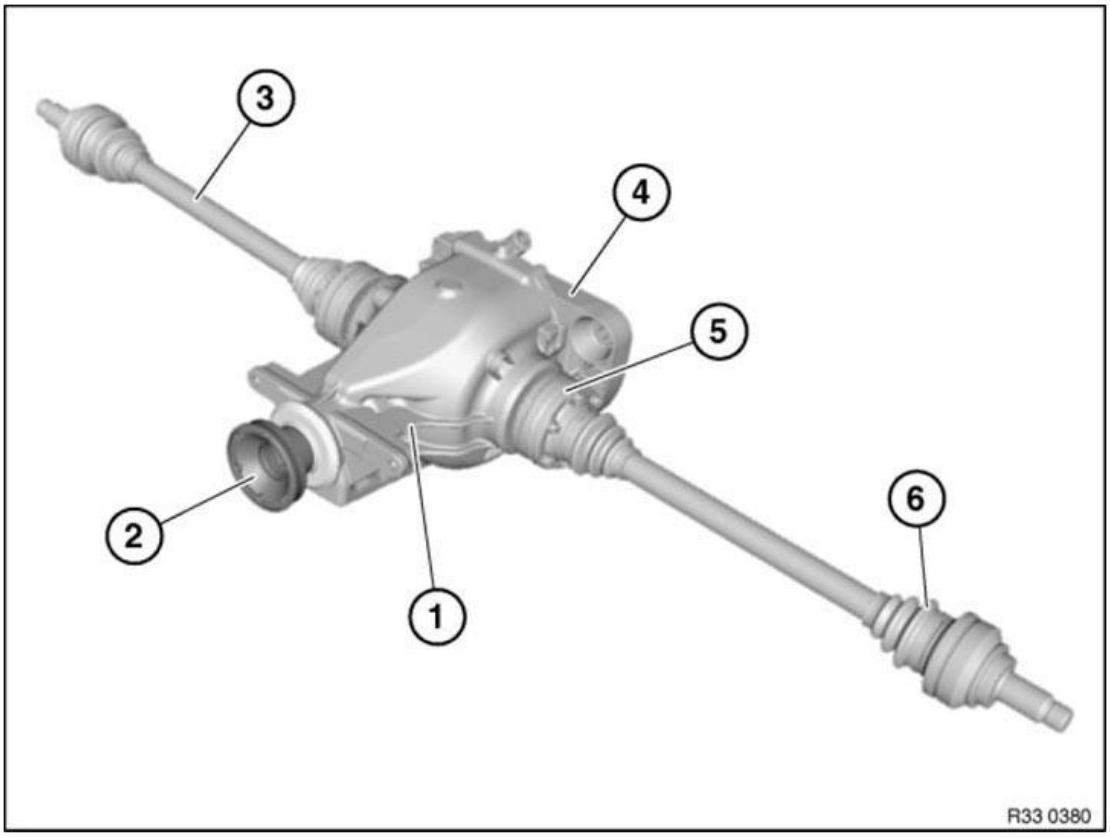
33 31 . OVERVIEW OF REAR AXLE CARRIER WITH RUBBER MOUNTS



1 Rear axle carrier
2 Rear axle carrier rubber mount, rear
3 Rear differential rubber mount, rear
4 Rear axle carrier rubber mount, front
5 Rear differential rubber mount, front

Fig. 9: Overview Of Rear Axle Carrier With Rubber Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

33 10 ... OVERVIEW OF REAR DIFFERENTIAL/OUTPUT SHAFTS



1	Rear differential	4	Cover gasket
2	Drive flange / shaft seal	5	Drive flange / shaft seal
3	Output shaft (left/right)	6	Output shaft gaiters

Fig. 10: Overview Of Rear Differential/Output Shafts
Courtesy of BMW OF NORTH AMERICA, INC.

00 ... ... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. **Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.**
2. **Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!**
3. **Check the rubber plate on the trolley jack prior to each use, replacing if necessary.**

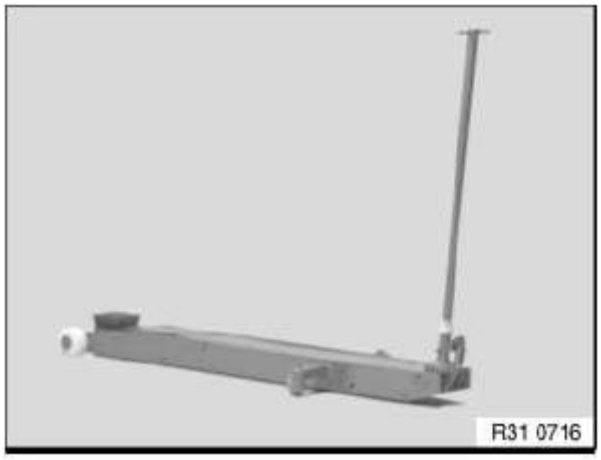


Fig. 11: Identifying Trolley Jack
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Car jacking point
2. Side car jacking points
3. Rear differential (**REMOVE HEAT SHIELD**)

   Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

4. Bolting point for rear axle tension struts

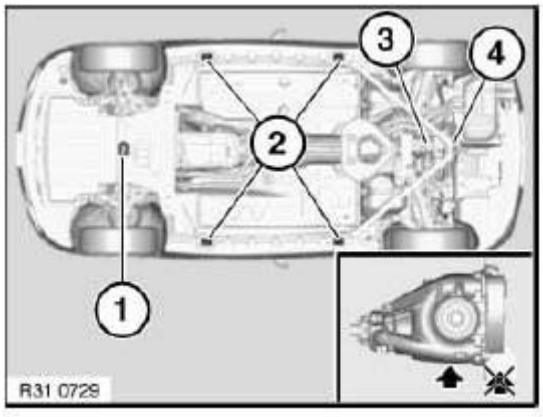
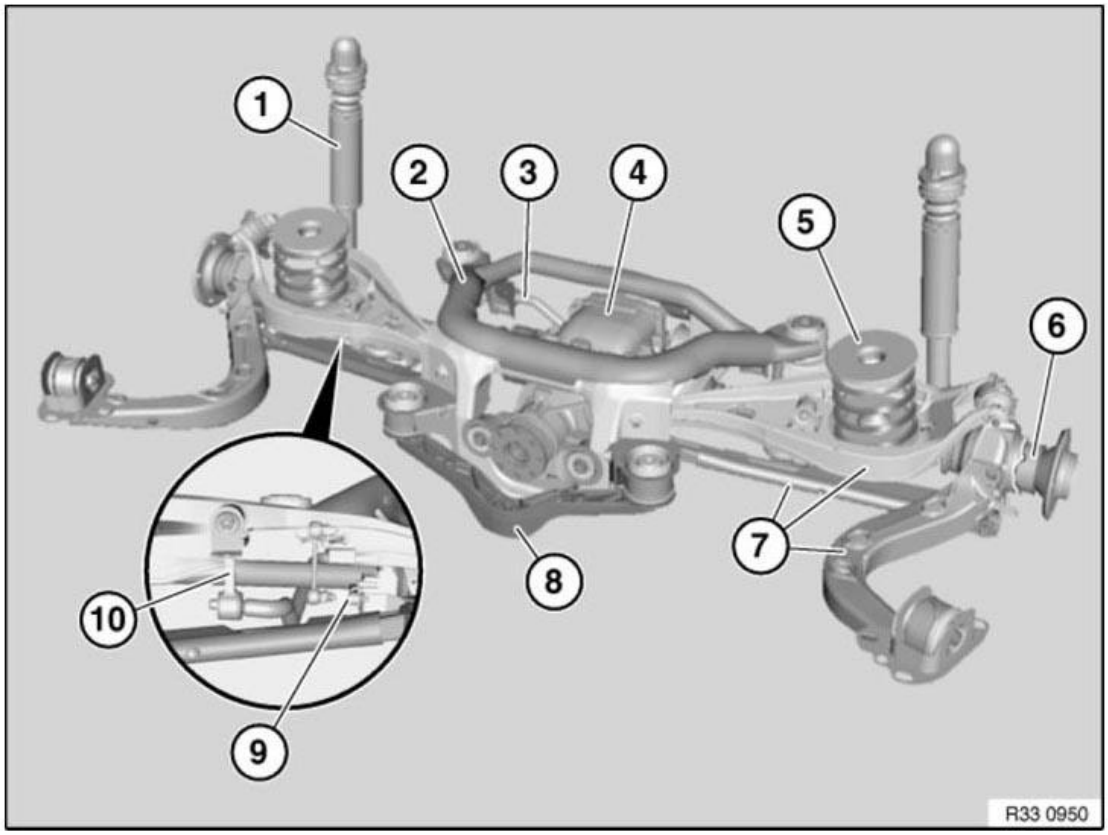


Fig. 12: Identifying Rear Differential, Side Car Jacking Points And Car Jacking Point
Courtesy of BMW OF NORTH AMERICA, INC.

33 .. . REAR AXLE LAYOUT



1 Shock absorber
2 Rear axle support
3 Stabiliser
4 Rear axle differential / output shafts
5 Coil spring
6 Wheel bearing / drive flange hub
7 Arm
8 Tension strut
9 Ride height sensor
10 Stabiliser link

Fig. 13: Layout Of Rear Axle
Courtesy of BMW OF NORTH AMERICA, INC.

33 00 ... REAR AXLE: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

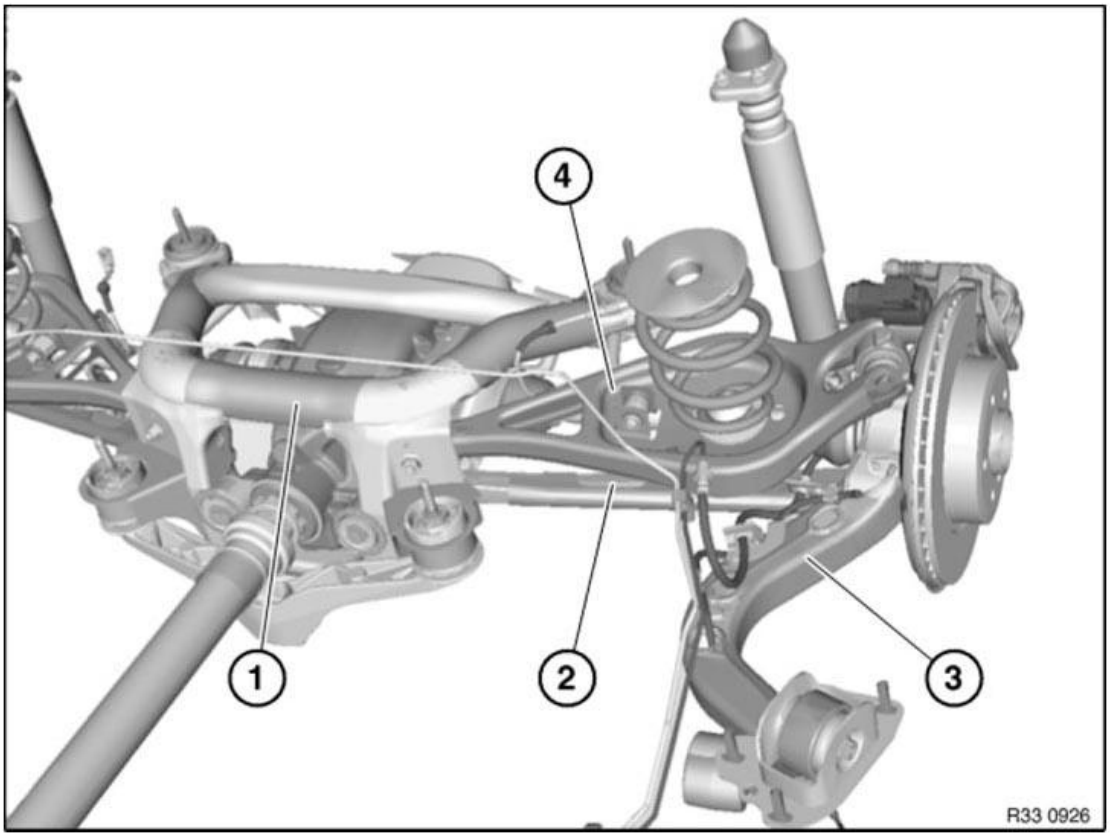


Fig. 14: Identifying Rear Axle Carrier, Lower And Upper Control Arms And Trailing Arm
Courtesy of BMW OF NORTH AMERICA, INC.

A **WHEEL/CHASSIS ALIGNMENT CHECK** must be carried out after the following work:

- **Release of following screw/bolt connections:**
  - Bearing block to trailing arm/body
  - Upper control arm to trailing arm
  - Lower control arm to trailing arm
- **Replacement of following parts:**
  1. Rear axle carrier
  2. Lower control arm
  3. Trailing arm/rubber mount/bearing block
  4. Upper control arm

51 47 491 REMOVING AND INSTALLING/REPLACING REAR UNDERBODY PROTECTION

WARNING: Scalding hazard!
This work may only be carried out on an exhaust system which has cooled down.

Release screws (1).

Pull underbody protection (2) out from under bumper trim (3).

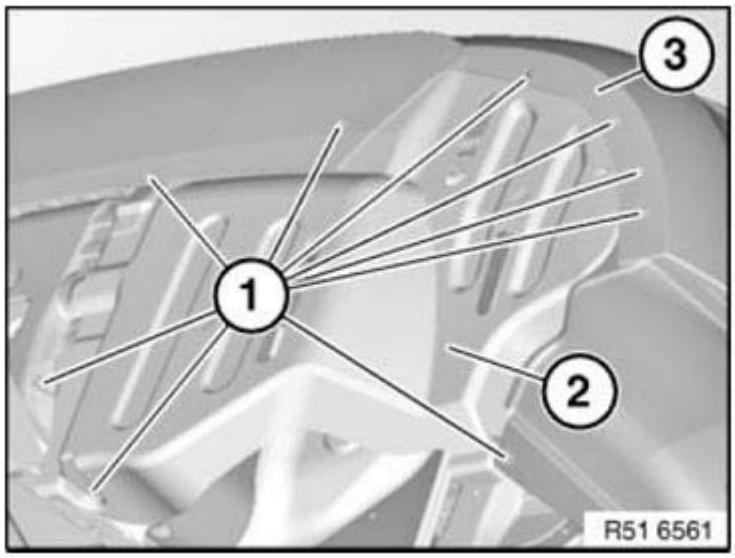


Fig. 15: Identifying Underbody Protection, Under Bumper Trim With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

41 00 ... REPAIR SOLUTION FOR STRAIGHT SHANK/HEXAGON RIVET NUT

Protection measures!

- Wear safety goggles
- Wear protective gloves

IMPORTANT: To prevent the material from tapering, do not drill out the rivet head.

1. Carefully spot-drill rivet head with a larger drill bit/countersink

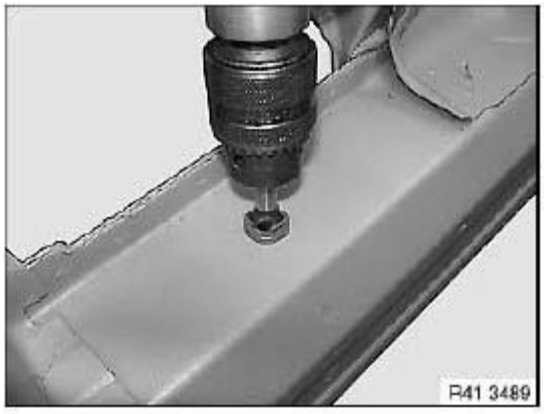


Fig. 16: Drilling Rivet Head Using Larger Drill Bit/Countersink
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid paintwork damage

2. Knock rivet head away with a chisel

Fig. 17: Knocking Rivet Head Using Chisel
Courtesy of BMW OF NORTH AMERICA, INC.

3. Drive through rivet shank into cavity, remove if necessary

Fig. 18: Identifying Cavity Of Rivet Shank
Courtesy of BMW OF NORTH AMERICA, INC.

4. Clean component, eliminate paintwork damage if necessary

Fig. 19: Identifying Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

If the rivet shank can be removed:

IMPORTANT: To avoid corrosion, stop chips/swarf by means of cavity sealing.

Follow **INSTRUCTIONS ON CORROSION PROTECTION** .

5. Preserving cavity

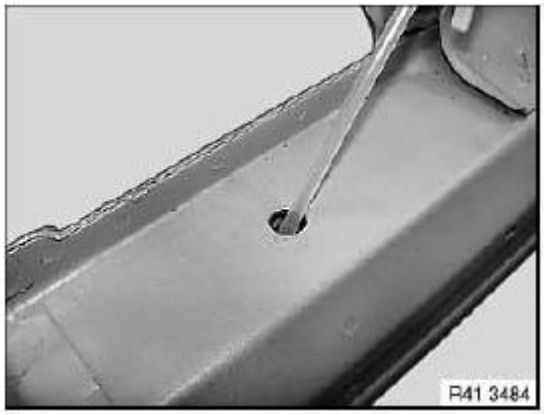


Fig. 20: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

If the rivet shank cannot be removed:

WARNING: Risk of injury!
Observe NOTES ON CAVITY FOAM .

IMPORTANT: To avoid corrosion and rattling noises, stop chips/swarf and rivet nut shank with cavity foam.

Remove foam remnants with isohexane (benzine).

5. Stop rivet shank by means of specific foaming
6. Set rivet nut with hand rivet gun

NOTE: Fit rivet nut as quickly as possibly, ideally before the cavity foam hardens.

Fig. 21: Preserving Cavity
Courtesy of BMW OF NORTH AMERICA, INC.

Hexagon/straight shank rivet nut (up to thread M8) with hand rivet gun ZS308

IMPORTANT: Follow manufacturer's operating instructions.
Make sure rivet nut correctly contacts component.

NOTE: According to the manufacturer, the pictured tool is suitable up to an M8 thread.

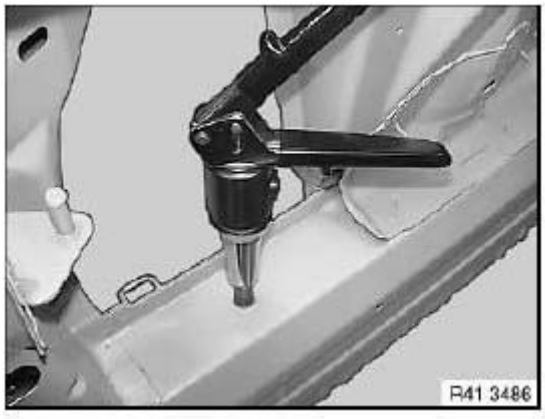


Fig. 22: Setting Rivet Using With Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

Hexagon/straight shank rivet nut (up to thread M12) with hand rivet gun MB512

IMPORTANT: Follow manufacturer's operating instructions.
Make sure rivet nut correctly contacts component.

NOTE: According to the manufacturer, the pictured tool is suitable up to an M12 thread.

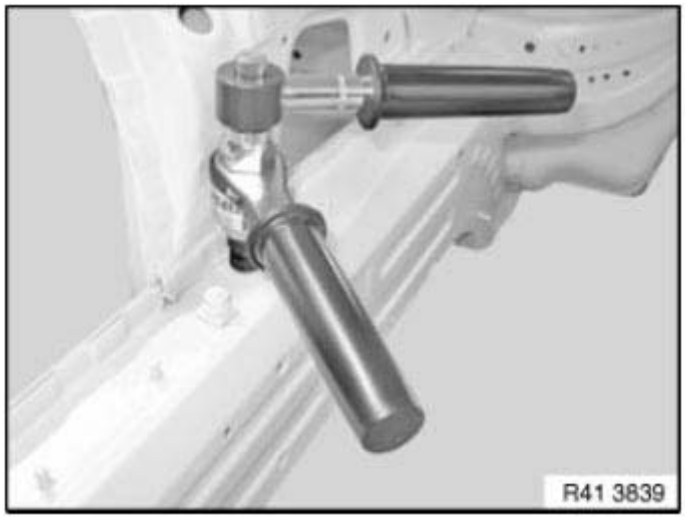


Fig. 23: Setting Rivet Nut With Hand Rivet Gun
Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

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Possible symptoms are:

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- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

3310 FINAL DRIVE

00 11 ... CHECKING/TOPPING UP OIL LEVEL IN REAR DIFFERENTIAL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Risk of damage!
To avoid serious damage to the rear differential, it is essential to use only REAR AXLE - OPERATING FLUIDS in the rear differential.

Undo oil filler plug (1).

Tightening torque **33 11 2AZ** .

Check oil level.

If necessary, pour in rear differential oil up to lower edge of opening for oil filler plug (1).

Installation:

Replace oil filler plug (1) with O-ring.

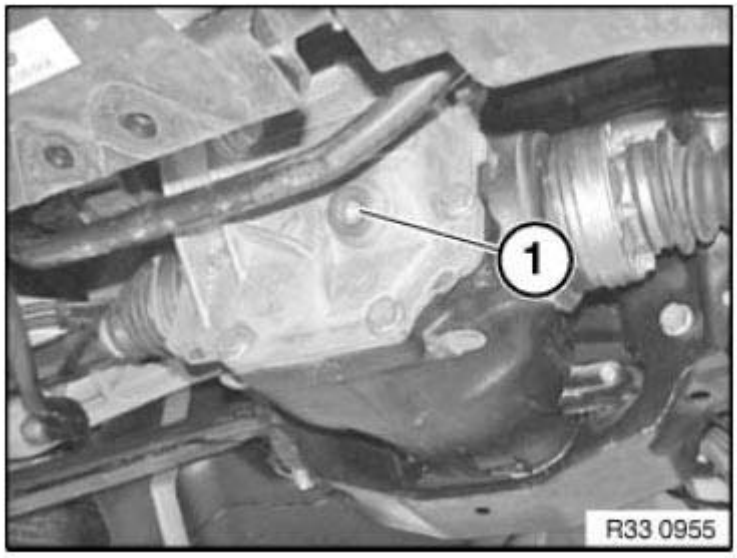


Fig. 24: Identifying Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

00 11 259 OIL CHANGE IN REAR DIFFERENTIAL INCL. USED OIL DISPOSAL

NOTE: Observe following instructions and torques.

- **Replace screw plug with O-ring after releasing.**

Tightening torque with O-ring 33 11 2AZ.

WARNING: Risk of burning if exhaust system is touched!
DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Risk of damage!
To avoid serious damage to the rear axle differential, it is essential to use only REAR AXLE - OPERATING FLUIDS in the rear axle differential.

NOTE: The oil does not need to be changed in rear differentials carrying the "Life-Time-Oil" sticker.
Only change oil when rear differential is at normal operating temperature.

Recycling

Catch and dispose of emerging differential oil.

Observe country-specific waste-disposal regulations

Open plug (1).

Drain and dispose of differential oil.

Add rear differential oil up to lower edge of opening for screw plug (1); if necessary, refer to Technical Data . See **REAR AXLE FINAL DRIVE** for necessary fill quantity.

Replace screw plug.

Tightening torque **33 11 2AZ** (with O-ring).

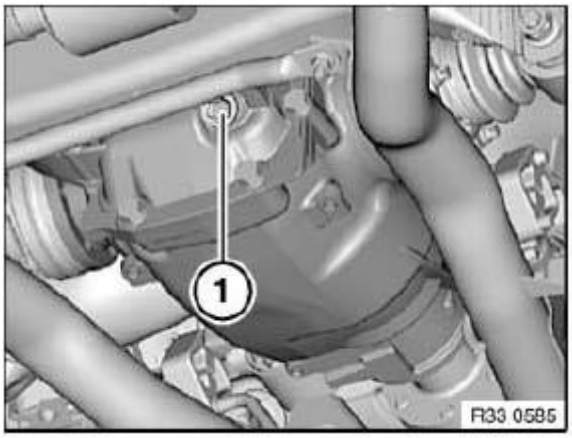
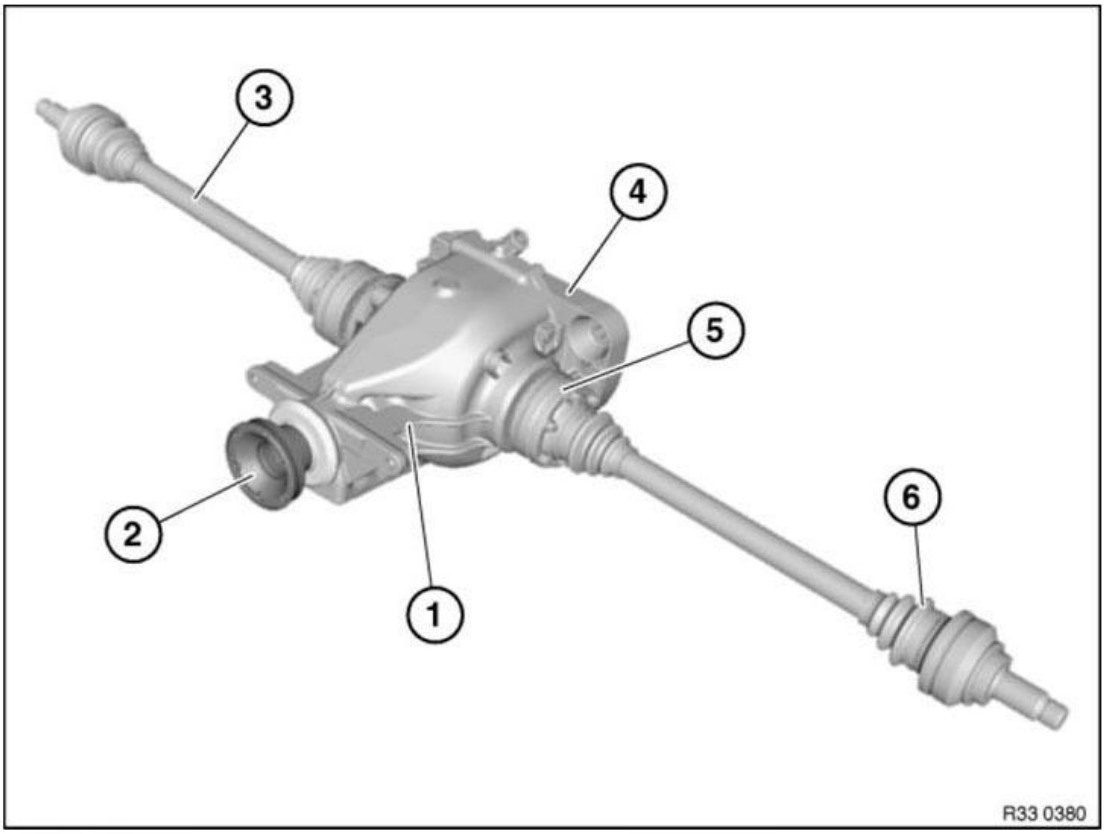


Fig. 25: Identifying Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

33 10 ... OVERVIEW OF REAR DIFFERENTIAL/OUTPUT SHAFTS



1 Rear differential
2 Drive flange / shaft seal
3 Output shaft (left/right)
4 Cover gasket
5 Drive flange / shaft seal
6 Output shaft gaiters

Fig. 26: Overview Of Rear Differential/Output Shafts
Courtesy of BMW OF NORTH AMERICA, INC.

33 10 ... REAR DIFFERENTIAL: ASSIGNMENT TO MODEL SERIES

REAR DIFFERENTIAL WITH MODEL SERIES

Model series	Engine	Rear differential	Remark
E89	N52K (S23i/S28i)	188L	
	N54 (S35i)	215L	

K = Compact

L = Light-running

33 10 010 REMOVING AND INSTALLING/REPLACING REAR DIFFERENTIAL

IMPORTANT: Risk of damage!
Reinstall shim (1).
Use only REAR AXLE - OPERATING FLUIDS !

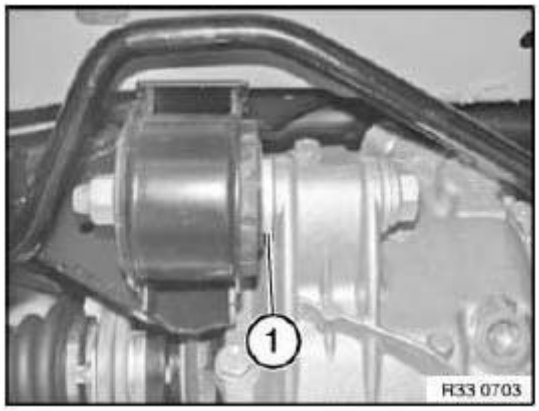


Fig. 27: Identifying Shim
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks

- Remove **STABILIZER**
- Remove output shaft from rear differential at both ends . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3321002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT** and tie back
- Remove **PROPELLER SHAFT FROM REAR DIFFERENTIAL** and tie back

WARNING: Danger to life!
Car may tilt off lifting platform if the workshop jack is incorrectly handled.
After supporting components, make sure that:

- **the vehicle can no longer be raised or lowered**
- **the vehicle does not lift off the locating plates on the lifting platform**

Remove **COMPRESSION STRUT** and insert bolts for rear axle carrier at front until contact is made.

Support rear differential with workshop jack and special tool 33 4 420 .

IMPORTANT: Observe gap between special tool 33 4 420 and dust plates (1).
To avoid grinding noises, make sure the dust plates (1) are not damaged (e.g. bent).

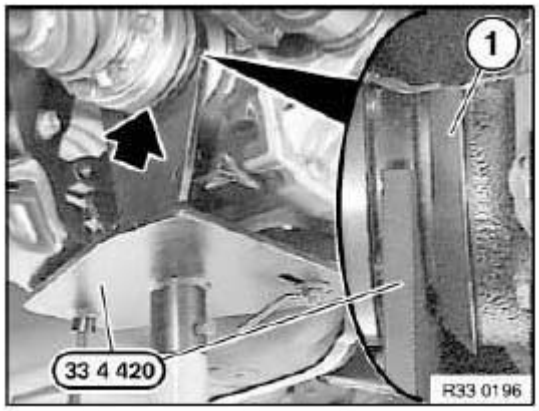


Fig. 28: Identifying Gap Between Special Tool (33 4 420) And Dust Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

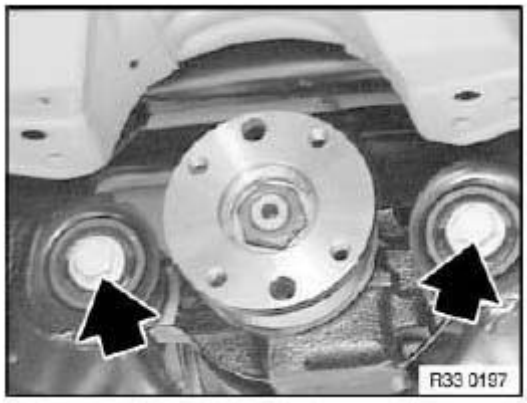


Fig. 29: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Unscrew bolt to center of car; if necessary, remove spacer.

Slowly lower workshop jack and tip rear differential out towards rear.

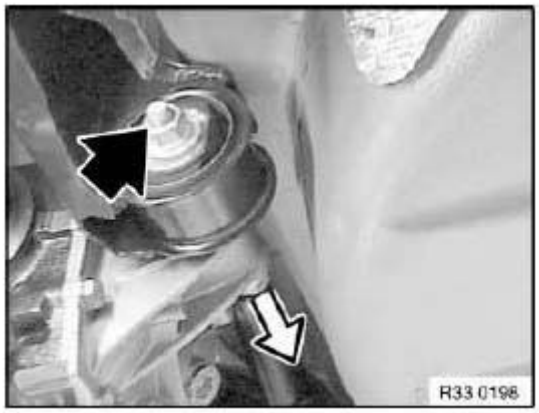


Fig. 30: Removing Spacer
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Adhere to the following installation sequence in order to prevent distortion of the rear differential during installation and thereby avoid potential complaints about noise.

Installation sequence:

1. Install rear differential with workshop jack and special tool 33 4 420 .
2. Insert bolts (1) (do not tighten down)
3. Insert bolt (2); if necessary, fit spacer
4. Replace and screw on nut (3) (do not tighten down)
5. Lower workshop jack
6. Install **COMPRESSION STRUT**
7. Tighten down screws (1)

   Tightening torque **33 17 1AZ** .

8. Tighten down screw (2)

Tightening torque **33 17 2AZ** .

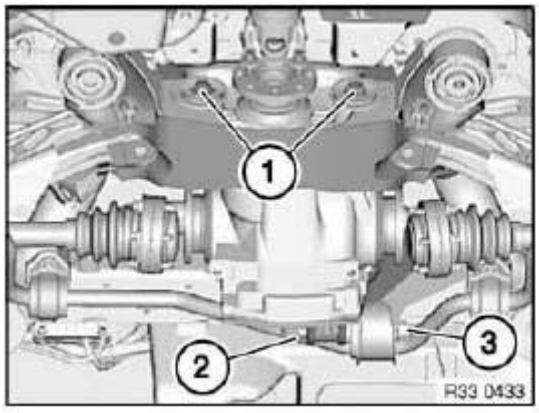


Fig. 31: Identifying Rear Differential Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check **REAR DIFFERENTIAL OIL LEVEL** , correct if necessary

3311 FINAL DRIVE WITH COVER

33 31 025 REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER ON SIDE MEMBER

Necessary preliminary tasks

- Remove rear **WHEEL ARCH SPLASH GUARD**

Release nut (1) and remove vibration absorber (2) from holder.

Tightening torque 33 32 9AZ.

Installation:

Pay attention to lock washer (3) between collar nut and vibration absorber.

Replace screw and nut.

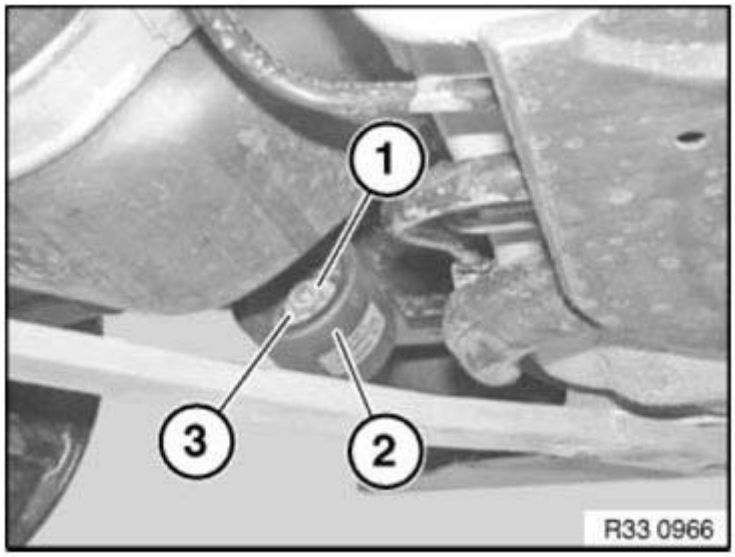


Fig. 32: Identifying Vibration Absorber And Lock Washer With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Groove (1) on the vibration absorber must be aligned horizontally to the holder corners!**

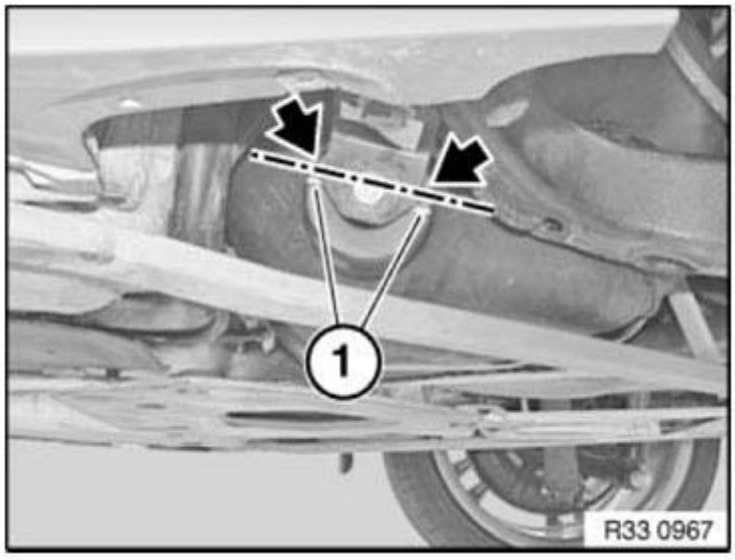


Fig. 33: Identifying Groove On Vibration Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 080 REPLACING LEFT DRIVE FLANGE ON REAR DIFFERENTIAL

WARNING: Risk of burning on the exhaust system!

IMPORTANT: When replacing the drive flange, you must also replace the shaft seal . See 3311140 REPLACING SHAFT SEAL FOR LEFT DRIVE FLANGE or 3311145 REPLACING SHAFT SEAL FOR RIGHT DRIVE FLANGE!

Necessary preliminary tasks

- Remove output shaft . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3321002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT** from rear differential and tie back

Drive out drive flange (1) with special tools 13 5 251 and 13 5 253.

Installation:

Insert drive flange and rotate until spline on flange meshes with teeth on differential bevel gear.

Press drive flange in further until circlip locates with an audible click.

IMPORTANT: High installation forces indicate that the spline teeth on the drive flange/differential bevel gear are damaged/deformed! Check spline teeth, replaced damaged parts.

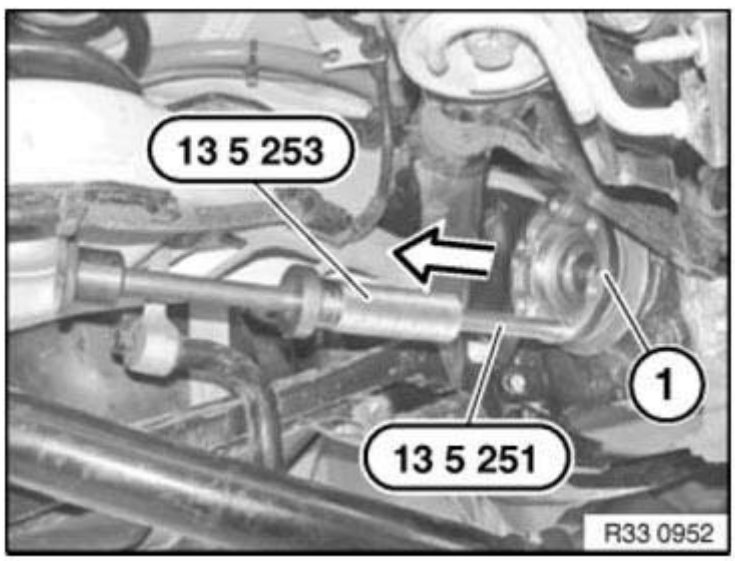


Fig. 34: Removing Drive Flange Using Special Tools (13 5 251 And 13 5 253)
Courtesy of BMW OF NORTH AMERICA, INC.

Install retaining ring (1).

Installation:

Clean shaft seal race on drive flange thoroughly.

Coat drive flange at contact face of shaft seal with **REAR AXLE - OPERATING FLUIDS** .

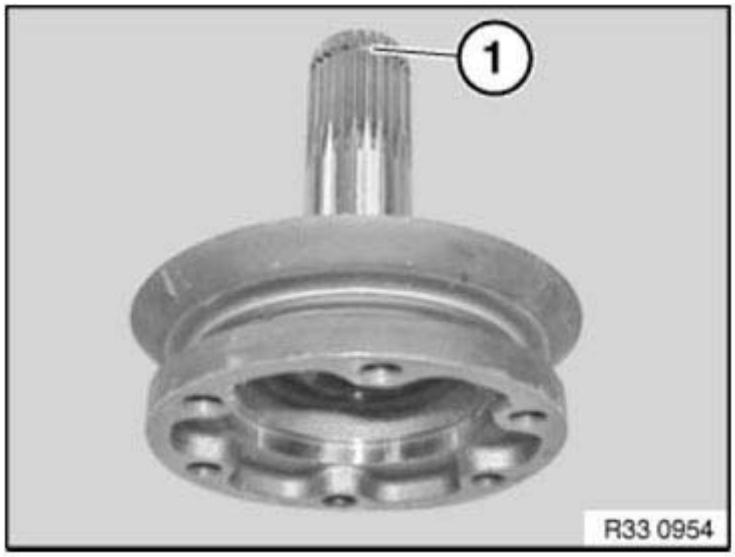


Fig. 35: Identifying Retaining Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Replace shaft seal . See **3311140 REPLACING SHAFT SEAL FOR LEFT DRIVE FLANGE** or **3311145 REPLACING SHAFT SEAL FOR RIGHT DRIVE FLANGE**.

After installation

- Check **OIL LEVEL IN REAR DIFFERENTIAL**

33 11 021 REPLACING RADIAL SHAFT SEAL FOR DRIVE FLANGE ON REAR DIFFERENTIAL

IMPORTANT: Use only REAR AXLE - OPERATING FLUIDS .
Failure to comply with this instruction will result in serious damage to the rear differential!

Necessary preliminary tasks

- Remove **PROPELLER SHAFT**

Remove retaining clip (1) and insert nut (2) with diaphragm seal.

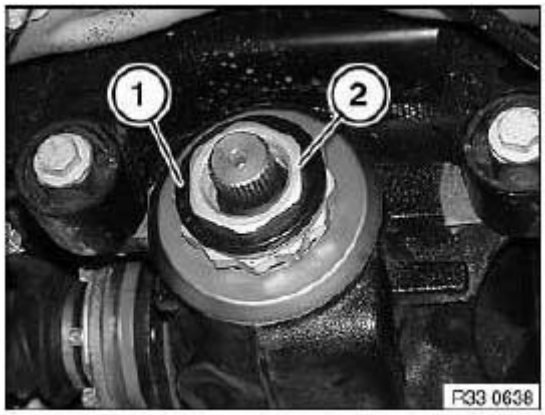


Fig. 36: Identifying Retaining Clip And Diaphragm Seal Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of flange nut (1) to bevel pinion (2).

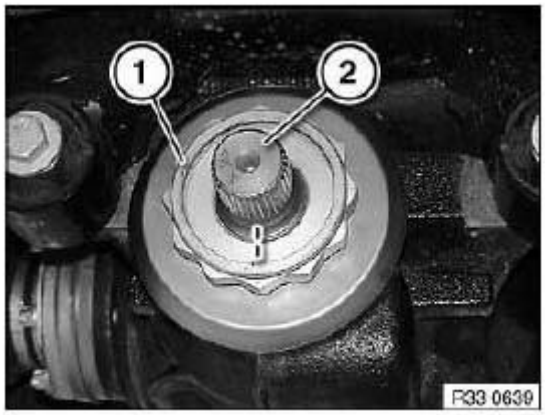


Fig. 37: Identifying Flange Nut And Bevel Pinion
Courtesy of BMW OF NORTH AMERICA, INC.

Release flange nut with special tools 33 5 050 and 33 5 070 , to do this, grip bevel pinion with special tool 33 5 060 and 33 5 070 .

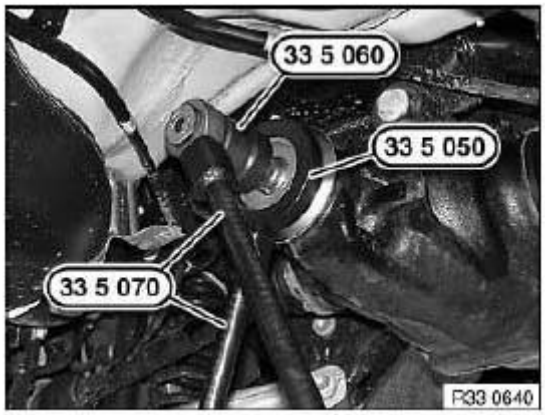


Fig. 38: Removing Flange Nut Using Special Tools (33 5 050 And 33 5 070)
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out shaft seal with special tool 00 5 010 .

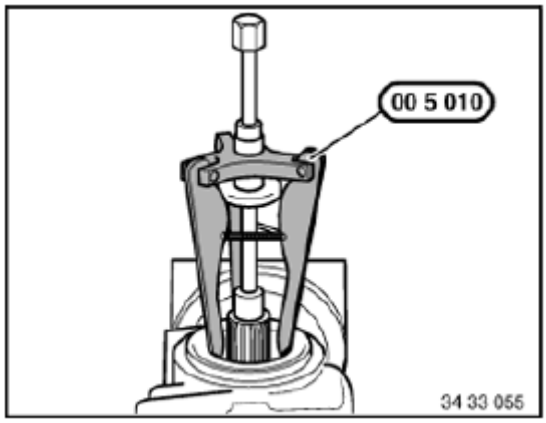


Fig. 39: Pulling Out Shaft Seal Using Special Tool (00 5 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat sealing lips of new shaft seal and sealing face of bevel pinion with differential oil.

Drive in shaft seal with special tool 33 0 150 .

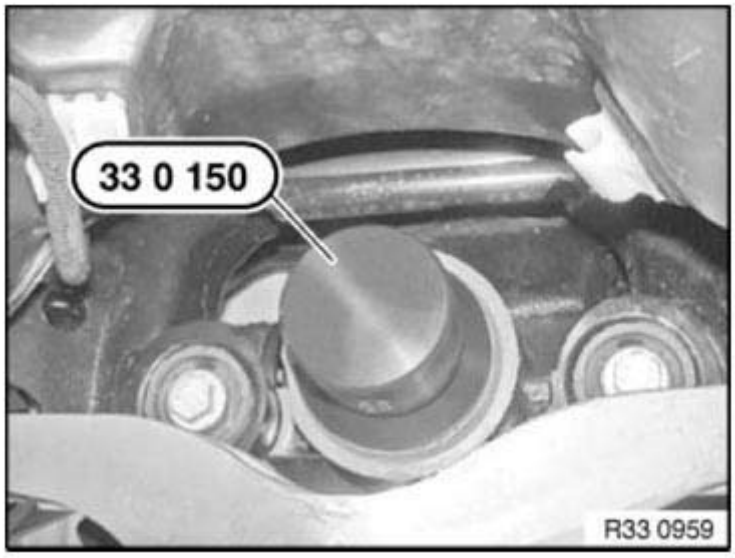


Fig. 40: Installing Shaft Seal Using Special Tool (00 5 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Clean bevel pinion thoroughly to remove remnants of screw-locking agent.

Fig. 41: Identifying Bevel Pinion
Courtesy of BMW OF NORTH AMERICA, INC.

Check dust cover for damage, replace if necessary.

IMPORTANT: Clean flange nut thoroughly to remove remnants of grease and screw-locking agent.
Pack collar insert (1) of flange nut with grease .
Apply a thin coating of grease to shaded area (2) of flange nut.
Coat at least four thread turns of flange nut with "DREI BOND adhesive type 1385".

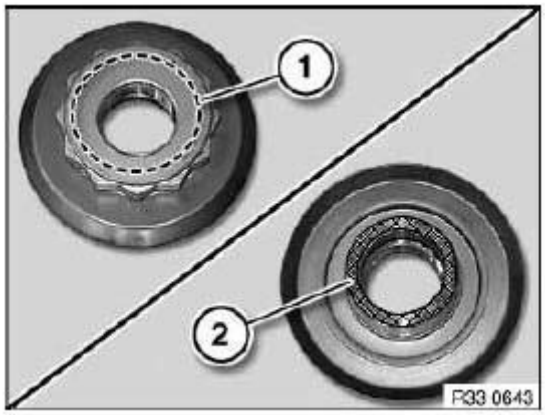


Fig. 42: Identifying Collar Insert Of Flange Nut With Grease Area
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: In order to avoid damaging the rear differential, do not under any circumstances tighten down the flange nut (1) beyond the marker point of the bevel pinion (2).

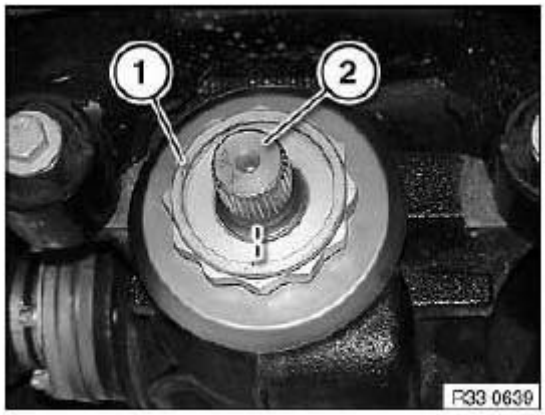


Fig. 43: Identifying Flange Nut Of Bevel Pinion
Courtesy of BMW OF NORTH AMERICA, INC.

Place insert nut (2) with diaphragm seal in flange nut.

Install retaining clip (1).

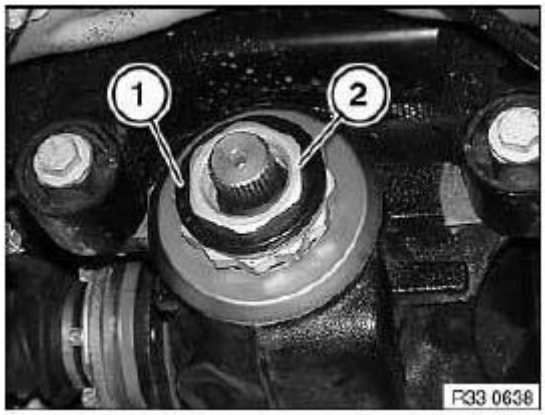


Fig. 44: Identifying Insert Nut With Retaining Clip
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check **OIL LEVEL IN FINAL DRIVE UNIT** and top up if necessary.

33 11 271 REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL

IMPORTANT: In event of oil loss, always check rear differential for traces of wear and damage.

Necessary preliminary tasks

- Draw off/drain **DIFFERENTIAL OIL**
- Remove **REAR DIFFERENTIAL**

NOTE: Read and comply with document "REAR DIFFERENTIAL: ASSIGNMENT TO MODEL SERIES ".

Select rear differential:

- **188L**
- **215L**

After installation

- Add **REAR DIFFERENTIAL OIL**

33 11 ... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (188L)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!

To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screws (1).

Tightening torque (M10x60) **33 11 1AZ** .

Unscrew screws (2).

Tightening torque (M10x25) **33 11 1AZ** .

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

The liquid gasket can be found in Main Group 33 in the Electronic Parts Catalogue.

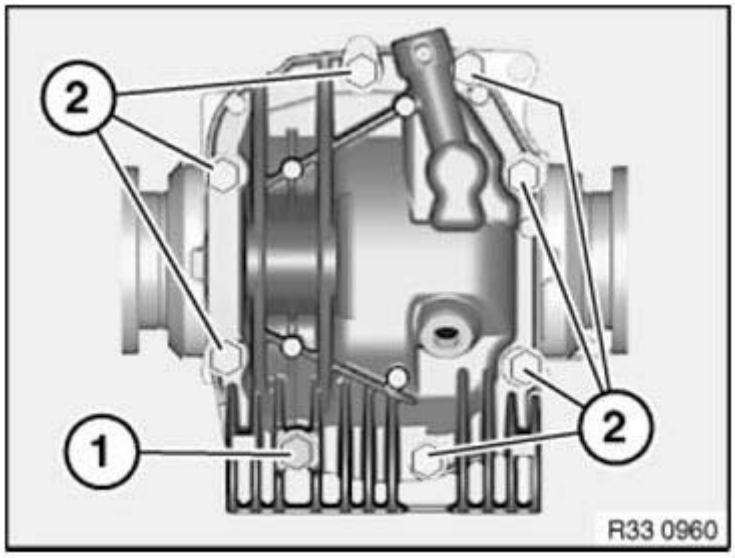


Fig. 45: Identifying Rear Differential Screws (188L)
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 ... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (215 WITH LOCK)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid sealing compounds!

To prevent the differential oil from foaming over, make sure that no remnants of the liquid sealing compound are pressed into the rear differential housing.

Release screws (1).

Tightening torque (M10x82) 33 11 1AZ.

Remove cover (2).

If necessary, remove remnants of liquid sealing compound with scraper.

Clean sealing face on cover and rear differential.

Installation:

If a paper gasket was fitted, a paper gasket or liquid sealing compound can be used.

The liquid sealing compound can be found in Main Group 33 in the Electronic Parts Catalogue.

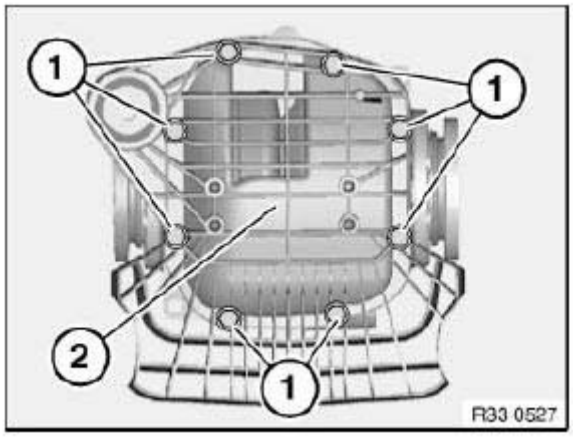


Fig. 46: Identifying Rear Differential Screws (215 With Lock)
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 ... REPLACING REAR COVER GASKET ON REAR DIFFERENTIAL (215L)

IMPORTANT: To avoid leaks from the rear differential cover, do not use a paper gasket in cars with liquid gaskets!
To prevent the differential oil from foaming over, make sure that no remnants of the liquid gasket are pressed into the rear differential housing.

Release screw (1).

Tightening torque (M10x25) **33 11 1AZ** .

Remove cover.

If necessary, remove remnants of liquid gasket with scraper.

Clean sealing face on cover and rear differential.

Installation:

If a paper gasket was fitted, a paper or liquid gasket can be used.

The liquid gasket can be found in Main Group 33 in the Electronic Parts Catalogue.

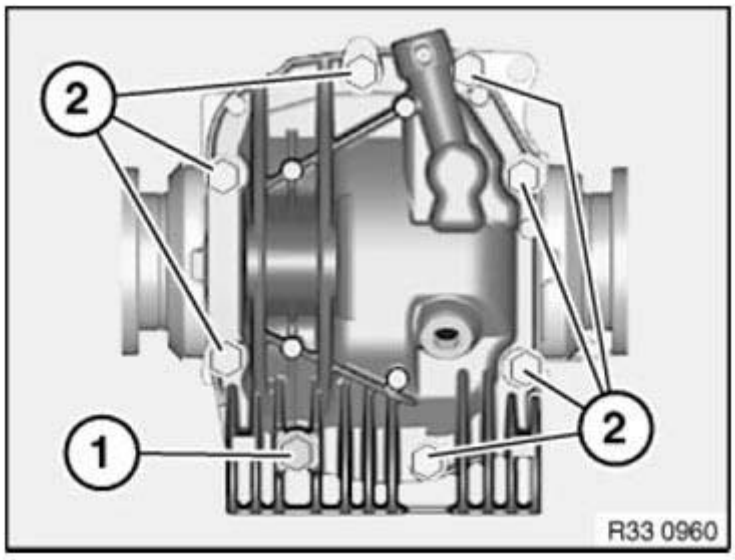


Fig. 47: Identifying Rear Differential Screws (215L)
Courtesy of BMW OF NORTH AMERICA, INC.

33 11 085 REPLACING RIGHT DRIVE FLANGE ON REAR DIFFERENTIAL

The procedure is described in the document "**REPLACING LEFT DRIVE FLANGE ON REAR DIFFERENTIAL** ".

33 11 140 REPLACING SHAFT SEAL FOR LEFT DRIVE FLANGE

Necessary preliminary tasks

- Remove drive flange from rear differential
- If necessary, press off dust cover

Withdraw shaft seal with special tools 00 5 010 and 32 1 060/33 1 308.

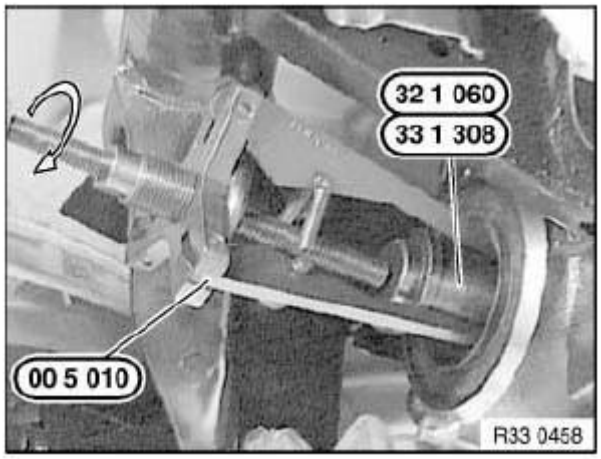


Fig. 48: Removing Shaft Seal Using Special Tools (00 5 010 And 32 1 060)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat housing plate flange and sealing lips of new shaft seal with **APPROVED REAR DIFFERENTIAL OIL** .

Drive in new shaft seal as far as it will go with following special tools (depending on rear differential/outside diameter).

- 33 5 130
- 33 5 140

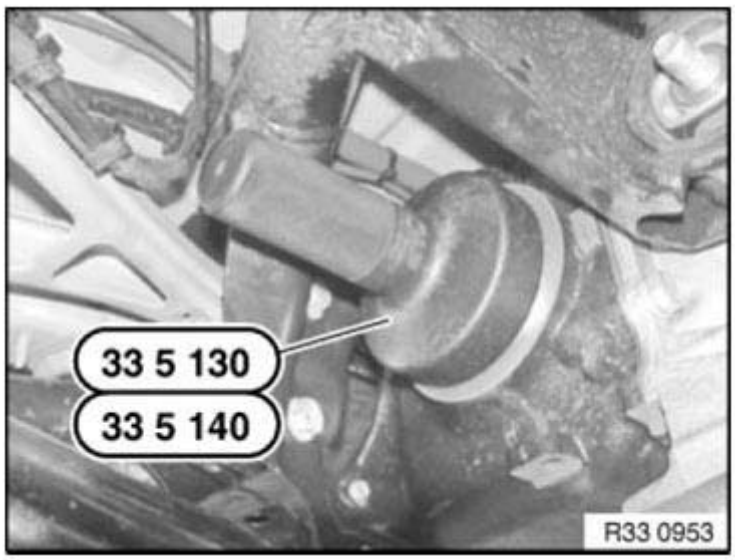


Fig. 49: Installing Shaft Seal Using Special Tools (33 5 130 And 33 5 140)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Correct rear differential fluid level

33 11 145 REPLACING SHAFT SEAL FOR RIGHT DRIVE FLANGE

The procedure is described in the document "**REPLACING SHAFT SEAL FOR LEFT DRIVE FLANGE** ".

3317 FINAL DRIVE MOUNTING

33 17 004 REPLACING ALL RUBBER MOUNTS FOR REAR AXLE DIFFERENTIAL MOUNTING AT FRONT

Necessary preliminary tasks

- Remove **REAR DIFFERENTIAL**

Pull out rubber mount with special tools 33 3 314, 33 3 315, 33 3 361, 33 3 362 and an M12 nut (1).

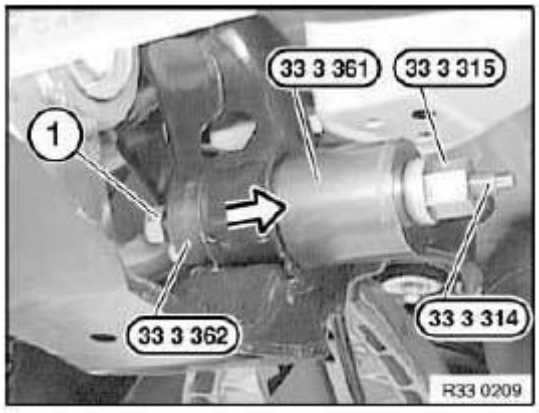


Fig. 50: Pulling Out Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe installation position of rubber mount.
Fig. 51: Protrusion (A) in rear direction of travel
Fig. 51: Openings (1) in transverse vehicle direction

Coat new rubber mount and bearing bushing in rear axle carrier with Circo Light.

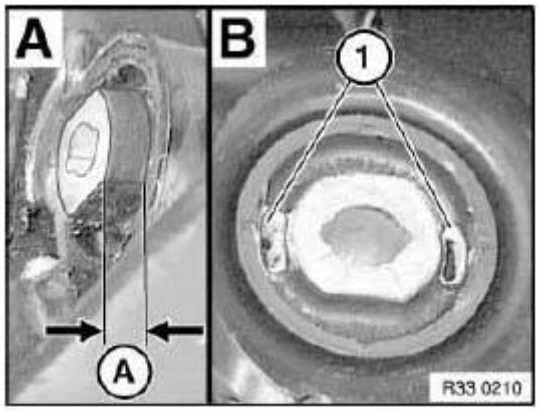


Fig. 51: Identifying Rear Direction Of Travel Protrusion And Transverse Vehicle Direction Openings
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount (1) with special tools 33 3 314, 33 3 315, 33 3 362 and 33 4 173 as far as it will go.

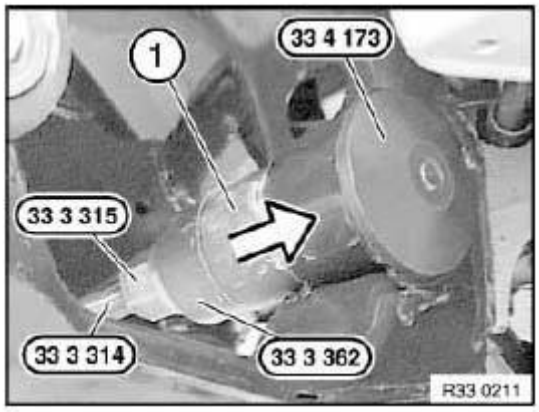


Fig. 52: Installing Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

33 17 ... REPLACING RUBBER MOUNT FOR REAR DIFFERENTIAL MOUNTING AT REAR

Pull out rubber mount with special tools 33 4 465, 33 4 466, 33 4 281 and 33 4 183.

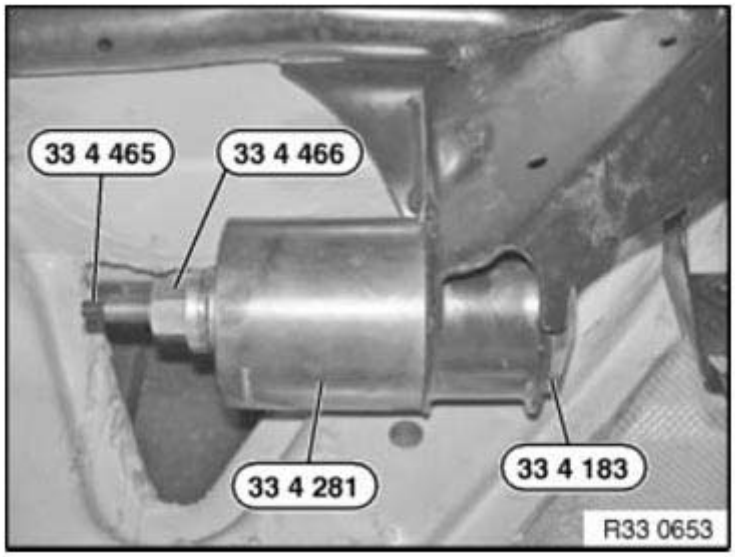


Fig. 53: Pulling Out Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Attach support 33 4 455 and strap retainer 33 4 456 to special tool 33 4 450 .

Install rubber mount (1) in special tool 33 4 450 and pull together.

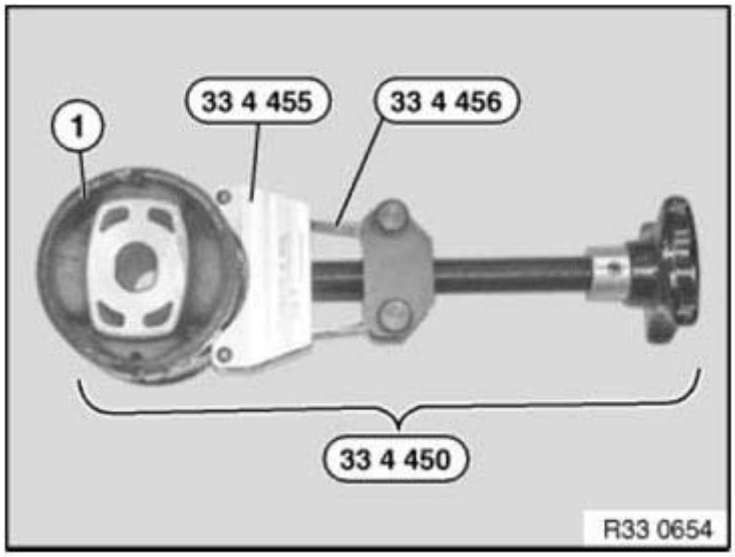


Fig. 54: Installing Rubber Mount On Special Tool (33 4 450)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Coat bearing bushing in rear axle carrier and new rubber mount with Circo Light.
Align rubber mount by way of elongated hole (1) to vehicle longitudinal direction (F).

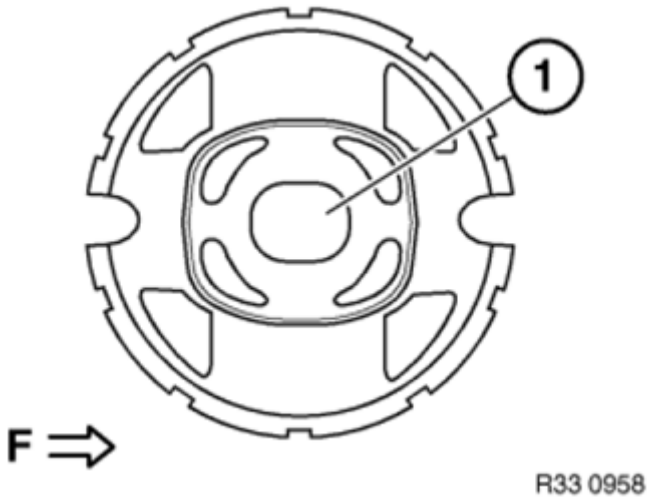


Fig. 55: Identifying Rubber Mount Aligning Hole
Courtesy of BMW OF NORTH AMERICA, INC.

Install rubber mount (1) with special tools 33 4 465, 33 4 466, 33 4 182 and 33 4 285 until special tool 33 4 450 rests on rear axle carrier.

Release special tool 33 4 450 and remove.

Install rubber mount (1) as far as it will go.

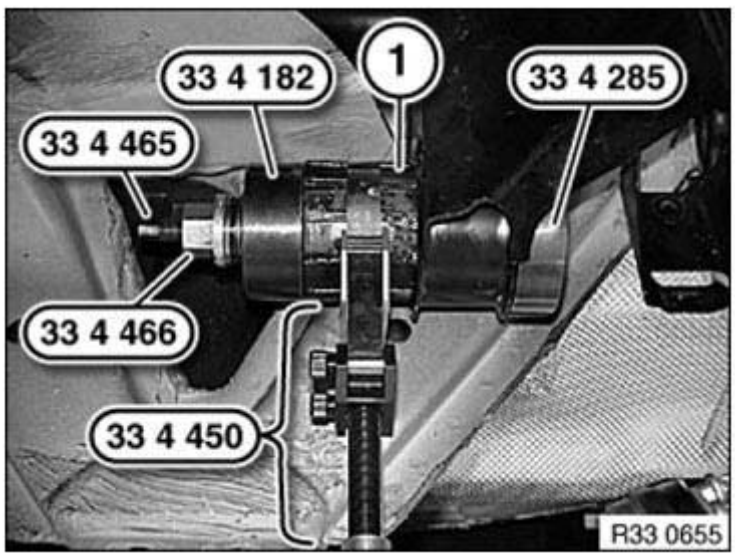


Fig. 56: Installing Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

3321 OUTPUT SHAFTS

33 21 ... PRESSING OUTPUT SHAFT OUT OF DRIVE FLANGE AND DRAWING IN (OUTPUT

SHAFT REMOVED FROM REAR AXLE FINAL DRIVE)

WARNING: Risk of injury!
It is not permitted to use the impact screwdriver to press out and draw in the output shaft.

IMPORTANT: Risk of damage!
To avoid damaging the output shaft and adjoining parts, it is essential during the pressing-out process to repeatedly check and if necessary correct the position of the output shaft.

Remove **REAR WHEEL** .

IMPORTANT: Expand anti-twist lock sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut, activate parking brake for this purpose.

Tightening torque **33 41 1AZ** .

Installation:

Replace collar nut, oil collar nut/wheel bearing contact surface lightly and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut by positive peening on flat areas of output shaft.

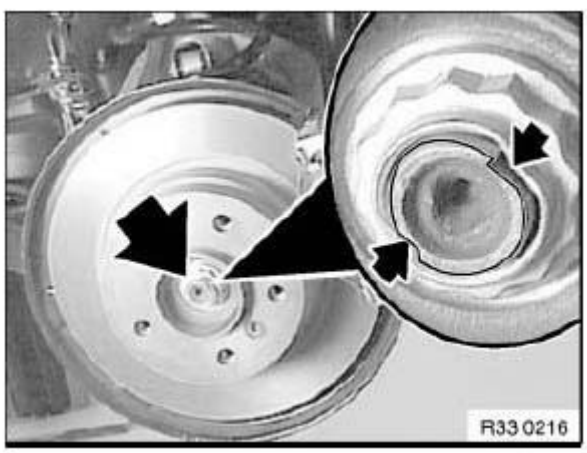


Fig. 57: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble special tools 33 2 201, 33 2 203 with 33 2 207.

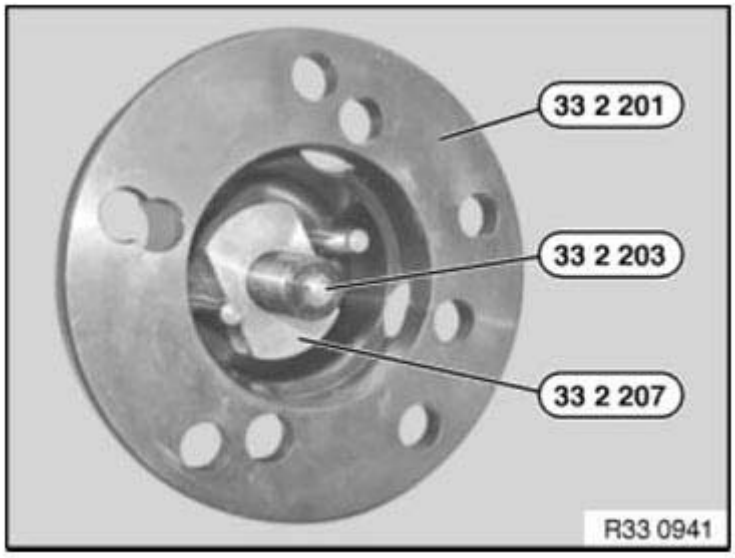


Fig. 58: Assembling Special Tools (33 2 201 , 33 2 203) With (33 2 207)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure output shaft against falling out.

Screw on special tools 33 2 203 and 33 2 201 with **all** wheel bolts to drive flange.

Press output shaft out of drive flange; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070 .

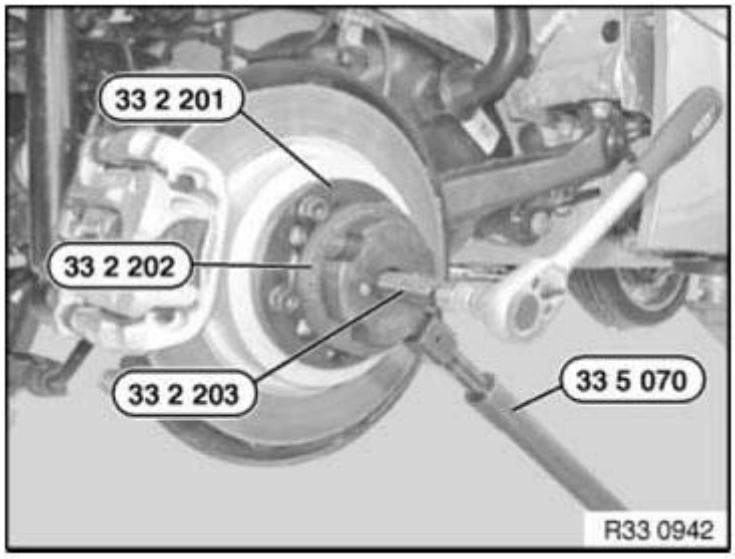


Fig. 59: Pressing Output Shaft Out Of Drive Flange
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: No oil permitted on shaft journal thread!

Lightly oil spline teeth of output shaft.

Insert output shaft into drive flange.

Screw special tool 33 2 206 onto output shaft.

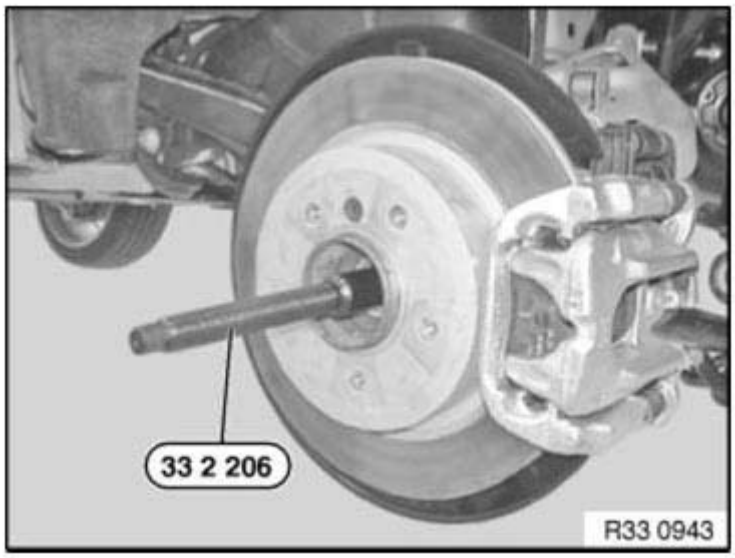


Fig. 60: Positioning Special Tool (33 2 206) Onto Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 33 2 201 with **three** wheel bolts to drive flange.

Draw in output shaft with special tools 33 2 206 and 33 2 208 up to stop; in so doing, grip basic body 33 2 201 with special tools 33 2 202 and 33 5 070 .

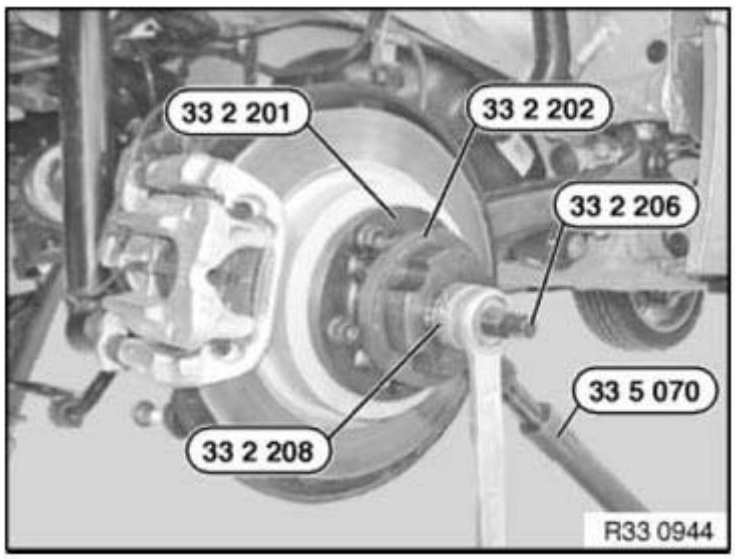


Fig. 61: Installing Output Shaft Using Special Tools (33 2 206 And 33 2 208)

Courtesy of BMW OF NORTH AMERICA, INC.

33 21 001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT

WARNING: Scalding hazard!
Only perform the following tasks after the vehicle has cooled down.

Necessary preliminary tasks

- Remove **EXHAUST SYSTEM** .

The subsequent procedure is described in the document "**REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT** ".

33 21 002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT

Remove **REAR WHEEL** .

IMPORTANT: Expand turning lock sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut, activate parking brake for this purpose.

Tightening torque **33 41 1AZ** .

Installation:

Replace collar nut, oil collar nut/wheel bearing contact surface lightly and tighten down.

No oil permitted on thread of shaft journal or collar nut.

Secure collar nut by positive peening on flat areas of output shaft.

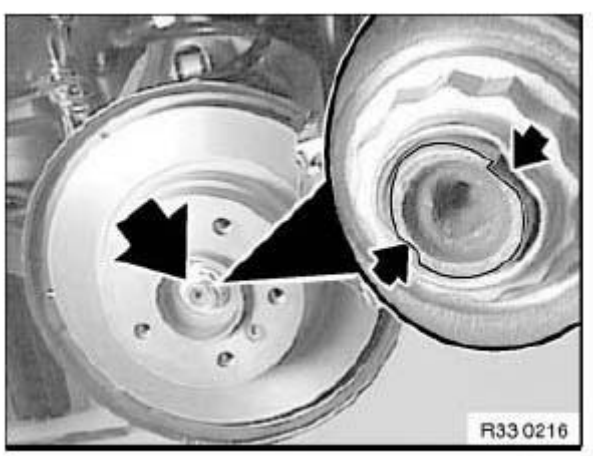


Fig. 62: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TENSION STRUT** .

Remove heat shield.

Remove **STABILIZER ON REAR AXLE CARRIER** .

REMOVE STABILIZER BAR BRACKET FROM CONTROL ARM AT TOP .

Release bolts and remove with washers (1).

Tightening torque **33 21 1AZ** .

Press output shaft off drive flange using a suitable tool; if necessary, raise trailing arm with workshop jack approx. 20 mm.

Installation:

Before installing output shaft, make sure that drive flange is fully engaged in rear differential.

Replace bolts and washers (1).

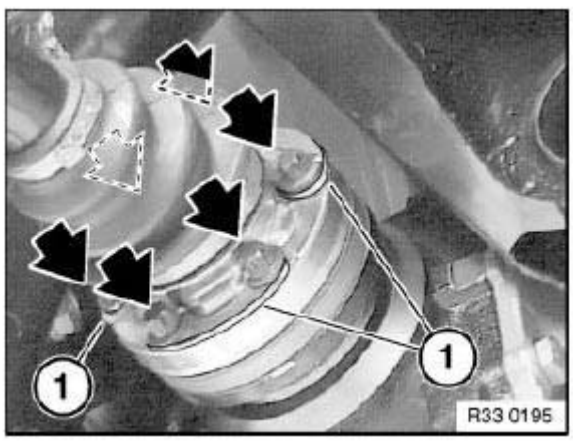


Fig. 63: Locating Washer Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Do not drive output shaft out of drive flange with an impact tool.

Press **OUTPUT SHAFT OUT OF DRIVE FLANGE** and remove towards center of vehicle.

After installation

- Check that output shaft is correctly seated in rear differential.

33 21 071 REPLACING BOTH GAITERS ON LEFT AND RIGHT OF OUTPUT SHAFT

Necessary preliminary tasks

- Remove output shaft . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3321002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT**

Removing inner gaiter

Clean output shaft and clamp with a cloth in vice.

Unfasten hose clip (1).

Using a suitable tool, force gaiter cap (2) off joint or sealing cover.

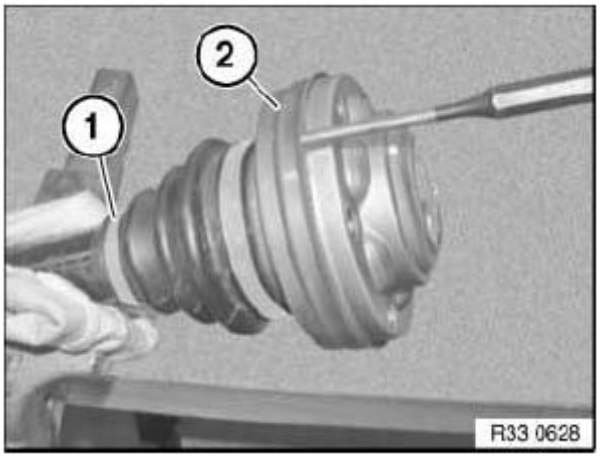


Fig. 64: Pushing Gaiter Cap Off Joint Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Push back gaiter with cap.

IMPORTANT: Risk of damage!
Make sure that joint does not fall apart.

Clamp joint (1) in vice.

Using a suitable tool, force sealing cover (2) off joint (1).

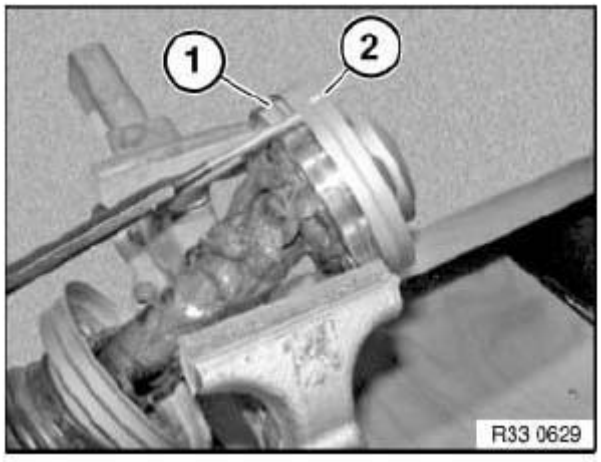


Fig. 65: Removing Sealing Cover Off Joint Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mark positions in relation to each other of ball hub, ball cage and joint at ends.

NOTE: If the joint falls apart, it can only be reassembled correctly with the aid of the markings.

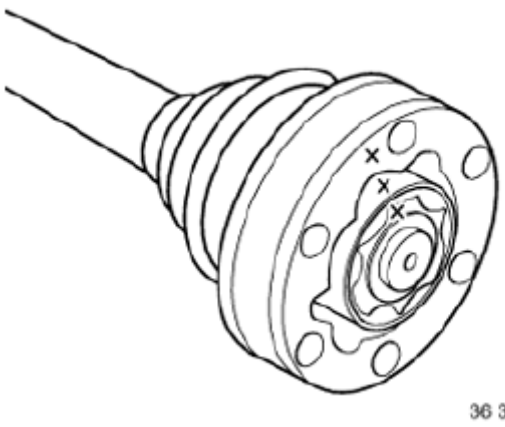


Fig. 66: Identifying Marking On Ball Hub, Ball Cage And Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Remove circlip (1).

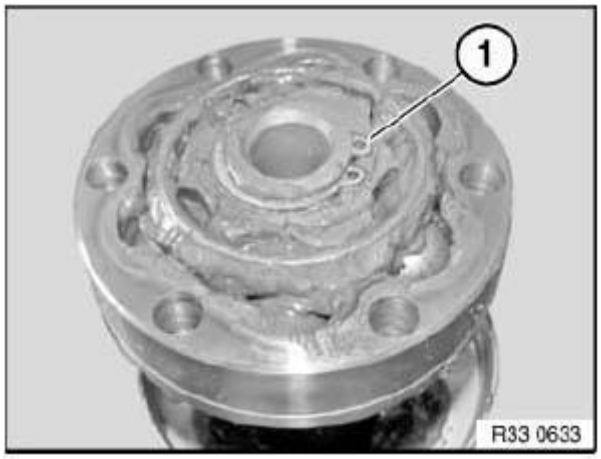


Fig. 67: Identifying Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Grip output shaft.

Using special tool 26 1 110 and a suitable tool (for hollow shaft 21 2 120), press output shaft out of joint (1).

Clean joint (1) carefully.

NOTE: All traces off old grease must be removed.

Detach gaiter from output shaft.

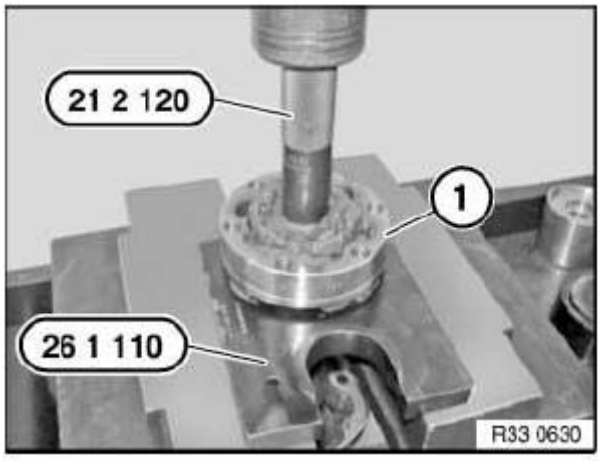


Fig. 68: Pressing Output Shaft Out Of Joint Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Removing and installing outer gaiter

Release hose clamps (1, 3) and detach gaiter (2) from output shaft.

Clean joint and output shaft carefully.

NOTE: All traces off old grease must be removed.

Check joint for damage; if necessary, replace output shaft . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3321002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT**.

Fill joint with propeller shaft grease.

Fit gaiter (2) on bellows and secure with hose clamps (1, 3).

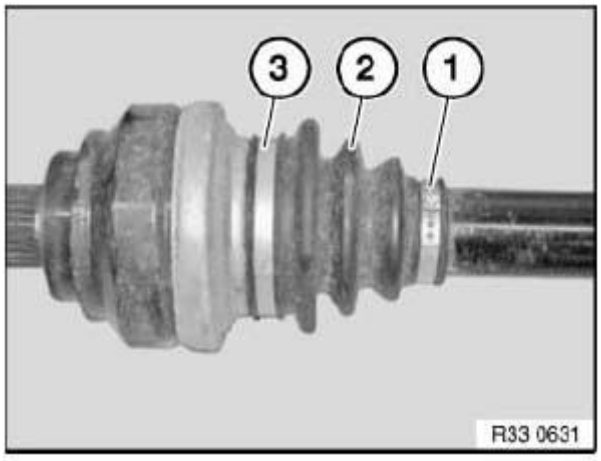


Fig. 69: Identifying Hose Clamps And Gaiter On Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installing inner gaiter

Push gaiter with cap onto output shaft (1).

Mount special tool 33 2 100 with corresponding shell inserts on output shaft (1).

Press joint (2) over bearing inner race onto output shaft.

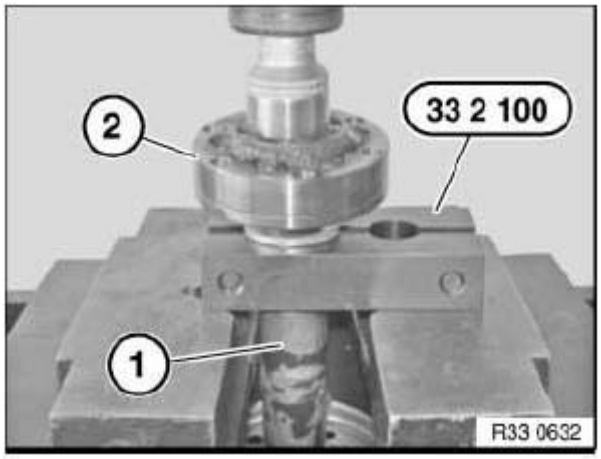


Fig. 70: Mounting Special Tool (33 2 100) On Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Install new circlip (1).

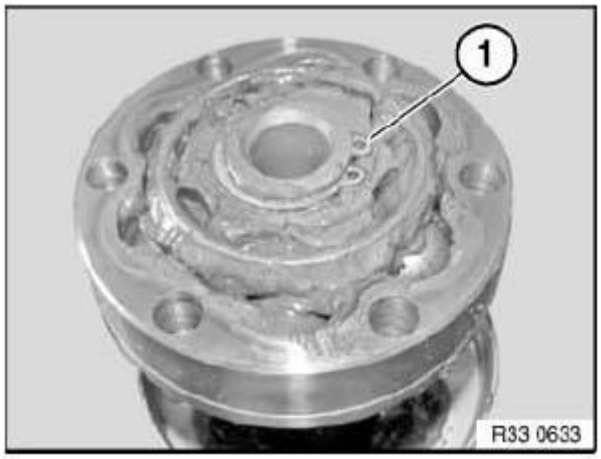


Fig. 71: Identifying Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Keep sealing faces of cap and joint (on both sides) clean and free from grease.

Fill joint at both ends with high-temperature grease.

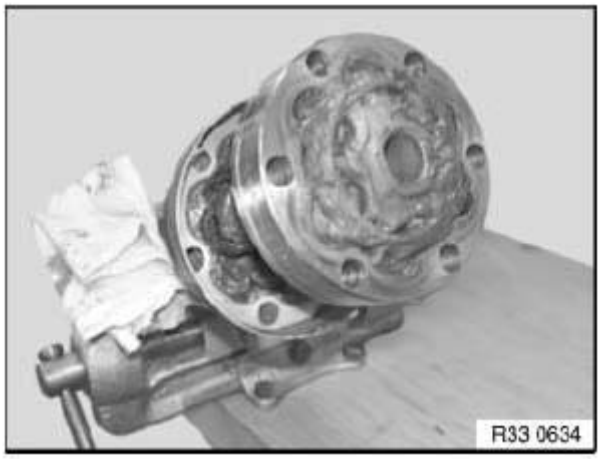


Fig. 72: Filling High-Temperature Grease On Joints Ends
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Do not install gaiter with cap and sealing cover on joint without shims.

Apply a thin coating of sealing compound to sealing faces of sealing cover and cap.

Install sealing cover (1) with two bolts, shims and nuts on joint.

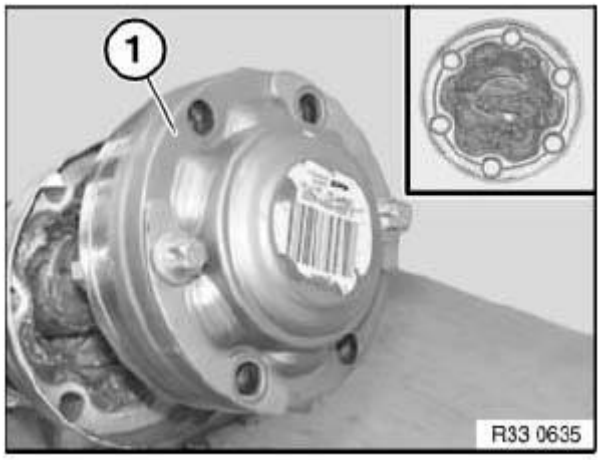


Fig. 73: Identifying Sealing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Install cap (1) with two bolts, shims and nuts on joint.

Fit hose clamp (2).

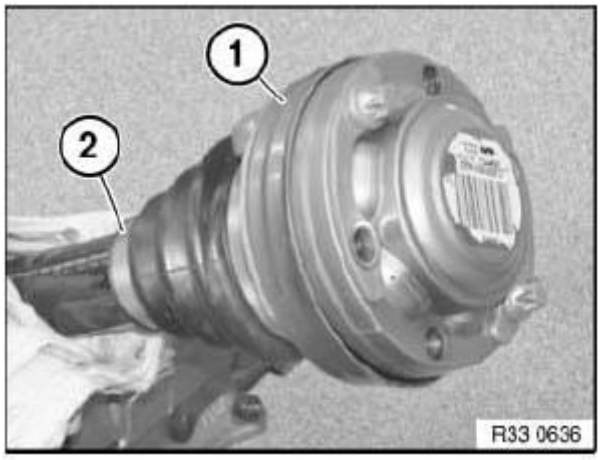


Fig. 74: Identifying Cap And Hose Clamp
Courtesy of BMW OF NORTH AMERICA, INC.

33 21 ... RIBBED TEETH

IMPORTANT: Bolts with ribbed teeth must be replaced after they have been released!

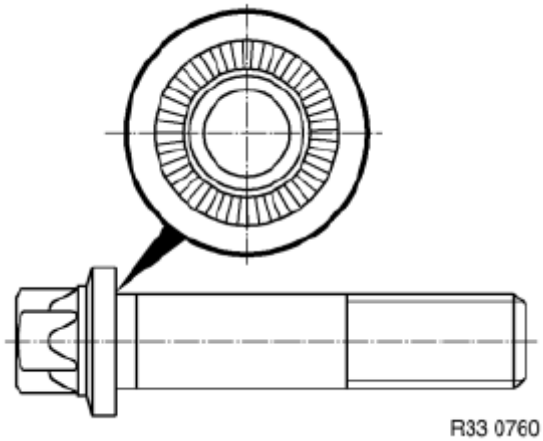


Fig. 75: Identifying Bolt With Ribbed Teeth
Courtesy of BMW OF NORTH AMERICA, INC.

3331 REAR SUB-FRAME

33 31 503 LOWERING/RAISING REAR AXLE CARRIER

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.
Read and observe the information on load distribution in the Owner's Handbook, lifting platform.
Before lowering/removing the rear axle carrier, it is essential to place a

minimum load of 100 kg in the luggage compartment to prevent the vehicle from toppling/slipping off the lifting platform!

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

NOTE: If the rear axle carrier is detached from the body, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks

- Remove **PROPELLER SHAFT FROM REAR DIFFERENTIAL** and tie back
- Release shock absorber . See **3712131 REPLACING LEFT OR RIGHT REAR SHOCK ABSORBER (ADAPTIVE M SUSPENSION)** or **3352000 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SHOCK ABSORBER** on left and right on trailing arm

IMPORTANT: Risk of damage!
Brake hose must not be exposed to tensile loads.

Release screws (1) on trailing arm on left and right and remove holder.

Tightening torque **34 32 4AZ** .

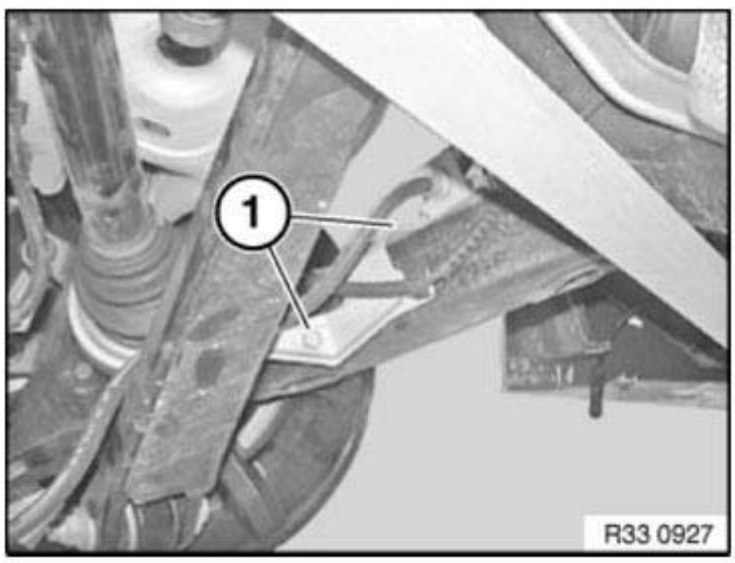


Fig. 76: Identifying Screws On Trailing Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect **PLUG CONNECTION** from ride-height sensor

Support rear axle carrier with workshop jack and special tool 31 5 250 .

IMPORTANT: Risk of injury!
Position support (1) at rear on rear axle carrier.
Position support (2) in bore at front on rear axle carrier.

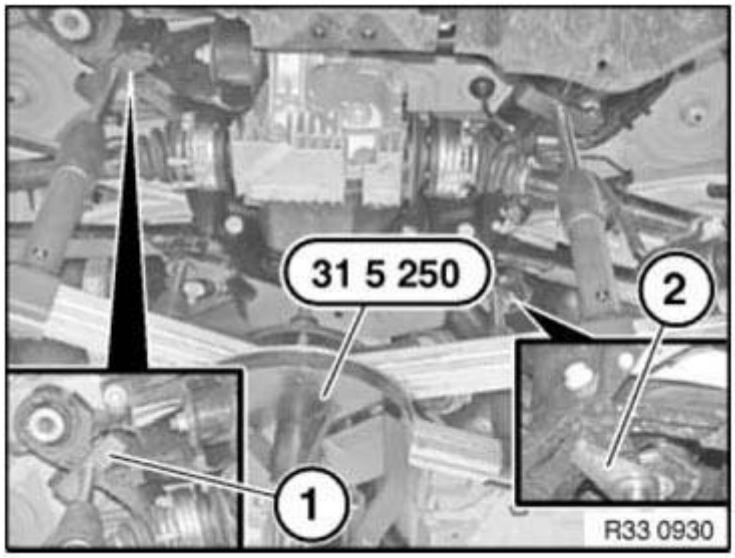


Fig. 77: Supporting Rear Axle Carrier Using Workshop Jack And Special Tool (31 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Release nuts (2) and remove tension strut.

Tightening torque **33 33 1AZ** .

Lower rear axle carrier slowly.

Installation:

Check threads for damage; if necessary, repair with **HELICOIL THREAD INSERTS** .

Check seating of coil springs with spring pads, correct if necessary.

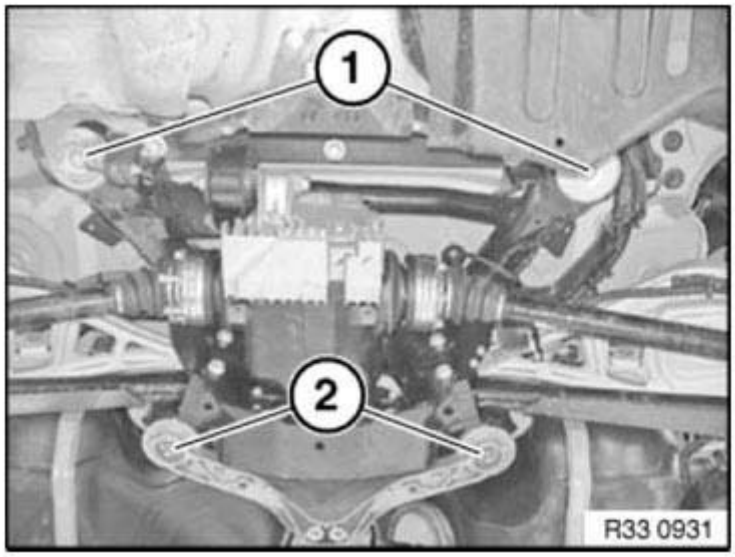


Fig. 78: Identifying Tension Strut Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check threaded pin for damage, replace if necessary.

Tightening torque **33 33 2AZ** .

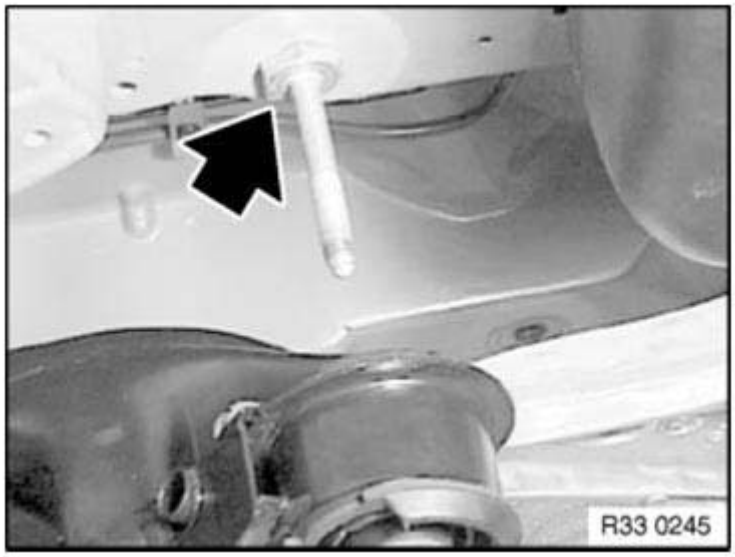
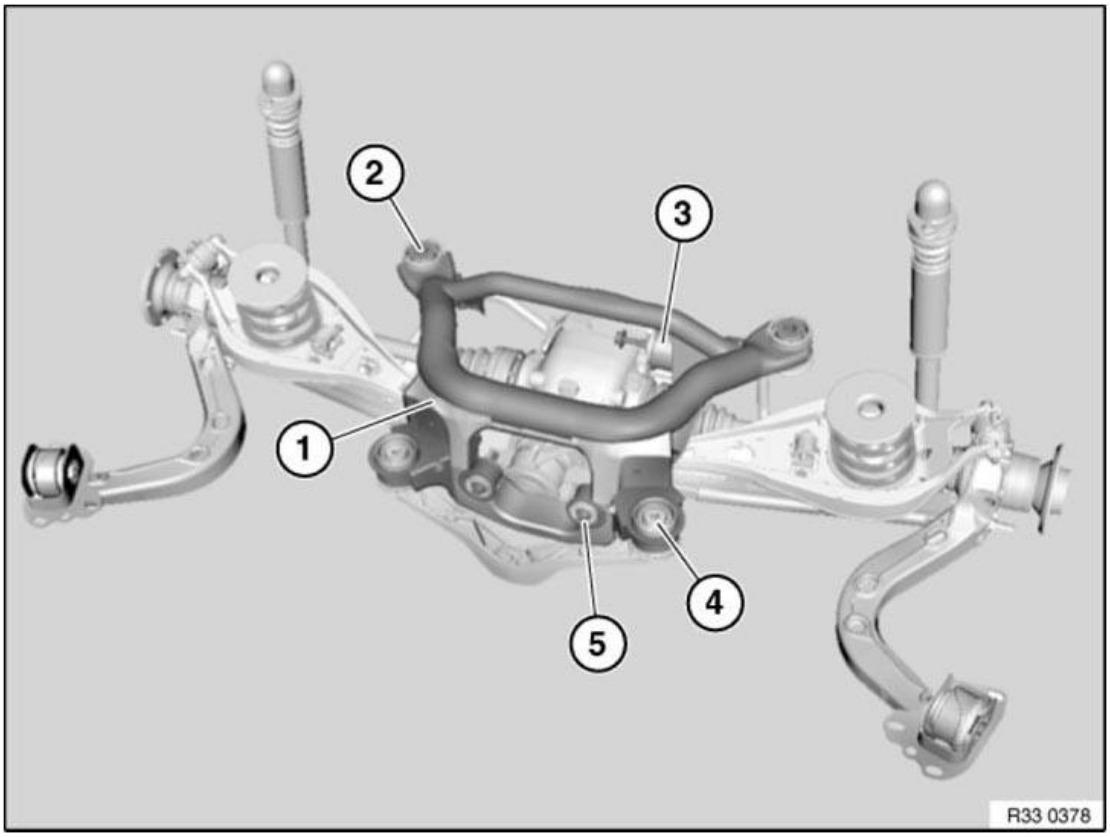


Fig. 79: Locating Threaded Pin
Courtesy of BMW OF NORTH AMERICA, INC.

33 31 . OVERVIEW OF REAR AXLE CARRIER WITH RUBBER MOUNTS



1 Rear axle carrier
2 Rear axle carrier rubber mount, rear
3 Rear differential rubber mount, rear
4 Rear axle carrier rubber mount, front
5 Rear differential rubber mount, front

Fig. 80: Overview Of Rear Axle Carrier With Rubber Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

33 31 000 REMOVING AND INSTALLING COMPLETE REAR AXLE CARRIER

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.
Read and observe the information on load distribution in the Owner's Handbook, lifting platform.
Before lowering/removing the rear axle carrier, it is essential to place a minimum load of 100 kg in the luggage compartment to prevent the vehicle from toppling/slipping off the lifting platform!

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Necessary preliminary tasks

- Remove **PROPELLER SHAFT FROM REAR DIFFERENTIAL** and tie back
- Remove rear axle **STABILIZER**

IMPORTANT: Risk of damage!
Brake hose must not be exposed to tensile loads.

Release screws (1) and remove brackets.

Tightening torque **34 32 4AZ** .

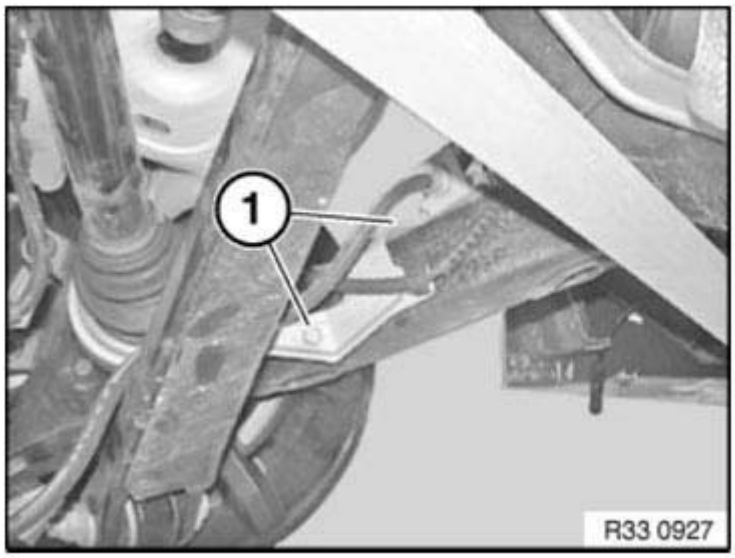


Fig. 81: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for right **BRAKE PAD WEAR SENSOR** .

Disconnect plug connection for **PULSE GENERATOR** on both sides.

Disconnect plug connection on **RIDE-HEIGHT SENSOR** .

Release output shafts . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3321002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT** from rear differential.

Release shock absorber . See **3712131 REPLACING LEFT OR RIGHT REAR SHOCK ABSORBER (ADAPTIVE M SUSPENSION)** or **3352000 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SHOCK ABSORBER** on trailing arm.

Remove **COIL SPRINGS** at rear.

Disconnect plug connection from brake anchor plate and unclip cable from trailing arm.

Release brake caliper on brake anchor plate.

Guide brake caliper through between output shaft and lower control arm and tie up.

Remove **BEARING BLOCK FOR TRAILING ARM FROM BODY** .

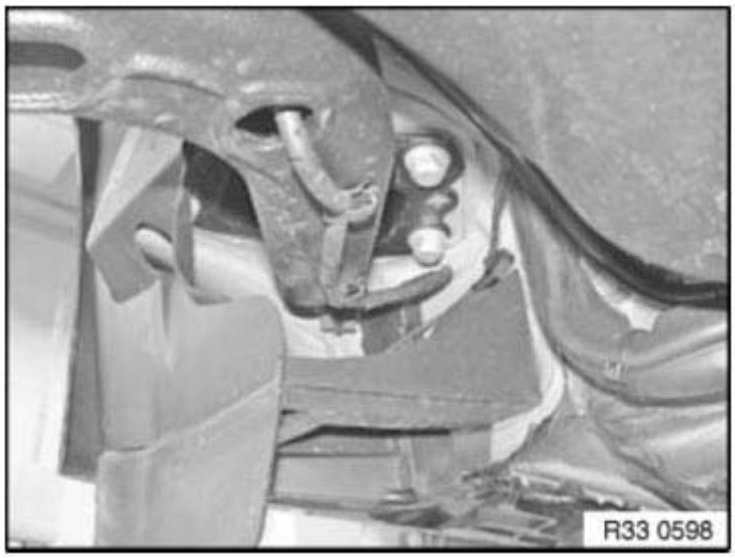


Fig. 82: Identifying Bearing Block Of Trailing Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Support rear axle carrier with workshop jack and special tool 31 5 250 .

IMPORTANT: Danger of injury:
Position support (1) at rear on rear axle carrier.
Position support (2) in bore at front on rear axle carrier.

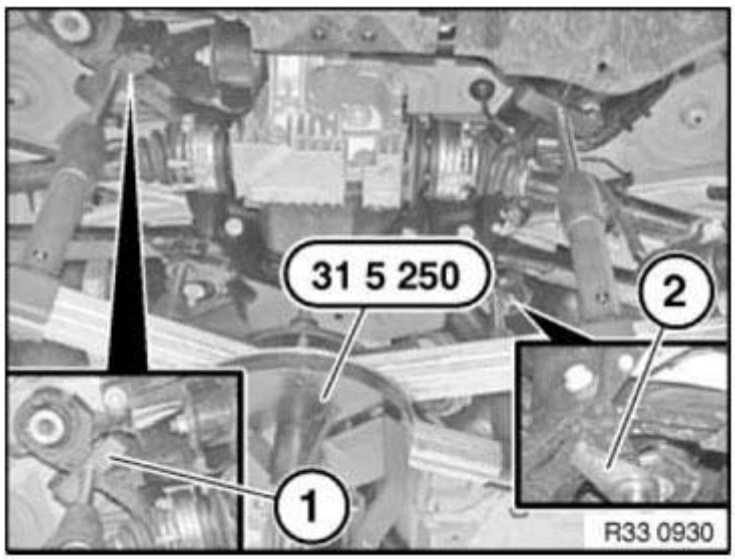


Fig. 83: Supporting Rear Axle Carrier Using Workshop Jack And Special Tool (31 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Release nuts (2) and remove tension strut.

Tightening torque **33 33 1AZ** .

Lower rear axle carrier slowly.

Installation:

Check threads for damage; if necessary, repair with **HELICOIL THREAD INSERTS** .

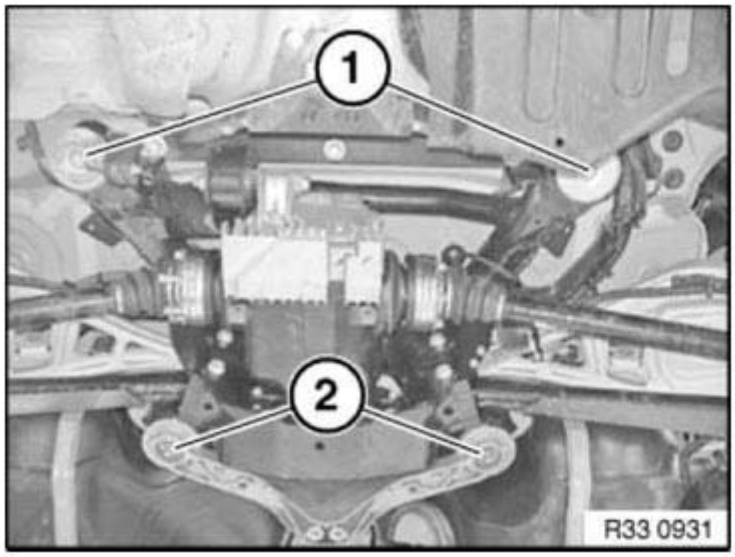


Fig. 84: Identifying Tension Strut Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check threaded pin for damage, replace if necessary.

Tightening torque **33 33 2AZ** .

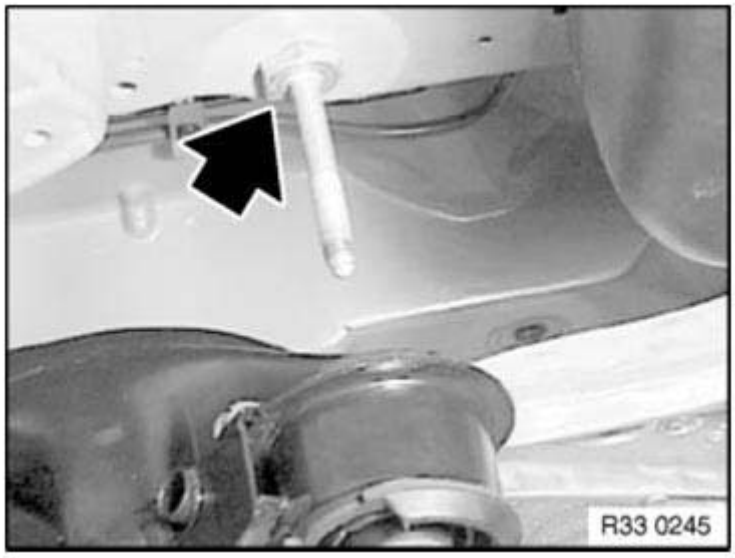


Fig. 85: Locating Threaded Pin
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**

51 71 390 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE ON REAR AXLE

IMPORTANT: Vehicles must not be driven without reinforcement plates. Driving without the reinforcement plate may damage the vehicle body. Screws of reinforcement plate must be tightened to torque and then tightened down with special tool 00 9 120 .

Release screws (1) and remove heat shield (2).

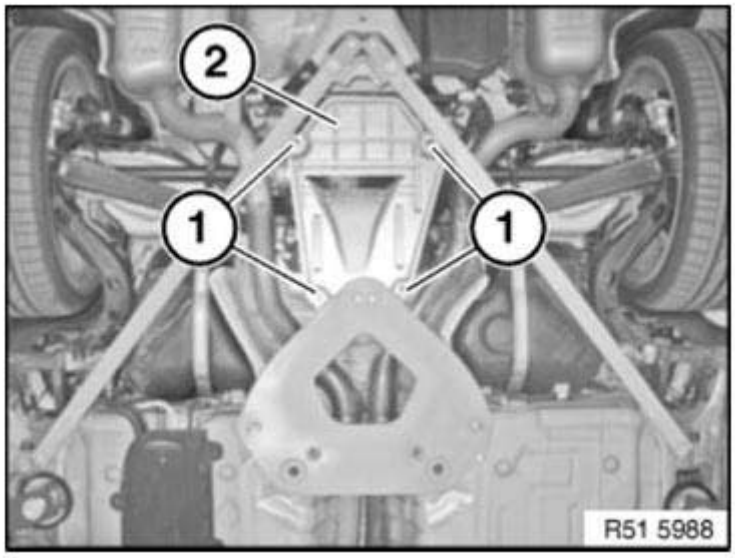


Fig. 86: Identifying Heat Shield With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 71 24AZ** .

Unscrew nuts (2).

Tightening torque **51 71 25AZ** .

Unscrew nuts (3).

Tightening torque **51 71 26AZ** .

Remove thrust panel (reinforcement plate) (4).

Installation:

Replace screw (1).

- Tighten down screws (1) to specified torque and then to angle of rotation.

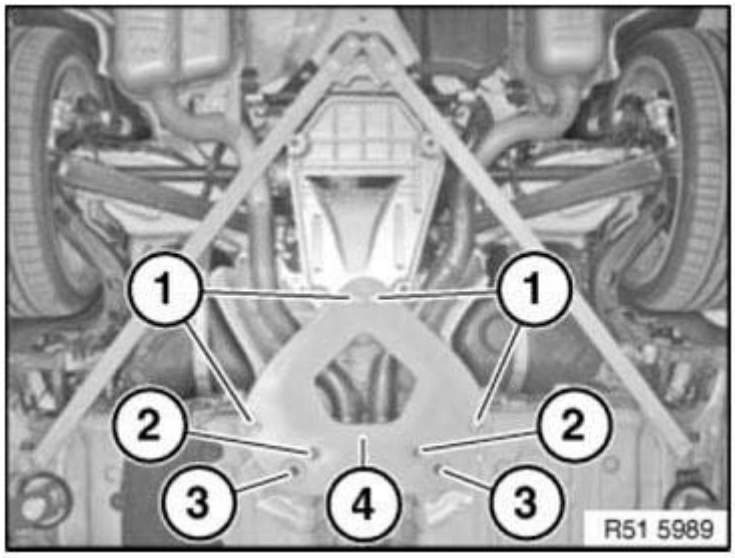


Fig. 87: Identifying Thrust Panel (Reinforcement Plate) With Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

33 31 025 REMOVING AND INSTALLING/REPLACING VIBRATION ABSORBER ON SIDE MEMBER

Necessary preliminary tasks

- Remove rear **WHEEL ARCH SPLASH GUARD**

Release nut (1) and remove vibration absorber (2) from holder.

Tightening torque, see 33 32 9AZ in **33 32 CONTROL ARMS AND STRUTS** .

Installation:

Pay attention to lock washer (3) between collar nut and vibration absorber.

Replace screw and nut.

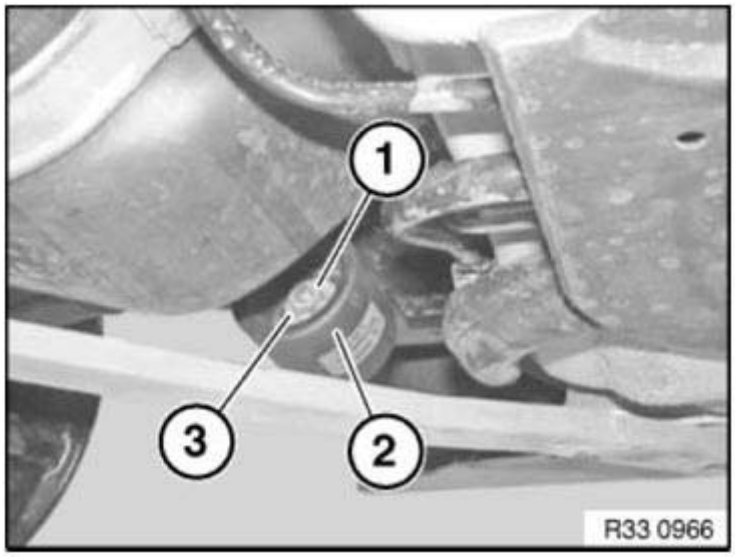


Fig. 88: Identifying Vibration Absorber And Lock Washer With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Groove (1) on the vibration absorber must be aligned horizontally to the holder corners!**

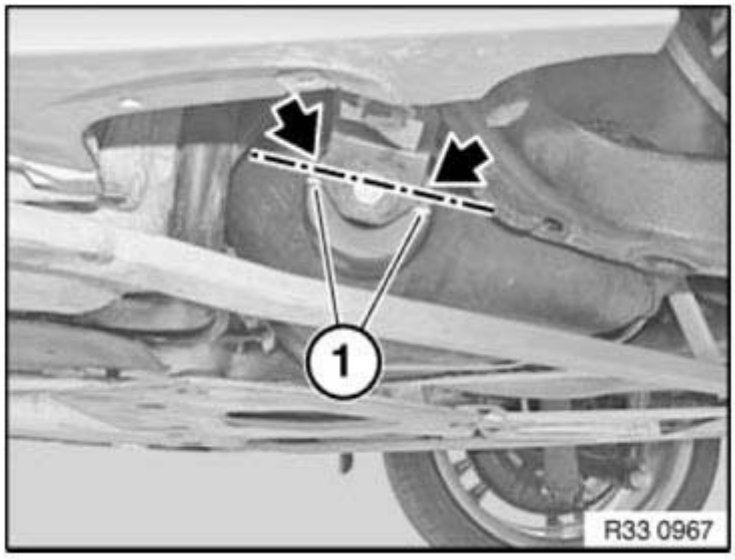


Fig. 89: Identifying Groove On Vibration Absorber
Courtesy of BMW OF NORTH AMERICA, INC.

33 31 011 REPLACING REAR AXLE CARRIER

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

Read and observe the information on load distribution in the Owner's Handbook, lifting platform.
Before lowering/removing the rear axle carrier, it is essential to place a minimum load of 100 kg in the luggage compartment to prevent the vehicle from toppling/slipping off the lifting platform!

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Necessary preliminary tasks

- Remove **REAR DIFFERENTIAL**
- Remove **RIDE-HEIGHT SENSOR**
- Remove **REAR AXLE CARRIER**

Remove lower control arm on both sides from rear axle carrier . See **3332086 REMOVING AND INSTALLING/REPLACING BOTTOM LEFT CONTROL ARM** or **3332087 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT CONTROL ARM**.

Remove upper control arm . See **3332076 REMOVING AND INSTALLING/REPLACING TOP LEFT CONTROL ARM** or **3332077 REMOVING AND INSTALLING/REPLACING TOP RIGHT CONTROL ARM** on both sides from rear axle carrier..

Remove trailing arm complete with output shaft and all suspension arms.

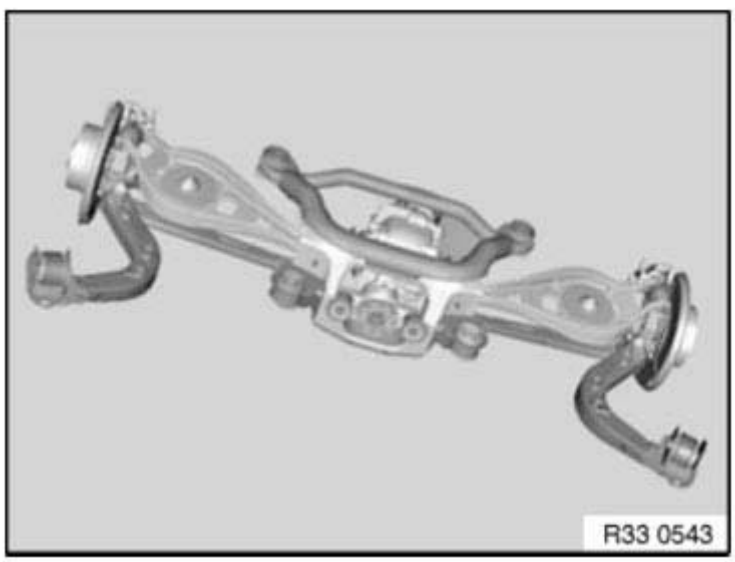


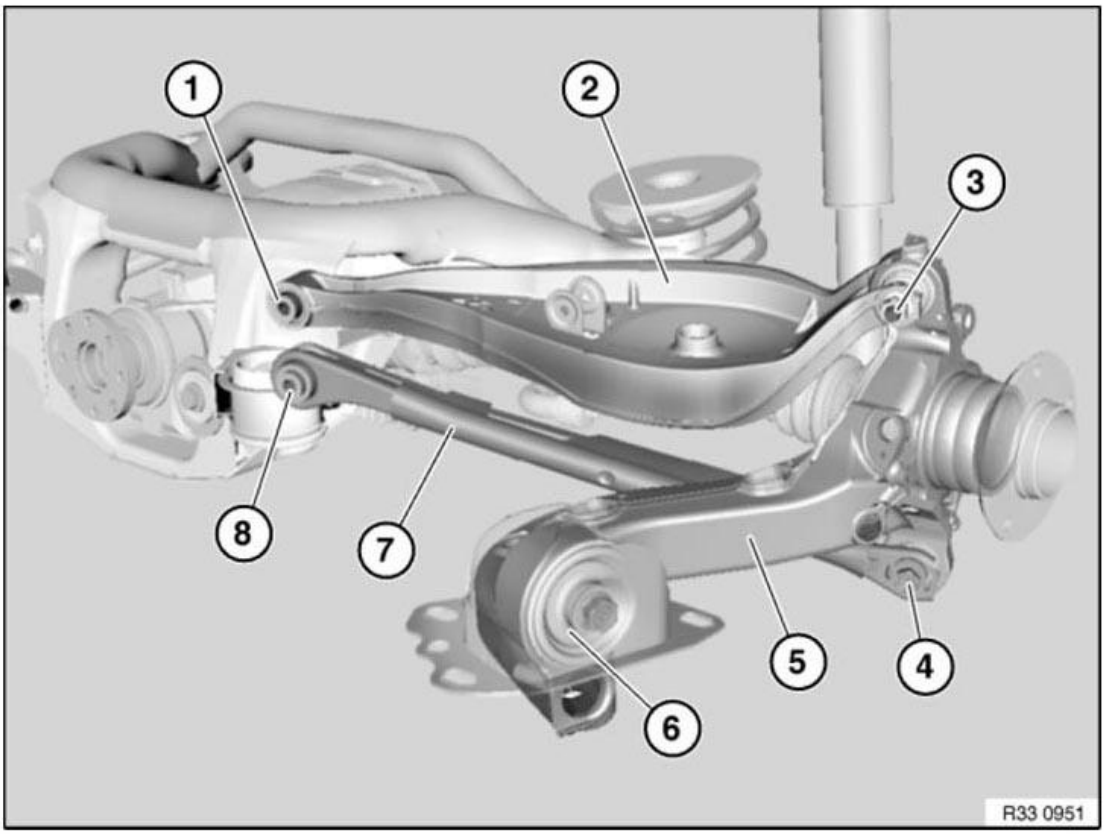
Fig. 90: Identifying Rear Axle Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**

3332 CONTROL ARMS AND STRUTS

33 32 ... OVERVIEW OF CONTROL ARMS WITH RUBBER MOUNTS



1 Rubber mount in control arm, top
2 Control arm, top (left/right)
3 Ball joint in trailing arm
4 Rubber mount in trailing arm
5 Trailing arm (left/right)
6 Rubber mount in trailing arm at front
7 Control arm, bottom (left/right)
8 Rubber mount in control arm, bottom

Fig. 91: Overview Of Control Arms With Rubber Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

33 32 077 REMOVING AND INSTALLING/REPLACING TOP RIGHT CONTROL ARM

NOTE: If the upper control arm is detached from the rear axle carrier/trailing arm, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks

- Remove **OUTPUT SHAFT** from rear differential and tie back

- Remove **COIL SPRING**

Release stabilizer on upper control arm.

Tightening torque **33 55 2AZ** .

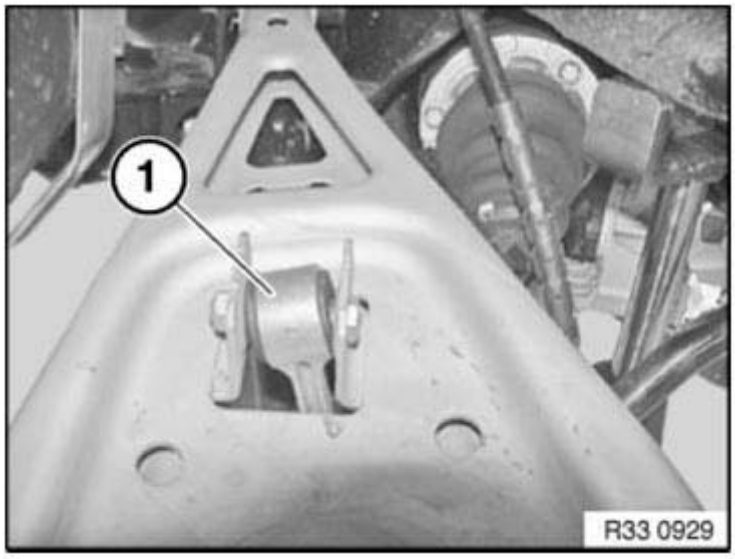


Fig. 92: Identifying Stabilizer On Upper Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw.

Tightening torque **33 32 5AZ** .

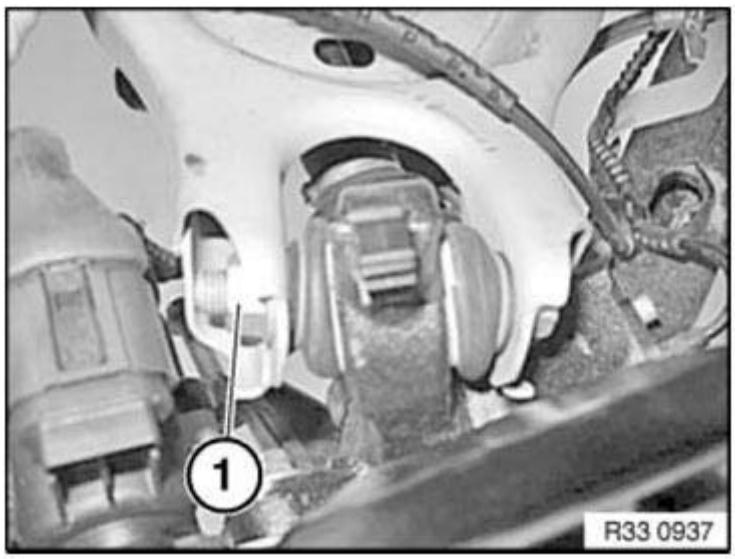


Fig. 93: Identifying Control Arm Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on rear axle carrier and unscrew towards rear.

Remove upper control arm at side.

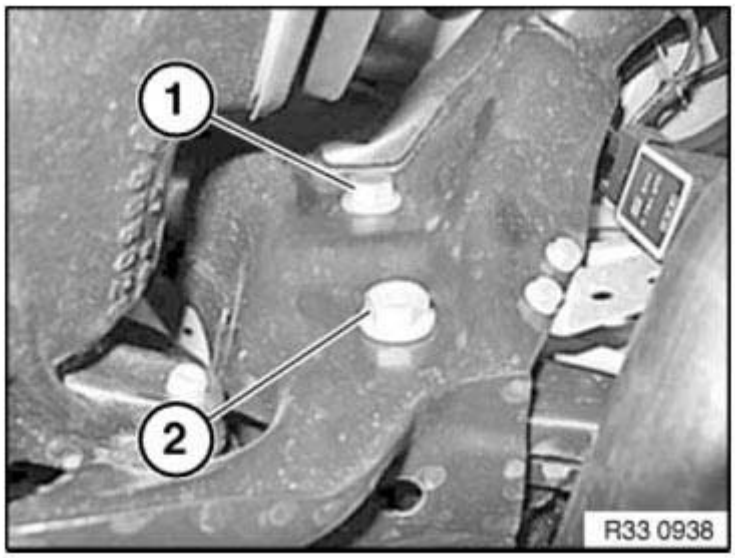


Fig. 94: Identifying Bolt On Rear Axle Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tighten control arm on rear axle carrier in normal position.

Tightening torque **33 32 6AZ** .

Adjusting normal position:

IMPORTANT: Coil spring must not be fitted yet!

Press wheel carrier upwards with special tool 31 5 220 and workshop jack up to dimension A.

Dimension A = middle of wheel hub to top edge of wheel arch

Conventional chassis/suspension:

A = 361 mm

EDC suspension:

A = 351 mm

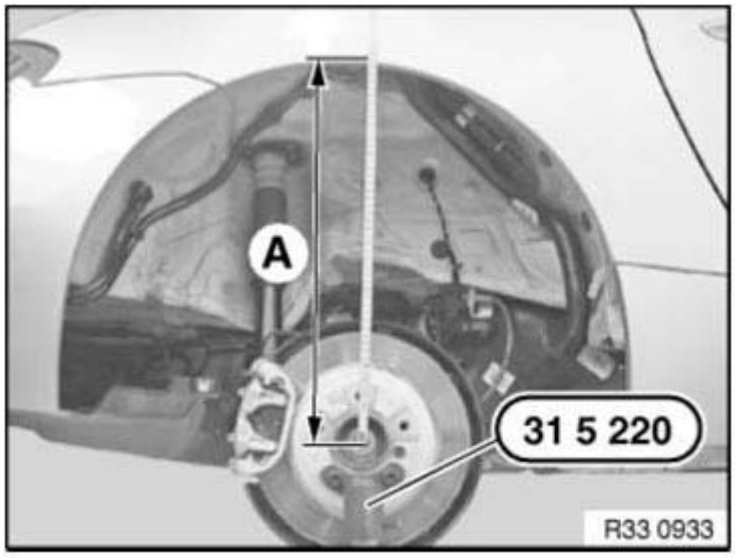


Fig. 95: Pressing Wheel Carrier Upwards Using Special Tool (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**

33 32 086 REMOVING AND INSTALLING/REPLACING BOTTOM LEFT CONTROL ARM

NOTE: If the lower control arm is detached from the trailing arm, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks

- Remove **REAR WHEEL** .
- Remove shock absorber . See **3712131 REPLACING LEFT OR RIGHT REAR SHOCK ABSORBER (ADAPTIVE M SUSPENSION)** or **3352000 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SHOCK ABSORBER** from trailing arm

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Mark position of eccentric screw (1) to lower control arm with center marks (2).

Replacement only: Carry over marking from old part to new part.

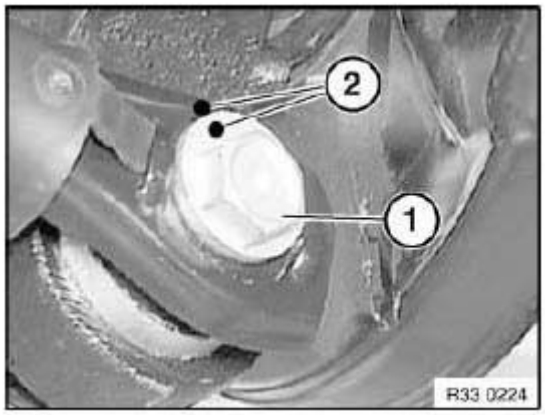


Fig. 96: Identifying Mark Position Of Eccentric Screw With Centre Marks On Lower Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To avoid damaging the output shaft, it will be necessary to support the trailing arm with the workshop jack.

Support trailing arm from underneath using a workshop jack.

Spread cover on lower control arm and pull off.

Installation:

Opening in cover points upwards.

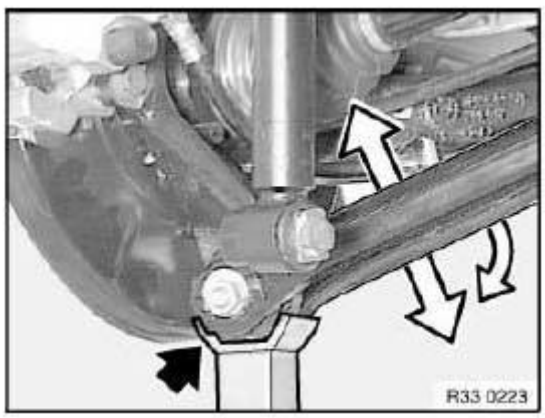


Fig. 97: Pulling Lower Control Arm Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove eccentric washer (2).

Remove eccentric screw towards front.

Installation:

Note insertion direction of eccentric screw.

Align eccentric screw by means of marking to lower control arm.

Fit eccentric washer (2).

Replace nut (1).

Tightening torque **33 32 3AZ** .

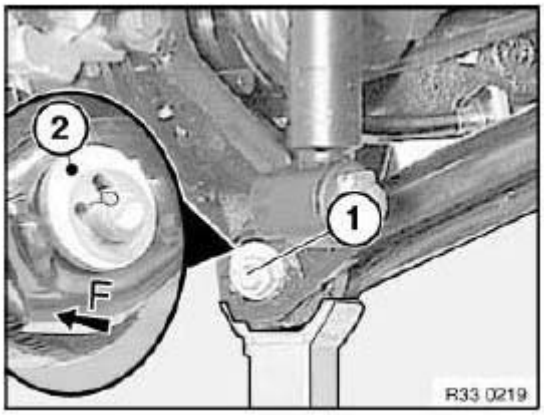


Fig. 98: Identifying Eccentric Washer With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Support rear differential with workshop jack (1).

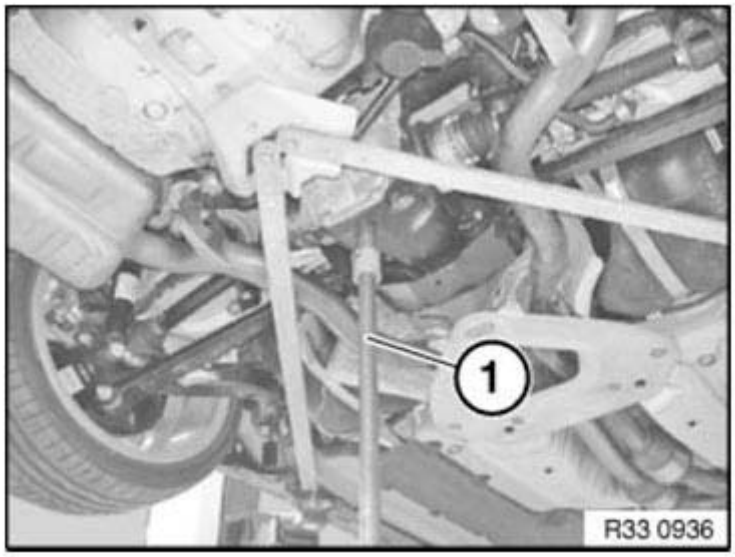


Fig. 99: Supporting Rear Differential Using Workshop Jack
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) on rear axle differential at front and slide out towards rear until rear axle differential is exposed.

Tightening torque **33 17 1AZ** .

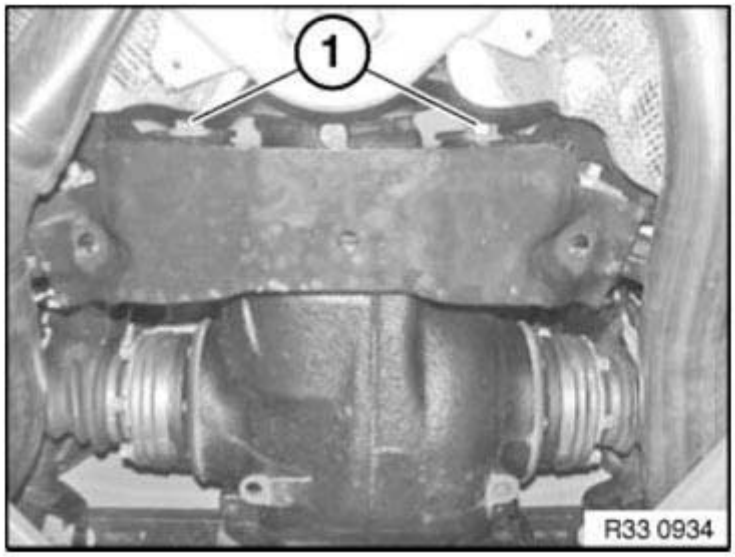


Fig. 100: Identifying Bolts On Rear Axle Differential
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut (1) and remove screw (2).

Tightening torque **33 17 2AZ** .

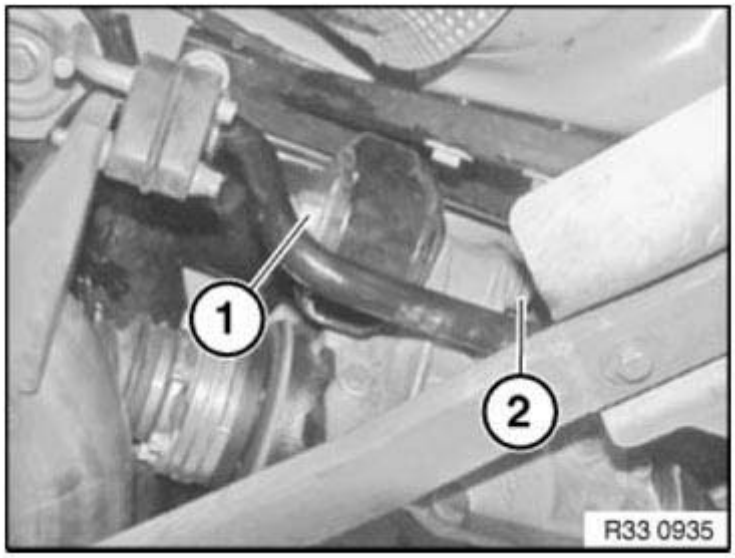


Fig. 101: Identifying Rear Axle Differential Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Installation:

Tighten bolt in normal position.

Tightening torque **33 32 4AZ.**

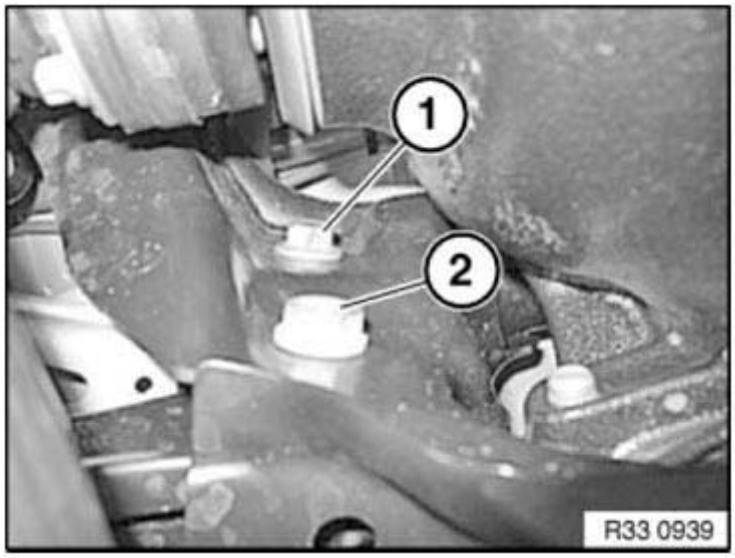


Fig. 102: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Press rear differential (2) with tire iron (1) towards rear and unscrew bolt from control arm/rear axle carrier.

Remove bottom control arm.

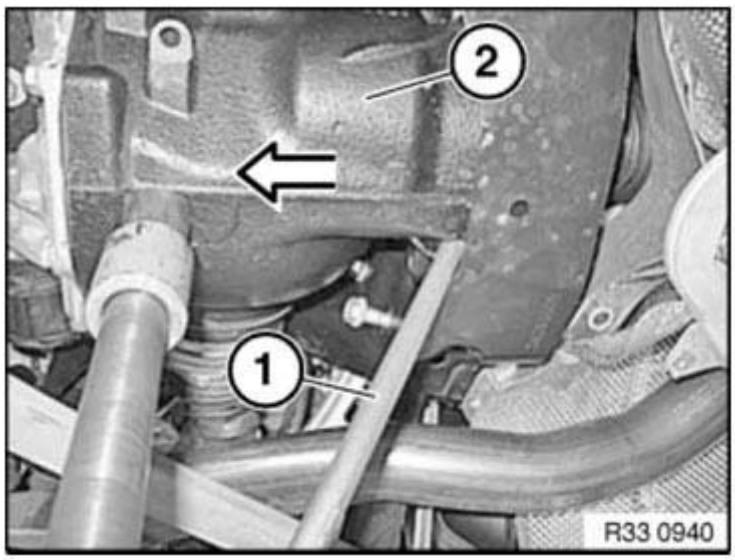


Fig. 103: Pressing Rear Differential Using Tyre Iron
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Weld seam of control arm must point upwards.

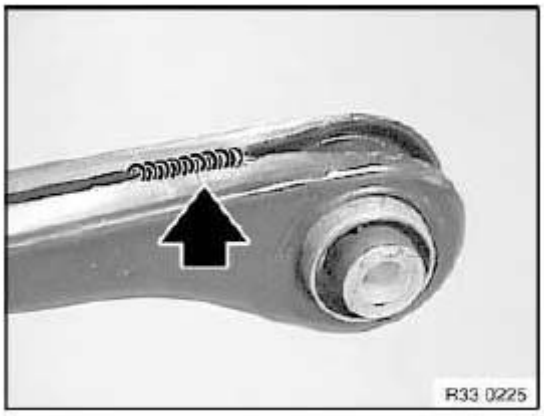


Fig. 104: Locating Weld Seam Of Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check that output shaft is correctly seated in rear differential.
- Perform **CHASSIS ALIGNMENT CHECK**

33 32 087 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT CONTROL ARM

NOTE: If the lower control arm is detached from the rear axle carrier, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Necessary preliminary tasks

- Remove **REAR WHEEL** .
- Remove output shaft from rear differential . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3321002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT**

IMPORTANT: To avoid damaging the output shaft, it will be necessary to support the trailing arm with the workshop jack.

Support trailing arm from underneath using a workshop jack.

Spread cover on lower control arm and pull off.

Installation:

Opening in cover points upwards.

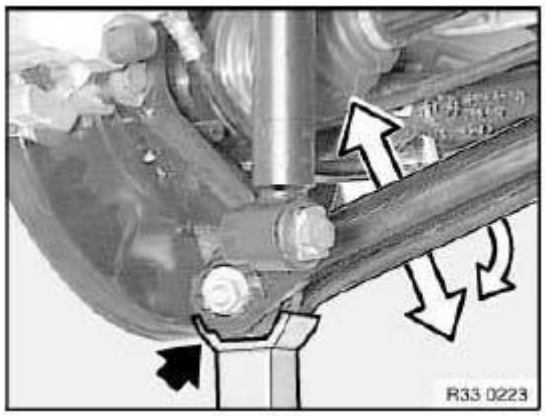


Fig. 105: Pulling Lower Control Arm Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of eccentric screw (1) to lower control arm with center marks (2).

Replacement only: Carry over marking from old part to new part.

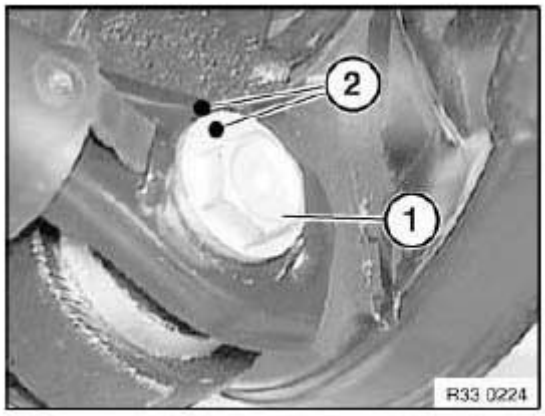


Fig. 106: Identifying Mark Position Of Eccentric Screw With Centre Marks On Lower Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove eccentric washer (2).

Remove eccentric screw towards front.

Installation:

Note insertion direction of eccentric screw.

Align eccentric screw by means of marking to lower control arm.

Fit eccentric washer (2).

Replace nut (1).

Tightening torque **33 32 3AZ** .

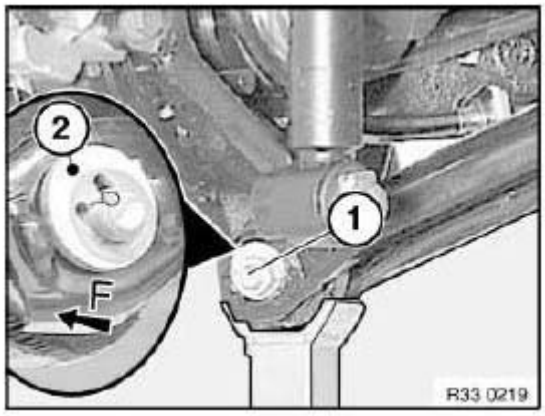


Fig. 107: Identifying Eccentric Washer With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Installation:

Tighten bolt in normal position.

Tightening torque **33 32 4AZ** .

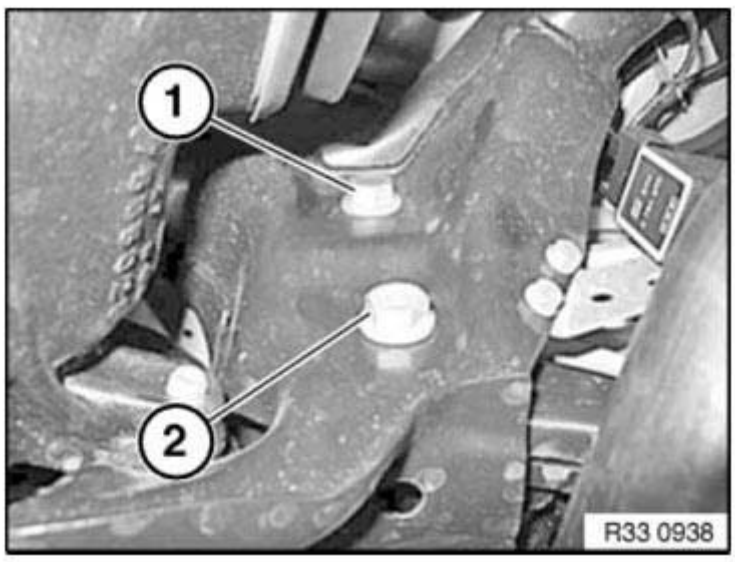


Fig. 108: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Weld seam of control arm must point upwards.

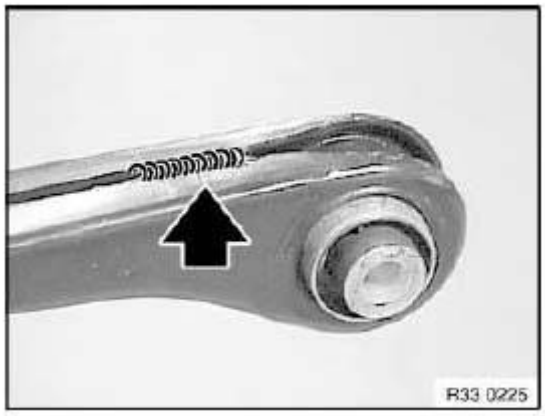


Fig. 109: Locating Weld Seam Of Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check that output shaft is correctly seated in rear differential.
- Perform **CHASSIS ALIGNMENT CHECK**

33 32 160 REMOVING AND INSTALLING/REPLACING COMPRESSION STRUT FOR REAR AXLE CARRIER

IMPORTANT: Observe SAFETY INSTRUCTIONS for raising the vehicle
Driving without the compression strut is not permitted!

Necessary preliminary tasks

- Remove **EXHAUST SYSTEM** .
- Remove tunnel thermal insulation

IMPORTANT: Risk of damage!
Support rear axle carrier at front middle with workshop jack.

Release nuts and remove compression strut.

Secure rear axle carrier by screwing on nuts.

Installation:

Replace self-locking nuts.

Tightening torque **33 32 7AZ** .

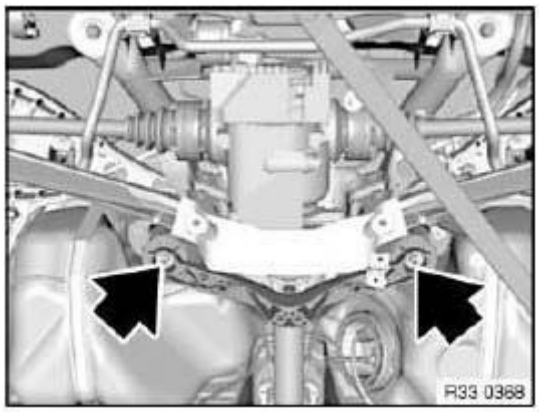


Fig. 110: Locating Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

51 71 482 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TENSION STRUT

IMPORTANT: Vehicles must not be driven without tension struts.
Driving without tension struts may damage the vehicle body.
Tension strut bolts must be tightened to torque and then tightened down with special tool 00 9 120 .

Tension strut, left and right

Release bolts (1, 2) and nuts (3) and remove tension strut (4).

Installation:

Replace bolts (1 and 2).

- Bolt (1) M10x50

  Tightening torque **51 71 29AZ** .

- Bolt (2) M8x35

  Tightening torque **51 71 30AZ** .

- Nut (3)

Tightening torque **51 71 31AZ** .

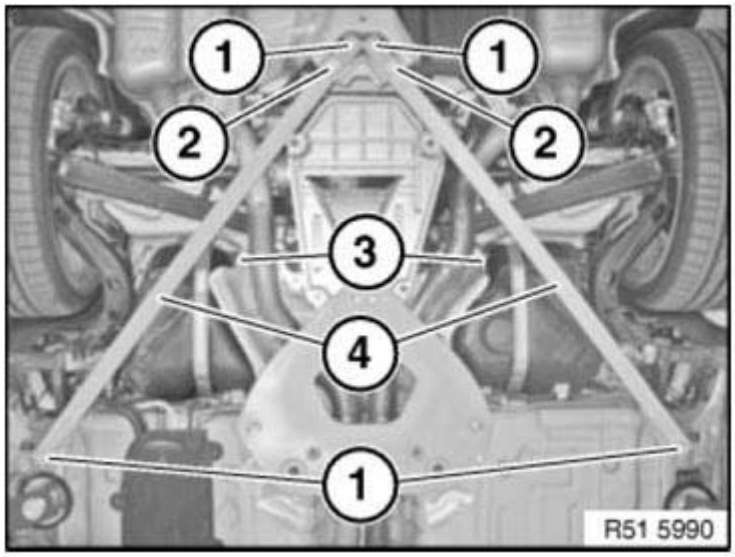


Fig. 111: Identifying Tension Strut With Bolts And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

33 32 076 REMOVING AND INSTALLING/REPLACING TOP LEFT CONTROL ARM

Necessary preliminary tasks

- Remove **COIL SPRING**
- Remove rear axle underbody protection

Release stabilizer on upper control arm.

Tightening torque **33 55 2AZ** .

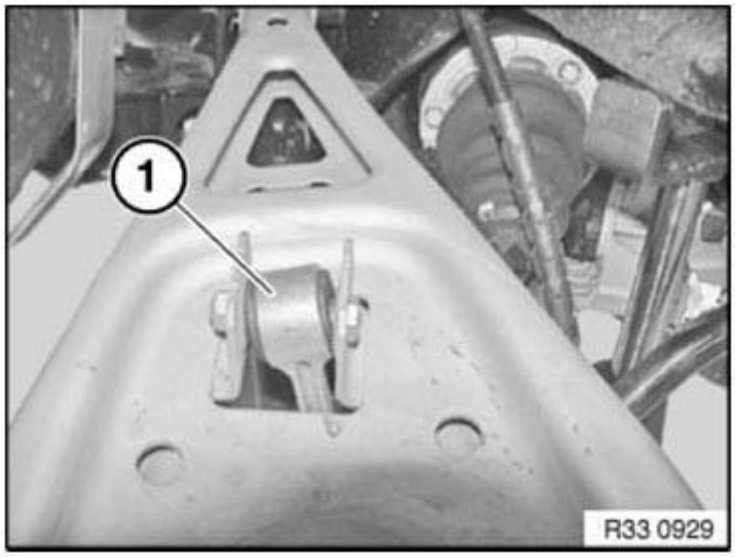


Fig. 112: Identifying Stabilizer On Upper Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Support rear differential with workshop jack (1).

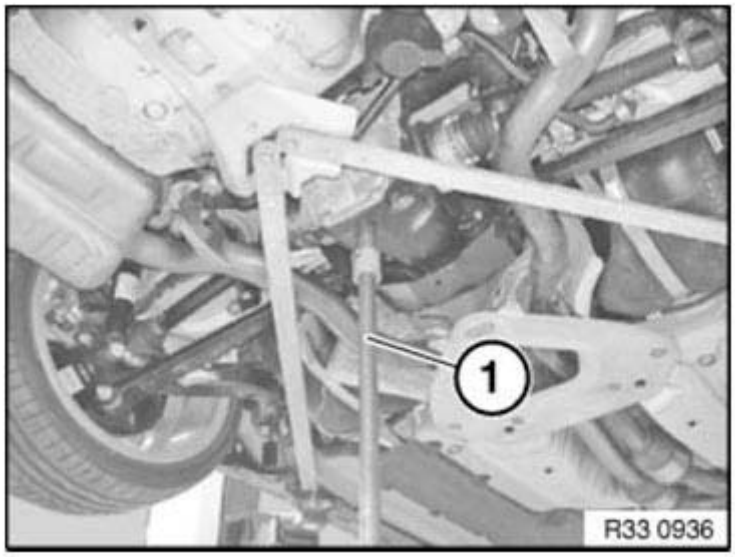


Fig. 113: Supporting Rear Differential Using Workshop Jack
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) on rear differential at front. And slide out towards rear axle differential is exposed.

Tightening torque **33 17 1AZ** .

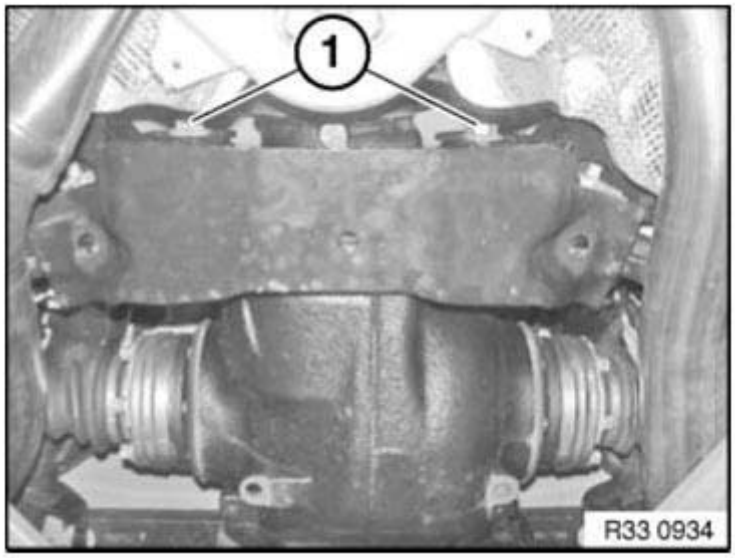


Fig. 114: Identifying Bolts On Rear Axle Differential
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) on rear differential at rear.

Tightening torque **33 17 2AZ** .

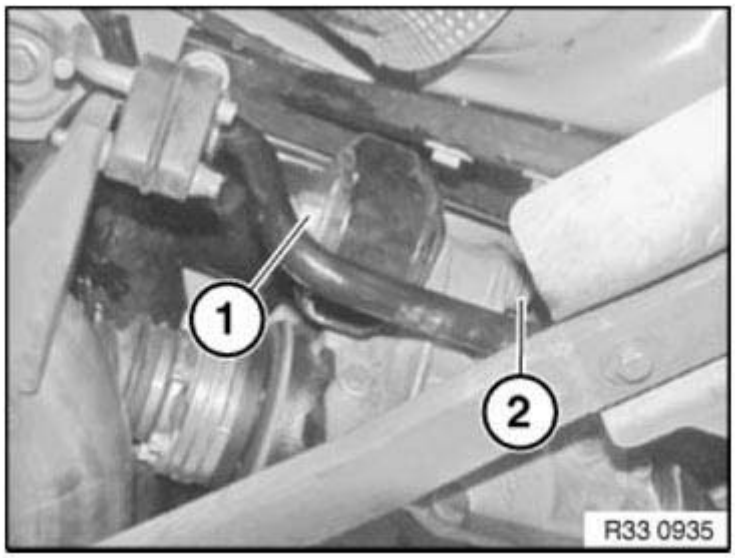


Fig. 115: Identifying Bolt On Rear Differential
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and remove screw.

Tightening torque **33 32 5AZ** .

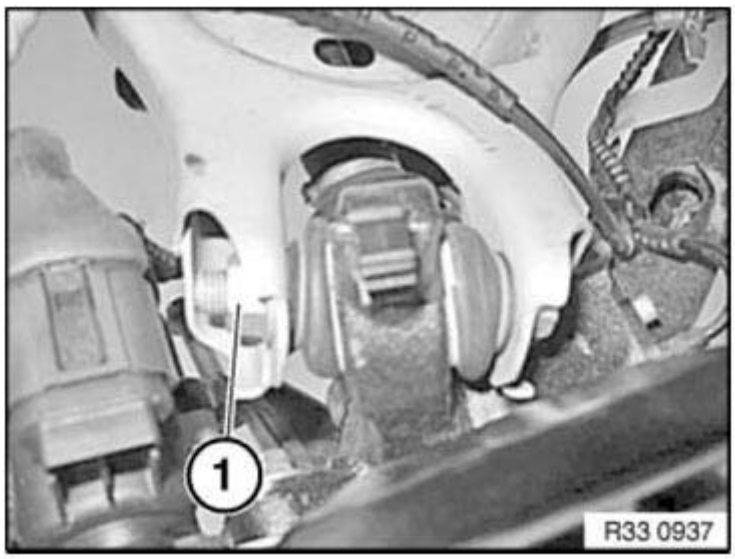


Fig. 116: Identifying Control Arm Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Press rear differential on opposite side and unscrew bolt towards rear.

Remove control arm at side.

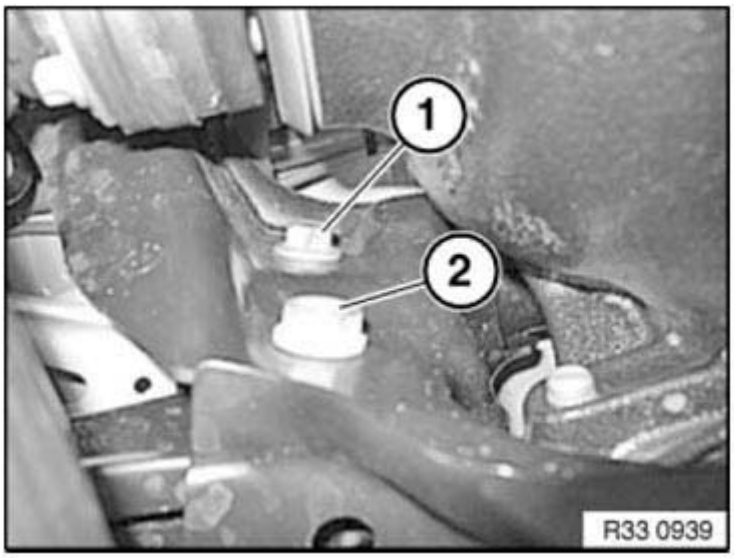


Fig. 117: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tighten control arm on rear axle carrier in normal position.

Tightening torque **33 32 6AZ** .

Adjusting normal position:

IMPORTANT: Coil spring must not be fitted yet!

Press wheel carrier upwards with special tool 31 5 220 and workshop jack up to dimension A.

Dimension A = middle of wheel hub to top edge of wheel arch

Conventional chassis/suspension:

A = 361 mm

EDC suspension:

A = 351 mm

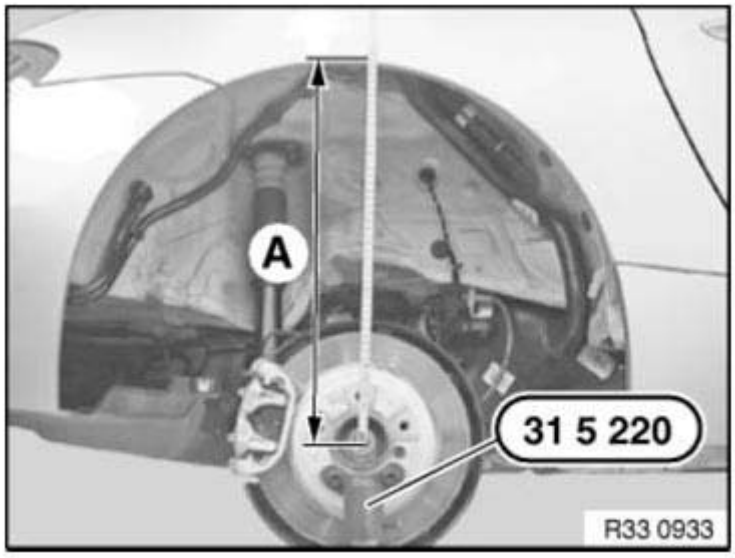


Fig. 118: Pressing Wheel Carrier Upwards Using Special Tool (31 5 220)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**

33 32 024 REPLACING A BALL JOINT IN TRAILING ARM

Necessary preliminary work

- Detach wishbone . See **3332076 REMOVING AND INSTALLING/REPLACING TOP LEFT CONTROL ARM** or **3332077 REMOVING AND INSTALLING/REPLACING TOP RIGHT CONTROL ARM** at top from trailing arm.
- Remove **BRAKE DISC** .
- Detach **BRAKE GUARD PLATE** .

Measure protrusion (A) of previous ball joint and note down.

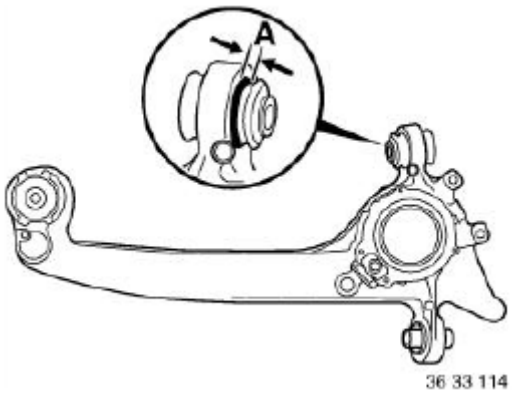


Fig. 119: Identifying Protrusion Of Ball Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out ball joint with special tools 33 3 331, 33 3 332 and 33 3 333.

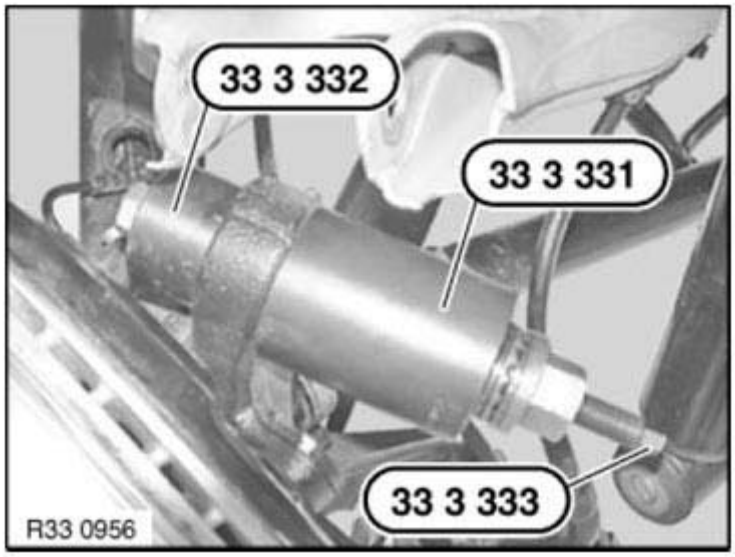


Fig. 120: Pulling Out Ball Joint Using Special Tools (33 3 331, 33 3 332 And 33 3 333)
Courtesy of BMW OF NORTH AMERICA, INC.

Keep trailing arm eye and ball joint (1) clean and free from oil and grease.

Draw in new ball joint (1) with special tools 33 3 332, 33 3 333 and 33 3 334 to previously determined protrusion (A).

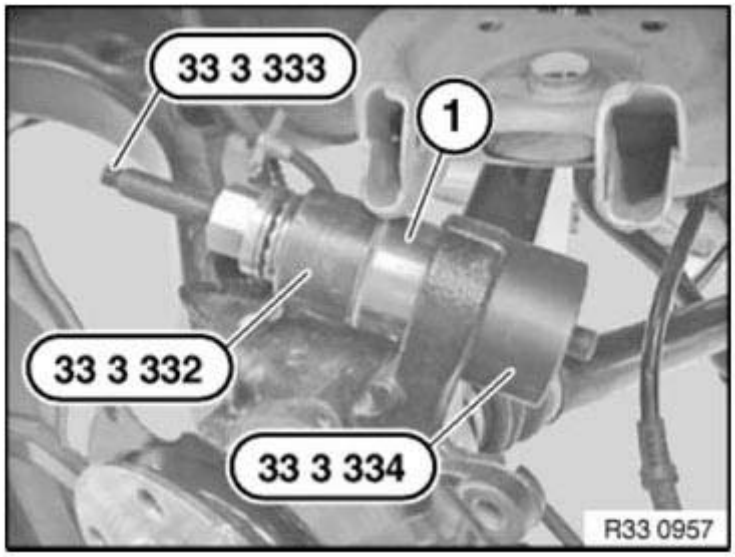


Fig. 121: Installing Ball Joint Using Special Tools (33 3 332, 33 3 333 And 33 3 334)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out **WHEEL ALIGNMENT PROCEDURE** .

33 32 042 REPLACING A RUBBER MOUNT IN TRAILING ARM, FRONT

NOTE:

- **Version from 03/10 onward, rubber mount (1)**
- **Version until 03/10, rubber mount (2)**

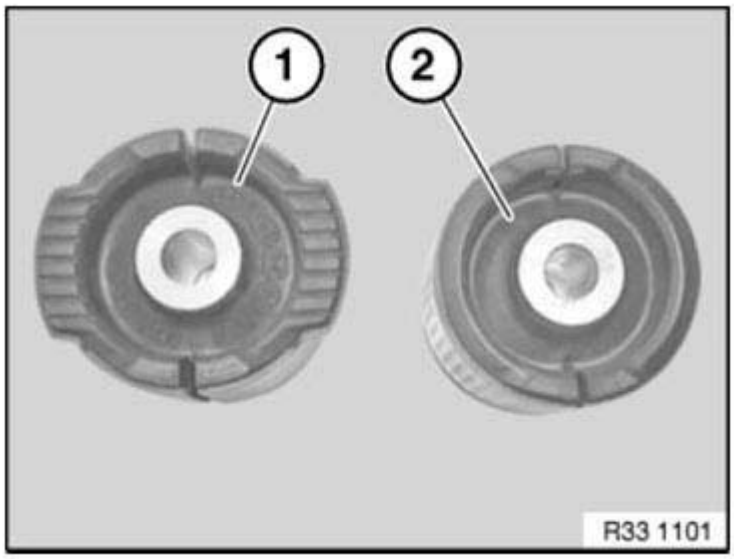


Fig. 122: Identifying Rubber Mounts
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks

- Remove **BEARING SUPPORT**

Removal of rubber mount, version from 03/10 onward:

Pull out rubber mount (1) with special tool 00 8 550, 33 3 324, 33 0 161.

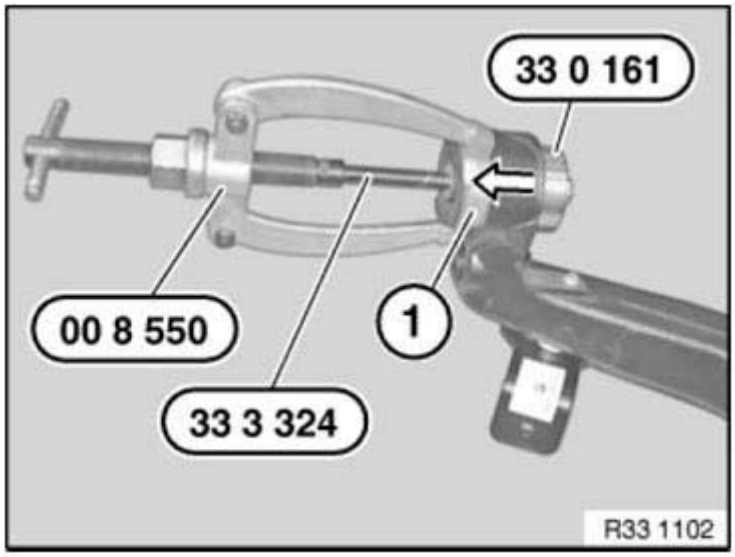


Fig. 123: Pulling Out Rubber Mount Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Removal of rubber mount, version until 03/10

Pull out rubber mount (1) with special tools 33 0 161, 33 0 162, 33 3 011, 33 3 012, 33 3 013.

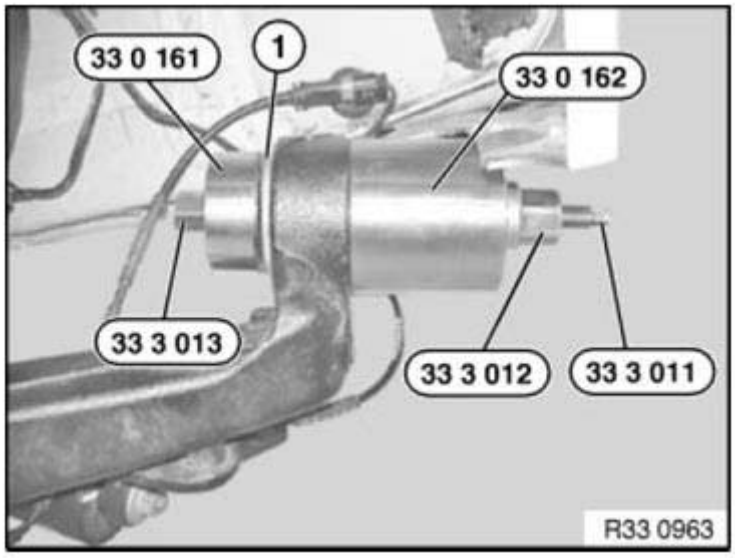


Fig. 124: Pulling Out Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Keep rubber mount (1) and trailing arm eye clean and free from oil and grease.

Align slot in rubber mount (1) to side member.

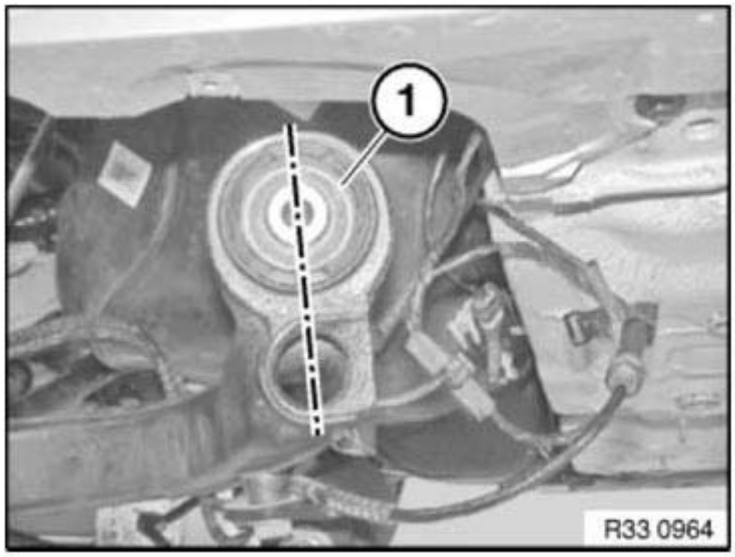


Fig. 125: Identifying Rubber Mount Slot Aligning Line
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount (1) with special tools 33 0 161, 33 0 163, 33 3 011, 33 3 012 and 33 3 013 as far as it will go.

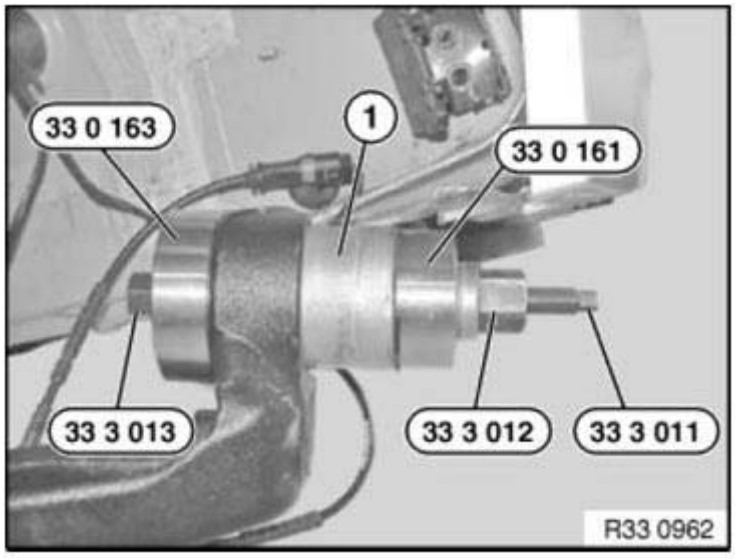


Fig. 126: Installing Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check that output shaft is correctly seated in rear differential.
- Perform chassis alignment check

33 32 ... REPLACING BEARING SUPPORT FOR FRONT TRAILING ARM

Necessary preliminary tasks

- Remove **REAR WHEEL**
- Unplug **CONNECTOR FOR PULSE SENSOR** ; if necessary, expose lead up to trailing arm
- Only on right side: Unplug connector for brake pad sensor; if necessary, expose lead up to trailing arm

IMPORTANT:

- **Check sensor head and line from pulse sensor prior to installation for external damage, replacing if necessary.**

IMPORTANT: Risk of damage!
Brake hose must not be exposed to tensile loads.

Release screws (1) and remove holder with brake hose.

Tightening torque **34 32 4AZ** .

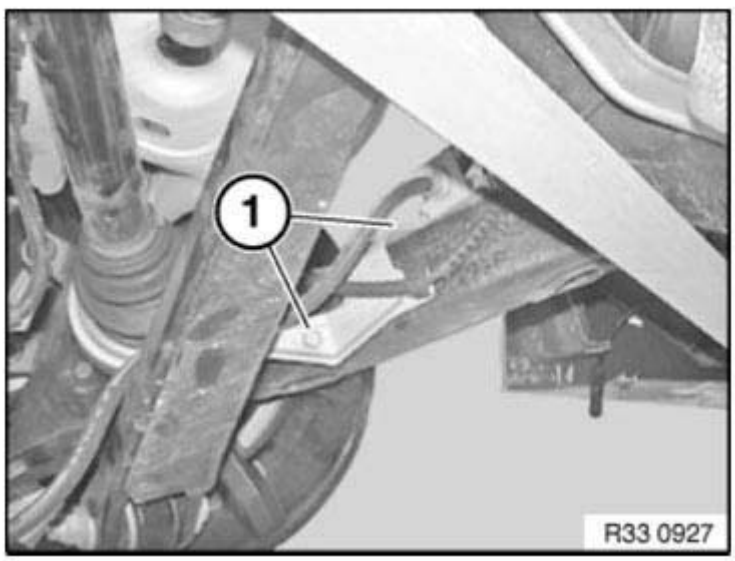


Fig. 127: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Mark position of mounting (1) relative to body (2) with a paint mark (3) in order to simplify subsequent toe-in adjustment.

Release screws.

Tightening torque **33 32 2AZ** .

Lower workshop jack and pull trailing arm downwards.

Installation note:

Check threads for damage; if necessary, repair with **HELICOIL THREAD INSERTS** .

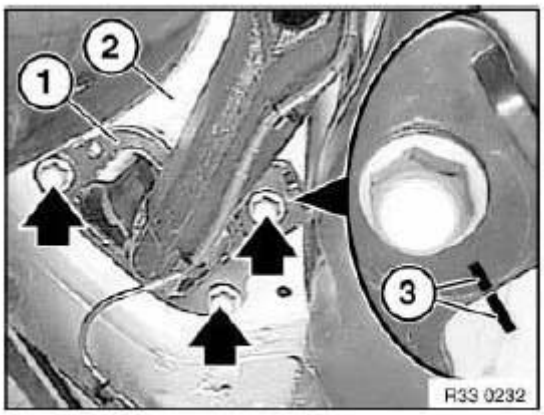


Fig. 128: Identifying Position Of Mounting To Body Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Pull out screw.

Tightening torque **33 32 1AZ** .

Remove bearing support towards top.

Installation note:

Replace self-locking nut.

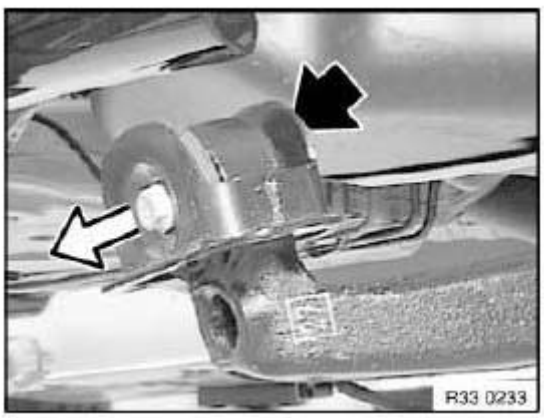


Fig. 129: Removing Self-Locking Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation with special tool

Installation note:

Secure special tool 33 3 280 to bearing support with a screw and align to wheel center. Place bearing support in position and screw down.

Tightening torque **33 32 1AZ** .

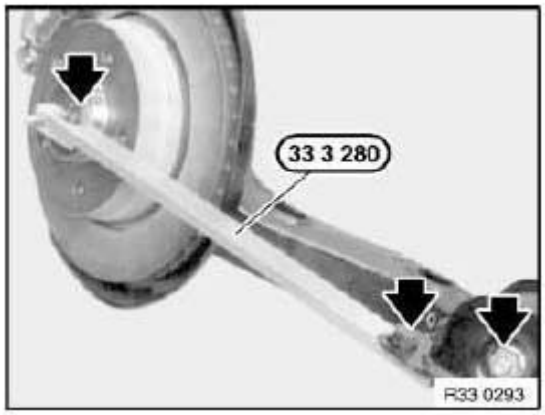


Fig. 130: Securing Special Tool (33 3 280) To Bearing Support With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation without special tool

Installation note:

Place tube (1) (length = approx. 500 mm, dia. = 16 mm) flat on bearing support, secure with screw clamp and align tube center to wheel center. Screw bearing pedestal down in this position.

Tightening torque **33 32 1AZ** .

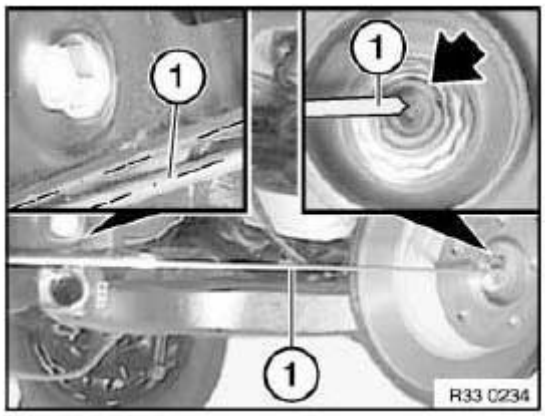


Fig. 131: Identifying Tube On Bearing Support

Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis/wheel alignment check .. See **CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**

33 32 021 REPLACING LEFT OR RIGHT TRAILING ARM

Necessary preliminary tasks

- Remove **REAR WHEEL**
- Release collar nut . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3321002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT** on output shaft
- Remove **BRAKE DISC**
- Remove drive flange . See **3341005 REPLACING LEFT DRIVE FLANGE ON REAR AXLE SHAFT** or **3341007 REPLACING RIGHT DRIVE FLANGE ON REAR AXLE SHAFT**
- Remove **BRAKE GUARD PLATE**
- Remove **PULSE SENSOR** from trailing arm
- Only on right side: Remove **BRAKE PAD WEAR SENSOR**
- Remove **COIL SPRING** at rear

IMPORTANT:

- **Check sensor head and line from pulse sensor prior to installation for external damage, replacing if necessary.**

IMPORTANT: Risk of damage!
Brake hose must not be exposed to tensile loads.

Release screws (1) and remove holder with brake hose.

Tightening torque **34 32 4AZ** .

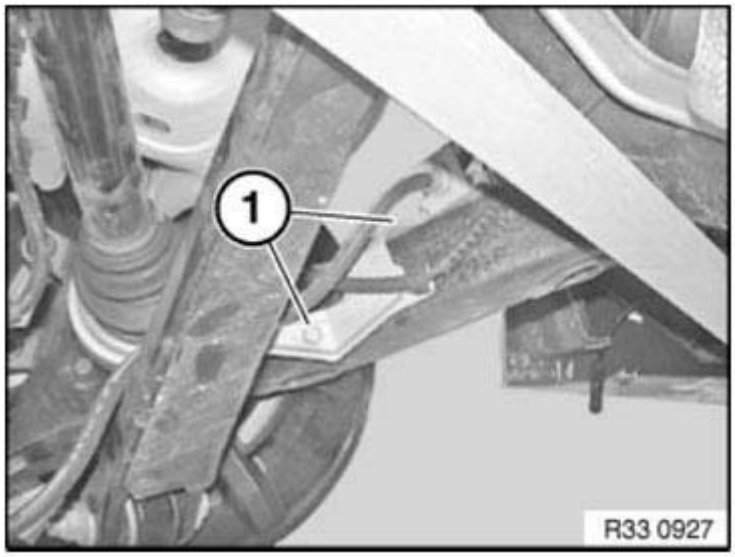


Fig. 132: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove holder (3) with vibration absorber.

Installation:

Check installation location.

Secure vibration absorber (3) with 5.5 mm dia. punch (2) in trailing arm bore and tighten.

Tightening torque **33 32 8AZ** .

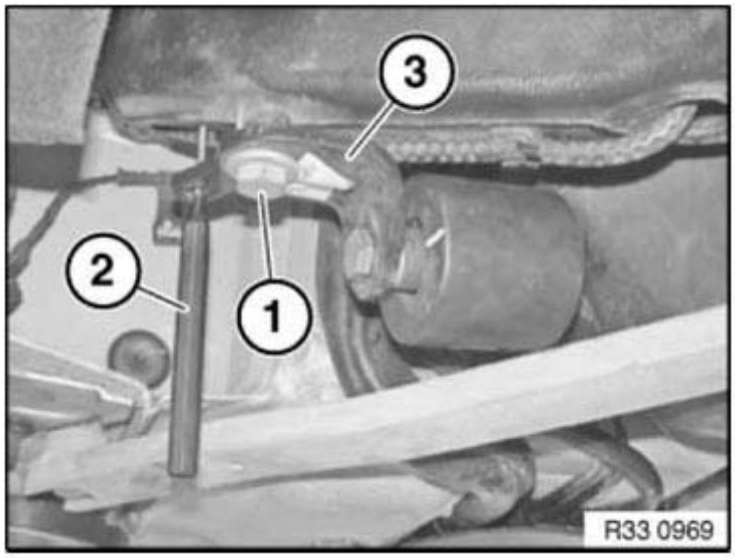


Fig. 133: Identifying Vibration Absorber with Screw And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release anti-roll bar link (1) on upper control arm.

Tightening torque **33 55 2AZ.**

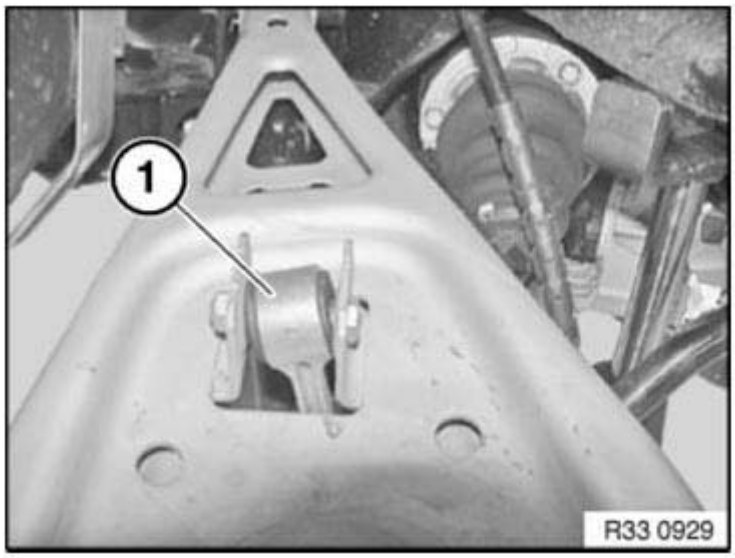


Fig. 134: Identifying Anti-Roll Bar Link On Upper Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Remove lower control arm . See **3332086 REMOVING AND INSTALLING/REPLACING BOTTOM LEFT CONTROL ARM** or **3332087 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT CONTROL ARM** from trailing arm

Remove upper control arm . See **3332076 REMOVING AND INSTALLING/REPLACING TOP LEFT CONTROL ARM** or **3332077 REMOVING AND INSTALLING/REPLACING TOP RIGHT CONTROL ARM** from trailing arm

Remove **BEARING SUPPORT FROM BODY** and trailing arm

IMPORTANT: Risk of injury!
Remove output shaft

Installation:

Replace wheel bearing . See **3341153 REPLACING LEFT WHEEL BEARING ON REAR AXLE SHAFT** or **3341155 REPLACING RIGHT WHEEL BEARING ON REAR AXLE SHAFT**.

Convert **BEARING SUPPORT** .

After installation

- Perform **CHASSIS ALIGNMENT CHECK**

33 32 681 REPLACING ONE RUBBER MOUNT IN LOWER CONTROL ARM (CONTROL ARM REMOVED)

Attach special tool 33 3 354 between both control arms.

Press rubber mount with special tools 33 3 351 and 33 3 352 out of lower control arm.

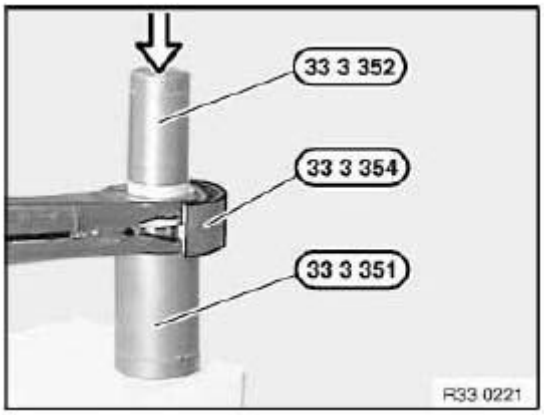


Fig. 135: Pressing Out Rubber Mount Using Special Tools (33 3 351 And 33 3 352)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 33 3 354 between both control arms.

Press in new rubber mount (1) with special tools 33 3 351 and 33 3 353.

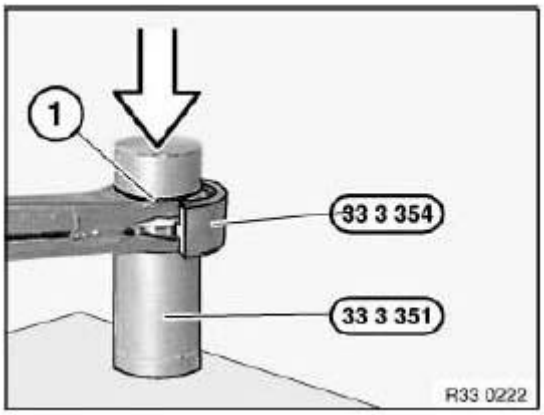


Fig. 136: Pressing In Rubber Mount Using Special Tools (33 3 351 And 33 3 353)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**

33 32 671 REPLACING ONE RUBBER MOUNT IN THE UPPER CONTROL ARM (CONTROL ARM

REMOVED)

Press rubber mount with special tools 33 3 351 and 33 3 352 out of upper control arm.

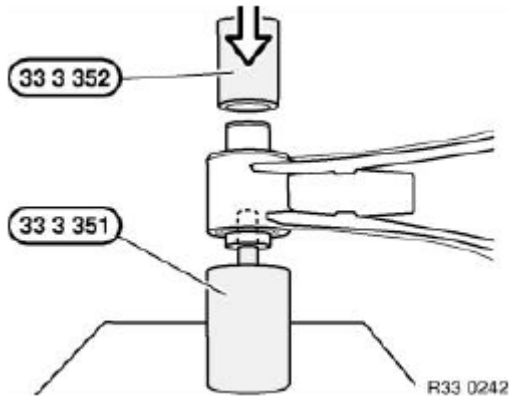


Fig. 137: Pressing Out Rubber Mount Using Special Tools (33 3 351 And 33 3 352)
Courtesy of BMW OF NORTH AMERICA, INC.

Place new rubber mount at chamfered end of control arm bore. Here, longer collar (A = 17 mm) of rubber mount must point upwards.

Press in rubber mount with special tools 33 3 351 and 33 3 352 until flush.

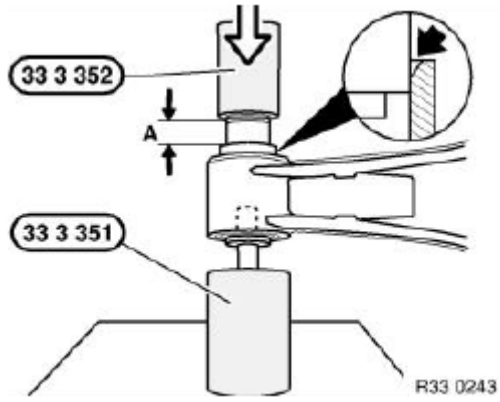


Fig. 138: Pressing In Rubber Mount Using Special Tools (33 3 351 And 33 3 352)
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**

33 32 044 REPLACING ONE RUBBER MOUNT IN TRAILING ARM FOR LOWER CONTROL ARM

Necessary preliminary tasks

- Remove lower control arm from trailing arm . See **3332086 REMOVING AND INSTALLING/REPLACING BOTTOM LEFT CONTROL ARM** or **3332087 REMOVING AND INSTALLING/REPLACING BOTTOM RIGHT CONTROL ARM**

Measure and note protrusion (A) of old rubber mount.

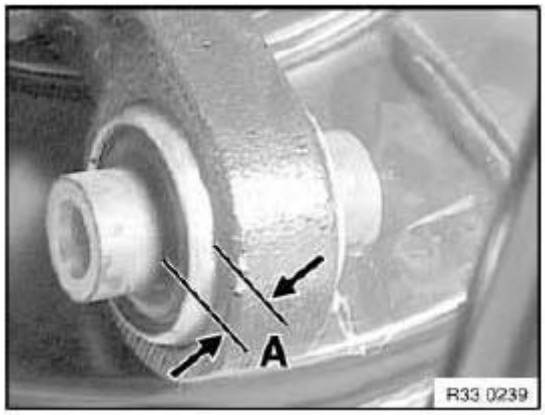


Fig. 139: Identifying Protrusion Of Old Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out rubber mount with special tools 33 3 331, 33 3 332, 33 3 333 and nut (1).

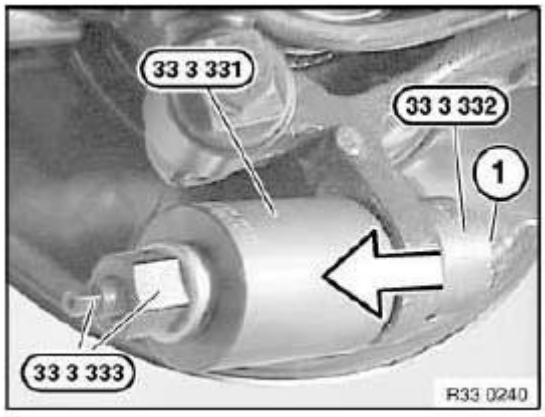


Fig. 140: Pulling Out Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in new rubber mount (1) with special tools 33 3 332, 33 3 333 and 33 3 334 to previously determined protrusion (A).

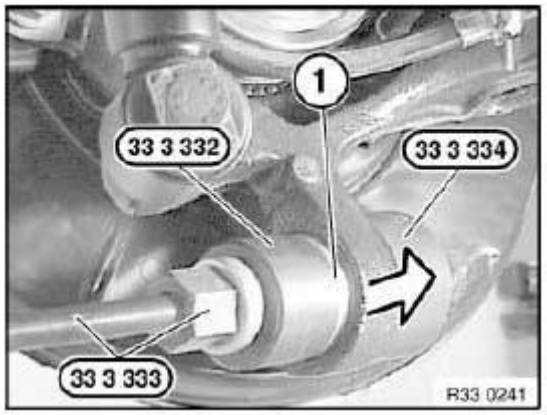


Fig. 141: Installing Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check that output shaft is correctly seated in rear differential.
- Perform **CHASSIS ALIGNMENT CHECK**

3333 AXLE MOUNTING

33 53 ... MEASURING RIDE HEIGHT OF VEHICLE (REAR AXLE)

Determine actual ride level (A).

Measurement from wheel arch lower edge (1) to rim flange (2) at height of wheel center.

If determined value deviates from specified target value:

REFER TO TECHNICAL DATA .

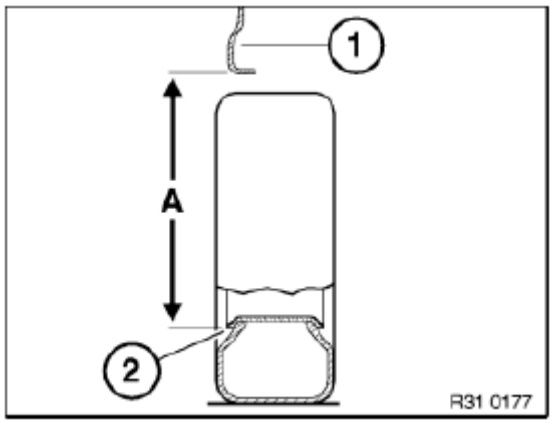


Fig. 142: Identifying Actual Ride Height From Lower Edge Of Wheel Arch To Rim Flange
Courtesy of BMW OF NORTH AMERICA, INC.

33 33 101 REPLACING TWO RUBBER MOUNTS (REAR) FOR REAR AXLE CARRIER

WARNING: Danger of explosion!
Do not point air jet from hot air blower at fuel tank!

Necessary preliminary tasks

- Lower **REAR AXLE CARRIER**

Assemble special tool 33 4 140 with 33 4 142 and 33 4 147.

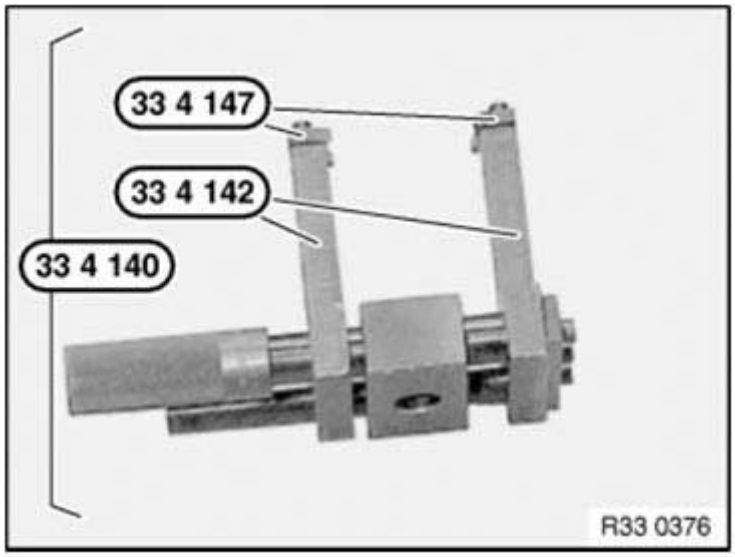


Fig. 143: Assembling Special Tool (33 4 140) With (33 4 142 And 33 4 147)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tools 33 4 140, 33 4 155, 33 3 371, 33 3 372 and nut (1) on openings of rubber mount.

NOTE: Ensure it is correctly supported on bushing of rear axle carrier.

Using a hot air blower, heat bearing bushing at max. 600 °C outlet temperature for approx. 2 minutes.

Pull out rubber mount by turning special tool 33 4 155.

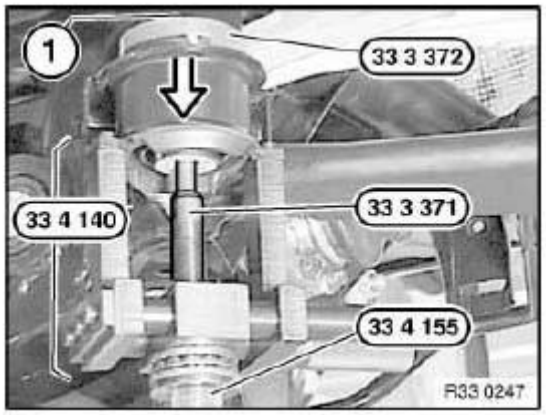


Fig. 144: Pulling Out Rubber Mount Using Special Tool (33 4 155)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat rubber mount with Circo Light anti-friction agent.

IMPORTANT: When rubber mount is fitted, arrows (1) must point down longitudinal axis of vehicle.

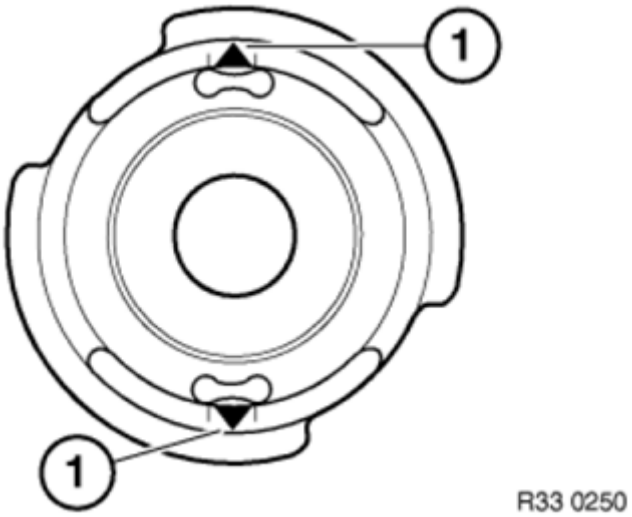


Fig. 145: Identifying Rubber Mount Fitting Arrows
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount (1) with special tools 33 3 314, 33 3 315, 33 3 372 and 33 3 373 as far as it will go.

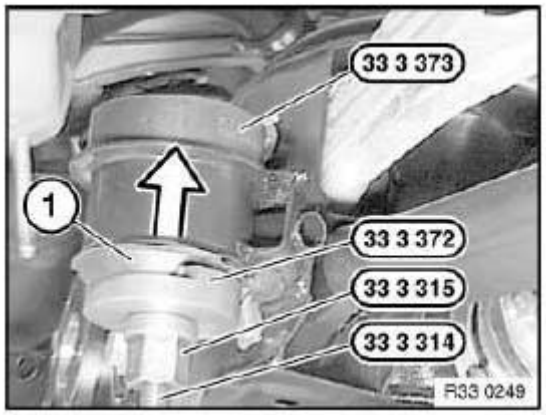


Fig. 146: Installing Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check seating of coil spring with spring pads, correct if necessary
- Perform **CHASSIS ALIGNMENT CHECK**

33 33 101 REPLACING TWO RUBBER MOUNTS FOR REAR AXLE CARRIER (RUBBER MOUNTS, FRONT)

> **WARNING: Danger of explosion!**
> **Do not point air jet from hot air blower at fuel tank!**

Necessary preliminary tasks

- Lower **REAR AXLE CARRIER**

Assemble special tool 33 4 140 with 33 4 142 and 33 4 147.

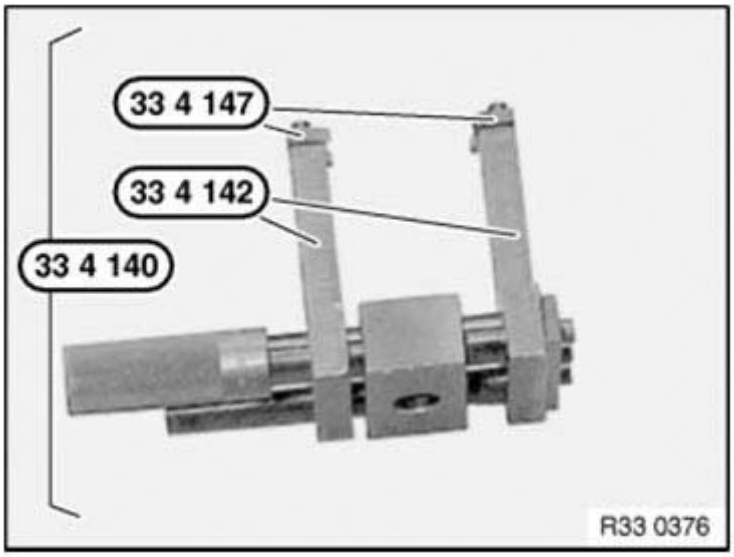


Fig. 147: Assembling Special Tool (33 4 140) With (33 4 142 And 33 4 147)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tools 33 4 140, 33 4 155, 33 3 371, 33 3 372 and nut (1) on openings of rubber mount.

NOTE: Ensure it is correctly supported on bushing of rear axle carrier.

Using a hot air blower, heat bearing bushing at max. 600 °C outlet temperature for approx. 2 minutes.

Pull out rubber mount by turning special tool 33 4 155.

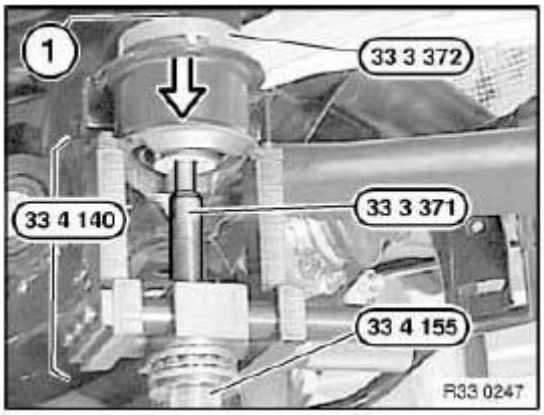


Fig. 148: Pulling Out Rubber Mount Using Special Tool (33 4 155)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat rubber mount with Circo Light anti-friction agent.

IMPORTANT: Front rubber mounts differ:
Rubber mount VR = front right with elongated hole (1)

Rubber mount VL = front left
When rubber mount is fitted, arrows (2) must point down longitudinal axis of vehicle.

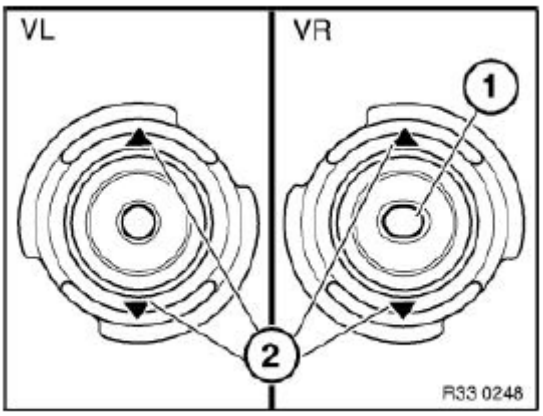


Fig. 149: Identifying Front Rubber Mount Fitting Arrows On Left And Right Side
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in rubber mount (1) with special tools 33 3 314, 33 3 315, 33 3 372 and 33 3 373 as far as it will go.

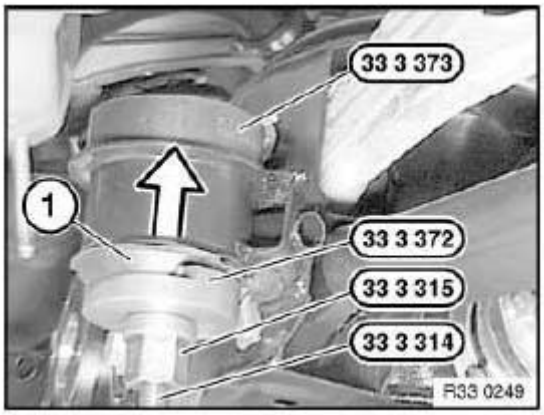


Fig. 150: Installing Rubber Mount Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check seating of coil spring with spring pads, correct if necessary
- Perform **CHASSIS ALIGNMENT CHECK**

3341 WHEEL BEARINGS

33 41 ... DETACHING INNER WHEEL BEARING RACE FROM DRIVE FLANGE

Necessary preliminary tasks

- Remove drive flange . See **3341005 REPLACING LEFT DRIVE FLANGE ON REAR AXLE SHAFT** or **3341007 REPLACING RIGHT DRIVE FLANGE ON REAR AXLE SHAFT**

NOTE: Detach wheel bearing inner race with special tool 33 4 400 through groove in wheel bearing inner race.

Position special tool 33 1 307 on drive flange.

Select one of the following special tools using the wheel bearing inner race and insert into special tool 33 4 401.

33 4 405 for dia. 45 - 51 mm

33 4 406 for dia. 50 - 55 mm

33 4 407 for dia. 55 - 61 mm

Screw in special tool 33 4 402 until tapered attachment of spindle comes into contact with special tool 33 4 401.

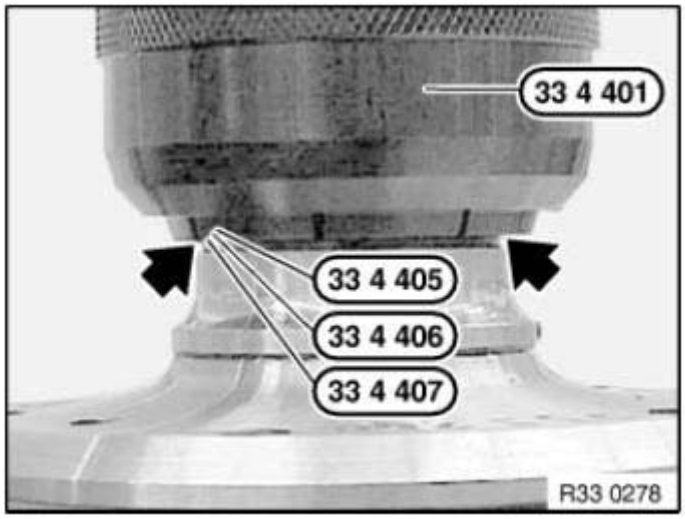


Fig. 151: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 33 4 401 with corresponding insert on groove of wheel bearing inner race.

Compress special tool 33 4 401 with wrenches 33 4 403 and 33 4 404 until special tool can still just be turned in groove.

Detach wheel bearing inner race by turning special tool 33 4 402.

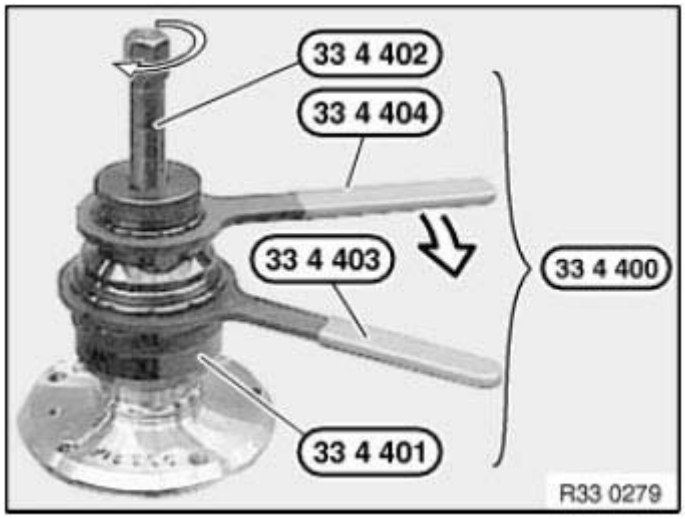


Fig. 152: Removing Wheel Bearing Inner Ring Using Special Tool (33 4 402)
Courtesy of BMW OF NORTH AMERICA, INC.

33 41 005 REPLACING LEFT DRIVE FLANGE ON REAR AXLE SHAFT

Remove **REAR WHEEL** .

IMPORTANT: Expand turning lock sufficiently to avoid damaging thread when releasing collar nut.

Release collar nut, activate parking brake for this purpose.

Installation:

Replace collar nut, oil collar nut/wheel bearing contact surface lightly and tighten down.

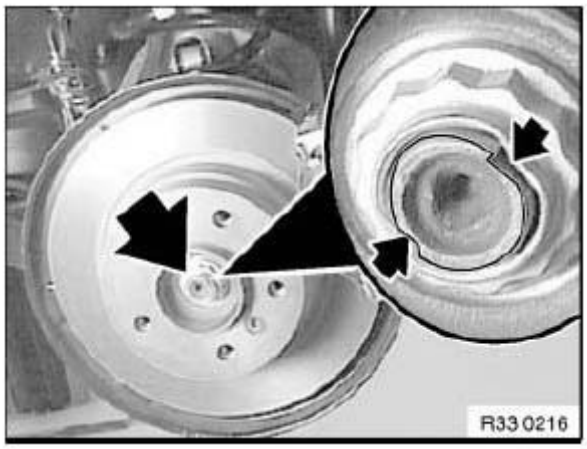


Fig. 153: Locating Collar Nut
Courtesy of BMW OF NORTH AMERICA, INC.

No oil permitted on thread of shaft journal or collar nut.

Tightening torque **33 41 3AZ** .

Secure collar nut by positive peening on flat areas of output shaft.

Remove output shaft . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3421320 REMOVING AND INSTALLING OR REPLACING BOTH REAR BRAKE DISCS** .

Remove **BRAKE DISC** .

Remove **PULSE GENERATOR** .

IMPORTANT: Check sensor head and line from pulse generator prior to installation for external damage, replacing if necessary.

Force drive flange with special tools 33 2 201, 33 4 200 and 5 wheel bolts out of wheel bearing.

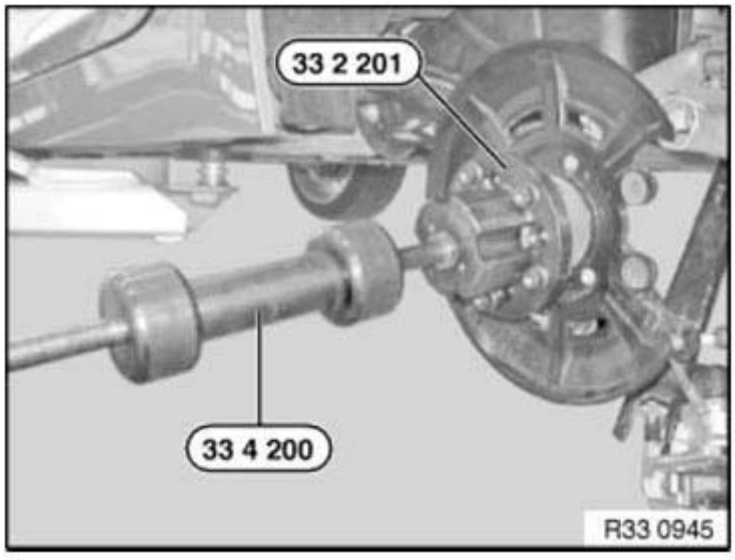


Fig. 154: Removing Drive Flange Using Special Tools (33 2 201 And 33 4 200)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The wheel bearing is destroyed when the drive flange is removed and cannot be reused!

Replace wheel bearing . See **3341153 REPLACING LEFT WHEEL BEARING ON REAR AXLE SHAFT** or **3341155 REPLACING RIGHT WHEEL BEARING ON REAR AXLE SHAFT**.

Installation:

Draw in drive flange (1) with special tools 33 4 041, 33 4 042, 33 4 043, 33 4 045 and 33 4 048.

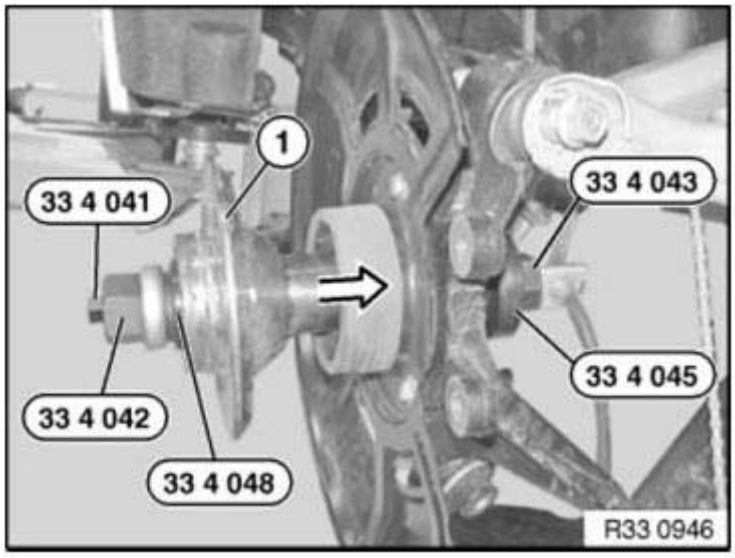


Fig. 155: Installing Drive Flange Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

33 41 153 REPLACING LEFT WHEEL BEARING ON REAR AXLE SHAFT

Necessary preliminary tasks

- Remove **DRIVE FLANGE FOR REAR AXLE SHAFT**
- Detach **WHEEL BEARING INNER RACE FROM DRIVE FLANGE** .

Press retaining ring (1) together using pliers (2) and remove.

Installation:

Install retaining ring (1).

Check seating of retaining ring (1), correct if necessary.

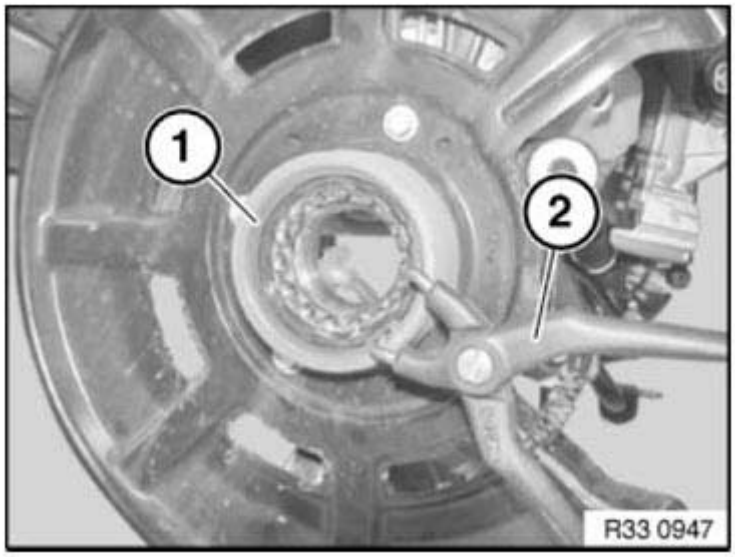


Fig. 156: Pressing Retaining Ring Using Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out wheel bearing with special tools 33 4 031, 33 4 041, 33 4 042, 33 4 043 and 33 4 048.

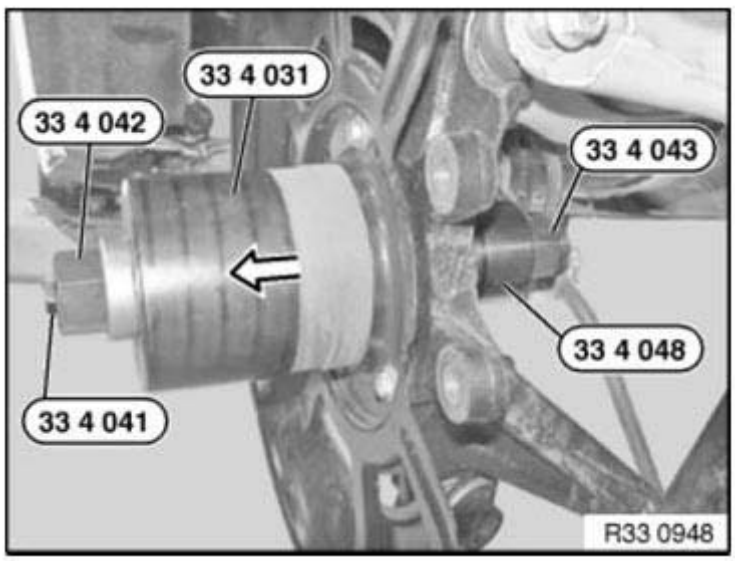


Fig. 157: Pulling Out Wheel Bearing Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not reuse old wheel bearing!

Installation:

Draw in new wheel bearing (1) with special tools 33 4 041, 33 4 042, 33 4 043, 33 4 047 and 33 4 049.

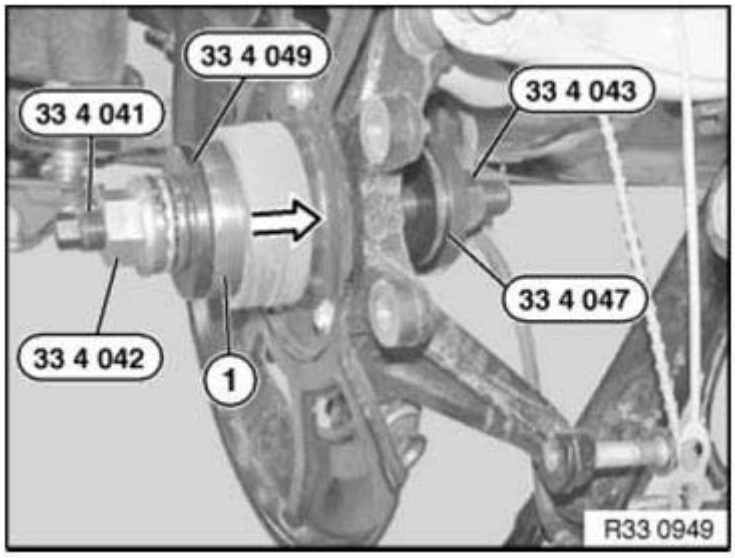


Fig. 158: Installing Wheel Bearing Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

33 41 007 REPLACING RIGHT DRIVE FLANGE ON REAR AXLE SHAFT

NOTE: The procedure is described in the document "Replacing drive flange on rear axle shaft on left".

33 41 155 REPLACING RIGHT WHEEL BEARING ON REAR AXLE SHAFT

NOTE: Procedure is described in the document "REPLACING WHEEL BEARING ON REAR AXLE SHAFT ON LEFT ".

3352 SHOCK ABSORBER

33 00 ... INFORMATION ON REPLACING SHOCK ABSORBERS

Situation

When a shock absorber is faulty on one side (leaking, noises, limit values exceeded on the shock tester), often both shock absorbers on the axle in question are replaced.

Effect

This is not necessary for technical reasons and causes the manufacturer not to recognize the unnecessarily removed shock absorbers as defective parts. Unnecessarily high costs for the customer can be avoided by replacing the shock absorber on one side only.

Procedure

If one shock absorber is damaged, it is only necessary to replace both shock absorbers when the car has driven in excess of 80 000 km.

Exception: On all M-GmbH models, when a limit value is exceeded on one side, it is still necessary always to replace both shock absorbers on the relevant axle.

33 52 000 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SHOCK ABSORBER

NOTE: Read and comply with INFORMATION ON REPLACING SHOCK ABSORBERS .

Necessary preliminary tasks

- Remove **REAR WHEEL**
- Remove **LUGGAGE COMPARTMENT WHEEL ARCH TRIM**

Version with VDC shock absorber only:

- Unlock and disconnect plug connection and expose line to shock absorber

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Support trailing arm with a workshop jack (1).

Release screw.

Tightening torque **33 52 3AZ** .

Installation:

Thrust washer (2) on rubber bearing must point to screw head.

Tighten bolt in **NORMAL POSITION** .

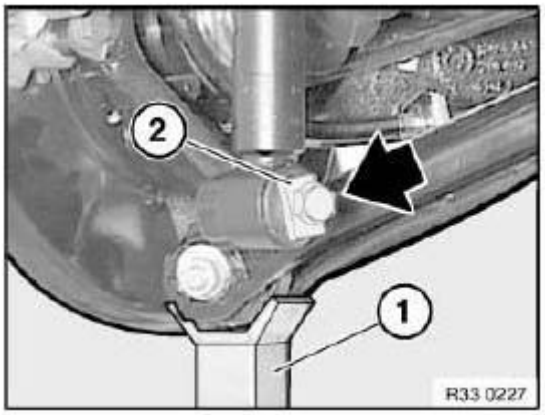


Fig. 159: Supporting Trailing Arm Using Workshop Jack
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Remove shock absorber with support bearing towards bottom.

Installation:

Replace flat seal (between support bearing and body).

Replace self-locking nuts.

Tightening torque **33 52 2AZ** .

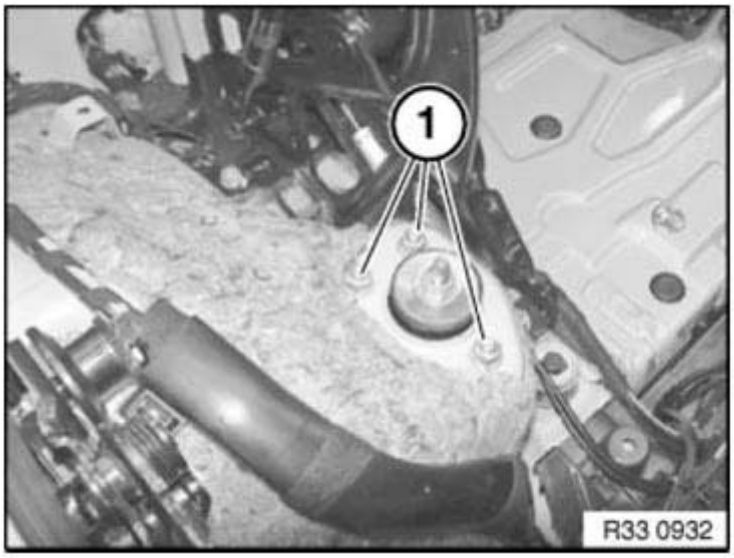


Fig. 160: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

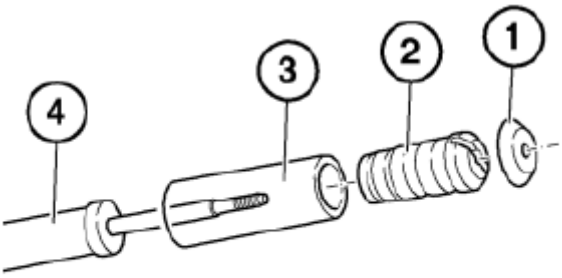
Replacement

Remove **SUPPORT BEARING** .

Remove or detach plate (1), spacer, auxiliary damper (2) and protective tube (3) from shock absorber (4).

Installation:

Check auxiliary damper (2) and protective tube (3) for damage, replace if necessary.



R33 0419

Fig. 161: Identifying Shock Absorber With Plate, Damper And Protective Tube
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check that output shaft is correctly seated in rear differential.

33 52 161 REPLACING REAR LEFT OR RIGHT THRUST BEARING FOR SPRING STRUT/SHOCK ABSORBER

Necessary preliminary tasks

- Remove rear shock absorber . See **3712131 REPLACING LEFT OR RIGHT REAR SHOCK ABSORBER (ADAPTIVE M SUSPENSION)** or **3352000 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SHOCK ABSORBER**

Slacken nut (1).

Remove plate (2) and support bearing (3).

Installation:

Replace self-locking nut.

Tightening torque **33 52 1AZ** .

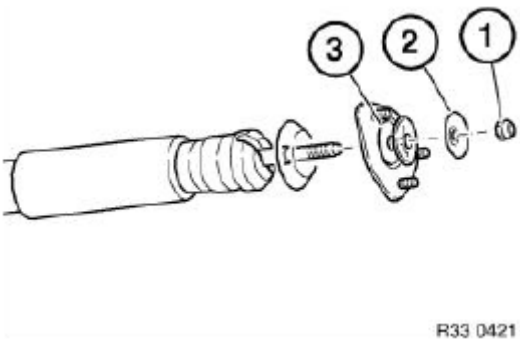


Fig. 162: Identifying Support Bearing With Nut And Plate
Courtesy of BMW OF NORTH AMERICA, INC.

3353 SPRINGS WITH SUSPENSION

33 53 ... MEASURING RIDE HEIGHT OF VEHICLE (REAR AXLE)

Determine actual ride level (A).

Measurement from wheel arch lower edge (1) to rim flange (2) at height of wheel center.

If determined value deviates from specified target value:

REFER TO TECHNICAL DATA .

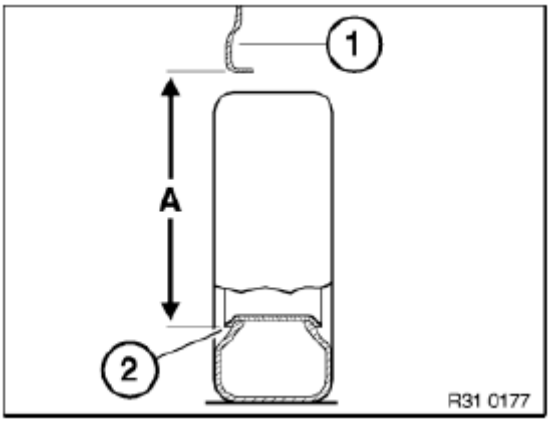


Fig. 163: Identifying Actual Ride Height From Lower Edge Of Wheel Arch To Rim Flange
Courtesy of BMW OF NORTH AMERICA, INC.

33 53 000 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT COIL SPRING

IMPORTANT:

- **Both coil springs on the relevant axle must be replaced in the event of corrosion breakage.**
- **The spring pads at the top and bottom must also be renewed when**

replacing the coil springs.

NOTE: **The coil spring is allocated in the Electronic Parts Catalogue (EPC) under the item "Spring table" after the vehicle identification number has been entered and the optional equipments of the car have been selected.**

Necessary preliminary work

- Remove **REAR WHEEL** .
- Remove output shaft of final drive . See **3321001 REMOVING AND INSTALLING OR REPLACING LEFT OUTPUT SHAFT** or **3321002 REMOVING AND INSTALLING/REPLACING RIGHT OUTPUT SHAFT**.
- Remove shock absorber on trailing arm . See **3712131 REPLACING LEFT OR RIGHT REAR SHOCK ABSORBER (ADAPTIVE M SUSPENSION)** or **3352000 REMOVING AND INSTALLING/REPLACING REAR LEFT OR RIGHT SHOCK ABSORBER** on left and right

WARNING: **Danger of injury!**
Failure to comply with the following instructions may result in the vehicle slipping off the vehicle hoist and critically injuring other persons.

When supporting components, make sure that:

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the vehicle hoist.

Press trailing arm downwards.

Pull out coil spring to the side.

Remove upper spring pad (1) from take-up locator/frame side member.

Installation note:

Position coil spring with upper spring pad (1) on lower spring pad (2) mounted in wishbone and align to take-up locator/frame side member.

Raise trailing arm using a workshop jack.

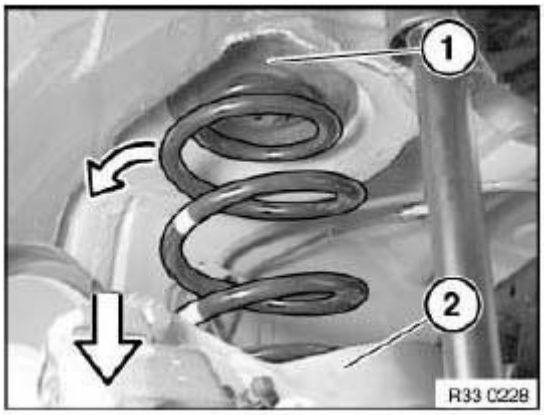


Fig. 164: Pulling Out Coil Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Spring pads must be positively seated in the take-up locator/frame side member or wishbone to prevent the coil spring from springing out of the centering mount.

Installation note:

Check spring pads (1, 3) for damage, replace if necessary.

Attach top spring pad (1) to coil spring (2).

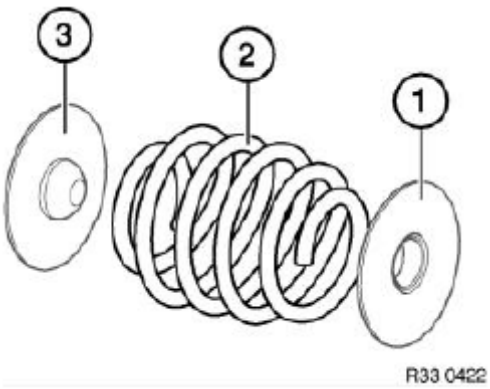


Fig. 165: Identifying Coil Spring And Spring Pads
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check **HEADLIGHT ADJUSTMENT** , correct if necessary.

3355 STABILIZER BAR

33 55 000 REMOVING AND INSTALLING/REPLACING REAR ANTI-ROLL BAR

Necessary preliminary work

- Remove both **TENSION STRUTS** .
- Remove **REAR WHEELS**
- N54 engine only: Remove exhaust system

Remove stabilizer link (1) on upper control arm.

Tightening torque **33 55 2AZ** .

Installation note:

Replace self-locking nut.

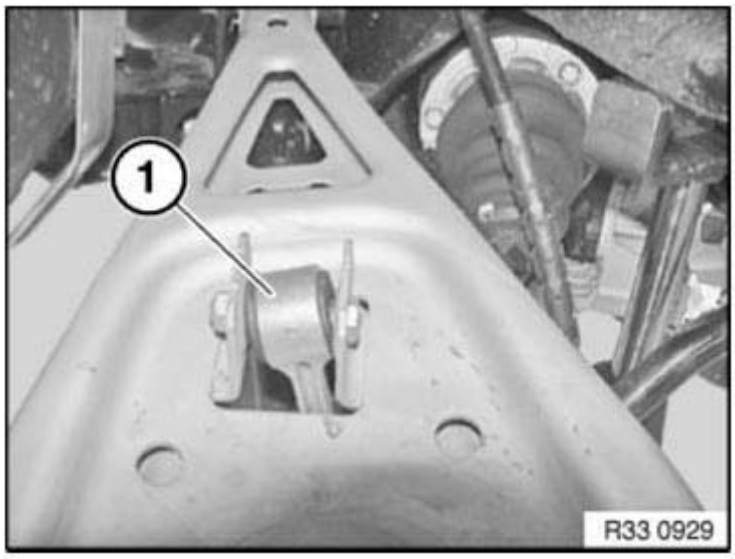


Fig. 166: Identifying Stabilizer Link On Upper Control Arm
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
To avoid scratching by the stabilizer link bracket, it will be necessary to tape off the output shafts and lower control arm.

Release nuts and remove screws towards rear.

Tightening torque **33 55 1AZ** .

Remove stabilizer from rear axle carrier and feed out to right.

Installation note:

Check **RUBBER MOUNT ON BOTH SIDES** , replace if necessary.

Replace self-locking nuts.

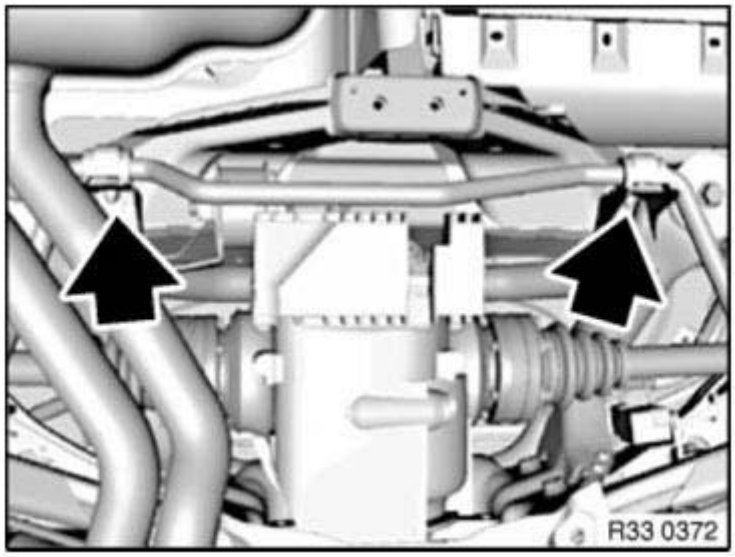


Fig. 167: Locating Rear Axle Carrier Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Replace **STABILIZER LINK ON BOTH SIDES** .

Remove **RUBBER MOUNT ON BOTH SIDES FROM STABILIZER** .

33 55 040 REPLACING ANTI-ROLL BAR LINKS FOR STABILIZER BAR

Necessary preliminary work

- Remove **ANTI-ROLL BAR**

Clamp stabilizer link in vice with protective vice jaws.

Pull off stabilizer with rotational movements.

If the rubber mount remains on the stabilizer, it must be cut through with the blade and pulled off.

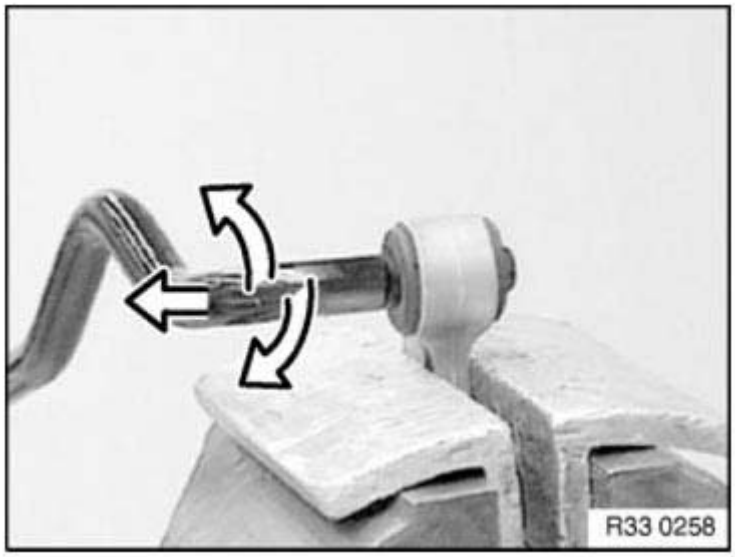


Fig. 168: Pulling Off Stabilizer
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clamp new stabilizer link in vice with protective vice jaws.

Moisten end of stabilizer and inside of rubber mount with Circolight mounting agent.

Press stabilizer as far as possible into stabilizer link with rotary motions.

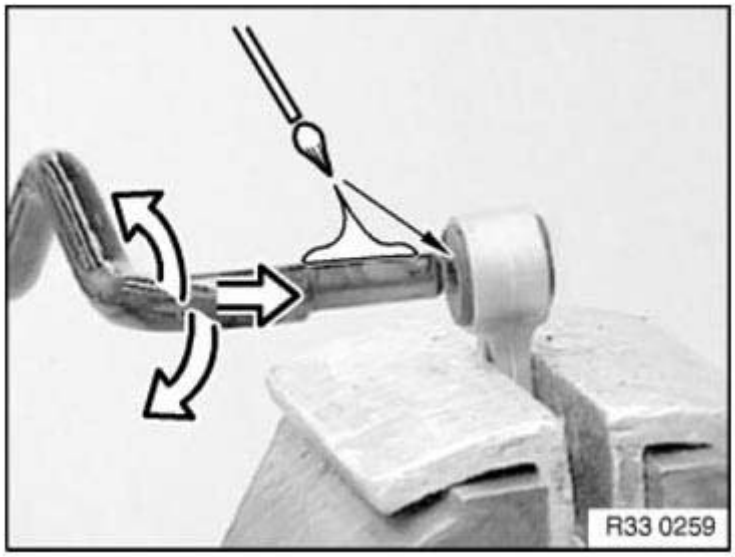


Fig. 169: Pressing Stabilizer Into Stabilizer Link
Courtesy of BMW OF NORTH AMERICA, INC.

33 55 021 REPLACING BOTH RUBBER MOUNTS FOR STABILIZER MOUNTING

Release nuts and remove screws towards rear.

Tightening torque **33 55 1AZ** .

Remove stabilizer from rear axle carrier.

Remove retaining bracket and rubber mount on both sides.

Installation:

Keep retaining bracket, rubber mount and stabilizer clean and free from oil and grease.

Replace self-locking nuts.

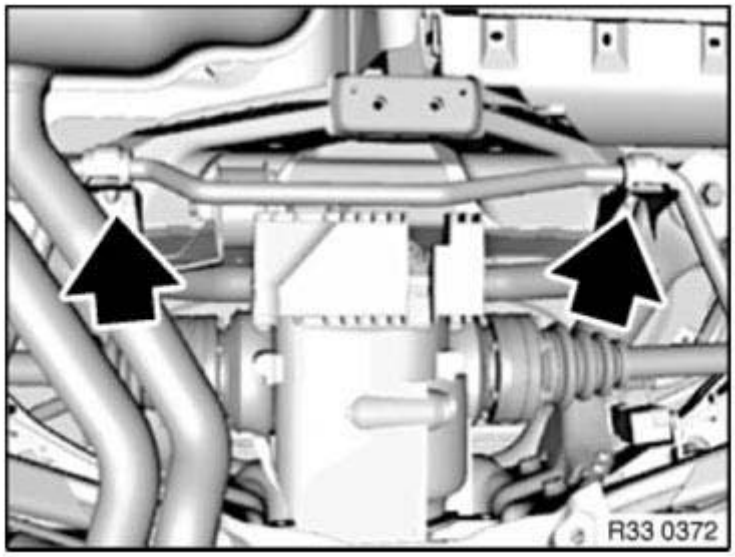


Fig. 170: Locating Rear Axle Carrier Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

33 REAR AXLE

33-1030 DEVICE

Device MW

Replaced by: 0492079

NOTE: (Fixture) For all rear axle final drives - model year: From 88 - Replaced by 33 1 070.(0 492 079)

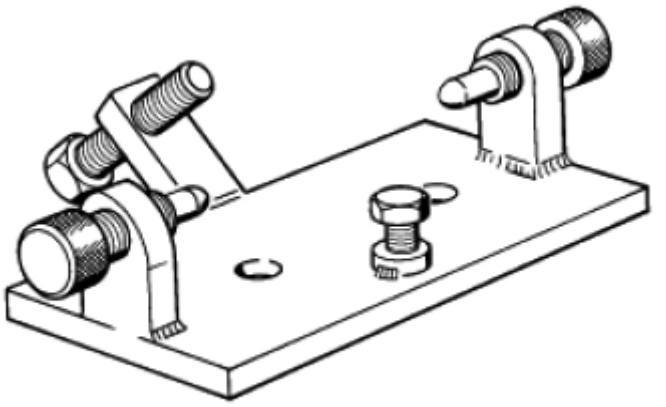


Fig. 1: Identifying Device (331030)
Courtesy of BMW OF NORTH AMERICA, INC.

33-1150 DEVICE

Device MW

NOTE: For pulling off drive flanges (also E46/16).

Storage Location

C18

C17

Consisting of:

4 = 0494872 Plate

NOTE: (Adapter plate) Transmission: GS6-57DZ, GS6-53BZ (G-transmission) GS6-51DZ, GS6-51BZ (H-transmission)

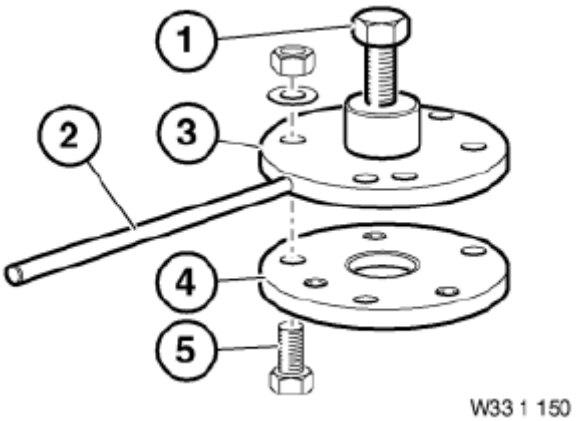


Fig. 2: Identifying Device (331150)
Courtesy of BMW OF NORTH AMERICA, INC.

5 = 0494873 Screw

NOTE: (Countersunk screws M10x30 (3 x)) Transmission: GS6-57DZ, GS6-53BZ (G-transmission) GS6-51DZ, GS6-51BZ (H-transmission)

1 = 0493265 Spindle

2 = 0493266 Mandrel

3 = 0494631 Washer

33-4130 DEVICE

Device MW

NOTE: For removing and installing rubber mount in support tube of rear axle final drive mounting.

SI number

01 01 89 (989)

Consisting of:

1 = 0492394 Plate

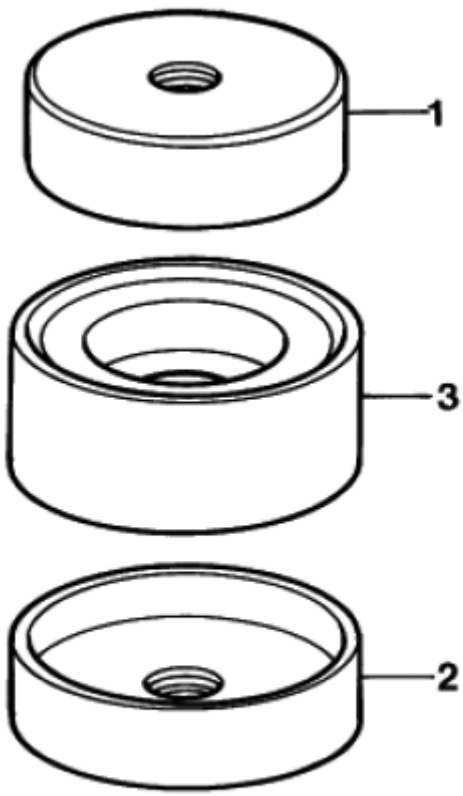
NOTE: (Shaped plate, top) For removing

2 = 0492395 Plate

NOTE: (Shaped plate, top) For pulling in

3 = 0492396 Plate

NOTE: (Shaped plate, bottom) For pulling in



W33 4 130

Fig. 3: Identifying Device (334130)
Courtesy of BMW OF NORTH AMERICA, INC.

33-4450 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (Device) For installing split rubber mounts.

Storage Location

A50

B50

SI number

01 15 04 (117)

Consisting of:

1 = 0495038 Spindle

NOTE: (Spindle with handle)

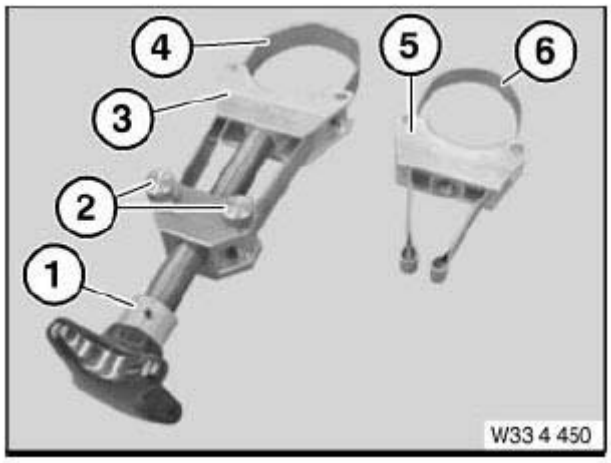


Fig. 4: Identifying Device (334450)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495039 Screw

NOTE: (Knurled screws (2 x))

3 = 0495040 Fixture

NOTE: (Fixture for diameter 46 mm)

4 = 0495041 Tensioning strap

NOTE: (Tensioning strap)

5 = 0495042 Fixture

NOTE: (Fixture for diameter 51 mm)

6 = 0495043 Tensioning strap

NOTE: (Tensioning strap)

33-4100 DEVICE

Device MW

NOTE: For extracting and press-fitting the rubber mount in the trailing arm.

SI number

01 01 89 (989)

Consisting of:

1 = 0492379 Sleeve

NOTE: (support sleeve) During extraction

2 = 0492380 Sleeve

NOTE: (press-out sleeve)

3 = 0492381 Sleeve

NOTE: (press-in sleeve)

4 = 0492382 Shaped element

NOTE: For press-fitting

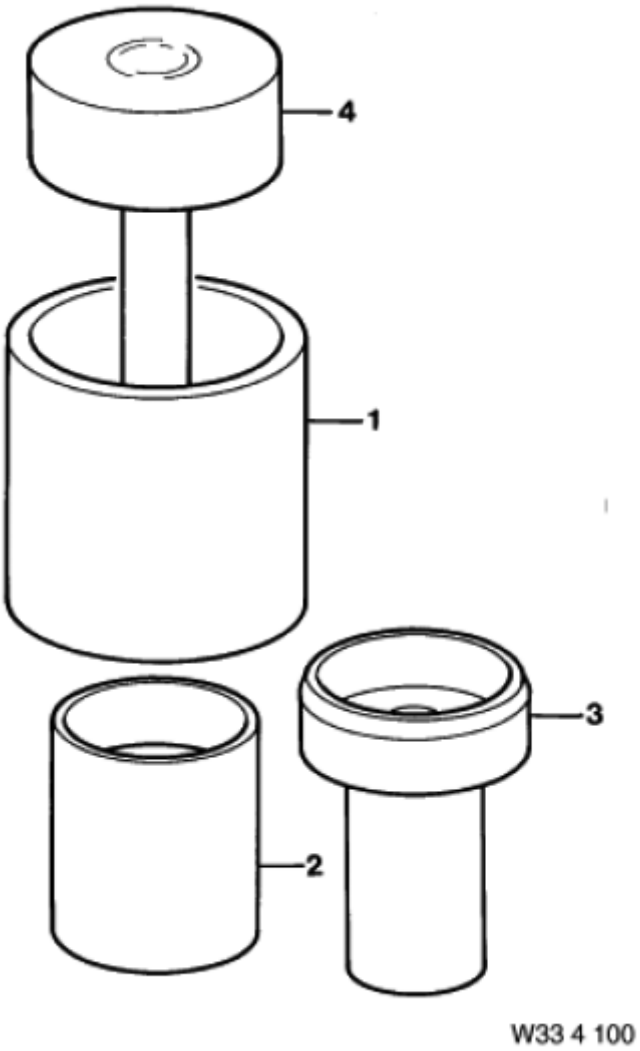


Fig. 5: Identifying Device (334100)
Courtesy of BMW OF NORTH AMERICA, INC.

33-4110 DEVICE

Device MW

NOTE: For removing and installing the rubber mount in the wishbone

SI number

01 01 89 (989)

Consisting of:

1 = 0492384 Sleeve

NOTE: (Support sleeve) For pressing out

2 = 0492385 Sleeve

NOTE: (Press-out sleeve)

3 = 0492386 Sleeve

NOTE: (Press-in sleeve)

4 = 0492387 Shaped element

NOTE: For pressing in

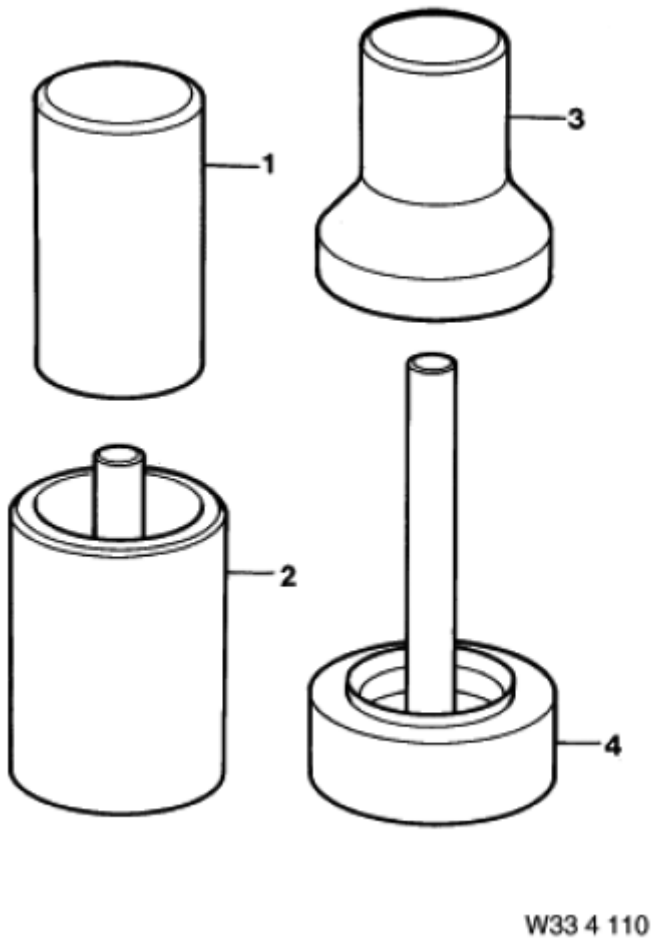


Fig. 6: Identifying Device (334110)
Courtesy of BMW OF NORTH AMERICA, INC.

33-2100 DEVICE

Device MW

NOTE: For gripping output shafts when press-fitting constant-velocity joint

Storage Location

C23

SI number

01 06 94 (801)

Consisting of:

1 = 0492166 Frame

2 = 0492167 Shell

NOTE: (shells) 2 pcs. Diameter 30 mm - model series: E38/model: 730i

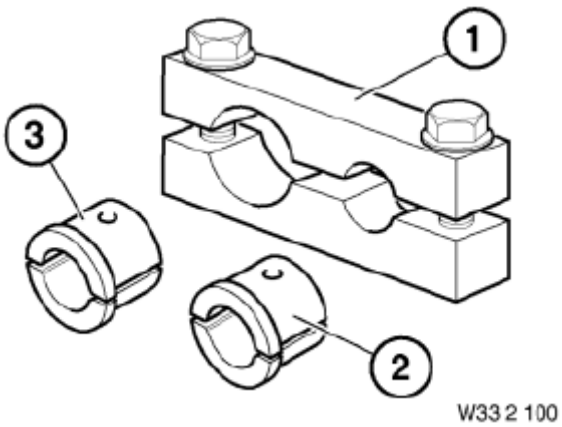


Fig. 7: Identifying Device (332100)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0492168 Shell

NOTE: (shells) 2 pcs. Diameter 35 mm - model series: all, except E38

33-4400 DEVICE

Device MW

NOTE: For removing inner wheel bearing races on rear axle

SI number

01 05 99 (426)

Consisting of:

1 = 0493816 Basic body

2 = 0493817 Spindle

3 = 0493818 Key

NOTE: (wrench)

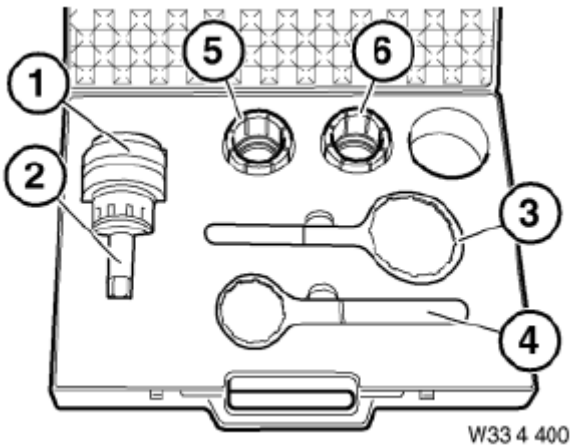


Fig. 8: Identifying Device (334400)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0493819 Key

NOTE: (wrench)

5 = 0493820 Pliers

NOTE: (clamping ring (45...51 mm))

6 = 0493821 Pliers

NOTE: (clamping ring (50...55 mm))

7 = 0494617 Pliers

NOTE: (clamping ring (55...61 mm)) Model series: E67

8 = 0496538 Ring

NOTE: **(clamping ring) Model series: F01, F02 See SI: 01 18 08 (482)**

9 = 0496539 Synchronizing key

NOTE: **Series: F01, F02 See SI: 01 18 08 (482)**

33-0160 DEVICE

Device MW

NOTE: **For removing and installing rubber mount in trailing arm, front, on rear axle.**

Storage Location

C26

SI number

01 09 09 (532)

Consisting of:

1 = 0496607 Synchronizing key

2 = 0496608 Bush

3 = 0496609 Washer

NOTE: **(shaped disc)**

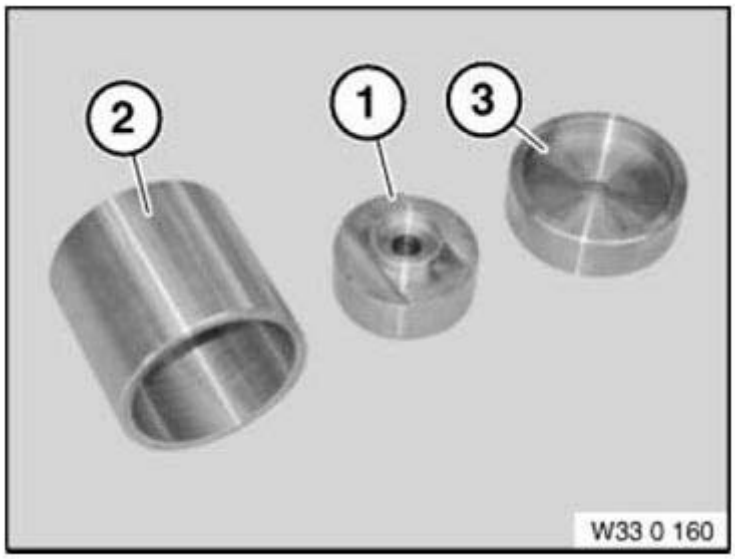


Fig. 9: Identifying Device (330160)
Courtesy of BMW OF NORTH AMERICA, INC.

33-4120 DEVICE

Device MW

NOTE: For removing and installing ball joint mount in wishbone.

SI number

01 01 89 (989)

Consisting of:

1 = 0492389 Shaped element

NOTE: For hanging up when pressing out the ball joint

2 = 0492390 Bush

NOTE: (Pressure bushing) For pressing the ball joint out of the wishbone

3 = 0492391 Shaped element

NOTE: For hanging up the wishbone when pressing in the ball joint

4 = 0492392 Bush

NOTE: (Pressure bushing) For pressing the ball joint into the wishbone

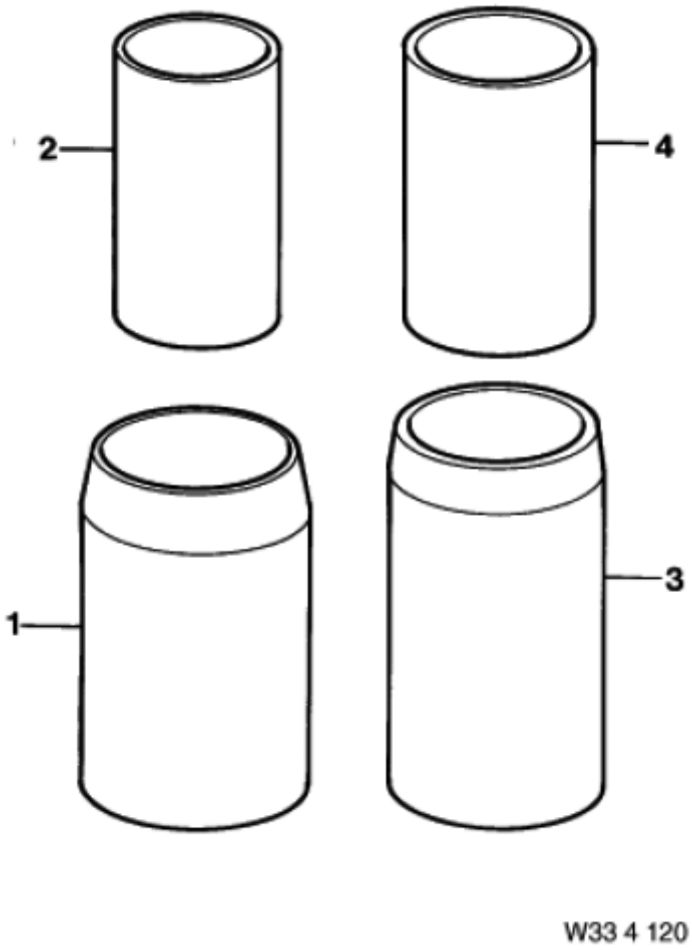


Fig. 10: Identifying Device (334120)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5153 DISC

Disc

SI number

01 22 06 (307)

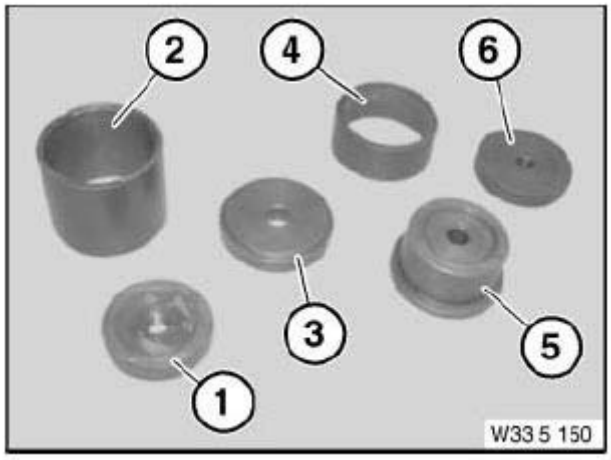


Fig. 11: Identifying Disc (335153)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5156 DISC

Disc

SI number

01 22 06 (307)

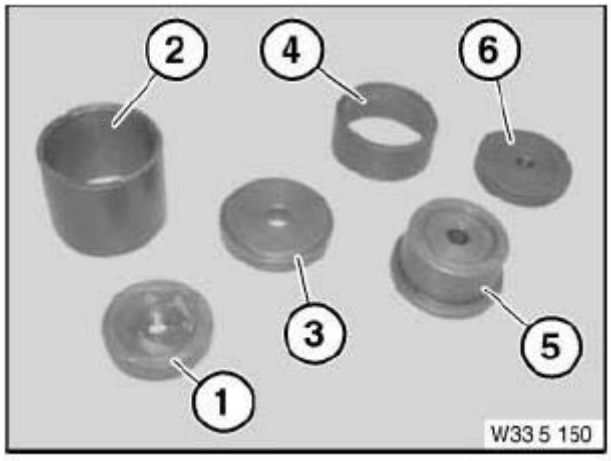


Fig. 12: Identifying Disc (335156)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5151 DISC

Disc

SI number

01 22 06 (307)

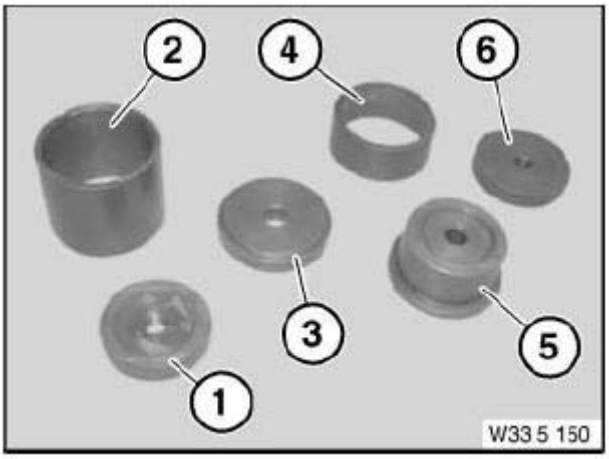


Fig. 13: Identifying Disc (335151)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5155 DISC

Disc

SI number

01 22 06 (307)

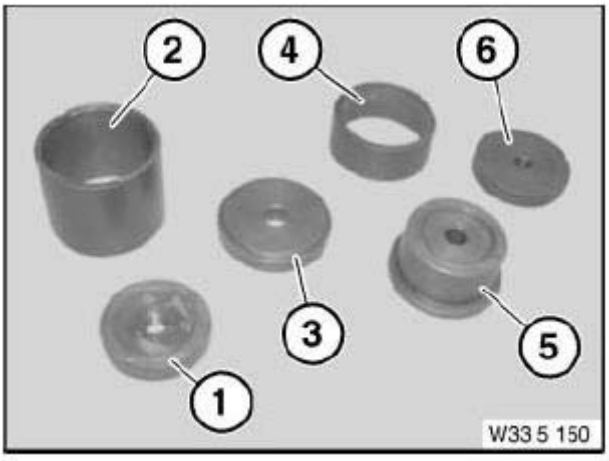


Fig. 14: Identifying Disc (335155)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5070 EXTENSION

Extension Minimum set: Mechanical tools MW

NOTE: (2 pieces) Pullout extension for 33 5 040, 33 5 050, 33 5 060.

Storage Location

A18

B18

SI number

01 21 06 (300)

Consisting of:

1 = 0495592 Extension

NOTE: (Extension (1 piece))

Fig. 15: Identifying Extension (335070)
Courtesy of BMW OF NORTH AMERICA, INC.

33-1300 EXTRACTOR

Extractor MW

NOTE: (Rillex extractor) For bevel pinion and differential case (rear diff)/for installation of camshaft sprocket on crankshaft (M70)/for removing bearing inner race from drive flange (E36, E46)

Storage Location

B6

C6

Consisting of:

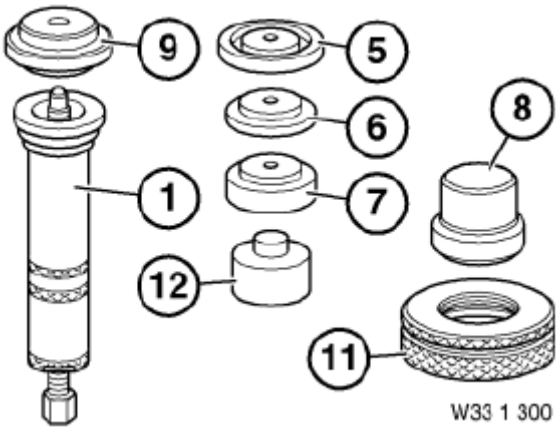


Fig. 16: Identifying Extractor (331300)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0492098 Washer

NOTE: (Disc) Replaced by 33 1 311.(0 492 107)

3 = 0492099 Washer

NOTE: (Disc) Replaced by 33 1 311.(0 492 107)

4 = 0492100 Washer

NOTE: (Disc) Replaced by 33 1 311.(0 492 107)

1 = 0492097 Connector

NOTE: (basic body) For transmission S5D 260Z, S5D 310Z and S5D 320Z;

5 = 0492101 Synchronizing key

NOTE: (Synchronizing key (old))

6 = 0492102 Synchronizing key

7 = 0492103 Synchronizing key

8 = 0492104 Synchronizing key

= 0492105

9 = 0492105 Synchronizing key

NOTE: **For rear axle final drive and for installation of the camshaft sprocket on the crankshaft (M70)**

1 = 0492107 Washer

NOTE: **(washer)**

2 = 0492108 Synchronizing key

NOTE: **For pulling the bearing inner race off the drive flange - Series: E36/5**

33-4420 FIXTURE

Fixture MW

NOTE: **For mounting rear axle final drive during removal and installation.**

Consisting of:

2 = 0494831 Angle

NOTE: **(Support angle) Replaced by 33 4 425. (0 495 317)**

4 = 0495575 Adapter

NOTE: **(mounting adapter) mounting for E85 Z4 M. SI 01 10 06 (264)**

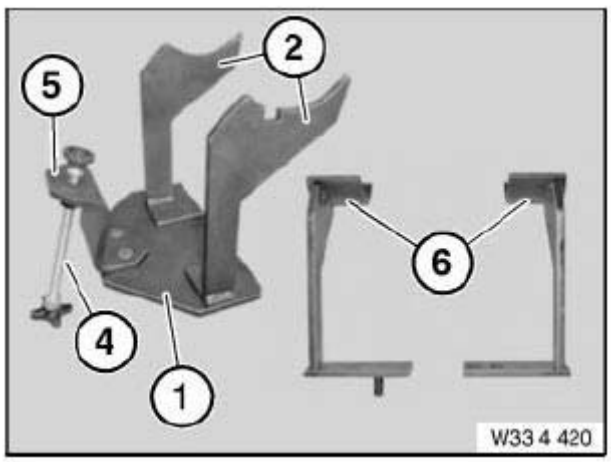


Fig. 17: Identifying Fixture (334420)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494829 Plate

NOTE: (Base plate)

2 = 0494830 Adapter

NOTE: (adapter kit)

4 = 0494832 Spindle

NOTE: (spindle with synchronizing key)

5 = 0495317 Angle

NOTE: (support angle)

33-3280 GAUGE

Gauge MW

NOTE: (setting gauge) For aligning bearing support from side member to wheel center

SI number

01 19 99 (484)

W33 3 280

Fig. 18: Identifying Gauge (333280)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5152 HOLDING SLEEVE

Holding sleeve

SI number

01 22 06 (307)

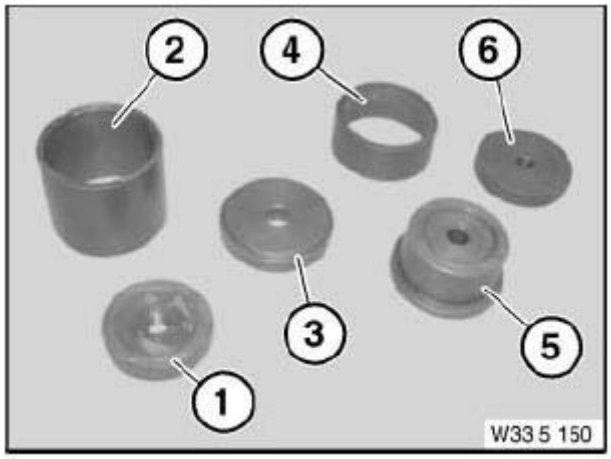


Fig. 19: Identifying Holding Sleeve (335152)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5154 HOLDING SLEEVE

Holding sleeve

SI number

01 22 06 (307)

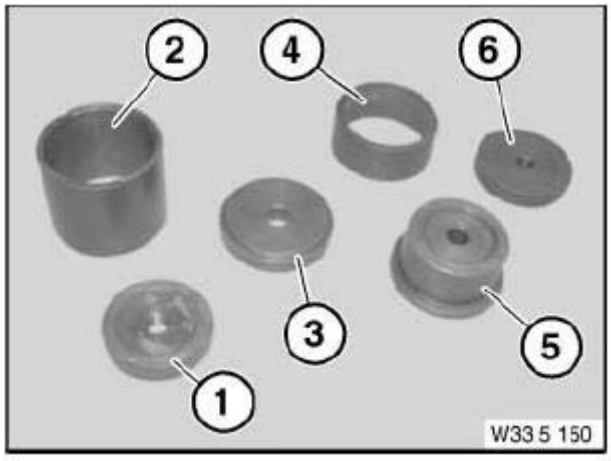


Fig. 20: Identifying Holding Sleeve (335154)
Courtesy of BMW OF NORTH AMERICA, INC.

33-1100 KEY

Key MW

NOTE: (Key) To counter-hold the drive flange - Replaced by universal key

33-0150 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (drift) For driving radial shaft seal onto drive flange.

Storage Location

B26

SI number

01 09 09 (532)

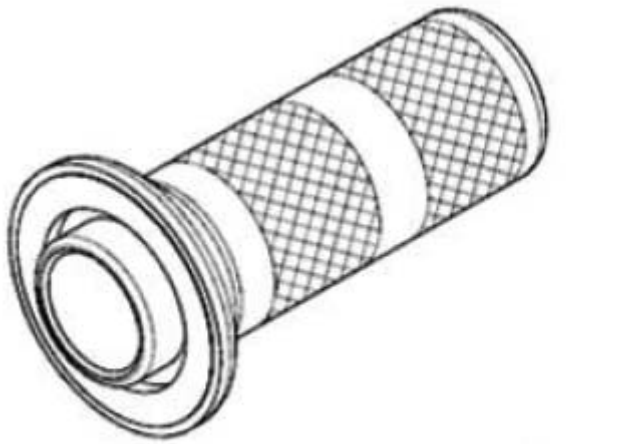


Fig. 21: Identifying Mandrel (330150)
Courtesy of BMW OF NORTH AMERICA, INC.

33-1180 MANDREL

Mandrel MW

Replaced by: 0491891

NOTE: (Drift) Replaced by 31 2 040.(0 491 891)

33-1210 MANDREL

Mandrel MW

Replaced by: 0492338

NOTE: (Drift) For radial seal on output flange - Replaced by 33 3 420.(0 492 338)

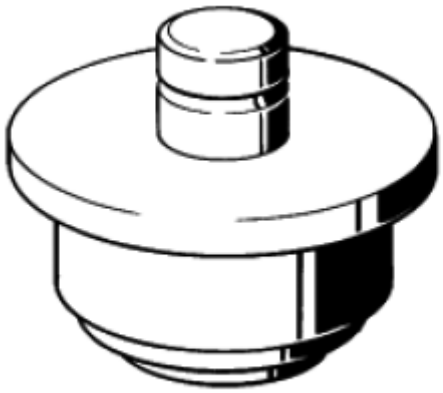


Fig. 22: Identifying Mandrel (331210)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5130 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: For driving the radial shaft seal of the output shaft into the rear axle final drive. Rear axle final drive: 188

Storage Location

C21

SI number

01 22 06 (307)

Fig. 23: Identifying Mandrel (335130)
Courtesy of BMW OF NORTH AMERICA, INC.

33-3380 MANDREL

Mandrel MW

Replaced by: 0492338

NOTE: (Drift) For fitting the radial sealing ring, right-hand output end/Replaced by 33 3 420.(0 492 338)

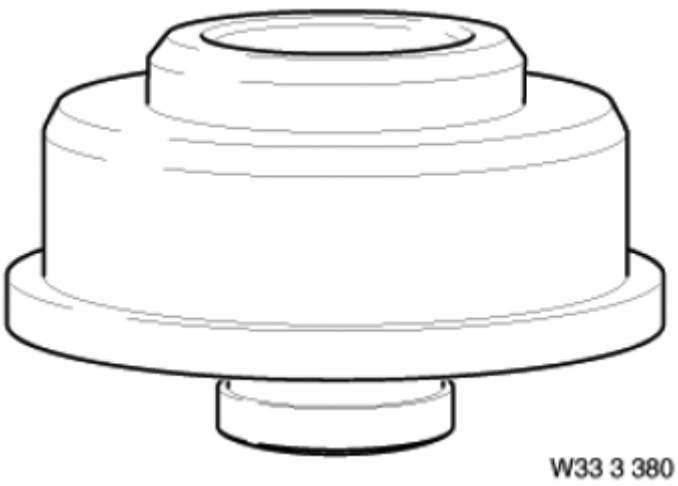


Fig. 24: Identifying Mandrel (333380)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5080 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: For driving in shaft seal on drive shaft.

Storage Location

A16

SI number

01 21 06 (300)

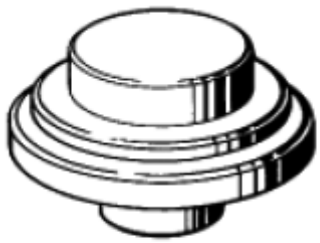
Fig. 25: Identifying Mandrel (335080)
Courtesy of BMW OF NORTH AMERICA, INC.

33-1170 MANDREL

Mandrel MW

Replaced by: 0492339

NOTE: (Drift) For driving the radial seal into the output flange with flange diameter 38 mm - Replaced by 33 3 430.(0 492 339)



W33 1 170

Fig. 26: Identifying Mandrel (331170)
Courtesy of BMW OF NORTH AMERICA, INC.

33-4426 MOUNTING ADAPTER

Mounting adapter

NOTE: Locator for E85 Z4 M. SI 01 10 06 (264)

SI number

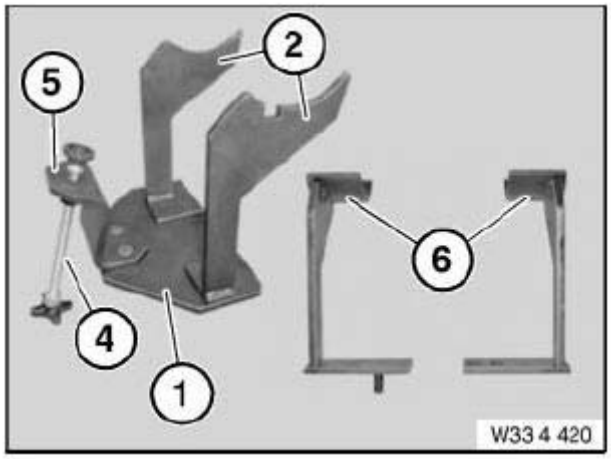


Fig. 27: Identifying Mounting Adapter (334426)
Courtesy of BMW OF NORTH AMERICA, INC.

33-5040 OPEN-END WRENCH

Open-end wrench Minimum set: Mechanical tools MW

NOTE: Open-end spanner SW50 with retaining clip For releasing and tightening down the insert nuts for the screw connection of the propeller shaft on the rear axle final drive.

Storage Location

A18

SI number

01 21 06 (300)

Consisting of:

2 = 0495582 Retaining bracket

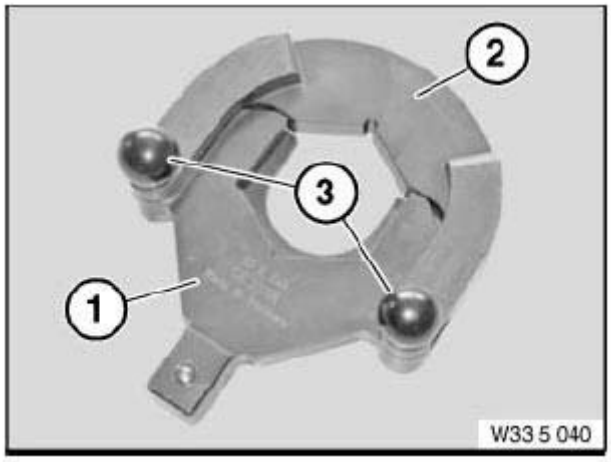


Fig. 28: Identifying Open-End Wrench (335040)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0495583 Pin

NOTE: (Pin with chain (2 x))

1 = 0495581 Basic body

33-3010 SPINDLE

Spindle Minimum set: Mechanical tools MW

NOTE: (spindle TR12 with nut) For installing and removing rubber mounts, see "In conjunction with".

SI number

01 16 08 (476)

Consisting of:

3 = 0496555 Nut

NOTE: (nut M12x1.5 (high wall))

1 = 0496553 Spindle

NOTE: (spindle TR12)

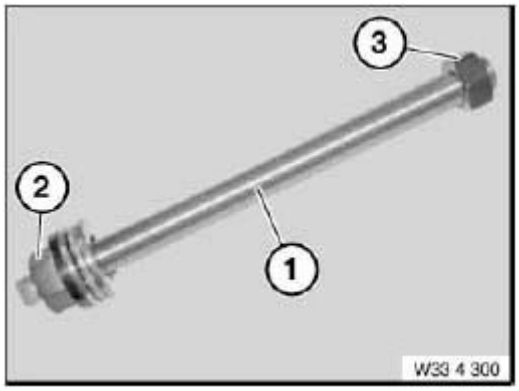


Fig. 29: Identifying Spindle (333010)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0496554 Nut

NOTE: (nut TR12 with thrust bearing)

33-4300 SPINDLE

Spindle Minimum set: Mechanical tools MW

NOTE: (spindle TR20 with nut) For installing and removing rubber mounts, see "In conjunction with".

SI number

01 16 08 (476)

Consisting of:

1 = 0496535 Spindle

NOTE: (spindle TR20 (length 300 mm))

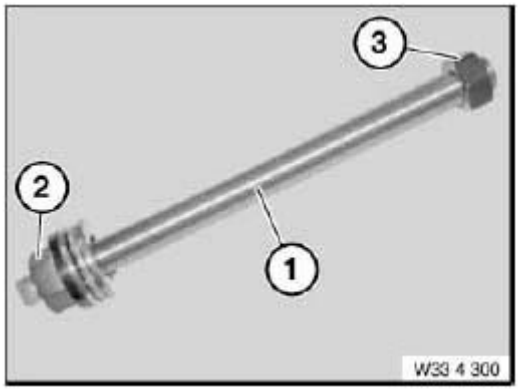


Fig. 30: Identifying Spindle (334300)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0496551 Nut

NOTE: (nut TR20)

2 = 0496536 Nut

NOTE: (nut TR20 with thrust bearing)

33-5014 THRUST PIECE WITH SPLINED KEY

Thrust piece with splined key

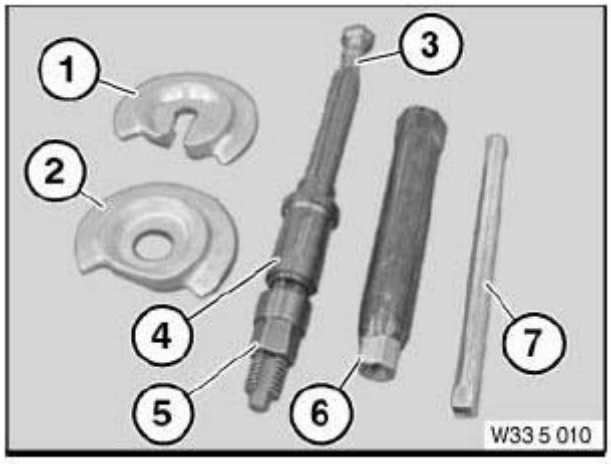


Fig. 31: Identifying Thrust Piece With Splined Key (335014)
Courtesy of BMW OF NORTH AMERICA, INC.

33-4030 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: **(Tool set) For removing and installing rear wheel bearings Components 33 4 032, 33 4 038 and 33 4 039 are discontinued and are replaced in the order by 33 4 301, 33 4 302 and 33 4 303**

Storage Location

C7

Consisting of:

2 = 0492351 Spindle

NOTE: **(Spindle) Series: E28 Replaced by 33 4 301 (0 496 535)**

8 = 0492357 Nut

NOTE: **(Nut with bearing) Series: E28 Replaced by 33 4 302 (0 496 536)**

5 = 0492354 Washer

NOTE: **(thrust washer) For installing wheel bearing, rear/Series: E28/model: 518, 520i**

7 = 0492356 Washer

NOTE: **(thrust washer) For installing wheel bearing, rear/Series: E28/model: 525i, 528i**

9 = 0492358 Nut

NOTE: **(nut)**

1 = 0492350 Bell housing

NOTE: **For counter support when removing the rear wheel bearing**

3 = 0492352 Washer

NOTE: **(thrust washer) For removing wheel bearing, rear/Series: E28/model: 518, 528i**

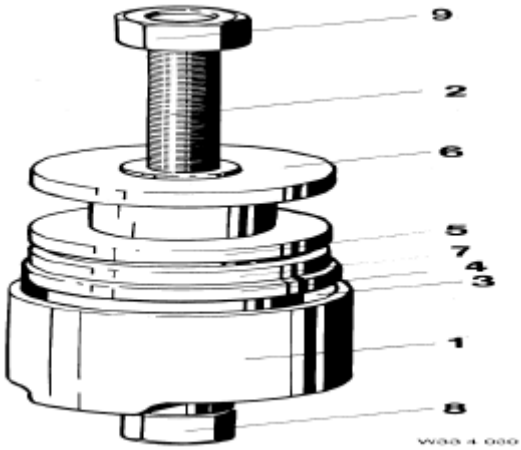


Fig. 32: Identifying Tool (334030)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0492353 Sleeve

NOTE: (guide sleeve) For installing wheel bearing, rear/Series: E28/model: 518, 520i

6 = 0492355 Sleeve

NOTE: (guide sleeve) For installing wheel bearing, rear/Series: E28/model: 525i, 528i

33-4180 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (installation/removal tool) For removing and installing rubber mounts on rear axle final drive, rear

Storage Location

B34

SI number

01 12 95 (992)

Consisting of:

1 = 0492427 Pipe

NOTE: (Support tube) For removing

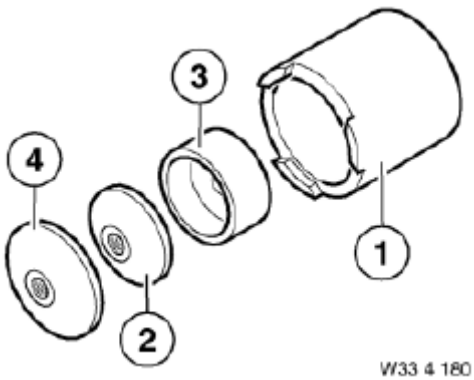


Fig. 33: Identifying Tool (334180)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0492428 Synchronizing key

NOTE: For installing

3 = 0492429 Plate

NOTE: (support plate) For installing

4 = 0492430 Synchronizing key

NOTE: For removing

33-3200 TOOL

Tool MW

NOTE: (Press-out/-in tool set) For pressing the rubber mount out of and into the control arm special tools 33 3 202 and 33 3 203 for E87 and E90

Storage Location

B32

SI number

01 05 90 (207)

Consisting of:

1 = 0492261 Bush

NOTE: For accommodating control arm when pressing out rubber mount Series: E31

2 = 0492262 Thrust piece

NOTE: For pressing out rubber mount Series: E31, E46, E85, F01, F02

3 = 0492263 Sleeve

NOTE: (Spacer sleeve) For pressing rubber mount into control arm Series: E31, E46, E85, F01, F02

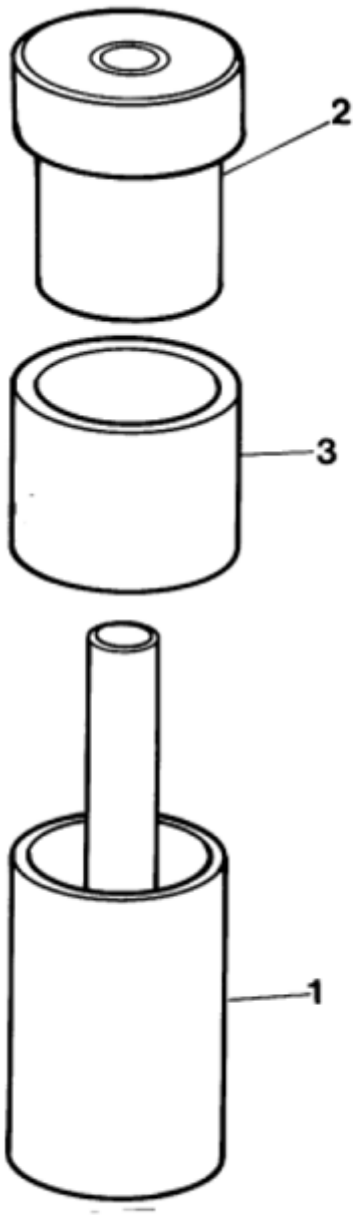


Fig. 34: Identifying Tool (333200)
Courtesy of BMW OF NORTH AMERICA, INC.

33-4040 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (Tool set) For removing and installing wheel bearings, rear

Storage Location

C8

Consisting of:

3 = 0492362 Nut

NOTE: Series: E30, E46 Replaced by 33 4 303 (0 496 551)

8 = 0492367 Bush

NOTE: (Draw-in bushing for rear axle shaft)

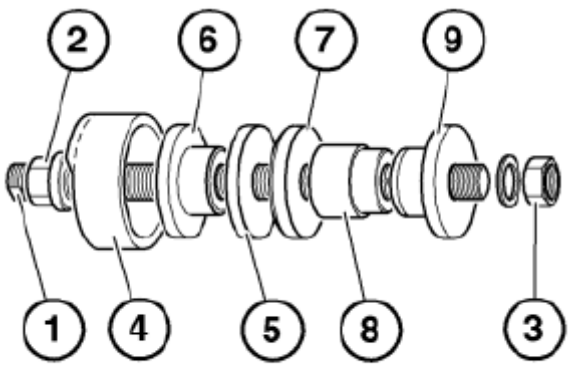


Fig. 35: Identifying Tool (334040)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0492363 Bell housing

NOTE: For gripping when removing wheel bearing, rear/series: E30

6 = 0492365 Sleeve

NOTE: (Guide sleeve) For installing wheel bearing, rear/series: E30

5 = 0492364 Washer

NOTE: (Pullout disc)

7 = 0492366 Washer

NOTE: (Thrust washer) For installing wheel bearing, rear

9 = 0492368 Sleeve

NOTE: (Guide sleeve) For installing wheel bearings

= 0492360

1 = 0492360 Spindle

NOTE: (Spindle) Series: E30, E46 Replaced by 33 4 301/0 496 535

2 = 0492361 Nut

NOTE: (Nut with bearing) Series: E30, E46 Replaced by 33 4 302/0 496 536

33-4460 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: For removing and fitting camber arm rubber mount on rear axle support.

Storage Location

B49

C49

SI number

01 15 04 (117)

Consisting of:

1 = 0494977 Washer

NOTE: (Draw-in disc)

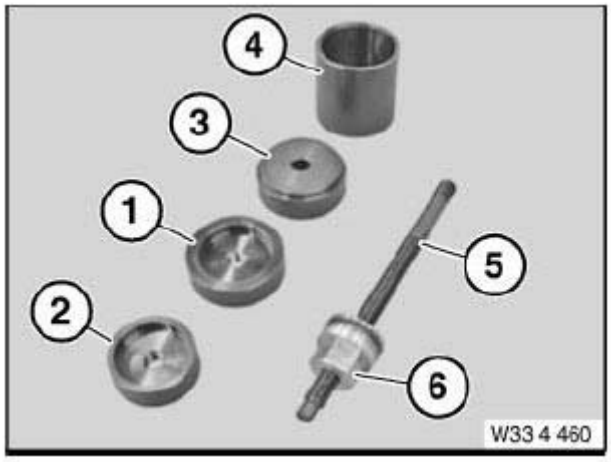


Fig. 36: Identifying Tool (334460)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0494978 Washer

NOTE: (Pullout disc)

3 = 0494979 Holder

NOTE: (Counter support)

4 = 0494980 Sleeve

NOTE: (Support sleeve)

5 = 0494981 Spindle

NOTE: (spindle 205 mm, M12)

6 = 0494982 Nut

NOTE: (Thrust nut)

33-4280 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: For removing and installing rubber mount of rear axle final drive mounting at rear.

Storage Location

C45

SI number

01 14 01 (766)

Consisting of:

6 = 0496310 Washer

NOTE: (disc (draw-in dimension 3.5 mm)) model series: E83, E85 see SI 01 18 07 (396)

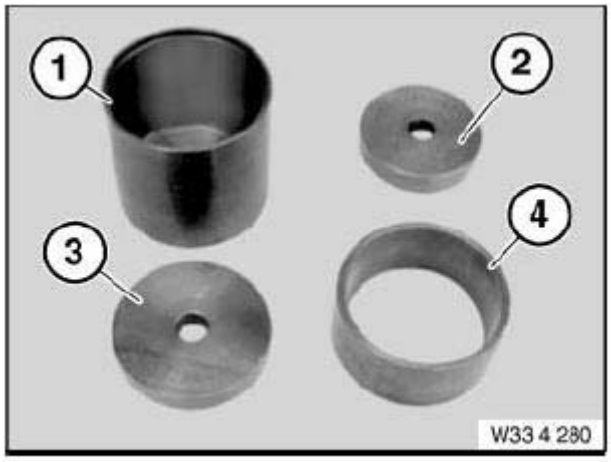


Fig. 37: Identifying Tool (334280)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494049 Bush

2 = 0494050 Washer

4 = 0494052 Washer

5 = 0495623 Washer

NOTE: (disc (draw-in dimension 5.0 mm)) model series: E85, E86

3 = 0494051 Bush

NOTE: (slip bush)

Rear Axle - Technical Data - Z4

GENERAL - TRACK WIDTH

33 00 GENERAL - TRACK WIDTH E92/M3 GTS

GENERAL - TRACK WIDTH SPECIFICATION

Track width for normal position		
19" wheel	mm	1539

GENERAL - TRACK WIDTH E89/STANDARD SUSPENSION

33 00 GENERAL - TRACK WIDTH E89 STANDARD SUSPENSION

GENERAL - TRACK WIDTH SPECIFICATION

Track width for normal position and offset (ET)		
- ET29	mm	1562
- ET40	mm	1540

GENERAL - TRACK WIDTH E89/VDC SUSPENSION

33 00 GENERAL - TRACK WIDTH E89 VDC SUSPENSION

GENERAL - TRACK WIDTH SPECIFICATION

Track width for normal position and offset (ET)		
- ET29	mm	1566
- ET40	mm	1544

REAR AXLE - RIDE HEIGHT E89

33 00 REAR AXLE - RIDE HEIGHT E89

REAR AXLE - RIDE HEIGHT SPECIFICATION

Ride level height in normal position Attach tape measure to bottom middle of rim flange and measure to lower edge of wheel arch	
Tolerance ride height in ○ **NORMAL POSITION** max. 10 mm ○ **DESIGN POSITION** max. 2 mm	
Difference ride height between left/right in ○ **NORMAL POSITION** 10 mm	

○ **DESIGN POSITION** 2 mm		
Standard suspension		
17" rim	mm ± 10	593
18" rim	mm ± 10	606
19" rim	mm ± 10	618
Adaptive M suspension		
17" rim	mm ± 10	582
18" rim	mm ± 10	595
19" rim	mm ± 10	607

REAR AXLE FINAL DRIVE

33 10 REAR AXLE FINAL DRIVE E60/E61/E63/E64/E70/E72/E82/E89/E90/E91/E92/E93 215L 215LW

REAR AXLE FINAL DRIVE SPECIFICATION

Use only approved final drive oils (refer to **REAR AXLE - OPERATING FLUIDS**).		
New oil filling volume	litre	1.2

REAR AXLE FINAL DRIVE

33 10 REAR AXLE FINAL DRIVE E60/E61/E63/E64/E81/E82/E86/E87/E89/E90/E91/E92/E93/E70 188L

REAR AXLE FINAL DRIVE SPECIFICATION

Use only approved final drive oils (refer to **REAR AXLE - OPERATING FLUIDS**).		
New oil filling volume	litre	1.0

WHEEL BEARINGS

33 41 WHEEL BEARINGS

WHEEL BEARINGS SPECIFICATION

Double-row, angular ball bearing lubricated for service life and not to be disassembled		
Max. axial wheel bearing play	max. mm	0.06 ... 0.08

Rear Axle - Tightening Torques - Z4

CONTROL ARMS AND STRUTS

33 32 CONTROL ARMS AND STRUTS

TIGHTENING TORQUE SPECIFICATION - CONTROL ARMS AND STRUTS

		Type	Thread	Tightening specification	Measure
1AZ	Trailing arm console to trailing arm	E89	M12	Replace nut	100 Nm
2AZ	Trailing arm console to body	E89	M14		77 Nm
3AZ	Lower wishbone to trailing arm	E89	M12	Replace screw and nut	100 Nm
4AZ	Lower control arm to rear axle carrier	E89	M12	Replace screw and nut Jointing torque Torque angle	 70 Nm 90 °
5AZ	Upper wishbone to trailing arm	E89	M12	Replace screw and nut Jointing torque Torque angle	 100 Nm 90 °
6AZ	Upper control arm to rear axle carrier	E89	M12	Replace screw and nut Jointing torque Torque angle	 70 Nm 90 °
7AZ	Compression strut on body	E89	M12		77 Nm
8AZ	Damper holder to trailing arm	E89	M12	Replace screw and nut Jointing torque Torque angle	 50 Nm 90 °
9AZ	Damper to damper holder	E89	M10	Replace screw and nut Jointing torque Torque angle	 30 Nm 90 °

OUTPUT SHAFT

33 21 OUTPUT SHAFT

TIGHTENING TORQUE SPECIFICATION - OUTPUT SHAFT

		Type	Thread	Tightening specification	Measure
1AZ	Output shaft to rear differential drive	E89	M10	Replace bolts and washers	70 Nm

	flange (Torx screw with ribbed teeth)				

REAR AXLE SUSPENSION

33 33 REAR AXLE SUSPENSION

TIGHTENING TORQUE SPECIFICATION - REAR AXLE SUSPENSION

		Type	Thread	Tightening specification	Measure
1AZ	Rear axle carrier with rubber mounts to body	E89	M12	Follow repair instruction . See **3331011 REPLACING REAR AXLE CARRIER** or **3331503 LOWERING/RAISING REAR AXLE CARRIER** .	77 Nm
2AZ	Threaded bolt to cross-member, rear axle, front	E89	M12		90 Nm

REAR DIFFERENTIAL CASE WITH COVER

33 11 REAR DIFFERENTIAL CASE WITH COVER

TIGHTENING TORQUE SPECIFICATION - REAR DIFFERENTIAL CASE WITH COVER

		Type	Thread	Tightening specification	Measure
1AZ	Case Covers **TRANSMISSION ALLOCATION**	E89	M10x60 10.9	188L 215L	55 Nm
		E89	M10x25 10.9	188L 215L	55 Nm
2AZ	Oil filler plug with O-ring	E89			60 Nm

REAR AXLE DIFFERENTIAL MOUNTINGS

33 17 REAR AXLE DIFFERENTIAL MOUNTINGS

TIGHTENING TORQUE SPECIFICATION - REAR AXLE DIFFERENTIAL MOUNTINGS

		Type	Thread	Tightening specification	Measure
1AZ	Rear differential to rear axle carrier, front	E89	M12	See Repair Instruction	100 Nm

2AZ	Rear differential to rear axle carrier, rear	E89	M14	See Repair Instruction	165 Nm

SHOCK ABSORBERS

33 52 SHOCK ABSORBERS

TIGHTENING TORQUE SPECIFICATION - SHOCK ABSORBERS

		Type	Thread	Tightening specification	Measure
1AZ	Shock absorber to thrust bearing	E89	M10	Replace nut	14 Nm
2AZ	Nut and locknut/self-locking nut	E89	M18	Replace nut	24 Nm
3AZ	Shock absorber to trailing arm	E89	M14		165 Nm

STABILIZER BAR

33 55 STABILIZER BAR

TIGHTENING TORQUE SPECIFICATION - STABILIZER BAR

		Type	Thread	Tightening specification	Measure
1AZ	Retaining bracket, stabilizer bar to rear axle support	E89	M8		22 Nm
2AZ	Stabilizer link to bracket, upper control arm	E89	M8		22 Nm

WHEEL BEARINGS

33 41 WHEEL BEARINGS

TIGHTENING TORQUE SPECIFICATION - WHEEL BEARINGS

		Type	Thread	Tightening specification	Measure
1AZ	Drive flange hub to output shaft	E89	M24	Replace collar nut	250 Nm

BREAKOUT BOXES AND CONNECTORS

Model: All

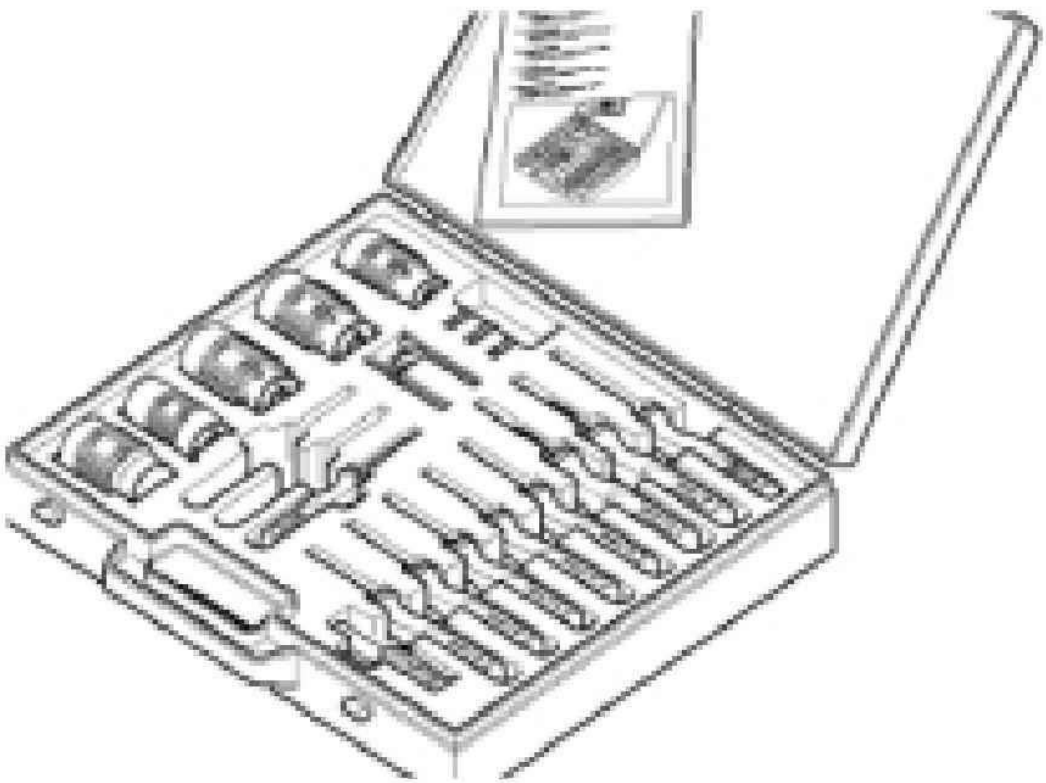
Production Date: All

CONNECTOR CONTACT KIT

Connector Contact Removal Kit

The connector contact removal kit provides tools for the disassembly of connectors. Proper use of these tools enable the technician to access wiring connectors for repairs equal to factory quality.

Always refer to the latest appropriate articles for up to date information regarding new tools.



G03388933

Fig. 1: Identifying Connector Contact Removal Kit
Courtesy of BMW OF NORTH AMERICA, INC.

Current P/N 88 88 6 611 150.

The Connector Contact Removal Kit is used for:

- Releasing round plug housings.
- Releasing relay carriers.
- Pressing out contacts.
- Pulling out indicator lamps.

Socket and Spring Contacts

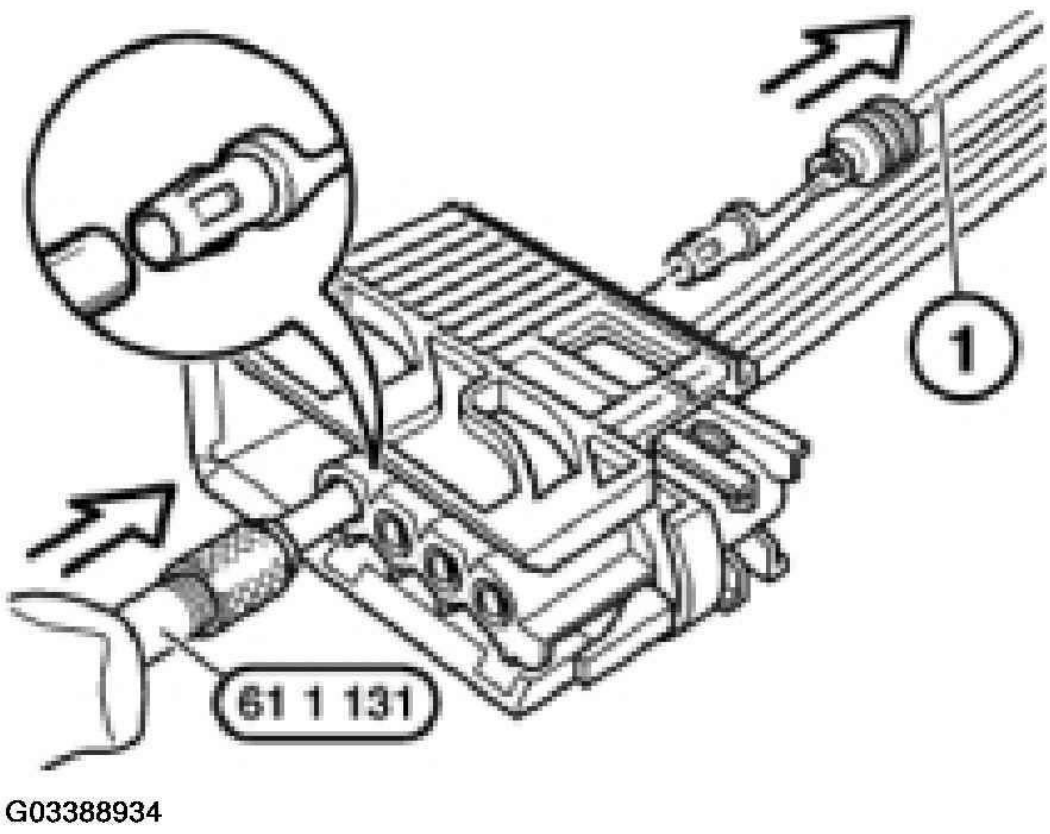


Fig. 2: Identifying Spring Contacts
Courtesy of BMW OF NORTH AMERICA, INC.

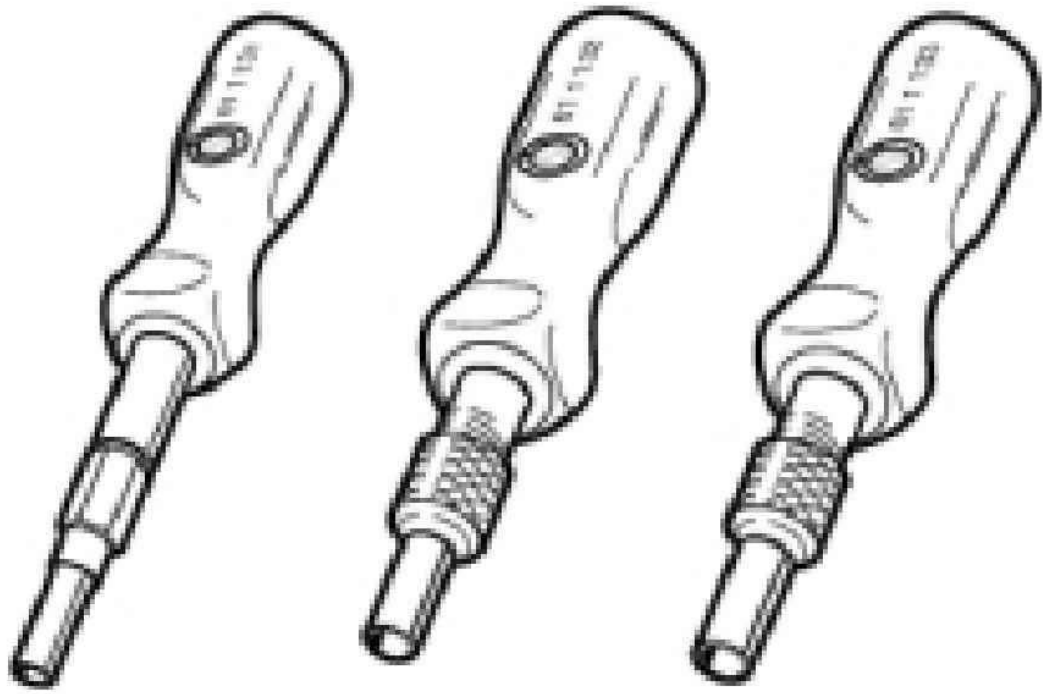


Fig. 3: View Of Socket Types
Courtesy of BMW OF NORTH AMERICA, INC.

Socket and Spring contacts compress the springs while the connector is pushed from the housing.

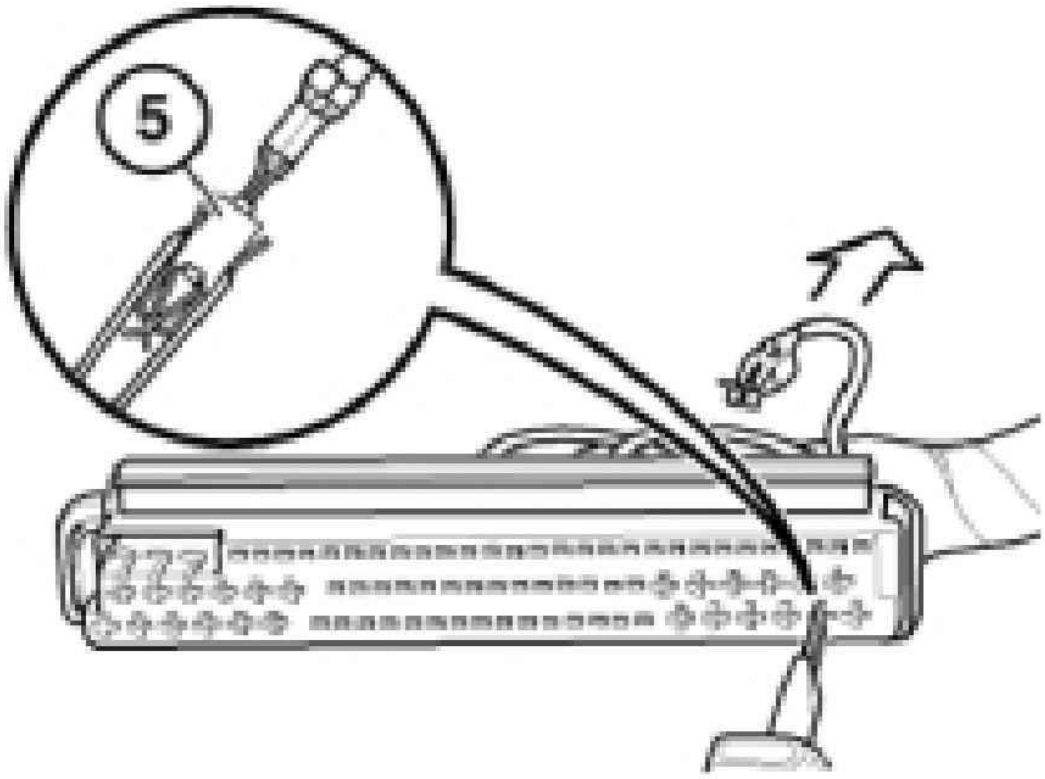


Fig. 4: Identifying Different Sockets
Courtesy of BMW OF NORTH AMERICA, INC.

Fig. 5: View Of Socket And Spring Contacts
Courtesy of BMW OF NORTH AMERICA, INC.

Flat spring contacts depress the spring allowing the connector to be pushed or gently pulled from the connector housing.

Instrument Cluster Illumination Bulb Holder Removal Socket

The backlighting illumination bulbs are removed from the cluster by placing square head of the socket on the bulb holder and turning 90° counter clockwise.

The bulb removal socket is used on all instrument clusters.

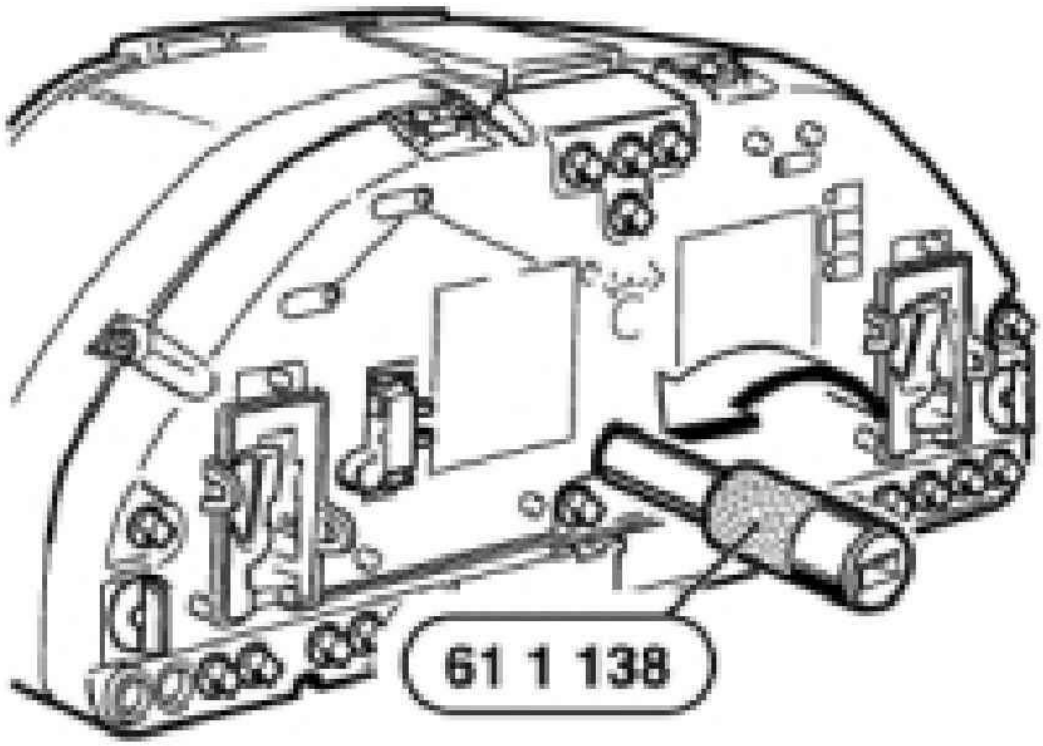


Fig. 6: Identifying Instrument Cluster Illumination Bulb Holder Removal Socket
Courtesy of BMW OF NORTH AMERICA, INC.

Relay Holder Disengaging Tool

This tool allows the relay holder (2) to disengage the relay connector (1).

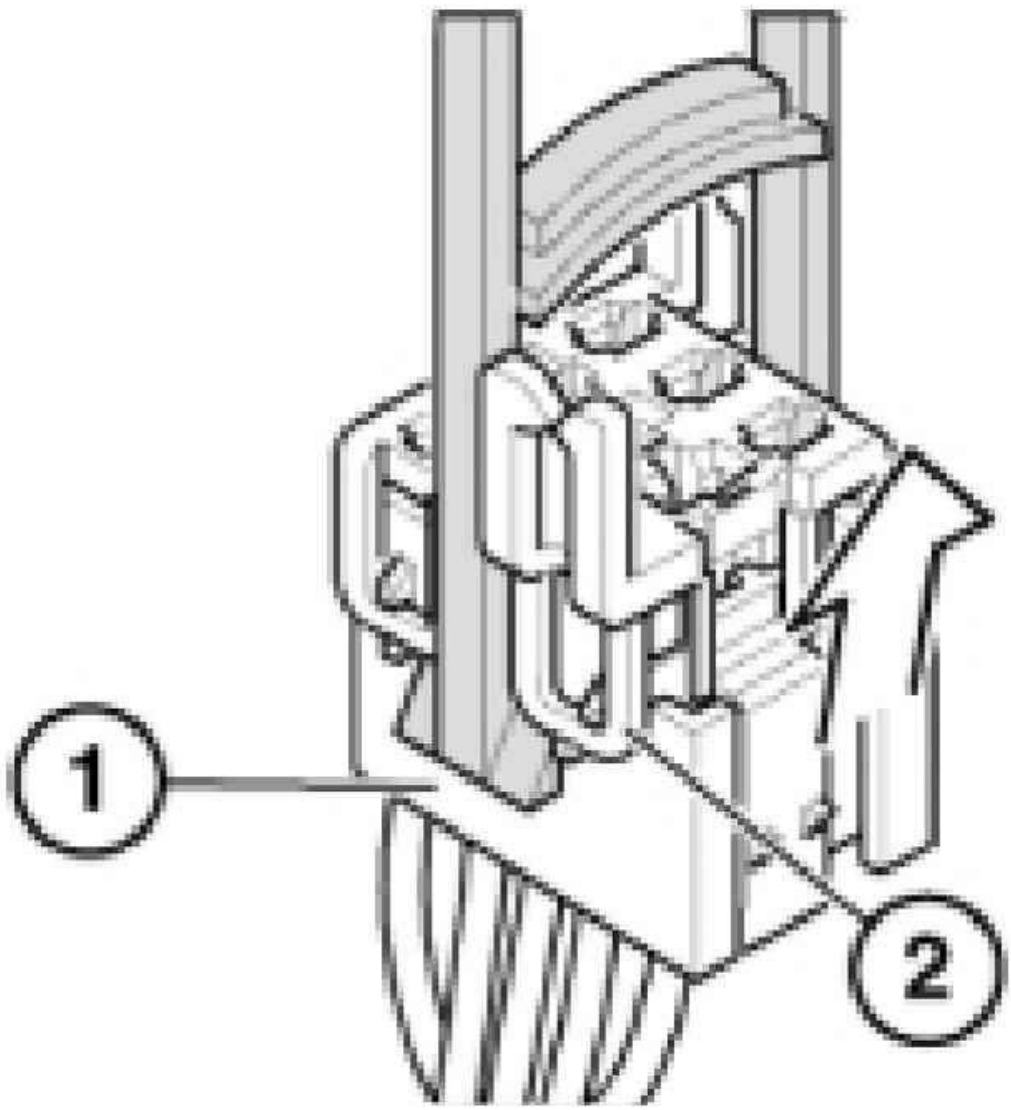


Fig. 7: Identifying Relay Holder Disengaging Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Circular Connector Lock Disengager

These tools unlock the circular connector housings allowing the individual connectors to be removed.

The various sizes are reflected in the part numbers:

4 pin = 61 1 141.

7 pin = 61 1 142.

10 pin = 61 1 145.

12 pin = 61 1 143.

25 Pin = 61 1 144.

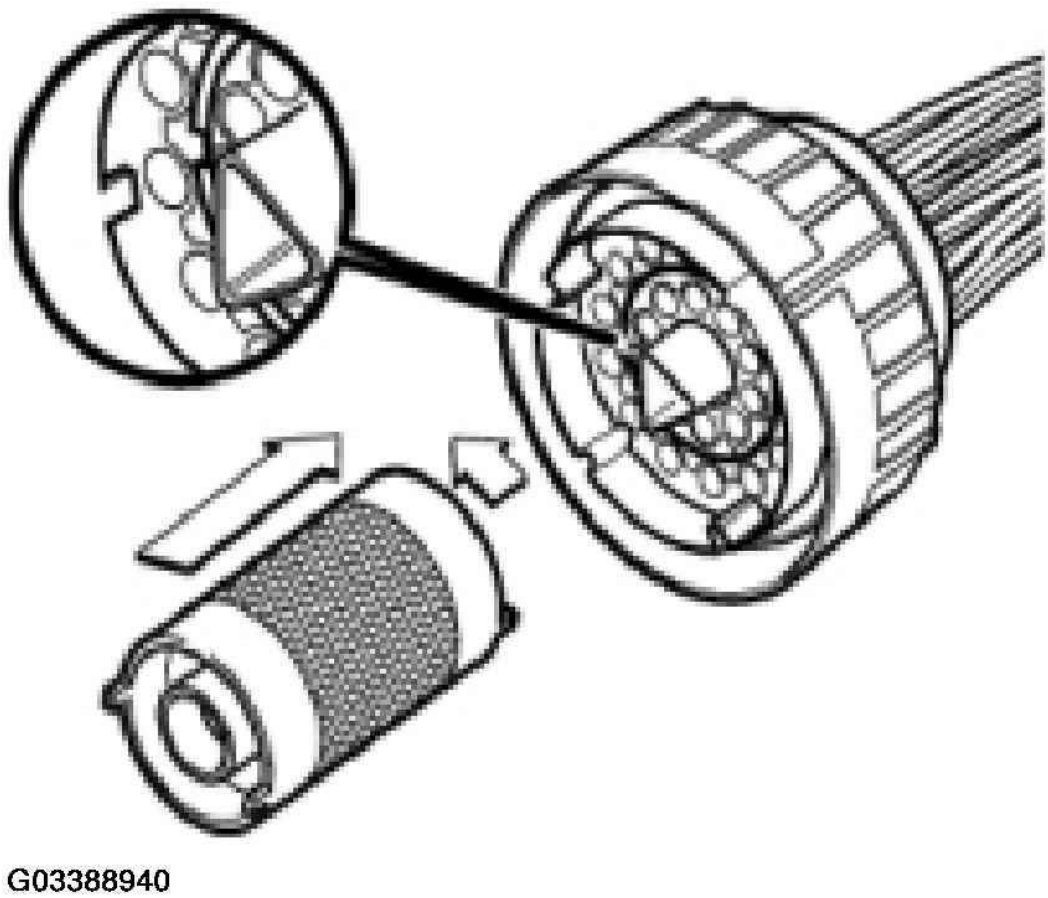


Fig. 8: Identifying Circular Connector Lock Disengager (1 Of 4)
Courtesy of BMW OF NORTH AMERICA, INC.

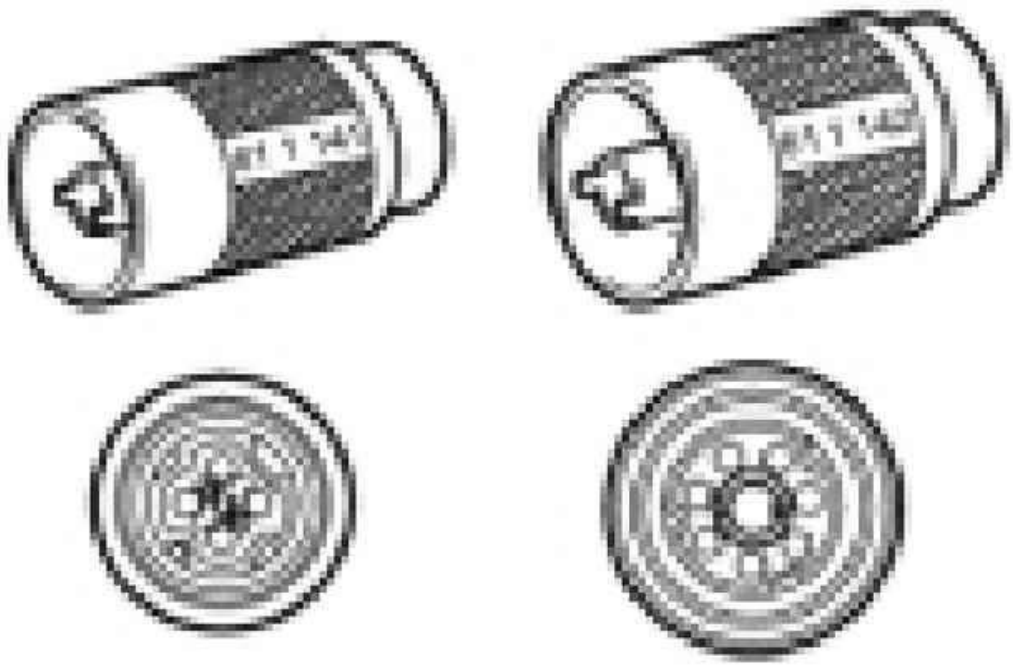


Fig. 9: Identifying Circular Connector Lock Disengager (2 Of 4)
Courtesy of BMW OF NORTH AMERICA, INC.

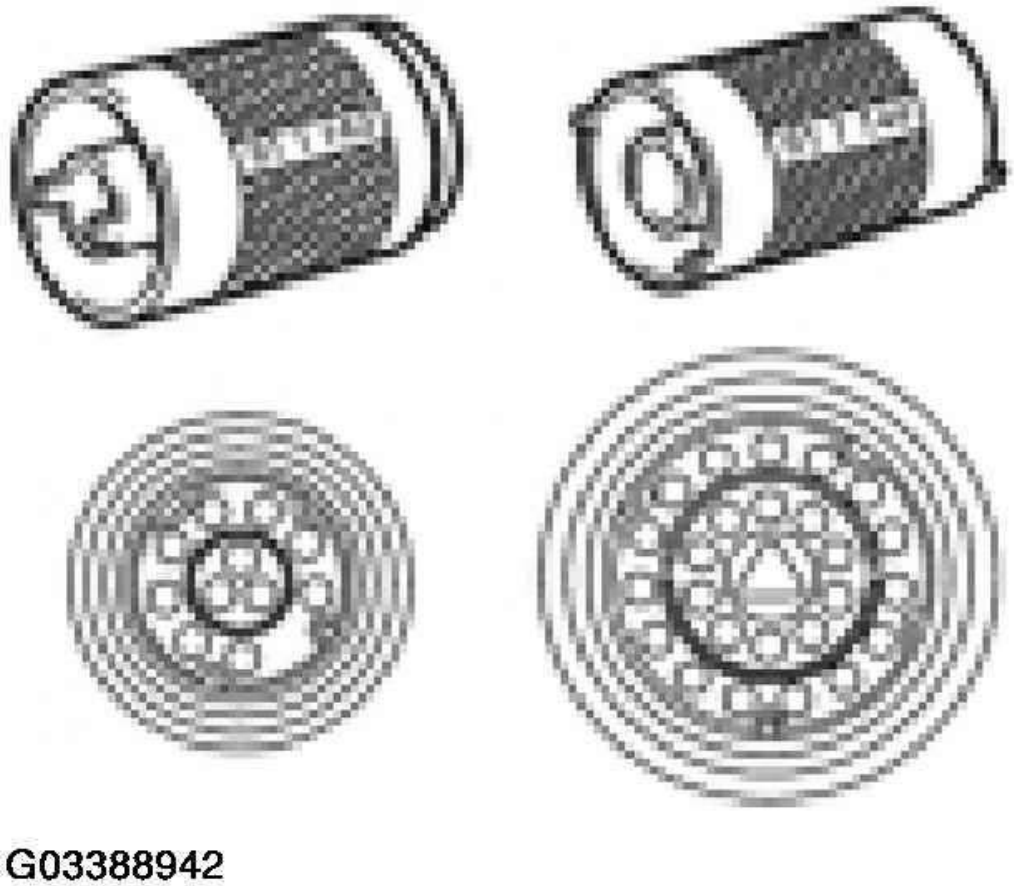


Fig. 10: Identifying Circular Connector Lock Disengager (3 Of 4)
Courtesy of BMW OF NORTH AMERICA, INC.

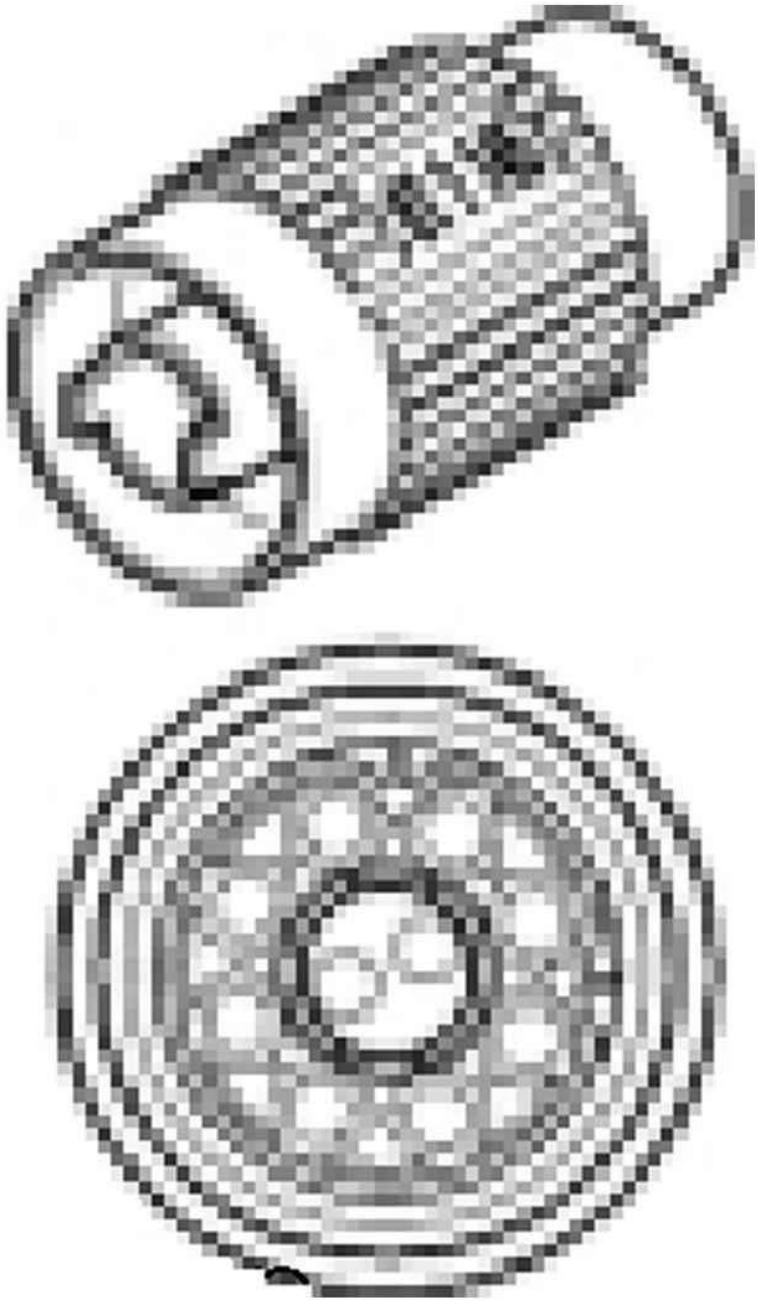


Fig. 11: Identifying Circular Connector Lock Disengager (4 Of 4)
Courtesy of BMW OF NORTH AMERICA, INC.

BMW PLUG SYSTEM ABBREVIATIONS

BMW PLUG SYSTEM ABBREVIATIONS

D 1.5/2.5	Round contacts of 1.5mm or 2.5mm diameter
MDK 3 Plus	Miniature double flat spring contact
JPT ELA	Junior Power Timer flat spring contacts with strand sealing
DFK ELA	Double flat spring contacts with strand sealing
Elo	Electronic contacts with and without strand sealing Manufacturer: Siemens
Elo	Power Electronic contacts for heavy loads with and without strand sealing Manufacturer: Siemens
MQS	Micro Quadlock System electronic contacts with and without strand sealing Manufacturer: AMP
MPQ	Micro Power Quadlock electronic contacts for heavy loads with and without strand sealing Manufacturer: AMP

PLUG SYSTEM D1.5/D2.5

Circular Plug 7--8 Pin System D2.5

- Pull off the rubber boot (1).
- Push the retaining lugs (2) of the inner connector section 3 inward carefully to disengage the lock notch.
- Push the inner connector section (3) in the direction of the arrow in the illustration until the retaining lugs (2) are in the recessed notch (4) and use the appropriate sized spring contact tool and remove the connector from the housing.

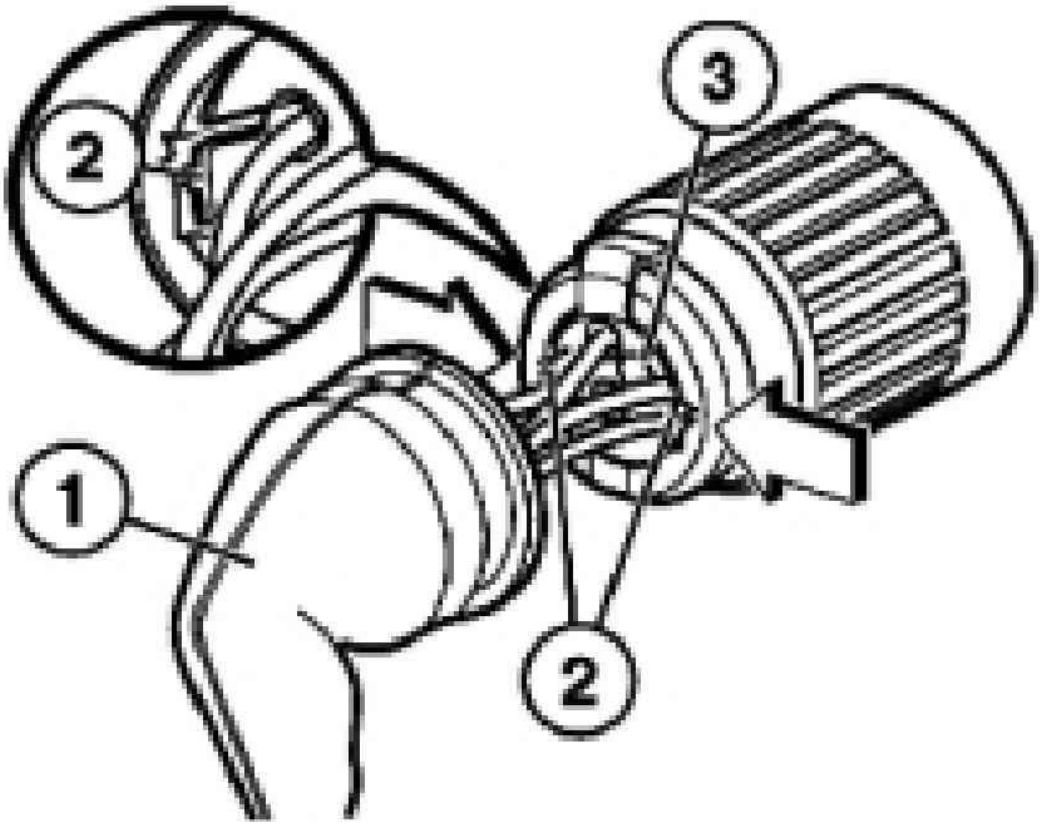


Fig. 12: Identifying Inner Connector Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

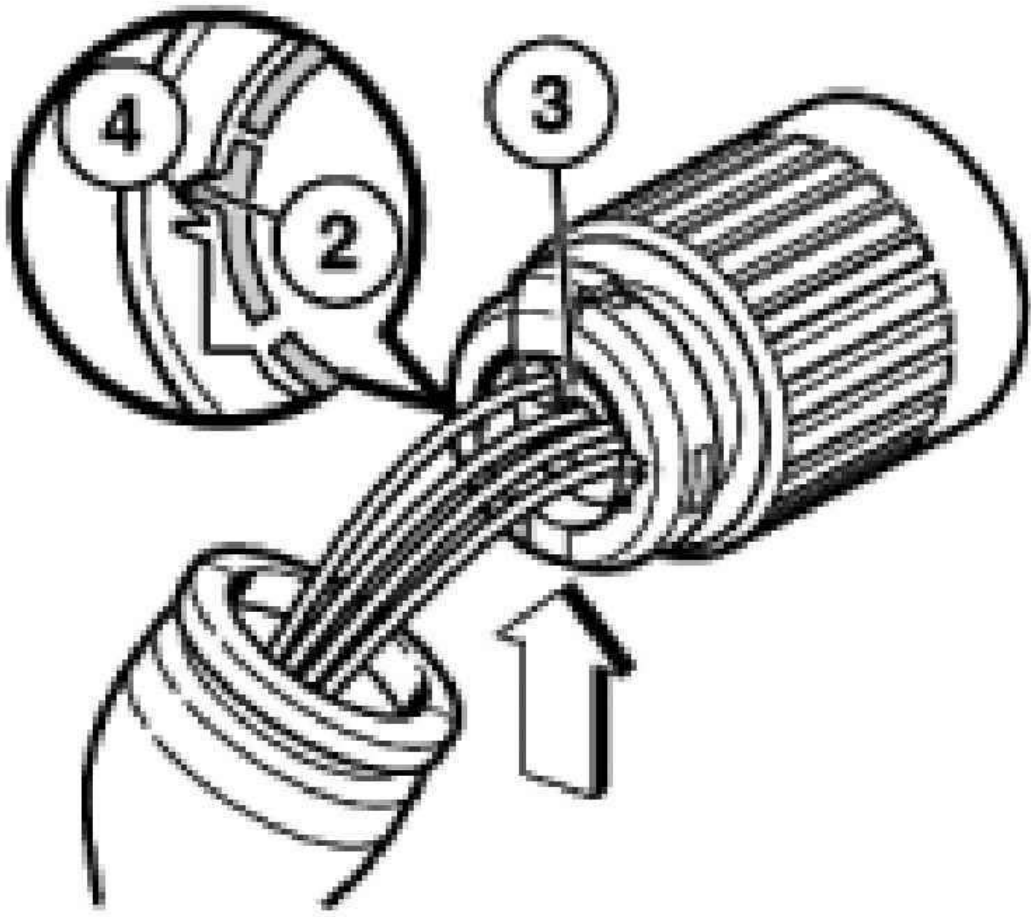


Fig. 13: Locating Recessed Notch In Inner Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Circular plug 13 Pin System D2.5

- Carefully pull off the rubber grommet (1).
- Pull the lock retainers (2) outward (direction of arrows) to allow the lock notch to disengage.
- Pull the inner section (3) upward as shown in the illustration until the lock notches (4) are in the released position of the lock retainers (5) and use the appropriate size spring contact and remove the connector from the housing.

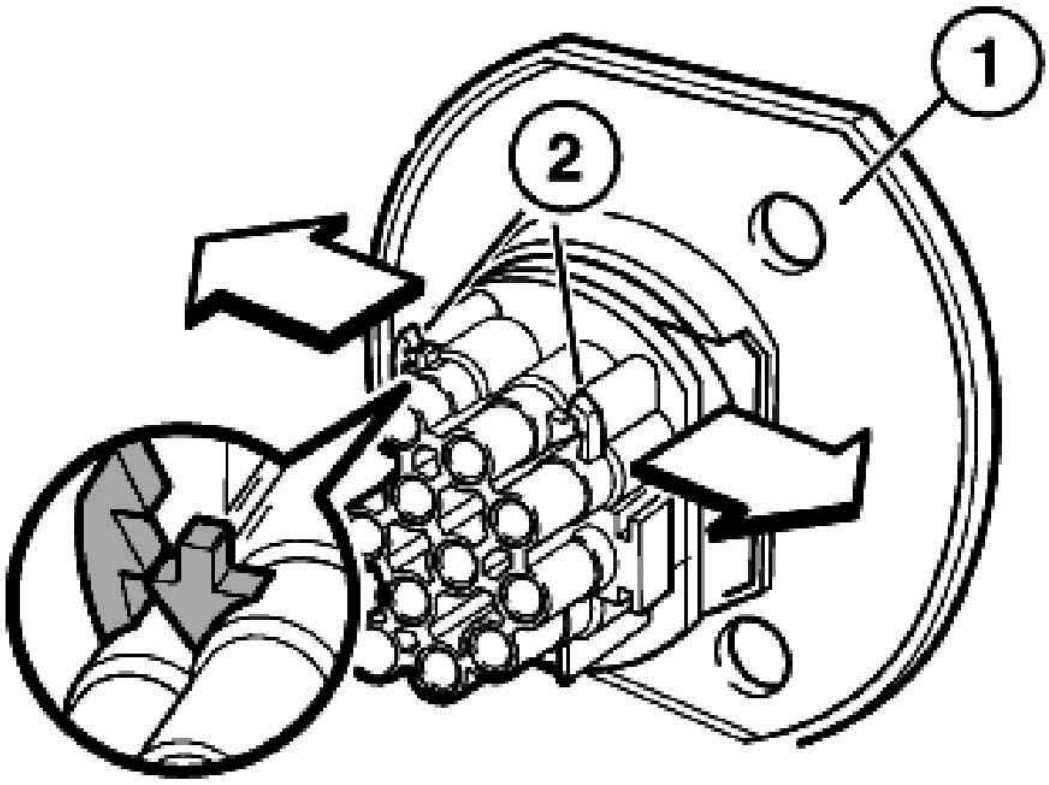


Fig. 14: Locating Circular Plug Lock Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

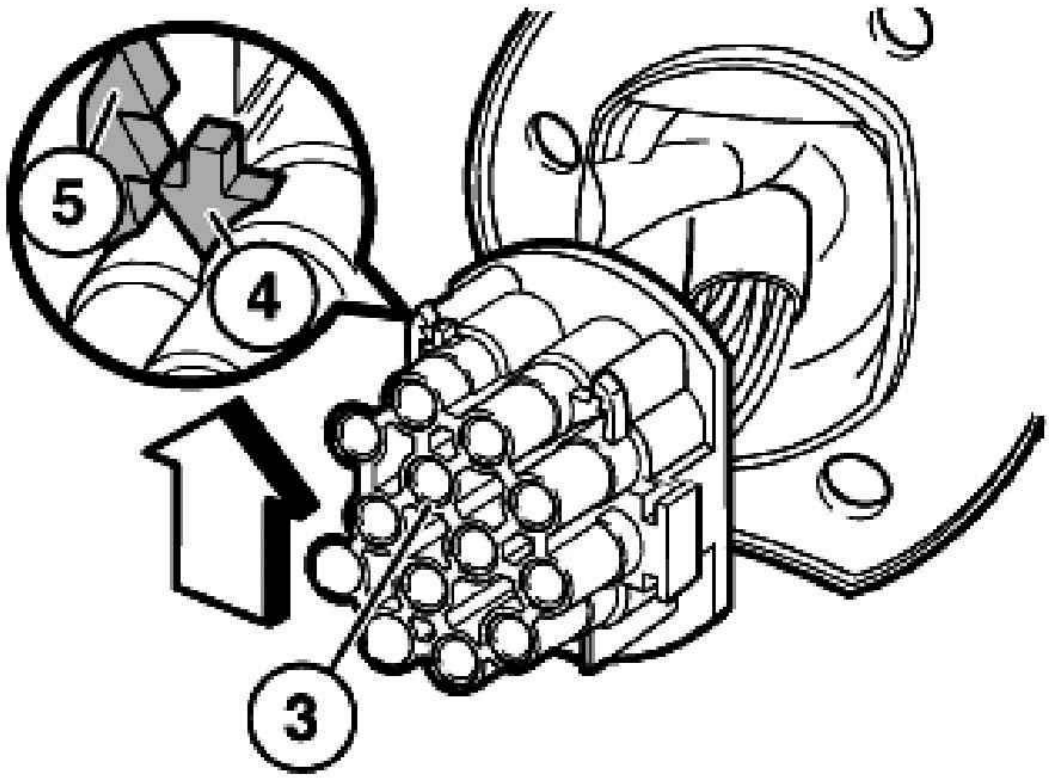


Fig. 15: View Of Lock Notch In Circular Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Circular Plug 20 Pin System D2.5

- With the boot pulled back, press the lock tabs (1) of the inner connector section (2) inward.
- Simultaneously, rotate the inner connection section (2) counter clockwise to allow the lock tabs (1) to engage in the unlocked position and use the appropriate sized spring contact and remove connector from the housing.

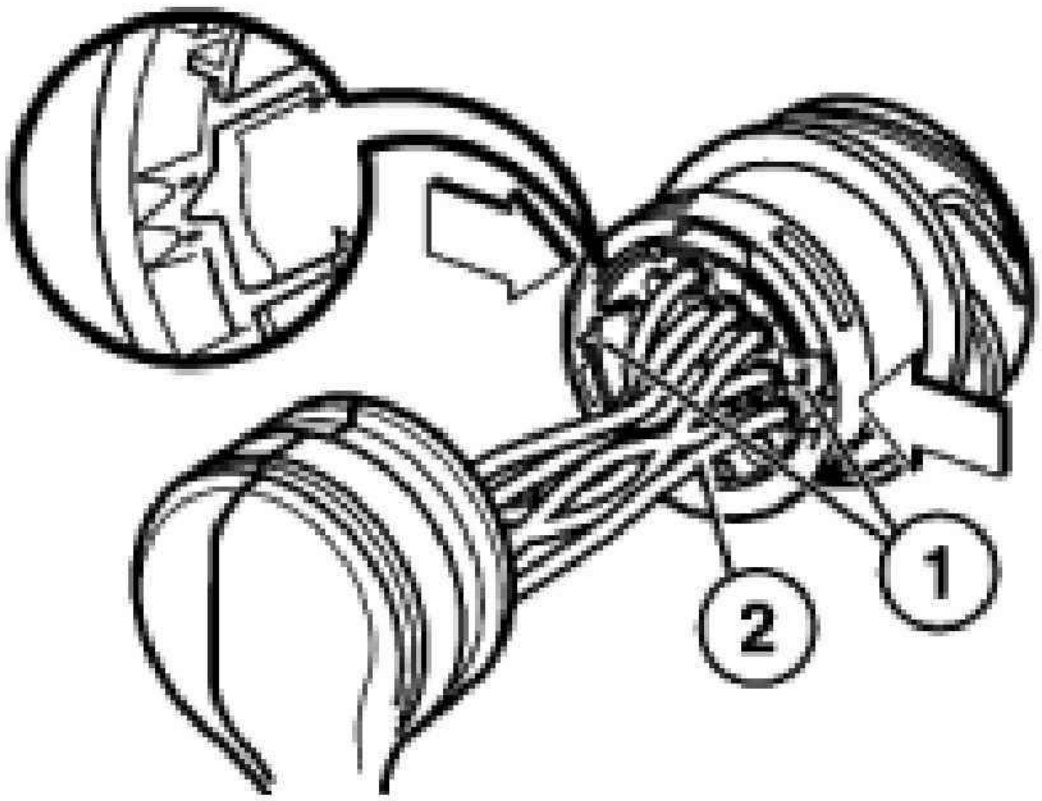


Fig. 16: Identifying Circular Plug Lock Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

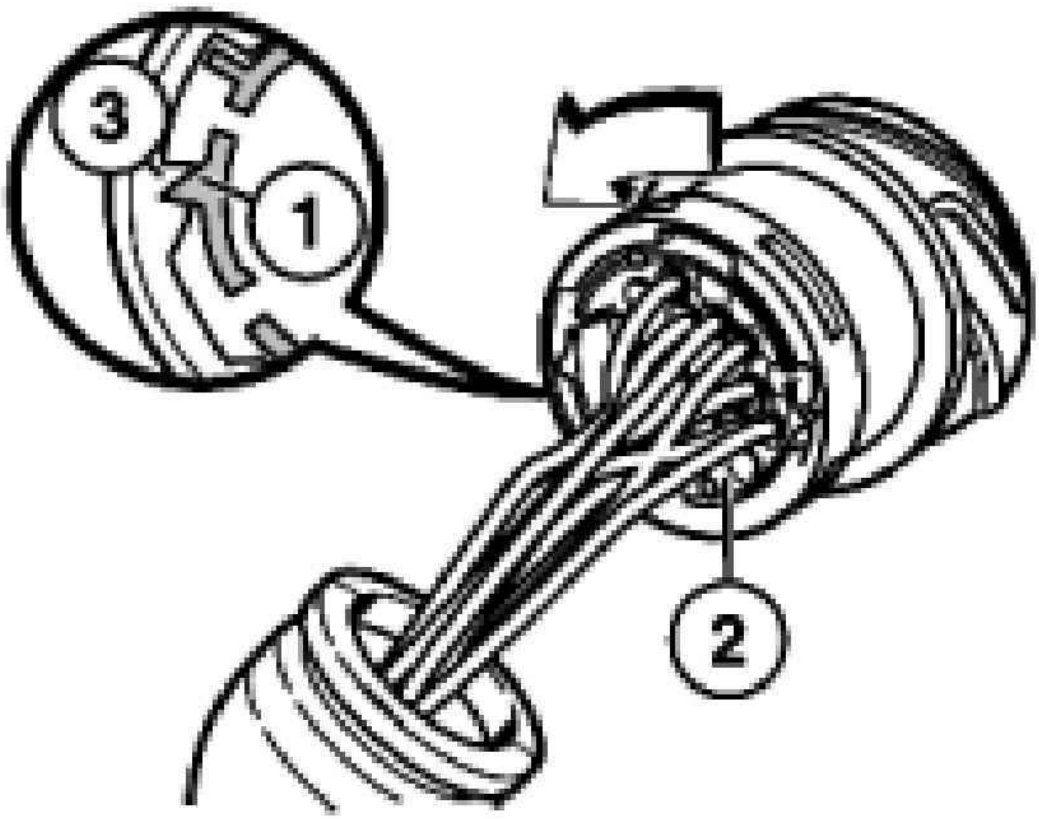


Fig. 17: View Of Inner Connection Of Circular
Courtesy of BMW OF NORTH AMERICA, INC.

Circular Plug 4-7-10-12-25 Pin System D1.5/D2.5

- Insert the appropriate unlocking tool (determined by the number of pins) into the connector.
- The connector is unlocked when the lock tab (3) is in the unlocked position (1). The connector is locked when the lock tab (3) is in the locked position (2).
- Use the appropriate sized spring contact and remove connector from the housing.

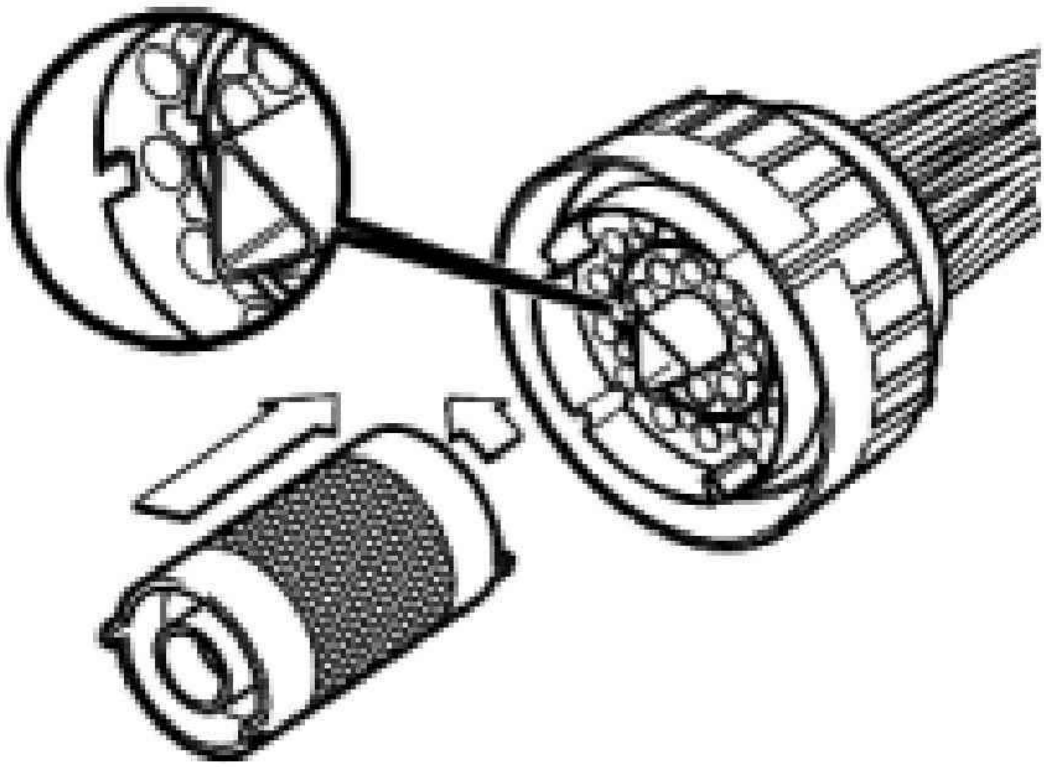


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Fig. 18: View Of Circular Plug And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

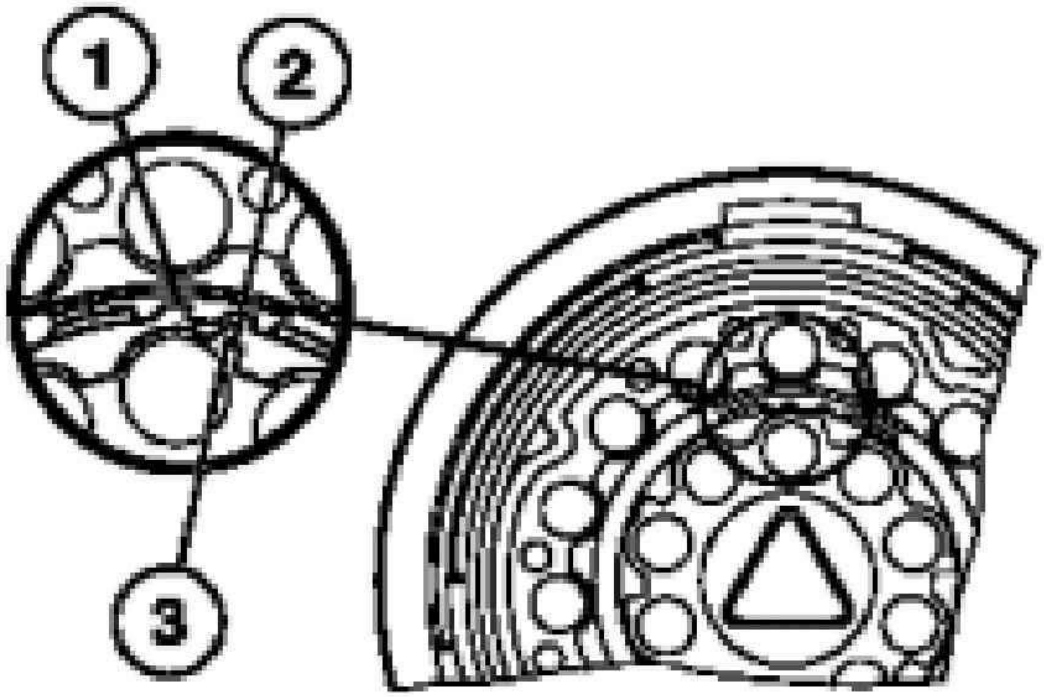


Fig. 19: Identifying Lock Tab Of Circular Plug
Courtesy of BMW OF NORTH AMERICA, INC.

In-line Plug 15 Pin System D2.5

- Pull the outer connector section (1) slightly outward in the area of lock tabs (2).
- Simultaneously, slide the inner connector section (3) in the direction of the arrow to the unlocked position.
- Use the appropriate sized spring contact and remove connector from housing.

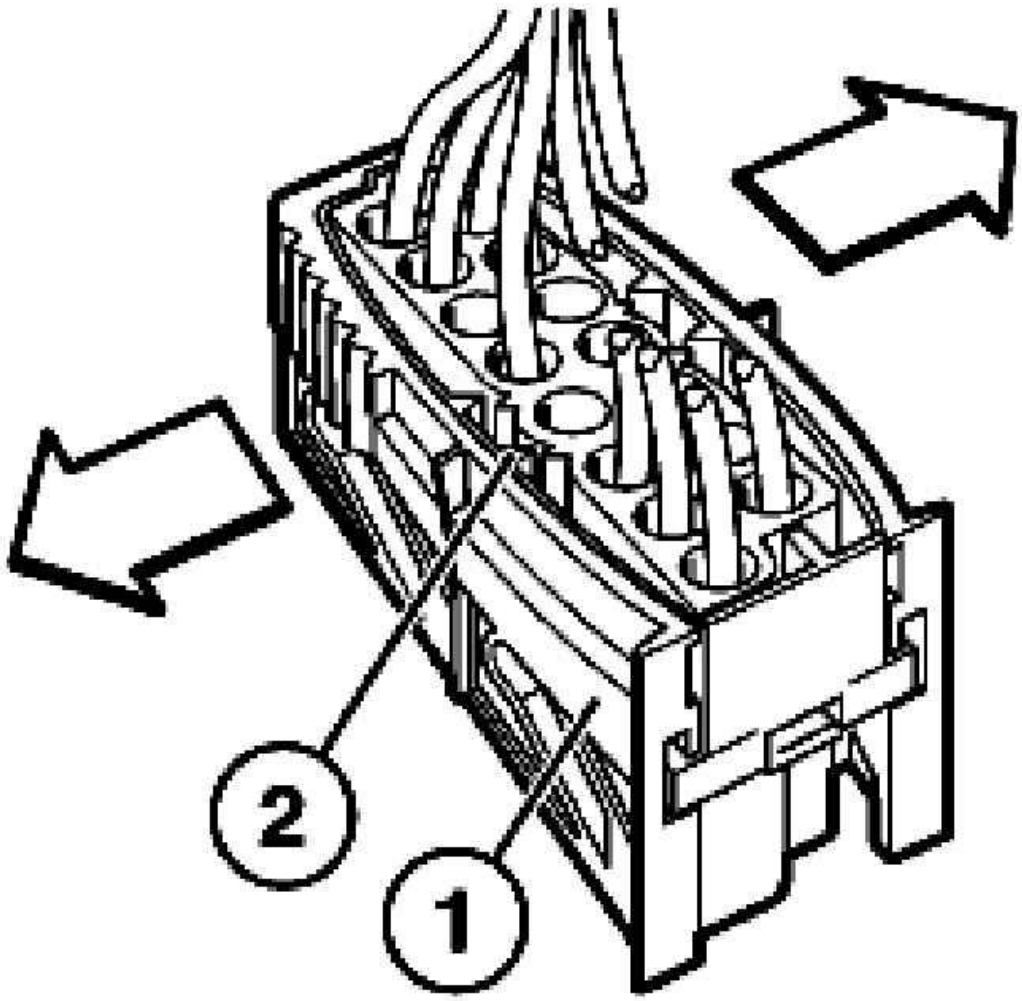
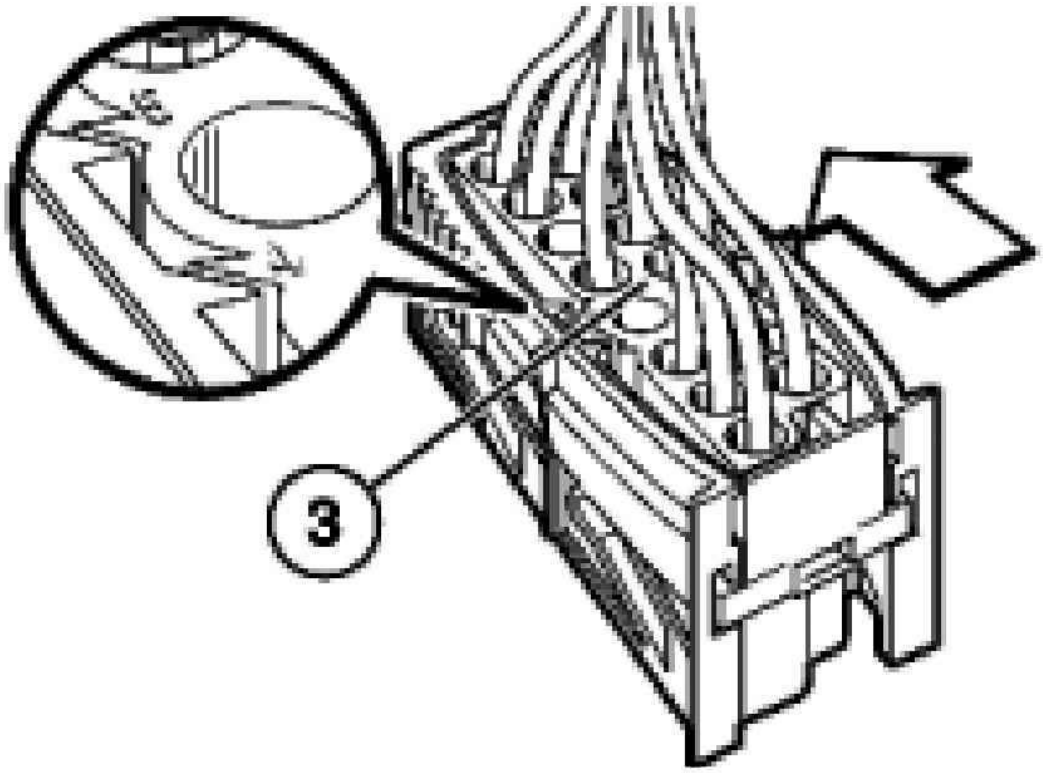


Fig. 20: Identifying In-Line Plug Lock Tabs
Courtesy of BMW OF NORTH AMERICA, INC.



G03388953

Fig. 21: Locating In-Line Plug Inner Connector Section
Courtesy of BMW OF NORTH AMERICA, INC.

In-line Plug 8-, 12 Pin System D2.5

- Slide the upper section (1) and the lower section (2) of the connector in opposite directions to unlock the connector.
- Using special tool **61 1 132** press the spring latch down and pull the connector (3) from the housing.

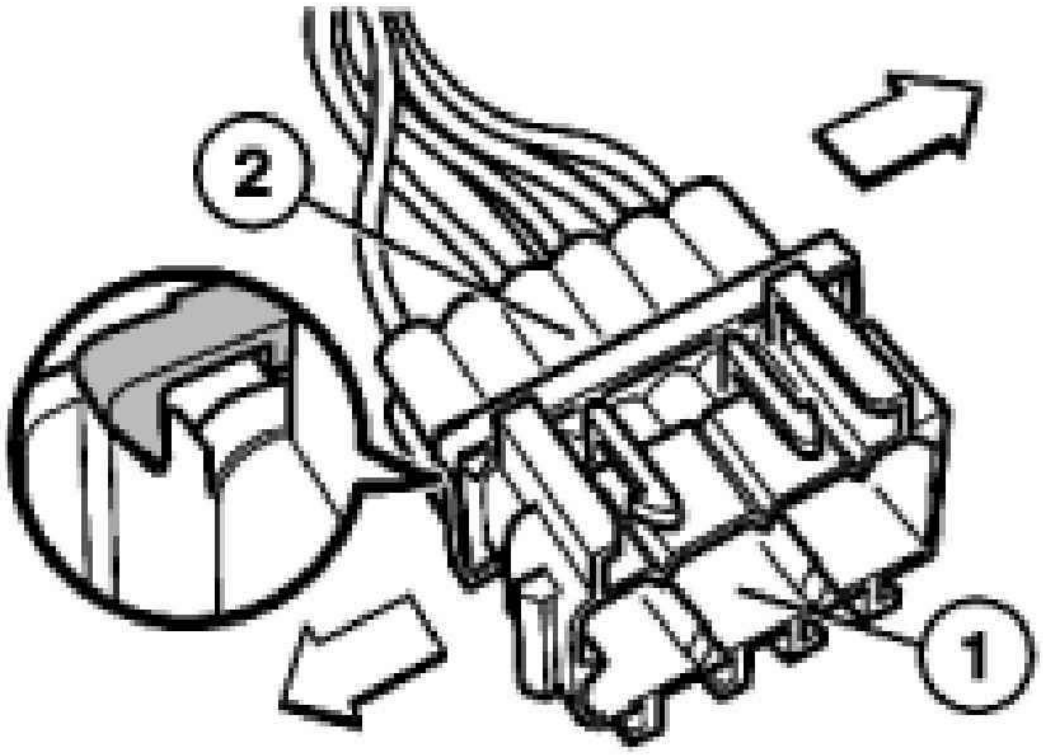


Fig. 22: Separating In-Line Plug Lower And Upper Sections
Courtesy of BMW OF NORTH AMERICA, INC.

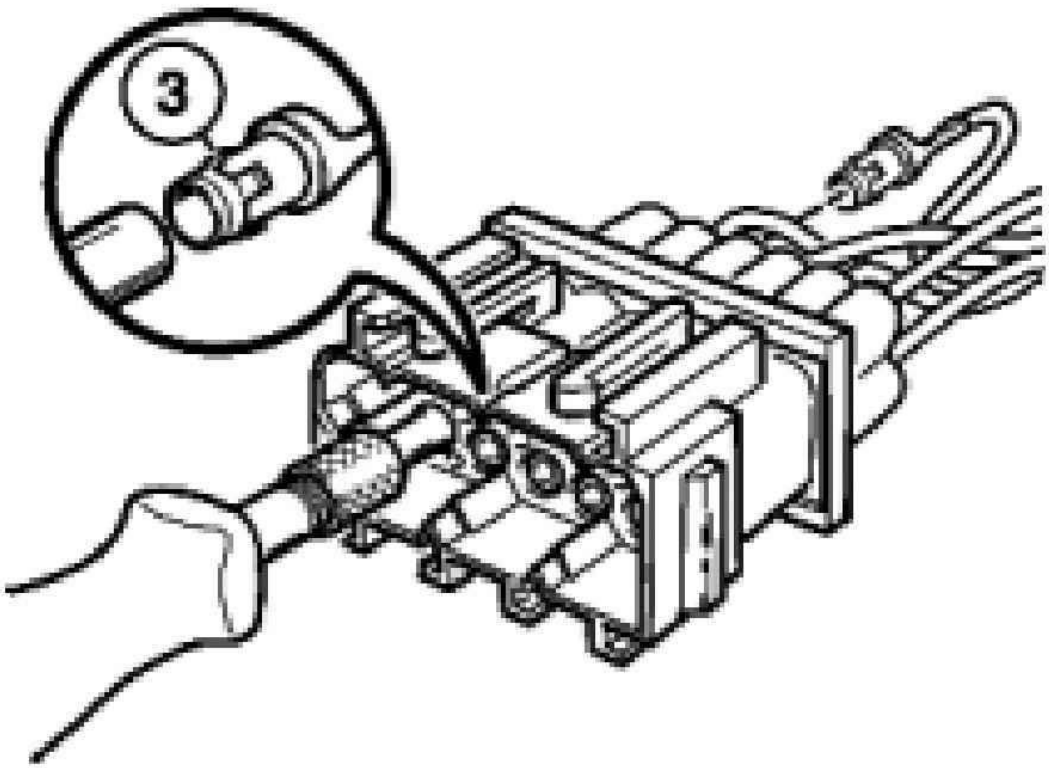


Fig. 23: View Of In-Line Plug Connector
Courtesy of BMW OF NORTH AMERICA, INC.

In-line Plug 20 Pin System D2.5

- Pull locking slide (1) completely out of connector (2).
- Using special tool **61 1 132** press the spring latch down and pull the connector from the housing.

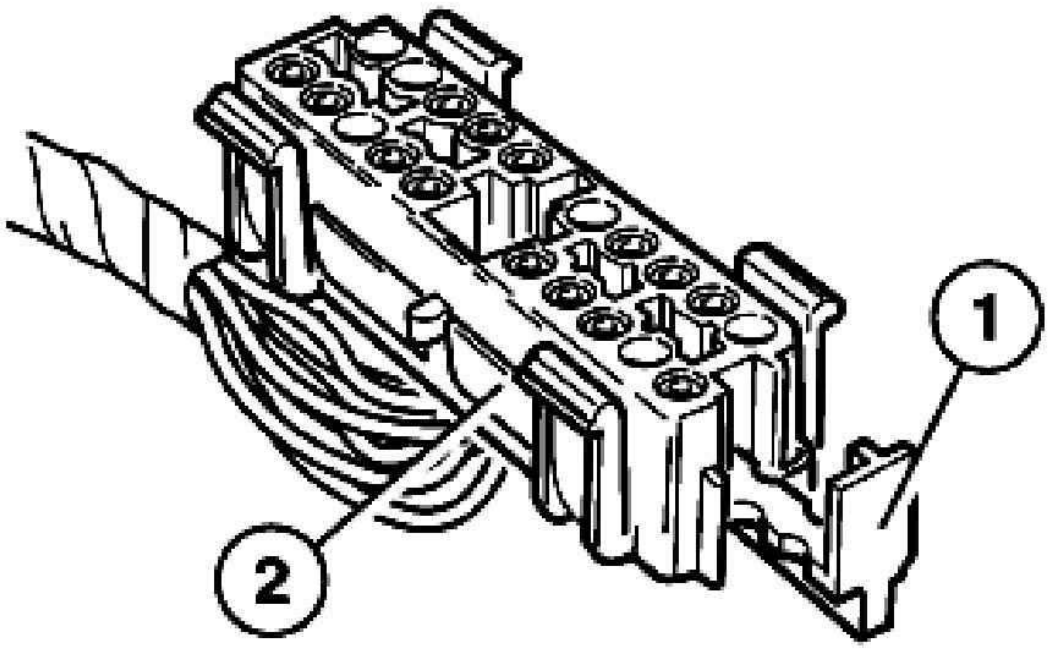


Fig. 24: Removing Locking Slide From Connector
Courtesy of BMW OF NORTH AMERICA, INC.

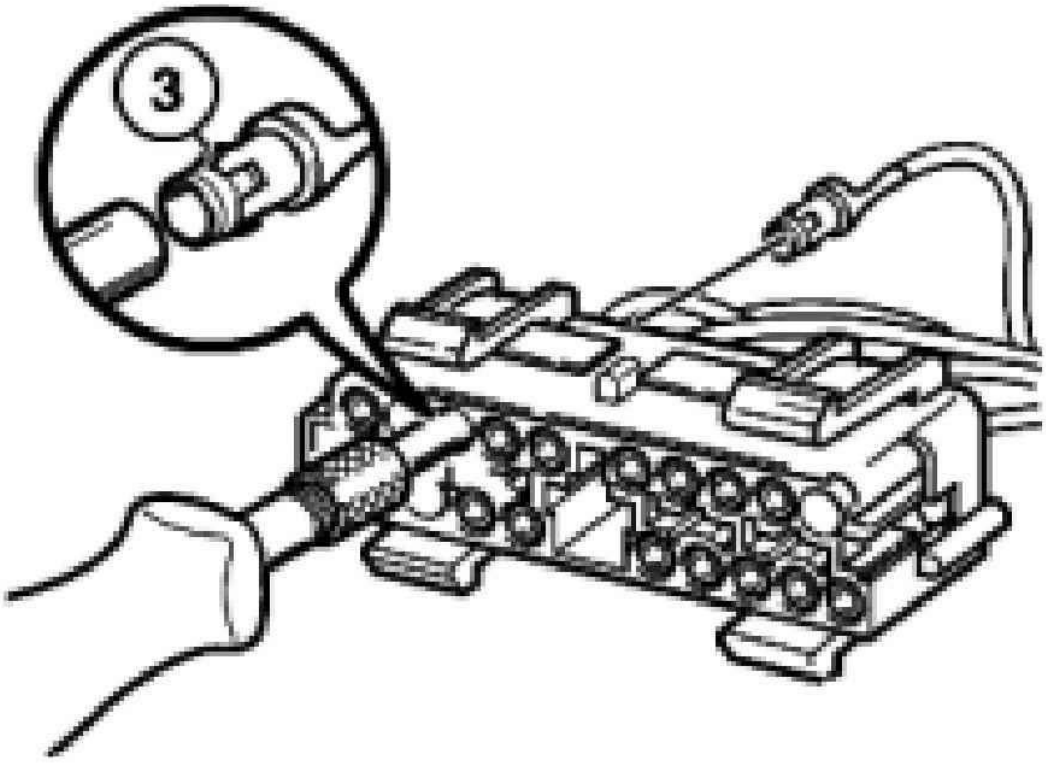


Fig. 25: View Of In-Line Plug Connector
Courtesy of BMW OF NORTH AMERICA, INC.

In-line Plug 30 Pin System D2.5

- Pull the outer section (1) slightly outward in the area of lock tabs (2).
- Simultaneously, slide the inner connector section (3) in the direction of the arrow to the unlocked position.
- Use the appropriate sized spring contact and remove connector from housing.

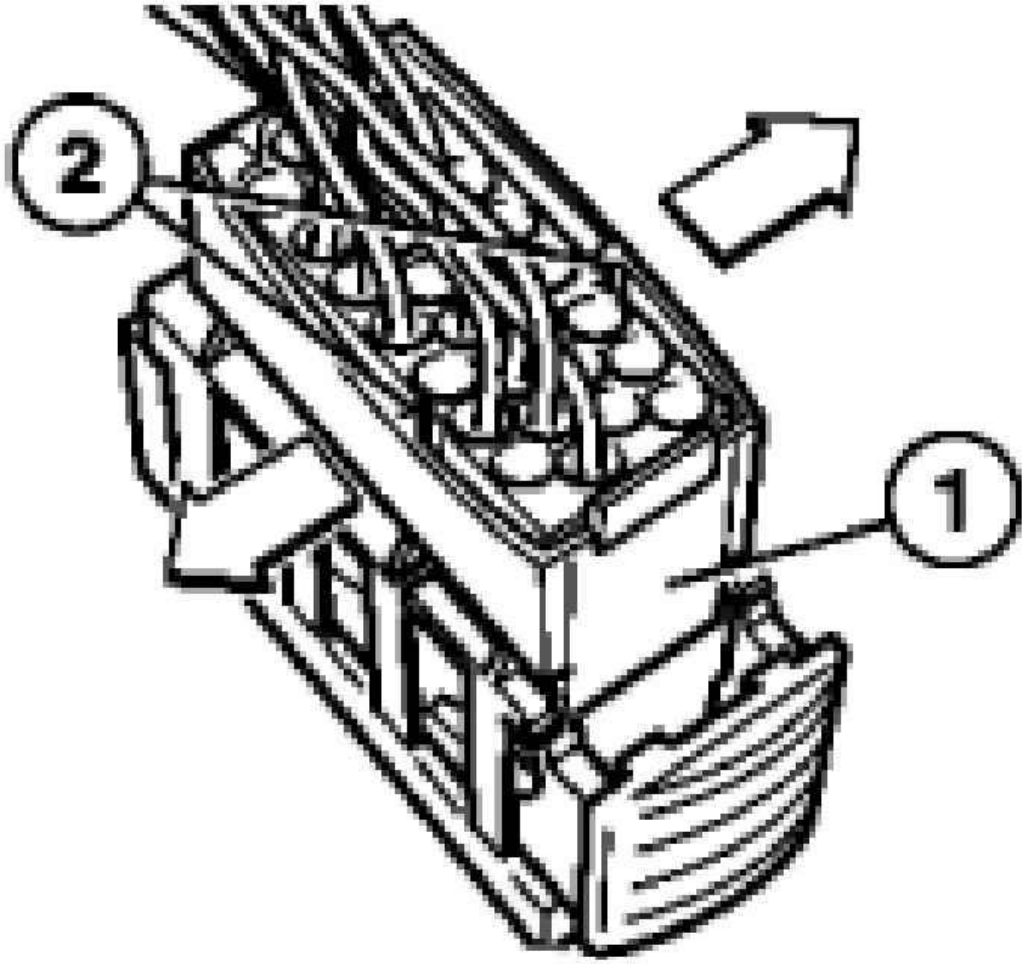


Fig. 26: Identifying In-Line Plug Outer Section
Courtesy of BMW OF NORTH AMERICA, INC.

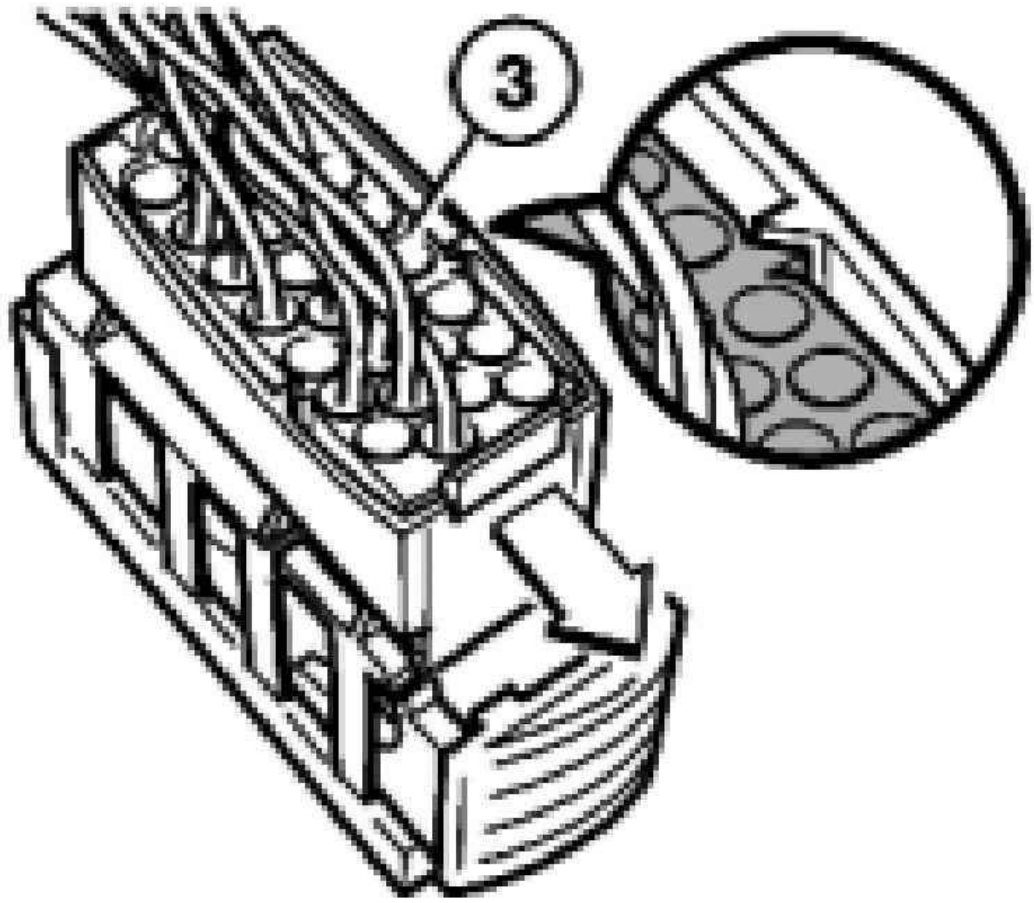


Fig. 27: View Of Inner Section Of In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

PLUG SYSTEM JPT/MDK/DFK

In-line plug 2 Pin System JPT ELA

- Press lock (1) in direction of arrow and slide plug forward.
- Press lock (1) downward and slide out to one side.
- Unlock contact with special tool **61 1 136** and pull out cable (2) and contact towards rear.

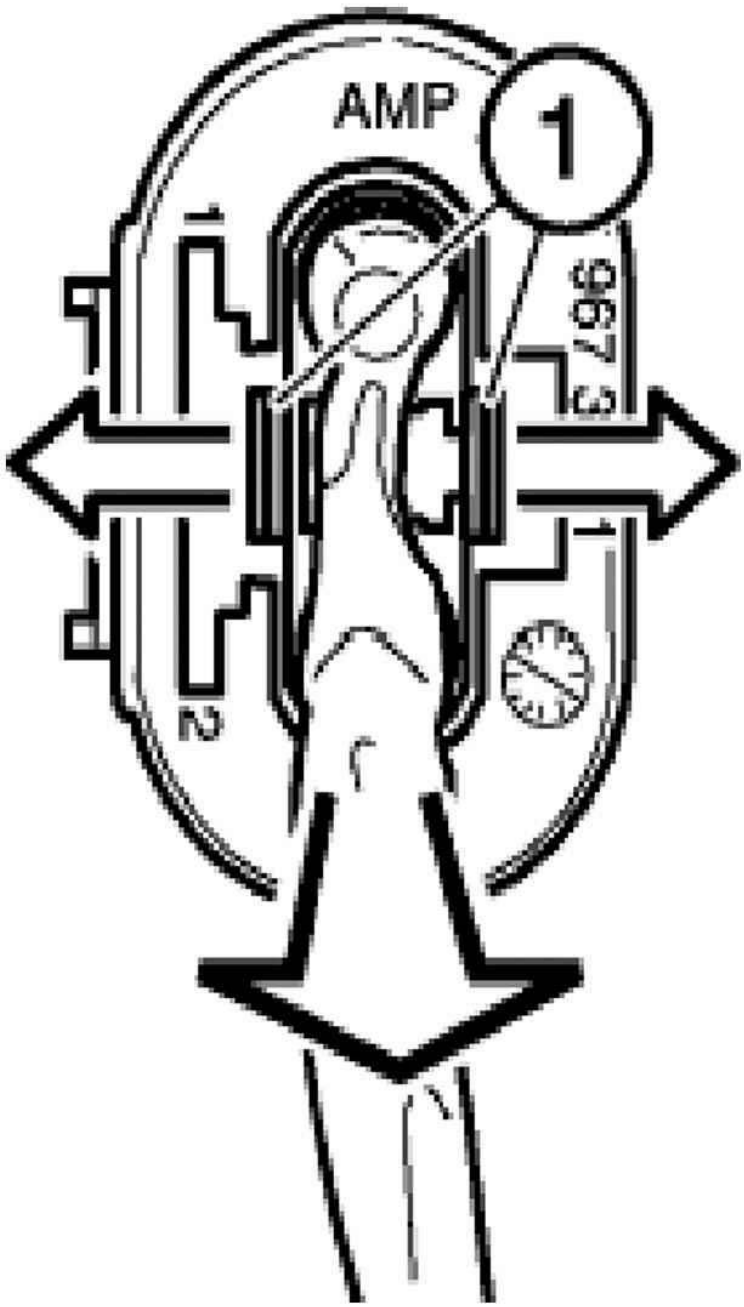


Fig. 28: Locating Lock For In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

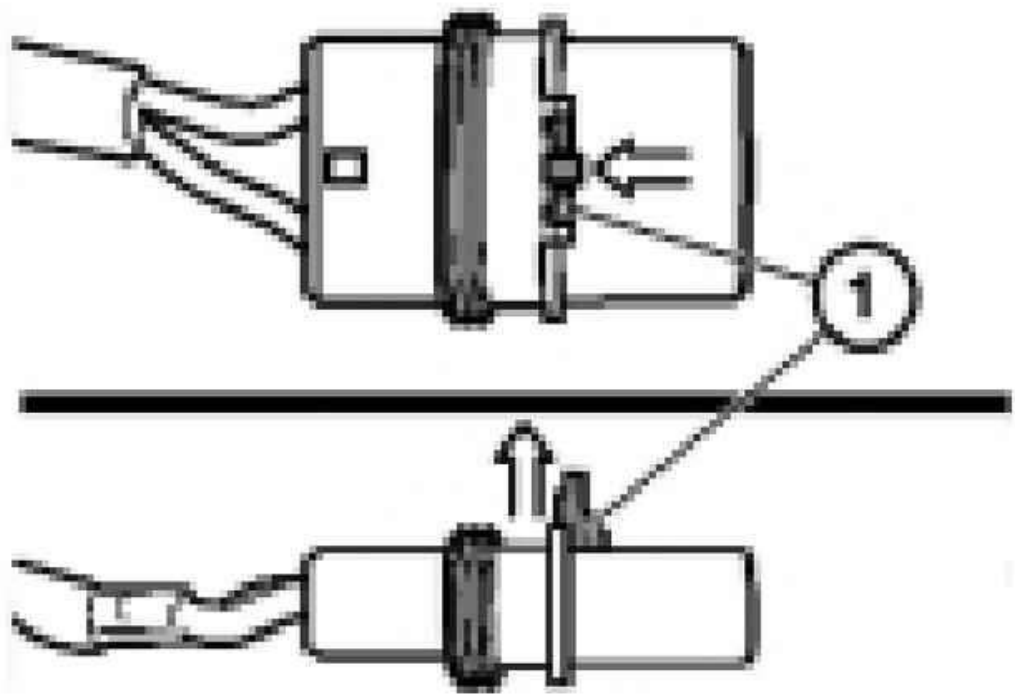


Fig. 29: View Of In-Line Plug Lock
Courtesy of BMW OF NORTH AMERICA, INC.

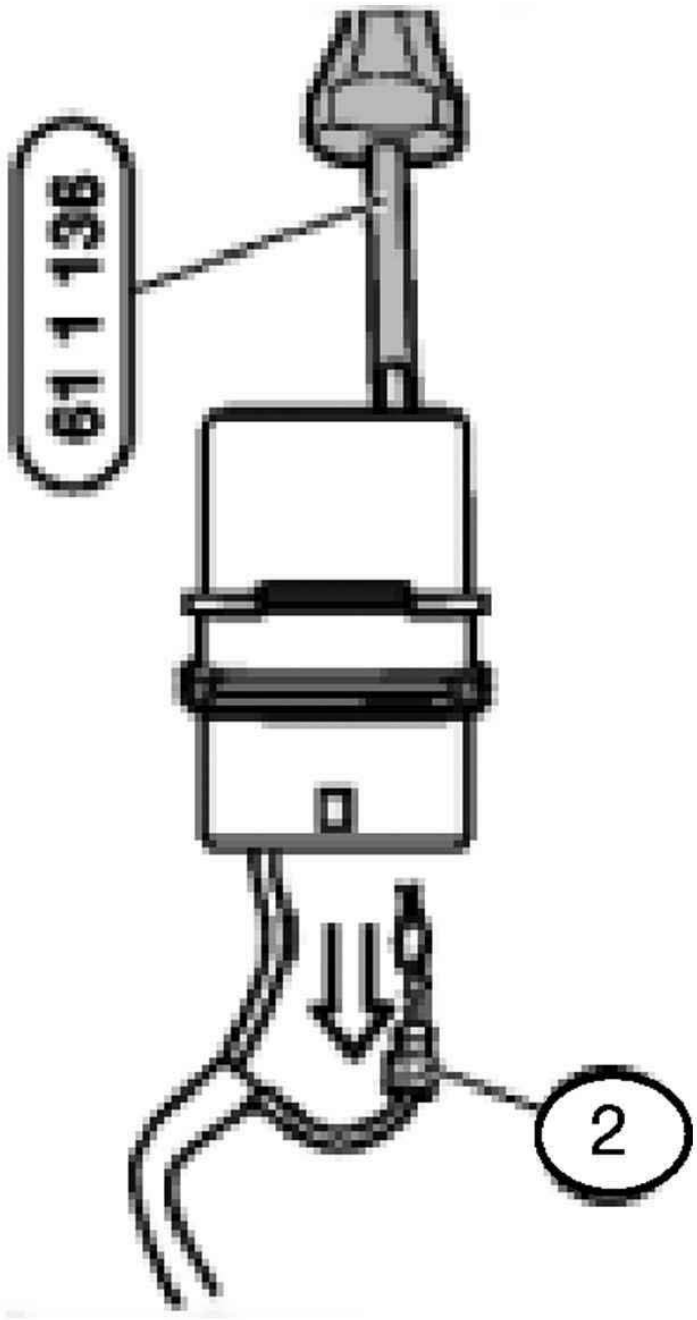


Fig. 30: Removing In-Line Plug Contact Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

In-line plug 2 Pin System MDK 3 plus 2.8

- Unlock lock (1) on outside at arrester hook and slide out lock (1) side.
- Unlock contact with special tool **61 1 136** and pull out cable (2) and contact towards rear.

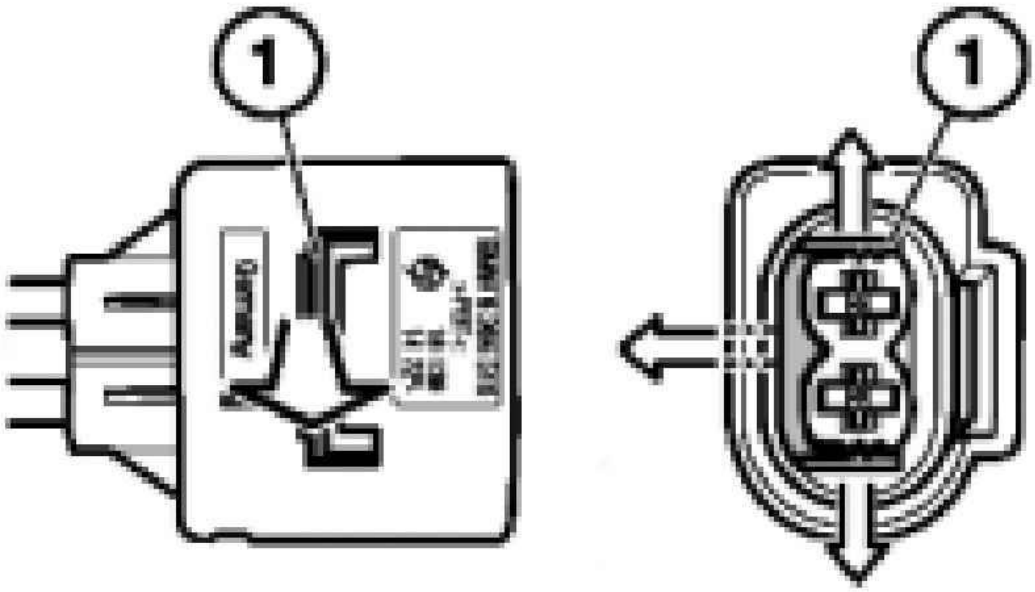


Fig. 31: View Of Lock On In-Line Plug Arrester Hook
Courtesy of BMW OF NORTH AMERICA, INC.

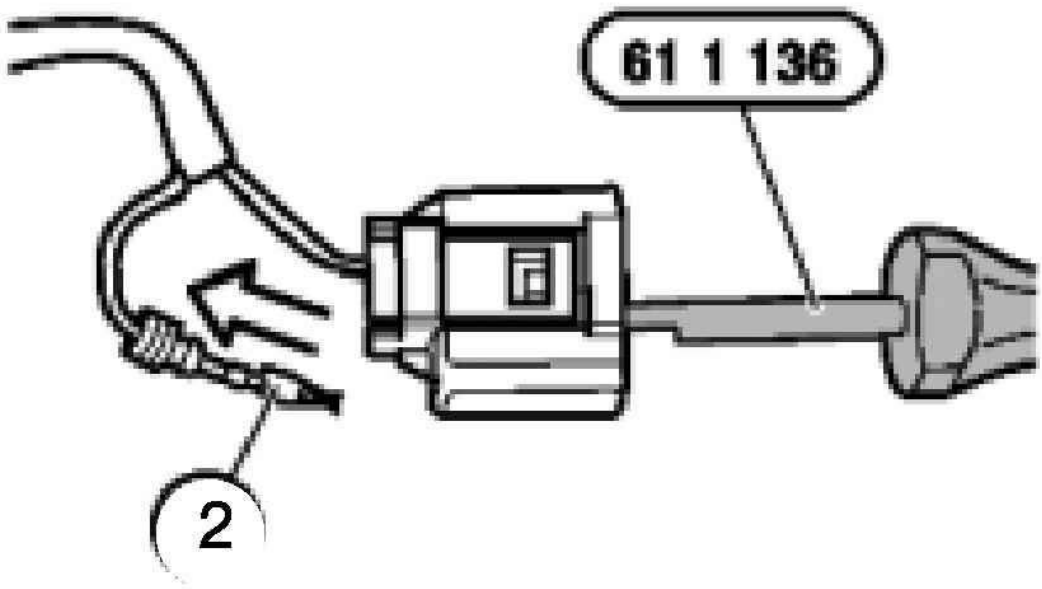


Fig. 32: Identifying In-Line Plug And Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

In-line plug 4 Pin System DFK ELA

- Press arrester hook in direction of arrow and remove lock (1).
- Unlock contact with special tool **61 1 136** and pull cable and contact out towards rear.

Installation Instructions:

- If necessary, slide lock must also be unlocked with screw driver.

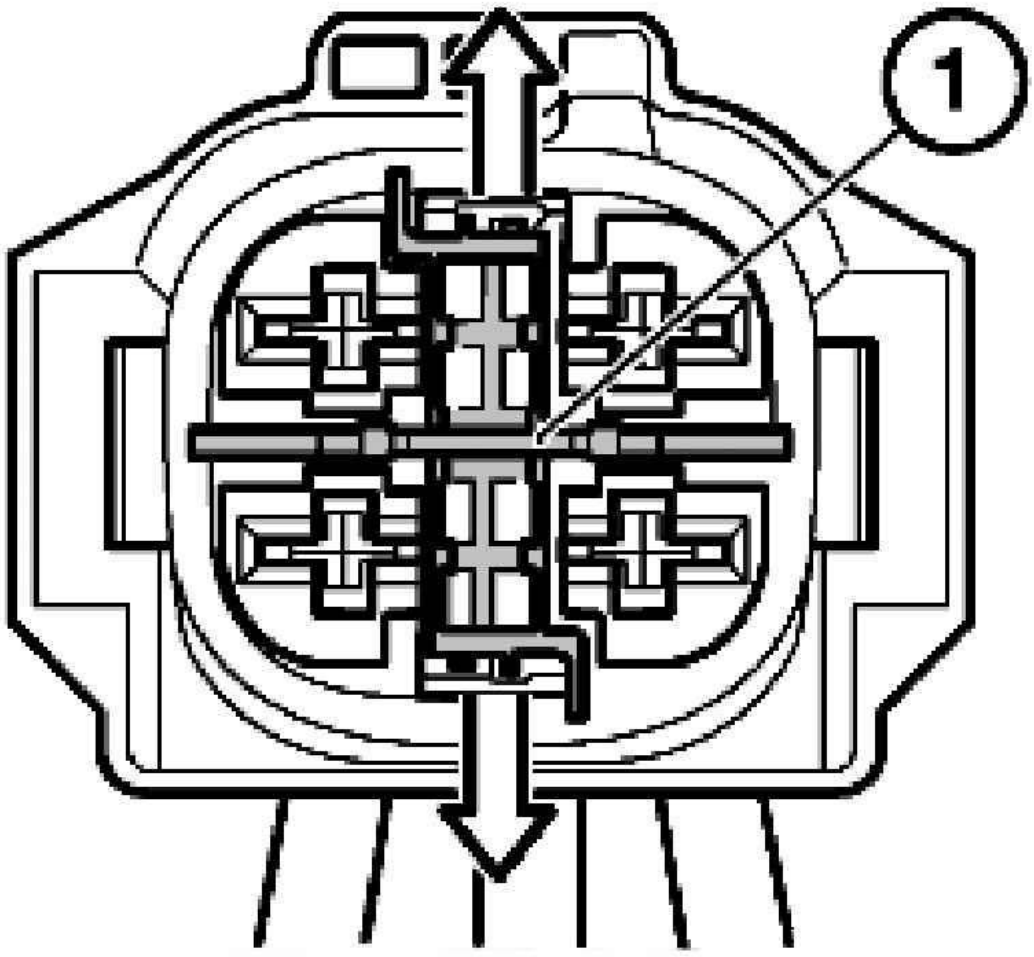


Fig. 33: Locating Lock In Plug
Courtesy of BMW OF NORTH AMERICA, INC.

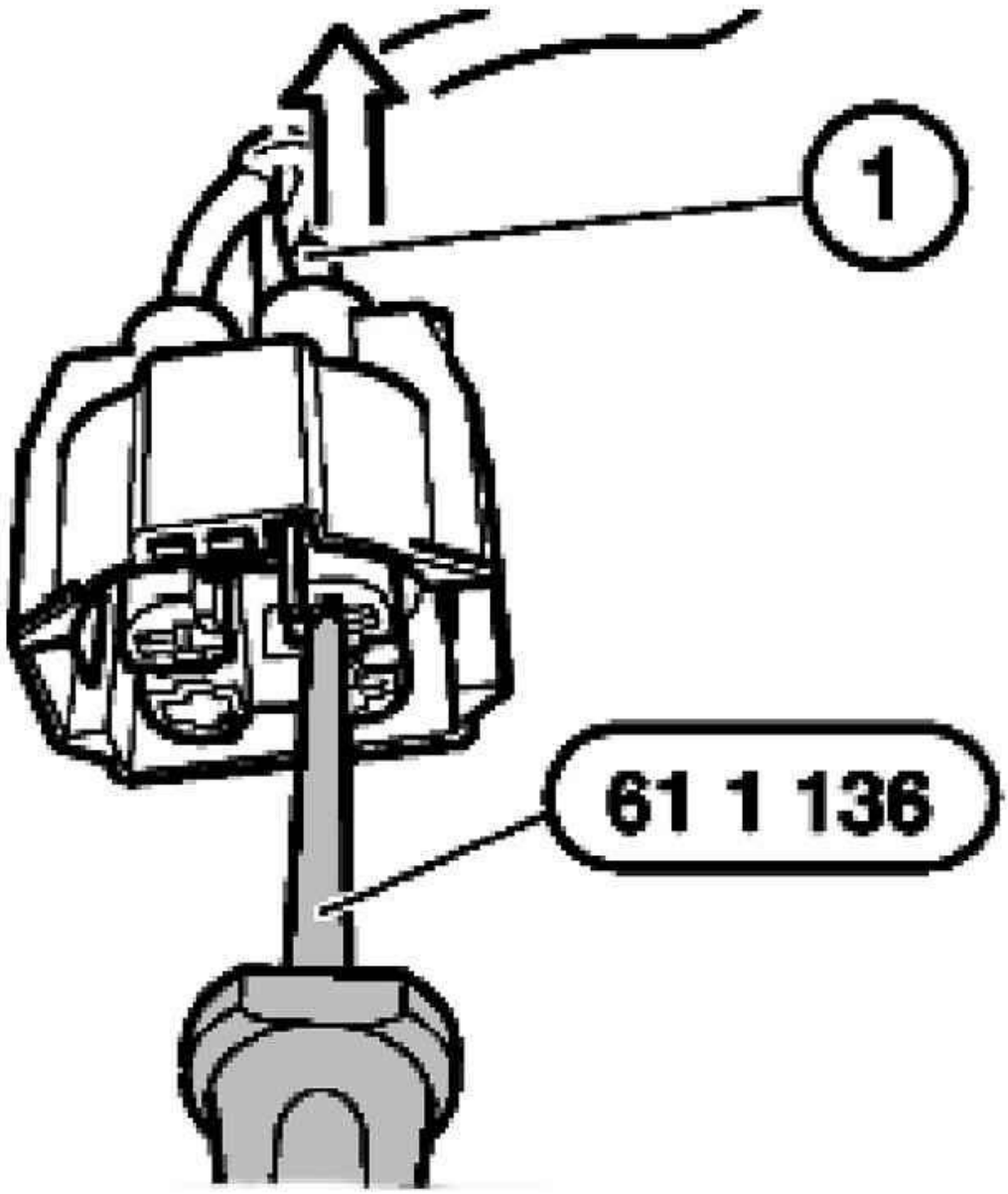
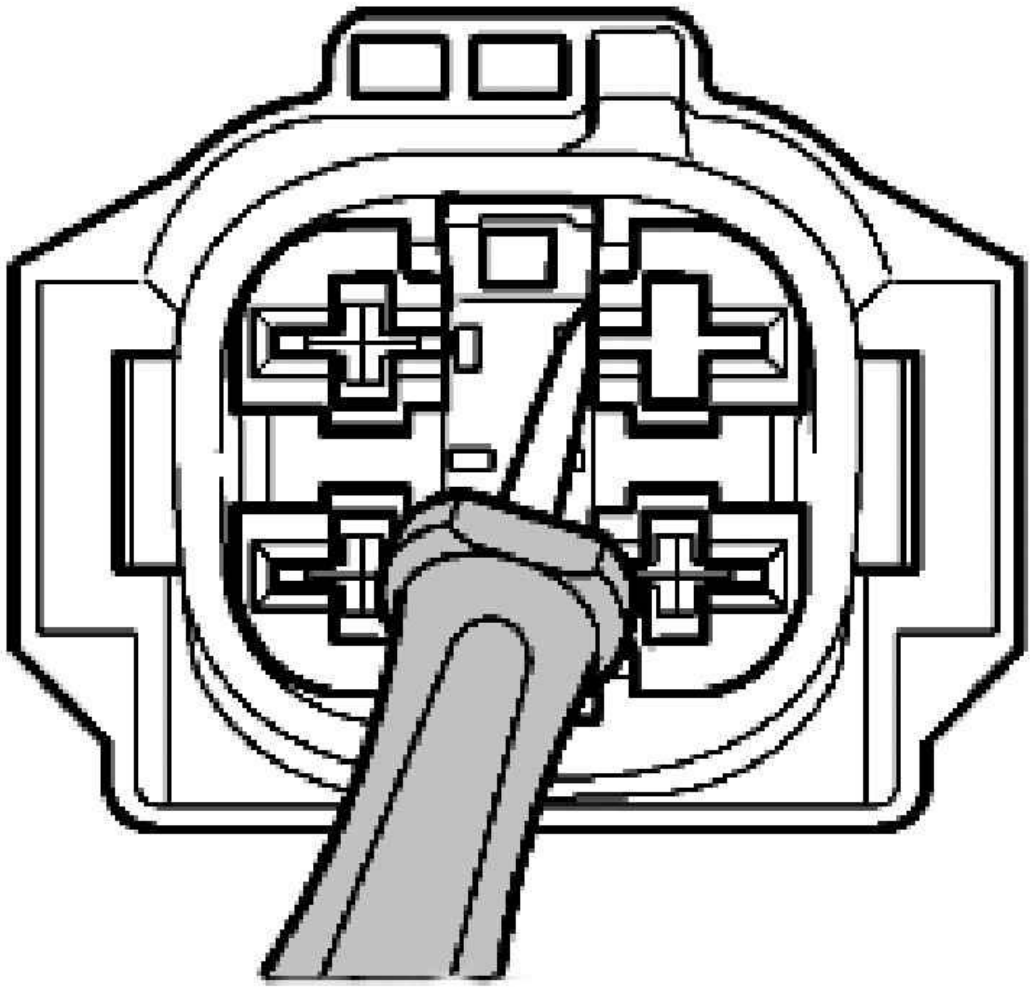


Fig. 34: Unlocking With Special Tool (61 1 136)
Courtesy of BMW OF NORTH AMERICA, INC.



G03388967

Fig. 35: View Of Slide Lock In Plug
Courtesy of BMW OF NORTH AMERICA, INC.

PLUG SYSTEM ELO/ELO POWER

In-line Plug 3-,6 Pin System Elo-Power 2.8

- Press unlocking hook (1) in direction of arrow and disengage. Then unlock locking hook (2) and remove lock.
- Press down arrestor hook (3) with screwdriver and pull out cable with contact towards rear.

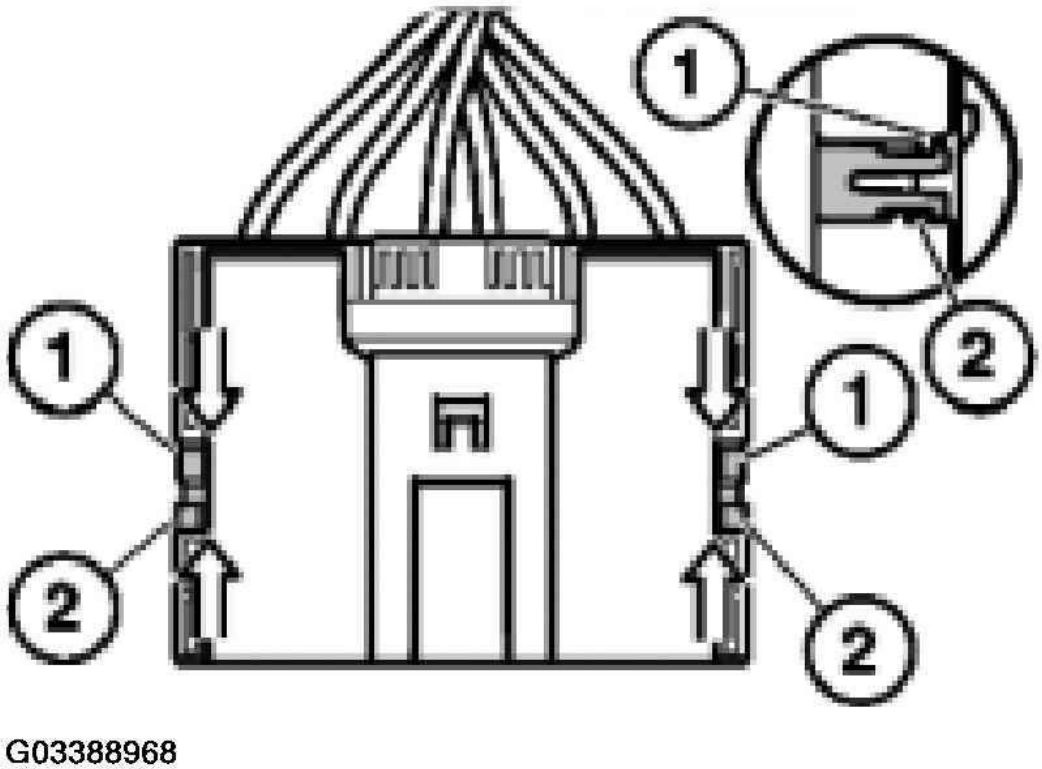


Fig. 36: Identifying Hook On In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

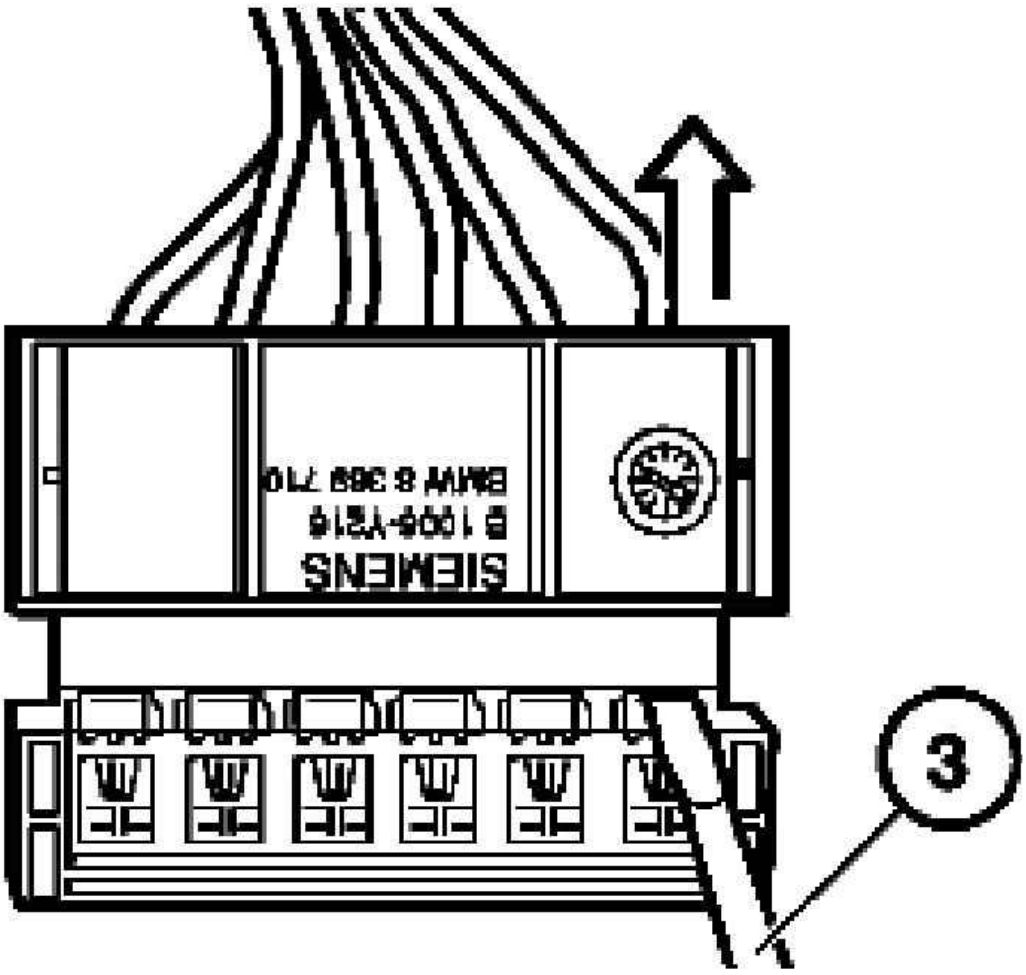


Fig. 37: View Of In-Line Plug Arrester Hook
Courtesy of BMW OF NORTH AMERICA, INC.

In-line plug 4-,10 Pin System Elo

- Slide connector lock (1) off of main connector body.
- Push the lock tab of the connector being removed down (3) with pin or small screwdriver in the primary lock slot (4) and pull the wire out (5) to the secondary lock position (6).
- Push the lock tab down again in the secondary lock position and remove wire completely.

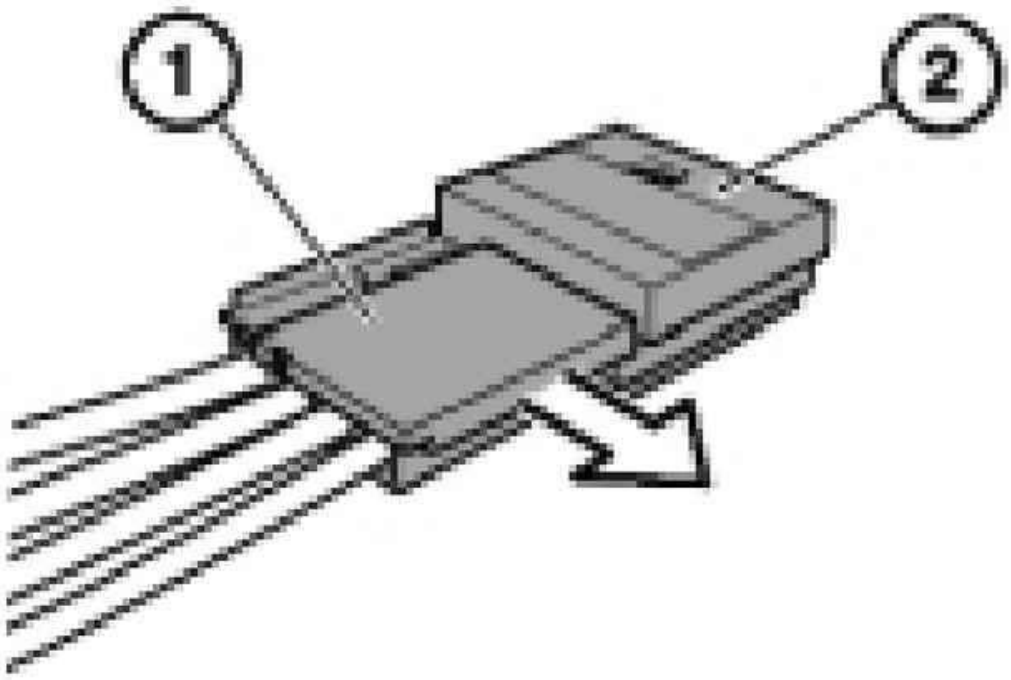


Fig. 38: Locating Connector Lock For In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

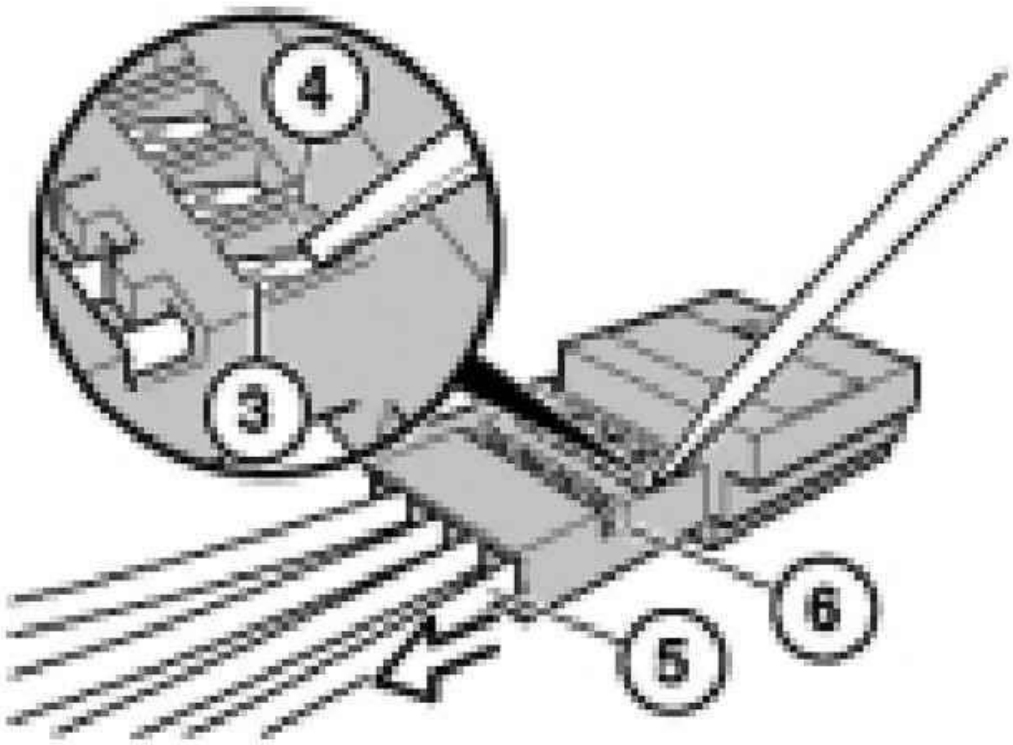


Fig. 39: Identifying In-Line Plug Lock Tab
Courtesy of BMW OF NORTH AMERICA, INC.

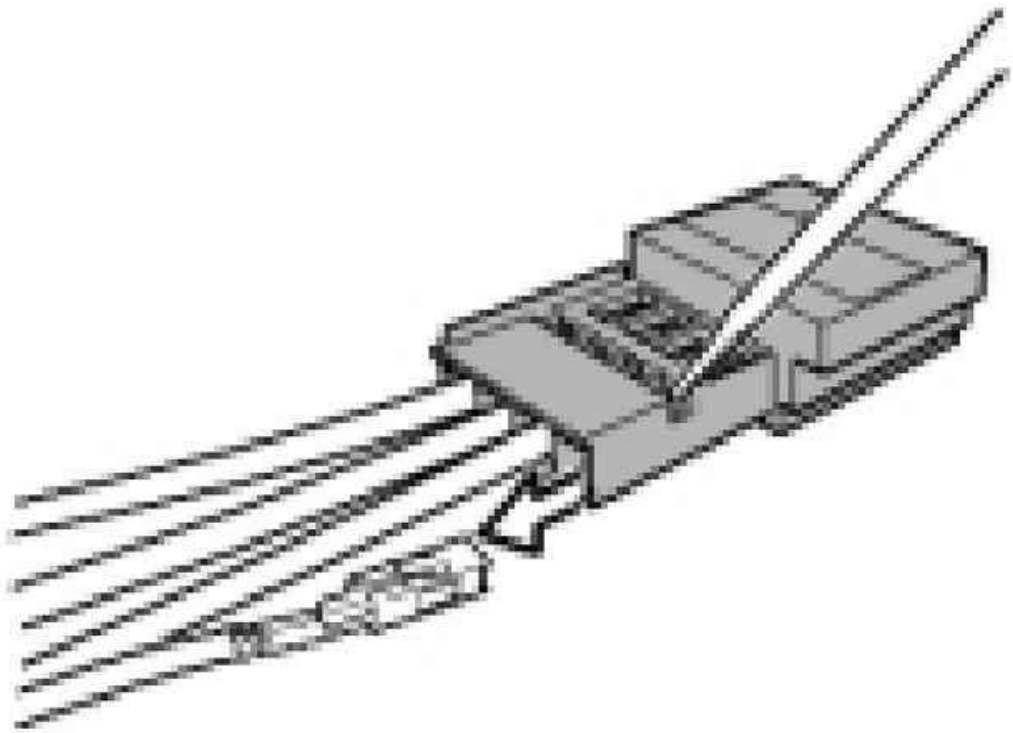


Fig. 40: View Of In-Line Plug 4-, 10 Pin System Elo
Courtesy of BMW OF NORTH AMERICA, INC.

In-line Plug 6-,50 Pin System Elo

- Unlock lock (**Fig. 41**).
- Unfasten cable clip (**Fig. 42**).
- Slide connector lock (1) off of main connector body (2) (**Fig. 43**).
- Push the connector plate (3) out of connector shell using a small screwdriver through hole on end of connector body (**Fig. 44**).
- Push the lock tab of the connector being removed down (6) with pin or small screw driver in the primary lock slot (7) and pull the wire out to the secondary lock position (8) (**Fig. 45**).
- Push the lock tab down again in the secondary lock position and remove wire completely (**Fig. 46**).

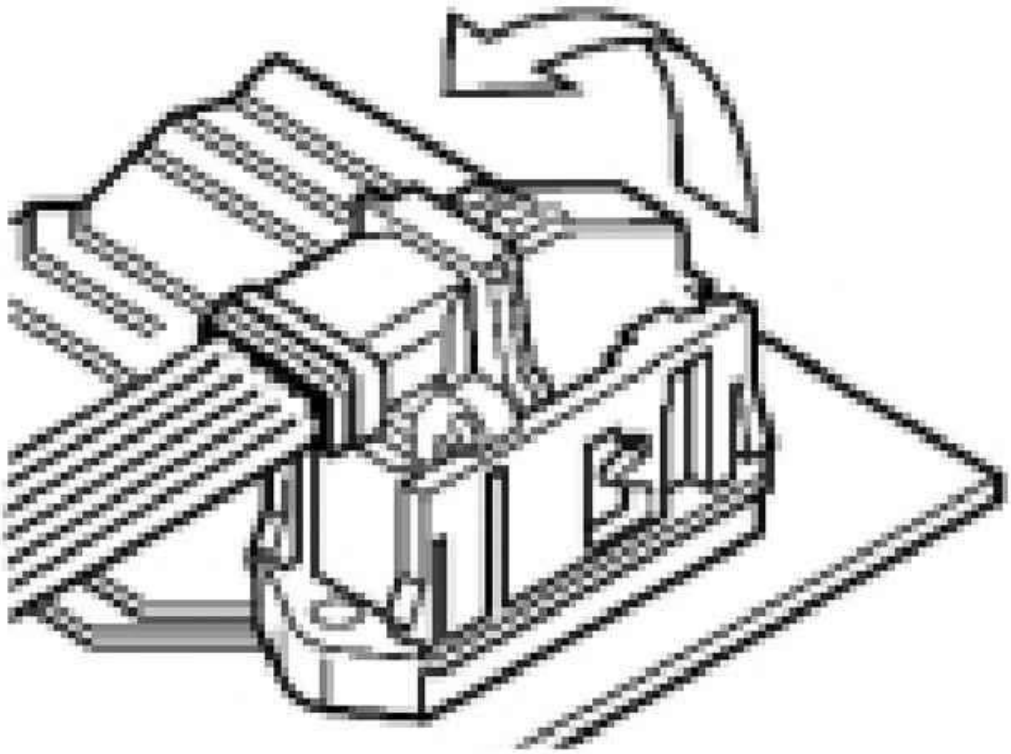


Fig. 41: Identifying Lock On In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

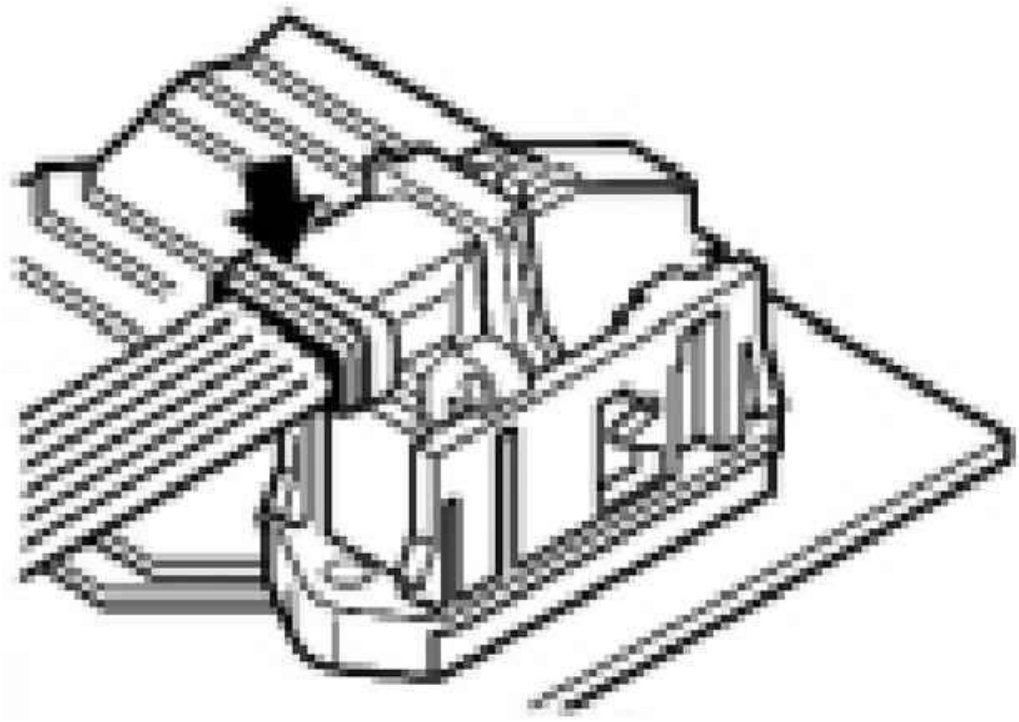


Fig. 42: View Of Clip On In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

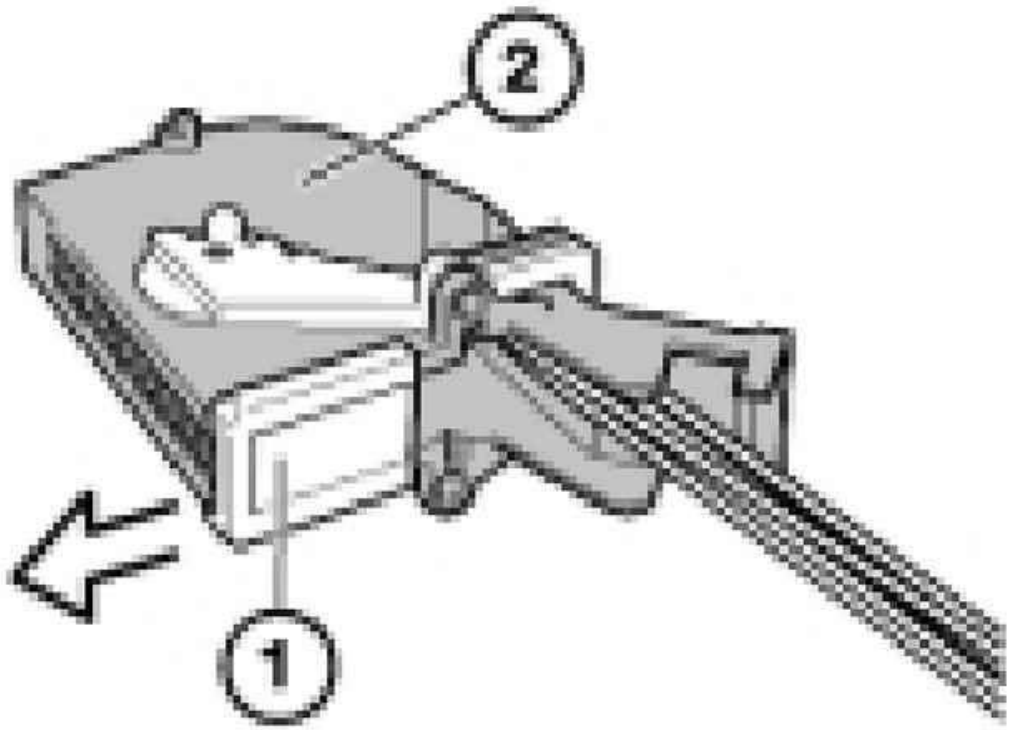


Fig. 43: Removing Connector Lock From In-Line
Courtesy of BMW OF NORTH AMERICA, INC.

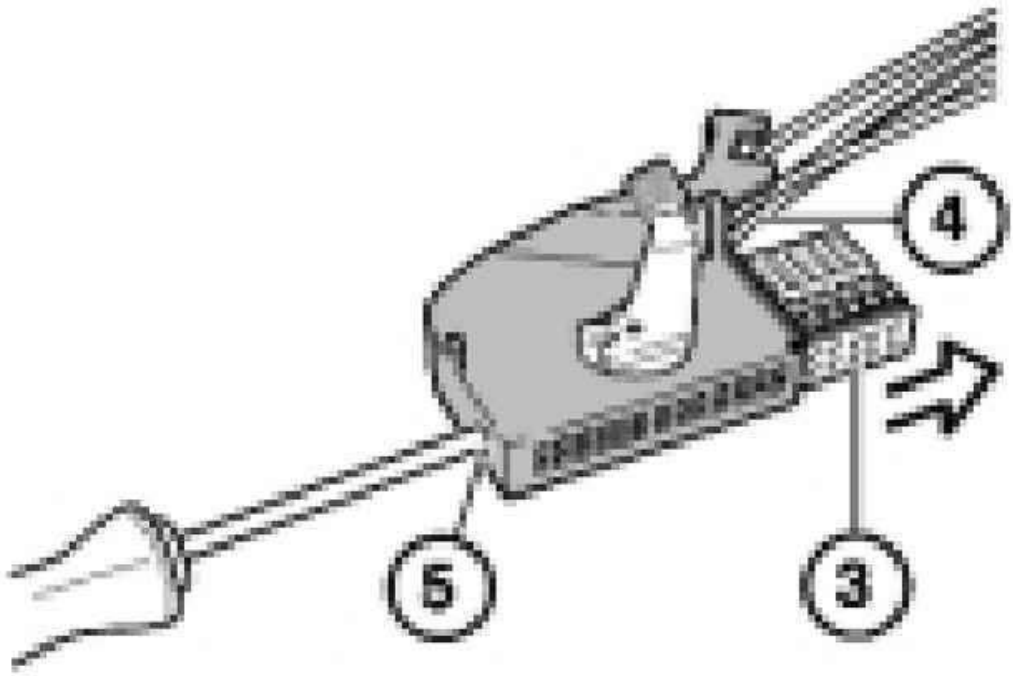


Fig. 44: Removing Connector Plate From In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

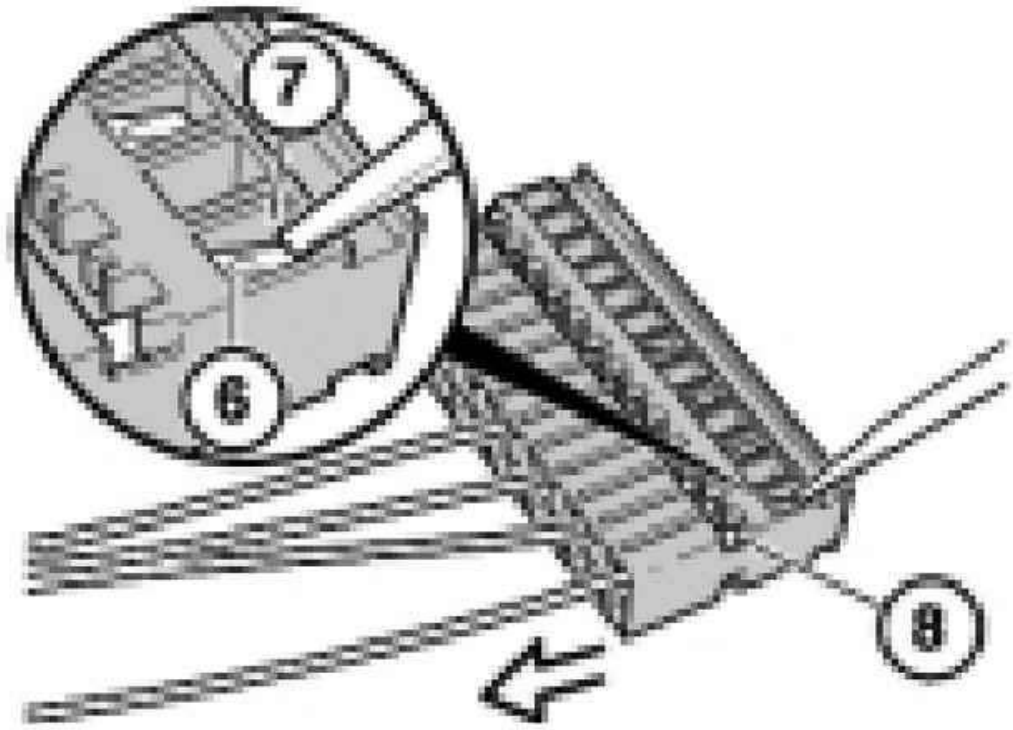


Fig. 45: Removing Wire From Secondary Lock Position
Courtesy of BMW OF NORTH AMERICA, INC.

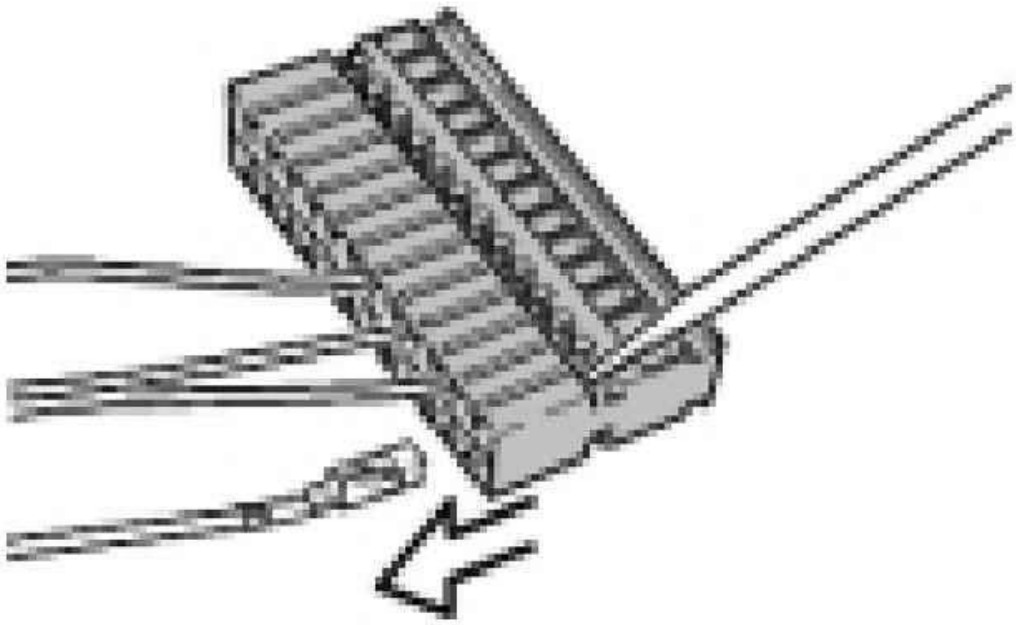


Fig. 46: Removing Wire Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

PLUG SYSTEM MQS/MPQ

In-line Plug 6-,8 Pin System MQS

- Press lock (1) in direction of arrow and slide plug forward.
- Press locking hook (2) downward and slide lock (1) out.
- Press down arrester hook (3) with screwdriver and pull out cable with contact towards rear.

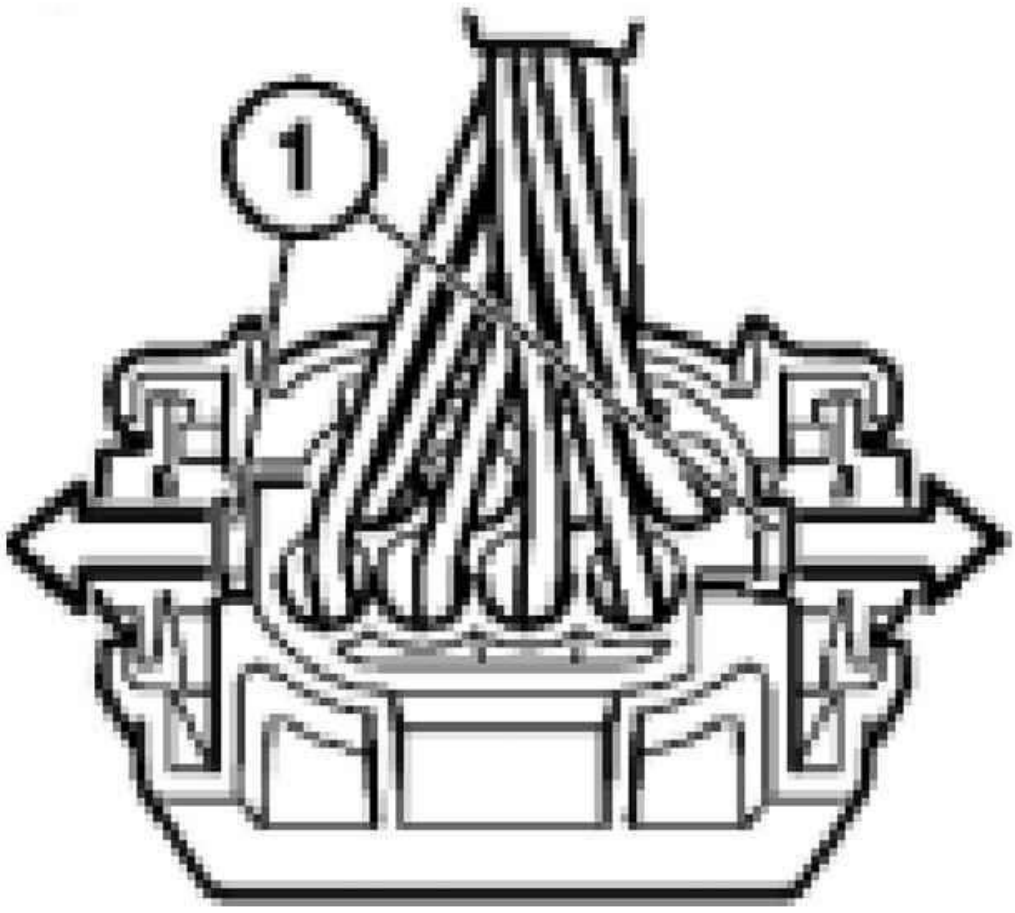


Fig. 47: View Of In-Line Plug Lock
Courtesy of BMW OF NORTH AMERICA, INC.

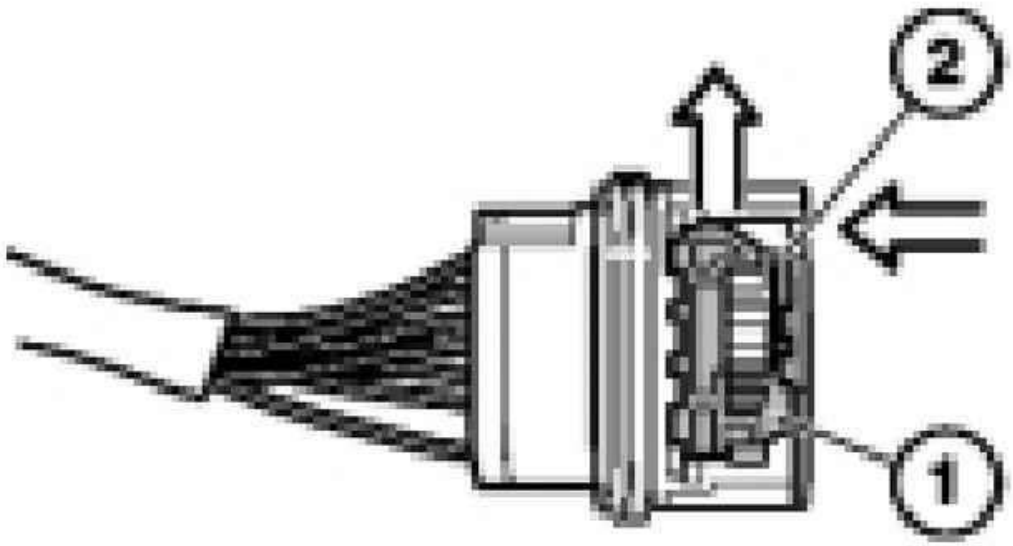


Fig. 48: Identifying In-Line Plug Locking Hook
Courtesy of BMW OF NORTH AMERICA, INC.

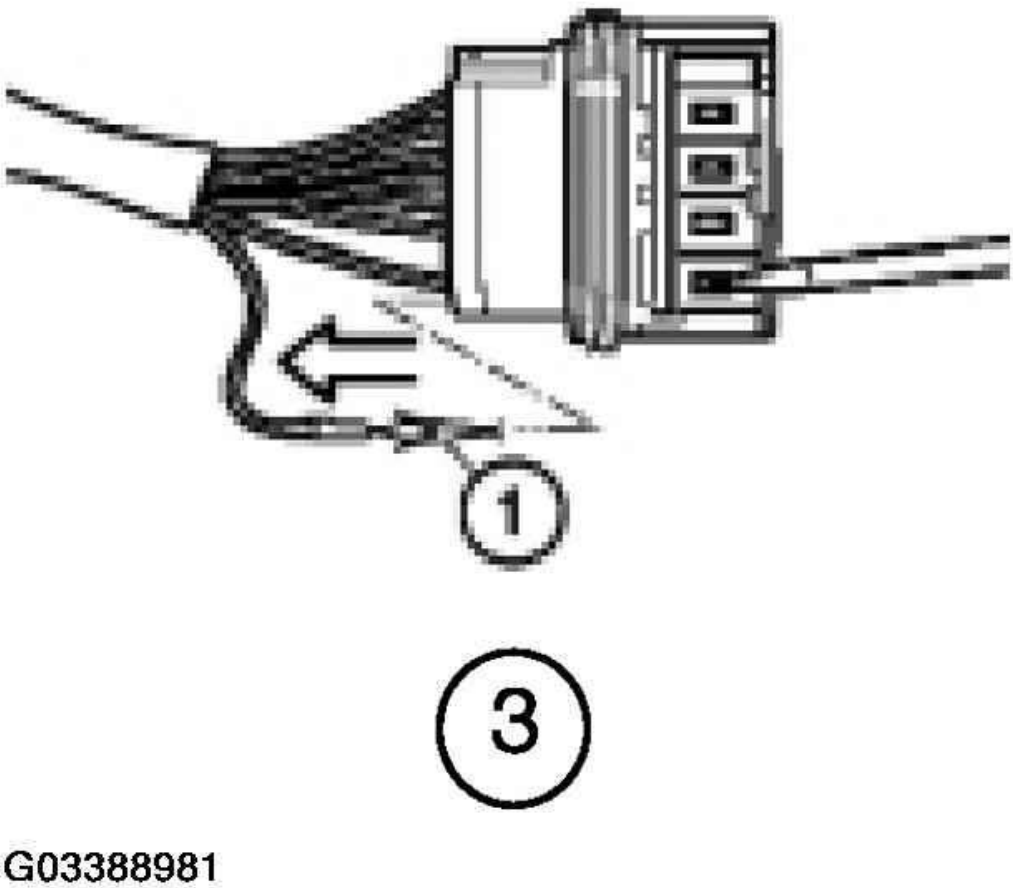


Fig. 49: Removing Cable From In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

In-line Plug 2 Pin System MPQ 2.8

- Press catch on outside in direction of arrow and remove towards top.
- Press down arrestor hook (1) with screwdriver and pull out cable and contact (2) towards rear.

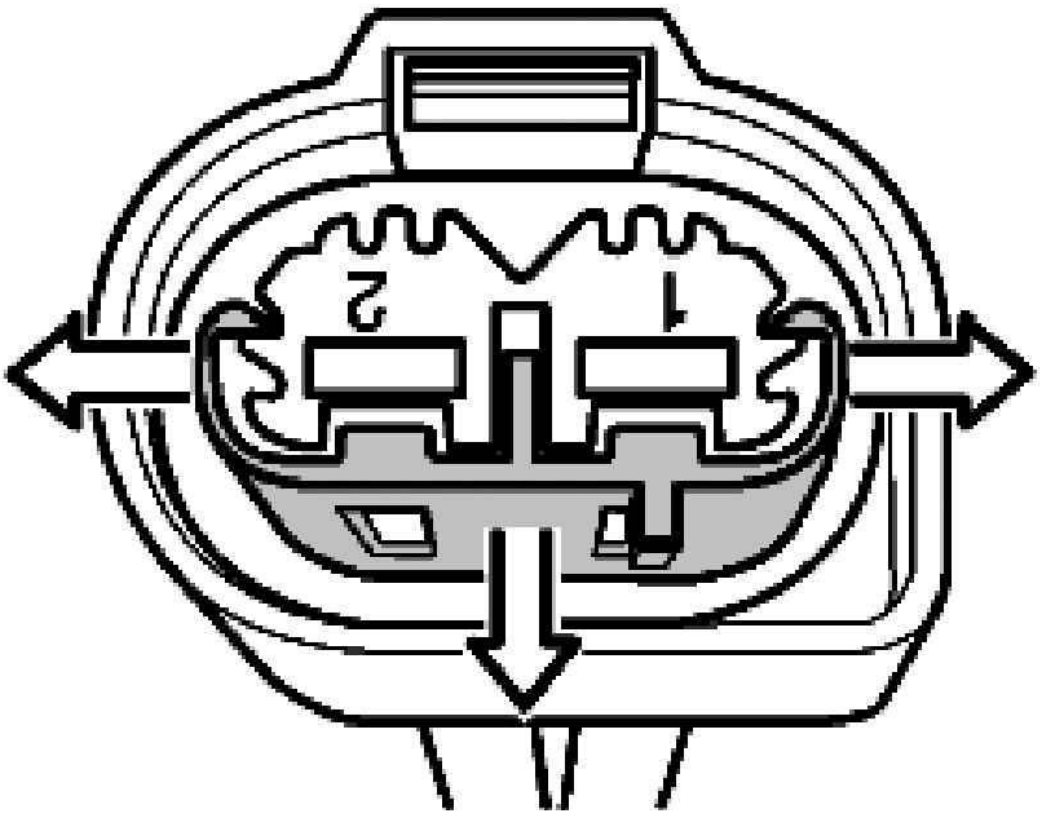


Fig. 50: Identifying Catch On In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

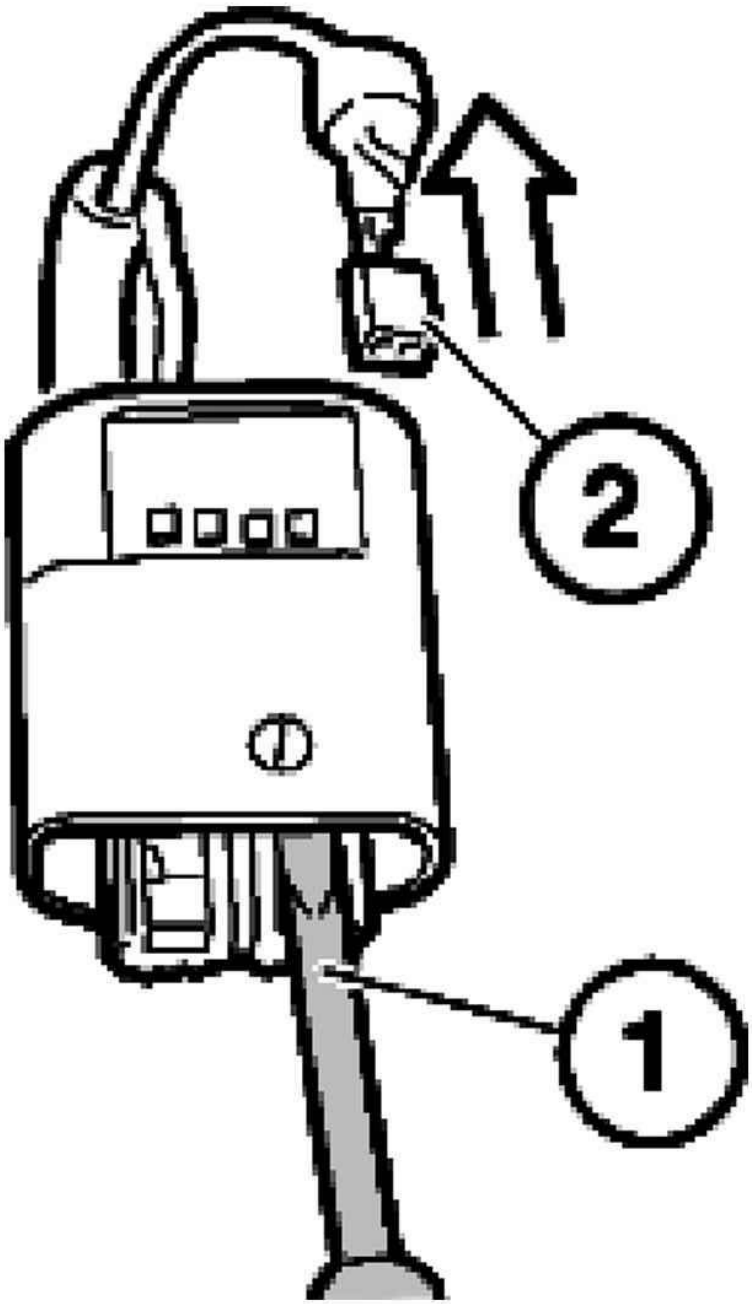


Fig. 51: Removing Cable And Contact From In-Line Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Control Unit Plug 25-, 35-, 55-,83-,88 Pin

- Remove phillips head screws (1) from connector. Gently pivot the connector plate (2) with seal (3) out of the connector shell.
- Remove seal (3) and pull connector plate lock (4) out of locked position.
- Using the appropriate sized spring contact and remove connector (5) from housing.

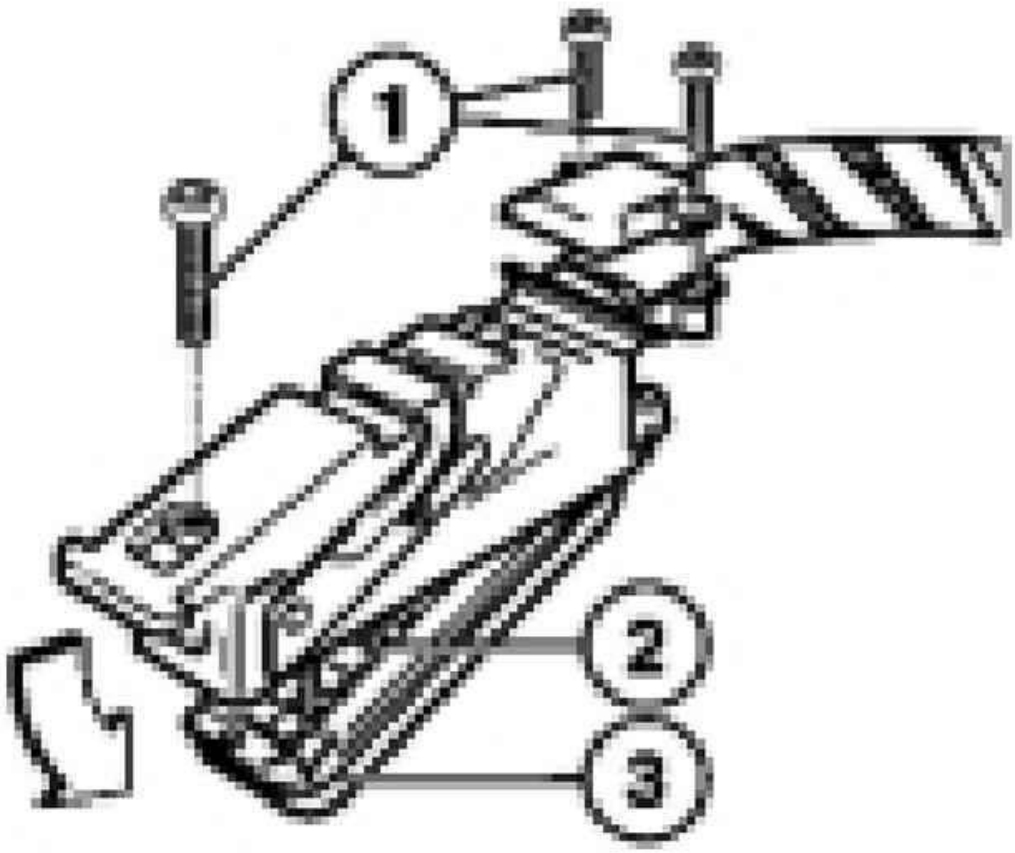


Fig. 52: Identifying Control Unit Plug Retaining Screws
Courtesy of BMW OF NORTH AMERICA, INC.

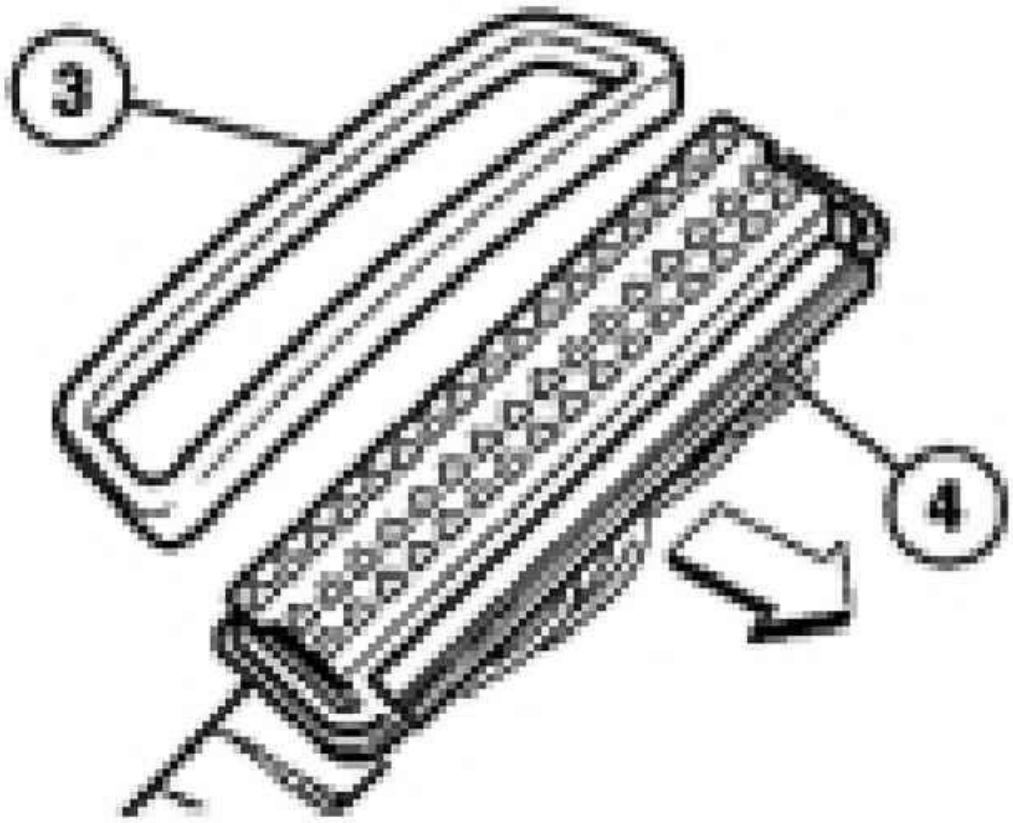


Fig. 53: View Of Control Unit Plug Seal
Courtesy of BMW OF NORTH AMERICA, INC.

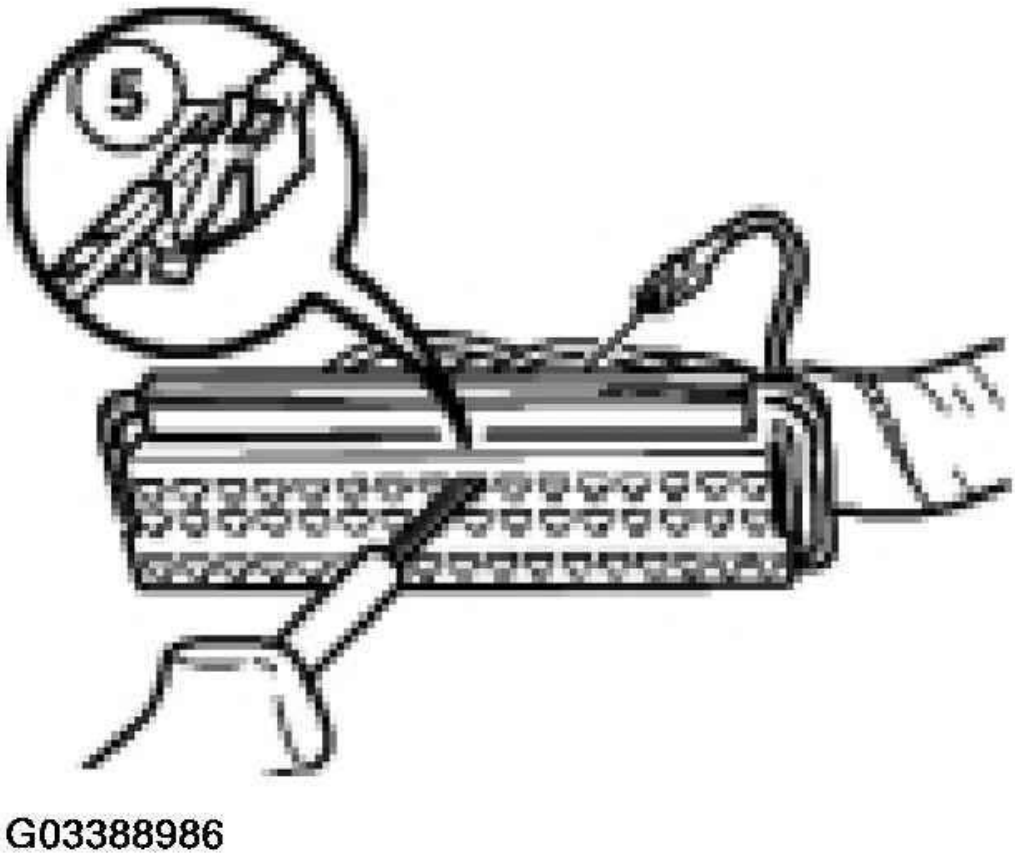


Fig. 54: Removing Connector From Control Unit Plug
Courtesy of BMW OF NORTH AMERICA, INC.

In-line Plug 24 Pin Hybrid System MQS/MPQ

Manufactured by AMP : The following contact types without strand sealing can be fitted in the plug housings:

MQS (Micro Quadlock System).

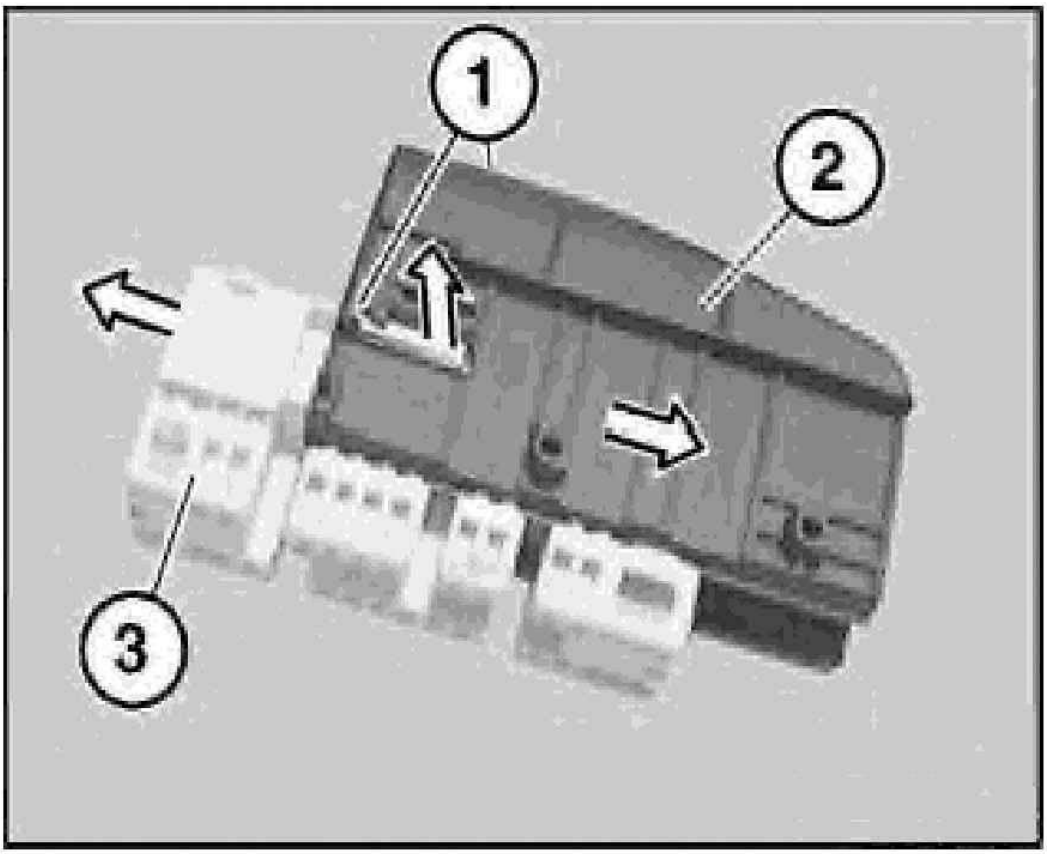
MPQ, width 2.8 mm (Micro Power Quadlock).

MPQ, width 5.2 mm (Micro Power Quadlock).

Socket Housing

- Press locks (1) on cap (2) upwards on both sides.
- Detach cap from contact carrier (3).

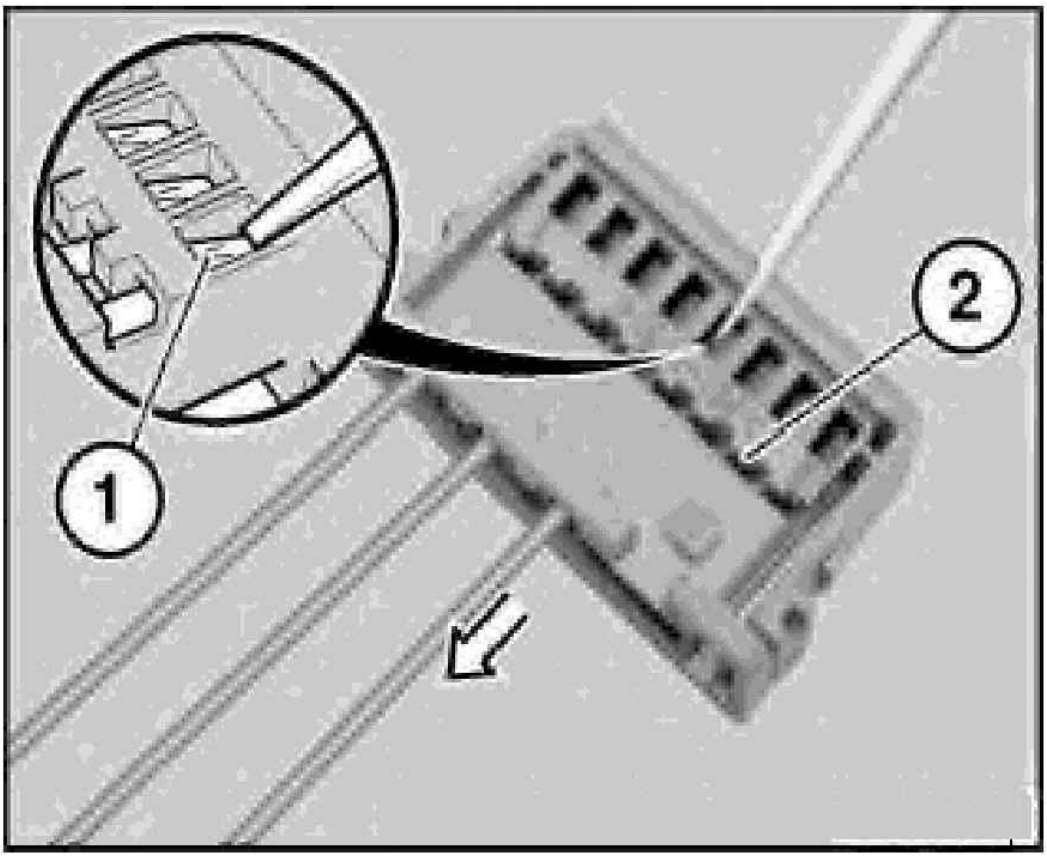
NOTE: Detaching the cap releases the secondary lock of the socket contacts.



G03388987

Fig. 55: Removing Cap From Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

- Hold down retaining hook (1) of socket contact carrier with a small screwdriver.
- Pull wire with socket contact in direction of arrow as far as secondary lock (2). (**Fig. 56**)
- Hold down retaining hook in secondary lock (1) again and pull cable with socket contact (2) completely out of contact carrier (3). (**Fig. 57**)



G03388988

Fig. 56: View Of Retaining Hook In Secondary Lock
Courtesy of BMW OF NORTH AMERICA, INC.

Pin Housing

- Press locks (1) on cap (2) upwards on both sides.
- Detach cap from housing carrier (3)(**Fig. 58**).

NOTE: Detaching the cap releases the secondary locks of the pin contacts in the contact carriers.

- Pull contact carrier (1) out of housing carrier (2) (**Fig. 59**).
- The pin contacts are pulled of a contact carrier as described under "Socket Housing".

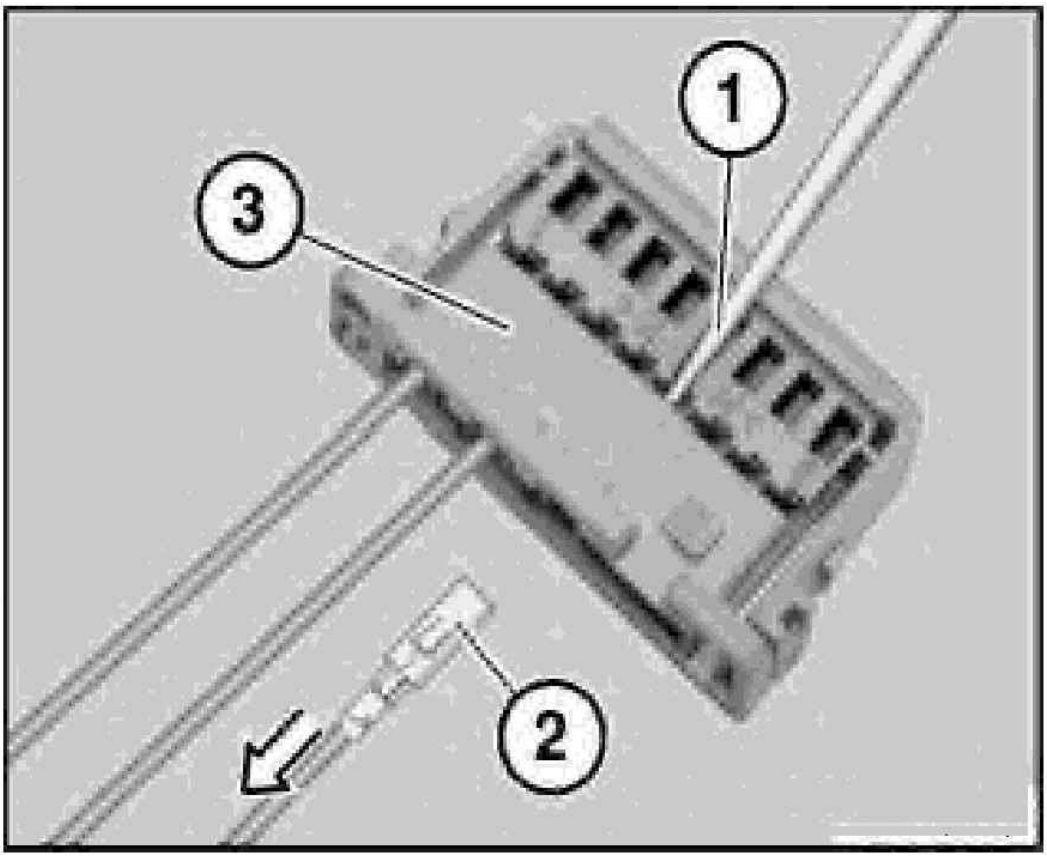
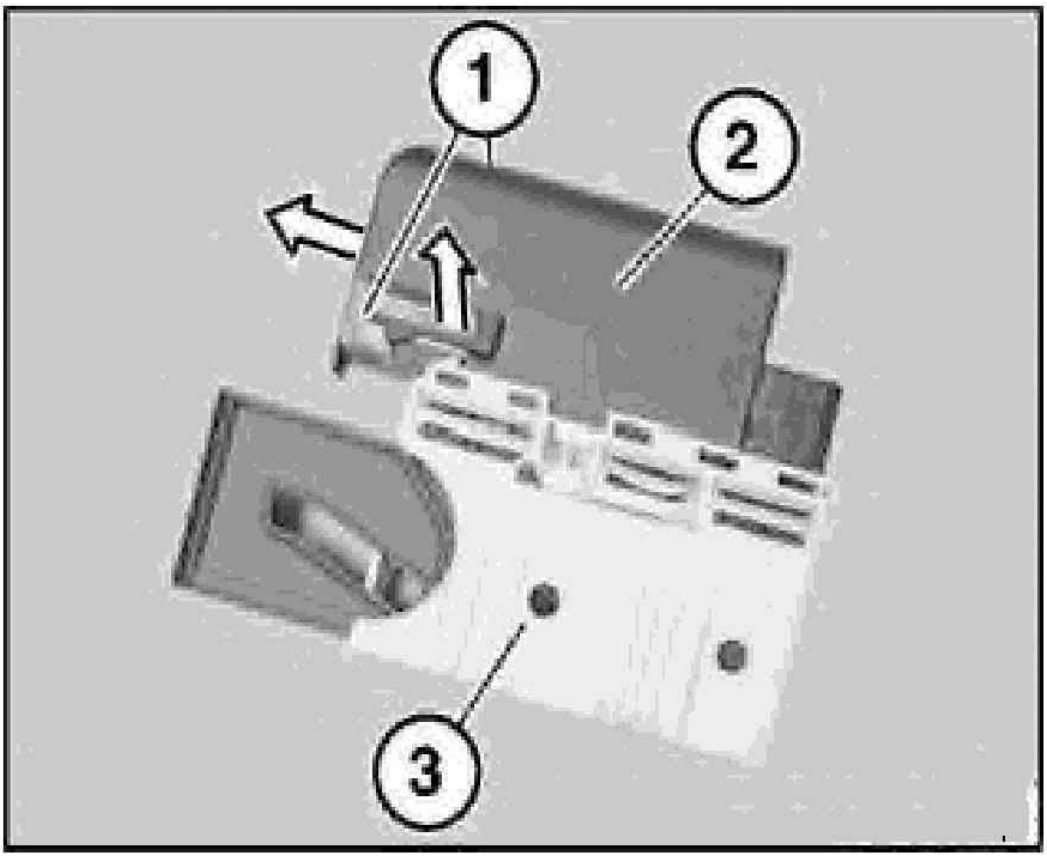
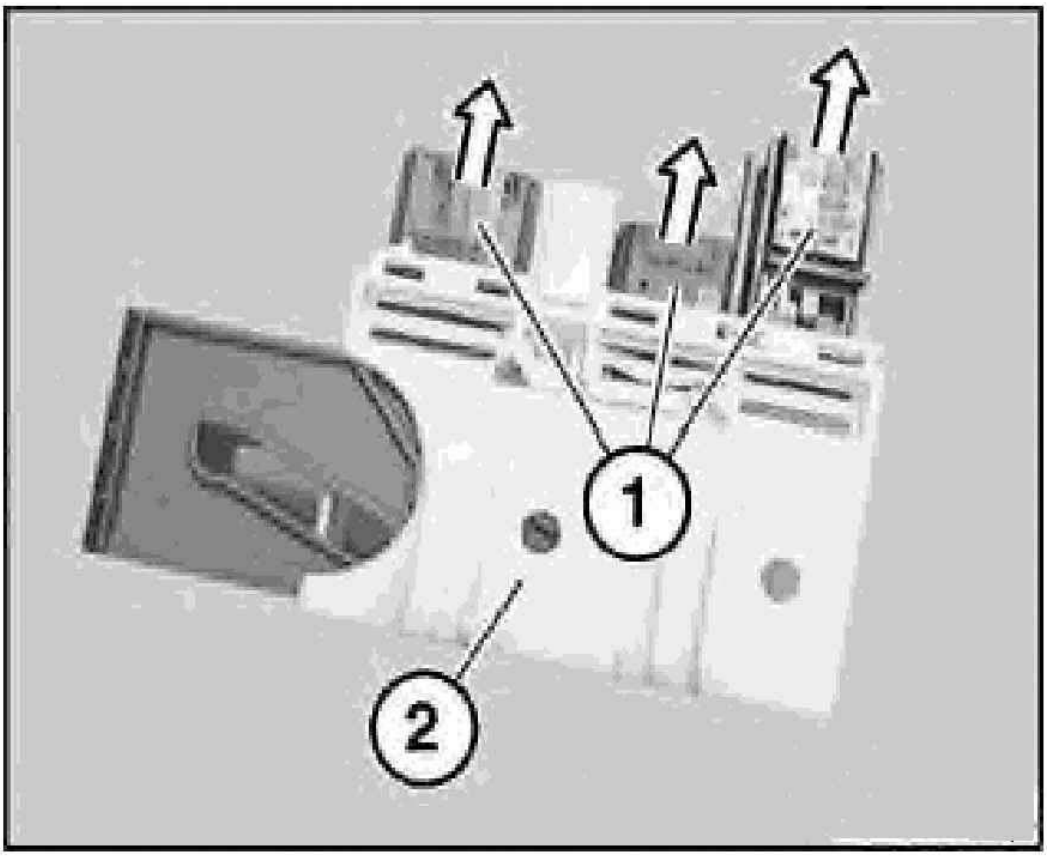


Fig. 57: Identifying Pin Housing Locks
Courtesy of BMW OF NORTH AMERICA, INC.



G03388990

Fig. 58: Removing Cap From Pin Housing
Courtesy of BMW OF NORTH AMERICA, INC.



G03388991

Fig. 59: Removing Contact Carrier From Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Socket Housing 42-,43 Pin Hybrid Systems MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

MQS (Micro Quadlock System).

MPQ, width 2.8 mm (Micro Power Quadlock).

MPQ, width 5.2 mm (Micro Power Quadlock).

- Open secondary locks (1) on socket housing.
- Press back retaining hook of MQS contacts (2) with special tool 61 1 134 and pull out cable with contact.
- Press back retaining hook of MPQ contacts (3) with screwdriver or similar tool and pull out cable with

contact.

Installation:

- Bend open retaining hook of contacts gently before inserting into plug housing.
- To install contacts, observe cavity numbers on reverse side of socket housing.

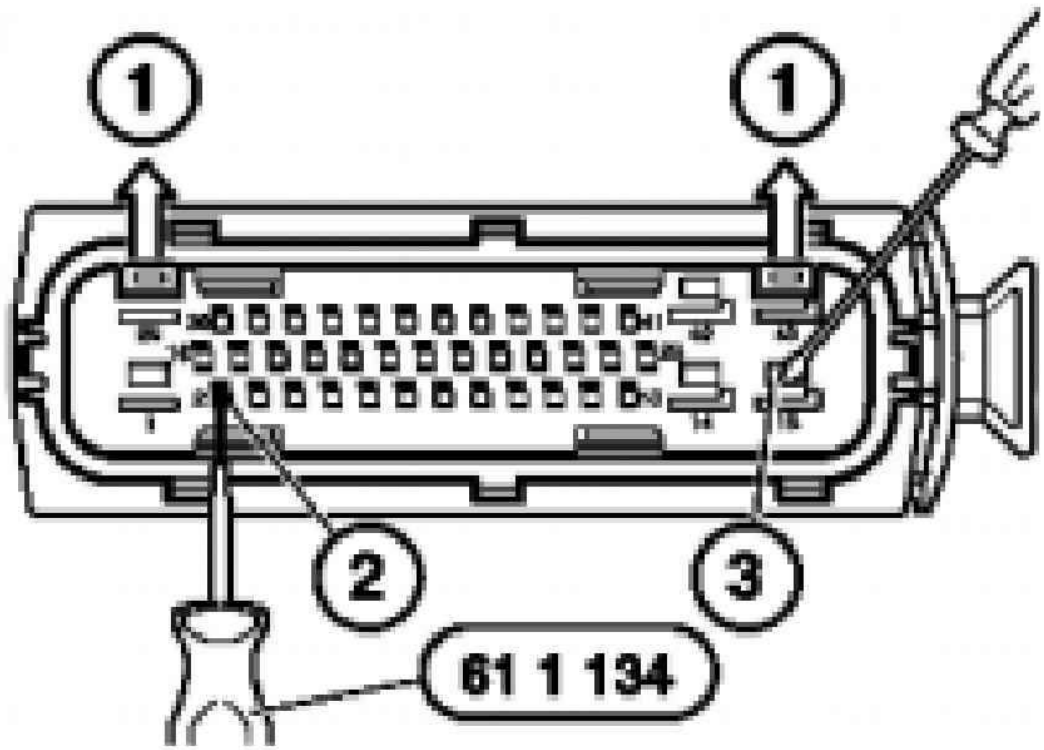
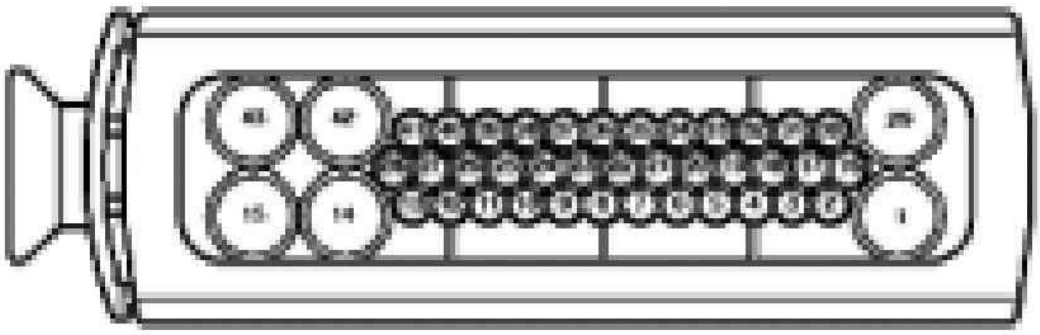


Fig. 60: Identifying MQS Contact Retaining Hook
Courtesy of BMW OF NORTH AMERICA, INC.



G03388993

Fig. 61: Identifying Cavity Numbers On Socket Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Socket Housing 2x27-, 2x27 Pin Hybrid System MQS/MPQ, Elo/Elo Power

Manufactured by Amp: The following contact types without strand sealing can be fitted in the socket housings:

MQS (Micro Quadlock System).

MQS, width 2.8 mm (Micro Power Quadlock).

MPQ, width 5.2 mm (Micro Power Quadlock).

Manufactured by Siemens: The following contact types without strand sealing can be fitted in the socket housings:

Elo (electronic contact).

Elo-Power 2.8 mm wide (electronic contact for heavy loads).

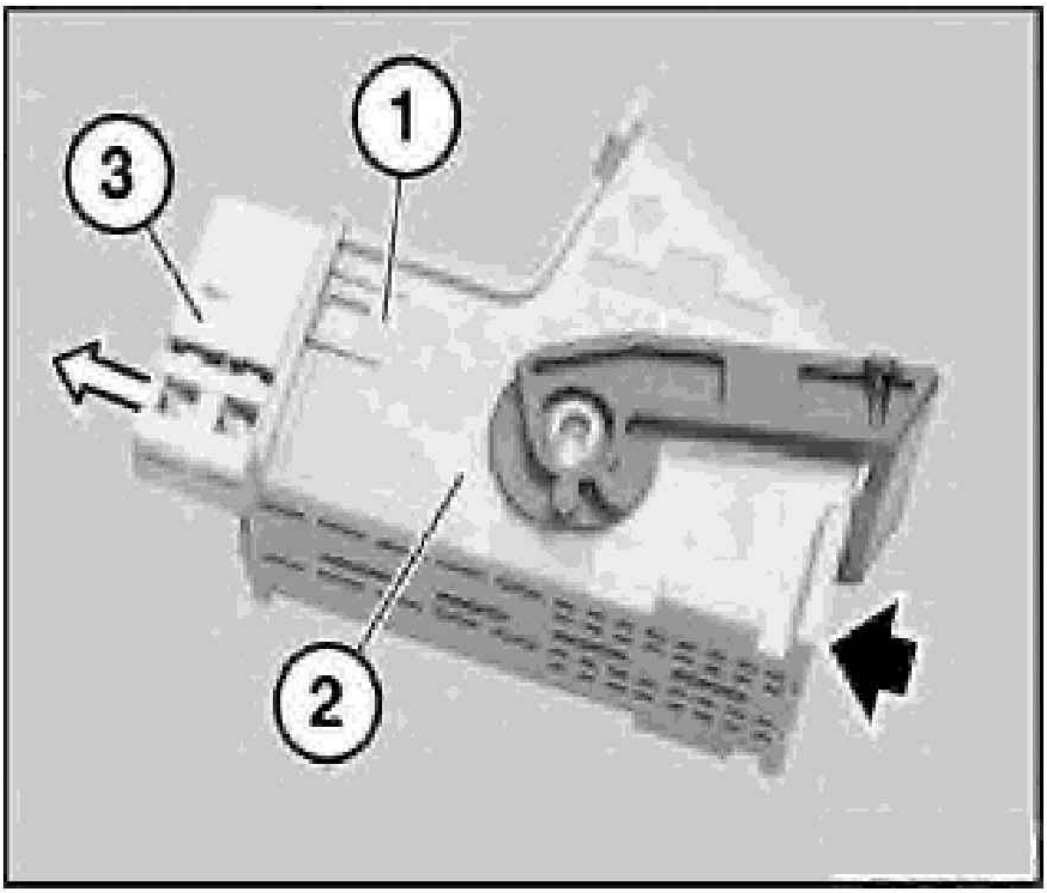
Elo-Power 5.2 mm wide (electronic contact for heavy loads).

- Raise lock (1) on housing (2).
- Push contact carrier (3) from rear out of housing.

NOTE: The second carrier is pushed out in the same way.

Pushing out the contact carrier releases the secondary locks of the secondary contacts.

Procedure for removing contacts are same as for other Elo/Elo-Power Systems, refer to the appropriate article.



G03388994

Fig. 62: Removing Contact Carrier From Rear Housing
Courtesy of BMW OF NORTH AMERICA, INC.

In-line Plug 30 Pin Hybrid System MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the plug housings:

MQS (Micro Quadlock System).

MPQ, width 2.8 mm (Micro Power Quadlock).

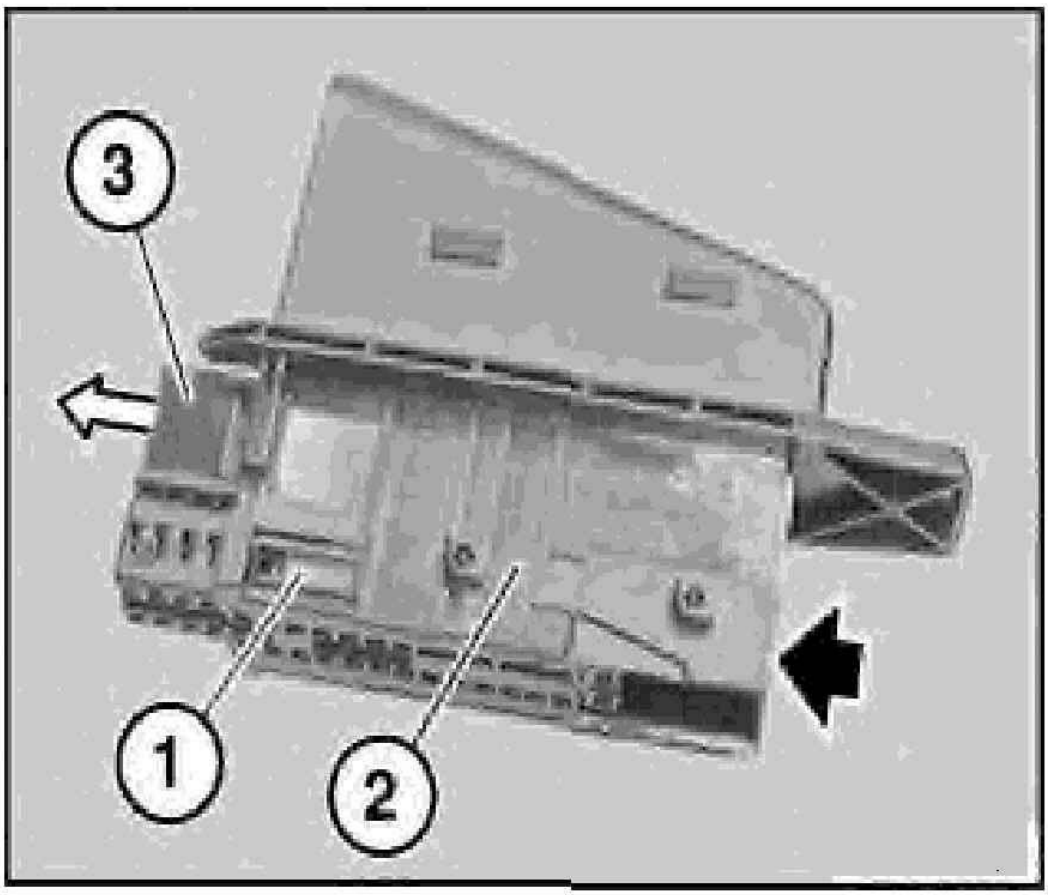
MPQ, width 5.2 mm (Micro Power Quadlock).

Socket Housing

- Raise lock (1) on housing (2).

- Push contact carrier (3) from rear out of housing (2).

NOTE: Pushing out the contact carrier releases the secondary locks of the socket contacts. Procedure for removing contacts are same as for other Elo/Elo-Power Systems, refer to the appropriate article.



G03388995

Fig. 63: Removing Contact Carrier From Rear Out Of Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Pin Housing

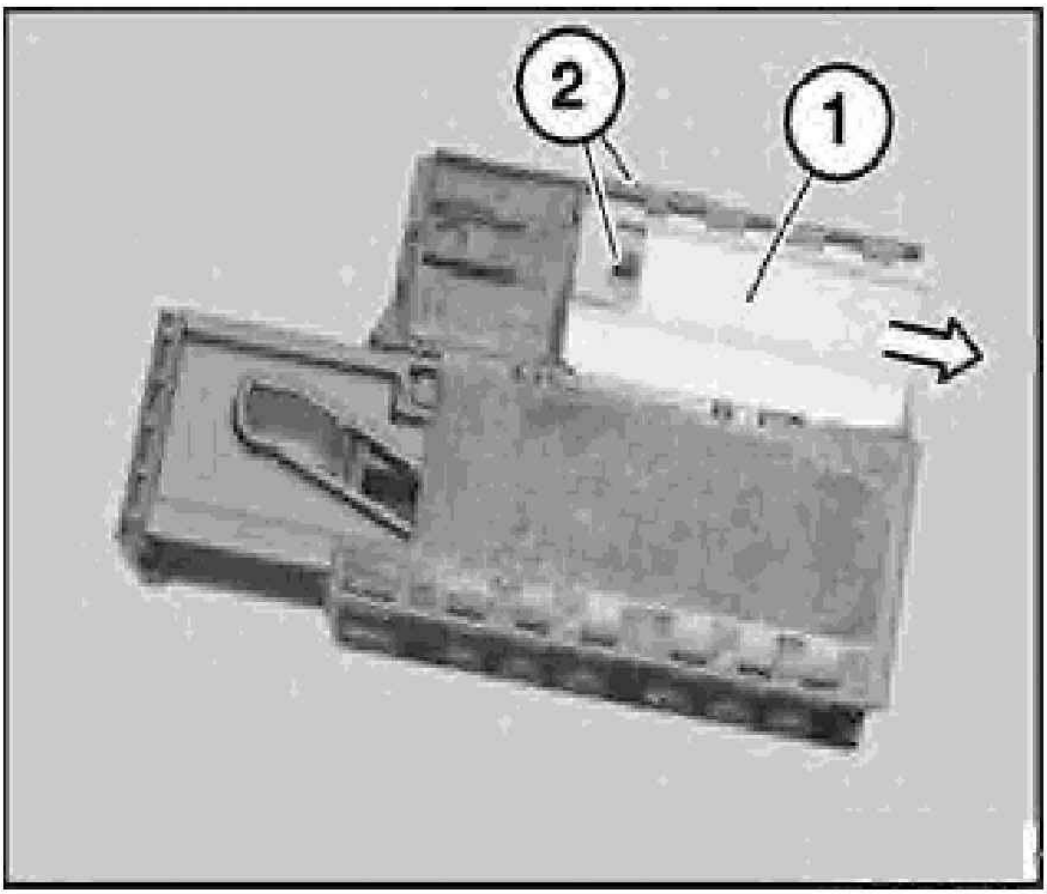
- Contact 1-13 and 19-27.
- Raise locking slide (1) on both sides (2) of housing and detach.

NOTE: Detaching the locking slide releases the secondary locks of the pin

contacts.

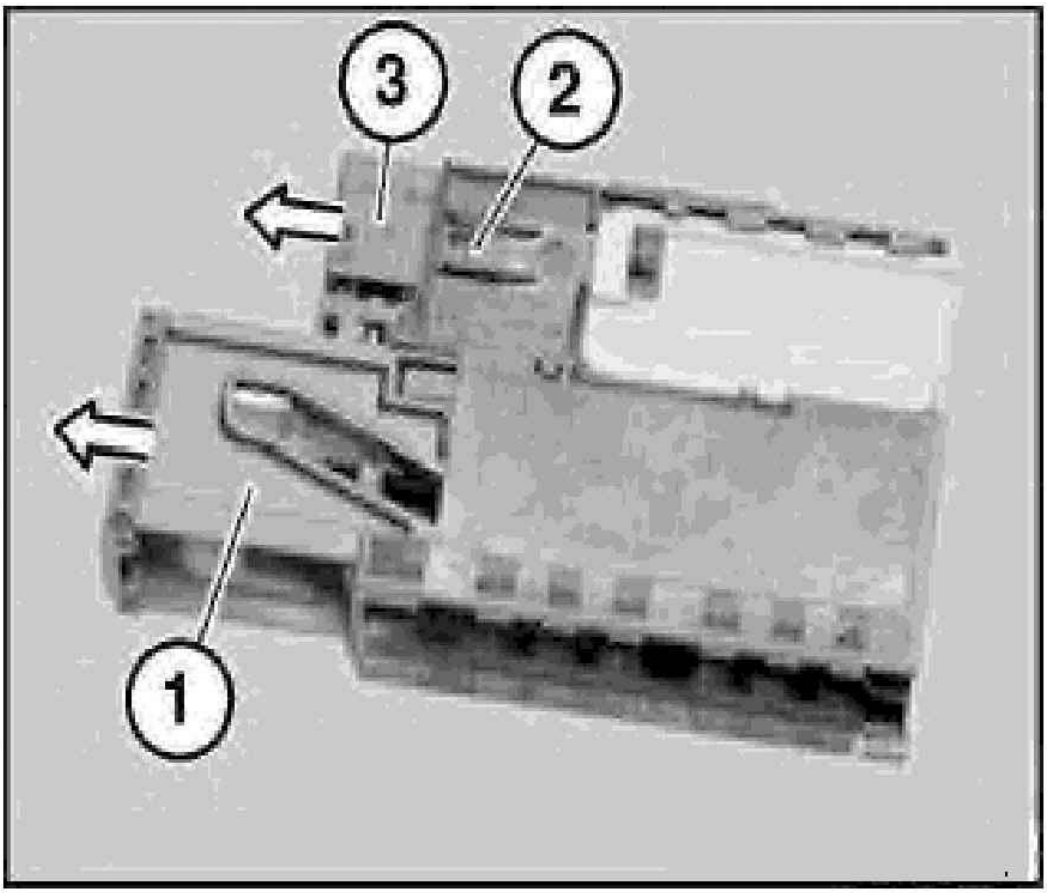
- Contacts 14-18 and 28-30.
- Pull slide (1) outward completely.
- Raise lock (2) on housing.
- Pull contact carrier out of housing.

NOTE: Pulling out the contact carrier releases the secondary locks of the pin contacts.



G03388996

Fig. 64: Identifying Pin Housing Slide
Courtesy of BMW OF NORTH AMERICA, INC.



G03388997

Fig. 65: Removing Pin Housing Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Socket Housing 5-, 8 Pin System MQS/MPQ

Manufactured by AMP: The following contact types without strand sealing can be fitted in the socket housings:

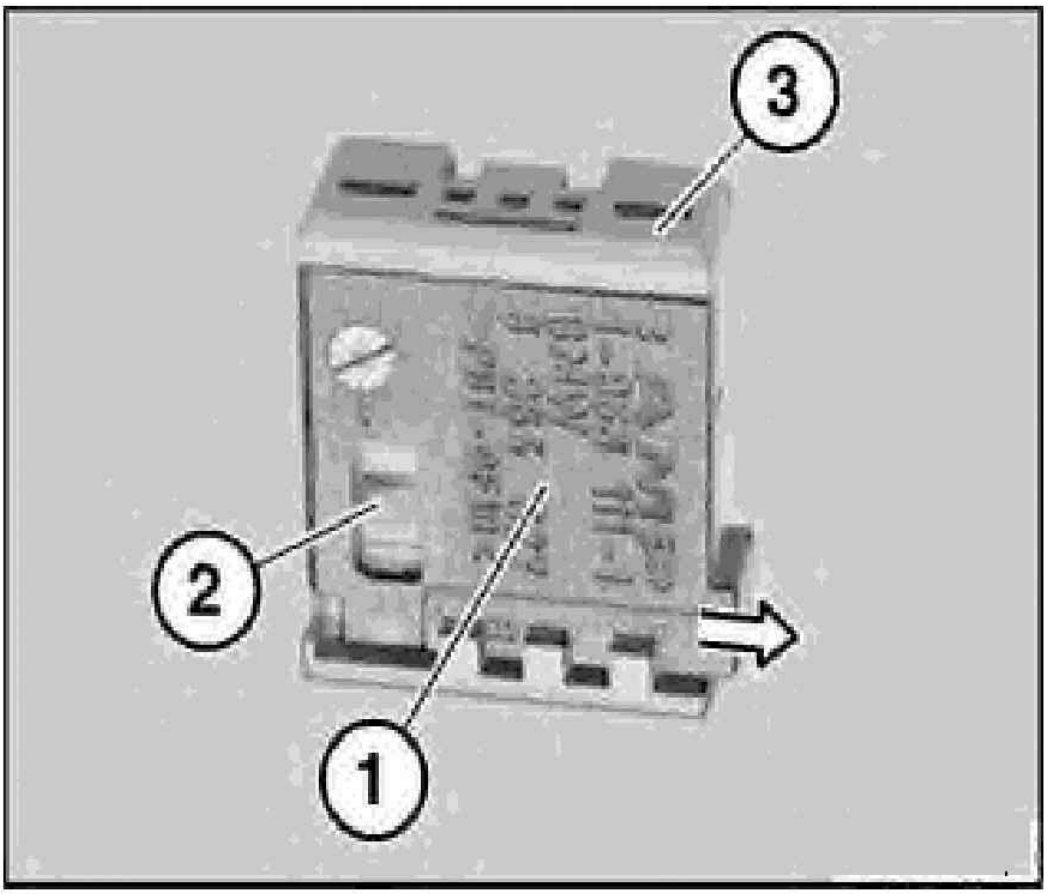
MQS (Micro Quadlock System).

MPQ, width 2.8 mm (Micro Power Quadlock).

MPQ, width 5.2 mm (Micro Power Quadlock).

Socket housing 5 pin (Hybrid System MQS/MPQ)

- Raise fastener (1) (slide) by way of retaining lug (2) and detach from contact carrier (3).



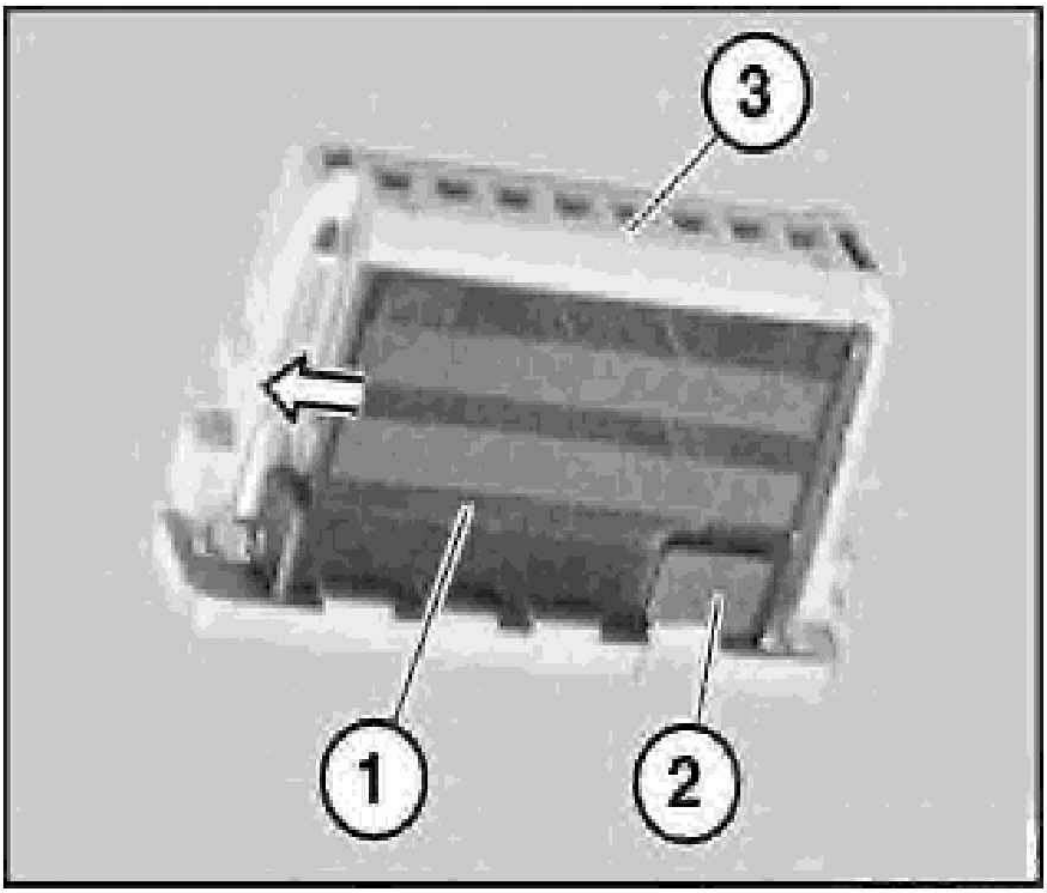
G03388998

Fig. 66: Identifying Socket Housing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Socket Housing 8 Pin (MQS)

- Raise fastener (1) (slide) by way of retaining lug (2) and detach from contact carrier (3).

Procedure for removing contacts are same as for other Elo/Elo-Power Systems, refer to the appropriate article.



G03388999

Fig. 67: Identifying Socket Housing 8 Pin (MQS)
Courtesy of BMW OF NORTH AMERICA, INC.

Socket Housing (Radio Plug) Hybrid system MQS/MPS

Manufactured by AMP: The following contact types without strand sealing can be fitted in the plug housings:

MQS (Micro Quadlock System).

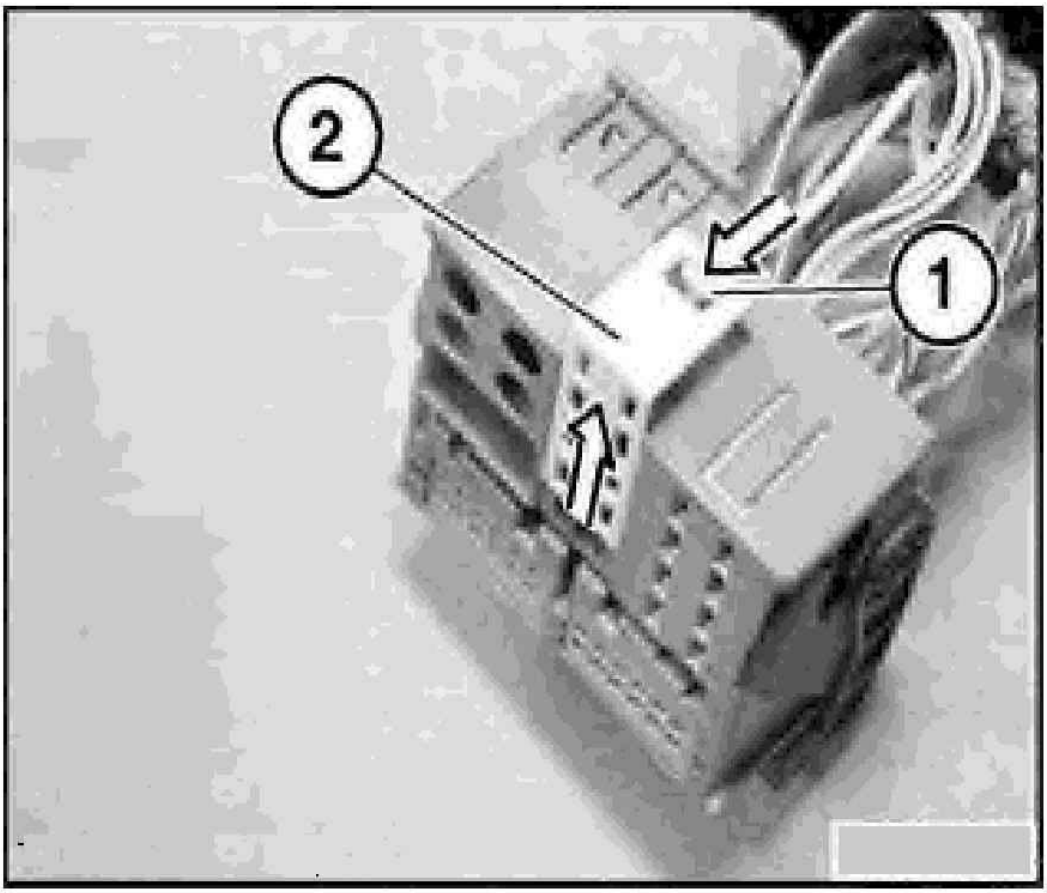
MPQ, width 2.8 mm (Micro Power Quadlock).

MPQ, width 5.2 mm (Micro Power Quadlock).

Removing MPQ contacts from radio plug:

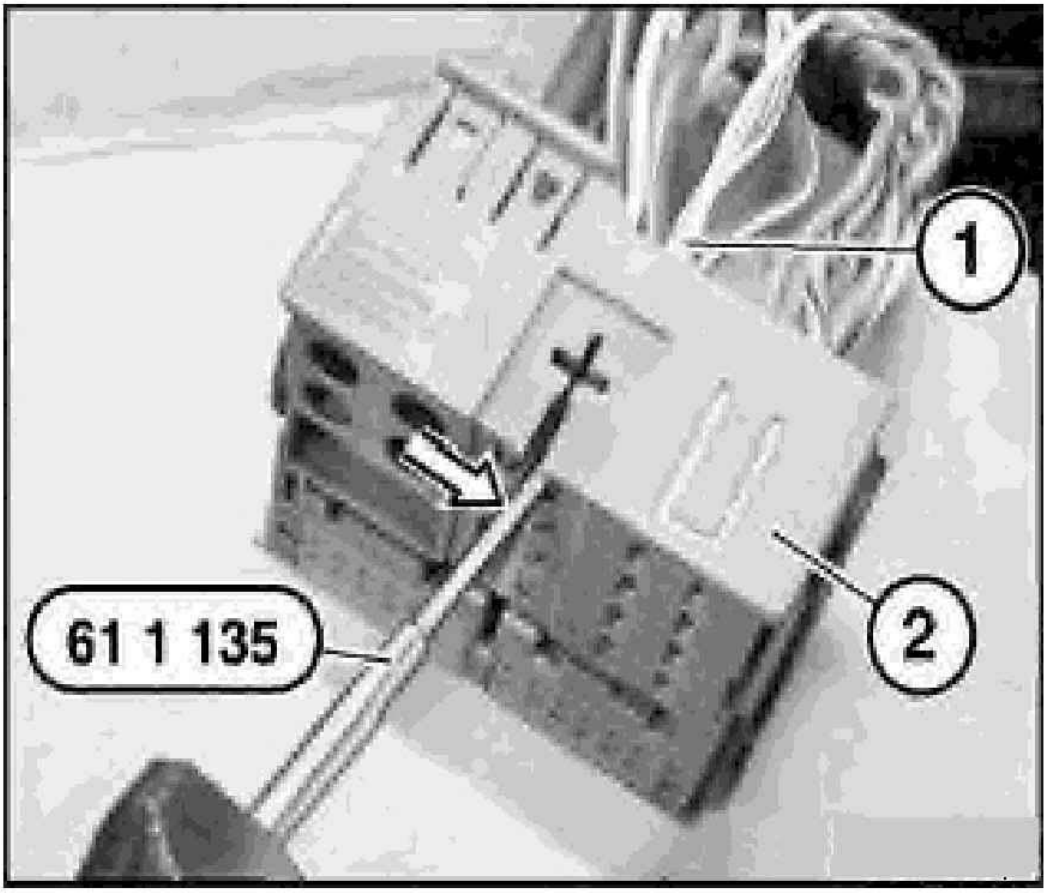
- Press lock (1) in direction of arrow, detach secondary lock (2) from radio plug.

- Feed special tool 61 1 135 past side of contact.
- Press special tool 61 1 135 in direction of arrow.
- Pull wire (1) with socket contact out of radio plug (2).



G03389000

Fig. 68: Locating Radio Plug Lock
Courtesy of BMW OF NORTH AMERICA, INC.



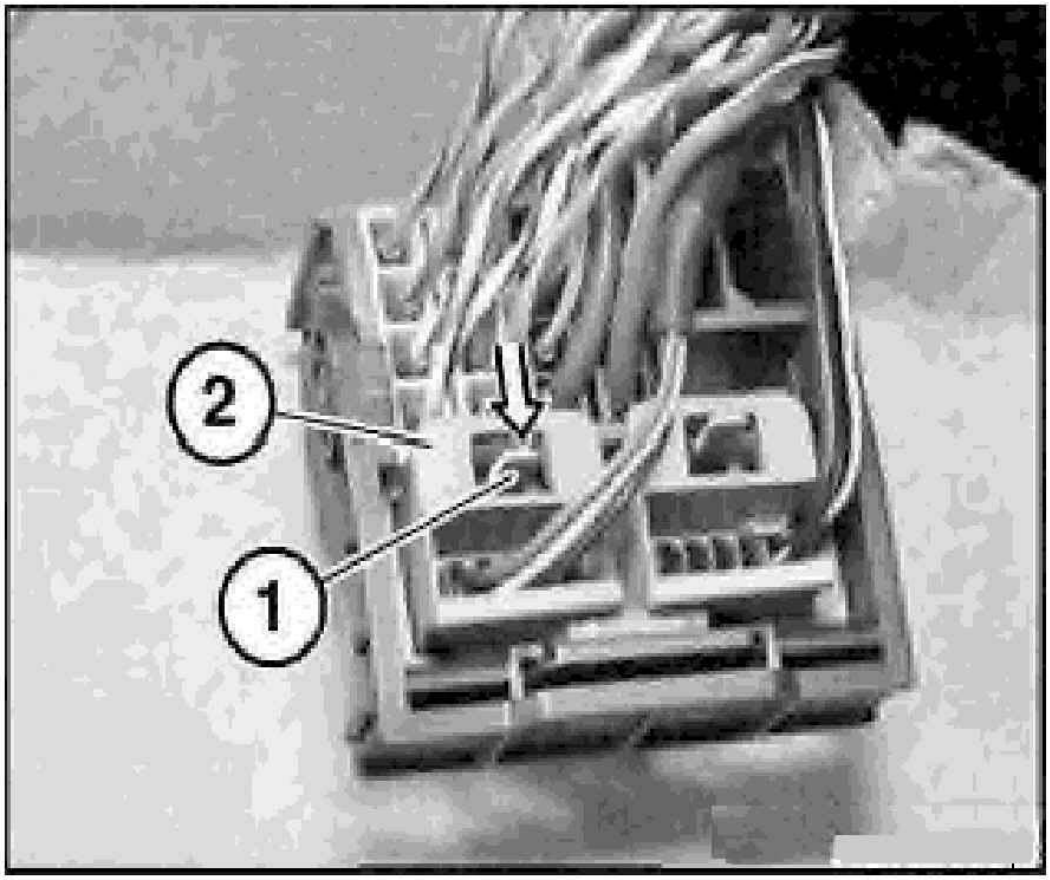
G03389001

Fig. 69: Identifying Special Tool In Radio Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Removing MQS contacts from carrier

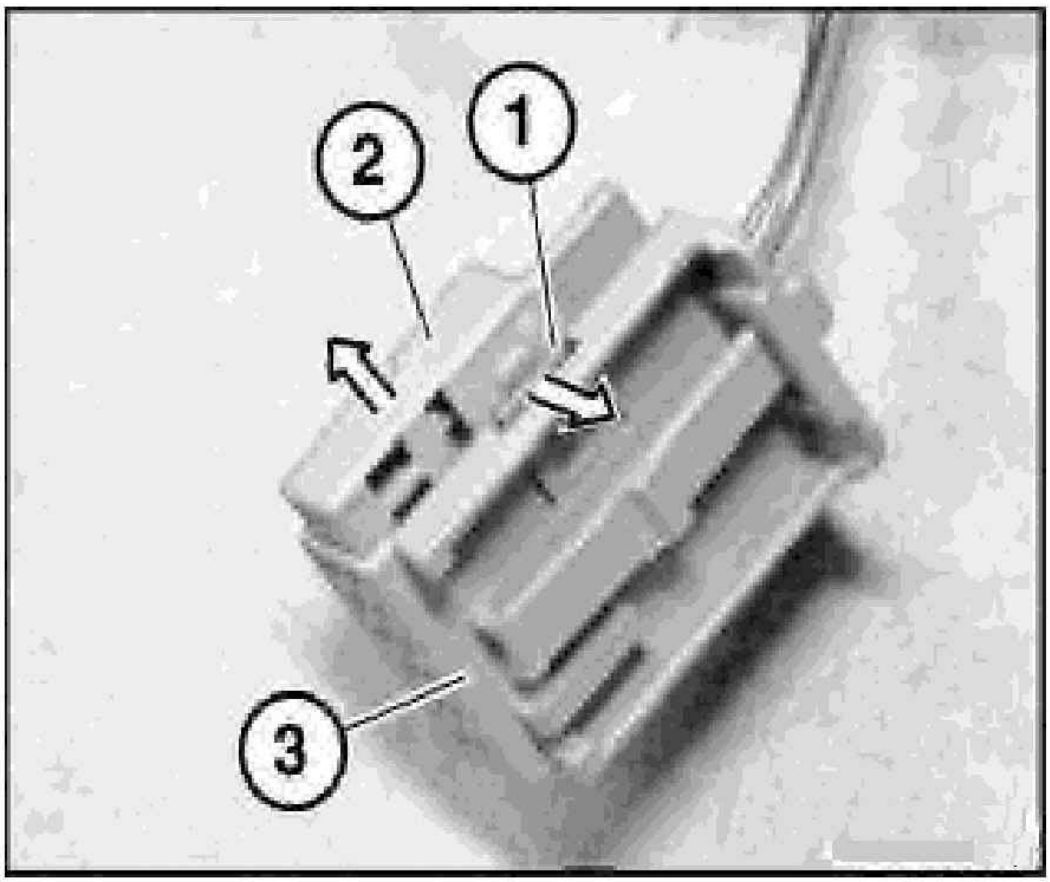
- Press lock (1) in direction of arrow and pull housing (2) out of radio plug (**Fig. 70**).
- Press lock (1) in direction of arrow. Pull contact carrier (2) out of housing (**Fig. 71**).

NOTE: When the contact carrier is pulled out, the secondary locks of the socket contacts are raised. Procedure for removing contacts are same as for other Elo/Elo-Power Systems, refer to the appropriate article.



G03389002

Fig. 70: Removing Housing From Radio Plug
Courtesy of BMW OF NORTH AMERICA, INC.

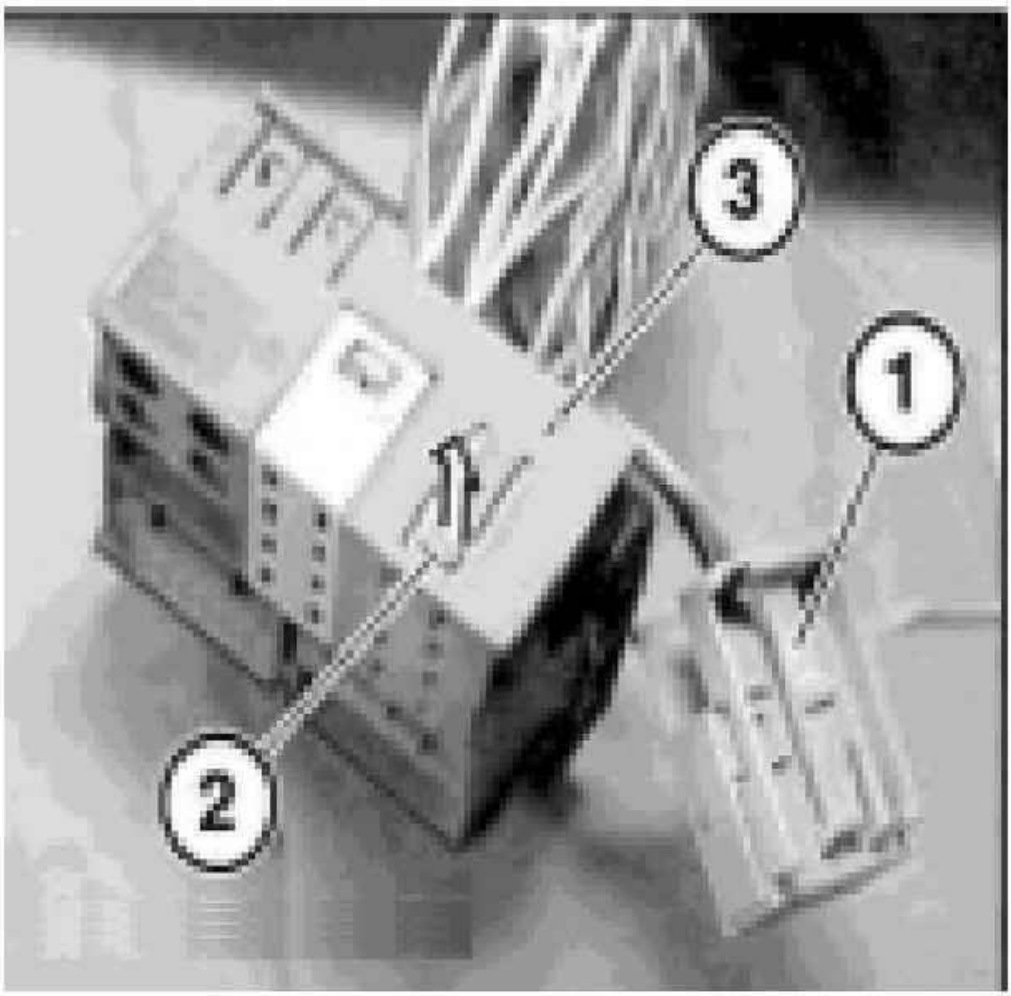


G03389003

Fig. 71: Removing Contact Carrier Out Of Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Removing MPQ contacts from contact carrier

- Remove contact carrier (1) with MQS contacts from radio plug. Raise lock (2) on radio plug. Pull contact carrier (3) out of radio plug (**Fig. 72**).
- Press lock (1) in direction of arrow. Pull secondary lock (2) in direction of arrow completely out of contact carrier (3) (**Fig. 73**).
- Press special tool 61 1 135 on inside of contact into contact carrier (2). Pull wire with socket contact (1) out of contact carrier (2) (**Fig. 74**).



G03389004

Fig. 72: Removing MPQ Contacts From Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

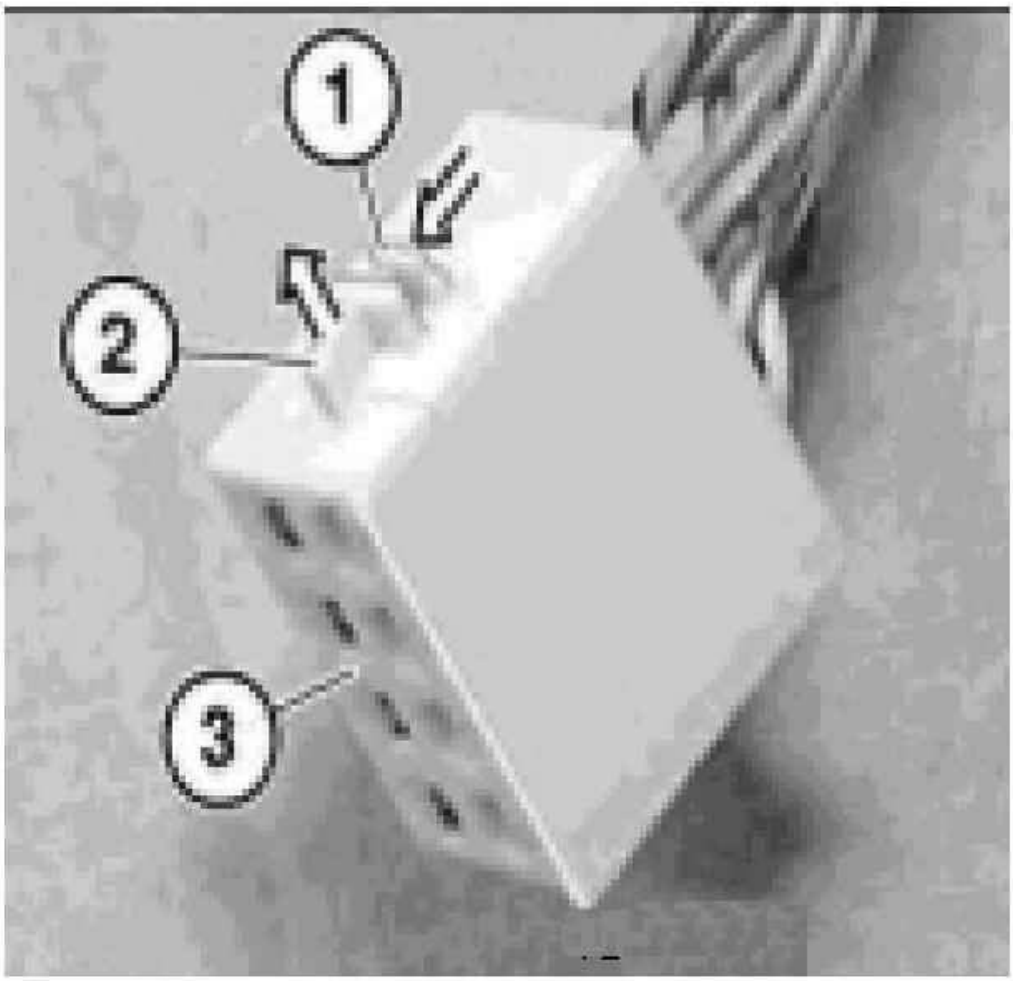


Fig. 73: Removing Secondary Lock From Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

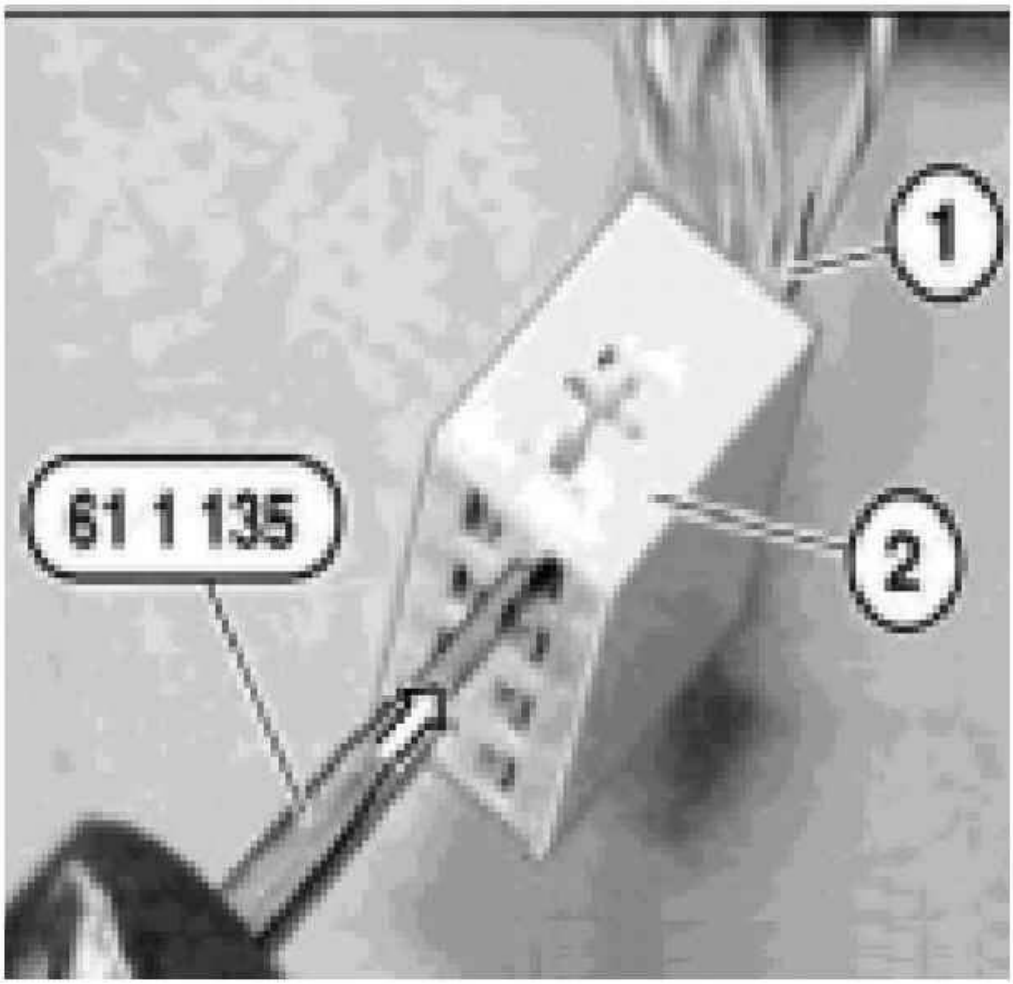


Fig. 74: Removing Socket Contact From Contact Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

MISCELLANEOUS CONNECTORS

Fuse Strip

- Pull appropriate fuse from fuse strip (1).**Note: Mark fuse rating and position for reinstallment.**
- Pull locking slide (2) out of fuse strip until stop is felt.
- Using special tool **61 1 136** or **61 1 137** press the spring latch down (3) and pull the connector from the housing.

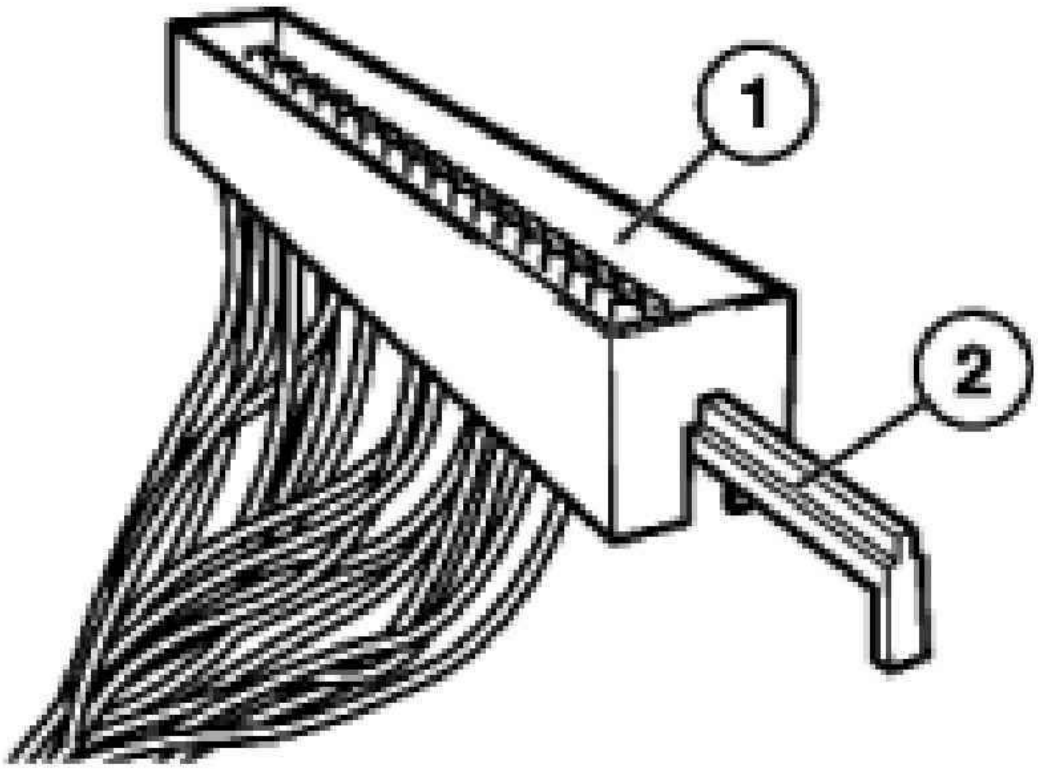


Fig. 75: Removing Locking Slide From Fuse Strip
Courtesy of BMW OF NORTH AMERICA, INC.

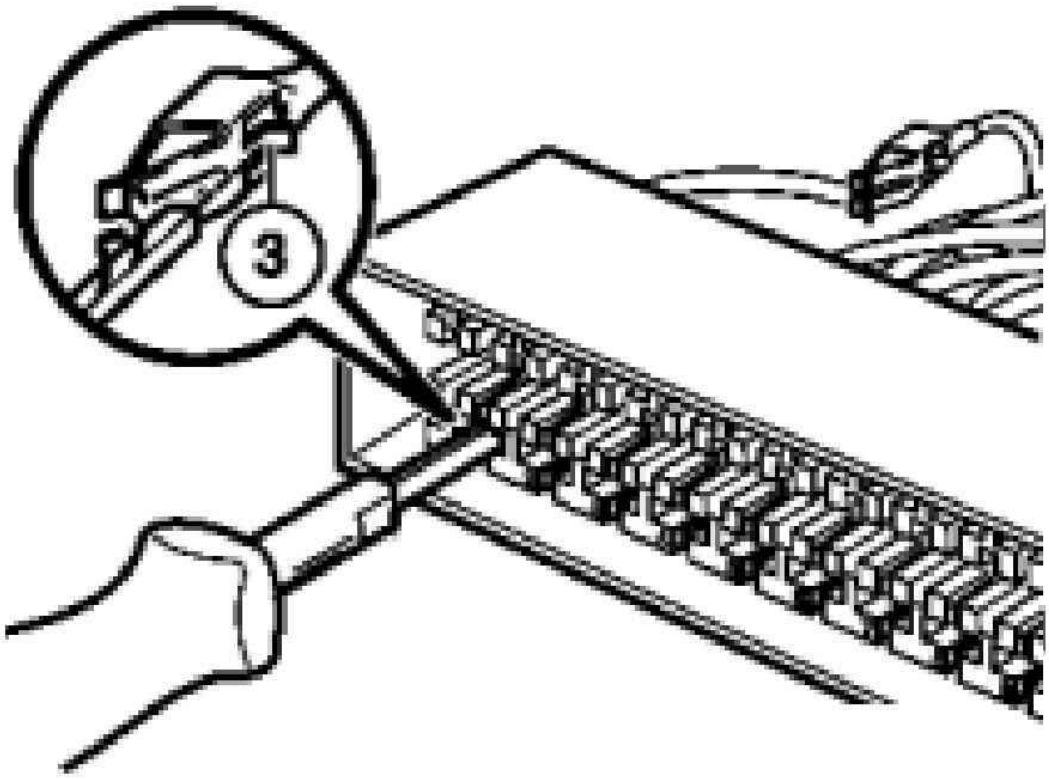


Fig. 76: Removing Connector From Housing Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

ECM Main Relay Connector

- Unlock wire flap (1) of connector being removed.
- Using special tool **61 1 136** or **61 1 137** press the spring latch down (2) and pull the connector from the housing.

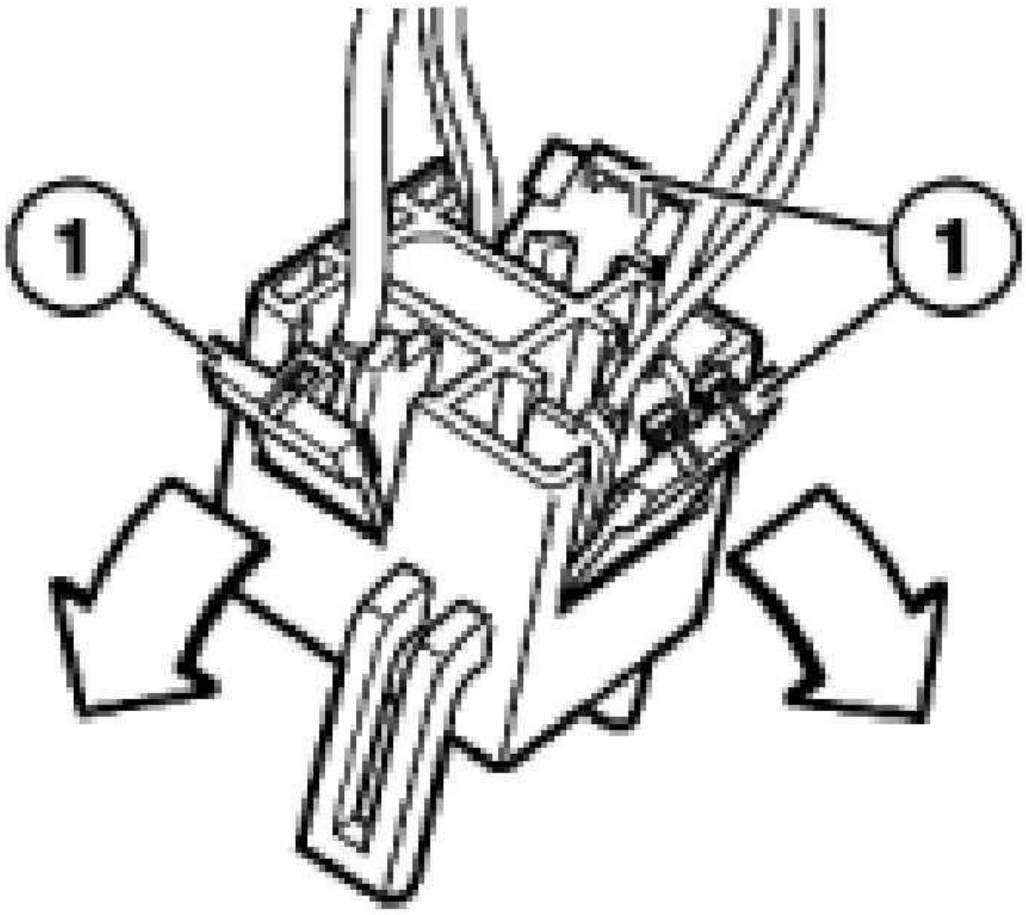


Fig. 77: Removing Wire Flap Of Connector
Courtesy of BMW OF NORTH AMERICA, INC.

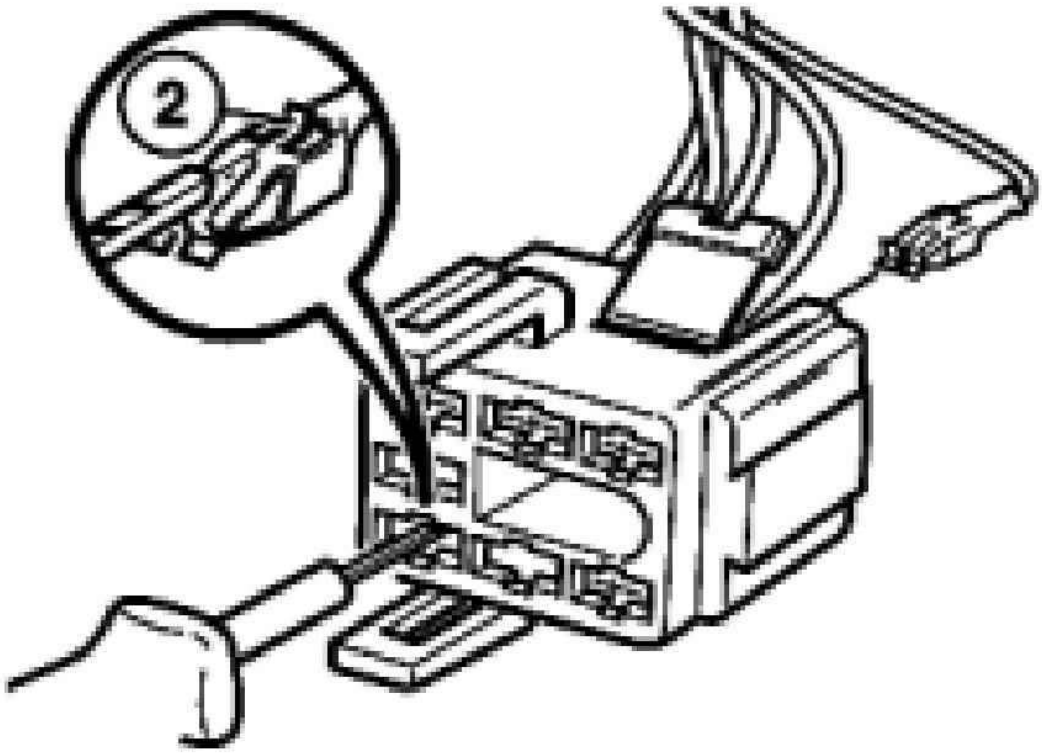


Fig. 78: Locating Spring Latch
Courtesy of BMW OF NORTH AMERICA, INC.

SOLDERLESS TERMINALS AND CONNECTORS

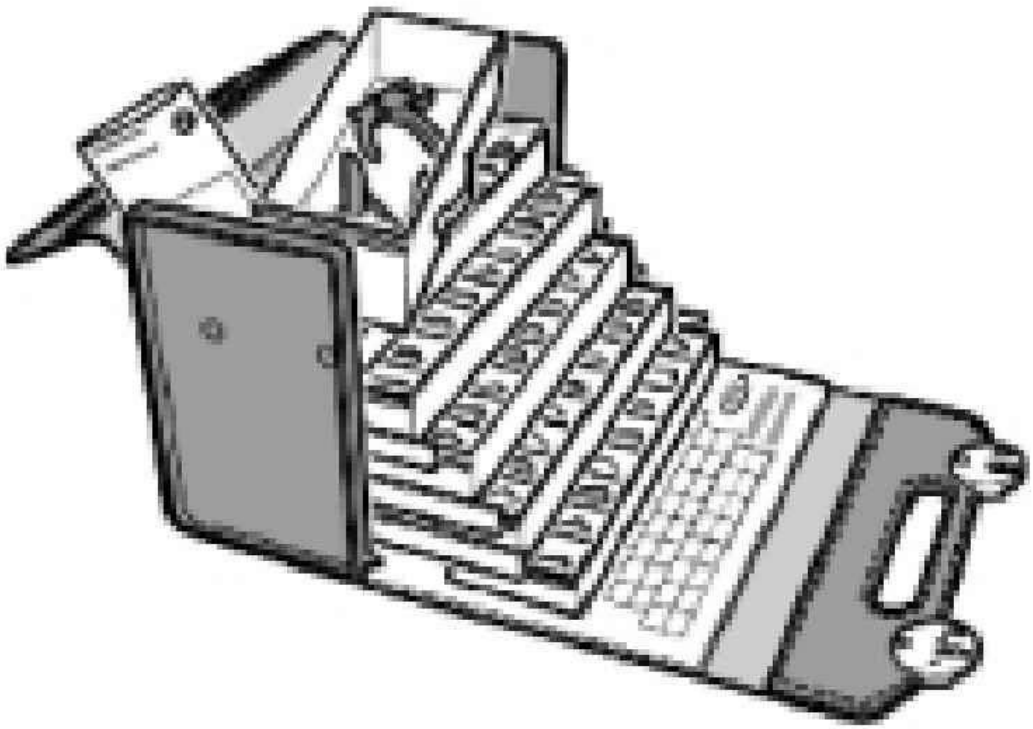
Mechanical strength of solderless terminal design and electrical conductivity must be maintained at all times. To ensure these characteristics are maintained in the vehicles electrical system several BMW repair kits are available.

The repair kits listed contain all the approved connectors, pins, and tools required for proper repair of BMW's electrical, electronics components.

- **Electrical Repair Kit IV**

P/N 90 88 6 619 020

The Electrical Repair Kit IV (Ref. SI. 04 18 92) is used in conjunction with the detailed repair procedures.



G03389011

Fig. 79: Identifying Electrical Repair Kit IV
Courtesy of BMW OF NORTH AMERICA, INC.

- Disassembling, replacing a plug connection on the various types of connectors.
- Cutting cable to length.
- Crimping stop parts (Contacts).
- Butt connectors for repairing a plug connection.

Operating instructions for special tools and the handling of individual parts in the repair kit are available under PN 61 9 029.

Three previous kits issued by BMW are:

- **Electrical Repair Kit I** (Black Case)

  P/N 81 24 9 408 080

- **Electrical Repair Kit II** (Blue Case)

P/N 81 24 9 408 300

- **Electrical Repair Kit III** (Red Case)

  P/N 82 11 9 408 400

Electrical repair kits I, II and III are primarily needed for repairing wiring harness and connectors of older vehicles (E30 and earlier).

Operating instructions for special tools in these kits are available under **PN 61 8 084.**

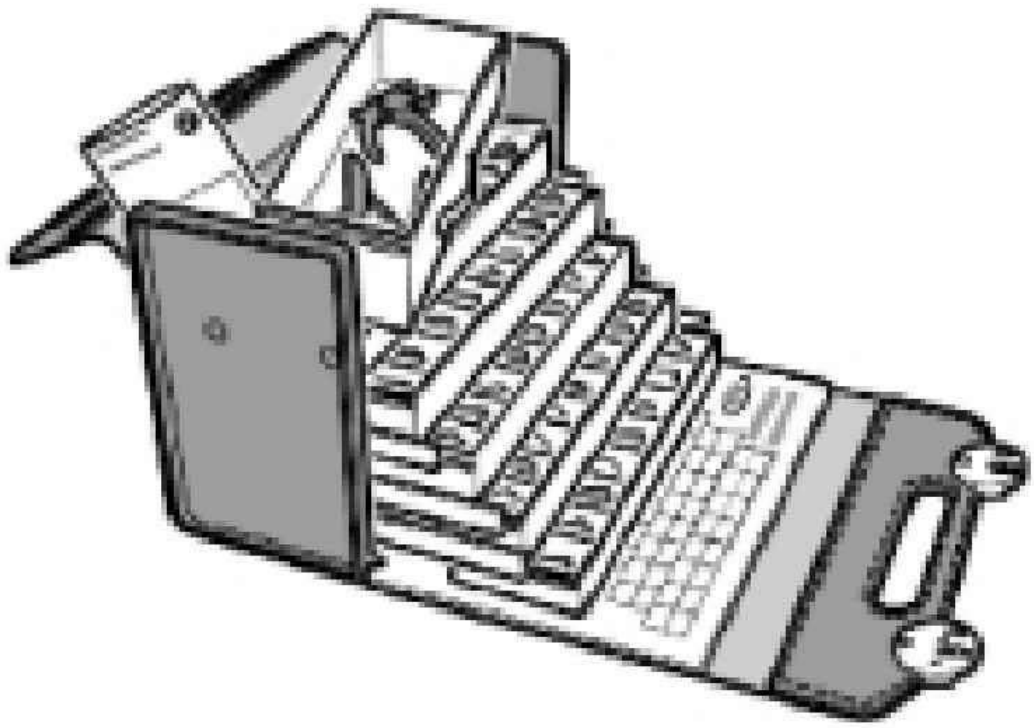
G03389012

Fig. 80: Identifying Electrical Repair Kits
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRICAL REPAIR KIT IV

The Electrical Repair Kits (I, II, III and IV) have gone through various upgrades.

Electrical Repair Kit IV (PN 90 88 619 020) has been developed to handle repairs of the specialized state of the art wiring and harnesses of the newest BMW products.



G03389013

Fig. 81: Identifying Electrical Repair Kit IV
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: The special tools contained in the Electrical Repair Kits I, II, III are not state of the art and are not suitable for specialized wiring harness repairs. Use exclusively Electrical Repair Kit IV for those repairs.

Electrical Repair Kit IV (61 9 020)

Contains the following:

61 9 041 Crimping Tool.

61 9 042 Matrix.

61 9 043 Cable Stripper.

61 9 044 Matrix.

Assorted Individual Parts.

Cable Stripper

Special Tool **61 9 043** Cable stripper with wire cutter for cutting and stripping insulation from cables.

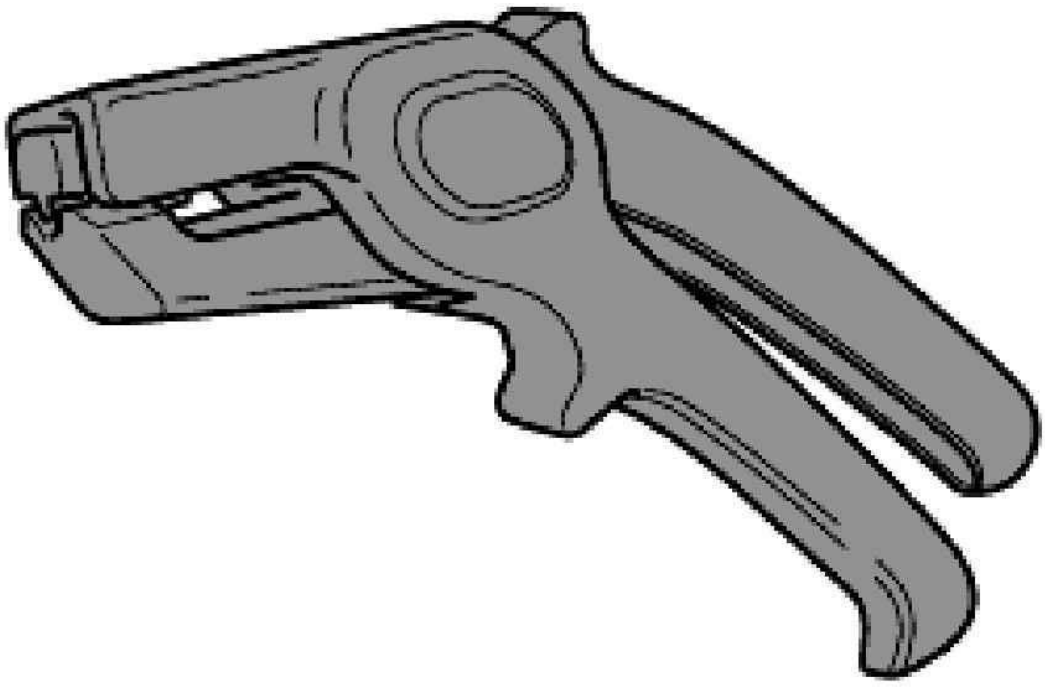


Fig. 82: Identifying Cable Stripper
Courtesy of BMW OF NORTH AMERICA, INC.

Crimping Tool

Special Tool **61 9 041** Crimping Tool with special tool **61 9 044** (matrix) for crimping cable guide and strain relief device on antenna elbow plug.

Supplementary kits for Electrical Repair Kit IV are released periodically.

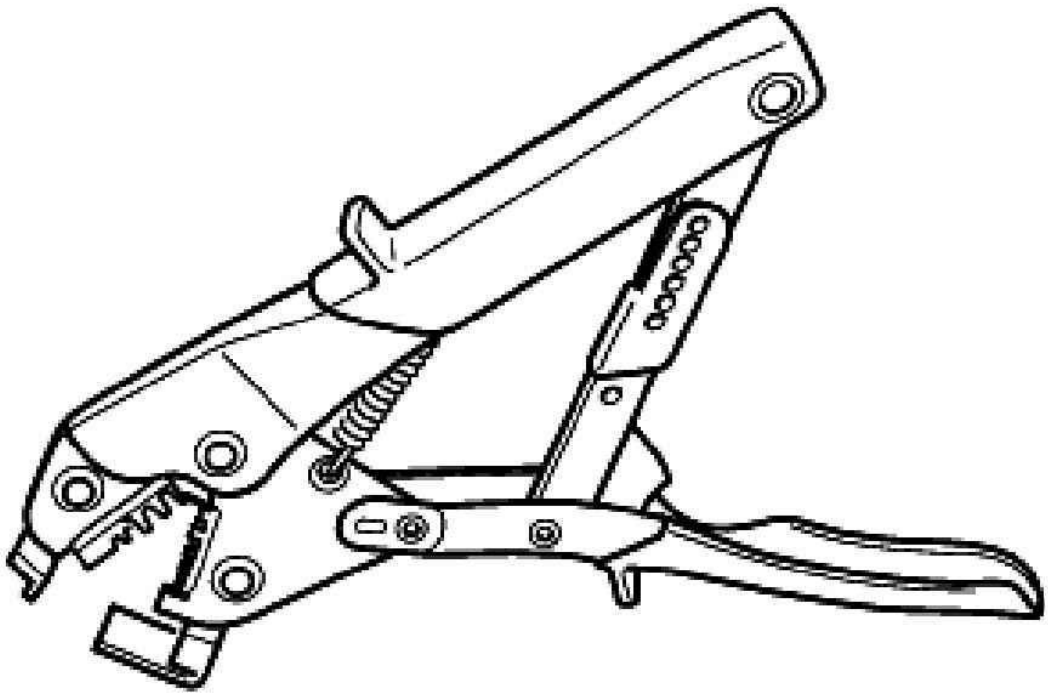


Fig. 83: Identifying Crimping Tool
Courtesy of BMW OF NORTH AMERICA, INC.

CABLE STRIPPING

Proper wire stripping and connector replacement is essential to ensure the integrity of the electrical connection. Always follow specific instructions in the Electrical Repair Kit IV instruction manual.

The length of wire to be stripped is determined by the wire gauge.

WIRE CROSS-SECTION SIZE SPECIFICATIONS

Wire cross-section size	stripped length:
mm^2	mm
0.35... 0.50	4.0
0.75... 1.00	4.5
1.00... 2.50	5.0

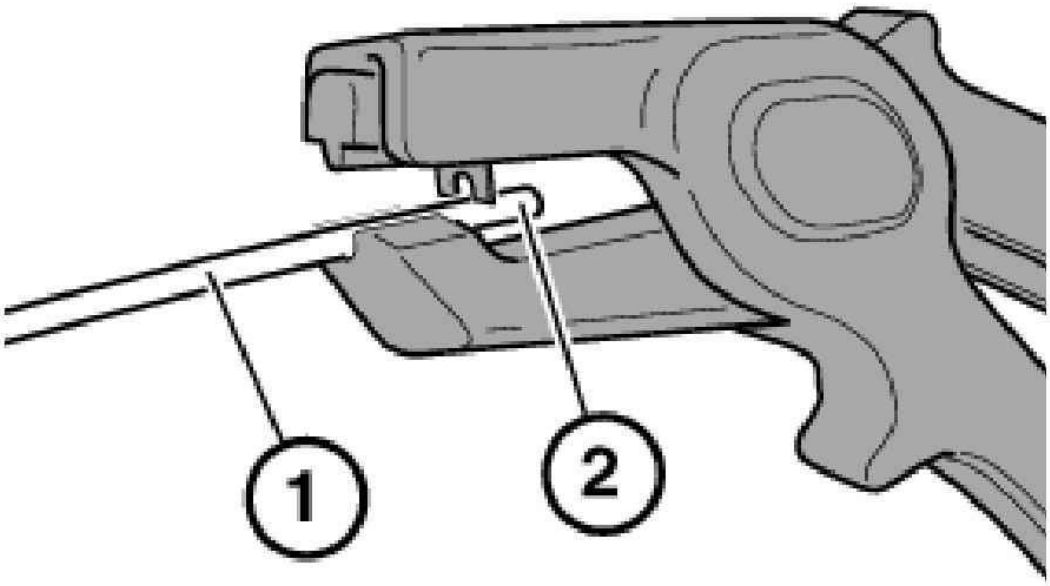


Fig. 84: Inserting Wire Into Cable Stripping Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Proper use of the wire stripping tool will provide consistently positive results. Insert the wire (1) into the stripper. Stop the wire when the required strip length is past the cutter (2). Squeeze the handle of the tool.

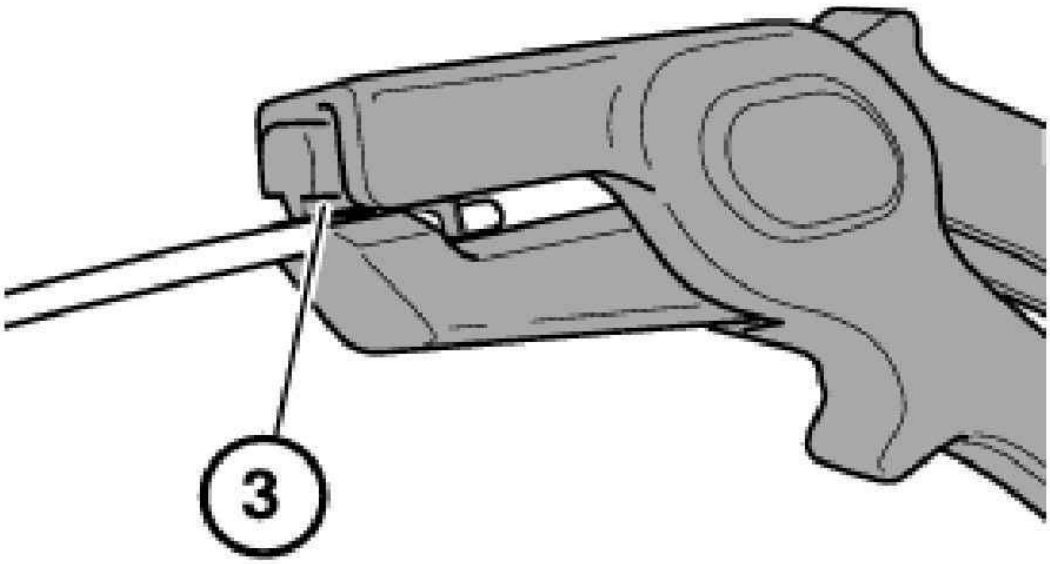


Fig. 85: View Of Wire In Stripper
Courtesy of BMW OF NORTH AMERICA, INC.

When the top jaw of the tool touches the wire (3) the mechanism shifts the clamping action to a pulling action which strips the wire of the insulation (4).

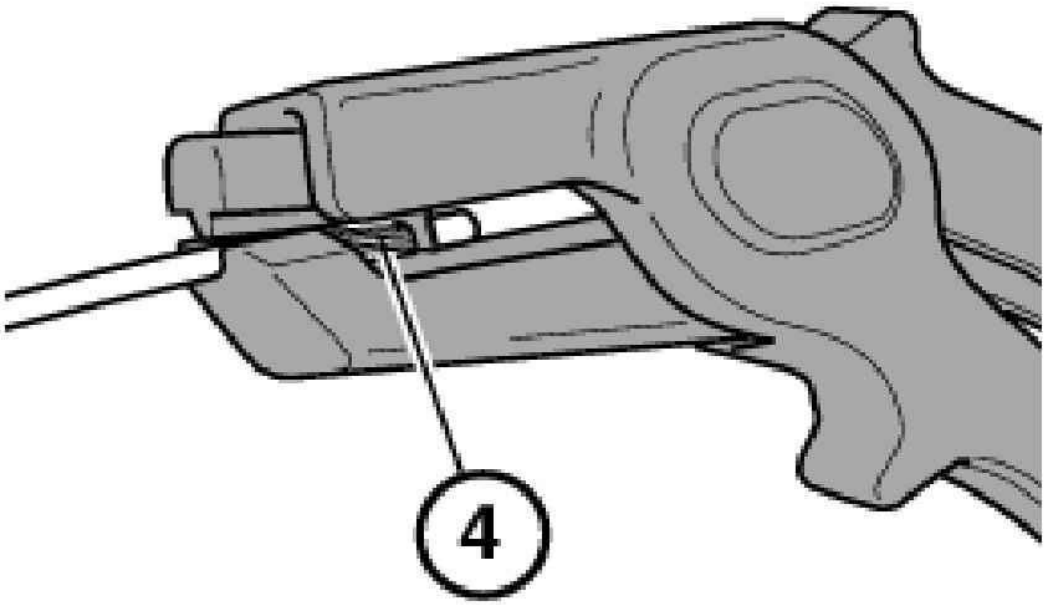


Fig. 86: Removing Insulation Using Stripper
Courtesy of BMW OF NORTH AMERICA, INC.

CRIMPING

Use the wire crimper from the BMW Electrical Repair Kit. This crimper is designed for the specific connectors found in BMW automobiles. Proper use of the tools will provide consistent good quality connector crimps.

The crimper is designed to apply just the right amount of pressure based on the wire gauge and connector size.

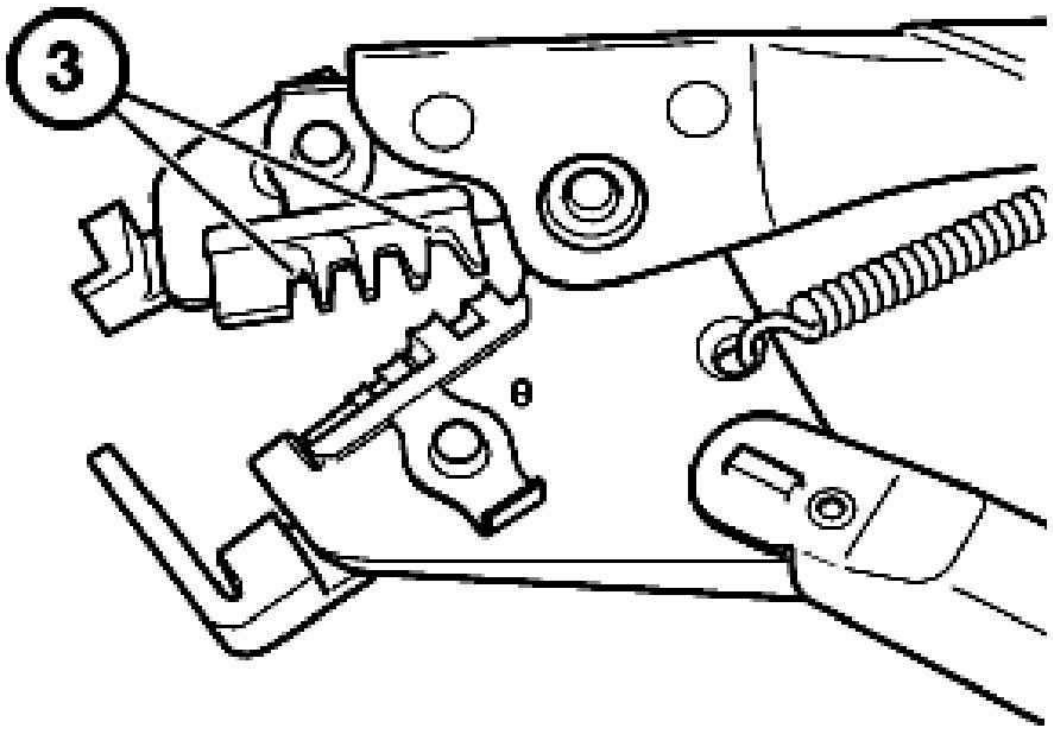


Fig. 87: Identifying Removable Crimper Jaws
Courtesy of BMW OF NORTH AMERICA, INC.

The tool has removable crimper jaws (3). This feature allows for an unlimited number of connector types for future compatibility. The article refers to the different sized crimping slots as "Nests". The gauge of the wire being crimped determines which "Nest" is used.

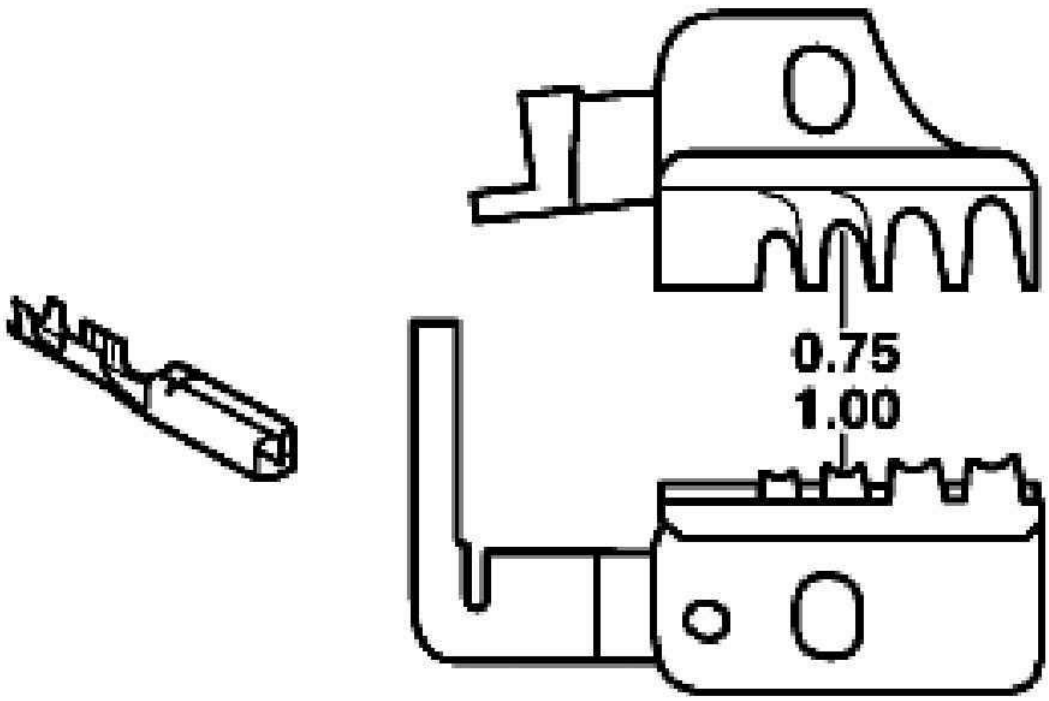


Fig. 88: Identifying Crimper Jaw Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

WIRE CROSS-SECTION SIZE SPECIFICATIONS

Nest	Wire Cross-section size
1	0.035....0.50mm^2
2	0.75.....1.0mm^2
3	1.5mm^2
4	2.5mm^2

Example:

A. 75 - 1.0mm gauge wire requires nest 2 for proper crimping.

Throughout the Electrical Repair Kit instruction manual are illustrations of various connectors being crimped. The highlighted box of the 16 box grid in these illustrations refers to the storage compartment in the electrical kit drawers in which that specific connector can be found.

Insert the "crimping end" of the connector into the appropriate "nest". Illustration provides example of comb replacement connector (4) and inline splice connector (5).

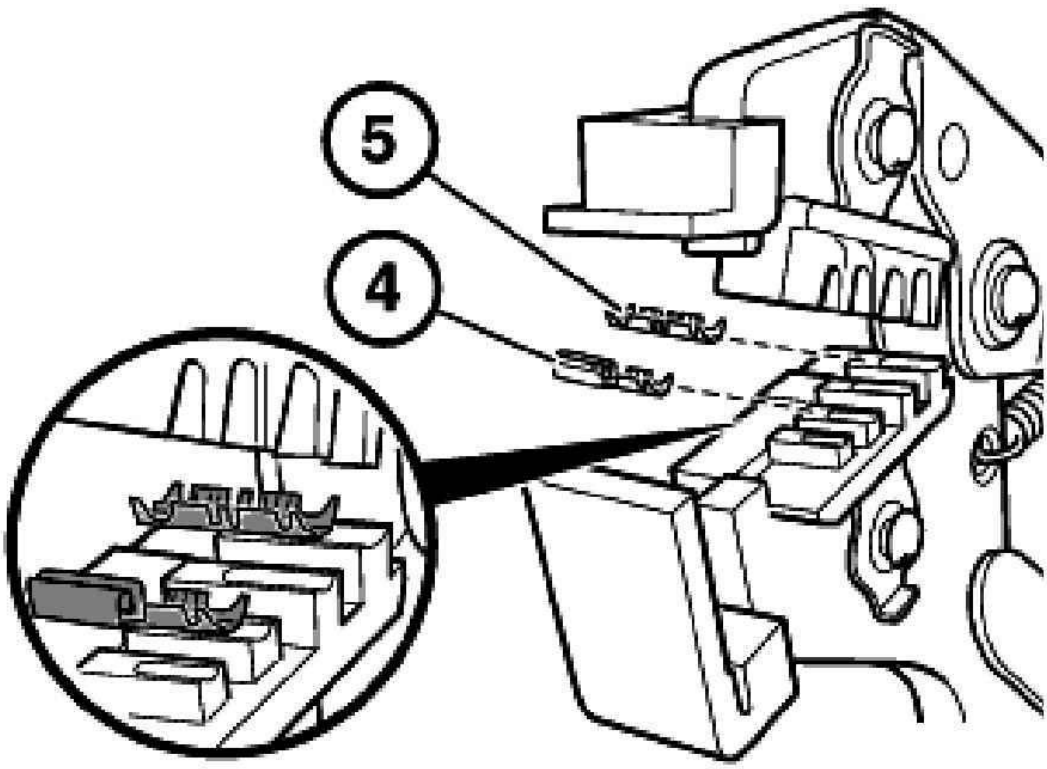


Fig. 89: Identifying Comb Replacement Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Squeeze the tool handle slightly to set the tool in the first ratchet latch position. This will hold the connector in the tool without closing the crimp (6).

Insert the stripped wire into the receiving end of the crimper tool making sure the wire is inserted far enough to ensure that only the wire insulation will be inside the insulation support barrel (7).

Properly crimped connectors exhibit the following characteristics:

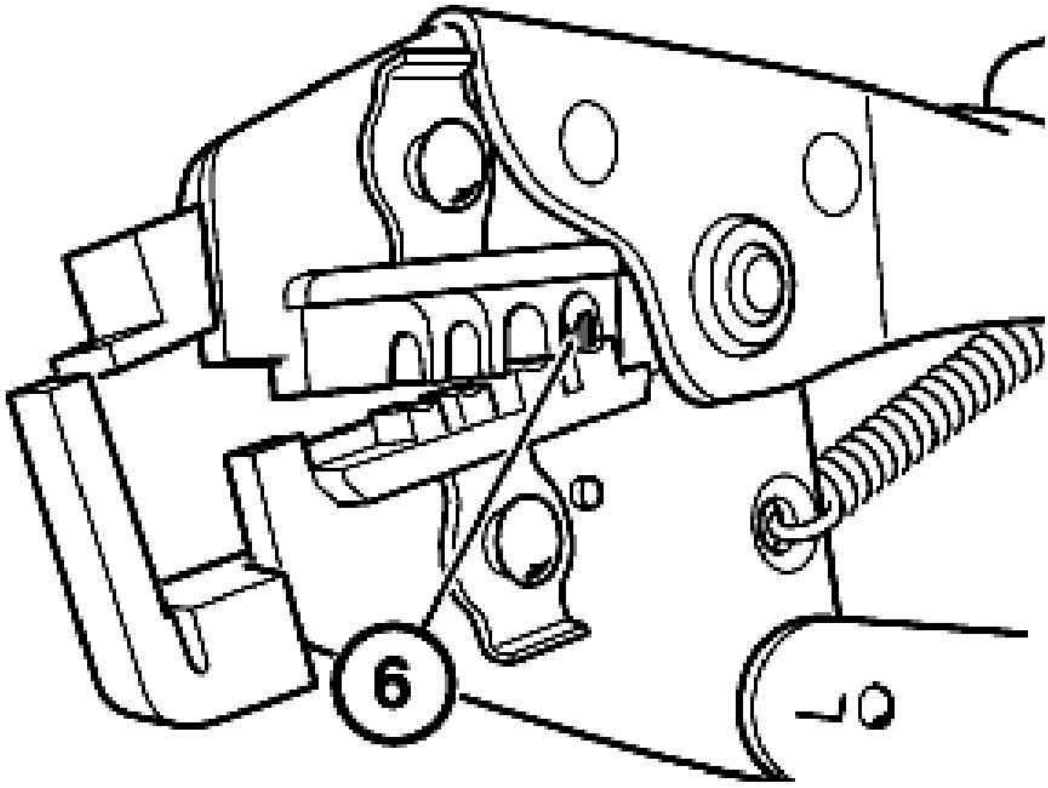


Fig. 90: View Of Connector In Tool
Courtesy of BMW OF NORTH AMERICA, INC.

- The insulation support barrel will be crimped consistently and snug against the insulation. The insulation will not be crushed (8).
- A bellmouth crimp will be visible at the wire end of the of the wire barrel (9).
- Wire strands will be visible at the contact end of the wire barrel (10).
- Insulation end will be visible in this area (11) (**Fig. 92**).

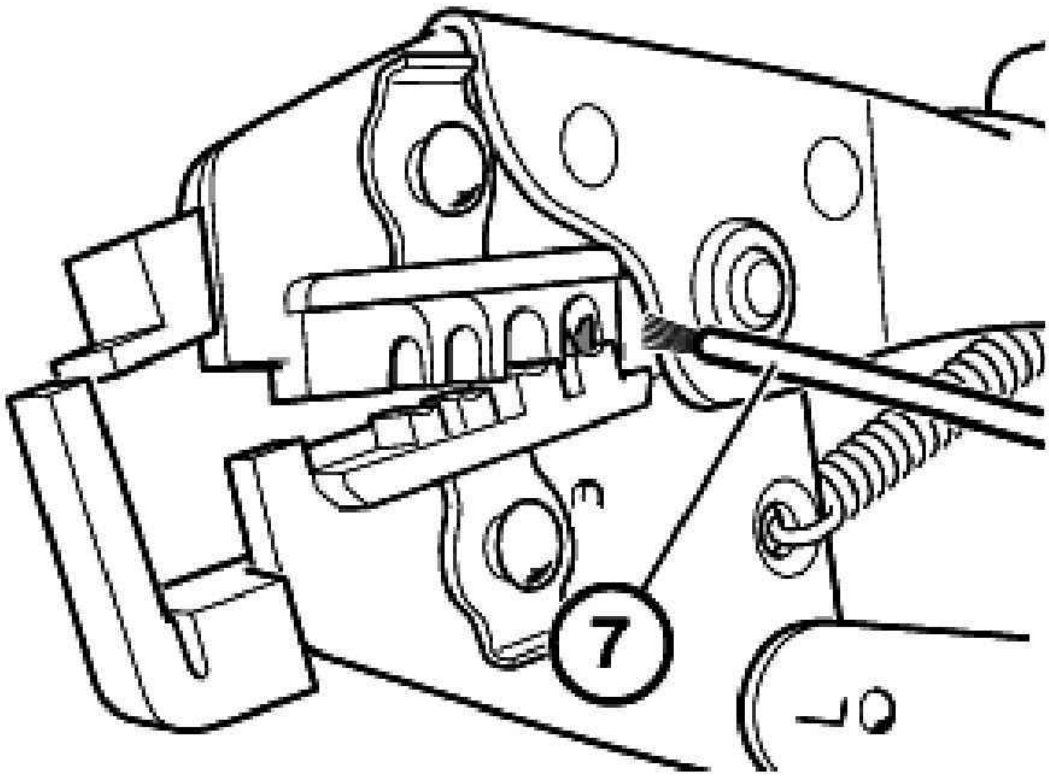


Fig. 91: View Of Wire Insulation In Support Barrel
Courtesy of BMW OF NORTH AMERICA, INC.

The following are examples of unacceptable crimps: (**Fig. 93**)

- Excessive or no wire strands at the contact end of the wire barrel (10).
- Excessive or no insulation end in the acceptable area (11).

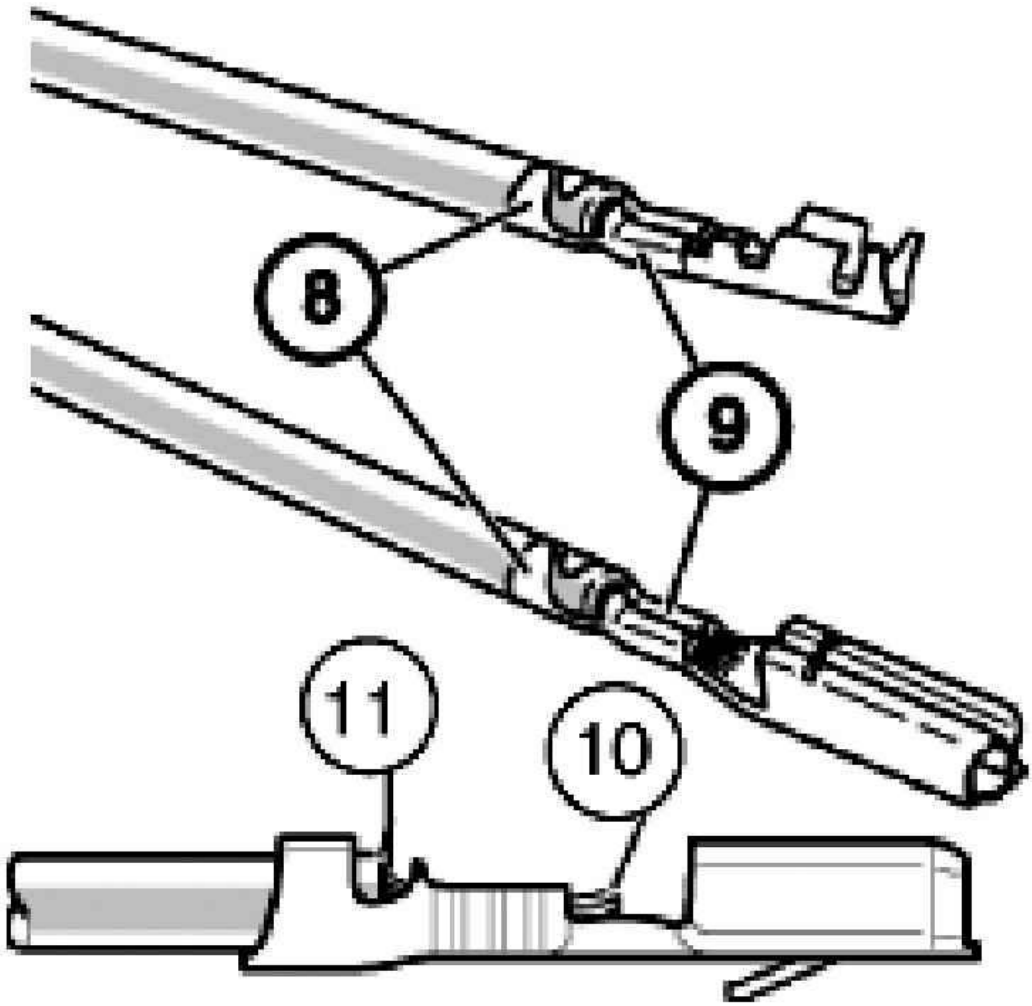


Fig. 92: Identifying Properly Crimped Connector
Courtesy of BMW OF NORTH AMERICA, INC.

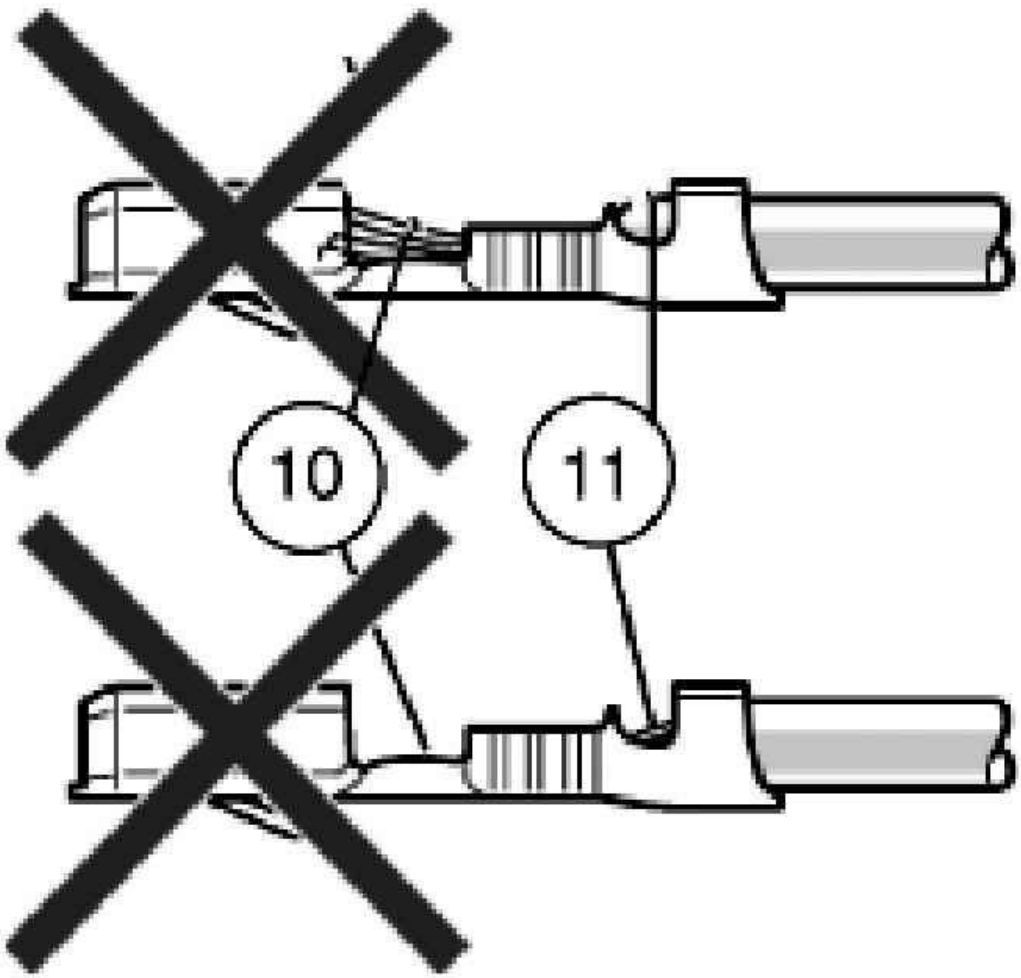


Fig. 93: Identifying Unacceptable Crimps
Courtesy of BMW OF NORTH AMERICA, INC.

PREPACKAGED WIRING REPAIR SETS

Included with the Electrical Repair Kit IV are a variety of wiring repair sets. These sets contain various pre-crimped wiring connectors on assorted gauge wire lengths for simple splice connection repair into a wiring harness.

The repair kits also contain:

1. Various gauge lengths of wire with precrimped connectors.

2. In-line splice connectors.
3. Heat shrink tubing.

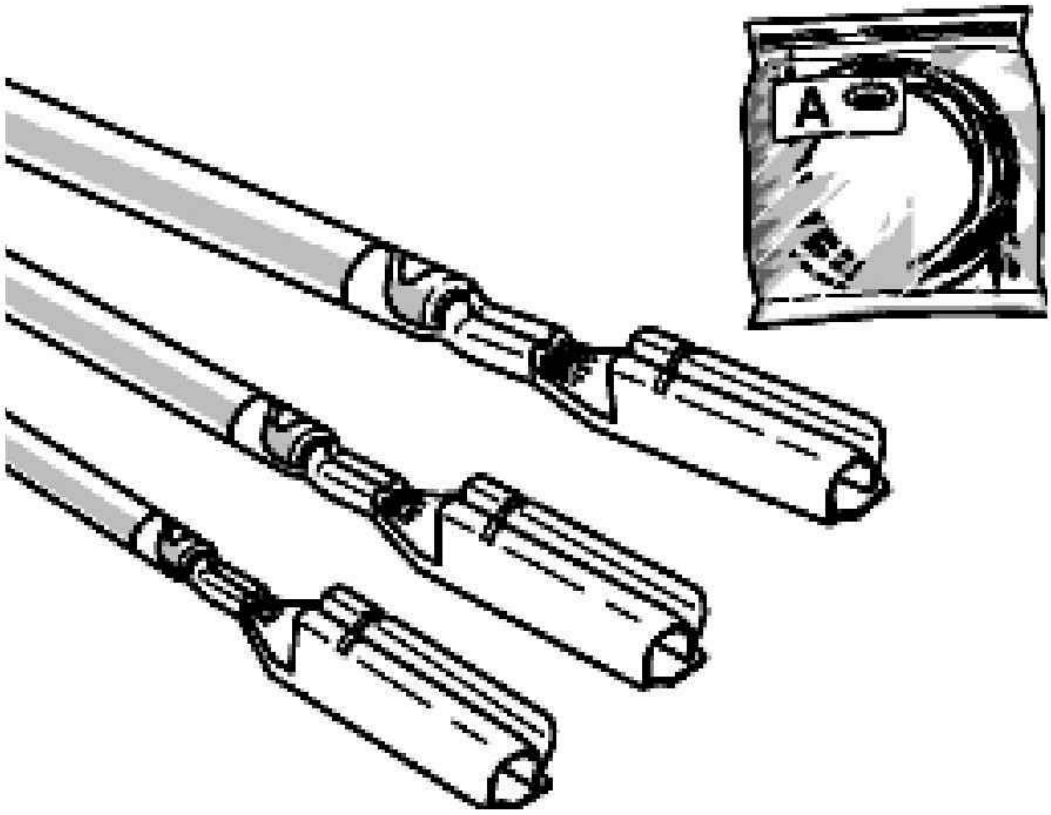


Fig. 94: Identifying Prepackaged Wiring Repair Sets
Courtesy of BMW OF NORTH AMERICA, INC.

When used correctly the in-line splice connectors provide a BMW factory approved wire crimp. Use the correct size nest in the crimper tool and connect one side of the in-line crimp with the wire.

Slide a piece of heat shrink tubing on the wire and crimp the other side of the in-line connector.

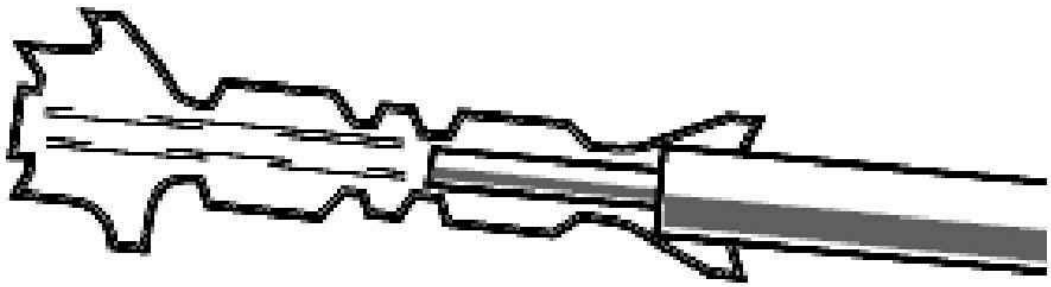


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Fig. 95: Using Correct Size Crimper Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Use a heat gun to shrink the tube around the splice connector to provide a moisture resistant seal.

Part numbers for the wire sets or any component of all four electrical repair kits can be reordered from:

- The P/N reference card inside each repair kit.
- Special tools microfiche.
- The Electrical Repair Kit 1-4 component catalog **(SD 92-036).**

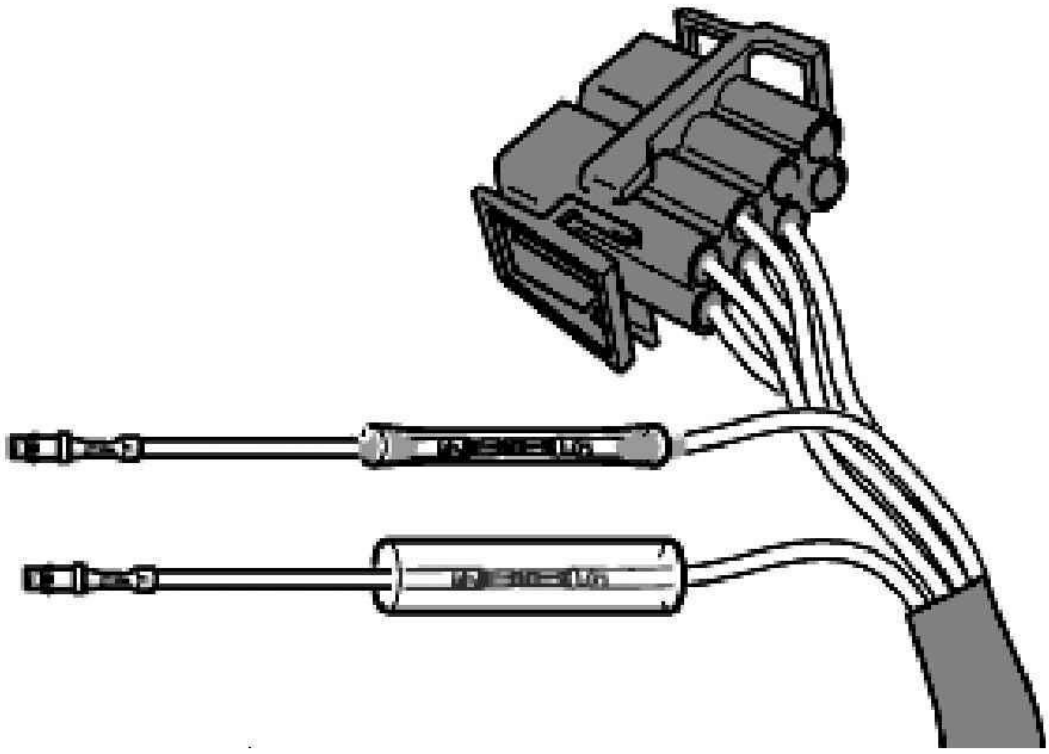

Fig. 96: Identifying Electrical Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

As new connectors are developed for new vehicles, the repair kits will be added to appropriate articles.

Soldering Connections

In the event that a wiring connection must be soldered in a vehicle's electrical system, there are certain procedures which must be followed. Improper soldering will result in poor electrical connections or damage to electrical components.

SAFETY: Adhere to the following basic guidelines when preparing to solder.

- **Safety glasses must be worn.**
- **Disconnect vehicle battery.**
- **Cover vehicle trim surfaces.**
- **Exercise your common sense.**
- **Provide adequate ventilation, it's the best safety precaution!**

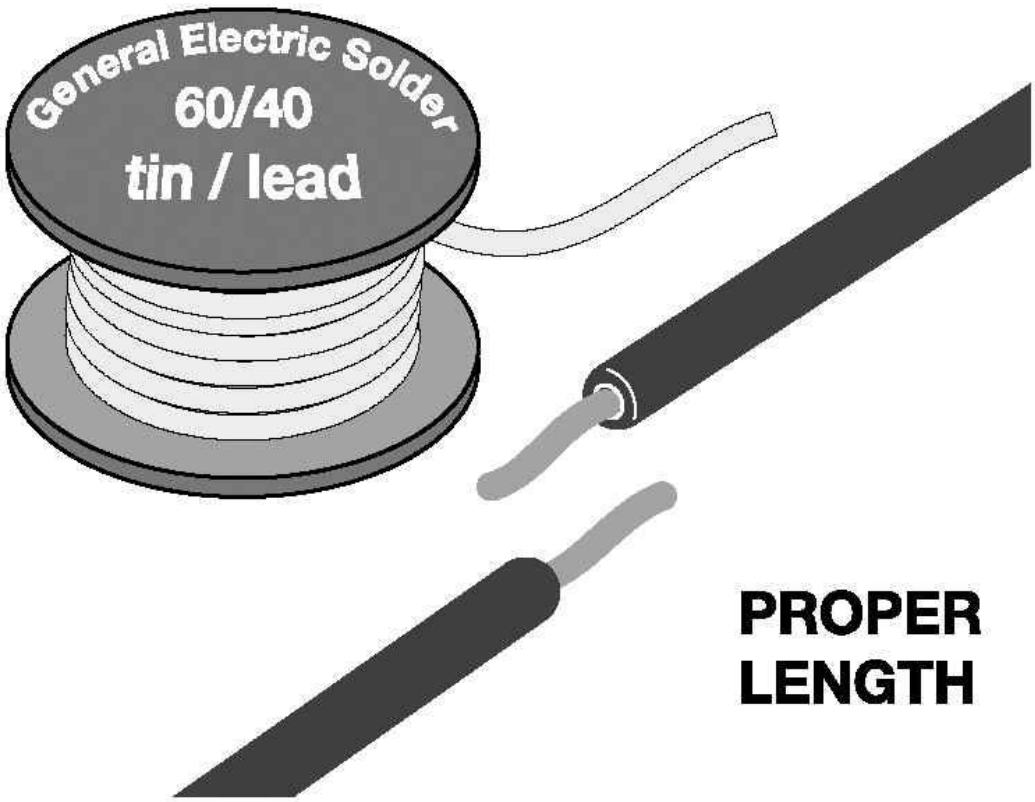

Fig. 97: Identifying Correct Amount Of Wire For Soldering
Courtesy of BMW OF NORTH AMERICA, INC.

Soldering Preparation and Procedure

- The wire insulation must be stripped to expose an adequate amount of bare wire (not too little-not to much.)
- The wires and or connectors must be **clean** and free of grease, dirt, wax, etc.
- A thin coating of **rosin core flux** must be applied to the soldering connection.
- Have enough **60/40 (tin/lead)** general electrical **solder** on hand prior to starting.
- If heat transfer to a heat sensitive component is possible use **"heat sinks".**
- Use a soldering gun tip that is the right size for the job. Do not use an overly large tip which could melt wire insulation and block your view of what is being soldered.
- The soldering tip must be **"tinned"** . This means to keep a thin layer of solder on the tip at all times during soldering. This will transfer the heat quickly and allow the solder to flow easily into the joint being soldered.

- Preheat the wires or connector. Introduce the solder into the joint not the soldering tip.
- When the solder starts to flow allow it to infiltrate the joint only for a moment. Almost simultaneously, pull the tip off of the joint to prevent overheating.
- A properly soldered joint will be smooth, shinny, and even surfaced.

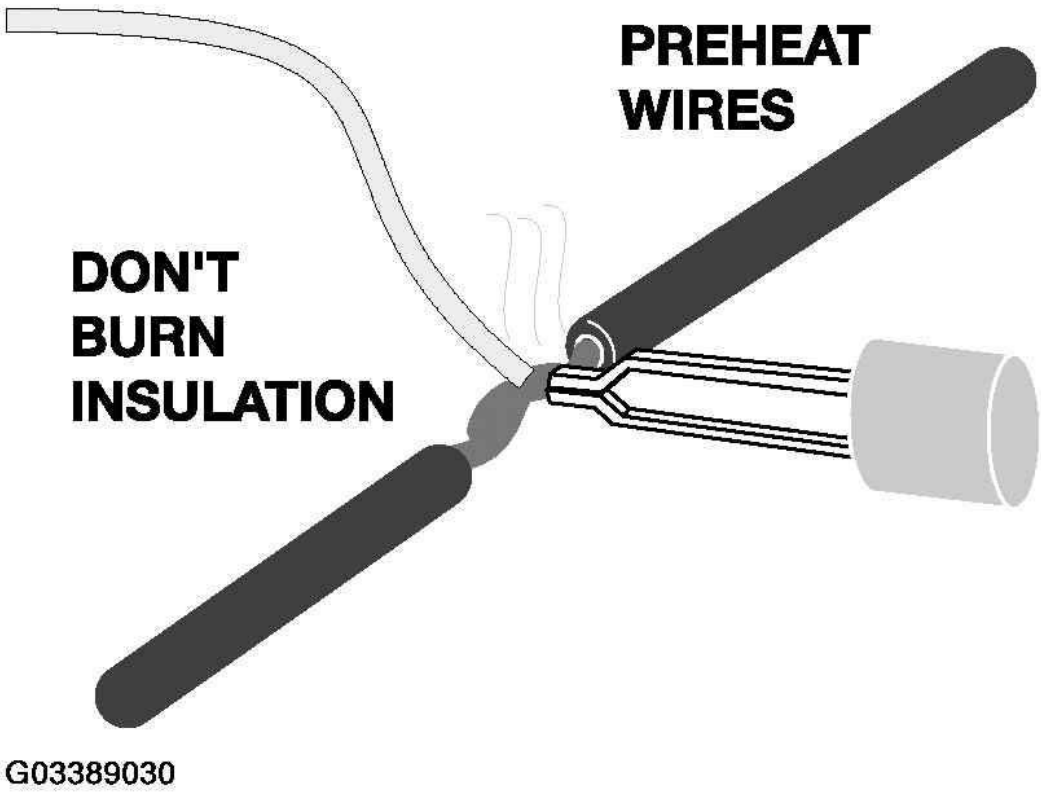

Fig. 98: Identifying Soldering Procedure
Courtesy of BMW OF NORTH AMERICA, INC.

BREAKOUT BOXES AND "V" CABLES

Breakout Boxes are used to:

- Provide a convenient "tap" into an electrical circuit.
- Minimize the possibility of damage to control unit connections and wire harnesses during diagnosis of electrical/electronic systems.
- Ensure solid meter connections for proper diagnosis, this in turn will help the technician to be more organized and efficient.
- Provide easier access to circuits for testing with equipment such as, multimeter, DISplus tester or other diagnostic tools.

CAUTION: Breakout box cable connections are universal in order to fit the varying coded connectors found in the vehicles. Always confirm that you are connecting the correct control module into the system harness that is on the other side of the breakout box. System damage will occur if it is not the correct system.

Example: DME and EGS/AGS control modules both utilize an 88 or 134 pin control module. These control modules reside in the same E-Box on most vehicles. The control modules are coded to prevent unintentional cross connecting at the vehicle harness. But, this connector coding is not present on the 88 or 134 pin breakout box(s). **Result: A DME control module could be connected to a transmission control system. Damage will result!**

Several different types of breakout boxes are available depending on the particular system being diagnosed.

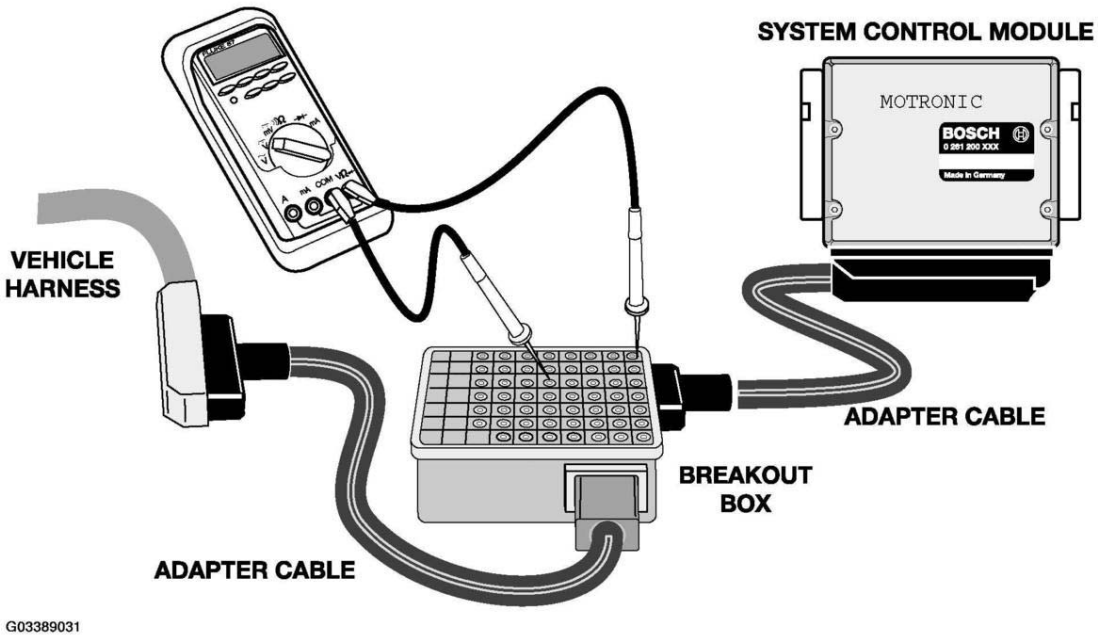

Fig. 99: View Of Breakout Box
Courtesy of BMW OF NORTH AMERICA, INC.

55 pin Breakout Box P/N 81 12 9 425 091

Used with control modules that have single multipin plugs from 25 to 55 pins.

- L-jetronic.
- ABS.
- Motronic.
- EGS.

Adapter cables are required.

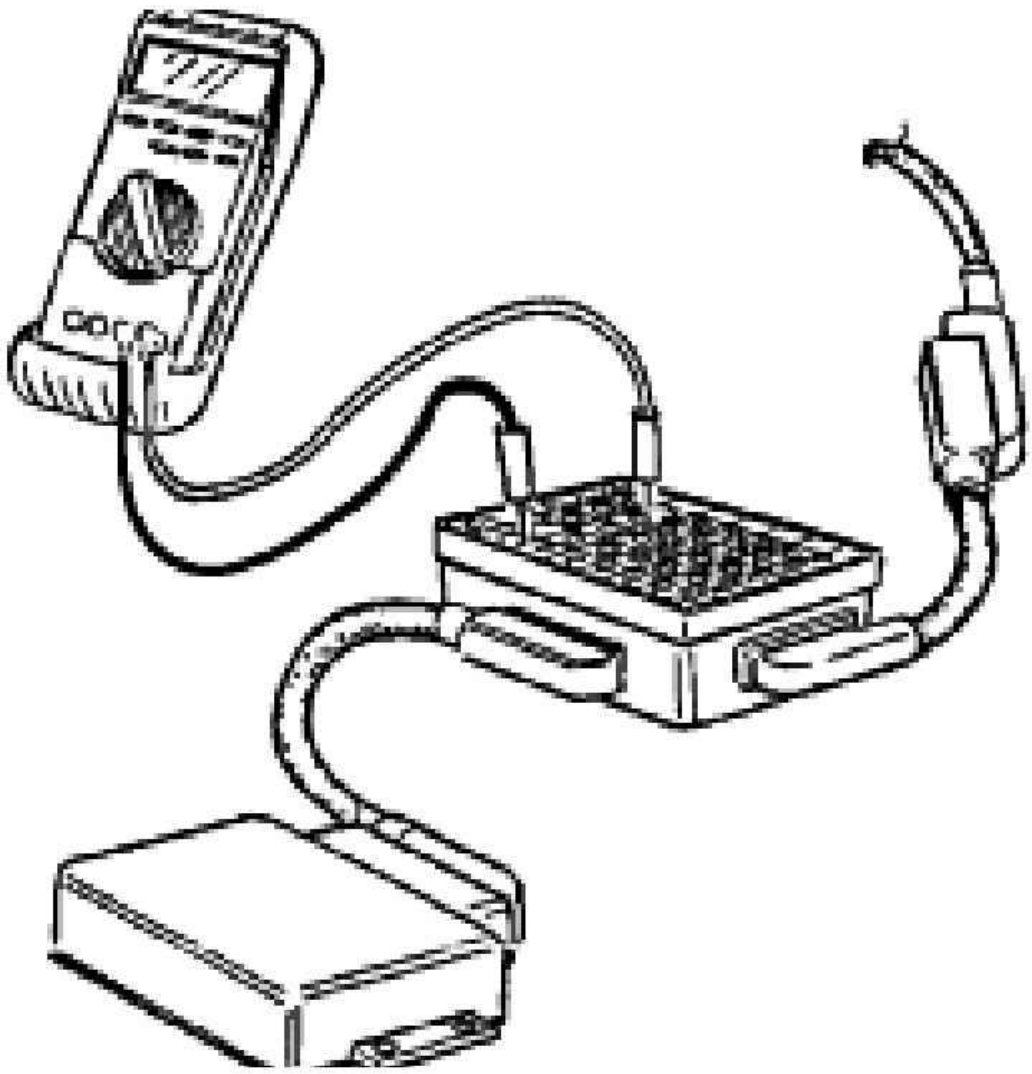

Fig. 100: Identifying 55 Pin Breakout Box P/N 81 12 9 425 091
Courtesy of BMW OF NORTH AMERICA, INC.

83 Pin Breakout Box (Red Face) P/N 90 88 6 614 420

When used with ABS/ASC 5 system, no adapter cables are required. There is an adapter harness for use with the Teves Mark IV G ABS system of the E36.

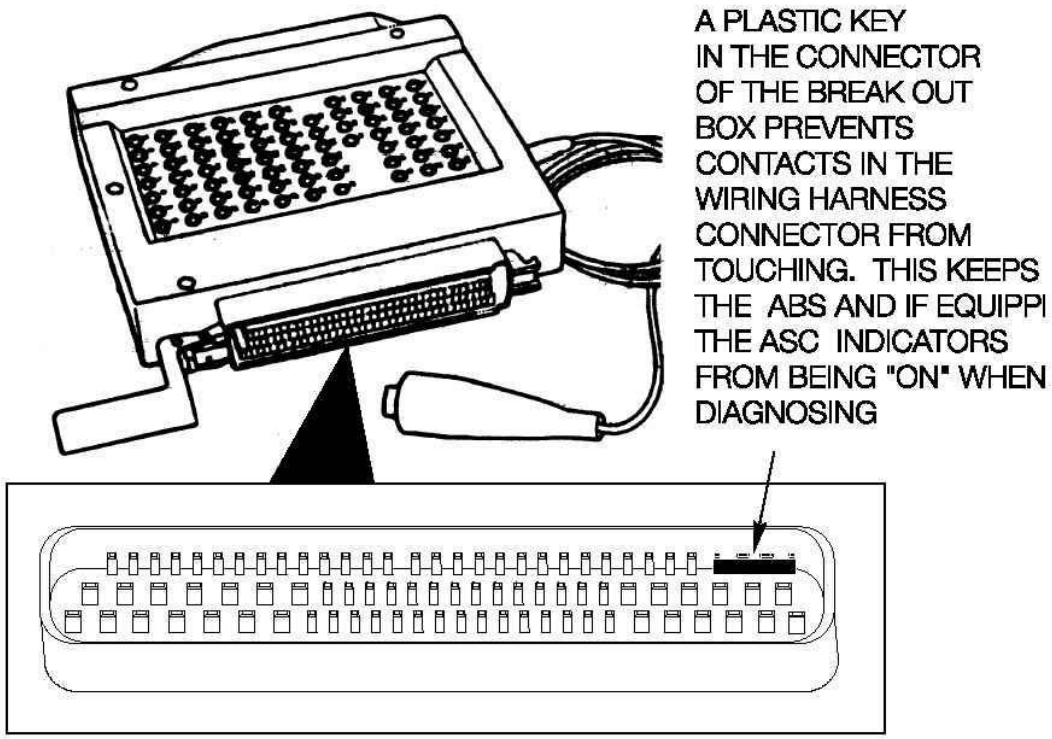

Fig. 101: View Of 83 Pin Breakout Box (Red Face) P/N 90 88 6 614 420
Courtesy of BMW OF NORTH AMERICA, INC.

88 Pin Breakout Box (Green Face) P/N 88 88 6 614 410

Used with control units that have up to 88 pins;

- DME.
- EGS/AGS.
- ZAE/MRS.
- LCM.

No adapter cables are required when connected to a DME or EGS/AGS control module. There are adapter harnesses for ZAE/MRS and LCM systems.

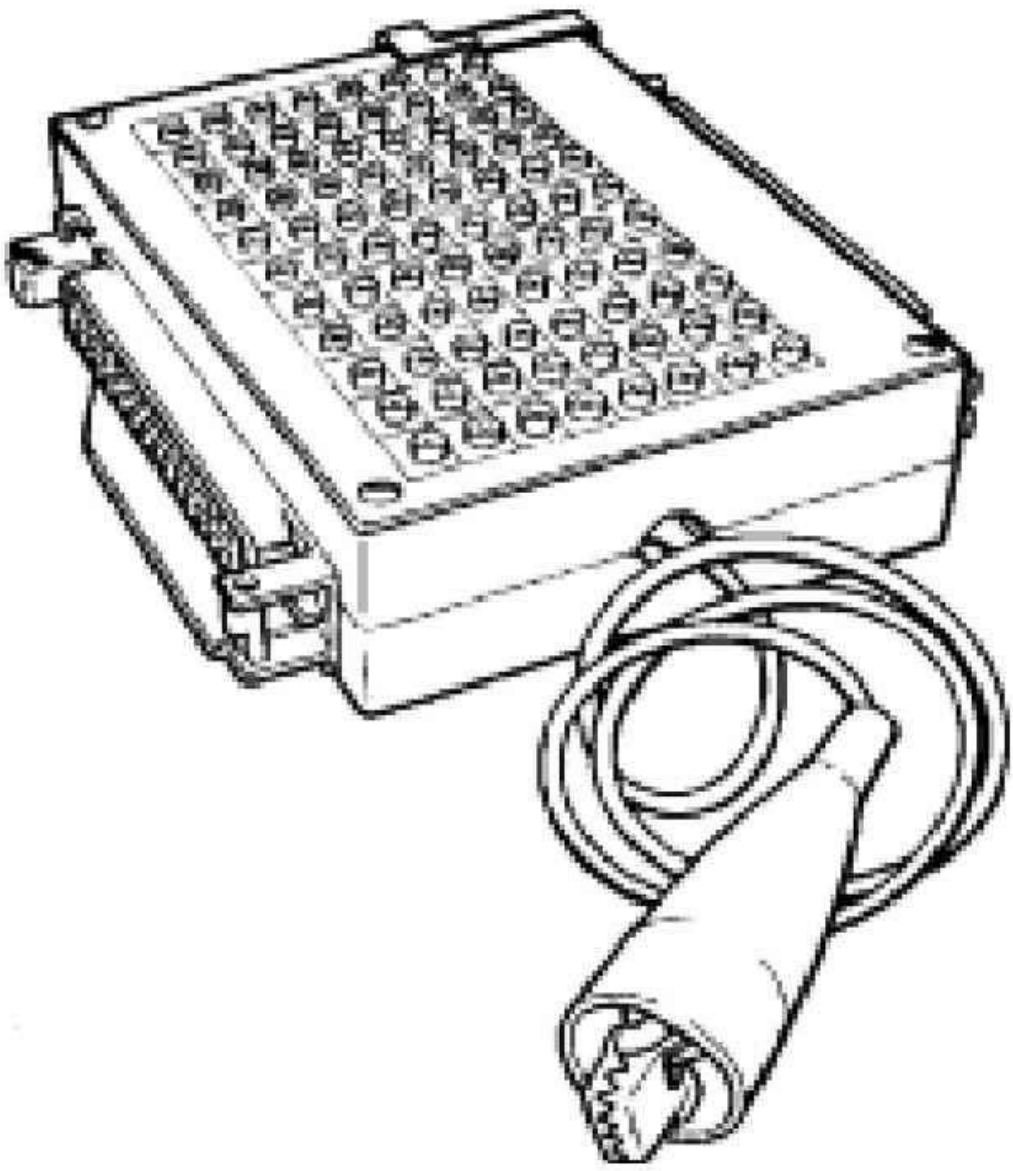

Fig. 102: Identifying 88 Pin Breakout Box (Green Face) P/N 88 88 6 614 410
Courtesy of BMW OF NORTH AMERICA, INC.

134 Pin SKE Control Module Breakout Box Set P/N 90 88 6 121 300

The 134 pin modular connector DME and AGS control modules use a combination of breakout boxes for troubleshooting. The part number above provides three breakout boxes and five adapter harnesses. The two

outside edge connectors use the familiar 26 pin breakout boxes. The three inside connectors use the boxes from the ordered set.

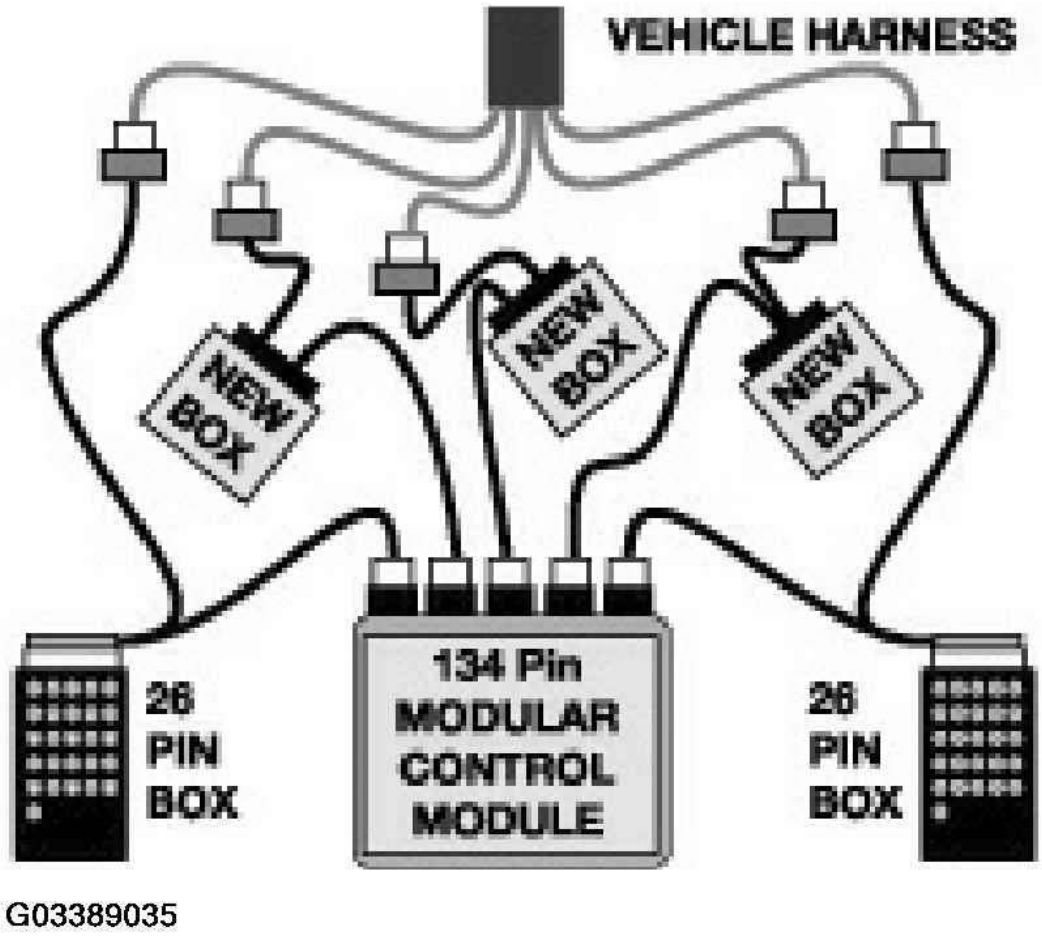

Fig. 103: View Of 134 Pin SKE Control Module Breakout Box Set P/N 90 88 6 121 300
Courtesy of BMW OF NORTH AMERICA, INC.

26 Pin Breakout Box P/n 88 88 6 611 459

Used with system or peripheral control module that have up to 26 pins. This breakout box is used in conjunction with adapter cables called "V" Cables. There are many different types of "V" cables for the various connectors found on the vehicles.

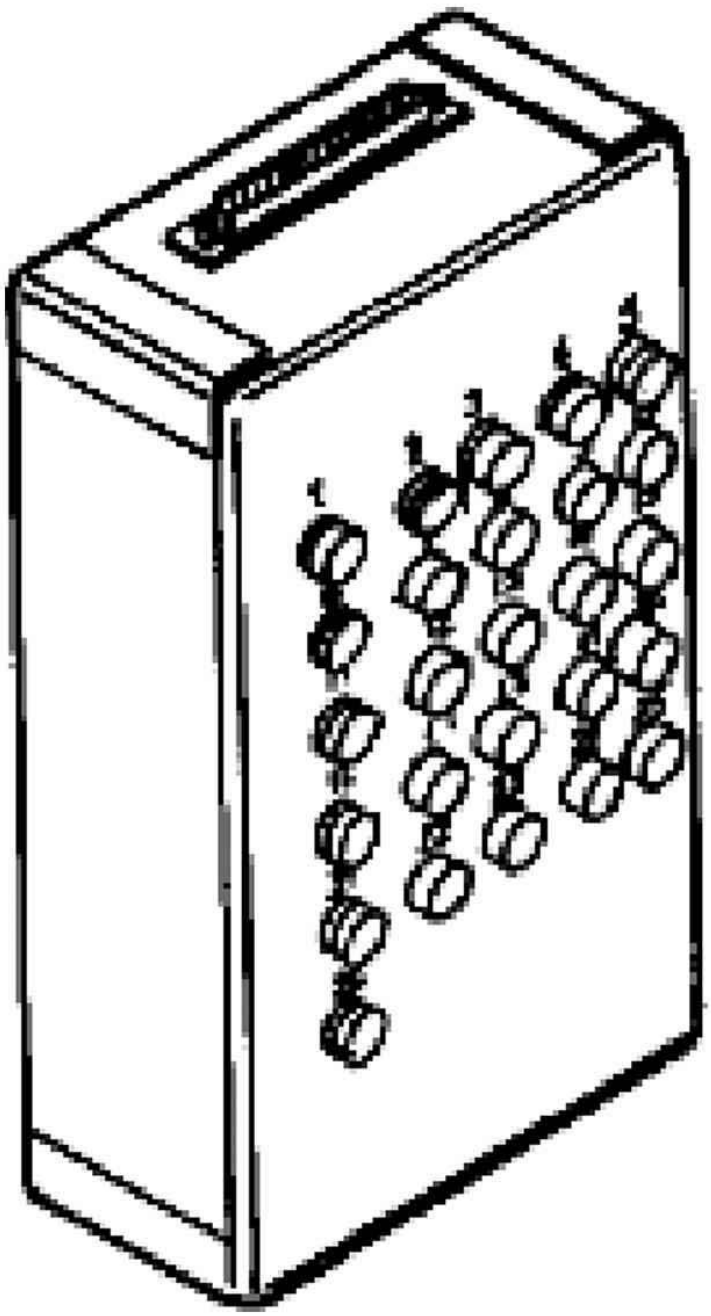

Fig. 104: Identifying 26 Pin Breakout Box P/N 88 88 6 611 459
Courtesy of BMW OF NORTH AMERICA, INC.

60 Pin Breakout Box P/N 90 88 6 614 390

Used for connecting all adapter leads with 27 pin to 60 pin plug connections.

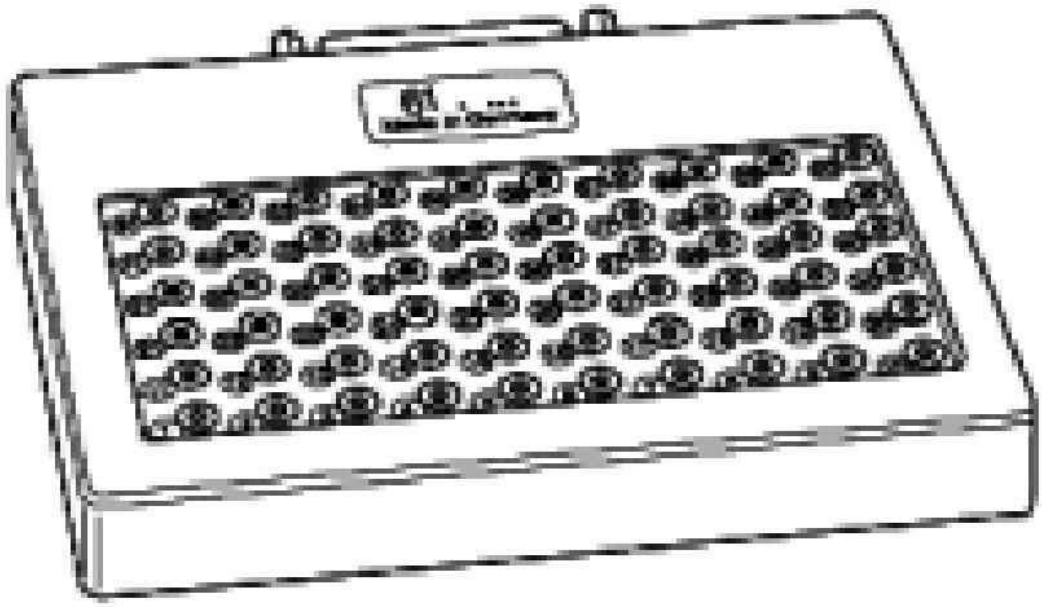

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Fig. 105: View Of 60 Pin Breakout Box P/N 90 88 6 614 390
Courtesy of BMW OF NORTH AMERICA, INC.

TESTER AND ADAPTER SET FOR RELAYS

The Relay Adapter provides a platform to test a relay while allowing the relay to remain active in a circuit.

The adapters included enable different pin configurations of relays to be tested using a single tester.

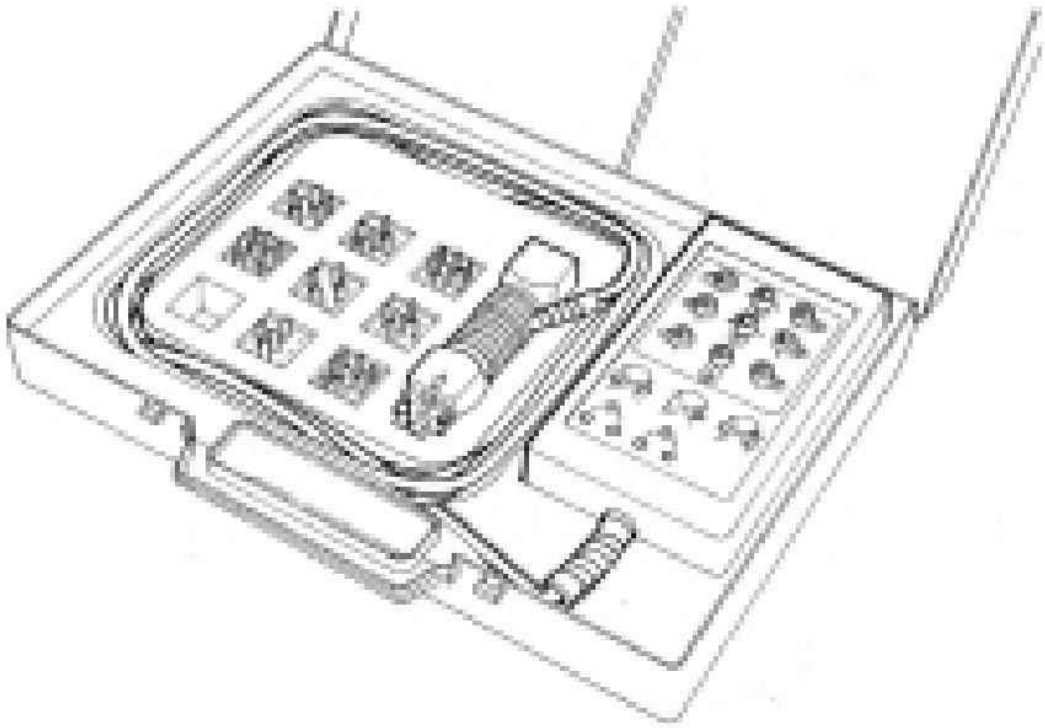

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Fig. 106: Identifying Tester And Adapter Set For Relays
Courtesy of BMW OF NORTH AMERICA, INC.

Remove relay and compare plug in adapter with plug pattern on relay. Choose correct adapter (**Fig. 107**).

Fit adapter to Measuring bridge, noting the marker arrows (A). Fit the relay to the measuring bridge (**Fig. 108**).

Plug the assemble measuring bridge into the socket of the relay to be checked. Test using a multimeter. See the circuit diagram, testing instructions in the appropriate article for subsequent procedure (**Fig. 109**).

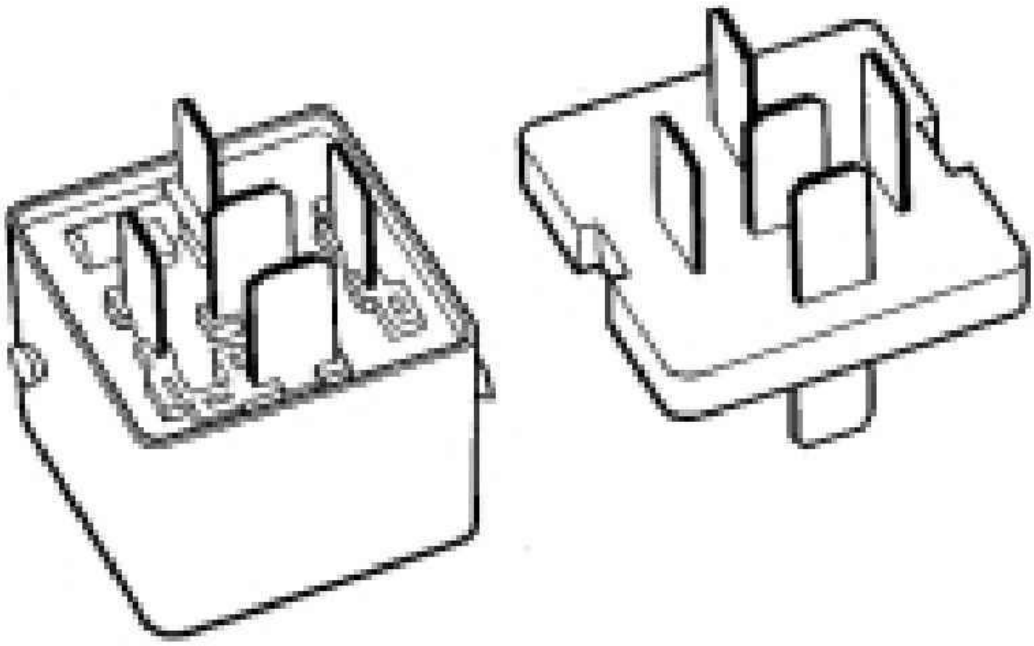

Fig. 107: Identifying Relay And Compare Plug
Courtesy of BMW OF NORTH AMERICA, INC.

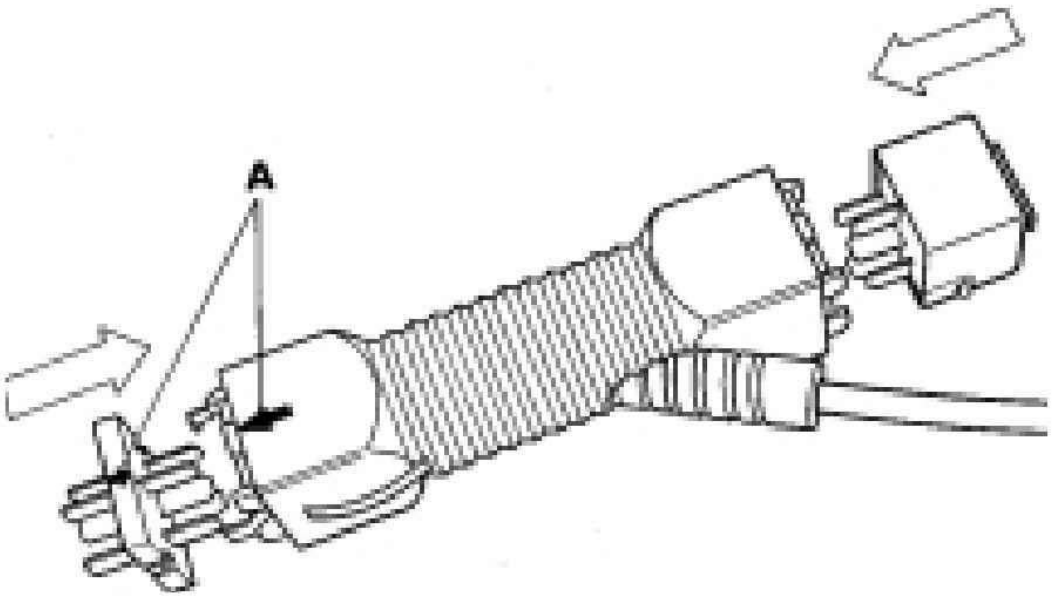

Fig. 108: Fitting Adapter To Measuring Bridge
Courtesy of BMW OF NORTH AMERICA, INC.

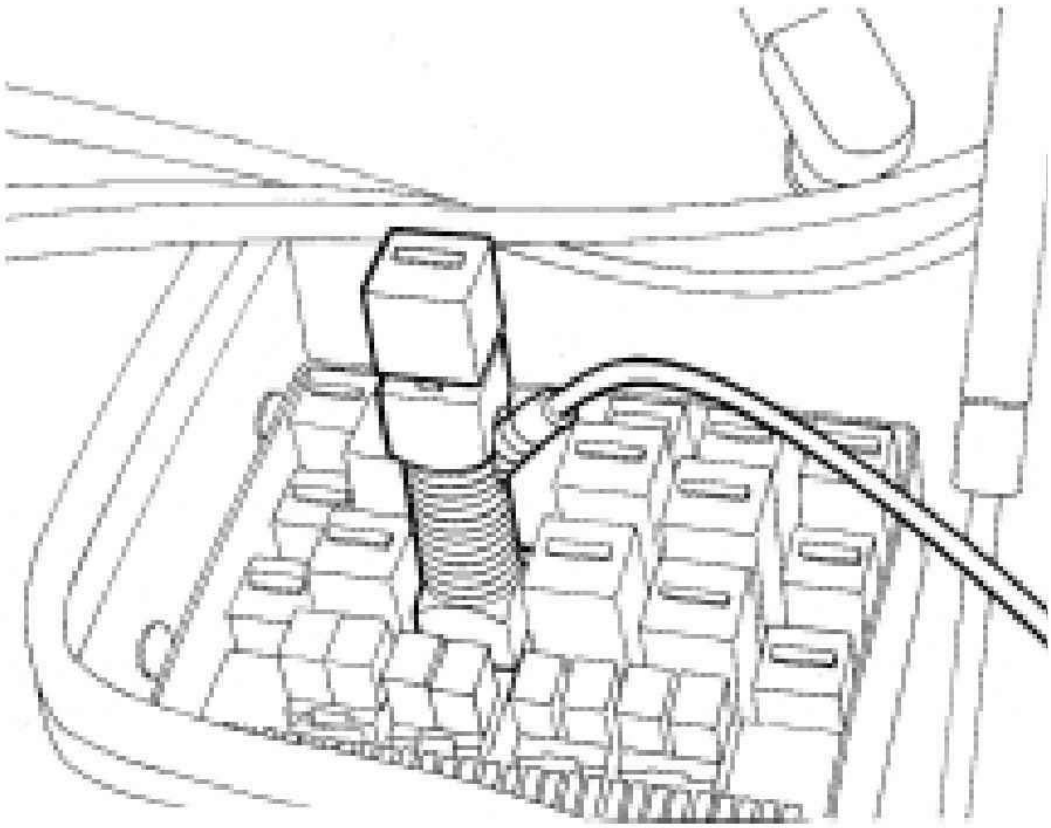

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Fig. 109: View Of Measuring Bridge In Socket
Courtesy of BMW OF NORTH AMERICA, INC.

"V" Cables

"V" cables are available in different versions depending on the system being diagnosed. Always refer to the most recent information for the required special tools.

"V" cables are only used with the 26 pin breakout box to access input and output signals of peripheral modules and systems.

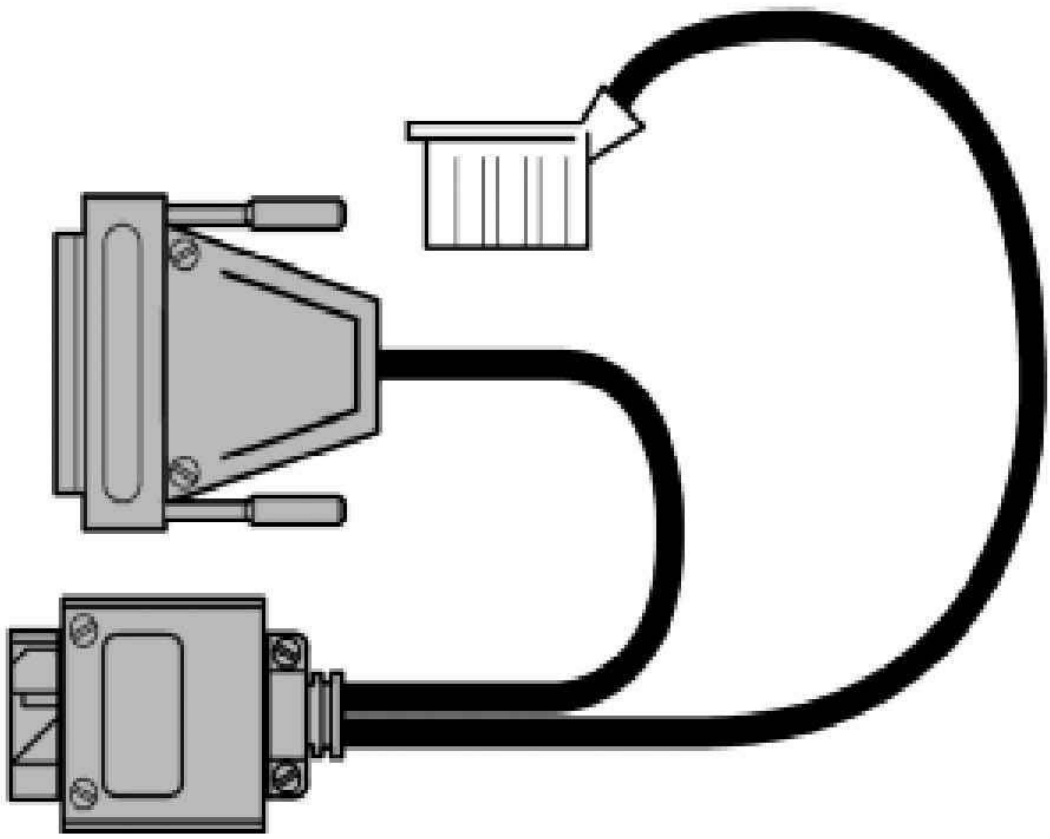


Fig. 110: Identifying "V" Cables
Courtesy of BMW OF NORTH AMERICA, INC.

- The appropriate cable is distinguished by the color of the connector end.
- The color will match the particular modules connector color. Unless the color matches, the cable will not fit the connector on the module being tested.
- Each colored "V" cable has a series of alignment tabs that will only fit it's particular module or system.

"V" cables with ELO connectors are also being used with the 26 pin breakout box. These cables are unique in that they have a locking arm on the component side of the cable. They are light green in color, and the number of pins will vary depending on the system being tested.

"V" harness adapters were introduced with the E38. These also have light green ELO connectors on the component side, but they do not require a breakout box.

There is a black plug on one side with same number of pins as the component being tested.

The plug has numbers stamped on it's side that corresponds with the pins on that particular component.

You access the signals by plugging the test equipment directly into those pin numbers.

As new systems and components are being introduced, new breakout boxes and cables will also be introduced.

CHARGING SYSTEMS

Model: All

Production Date: All

PURPOSE OF THE CHARGING SYSTEM

The purpose of the charging system is to convert the mechanical energy of the engine into electrical energy that is used to recharge the battery and power the electrical accessories. When the engine is first started, the battery (s) supplies all the current required by the starting and ignition systems.

As the battery drain continues and engine speed increases the charging system is able to produce more voltage than the battery can deliver. When this occurs, the electrons from the charging device are able to flow in a reverse direction through the battery's positive terminal. The charging device now supplies the electrical system's load requirements and recharges the battery.

The charging system consists of:

- Battery.
- Generator.
- Drive Belt.
- Rectifier Assembly.
- Voltage Regulator.
- Charge Indicator.
- Ignition Switch.
- Cables and Wiring Harness

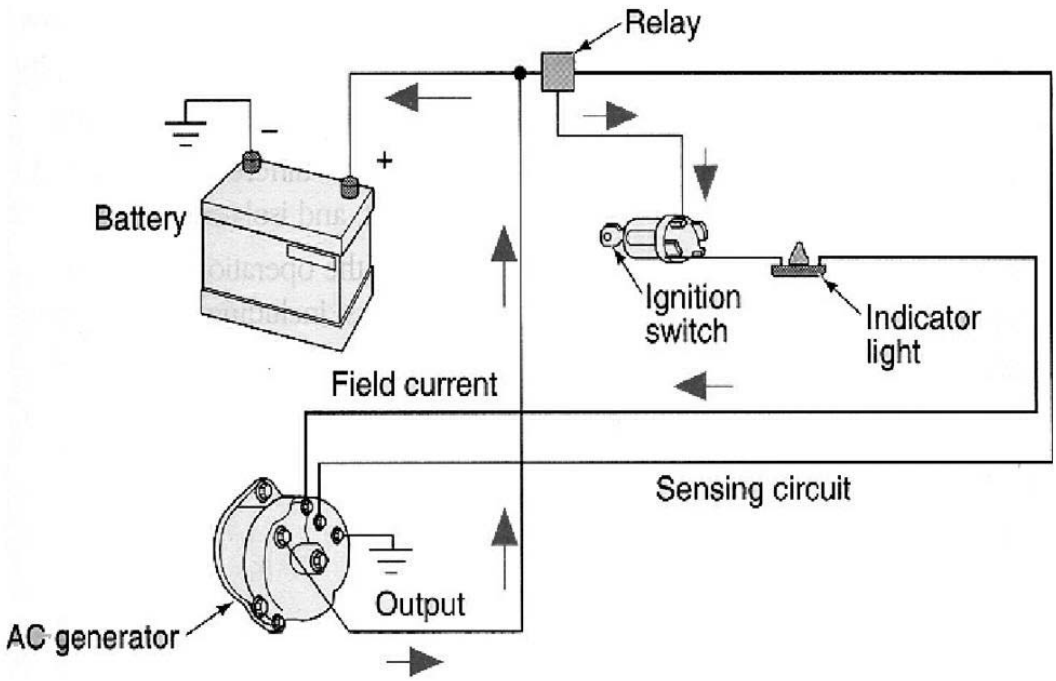


Fig. 1: Identifying Battery Charging System
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM COMPONENTS

Battery

The Battery is the primary EMF source in the automobile. The automotive battery is an electromechanical device that provides the potential difference (voltage). The battery does not store electrical energy. It stores chemical energy that is converted to electrical energy as it discharges.

Generator

The Generator produces free electrons necessary to charge the battery. The electron flow is produced through inductance, a magnetized rotor spinning inside a stator. The generator produces AC voltage which is converted to DC voltage or rectified.

Generator styles:

- Brush Type.
- Brushless Type.

NOTE: **In an attempt to standardize terminology in the industry, the term alternator is being replaced with generator. Often an alternator is referred to as an AC generator.**

Air or liquid (coolant) is used for generator cooling.

BRUSH TYPE GENERATORS

Brush Type generators consist of the following main components:

- Generator Housing.
- Stator Assembly.
- Rotor Assembly.

Generator Housing

The Housing is made of two pieces of die-cast aluminum. Aluminum is used because it is nonmagnetic, light weight and provides good heat dissipation.

Bearings for support of the rotor assembly are mounted in the front and rear housings.

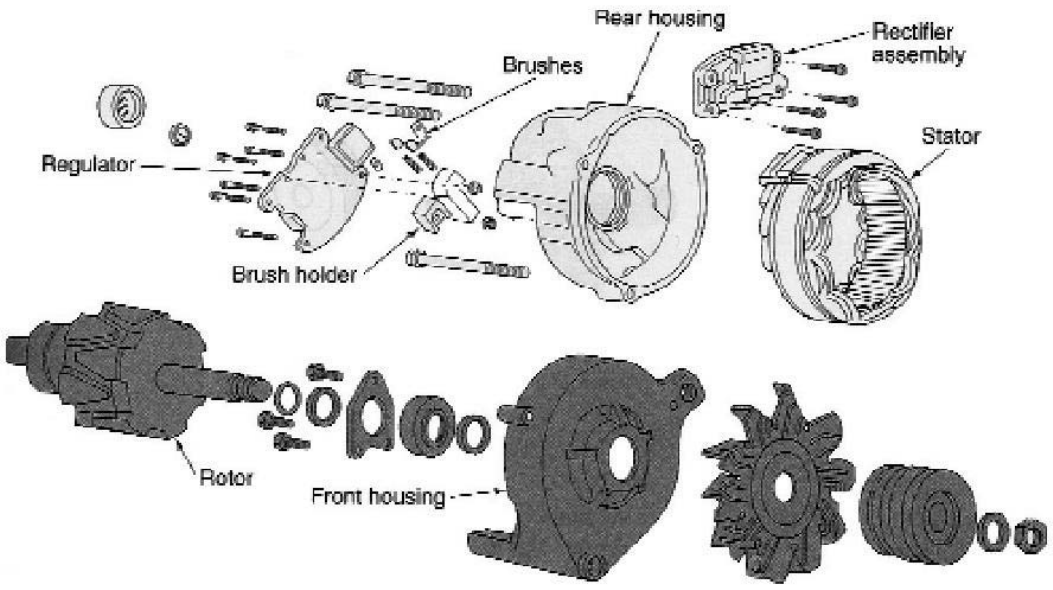


Fig. 2: Exploded View Of Generator Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Stator Assembly

The Stator is fixed to the housing of the generator and does not turn. It contains three main sets of windings wrapped in slots around a laminated, circular iron frame. Each of the three windings has the same number of coils as the rotor has pairs of north and south poles. The coils of each winding are evenly spaced around the core.

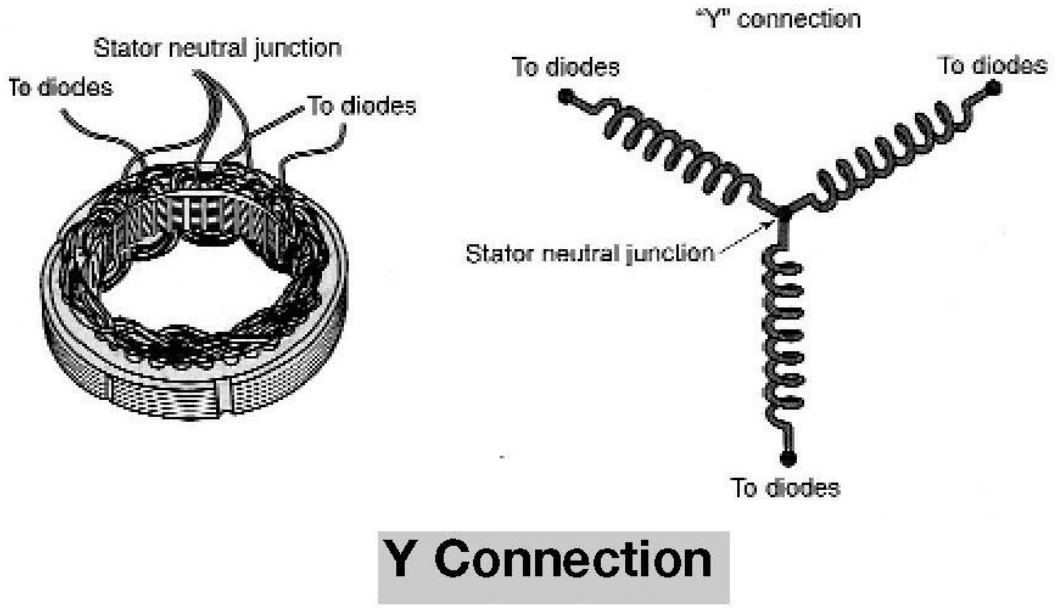


Fig. 3: View Of Stator Assembly (Y Connection)
Courtesy of BMW OF NORTH AMERICA, INC.

The three sets of windings alternate and overlap as they pass through the core in order to produce the required phase angles.

Each group of windings occupy one third of the stator, or 120 degrees of the circle.

The voltage produced by each loop of the stator is at a different phase angle, as a result the output of the stator is divided into three phases.

Two common methods of connecting the windings are:

- Y Connection.
- Delta Connection.

The parallel path of the Delta connection makes more current available.

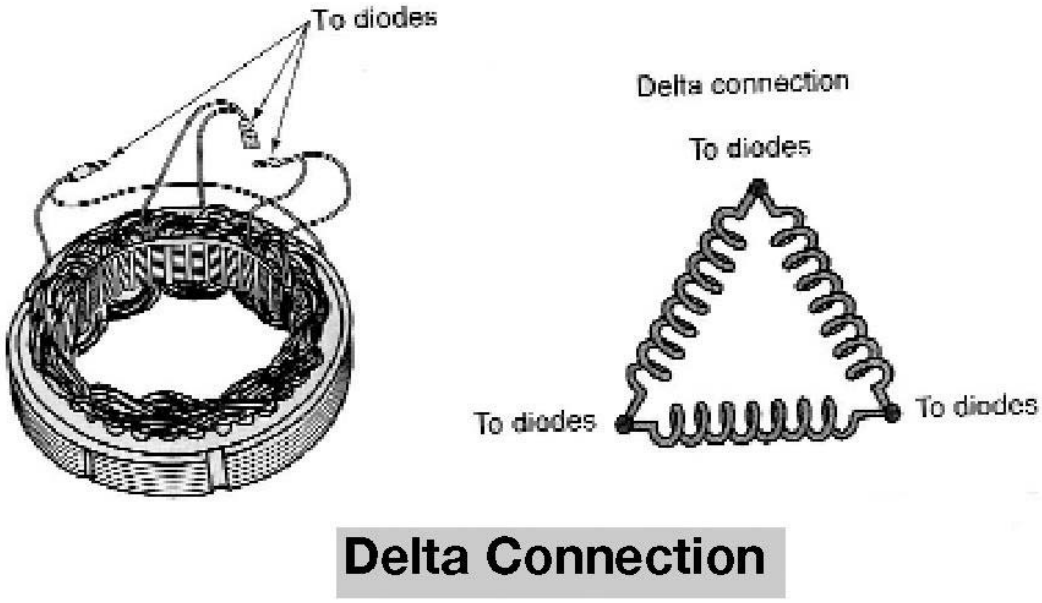


Fig. 4: Identifying Stator Assembly (Delta Connection)
Courtesy of BMW OF NORTH AMERICA, INC.

Rotor Assembly

The Rotor Assembly consists of the rotor shaft, a winding around an iron core, two pole pieces and slip rings.

The rotor shaft is pressed into the core, then six-fingered malleable iron pole pieces are assembled on the shaft against each end of the winding core.

The pole pieces are placed so that the fingers mesh but do not touch. When direct current is passed through the field coil winding, the fingers become alternately North and South poles.

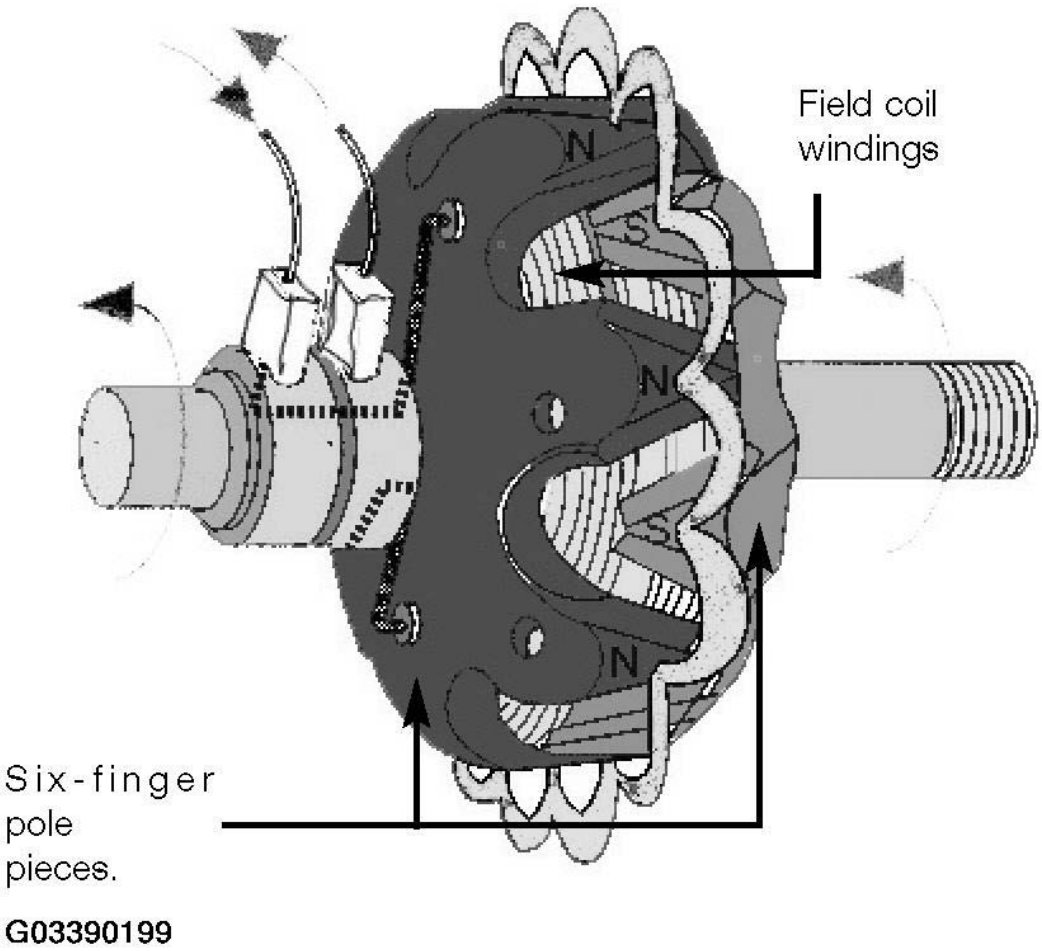


Fig. 5: View Of Rotor Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

As a result of this arrangement of poles, the magnetic flux lines will move in opposite directions between adjacent poles.

(Flux lines always move from North to South.)

This arrangement provides for several alternating magnetic fields to intersect the stator as the rotor is turning.

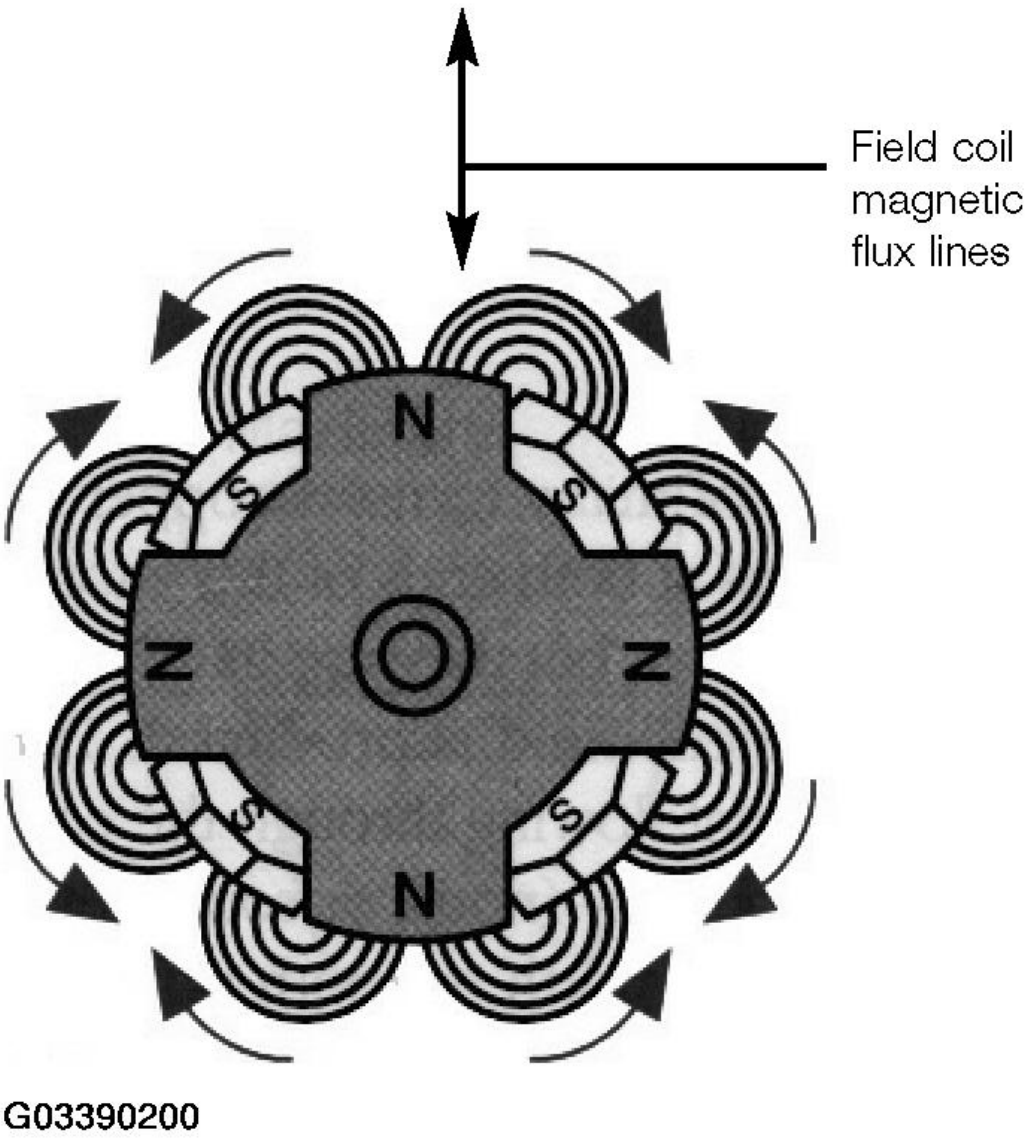


Fig. 6: Identifying Rotor Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

A slip ring pressed on to the rotor shaft is connected to the two ends of the field winding.

Two brushes are held by springs against the slip rings. One brush is connected through a switch to the battery B+, the other to the voltage regulator.

The brushes conduct only the field current (2 to 5 amps).

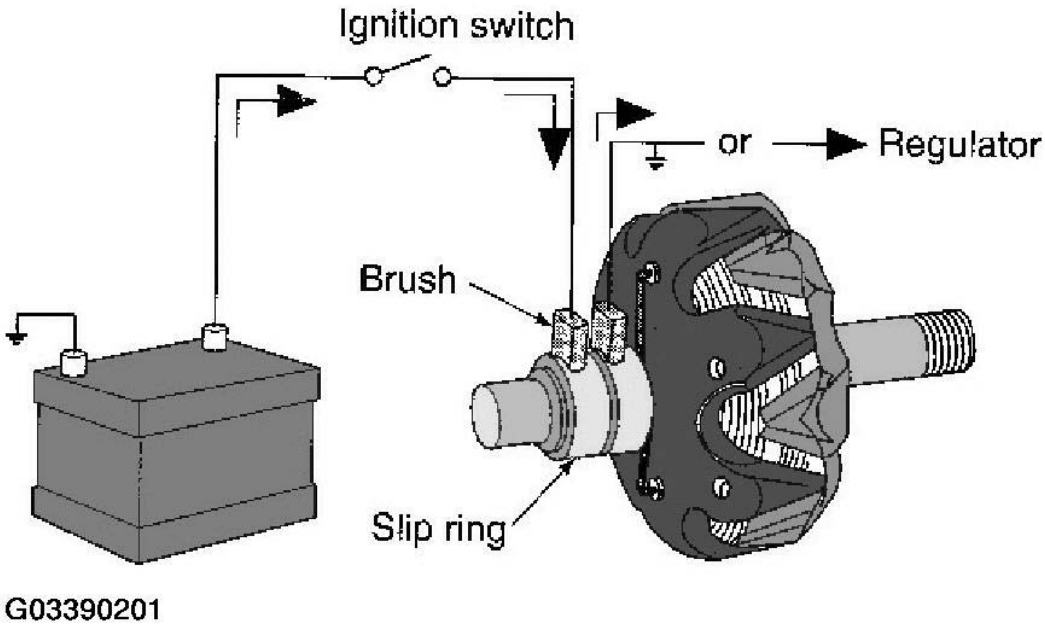
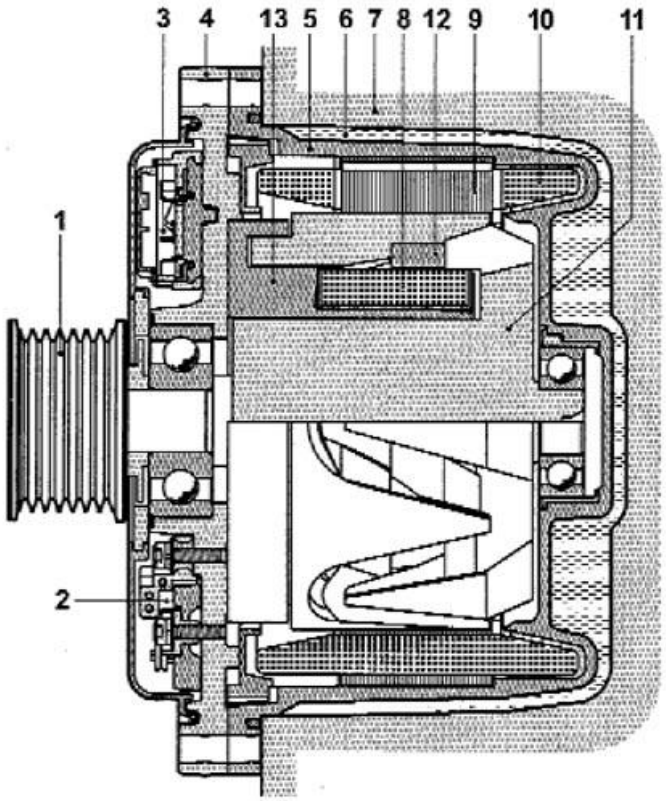


Fig. 7: Locating Brushes On Rotor Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

BRUSHLESS TYPE GENERATORS

Brushless Type generators are liquid cooled (coolant) and consist of the following main components:

- Generator Housing.
- Stator Assembly.
- Rotor Assembly.



1. Pulley
2. Rectifier
3. Voltage Regulator
4. Drive End Shield
5. Generator Housing
6. Coolant
7. Coolant Housing
8. Field Winding
9. Stator Housing
10. Stator Winding
11. Rotor
12. Non Magnetic Intermediate Ring
13. Rotor Pole

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Fig. 8: Cross Sectional View Of Brushless Type Generator
Courtesy of BMW OF NORTH AMERICA, INC.

Generator Housing Water Cooled

The Water Cooled Generator is housed in an encapsulated metal shell enclosure. The enclosure is installed an aluminum shell.

The space between the inner surface of the shell and the outer surface of the generator creates a water jacket that engine coolant flows through.

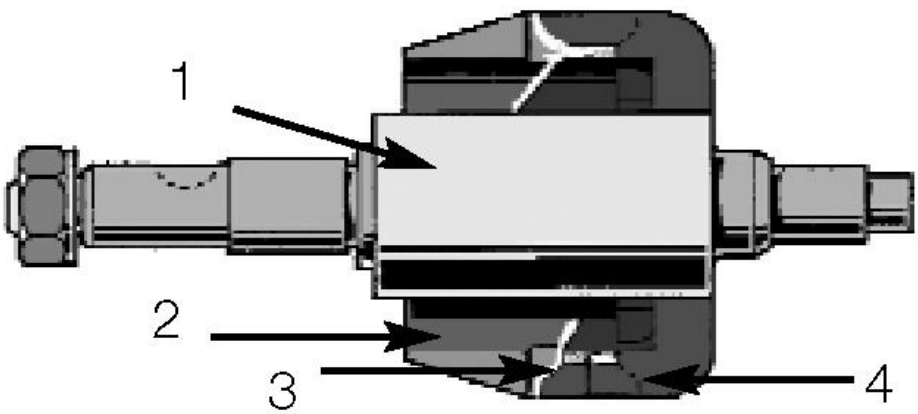
Coolant flows from the engine into the shell through internal ports and exits via hose connections.

Liquid cooling minimizes noise generation through elimination of generator cooling fan.

Stator Assembly

Although different in appearance the Stator Assembly in a brushless generator performs the same functions as the brush type.

Rotor Assembly



1. Rotor Shaft With Pole Core
2. Left Pole-Finger Crown
3. Non-,Magnetic Retaining Ring
4. Right Pole-Finger Crown

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Fig. 9: Identifying Rotor Assembly

Courtesy of BMW OF NORTH AMERICA, INC.

The brushless generator Rotor does not contain the field coil. The pole-finger crowns rotate around a fixed field coil and are magnetized by the flux field of the field coil.

The two crowns form claw-pole half sections and are retained by a non-magnetic ring positioned below the pole fingers.

Rectifier Assembly

The Rectifier Assembly consists of six diodes, a pair of diodes for each stator winding. Each pair contain one positive biased diode and one negative biased diode. By using a pair of diodes that are reversed biased to each other, rectification of both sides of the AC sine wave is achieved. The negative biased diodes allow for conducting current from the negative side of the AC sine wave and putting this current into the circuit as positive current. The use of positive and negative biased diodes provide for full wave rectification because both halves of the sine wave are used.

Drive Belt

It is the function of the Drive Belt to transfer rotating energy from the engine to the generator. The drive belt rotates the rotor, spinning the magnetic field. A loose belt can inhibit charging system efficiency and a belt that too tight causes early bearing failure.

VOLTAGE REGULATOR

Voltage Regulators prevent excessively high voltage output of the generator. Excessive voltage would cause damage to the battery (through overcharging), light bulbs, motors, and particularly sensitive electronic components.

The regulator prevents these problems by limiting the current output of the generator.

Two types of regulators that are used:

- Standard Regulator.
- Multifunction Controller.

Standard Regulator

Electronic Voltage Regulators are mounted internally in the back of the generator assembly. Generator output is controlled by varying the amount of time the field coil is energized. The duty cycle of the field coil ground side is varied based on the demand placed on the electrical system.

The electronic voltage regulator compares field current supply voltage (from the stator windings through the diode trio) against a set voltage level (using a zener diode).

As the field current supply voltage surpasses the zener diode's breakdown voltage, the field current to the rotor is switched off. When the field current voltage to the rotor is off, the generator is not producing voltage. A rapid switching of the field current allows a fixed voltage output to be maintained. Additional diodes in the regulator,

prevent current flow when the ignition is off preventing battery drain.

Multifunction Controller

In addition to voltage regulation, the Muti-function Control electronic regulator provides the following features:

- Load response during start-up.
- Load response during driving.
- Fault display (under voltage, drive belt breakage, field coil interruption).

NOTE: Multi-function Control electronic regulators are available with and without start load response. The only difference is the time limitation of the rated current during the start procedure.

The start-up load response system provides for the alternator exciter current (field coil) to be started by a transistor two seconds after the battery indicator goes out. This means that engine start-up is unaffected by generator induced drag.

The load response during driving ensures that when large current consumers are switched on the generator output increases linearly allowing the DME/EML system to stabilize the engine speed and/or modify injection time if necessary.

Charge Indicator

The purpose of the Charge Indicator is to advise the driver that the vehicle's electrical system is not operating at peak efficiency and service should be performed.

The charge indicator operates differently depending on which type of regulator the vehicle is equipped with.

Standard Regulator

The charge indicator operates on the basis of opposing voltages. If there is no output through the diode trio, then the lamp circuit is completed to ground through the rotor field. Diode output applies voltage to the previously grounded side of the bulb, turning the bulb off (No current flow with equal voltage on both sides of the bulb).

Multifunction Controller

The charge indicator is activated by an electronic switch integrated in the controller. This internal switch receives its voltage supply from KL15 of the 2 pin generator connector. The controller measures internally the difference in voltage between KL30 and KL15 and switches the indicator circuit low in case of a fault.

Ignition Switch

The Ignition Switch provides initial power for the field circuit of the alternator, reducing the time required for the field to develop the magnetic field. Depending on which type of regulator is employed the ignition switch supplies power to the charge indicator to check bulb integrity.

Cables and Wiring Harness

The Cables and Wiring Harness are used to deliver the voltage produced by the generator to the battery for storage, and to vehicle systems to supplement battery voltage.

CHARGING SYSTEM PRINCIPLE OF OPERATION

Charging Systems (Brush or Brushless) use the principle of electromagnetic induction to generate electrical power. Electromagnetic induction occurs in a generator when a magnetic field is rotated within a stationary conductor. The magnetic field can be generated by permanent magnets or as in the case of the automotive generator by powerful electromagnets.

Passing electric current through a wire or winding causes a magnet field to surround the wire or winding. The number of turns in the winding and the magnitude of the current flowing through the winding determine the magnetic field strength.

The strength of the field is further increased by surrounding the coil with pole pieces. The poles will take on the polarity (North or South) of the side of the coil they touch or the ones they are closest to. The combined windings (field coil) and pole pieces are referred to as the rotor. Output of the generator is regulated through control of field coil intensity.

An examination of single phase AC voltage generation, will aid in the understanding of 3 phase AC voltage generation.

SINGLE-PHASE AC VOLTAGE GENERATION

Single Phase AC Voltage Generation requires one stator frame with windings and one magnetic field (North and South pole pieces).

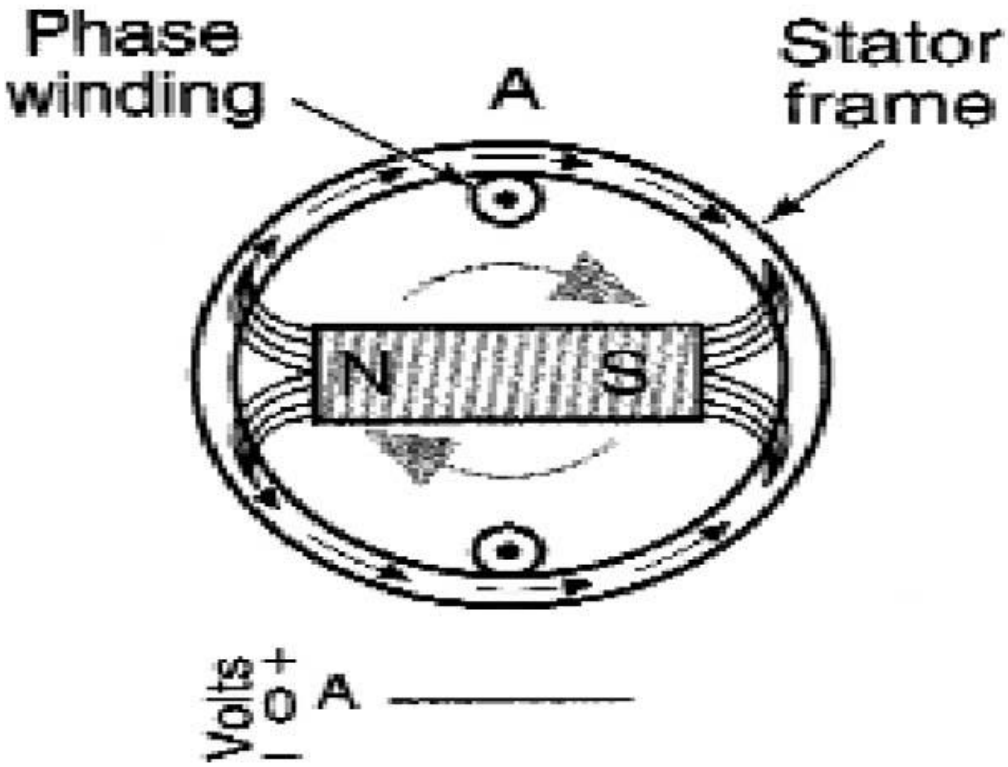

Fig. 10: View Of North/South Poles And Stator Frame
Courtesy of BMW OF NORTH AMERICA, INC.

As the North pole of the rotor pole piece approaches the winding of the stator, induced voltage level in the stator begins to rise. The closer the North pole gets to the stator winding the higher the induced voltage. As the North pole reaches 90° to the stator winding the maximum amount of flux lines are acting on the winding, induced voltage is at its highest positive value (1/4 turn).

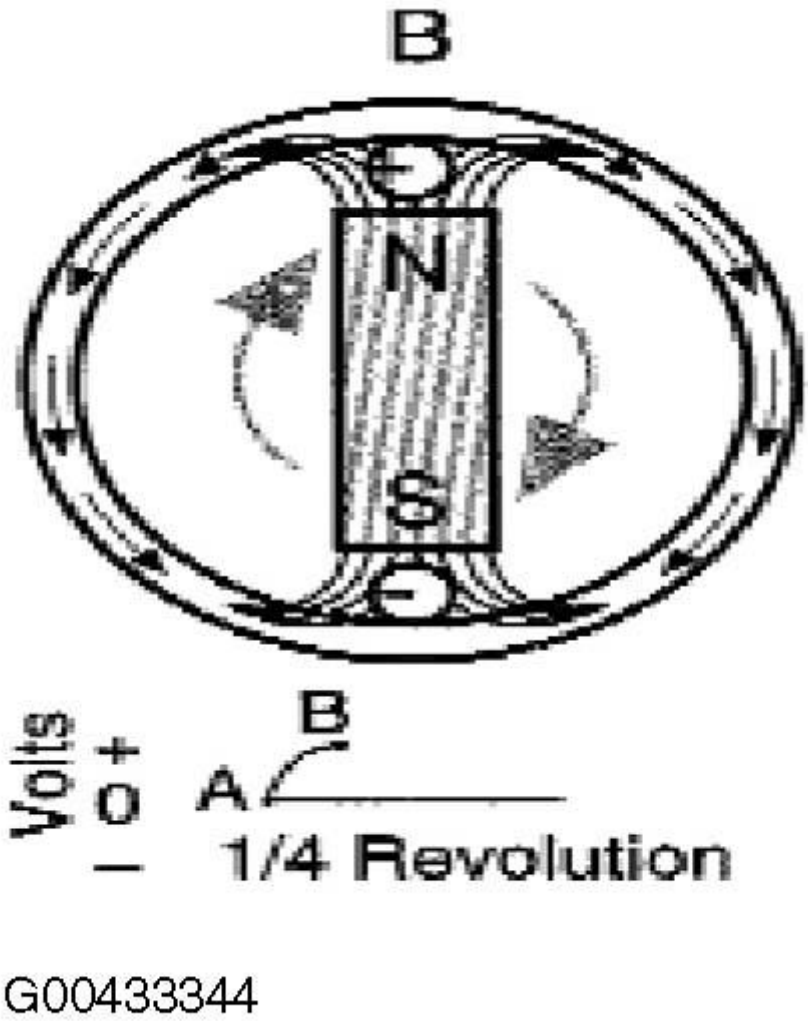

Fig. 11: Identifying Stator Rotation (1/4 Turn)
Courtesy of BMW OF NORTH AMERICA, INC.

The rotor continues to rotate and the North pole gets further away from the winding. The voltage drops, until 0 voltage is induced through the stator (1/2 turn).

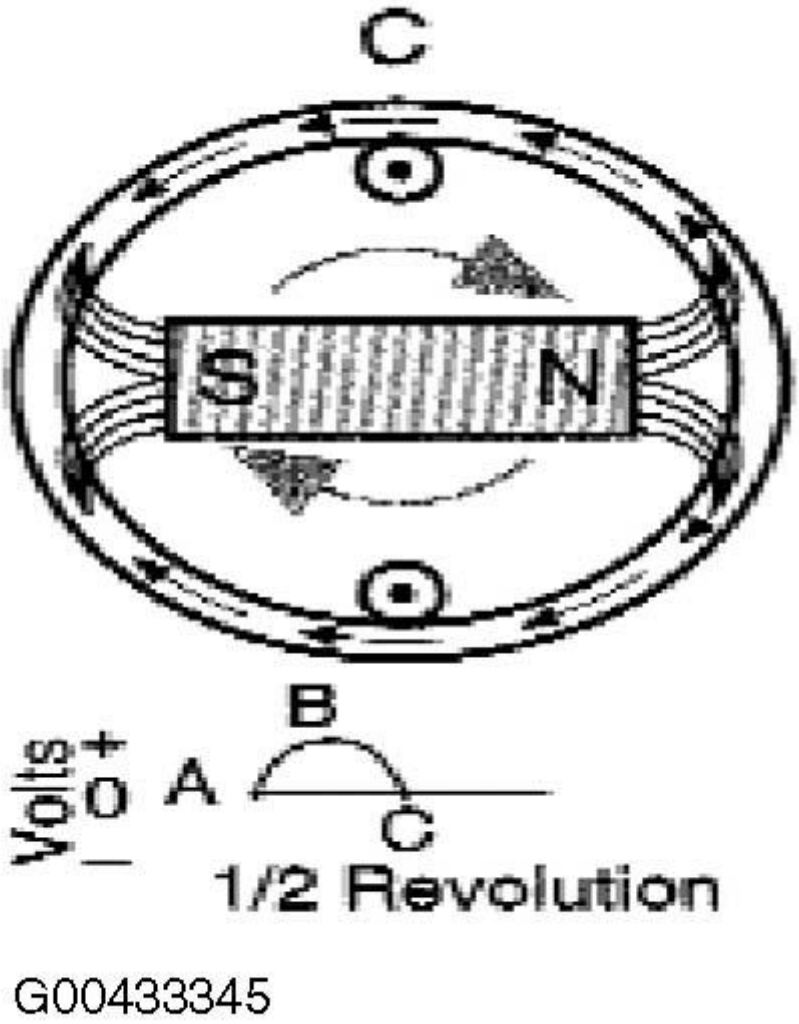

Fig. 12: Identifying Stator Rotation (1/2 Turn)
Courtesy of BMW OF NORTH AMERICA, INC.

With the South pole now approaching the winding voltage begins to increase negatively. When the South pole reaches 90° to the winding, again the maximum amount of flux lines are acting on the winding and induced voltage is at its greatest negative value (3/4 turn).

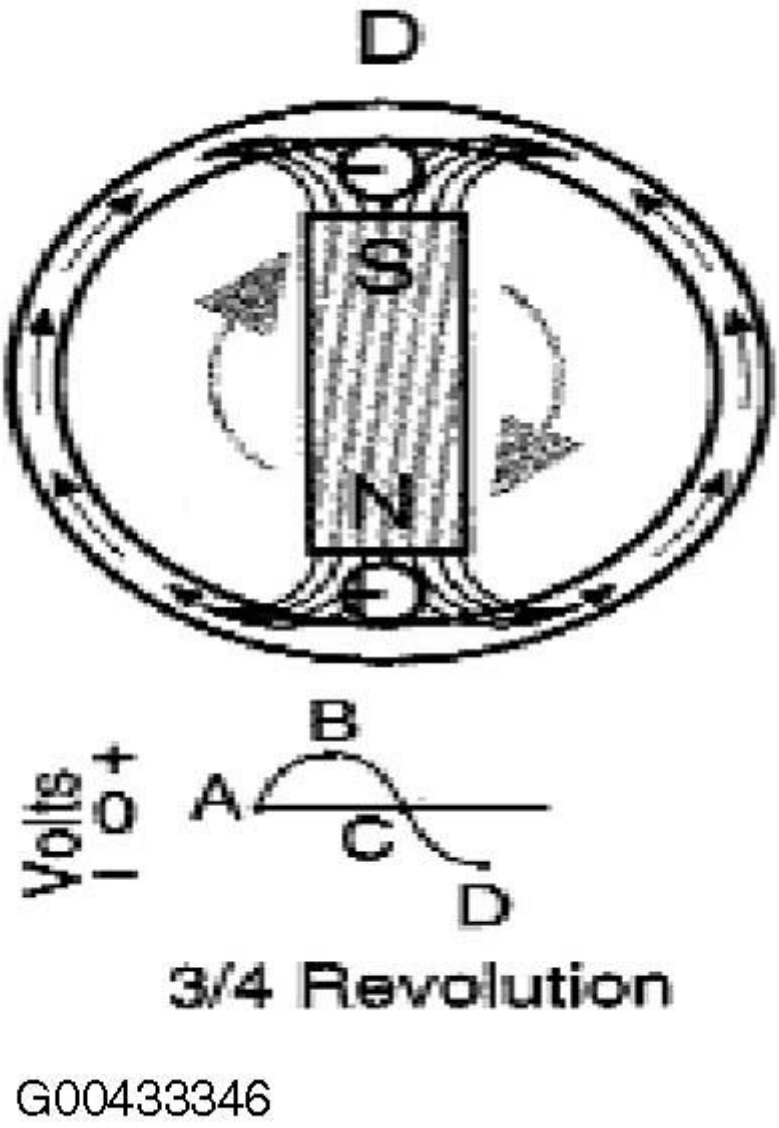

Fig. 13: Identifying Stator Rotation (3/4 Turn)
Courtesy of BMW OF NORTH AMERICA, INC.

The South pole continues to travel farther away from the winding decreasing the negative voltage value until 0 voltage is again reached (1 full turn).

This comprises one cycle or 360° rotation of the magnetic field.

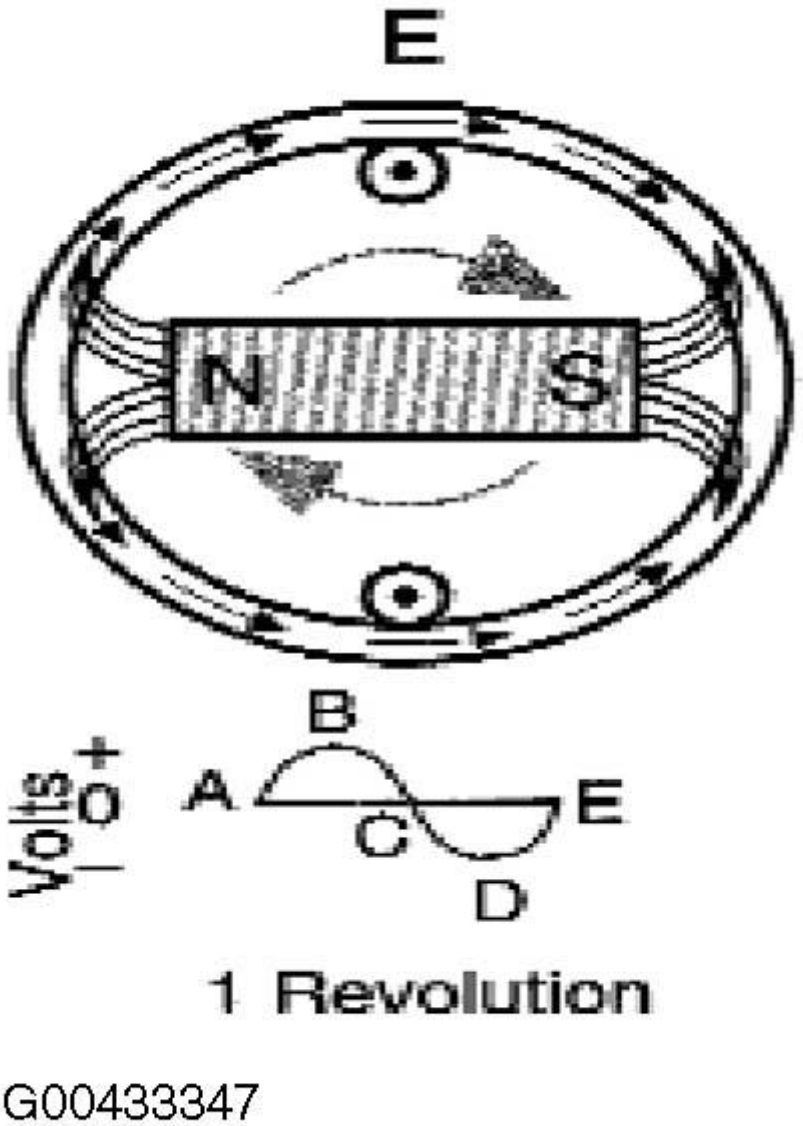

Fig. 14: Identifying Stator Rotation (1 Full Turn)
Courtesy of BMW OF NORTH AMERICA, INC.

Sine wave produced by a single winding of the stator during a single revolution of one pair of pole pieces is called single phase voltage.

THREE-PHASE AC VOLTAGE GENERATION

Most AC generators use either a twelve or a fourteen pole rotor. Each pair of poles (North and South) produce one complete sine wave in each winding per revolution.

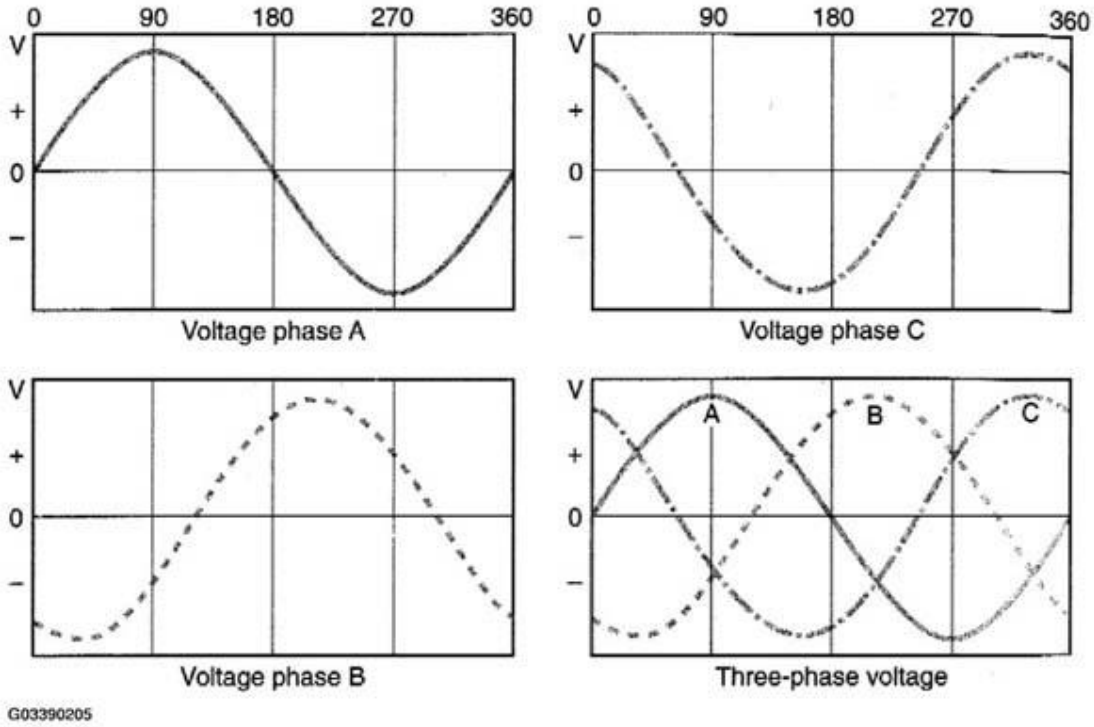

Fig. 15: Three-Phase AC Voltage Graph
Courtesy of BMW OF NORTH AMERICA, INC.

Voltage of each stator winding is added together to create three-phase voltage.

During one revolution a fourteen pole rotor will produce seven sine waves. (The stator has one winding (coil) for each pair of rotors.)

The rotor generates three overlapping sine wave voltage cycles in the stator (one rotor three sets of windings in the stator).

The total output would be twenty one sine wave cycles per revolution (3 sets of stator windings, each with 7 coils).

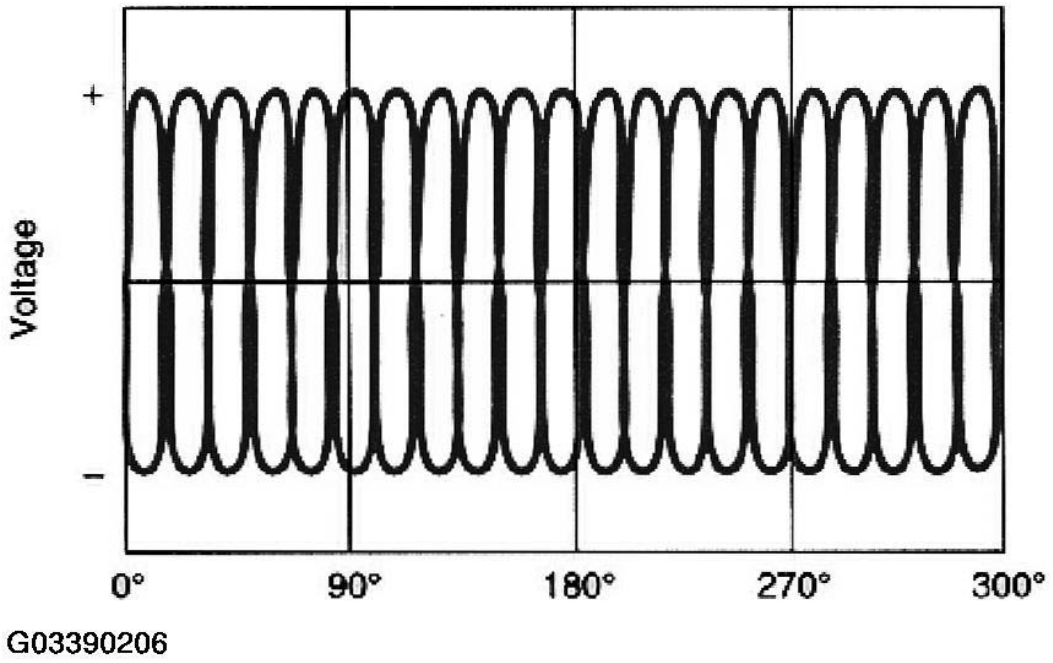

Fig. 16: Identifying Wave Cycle
Courtesy of BMW OF NORTH AMERICA, INC.

Sine wave cycle of a fourteen pole rotor and three phase stator.

VOLTAGE RECTIFICATION

The battery and the electrical system cannot store or use the 3-phase AC voltage produced by a generator, it must be rectified or converted to DC voltage.

A diode rectifier bridge is used to make the conversion.

The diode is similar to a non-return or one way valve which permits the passage of a fluid or gas in only one direction.

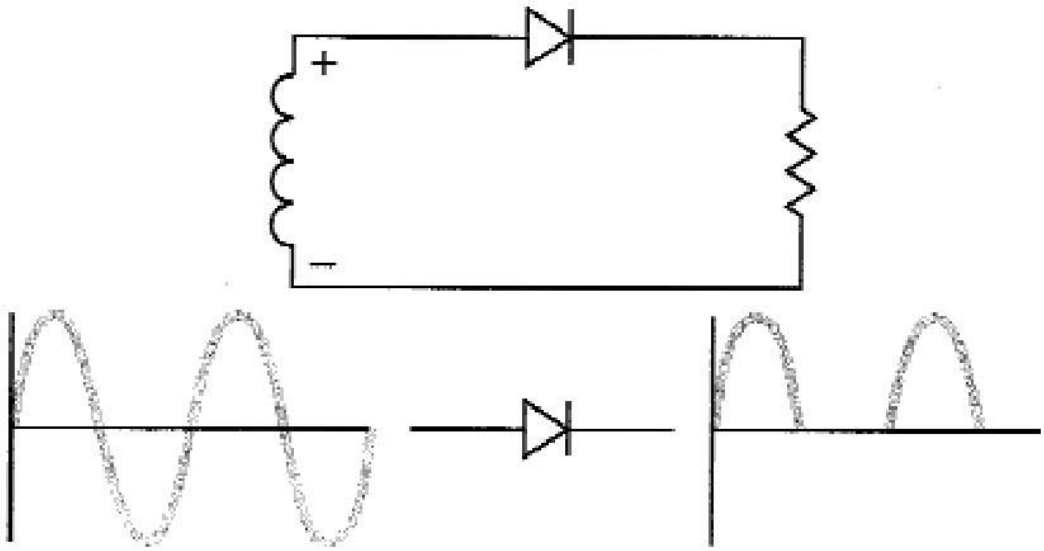

Fig. 17: Identifying Voltage Rectification
Courtesy of BMW OF NORTH AMERICA, INC.

In a simple conversion the rectifier diode suppresses the negative half waves and allows only positive half waves to pass.

To make use of the negative value half waves full rectification is applied.

Full rectification of the negative half waves invert them into positive half waves.

The result is a rectified pulsating direct current.

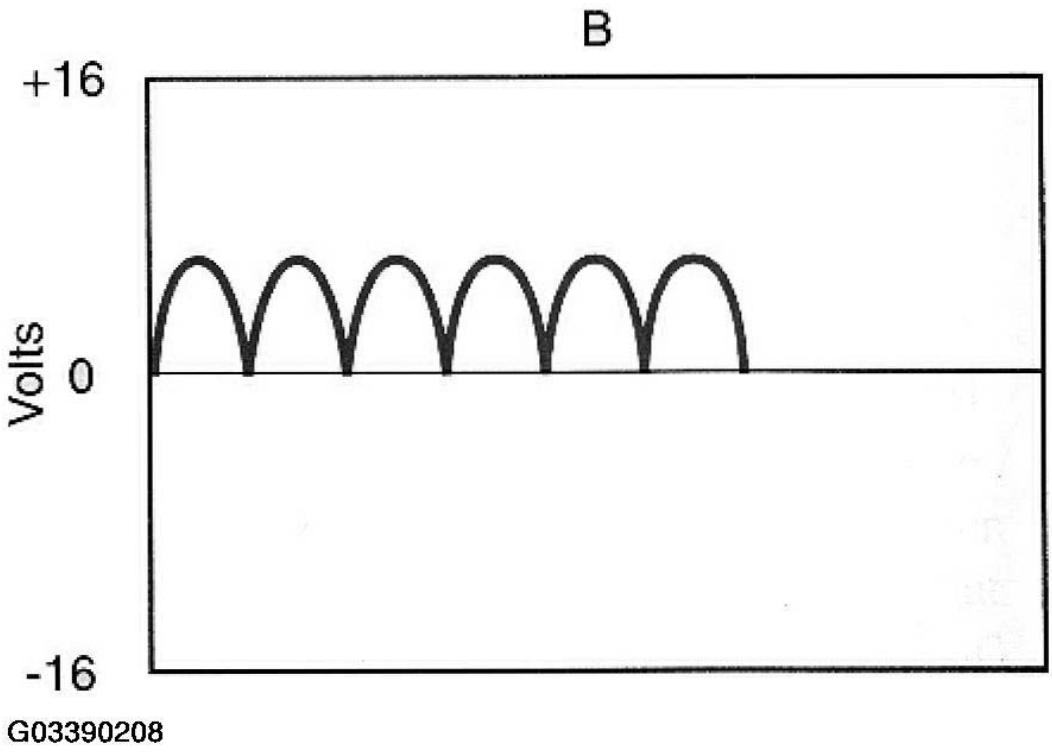

Fig. 18: Identifying Half Waves
Courtesy of BMW OF NORTH AMERICA, INC.

Rectified Pulsating DC current

THREE-PHASE VOLTAGE REGULATION

Six diodes are used to achieve three-phase AC voltage rectification. Three diodes are positive biased and three are negative biased.

The positive half-waves pass through the positive biased diodes and the negative halfwaves through the negative biased diodes.

Diode rectification of the negative half-waves invert them into positive half-waves.

With full rectification DC voltage supplied to vehicle by generator is not ideally smooth, but exhibits a slight ripple. This ripple is further smoothed by the battery which is connected in parallel with the generator.

The rectifier diodes in the generator not only convert the current but also prevent battery discharging through the 3 phase windings of the stator. Current flow can only take place from the generator to the battery.

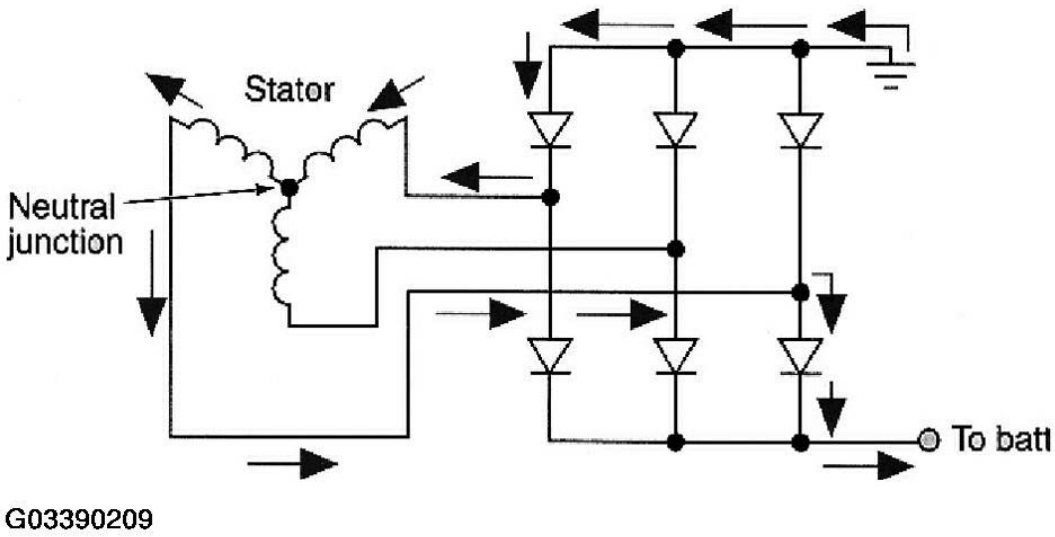

Fig. 19: Rectifier Diodes Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Current flow through Y wound stator.

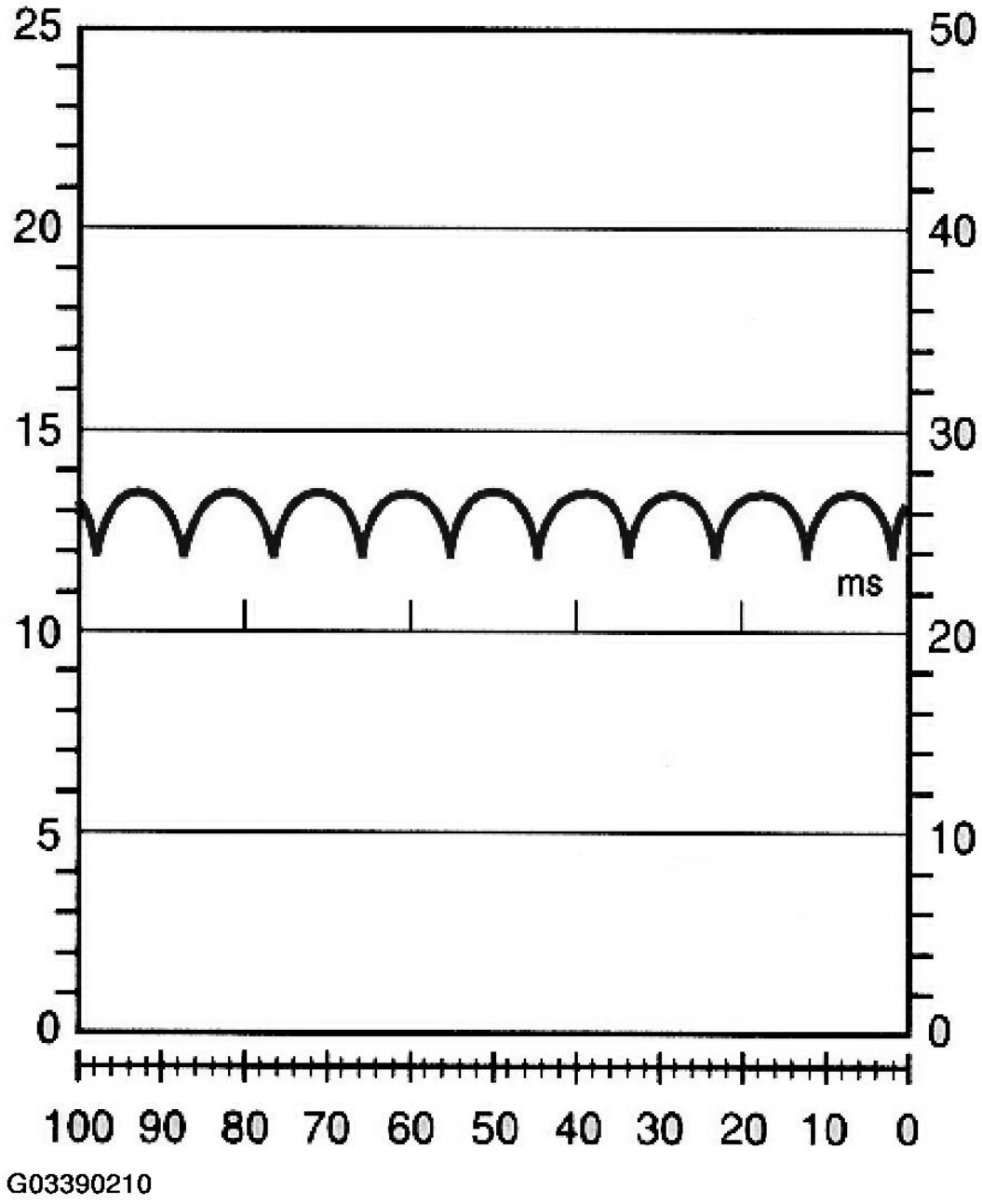

Fig. 20: Oscilloscope Graph
Courtesy of BMW OF NORTH AMERICA, INC.

Rectified AC output has a ripple as seen on oscilloscope.

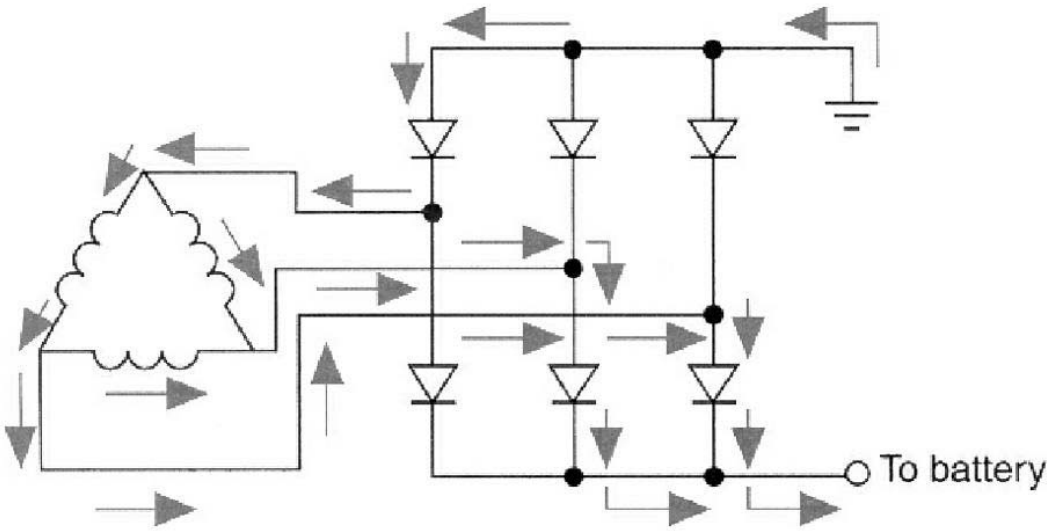

Fig. 21: Identifying Current Flow Through Delta Wound Stator
Courtesy of BMW OF NORTH AMERICA, INC.

Current flow through Delta wound stator.

Voltage Regulation

Standard Regulator

The Electronic Regulator uses a zener diode that blocks current flow until a specified voltage is obtained.

Sensing current from terminal 2 passes through a thermistor to the zener diode (D2). As the system voltage exceeds the breakdown voltage of the zener diode, current flows through the zener diode turning transistor 2 (TR2) on. With TR2 on transistor 1 (TR1) is shut off.

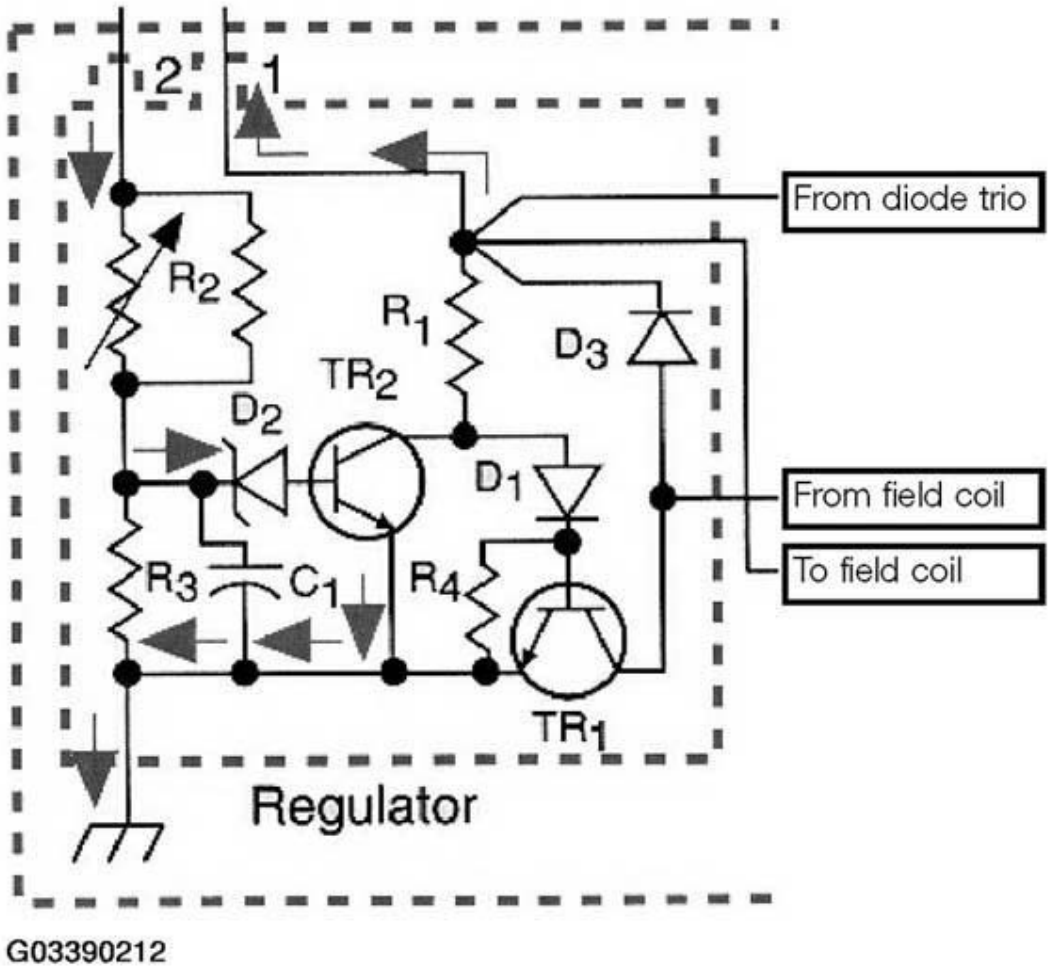

Fig. 22: Regulator Circuit Diagram (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Transistor 1 controls field current to the rotor. With TR1 off no current flows to the field coil and the generator has no output.

A voltage drop below the breakdown voltage of the zener diode stops the current flow to TR2 which turns on TR1.

Voltage is again applied to the field allowing the generator to produce voltage.

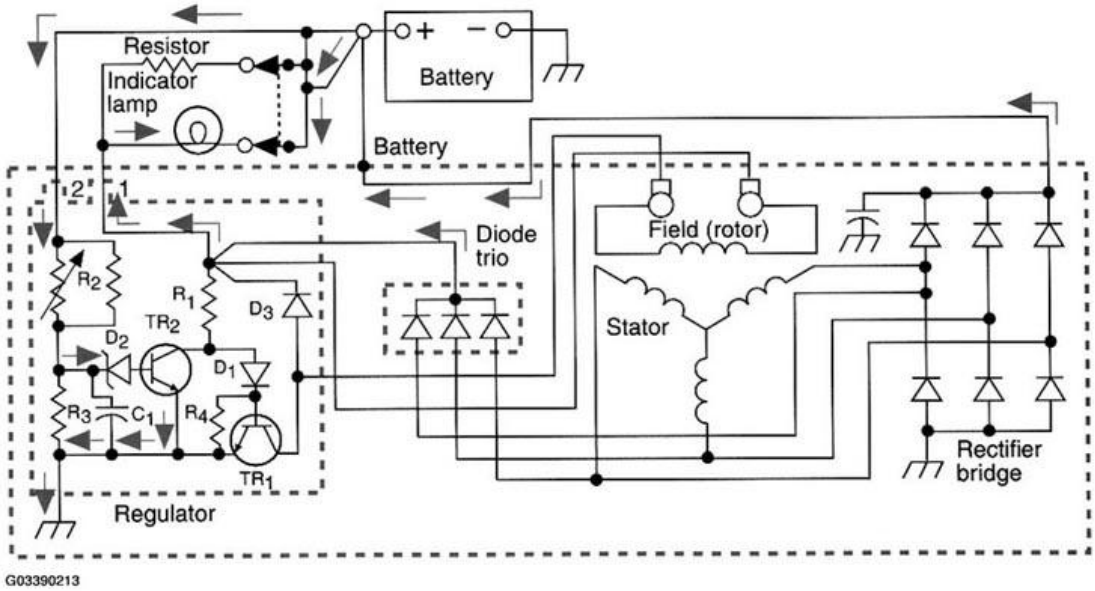

Fig. 23: Regulator Circuit Diagram (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Field coil off, no charging.

Multifunction Controller

The Multifunction Controller regulates voltage in the same manner as the standard voltage regulator. Regulation is through duty cycle control of the field coil.

The differences as compared to the standard regulator are:

- Manner in which malfunction indicator lamp is controlled.
- Connections to wiring harness.

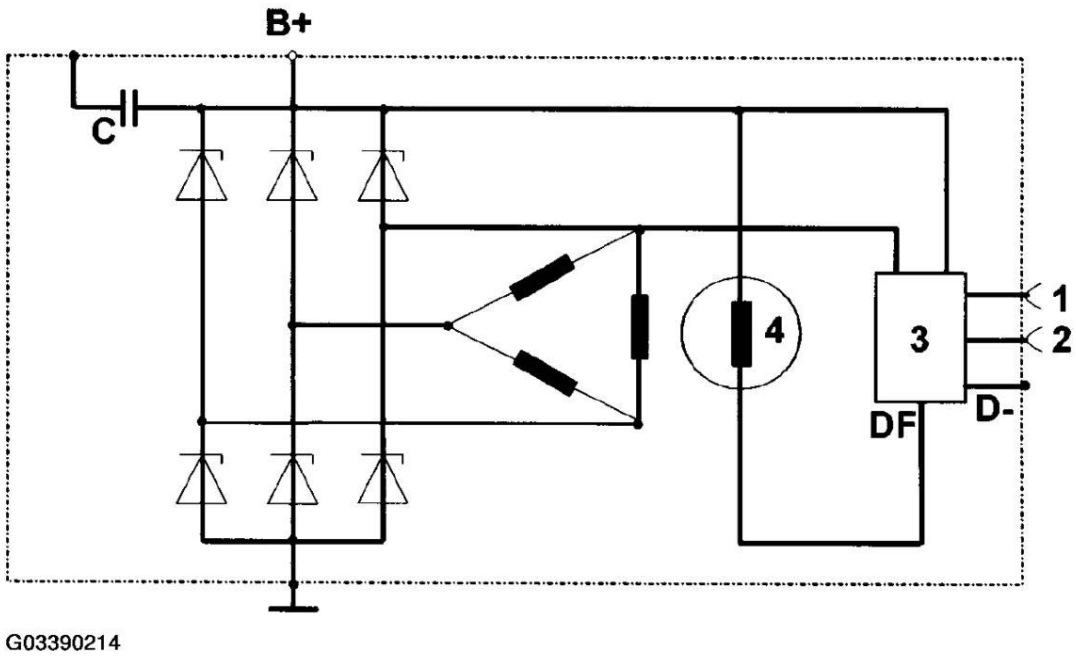

Fig. 24: Identifying Multifunction Controller Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Terminal 1:

KL 15 from fused source.

Terminal 2:

D+ (KL61) to DME.

B+

Generator output to Battery.

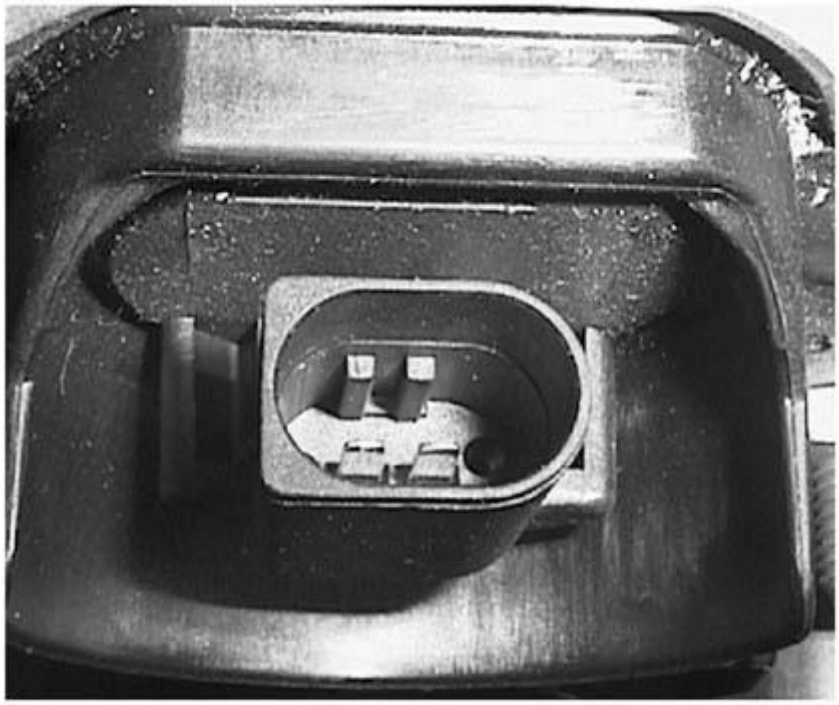

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Fig. 25: Identifying Two Pin Wiring Harness Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Two Pin wiring harness connector

Harness connector

B+ connection.

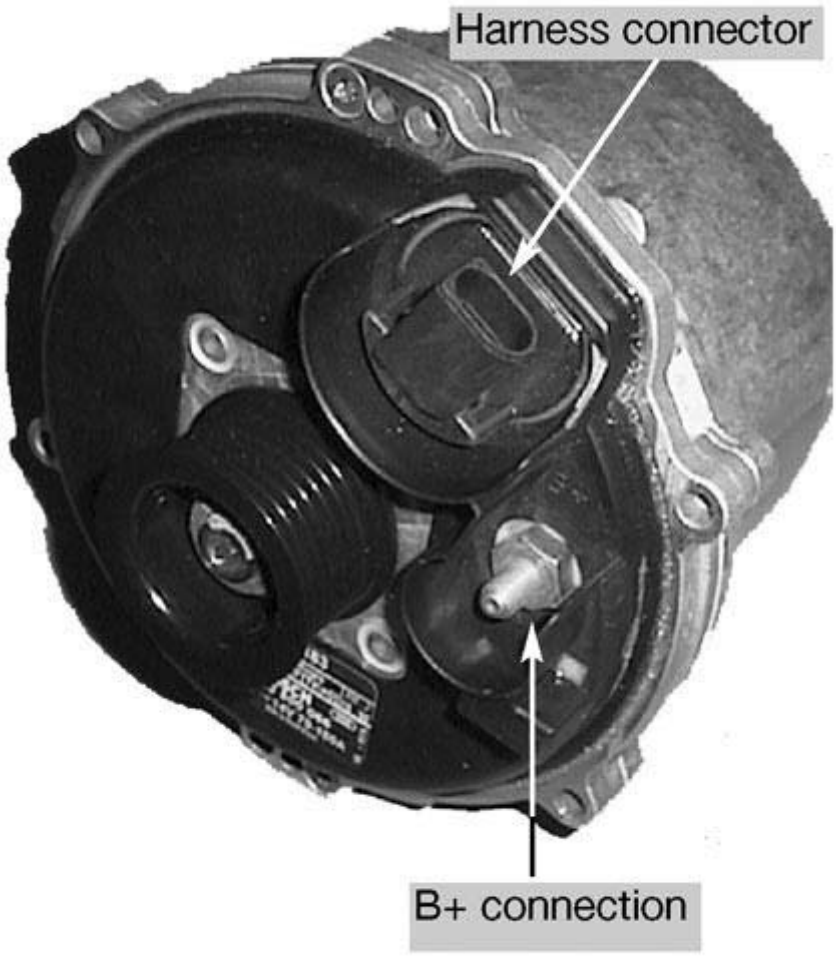

Fig. 26: Identifying Harness Connector
Courtesy of BMW OF NORTH AMERICA, INC.

CHARGE SYSTEM INDICATOR

Standard Regulator

The Charging System Indicator light operates on the principle of opposing voltage. Battery voltage is supplied to one side of the light bulb, the other side of the bulb is connected to the voltage regulator. With the key turned on, power is sent to the light bulb, through to the regulator. No voltage is being produced by the stator, so there is no voltage from the diode trio. This lack of voltage from the diode trio, allows the voltage from the ignition switch to flow through the regulator to ground. This completes the circuit allowing the charge indicator bulb to burn.

As the generator begins to produce voltage, the output of the diode trio equals battery voltage. This equal voltage is supplied to the light bulb. With equal voltage on each side of the light bulb, no current can flow and

the light is turned off.

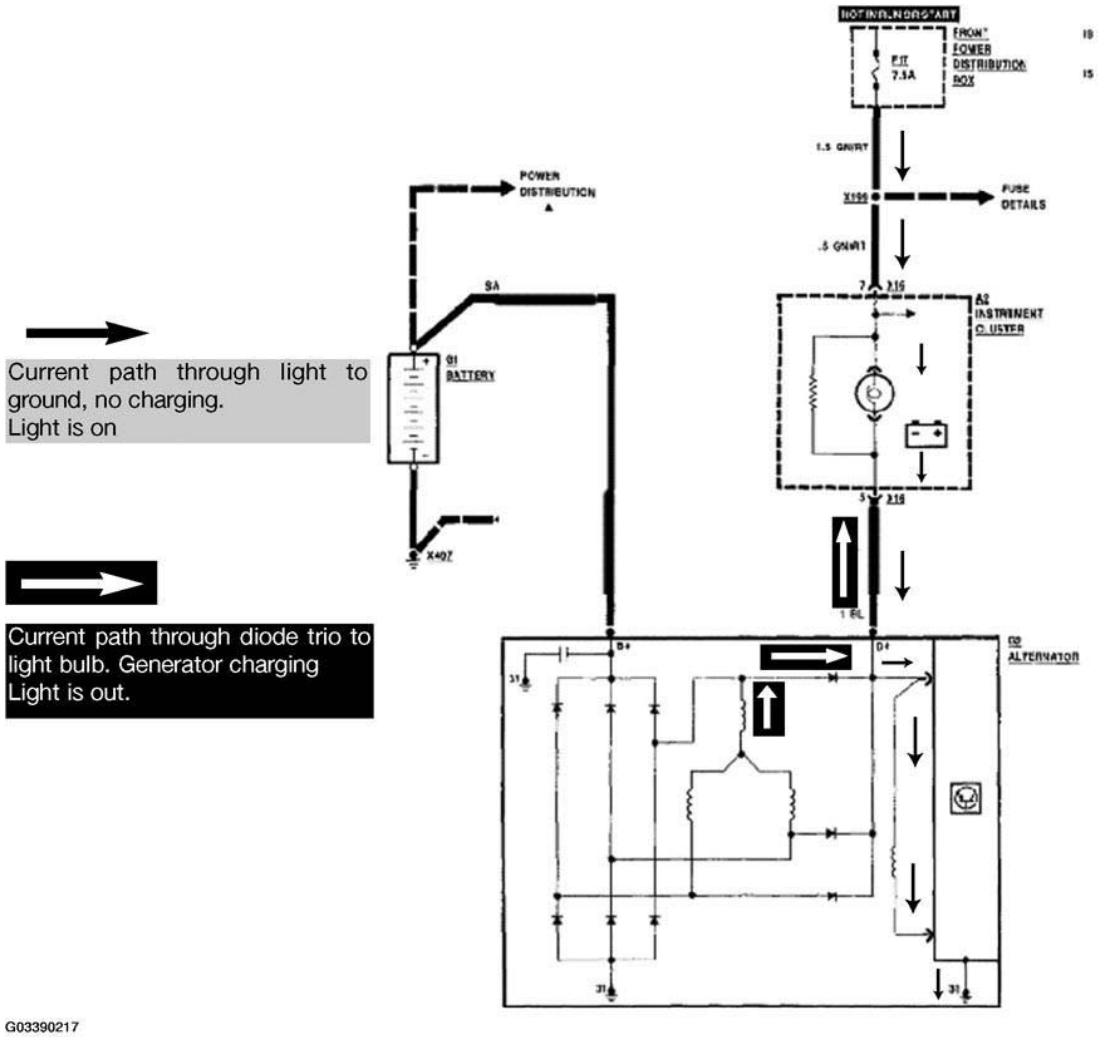

Fig. 27: View Of Charge Indicator System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Multifunction Controller

The charge indicator light is activated by means of an electronic switch integrated into the controller. This switch receives its voltage supply from terminal 15 on the 2 or 3 pin connector on the generator. Terminal D+ is replaced by an isolated electronic terminal 61E in generators with a multifunction controller. The task on this terminal is to activate the battery charge indicator lamp and to indicate to the various loads that the generator is in charge mode.

The indicator lamp is supplied with voltage via terminal 15 from the instrument cluster. The lamp is illuminated when the voltage at terminal 61E is below 1.5v and goes out when the voltage is above 8v.

The indicator is on during the following conditions:

- Key on, engine off.
- Generator not charging.
- Failure of drive belt.
- Interruption of field coil.
- Controller overvoltage.
- Break in charging cable.

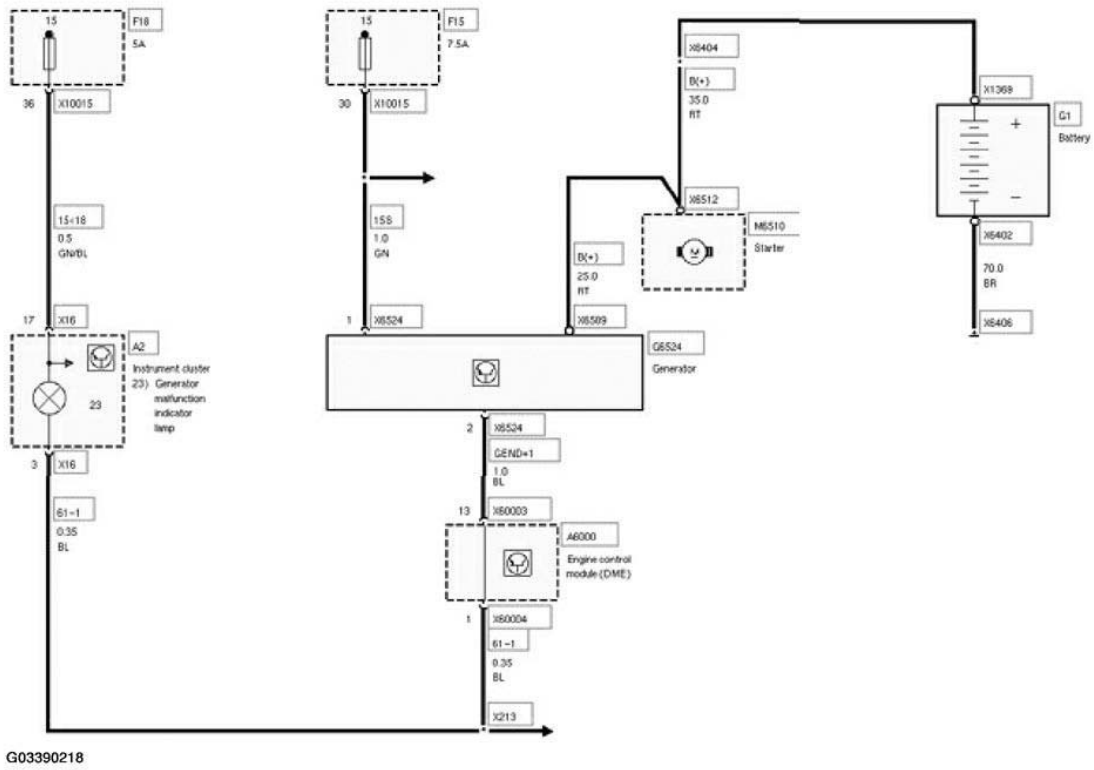

Fig. 28: View Of Multifunction Controller Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

GENERATOR DIAGNOSIS

Before beginning any generator diagnosis, ensure that the battery is in good condition and has passed all testing procedures. A weak or defective battery will influence the generator testing.

The generator may be tested using:

- DISplus.
- VAT testing equipment.

Workshop Hint:

Before beginning diagnostic procedures on the charging system do the following:

- Run engine at idle speed for about 5 minutes.
- Switch off all electrical loads.

This is done to ensure the battery is charged to such a level that the generator will not be fully utilized and that loads required during starting (e.g. starter, secondary air pump) will be already switched off.

Testing Generator With DISplus

Two modes of testing are available when using DISplus.

- Testing using Test Plan.
- Testing using Preset Measurement.

Testing Generator Using Test Plan

Testing the charging system using a test plan is the more complete method of testing.

When selecting this mode of testing, other components in the charging system are tested in addition to the generator.

Test plans available:

- Generator (Checks voltage and current output).
- Wiring from generator to battery (Performs voltage drop test).
- Charge indicator lamp (Condition of bulb, wiring and signal to bulb).
- ON delay and Start ON delay (If applicable).
- Ground side circuit wiring (Voltage drop test).

Sub-tests may be available with some of the component testing.

There are many advantages to using the test plan.

1. Complete system testing.
2. Functional description of system on screen.
3. Proper wiring diagrams provided during testing.
4. Test instructions and notes.
5. Instructions for proper test set-up.
6. Display of nominal values.
7. Solutions.

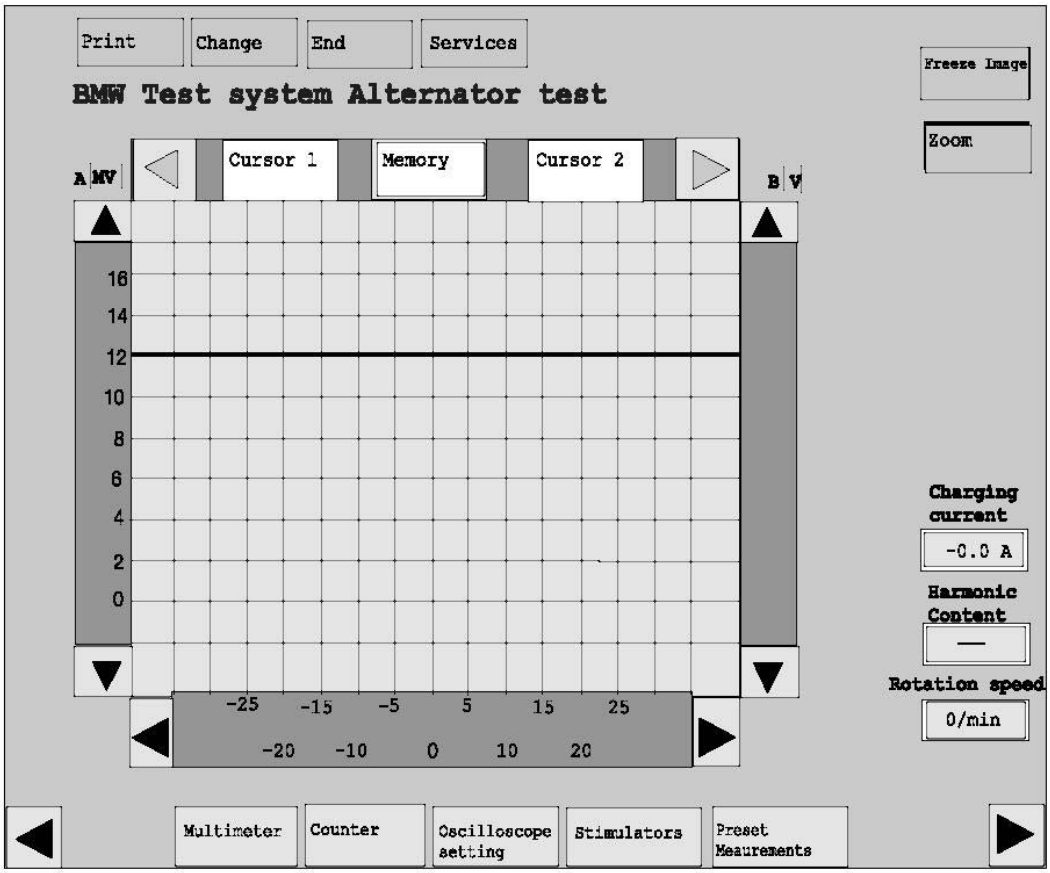

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Fig. 29: Identifying DISplus Screen
Courtesy of BMW OF NORTH AMERICA, INC.

Testing Generator Using Measurement System

Enter the measurement system and select **Preset Measurements.**

Instruction on the proper hook-ups required are available through the **HELP** button, selecting **Help using Preset Measurement.**

The oscilloscope will display pre-configured for the testing.

Diagnostic information available through oscilloscope.

- Voltage Graph.
- Charging Current.
- Harmonic Content.

- Rotation Speed (Engine RPM).

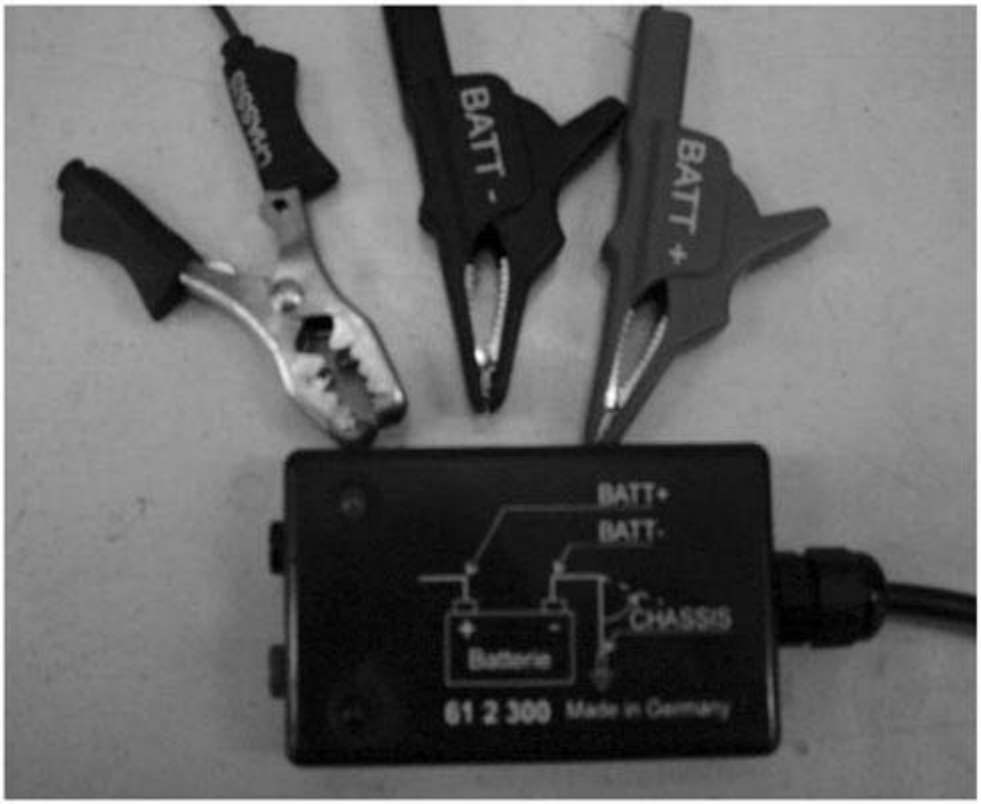

Fig. 30: View Of Special Tool 61 2 300
Courtesy of BMW OF NORTH AMERICA, INC.

Harmonic Content:

This is an expression of AC voltage contained in DC voltage.

The higher the percentage of harmonic content the larger the amount of residual AC voltage in the DC voltage.

High residual AC voltage is caused by weak or failing diodes in the generator. Generators which have harmonic content readings higher than specified (In TIS) should be replaced.

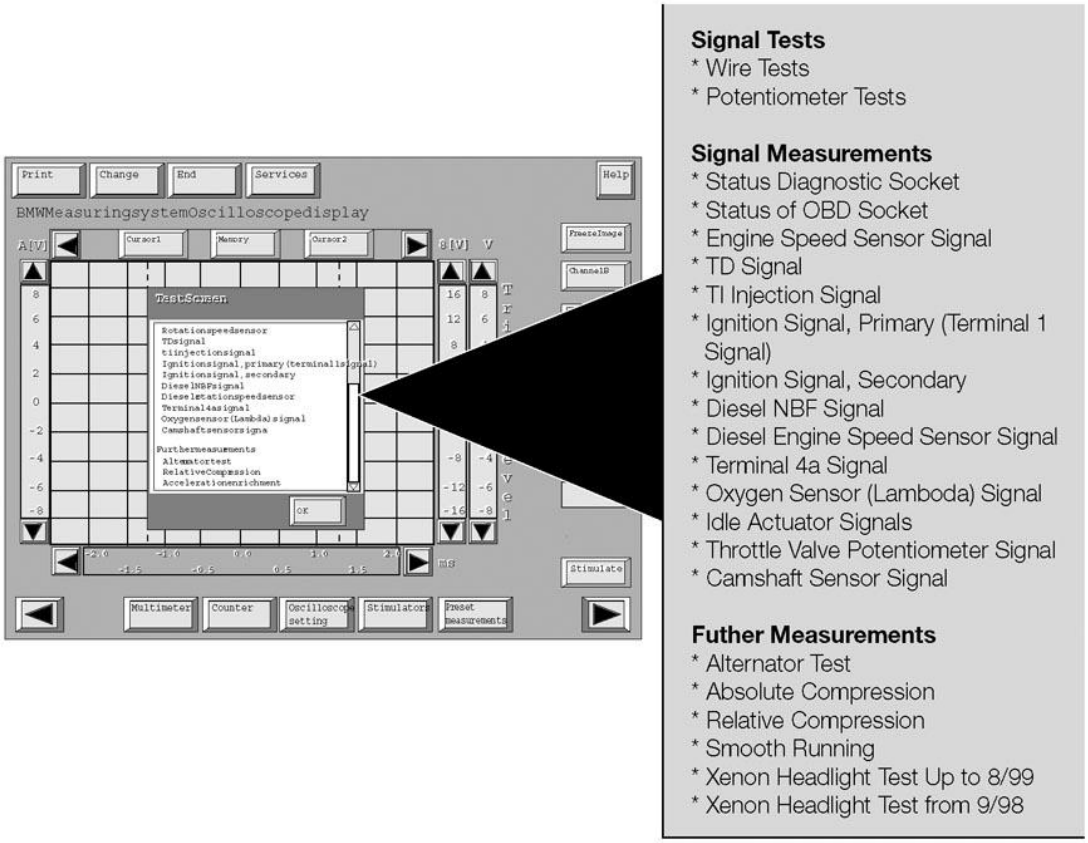

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Fig. 31: Functional Description Of System On Screen
Courtesy of BMW OF NORTH AMERICA, INC.

CIP PROGRAMMING

CIP PROGRAMMING SCREENS

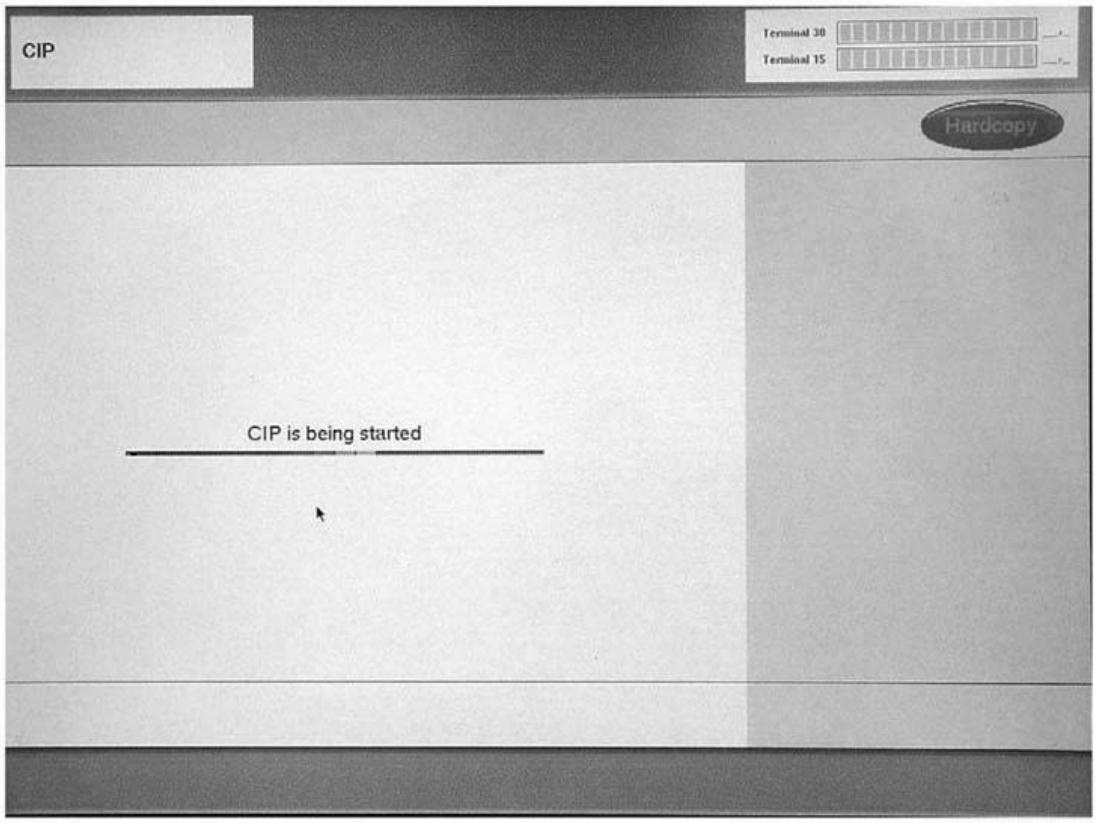

Fig. 1: CIP Programming Screen
Courtesy of BMW OF NORTH AMERICA, INC.

The opening screen when CIP is started.

Choose which vehicle you will be programming.

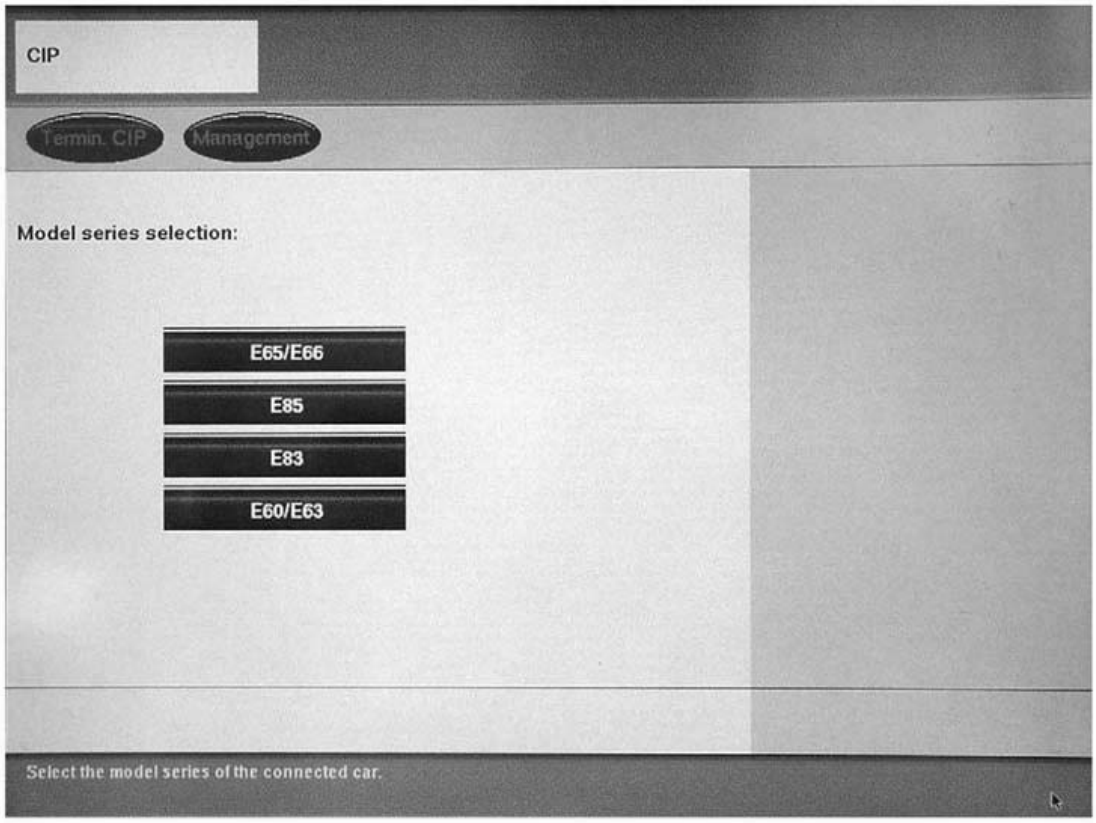

Fig. 2: Vehicle Selecting Programming Screen
Courtesy of BMW OF NORTH AMERICA, INC.

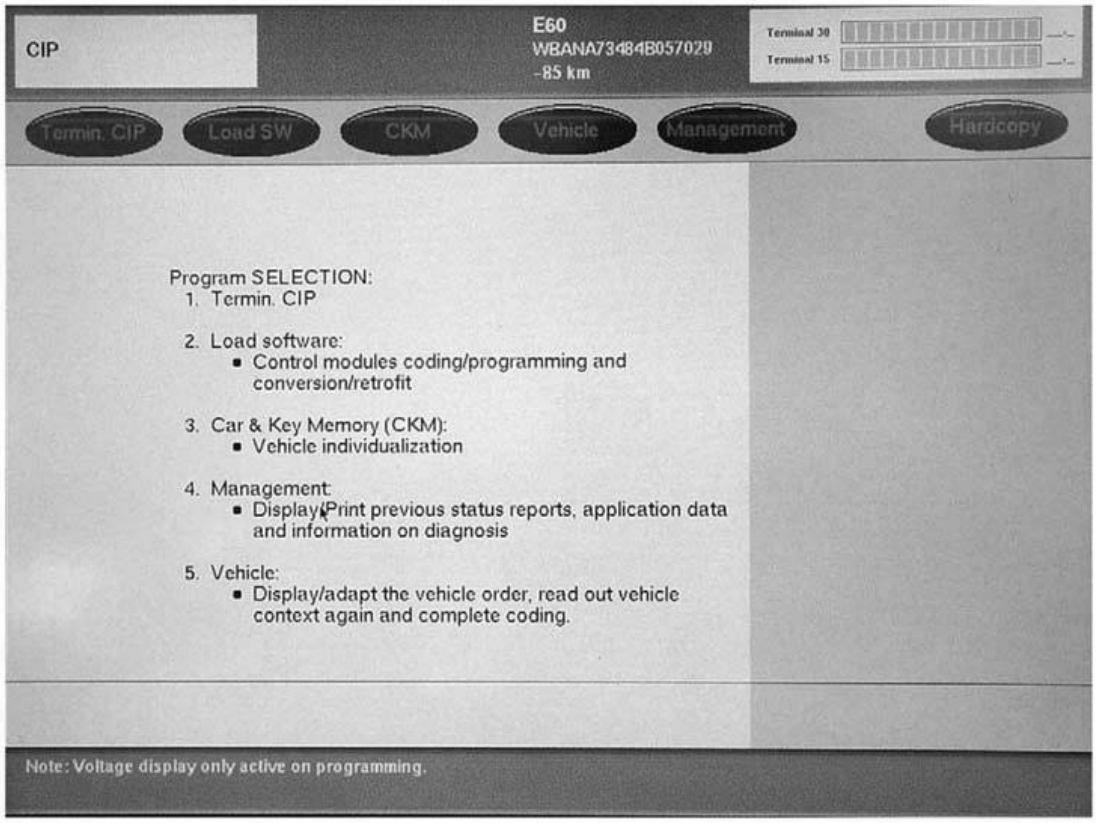

Fig. 3: Programming Screen - Retrofit Select
Courtesy of BMW OF NORTH AMERICA, INC.

Select depending upon programming required.

To retrofit select **Load SW.**

To update a vehicle select **Vehicle.**

Selecting Vehicle will ensure that complete encoding is performed.

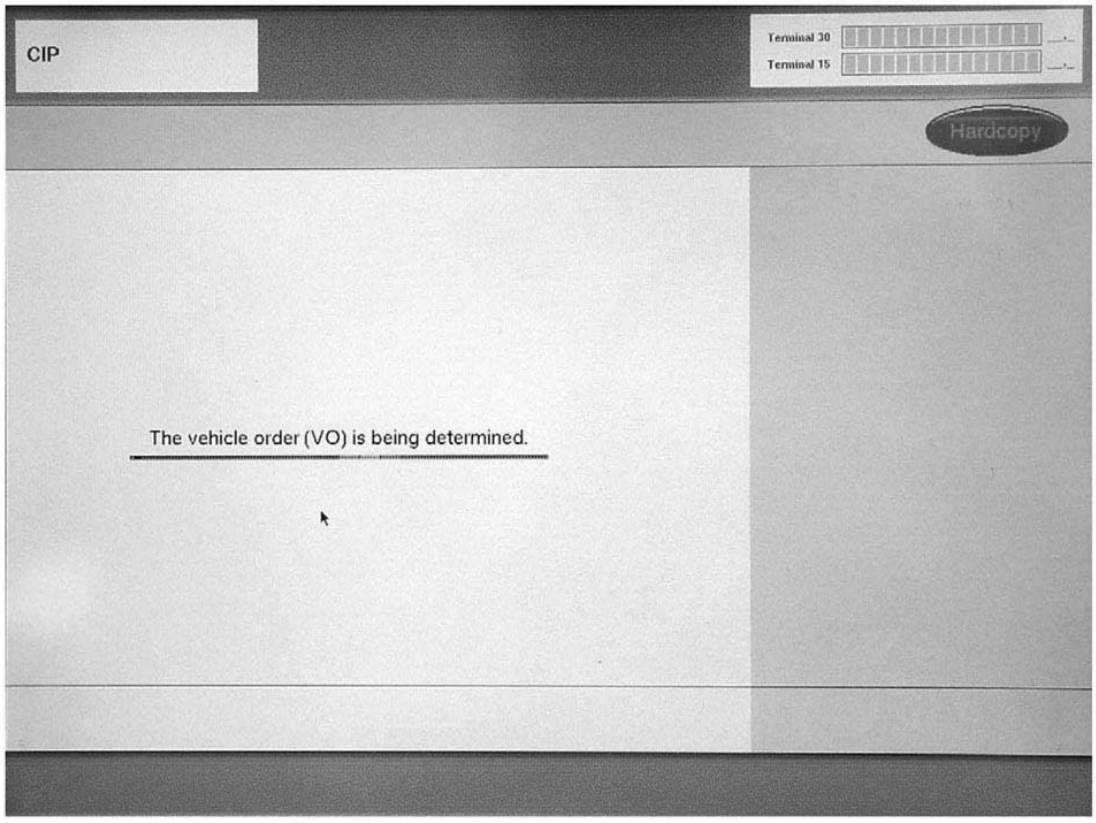

Fig. 4: Programming Screen - Load Software
Courtesy of BMW OF NORTH AMERICA, INC.

Regardless of whether you have selected Load SW or Vehicle, the VO will be determined.

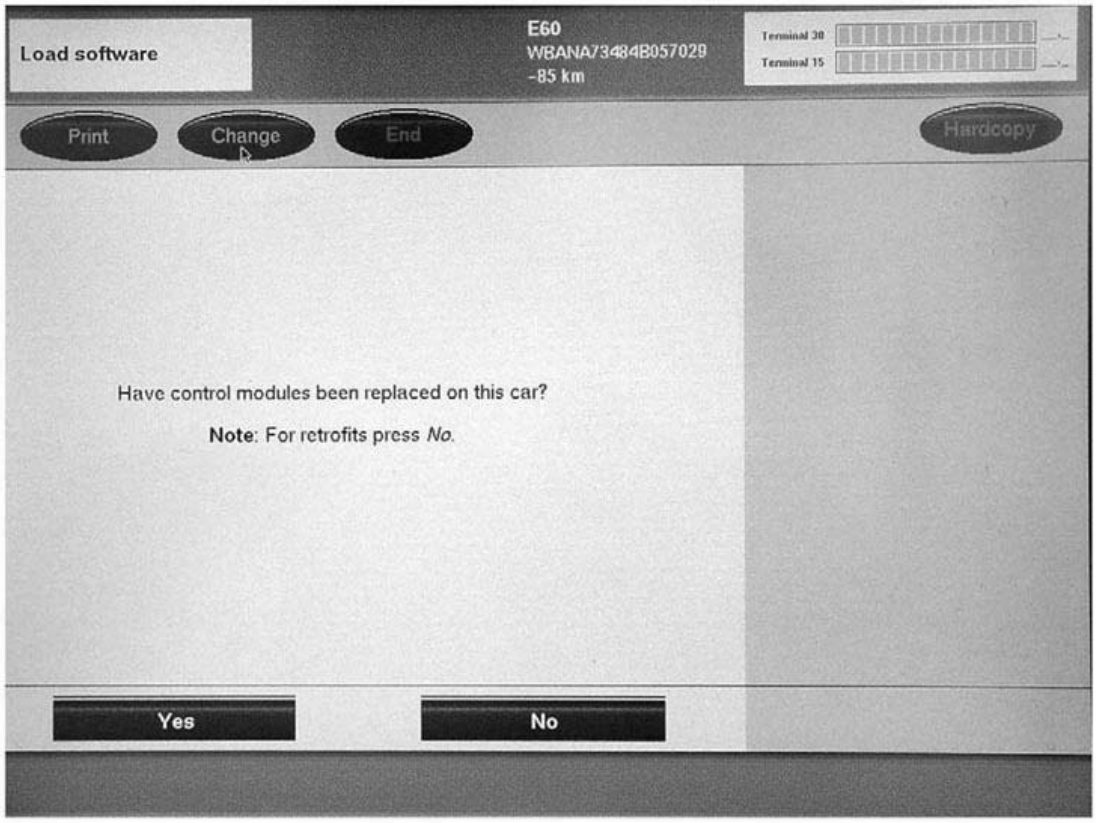

Fig. 5: Programming Screen - Determine
Courtesy of BMW OF NORTH AMERICA, INC.

A **YES** selection will lead you to choose which control module(s) have been replaced.

A **NO** selection will lead you to **Retrofits** .

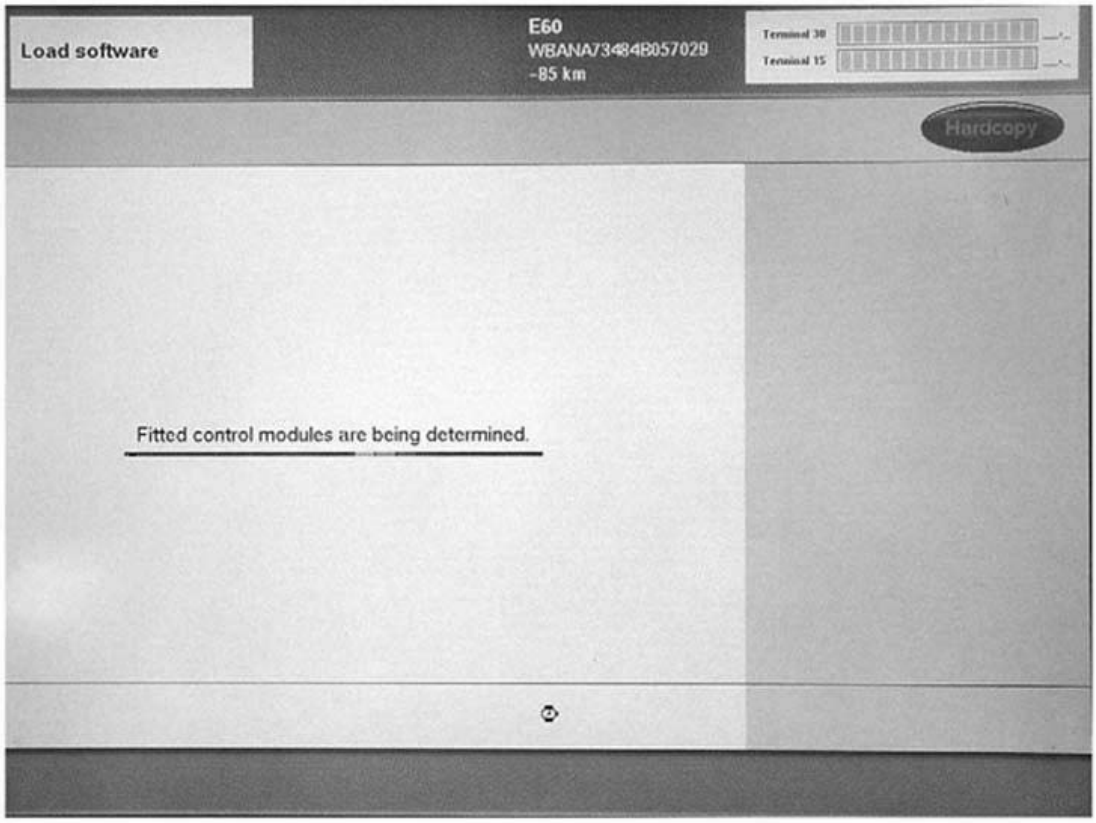

Fig. 6: Programming Screen - Measure Plan
Courtesy of BMW OF NORTH AMERICA, INC.

After selecting YES fitted control modules will be determined.

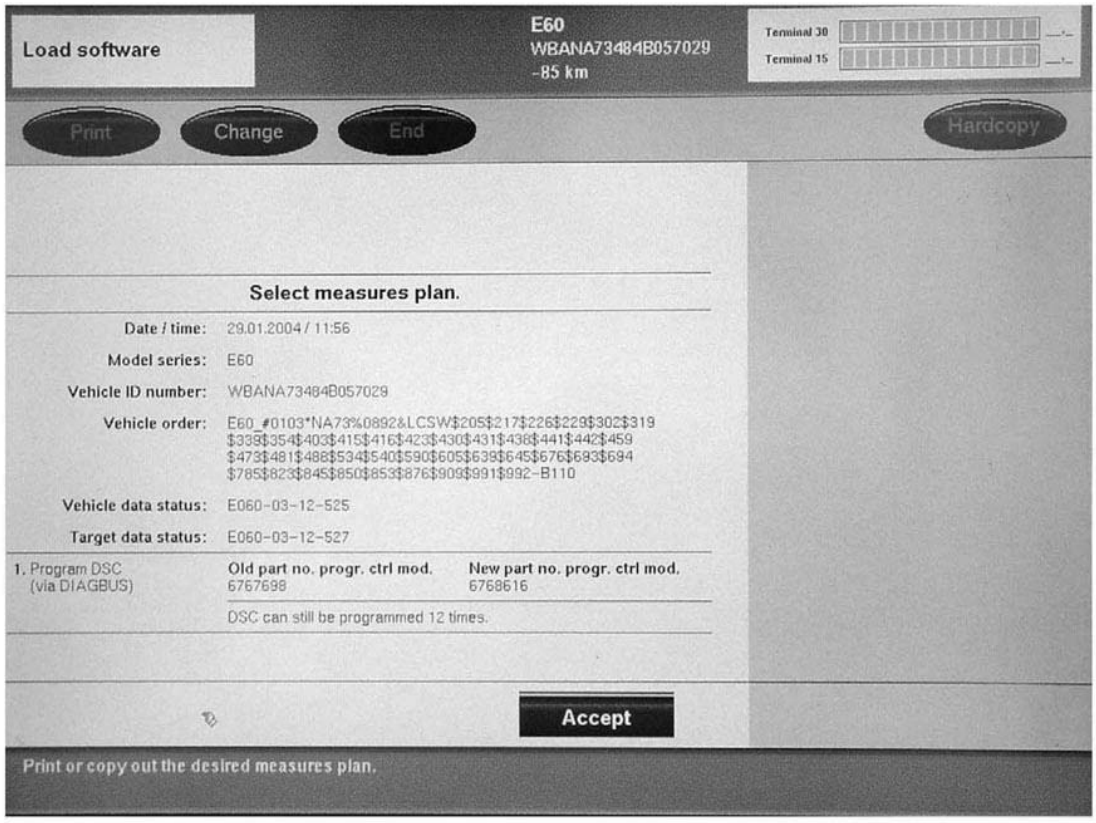

Fig. 7: Programming Screen - Control Modules
Courtesy of BMW OF NORTH AMERICA, INC.

After determining the fitted modules, a measures plan will be made. At this point you will be notified if control modules need to be replaced.

Control module replacement is required if the hardware level in a module can not be upgraded to a high enough software level.

In the case above no modules need replacement, in fact on the DSC needs to be reprogrammed.

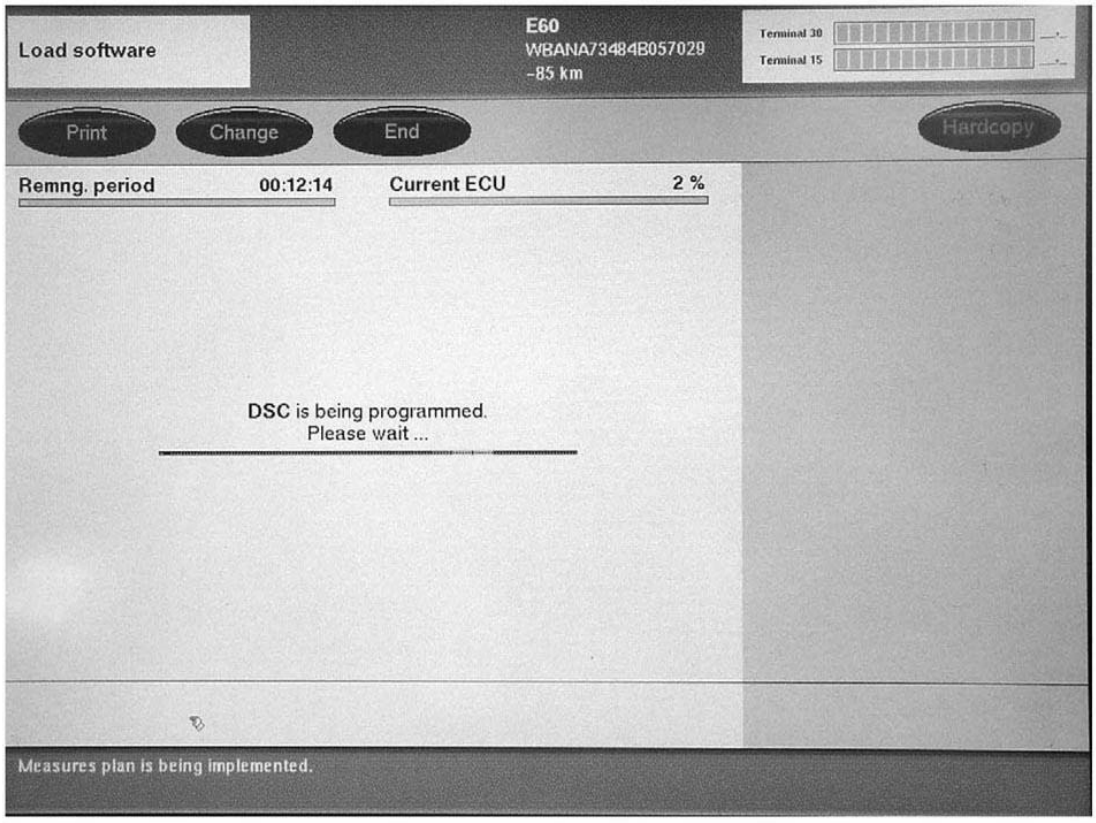

Fig. 8: Programming Screen - DSC Being
Courtesy of BMW OF NORTH AMERICA, INC.

DSC programming is being carried out.

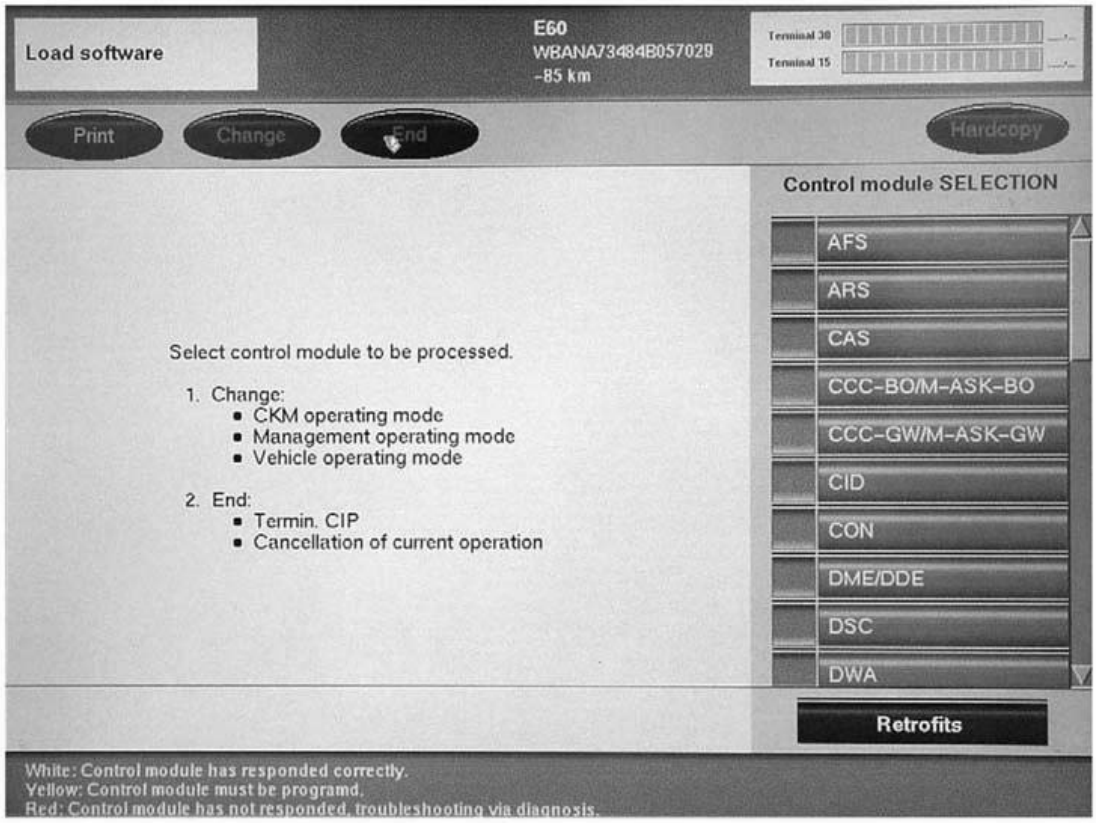

Fig. 9: Programming Screen - Retrofit Programming
Courtesy of BMW OF NORTH AMERICA, INC.

If you selected no earlier (Have any control modules been replaced?) you would come to this screen.

Here selections to reprogram individual modules can be made or entry into retrofit programming.

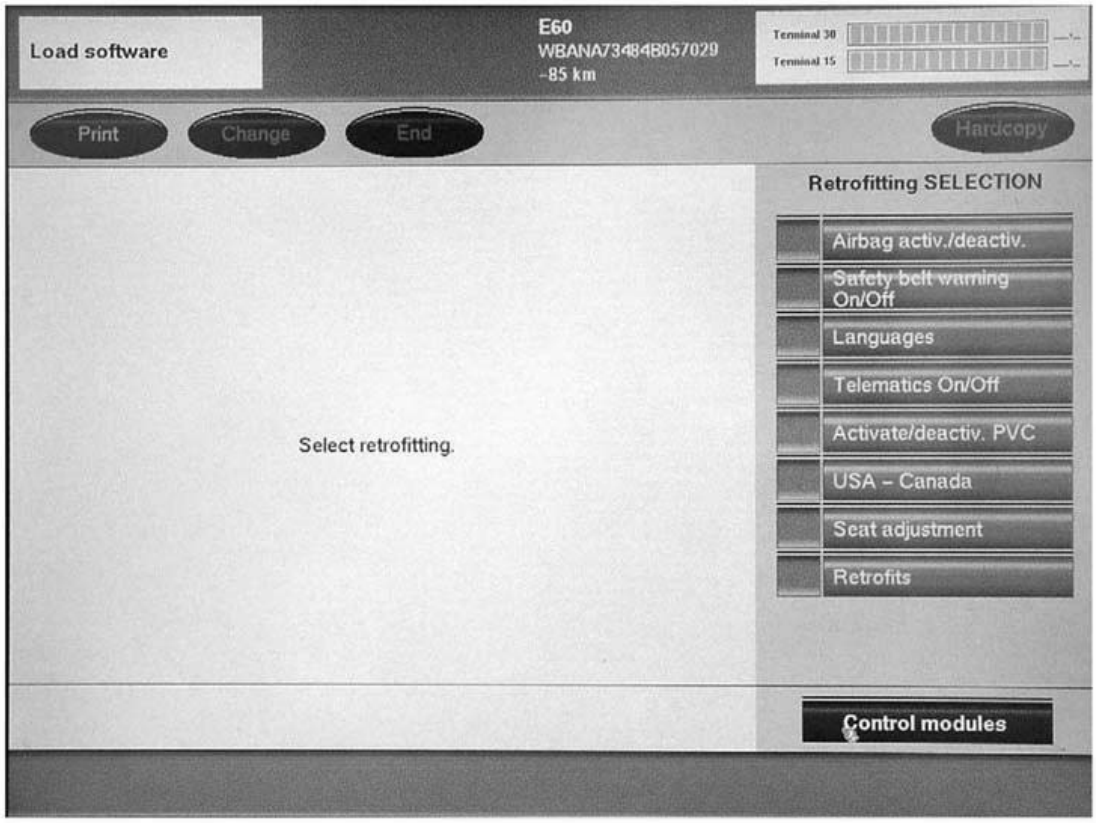

Fig. 10: Programming Screen - Selecting Retrofit
Courtesy of BMW OF NORTH AMERICA, INC.

Selecting retrofit on the previous screen brings you here.

More selections (such as mobile phone USA) are on the next page, accessed by pressing retrofits on bottom of selection list.

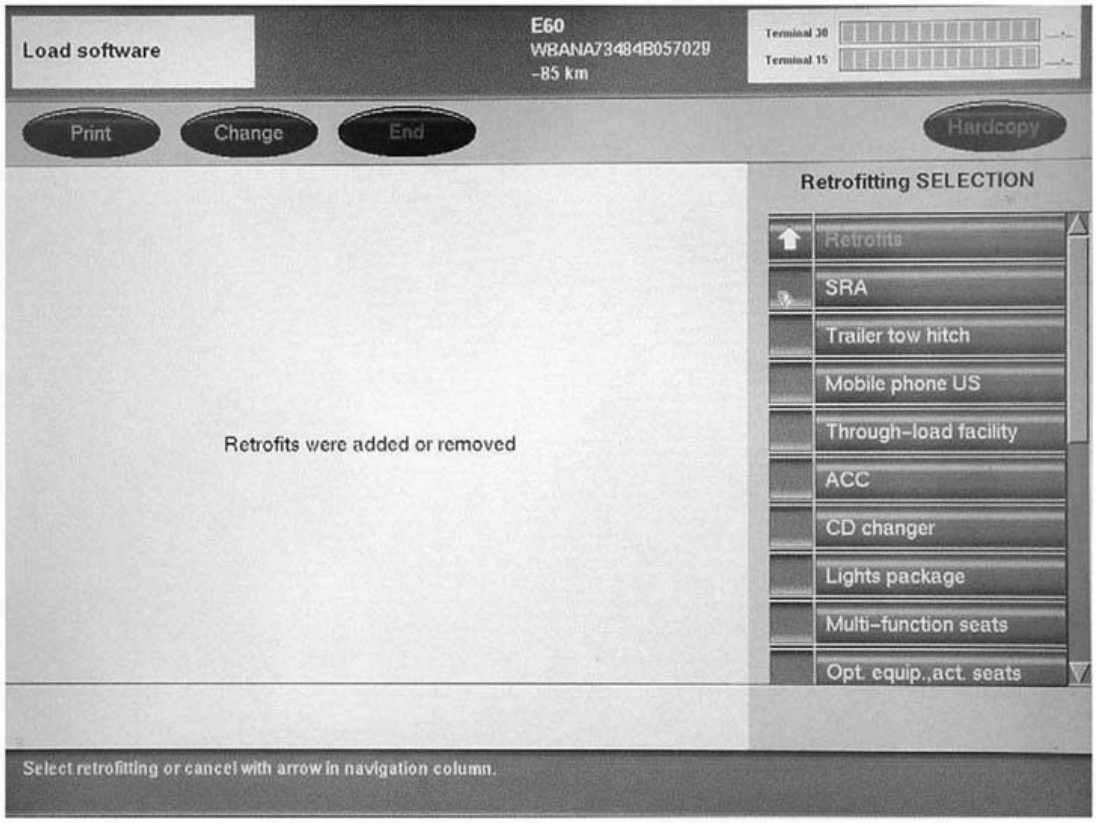

Fig. 11: Programming Screen - Retrofit
Courtesy of BMW OF NORTH AMERICA, INC.

Select the retrofit, in this case the Mobile phone USA.

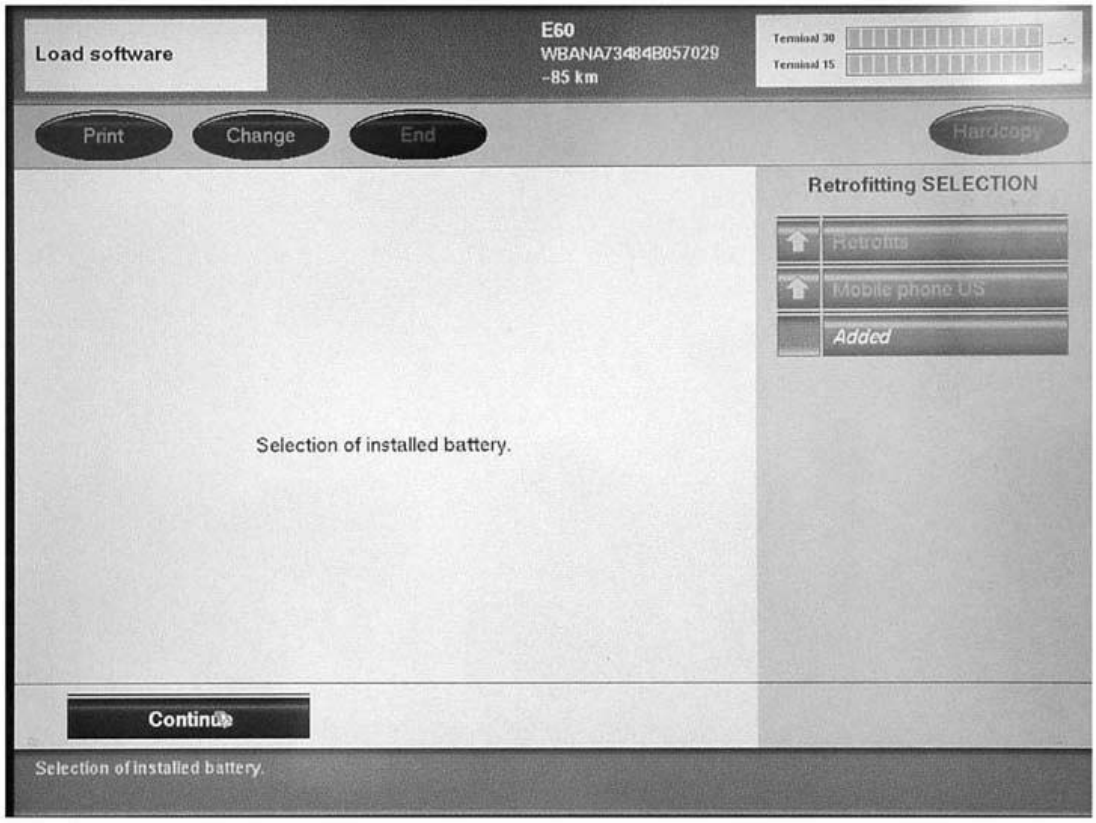

Fig. 12: Programming Screen - Battery
Courtesy of BMW OF NORTH AMERICA, INC.

You will be asked which battery the car has installed.

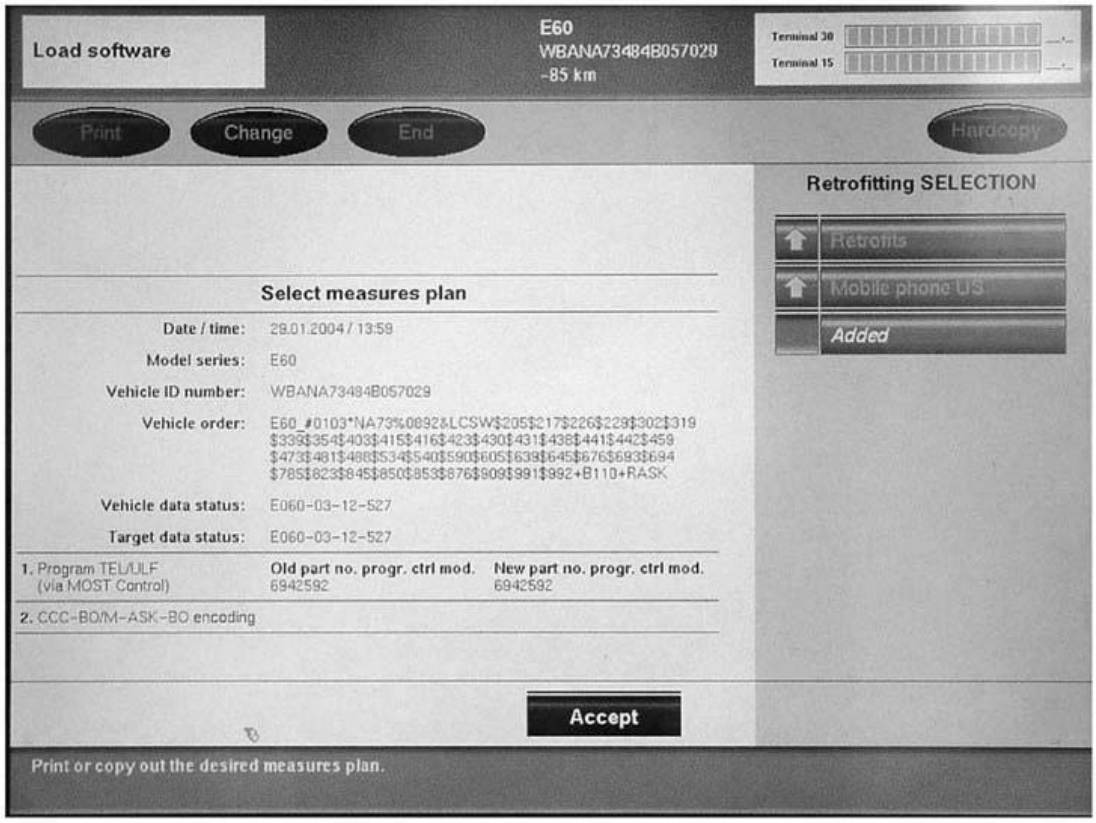

Fig. 13: Programming Screen - Measures Plan
Courtesy of BMW OF NORTH AMERICA, INC.

A measures plan will be determined and displayed to accomplish the retrofit.

Press Accept.

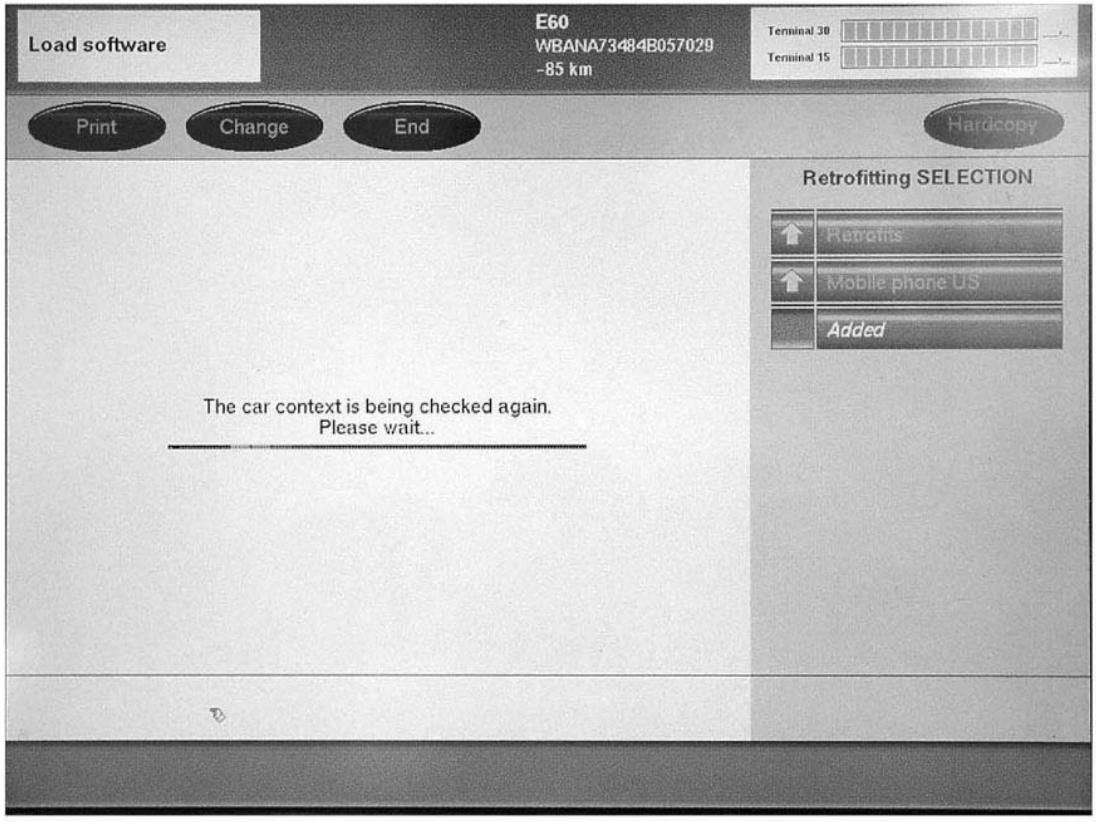

Fig. 14: Programming Screen - Retrofit Being Carried Out
Courtesy of BMW OF NORTH AMERICA, INC.

The retrofit is being carried out.

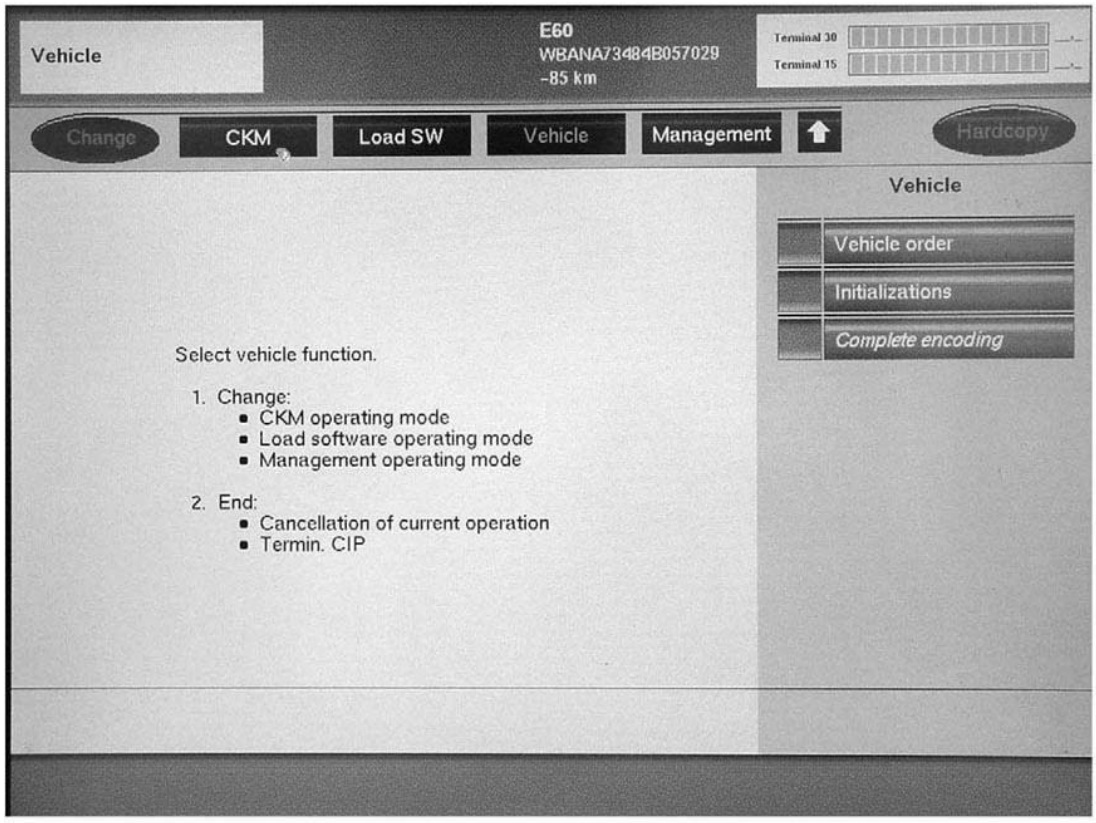

Fig. 15: Programming Screen - Vehicle Function
Courtesy of BMW OF NORTH AMERICA, INC.

By selecting Vehicle initially when entering CIP, you will save time when updating the vehicle.

Updating through Load SW differs from Measures Plan determined through Vehicle.

When updating through Load SW only the module programmed is re-coded. You still need to come to this screen and perform Complete Encoding.

By updating through Vehicle, the entire car is automatically encoded, after the programming is complete.

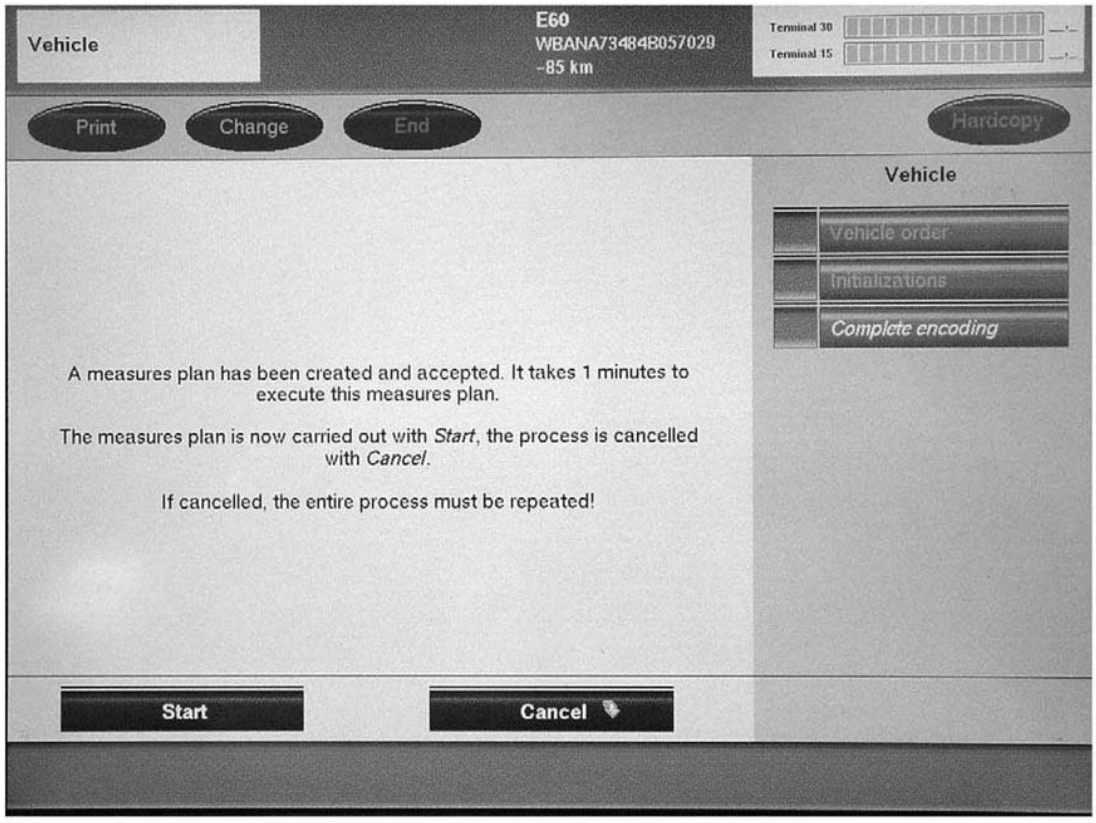

Fig. 16: Programming Screen - Pressing Start
Courtesy of BMW OF NORTH AMERICA, INC.

Press start to begin the programming and encoding procedure.

THE DVOM

Model: All

Production Date: All

INTRODUCING THE DVOM

The ability to measure voltage, current flow, and resistance is important in the diagnosing of electrical problems. Without the results of these measurements troubleshooting in an electrical system is a futile process.

The instrument most commonly used to make electrical measurements is called the Digital Voltage-Ohm Meter (DVOM).

Basic DVOM's are capable of measuring:

- AC Voltage.
- DC Voltage.
- Millivolts.
- Resistance.
- Conductance.
- Capacitance.
- Continuity.
- Diode Test.
- Amps/Milliamps.
- Microamps.

Advanced DVOM's add:

- Frequency.
- RPM.
- Duty Cycle.
- Pulse Width.

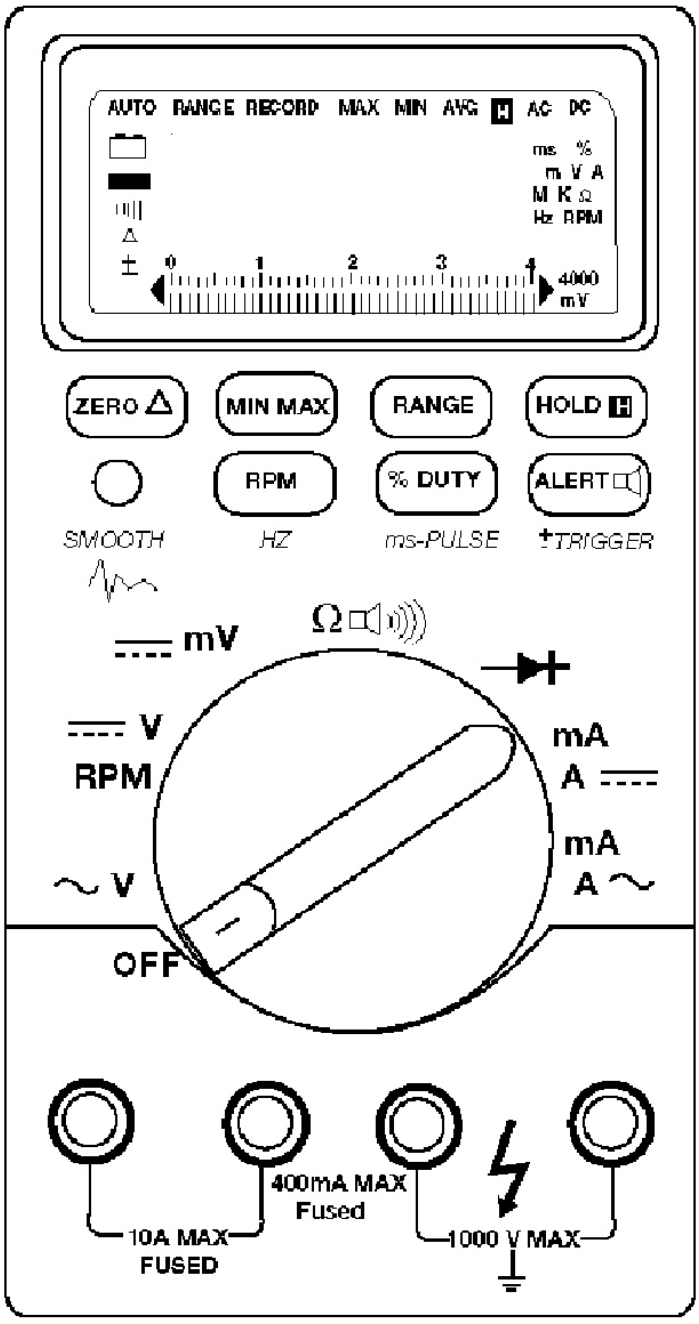

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Fig. 1: Identifying DVOM
Courtesy of BMW OF NORTH AMERICA, INC.

The DVOM provides for a method of accurate measurements.

Even though accurate measurements are the key to electrical diagnosis, the following four factors determine the effectiveness of the measurements:

- Accuracy of the measuring instrument.
- Correct installation in the circuit of the measuring instrument.
- Ability of the Technician to read the instrument.
- Skill of the Technician in interpreting the results.

As it is clearly seen, only one of the factors depends on the DVOM (e.g. accuracy), the rest will always depend the ability of the technician to read and interpret the results.

CHOOSING A DVOM

A good choice of a DVOM is the DISplus or the MoDic, as the measuring system of each contains a highly accurate DVOM.

Choosing a handheld DVOM from a reputable manufacturer, however, leaves the DISplus and MoDic free to perform other tasks that a DVOM can not do (e.g. Retrieval of fault codes).

In choosing a DVOM several factors need to be considered, one of which is **Impedance.**

Impedance is the combined resistance to current created by the resistance, capacitance and inductance of the meter. Impedance is measured in **'Ohms per Volt'.**

Meters with the highest **'Ohms per Volt'** impedance are the most accurate. More importantly using a meter with high impedance will not cause damage to sensitive electronic circuitry.

When a Meter is connected across a circuit to measure voltage, it must be connected in parallel. This adds parallel resistance. The total resistance in a parallel circuit is less than the lowest resistance in that circuit (Ohms Law). Using a Meter with low impedance will reduce the total resistance of the circuit and allow more current to flow.

A meter with low impedance can draw enough current to cause inaccurate measurement, voltage drops or damage sensitive electronic circuit boards. A high impedance meter will draw little current and insure accurate readings.

Using older type meters with low impedance values (20,000 to 30,000 ohms-per-volt) can damage modern electronic circuits and components or give inaccurate readings.

Test lights should be avoided for the same reason. They lower the total resistance of the circuit and cause increased current flow.

Other factors in choosing the proper DVOM are:

- Cost.
- Features.

Basic DVOM's are available reasonably priced. These basic models may be more than sufficient for use in BMW Centers, given the availability of the DISplus and MoDic for advanced measurement and scope functions.

Advanced features and price go hand in hand. The more features added the higher the cost. Some of those features may be worth the increase in cost (e.g. frequency, duty cycle and pulse width). Other features may not (e.g. oscilloscope, graphing).

Choose a DVOM wisely based on personal preference and cost. Like many other tools it is valuable in the diagnosis and repair of BMW's. Experience has shown if the technician is not comfortable with the DVOM or confident in the results of the measurements, the DVOM will not be used. Considering the technology in BMW automobiles, diagnosing with a quality DVOM certainly makes repairing the problem correctly and expediently a more manageable task.

THE FUNCTIONS

Function Selector Rotary Switch

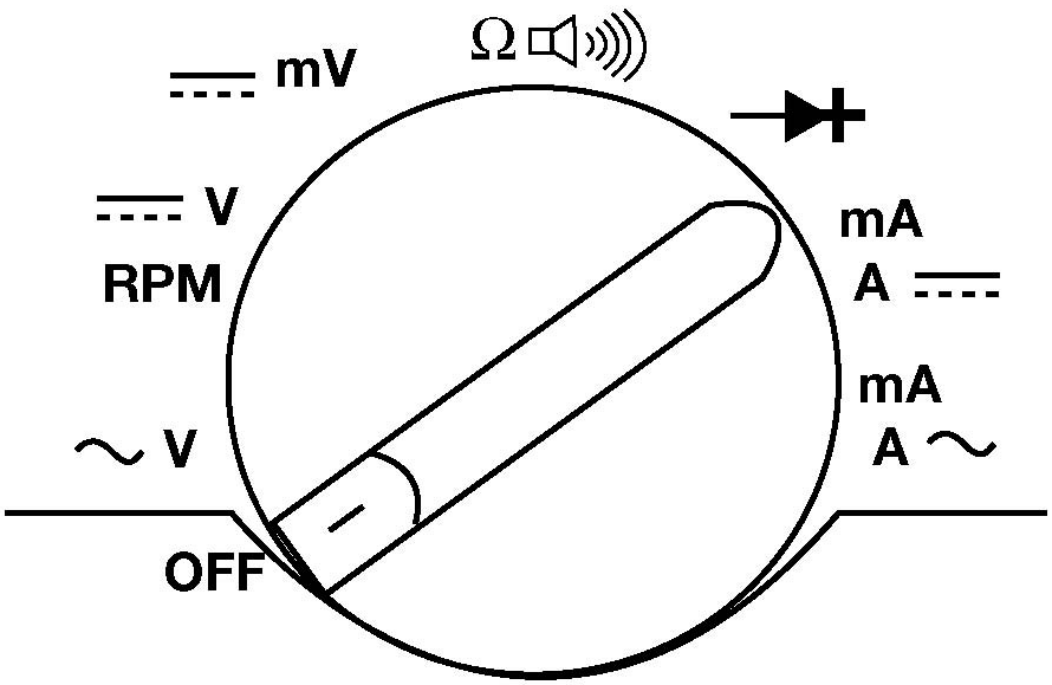

Fig. 2: Identifying Function Selector Rotary Switch (Off)
Courtesy of BMW OF NORTH AMERICA, INC.

Power to the meter is turned off.

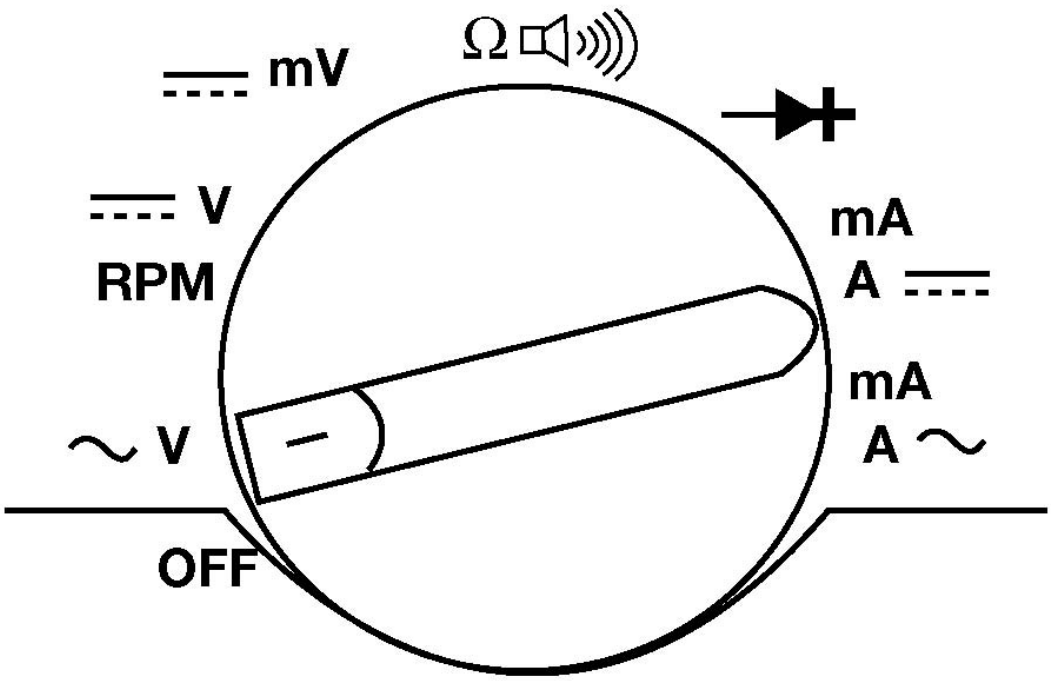

Fig. 3: Identifying Function Selector Rotary Switch (Volts AC)
Courtesy of BMW OF NORTH AMERICA, INC.

Volts AC.

Measures AC voltage.

Ranges 400mV, 4V, 400V, 1000V.

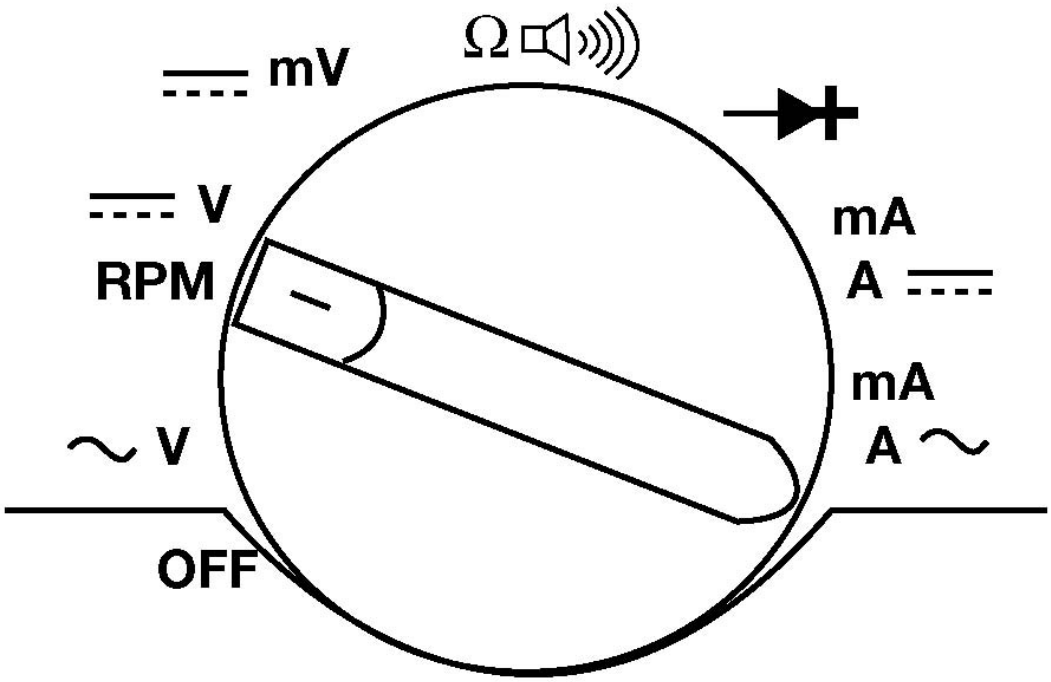

Fig. 4: Identifying Function Selector Rotary Switch (Volts DC, RPM)
Courtesy of BMW OF NORTH AMERICA, INC.

Volts DC, RPM.

Measures DC Voltage.

Ranges 4V, 40V, 400V, 1000V.

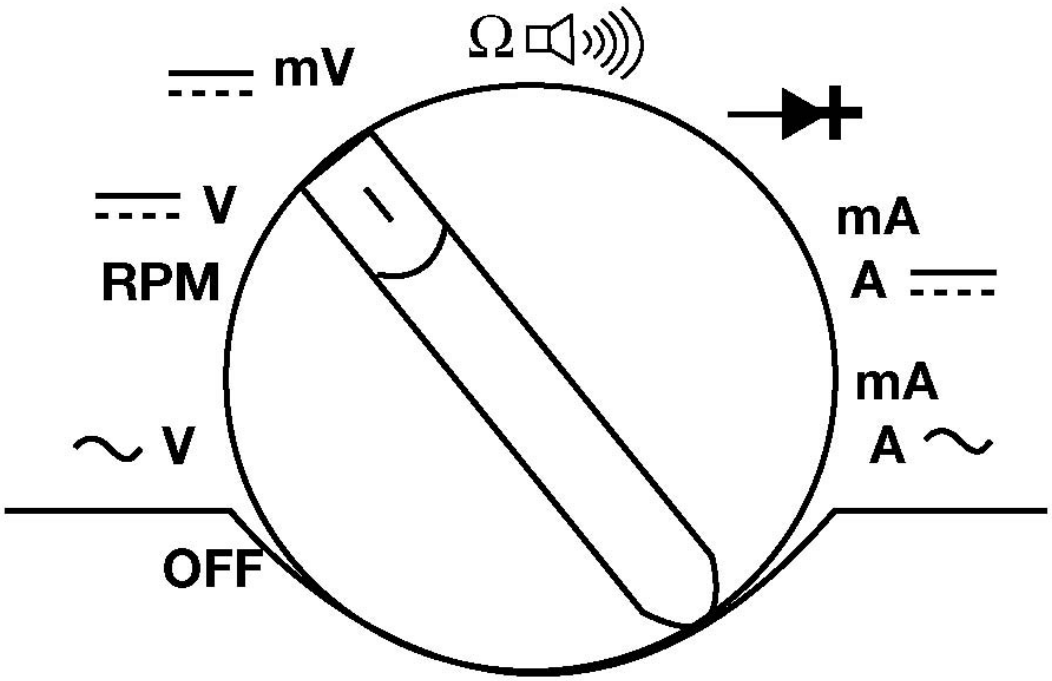

Fig. 5: Identifying Function Selector Rotary Switch (mV)
Courtesy of BMW OF NORTH AMERICA, INC.

mV.

Measures DC Millivolts.

Range: 400mV.

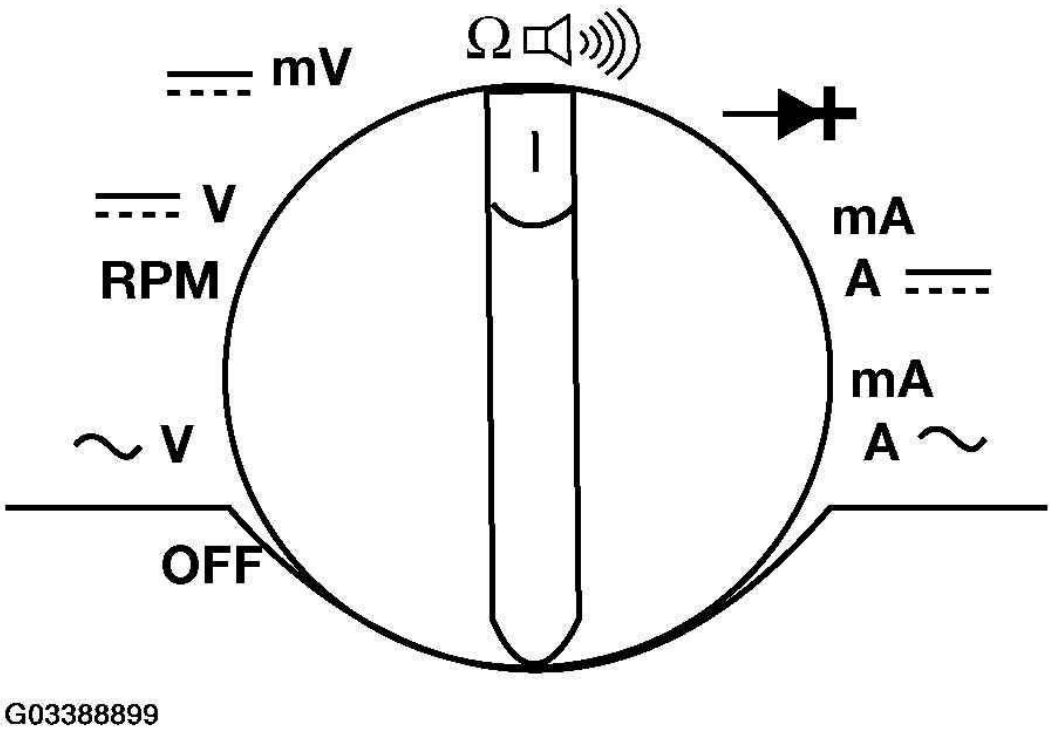

Fig. 6: Identifying Function Selector Rotary Switch (Continuity/Ohms)
Courtesy of BMW OF NORTH AMERICA, INC.

Continuity/Ohms.

Measures Continuity and Ohm.

Ranges: 400ohms,4kohms, 400kohms, 4Mohms, 40Mohms.

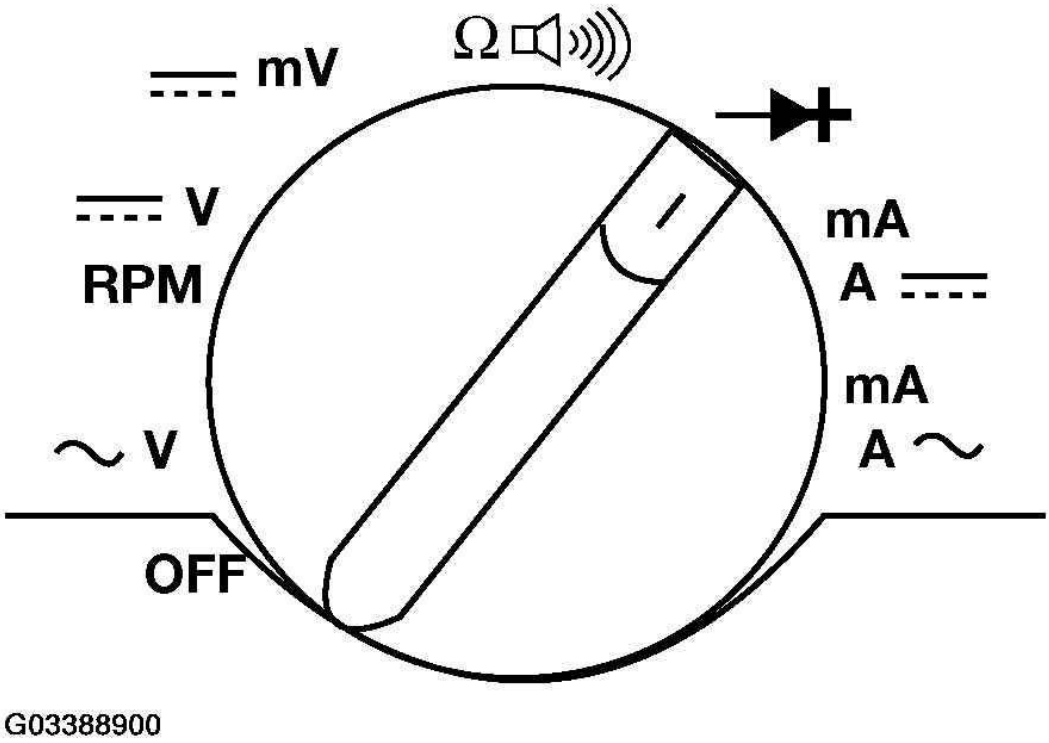

Fig. 7: Identifying Function Selector Rotary Switch (Diode Test)
Courtesy of BMW OF NORTH AMERICA, INC.

Diode Test.

Test diode operation.

Range: 3.000V.

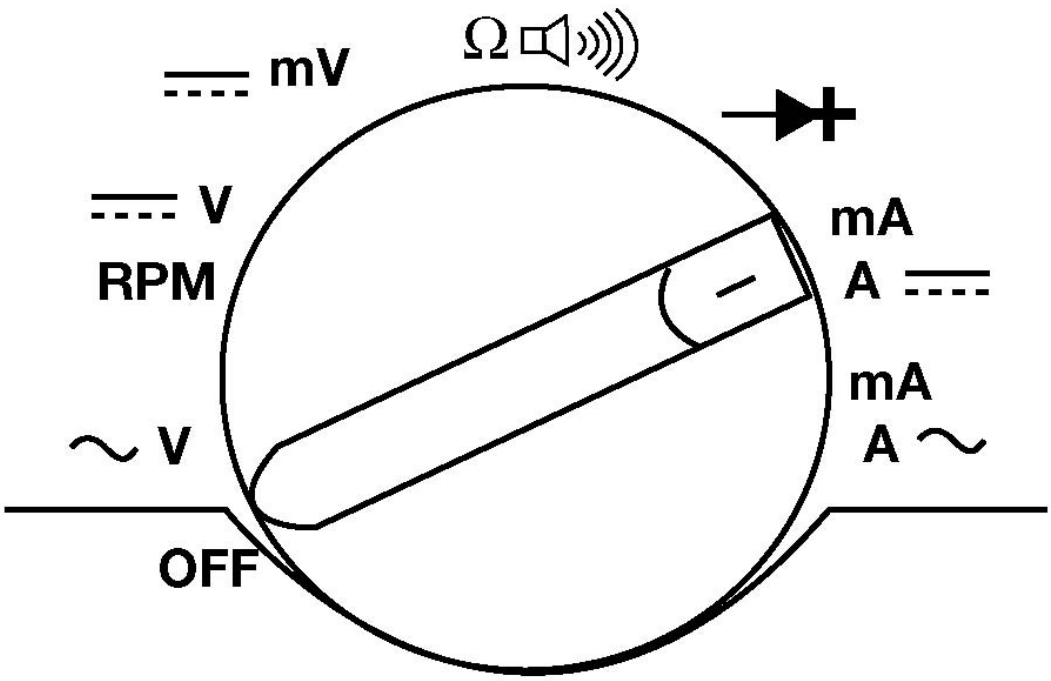

Fig. 8: Identifying Function Selector Rotary Switch (Amps DC)
Courtesy of BMW OF NORTH AMERICA, INC.

Milliamp or Amps DC.

Measures DC Milliamps or amps.

Ranges: 40mA or 400mA for mA input 4000mA or 10 A for A input.

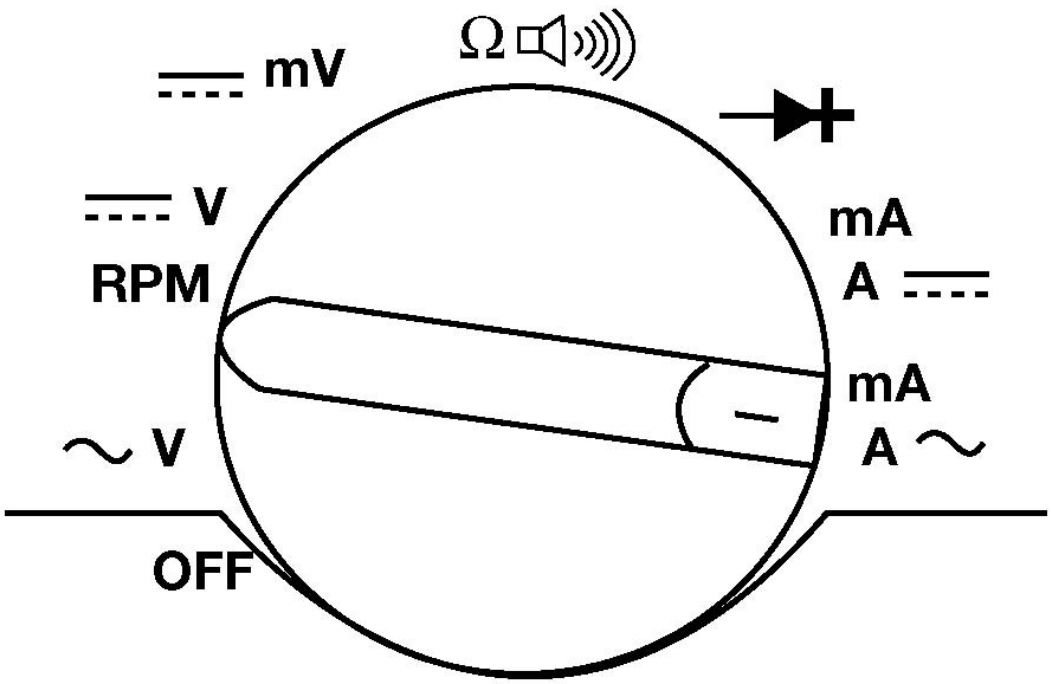

Fig. 9: Identifying Function Selector Rotary Switch (Amps AC)
Courtesy of BMW OF NORTH AMERICA, INC.

Milliamps or Amps AC.

Measures AC Milliamps or amps.

Ranges: 40mA or 400mA for mA input 4000mA or 10 A for A input.

PUSH BUTTON FUNCTIONS

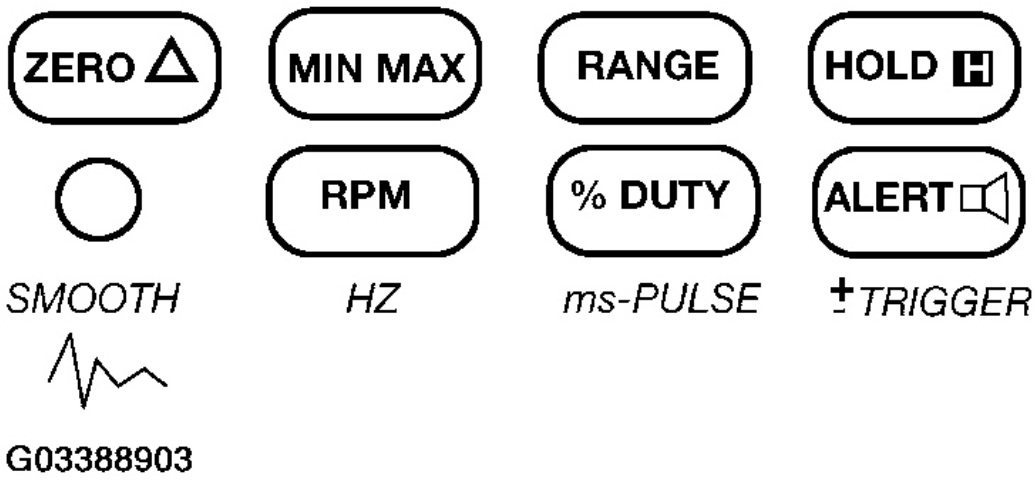

Fig. 10: Identifying Push Button Functions
Courtesy of BMW OF NORTH AMERICA, INC.

Zero (Relative Reading) Function:

Displays difference between the measured value and the stored value.

Fig. 11: Identifying Zero (Relative Reading) Push Button
Courtesy of BMW OF NORTH AMERICA, INC.

Minimum (Min), Maximum (Max), Average (AVG) Recording:

Records minimum, maximum and calculates the true average.

Fig. 12: Identifying Min/Max, AVG Recording Push Button
Courtesy of BMW OF NORTH AMERICA, INC.

Manual Range or Autorange:

In Manual Range user selects fixed range. Meter stays in that range until user changes it, selects Autorange or turns meter off. In Autorange meter selects range automatically.

Fig. 13: Identifying Manual Range or Autorange Push Button
Courtesy of BMW OF NORTH AMERICA, INC.

Touch Hold:

Touch Hold holds last stable reading on display. A new stable reading causes beeper to sound and display to update.

If meter is in MIN MAX Recording, RPM, Duty Cycle, Pulse Width or Hz, Touch Hold interrupts the function. The display is frozen, but recorded readings are not erased.

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Fig. 14: Identifying Touch Hold Push Button
Courtesy of BMW OF NORTH AMERICA, INC.

RPM / HZ.

RPM 2, RPM 1, or frequency.

RPM 2, 4-cycle engines.

RPM 1, 2-cycle engines.

Hz. counts frequency between 0.5 Hz and 200 kHz.

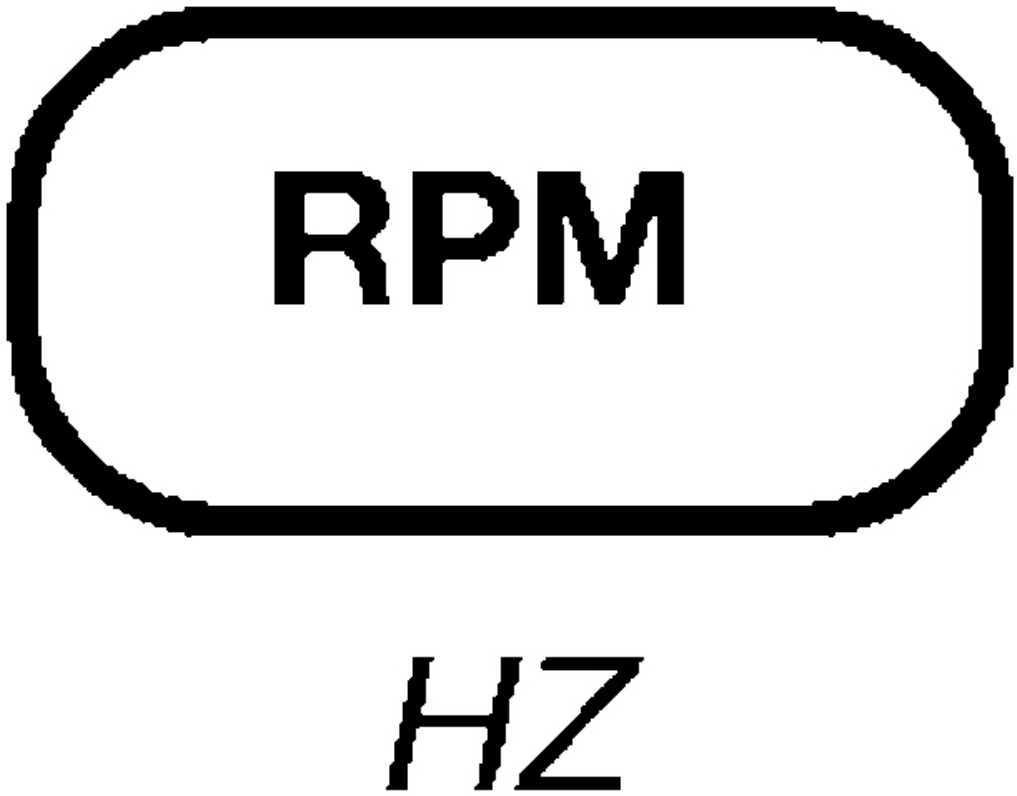


Fig. 15: Identifying RPM / HZ Push Button
Courtesy of BMW OF NORTH AMERICA, INC.

Duty Cycle or Pulse Width.

Duty Cycle between 0.0 and 99.9% displayed.

Pulse Width between 0.002 and 1999.9 ms displayed.

Fig. 16: Identifying Duty Cycle Or Pulse Width Push Button
Courtesy of BMW OF NORTH AMERICA, INC.

Change Alert, Continuity Beeper or +/- Trigger.

In voltage or current functions selects Change Alert.

In ohms function selects Continuity Tests.

In Duty Cycle or Pulse Width selects trigger slope.

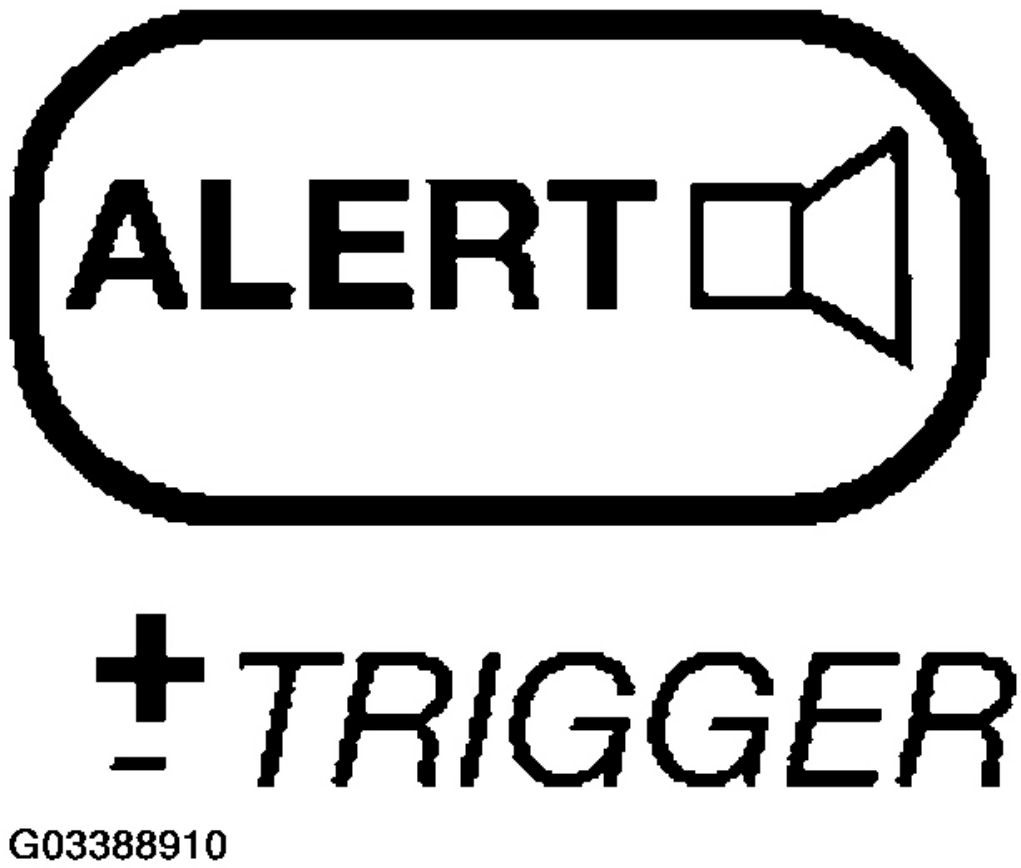
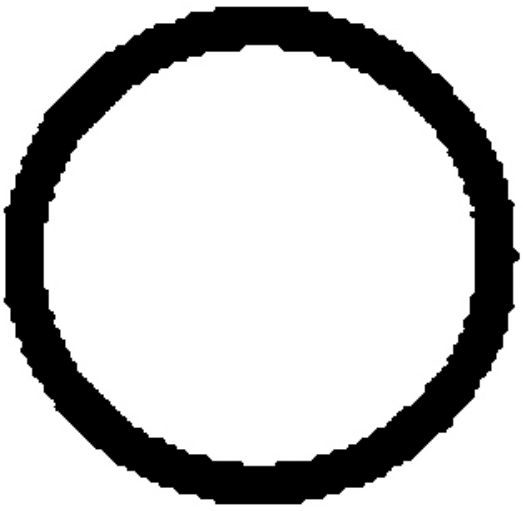


Fig. 17: Identifying Change Alert Push Button
Courtesy of BMW OF NORTH AMERICA, INC.

Smoothing Function and Back-light display (advance model only).

Smooth displays average of last eight readings.

Press Yellow button to turn on or off back-light.



SMOOTH

G03388911

Fig. 18: Identifying Smoothing Function Push Button
Courtesy of BMW OF NORTH AMERICA, INC.

INPUT TERMINALS

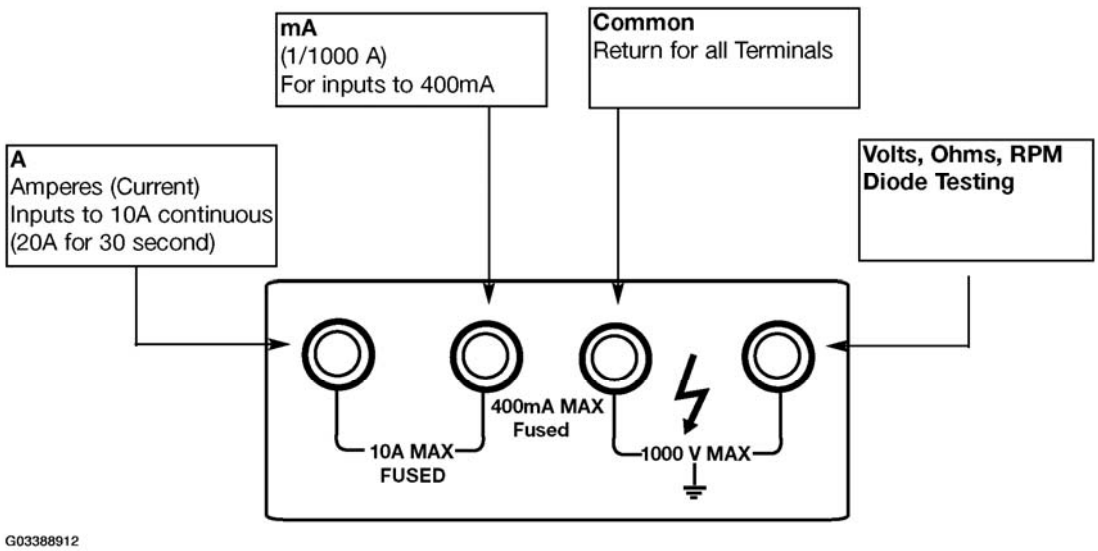


Fig. 19: Identifying Input Terminals
Courtesy of BMW OF NORTH AMERICA, INC.

DISPLAY

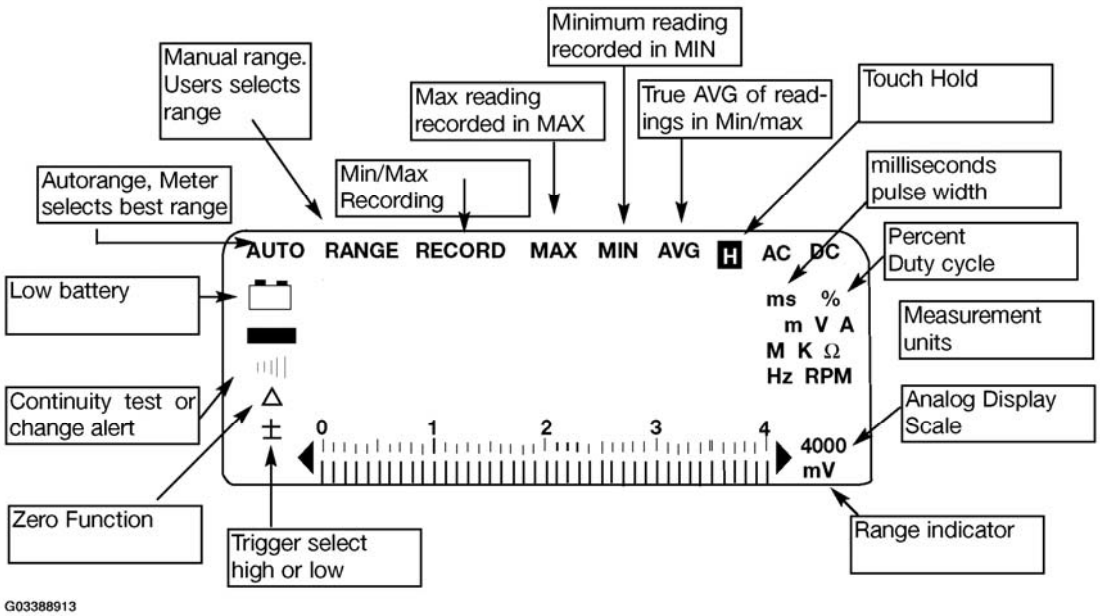


Fig. 20: View Of Functions Display

Courtesy of BMW OF NORTH AMERICA, INC.

INFINITY DISPLAY

While most displays of DVOMs are standard (i.e. mV means millivolt, mA means milliamp) the display or symbol for infinity or open circuit can be confusing. A display of 0ohms indicates no or little resistance. It means the circuit or portion of the circuit being measured has continuity or is complete. A reading of OL means the circuit is open or not complete, the resistance is said to be "INFINITY". Some meters may use the symbol "INFINITY" for Infinity. Be aware of which reading the meter being used will give for infinity or open circuit.

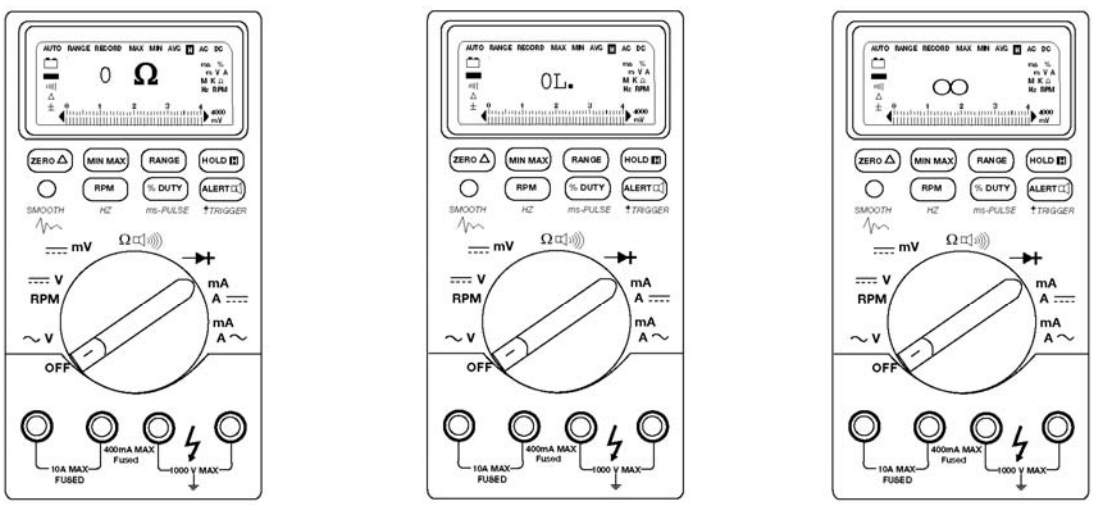


Fig. 21: Infinity Display
Courtesy of BMW OF NORTH AMERICA, INC.

VOLTAGE TESTING

The voltmeter (DVOM) must be connected in parallel with the load or circuit.

The DVOM has a high resistance and taps off a small amount of current.

A voltmeter must be used with the current on and with the correct polarity.

The red lead should be connected to the B^+ side of the circuit and the black lead to the B^- side of the circuit.

If the leads are reversed the reading will be a negative number.

Typical Application of Voltage Testing

- Checking Power Supply.

- Charging System.
- Complete Basic Circuits.
- Control Module Functions (Input/Output).

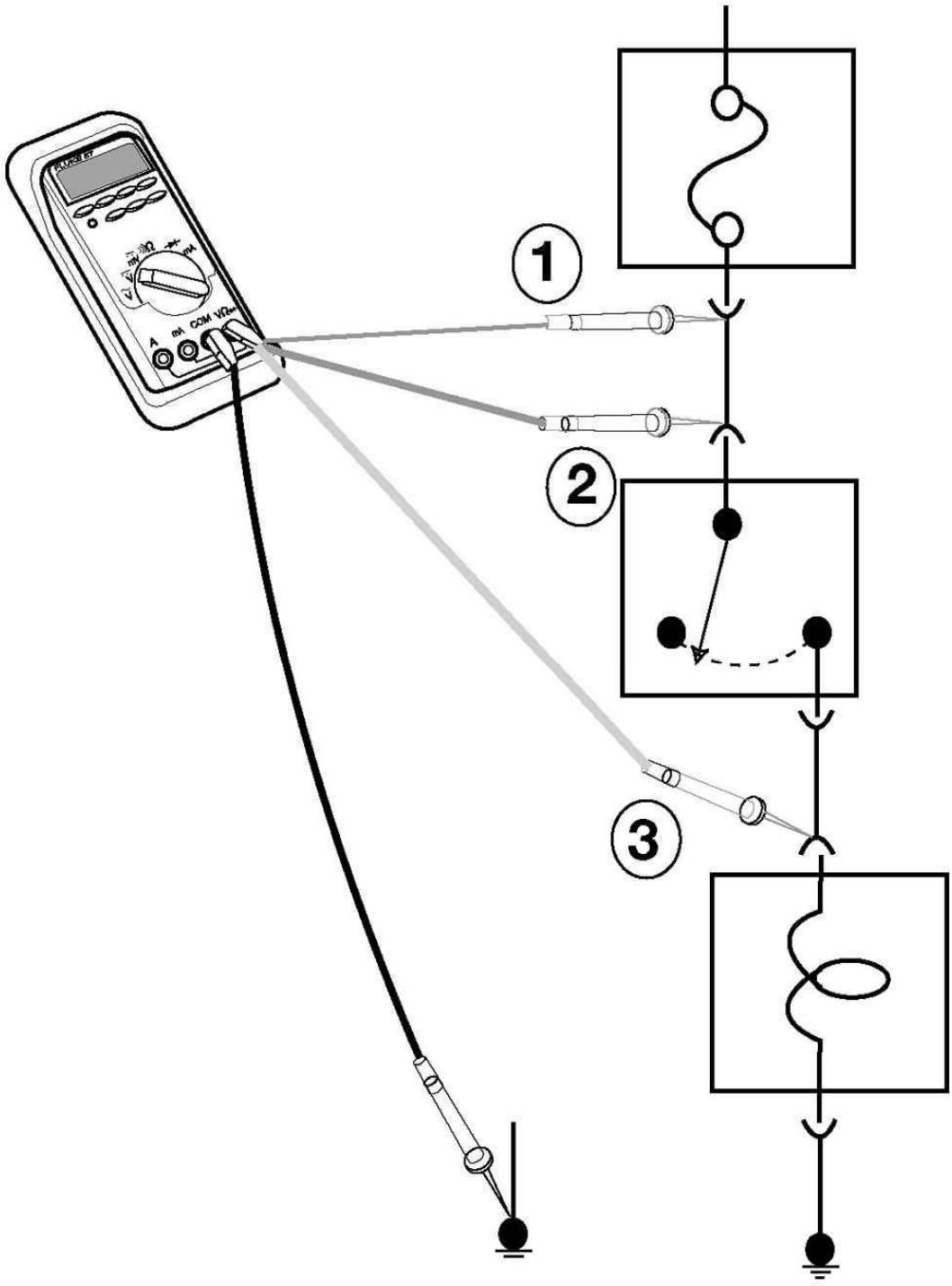


Fig. 22: Identifying Voltage Testing
Courtesy of BMW OF NORTH AMERICA, INC.

Measure at different points checking for change or interruption in the voltage supply.

- Select proper function and range of DVOM.
- Connect (-) lead of meter to battery B- or known good ground.
- Connect (+) lead of meter to test circuit.

DVOM will indicate supply or available voltage at that point.

AMPERAGE TESTING

To measure amperage the meter must be installed in series in the circuit. The current flow of the circuit must flow through the meter itself.

Current must be flowing in the circuit.

Installing the meter in parallel with the circuit may cause damage to the meter, because of the increased current flow in the circuit, due to the low resistance in the meter.

> **CAUTION: Most ampere meters or DVOMs are rated for no more than 10 amps. Current flow above 10 amps will damage the internal fuse of the DVOM and render it unable to measure amperage.**

Typical Application of Amperage Testing

- Proper Component Operation (Correct Current Draw).
- Parasitic Draw Testing.

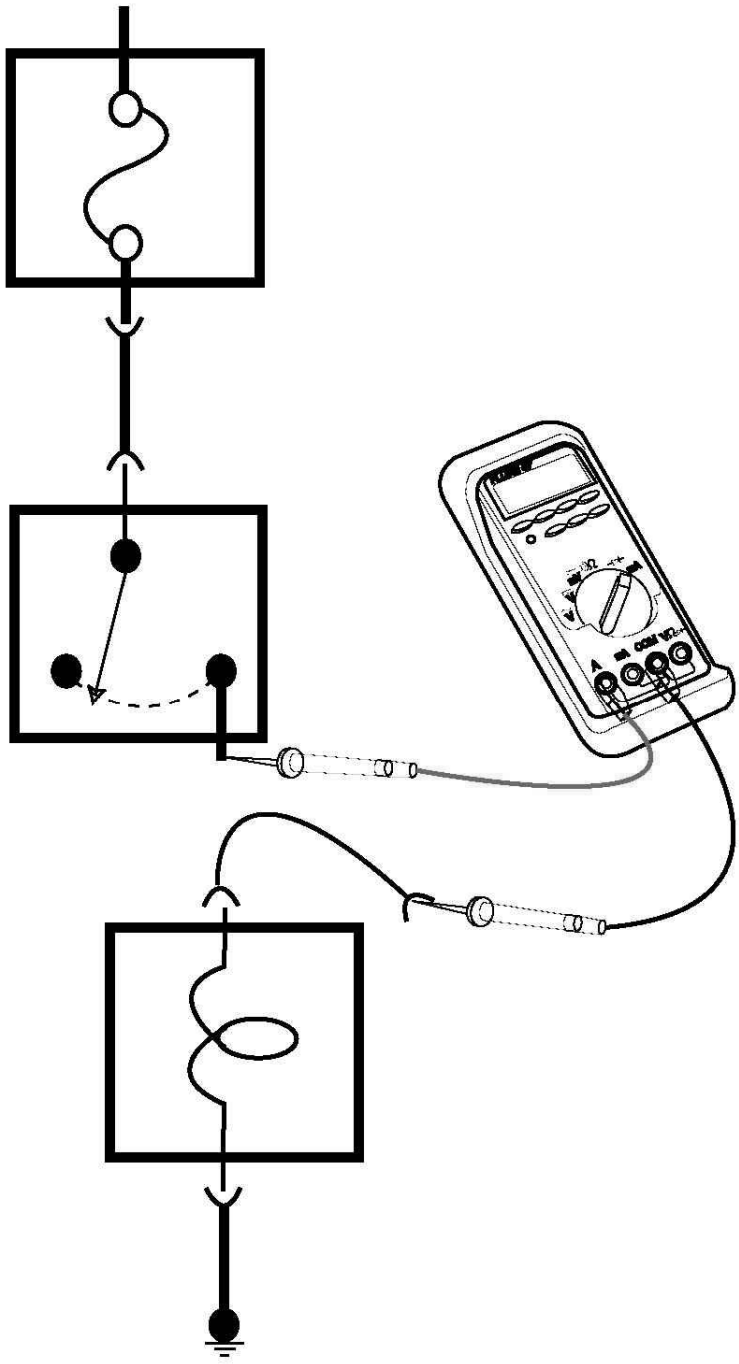


Fig. 23: Identifying Amperage Testing
Courtesy of BMW OF NORTH AMERICA, INC.

Ensure meter is capable of handling current flow.

Use caution when activating additional consumers.

- Select proper function of DVOM and move leads to proper position.
- Connect meter in series with (+) lead on the B^+ side of the circuit.
- Connect (-) lead of meter to complete circuit.

NOTE: **If the expected load may exceed the range of the meter, use a meter with a higher range (DISplus inductive pick-up) for initial testing.A convenient location to apply meter (e.g. across fuse terminals). DVOM will indicate current flow (Amps) through circuit.**

RESISTANCE TESTING

When set for resistance testing (Ohms) the DVOM must never be connected in a live circuit.

The component or portion of a circuit being measured, must be isolated from the power source.

Most modern day DVOM's are self ranging when set to measure resistance, so the meter can not be damaged by out of range measurements.

The test leads may be used without regard for polarity, unless the circuit contains a diode.

The DVOM functions by placing a very small amount of current on the circuit being tested, the red lead must be placed on the anode side of the diode.

Typical Application of Resistance Testing

- Locating a Short to Ground (As Shown).
- Determining Resistance of Components (e.g. Temp Sensors and Injectors).

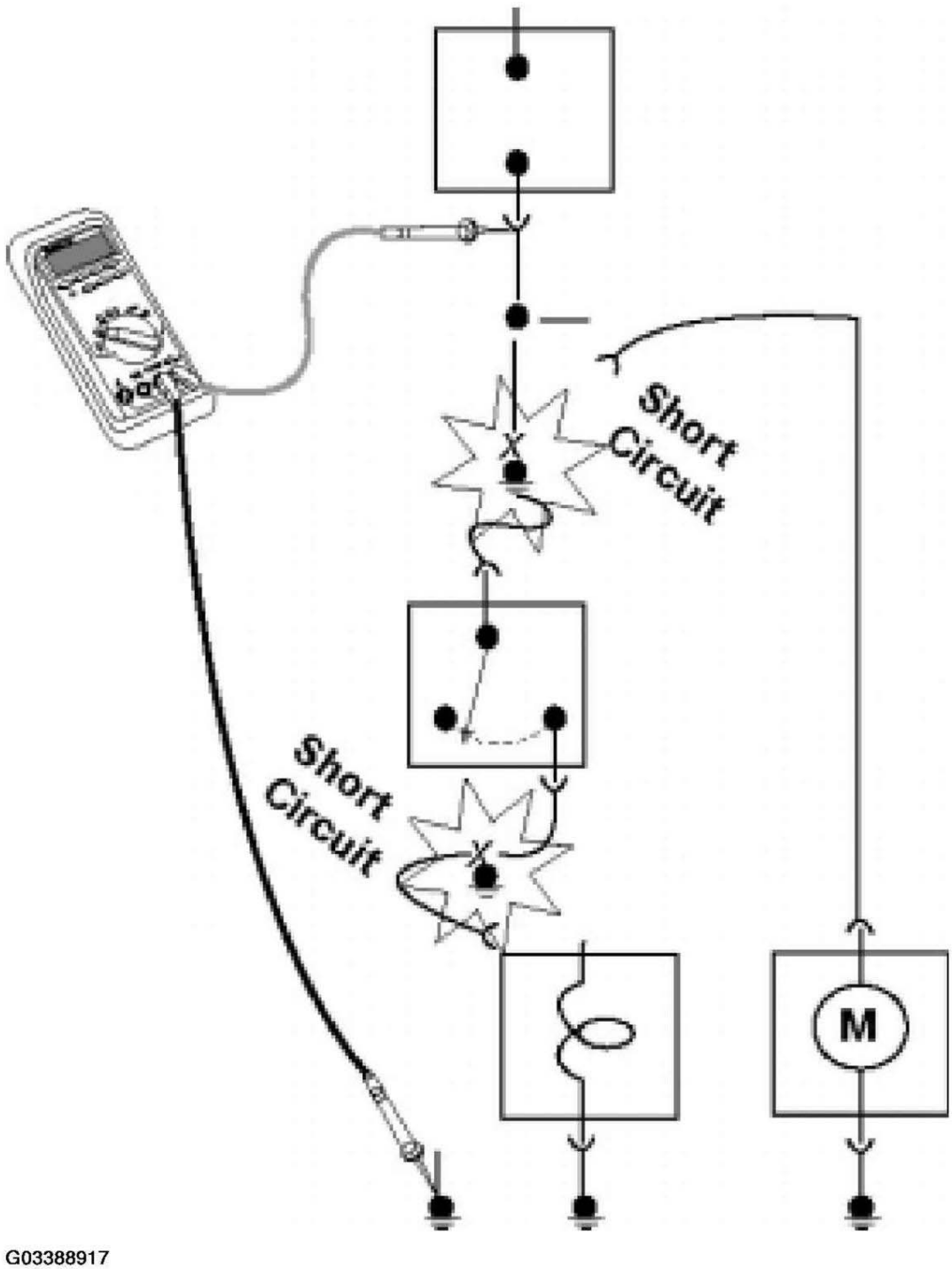


Fig. 24: Identifying Resistance Testing
Courtesy of BMW OF NORTH AMERICA, INC.

An Ohmmeter uses its internal power to test a circuit or component.

- Select correct function and range (Most meters are self ranging in this function).
- Disconnect power to circuit.
- Disconnect any circuit wired in parallel with circuit being tested.
- Connect test leads.

NOTE: There must be NO current available to the circuit during the resistance (Ohmic) test. DVOM will indicate resistance (Ohms) of component or circuit being tested.

CONTINUITY TESTING

The DVOM may have a separate setting for continuity testing.

When set for continuity testing the DVOM must never be connected in a live circuit.

The power source must be disconnected from the circuit being tested. Any circuits wired in parallel with the circuit being tested must also be disconnected.

The DVOM uses its own internal power supply to test the continuity of the circuit.

Continuity testing verifies that circuit connections are intact. The continuity mode is extremely fast and is used to detect either shorts or opens that last as little as 1ms.

When a change is detected the beeper tone is stretched to last at least 1/4 second so both shorts and opens can be audibly detected.

This is a valuable troubleshooting aid when diagnosing intermittent faults associated with wiring, connections, switches and other components of the circuit.

Typical Application of Continuity Testing:

- Circuit Continuity.
- Intermittent Wiring Harness Faults.

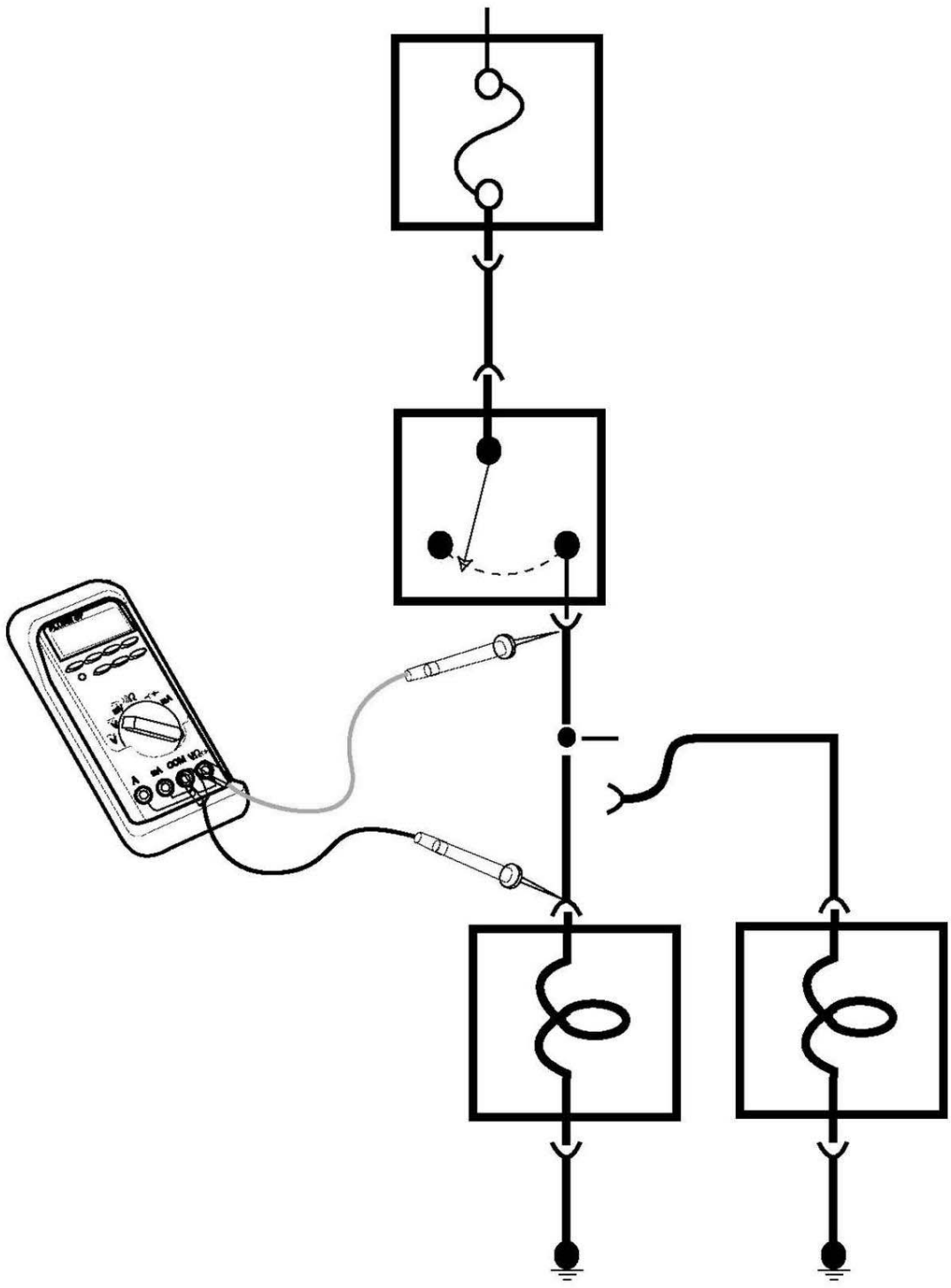


Fig. 25: Identifying Continuity Testing
Courtesy of BMW OF NORTH AMERICA, INC.

- Select correct function and range of DVOM.
- Disconnect power to the circuit.
- Disconnect any circuits wired in parallel.
- Connect DVOM leads to the circuit to be tested.

NOTE: There must be NO current available to the circuit during the continuity test. DVOM display will indicate continuity of circuit.

VOLTAGE DROP TESTING

Voltage Drop Tests determine the resistance of an active circuit, a circuit with current flowing.

Voltage drop tests are preferred over simple resistance measurements because the power source is not removed from the circuit.

By measuring the voltage on both sides of a load, the amount of voltage consumed by the load is measured.

The voltage drops of each part of a series circuit added together must equal the power supply for that circuit while it is active.

Typical Application of Voltage Drop Testing:

- Determine proper component operation.
- Active circuit continuity.
- Active circuit resistance.

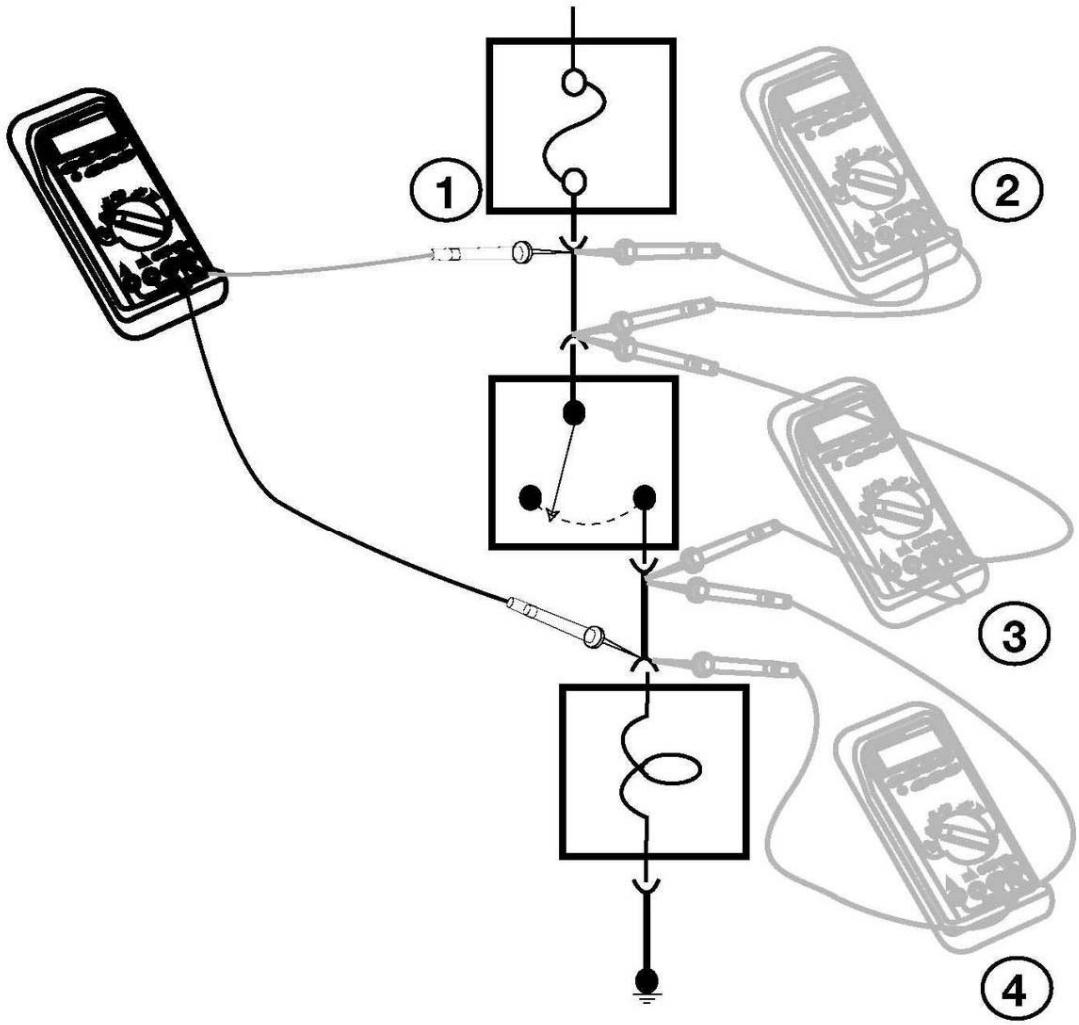


Fig. 26: Identifying Voltage Drop Testing
Courtesy of BMW OF NORTH AMERICA, INC.

As a "Dynamic" test with the circuit operational, a voltage drop in any non-resistive part of the circuit indicates a fault in the circuit,

- Select proper function and range of DVOM.
- Connect (+) lead to the B+ side of the circuit or component being tested.
- Connect (-) lead to the B- side of the circuit or component.

NOTE: All consumers of the test circuit should be active during the test. Always include ground circuit as part of voltage drop test. DVOM display will indicate the voltage drop in the circuit tested between the DVOM leads.

6700 ELECTRIC DRIVES

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

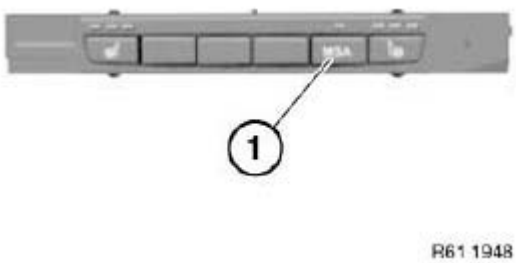


Fig. 1: Identifying Automatic Engine Start/Stop Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

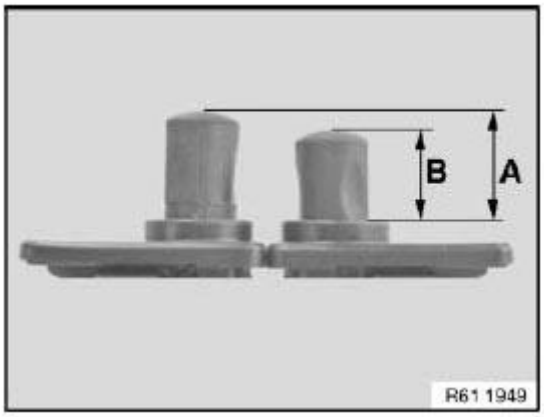


Fig. 2: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool.

6711 CENTRAL LOCKING UNIT UNLOCKING UNITS

67 11 510 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR FRONT LEFT OR RIGHT DOOR LOCKING MECHANISM

NOTE: Servodrive for door locking mechanism can only be replaced in conjunction with door lock.

This operation is described in:

Removing and installing/replacing **FRONT DOOR LOCK**

67 11 555 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR TANK FILLER FLAP

Necessary preliminary tasks:

- Remove **COVER HOUSING**

Release screws (1) on drive holder (2).

Installation:

Make sure servodrive for fuel filler flap is correctly adjusted. It must be possible to lock or unlock the tank filler flap completely.

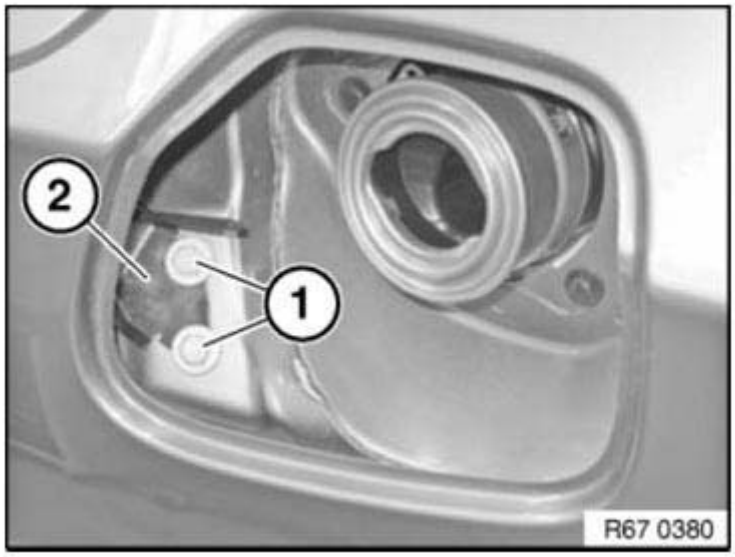


Fig. 3: Identifying Screws On Drive Holder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Locking pin (2) must not be damaged.

Detach emergency actuation pull strap (1) on servodrive for tank filler flap.

Unlock plug connection (3) and disconnect.

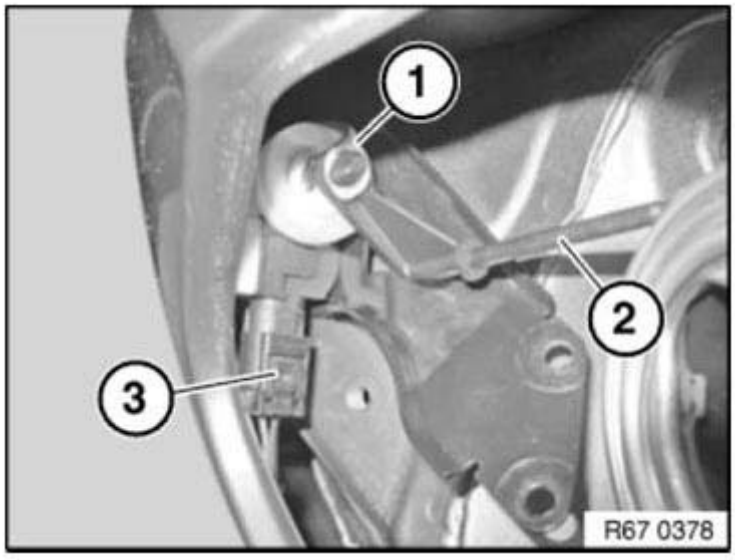


Fig. 4: Identifying Emergency Actuation Pull Strap With Locking Pin And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Feed emergency actuation pull strap (1) out of lug (2).

Feed out servodrive (3).

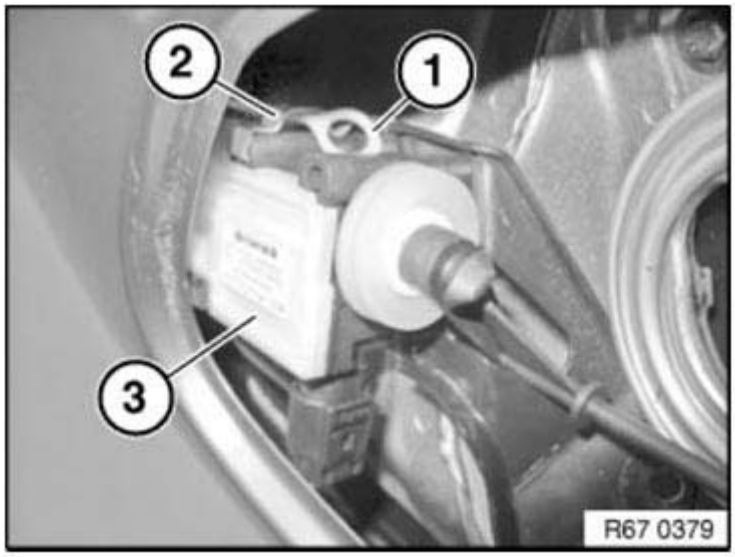


Fig. 5: Identifying Servodrive With Emergency Actuation Pull Strap
Courtesy of BMW OF NORTH AMERICA, INC.

67 11 610 REMOVING AND INSTALLING/REPLACING SERVODRIVE IN STORAGE COMPARTMENT

Necessary preliminary tasks:

- Remove **CENTRE CONSOLE** .

Unlock plug socket (1) and feed out.

Release screws (3).

Remove servodrive (2).

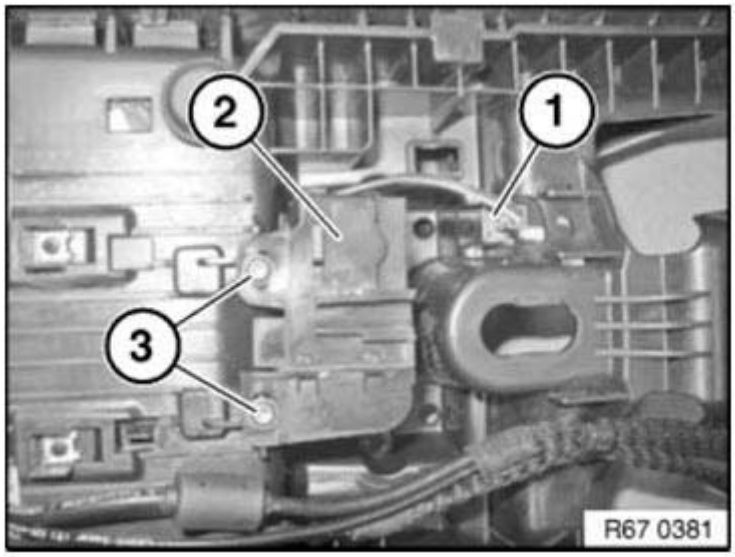


Fig. 6: Identifying Servo Drive With Plug Socket And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

67 11 560 REPLACING SERVODRIVE FOR REAR LID LOCKING

NOTE: Servodrive for rear lid locking can only be replaced in conjunction with rear lid lock.

This operation is described in:

Removing and installing/replacing **REAR LID LOCK**

6713 MIRROR ADJUSTMENT

67 13 001 REPLACING DRIVE UNIT FOR ELECTRICALLY OPERATED LEFT OR RIGHT EXTERIOR MIRROR

Necessary preliminary tasks:

- Remove **MIRROR GLASS** for rear-view mirror

Release screw (1).

Remove drive for electrically operated exterior mirror (2) in direction of arrow from mirror housing (3).

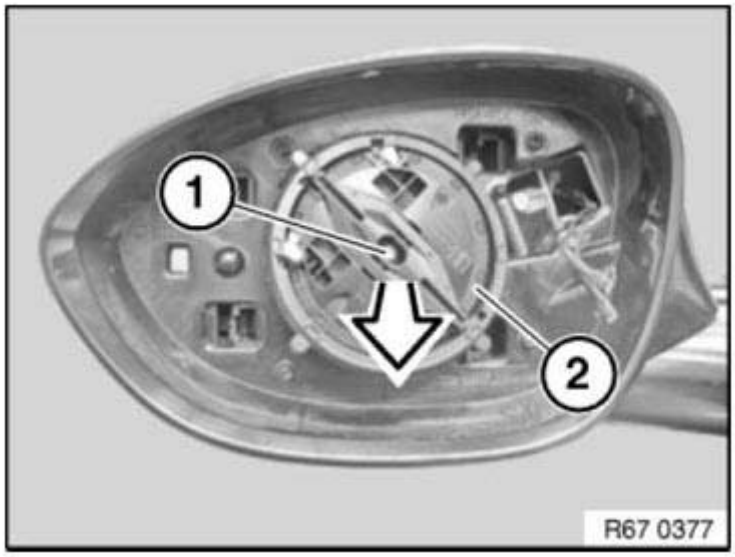


Fig. 7: Removing Electrically Operated Exterior Mirror Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit drive for electrically operated exterior mirror (1) so that pin housing (2) engages exactly in plug housing (3) and locators (4) slide into guides (5).

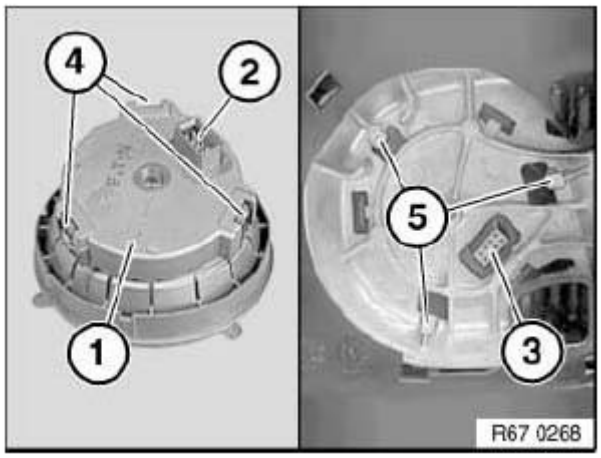


Fig. 8: Identifying Electrically Operated Door Mirror, Pin Housing, Plug Housing And Locators
Courtesy of BMW OF NORTH AMERICA, INC.

6716 SERVO POSITIONING DRIVES

67 16 011 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT VERTICAL AIM ADJUSTER

WARNING: Xenon headlights: Danger to life due to high voltage! Therefore

disconnect xenon headlights from the power supply.
Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

- Remove **WHEEL ARCH COVER AT FRONT**
- Remove ignition unit for xenon headlight See **6312871 REPLACING IGNITION UNIT FOR RIGHT XENON HEADLIGHT (WITH XENON BULB)** or **6312870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT (WITH XENON BULB)**

Specification with adaptive headlights:

Unlock plug connection (1) on sensor system (2) and disconnect.

This produces additional space for removing the headlight vertical aim adjuster.

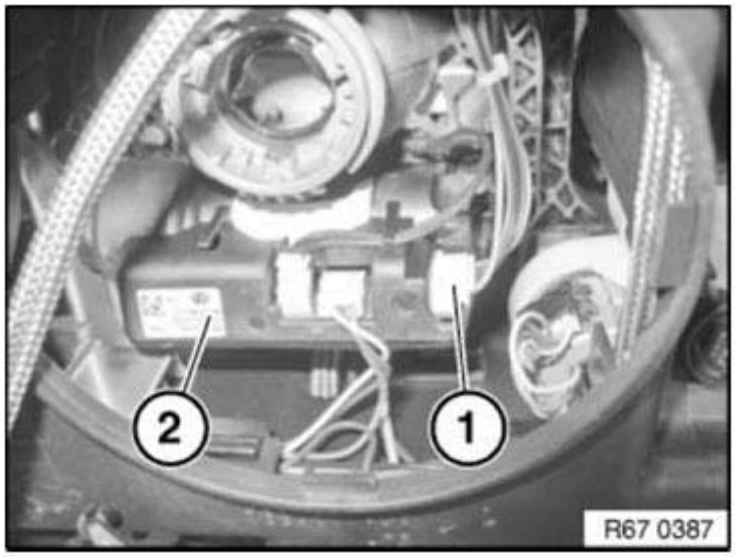


Fig. 9: Identifying Sensor System With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Carry out following operation carefully.
Turn screws only until an increase in torque is detected.

Move adjusting screw for horizontal adjustment (1) to end position by turning clockwise.

Move adjusting screw for vertical adjustment (2) to end position by turning counterclockwise.

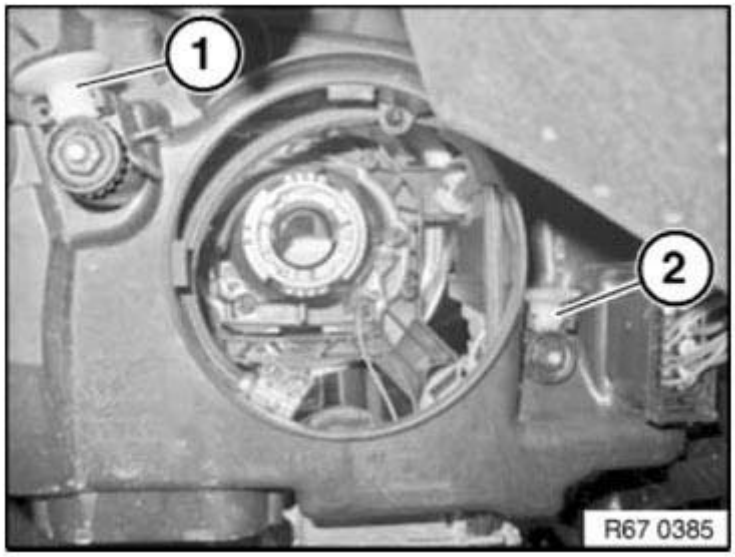


Fig. 10: Identifying Adjusting Screw For Vertical And Horizontal Beam Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Turn headlight vertical aim adjuster (1) by turning counterclockwise (45°) out of carriage bayonet.

Turn adjusting screw for vertical adjustment (2) clockwise until an increase in torque is detected.

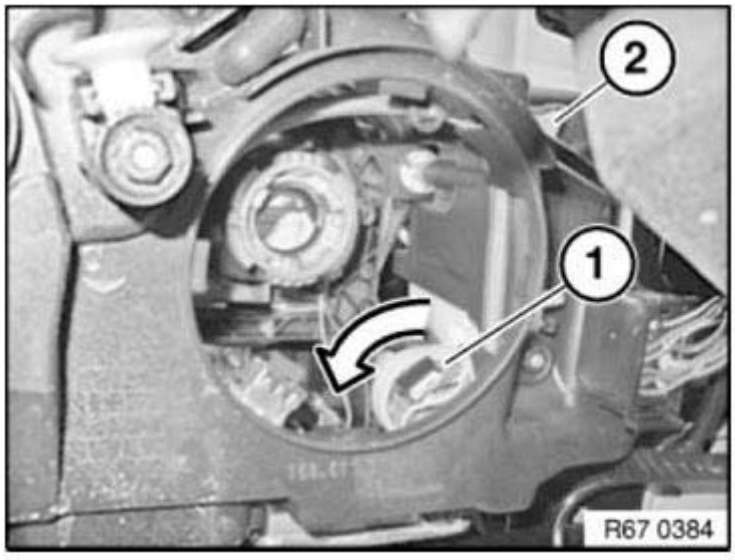


Fig. 11: Turning Adjusting Screw For Vertical Beam Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage headlight vertical aim adjuster (1) with a swinging movement in direction of arrow from ball socket.

Feed out headlight vertical aim adjuster (1).

Unlock associated plug connection and disconnect.

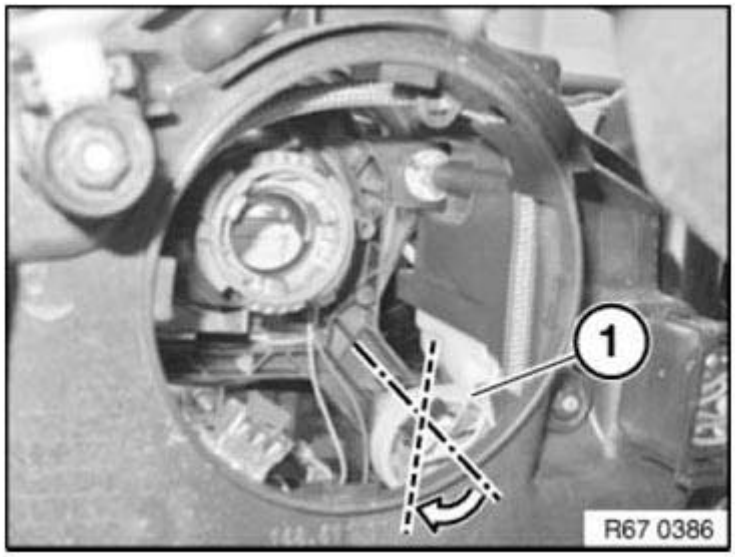


Fig. 12: Disconnecting Headlight Vertical Aim Adjuster
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull adjustment mechanism (1) forwards to enable headlight vertical aim adjuster (2) to be engaged in ball socket.

Make sure ball head on headlight vertical aim adjuster (2) is exactly seated in mounting.

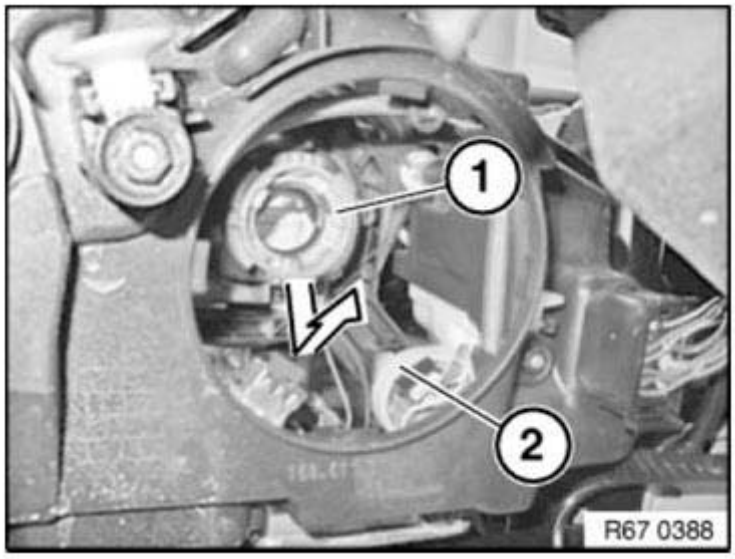


Fig. 13: Pull Headlight Adjustment Mechanism Forwards
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **ADJUST** headlight

67 16 016 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT VERTICAL AIM ADJUSTER

Operation is described in:

REMOVING AND INSTALLING LEFT HEADLIGHT VERTICAL AIM ADJUSTER

6731 DRIVE, SEAT ADJUSTMENT

67 31 531 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR BACKREST ANGLE ADJUSTMENT

Necessary preliminary tasks

- Remove **OUTER COVER**

Unlock plug connections (2) and disconnect.

Release screws (1).

Remove drive for backrest angle adjustment from flange.

Installation:

Make sure drive shaft is correctly seated in gearbox.

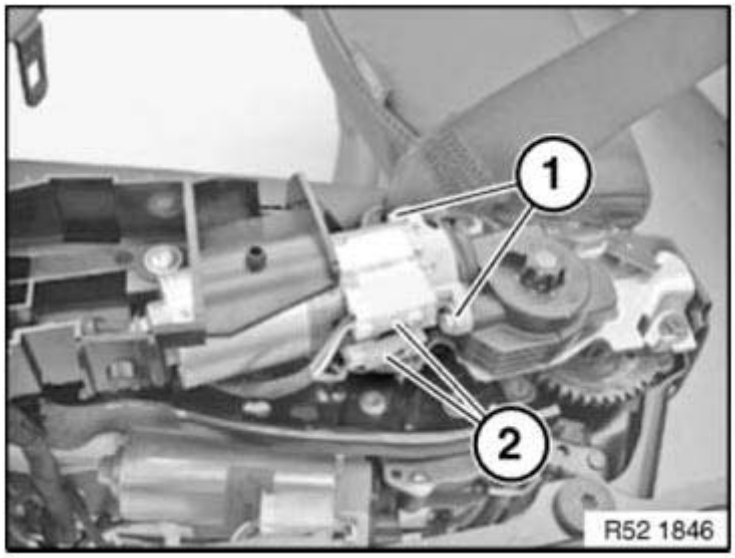


Fig. 14: Identifying Screws And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

67 31 501 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR LONGITUDINAL SEAT ADJUSTMENT

Necessary preliminary tasks

- Remove **FRONT SEAT**

Unfasten plug connection (1) and disconnect.

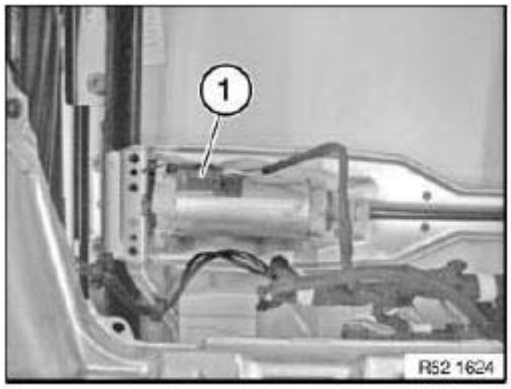


Fig. 15: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Bend metal tab (1) open.

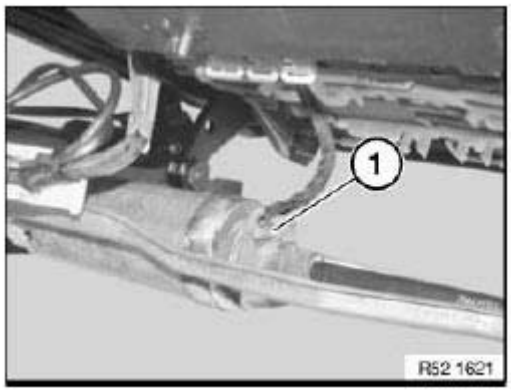


Fig. 16: Identifying Metal Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Lift drive (1) and flex shaft (2) out of guide (4) in direction of arrow.

Detach drive (1) from rubber mounts (3).

Detach flex shaft (2) from drive (1).

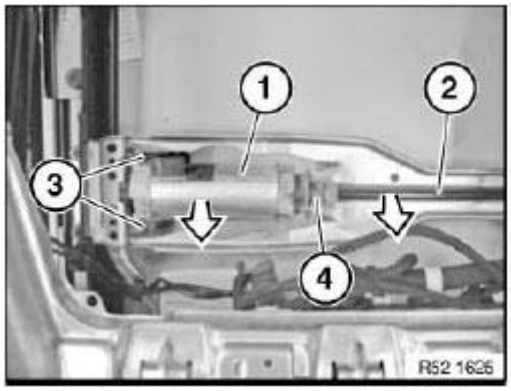


Fig. 17: Disconnecting Drive And Flex Shaft From Guide
Courtesy of BMW OF NORTH AMERICA, INC.

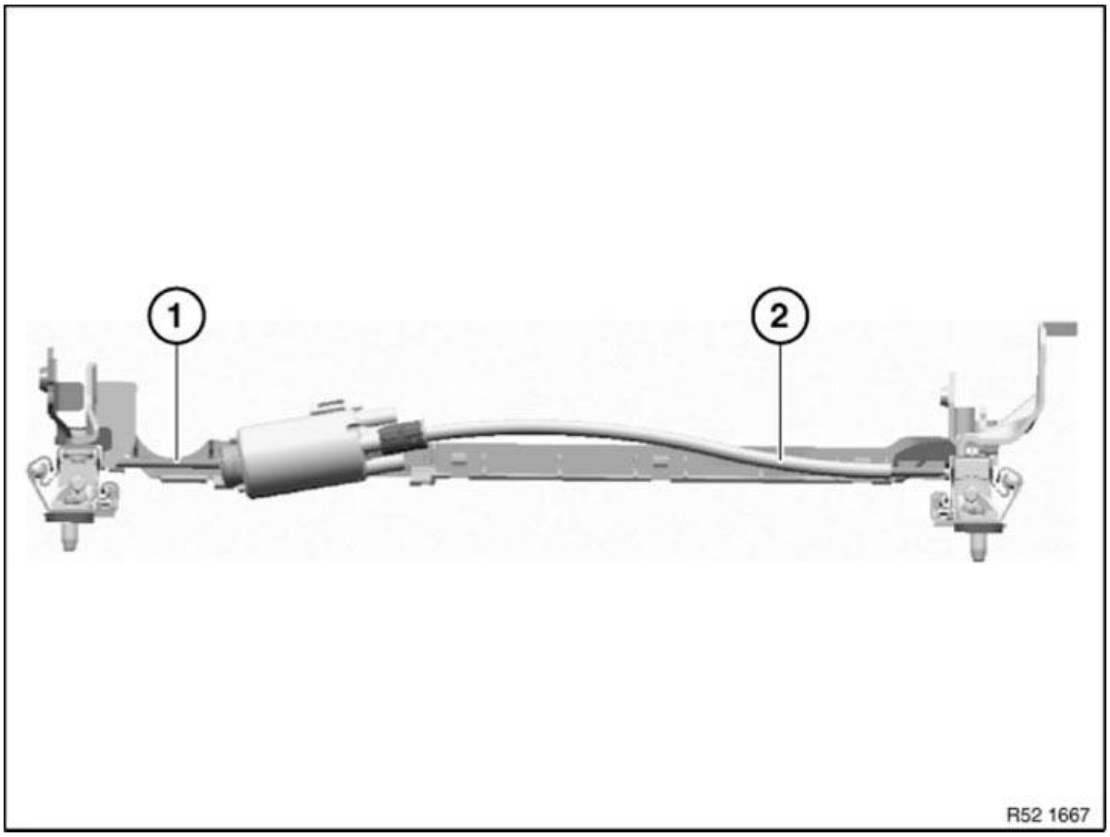


Fig. 18: Identifying Short Flex Shaft And Long Flex Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Slide short flex shaft (1) into longitudinal seat adjustment gearing square.

Bend long flex shaft (2) upwards and slide into longitudinal seat adjustment gearing.

Clip motor and flex shafts into carrier plate.

Make sure flex shafts are correctly seated in gearboxes.

67 31 521 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SEAT HEIGHT ADJUSTMENT

Necessary preliminary tasks

- Remove **FRONT SEAT**

Unlock plug connections (1) and disconnect.

Unfasten screws (2).

Remove drive unit for seat height adjustment.

Installation:

Make sure drive shaft is correctly seated in gearbox.

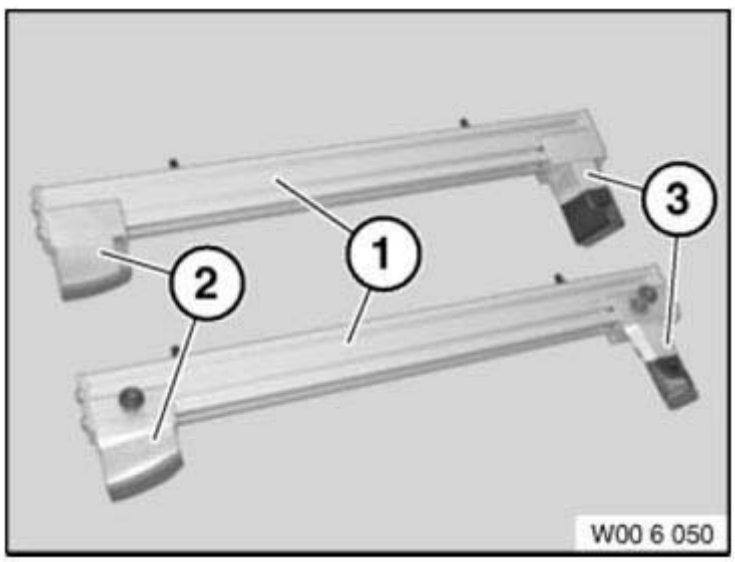


Fig. 19: Identifying Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

67 31 511 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SEAT TILT ADJUSTMENT

Necessary preliminary tasks

- Remove **FRONT SEAT**

Unlock plug connections (1) and disconnect.

Unfasten screws (2).

Installation:

Make sure drive shaft is correctly seated in gearbox.

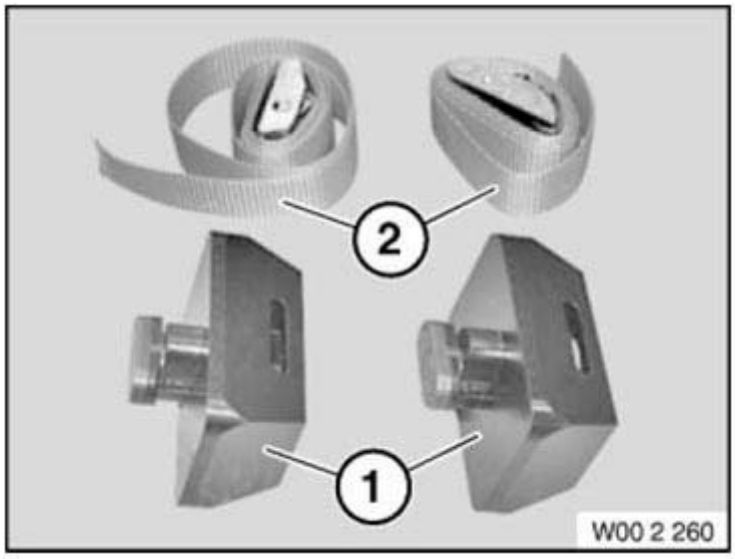


Fig. 20: Identifying Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

6761 DRIVE, SLIDETILT SUNROOF/CONVERTIBLE TOP

67 61 030 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SOFT TOP LATCH

Procedure is described in the document "**REMOVING AND INSTALLING ROOF SHELL LATCH MOTOR** ".

6762 DRIVE, POWER WINDOW

67 62 ... NOTES ON INITIALIZING POWER WINDOW REGULATOR

NOTE: Initialization is performed on the power window switch of the relevant door.

Initialization comprises:

- Normalization
- Learning characteristic curve

With normalization, the mechanical end stops of the power window regulator are recorded and stored.

The characteristic curve is learnt immediately after normalization.

When the characteristic curve is learnt, the mechanical closing forces of the power window are recorded and stored for correct operation of the anti-trapping mechanism.

Initialization, i.e. normalization and learning of characteristic curve, is performed in a continuous operation.

NOTE: An initialization must be performed:

- In the event of malfunctions, e.g. no one-touch function, no opening or no comfort function possible.
- After the power window drive or door module has been replaced.
- After work is carried out on the power window mechanism.

WARNING: There is no anti-trapping protection during initialization.

Necessary preliminary tasks

- Vehicle stationary
- Sufficient battery voltage available/connect charger if necessary
- Terminal "15" switched on
- All doors closed

Operating procedure for initialization (manual):

Erasure of initialization

- Move side window into lower end position.
- Press and hold switch in "Open one-touch operation" position (second switch position) for between 15 and 25 seconds.

NOTE: Deletion of initialization was successful if one-touch control function and anti-trapping protection have been rendered inoperative.

Performing initialization

- Move side window to upper end position
- Pull and hold switch in "Close one-touch operation" (2nd switch position) during the entire process.

NOTE: Re-initialisation was successful if one-touch control function and anti-trapping protection function flawlessly.

Alternatively, initialization of the power window regulation can also be carried out via the Service function in ISTA.

Selection via:

- Body
  - Locking and security functions
    - Power windows
      - Initialize power windows

67 62 ... NOTES ON INITIALIZING POWER WINDOW

NOTE: An initialization must be performed:

- In the event of malfunctions: e.g. one-touch function (automatic mode) for closing not possible, convenient closing not possible, window reversed without there being trapping
- After the power window regulator drive or footwell module has been replaced.
- After work is carried out on the power window mechanism

NOTE: Initialization is performed on the power window switch of the relevant door.

Initialization comprises:

- An automatic operation for teaching in the power window regulator by the diagnosis system (normalization, learning of characteristic curve)
- **And** a manual operation for teaching in the power window regulator (teaching in the stiff movement due to the seals)

WARNING: There is no anti-trapping protection during initialization.

Necessary preliminary tasks

- Vehicle stationary
- Sufficient battery voltage available/connect charger if necessary
- Terminal "15" switched on
- All doors closed

IMPORTANT: If the windscreen reverses at top dead centre when the diagnosis command "Initialize power window" is executed, i.e. travels back at top dead centre , the soft top must be opened and the automatic operation repeated.
But then the soft top must be closed when the manual operation is carried out.

Automatic operation

1. Select and start service function (testing procedure) "Initialize power window" on diagnosis system.

Selection via:

- Body
  - Locking and security functions
    - Power windows
      - Initialize power windows

2. Execute automatic sequence for teaching in power window regulator. (The relevant window is opened and closed. Top and bottom dead centers are taught in.)

Do not terminate service function.

Manual operation

In this operation it is necessary to place the power window regulator in panic mode to teach in the stiff movement due to the seals.

3. Simulate exit from the vehicle:
   1.
      - Entry through the **driver's door**
      - Remove key
4. Simulate entry into the vehicle:
   - Open and fully close **driver's door**
   - Insert spare key and turn on ignition
5. Full open windscreen (which is being initialized).

> **WARNING: Risk of injury!**
> **The Panic mode function is activated in this operation, i.e. the windscreen is closed without active anti-trapping protection.**

6. **Pull and hold** power window switch in 2nd position and have the window glass reverse in the position shown.
7. Immediately after reversing, release the switch, remove hand from the window area and pull the switch straight away into position 2 again. Keep switch pulled until windscreen is fully closed.

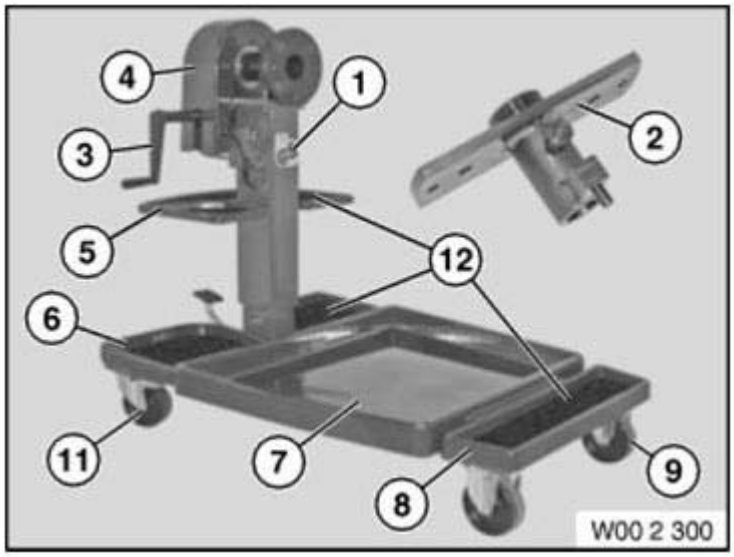


Fig. 21: Identifying Window Glass Position
Courtesy of BMW OF NORTH AMERICA, INC.

8. Remove key and exit vehicle.
9. Continue service function on diagnosis system. The Speed command is sent from the diagnosis system to the footwell module.

67 62 000 REMOVING AND INSTALLING OR REPLACING FLAT MOTOR FOR FRONT LEFT OR RIGHT POWER WINDOW UNIT

Necessary preliminary tasks

- Close window in front door
- Remove **SOUND INSULATION** on front door

Release screws (1).

Tightening torque **51 21 16AZ** .

Remove adapter for door speaker (2).

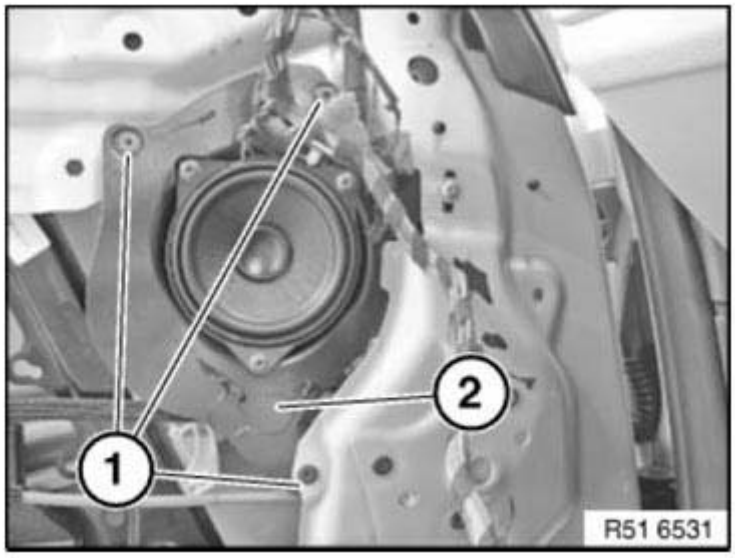


Fig. 22: Identifying Door Speaker With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **51 33 5AZ** .

Remove power window motor (2) from door (4).

Installation:

Power window motor (3) must be correctly seated in pole retainer (3).

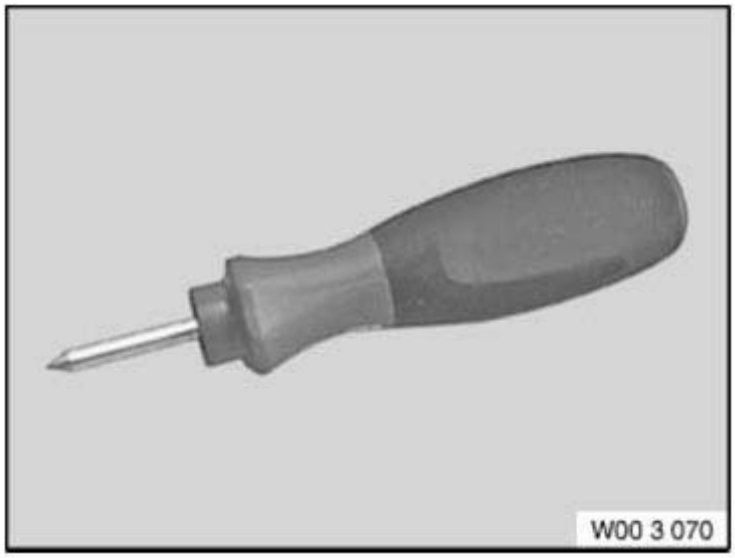


Fig. 23: Identifying Power Window Motor With Pole Retainer And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connection (3) and disconnect.

Release screws (3).

Tightening torque **67 62 1AZ** .

Detach flat motor for power window unit (2) from power window unit adapter plate (4).

Installation:

INITIALIZE POWER WINDOW .

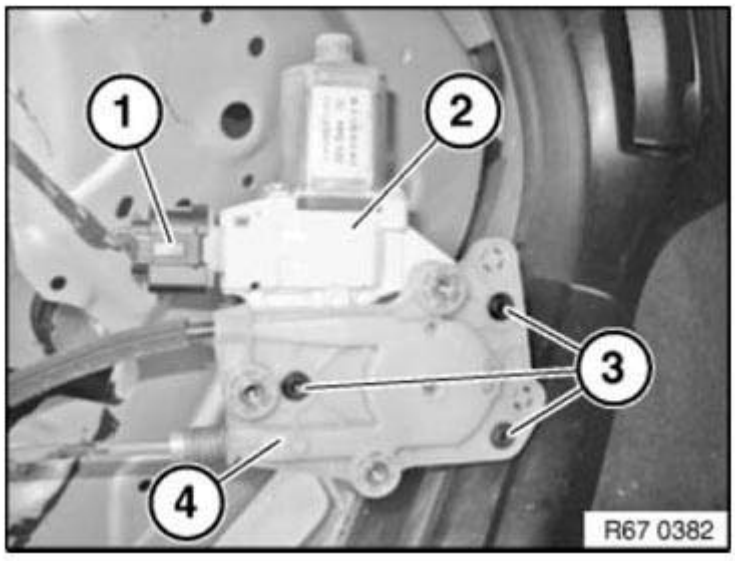


Fig. 24: Identifying Door Speaker With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

67 62 020 REMOVING AND INSTALLING/REPLACING FLAT MOTOR FOR REAR LEFT OR RIGHT POWER WINDOW LIFTER

Necessary preliminary tasks

- Remove rear left or right **POWER WINDOW UNIT**

Release screws (1) on power window unit (2).

Tightening torque **67 62 1AZ** .

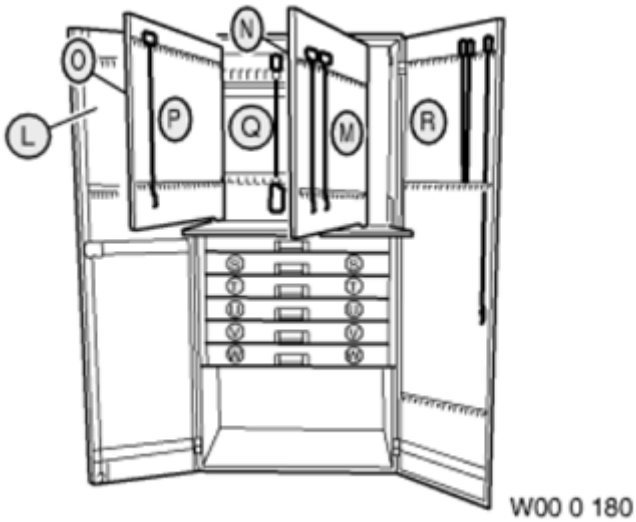


Fig. 25: Identifying Screws On Power Window Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Detach flat motor for power window unit (2) from power window unit (1).

Installation:

INITIALIZE POWER WINDOW .

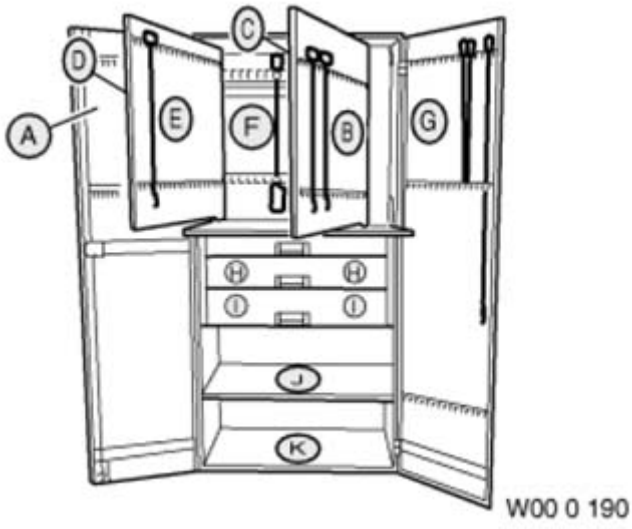


Fig. 26: Identifying Flat Motor With Power Window Unit
Courtesy of BMW OF NORTH AMERICA, INC.

6763 DRIVE, WIPER/HEADLIGHT WASHER SYSTEM

67 61 030 REMOVING AND INSTALLING/REPLACING DRIVE UNIT FOR SOFT TOP LATCH

Procedure is described in the document "**REMOVING AND INSTALLING ROOF SHELL LATCH MOTOR** ".

67 11 510 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR FRONT LEFT OR RIGHT DOOR LOCKING MECHANISM

NOTE: Servodrive for door locking mechanism can only be replaced in conjunction with door lock.

This operation is described in:

Removing and installing/replacing **FRONT DOOR LOCK**

67 11 560 REPLACING SERVODRIVE FOR REAR LID LOCKING

NOTE: Servodrive for rear lid locking can only be replaced in conjunction with rear lid lock.

This operation is described in:

Removing and installing/replacing **REAR LID LOCK**

67 63 512 REPLACING WIPER MOTOR

NOTE: Wiper motor can only be replaced in conjunction with wiper console.

Procedure is described in the document "**REMOVING AND INSTALLING COMPLETE WIPER CONSOLE** ".

DRIVES, POWER WINDOWS

67 62 DRIVES, POWER WINDOWS

TIGHTENING TORQUE SPECIFICATION - DRIVES, POWER WINDOWS

		Type	Thread	Tightening specification	Measure
1AZ	Motor to window regulator	E46/E85/E86/E93			4.5 Nm
		E31/E36/E65/E66			5 Nm
		E81/E82/E83/E88			3 Nm
		E60/E61/E63/E64/E84/E87/E90/E91/E92/E93			6 Nm
		E70/E71/E72		Observe screwing sequence	6 Nm
		E89		Replace bolts.	7.6 Nm

1.0 BATTERY

Only distilled water (available locally) is to be used when topping up the electrolyte level.

If a new battery (delivered dry) is to be placed into service, use only battery electrolyte ("sulfuric acid"), available locally.

2.0 SEALANT/SUPER GLUE/CONTACT CLEANER

Sealant

Aftermarket accessory installations which require routing electrical wires through metal body panels are to have the access holes sealed.

(former BMW Part No. 81 22 9 400 013)

BMW PART NUMBER SPECIFICATION

Wurth	Part No. 893430

SUPER GLUE

The rubber seal around the trunk release button of E39 vehicles can be repositioned with Wurth Rubberized Super Glue (Part No. 893 4103).

3.0 ELECTRICAL CONTACT ENHANCER AND CONTACT CLEANER

ELECTRICAL CONTACT/CONNECTOR GREASE

NyoGel 760G is resistive to moisture and can used for a lubrication of tin-lead type electrical connectors.

NyoGel 760G BMW Part No. 83 23 0 392 297

ELECTRICAL CONTACT ENHANCER

Stabilant 22A evaporates and leaves a thin polymer film which is conductive between the mating surfaces, while staying non-conductive between adjacent pins. At the same time it prevents the formation of any further harmful deposits.

BMW PART NUMBER SPECIFICATION

Wurth	Part No. 893622 (Stabilant 22A)

NOTE: 1 : Stabilant 22A must not be used on Oxygen Sensor connectors. To function, oxygen sensors require a flow of oxygen through the terminal connector to the sensor element. Stabilant 22A will affect this flow of oxygen, and will result in irreparable damage to the sensor.

NOTE: 2 : Stabilant 22A must not be used on plug connectors which carry fiber optics. Stabilant 22A may migrate to the fiber optic and attenuate the optical signal.

CONTACT CLEANER SPRAY

Use to clean electrical and electronic components of dirt, grease, etc. Will not harm components or epoxy coverings. Allow to air dry. **Do not** dry with shop air supply as this may contaminate the connector.

BMW PART NUMBER SPECIFICATION

Wurth	Part No. 89365 (Zero Residue Electrical Contact Cleaner)

ELECTRICAL SYSTEM

The electrical system of the E89 - Z4 Roadster is based on the BMW 1 Series and 3 Series. The electrical system therefore includes the junction box electronics, footwell module and the roof functions module with the known functions.

The E89 has no fog lights. The following points are new features or changes on the E89:

- Steering wheel heating
- MOST direct access port
- Overview of head units
- Antenna systems

E89 BUS DIAGRAM

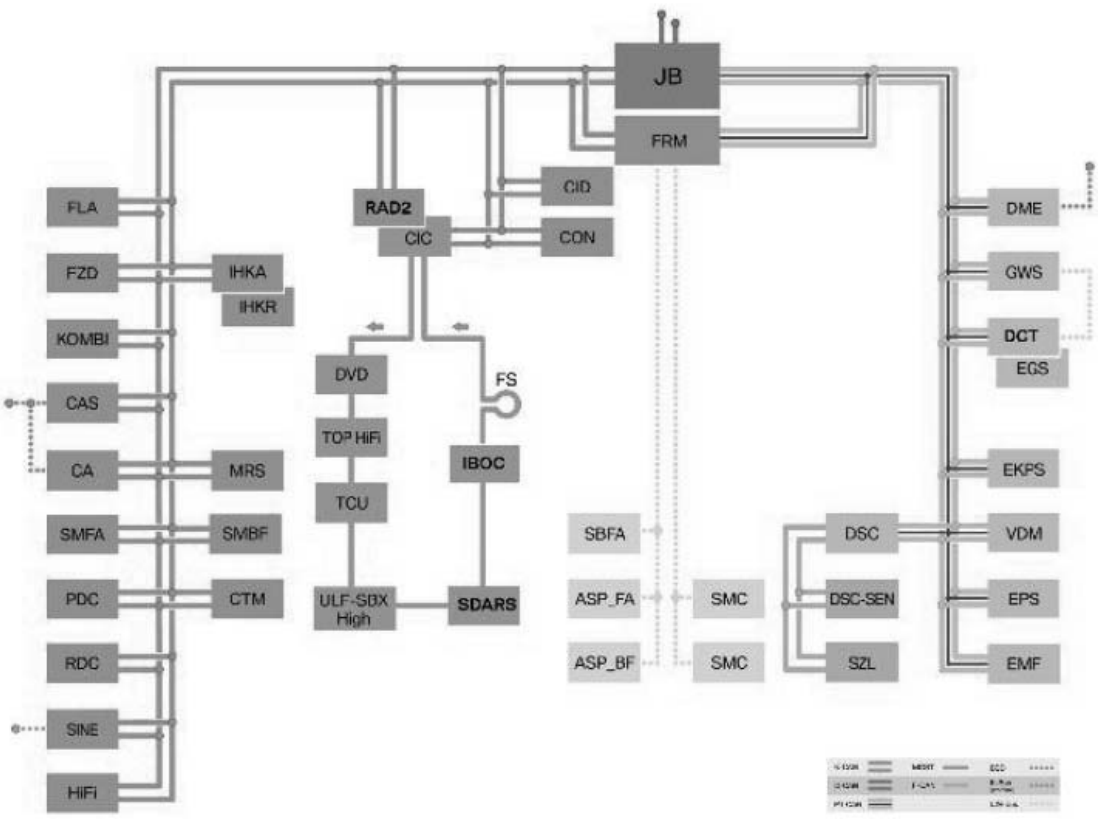


Fig. 1: E89 Bus Communication Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
ASP	Exterior mirrors
CA	Comfort access
CAS	Car access system
CIC	Car information computer
CID	Central information display
CTM	Convertible top module
CON	Controller
DCT	Double clutch transmission/gearbox
DME	Digital motor electronics
DSC	Dynamic stability control
DS SEN	DSC Sensor
DVD	DVD changer
EGS	Electronic transmission control
EKPS	Electronic fuel pump control
EMF	Electromechanical parking brake
EPS	Electromechanical power steering
FLA	High beam assist
FRM	Footwell module
FZD	Roof functions module
GWS	Gear selector
HiFi	HiFi amplifier
IBOC	Digital tuner US (only installed without CIC)
IHKA	Automatic climate control
IHKR	Integrated heating/air conditioning control
JB	Junction box
KOMBI	Instrument cluster
MRS	Multiple restraint system
PDC	Park distance control
RAD2	Radio BMW Professional
RDC	Tire pressure monitor
SBFA	Switch cluster, driver's side
SDARS	Satellite tuner (US)
SINE	Siren with tilt alarm sensor
SMFA	Driver's seat module
SMBF	Passenger's seat module
SMC	Stepper motor controller
SZL	Steering column switch cluster
TCU	Telematics control unit
TOP HiFi	Top-HiFi amplifier
ULF-SBX	Interface box High (USB/audio interface)
VDM	

	Vertical dynamics management

MOST DIRECT ACCESS PORT

Because the vehicle is based on a 2000BN vehicle and is equipped with a MOST-bus, MOST direct access port is also installed in the E89. The MOST direct access port is located on the left in the footwell.

The two connected plugs must be taken from the common connector (A). The two plugs are then connected together (B). The integrated communication optical module ICOM can now be connected in the usual way to the joined plug.

Fig. 2: Identifying E89 MOST Bus Connection
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	MOST plug connector
2	MOST-bus disconnected and plug connector joined
3	ICOM connected with MOST direct access port

CONTROL UNIT LOCATIONS

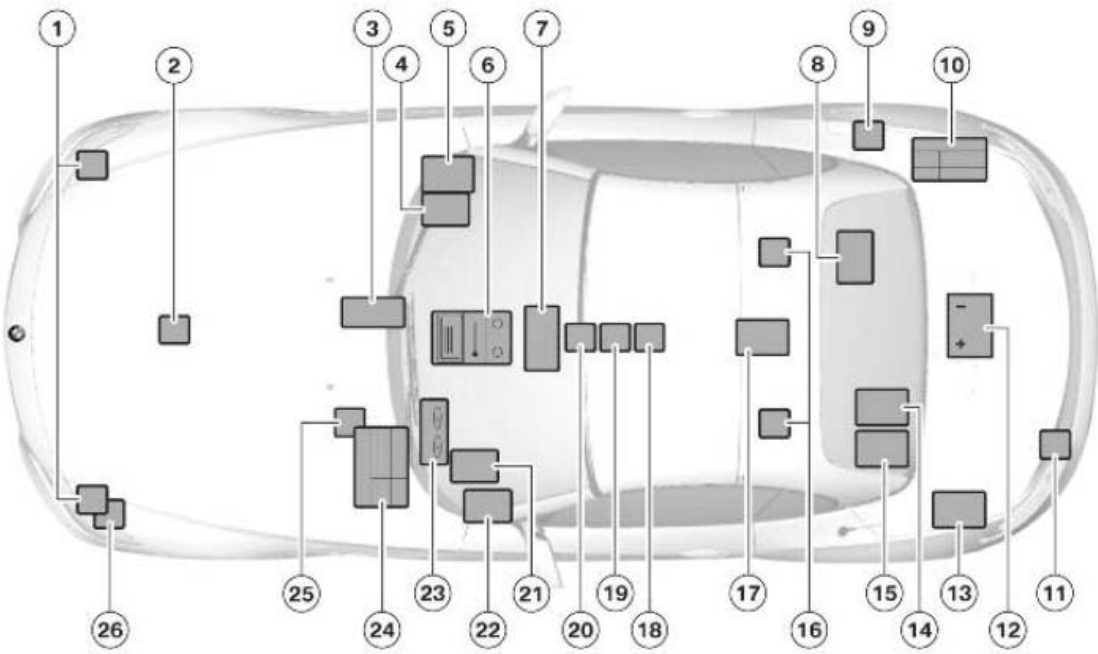


Fig. 3: Identifying Control Unit Locations
Courtesy of BMW OF NORTH AMERICA, INC.

CONTROL UNIT LOCATION REFERENCE CHART

Index	Explanation
1	Adaptive headlight (AHL)
2	Electromechanical power steering (EPS)
3	EGS/DCT Control Unit
4	CD changer (CDC) and DVD changer (MMC)
5	Junction box (JB)
6	IHKA/IHKR, RAD2/CIC, SZM
7	FZD and FLA
8	Top-HiFi amplifier (TOP HiFi)/HiFi amplifier (HiFi)
9	Electronic fuel pump control (EKPS)
10	CTM, PDC, CA, EMF, RDC
11	Diversity module
12	Battery
13	SDARS
14	Side airbag, front left
15	Door satellite, front left (STVL)
16	Belt force limiter, right
17	Belt force limiter, left
18	B-pillar satellite, left (SBSL)

19	B-pillar satellite, right (SBSR)
20	Electric fuel pump
21	Telephone (TCU)
22	Safety battery terminal (BST)
23	Side airbag, rear left
24	Vehicle center satellite (SFZ)
25	Side airbag, rear right
26	Seat occupancy detection, rear left

Audio System

Two head units are available on the E89; BMW Professional RAD2 and car information computer CIC.

The available speaker systems include both the stereo system as well as the HiFi and TOP HiFi system.

All of the same features available to the E90 are also avaliable to the E89 such as SBX High (USB), multimedia changer, SIRIUS satellite radio and IBOC (HD radio).

If a vehicle is ordered with a CIC, the iboc tuner is located inside the CIC. If the vehicle is equipped with a RAD2, the IBOC control unit is mounted in a separate location.

Antenna Locations

The antenna system on the E89 consists of 3 FM, 1 AM, 1 GPS, 2 Telephone and an SDARS antenna. Their locations are illustrated below:

Fig. 4: Overview Of Antennas
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Satellite tuner antenna SDARS antenna
2	Not for U.S.
3	FM 3
4	Telephone antenna 2
5	Not for U.S.
6	FM antenna 2
7	FM antenna 1, AM antenna, telephone antenna 1

MULTIPLE RESTRAINT SYSTEM 7

The 7th generation multiple restraint system MRS is a consistent further development of the multiple restraint systems fitted in BMW vehicles.

The multiple restraint system detects an accident situation that is critical for the occupants and activates the necessary restraint systems. The restraint system is activated selectively depending on the severity and type of accident.

Passenger Seat Occupancy Detection

The new passenger seat occupancy detection system introduced on the E89 consists of a seat occupancy pad

with integrated capacitor plate. The previous generation occupancy (OC3) detection was realized via the use of pressure sensors attached to the seat cushion.

In the new capacitive sensing passenger occupancy detection system, an electrical field is generated across the capacitor plate and vehicle ground. The seat occupancy mat is connected to an electronic evaluator. The occupancy status is classified based on the evaluation of the electrical field.

A person sitting down on the seat changes the electrical field. The change is registered by the electronic evaluator and the corresponding status is determined. The electronic evaluator sends the status information cyclically to the MRS control unit. Data exchange takes place by means of a hardware link. The seat occupancy detection function monitors the inputs and outputs. Possible fault statuses are stored in the fault code memory of the MRS control unit.

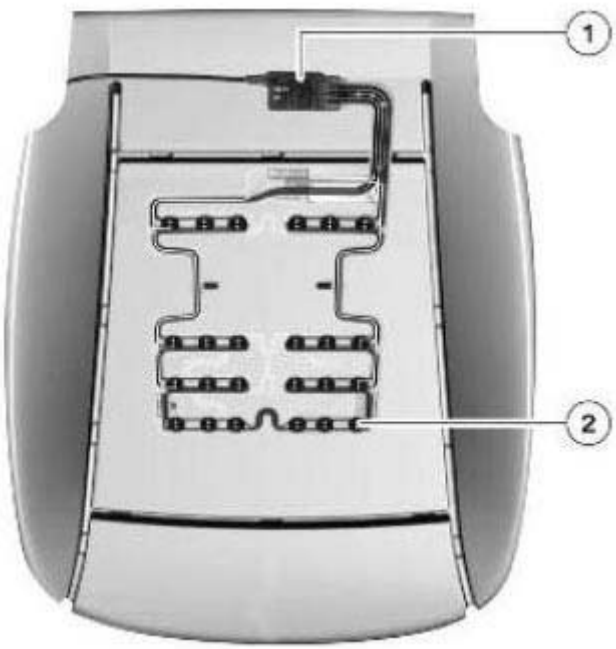


Fig. 5: Identifying Capacitive Seat Occupancy Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Electronic Evaluator
2	Seat Occupancy Pad

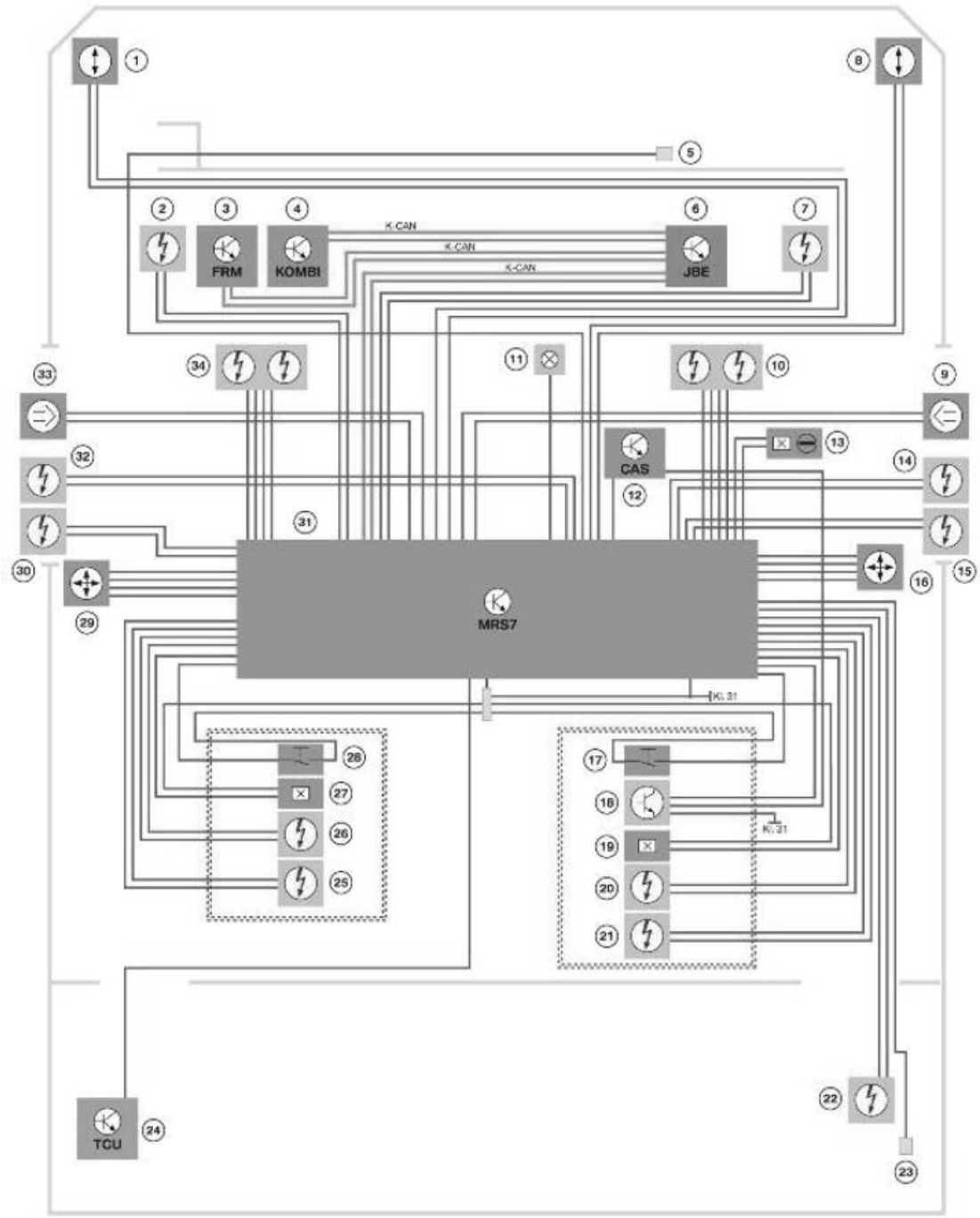


Fig. 6: MRS 7 Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Airbag front sensor, left
2	Driver's knee airbag
3	Footwell module (FRM)

4	Instrument cluster (KOMBI)
5	Plug connection, battery monitoring line, front
6	Junction box electronics (JBE)
7	Knee airbag, front passenger
8	Airbag front sensor, right
9	Airbag sensor, front right door
10	Front airbag, passenger's side
11	Indicator lamp for front passenger airbag deactivation
12	Car access system (CAS)
13	Switch for front passenger airbag deactivation
14	Seat belt force limiter, front passenger
15	Retractor tensioner, front passenger
16	Airbag sensor, front left door
17	Seat occupancy switch, front passenger
18	Seat occupancy pad, front passenger
19	Seat belt buckle contact, front passenger
20	Side airbag, front passenger
21	Seat belt pretensioner, front passenger
22	Safety battery terminal
23	Plug connection, battery monitoring line, rear
24	Telematics control unit (TCU)
25	Seat belt pretensioner, driver
26	Side airbag, driver
27	Seat belt buckle contact, driver
28	Seat occupancy switch, driver
29	Seat occupancy pad, driver
30	Retractor tensioner, driver
31	MRS control unit
32	Seat belt force limiter, driver
33	Airbag sensor, driver's door
34	Steering wheel airbag

ELECTRONIC SIGNALS

Model: All

Production Date: All

PURPOSE OF SIGNALS

Electronic signals move information much like cars move passengers down the highway. It would be difficult to get to work without transportation, and there would be no transportation with out signals.

Signals allow devices (e.g. sensors or switches) to communicate with control modules (either complicated processors or simple relays) which in turn perform or request (through more signaling) other functions to be carried out.

Signals inform the Climate Control of the outside air temp or tell the brake lights the right time to illuminate.

The use of electronic signals goes far beyond the basic application of electron flow to control components, enabling complex information to be passed from one component to another.

The data (input or output) is conveyed through various forms of changing voltages, resistances, current or frequency modulation.

1. AC Voltage Signals:
    A. Inductive Signals.
    B. Phase Shifted Signals.

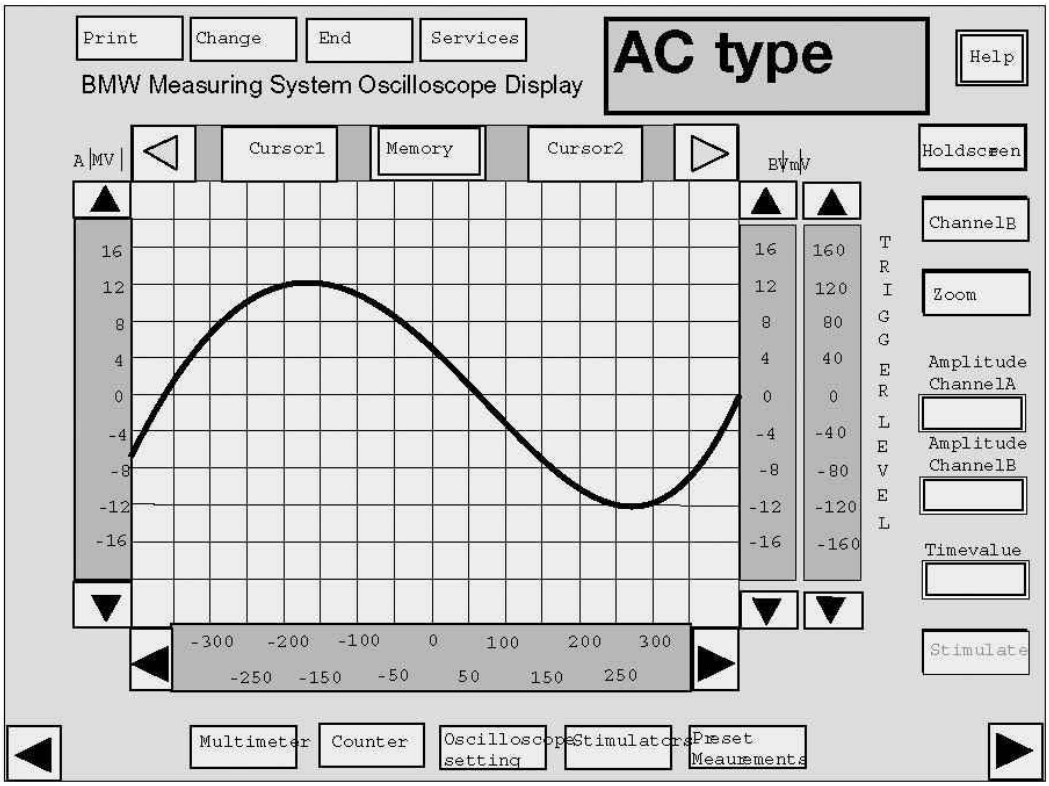


Fig. 1: Identifying AC Voltage Signals
Courtesy of BMW OF NORTH AMERICA, INC.

2. DC Voltage Signals:
   A. Analog Signals.
   B. Digital Signals:
      1. Switched (High/Low) Signals.
      2. Modulated Square Wave Signals:
         a. Frequency Controlled Signals.
         b. Pulse Width Controlled Signals.
         c. Duty Cycle Controlled Signals.
   C. Designated Value Signals.
   D. Coded Ground Signals.
   E. Transistor Signals:
      1. Modulated B+/B- Signals.
      2. Momentary B+/B- Signals.

3. Constant B+/B- Signals.

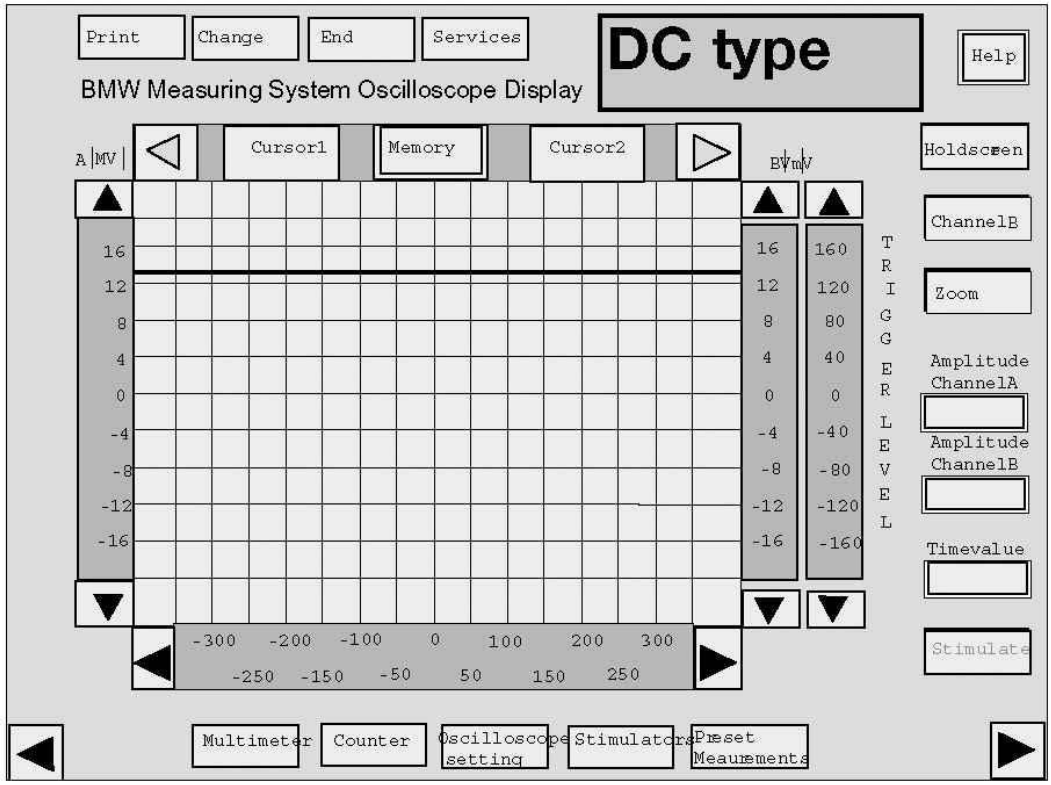


Fig. 2: Identifying DC Voltage Signals
Courtesy of BMW OF NORTH AMERICA, INC.

AC VOLTAGE SIGNALS

Two types of AC Voltage signals are used:

- Inductive Signals (Induced Voltage).
- Phase Shifted Signals (Angle Pulse Generator).

INDUCTIVE SENSORS

Inductive sensors produce an AC Sine Wave signal. The AC voltage is induced by the shifting of a magnetic field. The sensor consists of an impulse wheel (the moving part) and a coil wound magnetic core (the stationary part).

As each tooth of the impulse wheel approaches the sensor tip, the magnetic field of the sensor shifts toward the

impulse wheel and induces a voltage pulse in the windings.

As the teeth move away from the sensor, the magnetic field shifts back inducing a voltage pulse in the opposite direction.

This shifting of the magnetic field produces an alternating current (positive to negative).

Control modules which receive this alternating current, count the impulses (shifts from positive to negative) and interpret the speed of rotation of the impulse wheel.

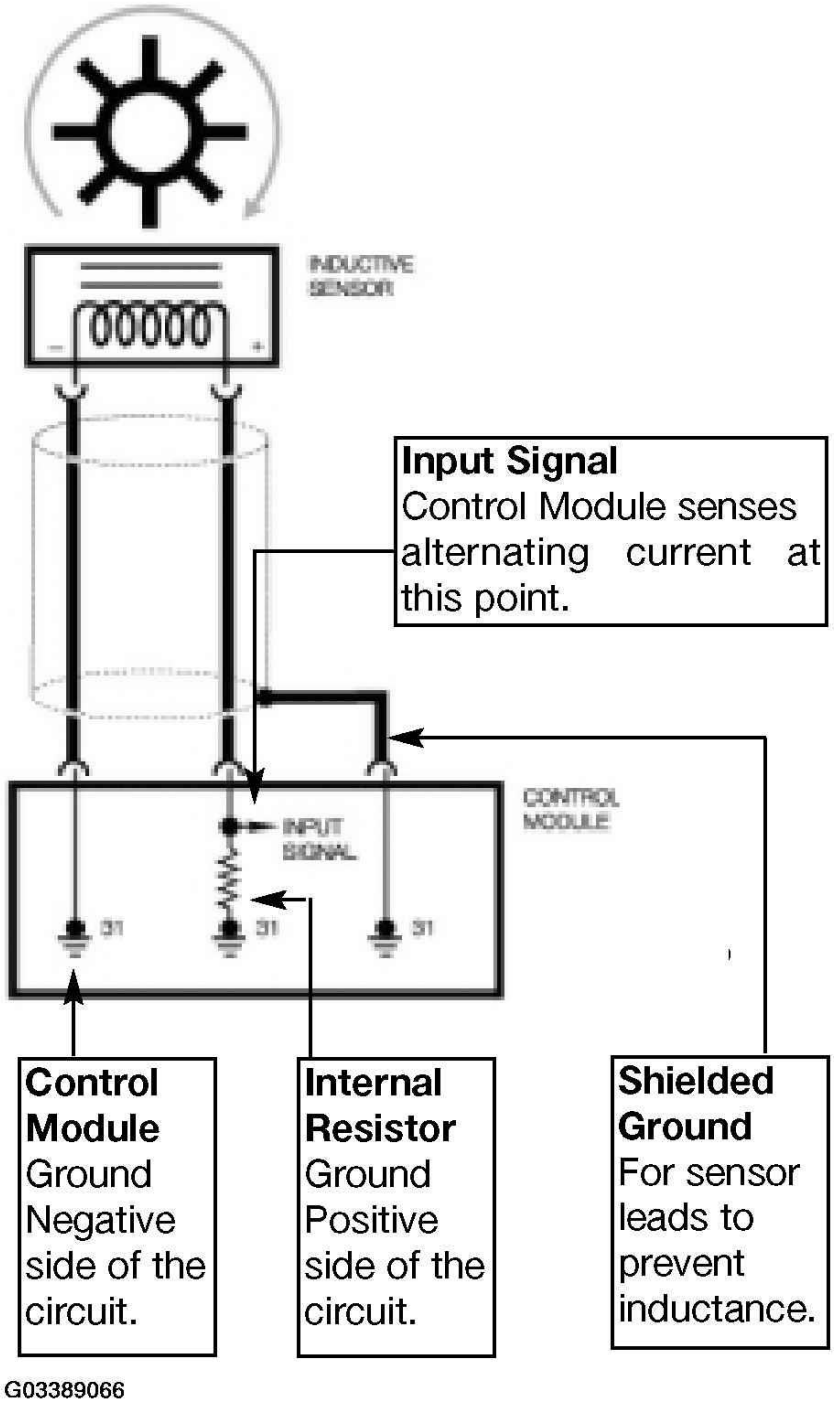


Fig. 3: Inductive Sensor Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of Inductive Sensors:

- Crankshaft Speed Sensor.
- Camshaft Speed Sensor.
- Transmission Input/Output Speed Sensor.
- Wheel Speed Sensor.

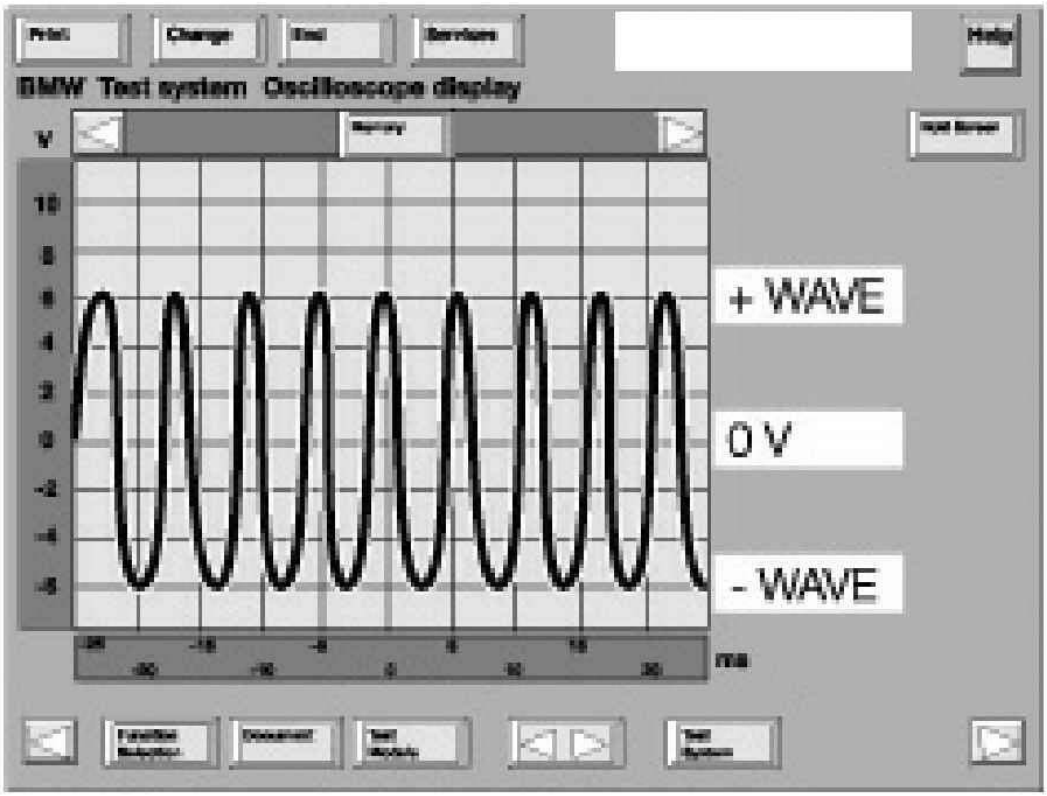


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Fig. 4: Identifying AC Sine Wave Signal
Courtesy of BMW OF NORTH AMERICA, INC.

Voltage levels are dependent on sensor design.

Not all inductive sensors produce 12 volts.

ANGLE PULSE GENERATOR

An Angle Pulse Generator Sensor acts on an existing AC voltage signal rather than produce a new one.

The sensor consists of two windings (primary and secondary) that are connected together at one end and a magnetic iron core (stationary) along with a trigger wheel (movable).

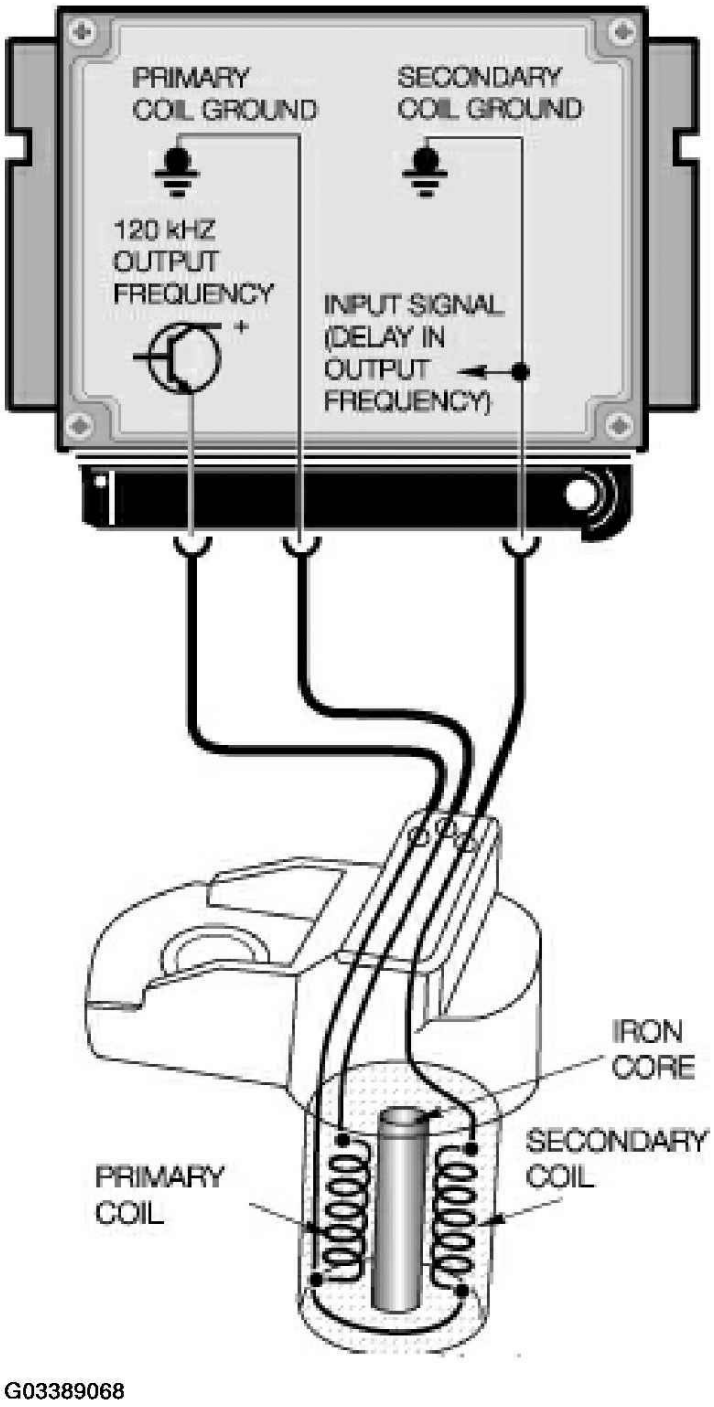

Fig. 5: Checking Angle Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

The primary winding (coil) is supplied with a 120kHz AC signal by the control module. The magnetic coupling (core) causes a voltage at the same frequency to be induced in the secondary winding. The induced frequency

has a slight phase shift due the induction time delay.

The trigger wheel influences the magnetic field of the sensor and causes the phase shift to increase as the disc of the wheel moves closer to the sensor.

This changing of the phase shift (time delay) from a smaller time period to a larger time period and back again provides the control module with trigger wheel position.

The angle pulse generator provides position information regardless of movement. Trigger wheel position is established with the application of an output frequency from the control module and the return of the phase shifted signal.

Typical Application of Angle Pulse Generator

- Camshaft Sensor MS41.1.
- Pedal Request Sensor EML.

(a bank of three)

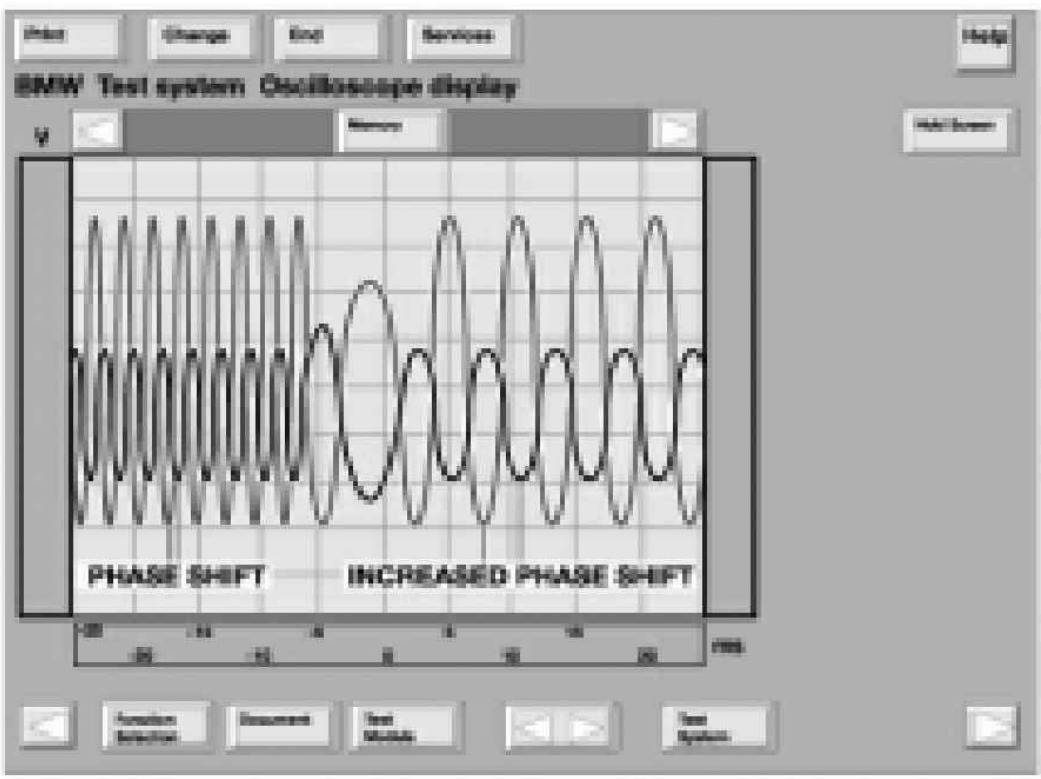

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Fig. 6: Angle Pulse Generator Wave Signal
Courtesy of BMW OF NORTH AMERICA, INC.

DC VOLTAGE SIGNALS

Five Types of DC Voltage Signals Are Used:

- Analog Signals.
- Digital Signals.
- Designated Value Signals.
- Coded Ground Signals.
- Transistor Signals.

DC voltage signals are based on either 5 volts or 12 volts.

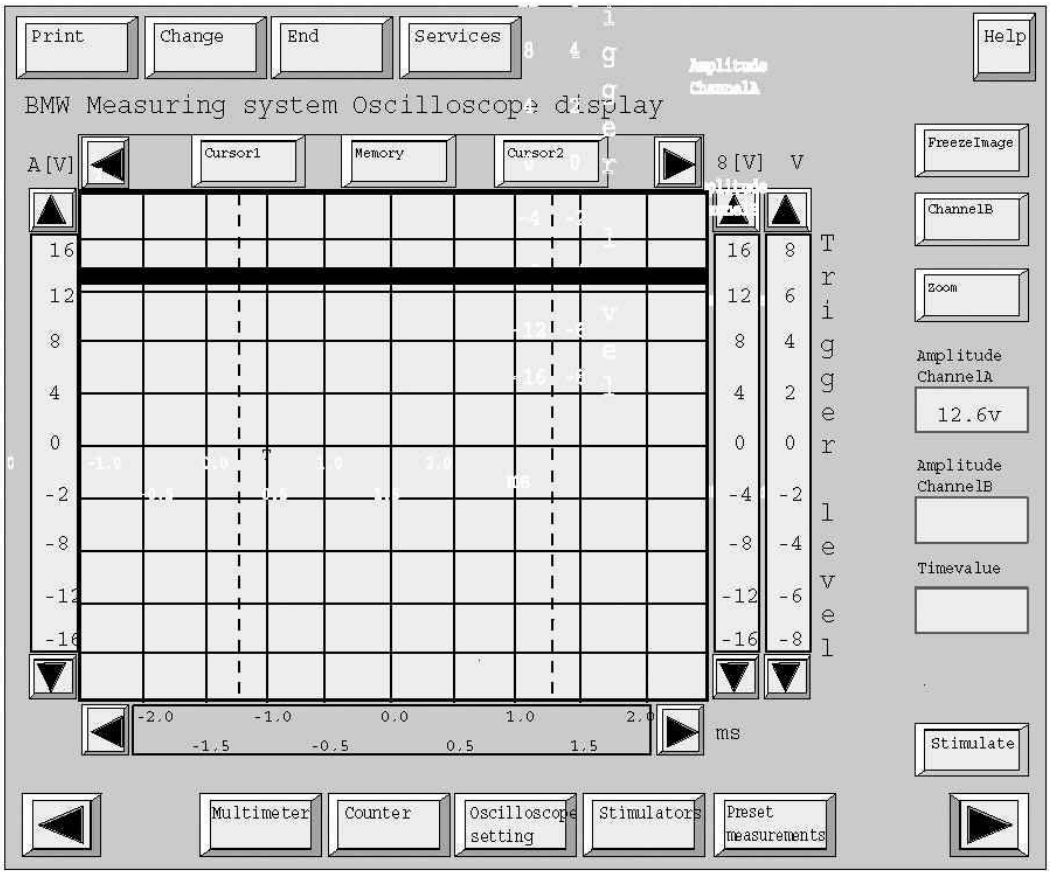

Fig. 7: Identifying DC Voltage Signals

Courtesy of BMW OF NORTH AMERICA, INC.

ANALOG SIGNALS

Analog signals transmit information through an electrical circuit by regulating or changing the current or voltage.

The voltage of the signal has no fixed value. The value may be anywhere in the operating range of the signal.

Three sources of analog signals are:

- NTC Sensors.
- PTC Sensors.
- Potentiometers.

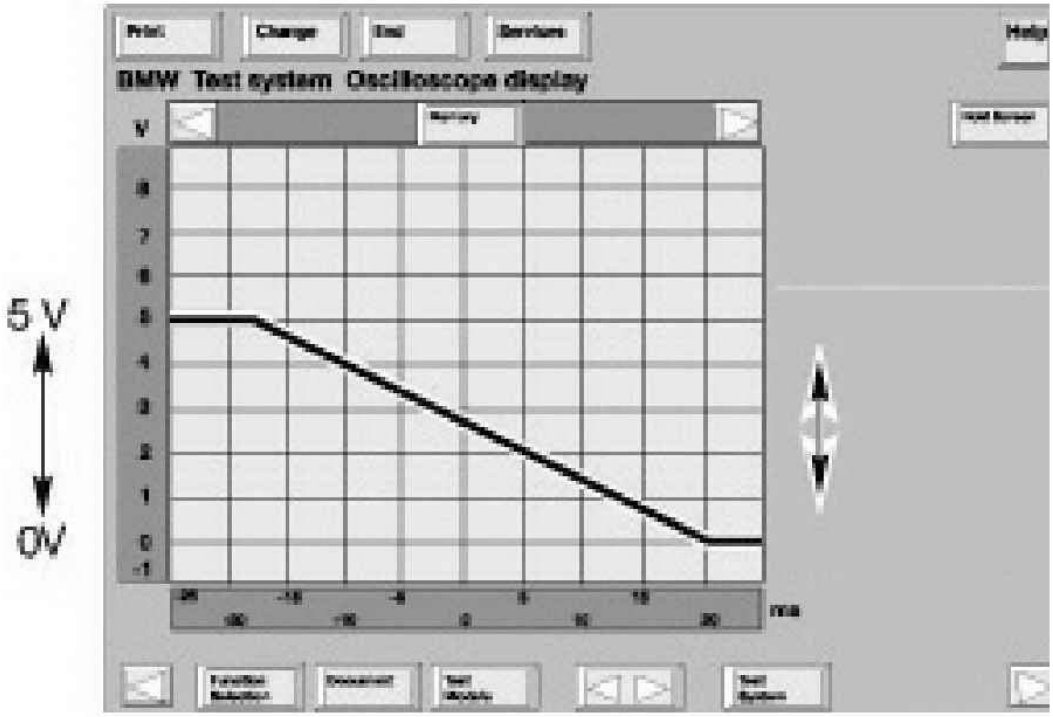

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Fig. 8: Identifying Analog Signals
Courtesy of BMW OF NORTH AMERICA, INC.

NTC SENSORS

NTC (Negative Temperature Coefficient) sensors change resistance based on temperature. As the temperature

goes up the resistance goes down. This decrease in resistance causes the voltage drop across the sensor to decrease and the input signal voltage at the control module decreases.

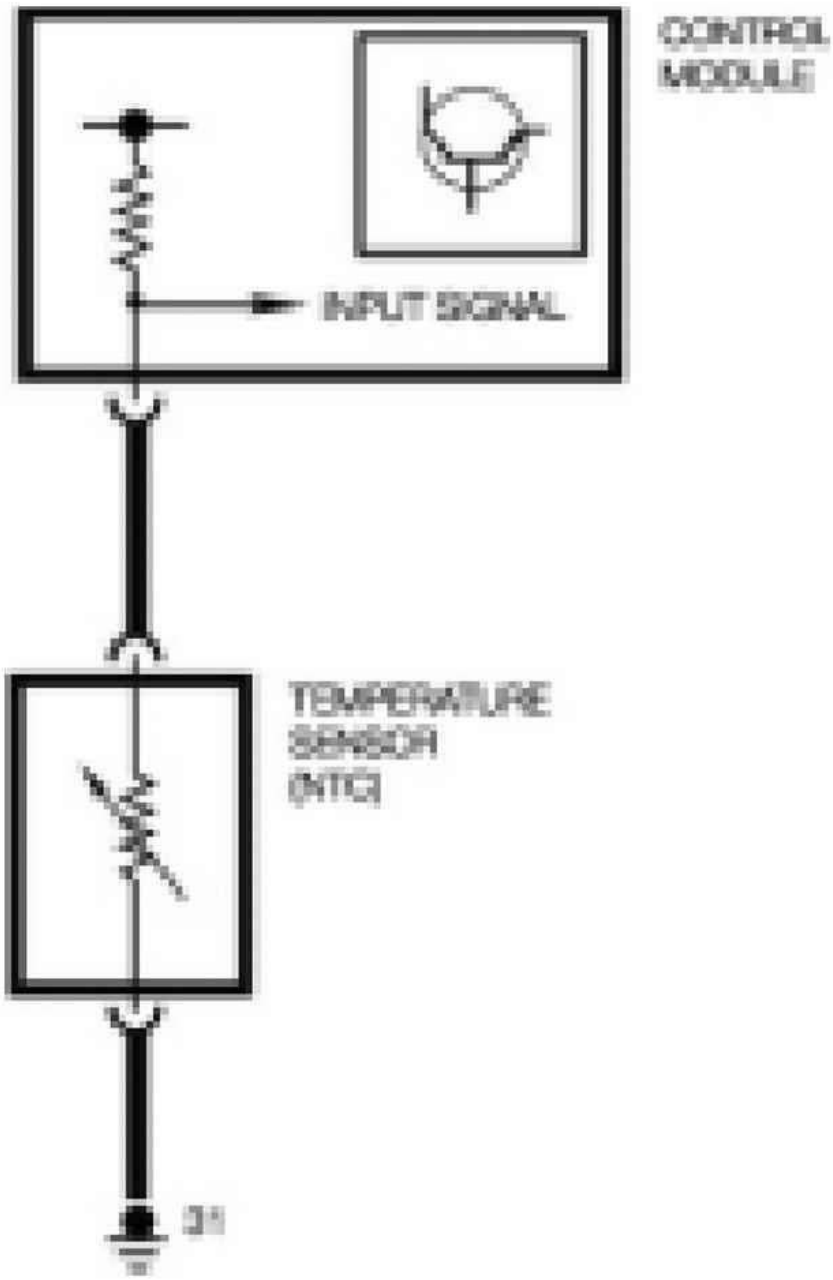

Fig. 9: NTC Sensor Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Examples Of NTC Sensors

Intake Air Temperature Sensor

The intake air temp sensor provides a 0--5 volt analog signal to the DME indicating temperature of the incoming air.

The intake air temp sensor is located either in the intake manifold or integrated in the mass air flow meter.

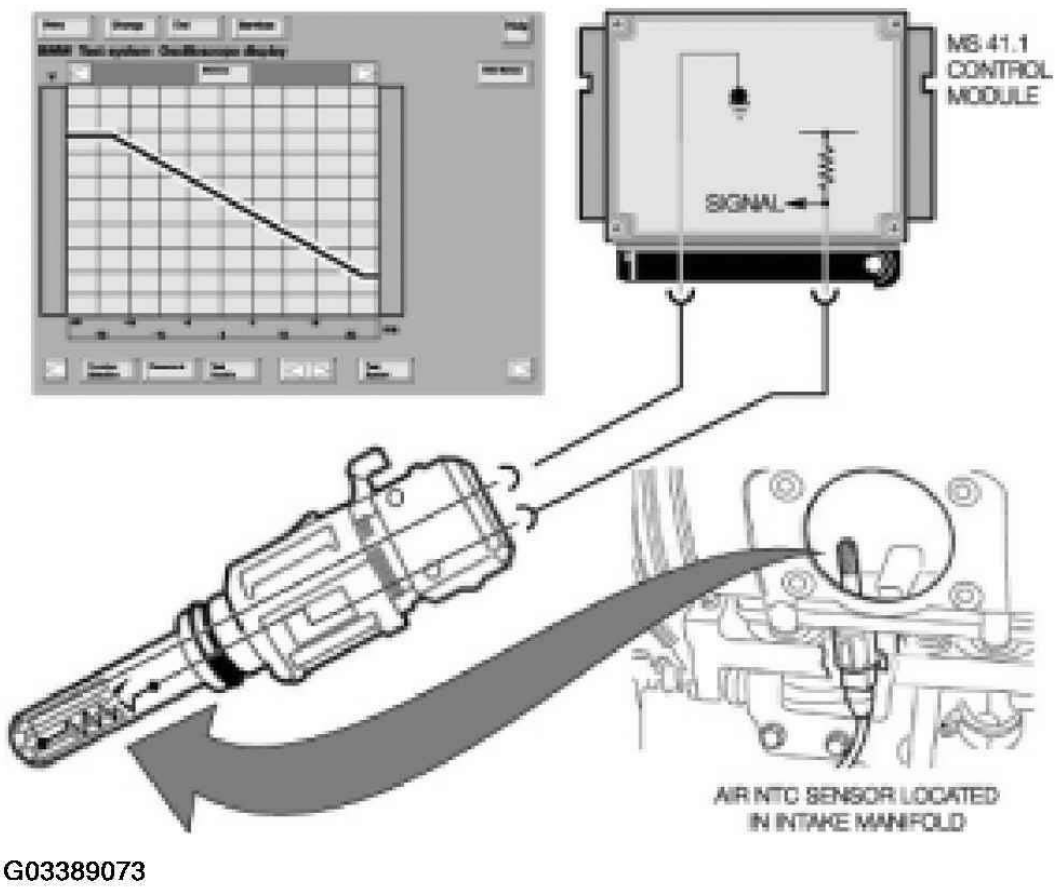

Fig. 10: Checking Intake Air Temperature Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Engine Coolant Temperature Sensor

A dual sensor is used for engine temp. Operation is the same as other NTC sensors, 0-5 volt operating range, except that two independent sensors are housed in one assembly.

One is for the engine temperature input to the DME.

The other sensor is used to input engine temp to the instrument cluster.

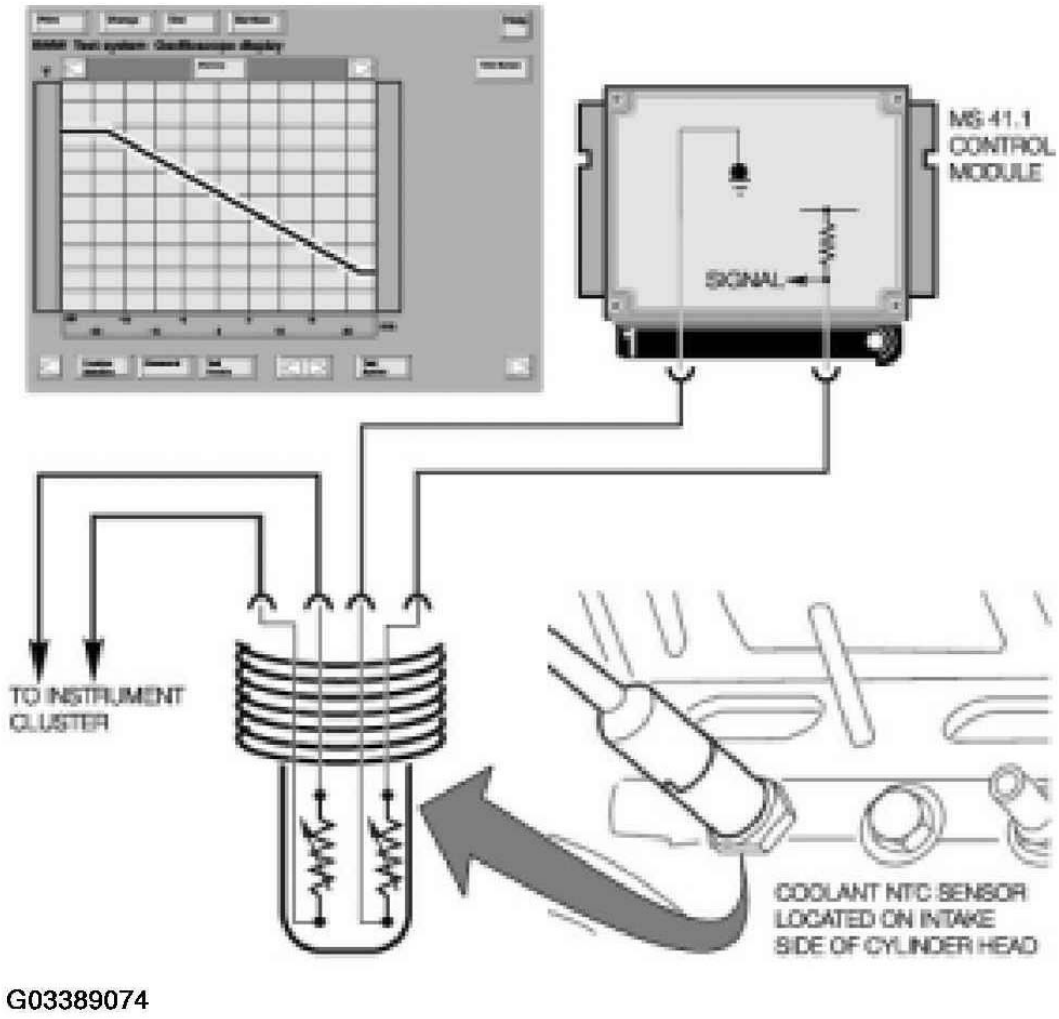

Fig. 11: Checking Engine Coolant Temperature Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of NTC Type sensor:

- Engine Coolant Temp Sensor.
- Intake Air Temp Sensor.
- Transmission Temp Sensor.

PTC SENSOR

PTC (Positive Temperature Coefficient) sensors also change resistance based on temperature. In a PTC sensor

as the temperature goes up the resistance also goes up. The increase in resistance causes the voltage drop across the sensor to increase and the input voltage signal at the control module increases.

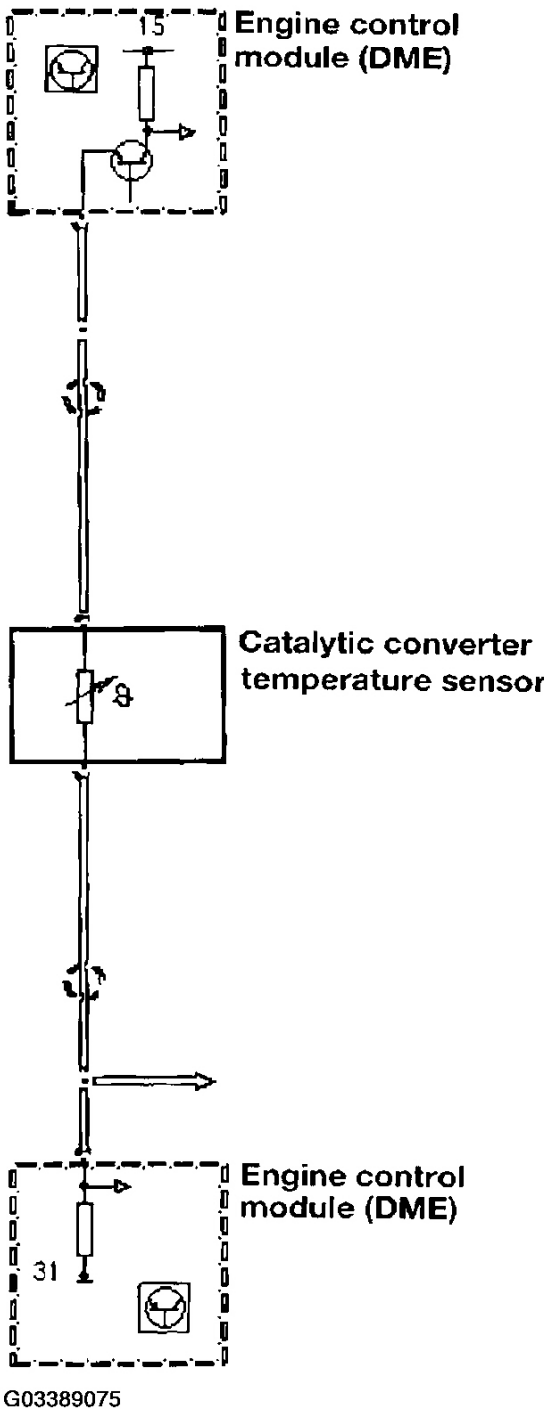

Fig. 12: PTC Sensor Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of A PTC Type Sensor:

- Exhaust Temp Sensor.
- Transmission Temp Sensor.

Example of PTC Sensor

A M5 Catalytic Convertor uses a PTC type sensor to monitor exhaust temperature.

A 0-12v signal is supplied to the DME indicating catalyst temperature.

Workshop Hints NTC/PTC Sensors:

When troubleshooting a faulty input display, the input signal must be verified as "good" BEFORE the control module is replaced.

When checking a NTC Sensor look for these voltages and problems:

0 volts = no supply voltage or shorted to ground.

2v = sensor is indicating a warm condition for system being measured.

4v = sensor is indicating a cold condition for system being measured.

5v = sensor or wiring harness is open.

Remember a PTC type sensor will indicate opposite results on intermediate readings (i.e. 4 volts = warm).

POTENTIOMETERS

A Potentiometer produces a gradually changing voltage signal to a control module. The signal is infinitely variable within the operating range of the sensor.

This varying voltage reflects a mechanical movement or position of the potentiometer wiper arm and its related components.

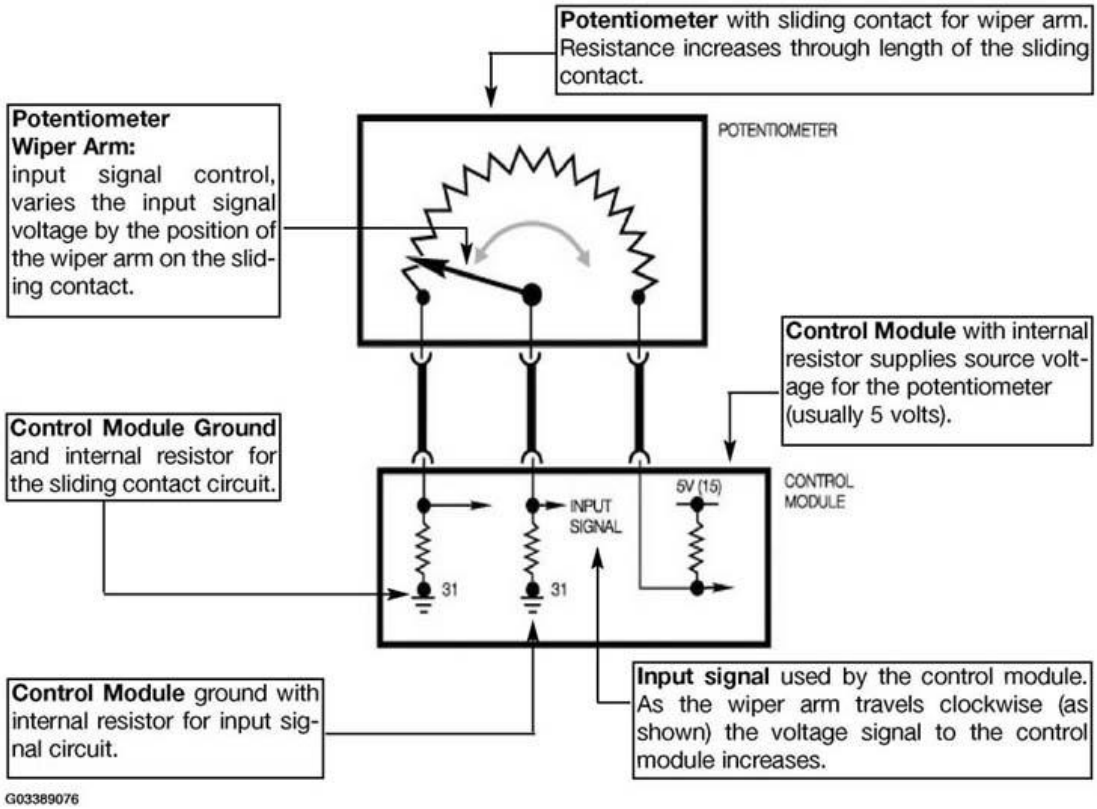

Fig. 13: Identifying Potentiometer
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of Potentiometers:

- Air Flow Meter.
- Pedal Position Sensors.
- Seat and Mirror Memory Position.
- Throttle Position Sensors (Also Feedback Potentiometers).

DIGITAL SIGNALS

Digital Signals transfer information through an electrical circuit by switching the current on or off. Unlike analog signals which vary voltage, a digital signal has only two possible states, control voltage or 0 voltage.

Two types of Digital Signals:

- Switched (High/Low) Signals.
- Modulated Square Wave signals.

SWITCHED B+ SIGNAL

This DC voltage signal produces a YES/NO type input to the control module. The voltage level will indicate a specific operating condition.

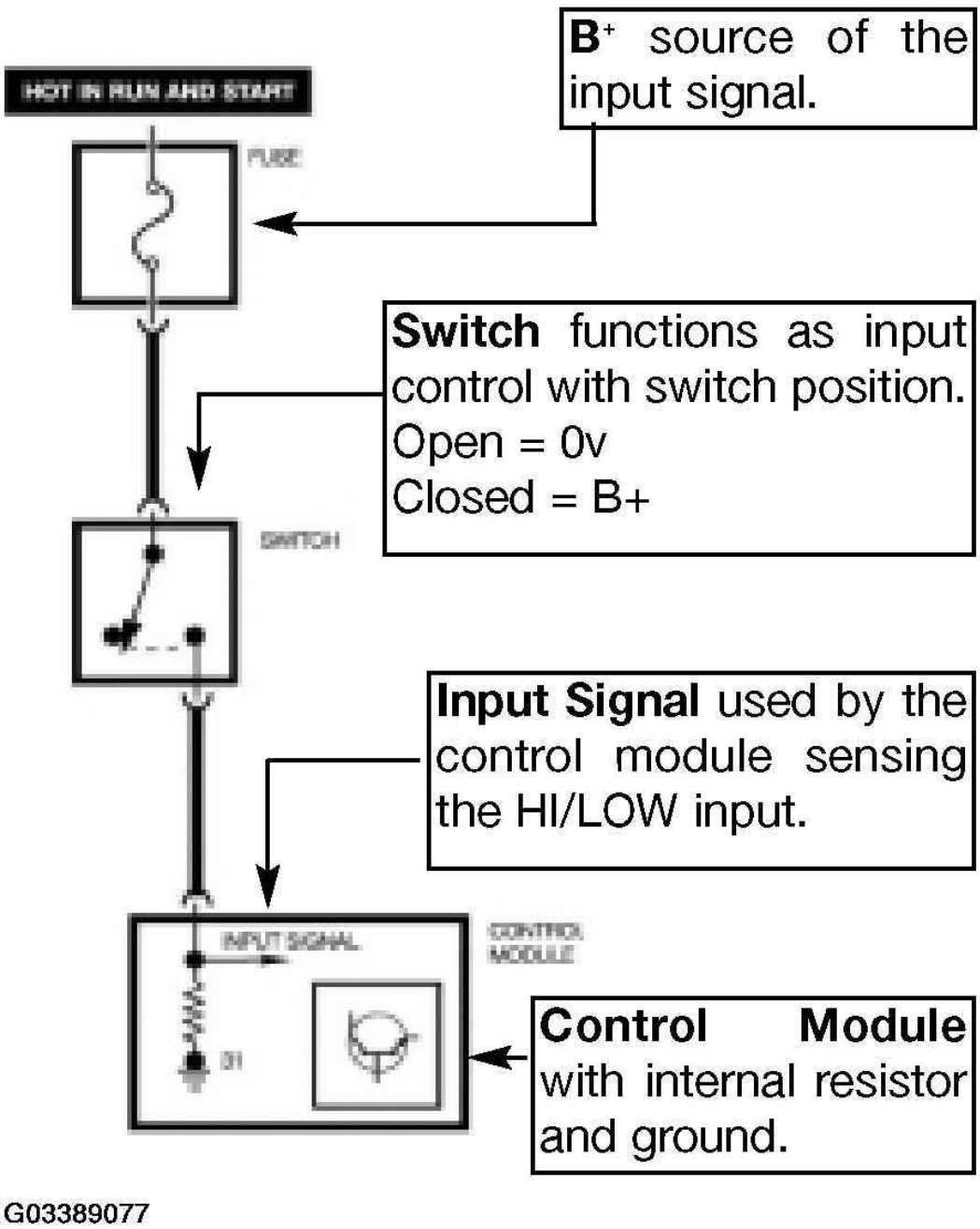

Fig. 14: Digital Signals Transfer Information Chart
Courtesy of BMW OF NORTH AMERICA, INC.

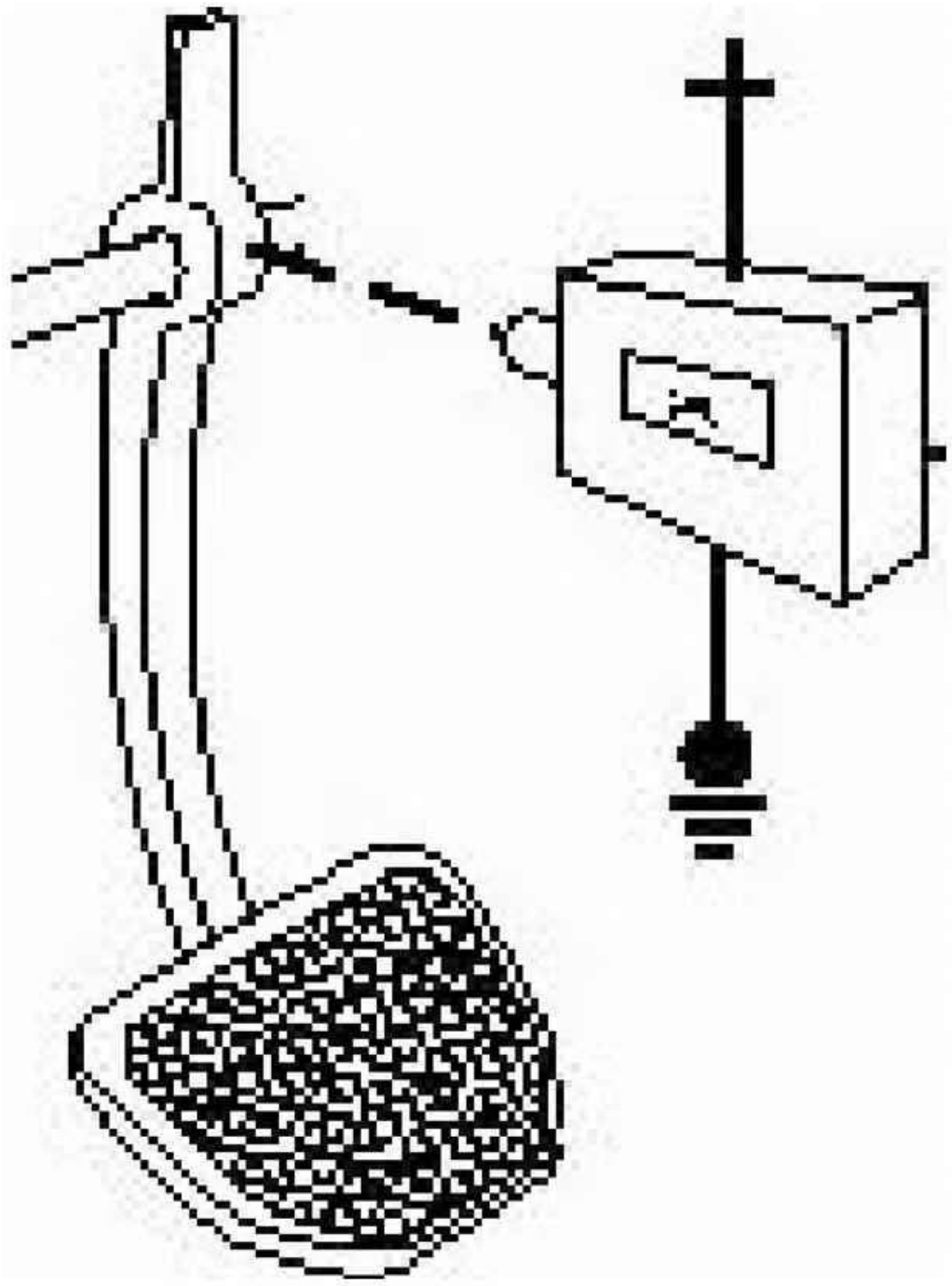

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Fig. 15: Identifying Brake Light Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Hall effect Brake Light Switch

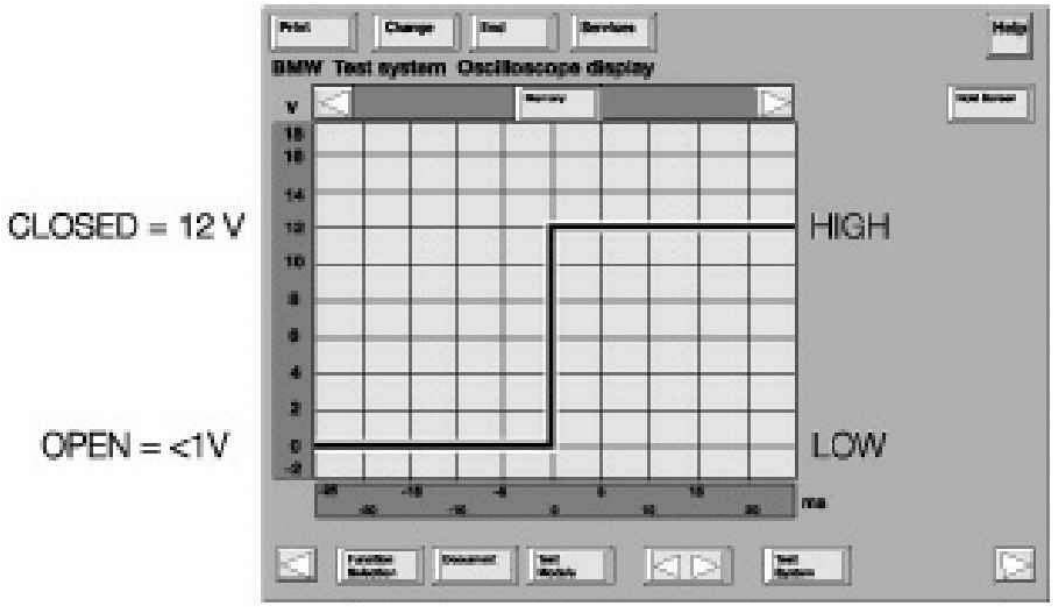


Fig. 16: Identifying DC Voltage Signal
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of Switched B+:

- Ignition Switch.
- Seat Belt Switch.
- Light Switch.
- Hall Effect Switch (e.g. Brake Light Switch).
- Reed Switch.

SWITCHED B- SIGNAL

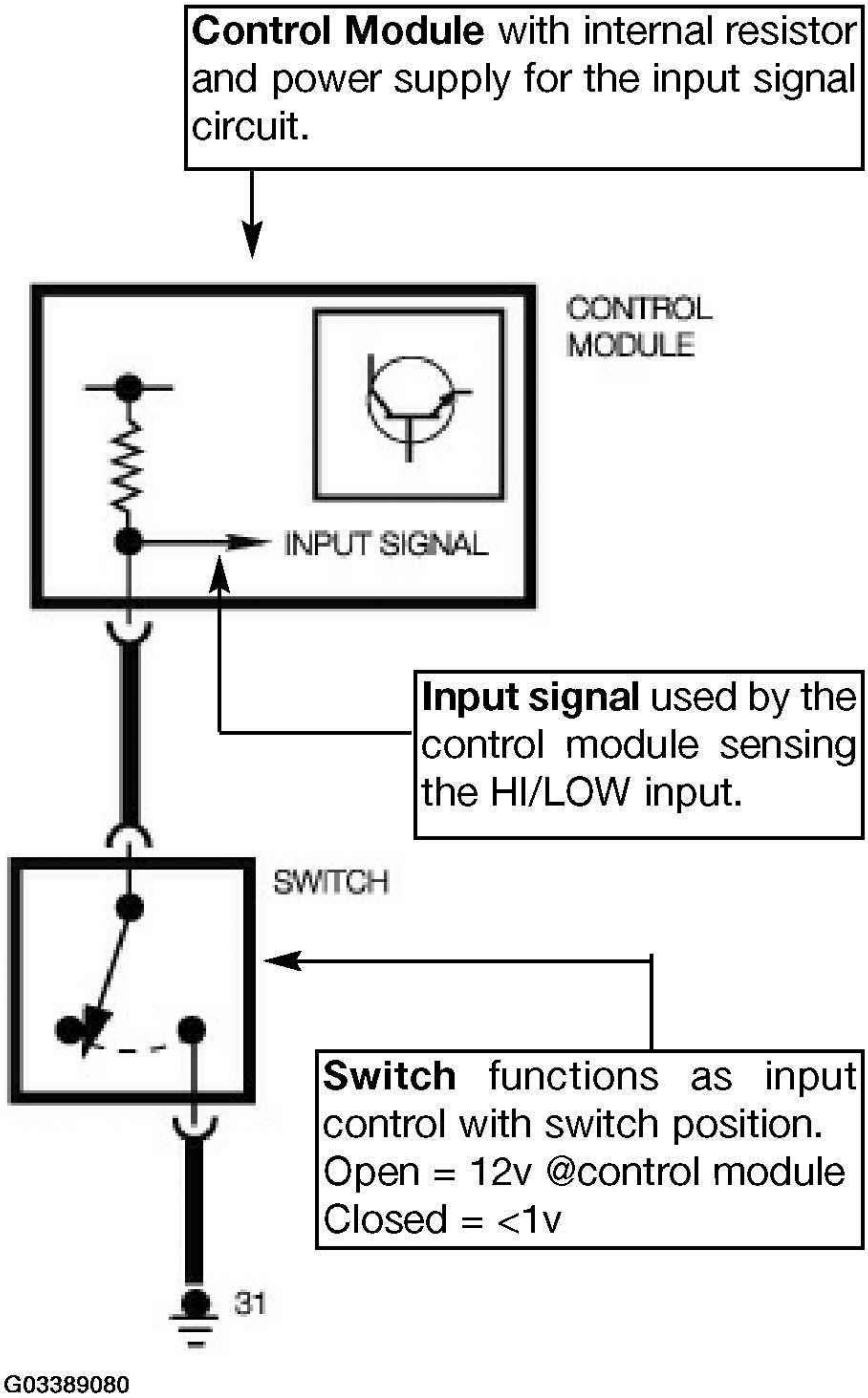


Fig. 17: Identifying (High/Low) Signal
Courtesy of BMW OF NORTH AMERICA, INC.

This Ground Signal produces a YES/NO type input to the control module. The voltage level will indicate a specific operating condition.

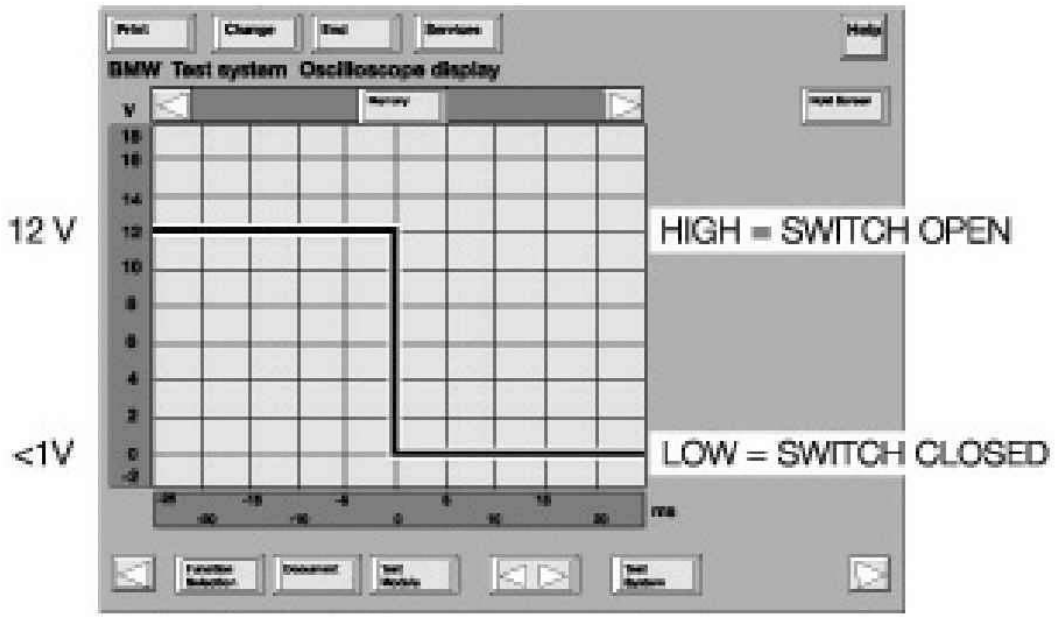


Fig. 18: Identifying Ground Signal
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of Switched B-

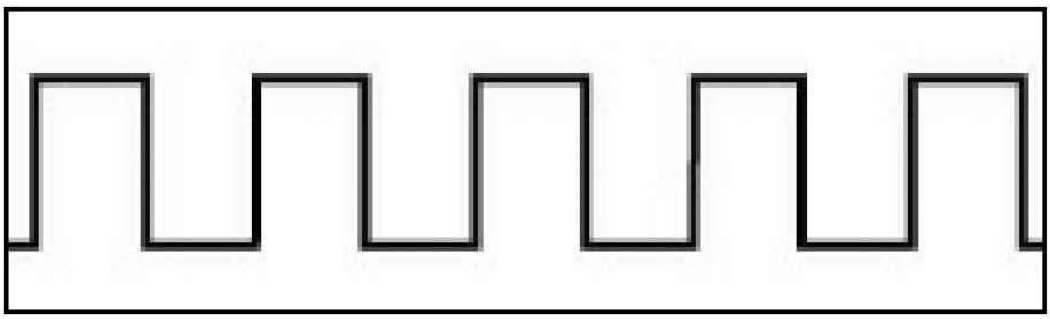
- Door Position Switch.
- Kickdown Position Switch.
- A/C Pressure Switch.

MODULATED SQUARE WAVE

A Modulated Square Wave is a series of High/Low signals repeated rapidly.

Like the switched signals (B+, B-) the square wave has only two voltage levels.

A high level and a low level.



A **Modulated Square Wave** appears as a High/Low signal repeated rapidly over and over.

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Fig. 19: Identifying Modulated Square Wave
Courtesy of BMW OF NORTH AMERICA, INC.

A modulated square wave has 3 characteristics that can be modified to vary the signal:

- Frequency.
- Pulse Width.
- Duty Cycle.

Frequency

The frequency of a modulated square wave signal is the number of complete cycles or pulses that occur in one second. This number of cycles or frequency is expressed in **Hertz (Hz)** . 1Hz = 1 complete cycle per second.

An output function may use a fixed or varied frequency.

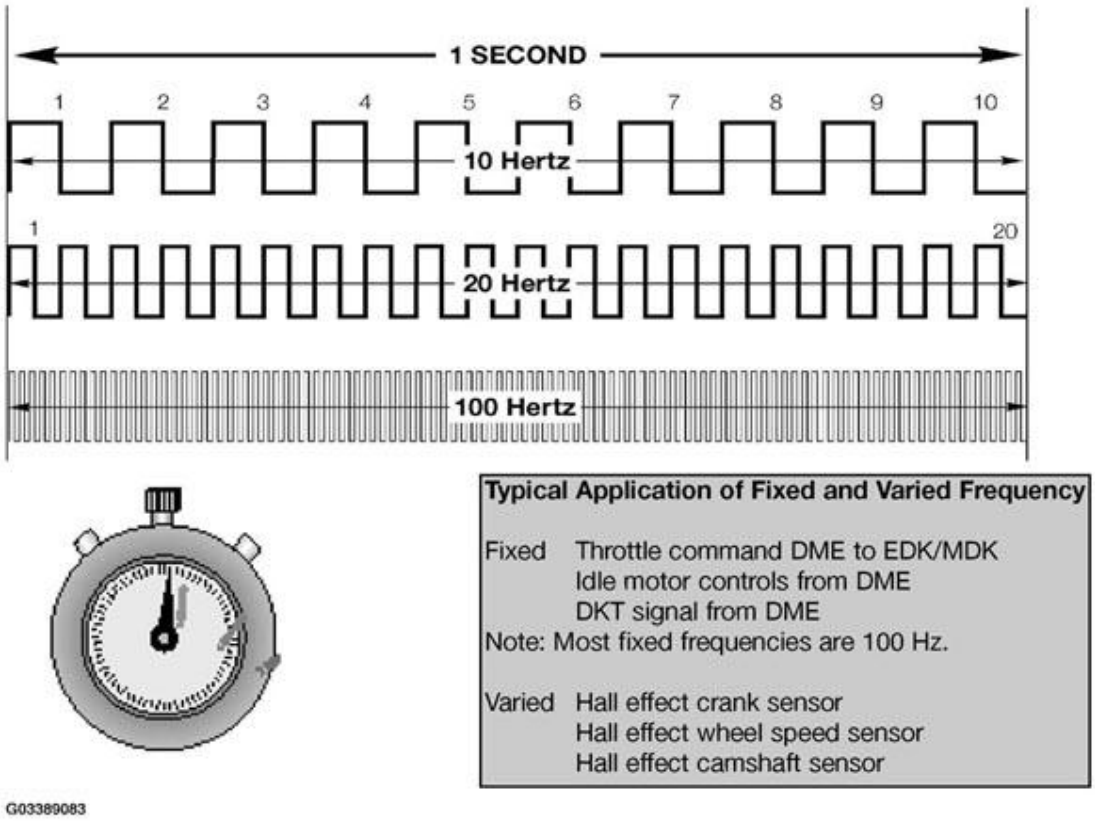


Fig. 20: Identifying Modulated Square Wave Signal
Courtesy of BMW OF NORTH AMERICA, INC.

Pulse Width

The Pulse Width of a square wave is the length of time one pulse is ON. Vehicle systems may use fixed or varied ON times or pulse width. Pulse width is expressed in **milliseconds** (ms).

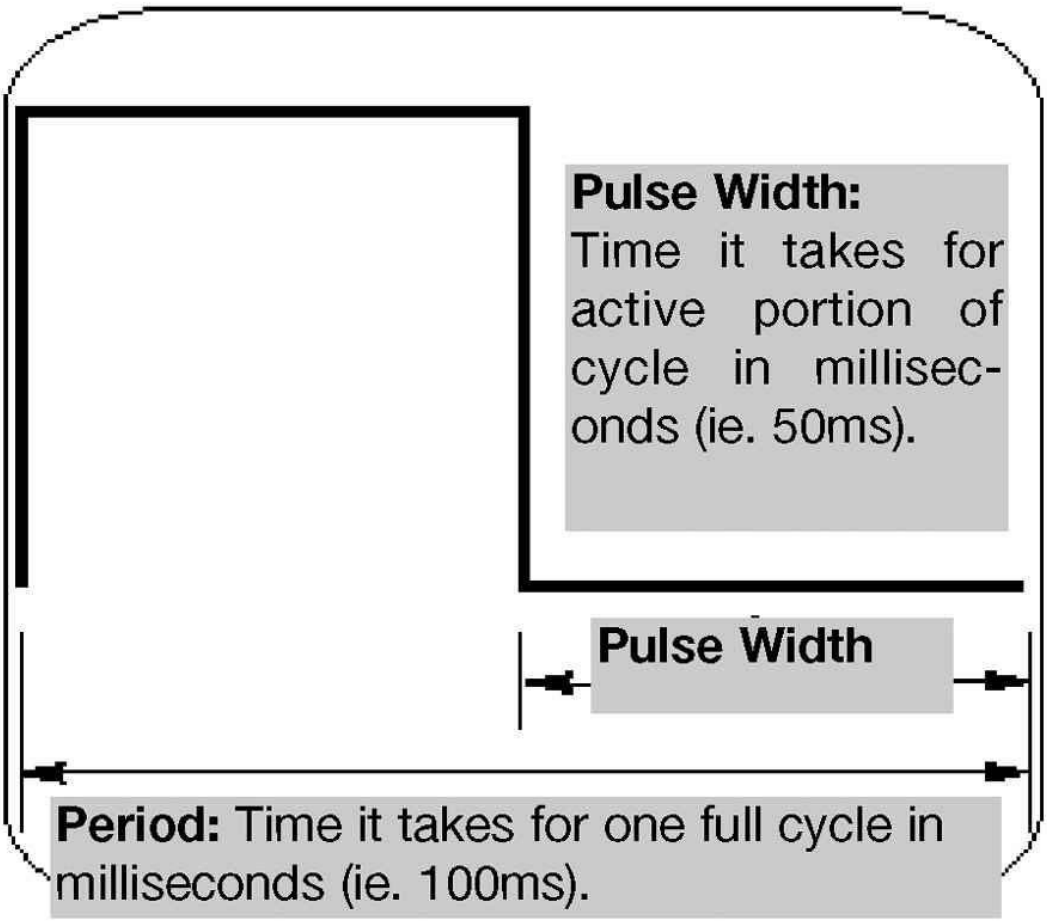


Fig. 21: Identifying Pulse Width Display
Courtesy of BMW OF NORTH AMERICA, INC.

Duty Cycle

The Duty Cycle of a square wave is the ratio of ON time to OFF time for one cycle.

Duty cycle is expressed in %.

Vehicle systems use both fixed duty cycle signals and variable duty cycle signals.

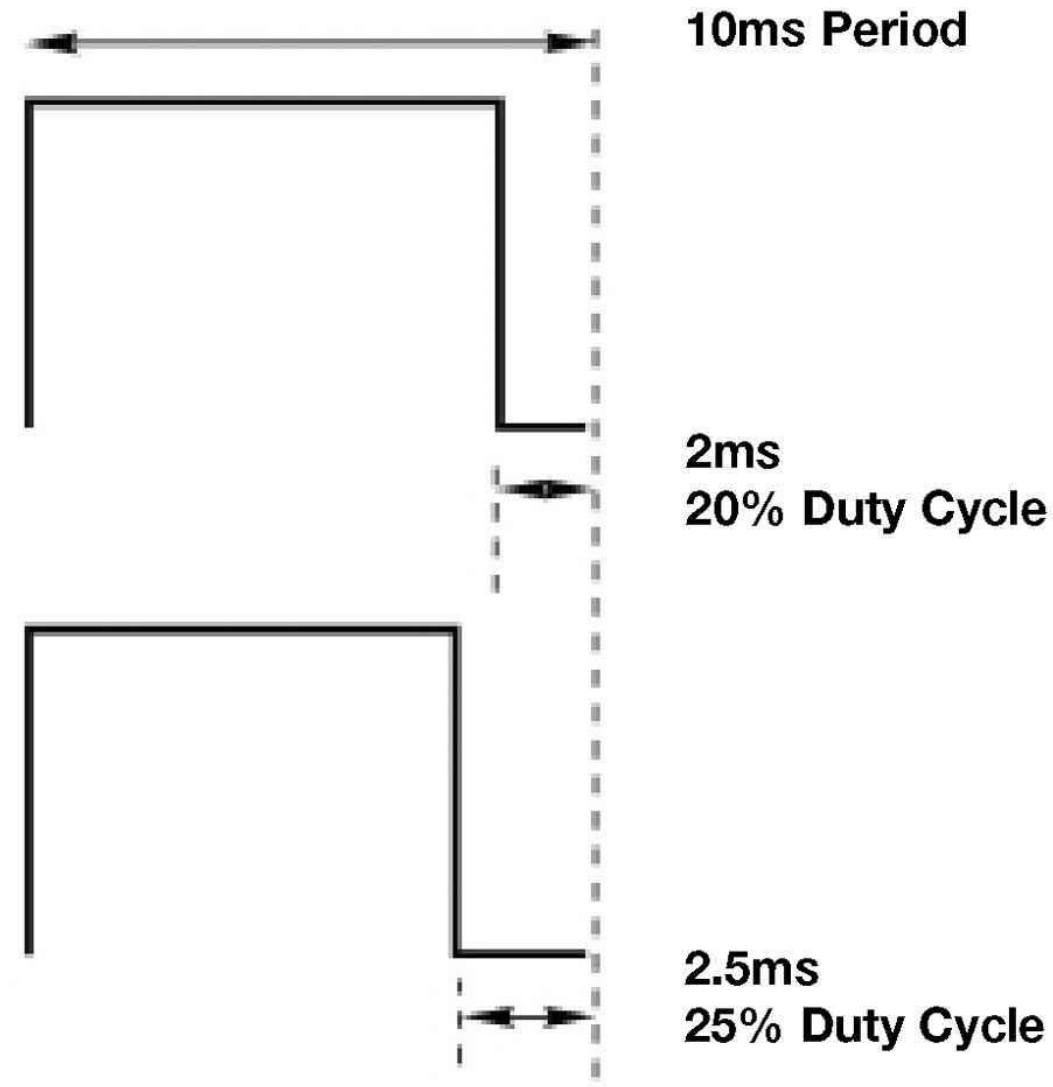


Fig. 22: Identifying Duty Cycle (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

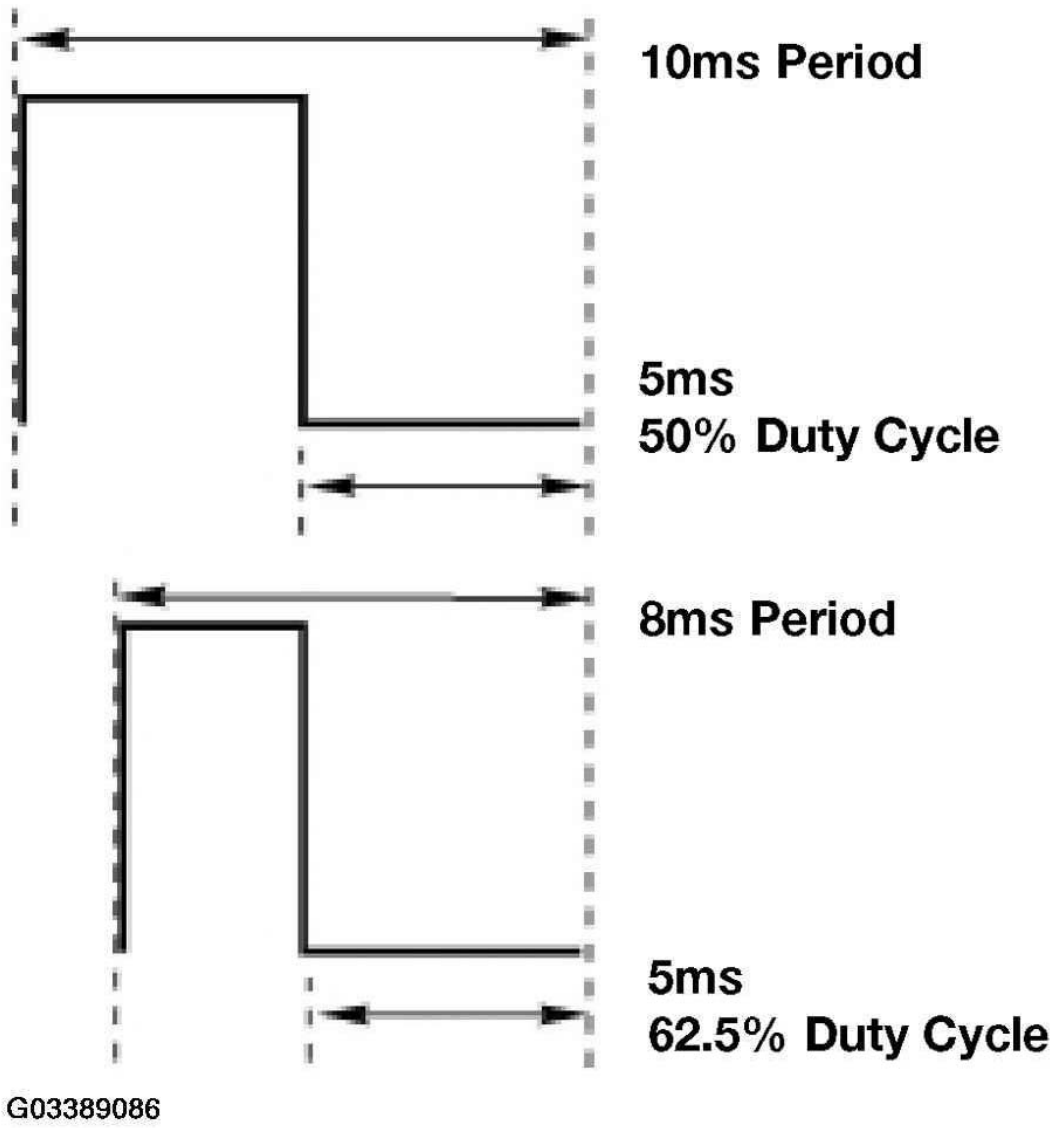


Fig. 23: Identifying Duty Cycle (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Time

1 second = 1000 milliseconds (ms).

1/2 second = 500 milliseconds.

1/4 second = 250 milliseconds.

1/10 second = 100 milliseconds.

1/100 second = 10 milliseconds.

1/1000 second = 1 milliseconds.

HALL-EFFECT SENSORS

Hall Effect Sensors produce a modulated square wave.

Hall Effect Sensors are electronic switches that react to magnetic fields to rapidly control the flow of current or voltage ON and OFF.

The Hall Sensor consists of an epoxy filled non-magnetic housing containing a hall element and a magnet, and a trigger wheel.

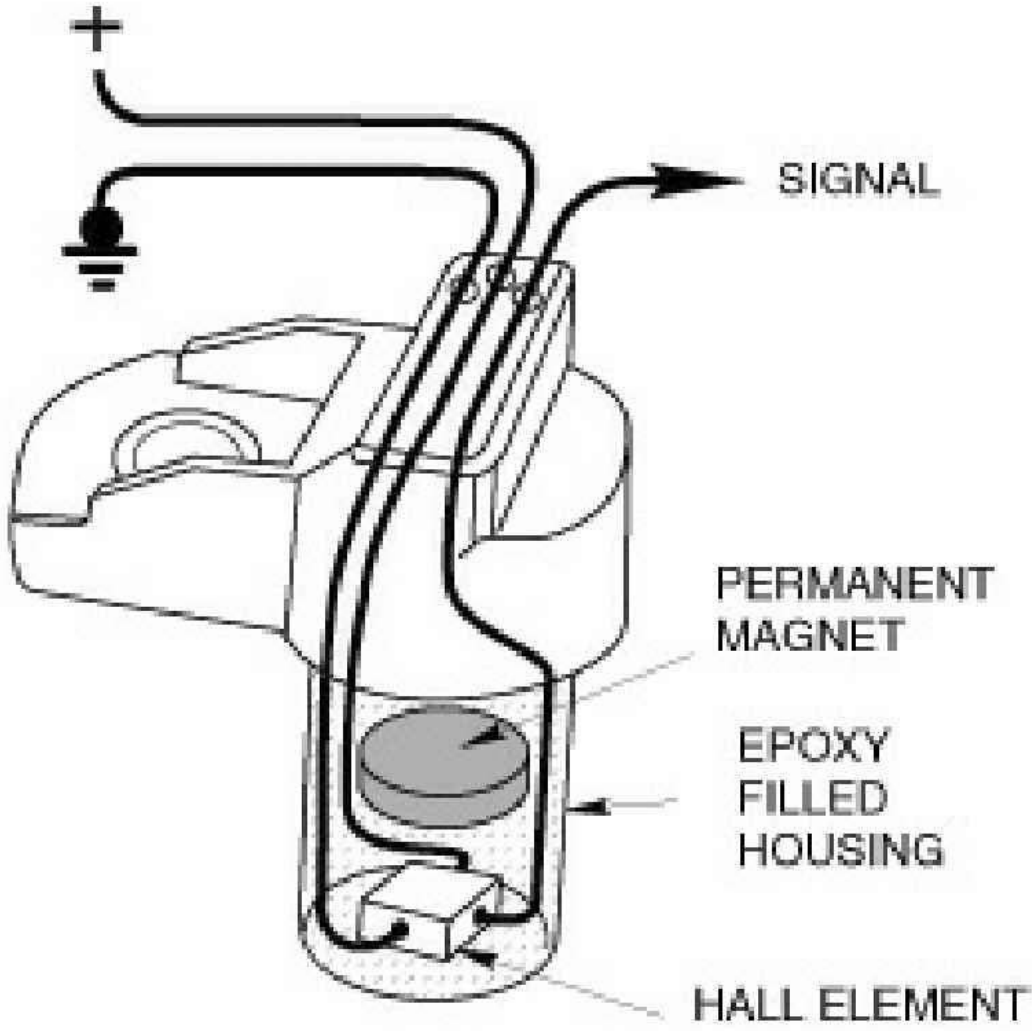


Fig. 24: View Of Hall Effect Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

The Hall element is a thin non-magnetic plate which is electrically conductive. (Voltage will flow through the plate.) Electron flow is equal on both sides of the plate.

Since everything between the magnet and the hall element is non-magnetic the magnet (magnetic field) has no effect on the current flow.

As a metal disk or solid area of a toothed wheel, flywheel or other trigger device approaches the sensor, a magnetic field is created between the magnet and the disk.

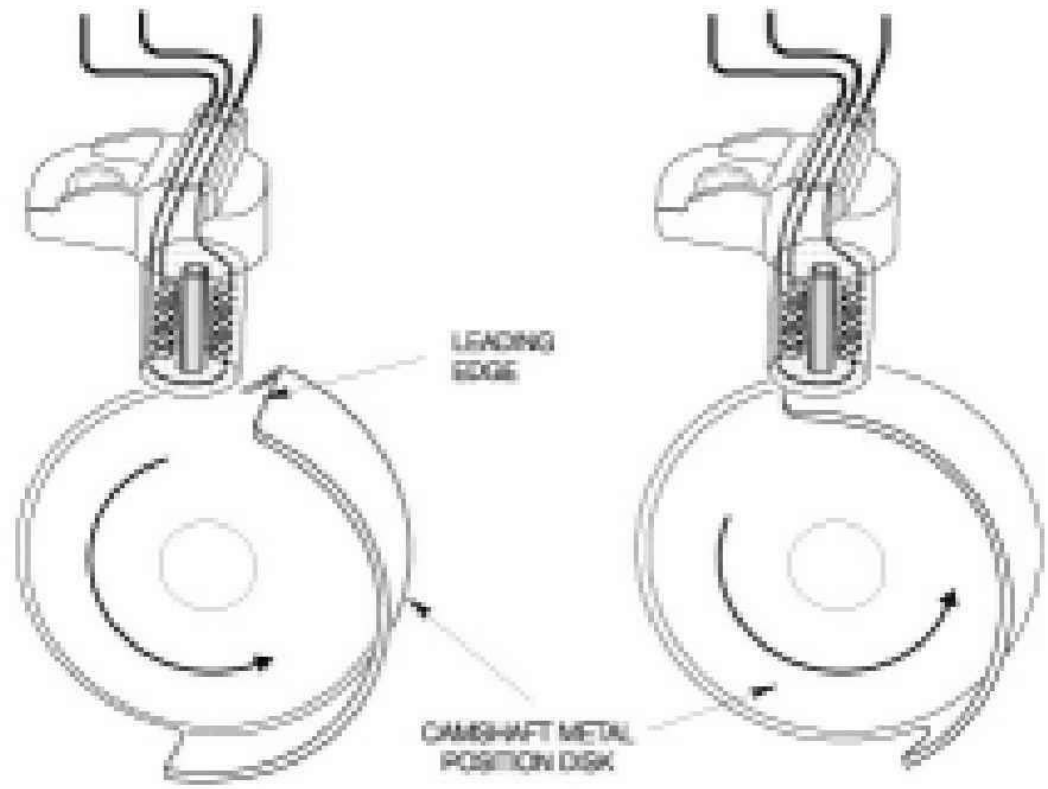


Fig. 25: Identifying Magnetic Field
Courtesy of BMW OF NORTH AMERICA, INC.

The magnetic field cause the electron flow to stop on one side of the plate. Electrons continue to flow on the other side of the plate.

The Hall Sensor Signal is a measurement of the voltage drop between the two sides of the plate or element.

When the magnetic field increases (disc or solid toothed area in front of sensor) the voltage drop across the two sides of the element increases. High voltage on one side, little on the other. The signal output from the sensor is High.

As the disc moves away from the sensor the magnetic fields weakens and is lost. The loss of the magnetic field (blank toothed or open area of the wheel in front of the sensor) produces very little voltage drop across the two sides of the element. The output signal is Low.

This rapid switching of the voltage ON/OFF produces a HIGH/LOW signal that the control module uses to recognize speed and position.

Examples of Hall Effect Sensors

Motor Position Hall Sensors

Hall sensors are used on many electric motors to monitor speed and position. (i.e. electric window motors and sunroof motors.)

The Hall Effect principal is the same except the magnet is placed on the shaft of the motor.

The magnet is aligned to rotate in a precise position in front of the element. The polarization of the magnetic ring causes a polarity switch in the Hall element to occur as it rotates The square wave produced provides speed and position information to the control module.

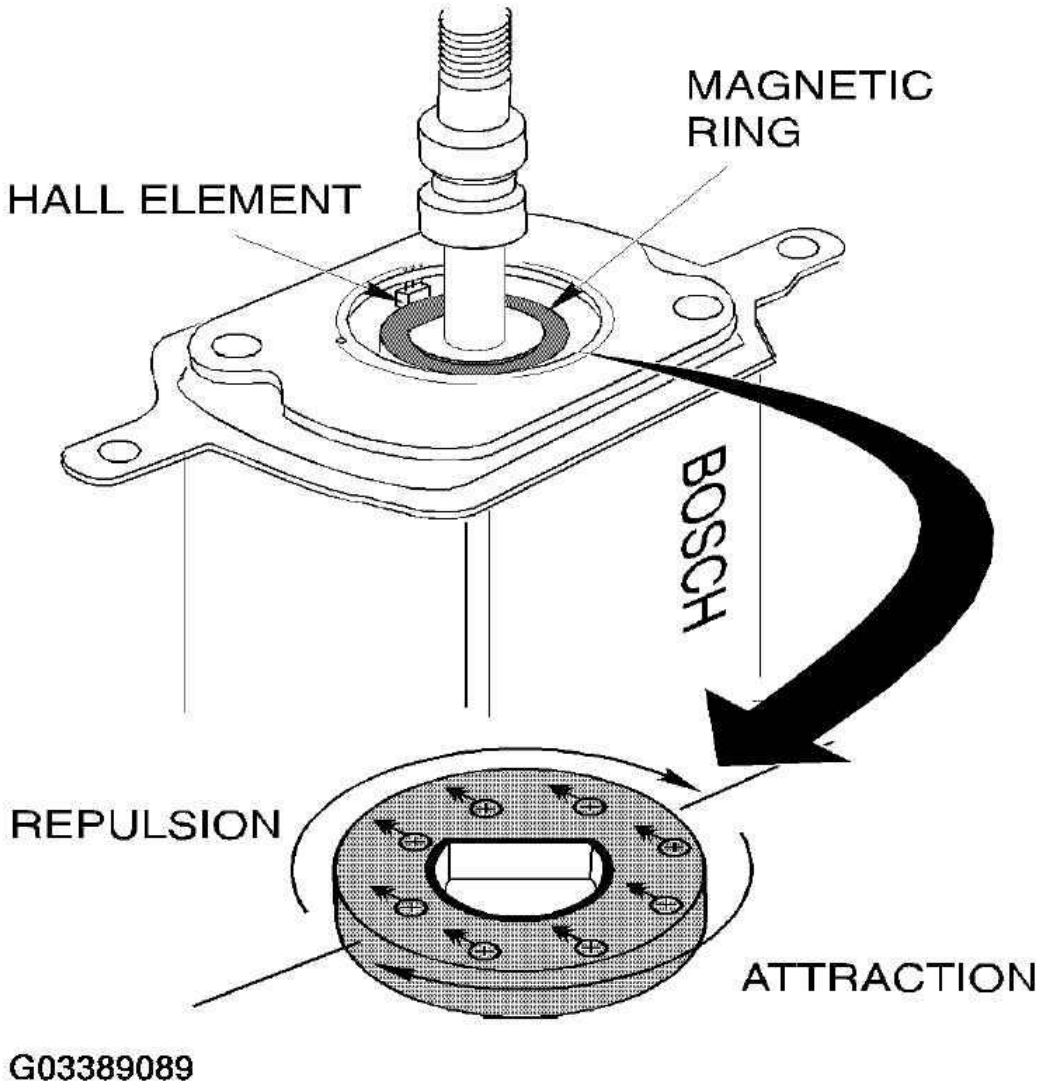


Fig. 26: Identifying Motor Position Hall Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel Speed Hall Effect Sensors

Hall Effect sensors are used to indicate wheel speed.

Conventional Hall Effect Sensors use three wires, power supply (usually 5v or 12v) a ground wire and a signal wire back to the control module.

The Hall Effect sensors used as wheel speed sensors are unique in that they are two wire Hall Effect Sensors.

The two wire sensors eliminate the separate ground wire and the signal wire functions as the ground also.

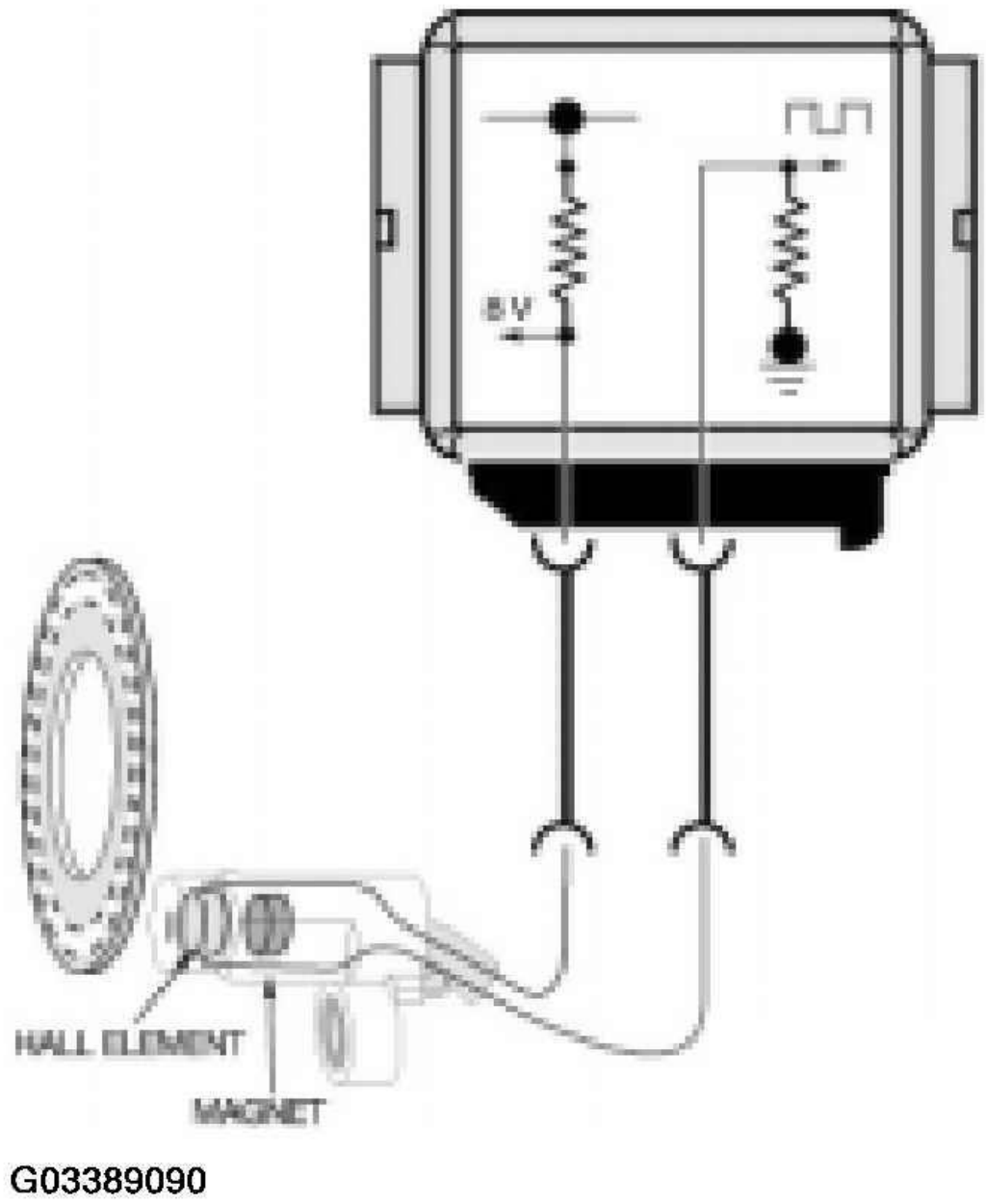


Fig. 27: Identifying Wheel Speed Hall Effect Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

The unique two wire arrangement provides the control module with a HIGH/LOW signal having a low voltage of .75 volts and a high voltage of 2.5 volts.

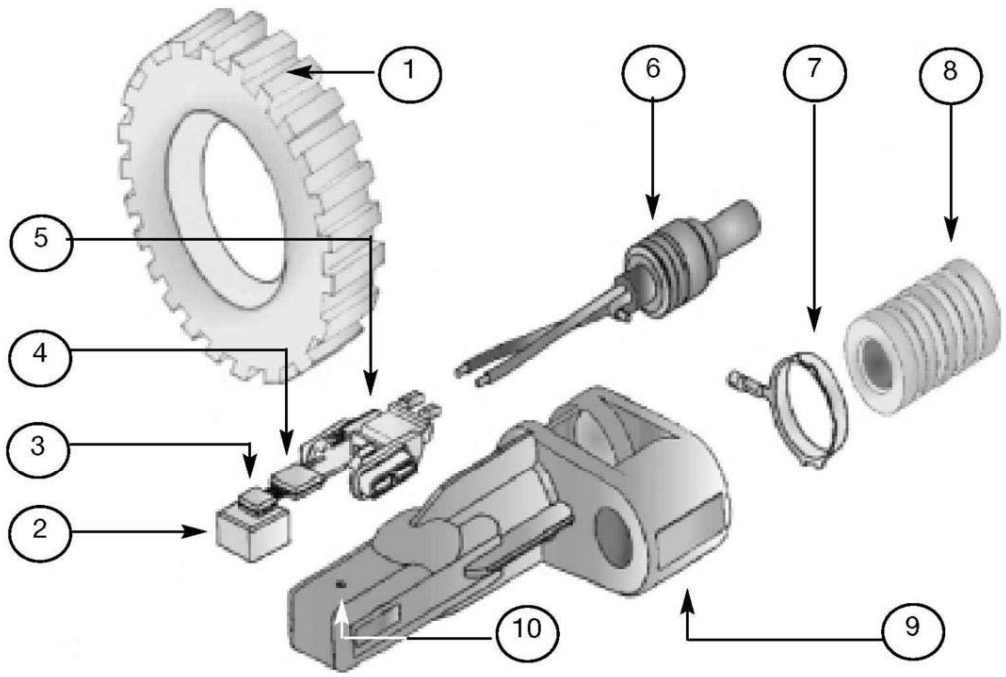
Typical Application of Hall Effect sensors

- Crankshaft Sensors.
- Motor Position and Speed Sensors (e.g. Window Motor, Sunroof Motor).
- Camshaft Sensors.
- Wheel Speed Sensors.

MAGNETORESISTIVE SENSORS

The active sensing of the Magnetoresistive Sensor is particularly suitable for advanced stability control applications in which sensing at zero or near zero speed is required.

A permanent magnet in the sensor produces a magnetic field with the magnetic field stream at a right angle to the sensing element.



1. Metal Pulse Wheel
2. Magnet
3. Sensor Element
4. Evaluation Module
5. Support for Sensor Element
6. Sensor Wiring With Weather Boot
7. Ground Contact Ring
8. Fastening Element
9. Sensor Housing
10. Pick-Up Surface

G03389091

Fig. 28: Exploded View Of Magnetoresistive Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

The sensor element is a ferromagnetic alloy that changes its resistance based on the influence of magnetic fields.

As the high portion of the pulse wheel approaches the sensing element a deflection of the magnetic field stream is created. This creates a resistance change in the thin film ferromagnetic layer of the sensor element.

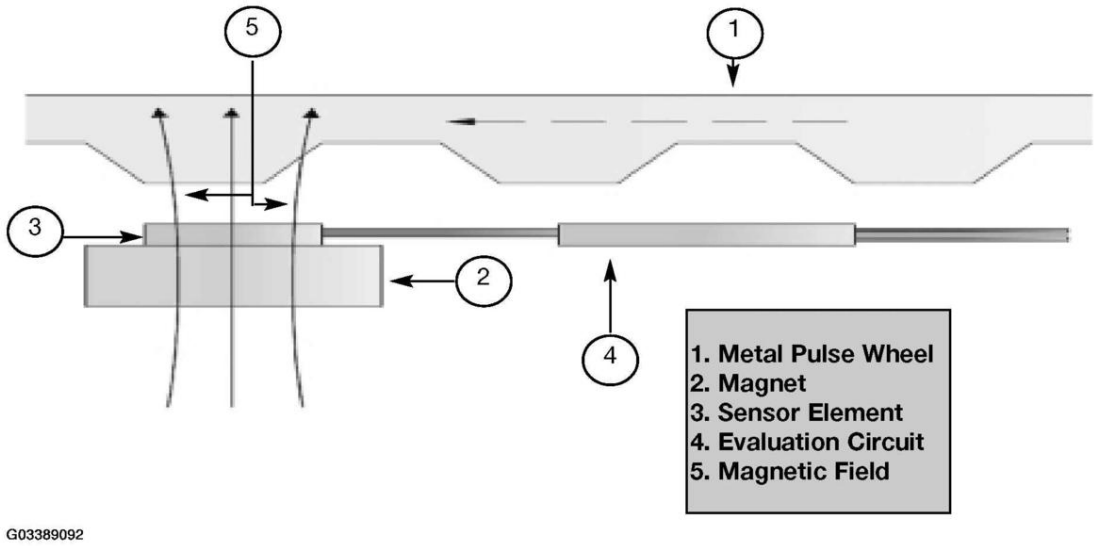


Fig. 29: View Of Sensor Element
Courtesy of BMW OF NORTH AMERICA, INC.

The sensor element is affected by the direction of the magnetic field, not the field strength. The field strength is not important as long as it is above a certain level. This allows the sensor to tolerate variations in the field strength caused by age, temperature, or mechanical tolerances.

The resistance change in the sensor element affects the voltage that is supplied by the evaluation circuit. The small amount of voltage provided to the sensor element is monitored and the voltage changes (1 to 100mv) are converted into current pulses by the evaluation module.

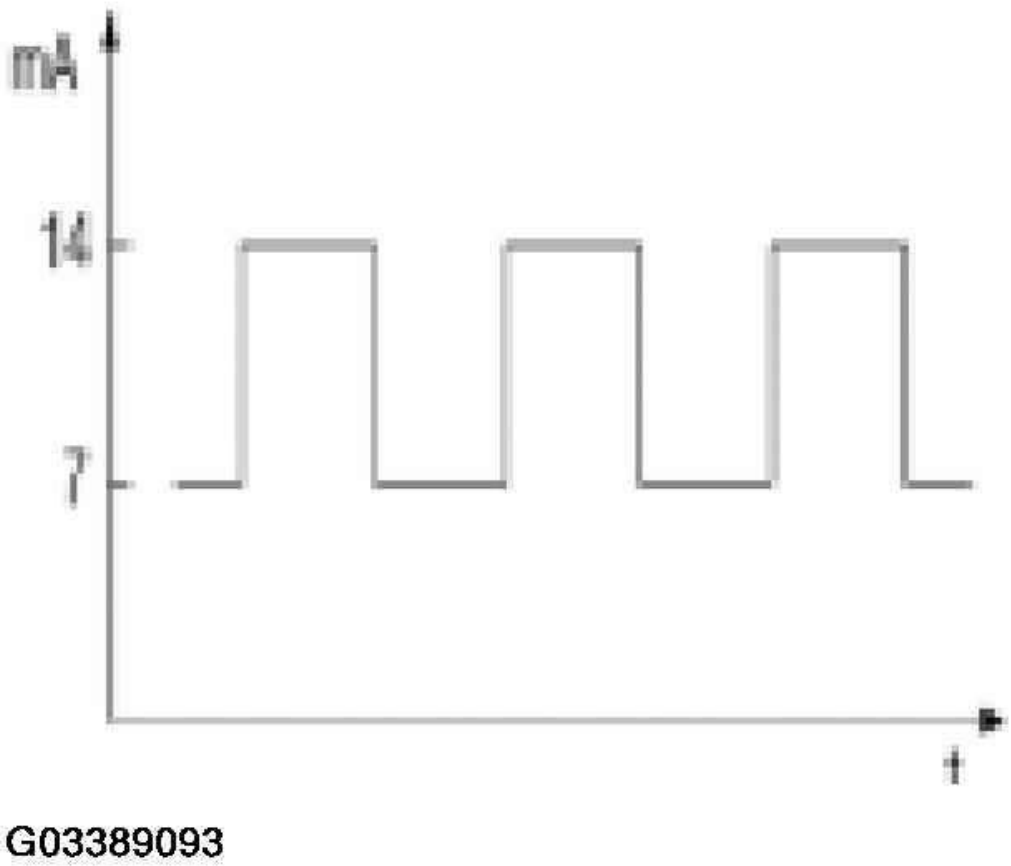


Fig. 30: Identifying High And Low Current Pulses
Courtesy of BMW OF NORTH AMERICA, INC.

- Signal Low-**7mA** .
- Signal High-**14mA** .

The sensor is supplied 12V by the control unit. Output voltage from the sensor is approximately 10V. The control unit counts the high and low current pulses to determine the wheel speed.

Typical Application of Magnetoresistive Sensor:

- Found Currently on E46 with Teves DSCIII MK-60.

DESIGNATED VALUE SIGNALS

Designated values are produced through fixed resistance positions of a multi-position switch. As the switch is

operated the voltage drop across the resistor(s) of each switch position causes the voltage level of the input signal to change to a predetermined voltage value.

These predetermined (designated) voltages signal the control module to perform specific functions.

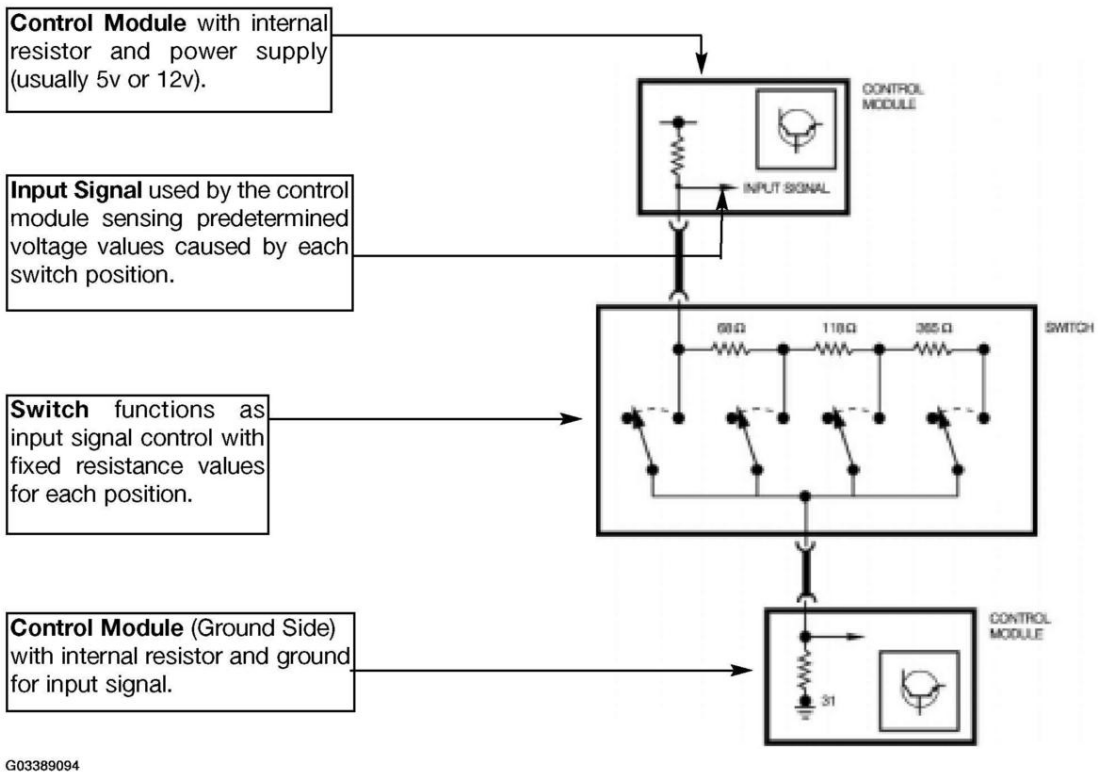


Fig. 31: Identifying Designated Value Signals
Courtesy of BMW OF NORTH AMERICA, INC.

Voltage Values seen as input by control module.

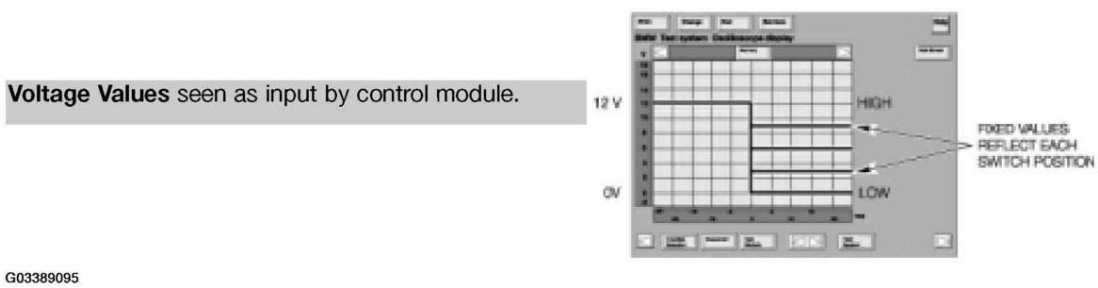


Fig. 32: Voltage Values Display
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of Designated Values:

- Cruise Control Switch On E 32.
- Seat and Mirror Memory Position Buttons.

Coded Ground Signals

Coded ground signals produce a set of High/Low requests, the combination (pattern) of which is interpreted by the control module to perform a specific function. Coded ground signals are generated through a switch or series of switches signaling the control module requests for operation.

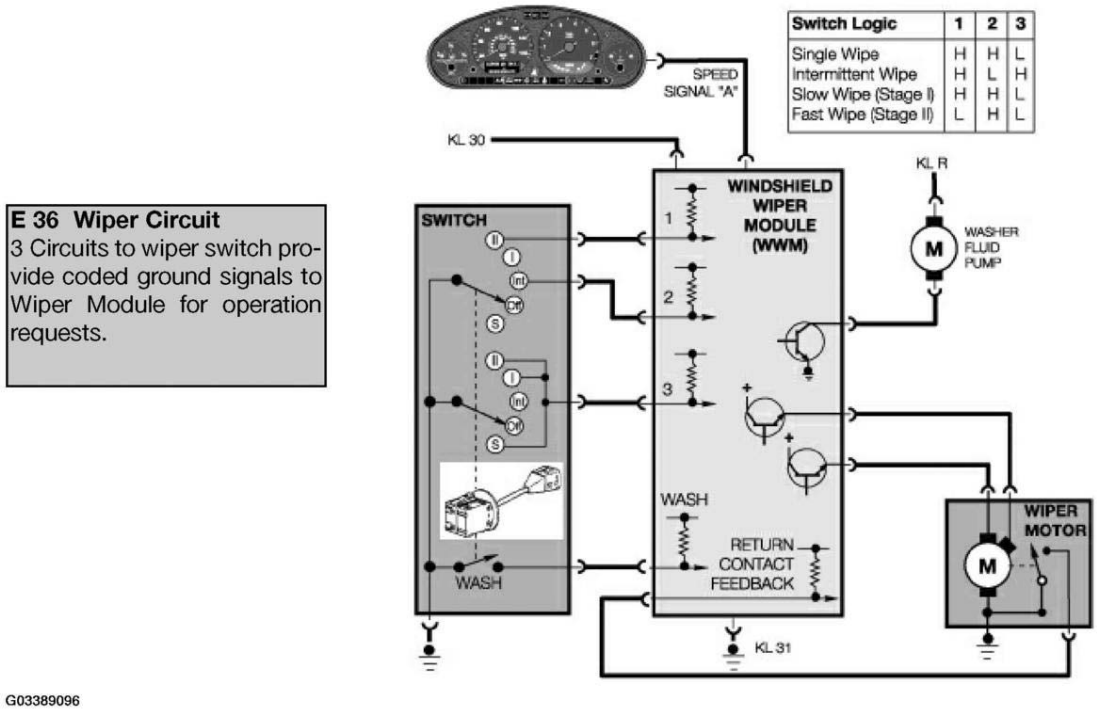


Fig. 33: Identifying E 36 Wiper Circuit
Courtesy of BMW OF NORTH AMERICA, INC.

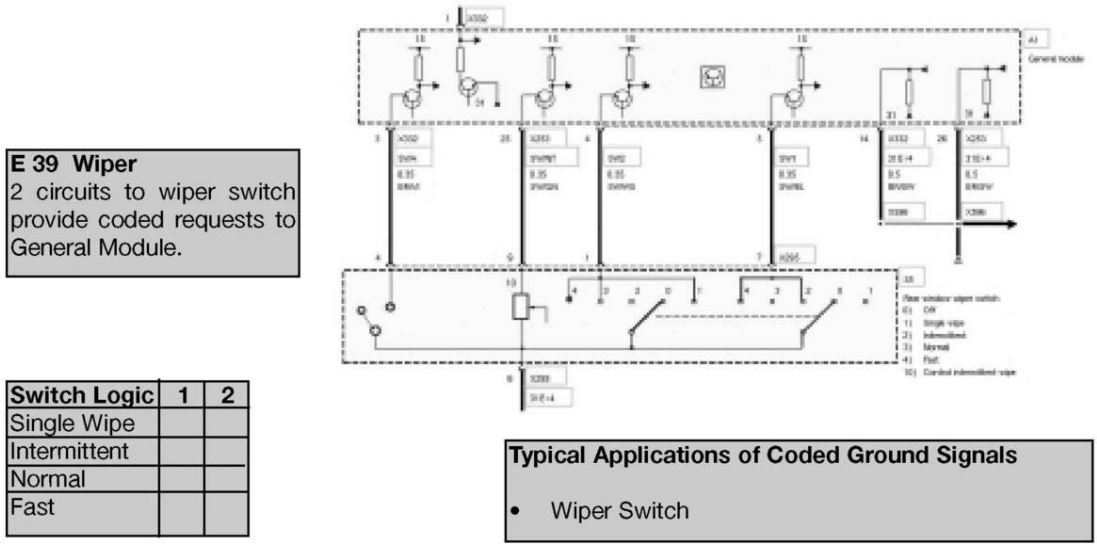


Fig. 34: Identifying E 39 Wiper Circuit
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSISTOR FUNCTION

The transistor takes on a number of applications that must be understood to effectively analyze a circuit.

The transistor in operation functions as two parts much like a relay. Both the relay and the transistor control high currents with a low current signal.

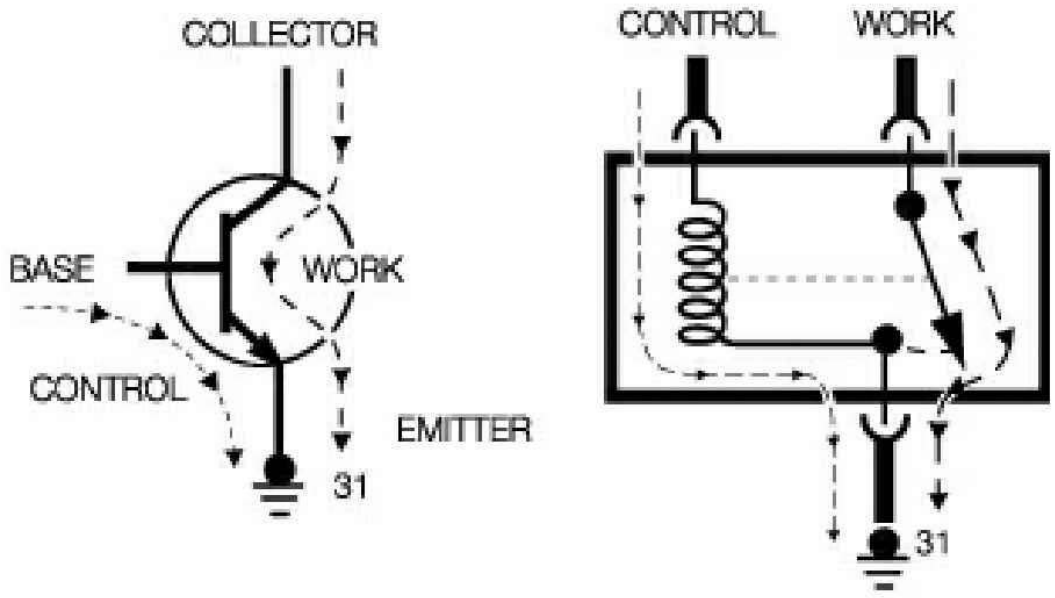


Fig. 35: Identifying Transistor Final Stage Function (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

The base/emitter path functions as the control circuit activated by the control module to oversee or control the work.

The collector/emitter path functions as the work side of the circuit, supplying power or switching on the work.

In operation the transistor can be switched ON momentarily, or supply a constant power or ground.

The transistor can also be modulated or pulsed to supply a modulated square wave signal.

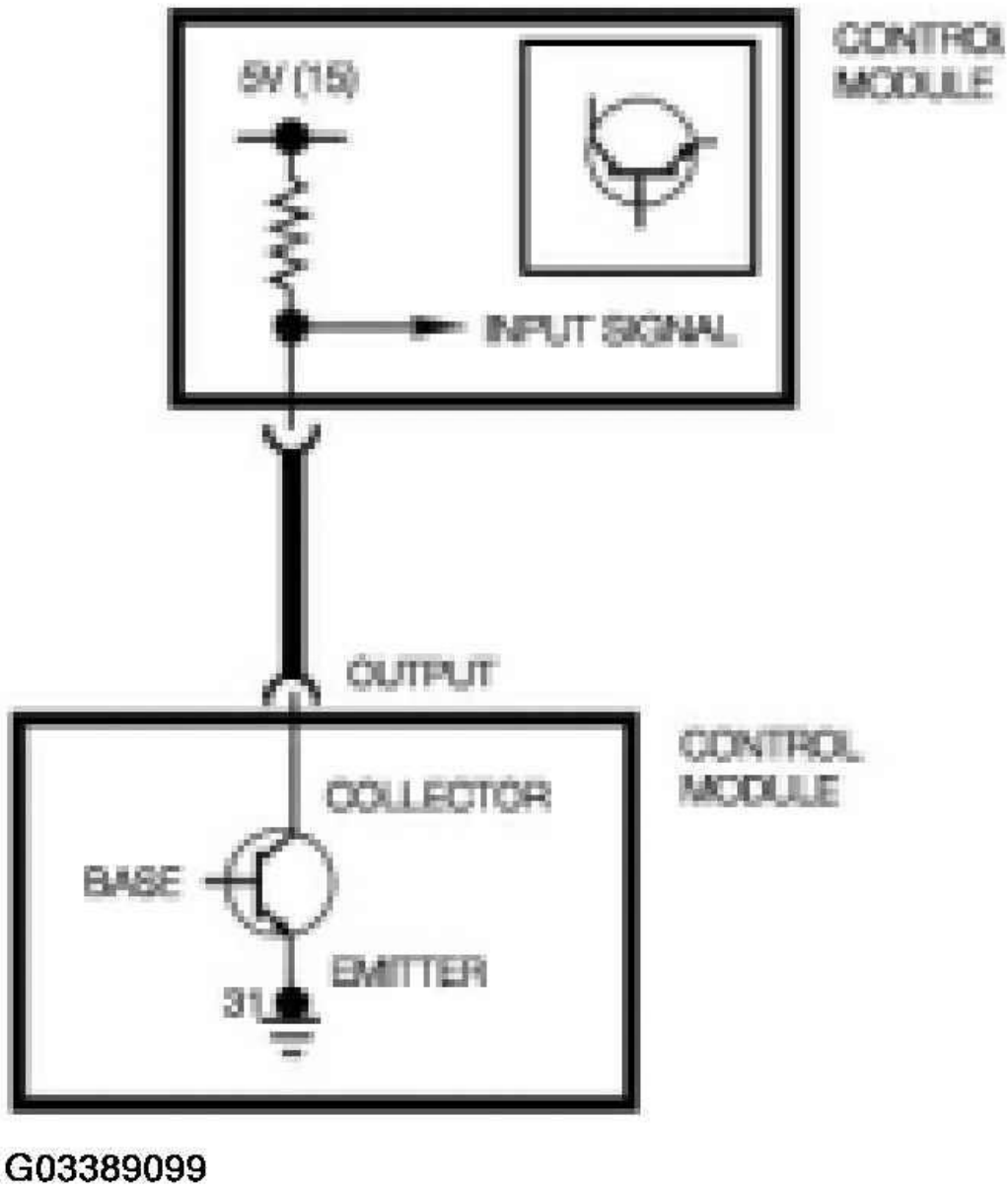


Fig. 36: Identifying Transistor Final Stage Function (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Modulated, Momentary, Constant B- as Input/Output

The input signal of control module 1 is an output signal of control module 2.

Control module 2 through activation of its internal transistor provides a ground input for control module 1.

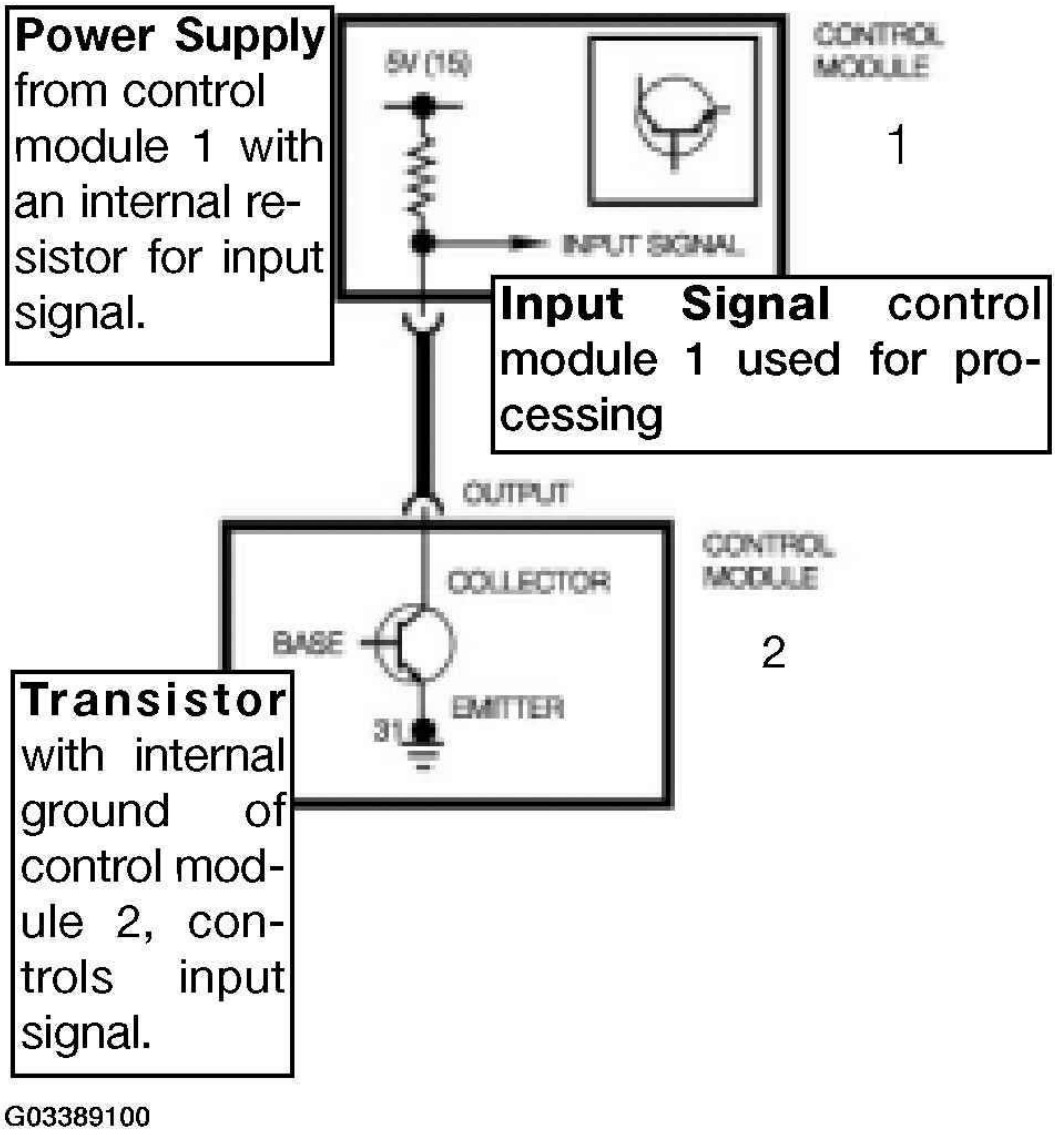


Fig. 37: Identifying Modulated, Momentary, Constant B- As Input/Output Function
Courtesy of BMW OF NORTH AMERICA, INC.

The input signal at control module 1 is either a momentary/constant signal (i.e torque convertor signal from TCM to DME) or a modulated signal (i.e. vehicle speed signal ASC to DME).

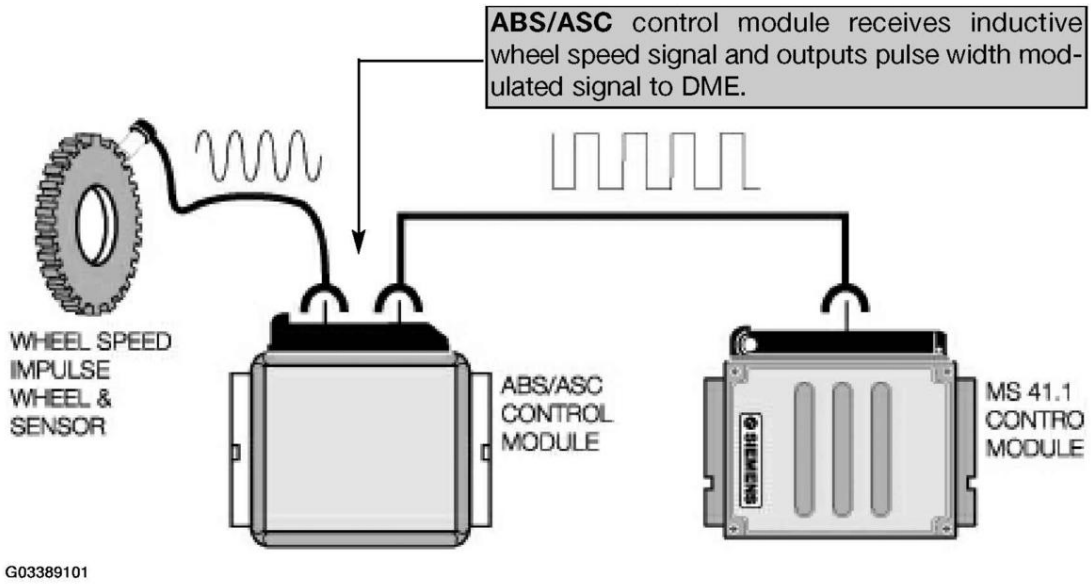


Fig. 38: Identifying Wheel Speed Signal And Output Pulse
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of Modulated, Momentary, Constant B- as Input/Output Signal:

- A/C KO Signal.
- Speed Signal From ABS/ASC.
- TI/TD Output Signal From DME.

Momentary/Constant B^+ as an Input/Output Signal

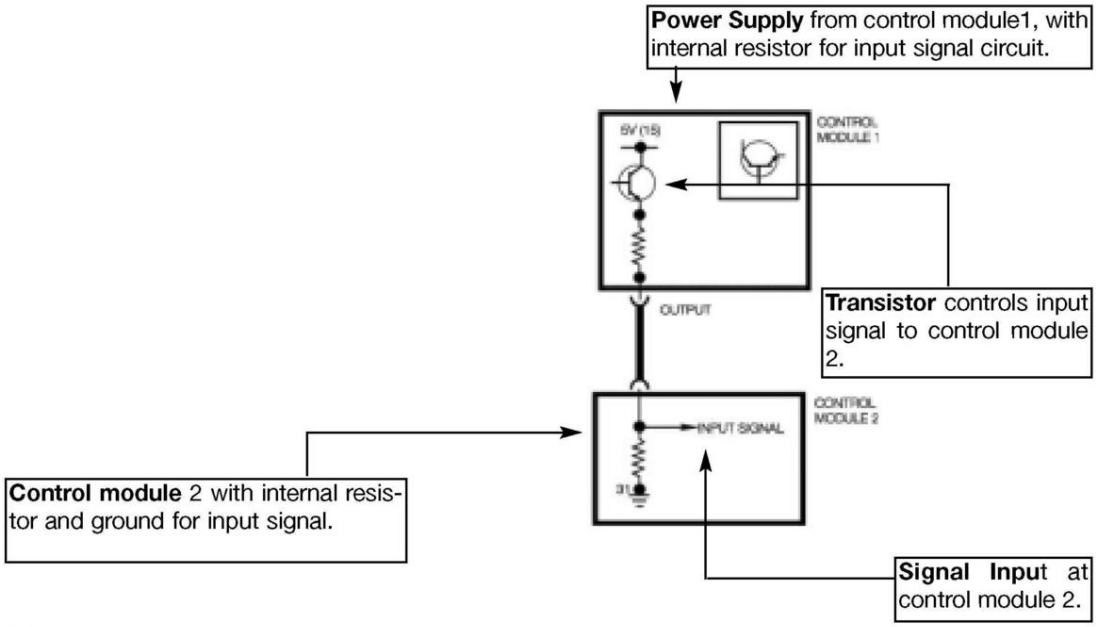


Fig. 39: Identifying Momentary/Constant B As An Input/Output Signal Function
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of Momentary/Constant B^+ as an Input/Output Signal:

- OBC Code Signal to DME.
- A/C Signal to DME.

Constant B-/B+ To Energize a Component

Constant B-

Output function to energize a component.

Relay is energized by control module.

Internal activation of the transistor provides a ground for the relay coil.

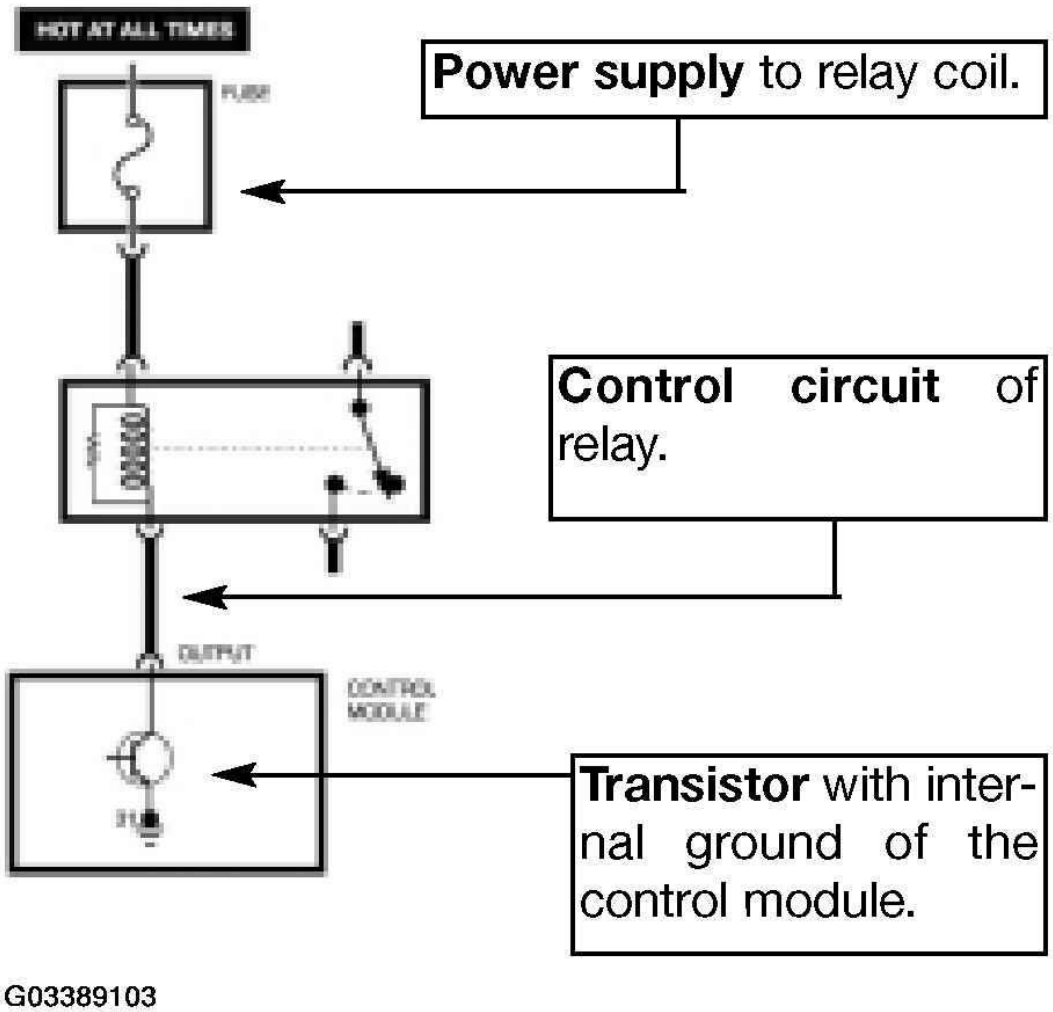


Fig. 40: Identifying Output Function To Energize Component (Constant B-)
Courtesy of BMW OF NORTH AMERICA, INC.

Constant B+

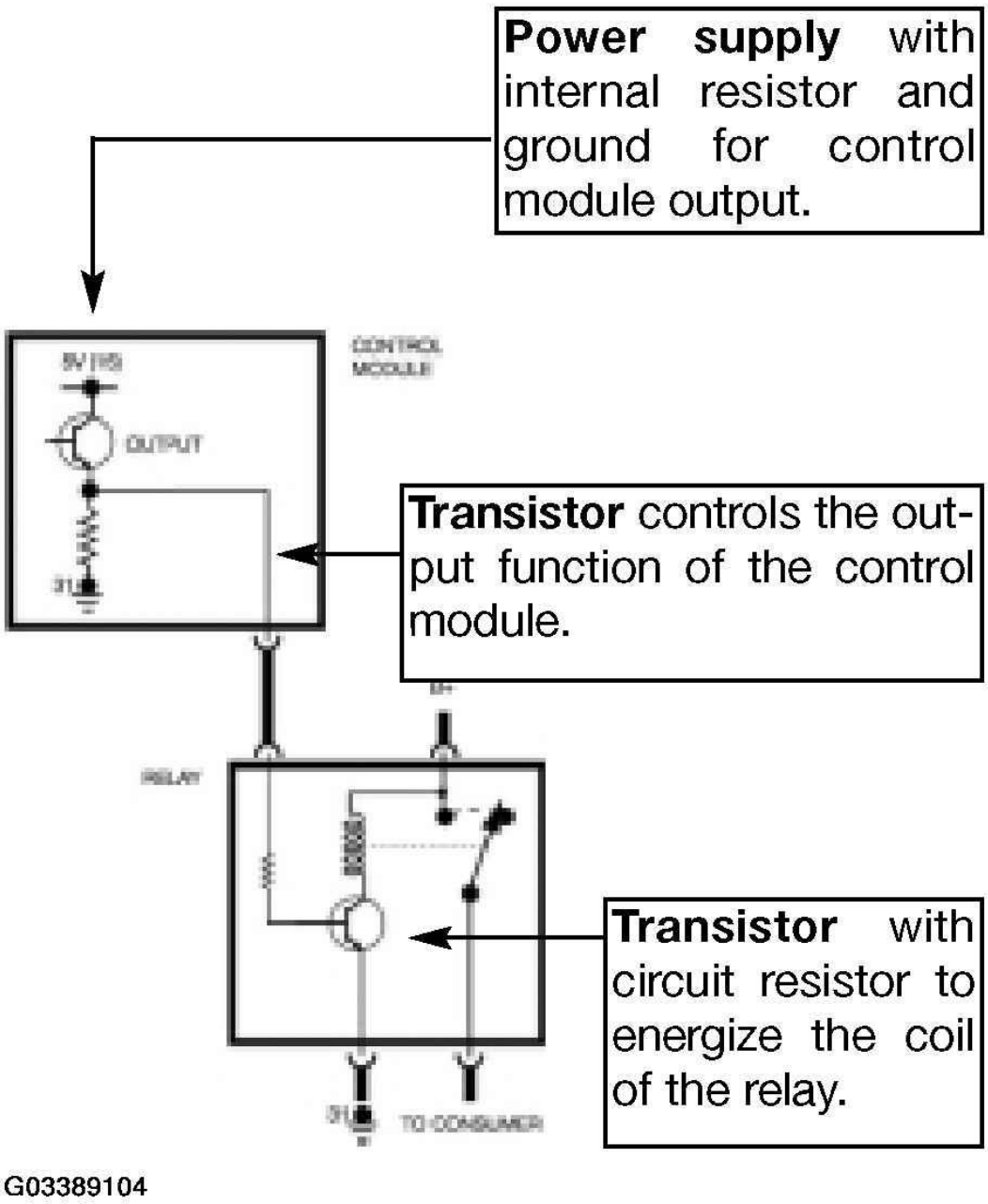


Fig. 41: Identifying Output Function To Energize Component (Constant B+)
Courtesy of BMW OF NORTH AMERICA, INC.

Control module output function to energize a component.

Transistor controls output function of the control module.

Control module supplies power to the relay. The relay is activated by the control module through internal activation of the transistor which provides a ground for the relay coil.

Modulated B-/B+ To Operate A Component

Modulated B-

Output function to operate a component.

The idle valve motor is operated by the control module through internal activation of the transistor which provides a ground for the open winding of the valve.

The idle control valve is operated by regulation of the duty cycle at a specific frequency.

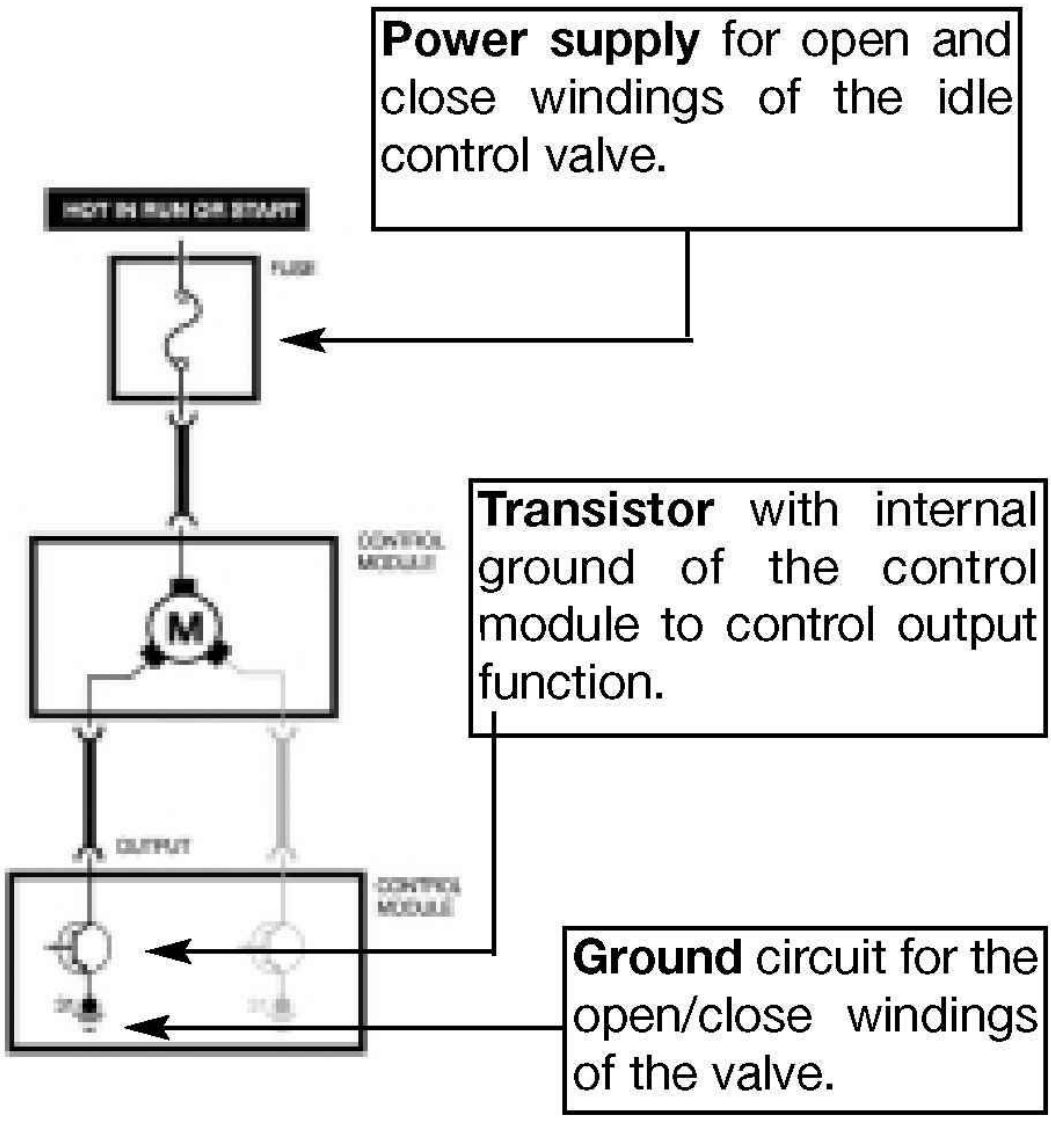


Fig. 42: Identifying Output Function To Operate Component (Modulated B-)
Courtesy of BMW OF NORTH AMERICA, INC.

Typical Application of modulated B-

- Idle Control Motor.
- Purge Valve.
- Injector.
- Ignition Coil.

Modulated B+

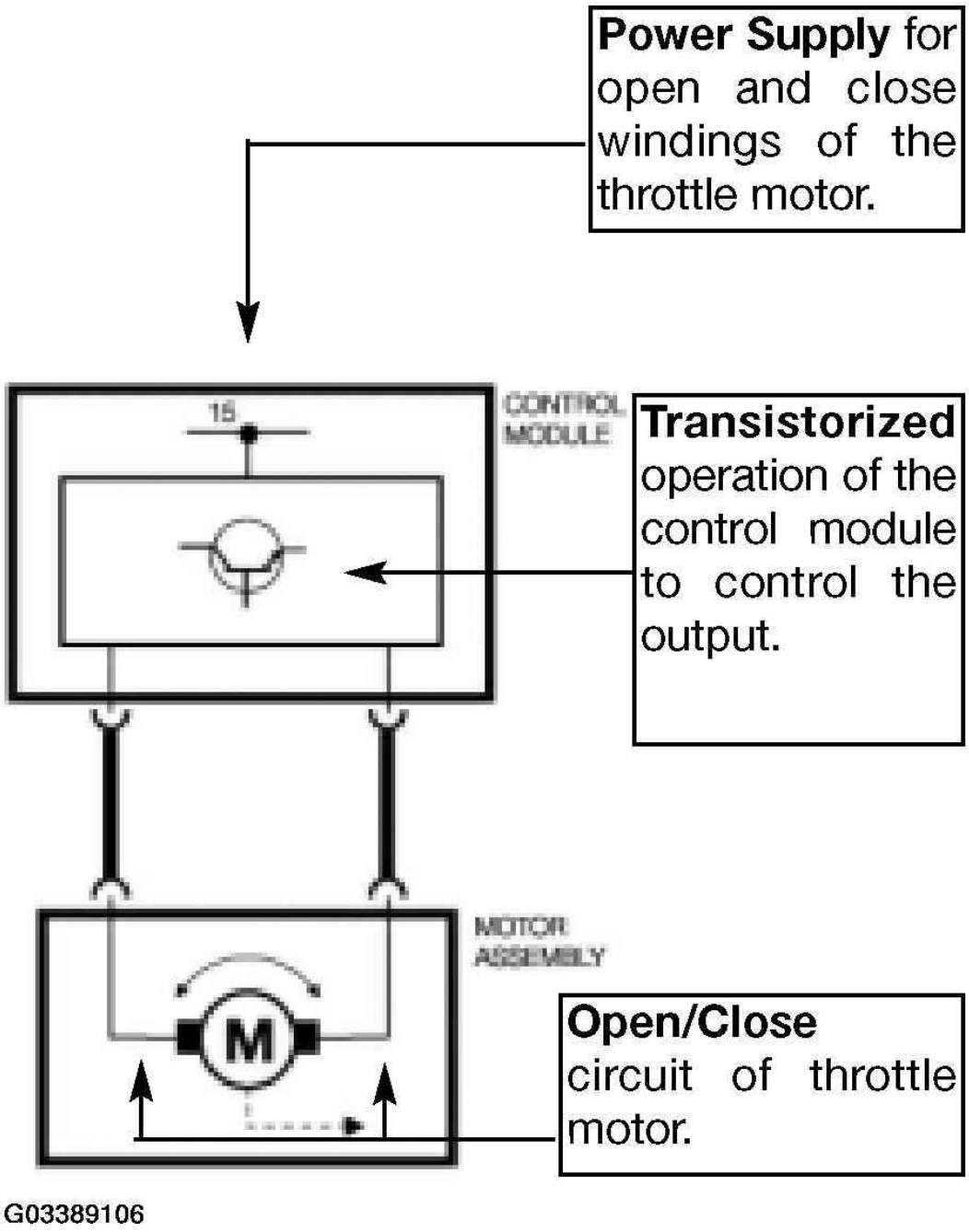


Fig. 43: Identifying Output Function To Operate Component (Modulated B+)
Courtesy of BMW OF NORTH AMERICA, INC.

Output function to operate a component.

The motor is controlled by a transistorized function of the control module, which provides a modulated voltage at a specific frequency to the motor. The throttle position is changed by altering the Duty Cycle of the pulses.

6100 TROUBLESHOOTING

61 20 ... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular motorization and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, only one work scope will be provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery replacement

- Service functions
- Body
- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 12 ... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: ***Do not connect the charger to the 12 V charging socket.***
The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

- **Do not introduce any additional connections at the battery negative terminal.**
- **Do not modify the grounding cable. The grounding cable also serves to dissipate heat.**
- **Do not establish any connection between the IBS and the sensor screw.**
- **Do not use force when disconnecting the pole shoe from the battery terminal:**
  - **Do not pull on the grounding cable.**
  - **Do not place any tools under the IBS to lever off the pole shoe.**
- **Do not use IBS connections as levers.**
- **Use a torque wrench and set tightening torque in accordance with repair instructions.**
- **Do not release or tighten down sensor screw (screw with Torx head).**
- **Avoid contact between IBS and ground.**

WARNING: Danger of destruction to IBS and cables when battery is replaced

- **The IBS and the cables can be destroyed by mechanical strain when the battery is replaced. Therefore avoid mechanical strain.**
- **The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).**
- **Use the battery size (capacity) installed as standard when replacing the battery.**
- **Register battery replacement via Service functions in diagnosis**

system.

- Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.
- Always proceed in accordance with the repair instructions.

NOTE: Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.

- A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.
- For this reason, only replace the IBS when a corresponding fault entry in the DME or DDE.

61 12 ... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

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- **A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.**
- **For this reason, only replace the IBS when a corresponding fault entry in the DME or DDE.**

61 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY** .

Before disconnecting battery

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: **If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.**

IMPORTANT:

- **There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.**
- **The on-board computer and clock may lose your data.**

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

  Do not under any circumstances pull/lever off pole shoes by force.

  Do not under any circumstances release socket-head cap screw of IBS.

- Disconnect terminal of **BATTERY NEGATIVE LEAD** from vehicle battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque **61 21 1AZ** .

After connecting battery

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.
Likewise, individual settings may be lost.
Settings or activations must be carried out, depending on the equipment specification.
For example:

- **If necessary, carry out adjustment of active steering**
- **If necessary, activate slide/tilt sunroof**
- **If necessary, activate POWER WINDOWS**

Refer to the diagnosis system for further vehicle-specific information.

61 13 ... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

ABBREVIATIONS OF PLUG CONTACTS SYSTEM CHART

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1).

Ultrasonically welded plugs (1) must be replaced completely.
Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

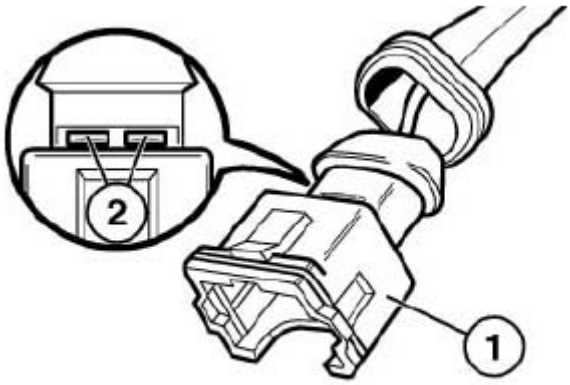

Fig. 1: Identifying Ultrasonic-Welded Connectors And Welds
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Special tools referred to in the repair instructions below are contained in the following special tool kits:**

- **Release and pressing-off tool61 1 150 will be replaced on 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)**
- **Release and pressing-off tool 61 1 100 (engine)**

Repair instructions for opening plug housings and removing contacts of different plug systems

61 00 ... NOTES ON HANDLING OPTICAL FIBRES

IMPORTANT: **To avoid damage when handling optical fibres, comply with the following points:**

- **The minimum permitted bending radius is 25 mm**
- **Do not subject optical fibres to compressive and tensile load**
- **Protect optical fibres against the effects of heat > or =85 °C (e.g. during welding work, drying work with infrared heater or hot air blower)**
- **Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary**

NOTE: **The optical fibres are colored differently as follows:**

- **Green = MOST (M edia O riented S ystems T ransport) fibre-optic cables**

- **Yellow = ISIS (I ntegrated S ervice I nformation S erver) optical fibres**
- **Orange=repair fibre-optic cables**

Follow instructions for processing cables and optical fibres See 6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH or 6113... CRIMPING OPTICAL FIBRES.

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**

- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** or **6113... CRIMPING OPTICAL FIBRES**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special Crimping tool for repairing the coaxial line RTK031 .

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: **Optical fibre cables are colored differently as follows:**

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange = repair optical fibre cables**

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat > or = 85°**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

12 00 ... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.

- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

61 00 ... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations

Safety regulations for handling components of airbag system.

INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Procedure for cable repair

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

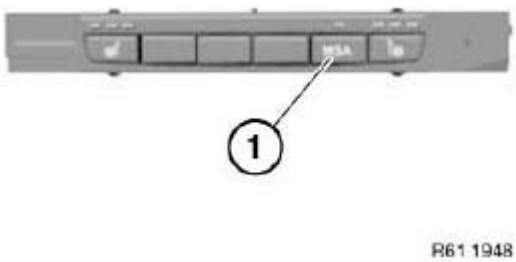

Fig. 2: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

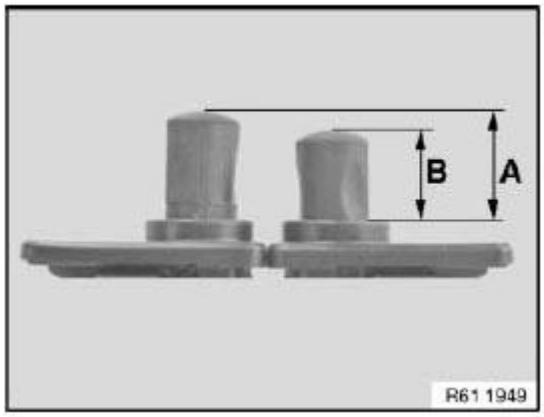

Fig. 3: Identifying Engine Hood/Bonnet Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY

Battery acid is highly corrosive

Do not allow any battery acid to come into contact with the eyes, the skin or clothing. Therefore wear protective clothing, gloves and goggles.

Do not tilt the battery, acid may emerge from the vent opening.

In event of contact with acid

If acid is splashed into the eyes, rinse them immediately for several minutes with clear water. You must then consult a doctor without delay.

If acid is splashed onto the skin or clothing, neutralize it immediately with a soapy solution and rinse with lots of water.

Seek medical attention immediately if battery acid is accidentally swallowed.

Explosion hazard

Strictly no flames, sparks, naked light or smoking!

A highly explosive mixture of electrolytic gas is created when batteries are charged. The rooms where charging is carried out must therefore always be well ventilated.

Avoid the formation of sparks when handling cables, wiring and electrical devices.

Turn the ignition lock to the 0 position before disconnecting or connecting the battery.

Do not place tools or any similar object on the battery (danger of short-circuiting and explosion!).

61 13 ... TREATING CABLES AND FIBRE-OPTIC CABLES

Subject of repair instructions

- **SPECIAL TOOLS FOR WIRING HARNESS REPAIRS**
- **CUTTING CABLES TO LENGTH AND STRIP INSULATION**
- Crimping stop parts (contacts) See **6113... CRIMPING MICRO QUADLOCK SYSTEM CONTACTS (MQS)**; **6113... CRIMPING MICRO POWER QUADLOCK CONTACTS (MPQ)** or **6113... CRIMPING STOP PARTS**
- **BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION**
- **COMB CONNECTOR FOR RETROFITTING/REPAIRS**
- **CUTTING TO LENGTH AND STRIPPING INSULATION FROM OPTICAL FIBRES**

  CRIMPING OPTICAL FIBRES

6111 WIRING HARNESS

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools .

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: **Optical fibre cables are colored differently as follows:**

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange = repair optical fibre cables**

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat > or = 85°**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** or **6113... CRIMPING OPTICAL FIBRES**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

6112 AUXILIARY CABLE

61 12 ... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: ***Do not connect the charger to the 12 V charging socket.***
The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

- **Do not introduce any additional connections at the battery negative terminal.**
- **Do not modify the grounding cable. The grounding cable also serves to dissipate heat.**
- **Do not establish any connection between the IBS and the sensor screw.**
- **Do not use force when disconnecting the pole shoe from the battery terminal:**
  - **Do not pull on the grounding cable.**
  - **Do not place any tools under the IBS to lever off the pole shoe.**
- **Do not use IBS connections as levers.**
- **Use a torque wrench and set tightening torque in accordance with repair instructions.**
- **Do not release or tighten down sensor screw (screw with Torx head).**
- **Avoid contact between IBS and ground.**

WARNING: Danger of destruction to IBS and cables when battery is replaced

- **The IBS and the cables can be destroyed by mechanical strain when the battery is replaced. Therefore avoid mechanical strain.**
- **The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).**
- **Use the battery size (capacity) installed as standard when replacing the battery.**
- **Register battery replacement via Service functions in diagnosis system.**

- **Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.**
- **Always proceed in accordance with the repair instructions.**

NOTE: ***Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.***

- **A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.**
- **For this reason, only replace the IBS when a corresponding fault entry in the DME or DDE.**

61 12 ... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: ***Do not connect the charger to the 12 V charging socket***
The 12 V charging socket is supplied with voltage by the rear distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the power supply be registered by the vehicle.

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- **Do not use force when disconnecting the pole shoe from the battery terminal:**
  - **Do not pull on the grounding cable.**
  - **Do not place any tools under the IBS to lever off the pole shoe.**
- **Do not use IBS connections as levers.**
- **Use a torque wrench and set tightening torque in accordance with repair instructions.**
- **Do not release or tighten down sensor screw (screw with Torx head).**
- **Avoid contact between IBS and ground.**

WARNING: Danger of destruction to IBS and cables when battery is replaced

- **The IBS and the cables can be destroyed by mechanical strain when**

the battery is replaced. Therefore avoid mechanical strain.

- **The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).**
- **Use the battery size (capacity) installed as standard when replacing the battery.**
- **Register battery replacement via Service functions in diagnosis system.**
- **Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.**
- **Always proceed in accordance with the repair instructions.**

NOTE: ***Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.***

- **A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.**
- **For this reason, only replace the IBS when a corresponding fault entry in the DME or DDE.**

61 13 ... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

ABBREVIATIONS OF PLUG CONTACTS SYSTEM CHART

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1). Ultrasonically welded plugs (1) must be replaced completely. Ultrasonic-welded connectors (1) can be identified by the welds (2) on their

longitudinal side.

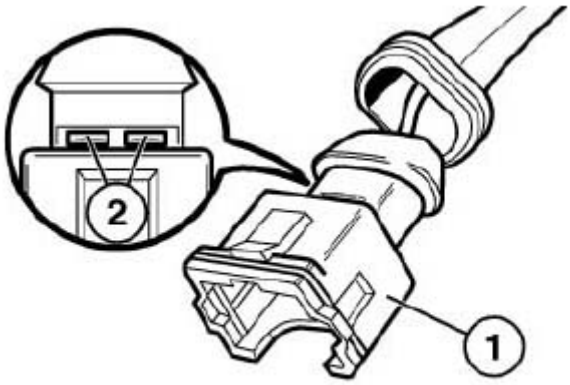


Fig. 4: Identifying Ultrasonic-Welded Connectors And Welds
Courtesy of BMW OF NORTH AMERICA, INC.

Repair instructions for opening plug housings and removing contacts of different plug systems

61 12 013 REPLACING BATTERY NEGATIVE LEAD

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery. Read and comply with notes and instructions on INTELLIGENT BATTERY SENSOR IBS .

Necessary preliminary tasks

- Remove **PANEL FOR LUGGAGE COMPARTMENT SIDE MEMBER**

Loosen nut (1).

Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances use force to pull off negative terminal.

Detach battery negative lead with intelligent battery sensor (IBS) in upward direction, lay to one side and secure.

Unfasten plug connection (2) and disconnect.

Release nut (3) and battery negative lead (4).

Tightening torque **61 12 5AZ** .

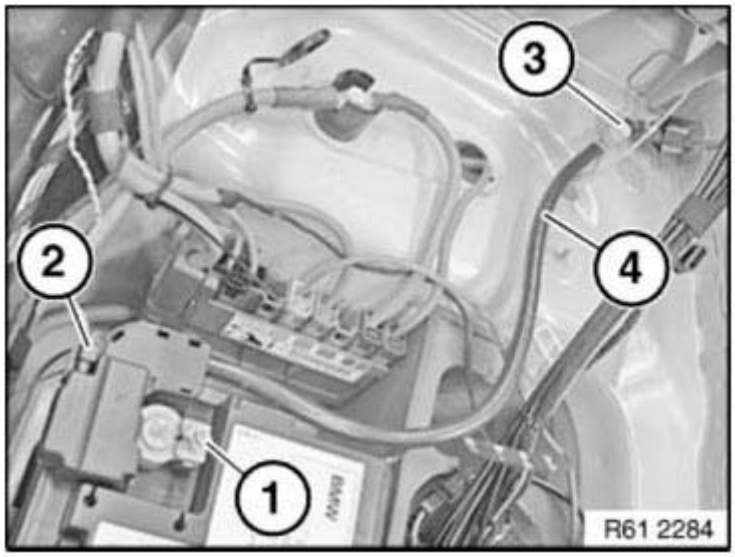


Fig. 5: Identifying Battery Negative Lead And Plug Connection With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 002 REPLACING BATTERY POSITIVE LEAD

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery. Follow instructions for DISCONNECTING AND CONNECTING BATTERY .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**

Unlock and disconnect plug connection for safety battery terminal (1).

IMPORTANT: Do not under any circumstances use force to pull off safety battery terminal.

Loosen nut (2).

Tightening torque **61 21 1AZ** .

Unscrew nut (3).

Tightening torque **61 12 1AZ** .

Release attachment point (4).

Release screw (5).

Tightening torque **61 12 3AZ** .

Disconnect battery positive lead (6).

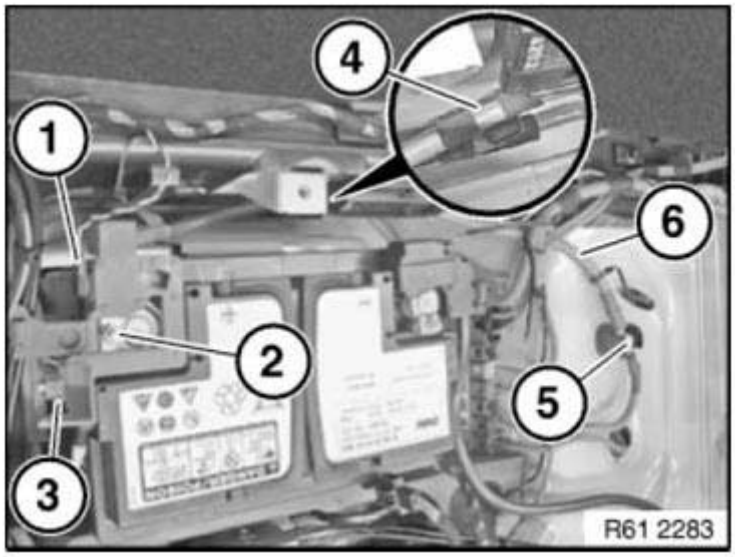


Fig. 6: Identifying Battery Positive Lead Screw And Battery Terminal With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure battery positive lead (6) is correctly routed.

61 12 004 REPLACING BATTERY POSITIVE LEAD (FROM LUGGAGE COMPARTMENT CONNECTOR TO ENGINE BULKHEAD CONNECTOR)

WARNING: Observe safety instructions See 6100... NOTES ON HANDLING WIRING HARNESSES AND CABLES or 6120... (SAFETY) INFORMATION ON AGM BATTERY for handling vehicle battery.
Read and comply with notes on HANDLING WIRING HARNESSES and cables.

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**
- Disconnect **BATTERY NEGATIVE LEAD**

Release screw (1).

Tightening torque **61 12 3AZ** .

Unfasten plug connection (2) and disconnect.

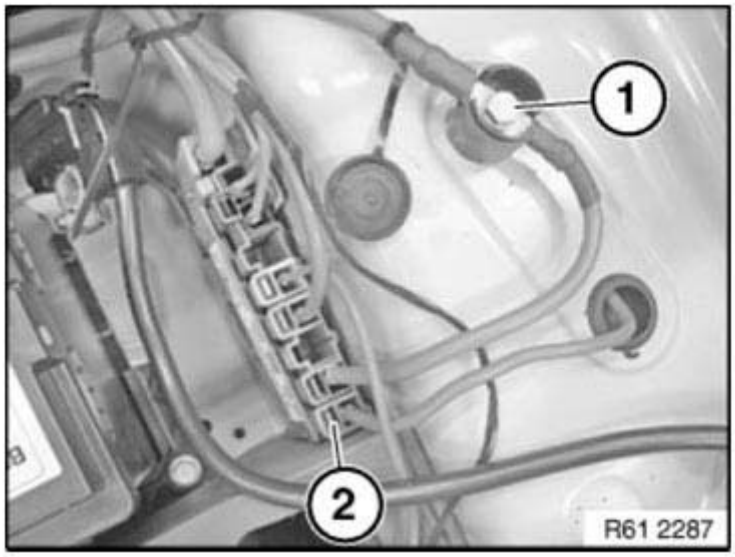


Fig. 7: Identifying Plug Connection With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out vacuum hose (1).

Release nuts (2).

Release all screws.

Remove heat shield (3) towards bottom.

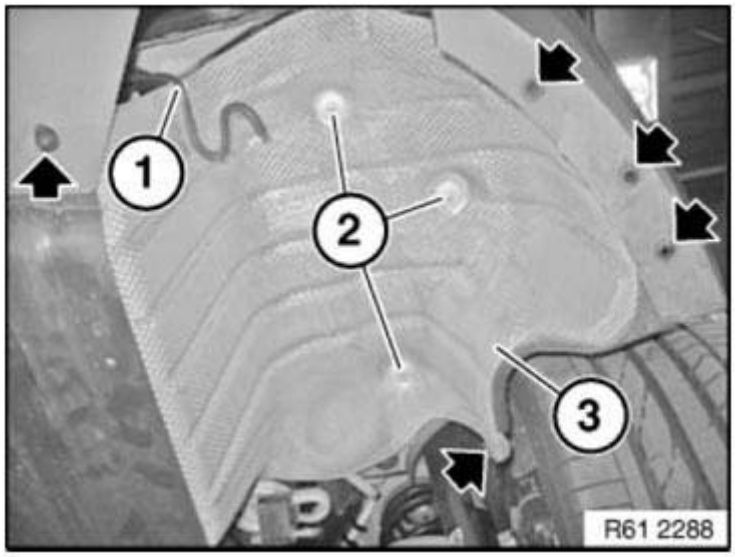


Fig. 8: Locating Heat Shield Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out battery positive leads (1) towards bottom.

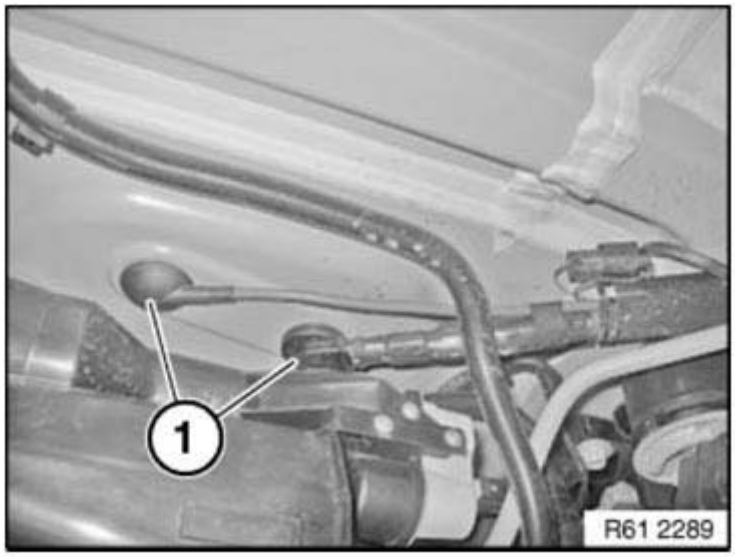


Fig. 9: Identifying Battery Positive Leads
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Release cable tie and remove cover (2).

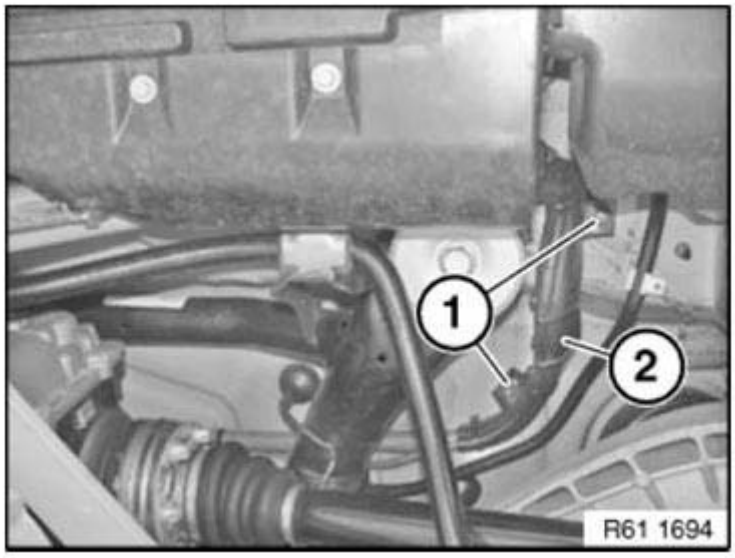


Fig. 10: Identifying Cover With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable holder (1).

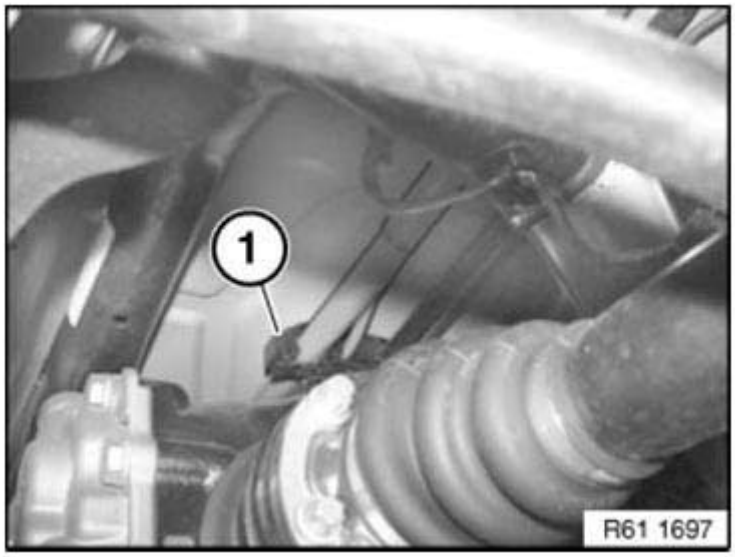


Fig. 11: Identifying Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Remove duct cover (2).

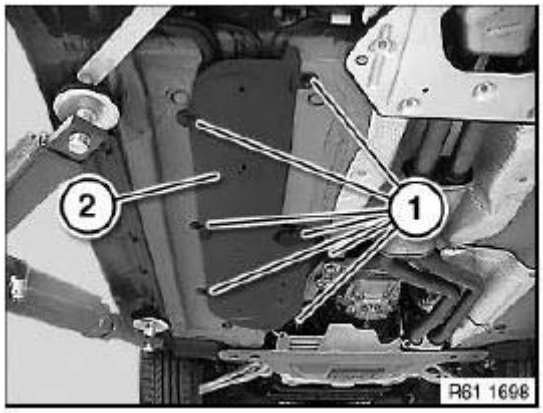


Fig. 12: Identifying Duct Cover With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable holder (1).

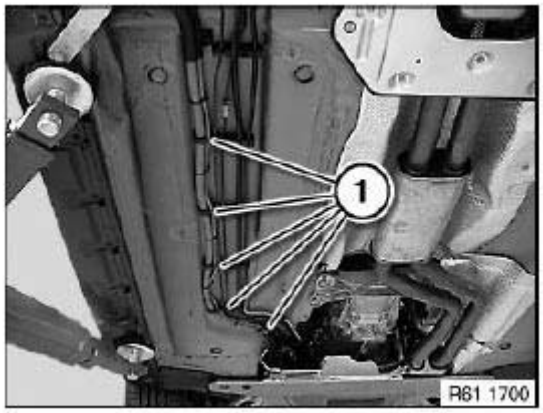


Fig. 13: Identifying Cable Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove electronics box cover (2).

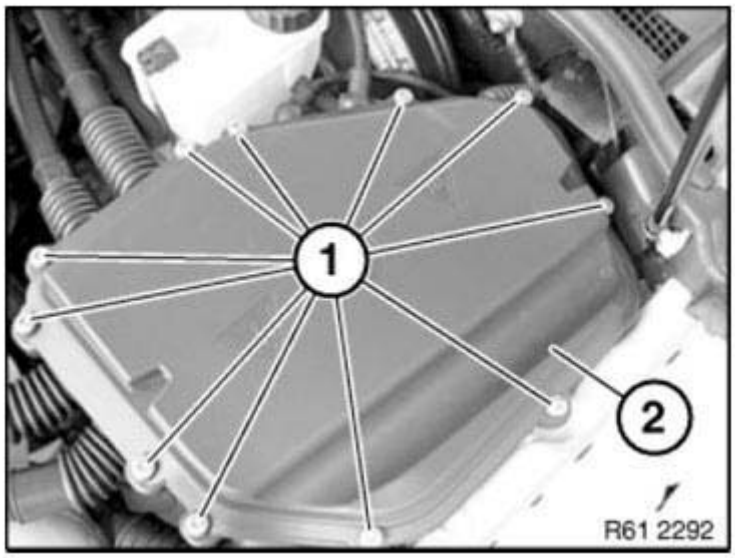


Fig. 14: Identifying Electronics Box Cover With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove battery positive lead with wiring harness grommet (2) from electronics box.

Installation:

Make sure wiring harness grommets (2) are correctly seated in electronics box.

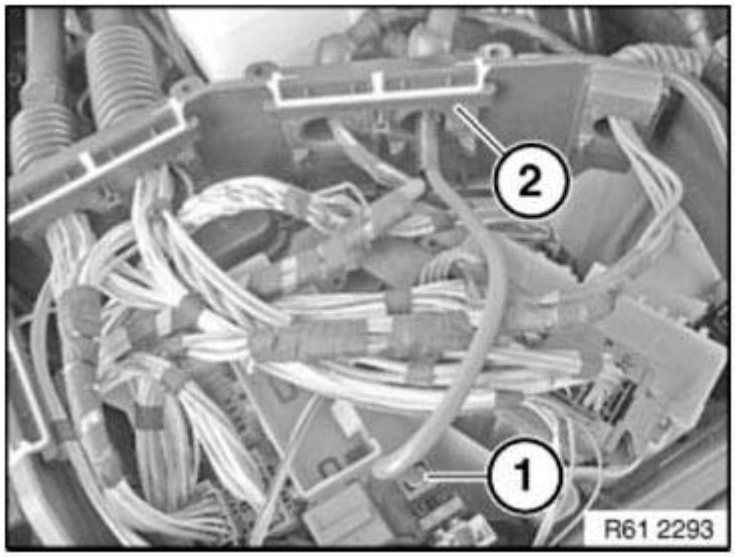


Fig. 15: Identifying Plug Connection And Wiring Harness Grommets
Courtesy of BMW OF NORTH AMERICA, INC.

Remove cover cap (1) from B+ terminal.

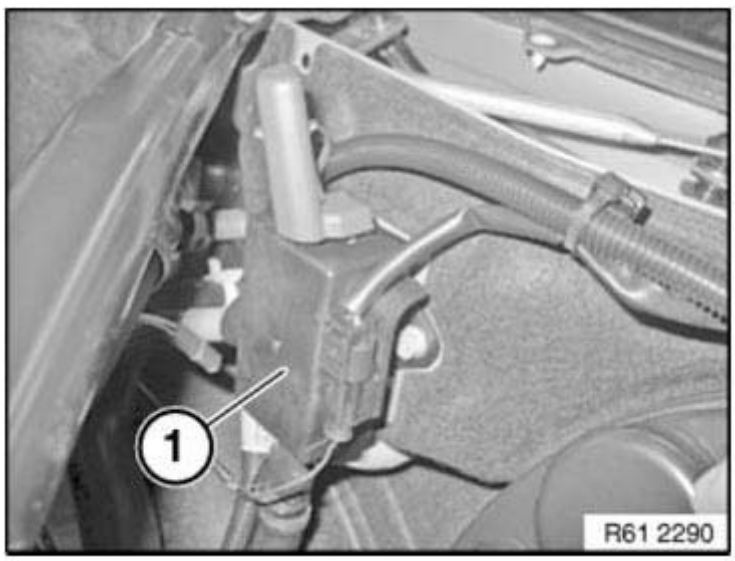


Fig. 16: Identifying Cover Cap Of B+ Terminal
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **61 12 2AZ** .

Remove battery positive lead in downward direction.

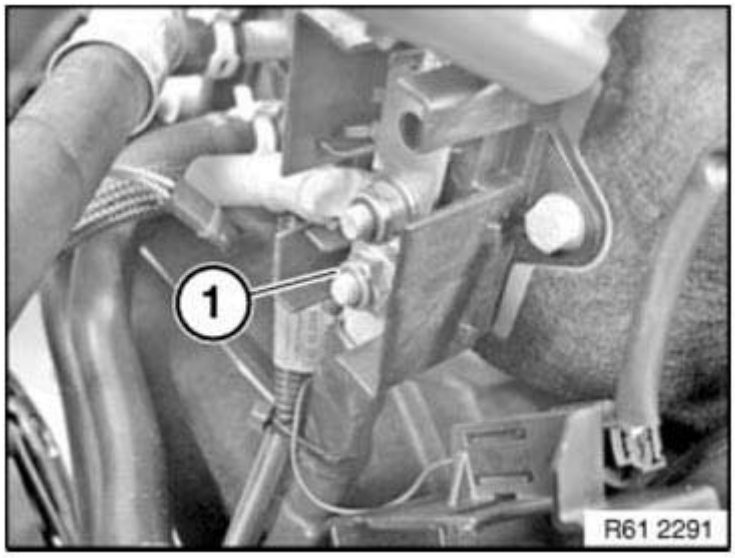


Fig. 17: Identifying Battery Positive Lead Nut
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 062 REPLACING WIRING HARNESS FOR FRONT BUMPER

IMPORTANT: Read and comply with notes on HANDLING WIRING HARNESSES and cables.

Necessary preliminary tasks

- Remove front bumper trim See **5111156 REMOVING AND INSTALLING FRONT BUMPER TRIM** or **5111157 REPLACING FRONT BUMPER TRIM** .

Unlock and disconnect plug connections (1) of all four ultrasonic transducers.

Unclip wiring harness (2) from bumper trim (3).

Remove wiring harness (2) from bumper trim (3).

Remove PDC See **6620518 REMOVING AND INSTALLING/REPLACING A FRONT ULTRASONIC TRANSDUCER (SIDE)** or **6620520 REMOVING AND INSTALLING/REPLACING A FRONT ULTRASONIC TRANSDUCER (MIDDLE)** .

Installation:

Make sure wiring harness (2) is laid correctly.

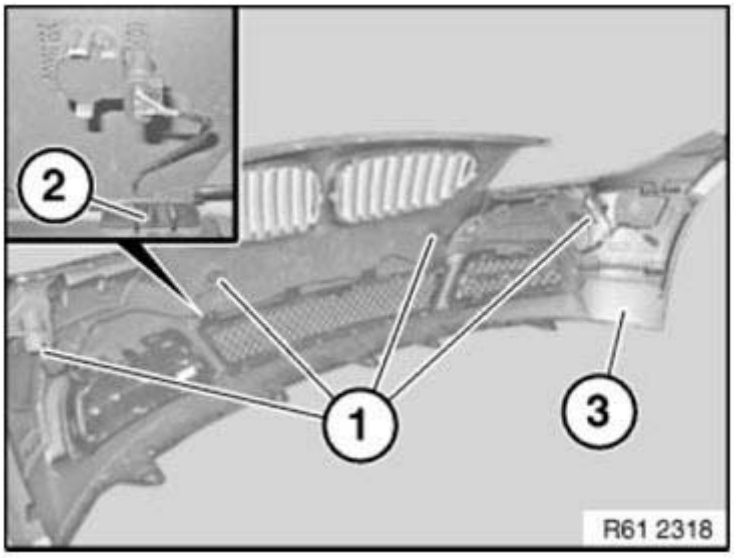


Fig. 18: Identifying Plug Connection And Wiring Harness Of Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

61 12 200 REPLACING WIRING HARNESS IN LEFT OR RIGHT FRONT DOOR

Necessary preliminary tasks

- Close front side window completely
- Remove **FRONT DOOR TRIM**
- Remove **SOUND INSULATION IN FRONT DOOR**

Release screws (1).

Disconnect plug connections (2).

Cut open cable fastener (3).

Remove speaker holder (4).

Installation:

Make sure door wiring harness is correctly laid.

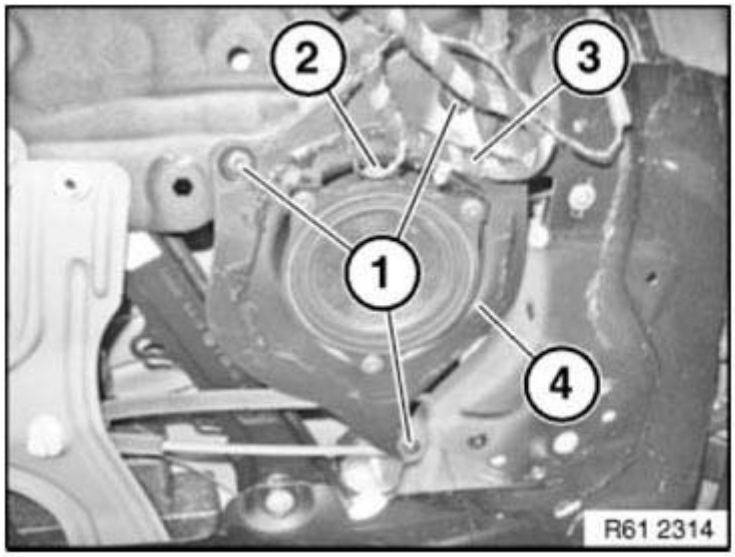


Fig. 19: Identifying Speaker Holder, Cable Fastener And Plug Connection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable tie (1).

Unfasten plug connection (2) and disconnect.

Installation:

Replace cable tie (1).

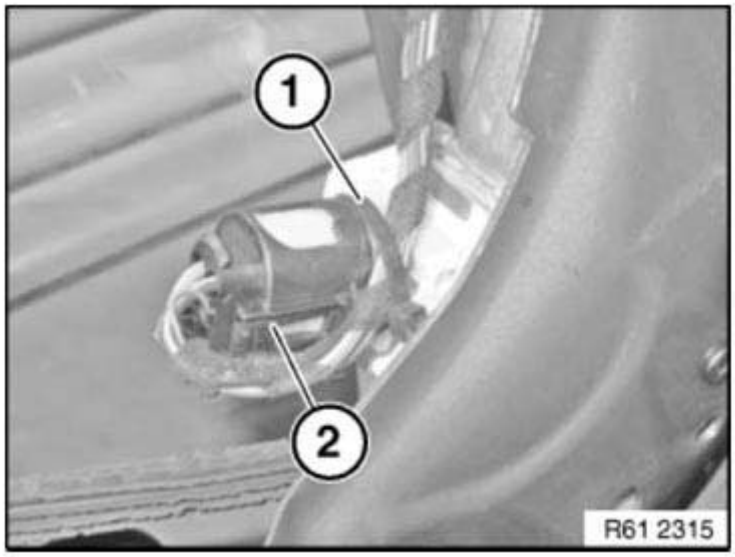


Fig. 20: Identifying Plug Connection And Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Front side panel shown removed for purposes of clarity.**

Release screw (1), fold door wiring harness plug on A-pillar (2) downwards slightly and remove.

Unlock plug connection behind and disconnect.

Pull rubber grommet (3) in direction of arrow out of front door (4).

Feed out door wiring harness towards front to A-pillar and remove.

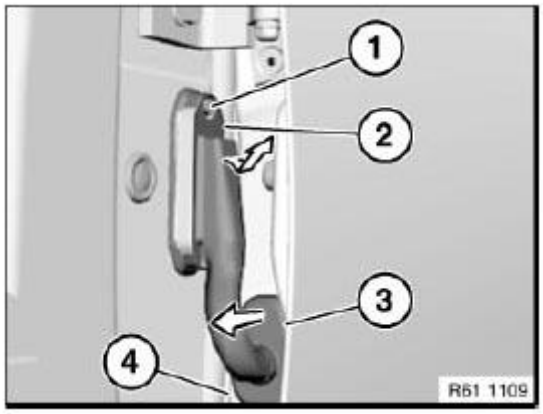


Fig. 21: Pulling Rubber Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

6113 PLUG CONNECTION, TERMINAL, FUSE BOX

61 13 ... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

IMPORTANT:

1. **Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).**
2. **Read out fault memory**
3. **Eliminate cause of damage.**
4. **Disconnect battery negative terminal**
5. **Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)**
6. **Carry out function test and read out fault memories again**
7. **Eliminate new faults if applicable and clear fault memories**

NOTE: **The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.**

The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Service.

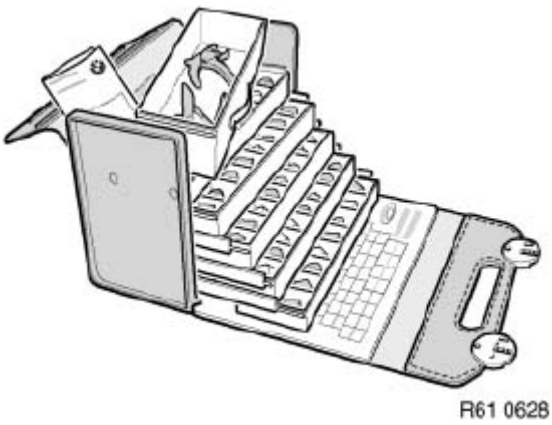


Fig. 22: Identifying Wiring Harness Repair Kit
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.

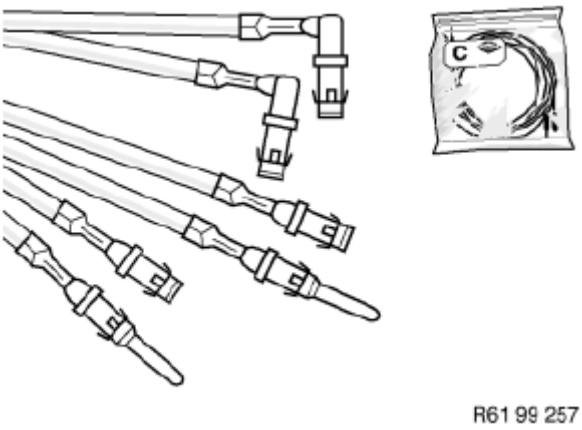


Fig. 23: Identifying Repair Kit, Circular Plug System D 2.5
Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose

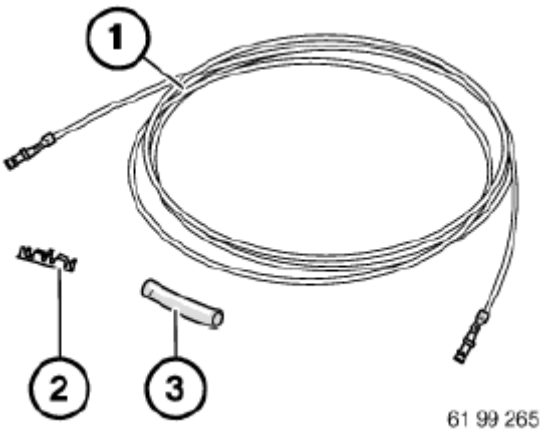


Fig. 24: Identifying Cable With Wire Cross-Section, Crimp Connector And Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool kit 61 0 300.

See repair instructions

INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS of different plug contact systems.

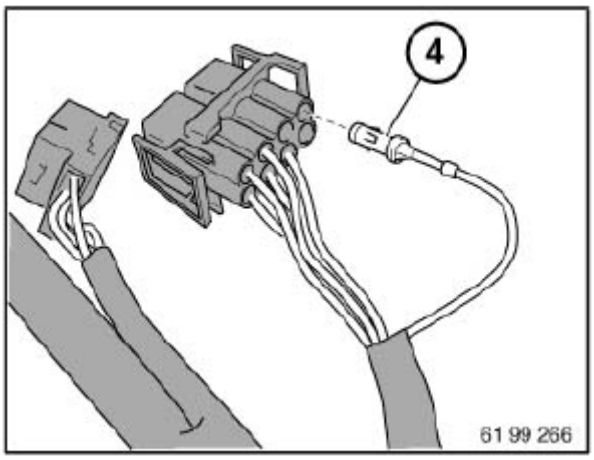


Fig. 25: Identifying Damage Cable With Socket Number
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Check maximum length of repair cable**
- **If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.**

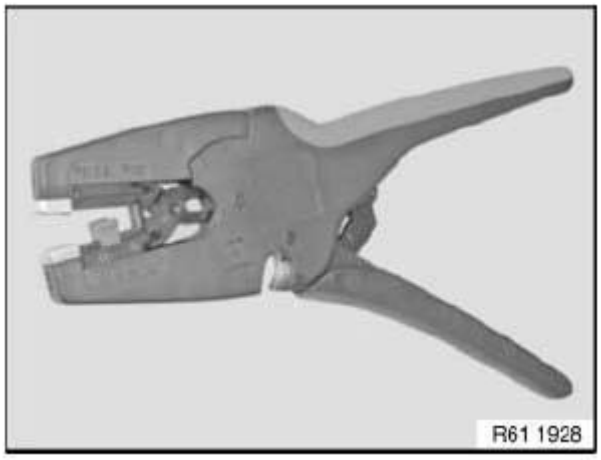


Fig. 26: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

Crimp butt connector on preassembled wire end.

Special tools:

- 61 4 328 (0.35 - 2.5 mm^2
- 61 0 240 (4.0 - 6.0 mm^2

See repair instructions

CRIMPING ON STOP PARTS

61 99 270

Fig. 27: Identifying Crimp Butt Connector On Preassembled Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

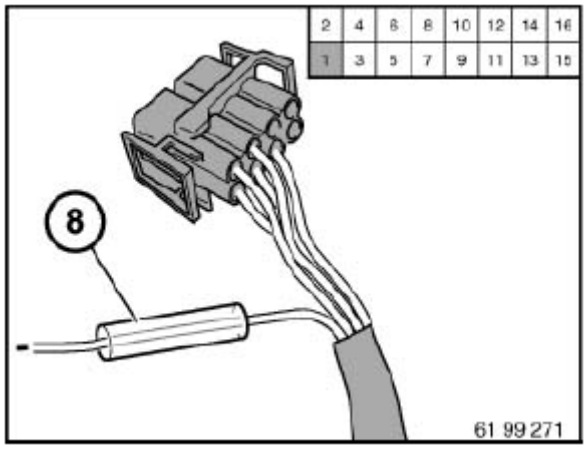


Fig. 28: Identifying Shrink-Fit Hose On Free Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

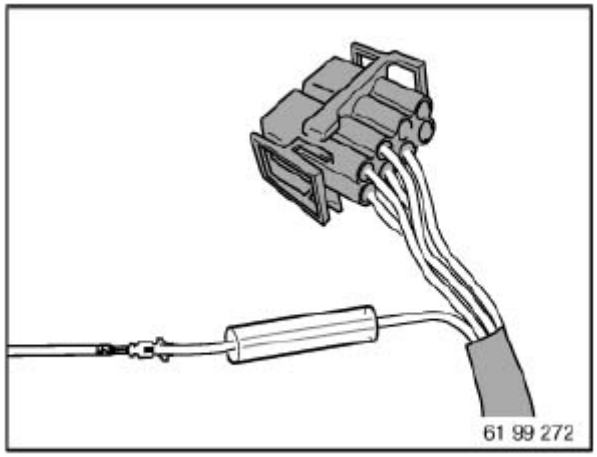


Fig. 29: Crimping Of Unused Wire End To Butt Connector

Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

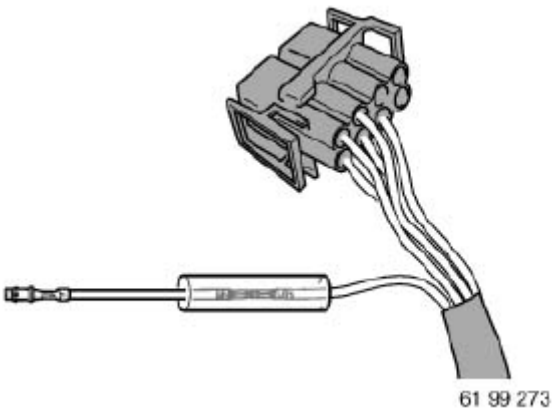


Fig. 30: Identifying Shrink-On Sleeve Over Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

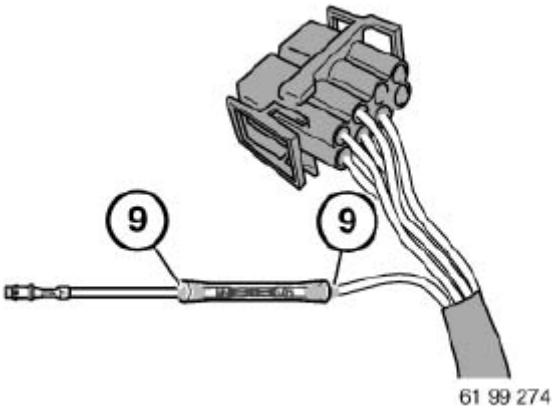


Fig. 31: Identifying Shrink On Shrink-On Sleeve Ends
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CIRCULAR CONNECTOR, 7-PIN, 8-PIN, SYSTEM D2.5

Carefully pull off rubber grommet (1).

Carefully press back retaining lugs (2) of internal connector (3).

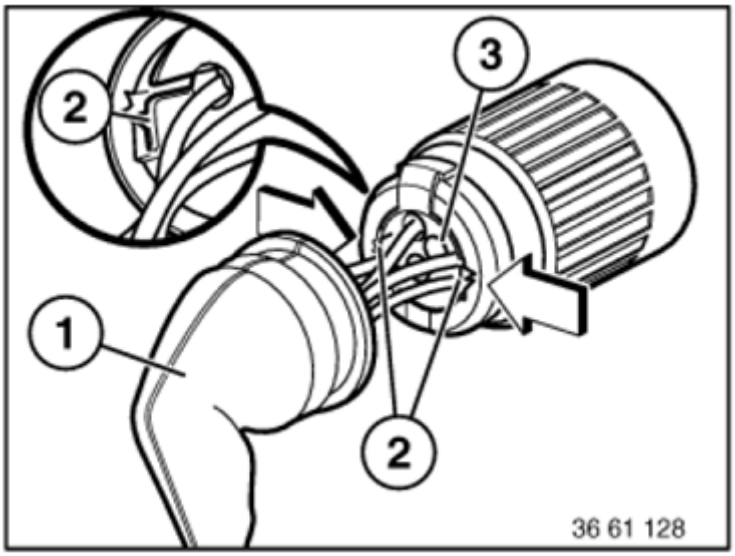


Fig. 32: Pressing Back Retaining Lugs Of Internal Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Slide internal connector (3) in direction of arrow until retaining lugs (2) lock into locking groove (4).

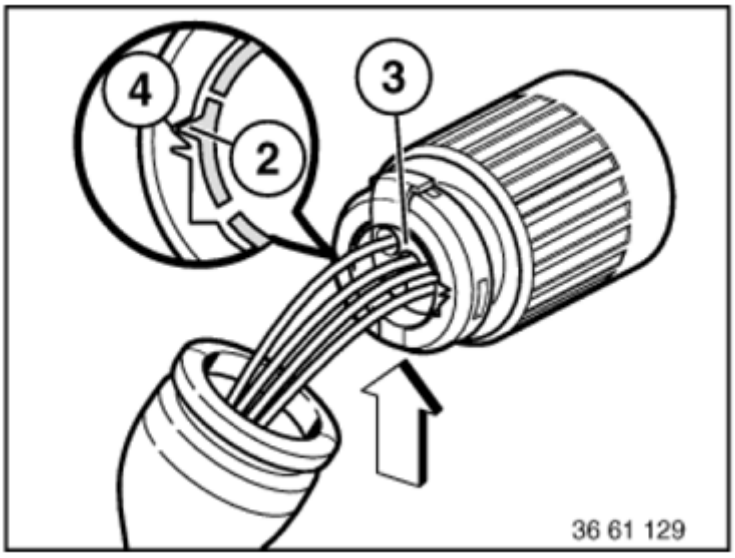


Fig. 33: Sliding Internal Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool 61 0 303 (61 1 132) to press back retaining hook (5) of corresponding contact and pull out cable with contact.

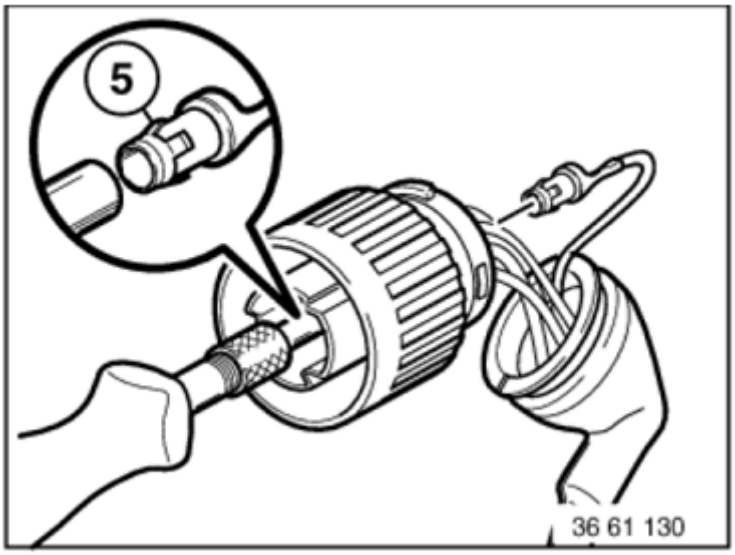


Fig. 34: Pressing Back Retaining Hook Using Special Tool (61 0 303)
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CRIMPING MICRO POWER QUADLOCK CONTACTS (MPQ)

To crimp MPQ contacts, use hand pliers 61 4 321 (1) in conjunction with crimping head 61 4 325 (2) from crimping set 61 4 320 .

NOTE: Hand pliers (1) open automatically as far as they will go when handles are pressed together.

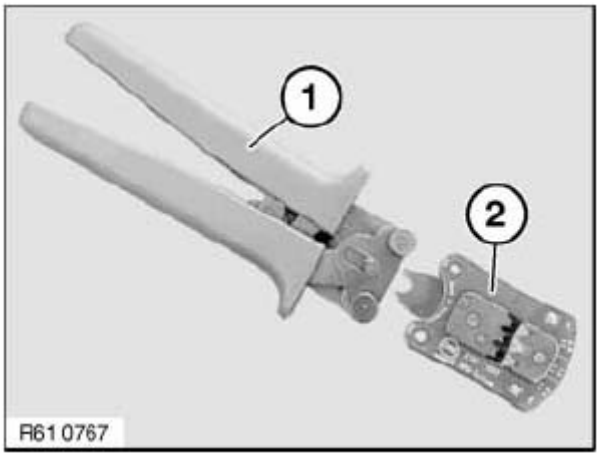


Fig. 35: Identifying Hand Pliers With Crimping Head (61 4 325)
Courtesy of BMW OF NORTH AMERICA, INC.

Open hand pliers (1).

NOTE: Place contact (2) with utmost care in designated nest (observe line cross-

section) in crimping head (3). Make sure it is exactly positioned.

Place MPQ contact (2) in crimping head (3).

Close hand pliers (1) one notch.

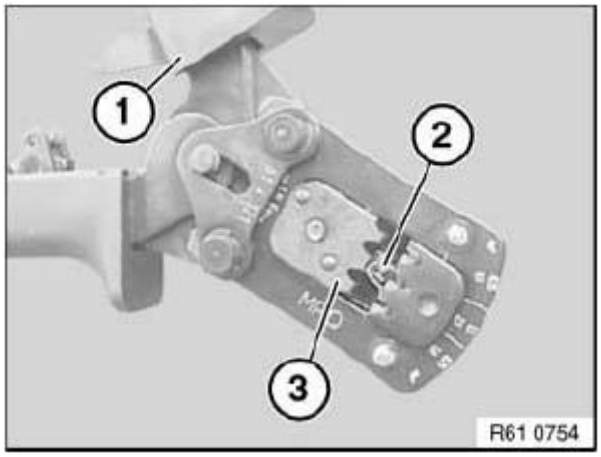


Fig. 36: Identifying Hand Pliers With Crimping Head And MPQ Contact
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION from cables.

Insert stripped cable (2).

Close hand pliers (1) fully.

Open hand pliers (1) and remove cable (2).

IMPORTANT: Check contact for correct crimping.

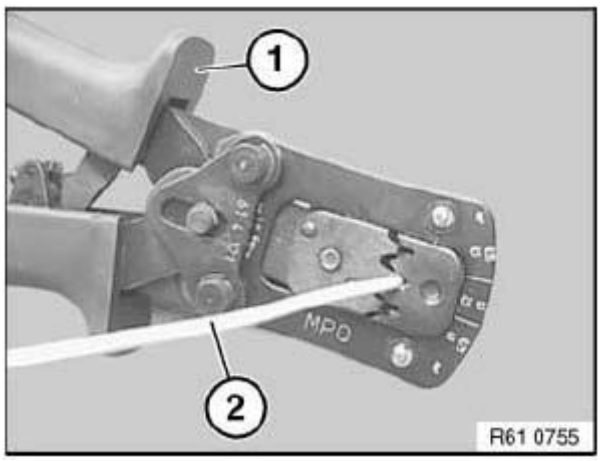


Fig. 37: Removing Cable Using Hand Plier
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CRIMPING MICRO QUADLOCK SYSTEM CONTACTS (MQS)

To crimp MPQ contacts, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 324 (2) from crimping set 61 4 320 .

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

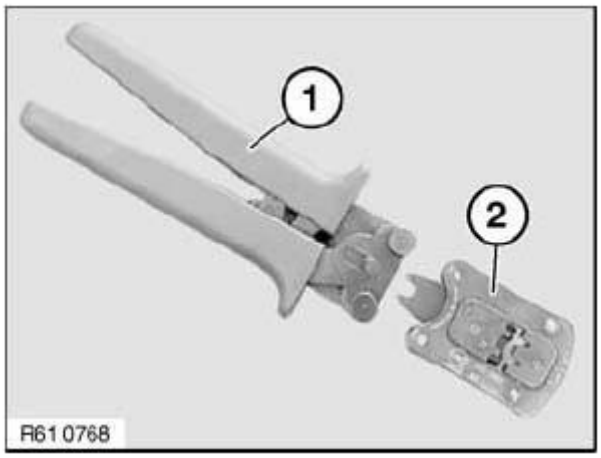


Fig. 38: Identifying Hand Pliers With Crimping Head (61 4 324)
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (1).

Fold up contact carrier (2).

Insert MQS contact (3) in contact carrier (2).

Fold back contact carrier (2).

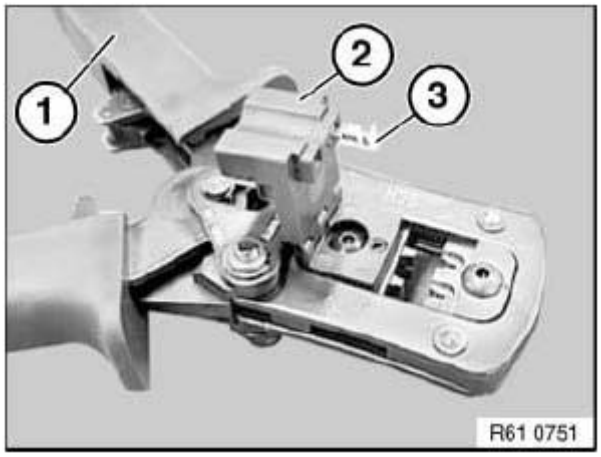


Fig. 39: Inserting MQS Contact On Contact Carrier Of Plier
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION from cables.

Close pliers (1) one notch.

Insert stripped cable (2).

Close pliers (1) fully.

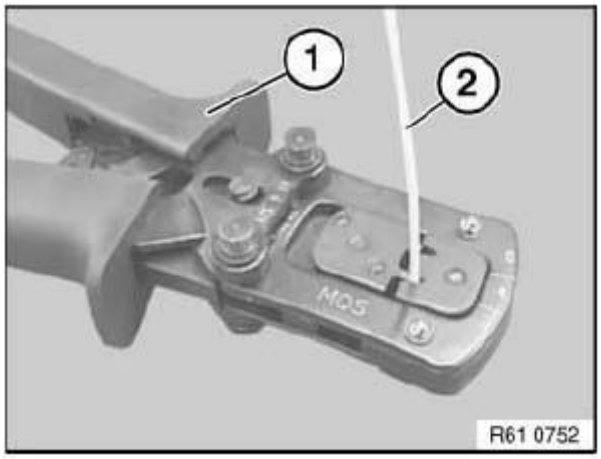


Fig. 40: Inserting Stripped Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (1).

Open contact carrier (2) gently and carefully remove MQS contact.

IMPORTANT: Check contact for correct crimping.

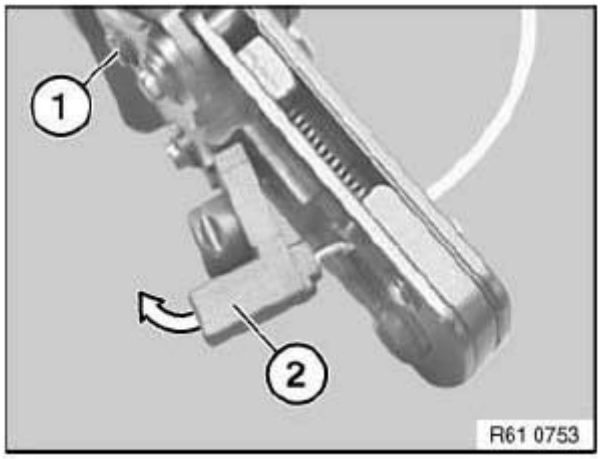


Fig. 41: Removing MQS Contact
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CRIMPING OPTICAL FIBRES

Special tools required

To crimp optical fibres, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 323 (2) from crimping set 61 4 320 .

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

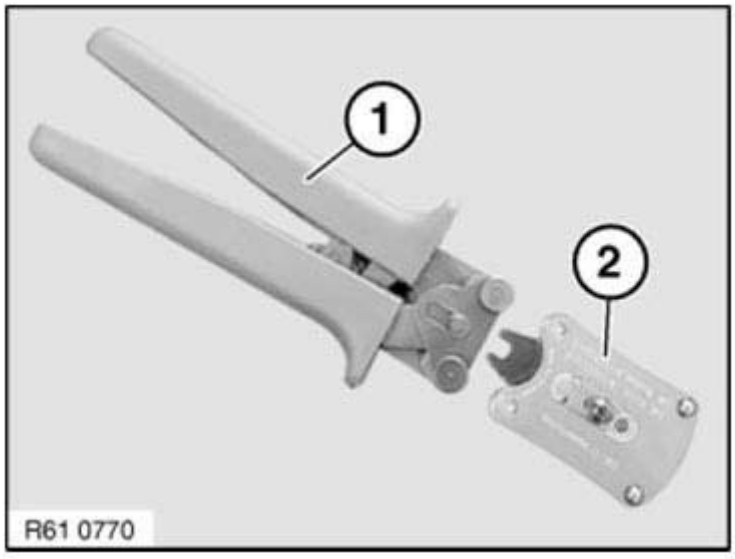


Fig. 42: Identifying Pliers 61 4 321 With Crimping Head 61 4 323
Courtesy of BMW OF NORTH AMERICA, INC.

Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).

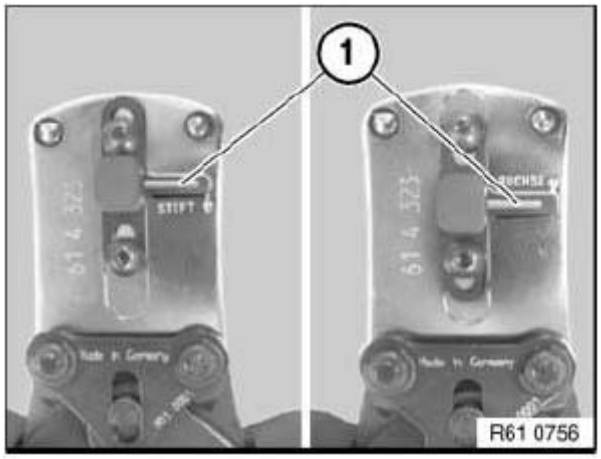


Fig. 43: Identifying Stop Lever On Plier
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

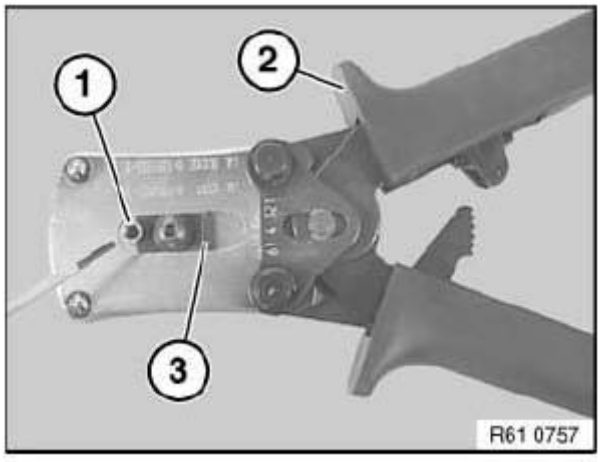


Fig. 44: Placing Pin Contact Or Jack On Crimping Head
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION FROM OPTICAL FIBRES .

Insert stripped optical fibre (1) as far as it will go into pin contact or jack (2).

Close pliers (3) fully.

Open pliers (3) and locking lever (4).

Remove optical fibre (1).

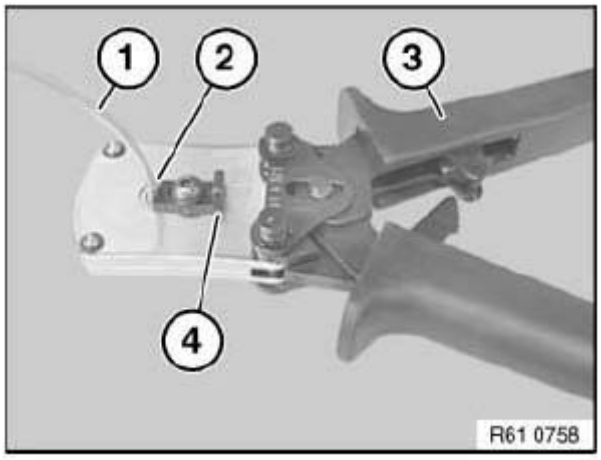


Fig. 45: Removing Optical Fibre
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).

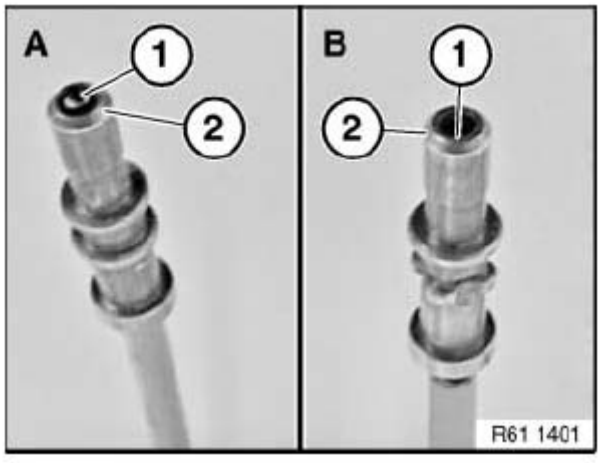


Fig. 46: Identifying Optical Fibre End With Pin Contact Tip
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CRIMPING OPTICAL FIBRES

To crimp optical fibres, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 323 (2) from crimping set 61 4 320 .

NOTE: **Pliers (1) open automatically as far as they will go when handles are pressed together.**

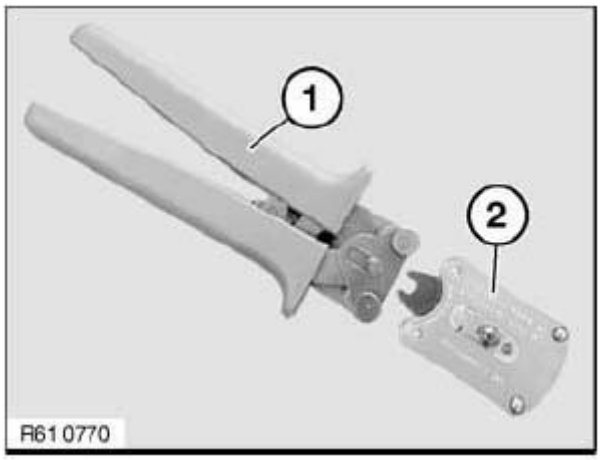


Fig. 47: Identifying Hand Pliers With Crimping Head (61 4 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Move contact guide by means of stop lever (1) into corresponding position (pin contact or jack).

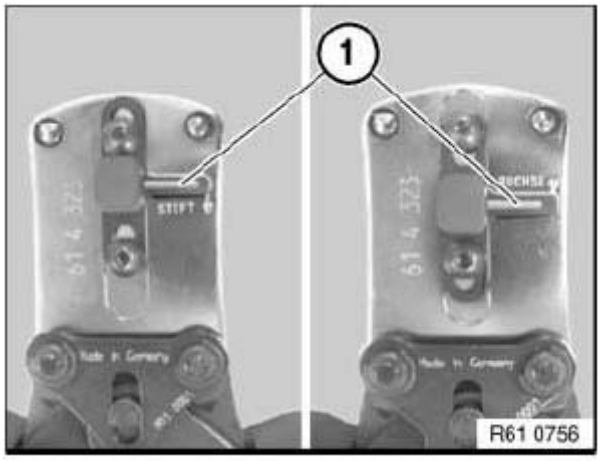


Fig. 48: Move Contact Guide By Means Of Stop Lever (1)
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (2).

Place pin contact or jack (1) in crimping head and secure with locking lever (3).

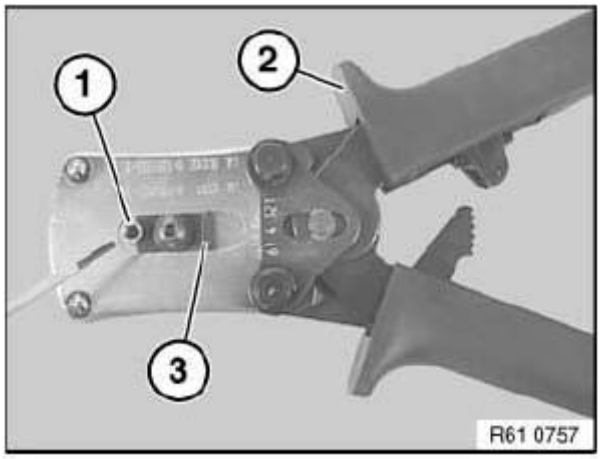


Fig. 49: Placing Pin Contact Or Jack On Crimping Head
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Follow procedure for CUTTING AND STRIPPING INSULATION FROM OPTICAL FIBRES .

Insert stripped optical fibre (1) as far as it will go into pin contact or jack (2).

Close pliers (3) fully.

Open pliers (3) and locking lever (4).

Remove optical fibre (1).

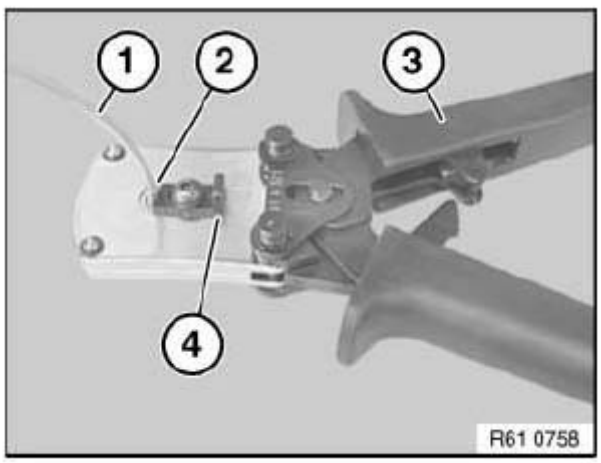


Fig. 50: Removing Optical Fibre
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Make sure optical fibre is correctly seated in jack.

Right (A)

End of optical fibre (1) must be flush with tip of pin contact (2).

Wrong (B)

End of optical fibre (1) is not flush with tip of pin contact (2).

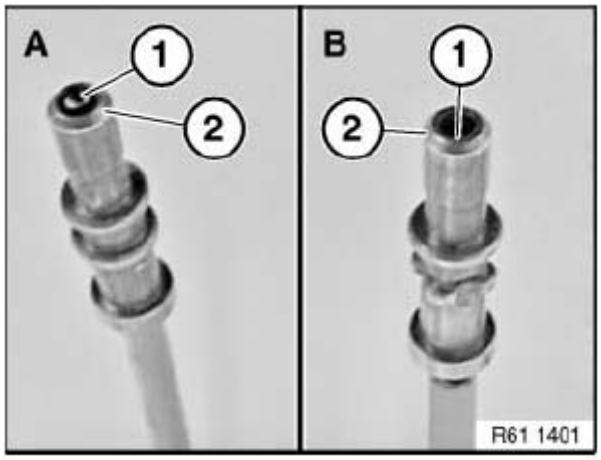


Fig. 51: Identifying Optical Fibre End With Pin Contact Tip
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CRIMPING STOP PARTS

Necessary preliminary work:

- Cut cables to length and strip insulation

Special tools for wiring harness repairs.

Spare parts for vehicle electrical system (stop parts and housings):

- Sourcing reference: BMW Parts Service.

1. Crimping stop parts up to 2.5 mm ^{2}

Crimping Micro Quadlock System contacts (MQS).

- Special tool 61 4 320

Crimping Micro Power Quadlock contacts (MPQ).

- Special tool 61 4 325

Crimping miscellaneous stop parts up to 2.5 mm^2

- Special tool 61 4 328

2. Crimping stop parts including and over 2.5 mm 2

Crimping load current contacts (LSK 8).

- Special tool 61 0 210

Crimping SLK 2.8.

- Special tool 61 0 220

Crimping double spring contact (DFK 40)

Crimping MAK 8

- Special tool 61 0 230

Checking crimping

Check insulation crimping (8) and wire crimp (9) against following illustrations to ensure crimps are correctly located.

NOTE: Illustration shows butt connectors and contact sleeves for comb connectors knocked on one side. The crimping procedure is identical here.

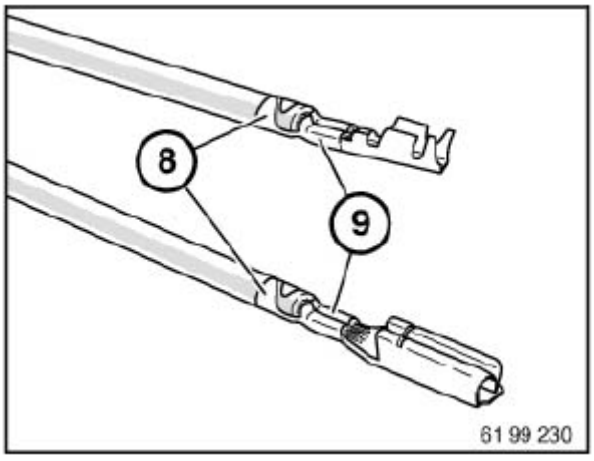
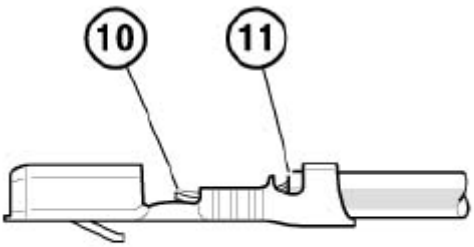


Fig. 52: Identifying Crimping Insulation And Wire Crimp
Courtesy of BMW OF NORTH AMERICA, INC.

Correct crimping:

Visible conductor end (10).

Visible insulation end (11).



61 99 231

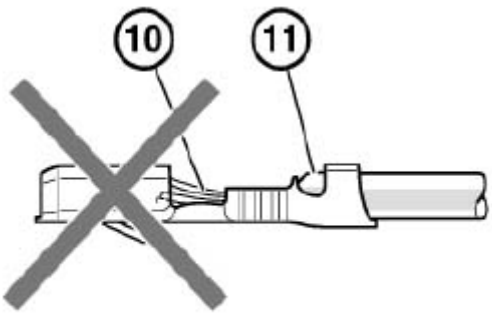
Fig. 53: Identifying Conductor And Insulator Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Incorrect crimping:

Conductor end (10) inserted too far.

Insulation end (11) in wire crimp.

If necessary, repeat crimping with a new contact.



61 99 232

Fig. 54: Incorrect Crimping (Conductor End Inserted Too Far)
Courtesy of BMW OF NORTH AMERICA, INC.

Incorrect crimping:

Conductor end (10) not visible.

Insulation end (11) not visible.

If necessary, repeat crimping with a new contact.

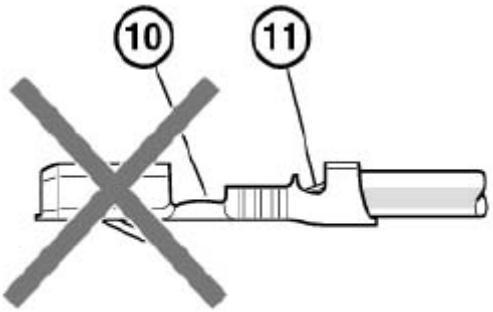


Fig. 55: Incorrect Crimping (Conductor End Not Visible)
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH

To cut off, strip insulation and cut optical fibres to length, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 322 (2) 61 4 320 from crimping set.

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

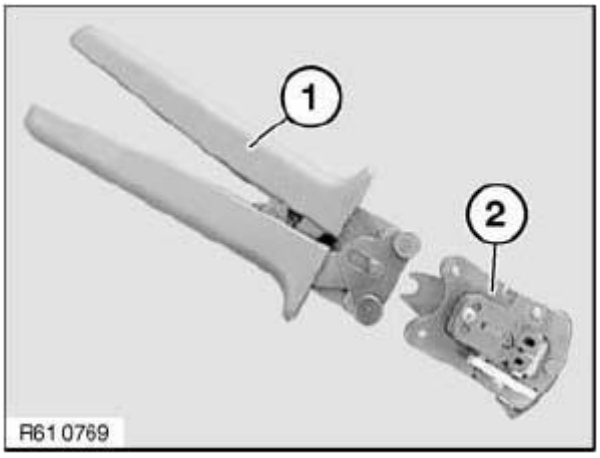


Fig. 56: Identifying Hand Pliers With Crimping Head (61 4 320)
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre

Open pliers (1).

Place optical fibre (2) in cutting device (3).

Close pliers (1) and remove optical fibre (2).

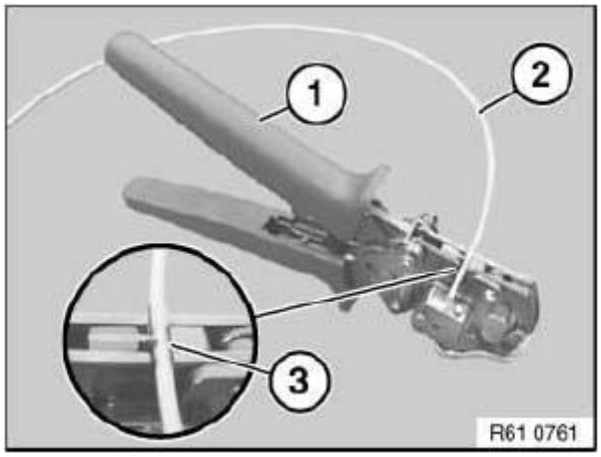


Fig. 57: Removing Optical Fibre Using Plier
Courtesy of BMW OF NORTH AMERICA, INC.

Stripping insulation from optical fibre

Open pliers (1).

Open lever (2) in direction of arrow.

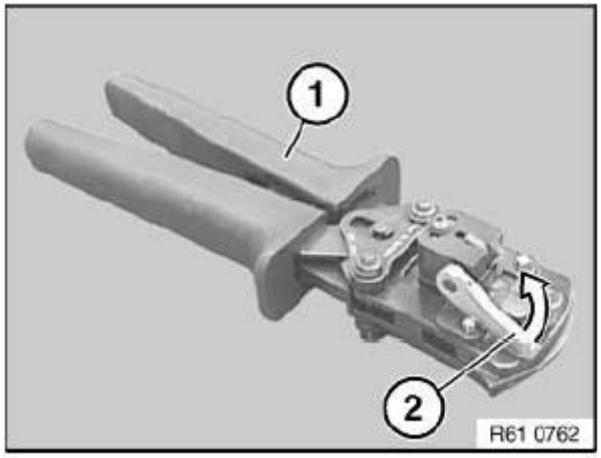


Fig. 58: Opening Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Slide optical fibre (1) into stripping device (2) until flush at point (3).

Close pliers (4) fully.

Close clamping lever (5) in direction of arrow.

Open pliers (4) by one tooth notch.

Open clamping lever (5) against direction of arrow again and remove optical fibre (1).

NOTE: A stripping replacement blade set is available under number 61 4 327.

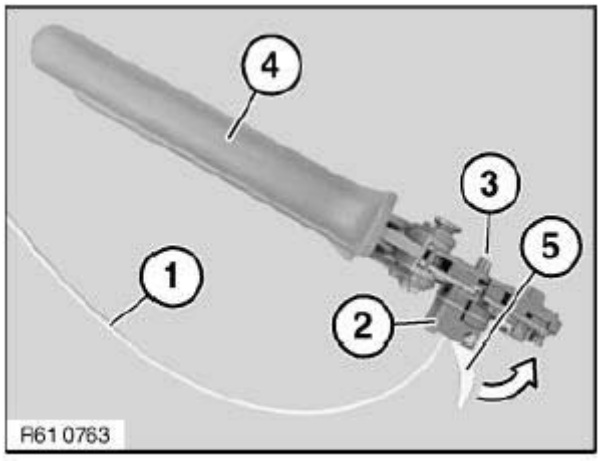


Fig. 59: Closing Clamping Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre to length

IMPORTANT: The cutting blade must be replaced prior to each cutting of the optical fibre.

Pull pin (1) in direction of arrow.

Fold up blade retaining link (2) in direction of arrow.

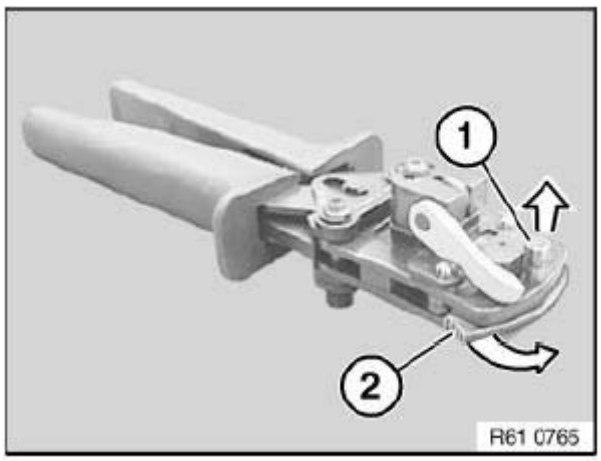


Fig. 60: Pulling Pin
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury when changing the blade.

Remove blade (1) and replace.

Installation:

Make sure blade (1) is correctly seated on locating points (2).

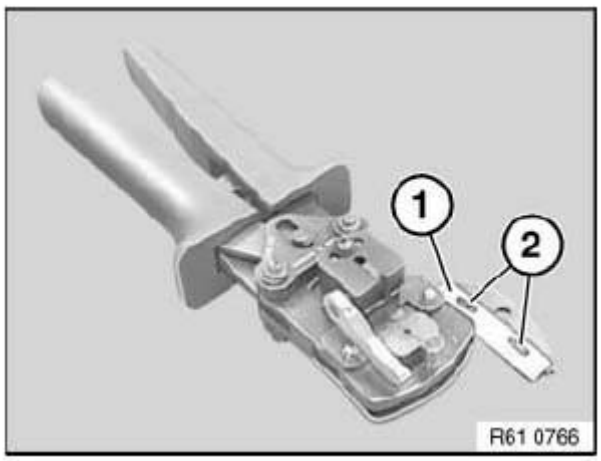


Fig. 61: Identifying Locating Points On Blade
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (3).

Slide optical fibre (1) into cutting device (2) until insulation of optical fibre (1) butts against clamping device.

Close pliers (3) fully and keep closed.

Remove optical fibre (1).

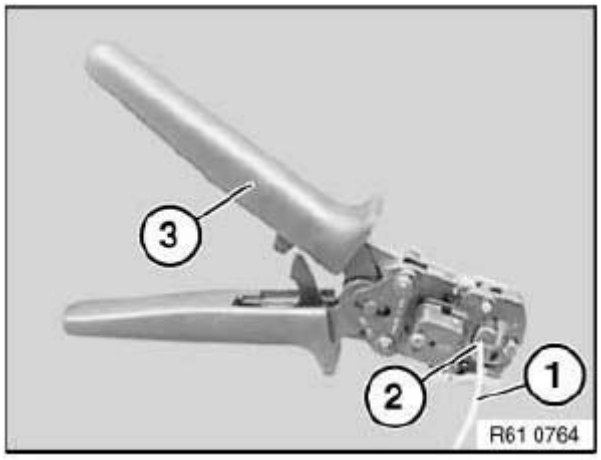


Fig. 62: Removing Optical Fiber
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH

To cut off, strip insulation and cut optical fibres to length, use pliers 61 4 321 (1) in conjunction with crimping head 61 4 322 (2) from crimping set 61 4 320 .

NOTE: Pliers (1) open automatically as far as they will go when handles are pressed together.

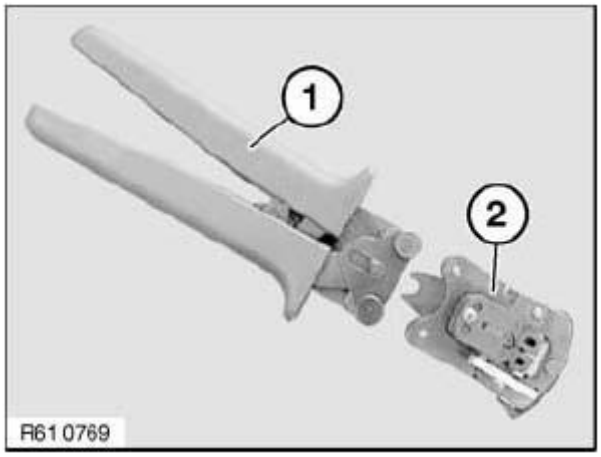


Fig. 63: Identifying Hand Pliers With Crimping Head (61 4 320)
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre

Open pliers (1).

Place optical fibre (2) in cutting device (3).

Close pliers (1) and remove optical fibre (2).

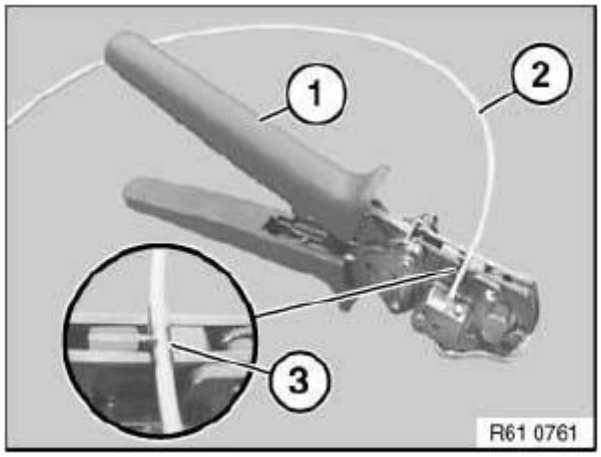


Fig. 64: Removing Optical Fibre Using Plier
Courtesy of BMW OF NORTH AMERICA, INC.

Stripping insulation from optical fibre

Open pliers (1).

Open lever (2) in direction of arrow.

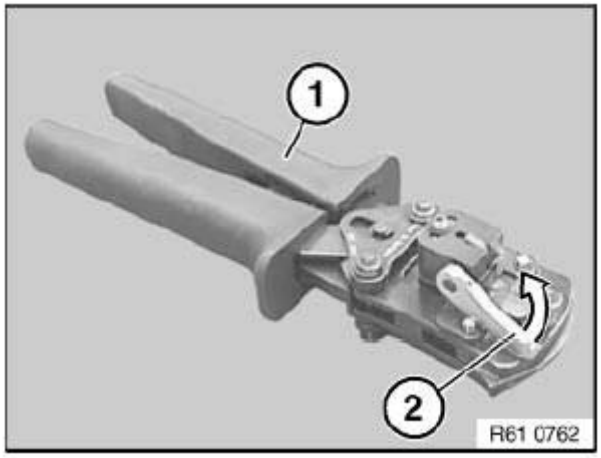


Fig. 65: Opening Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Slide optical fibre (1) into stripping device (2) until flush at point (3).

Close pliers (4) fully.

Close clamping lever (5) in direction of arrow.

Open pliers (4) by one tooth notch.

Open clamping lever (5) against direction of arrow again and remove optical fibre (1).

NOTE: A stripping replacement blade set is available under number 61 4 327.

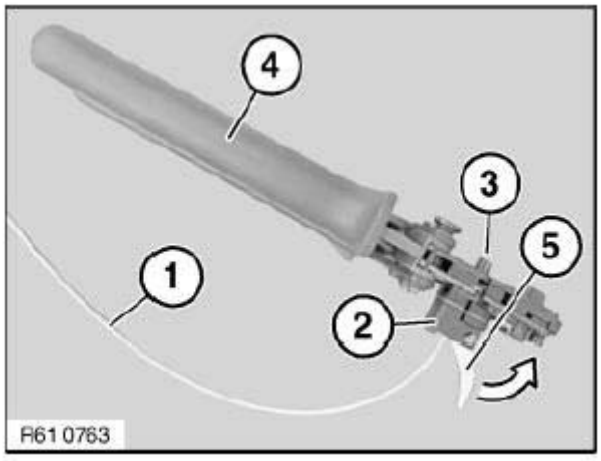


Fig. 66: Closing Clamping Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting optical fibre to length

IMPORTANT: The cutting blade must be replaced prior to each cutting of the optical fibre.

Pull pin (1) in direction of arrow.

Fold up blade retaining link (2) in direction of arrow.

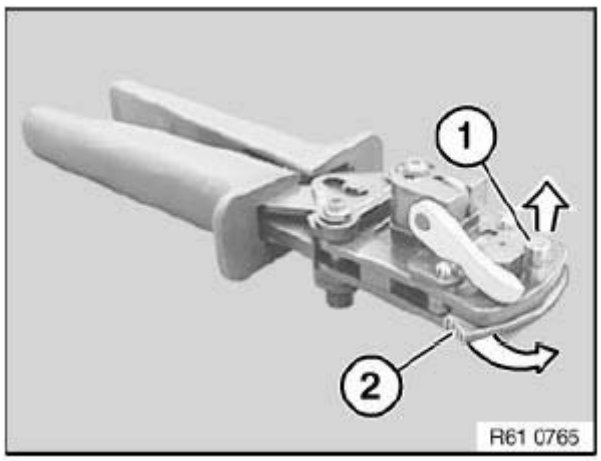


Fig. 67: Pulling Pin
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury when changing the blade.

Remove blade (1) and replace.

Installation:

Make sure blade (1) is correctly seated on locating points (2).

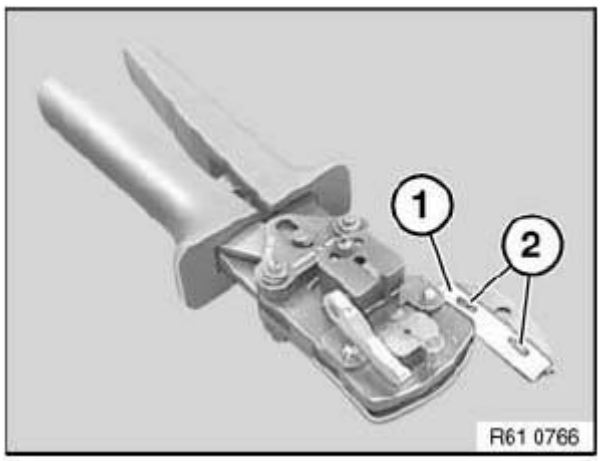


Fig. 68: Identifying Locating Points On Blade
Courtesy of BMW OF NORTH AMERICA, INC.

Open pliers (3).

Slide optical fibre (1) into cutting device (2) until insulation of optical fibre (1) butts against clamping device.

Close pliers (3) fully and keep closed.

Remove optical fibre (1).

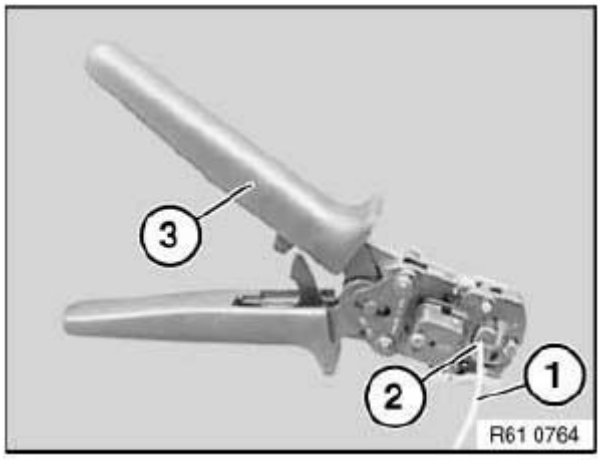


Fig. 69: Removing Optical Fiber
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

Stripped length:

STRIPPED LENGTH REFERENCE CHART

Wire cross-section (mm^2)	Stripped length (mm)
0.35 ... 0.50	4.0
0.75 ... 1.00	4.5
1.00 ... 2.50	5.0

61 13 ... INSTALLING FAN CONNECTOR FOR RETROFITTING/REPAIRS

NOTE: The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.
The case can no longer be ordered. Order individual parts for wiring harness repair through BMW Parts Service.

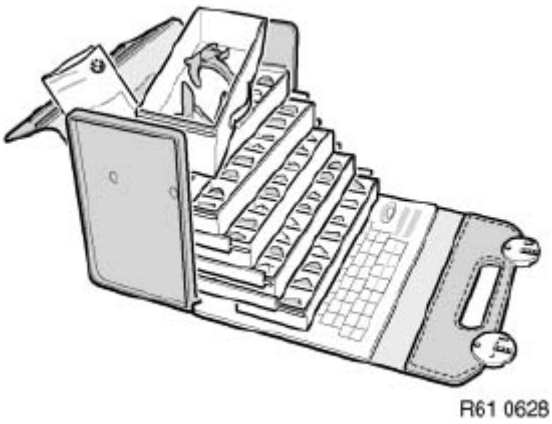


Fig. 70: Identifying Wiring Harness Repair Kit
Courtesy of BMW OF NORTH AMERICA, INC.

Choose contact sleeve (up to 4 mm^2) in accordance with wire cross-section.

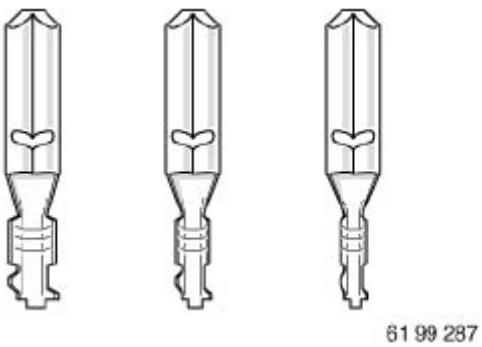


Fig. 71: Identifying Contact Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Alternatively:

Choose contact sleeves (up to 2.5 mm^2) for fan connectors.

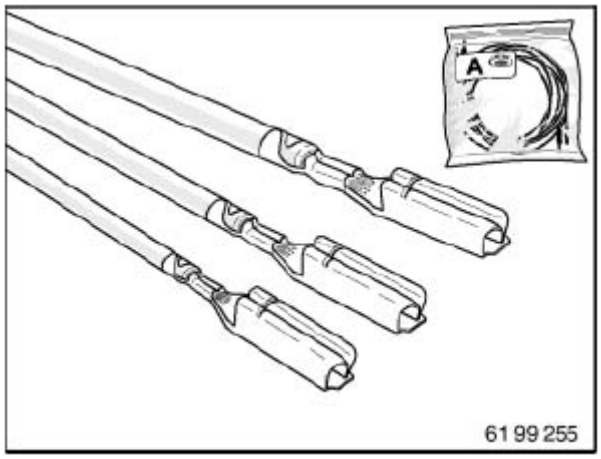


Fig. 72: Identifying Contact Sleeves For Fan Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

Cut through wire loop in wiring harness at established point.

Strip insulation from both wire ends.

See repair instructions

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

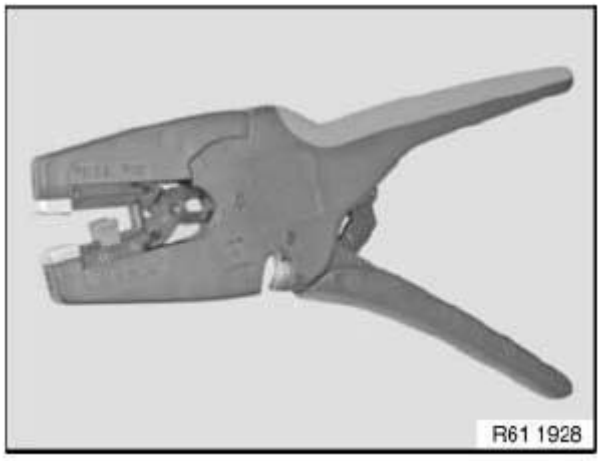


Fig. 73: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp contact sleeves on both wire ends.

See repair instructions

CRIMPING ON STOP PARTS

NOTE: If using repair kit for contact sleeves, refer to repair instruction:

BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION .

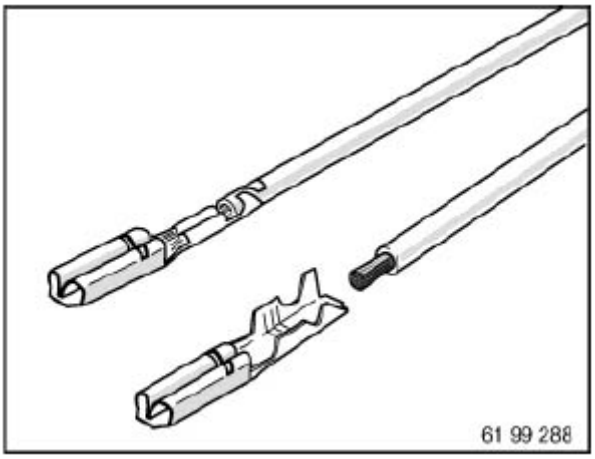


Fig. 74: Crimp Contact Sleeves On Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp connecting cable for retrofitting likewise with contact sleeve.

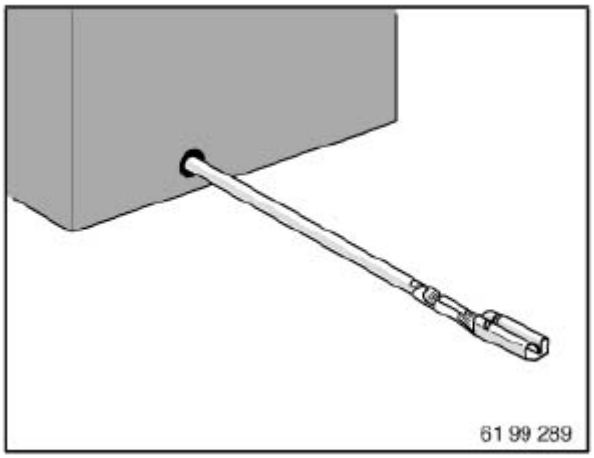


Fig. 75: Crimping Connecting Cable For Retrofitting
Courtesy of BMW OF NORTH AMERICA, INC.

Cut required number of poles to length for fan connectors.

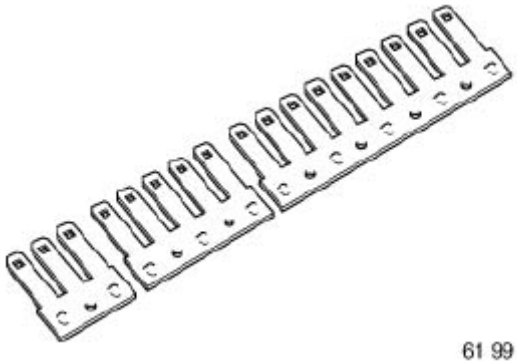


Fig. 76: Identifying Poles
Courtesy of BMW OF NORTH AMERICA, INC.

Special tool 61 9 041 (hand crimping tool) in conjunction with 61 9 042 (matrix) are used for pushing contact sleeves onto fan connectors.

See repair instructions

SPECIAL TOOLS FOR WIRING HARNESS REPAIRS .

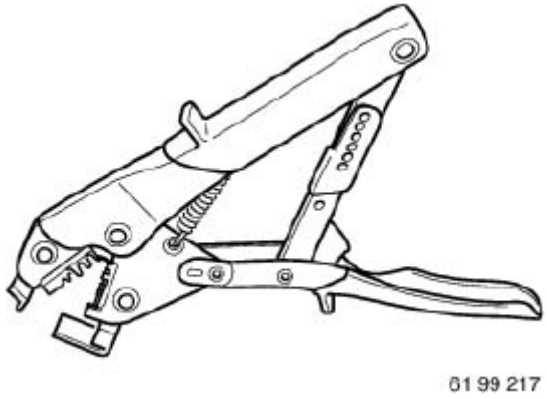


Fig. 77: Identifying Special Tool 61 9 041 (Hand Crimping Tool)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock special tool 61 9 041:

Squeeze grips (1) lightly and push unlocking lever (2) in direction of arrow.

Or:

Compress handles as far as they will go, tool unlocks automatically.

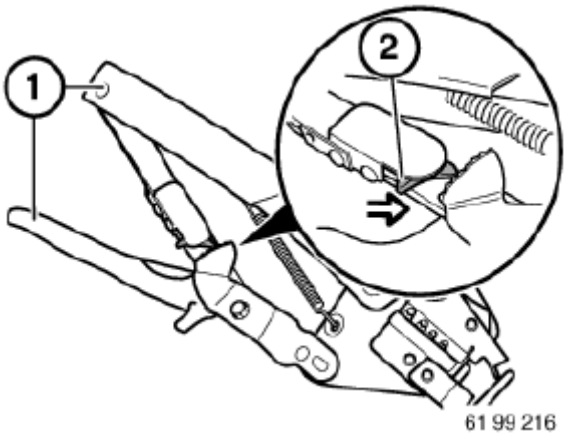


Fig. 78: Pushing Unlocking Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Insert prepared fan connectors (3) in special tool 61 9 041/61 9 042.

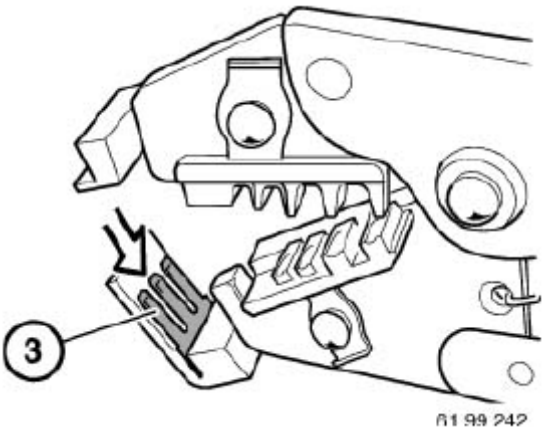


Fig. 79: Inserting Fan Connectors On Special Tool (61 9 041 / 61 9 042)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach wire with contact sleeve to fan connector.

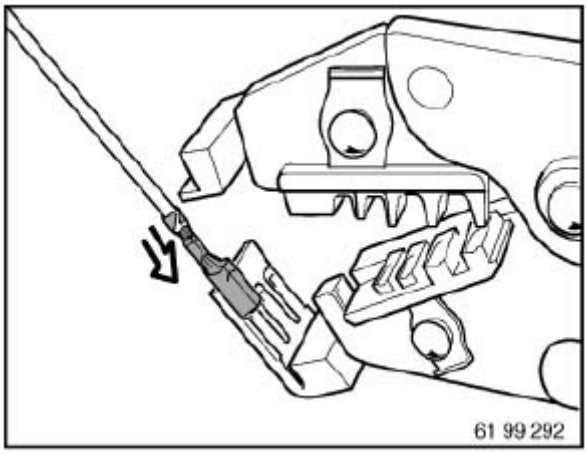


Fig. 80: Connecting Wire With Contact Sleeve To Fan Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Press crimping tool together and slide contact sleeve firmly home.

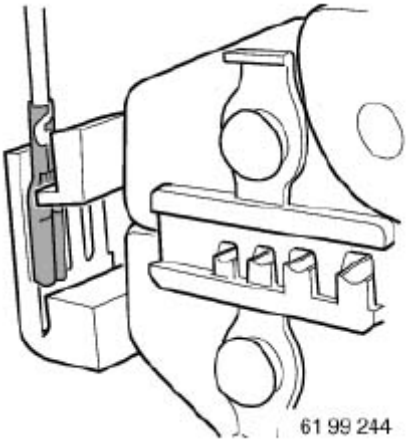


Fig. 81: Pressing Crimping Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Once contact sleeves have been pushed on, they should not be detached again from the fan connector or reused.

Push on further contact sleeves for potential branching.

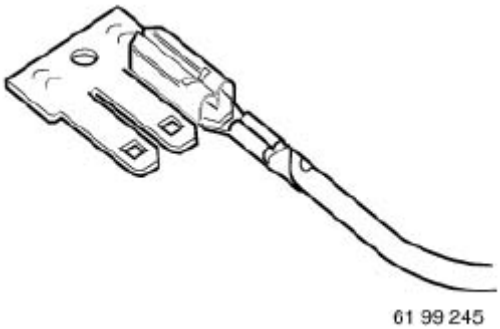


Fig. 82: Identifying Contact Sleeve On Fan Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation in wet area (engine compartment, wheel arch)

Apply sealing compound on both sides and press into contacts (1).

Fit shrink-fit hose and heat up with hot air blower (2) (approx. 250 °C).

NOTE: Ensure that fan connector has sufficient contact surface on mounting point. Do not heat shrink-fit hose on edges of fan connector too strongly, risk of cracking.

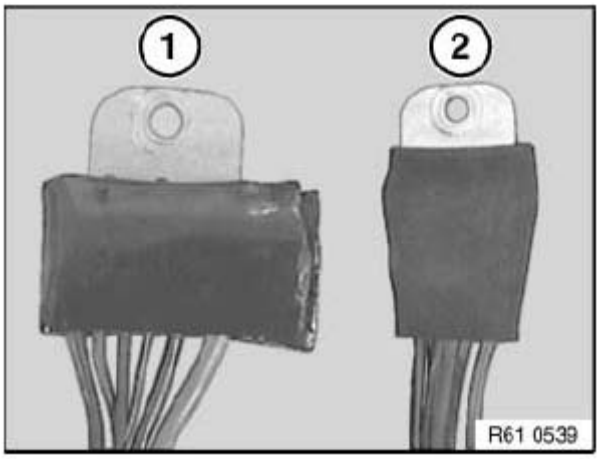


Fig. 83: Identifying Shrink-Fit Hose With Blower
Courtesy of BMW OF NORTH AMERICA, INC.

Allow shrink-fit hose to cool down until hand-warm. Then press sealing material again into contacts and onto edges of fan connector.

If necessary, carefully heat shrink-fit hose again.

Installation in dry area (interior, luggage compartment)

Slide assembled fan connector into insulation housing until it locks into place.

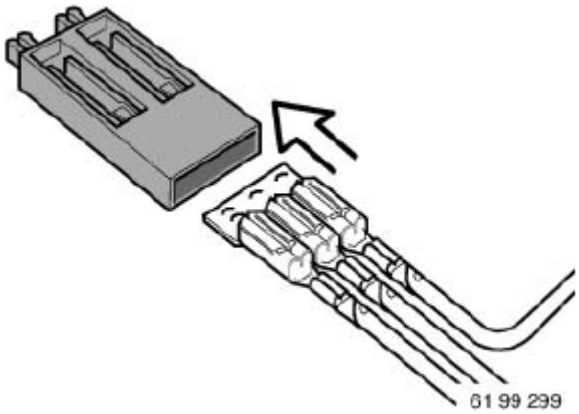


Fig. 84: Sliding Assembled Fan Connector Into Insulation Housing
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

ABBREVIATIONS OF PLUG CONTACTS SYSTEM CHART

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1). Ultrasonically welded plugs (1) must be replaced completely. Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.

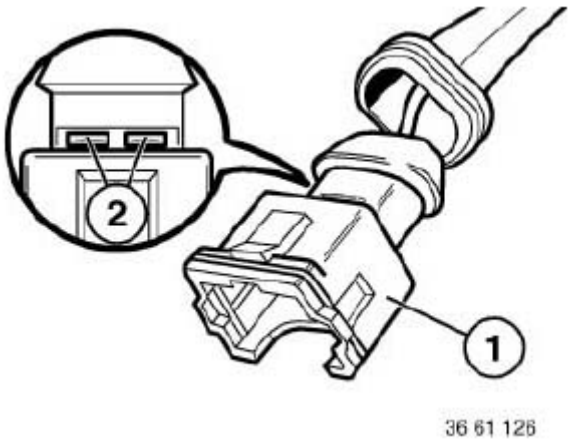


Fig. 85: Identifying Ultrasonic-Welded Connectors And Welds
Courtesy of BMW OF NORTH AMERICA, INC.

Repair instructions for opening plug housings and removing contacts of different plug systems

61 00 ... NOTES ON HANDLING OPTICAL FIBRES

IMPORTANT: To avoid damage when handling optical fibres, comply with the following points:

- **The minimum permitted bending radius is 25 mm**
- **Do not subject optical fibres to compressive and tensile load**
- **Protect optical fibres against the effects of heat > or =85 °C (e.g. during welding work, drying work with infrared heater or hot air blower)**
- **Fibre-optic cables are permitted to show only one junction point (bridge), replace fibre-optic cables if necessary**

NOTE: The optical fibres are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) fibre-optic cables**
- **Yellow = ISIS (I ntegrated S ervice I nformation S erver) optical fibres**
- **Orange=repair fibre-optic cables**

Follow instructions for processing cables and optical fibres See 6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH or 6113... CRIMPING OPTICAL FIBRES.

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** or **6113... CRIMPING OPTICAL FIBRES**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**

- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

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Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** or **6113... CRIMPING OPTICAL FIBRES**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

61 13 ... REMOVING AND INSTALLING/REPLACING OBD-II SOCKET

Necessary preliminary tasks

- Remove **FOOTWELL SIDE TRIM PANEL ON A-PILLAR, LEFT**

Release screws (1).

Remove OBD-II socket (2) from holder (3).

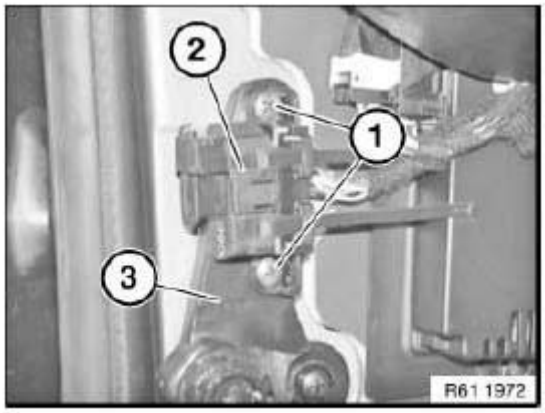

Fig. 86: Identifying Screws, OBD-II Socket And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Remove OBD-II socket cover (2) from OBD-II socket (1).

Unlock slide plate (3) with a suitable tool in direction of arrow.

Insert special tool 61 0 315 in OBD-II socket (1) in direction of arrow and press out associated flat spring

contact (4). Press remaining flat spring contacts with special tool 61 0 315 out of OBD-II socket (1).

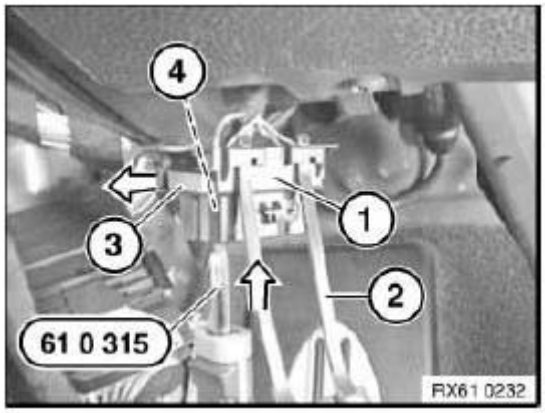

Fig. 87: Removing Slide Plate Using Special Tool 61 0 315
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pay attention to pin assignment of OBD-II socket (1).

Make sure flat spring contacts and slide plate (3) are correctly engaged and seated in OBD-II socket (1).

61 13 050 REMOVING AND INSTALLING/REPLACING FUSE BOX IN PASSENGER COMPARTMENT

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary tasks

- Remove **JUNCTION BOX ELECTRONICS** .

Unlock plug connections (1) on passenger compartment fuse box (2) and disconnect.

Release cable tie (3).

Release screw (4).

Fold down passenger compartment fuse box (5) in direction of arrow.

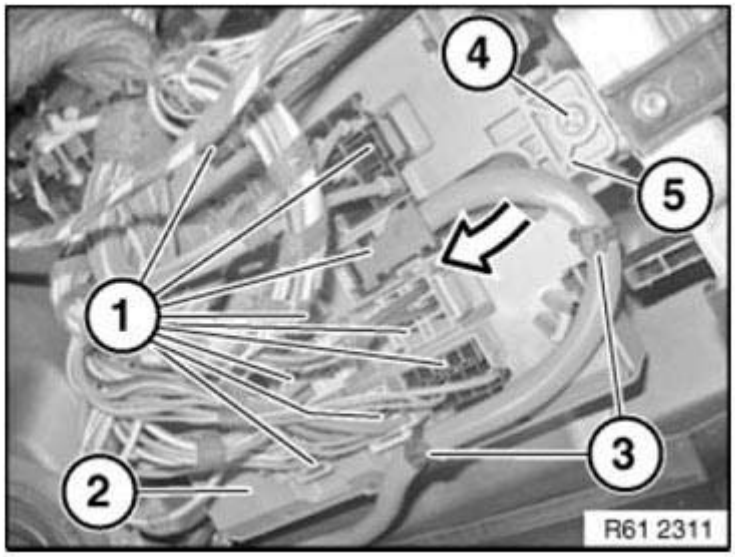

Fig. 88: Removing Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

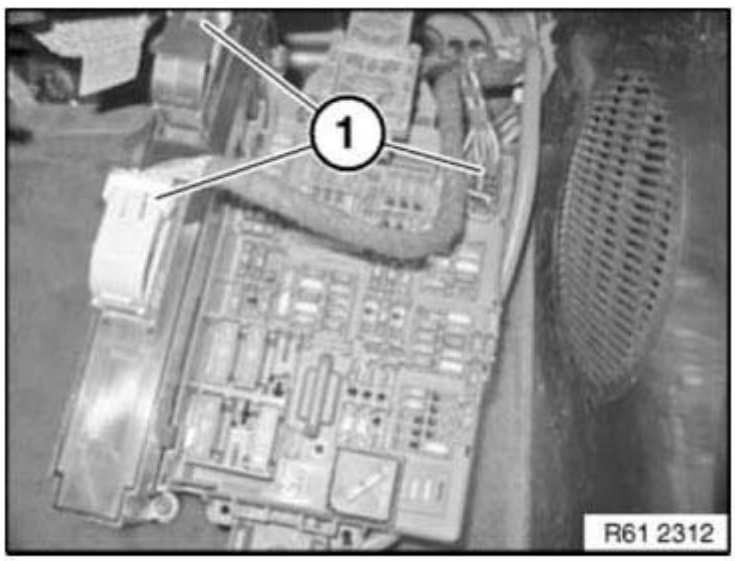

Fig. 89: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unlock retainer (2) and remove passenger compartment fuse box (3).

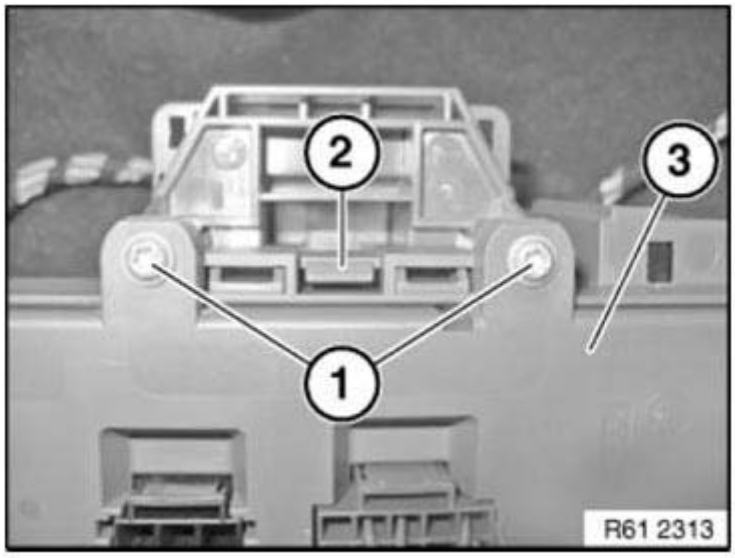

Fig. 90: Identifying Retainer And Passenger Compartment Fuse Box With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Remove **JUNCTION BOX ELECTRONICS** .

Remove fuses.

61 00 ... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations

Safety regulations for handling components of airbag system.

INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

61 13 ... SPECIAL TOOLS FOR WIRING HARNESS REPAIRS

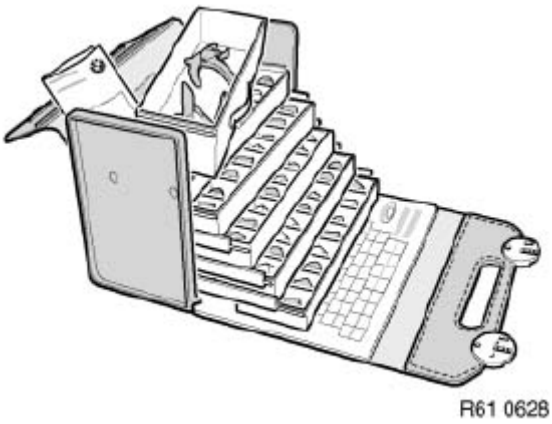

Fig. 91: Identifying Wiring Harness Repair Kit
Courtesy of BMW OF NORTH AMERICA, INC.

Release and press-out tool

- Special tool 61 0 300
- Special tool 61 0 400 (MINI N12/N14)
- Special tool 61 1 100 (engine)

Handling:

- **INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS** of different plug contact systems

Fig. 92: Identifying Special Tool (61 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Cutting to length and stripping insulation from cables

Wire stripper MultiStrip10

Handling:

- **CUTTING CABLES TO LENGTH AND STRIP INSULATION**

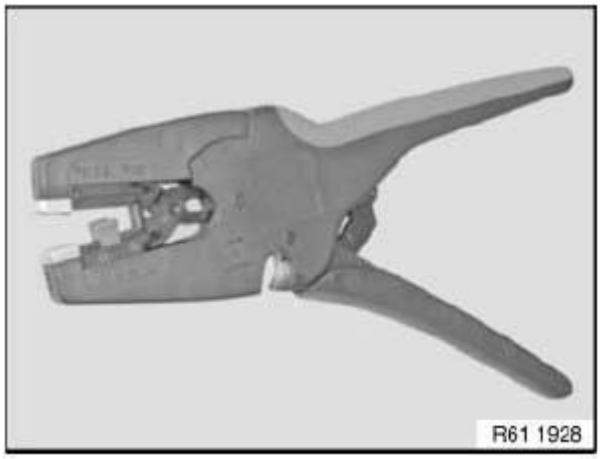

Fig. 93: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Crimping stop parts (small contacts) and butt connectors

- Special tool 61 4 320

1. Tool without crimping head
2. Crimping head **(STRIPPING INSULATION AND CUTTING FIBRE-OPTIC CABLES TO LENGTH)**
3. Crimping head **(CRIMPING FIBRE-OPTIC CABLE CONTACTS)**

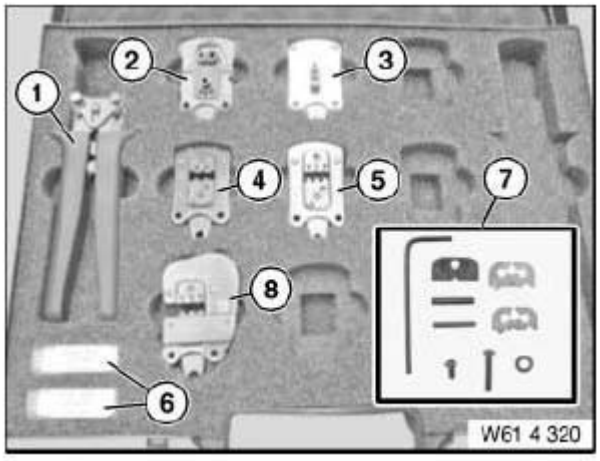

Fig. 94: Identifying Crimping Heads
Courtesy of BMW OF NORTH AMERICA, INC.

4. Crimping head **(CRIMPING MQS CONTACTS)**
5. Crimping head **(CRIMPING MPQ CONTACTS)**

6. Replacement blade (face-cutting fibre-optic cables)
7. Replacement blade with tool (insulation stripping unit)
8. Universal crimping head

Crimping stop parts (large contacts) and butt connectors

- Special tool 61 0 200 (crimping set)
- Special tool 61 0 210 (matrix set SLK 8)
- Special tool 61 0 220 (matrix set SLK 2.8)
- Special tool 61 0 230 (matrix set MAK 8/DFK4)
- Special tool 61 0 240 (butt connector 4.0 - 6.0 mm^2)

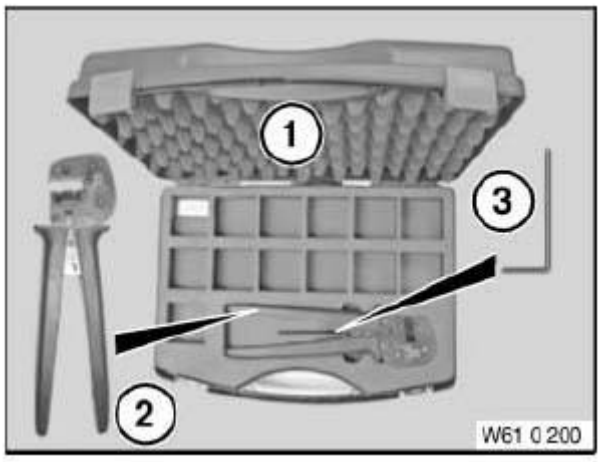

Fig. 95: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

61 13 ... TREATING CABLES AND FIBRE-OPTIC CABLES

Subject of repair instructions

- **SPECIAL TOOLS FOR WIRING HARNESS REPAIRS**
- **CUTTING CABLES TO LENGTH AND STRIP INSULATION**
- Crimping stop parts (contacts) See **6113... CRIMPING MICRO QUADLOCK SYSTEM CONTACTS (MQS)**; **6113... CRIMPING MICRO POWER QUADLOCK CONTACTS (MPQ)** or **6113... CRIMPING STOP PARTS**
- **BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION**
- **COMB CONNECTOR FOR RETROFITTING/REPAIRS**
- **CUTTING TO LENGTH AND STRIPPING INSULATION FROM OPTICAL FIBRES**

  CRIMPING OPTICAL FIBRES

6114 DISTRIBUTION BOX, POWER SUPPORT POINTS

61 14 010 REMOVING AND INSTALLING/REPLACING DISTRIBUTION BOX

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**

Unscrew nuts (1).

Tightening torque **61 12 1AZ** .

Unlock plug connections (2) and disconnect.

Unlock retaining clip (3).

Remove distribution box (4) in direction of arrow.

Installation:

Make sure distribution box (4) is correctly seated.

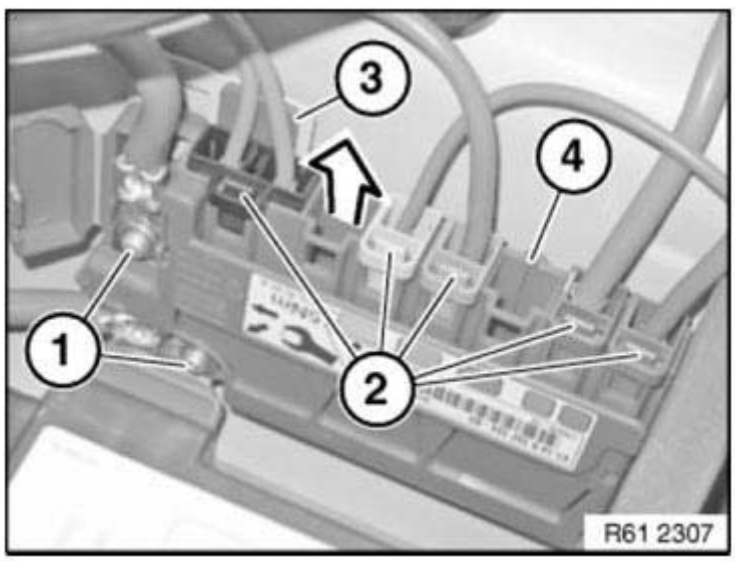

Fig. 96: Removing Distribution Box
Courtesy of BMW OF NORTH AMERICA, INC.

61 14 ... REMOVING AND INSTALLING/REPLACING ENGINE COMPARTMENT B+ TERMINAL

Necessary preliminary tasks

- Read fault memory.
- Clamp off **BATTERY NEGATIVE LEAD**

Remove cover (1).

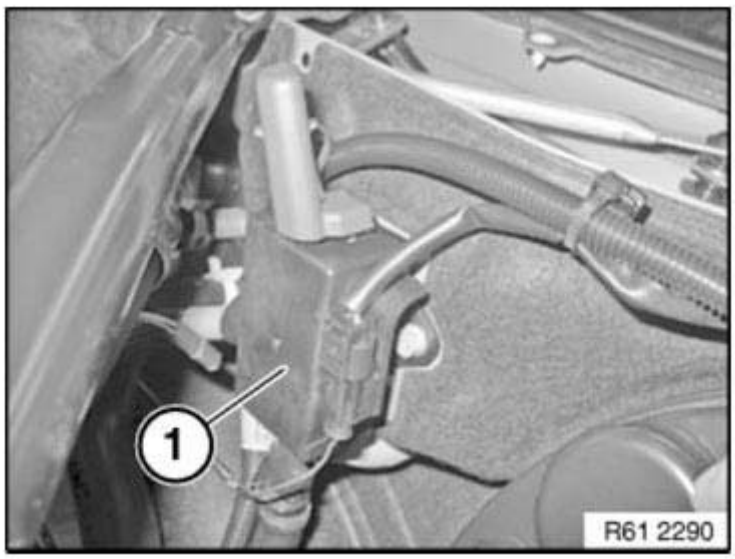

Fig. 97: Identifying Engine Compartment Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **61 12 4AZ** .

Disconnect battery positive leads (2).

Release screw (3).

Remove B+ terminal.

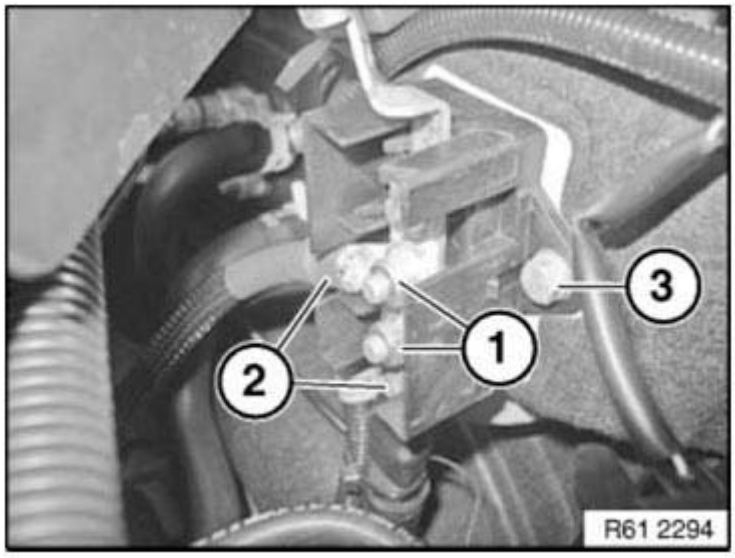

Fig. 98: Identifying Battery Positive Leads With Nuts And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

6120 BATTERY

61 20 ... (SAFETY) INFORMATION ON AGM BATTERY

Fig. 99: Identifying AGM Battery
Courtesy of BMW OF NORTH AMERICA, INC.

Introduction

In September 2002, the first so-called VRLA batteries, better known as **AGM batteries** came into use. (VRLA means **V** alve **R** egulated **L** ead **A** cid, i.e. lead acid battery with pressure relief valve; **AGM stands for A** bsorbent **G** lass **M** at, i.e. absorbent glass-fibre fleece)

The constantly increasing energy demand of modern vehicle electrical systems calls for ever more powerful battery solutions. A modern luxury-class vehicle has some 100 actuator motors that have to be fed with electrical current. Added to these are safety, environmental and comfort and convenience elements which are increasingly becoming standard features, such as e.g. Anti-lock Brake System (ABS), Dynamic Stability Control (DSC), electric steering effort assistance (EPS), heated catalytic converter, electronic chassis and suspension control, air conditioning and navigation system. Current consumption is considerable even when the vehicle is not in use.

The somewhat higher price compared with a battery of similar size is fully balanced by the following benefits:

- greatly longer service life
- improved starting reliability at low temperatures
- reliable starting of engines with high starting current requirements, e.g. high-performance diesel engines
- 100 % freedom from maintenance
- low risk in the event of an accident (reduced environmental risk)

Service life of AGM batteries

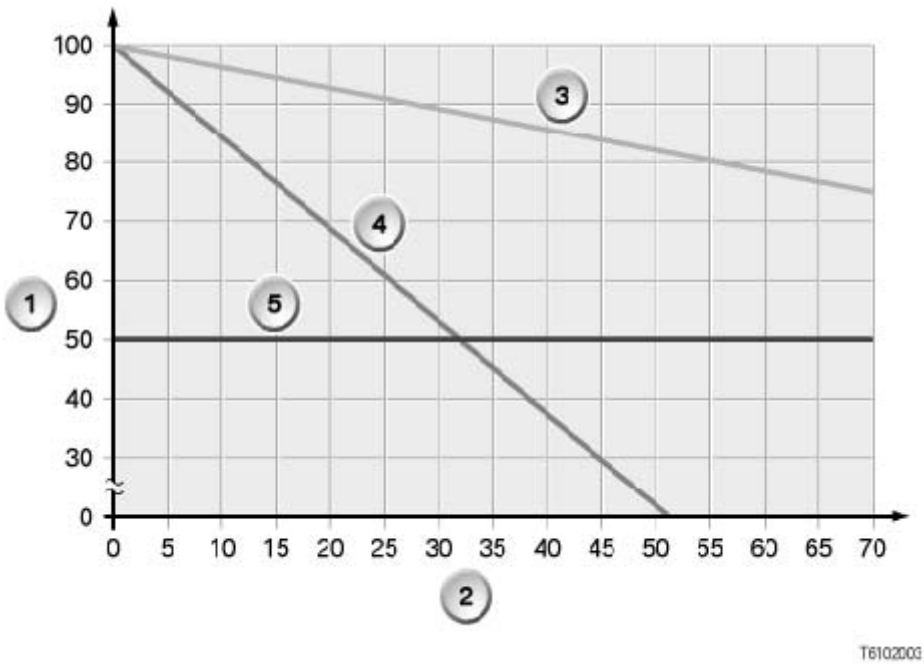

Fig. 100: AGM Batteries Service Life Graph
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE LIFE OF AGM BATTERIES DESCRIPTION CHART

Item	Description	Item	Description
1	Available capacity [%]	2	Mileage [thousand km]
3	AGM battery	4	Lead-calcium battery
5	50 % capacity limit		

In contrast to conventional lead-calcium batteries, the sulphuric acid in a battery with fleece technology is not held freely in the battery housing. Rather, 100% of the sulphuric acid is bound into the mats of the glass-fibre fleece (separators). For this reason, no acid can escape if the battery housing is damaged. In addition, the AGM battery is sealed to be airtight. This is possible because the gases are converted back into water as a result of the separator permeability.

Brief component description

An AGM battery can be recognized by its black housing and the lack of a so-called "Magic Eye".

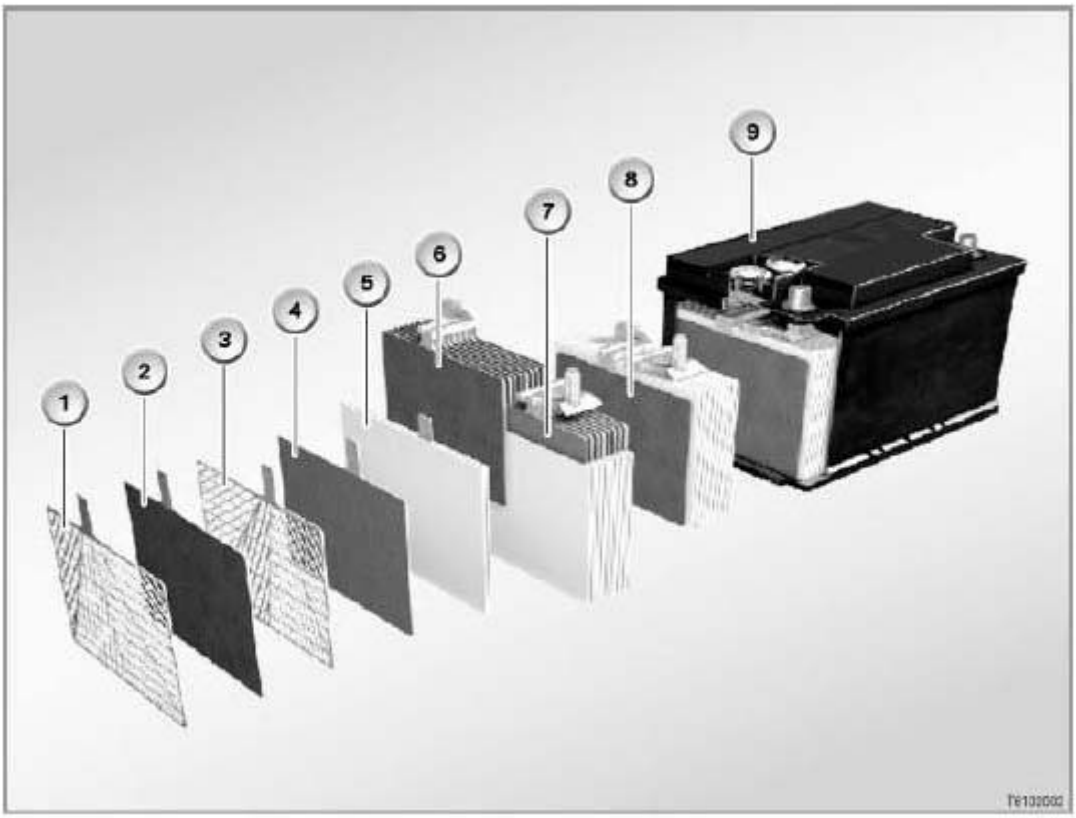

Fig. 101: Identifying AGM Battery Components
Courtesy of BMW OF NORTH AMERICA, INC.

AGM BATTERY COMPONENTS DESCRIPTION CHART

Item	Description	Item	Description
1	Positive grille with silver alloy	2	Positive plate

3	Negative grille	4	Negative plate
5	Separator made of glass-fibre fleece	6	Set of positive plates
7	Set of negative plates	8	Block of plates
9	Block box with base strips		

Construction

The AGM battery differs from the conventional lead calcium battery as follows:

- larger plates: Larger plates allow a 25% larger power density.
- Separators made of glass-fibre fleece: These can cause an up to 3-times higher cycle stability to be reached. This improves the cold starting capability, the power consumption and service life.
- Airtight housing with pressure relief valve (please refer to "How it works"):

  The inspection plugs are sealed and can not be opened.

- Battery acid bound in glass-fibre fleece: Battery acid is not found free in the housing as before, but is rather bound 100% in the glass-fibre fleece. This gives increased security against the acid escaping and thus reduces the environmental risk.

How it works

The AGM battery differs from conventional batteries in its non-polluting and substance-retaining behavior during charging.

When a vehicle battery is charged, the electrolysis process emits the gases oxygen and hydrogen.

- In a conventional wet lead calcium battery, the two gases hydrogen and oxygen are dissipated into the atmosphere.
- In an AGM battery, the two gases are converted back into water: The oxygen which is created at the positive electrode during charging passes through the permeable glass fibre fleece to the negative electrode. At the negative electrode the oxygen reacts with the arriving hydrogen ions in the electrolyte to form water (oxygen cycle).

In this manner, the gas, and thus the electrolyte, is not lost.

Only in the event of an excessively heavy build-up of gas, i.e. excessively high pressure build-up (20 to 200 mbar), does the pressure relief valve discharge the gas. In this process, the pressure relief valve does not allow any oxygen in the air to enter. Because the pressure in the battery is regulated by a valve, the AGM battery is also known as the VRLA battery (valve-regulated lead acid).

Notes for Service department

It is necessary when handling an AGM battery to observe some particular points pertaining to battery changing and installation location.

Charging

WARNING: Do not charge the AGM battery with > or = 15.2 V. Do not use rapid-charging programs!
When charging removed batteries (so-called stand-alone batteries), do not exceed the maximum charging voltage of 15.2 V at room temperature. Also, for charging via positive battery connection point the maximum charging voltage of 15.2 volt at room temperature must not be exceeded. The batter can be damaged even with short charging of the AGM battery with a charging voltage higher than 15.2 volts. A charging voltage of more than 15.2 V is usually used in quick-charging routines.

Installation location

WARNING: Do not install the AGM battery in the engine compartment.
The AGM battery must not be installed in the engine compartment on account of the high spatial temperature differences, otherwise its service life will be significantly shortened.

Housing

WARNING: Do not open AGM batteries.
On no account may AGM batteries be opened, as the ingress of oxygen from the atmosphere would cause the battery to lose its chemical balance, rendering it unserviceable.

61 20 ... AGM BATTERY

Fig. 102: Identifying AGM Battery
Courtesy of BMW OF NORTH AMERICA, INC.

Introduction

In September 2002, the first so-called VRLA batteries, better known as **AGM batteries** came into use. (VRLA means **V** alve **R** egulated **L** ead **A** cid, i.e. lead acid battery with pressure relief valve; **AGM stands for A** bsorbent **G** lass **M** at, i.e. absorbent glass-fibre fleece)

AGM batteries are fitted in models with electrical loads/consumers which have a high energy demand.

With the option SA 146 (2nd battery), the AGM battery (70 Ah) is fitted as the 2nd battery.

The constantly increasing energy demand of modern vehicle electrical systems calls for ever more powerful battery solutions. A modern luxury-class vehicle has some 100 actuator motors that have to be fed with electrical current. Added to these are safety, environmental and comfort and convenience elements which are increasingly becoming standard features, such as e.g. Anti-lock Brake System (ABS), Dynamic Stability Control (DSC), electric steering effort assistance (EPS), heated catalytic converter, electronic chassis and suspension control, air conditioning and navigation system. Current consumption is considerable even when the vehicle is not in use.

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Service life of AGM batteries

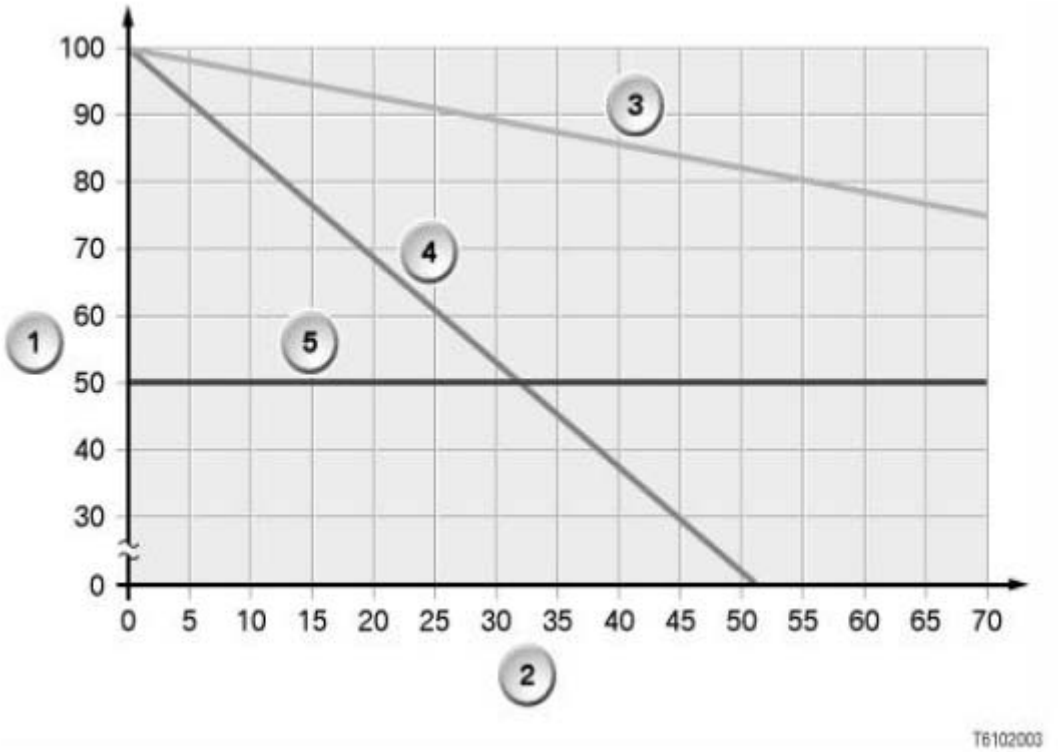

Fig. 103: AGM Batteries Service Life Graph
Courtesy of BMW OF NORTH AMERICA, INC.

AGM BATTERIES DESCRIPTION CHART

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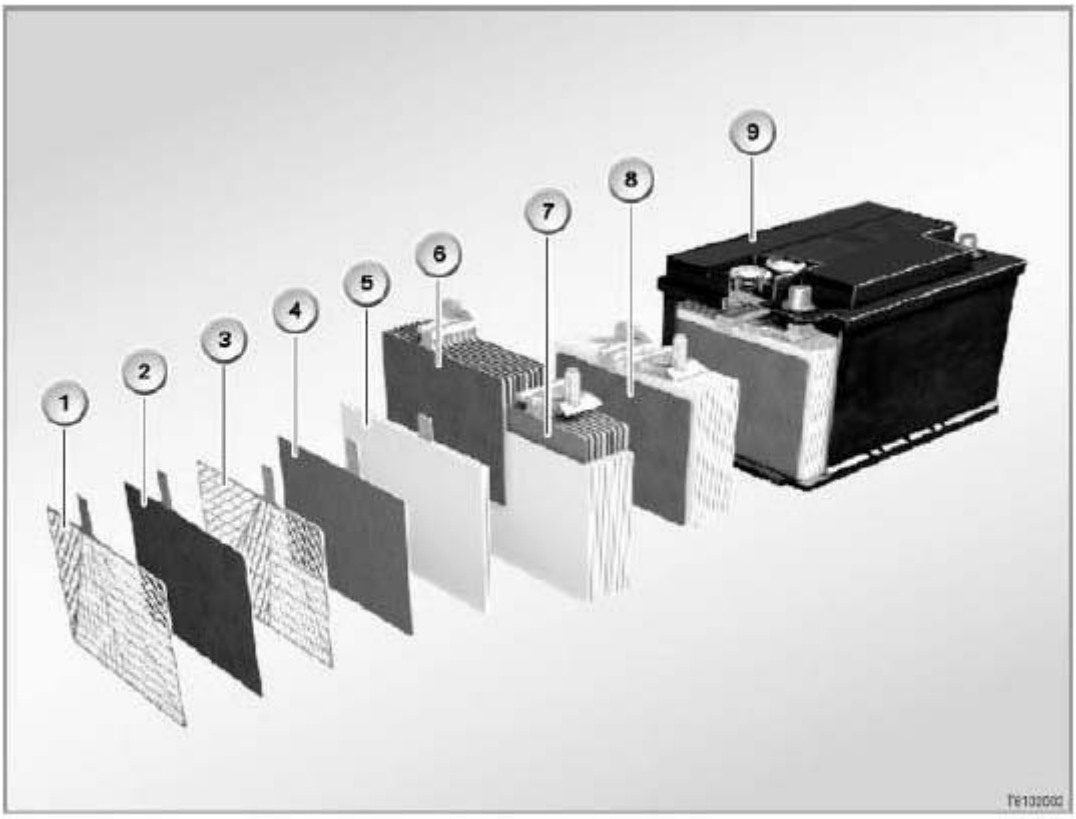

Fig. 104: Identifying AGM Battery Components
Courtesy of BMW OF NORTH AMERICA, INC.

AGM BATTERY COMPONENTS DESCRIPTION CHART

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- In an AGM battery, the two gases are converted back into water: The oxygen which is created at the positive electrode during charging passes through the permeable glass fibre fleece to the negative electrode. At the negative electrode the oxygen reacts with the arriving hydrogen ions in the electrolyte to form water (oxygen cycle).

In this manner, the gas, and thus the electrolyte, is not lost.

Only in the event of an excessively heavy build-up of gas, i.e. excessively high pressure build-up (20 to 200 mbar), does the pressure relief valve discharge the gas. In this process, the pressure relief valve does not allow any oxygen in the air to enter. Because the pressure in the battery is regulated by a valve, the AGM battery is also known as the VRLA battery (valve-regulated lead acid).

Notes for Service department

It is necessary when handling an AGM battery to observe some particular points pertaining to battery changing and installation location.

Charging

WARNING: Do not charge the AGM battery with > or = 15.2 V. Do not use rapid-charging programs!
When charging removed batteries (so-called stand-alone batteries), do not exceed the maximum charging voltage of 15.2 V at room temperature. Also, for charging via positive battery connection point the maximum charging voltage of 15.2 volt at room temperature must not be exceeded. The batter can be damaged even with short charging of the AGM battery with a charging voltage higher than 15.2 volts. A charging voltage of more than 15.2 V is usually used in quick-charging routines.

Installation location

WARNING: Do not install the AGM battery in the engine compartment.
The AGM battery must not be installed in the engine compartment on

account of the high spatial temperature differences, otherwise its service life will be significantly shortened.

Housing

WARNING: Do not open AGM batteries.
On no account may AGM batteries be opened, as the ingress of oxygen from the atmosphere would cause the battery to lose its chemical balance, rendering it unserviceable.

Battery renewal

On principle any conventional lead-calcium battery can be replaced with an AGM battery. No changes result for the vehicle electrical system by using an AGM battery.

NOTE: ***AGM batteries are especially recommended for "problem customers".***
"Problem customers" have a very high energy throughput through the battery. This high energy throughput is caused by stationary loads/consumers (TV, independent heating, etc.) and a bad use profile for the battery ("chauffeur operation", short-distance driving, "stop-and-go"). The use of an AGM battery is recommended for these problem customers.

61 20 ... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular motorization and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, only one work scope will be provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery replacement

- Service functions
- Body
- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.
Follow instructions FOR DISCONNECTING AND CONNECTING BATTERY !
Observe notes on POWER SUPPLY /on intelligent battery sensor (IBS).

Necessary preliminary tasks

- Remove **FRONT LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

Loosen nut (1).

Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances use force to pull off negative terminal.

Detach battery negative lead with IBS towards top, lay to one side and secure.

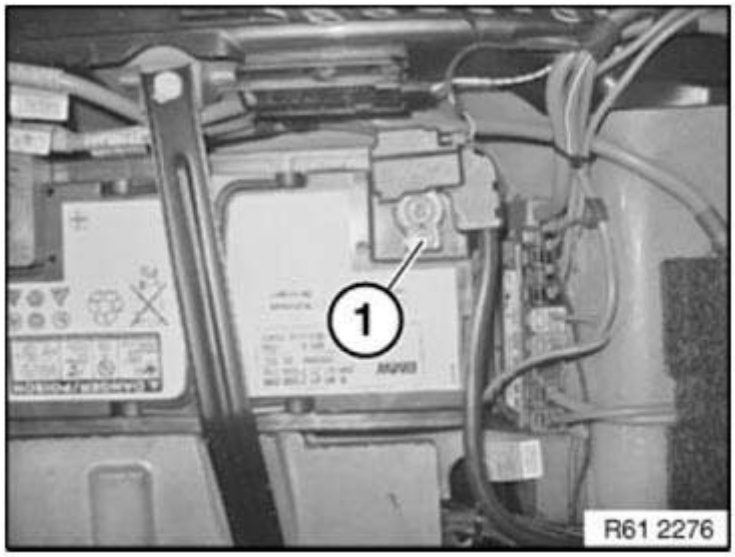

Fig. 105: Identifying Front Luggage Compartment Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Via BMW diagnosis system:

Carry out **STEERING ANGLE SENSOR ADJUSTMENT** .

61 12 ... GENERAL INFORMATION ON INTELLIGENT BATTERY SENSOR (IBS)

NOTE: ***Do not connect the charger to the 12 V charging socket.***
The 12 V charging socket is supplied with voltage by the rear power distribution box via relay. This relay drops out after terminal 15 OFF. This means that a trickle charger connected at the 12 V charging socket will be disconnected from the battery. Only charge the battery via the jump start terminal point. Only then can the power supply be registered by the vehicle.

WARNING: Danger of destruction in event of mechanical strain

- **Do not introduce any additional connections at the battery negative terminal.**
- **Do not modify the grounding cable. The grounding cable also serves to dissipate heat.**
- **Do not establish any connection between the IBS and the sensor screw.**
- **Do not use force when disconnecting the pole shoe from the battery terminal:**
  - **Do not pull on the grounding cable.**
  - **Do not place any tools under the IBS to lever off the pole shoe.**
- **Do not use IBS connections as levers.**

- **Use a torque wrench and set tightening torque in accordance with repair instructions.**
- **Do not release or tighten down sensor screw (screw with Torx head).**
- **Avoid contact between IBS and ground.**

WARNING: Danger of destruction to IBS and cables when battery is replaced

- **The IBS and the cables can be destroyed by mechanical strain when the battery is replaced. Therefore avoid mechanical strain.**
- **The size (capacity) of the battery required for the car is coded in the Car Access System (CAS).**
- **Use the battery size (capacity) installed as standard when replacing the battery.**
- **Register battery replacement via Service functions in diagnosis system.**
- **Delete fault entries in the Digital Engine Electronics (DME) associated with battery replacement.**
- **Always proceed in accordance with the repair instructions.**

NOTE: ***Battery draining possible in spite of the intelligent battery sensor IBS being fault-free.***

- **A battery can be drained (e.g. with lights or radio switched on) even when the IBS functions perfectly in conjunction with power management.**
- **For this reason, only replace the IBS when a corresponding fault entry in the DME or DDE.**

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61 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY** .

Before disconnecting battery

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: **If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.**

IMPORTANT:

- **There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.**
- **The on-board computer and clock may lose your data.**

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

  Do not under any circumstances pull/lever off pole shoes by force.

  Do not under any circumstances release socket-head cap screw of IBS.

- Disconnect terminal of **BATTERY NEGATIVE LEAD** from vehicle battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque **61 21 1AZ** .

After connecting battery

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.
Likewise, individual settings may be lost.
Settings or activations must be carried out, depending on the equipment specification.
For example:

- **If necessary, carry out adjustment of active steering**
- **If necessary, activate slide/tilt sunroof**
- **If necessary, activate POWER WINDOWS**

Refer to the diagnosis system for further vehicle-specific information.

12 00 ... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.

- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY

Battery acid is highly corrosive

Do not allow any battery acid to come into contact with the eyes, the skin or clothing. Therefore wear protective clothing, gloves and goggles.

Do not tilt the battery, acid may emerge from the vent opening.

In event of contact with acid

If acid is splashed into the eyes, rinse them immediately for several minutes with clear water. You must then

consult a doctor without delay.

If acid is splashed onto the skin or clothing, neutralize it immediately with a soapy solution and rinse with lots of water.

Seek medical attention immediately if battery acid is accidentally swallowed.

Explosion hazard

Strictly no flames, sparks, naked light or smoking!

A highly explosive mixture of electrolytic gas is created when batteries are charged. The rooms where charging is carried out must therefore always be well ventilated.

Avoid the formation of sparks when handling cables, wiring and electrical devices.

Turn the ignition lock to the 0 position before disconnecting or connecting the battery.

Do not place tools or any similar object on the battery (danger of short-circuiting and explosion!).

61 20 503 VEHICLE BATTERY - CLOSED-CIRCUIT CURRENT MONITORING

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

Necessary preliminary work

- Clamp off **BATTERY NEGATIVE LEAD**
- Disconnect Both negative battery cables

Connect adapter for closed-circuit current measurement.

Connect BMW diagnosis system.

Measure closed-circuit current.

6121 BATTERY/VAPOR SEPARATOR

61 21 028 CHARGE BATTERY

WARNING: Read and comply with SAFETY INSTRUCTIONS pertaining to vehicle battery.

IMPORTANT: To prevent the intelligent battery sensor from malfunctioning, use the charging points in the engine compartment.

NOTE: Use BMW-recommended charging computers to charge the battery.

61 21 010 REMOVING AND INSTALLING OR REPLACING BATTERY

WARNING: Observe SAFETY INSTRUCTIONS for handling vehicle battery.

To ensure the correct safety and convenience functions, install only the original battery (battery size and type) stored in the vehicle order. **OBSERVE NOTE ON BATTERY REPLACEMENT** .

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**
- Clamp off **BATTERY NEGATIVE LEAD**

Release screw (1) and remove bracket (2).

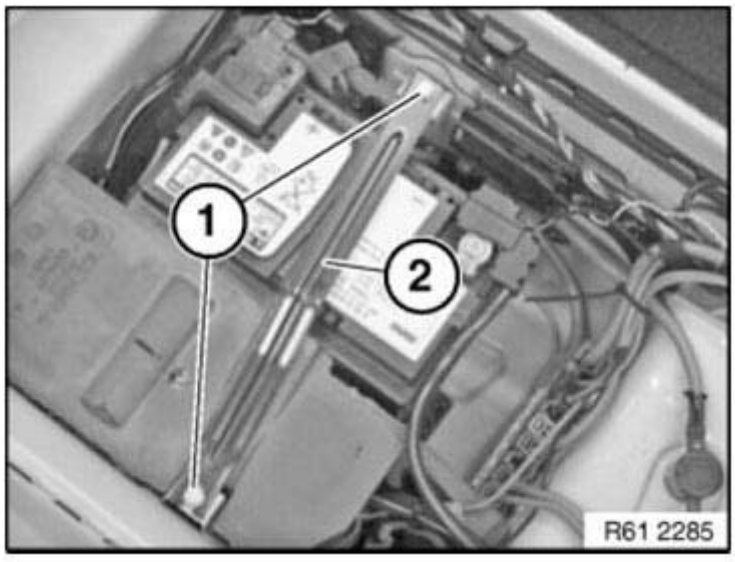


Fig. 106: Identifying Bracket Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **61 21 1AZ** .

IMPORTANT: Do not under any circumstances pull/lever safety battery terminal off by force.

Detach safety battery terminal (2) towards top, lay to one side and secure.

Detach vent hose (3).

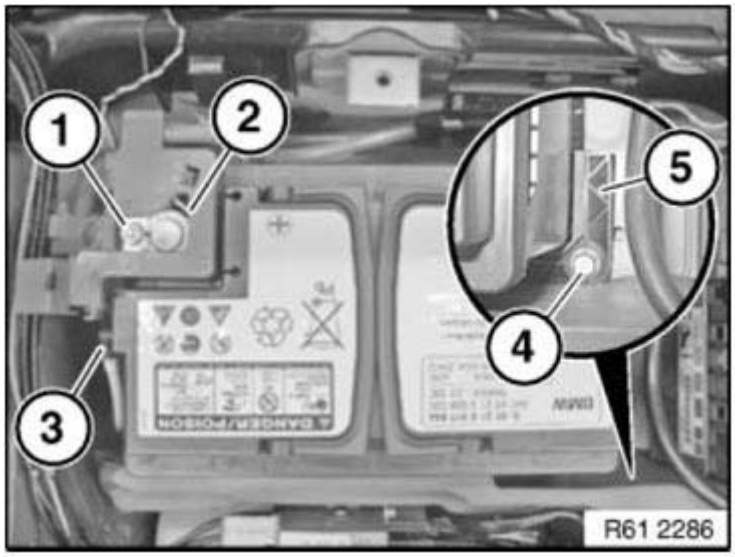


Fig. 107: Identifying Vent Hose, Battery Terminal With Nut And Bracket Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (4) and remove bracket (5).

Lift out battery.

Installation:

Make sure battery is correctly seated in associated fixture.

Replacement:

- Read out fault memory, clear if necessary
- On vehicles with IBS (intelligent battery sensor) **REGISTER BATTERY REPLACEMENT**

61 21 028 TESTING BATTERY WITH BATTERY TESTER

WARNING: Read and comply with SAFETY INFORMATION pertaining to vehicle battery.

Necessary preliminary work

Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL** .

NOTE: Use BMW-recommended battery tester to test the battery.

Procedure:

- Turn off ignition and close doors

- Connect battery tester directly to battery terminals
- Select Battery test and confirm
- Enter vehicle identification number
- Enter battery data
- Carry out battery test

Fig. 108: Identifying BMW-Recommended Battery Tester
Courtesy of BMW OF NORTH AMERICA, INC.

6131 SWITCH

61 31 996 CARRYING OUT STEERING ANGLE SENSOR ADJUSTMENT

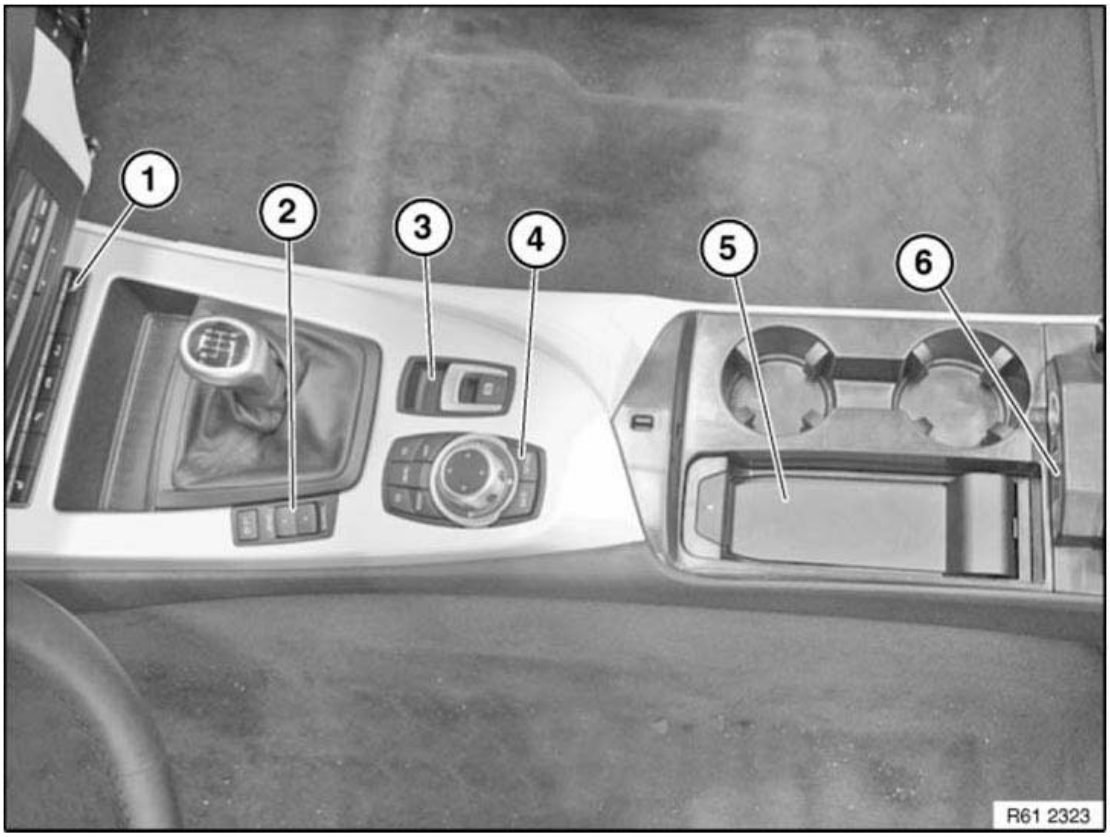
NOTE: Steering angle sensor adjustment must be carried out:

- **after adjustment work on the front axle/steering**
- **after all mechanical work on the steering system**
- **after disconnection of battery**
- **after replacement/coding/programming of the following components:**
  - **Fixture for switches of steering column/switch cluster/steering angle sensor**
  - **Dynamic Stability Control (DSC) control unit**

Connect vehicle to BMW diagnosis system.

Select and carry out steering angle sensor adjustment under Service functions.

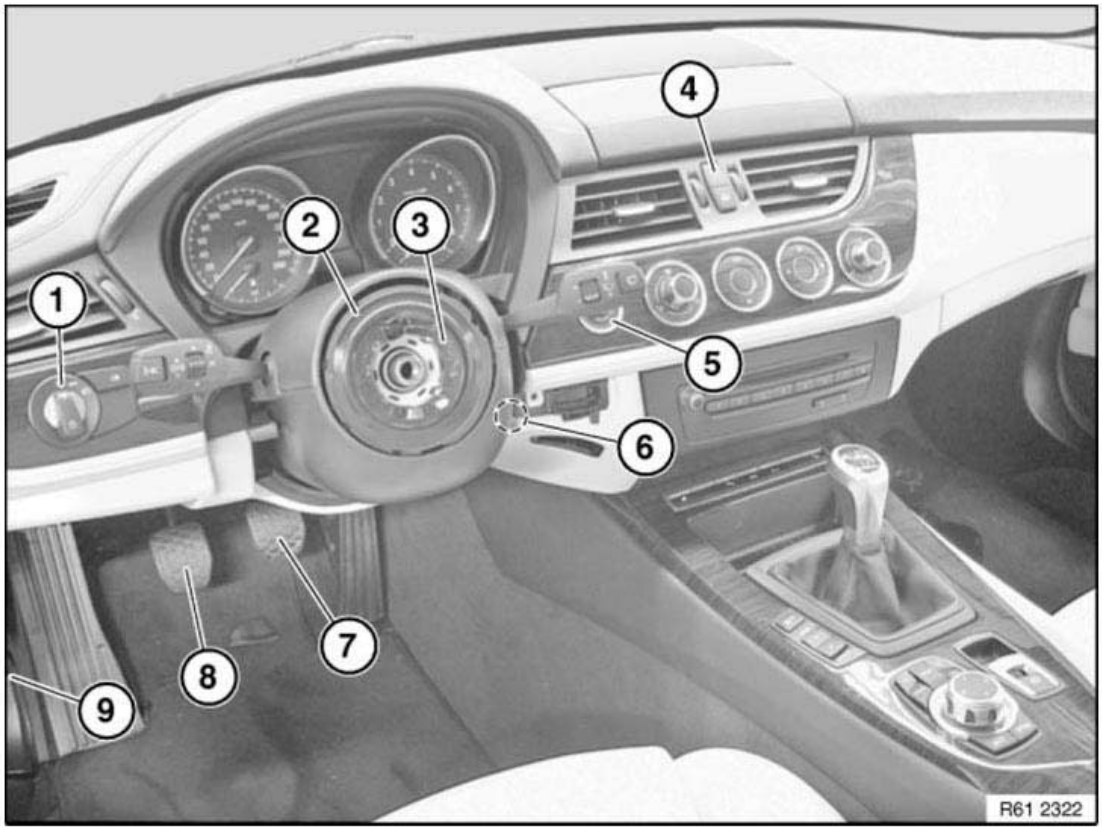
61 31 ... OVERVIEW OF SWITCHES IN CENTER CONSOLE/STORAGE COMPARTMENT



1 Centre console switch cluster
2 Driving dynamics switch
3 Switch for EMF
4 Controller
5 Eject box
6 Connection socket, AV/USB audio interface

Fig. 109: Overview Of Switches On Centre Console/Storage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 ... OVERVIEW OF SWITCHES IN INSTRUMENT PANEL/DRIVER'S FOOTWELL



1 Light switch unit
2 Steering-column switch cluster
3 Coil spring casing
4 Switch for hazard warning system/central locking
5 Start/Stop switch
6 Heated steering wheel button
7 Brake-light switch
8 Manual transmissions only:
9 Rear lid unlocking switch

Fig. 110: Overview Of Switches On Instrument Panel/Driver's Footwell
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 038 REMOVING AND INSTALLING (REPLACING) SWITCH FOR PASSENGER AIRBAG DEACTIVATION

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt pretensioners.
Incorrect handling can activate airbag and cause injury.

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**

Carefully lever out side cover (1) with special tool 00 9 323 at points (2).

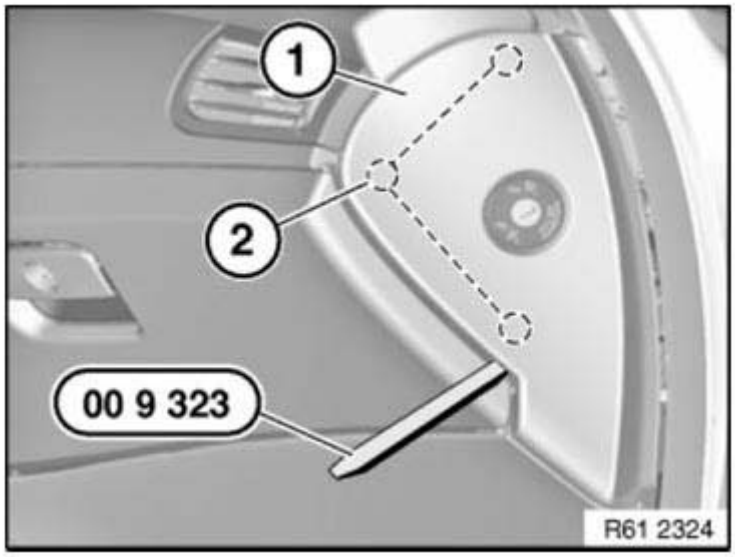


Fig. 111: Removing Side Cover Using Special Tool 00 9 323
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Unlock catches (4) in direction of arrow.

Feed switch for passenger airbag deactivation (2) out of side cover (3).

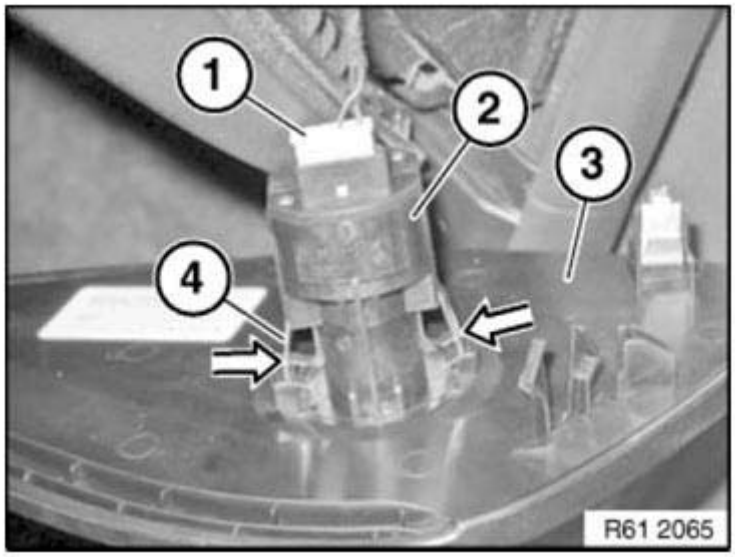


Fig. 112: Pressing Catches
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure switch for passenger airbag deactivation (2) is correctly seated in side cover (3).

61 31 052 REMOVING AND INSTALLING CENTER CONSOLE CONTROL PANEL

Necessary preliminary tasks

- Remove **TRIM FOR STORAGE COMPARTMENT**

Unclip center console control panel (1) at points (2).

Remove center console control panel (1) from storage compartment (3).

Installation:

Make sure center console control panel (1) is correctly engaged.

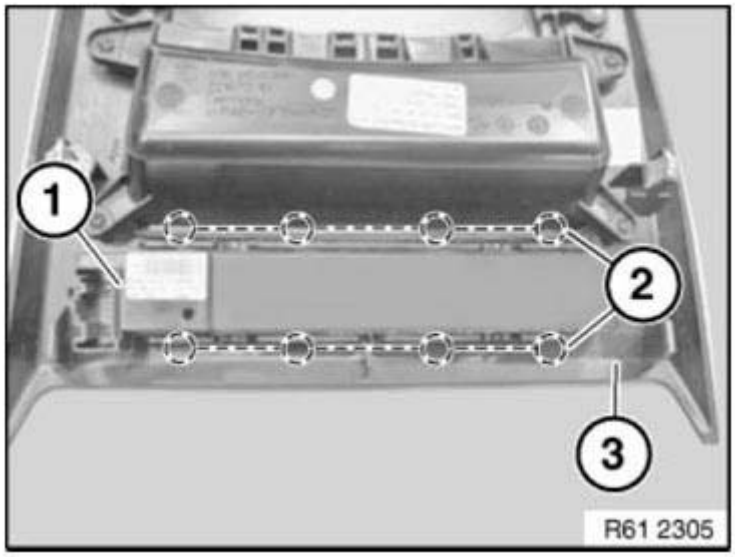


Fig. 113: Identifying Centre Console Control Panel Of Storage Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 133 REMOVING AND INSTALLING/REPLACING AV CONNECTION SOCKET

Necessary preliminary tasks:

- Remove **TRIM FOR STORAGE COMPARTMENT**

Remove rear cover (1) from center console (2) in direction of arrow.

Disconnect plug connection underneath.

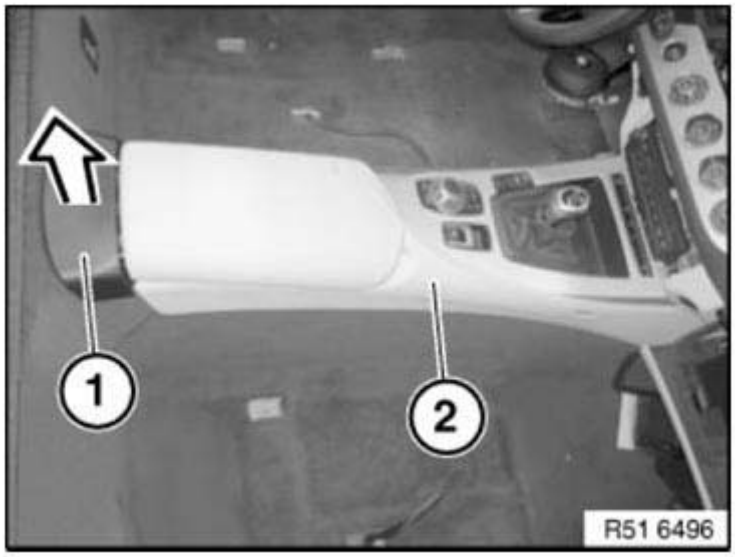


Fig. 114: Removing Rear Cover From Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Release screw (2).

Raise center console (3) a little.

Open center console storage compartment lid (4).

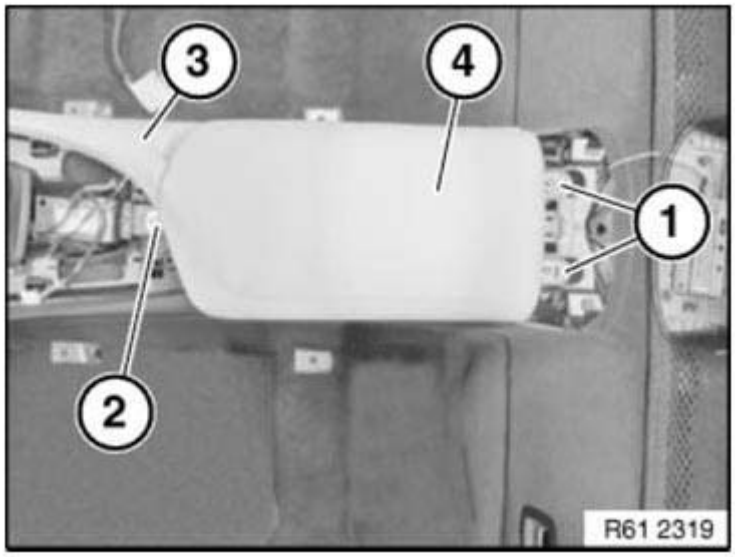


Fig. 115: Identifying Centre Console Storage Compartment Lid And Centre Console With Nuts And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Press connection socket (1) outwards out of center console (2).

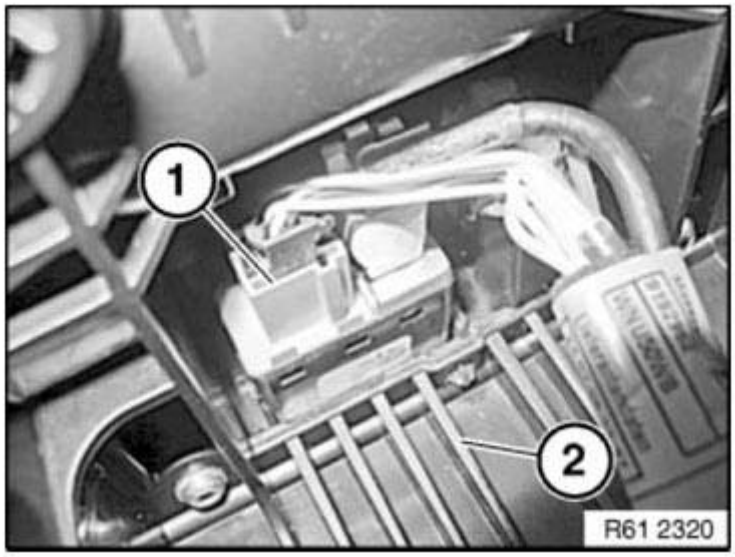


Fig. 116: Identifying Connection Socket Of Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Remove connection socket (2).

Installation:

Make sure connection socket (1) is correctly seated.

Retaining lugs (3) must not be damaged.

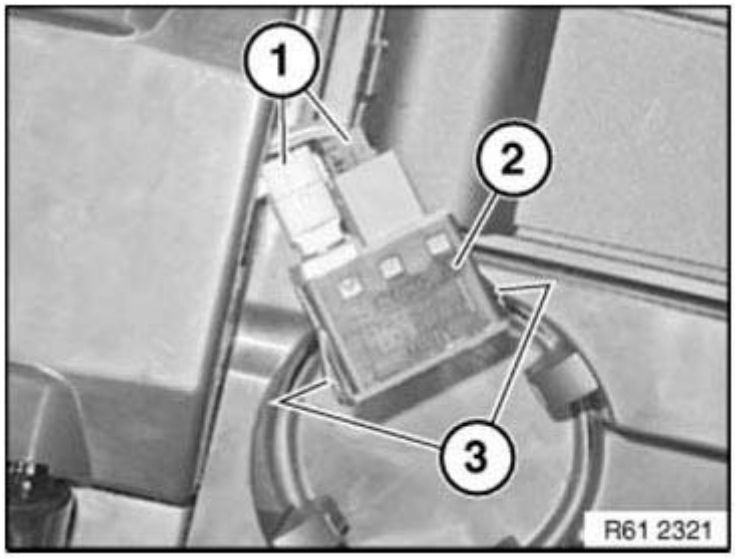


Fig. 117: Identifying Connection Socket With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 243 REMOVING AND INSTALLING/REPLACING HALL SWITCH

Necessary preliminary tasks

- Remove **PANEL FOR LUGGAGE COMPARTMENT SIDE MEMBER ON LEFT**

Disconnect plug connection (1).

Unlock Hall switch (2) and in remove in direction of arrow.

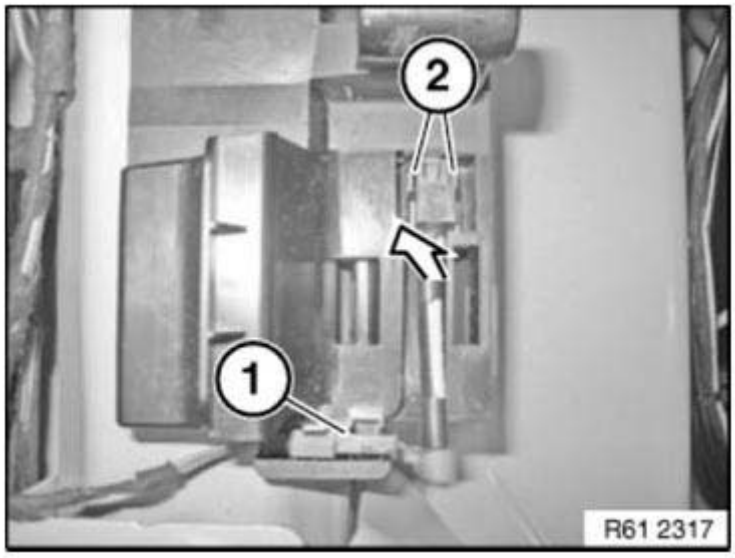


Fig. 118: Removing Hall Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 023 REMOVING AND INSTALLING/REPLACING START/STOP SWITCH

Necessary preliminary tasks

- Remove **RIGHT INSTRUMENT PANEL TRIM**

Unlock retainer (1) on both sides.

Remove Start/Stop switch (2).

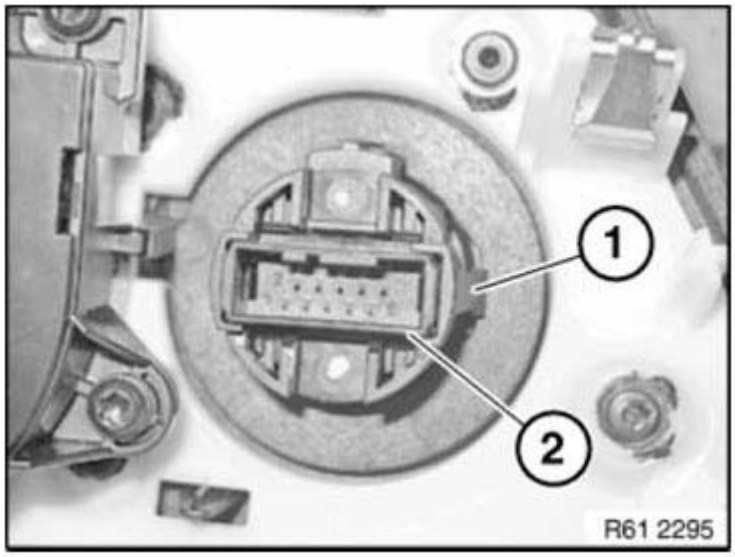


Fig. 119: Identifying Start/Stop Switch And Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 134 REMOVING AND INSTALLING/REPLACING USB/AUDIO INTERFACE CONNECTION SOCKET

Necessary preliminary tasks:

- Remove **TRIM FOR STORAGE COMPARTMENT**

Remove rear cover (1) from center console (2) in direction of arrow.

Disconnect plug connection underneath.

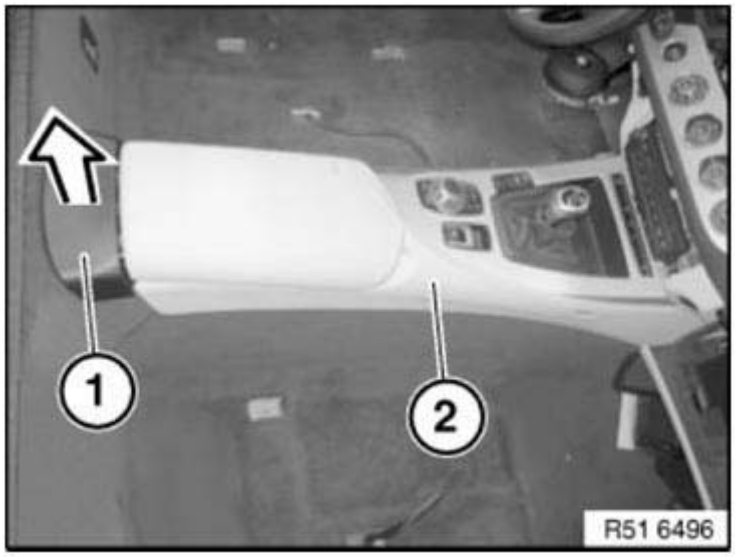


Fig. 120: Removing Rear Cover From Centre Console

Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Release screw (2).

Raise center console (3) a little.

Open center console storage compartment lid (4).

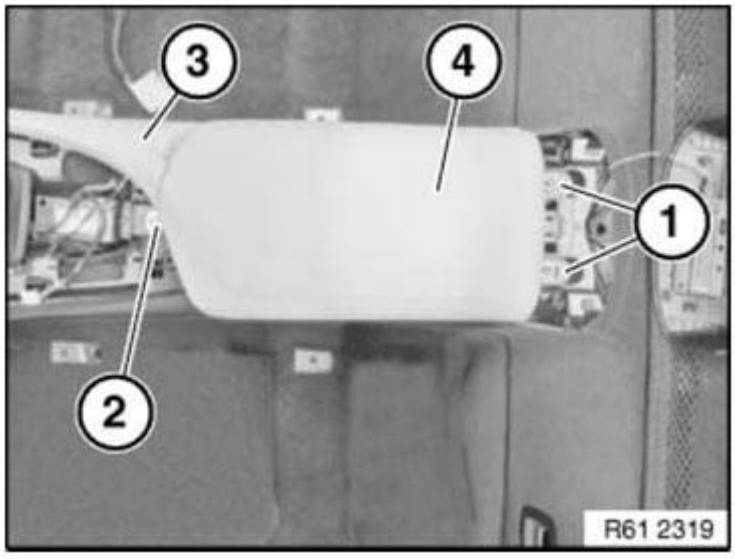


Fig. 121: Identifying Centre Console Storage Compartment Lid And Centre Console With Nuts And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Press connection socket (1) outwards out of center console (2).

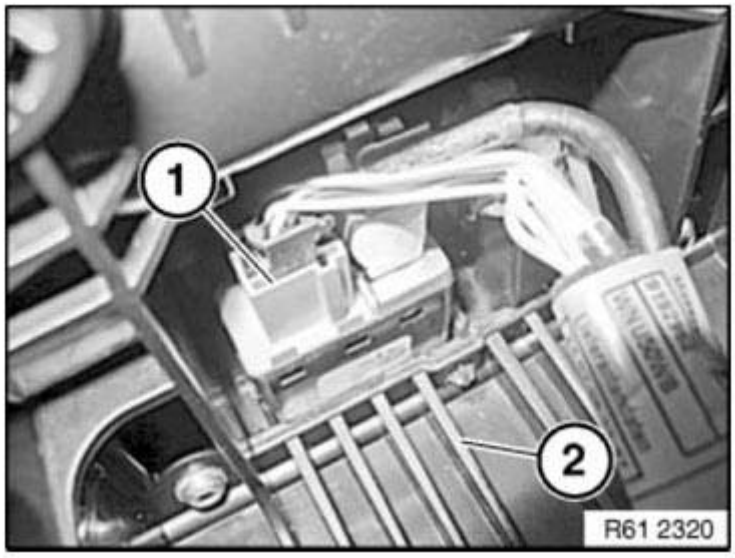


Fig. 122: Identifying Connection Socket Of Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Remove connection socket (2).

Installation:

Make sure connection socket (1) is correctly seated in center console (2).

Retaining lugs (3) must not be damaged.

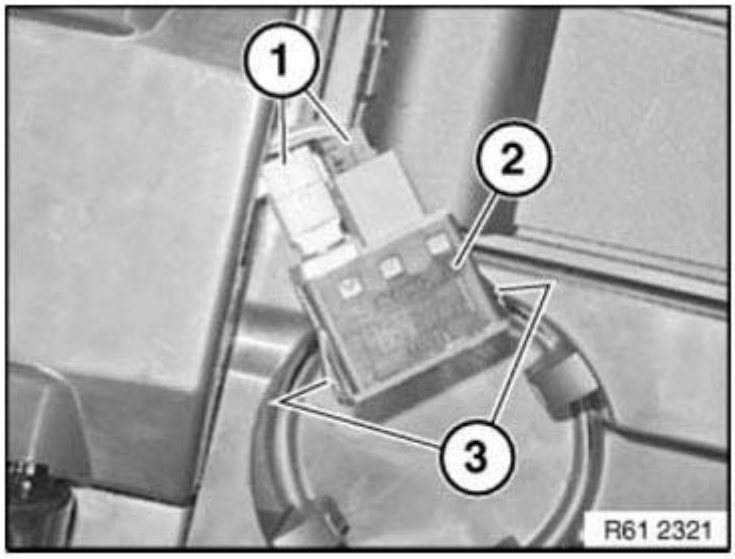


Fig. 123: Identifying Plug Connection, Connection Socket With Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 113 REMOVING AND INSTALLING/REPLACING BOTH SHIFT PADDLES FOR AUTOMATIC TRANSMISSION

Necessary preliminary tasks

- Remove **BOTH SWITCHES FROM SPORT STEERING WHEEL**

NOTE: For purposes of clarity.
Illustration shows steering wheel removed.

Release screws (1).

Disconnect plug connections (2).

Remove shift paddles for automatic transmission (3) in direction of travel.

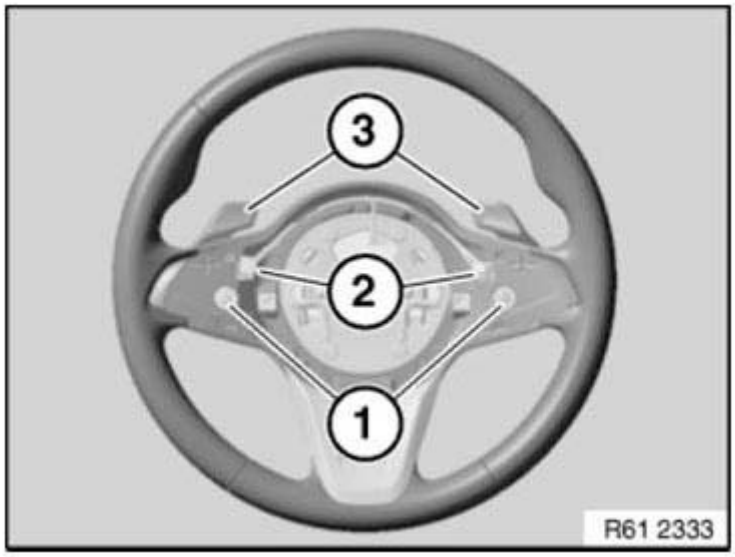


Fig. 124: Identifying Shift Paddles For Automatic Transmission And Plug Connection With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure electrical leads are correctly routed.

Make sure shift paddles for automatic transmission (3) are correctly seated on steering wheel.

61 31 229 REMOVING AND INSTALLING/REPLACING BOTH SWITCHES ON SPORT STEERING WHEEL

Necessary preliminary tasks

- Remove **AIRBAG UNIT**

NOTE: Both multifunction steering wheel switches (4) are connected to each other by the wiring harness (3).

Unfasten plug connection (1) and disconnect.

Unfasten screws (2).

Feed wiring harness (3) out of steering wheel.

Remove multifunction steering wheel switches (4) in direction of arrow.

Installation:

Make sure electrical leads are correctly routed.

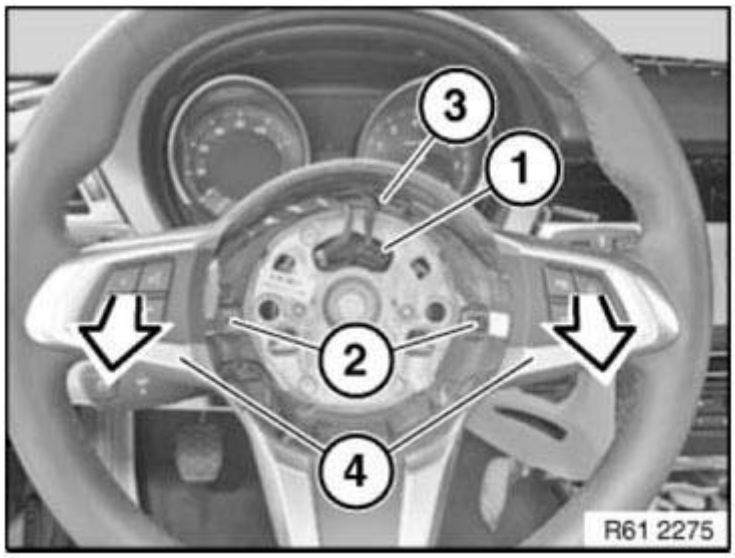


Fig. 125: Removing Multifunction Steering Wheel Switches
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 062 REMOVING AND INSTALLING/REPLACING BUTTON FOR STEERING WHEEL HEATING

Lever out button for steering wheel heating (1) with suitable tool in direction of arrow.

Disconnect plug connection behind and remove button for steering wheel heating (1).

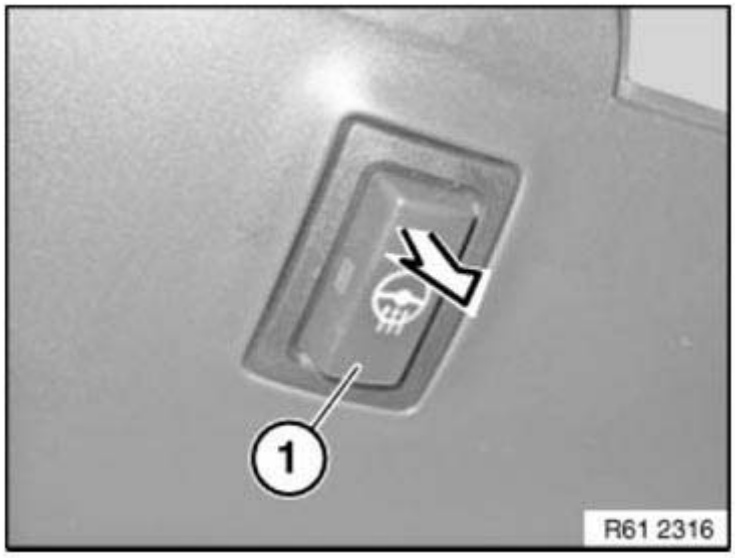


Fig. 126: Removing Button For Steering Wheel Heating
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 299 REMOVING AND INSTALLING/REPLACING CLUTCH SWITCH MODULE

Necessary preliminary tasks

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

NOTE: For purposes of clarity, the clutch master cylinder is shown removed.

Lever out clutch switch module (1) from clutch master cylinder (2) with screwdriver.

Unlock plug (4) and disconnect from housing (3).

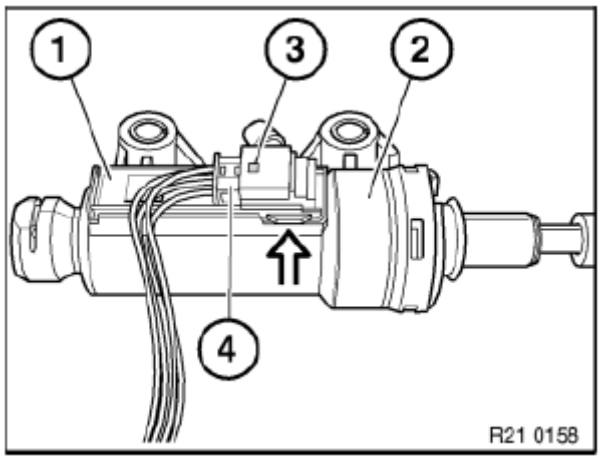


Fig. 127: Disconnecting Plug From Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clutch switch module is secured against incorrect installation.

Clutch switch module must snap audibly into place.

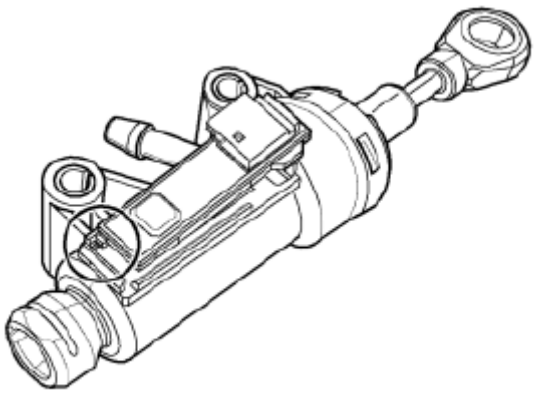


Fig. 128: Identifying Clutch Switch Module
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 195 REMOVING AND INSTALLING/REPLACING CONTROLLER

IMPORTANT: Risk of damage!
The button for the controller must not be removed!

Necessary preliminary tasks

- Remove **TRIM FOR STORAGE TRAY**

IMPORTANT: Risk of damage!

Carefully raise catches (1) on controller holder (3) and remove controller (2) towards top.

Installation:

Make sure controller (2) is correctly engaged in controller holder (3).

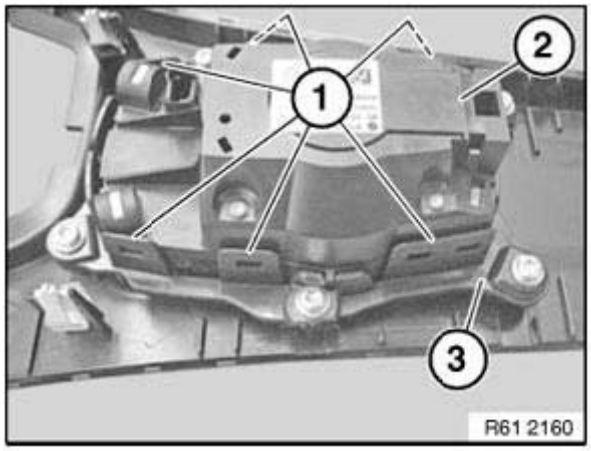


Fig. 129: Identifying Controller And Catches On Controller Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/encoding.

61 31 287 REMOVING AND INSTALLING/REPLACING DRIVING DYNAMICS SWITCH

Necessary preliminary tasks

- Remove **TRIM FOR STORAGE COMPARTMENT**

Release screws (1).

Remove driving dynamics switch (2).

Installation:

Make sure driving dynamics switch (2) is correctly seated.

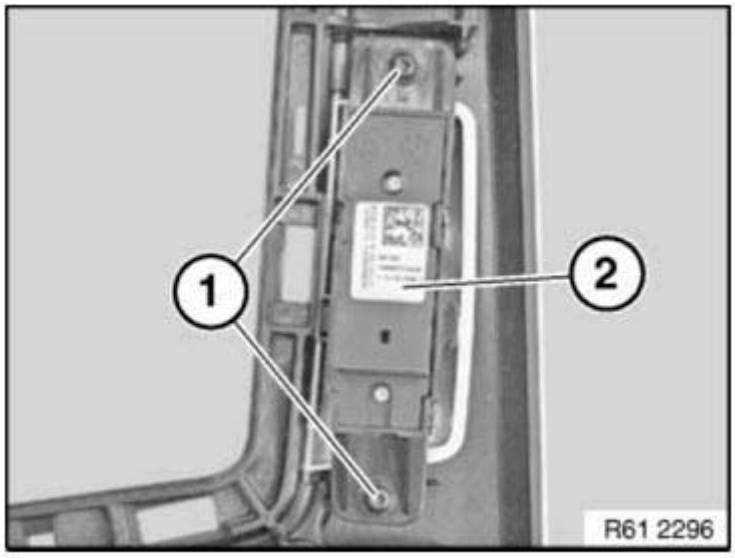


Fig. 130: Identifying Driving Dynamics Switch With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 037 REMOVING AND INSTALLING/REPLACING LIGHT CONTROL UNIT

Necessary preliminary tasks

- Remove **FINISHER ON LEFT INSTRUMENT PANEL TRIM**

Release screws (1).

Remove light switch unit (2) from trim (3).

Installation:

Make sure light switch unit (2) is correctly seated on trim (3).

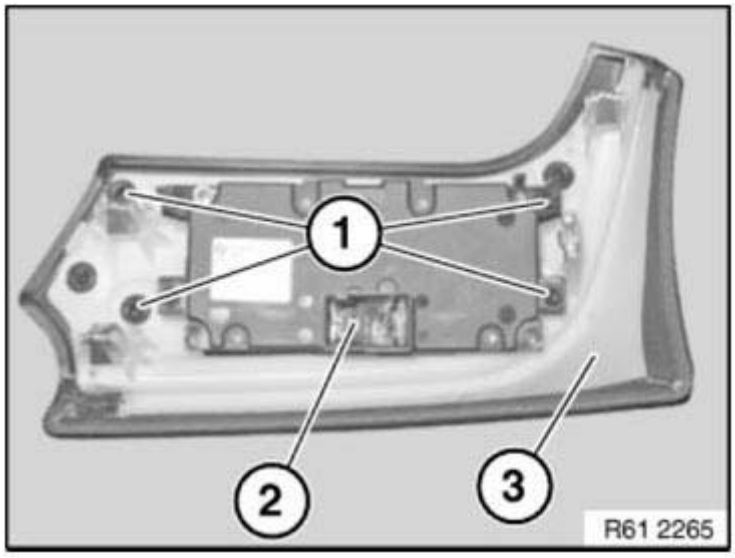


Fig. 131: Identifying Light Switch Unit With Screws On Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding .

61 31 117 REMOVING AND INSTALLING/REPLACING POWER WINDOW SWITCH (DRIVER'S SIDE)

Raise rocker switch (1) with special tool 00 9 317.

Feed rocker switch (1) out of door trim panel (2).

Unlock associated plug connection and disconnect.

Installation:

Make sure rocker switch (1) is correctly seated.

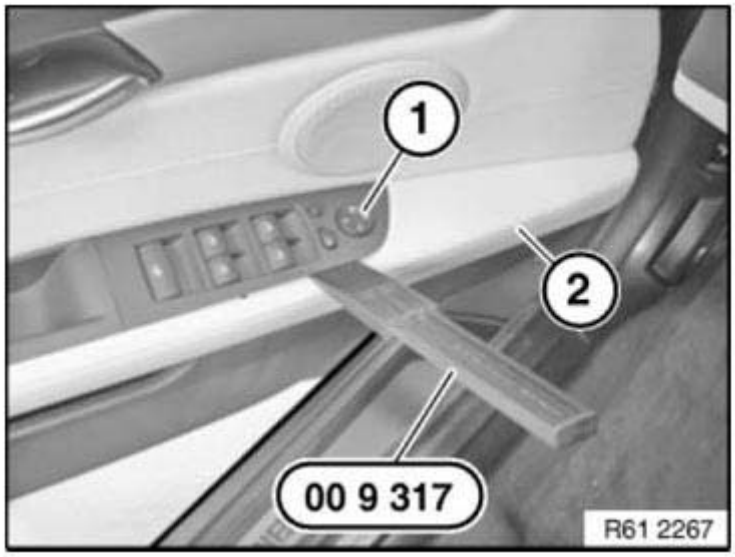


Fig. 132: Lifting Rocker Switch Using Special Tool 00 9 317
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 043 REMOVING AND INSTALLING/REPLACING ROOF SWITCH CLUSTER

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Carefully lever out roof switch center (1) with special tool 00 9 317 and lower slightly.

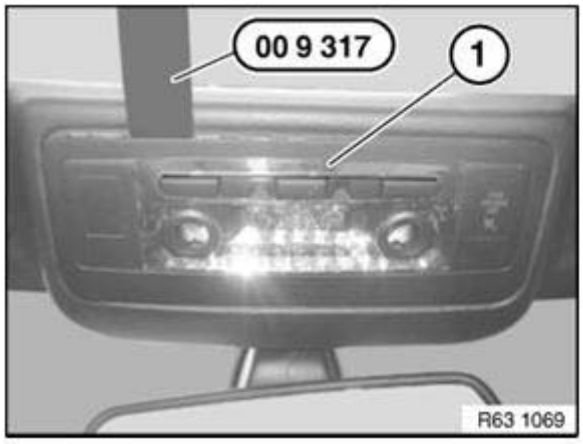


Fig. 133: Removing Roof Switch Centre Using Special Tool 00 9 317
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock retaining clips (1) and feed out roof switch center in direction of arrow.

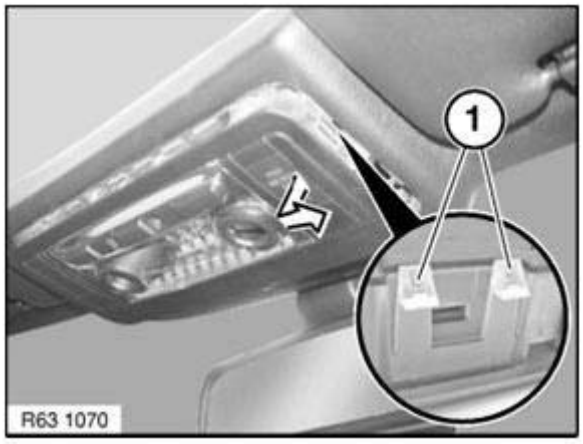


Fig. 134: Removing Retaining Clips Out Roof Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connections (1) and remove roof switch center.

IMPORTANT: Disconnecting the plug connection for the hands-free microphone or emergency SOS call button results in fault memory entries in the telephone control unit (limitation in the emergency SOS call system).
After fitting, read out fault memory and if necessary delete entries.

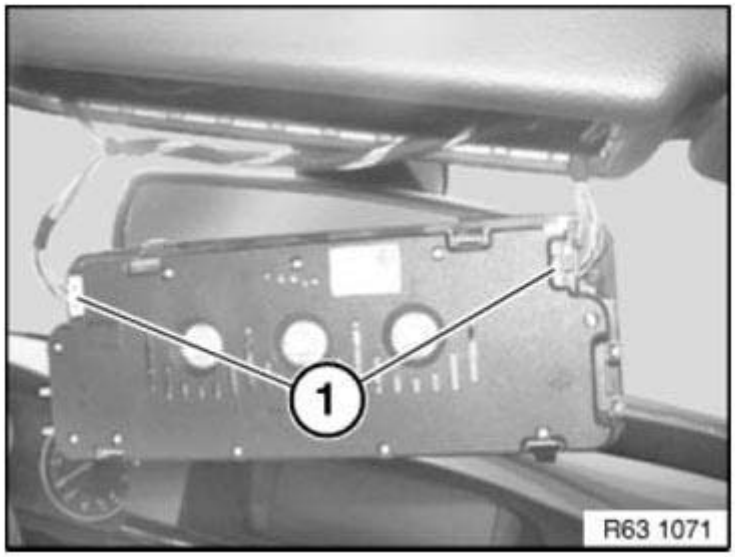


Fig. 135: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove **BULBS** .

Carry out vehicle programming/coding .

61 31 008 REMOVING AND INSTALLING/REPLACING STEERING-COLUMN SWITCH CLUSTER

WARNING: Move wheels into straight-ahead position and do not alter this position during the repair work.
Do not under any circumstances turn the steering column switch cluster when the steering wheel is removed.

Necessary preliminary work

- Remove steering wheel
- Remove steering column shroud lower section
- If necessary, remove switch for steering column adjustment

WARNING: Do not twist the coil spring cassette (1)!

NOTE: The coil spring cassette (1) may be replaced separately, if necessary!

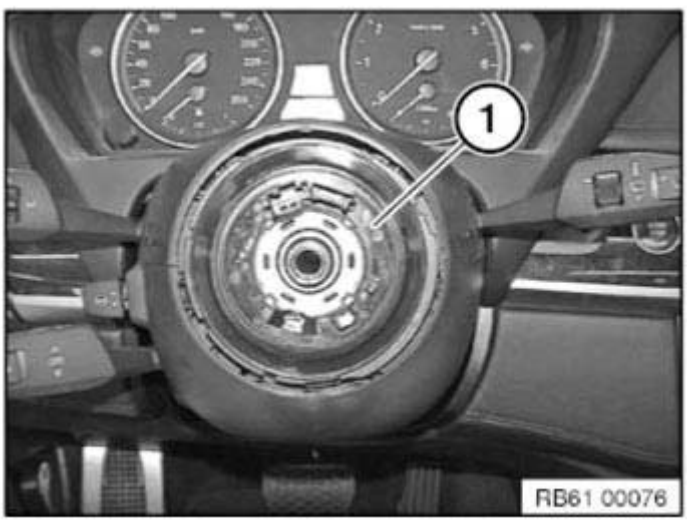


Fig. 136: Identifying Coil Spring Cassette
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

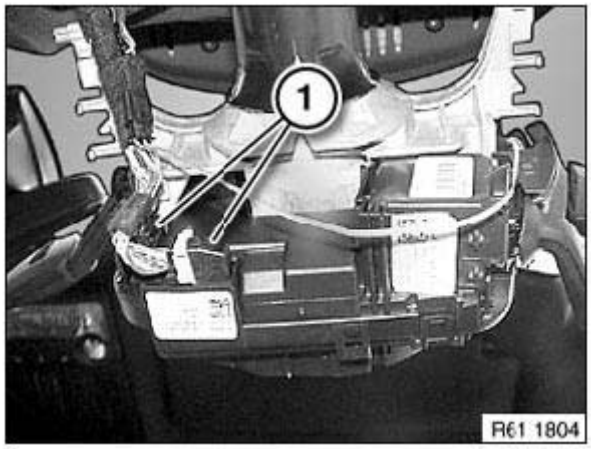


Fig. 137: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **61 31 8AZ** .

Remove steering-column switch cluster in direction of arrow.

Installation note:

The steering column switch cluster is installed in reverse sequence.

Carry out steering angle sensor adjustment.

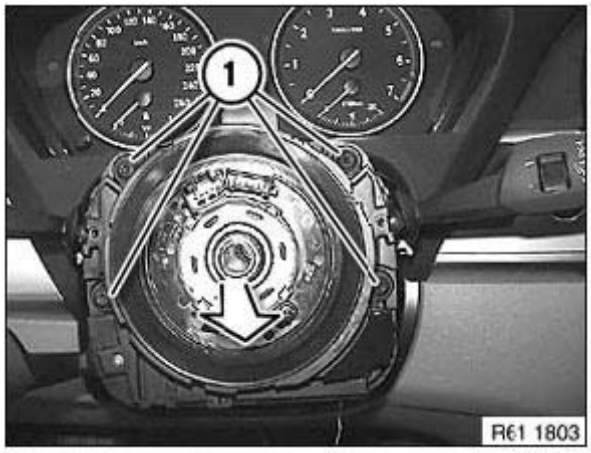


Fig. 138: Identifying Steering-Column Switch Cluster Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Remove volute spring cassette

- Carry out vehicle programming/encoding

NOTE:

- **If replacement of the steering column switch cluster is initiated via Progman, the steering column switch cluster is coded indirectly via the DSC control unit**
- **If coding is cancelled, first adjust the steering angle sensor; this makes a brand-new steering-column switch cluster coding-compatible again if necessary**
- **Then code the DSC control unit again**

- Carry out steering angle sensor adjustment

NOTE:

- **If steering angle sensor adjustment is cancelled, first code the DSC control unit**
- **Then adjust the steering angle sensor again**

- **Vehicles with active steering:**
  - Steering angle sensor is adjusted by means of initial operation/adjustment of active front steering
  - If necessary, proceed in accordance with instructions

61 31 172 REMOVING AND INSTALLING/REPLACING SWITCH FOR ELECTROMECHANICAL PARKING BRAKE

Necessary preliminary tasks:

- **DISCONNECT NEGATIVE BATTERY LEAD** (to avoid fault memory entries)
- Remove **TRIM FOR STORAGE TRAY**

Release screws (1).

Remove switch for electromechanical parking brake (2) from trim for storage compartment (3).

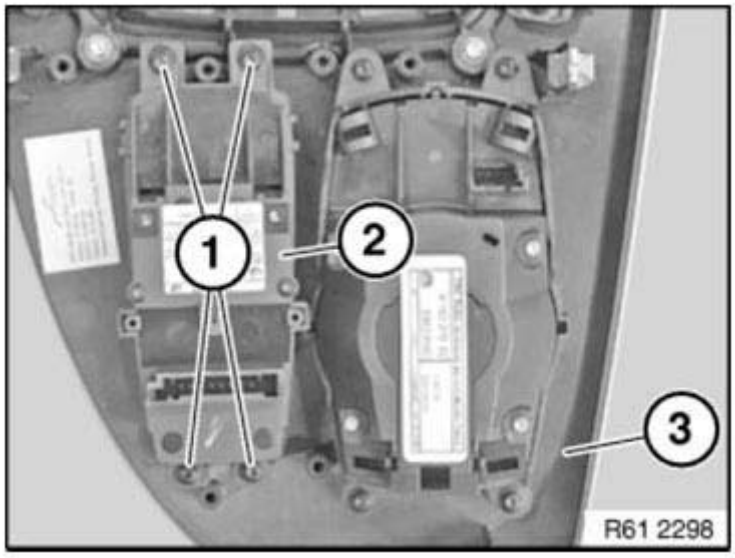


Fig. 139: Identifying Storage Compartment And Switch For Electromechanical Parking Brake With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 208 REMOVING AND INSTALLING/REPLACING SWITCH FOR FRONT LUMBAR SUPPORT

Necessary preliminary tasks

- Remove **OUTER COVER ON FRONT SEAT**

Expand catches (1) of cover (2).

Unclip switch for front lumbar support (3) in direction of arrow and remove.

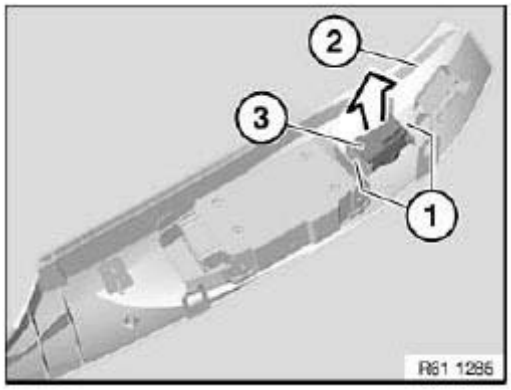


Fig. 140: Expanding Catches Of Cover
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 079 REMOVING AND INSTALLING/REPLACING SWITCH FOR HAZARD WARNING

FLASHERS/CENTRAL LOCKING

Carefully lever out switch for hazard warning system/central locking (1) with special tool 00 9 341 in direction of arrow.

Remove switch for hazard warning system/central locking (1) in direction of arrow and disconnect plug connection behind.

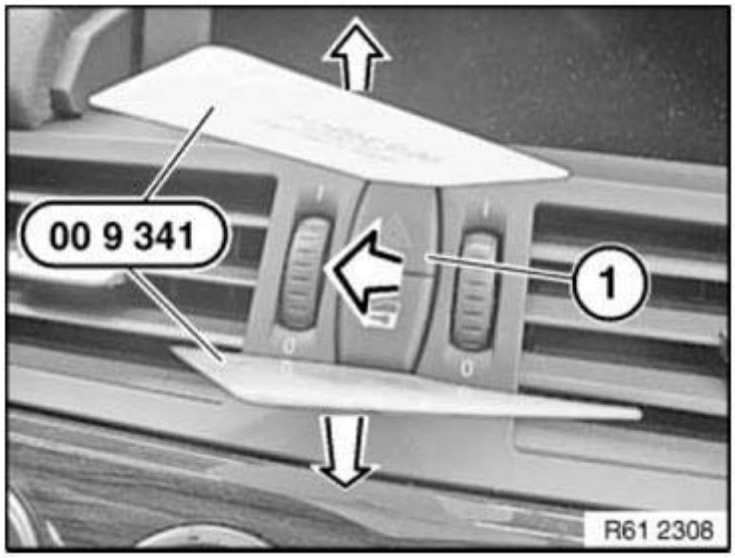


Fig. 141: Removing Switch For Hazard Warning System/Central Locking
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 083 REMOVING AND INSTALLING/REPLACING SWITCH FOR UNLOCKING REAR LID

NOTE: To unclip switch for unlocking rear lid (4), partially detach mucket (1). Grip from outside behind footwell side trim panel on A-pillar on left (2).

Press retaining lugs (3) together and feed switch for unlocking rear lid (4) out of footwell side trim panel on A-pillar on left (2).

If necessary, remove **FOOTWELL SIDE TRIM PANEL ON A-PILLAR, LEFT** .

Disconnect associated plug connection and remove switch for unlocking rear lid (4).

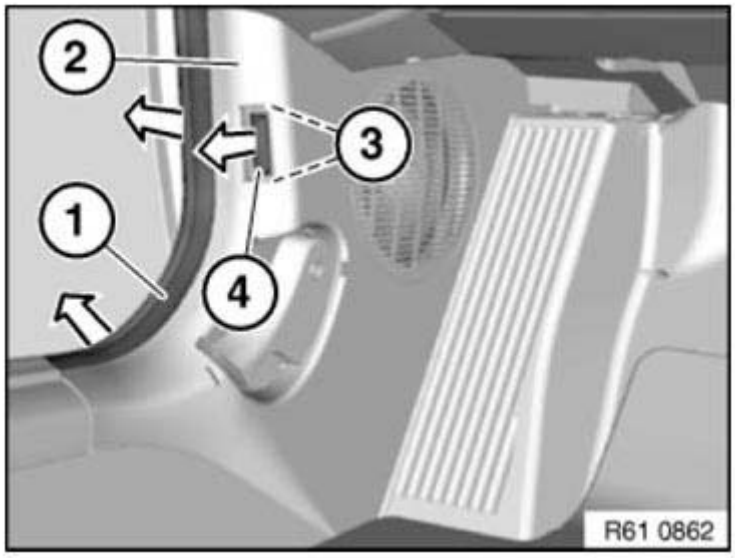


Fig. 142: Removing Switch For Unlocking Rear Lid
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 011 REMOVING AND INSTALLING/REPLACING VOLUTE SPRING CASSETTE

WARNING: Move wheels into straight-ahead position and do not alter this position during the repair work.

Necessary preliminary tasks

- Remove **STEERING-COLUMN SWITCH CLUSTER**

Unlock catches (1).

Press lock (2) and remove volute spring cassette (4) in direction of arrow from fixture for steering column stalk (3).

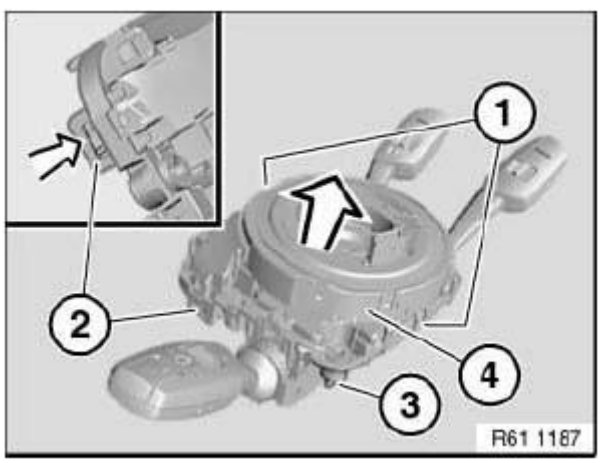


Fig. 143: Removing Volute Spring Cassette From Fixture For Steering Column Stalk
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Do not turn ring (1).**
- **Also turning ring (1) through 360° is not permitted!**
- **Secure ring (1) against unauthorized turning (e.g. with adhesive tape).**

Installation:

Notch (3) on ring (1) must line up with arrow (4) on switch (2).

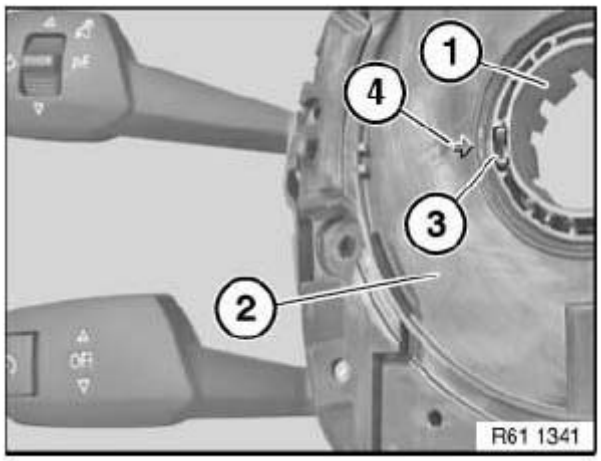


Fig. 144: Identifying Notch, Rings And Switch
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Fit volute spring cassette (1) so that guide (2) can slide exactly into associated notch on switch (3).

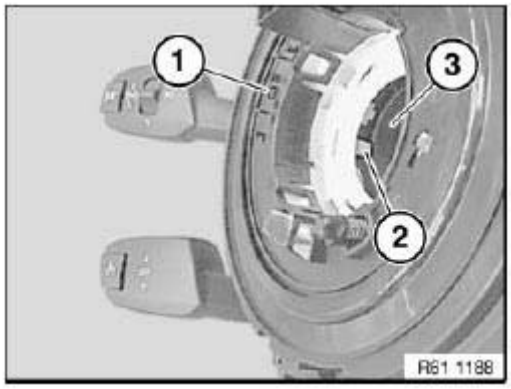


Fig. 145: Identifying Volute Spring Cassette, Guide And Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 310 REPLACING BRAKE LIGHT SWITCH

Necessary preliminary tasks

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY** .

NOTE: Brake light switch (2) is situated above the brake pedal.

Disconnect plug connection (1).

Pull brake light switch (2) in direction of arrow out of brake light switch holder (3).

Press catches (4) together and unclip brake light switch holder (3) from brake pedal.

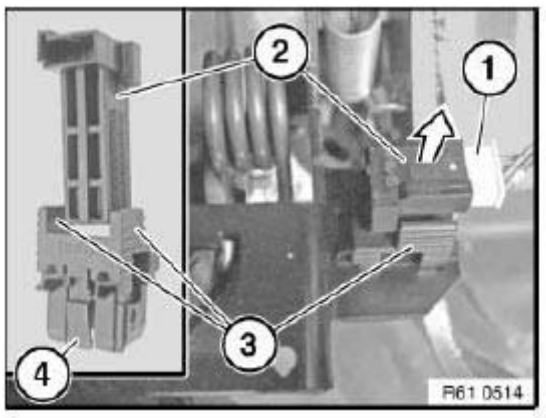


Fig. 146: Pulling Brake Light Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Depress brake pedal.

Slide brake light switch (2) as far as it will go into brake light switch holder (3).

Grip brake light switch holder (3), slowly return brake pedal to starting position and pull back to stop.

61 31 382 REPLACING COOLANT LEVEL SWITCH

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Unlock plug connection (1) on level switch (2) and disconnect.

Turn level switch (2) in direction of arrow and pull out of coolant expansion tank (3).

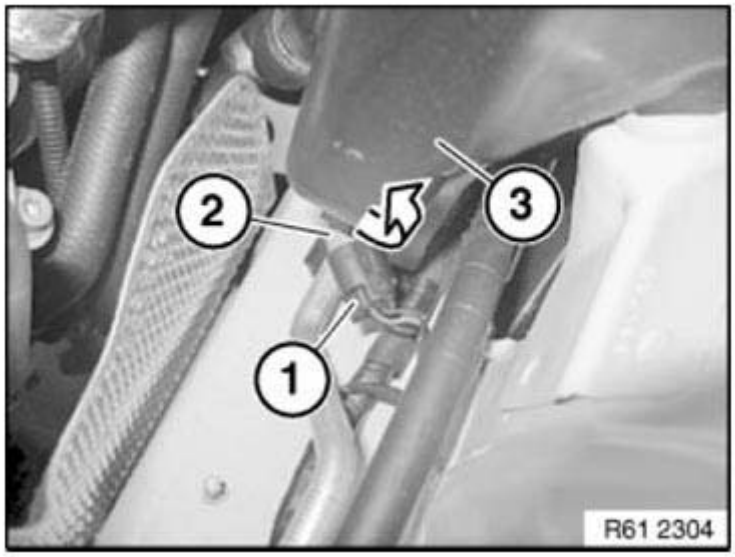


Fig. 147: Turning Level Switch
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 118 REPLACING FRONT PASSENGER POWER WINDOW SWITCH

Carefully lever out rocker switch (1) in area (2) with special tool 00 9 323 .

Feed rocker switch (1) out of door trim panel (3).

Unlock associated plug connection and disconnect.

remove rocker switch (1).

Installation:

Make sure rocker switch (1) is exactly seated.

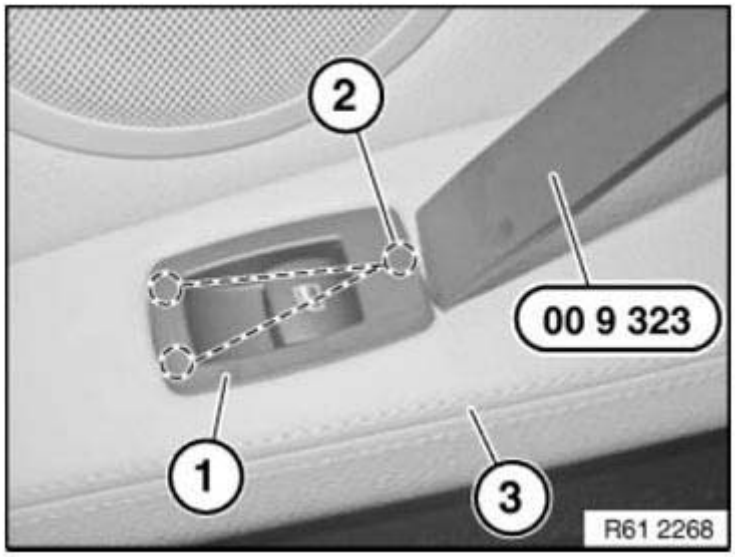


Fig. 148: Removing Rocker Switch On Area Using Special Tool 00 9 323
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 492 REPLACING LEVEL SWITCH FOR WINDSCREEN WASHER SYSTEM

Unlock retaining lugs (1).

Remove fluid tank for windscreen washer system (2).

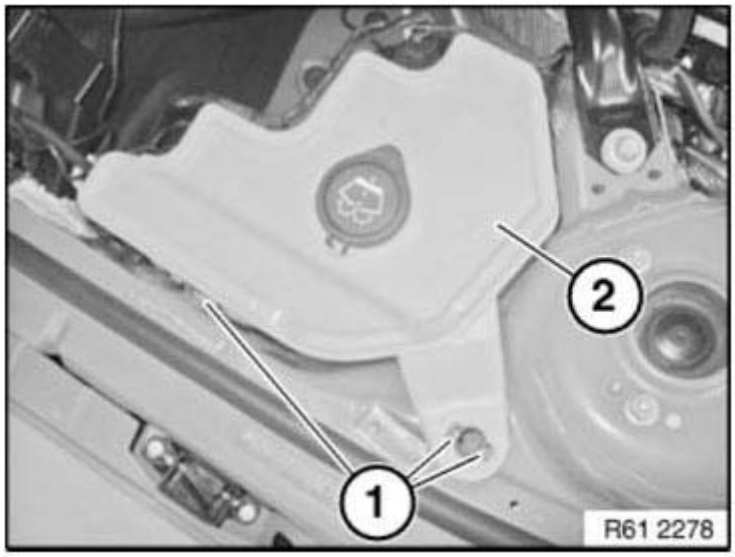


Fig. 149: Identifying Windscreen Washer System With Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Turn level switch for windscreen washer system (2) in direction of arrow through approx. 90° and pull out

downwards.

Installation:

Make sure level switch for windscreen washer system (2) is correctly seated.

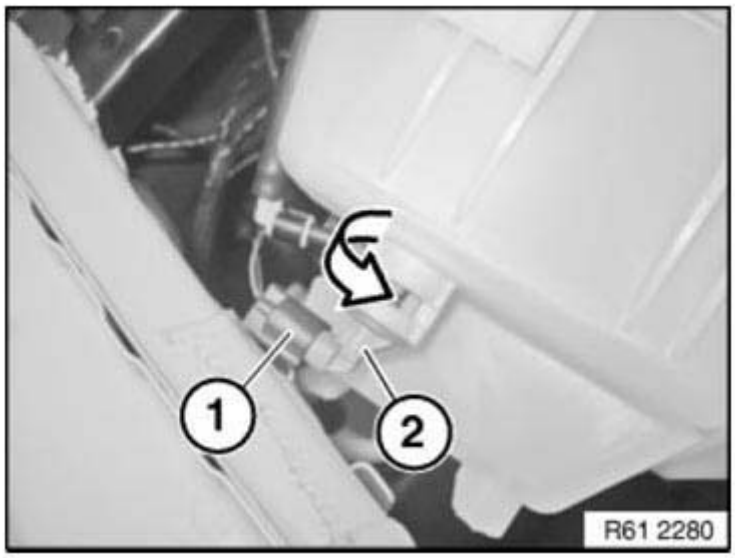


Fig. 150: Turning Level Switch For Windscreen Washer System
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 204 REPLACING SWITCH COMBINATION FOR SEAT ADJUSTMENT

Necessary preliminary tasks

- Remove **OUTER COVER** on front seat

Disconnect plug connection (2).

Unlock retaining tabs (3) in direction of arrow and remove switch combination (1) from cover.

Installation:

Retaining tabs (3) of cover and guide (4) of switch combination (1) must not be damaged.

Make sure switch combination (1) is correctly seated in retaining tabs (3).

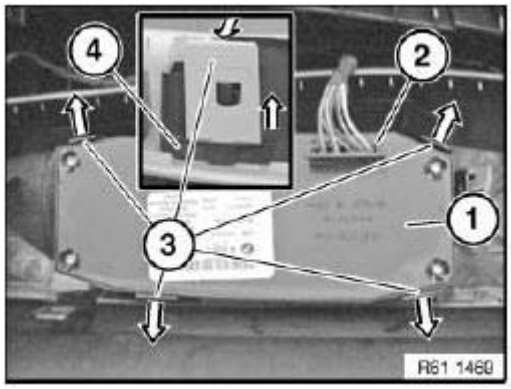


Fig. 151: Removing Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

61 31 270 REPLACING SWITCH FOR REVERSING LIGHT

NOTE: The installation location of the reversing light switch can vary, depending on the transmission model.

Necessary preliminary tasks

- If necessary, remove **REAR UNDERBODY PROTECTION**

Version A:

Disconnect plug connection (1).

Release switch for reversing light (2).

Tightening torque **61 31 2AZ** .

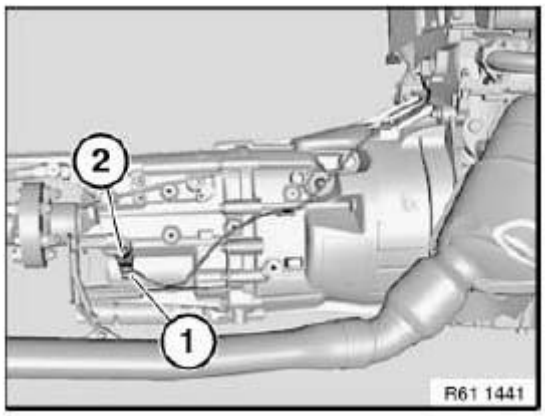


Fig. 152: Identifying Plug Connection And Switch For Reversing Light (Version A)
Courtesy of BMW OF NORTH AMERICA, INC.

Version B:

Disconnect plug connection (1).

Release switch for reversing light (2).

Tightening torque **61 31 2AZ** .

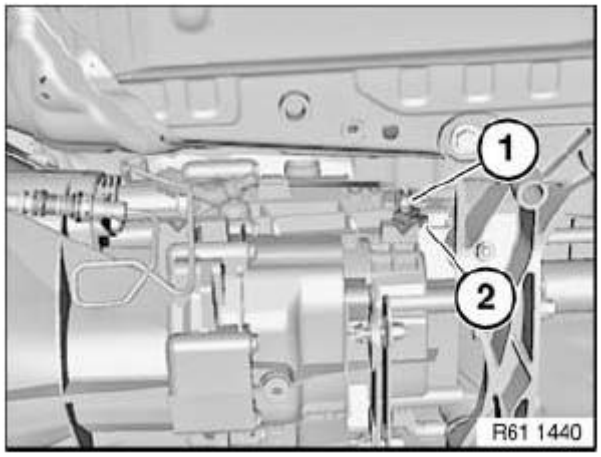


Fig. 153: Identifying Plug Connection And Switch For Reversing Light (Version B)
Courtesy of BMW OF NORTH AMERICA, INC.

6133 HORN

61 33 040 REMOVING AND INSTALLING/REPLACING A FANFARE HORN

Necessary preliminary tasks:

- Remove **FRONT LEFT WHEEL ARCH COVER**

Unlock plug connections (1) and disconnect.

Release screws (2) and remove fanfare horn (3) complete with holder.

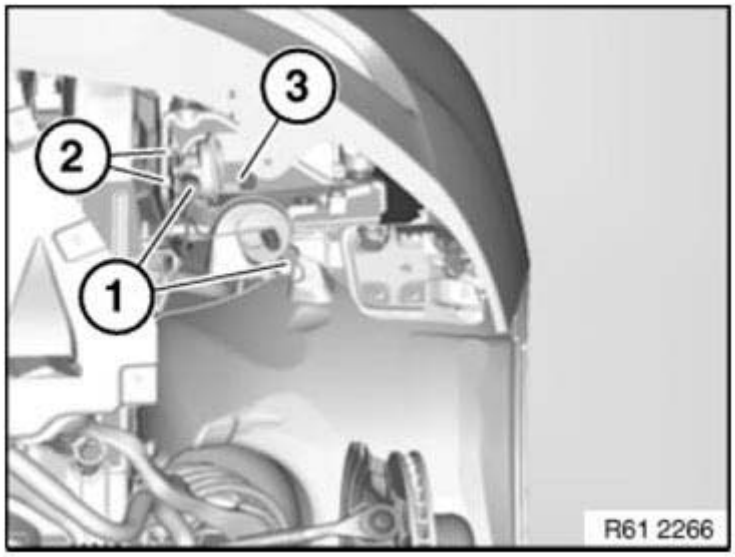


Fig. 154: Identifying Plug Connection And Fanfare Horn With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Slacken nut (1).

Remove holder (2) from air horn (3).

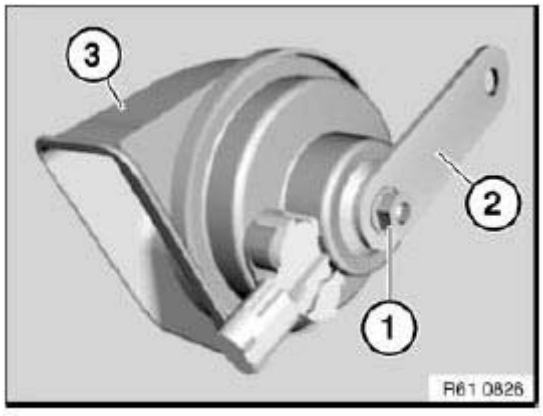


Fig. 155: Identifying Holder Of Air Horn With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

61 33 060 REMOVING AND INSTALLING/REPLACING BOTH FANFARE HORNS

Operation is described in:

- Removing **A FANFARE HORN**

6134 INSERT HOLDER FOR CIGARETTE LIGHTER

61 34 ... REMOVING AND INSTALLING/REPLACING 12-V SOCKET IN THE FRONT STORAGE COMPARTMENT

Necessary preliminary tasks

REMOVE COVER FOR FRONT STORAGE COMPARTMENT

Press together tabs in direction of arrow and remove the cover (1) forwards.

Expose cable at positions (3) and (5).

Carefully unclip lighting from storage compartment (2) and socket (4).

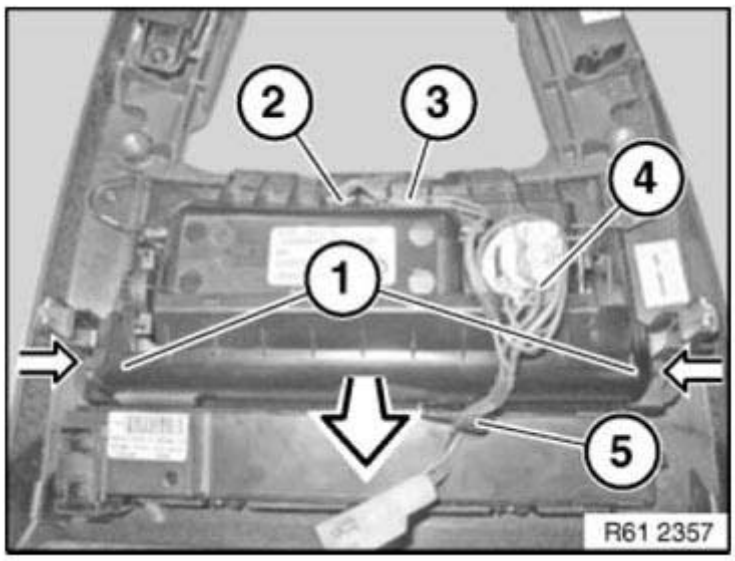


Fig. 156: Pressing Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Pull the 12-V socket with special tool 61 0 250 from the storage compartment housing until the connector is below on the light ring.

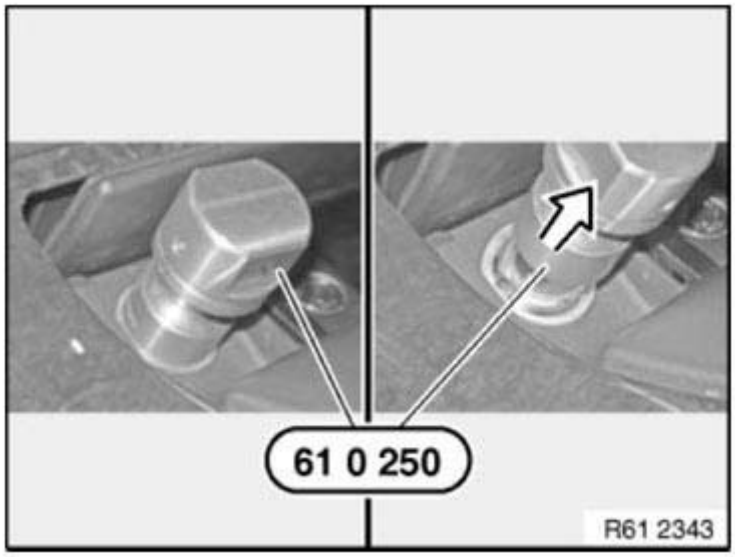


Fig. 157: Pulling 12V Socket Using Special Tool (61 0 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock tabs with suitable tool in direction of arrow and release light ring (1).

Pull out 12-V socket completely, including light ring and cable.

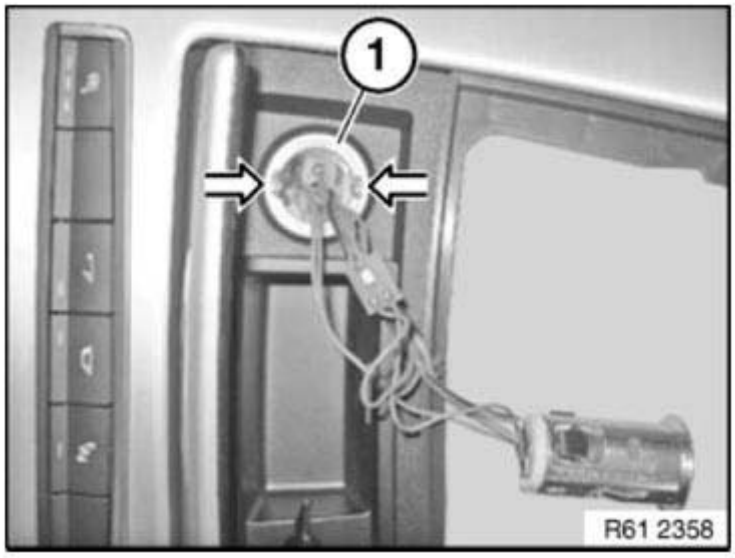


Fig. 158: Releasing Light Ring
Courtesy of BMW OF NORTH AMERICA, INC.

61 34 ... REMOVING AND INSTALLING/REPLACING 12V SOCKET IN CENTER ARMREST STORAGE COMPARTMENT

Necessary preliminary tasks

REMOVE CENTRE CONSOLE.

Remove 12V socket with special tool 61 0 250 .

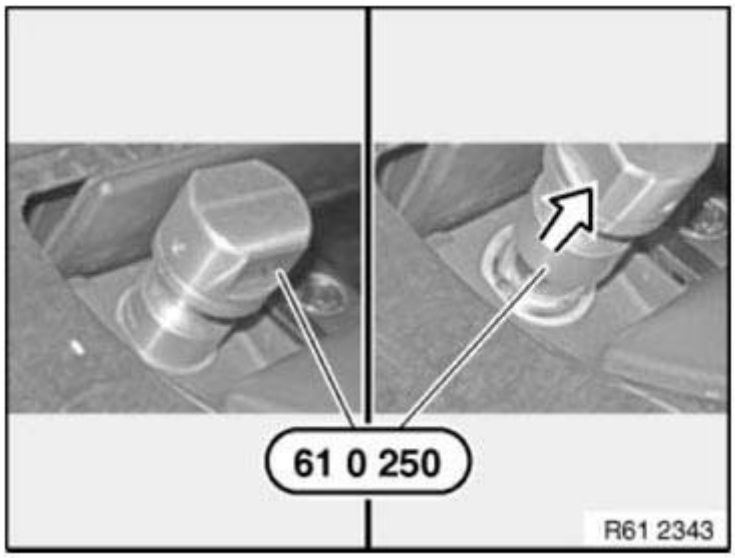


Fig. 159: Removing 12V Socket Using Special Tool (61 0 250)
Courtesy of BMW OF NORTH AMERICA, INC.

6135 CONTROL UNITS, MODULES

61 35 679 INITIALIZING RAIN/LIGHT (SOLAR) SENSOR

NOTE: **Initialization is necessary:**

- **after replacing windscreen**
- **after replacing rain/light (solar) sensor**
- **after replacing optical element on rain/light (solar) sensor**
- **after installing a used rain/light (solar) sensor**

NOTE:

- **Connect BMW diagnosis system**
- **Initializing rain/light (solar) sensor**

61 35 ... NOTES ON ESD PROTECTION (ELECTRO STATIC DISCHARGE)

NOTE: **Electrical components which are particularly sensitive to electrostatic discharge (electronic control units, sensors, etc.) are marked with the ESD warning symbol.**
E - Electro
S - Static

D - Discharge

Statically charged persons can discharge themselves when they touch electrical components.

NOTE: Humans can only detect a discharge starting from a level of approx. 3000 V. The danger threshold for electrical components already starts from a level of approx. 100 V.

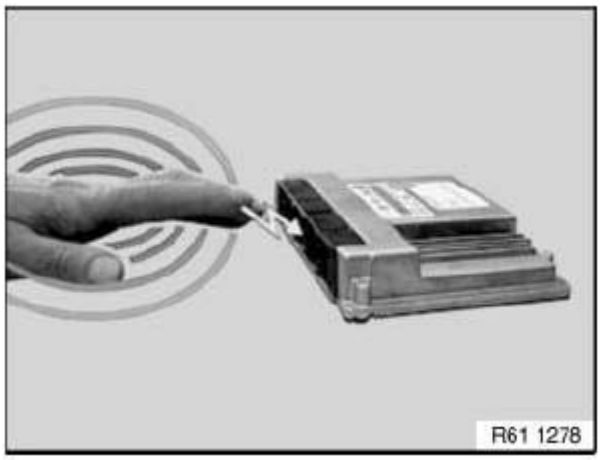


Fig. 160: Discharging Charged Person By Touching Electrical Components
Courtesy of BMW OF NORTH AMERICA, INC.

Example:

Mechatronic control unit.

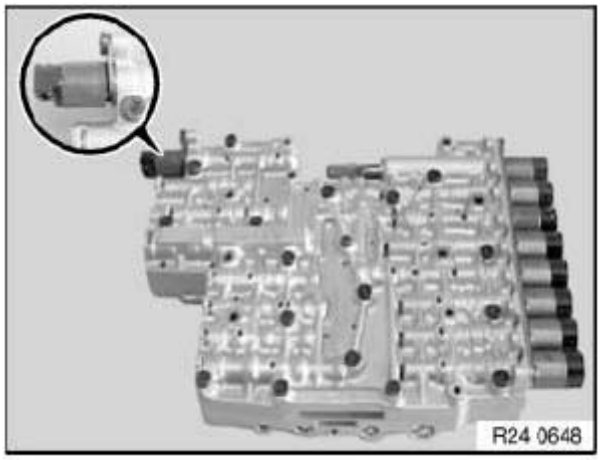


Fig. 161: Identifying Mechatronic Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Fig. 162: Precaution For Touching Pins And Multi-Pin Connectors Directly
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not touch pins and multi-pin connectors directly!

Touch electrical components by their housings only.

IMPORTANT: To avoid damaging or destroying electrical components as a result of electrostatic discharge, it is absolutely essential to observe the following instructions:

- **When replacing electrical components, leave the replacement components in their original packaging until immediately before they are to be installed**
- **If necessary, always return a removed component in its original packaging (always pack the component away immediately)**
- **Read and comply with user information on using the associated special tool 12 7 060**

Personal protective equipment:

Electrically conducting clothing (high wool content, antistatic shoes required).

These can primarily be identified by the logo on the side.

Fig. 163: Identifying Antistatic Shoes
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 015 REMOVING AND INSTALLING (REPLACING) CONTROL UNIT FOR CAR ACCESS SYSTEM

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **TRIM PANEL FOR PEDAL ASSEMBLY**

Unlock plug connections (1) and disconnect.

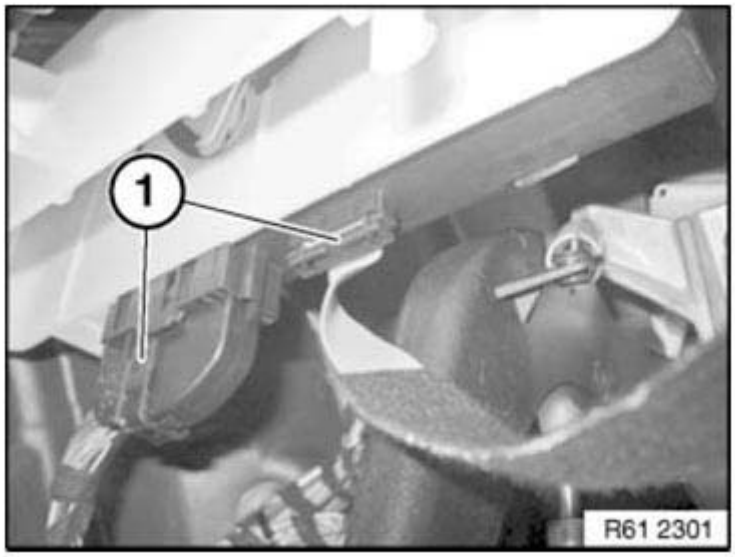


Fig. 164: Identifying Plug Connection

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock control unit for Car Access System (1) at points (2).

Remove control unit for Car Access System (1) in direction of arrow.

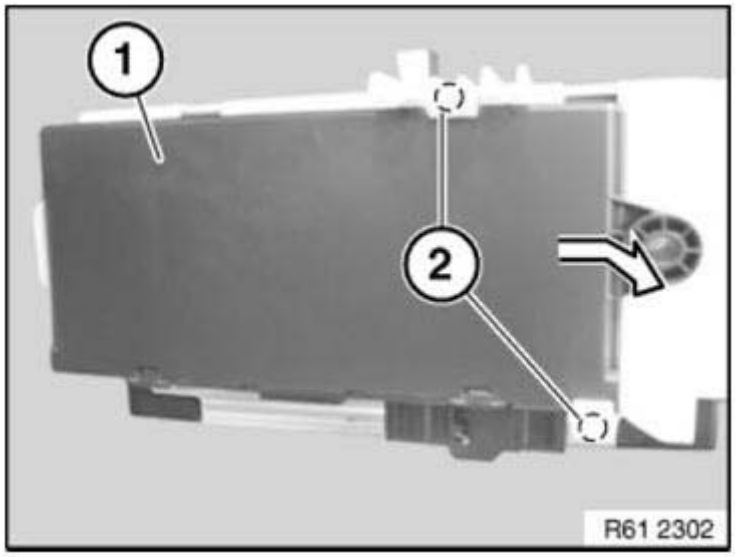


Fig. 165: Removing Control Unit For Car Access System
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Feed guide (1) of control unit for Car Access System (2) correctly into associated mounting.

Fig. 166: Identifying Guide Of Control Unit For Car Access System
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out programming/coding.

61 35 177 REMOVING AND INSTALLING (REPLACING) RAIN/LIGHT SENSOR

Expand two-part mirror base cover (1) by pressing from below and detach.

Feed out two-part mirror base cover (1) and remove.

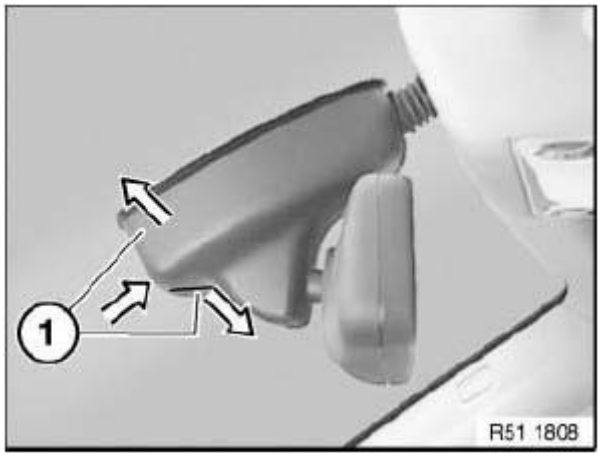


Fig. 167: Removing Two-Part Mirror Base Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (3).

Press locks (1) in direction of arrow and remove rain/light sensor (2) towards bottom.

Installation note:

Do not damage optical element covered by rain/light sensor (2).

If necessary, initialize **RAIN/LIGHT SENSOR** .

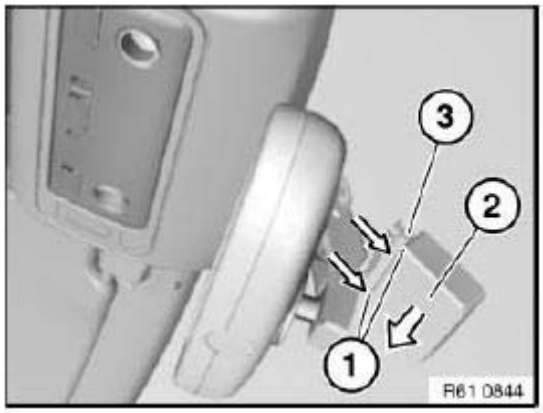


Fig. 168: Pressing Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out programming/encoding.

61 35 107 REMOVING AND INSTALLING OR REPLACING JUNCTION BOX ELECTRONICS

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **TRIM FOR INSTRUMENT PANEL** , bottom right

Unfasten plug connection (1) and disconnect.

Release screw (2).

Fold down passenger compartment fuse box (3) in direction of arrow.

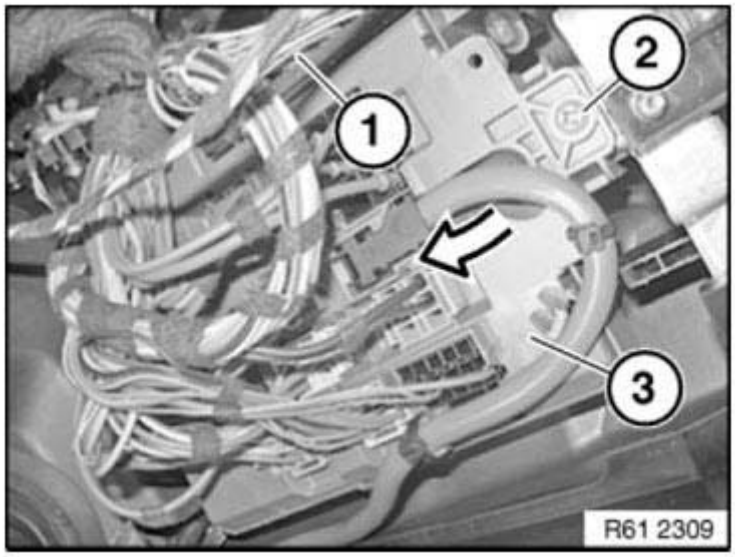


Fig. 169: Folding Passenger Compartment Fuse Box
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Release screws (2) and pull junction box electronics (3) out of holder in direction of arrow.

Installation:

Make sure junction box electronics (3) are correctly seated.

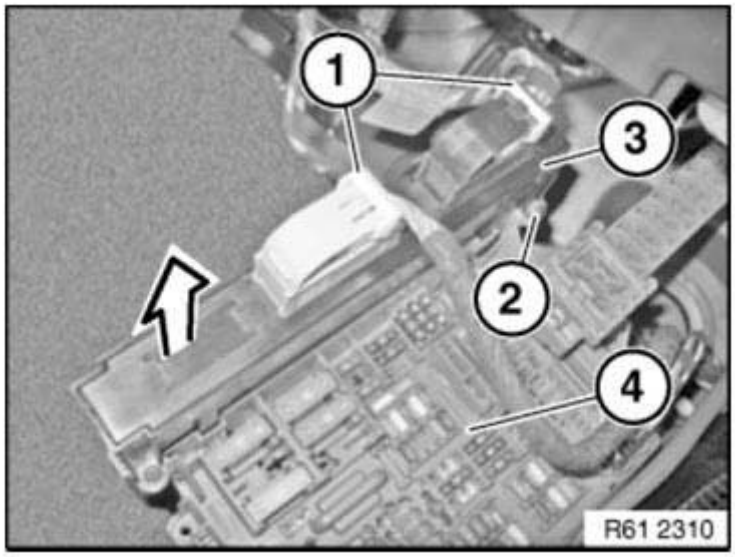


Fig. 170: Pulling Junction Box Electronics Out Of Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

Delete transport mode.

61 35 146 REMOVING AND INSTALLING/REPLACING CONVERTIBLE TOP MODULE

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary tasks

- Remove **RIGHT LOADING SILL END COVER**

Unlock plug connections (1) and disconnect.

Pull Convertible top module (2) out of device holder (3).

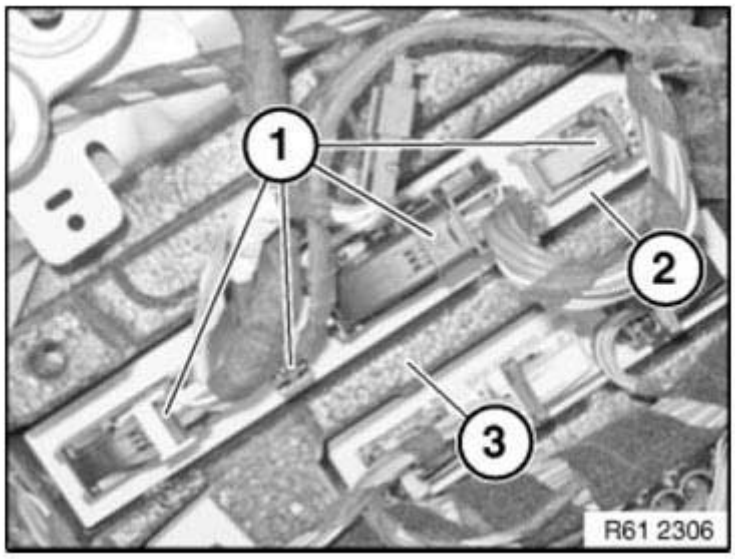


Fig. 171: Identifying Plug Connection And Convertible Top Module Of Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

61 35 975 REMOVING AND INSTALLING/REPLACING BUMPER AERIAL FOR COMFORT ACCESS SYSTEM

Necessary preliminary tasks:

- Remove **REAR BUMPER TRIM**

Disconnect plug connection (1).

Unlock and remove bumper aerial for comfort access system (2) from holder (3).

Installation:

Make sure bumper aerial for comfort access system (2) is correctly seated in designated holder (3).

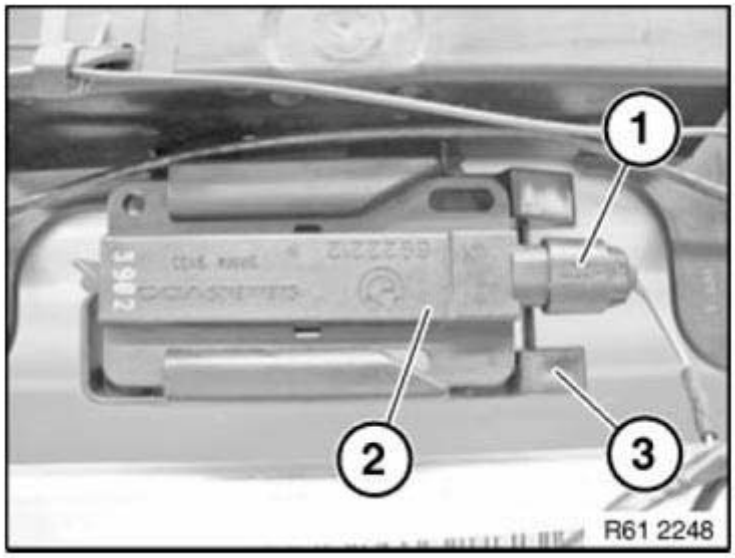


Fig. 172: Identifying Plug Connection And Bumper Aerial For Comfort Access System On Holder
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 080 REMOVING AND INSTALLING/REPLACING CONTROL UNIT/MODULE FOR LEFT OR RIGHT SEAT ADJUSTMENT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

NOTE: Move seat completely towards rear/top.

Unlock metal lug (1) towards front and remove control unit/module for seat adjustment (2) towards bottom.

Disconnect all associated plug connections.

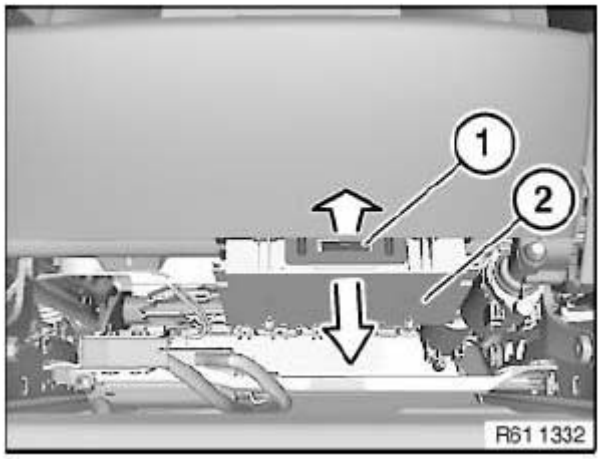


Fig. 173: Removing Control Unit For Seat Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure control unit/module for seat adjustment (1) is correctly seated in mounting (2).

Guides (3) and metal lug (4) must not be damaged.

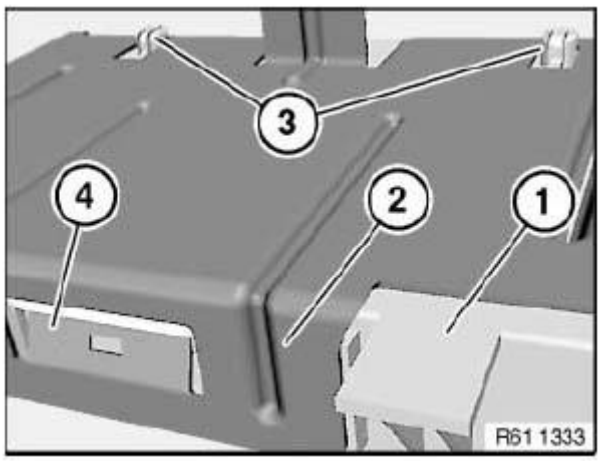


Fig. 174: Identifying Control Unit For Seat Adjustment, Mounting, Guides And Metal Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

61 35 095 REMOVING AND INSTALLING/REPLACING CONTROL UNIT/MODULE FOR SEAT HEATING

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD

PROTECTION) .

NOTE: Move seat completely towards rear/top.

Disconnect plug connection (1).

Open lock (2) in direction of arrow and remove control unit/module for seat heating (3) towards bottom.

Installation:

Make sure control unit/module for seat heating (3) is correctly engaged.

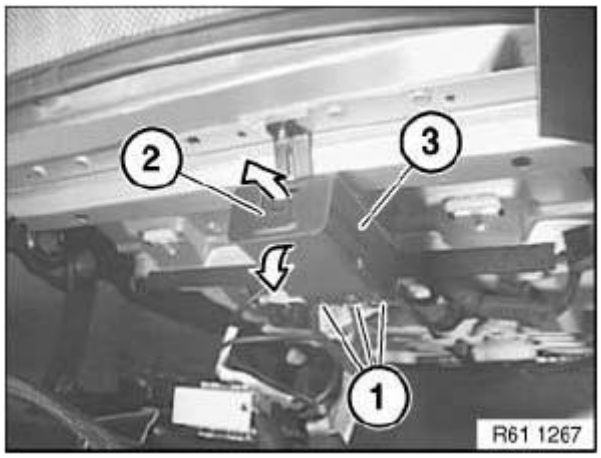


Fig. 175: Opening Lock
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 115 REMOVING AND INSTALLING/REPLACING FOOTWELL MODULE

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **TRIM PANEL FOR PEDAL ASSEMBLY**

Unlock plug connections (1) and disconnect.

Unclip footwell module (2) at points (3).

Carefully pull footwell module (2) out of device holder (4) in direction of arrow.

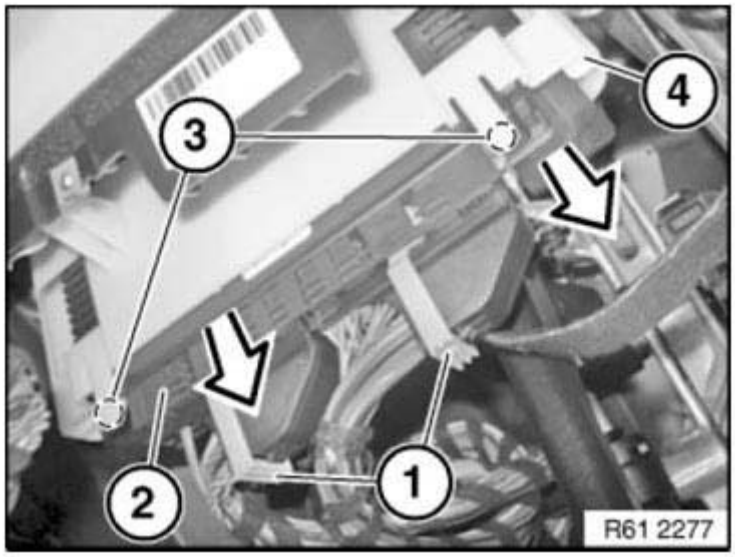


Fig. 176: Pulling Footwell Module Out Of Device Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Remove footwell module (2).

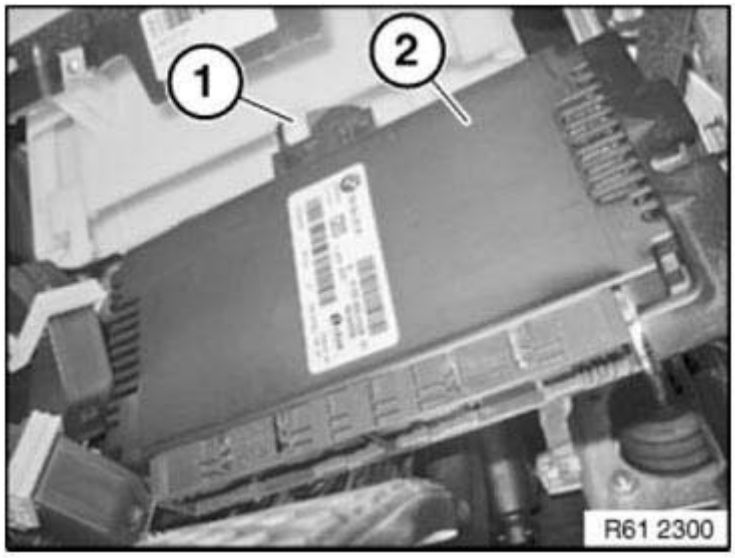


Fig. 177: Identifying Plug Connection And Footwell Module
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

61 35 954 REMOVING AND INSTALLING/REPLACING INTERIOR AERIAL FOR COMFORT

ACCESS SYSTEM

Remove rear cover (1) from center console (2) towards top.

Disconnect plug connection behind.

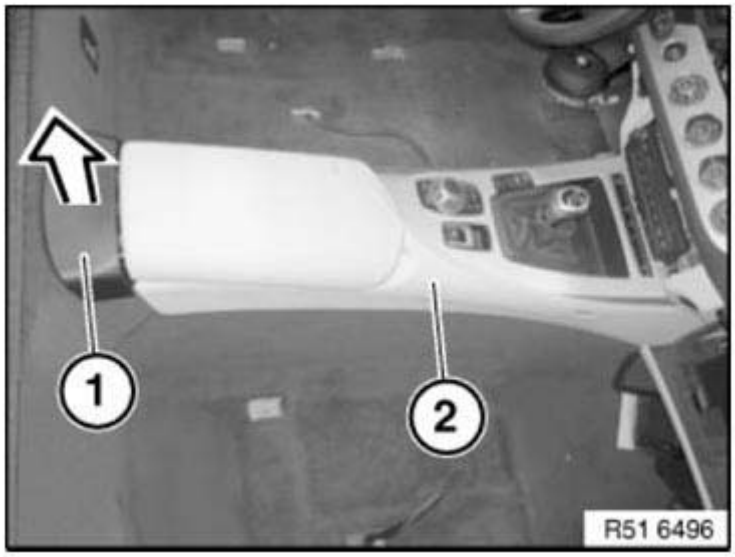


Fig. 178: Removing Rear Cover From Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and remove interior aerial for comfort access system (1) from holder (2).

Installation:

Make sure interior aerial for comfort access system (1) is correctly seated in designated holder (2).

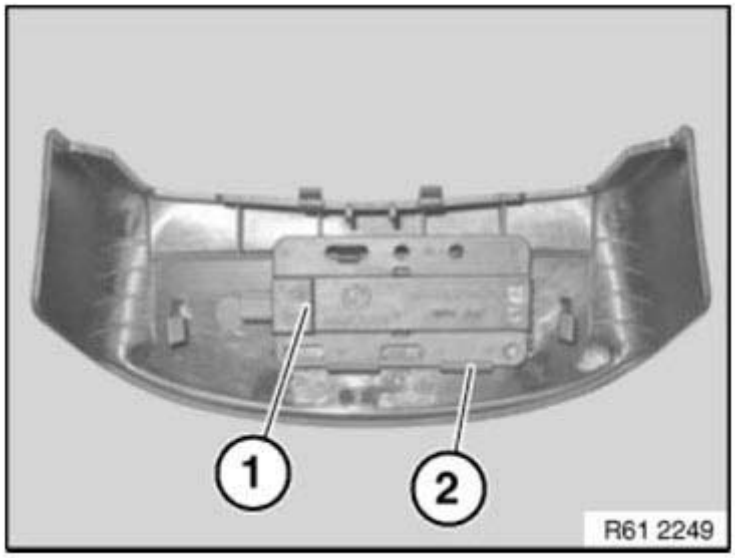


Fig. 179: Identifying Comfort Access System Of Holder
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 953 REMOVING AND INSTALLING/REPLACING INTERIOR AERIAL FOR COMFORT ACCESS SYSTEM

Necessary preliminary tasks:

- Remove **TRIM FOR STORAGE COMPARTMENT**

Disconnect plug connection (1).

Unlock and remove interior aerial for comfort access system (2) from holder (3).

Installation:

Make sure interior aerial for comfort access system (2) is correctly seated in designated holder (3).

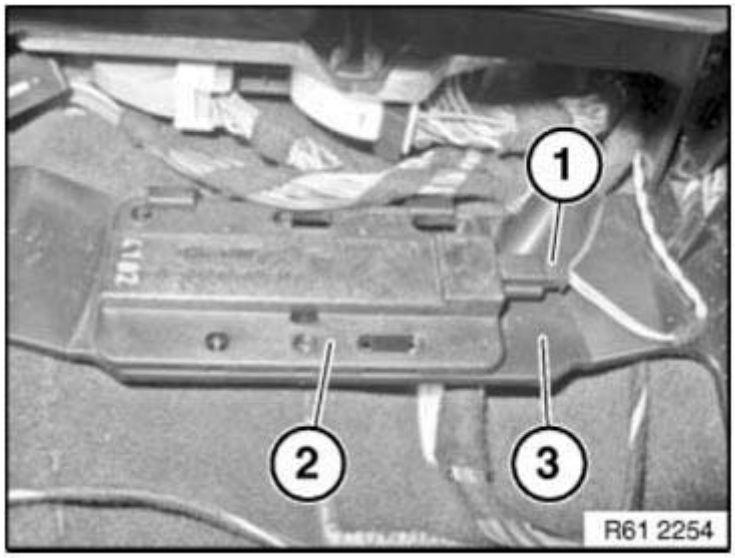


Fig. 180: Identifying Plug Connection And Comfort Access System Of Holder
Courtesy of BMW OF NORTH AMERICA, INC.

61 35 970 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT AERIAL FOR COMFORT ACCESS SYSTEM

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT FLOOR TRIM PANEL**

Disconnect plug connection (1).

Unlock and remove aerial for comfort access system (2) from holder (3).

Installation:

Make sure interior aerial for comfort access system (2) is correctly seated in designated holder (3).

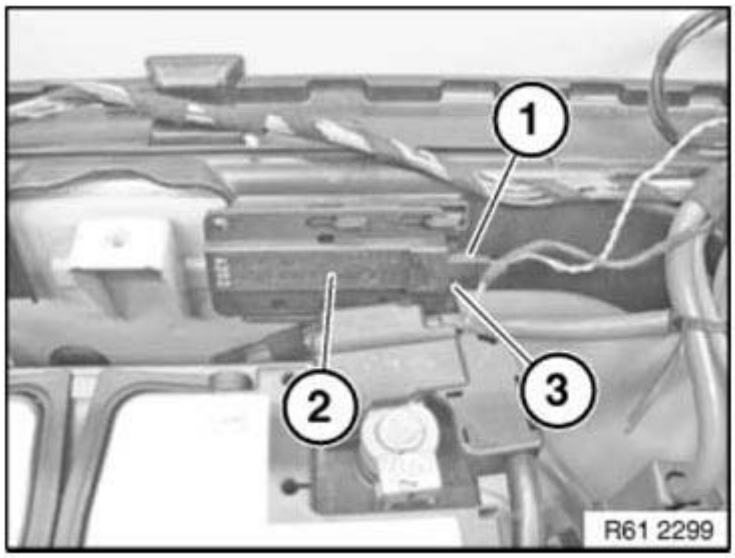


Fig. 181: Identifying Plug Connection And Comfort Access System Of Holder
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 970 REPLACING FOGGING SENSOR

WARNING: Make sure rooms are well ventilated when working with adhesive remover indoors.

IMPORTANT: Do not under any circumstances use paint thinner to clean the bonding surface.

Expand two-part mirror base cover (1) by pressing from below and detach.

Feed out two-part mirror base cover (1) and remove.

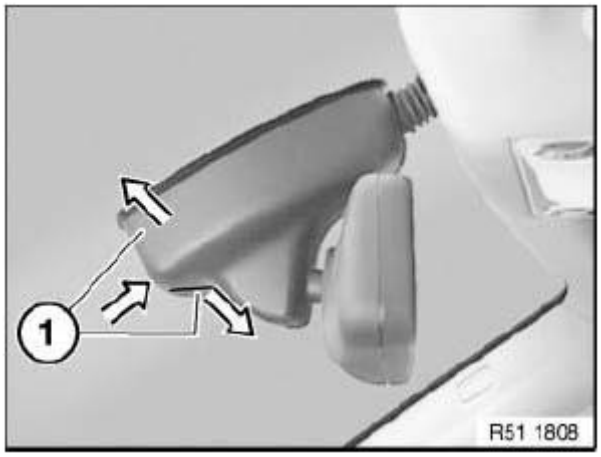


Fig. 182: Removing Two-Part Mirror Base Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

NOTE: If necessary, carefully heat fogging sensor (2) with a hot air blower to approx. 40-60 °C.

Lift off fogging sensor (2) with special tool 00 9 317 and slowly pull off from windshield.

Installation:

Bonding surface must be dry and free of dust and grease.

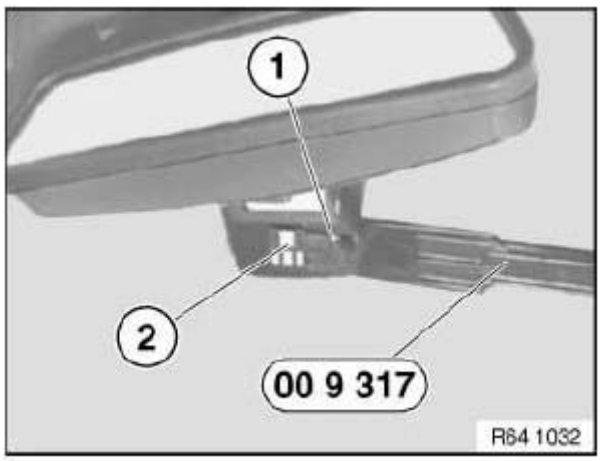


Fig. 183: Lifting Off Fogging Sensor Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Clean bonding surface with adhesive remover (sourcing reference: BMW Parts Service).

After cleaning, do not touch bonding surface with bare hands.

Pull off protective film completely from fogging sensor (3).

Place mounting template (1) as pictured on rain sensor (2).

Press fogging sensor (3) in direction of arrow with a contact pressure of > or = 15 N/cm^2 onto inside of windshield.

NOTE: Firm thumb pressure attains approx. 30 N/cm^2 .

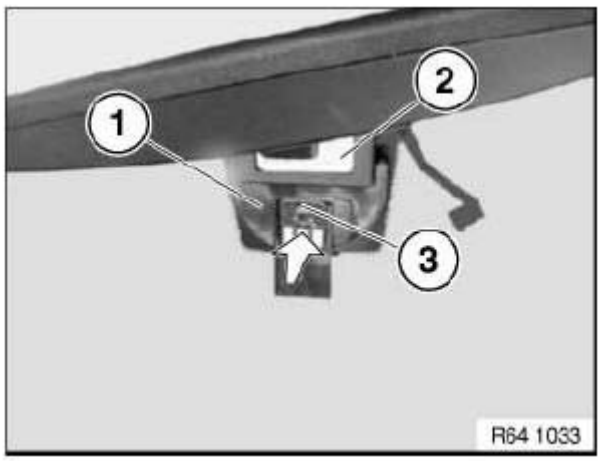


Fig. 184: Pressing Fogging Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Remove mounting template (1) carefully from fogging sensor (3).

VEHICLE PROGRAMMING AND ENCODING

NOTE:

- **In order to avoid incorrect programming procedures and error messages, it is essential when working with the Progman/ISTA/P programming system always to use the latest Progman version.**
- **Battery voltage must not drop below 13.0 V during programming.**

Connect battery charger prior to programming.

IMPORTANT: E72 only:
Before programming the vehicle, it is essential to disconnect the high-voltage system from the power supply.

Programming sequence via ISTA/P:

- Identify vehicle and read out control unit data

- Draw up and configure measures plan
- Prepare programming, export CBS/CKM data
- Carry out repair measures, replace control units if necessary
- Identify vehicle again after repair. Update measures plan
- Carry out programming
- Assess programming afterwards, import CBS/CKM data
- Programming successfully completed

Programming sequence via Progman:

Select menu item (1).

Select corresponding procedure from selection list.

For example:

- Preparation and subsequent evaluation of vehicle programming
- Start a Progman session
- Sequence of BMW/MINI vehicle programming and encoding
- BMW/MINI Car&Key Memory
- BMW/MINI initializations
- BMW/MINI service functions in Progman

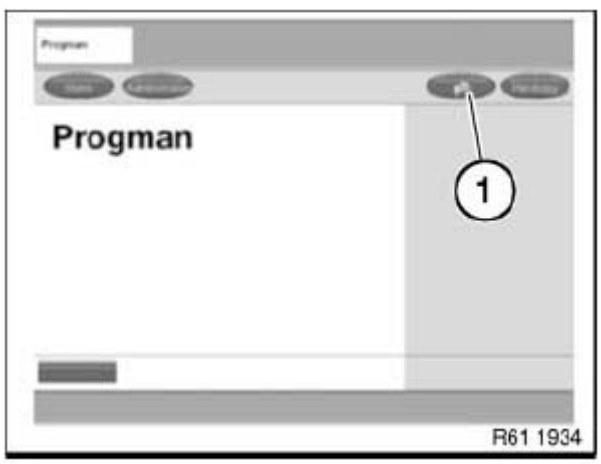


Fig. 185: Display - Vehicle Programming And Encoding
Courtesy of BMW OF NORTH AMERICA, INC.

6161 WINDSCREEN WIPERS

61 61 ... ADJUSTING LEFT OR RIGHT WINDSCREEN WIPER

Correctly adjusting the contact angle of the wiper arms on the windscreen increases wiping quality. For adjustment, refer to the vehicle-specific repair instruction.

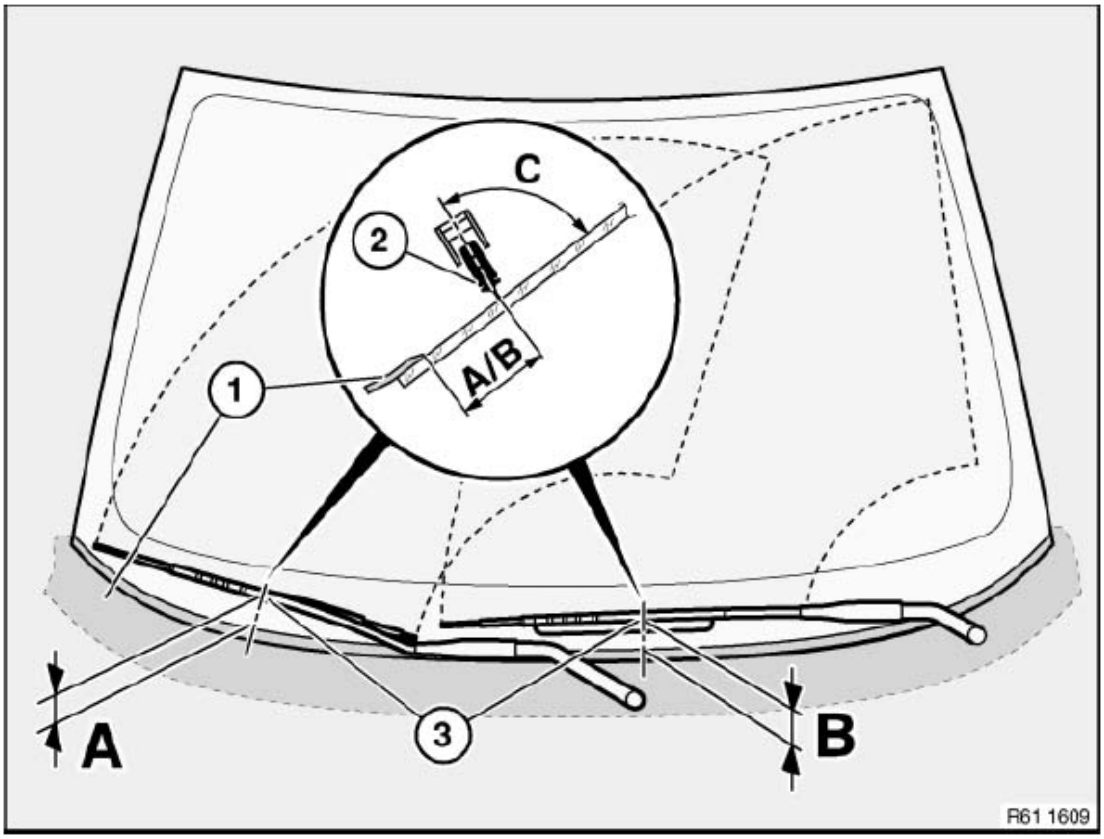


Fig. 186: Identifying Contact Angle Between Wiper Blade Centre Plane And Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

A/B = Distance between windscreen wiper blade (2) and trim panel on cowl panel (1)

NOTE: Measurement is taken at the height of the locators (3) for the windscreen wiper arms

C= Contact angle between wiper blade center plane and windscreen

When adjusting with special tool 61 6 100, set the scale value in accordance with the following table.

For RHD vehicles, change the preceding sign of the scale values.

- LHD cars, scale range 0 to - -10
- RHD cars, scale range 0 to +10

SCALE VALUE REFERENCE CHART

	Contact angle (C) on	Scale value (LHD) on	Adjustment dimension (A, B) on

Model		windscreen wiper arm		special tool		windscreen wiper arm		
		Front passenger side	Driver side	Front passenger side	Driver side	Front passenger side	Driver side	Rear end
1'	E81	85.5 ° +1.5° - - 1.0°	85.5 ° +1.5° - - 1.0°	-5	-5	47±3 mm	54±3 mm	
	E82	85.5 ° +1.5° - - 1.0°	85.5 ° +1.5° - - 1.0°	-5	-5	47±3 mm	54±3 mm	
	E87	85.5 ° +1.5° - - 1.0°	85.5 ° +1.5° - - 1.0°	-5	-5	47±3 mm	54±3 mm	
	E88	85.5 ° +1.5° - - 1.0°	85.5 ° +1.5° - - 1.0°	-5	-5	47±3 mm	54±3 mm	
3'	E46	85.7° ±1°	85.3° ±1°	-4	-5			
	E90	86.7° ±1°	86.0° ±1°	-3	-4	88±3 mm	95±3 mm	
	E91	86.7° ±1°	86.0°±1°	-3	-4	88±3 mm	95±3 mm	35±3 mm
	E92	86.7° ±1°	86.0° ±1°	-3	-4	75 ±3 mm	84 ±3 mm	
	E93	86.7° ±1°	86.0° ±1°	-3	-4	75 ±3 mm	84 ±3 mm	
5'	E39	86.5° ±1°	86.5° ±1°	-4	-4			60.1±1 mm
	E60	86.0° ±1°	86.0° ±1°	-4	-4	69 ±3 mm	87±3 mm	
	E61	86.0° ±1°	86.0° ±1°	-4	-4	69 ±3 mm	87±3 mm	30 ±3 mm
6'	E63	86.0° ±1°	86.0° ±1°	-4	-4	69 ±3 mm	87±3 mm	
	E64	86.0° ±1°	86.0° ±1°	-4	-4	69 ±3 mm	87±3 mm	
7'	E38;	87.0° ±1°	87.0° ±1°	-3	-3	65 ±3 mm	58 ±3 mm	
	E65	85.5° ±1°	87.0° ±1°	-	-	20±3 mm	48±3 mm	
	E66	85.5° ±1°	87.0° ±1°	-	-	20±3 mm	48±3 mm	
	E67	85.5° ±1°	87.0° ±1°	-	-	20±3 mm	48±3 mm	
8'	E52	85.5° ±1°	85.5° ±1°	-4	-4	38 ±2 mm	104 ±2 mm	
X	E53	85.0° ±1°	85.0° ±1°	-5	-5	54±3 mm	55 ±3 mm	32.5 ±2 mm
	E70	85.6° ±1°	85.0° ±1°	-4	-5	103±3 mm	90±3 mm	39 ±2 mm
	E71	85.6° ±1°	85.0° ±1°	-4	-5	103±3 mm	90±3 mm	
	E83	85.2° ±1°	85.4° ±1°	-5	-5	66 ±3 mm	61 ±3 mm	29 ±1 mm
Z	E85/E89	85.5° ±1°	85.5° ±1°	-4	-4	57±2 mm	52 ±2 mm	
	E86	85.5° ±1°	85.5° ±1°	-4	-4	57±2 mm	52 ±2 mm	

61 61 010 CHECKING/ADJUSTING APPROACH ANGLE OF WINDSCREEN WIPER ARMS ON

FRONT WINDSCREEN

NOTE: Wipe quality is improved by precise adjustment of CONTACT/APPROACH ANGLE of wiper arms.
Adjustment angle can be checked with special tool 00 9 331 or 61 6 100 .

Checking with setting gauge:

Before checking approach angle, briefly lift windscreen wiper arms off windscreen.

Place special tool 00 9 331 next to pivot point of wiper blade on windscreen.

Check light gap, adjust wiper arm if necessary.

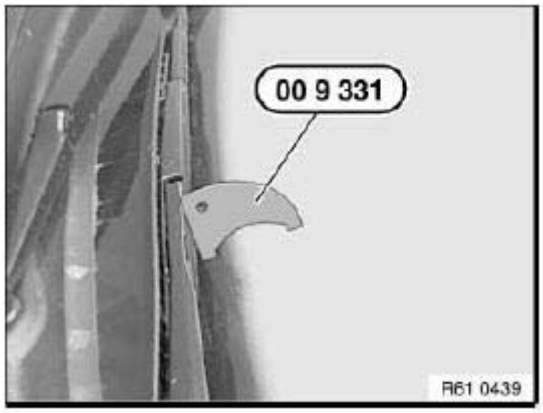


Fig. 187: Positioning Special Tool 00 9 331 To Pivot Point Of Wiper Blade On Windscreen
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Tape off wiper arm with fabric adhesive tape to avoid damage.

Press special tools 00 9 220 in appropriate direction until correct contact/approach angle is obtained.

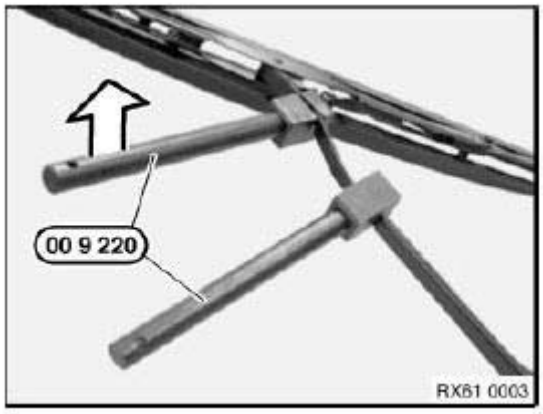


Fig. 188: Pressing Special Tools 00 9 220

Courtesy of BMW OF NORTH AMERICA, INC.

Checking with angulometer:

Remove wiper blades.

Insert windscreen wiper arm (1) in angle meter 61 6 100.

Using screw (2) and pressure plate (3), locate windscreen wiper arm (1) and position on windscreen.

Read off value in degrees, adjust wiper arm if necessary.

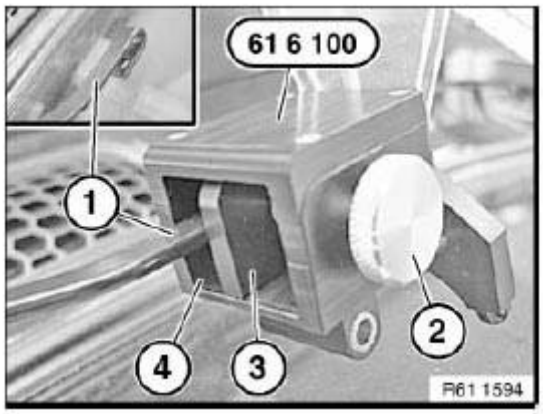


Fig. 189: Inserting Windscreen Wiper Arm On Special Tool (61 6 100)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Windscreen wiper arm (1) must rest correctly on lower and side contact surfaces (4) of angle meter 61 6 100 .
On right-hand-drive cars, screw (2) must be located on left side of special tool 61 6 100.

Press special tools 00 9 220 in appropriate direction until correct contact/approach angle is obtained.

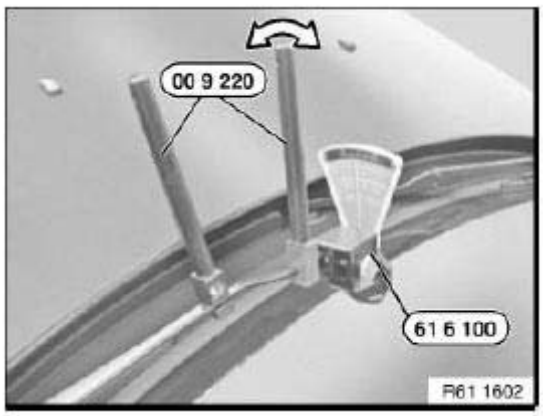
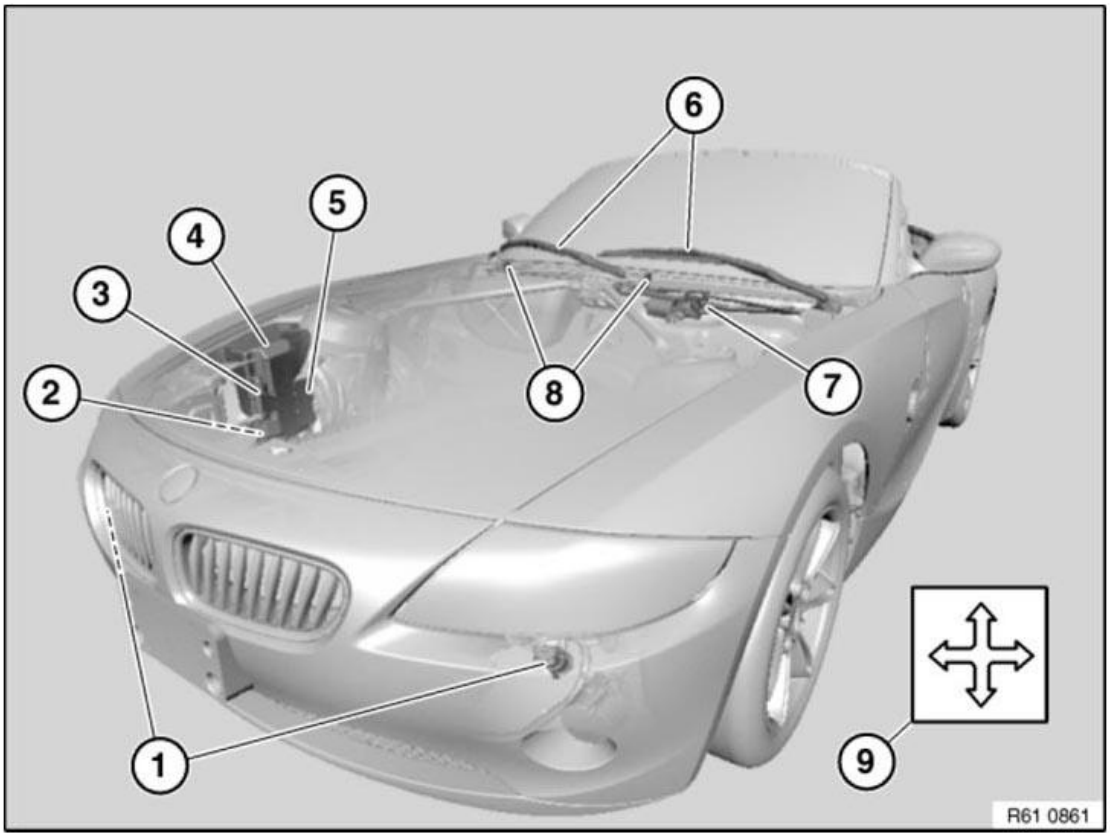


Fig. 190: Pressing Special Tool (00 9 220)
Courtesy of BMW OF NORTH AMERICA, INC.

61 61 ... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)



1 High-pressure nozzles of SRA
2 Level switch for windscreen washer system
3 Washer pump of headlight cleaning system
4 Fluid reservoir for windscreen washer system
5 Windscreen washer pump
6 Windscreen wiper arms
7 Bracket for windshield wiper system
8 Spray nozzles of windscreen washer unit
9 Checking and adjusting

Fig. 191: Overview Of Windscreen Washer System And Headlight Washer System (SRA)
Courtesy of BMW OF NORTH AMERICA, INC.

61 61 270 REMOVING AND INSTALLING OR REPLACING BRACKET FOR WINDSCREEN WIPER SYSTEM COMPLETE WITH MOTOR

Necessary preliminary tasks

- Remove **COWL PANEL COVER**

Unfasten plug connection (1) and disconnect.

Unclip and remove clamping lever (2).

Installation:

If necessary, replace clamping lever (2).

Release screws (3).

Tightening torque **61 61 1AZ** .

Remove wiper bracket (4) upwards.

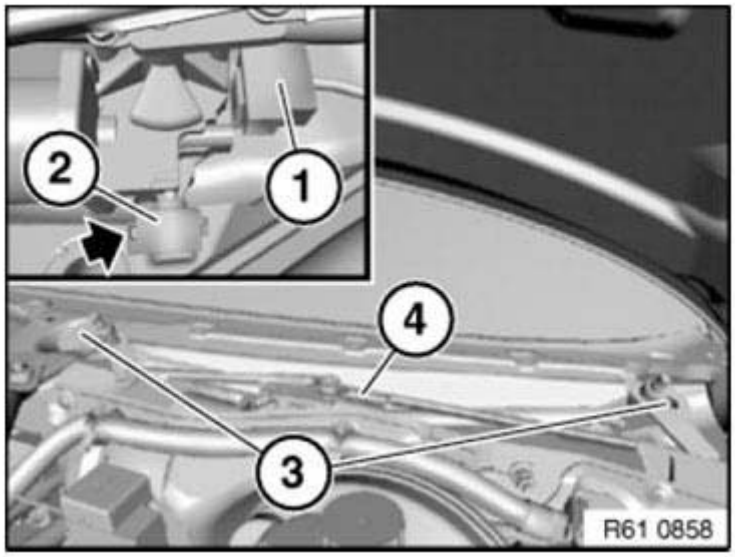


Fig. 192: Locating Clamping Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure wiper bracket (4) is exactly seated.

Installation:

Before fitting the wiper arms, allow the windscreen wiper motor to run into the rest position.

To ensure that the windshield wiper system functions properly, **CHECK/ADJUST** the contact angle of the wiper arms to the windshield.

61 61 100 REMOVING AND INSTALLING/REPLACING BOTH WINDSCREEN WIPER ARMS

Remove cover (1).

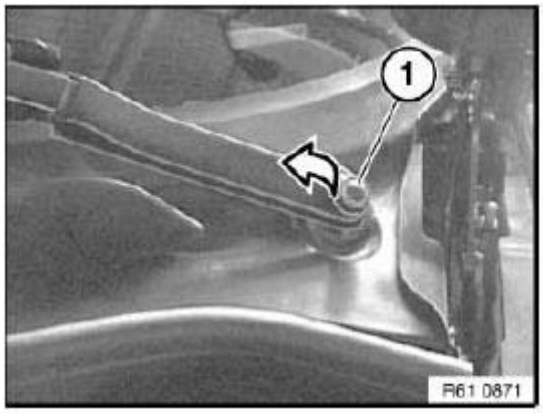


Fig. 193: Removing Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1), tightening torque **61 61 2AZ** .

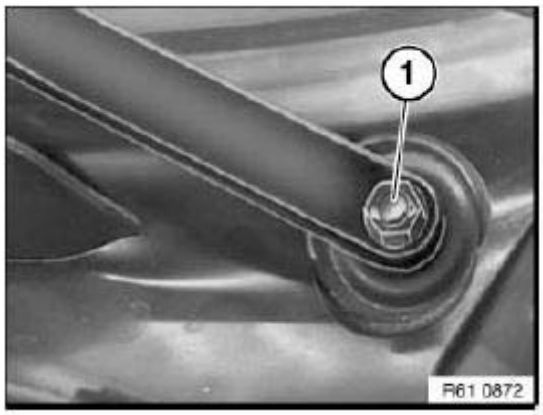


Fig. 194: Identifying Cover Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not bend wiper arm (1) when removing it (risk of breakage).

Detach wiper arm (1) with special tool 61 6 060.

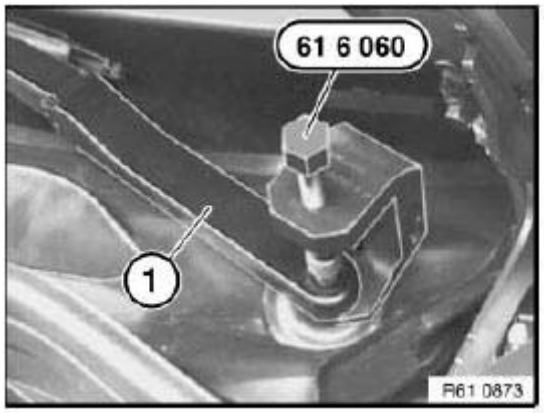


Fig. 195: Disconnecting Wiper Arm Using Special Tool 61 6 060
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, fit wiper blades on new wiper arms.

Always fit wiper blade with spoiler on left.

NOTE: The driver's side wiper arm is shown.

Installation:

Adjust position of relevant wiper arm in **rest position.**

The gap between wiper lip (1) and the top edge of cowl panel cover (3) at the attachment point (2) of the wiper blade is measured.

Then tighten down wiper arm and check position of relevant wiper arm again.

Adjustment dimensions:

- Driver's side: 52±2 mm
- Passenger side: 57±2 mm

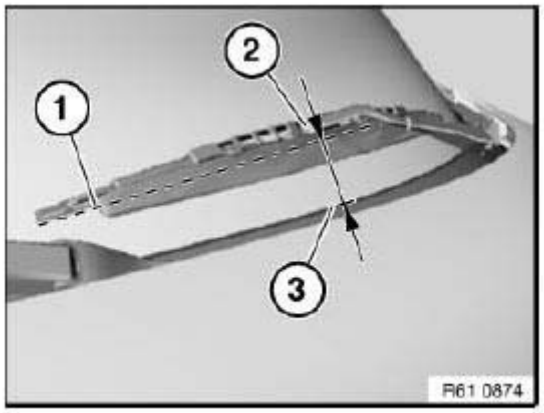


Fig. 196: Identifying Top Edge Of Cowl Panel Cover At Attachment Point And Wiper Lip
Courtesy of BMW OF NORTH AMERICA, INC.

61 61 041 REPLACING BOTH WINDSCREEN WIPER BLADES

Press retaining spring in direction of arrow. Pull windscreen wiper blade towards wiper arm and feed out.

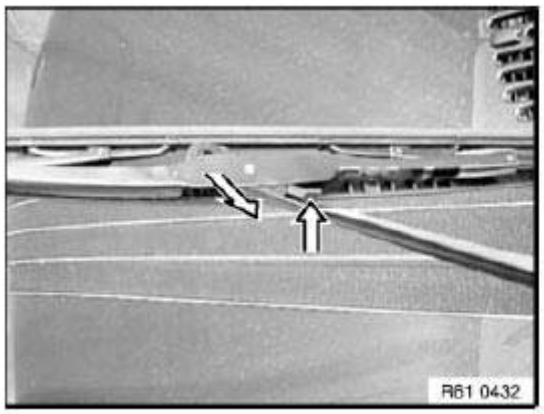


Fig. 197: Pressing Retaining Spring
Courtesy of BMW OF NORTH AMERICA, INC.

61 61 021 REPLACING LEFT OR RIGHT WINDSCREEN WIPER BLADE

Press retaining spring in direction of arrow. Pull windshield wiper blade towards wiper arm and feed out.

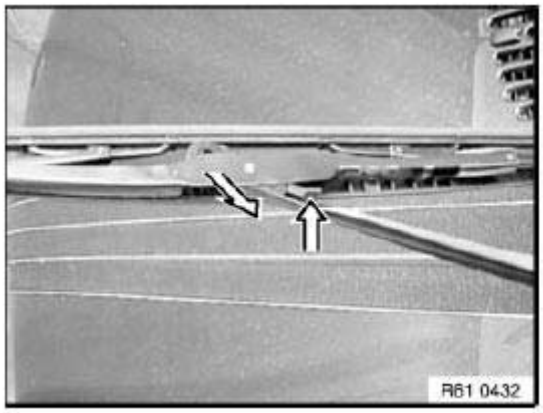


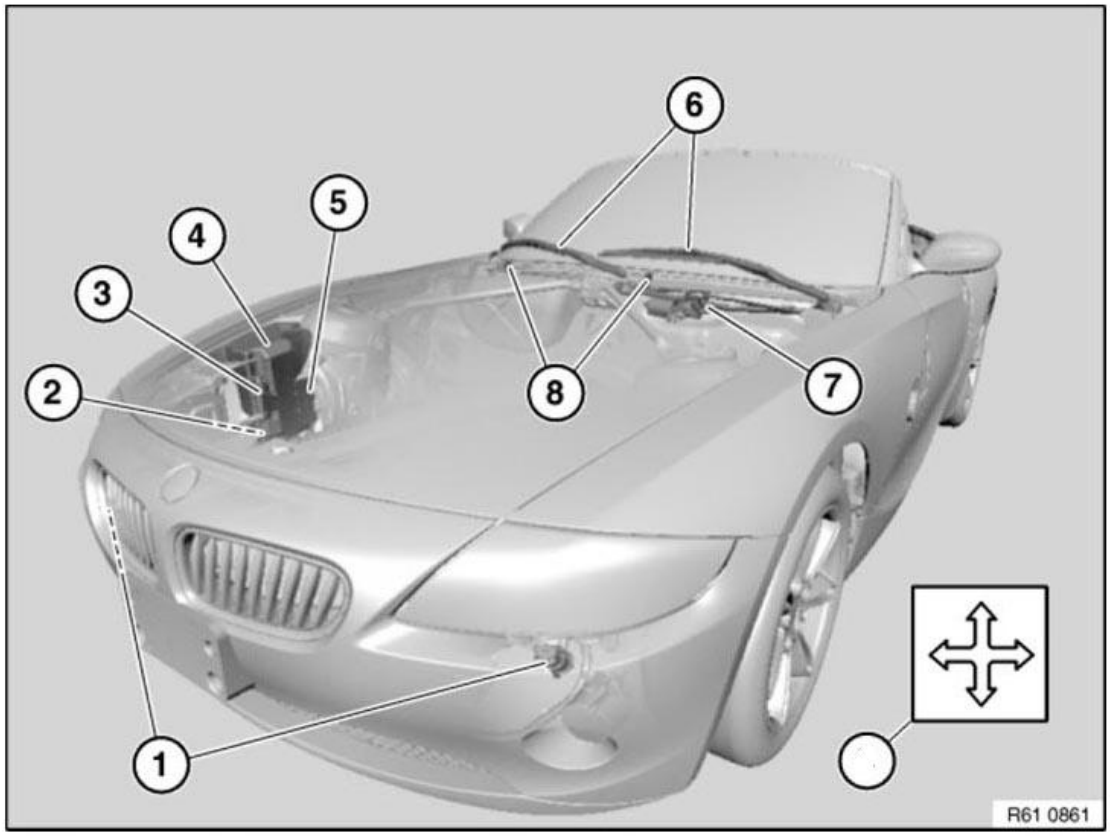
Fig. 198: Pressing Retaining Spring
Courtesy of BMW OF NORTH AMERICA, INC.

6167 HEADLIGHT WASHER SYSTEM

61 67 040 ADJUSTING SPRAY NOZZLES FOR HEADLIGHT WASHER SYSTEM

NOTE: **The spray nozzles of the headlight washer system have been adjusted at the factory and normally this setting is not altered (except by an accident). The nozzles therefore do not have to be adjusted.**
The spray nozzles do not have to be adjusted even in the event of replacement as the nozzles themselves and the telescopic nozzle form a single unit (high-pressure nozzle) and are already preset.

61 61 ... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)



1 High-pressure nozzles of SRA
2 Level switch for windscreen washer system
3 Washer pump of headlight cleaning system
4 Fluid reservoir for windscreen washer system
5 Windscreen washer pump
6 Windscreen wiper arms
7 Bracket for windshield wiper system
8 Spray nozzles of windscreen washer unit

Fig. 199: Overview Of Windscreen Washer System And Headlight Washer System (SRA)
Courtesy of BMW OF NORTH AMERICA, INC.

61 67 088 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HIGH-PRESSURE NOZZLE OF HEADLIGHT WASHER SYSTEM

Operation is described in:

- Removing **LEFT HIGH-PRESSURE NOZZLE OF HEADLIGHT WASHER SYSTEM**

61 67 083 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT HIGH-PRESSURE NOZZLE OF HEADLIGHT WASHER SYSTEM

Necessary preliminary tasks

- Remove **COVER FOR HEADLIGHT WASHER SYSTEM**
- Remove **FRONT BUMPER TRIM** .

Unlock high-pressure line (1) and detach from high-pressure nozzle of headlight washer system (3).

Pull locks (2) in direction of arrow.

Pull high-pressure nozzle of headlight washer system (3) in direction of arrow out of guides and feed out through opening in bumper trim.

Installation:

Make sure high-pressure nozzle of headlight washer system (3) is correctly seated.

New high-pressure nozzle of headlight washer system (3) is already preadjusted.

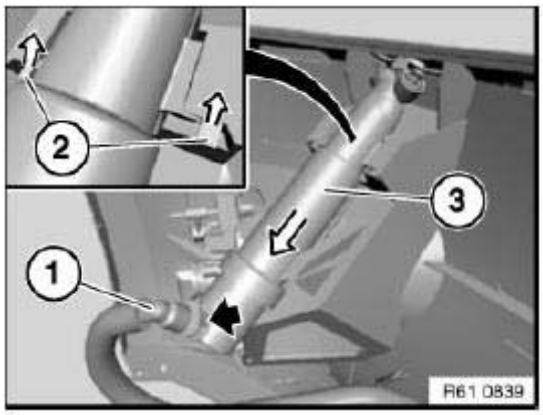


Fig. 200: Pulling High-Pressure Nozzle Of Headlight Washer System
Courtesy of BMW OF NORTH AMERICA, INC.

61 67 010 REMOVING AND INSTALLING/REPLACING WASHER PUMP OF HEADLIGHT WASHER SYSTEM

NOTE: Catch any escaping washer fluid if necessary.

Unfasten plug connection (1) and disconnect.

Turn washer pump of headlight washer system (2) in direction of arrow.

Unlock hose (3) and detach from washer pump of headlight washer system (2).

Detach washer pump of headlight washer system (2) from fluid reservoir in upward direction.

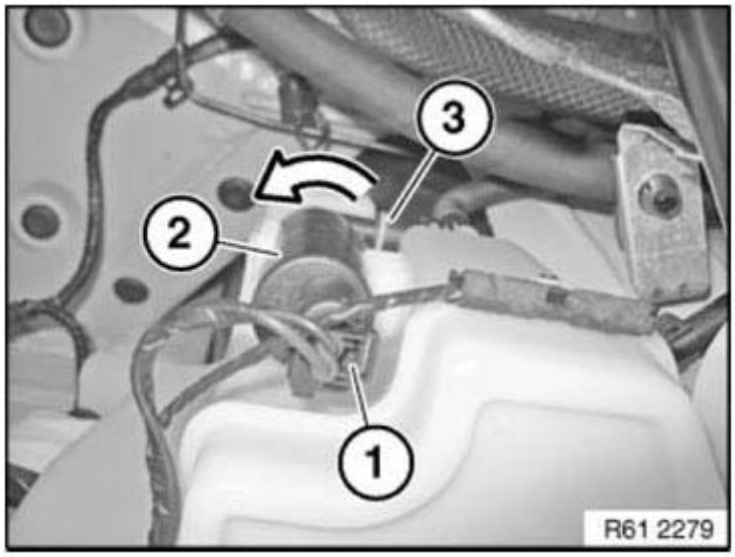


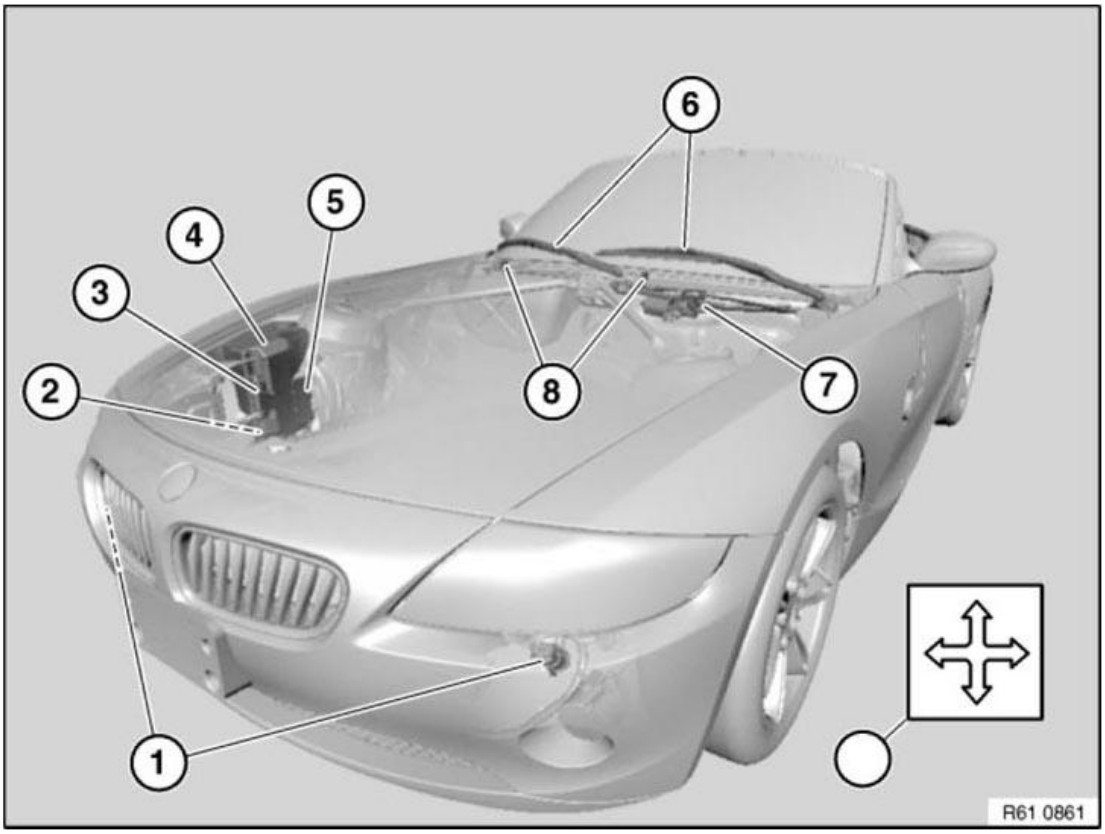
Fig. 201: Disconnecting Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

- Replace strainer for washer pump of headlight washer system.
- Coat sealing ring of washer pump for headlight washer system with antiseize agent.
- Lay hose of washer pump for headlight washer system without kinks
- Fill fluid reservoir

6171 WINDOW WASHER SYSTEM

61 61 ... OVERVIEW OF WINDSCREEN WASHER SYSTEM AND HEADLIGHT WASHER SYSTEM (SRA)



1 High-pressure nozzles of SRA
2 Level switch for windscreen washer system
3 Washer pump of headlight cleaning system
4 Fluid reservoir for windscreen washer system
5 Windscreen washer pump
6 Windscreen wiper arms
7 Bracket for windshield wiper system
8 Spray nozzles of windscreen washer unit

Fig. 202: Overview Of Windscreen Washer System And Headlight Washer System (SRA)
Courtesy of BMW OF NORTH AMERICA, INC.

61 71 015 REMOVING AND INSTALLING/REPLACING A JET NOZZLE IN WINDSCREEN WASHER SYSTEM

NOTE: The jet nozzles of the windscreen washer system are preset at the factory and cannot be readjusted.

Unfasten plug connection (1) and disconnect.

Detach connecting piece (2) in direction of arrow from spray nozzle of windscreen washer system (3).

Unlock spray nozzle (3), press out through opening and remove.

Installation:

Make sure spray nozzle of headlight washer system (3) is correctly seated.

Ensure hose is laid without kinks.

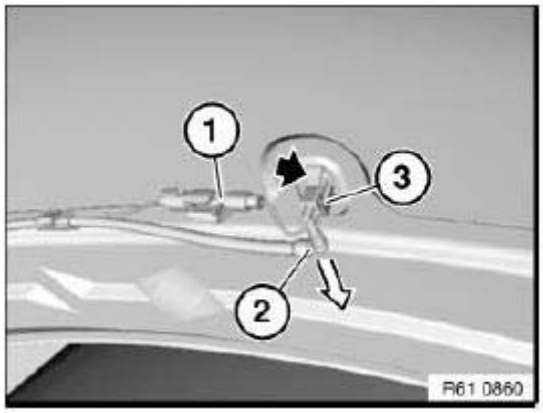


Fig. 203: Detaching Connecting Piece From Spray Nozzle Of Windscreen Washer System
Courtesy of BMW OF NORTH AMERICA, INC.

61 71 030 REMOVING AND INSTALLING/REPLACING ALL SPRAY NOZZLES OF WINDSCREEN WASHER SYSTEM

Operation is described in:

- Removing **A SPRAY NOZZLE OF WINDSCREEN WASHER SYSTEM**

61 71 100 REMOVING AND INSTALLING/REPLACING WINDSCREEN WASHER PUMP

NOTE: Drain fluid reservoir for windscreen washer system.

Unfasten plug connection (1) and disconnect.

Unlock clamp (2) and detach washing water line from windscreen washer pump (3).

Press windscreen washer pump (4) in direction of arrow.

Pull windscreen washer pump (4) up and out of fluid reservoir for windscreen washer system ().

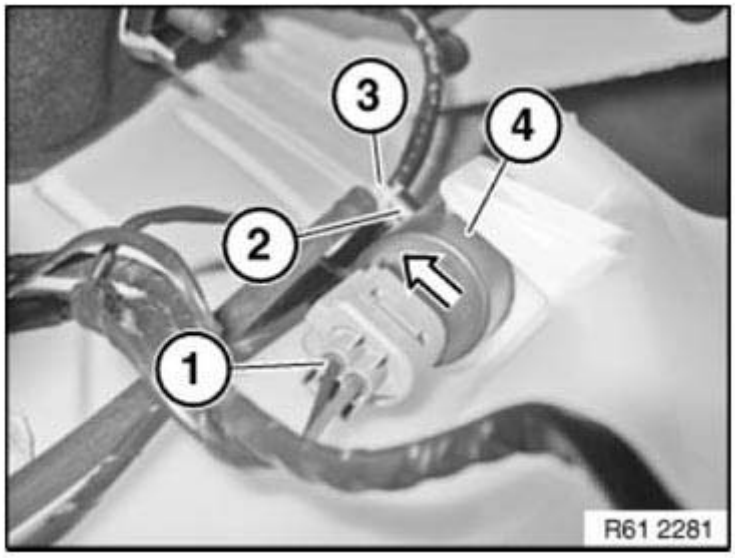


Fig. 204: Pressing Windscreen Washer Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring and strainer in windscreen washer pump.

Coat sealing ring of windscreen washer pump with antiseize agent.

Fill fluid reservoir for windscreen washer system.

61 71 061 REPLACING FLUID RESERVOIR FOR WINDSCREEN WASHER SYSTEM

Necessary preliminary tasks:

- Remove **WINDOW WASHER PUMP**
- Remove **WASHER PUMP FOR HEADLIGHT WASHER SYSTEM**
- Remove **LEVEL SWITCH**

Release detent lugs (1) and remove fluid reservoir (2) towards top.

Installation:

Make sure fluid reservoir for windscreen washer system (2) is correctly seated in existing guides.

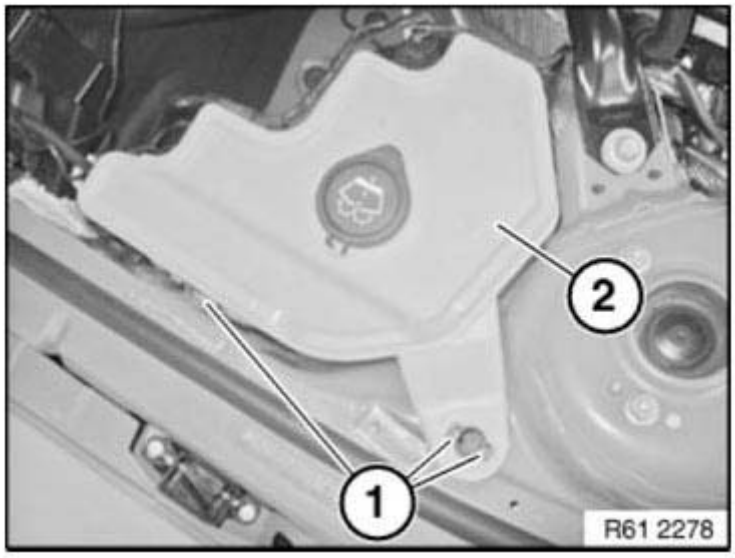


Fig. 205: Identifying Detent Lugs And Fluid Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

61 GENERAL ELECTRICAL SYSTEM

61-2420 ADAPTER CABLE

Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: (Adapter cable set (engine) consisting of adapter cable and cover plate for test box) 88-pin test cable (61 2 421) Cover plate for assignment of modules (61 2 422) For engines: N46, N52 and S85

SI number

02 05 04 (120)

Consisting of:

1 = 0494894 Adapter cable

NOTE: (adapter cable 88-pin for engine control unit)

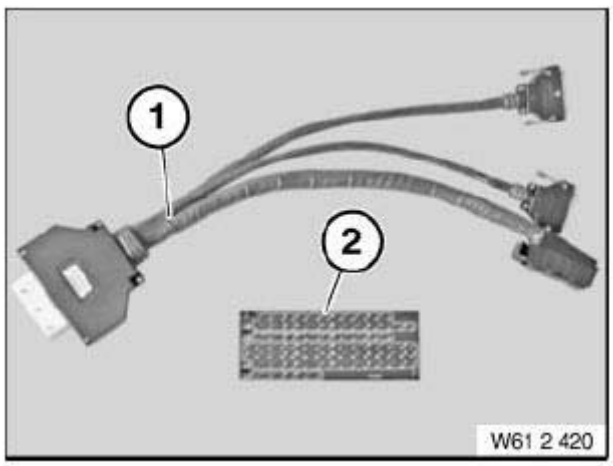


Fig. 1: Identifying Adapter Cable (612420)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0494895 Plate

NOTE: (cover plate for test box) For assignment of individual modules

61-4300 ADAPTER CABLE

Adapter cable MP

NOTE: (Adapter cable for diagnostic socket) To connect diagnosis system to diagnostic socket from 06/2000.

SI number

02 04 00 (561)

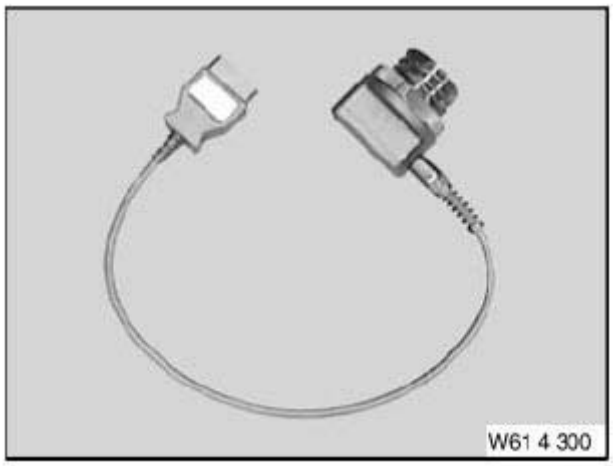


Fig. 2: Identifying Adapter Cable (614300)
Courtesy of BMW OF NORTH AMERICA, INC.

61-6240 ADAPTER CABLE

Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: 94-pin V adapter cable For diagnosis of engine control unit DDE 7.01 --> BMW and MINI.

SI number

02 05 10 (671)

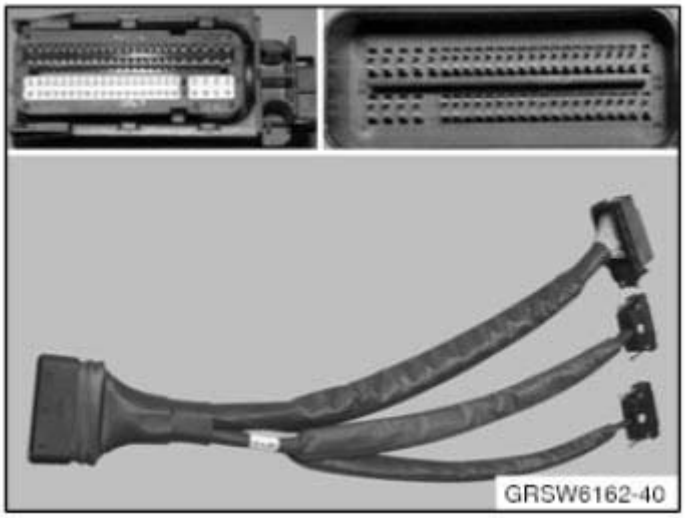


Fig. 3: Identifying Adapter Cable (616240)
Courtesy of BMW OF NORTH AMERICA, INC.

61-4170 ADAPTER CABLE

Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: (V adapter cable) 22-pin "Parking brake"

SI number

02 05 09 (549)

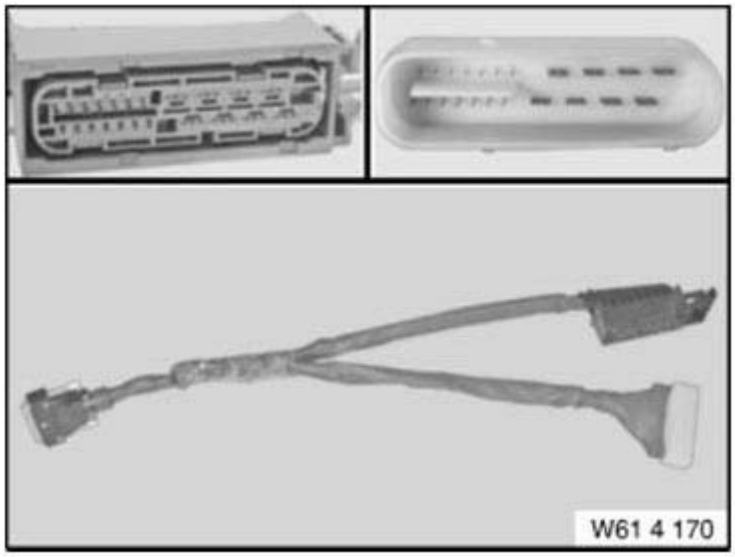


Fig. 4: Identifying Adapter Cable (614170)
Courtesy of BMW OF NORTH AMERICA, INC.

61-8081 ADDITIONS TO REPAIR KIT I

Additions to repair kit I

NOTE: Order through BMW EPC (Electronic Parts Catalogue), refer to SI 2 07 06 311 (order numbers: 12 52 1 706 059" 12 52 1 706 068" 12 52 1 706 069" 61 13 1 352 607" 61 31 1 378 942)

Storage Location

K 108

61-8082 ADDITIONS TO REPAIR KIT II

Additions to repair kit II

NOTE: Order through BMW EPC (Electronic Parts Catalogue), refer to SI 2 07 06 311 (order numbers: 61 13 1 368 534" 61 13 1 369 747" 61 13 1 374 225" 61 13 1 378 722)

Storage Location

K 108

61-8083 ADDITIONS TO REPAIR KIT III

Additions to repair kit III

NOTE: Order through BMW EPC (Electronic Parts Catalogue), refer to SI 2 07 06 311 (order numbers: 61 13 1 378 110" 61 13 1 378 130" 61 13 1 378 136" 61 13 1 378 137" 61 13 1 378 138" 61 13 1 378 139" 61 13 1 378 908" 61 13 1 378 944" 61 13 1 378 987)

Storage Location

K 108

61-1101 CASE

Case MP

NOTE: For storing release tools from set 61 1 100.

61-0329 CASE

Case MP

NOTE: **(case with foam insert not incl. tools) Storage system for release tools from set 61 0 300**

SI number

02 05 05 (217)

61-4280 CRIMPING TOOL

Crimping tool Minimum set: Mechanical tools MW

NOTE: **Repair of the coaxial cable RTK 031 (contacts and housing, refer to Electronic Parts Catalogue graphics 61_2638 and 61_2680).**

SI number

02 02 10 (622)

Consisting of:

4 = 0496949 Crimping tool

NOTE: **Positioner A + B**

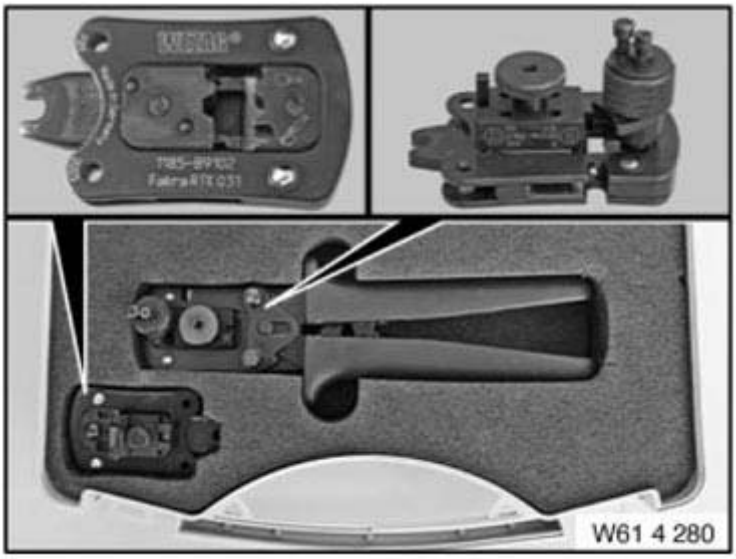


Fig. 5: Identifying Crimping Tool (614280)
Courtesy of BMW OF NORTH AMERICA, INC.

5 = 0496950 Crimping tool

NOTE: **Positioner C + D**

1 = 0496936 Handle

NOTE: Basic body for crimping tool

2 = 0496937 Crimping tool

NOTE: for stripping insulation from coaxial line (RTK031)

3 = 0496938 Crimping tool

NOTE: for crimping coaxial cable (RTK031)

61-4340 CRIMPING TOOL

Crimping tool Minimum set: Measuring and testing equipment MP

NOTE: Universal crimping head for contacts for a conductor cross-section of 0.35 - 2.5 mm^2 (without seal). As from 03/2010 previous special tool 61 4 328 will be supplied under this new number including a handle in a case as a set.

SI number

02 01 10 (615)

Consisting of:

1 = 0496848 Case

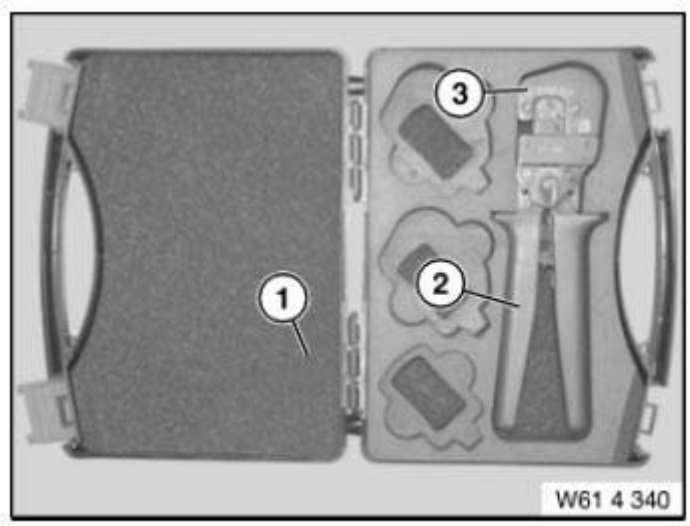


Fig. 6: Identifying Crimping Tool (614340)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For storing 61 4 342 and 61 4 343

2 = 0496849 Handle

3 = 0496850 Crimping tool

NOTE: Universal crimping head for contacts up to a conductor cross-section of 0.35 - 2.5 mm^2 (replaces special tool 61 4 328 as from 03/2010)

61-0200 CRIMPING TOOL

0495320 610200 Crimping tool Minimum set: Measuring and testing equipment MP

NOTE: (crimping set (basic tool)) Comprising case + basic crimping tool

SI number

02 02 05 (194)

Consisting of:

2 = 0495324 Pliers

NOTE: (crimping pliers) Basic tool for different dies (crimp insert set)

1 = 0495321 Case

NOTE: (plastic case) As storage system for complete set.

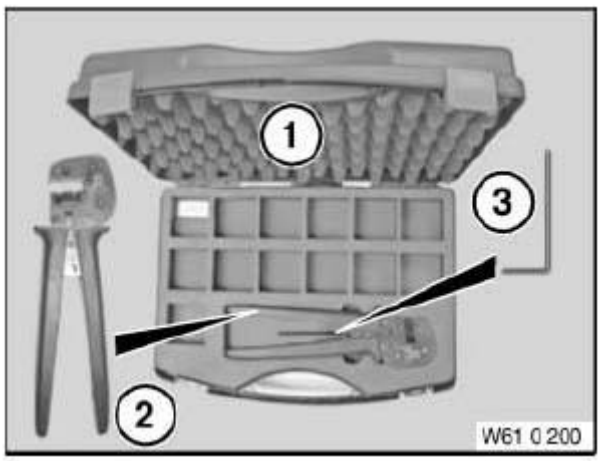


Fig. 7: Identifying Crimping Tool (610200)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0495360 Hexagon socket

NOTE: (hexagon wrench) For securing individual dies in crimping pliers

61-4320 CRIMPING TOOL

0494158 614320 Crimping tool Minimum set: Measuring and testing equipment MP

NOTE: (Crimping set with pliers) For optical fibres and cable repairs. As from 06/2006 extended by universal crimping head 61 4 328, see SI 2 04 06 293. As from 03/2010 61 4 328 will be removed from the set and can be ordered separately under 61 4 340, see SI 02 01 10 615. As from 03/2010 61 4 322 will be replaced by 61 4 329. As from 03/2010 61 4 326 will only be available as a replacement.

SI number

01 14 01 (766)

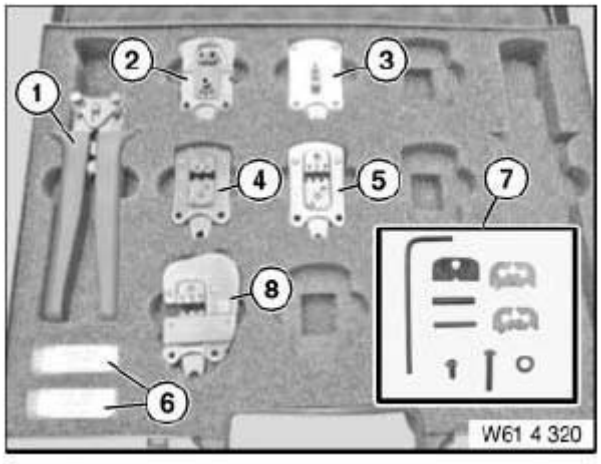


Fig. 8: Identifying Crimping Tool (614320)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

2 = 0494160 Crimping tool

NOTE: (Crimping head) For stripping insulating and cutting optical fibre to length Replaced as from 03/2010 by 61 4 329, see Service Information (bulletin) 02 01 10 (615). Replaced by 61 4 329 (0 496 847)

6 = 0494164 Supplement

NOTE: (Replacement blade) For face-cutting optical fibres. As from 03/2006 no longer included in set 61 4 320, but individually available as a replacement, see SI 02

01 10 (615)

7 = 0494320 Supplement

NOTE: (Replacement blade) With tool for changing blades in stripping unit. Must be ordered separately, not included in 61 4 320 delivery specification! Discontinued as from 03/2010, see SI 02 01 10 (615).

8 = 0495555 Crimping tool

NOTE: (Universal crimping head) For crimping contacts (without seal) and cable cross-sections from 0.35 - 2.5 mm, see SI 2 04 06 293. As from 03/2010 61 4 328 will not longer be supplied in set 61 4 320. Order by way of separate special tool number 61 4 340, see SI 02 01 10 615

1 = 0494159 Handle

NOTE: Basic handle for crimping heads

3 = 0494161 Crimping tool

NOTE: (Crimping head) For crimping optical fibre contacts

4 = 0494162 Crimping tool

NOTE: (Crimping head) For crimping MQS contacts

5 = 0494178 Crimping tool

NOTE: (Crimping head) For crimping MPQ contacts

2 = 0496847 Crimping tool

NOTE: Replaces special tool 61 4 322 as from 03/2010

61-0240 DIE

0496464 610240 Die Minimum set: Measuring and testing equipment MP

NOTE: (dies) Butt connectors and LSK8 4.0 to 6.0 mm2

SI number

02 08 08 (494)

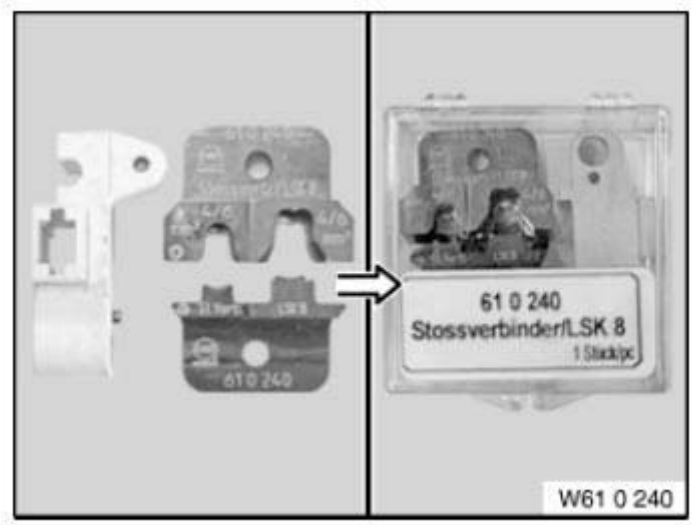


Fig. 9: Identifying Die (610240)
Courtesy of BMW OF NORTH AMERICA, INC.

61-9045 FEMALE DIE

61 9 045 Female die

In conjunction with: 61 9 041 Crimping tool

NOTE: For crimping 2.5 mm (dia.) sleeves

61-0021 FUSE LINK FF 3.15 A/500 V

61 0 021 Fuse link FF 3.15 A/500 V

NOTE: For analog/digital multimeter M 2005, M 2007, M2008

Storage Location

H 107

61-1410 GAUGE TIP

0492743 611410 Gauge tip MP

NOTE: (Set of diagnosis and information system gauge tips)

Consisting of:

1 = 0492744 Terminal

NOTE: (Crocodile clip SAGK4-K, red)

2 = 0492745 Terminal

NOTE: (Crocodile clip SAGK4-K, black)

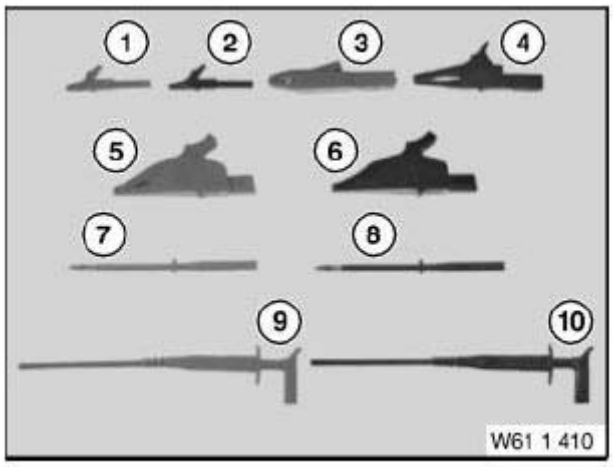


Fig. 10: Identifying Gauge Tip (611410)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0492746 Terminal

NOTE: (Crocodile clip SAGK4, red)

4 = 0492747 Terminal

NOTE: (Crocodile clip SAGK4, black)

5 = 0492748 Terminal

NOTE: (Crocodile clip XDK-1033, red)

6 = 0492749 Terminal

NOTE: (Crocodile clip XDK-1033, black)

7 = 0492750 Test probe

NOTE: (Test probe SPP4-S, red)

8 = 0492751 Test probe

NOTE: (Test probe SPP4-S, black)

9 = 0492752 Tester

NOTE: (Clamping test probe XB/100, red)

1 = 0492754 Tester

NOTE: (Clamping test probe XB/100, black)

2 = 0492755 Electronics box

NOTE: (6-fold potential distributor, black)

61-0327 INSERTION AID

0495677 610327 Insertion aid MP

NOTE: For inserting contacts (0.64 - 1.2 mm) in housing

SI number

02 05 06 (294)

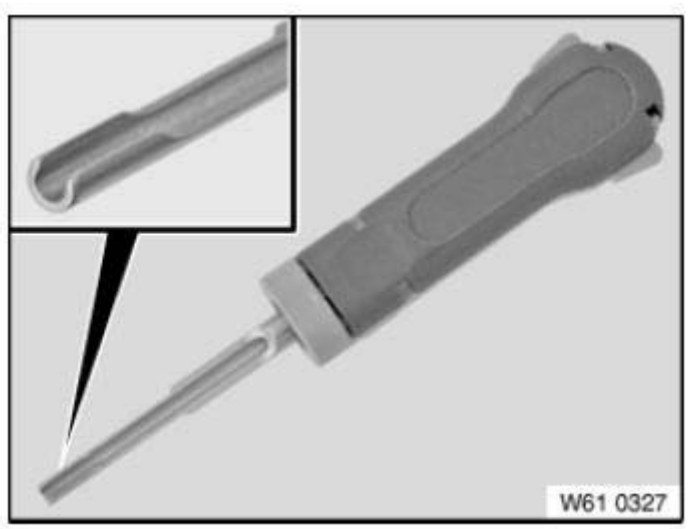


Fig. 11: Identifying Insertion Aid (610327)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0328 INSERTION AID

0495678 610328 Insertion aid MP

NOTE: For inserting contacts (2.8 - 4.8 mm) in housing

SI number

02 05 06 (294)

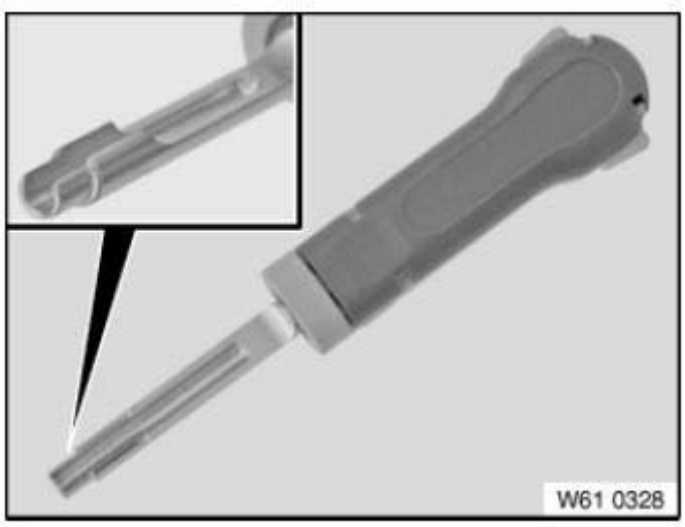


Fig. 12: Identifying Insertion Aid (610328)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0220 MATRIX

0495328 610220 Matrix MP

NOTE: (Matrix for SLK 2.8) (crimping insert set for load contact tube 2.8)

SI number

02 02 05 (194)

Fig. 13: Identifying Matrix (610220)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0230 MATRIX

0495477 610230 Matrix MP

NOTE: (Matrix for contacts "DFK 40" and "MAK 8") For crimping contacts when replacing interior fuse box (up to model year 09/2005) and for further applications.

SI number

02 07 05 (233)

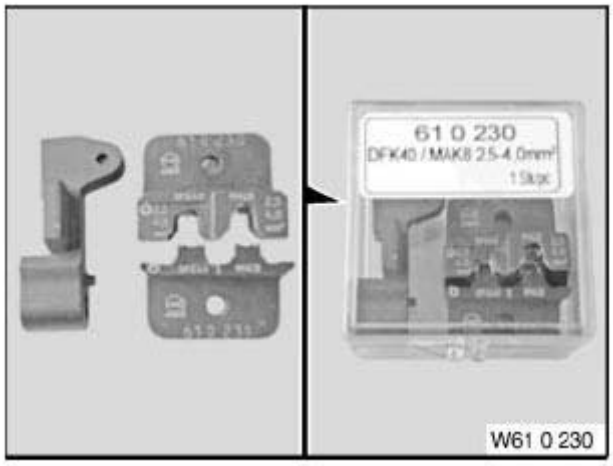


Fig. 14: Identifying Matrix (610230)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0210 MATRIX

0495327 610210 Matrix MP

NOTE: (Matrix LSK 8) (crimping insert set for load current contact 8)

SI number

02 02 05 (194)

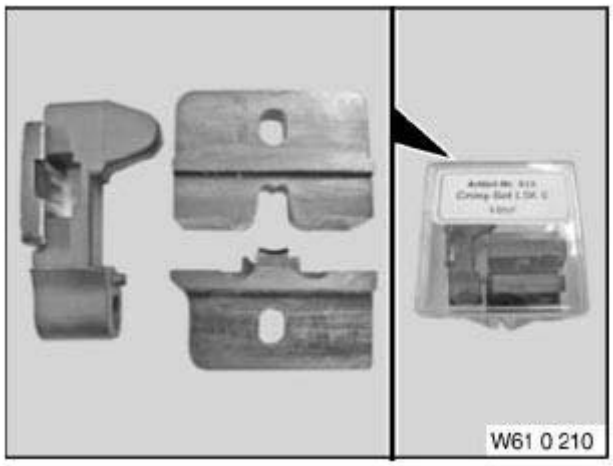


Fig. 15: Identifying Matrix (610210)
Courtesy of BMW OF NORTH AMERICA, INC.

61-6100 MEASURING DEVICE

0495346 616100 Measuring device Minimum set: Mechanical tools MW

NOTE: (Angle measuring device) For measuring contact angle of wiper blades to window glass (angle when setting wiper arms)

Storage Location

A54

SI number

01 21 05 (220)

Fig. 16: Identifying Measuring Device (616100)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1190 PLIERS

0494156 611190 Pliers MP

NOTE: For insulation displacement connectors for repairing ribbon cables

SI number

01 14 01 (766)

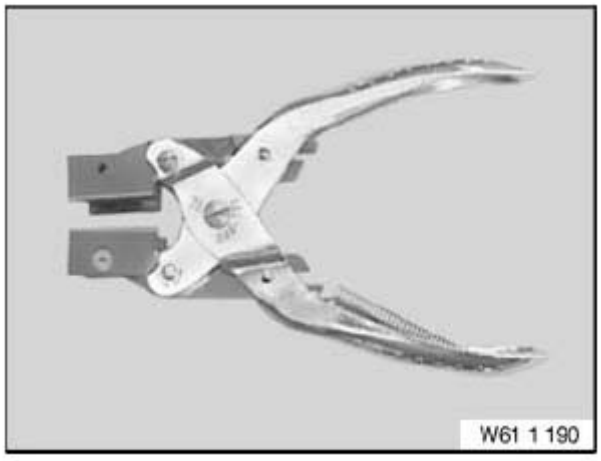


Fig. 17: Identifying Pliers (611190)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1110 PRESSING-OFF TOOL

0492703 611110 Pressing-off tool MP

Replaced by: 0495385

NOTE: (Pressing-off tool for 2.5 mm round contacts) Replaced by 61 0 303.(0 495 385)

61-1142 RELEASE TOOL

0492716 611142 Release tool MP

NOTE: For D 2.5/strand sealing, 7-pin, round

61-1104 RELEASE TOOL

0496344 611104 Release tool MP

NOTE: For releasing "SLK 2.8" mm contacts with secondary lock and supplementary slide

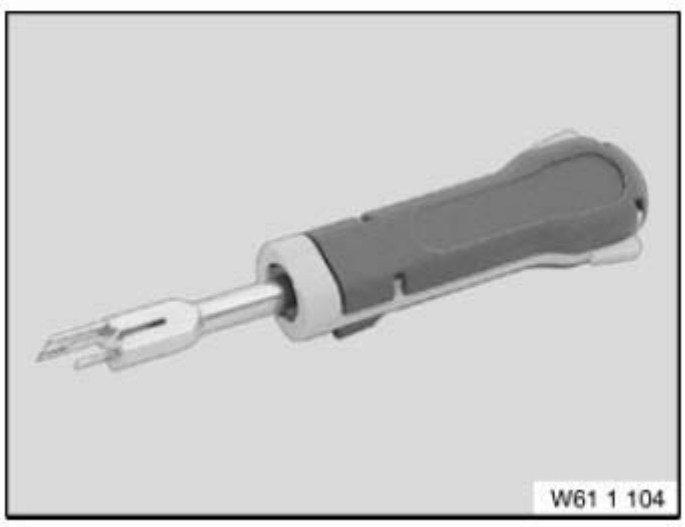


Fig. 18: Identifying Release Tool (611104)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0318 RELEASE TOOL

0495400 610318 Release tool MP

NOTE: (release tool for "Maxi Power Timer 9.5") Replaces from 09/2005 special tool 61 1 180

SI number

02 05 05 (217)

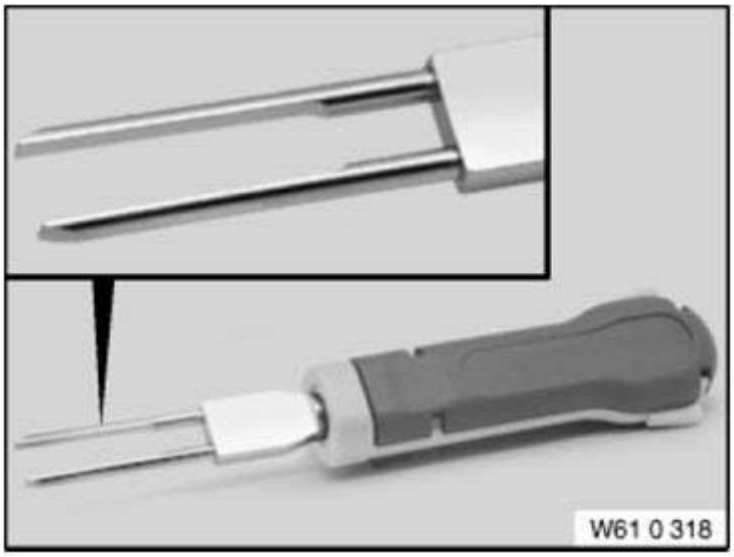


Fig. 19: Identifying Release Tool (610318)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0309 RELEASE TOOL

0495391 610309 Release tool MP

NOTE: (Release tool for pin-end round contact (D=1.5) manufactured by Kostal) Replaces from 09/2005 special tool 61 1 139

SI number

02 05 05 (217)

Consisting of:

10 = 0495393 Sleeve

NOTE: (Replacement sleeve for special tool 61 0 309) Replaces from 09/2005 special tool 61 1 154

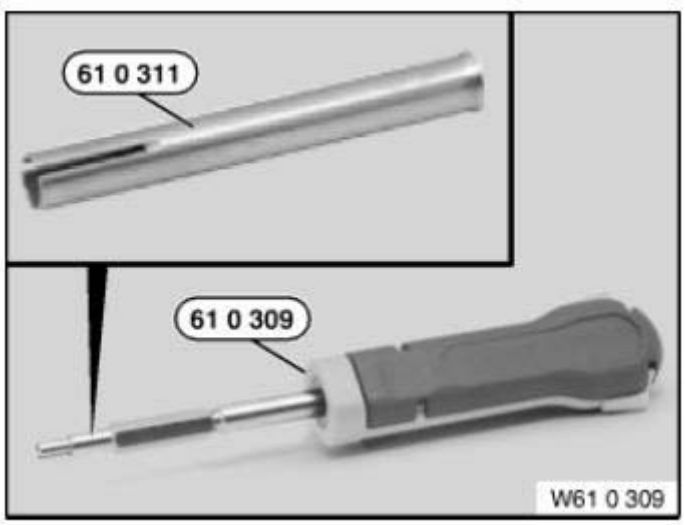


Fig. 20: Identifying Release Tool (610309)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0303 RELEASE TOOL

0495385 610303 Release tool MP

NOTE: (Release tool for round systems with D = 2.5) Replaces from 09/2005 special tool 61 1 132

SI number

02 05 05 (217)

Consisting of:

4 = 0495386 Holding sleeve

NOTE: (Replacement sleeve D = 2.5) Replaced as of 09/2005 special tool 61 1 156

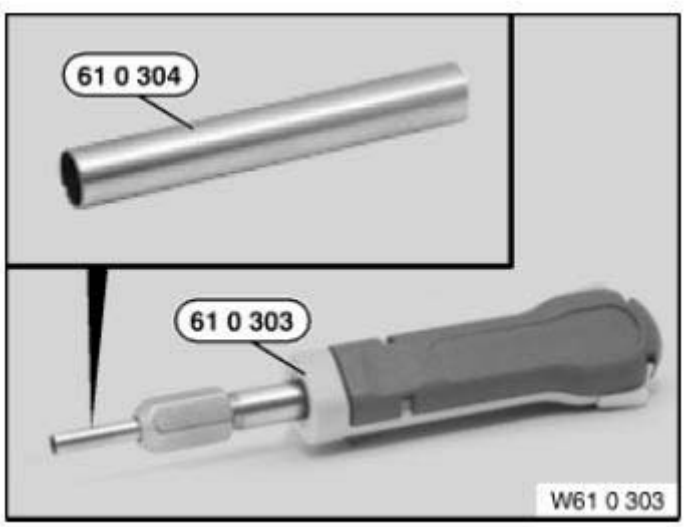


Fig. 21: Identifying Release Tool (610303)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0312 RELEASE TOOL

0495394 610312 Release tool MP

NOTE: (release tool for flat spring contact with a retaining lug (1.6 mm)) Replaces from 09/2005 special tool 61 1 134

SI number

02 05 05 (217)

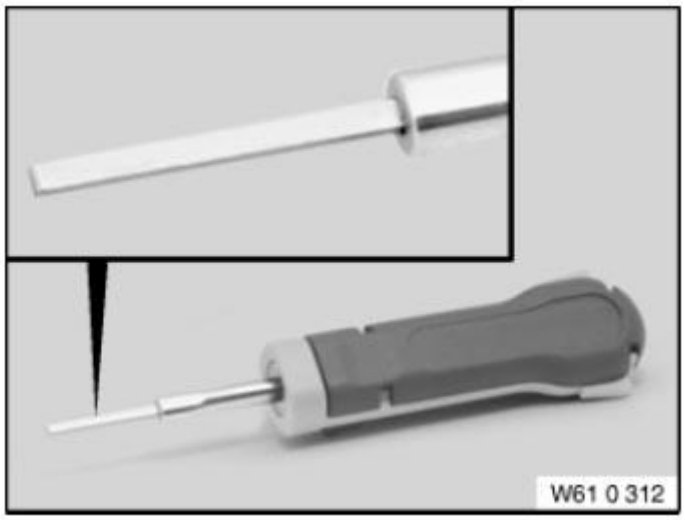


Fig. 22: Identifying Release Tool (610312)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0300 RELEASE TOOL

0495382 610300 Release tool Minimum set: Measuring and testing equipment MP

NOTE: (release tool (set complete)) Replaces from 09/2005 special tool 61 1 150. From 06/2006 extended by tools 61 0 325 - 61 0 331 (see SI 02 05 06 294). From 02/2008 extended by 61 0 332 and 61 0 333 (see SI 02 03 08 440).

SI number

02 05 05 (217)

Consisting of:

0495383

Fig. 23: Identifying Release Tool (610300)
Courtesy of BMW OF NORTH AMERICA, INC.

0495385

0495387

0495389

0495391

0495394

0495395

0495396

0495397

0495398

0495399

0495400

0495401

0495403

0495404

0495405

0495406

0495407

0495578

0495676

0495677

0495678

0495680

0496332

0496333

61-1144 RELEASE TOOL

0492718 611144 Release tool MP

NOTE: For D 2.5/strand sealing, 25-pin, round

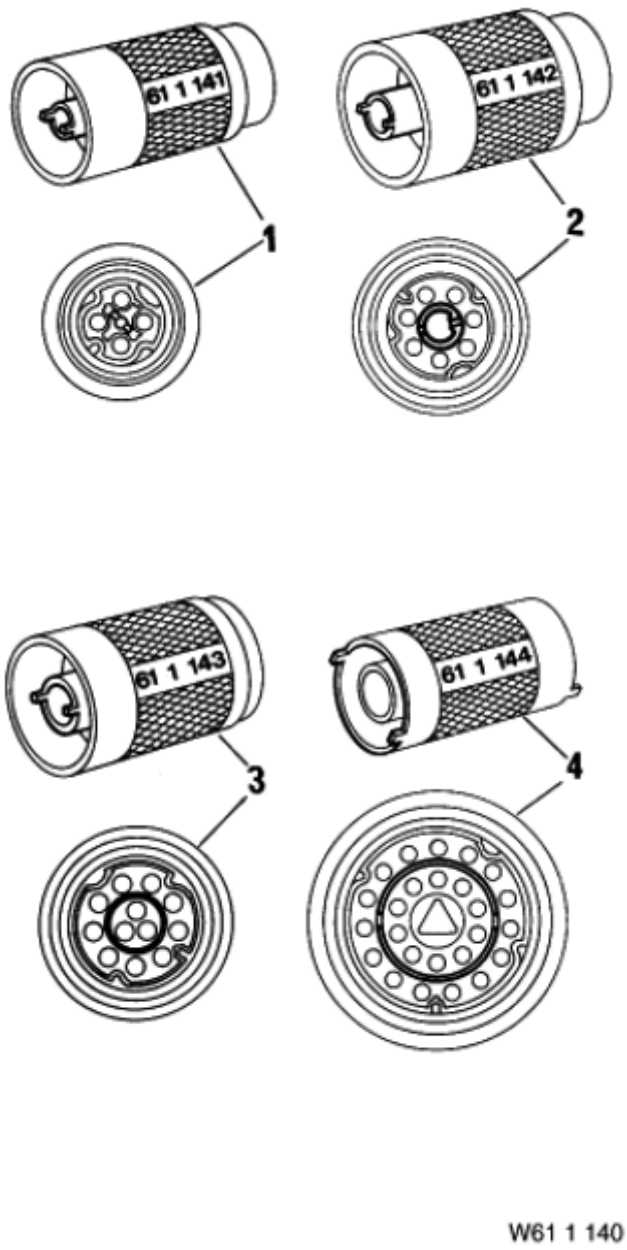


Fig. 24: Identifying Release Tool (611144)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0322 RELEASE TOOL

0495404 610322 Release tool MP

NOTE: (release tool for mini laminated contact ("MLK 1.2 mm"))

SI number

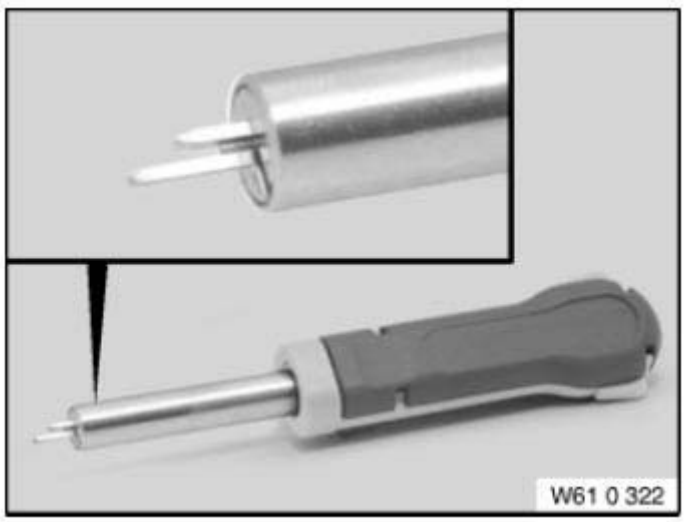


Fig. 25: Identifying Release Tool (610322)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1145 RELEASE TOOL

0492719 611145 Release tool MP

NOTE: For D 1.5/strand sealing, 10-pin, round

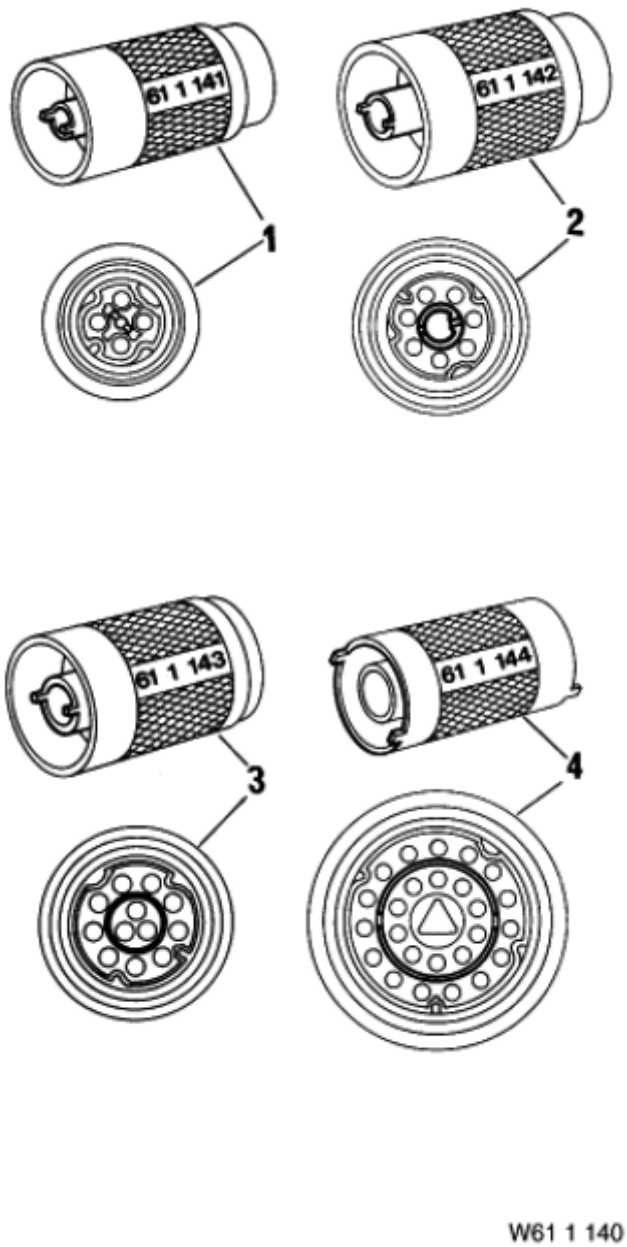


Fig. 26: Identifying Release Tool (611145)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0307 RELEASE TOOL

0495389 610307 Release tool MP

NOTE: (Release tool for socket-end round contacts (D=1.5))

SI number

02 05 05 (217)

Consisting of:

8 = 0495390 Holding sleeve

NOTE: (Spare sleeve for special tool 61 0 307 (D = 1.5))

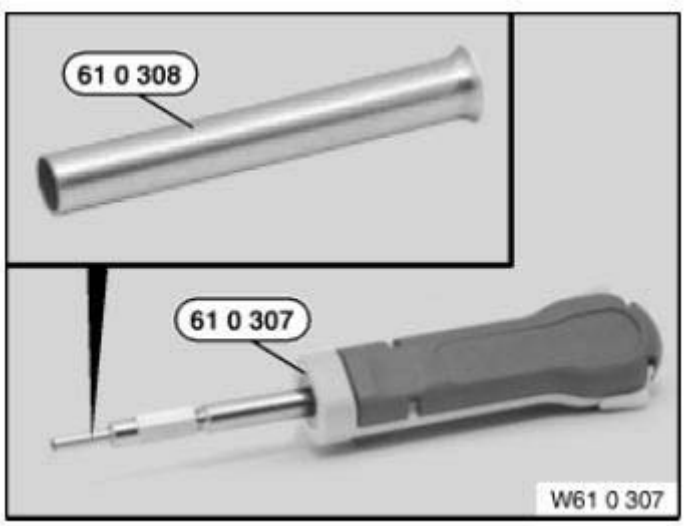


Fig. 27: Identifying Release Tool (610307)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0316 RELEASE TOOL

0495398 610316 Release tool MP

NOTE: (release tool for flat spring contacts with double retaining tab "SPT 4.8" "JPT 2.8") Replaces from 09/2005 special tool 61 1 136

SI number

02 05 05 (217)

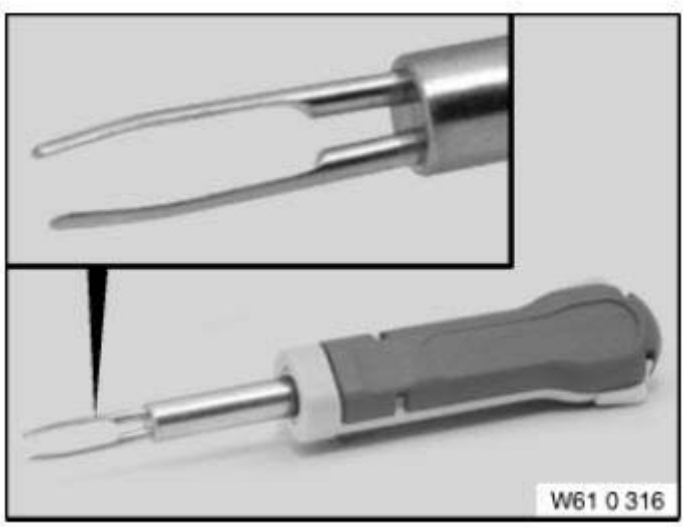


Fig. 28: Identifying Release Tool (610316)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0314 RELEASE TOOL

0495396 610314 Release tool MP

NOTE: (release tool for flat spring contact with a retaining tab (2.7 mm)) Replaces from 09/2005 special tool 61 1 135

SI number

02 05 05 (217)

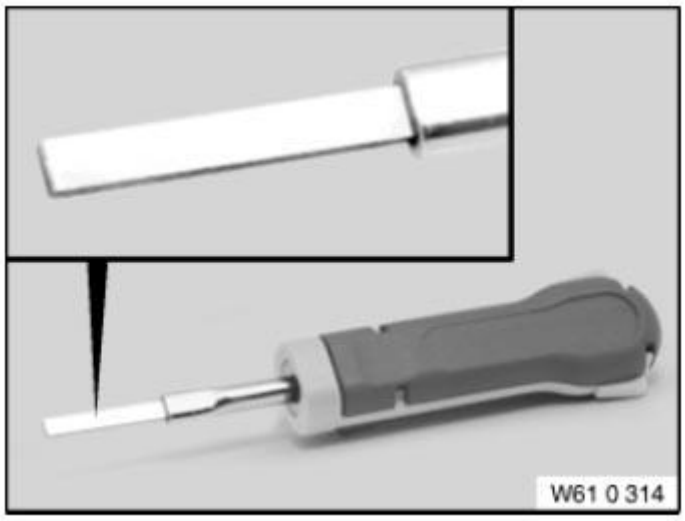


Fig. 29: Identifying Release Tool (610314)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0250 RELEASE TOOL

0496588 610250 Release tool Minimum set: Mechanical tools MW

NOTE: For all 12V sockets

Storage Location

A26

SI number

01 08 09 (531)

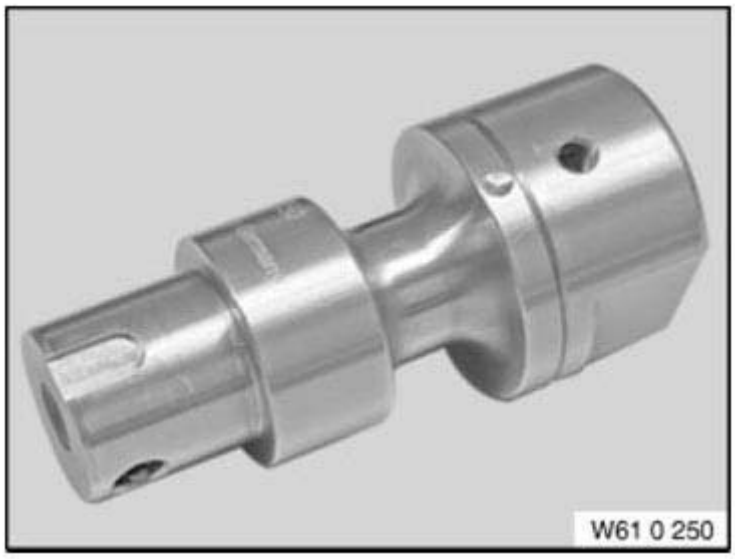


Fig. 30: Identifying Release Tool (610250)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1143 RELEASE TOOL

0492717 611143 Release tool MP

NOTE: For D 2.5/strand sealing, 12-pin, round

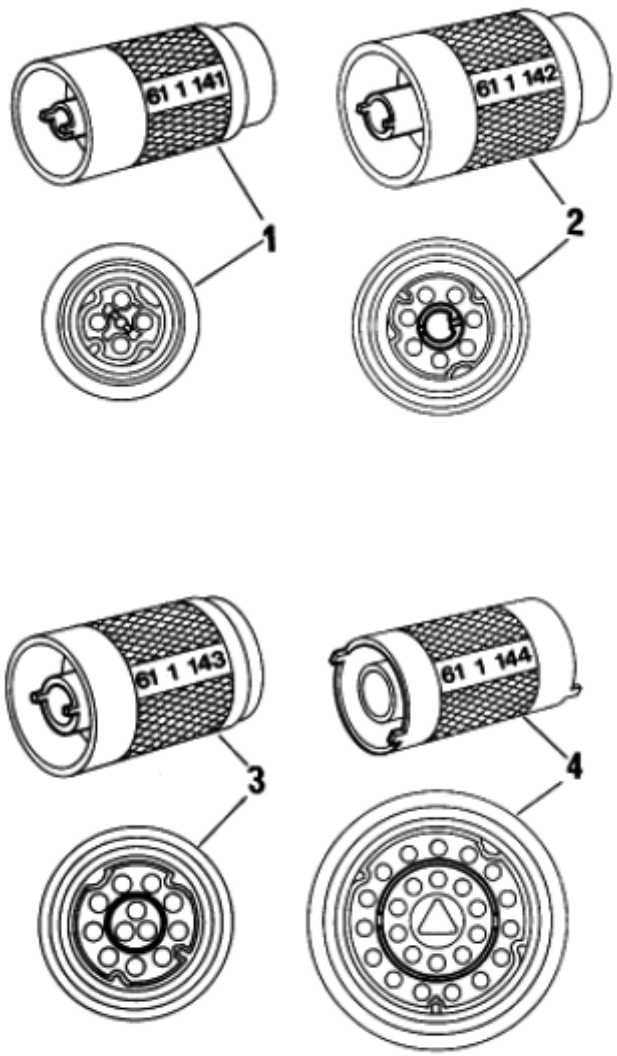


Fig. 31: Identifying Release Tool (611143)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1100 RELEASE TOOL

0496340 611100 Release tool Minimum set: Measuring and testing equipment MP

NOTE: (release set) For releasing assorted electrical contacts on all 4-cylinder diesel engines.

SI number

02 01 08 (438)

Consisting of:

0496341

Fig. 32: Identifying Release Tool (611100)
Courtesy of BMW OF NORTH AMERICA, INC.

0496342

0496343

0496344

0496345

61-0317 RELEASE TOOL

0495399 610317 Release tool MP

NOTE: (release tool for LSK 8) Replaces from 09/2005 special tool 61 1 200

SI number

02 05 05 (217)

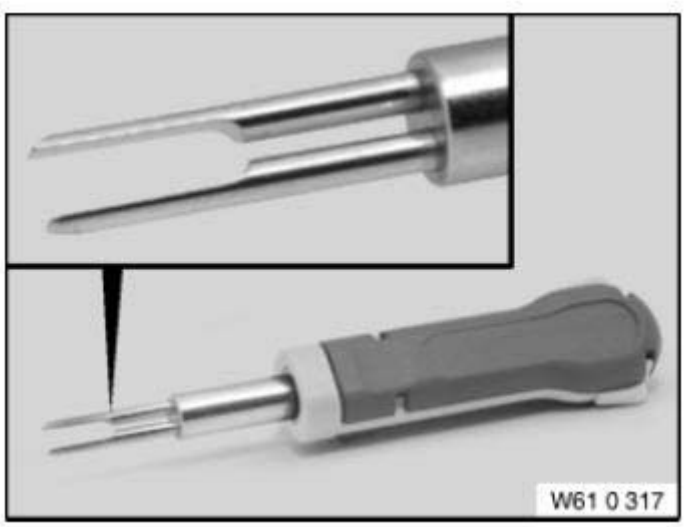


Fig. 33: Identifying Release Tool (610317)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0333 RELEASE TOOL

0496333 610333 Release tool MP

NOTE: For releasing "Mcon 2.8" contacts. Replaces special tool 61 0 319 from 2008.

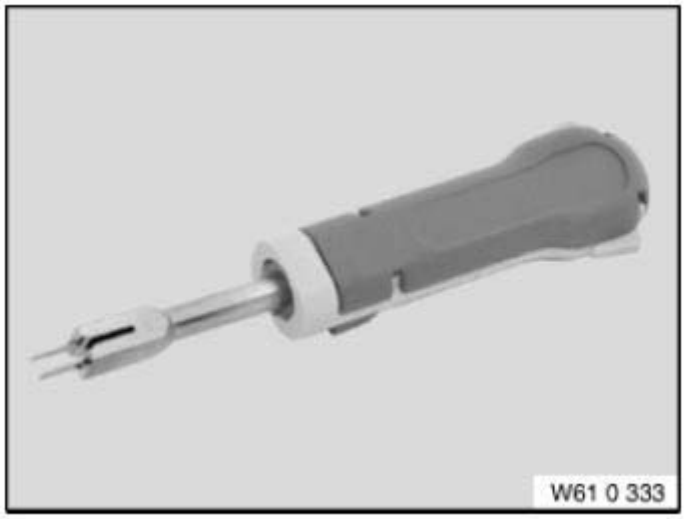


Fig. 34: Identifying Release Tool (610333)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0301 RELEASE TOOL

0495383 610301 Release tool MP

NOTE: **(Release tool for round contacts (diameter 1.5)) Replaces from 09/2005 special tool 61 1 131**

SI number

02 05 05 (217)

Consisting of:

2 = 0495384 Holding sleeve

NOTE: **(Replacement sleeve D = 1.5) Replaced as of 09/2005 special tool 61 1 157**

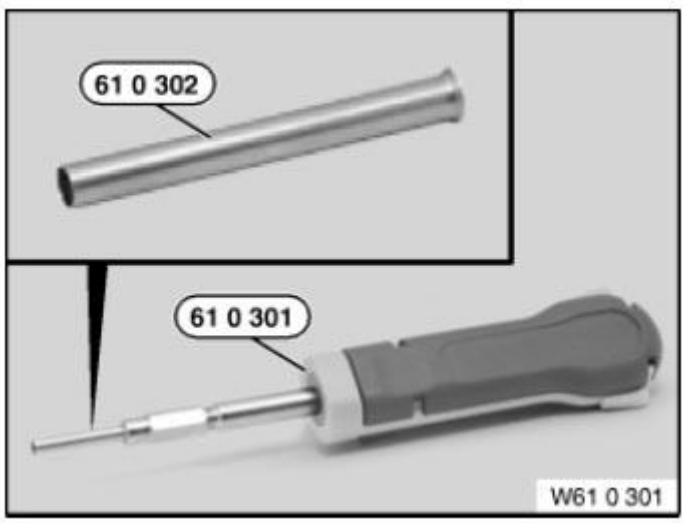


Fig. 35: Identifying Release Tool (610301)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0315 RELEASE TOOL

0495397 610315 Release tool MP

NOTE: **(release tool for flat spring contacts with double retaining tab "Micro-Timer 2") Replaces from 09/2005 special tool 61 1 151**

SI number

02 05 05 (217)

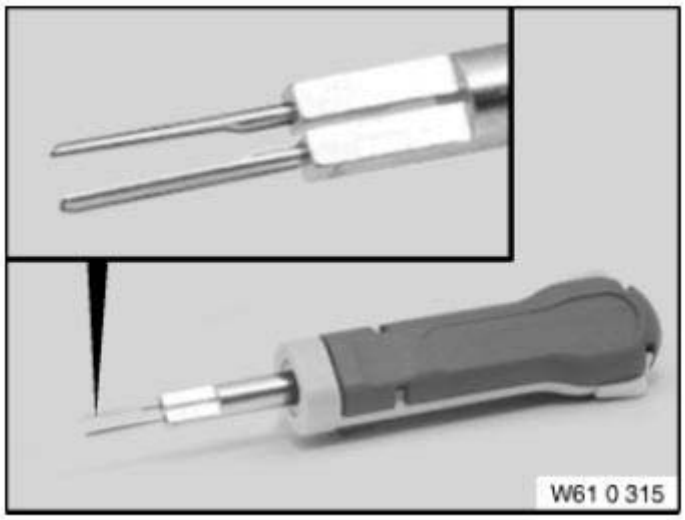


Fig. 36: Identifying Release Tool (610315)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0325 RELEASE TOOL

0495578 610325 Release tool MP

NOTE: (release tool "JPT")

SI number

02 05 06 (294)

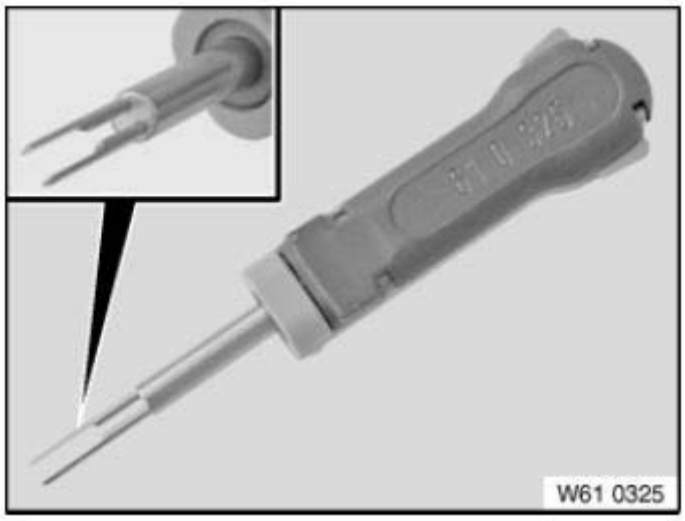


Fig. 37: Identifying Release Tool (610325)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1102 RELEASE TOOL

0496342 611102 Release tool MP

NOTE: For releasing "MLK 1.2" contacts (plug)

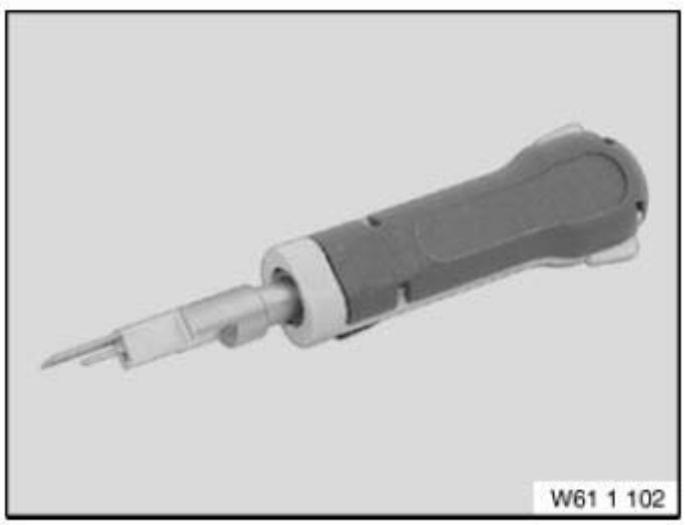


Fig. 38: Identifying Release Tool (611102)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1153 RELEASE TOOL

0492723 611153 Release tool MP

NOTE: For retaining tabs of relay carrier

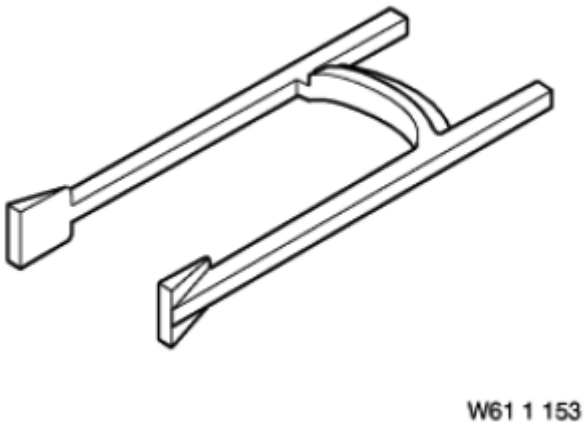


Fig. 39: Identifying Release Tool (611153)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0324 RELEASE TOOL

0495406 610324 Release tool MP

NOTE: (release tool for secondary lock) Universal tool for damage-free opening/removal of secondary locks

SI number

02 05 05 (217)

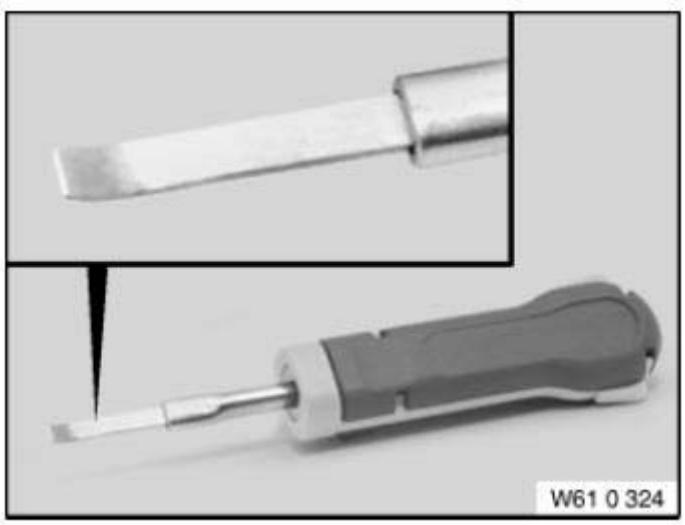


Fig. 40: Identifying Release Tool (610324)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0323 RELEASE TOOL

0495405 610323 Release tool MP

NOTE: (release tool for flat spring contacts with a retaining tab (MQS)) Replaces from 09/2005 special tool 61 1 152

SI number

02 05 05 (217)

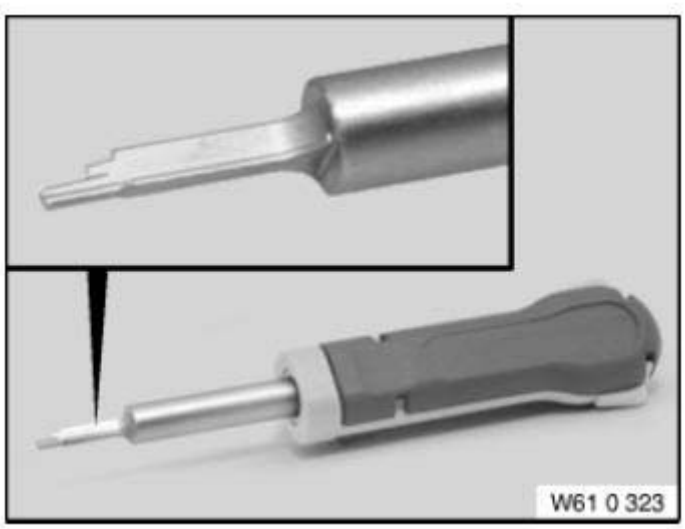


Fig. 41: Identifying Release Tool (610323)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1105 RELEASE TOOL

0496345 611105 Release tool MP

NOTE: For releasing "SLK 5.8" mm contacts with secondary lock and supplementary slide

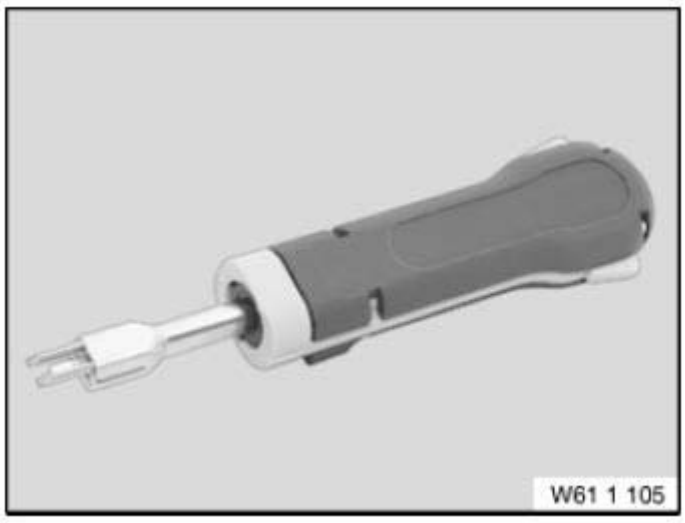


Fig. 42: Identifying Release Tool (611105)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0326 RELEASE TOOL

0495676 610326 Release tool MP

NOTE: (release tool "MQS") For releasing micro contacts

SI number

02 05 06 (294)

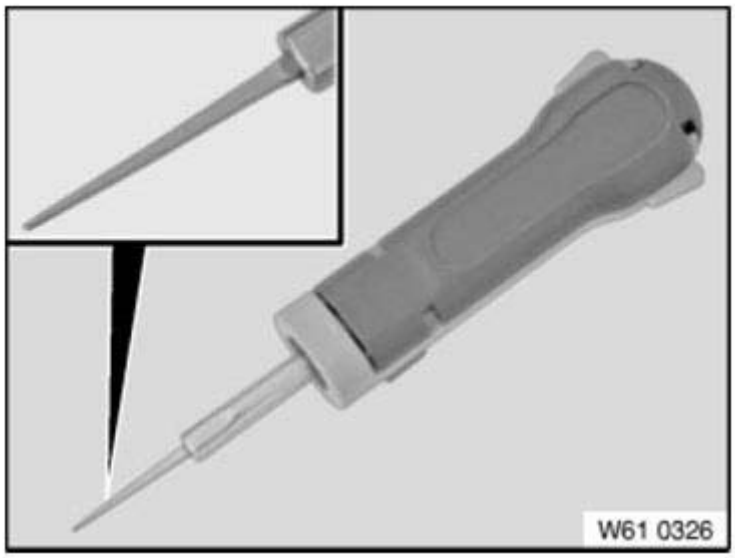


Fig. 43: Identifying Release Tool (610326)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0332 RELEASE TOOL

0496332 610332 Release tool MP

NOTE: For releasing "MQS 0.64 mm" contacts

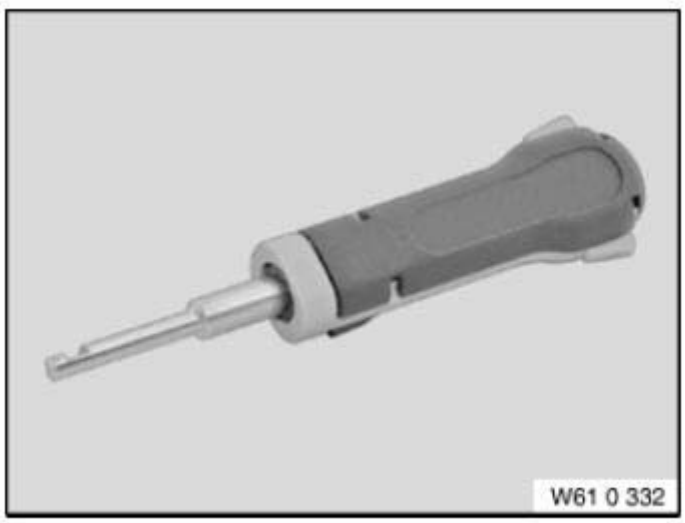


Fig. 44: Identifying Release Tool (610332)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0319 RELEASE TOOL

0495401 610319 Release tool MP

Replaced by: 0496333

NOTE: (release tool for sensor disc contacts ("SLK2.8")) Replaces from 09/2005 special tool 61 1 148. To be replaced from 02/2008 by special tool 61 333! Replaced by 61 0 333 (0 496 333)

SI number

02 05 05 (217)

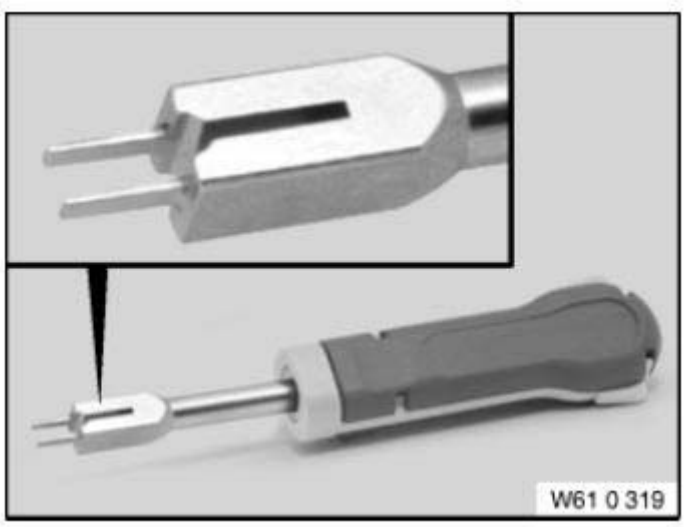


Fig. 45: Identifying Release Tool (610319)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0321 RELEASE TOOL

0495403 610321 Release tool MP

NOTE: (release tool for sensor laminated contacts with release device ("SLK 2.8"))

SI number

02 05 05 (217)

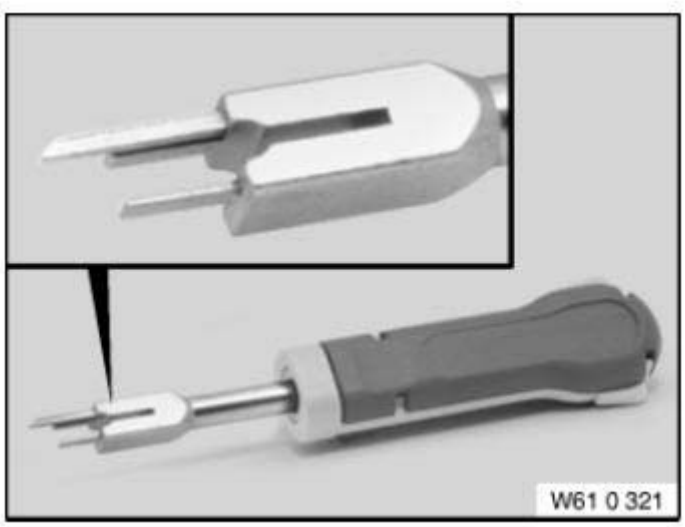


Fig. 46: Identifying Release Tool (610321)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0400 RELEASE TOOL

0495408 610400 Release tool Minimum set: Measuring and testing equipment MP

NOTE: (Release tools (extension set) for MINI) For releasing secondary lock and new contacts in N12 and N14 engines. From 02/2008 extended by 61 0 403 (see SI 02 08 439).

SI number

02 08 06 (312)

Consisting of:

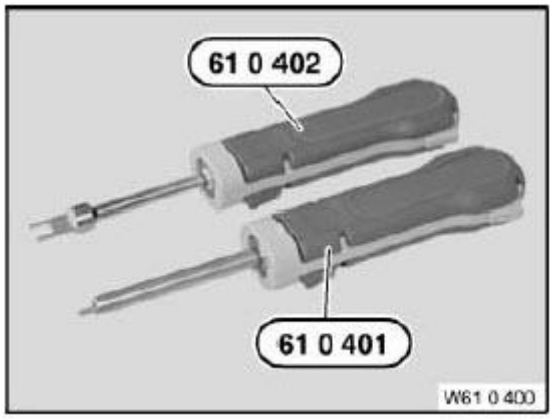


Fig. 47: Identifying Release Tool (610400)
Courtesy of BMW OF NORTH AMERICA, INC.

0495409

0495410

0496376

61-0313 RELEASE TOOL

0495395 610313 Release tool MP

NOTE: (release tool for flat spring contacts with a retaining tab (1.9 mm)) Replaces from 09/2005 special tool 61 1 137

SI number

02 05 05 (217)

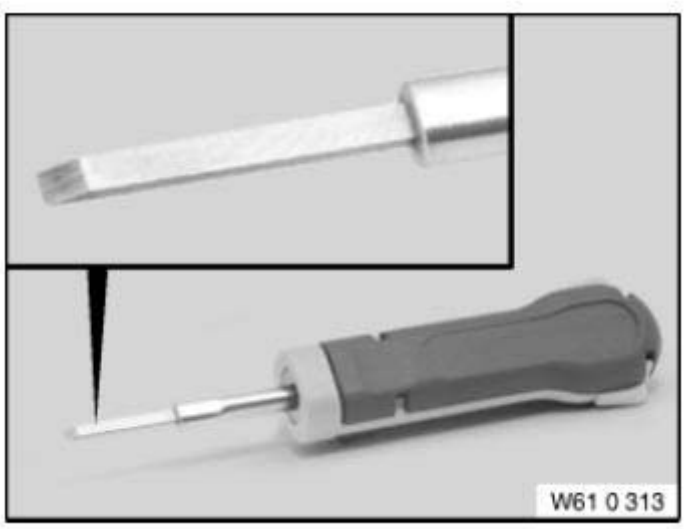


Fig. 48: Identifying Release Tool (610313)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1103 RELEASE TOOL

0496343 611103 Release tool MP

NOTE: For releasing "MLK 1.2" contacts (sleeve)

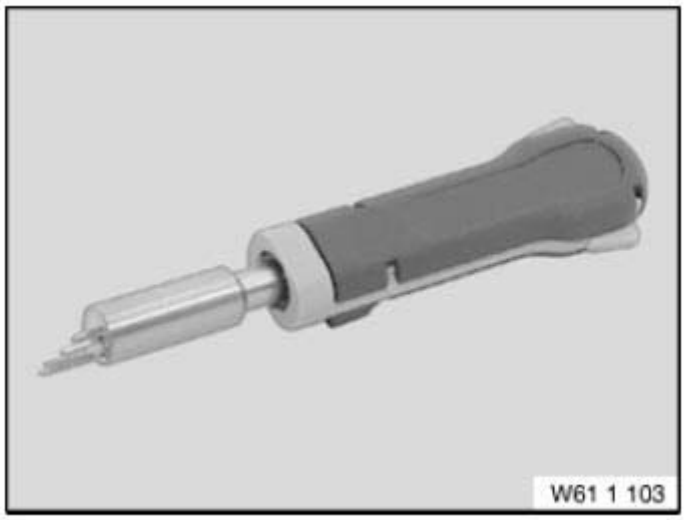


Fig. 49: Identifying Release Tool (611103)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0331 RELEASE TOOL

0495680 610331 Release tool MP

NOTE: (release tool "SLK 5.8") For releasing "SLK 5.8 mm" contacts

SI number

02 05 06 (294)

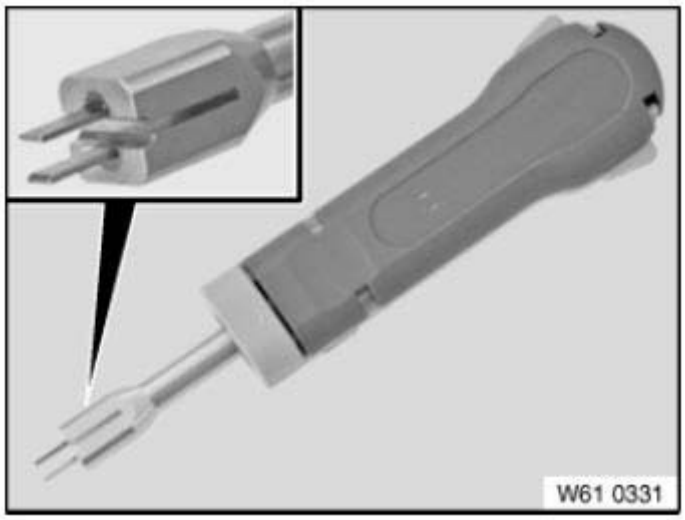


Fig. 50: Identifying Release Tool (610331)
Courtesy of BMW OF NORTH AMERICA, INC.

61-0305 RELEASE TOOL

0495387 610305 Release tool MP

NOTE: (Release tool for round contacts (D = 3.5)) Replaces from 09/2005 special tool 61 1 133

SI number

02 05 05 (217)

Consisting of:

6 = 0495388 Sleeve

NOTE: (Replacement sleeve (D = 3.5) for 61 0 305) Replaced from 09/2005 special tool 61 1 155

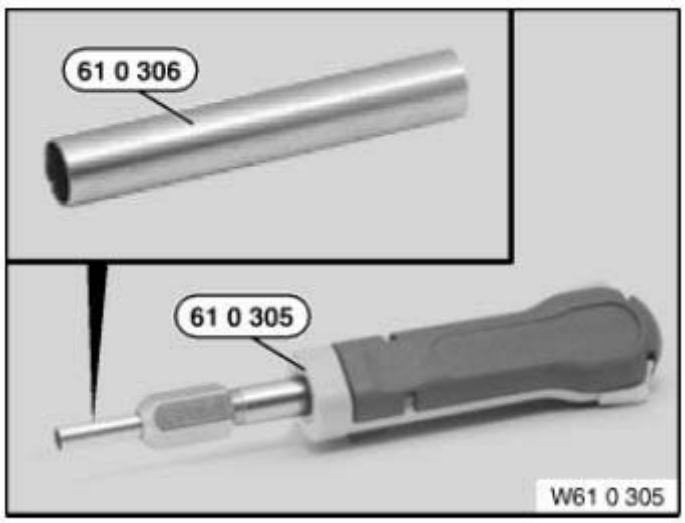


Fig. 51: Identifying Release Tool (610305)
Courtesy of BMW OF NORTH AMERICA, INC.

61-1141 RELEASE TOOL

0492715 611141 Release tool MP

NOTE: For D 2.5/strand sealing, 4-pin, round

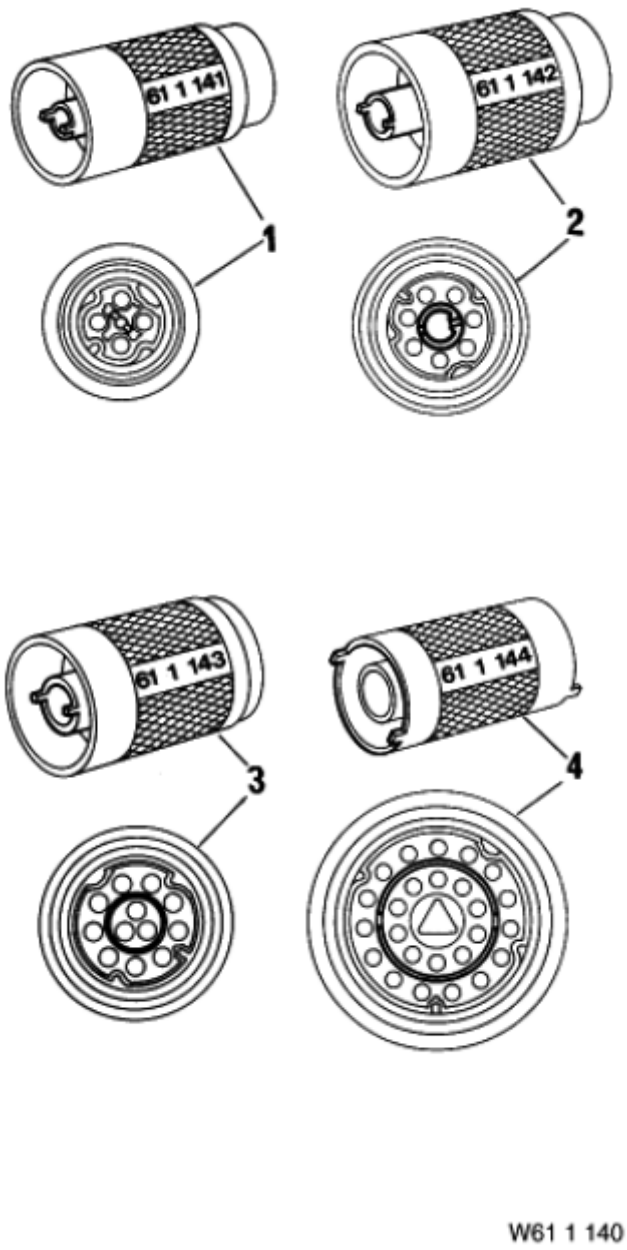


Fig. 52: Identifying Release Tool (611141)
Courtesy of BMW OF NORTH AMERICA, INC.

61-3330 SOCKET

0494218 613330 Socket MP

NOTE: (1/4 inch socket) For tightening the special nut on the EWS. Other: only UK

Storage Location

Fig. 53: Identifying Socket (613330)
Courtesy of BMW OF NORTH AMERICA, INC.

61-4250 CONNECTOR

0496682 614250 connector Minimum set: Measuring and testing equipment MP

NOTE: as intermediary contact on soft top

SI number

02 05 09 (549)

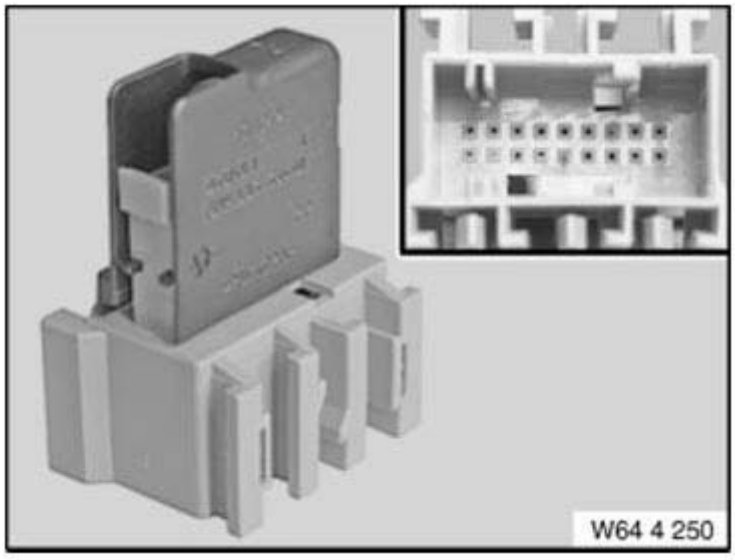


Fig. 54: Identifying Connector (614250)
Courtesy of BMW OF NORTH AMERICA, INC.

AUXILIARY CABLE

61 12 AUXILIARY CABLE

TIGHTENING TORQUE SPECIFICATION - AUXILIARY CABLE

		Type	Thread	Tightening specification	Measure
1AZ	Battery positive lead to distributor, luggage compartment B+ distributor lead to safety battery terminal	E89	M8		15 Nm
2AZ	Battery positive lead to connector, engine compartment partition wall	E89	M8		15 Nm
3AZ	Battery positive lead to connection support point, luggage compartment floor	E89	M8		15 Nm
4AZ	Battery positive lead to engine compartment B+ terminal	E89	M8		15 Nm
5AZ	Battery negative lead to body	E89	M8		15 Nm

BATTERY WITH TERMINAL

61 21 BATTERY WITH TERMINAL

TIGHTENING TORQUE SPECIFICATION - BATTERY WITH TERMINAL

		Type	Thread	Tightening specification	Measure
1AZ	Battery positive lead, battery negative lead, safety battery terminal, IBS (screw connection from	E89	M6		5 Nm

	above)				
2AZ	Battery positive lid to distributor, safety battery terminal	E89	M8		15 Nm
4AZ	Battery positive lead to transfer point	E89	M8		15 Nm

SWITCH

61 31 SWITCH

TIGHTENING TORQUE SPECIFICATION - SWITCH

		Type
1AZ	Ignition starter switch	E60/E61/E63/E64
2AZ	Reversing light switch	E36/E38/E39/E46/E53/E60/E61/E63/E64/E81/E82/E83/E85/E86/E87/E88/E89/E90/E91/E92/E
3AZ	Cover, gear selector switch	E70/E71/E72
4AZ	Gear selector switch	E70/E71/E72
5AZ	Controller	E70/E71/E72
6AZ	Gear selector switch	E60/E61/E63/E64/E89/E90 M3/E92 M3/E93 M3
7AZ	Emergency release to gear selector switch	E60/E61/E63/E64
8AZ	Switch cluster to steering column	E70/E71/E72/E81/E82/E87/E88/E89/E90/E91/E92/E93

WINDSCREEN WIPERS

61 61 WINDSCREEN WIPERS

TIGHTENING TORQUE SPECIFICATION - WINDSCREEN WIPERS

		Type	Thread	Tightening specification	Measure
1AZ	Wiper bracket to firewall	E89	M6	If necessary, observe tightening sequence.	10 Nm
2AZ	Wiper arm	E89			35 Nm

GENERAL INFORMATION

The Battery - Overview - All Models

THE BATTERY

Model: All

Production Date: All

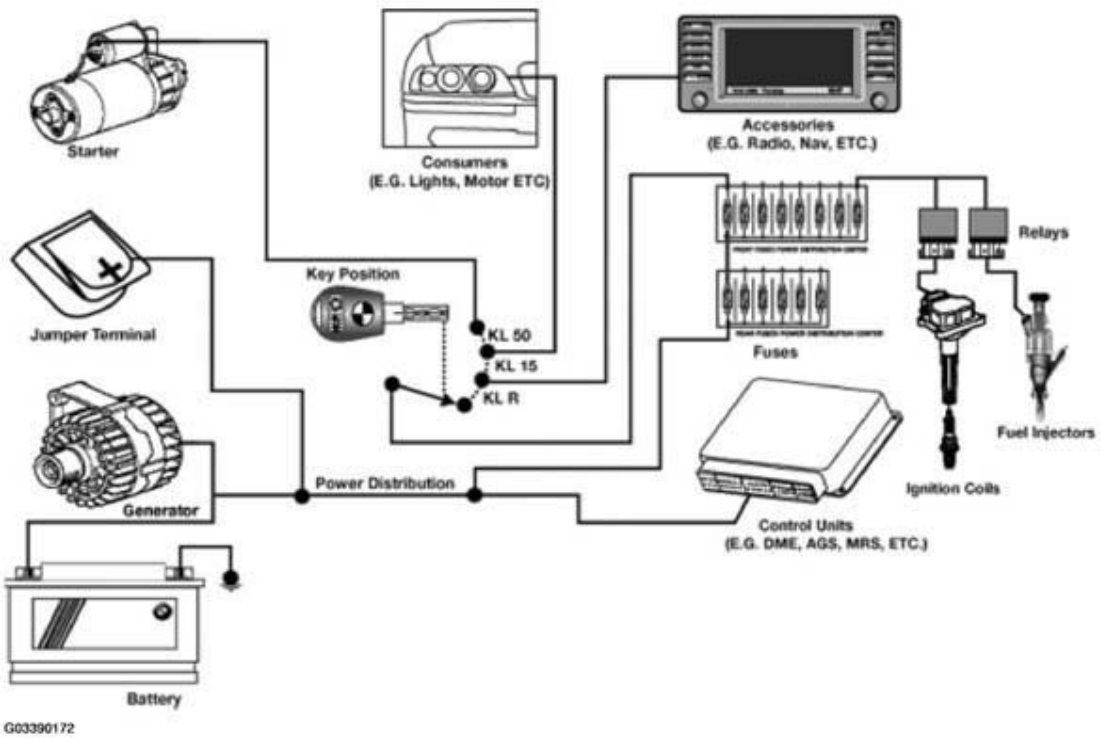


Fig. 1: View Of Electrical Components Connected To Battery
Courtesy of BMW OF NORTH AMERICA, INC.

Purpose of the Automotive Battery:

The battery is the primary EMF source in the automobile. In addition the battery performs the following functions:

- Provides voltage and current for the starter motor.
- Provides voltage and current for the ignition during cranking.
- Supplies all electrical power when the charging system is not operating.
- Supplies the extra power necessary when the vehicle's electrical load exceeds the supply from the charging system.
- Acts as a voltage stabilizer in the electrical system. The battery evens out voltage spikes and prevents

them from damaging other components in the electrical system.

- Provides power to KL30, KL15 and KLR.

The battery does not store electrical energy. It stores chemical energy that is converted to electrical energy as it discharges.

BATTERY CONSTRUCTION

Modern automotive batteries are made of cases (usually plastic) containing alternating plates of Lead and Lead Dioxide (or Lead Oxide) separated by insulators. These alternating plates are connected in series to produce a voltage of 12.6 volts, or about 2.1 volts for each set of Lead and Lead Dioxide plates. The negative terminal is connected to a Lead Dioxide plate and the positive terminal to a Lead plate.

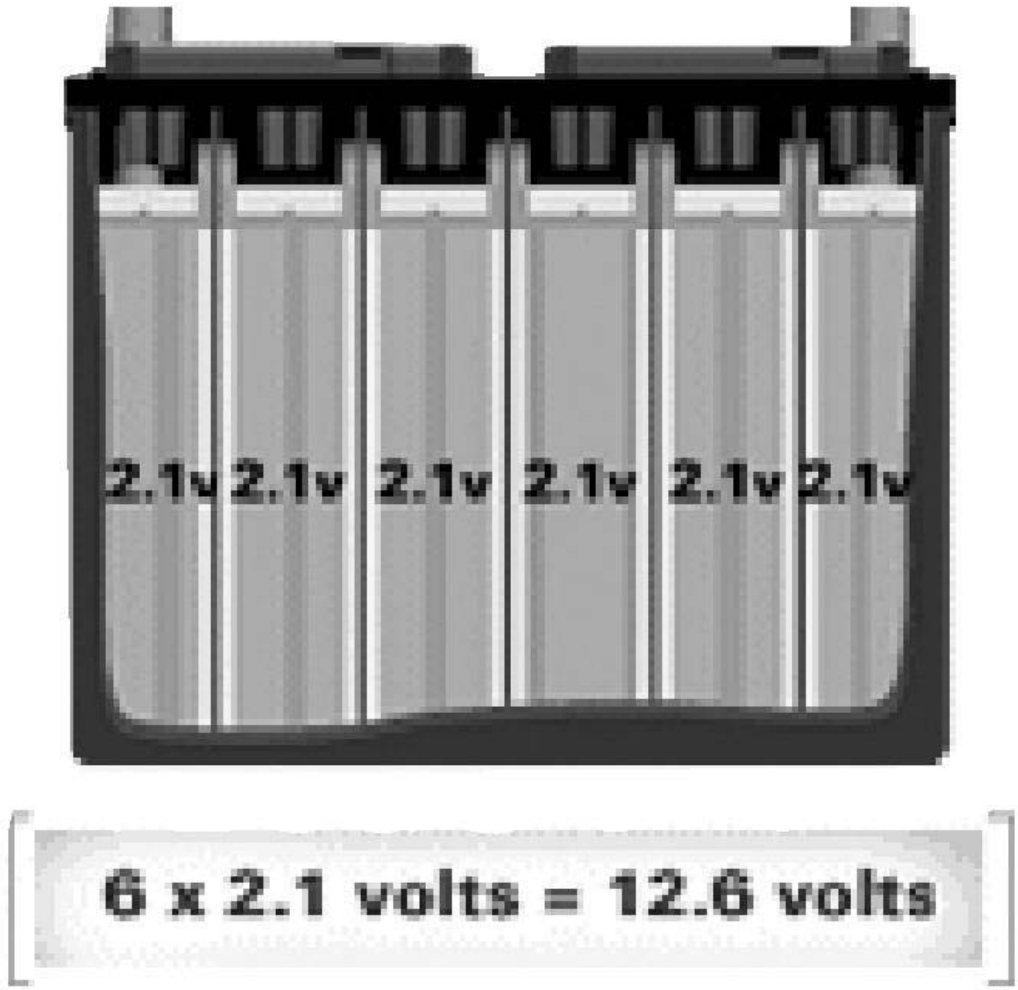


Fig. 2: Identifying Battery Plates
Courtesy of BMW OF NORTH AMERICA, INC.

The plates are covered with electrolyte which is a solution of 35% Sulfuric acid and 65% Water.

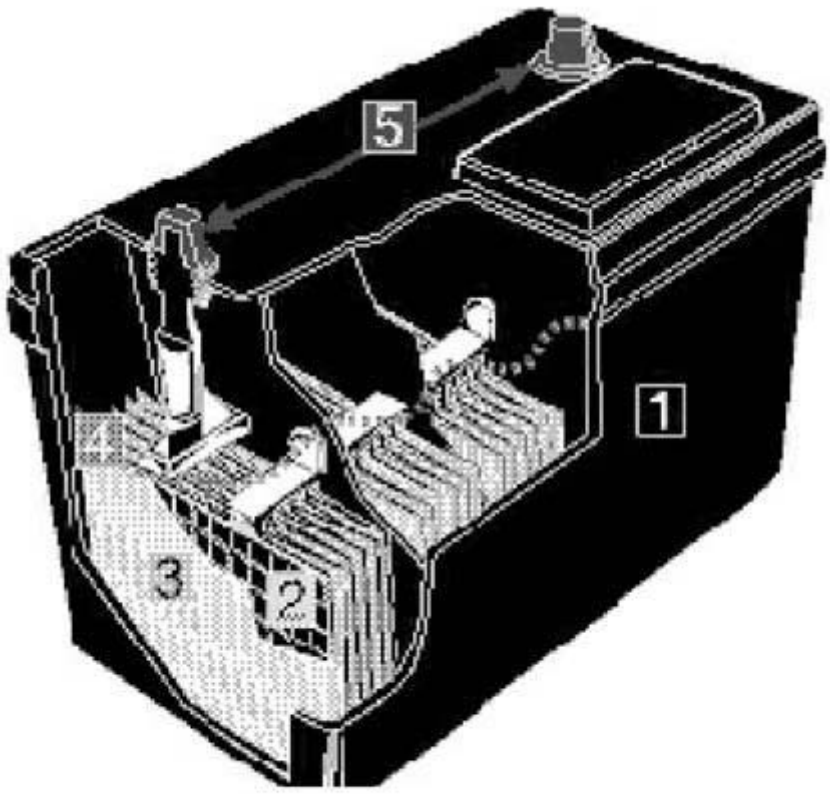


Fig. 3: Cross Sectional View Of Battery
Courtesy of BMW OF NORTH AMERICA, INC.

1. Plastic container.
2. Positive and negative internal plates made of lead.
3. Plate separators made of porous synthetic material.
4. Electrolyte which is a dilute solution of Sulfuric acid and water better known as Battery Acid.
5. Lead terminals which are the connection point between the battery and whatever it powers.

Battery Case

Most battery cases and their covers are made of polypropylene. The case is divided into six sections or cells, shaped similar to an ice-cube tray.

The case is designed to:

- Withstand hot and cold temperature extremes.
- Resist damage caused by mechanical shock in automotive applications.

- Resist acid absorption and chemical damage.

The Grids

The grids are the supporting framework for the active material of the plates. They also conduct current to and from the active material plates.

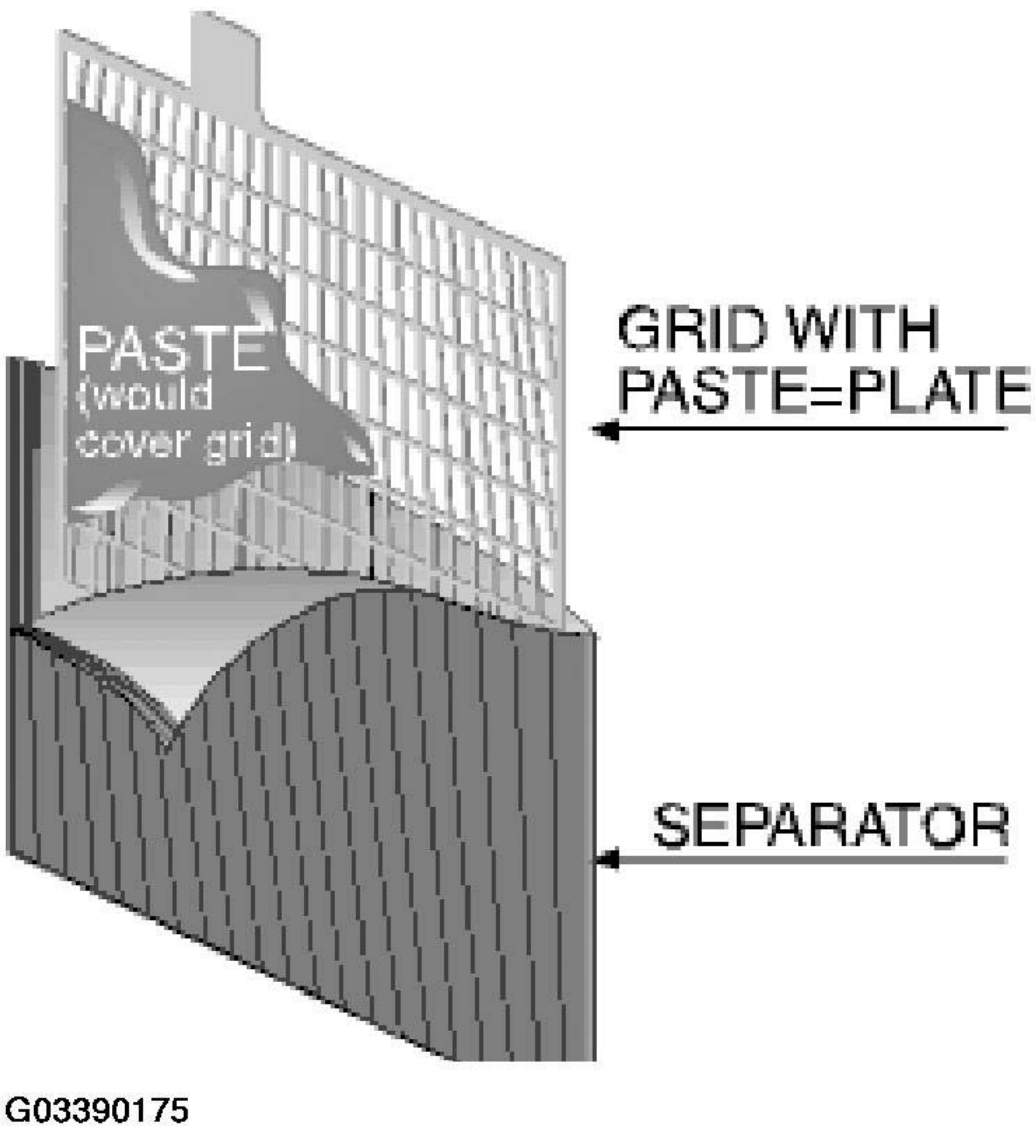


Fig. 4: Identifying Battery Grids
Courtesy of BMW OF NORTH AMERICA, INC.

The Plates

Plates are grids covered with a paste mixture of Lead Oxide and Sulfuric Acid and water. An expander material made of powdered sulfates is added to the paste to produce negative plates.

A forming charge is applied to the positive plates converting the Lead Oxide to Lead Dioxide, a highly porous material which allows the electrolyte to freely penetrate the plate.

A forming charge is also applied to the negative plates converting the Lead Oxide to Sponge Lead. The Sponge Lead allows the electrolyte to penetrate freely allowing the material beneath the plate surface to take part in the chemical reaction.

The Separators

Separators are thin sheets of electrically insulating porous material used as spacers between the plates to prevent short circuits within the cells.

Fine pores in the separators allow ionic current flow in the electrolyte between the positive and negative plates.

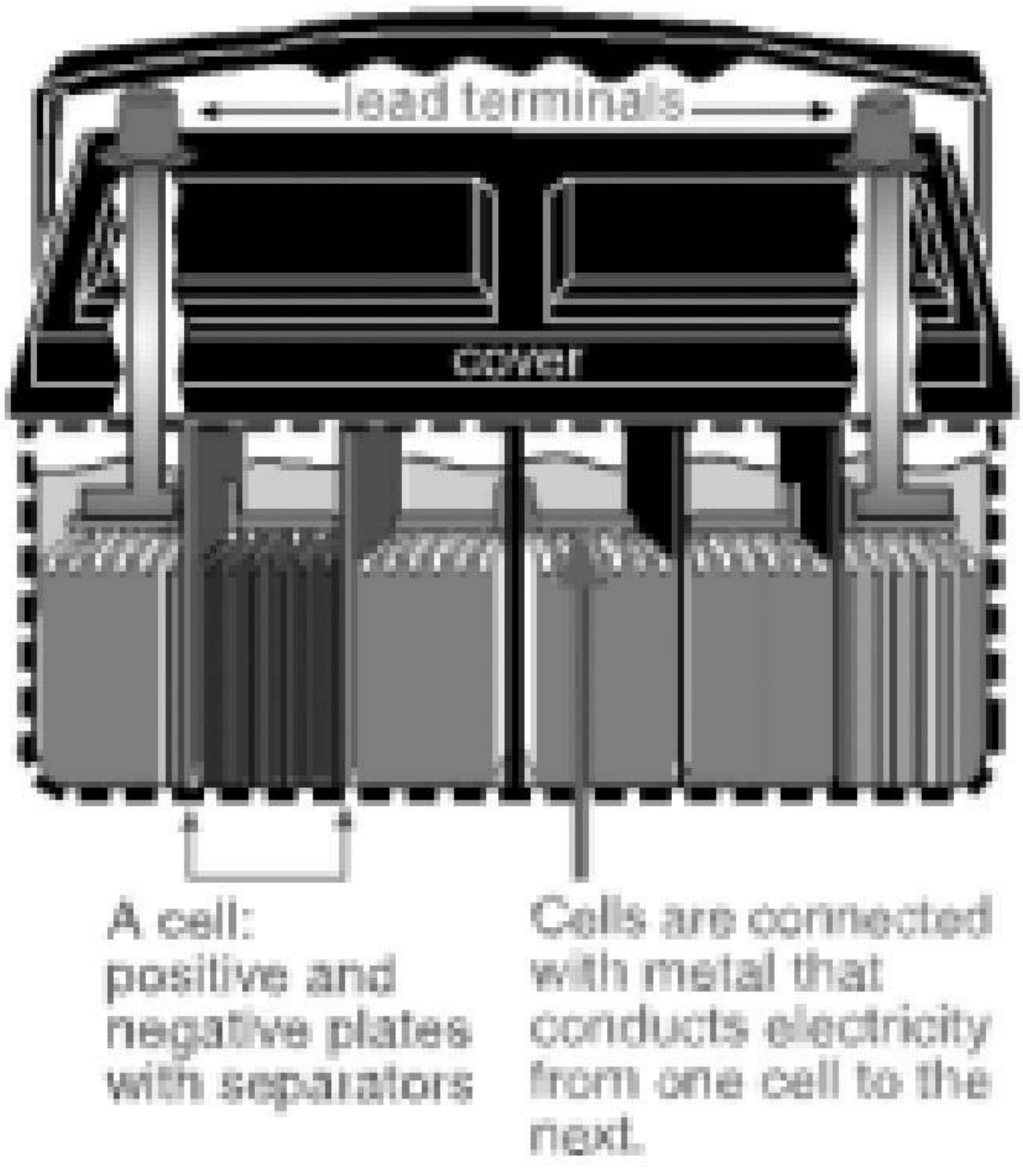


Fig. 5: Identifying Battery Separators
Courtesy of BMW OF NORTH AMERICA, INC.

Elements

In the most common method of construction, a stack of alternate positive and negative plates are formed with separators between each positive and negative plate. The lugs of the negative plates are welded together as are

those of the positive plates. The plate strap of each group of plates is used to connect them in series with the plate group of the next cell, or with a battery terminal.

The assembly resulting from placing one positive plate group and one negative plate group together, with separators is known as an element. There is one element per battery cell. More or larger plates per cell will increase plate surface area and increase capacity of the battery but will not affect the voltage output.

Electrolyte

The electrolyte is a mixture of Sulfuric Acid and Water. Electrolyte consists of 35% sulfuric acid and 65% water.

The electrolyte is the carrier for the electric current to move between the positive and negative plates through the separators.

The Lead Terminals

BMW's use a tapered top terminal. This design uses tapered terminal posts built to industry standards so that all cable clamps will fit any battery with these posts.

The positive terminal is slightly larger than the negative to minimize the danger of installing the battery in reverse. The positive terminal is 17.5mm in diameter at the top. The negative terminal is 15.9mm at the top.

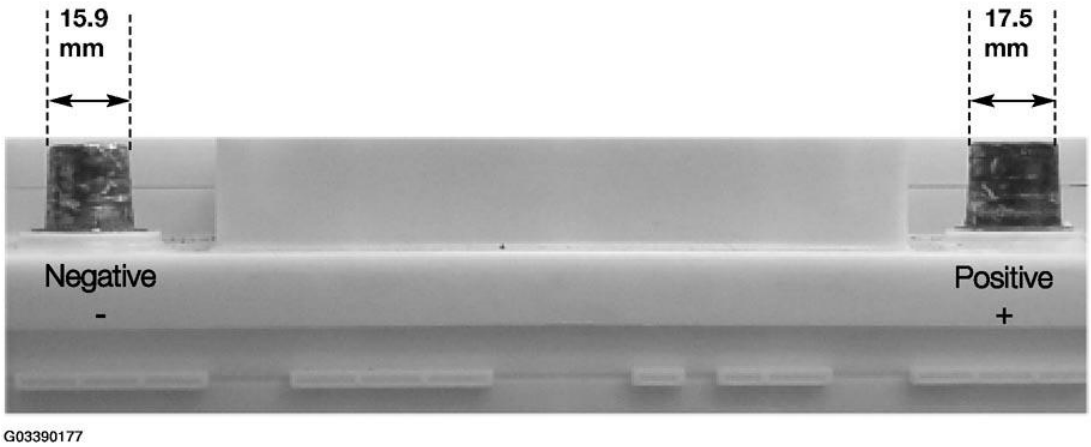


Fig. 6: Identifying Battery Terminals
Courtesy of BMW OF NORTH AMERICA, INC.

BATTERY TYPES

There are at least three types of the Lead-acid batteries that are currently used in the Automotive Industry.

Lead-Acid Battery

The three major contributors to battery chemistry are lead, lead dioxide and sulfuric acid. Pure lead is too soft to

withstand the physical abuse of mobile applications, so a strengthener is needed. About 6% antimony, a semi metallic element produced as a by-product to copper and lead ore refining, is added to strengthen the lead.

The antimony added to the grids acts as a catalyst and makes the loss of hydrogen and oxygen through outgassing worse. These batteries require frequent water replenishing.

Lead/Calcium Battery

Introduced in the 1970's Lead/Calcium batteries have Calcium added to the positive and negative grids to reduce the outgassing. These batteries were first referred to as "maintenance free". The Lead/Calcium batteries are not resistant to deep-cycling which occurs when a battery is drained to a very low voltage before being recharged. Frequent deep-cycling renders these batteries unable to sustain a charge. Lead/Calcium batteries need to be charged at higher voltage settings or they will not be recharged to full capacity.

Hybrid Battery

Hybrid batteries use a positive grid strengthened with antimony and a negative grid with calcium. The hybrid battery is more resistant to deep cycling than the lead/calcium, but still not as good as the original Lead-acid battery. Water usage is greatly reduced in the hybrid battery, although regular checking is advisable. Most cars supplied with hybrid batteries have their voltage regulators set to 14.3 volts.

Hybrid batteries were first installed in the E30 convertible during the 1991 Model Year.

HOW THE BATTERY WORKS

Discharging

Batteries don't store electrical energy, they store chemical energy and convert it to electrical energy during the discharging process.

Each cell of a battery contains positive and negative plates (grids). The positive plate is made of lead dioxide, the negative plate of a spongy lead. The negative plate combines with the sulfuric acid to create lead sulfate and one extra electron. The positive plate produces hydrogen ions and sulfuric acid ions (positive ions, atoms missing one electron).

The extra electrons from the negative plate are passed from the negative battery terminal and through the electrical consumer, back to the positive battery terminal. Once back at the battery, the free electrons combine with the positive ions at the positive battery terminal producing lead sulfate and water.

It is important to remember that the system is closed. For every electron generated at the negative terminal, there is an electron consumed at the positive terminal.

As the process continues, the active materials (lead and lead dioxide plates and the electrolyte) become depleted and the reactions slow down until the battery is no longer capable of supplying electrons. At this point the battery is discharged.

The discharge process changes the ratio of sulfuric acid to water in the electrolyte, as more water is produced in the discharge process. By measuring the volume of acid in the water, the state of charge of the battery is

discovered.

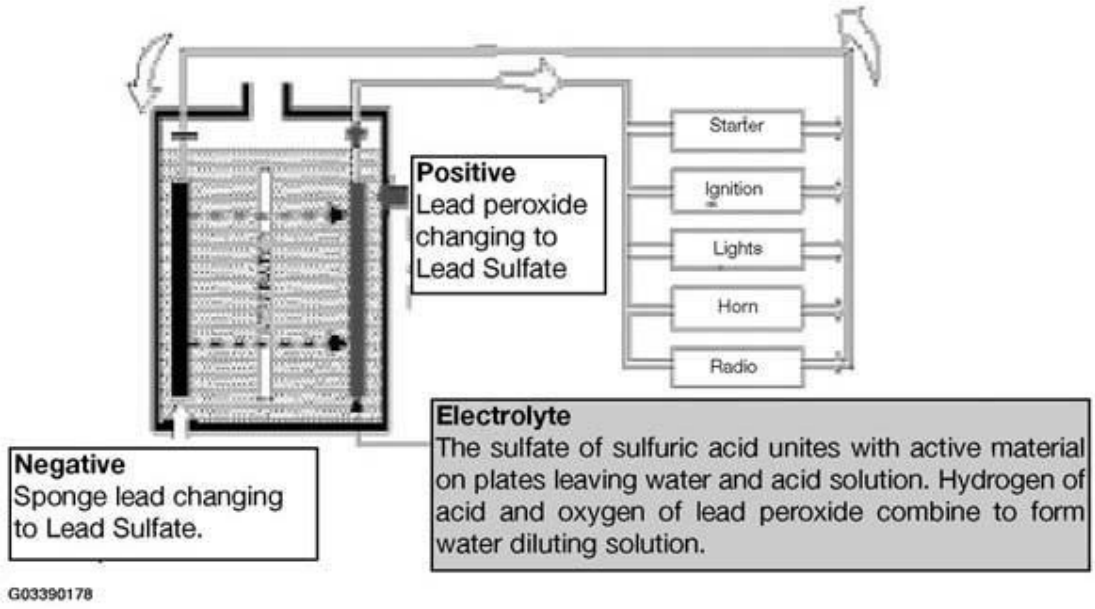


Fig. 7: Identifying Discharge Process
Courtesy of BMW OF NORTH AMERICA, INC.

Charging

Applying voltage to the battery from an external source such as the generator or battery charger reverses the chemical action in the battery.

Reversing the chemical action in the battery, forces the free electrons at the negative terminal of the battery back into the electrolyte raising the sulfuric acid percentage. This chemical action removes the Lead sulfate that had formed on the negative plates leaving pure active material.

The electrons that were forced into the electrolyte are able to react with the lead sulfate on the positive terminal again raising the Sulfuric acid content and leaving pure active material on the positive plates.

This process enables the battery to be used over and over again.

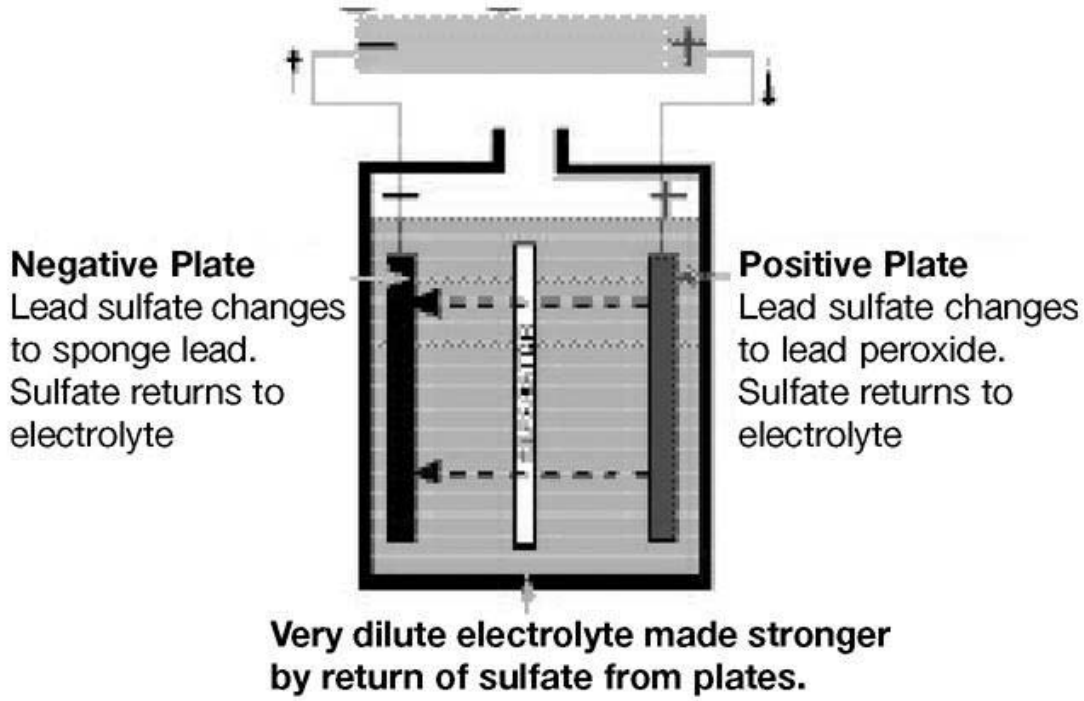


Fig. 8: Identifying Charging Process
Courtesy of BMW OF NORTH AMERICA, INC.

COMMON BATTERY TERMS

Fig. 9: View Of Battery Label
Courtesy of BMW OF NORTH AMERICA, INC.

- **Ah - Amp Hour Capacity**

  This rating is derived from discharging a fully charged battery at a constant amp draw for 20 hours @ 80° F, without the voltage of the battery falling below 10.5 volts. The constant amp draw is multiplied by the 20 hours to come up with the Amp Hour Rating.

- **CCA - Cold Cranking Performance**

  Represents the amperage capacity a fully charged battery can deliver @ 0°F for 30 seconds before the voltage of the battery falls below 7.2 volts.

- **RC - Reserve Capacity**

  Reserve capacity is expressed in minutes and relates to the amount of time a fully charged battery can maintain a constant draw of 25 amps @ 80°F before the voltage falls below 10.2 volts.

- **W - Watts**

  The measurement of electrical power that the battery can deliver for a cold start. It is calculated by multiplying the starter amperage draw @ 0°F times 10 volts.

- **V - Volt**

  Unit of measure of potential difference (Electrical pressure).

- **A - Amp**

  The current flow in a circuit. Value is proportional to the number of electrons flowing past a point in one second.

- **ohms - Ohm**

  The measurement of the resistance of a component or circuit to current flow.

- **Electrolyte**

  The mixture of sulfuric acid and water. 35% sulfuric acid, 65% water.

- **Specific Gravity**

  The measurement (by weight) of the volume of sulfuric acid in the electrolyte. A specific gravity of 1.275 (the specific gravity of a fully charged battery) means that the electrolyte is 1.275 times heavier than water. The specific gravity of water is 1.000.

- **Sulfate**

  Deposits formed on the plates of the battery as the electrolyte gives up its sulfuric acid. Excessive deep

cycling of a battery can cause a hardening of this deposit and make it impossible to return sulfate to the electrolyte. A sulfated battery is one which has these hardened deposits on the plates and cannot be recharged to full capacity.

- **OCV Open Circuit Voltage**

  The measurement of the voltage of a battery across the terminals.

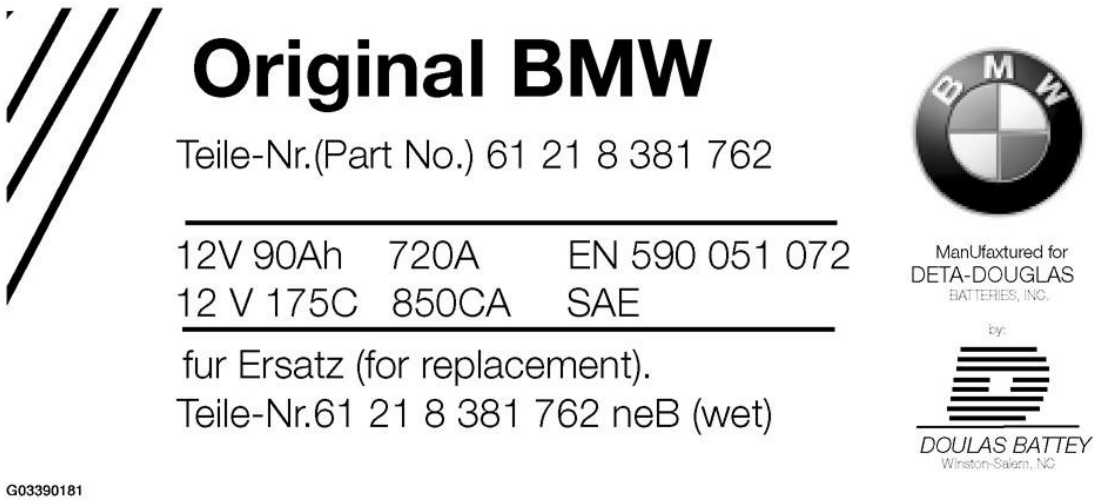


Fig. 10: View Of Battery Information Label
Courtesy of BMW OF NORTH AMERICA, INC.

BATTERY TESTING

There are four steps to follow in testing an automotive battery:

- Inspection.
- Removal of Surface Charge.
- State-of-Charge Test.
- Load Test.

Tools Needed

To test a battery following tools are needed:

- DVOM Digital Volt Ohm Meter.
- Battery Load Tester (i.e. Snap On VAT 60).
- DISplus or MoDic.
- Battery Draw Test Special Tool PN 61 2 300.
- Closed Circuit Measurement Adapter PN 90 88 6 612 310.

- Temperature Compensating Hydrometer.

Fig. 11: Identifying Battery Load Tester
Courtesy of BMW OF NORTH AMERICA, INC.

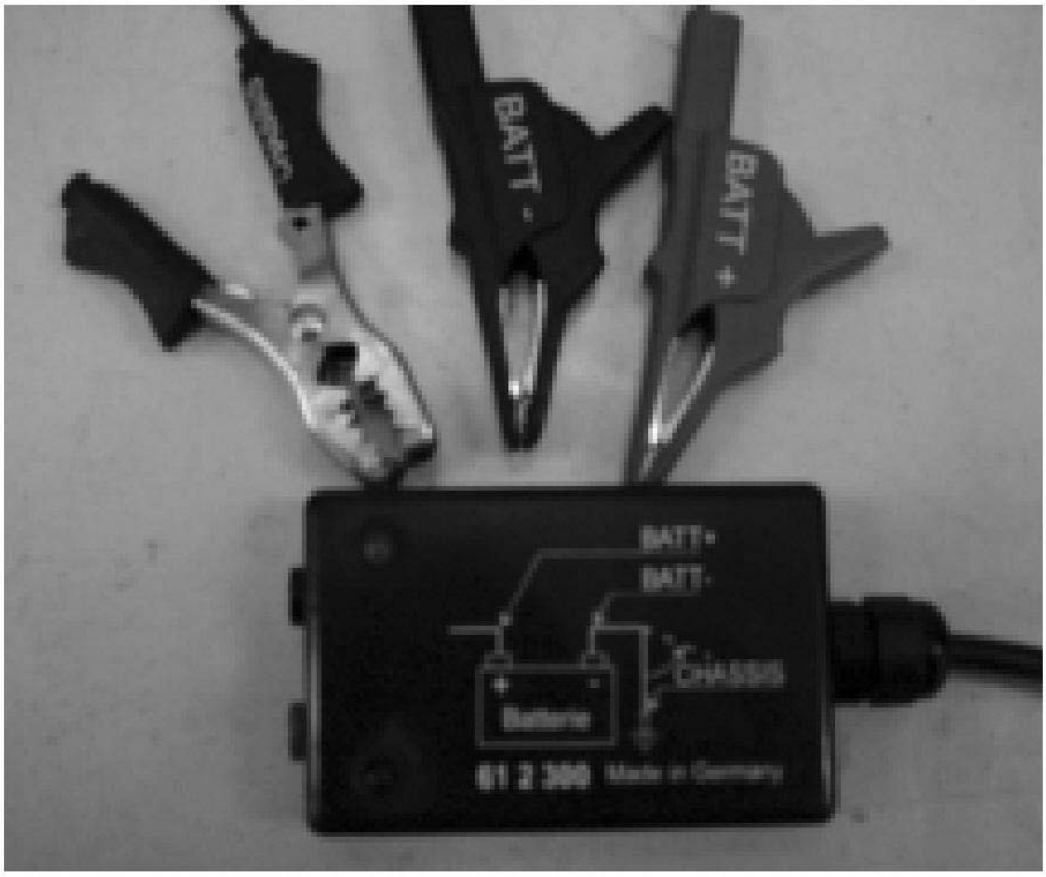


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Fig. 12: View Of Draw Test Tool
Courtesy of BMW OF NORTH AMERICA, INC.

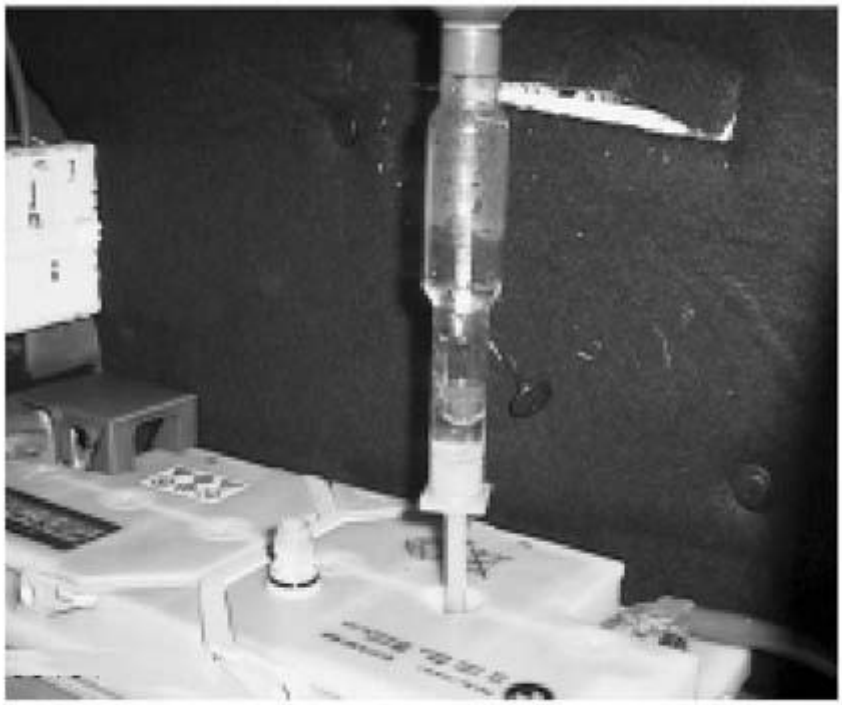

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Fig. 13: Identifying Temperature Compensating Hydrometer
Courtesy of BMW OF NORTH AMERICA, INC.

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Fig. 14: View Of Closed Circuit Measurement Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

Inspection

Visual inspection is important for the detection of obvious problems:

- Loose Generator Belt.
- Low Electrolyte Level.
- Corroded Cable or Terminal Clamps.
- Loose Hold-Down Camps or Cable Terminals.
- Damaged Battery Case.

NOTE: The proper electrolyte level is just covering the plates, not all the way to the top of the battery inspection holes.

Removal of Surface Charge

If the battery has just been recharged, or the car has been driven, eliminate any surface charge by one of the following methods:

- Allow the battery to sit for 2-3 hours.
- Turn the headlights on high beam for 5 minutes and wait 5 minutes after turning off.
- With battery load tester, apply a load of 1/2 the battery's CCA for 15 seconds, then wait 5 minutes.

State-of-Charge Test

OPEN CIRCUIT BATTERY VOLTAGE SPECIFICATIONS

Open Circuit Battery Voltage	Approximate State Of Charge	Average Cell SG
12.65 +	100%	1.265 +
12.45	75%	1.225
12.24	50%	1.190
12.06	25%	1.155
11.89	0%	1.120

Use the table to determine the battery's State-of-Charge.

Pay special attention if the DVOM measurement of OCV is equal to:

- 0 volts - Indicate an open cell.
- 10.45-10.65 volts - Indicates a shorted cell.

For non-sealed batteries, check both specific gravity (SG) in each cell with a temperature compensated hydrometer and battery OCV, without the engine running.

For sealed batteries, measuring the battery's OCV (without the engine running) with an accurate DVOM is the only way to determine the state-of-charge.

Batteries with a built-in hydrometer measure the state-of-charge in one cell only. If the indicator is clear or light yellow, the battery has a low electrolyte level and should be refilled before proceeding or replaced.

A state-of-charge reading **BELOW** 75% using SG, voltage measurement or dark indicator in batteries with built-in hydrometers, indicates the battery must be recharged before proceeding.

Replace the battery if one or more the following conditions are met:

- More than 0.050 difference in the specific gravity readings between the highest and lowest cell (There is a weak or dead cell).
- The battery will not recharge to 75% or greater state-of-charge or the built in hydrometer does not indicate good (green indicates 65% or better).
- DVOM reading indicates 0 volts (Open cell).
- DVOM reading indicates 10.45-10.65 volts (Shorted cell).

Load Test

A battery which has a state-of-charge of 75% or greater or has a "good" built-in hydrometer indication may be load tested.

With a battery load tester properly installed, load the battery for 15 seconds to one of the following:

- One-half (1/2) the CCA (Cold Cranking Amps).
- Three (3) times the AH Rating (Amp Hour Rating).

The voltage on a good battery will **NOT** drop below 9.7 volts during the battery load test. After the load is removed, wait 5 minutes, the battery should bounce back to 50% or greater state-of-charge. If a battery drops below 9.7 volts during the load test, does not bounce back or fails to start the engine, the battery should be replaced. Batteries which pass this test should be recharged to restore peak performance.

Load Test Conditions

Tests assume electrolyte temperature of 80° F, 26.7° C.

If the electrolyte temperature is above 80° F add .1 volt for every 10 degrees up to 100°.

If the temperature is below 80° F subtract .1 volt for every 10 degrees to 40°.

BATTERY MAINTENANCE

Electrolyte Level

If battery electrolyte level is allowed to drop substantially, the gas volume inside the battery grows proportionately resulting in an increased amount of flammable gas mixture. Any external or internal spark may result in an oxyhydrogen explosion. Additionally the plates are no longer covered by the electrolyte and may corrode.

The battery electrolyte level should be checked on every Inspection I and Inspection II.

Use only distilled water to top up the battery!

Tap water and electrolyte must never be used to refill or top off an automotive battery.

Workshop Hint:

Electrolyte levels may drop at a higher rate in the winter months, due to higher loads and increased utilization of electrical systems.

Battery Cable Connections

The top of the battery should be clean. Check for and correct corrosion on the top of the battery and the cable connections.

Workshop Hint

Many battery problems are caused by loose or corroded connections. Insure that cables are free from corrosion and tight before continuing diagnosis.

Battery Charging

The purpose of charging a battery is to put back the energy that has been removed. A battery that is not properly charged will deliver sub-standard performance and display a shorter life span.

A battery should be charged only after performing a visual inspection on the battery case and the electrolyte levels. Never attempt to charge a battery with a damaged case or low electrolyte levels.

A state-of-charge test should be performed before attempting to charge a battery.

Always connect the positive lead of the battery charger to the positive terminal of the battery and the negative lead of the battery charger to the negative terminal of the battery.

Unplug the charger or turn it off **BEFORE** disconnecting the leads at the battery.

Batteries that are fully discharged should be charged according to the following table.

BATTERIES SPECIFICATIONS

Reserve Capacity Rating (RC)	Slow Charge	Fast Charge
80 minutes or less	15 hours @ 3 amps	2.5 hours @ 20 amps
80 to 125 minutes	21 hours @ 4 amps	3.75 hours @ 20 amps
125 to 170 minutes	22 hours @ amps	5 hour @ 20 amps
170 to 250 minutes	23.hours @ 6 amps	7.5 hours @ 10 amps
Above 250 minutes	24 hours @ 10 amps	6 hours @ 40 amps

The best charging method is to **SLOWLY** recharge the battery using the BMW approved battery charger.

A slow charging rate allows more time for the electrolyte to penetrate the plates.

Sulfated Batteries

Continuous discharging of the battery or low electrolyte levels cause crystals to form on the plates. These crystals of lead sulphate occur when a battery is discharged. The deeper the discharge the more serious the sulphation. The sulphur molecules that form the sulphate are then absent from the electrolyte, causing the electrolyte to become inefficient.

A battery relies on clean plates and strong electrolyte to both receive charging current and offer strong current discharge. A sulphated battery can do neither. Proper recharging of the battery will remove some but not all of the sulphate. Eventually the battery plates are coated with enough sulphate that it is impossible to achieve an efficient recharge.

Testing A Battery for Sulphation

A battery which fails the load test should be tested for sulphation. To test a battery for sulphation, place it on a battery charger for three minutes with the charger set on 40 amps. After three minutes check the OCV, if the reading is greater than 15.0 volts the battery is sulphated. Batteries which indicate a sulphated condition should be recharged slowly and retested before being discarded.

Battery Freezing

A fully charged battery can be stored at sub-freezing temperatures with no damage. The battery is protected from freezing to a temperature of -75° F. A fully discharged battery however will freeze at +27° F.

Avoid freezing by keeping the battery fully charged.

Carefully inspect a battery which has frozen for a cracked case.

Battery Maintenance (Center Vehicles)

The battery charge is monitored while the vehicle is at the VPC and before it leaves on the transport. When the vehicle is having the QC I performed at the center the check list requires that the battery voltage be checked and maintained to 12.65V minimum.

In order to facilitate tracking vehicles in inventory, BMW has in place a Battery Maintenance Program. The program uses:

- Battery Log Forms.
- Battery Log Binder.
- Colored windshield stickers (red, green, yellow and white).

The Battery Maintenance Program has three possibilities:

- Vehicle in storage, battery disconnect switch removed.
- Vehicle in showroom or display.
- Vehicle in storage, Battery disconnect switch left in the vehicle.

Vehicle In Storage, Battery Disconnect Switch Removed

A four week charging cycle has been established for these cases. All vehicles arrive with a color coded sticker on the windshield. The color corresponds to the week that the battery must be charged. Also the vehicle will be provided with a Battery Log Form.

The "A" portion (Vehicle Receipt) of the Log Form must be completed during the QC I Display check and then has to be filed in the Battery Charge Log Book under the applicable color coded section. All the vehicles in that color section will have to be charged that week.

Vehicle In Showroom or Display

Because of the high consumer demand on vehicles that are being displayed and not driven, a four week charging cycle is not enough. For vehicles in the showroom the battery has to be charged as frequently as

necessary to ensure that the battery never drops below 12.5V. Use the "C" portion of the log form (Display Vehicle - Monitored Daily) to keep track of the charging and checking of the battery.

Vehicle In Storage, Battery Disconnect Switch Left In The Vehicle.

Since the battery disconnect switch is left installed and in the "OFF" position the 3 month charge cycle can be used. Use the "D" section of the Battery Log Form to document when the battery is charged.

Upon the sale of the vehicle, the Battery Log Form should be removed from the binder and placed in the vehicle file for future reference.

VPC USE: VIN: _____
Voltage: _____
Date: ____ /____ /____
Inspector: _____

2000
Battery Log Form

Stock # _____

This form should be filled out when the vehicle is received and updated according to the proper procedure (display vs. storage vehicle). It should be placed in the vehicle history file when sold.

Note: Failure to maintain batteries as recommended and documented with this form will be considered sufficient cause to reject warranty claims.

Ⓐ Vehicle Receipt	Model	VIN	
Center #	Voltage as received	Inspected by	Date received

Ⓑ Vehicle In Storage - Charged Every 4 Weeks — Color indicates battery is to be charged during the week of . . .

Week Of	Voltage Before Charge	Charged By	Week Of	Voltage Before Charge	Charged By	Week Of	Voltage Before Charge	Charged By	Week Of	Voltage Before Charge	Charged By
Jan. 3			Jan. 10			Jan. 17			Jan. 24		
Jan. 31			Feb. 7			Feb. 14			Feb. 21		
Feb. 28			Mar. 6			Mar. 13			Mar. 20		
Mar. 27			April 3			April 10			April 17		
April 24			May 1			May 8			May 15		
May 22			May 29			June 5			June 12		
June 19			June 26			July 3			July 10		
July 17			July 24			July 31			Aug. 7		
Aug. 14			Aug. 21			Aug. 28			Sept. 4		
Sept. 11			Sept. 18			Sept. 25			Oct. 2		
Oct. 9			Oct. 16			Oct. 23			Oct. 30		
Nov. 6			Nov. 13			Nov. 20			Nov. 27		
Dec. 4			Dec. 11			Dec. 18			Dec. 25		

Ⓒ Display Vehicle - Monitored Daily

Date										
Voltage before charge										
Charged by										

Date										
Voltage before charge										
Charged by										

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Fig. 15: Battery Log Form (B Section)
Courtesy of BMW OF NORTH AMERICA, INC.

Battery Log Form Stock # _____

This form should be filled out when the vehicle is received and updated according to the proper procedure (display vs. storage vehicle). It should be placed in the vehicle history file when sold.

Note: Failure to maintain batteries as recommended and documented with this form will be considered sufficient cause to reject warranty claims.

Ⓐ Vehicle Receipt	Model	VIN	
Center #	Voltage as received	Inspected by	Date received

Ⓓ Vehicle In Storage - Charged Every 3 Months

January	Date	February	Date	March	Date
Voltage Before Charge	Charged By	Voltage Before Charge	Charged By	Voltage Before Charge	Charged By
April	Date	**May**	Date	**June**	Date
Voltage Before Charge	Charged By	Voltage Before Charge	Charged By	Voltage Before Charge	Charged By
July	Date	**August**	Date	**September**	Date
Voltage Before Charge	Charged By	Voltage Before Charge	Charged By	Voltage Before Charge	Charged By
October	Date	**November**	Date	**December**	Date
Voltage Before Charge	Charged By	Voltage Before Charge	Charged By	Voltage Before Charge	Charged By

Ⓒ Display Vehicle - Monitored Daily

Date										
Voltage before charge										
Charged by										

Date										
Voltage before charge										
Charged by										

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Fig. 16: Battery Log Form (D Section)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the battery voltage drops below 11.6v for three days or more the battery must be replaced before delivery to the customer

Battery Maintenance Flowchart

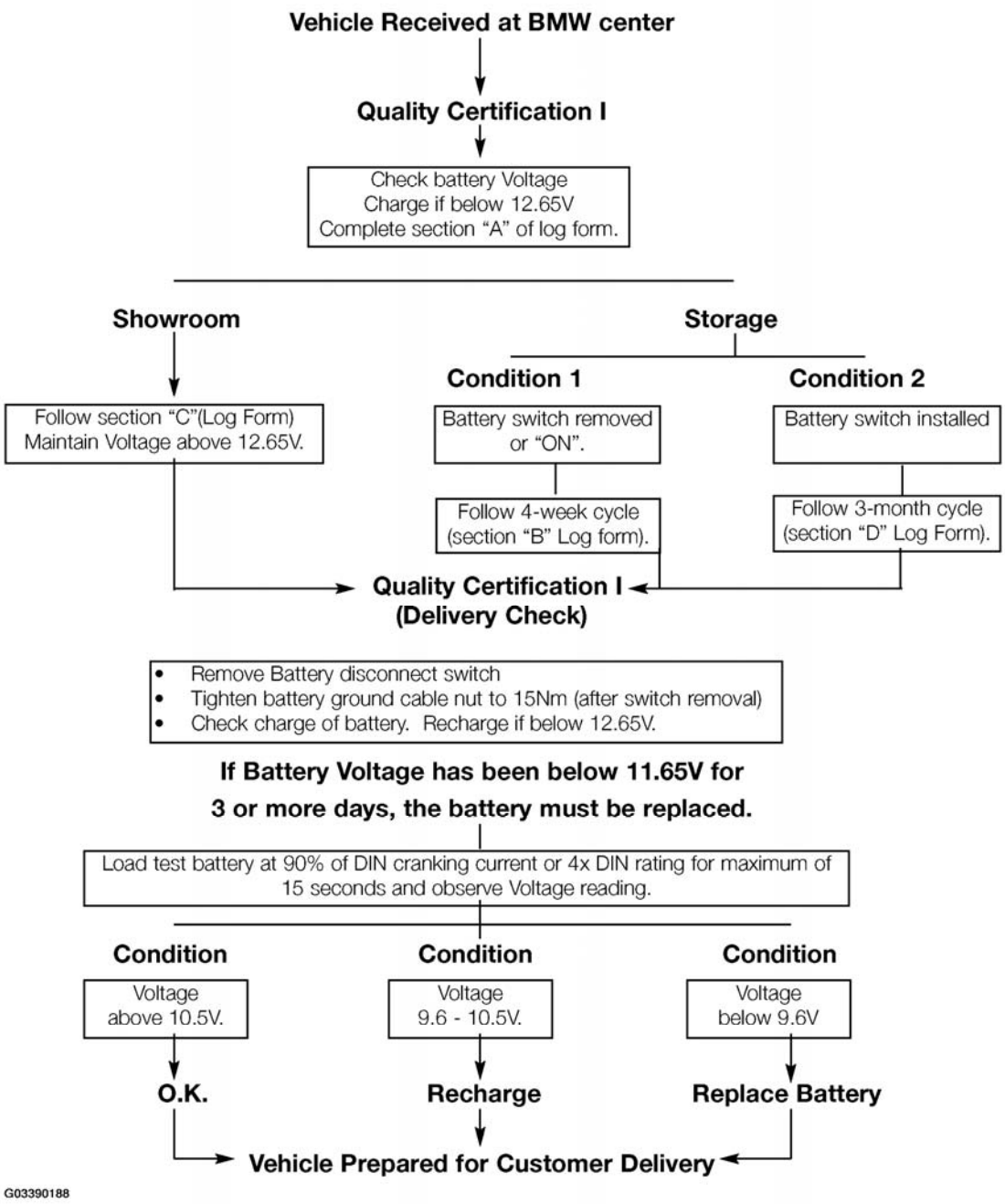

Fig. 17: Battery Maintenance Flow Chart
Courtesy of BMW OF NORTH AMERICA, INC.

BATTERY REPLACEMENT

Batteries determined to be defective through testing procedures should be replaced using the following guidelines.

- Reconfirm battery is actually defective and it does not need charging.
- Insure that ignition switch is in "Off" position and engine is not running.
- Disconnect negative battery terminal first.
- Place negative battery cable in a position so that it can not come in contact with battery during removal process.
- Reinstall battery hold down clamp.
- Install positive cable first.
- Recheck output of vehicle generator and balance of electrical system for other problems.
- Provide clear and concise description of the defect including cell readings, load test results and any other pertinent information which led to the battery replacement.
- Tag battery with VIN and repair order number.

Battery Failures

An analysis of batteries replaced under warranty shows that many claims could have been avoided had the batteries been maintained in a full state of charge.

Batteries must be maintained at all times when vehicles are at a retailer whether they are new cars, used cars, in storage (back lot), on display, or customer cars in for maintenance or repairs.

Batteries replaced due to lack of maintenance will not be covered by warranty.

Most Common Causes of Premature Battery Failures

- Failure to maintain proper state of charge.
- Loss of electrolyte due to overcharging or excessive heat.
- Deep discharging (Leaving lights on or other parasitic draws).
- Undercharging of battery.
- Vibration (Loose battery hold down clamp).
- Using tap water (instead of distilled water).
- Corrosion.
- Freezing.

Workshop Hints

Safety Tips

- Proper Clothing:
    - Always wear a face shield or safety goggles.
    - Plastic gloves can prevent acid burns to hands.
- Neutralizing Electrolyte:

Any leakage or spillage of battery electrolyte should be neutralized as soon as possible to prevent damage to

paint, body or trunk linings. Depending on the amount of spillage dilute some baking soda in water and apply to areas of the car that have been exposed to the battery electrolyte. The neutralizing action will create some foaming in the area where the chemical action takes place. Flush with ample amounts of water once the chemical reaction has subsided.

General Battery Hints

- Add only distilled water NEVER TOP OFF WITH ACID.
- Keep electrolyte level above plate separators.
- Keep battery top clean and dry.
- Keep open flame and metal objects away from battery top and terminals.
- Keep vent caps tightly in place (if applicable).
- Use proper charging equipment.

SPECIAL BATTERY SYSTEMS

Special battery systems are broken into two groups:

- Vibration Compensating Battery Systems.
- Dual Battery Systems.

Vibration Compensating Battery Systems

Vibration Compensating Battery Systems act as vibration absorbers, smoothing out road vibrations in the E36 and E46 convertibles.

E36:

The E36 convertible is not only an energy source. The battery is designed as a vibration dampener. Due to this additional function the battery also has a special tray with an integrated vibration absorber.

NOTE: E36 convertible batteries are labeled "Vibration Proof". Replacement batteries must be of the same type.

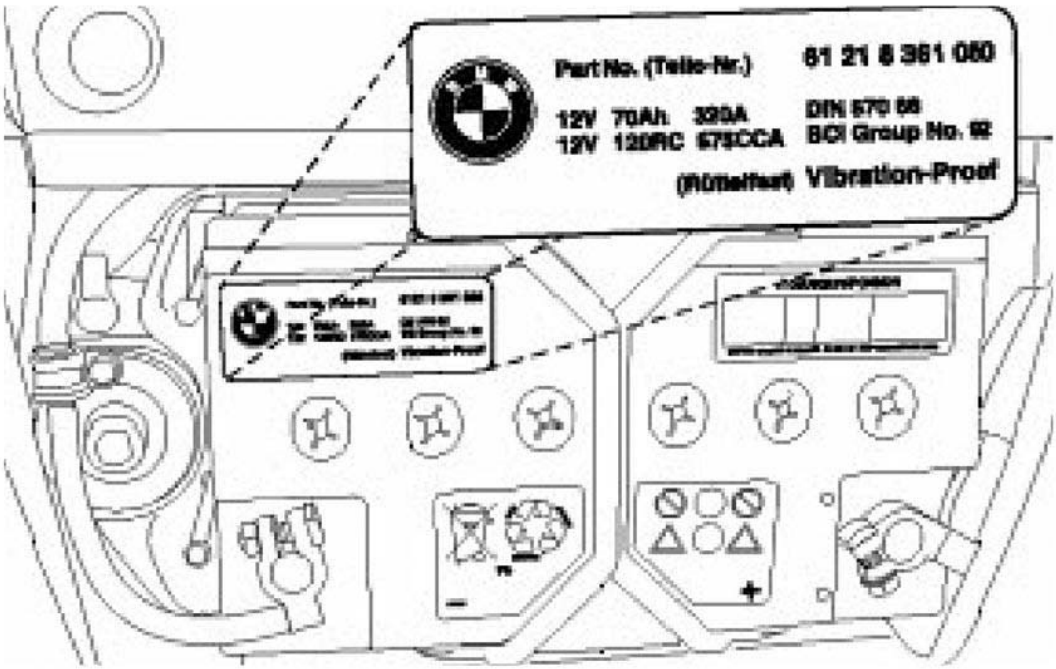

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Fig. 18: View Of Battery Identification Label
Courtesy of BMW OF NORTH AMERICA, INC.

E46:

The E46 convertible uses the same battery as the E46 sedan, coupe and touring. The battery box is specially designed to float on the vertical axis through three articulated rods.

This allows the battery to act as an inertia mass and dampen various vibrations while the vehicle is driven.

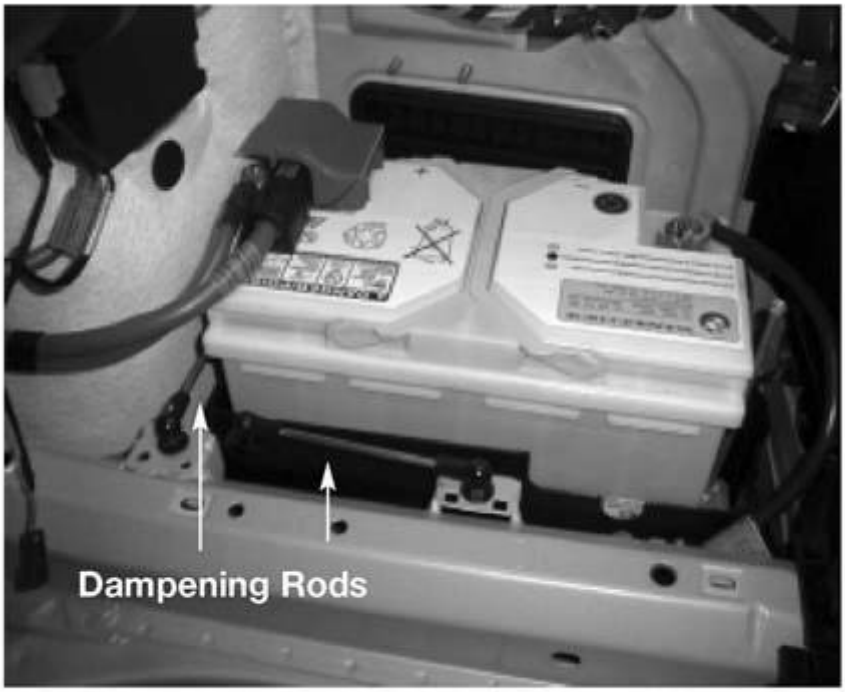

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Fig. 19: Identifying Dampening Rods
Courtesy of BMW OF NORTH AMERICA, INC.

Dual Battery Systems

E31 (850i):

The dual battery system on the 850i was introduced to handle the higher level of electronic technology with increased functions and safety features that were added to the vehicle, as well as the added diagnostic information.

Design considerations were made to minimize electrical loads during Key Off and periods of driving with low engine speeds while certain timed operations (e.g. Glove compartment light, courtesy lights and seat heating) were active.

Special testing and charging procedures exist for the dual battery system on the 850i, refer to appropriate article for specific information.

E38 750iL:

The dual battery system on the 750iL is necessary due to the addition of the E-CATs. If a single battery system was used, the E-CATs would be provided power from the single battery just after cold engine start-up when the battery is at its lowest capacity. This would increase engine loads due to charging of the single battery and cause an increase in injector "On" time during the cold engine warm-up period, which result in unnecessary tail pipe

emissions.

Providing separate battery systems for the starting circuit and the vehicle circuits also minimizes the possibility of a discharged starter battery ensuring reliable engine starting.

Components of E38 Dual Battery System

- Starter Battery: Located in the right rear trunk wheel, the starter battery is connected to the starter motor and to the heating coils of the E-CATs (via the E-CAT module).
- Vehicle Circuit Battery: Located above the starter battery on a swing out mount, the vehicle circuit battery provides operating power for the balance of the vehicles electrical requirements and is directly connected to the vehicle generator.
- Battery Isolation Switch: Located on the swing out mount of the vehicle circuit battery the battery isolation switch opens and closes the circuit between both batteries based on monitored conditions.

NOTE: The battery isolation switch is NOT used to boost a discharged starter battery with the voltage of the vehicle circuit battery to start the engine. The battery isolation switch can only withstand a maximum current flow of 60 amps.

Battery Isolation Switch

The Battery Isolation Switch provides the vehicle with separate battery systems for the vehicle circuits and the starting circuit.

When the isolation switch is open, the vehicle circuit battery is the only power source connected to the power distribution center.

When the isolation switch is closed the starter battery is charged and the vehicle circuit battery is boosted by the starter battery.

Modes of the isolation switch:

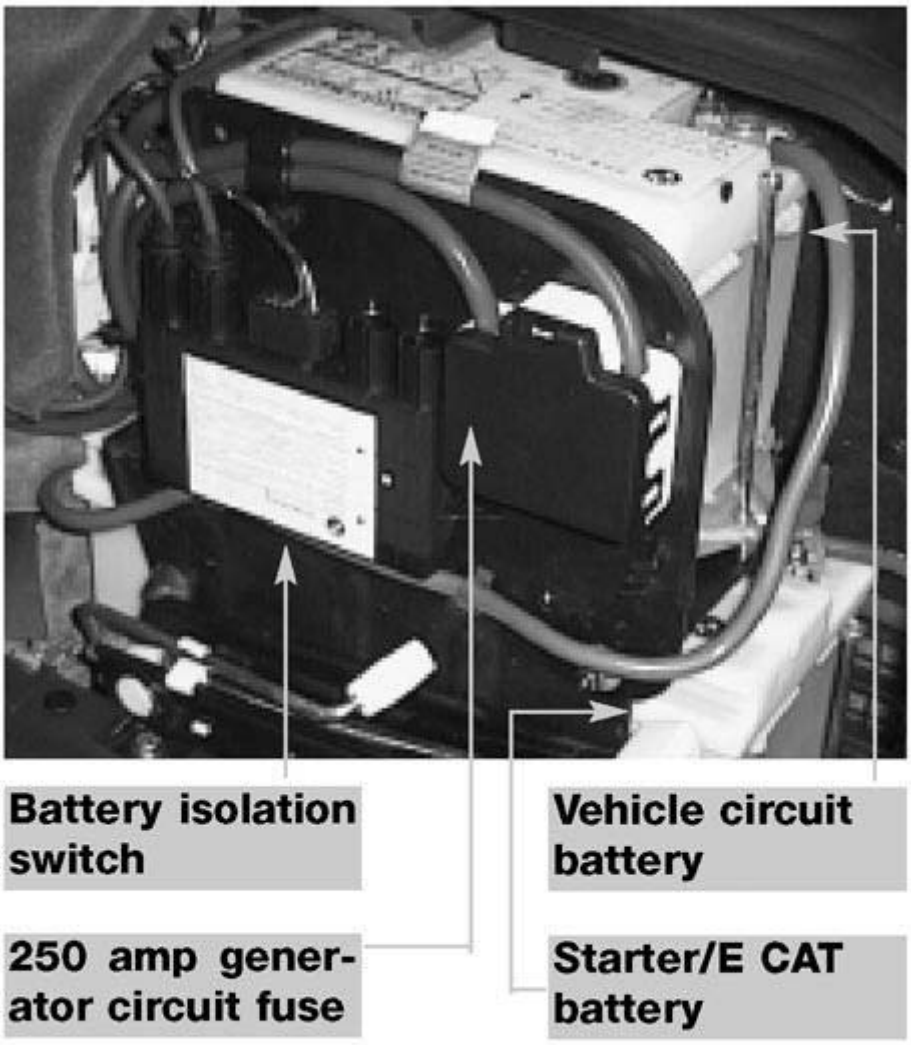


Fig. 20: Identifying Battery Isolation Switch
Courtesy of BMW OF NORTH AMERICA, INC.

- Starting Mode:
  - Normal Starting.
  - Safety Starting.
- Driving Mode.
- Charging Mode.
- Sleep Mode.

Starting Mode

When the isolation switch recognizes KL15 via the K Bus, it determines the voltage of the vehicle circuit battery.

- If the vehicle circuit battery **IS** sufficiently charged, it proceeds with **Normal Starting.**
- If the vehicle circuit battery IS NOT sufficiently charged, it proceeds with **Safety Starting.**

Normal Starting

- The isolation switch is open.
- Within 0.5 seconds of engine start-up the E-CAT module energizes the E-CAT heating coils (program dependent) and simultaneously signals the isolation switch that the ECATs are "On" via signal "KATON" (low signal).
- Upon completion of the heating period, the E-CAT module signals the isolation switch that the E-CATs are off (High Signal).
- Under normal conditions, the isolation switch is not closed before the heating procedure is finished.

Safety Starting:

- In response to a discharged condition of the vehicle circuit battery, the isolation switch closes to momentarily boost the vehicle circuit battery and supply all systems with starter battery voltage via the power distribution center.

  This operation lasts for a maximum of 30 seconds or until confirmation of engine start up is received. (TD signal on the K Bus)

- Receiving the TD signals causes the isolation switch to immediately open for the duration of the E-CAT heating cycle.
- If the engine is not started within the 30 seconds, the isolation switch opens and remains open until KL 15 is recognized on the next start-up cycle.

Driving Mode

The vehicle circuit battery is permanently connected in parallel to the generator and is charged when the engine is running. When the isolation switch is closed, the generator simultaneously charges the starter battery.

As the vehicle is driven the isolation switch cycles between open and closed based on:

- Voltage values of both batteries.
- Current transfer between both batteries as monitored by the isolation switch.
- Internal temperature of isolation switch.

Conditions Causing Switch To Open While Driving:

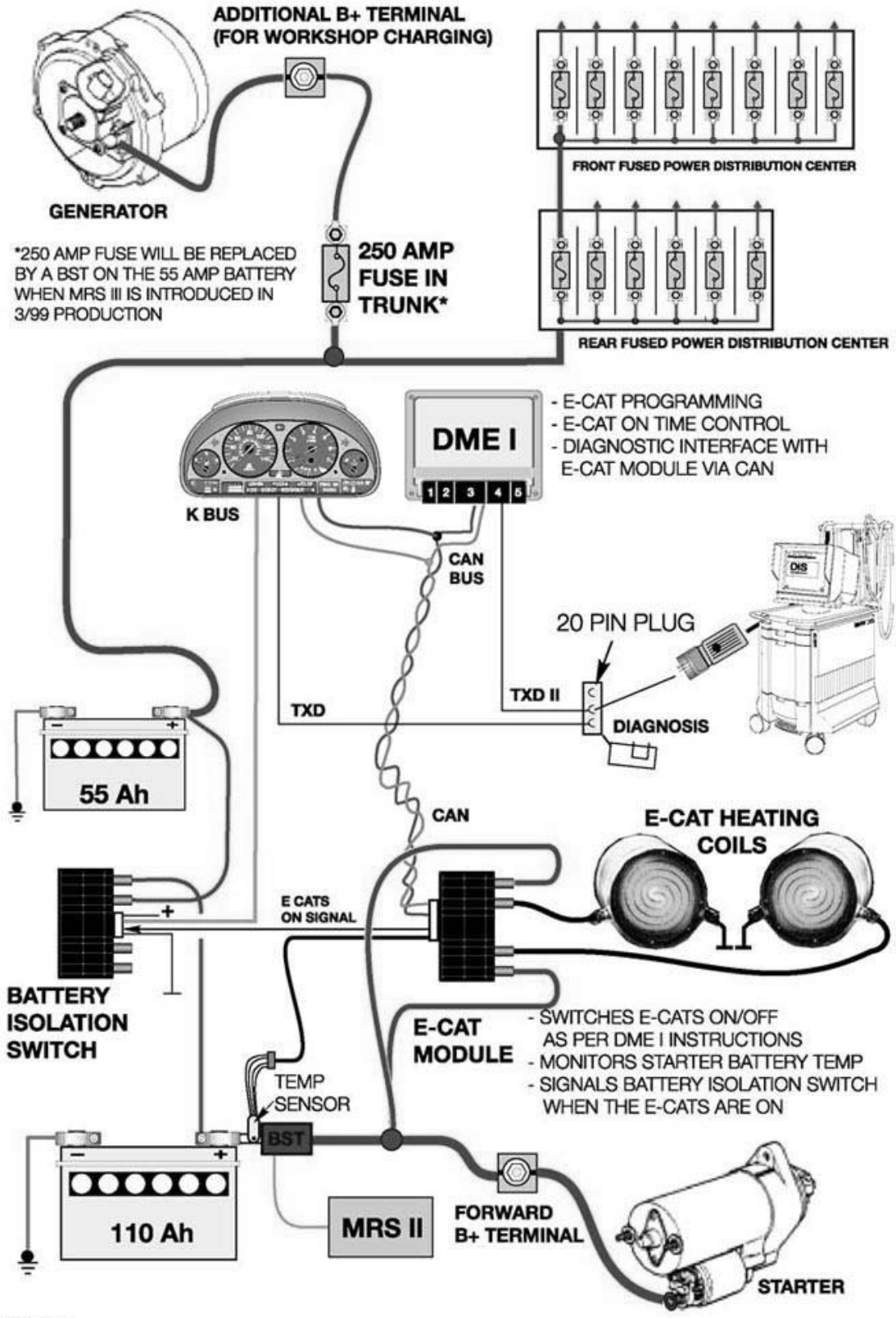
- Sufficiently charged starter battery.
- Current flow through switch exceeding 0.5 amps.

The starter battery will supplement vehicle electrical needs during periods of high demand (e.g continuous wiper operation combined with lights and blower).

- The internal temperature of the isolation switch exceeds programmed maximum value.

Conditions Causing Switch To Close While Driving:

- Monitored voltage of vehicle circuit battery exceeds that of starter battery by 0.7 volts.
- The voltage of the vehicle circuit battery drops below 9 volts three times within one minute.


ADDITIONAL B+ TERMINAL
(FOR WORKSHOP CHARGING)
GENERATOR
FRONT FUSED POWER DISTRIBUTION CENTER
REAR FUSED POWER DISTRIBUTION CENTER
*250 AMP FUSE WILL BE REPLACED BY A BST ON THE 55 AMP BATTERY WHEN MRS III IS INTRODUCED IN 3/99 PRODUCTION
250 AMP FUSE IN TRUNK*
DME I
1 2 3 4 5
- E-CAT PROGRAMMING
- E-CAT ON TIME CONTROL
- DIAGNOSTIC INTERFACE WITH E-CAT MODULE VIA CAN
K BUS
CAN BUS
20 PIN PLUG
TXD II
TXD
DIAGNOSIS
55 Ah
CAN
E-CAT HEATING COILS
E CATS ON SIGNAL
BATTERY ISOLATION SWITCH
E-CAT MODULE
- SWITCHES E-CATS ON/OFF AS PER DME I INSTRUCTIONS
- MONITORS STARTER BATTERY TEMP
- SIGNALS BATTERY ISOLATION SWITCH WHEN THE E-CATS ARE ON
TEMP SENSOR
BST
110 Ah
MRS II
FORWARD B+ TERMINAL
STARTER

G03390192

Fig. 21: Identifying Battery Charging System
Courtesy of BMW OF NORTH AMERICA, INC.

Charging Mode (in the workshop)

The isolation switch monitors starter battery voltage during key off conditions and continues monitoring after the vehicle and the isolation switch have entered sleep mode.

- If starter battery voltage exceeds 13.8 volts during charging in the workshop, the isolation switch comes out of sleep mode and closes.

  This causes the starter battery voltage to bleed off to the vehicle circuit battery, charging the circuit battery and protecting the starter battery from overcharging.

The isolation switch remains closed until the next key on cycle.

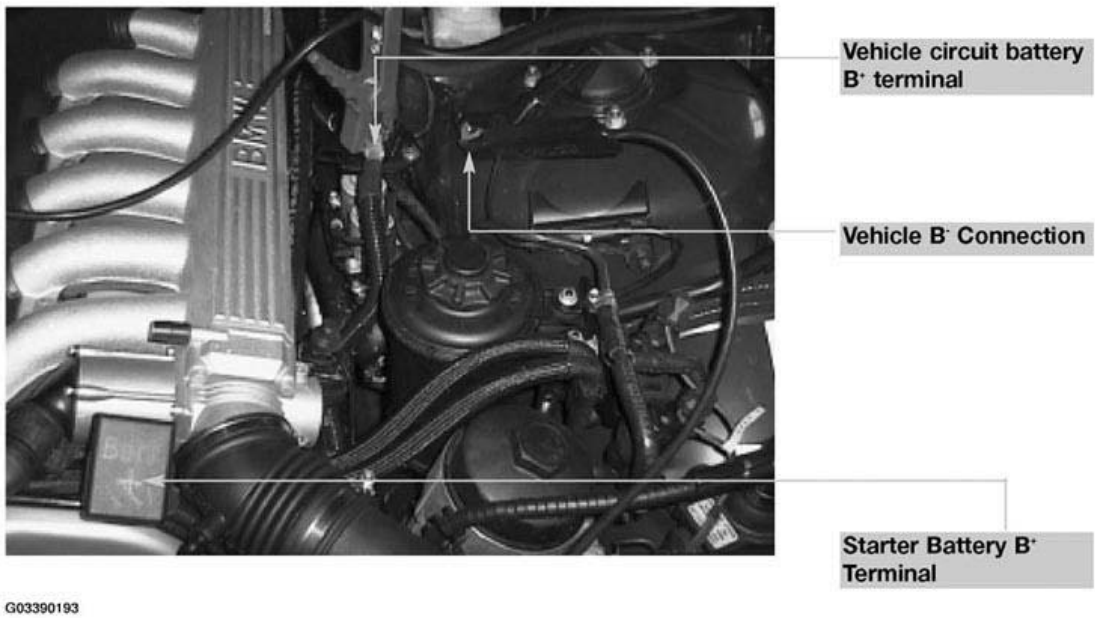


Fig. 22: Identifying Charging Mode (In Workshop)
Courtesy of BMW OF NORTH AMERICA, INC.

Sleep Mode

The isolation switch goes into sleep mode as soon as the engine is switched off. The current draw of the isolation switch drops below 1 mA. The isolation switch comes out of sleep mode if:

- KL15 is recognized.
- Starter battery voltage exceeds 13.8 volts (charging mode)

Failure of KATON signal:

If the **KATON** signal is not received due to:

- Open or short to B+ - isolation switch closes for 4 seconds after start-up, TD received.
- Short to B- - isolation switch opens 60 seconds after receiving TD.

CLOSED CIRCUIT CURRENT DRAW TESTING

Increased closed-circuit currents may occur permanently or intermittently and cause the battery to discharge prematurely. The increase in closed circuit current may be caused by a faulty control unit or by the installation of a non-approved accessory.

In a situation where a vehicle has broken down due to a discharged battery, for diagnostic purposes it is important not to disconnect the battery. The control unit may reset if the battery is disconnected. Following a reset, a faulty control unit may start functioning correctly again, making accurate diagnosis impossible.

Tools Needed:

- Closed Circuit Current Measurement Adapter.
- MoDic Adapter.
- DISplus, MoDic or DVOM.

To correctly measure closed-circuit current, measurement adapter **61 2 300** (P/N 90 88 6 612 300) should be used. This tool provides a bridge to ground, before the negative battery terminal is disconnected, and this prevents the control units from being reset.

The additional use of MoDiC adapter **61 2 310** (P/N 90 88 6 612 310) provides a method for current measurements over an extended period of time.

The measuring device needed depends on the situation.

The DISplus may be used in situations of suspected high current draw.

The 1000 amp probe measures AC and DC current from 0 to 1000 amps. It is a self calibrating inductive pick-up. (Use this pick-up with current draws over 10 amps) The DISplus, through MFK 1 is capable of measuring up to 2 amps.

The MoDic is particularly suitable for extended measurements and provides a graphical readout of recorded measurements over time. It is recommended for the situations where the use of a multimeter provided insufficient information for problem diagnosis.

The DVOM may be used for measurements up to 10 amps either with the measurement adapter or alone.

NOTE: It is extremely important that the battery is NOT disconnected during the installation of test equipment. Disconnection of battery may cause faulty component to function normal.

Performing Closed Current Draw Test

- Select proper measuring device (DISplus, MoDic or DVOM)
    - Remember amperage draw in excess of 10A will damage DVOM.
    - Use inductive amp probe of DISplus when amperage draw is high.
        - When using DISplus inductive probe, clamp on negative battery cable with:
        - Arrow pointing away from battery. Switch off all consumers.
        - (It is not necessary to disconnect B- from body when using inductive probe).
- Connect (-) test lead to negative battery terminal and (+) test lead to a known good ground.
- Ensure all systems are **OFF !**
- **Be sure DVOM is on and set in proper mode.**
- Disconnect battery ground lead from body.
- Observe meter reading, wait for vehicle to enter sleep mode.
- Identify faulty circuit by disconnecting fuses, relays, control modules or connectors, observing meter readings.
- Defective circuit is found when current is below maximum closed current for vehicle being tested.

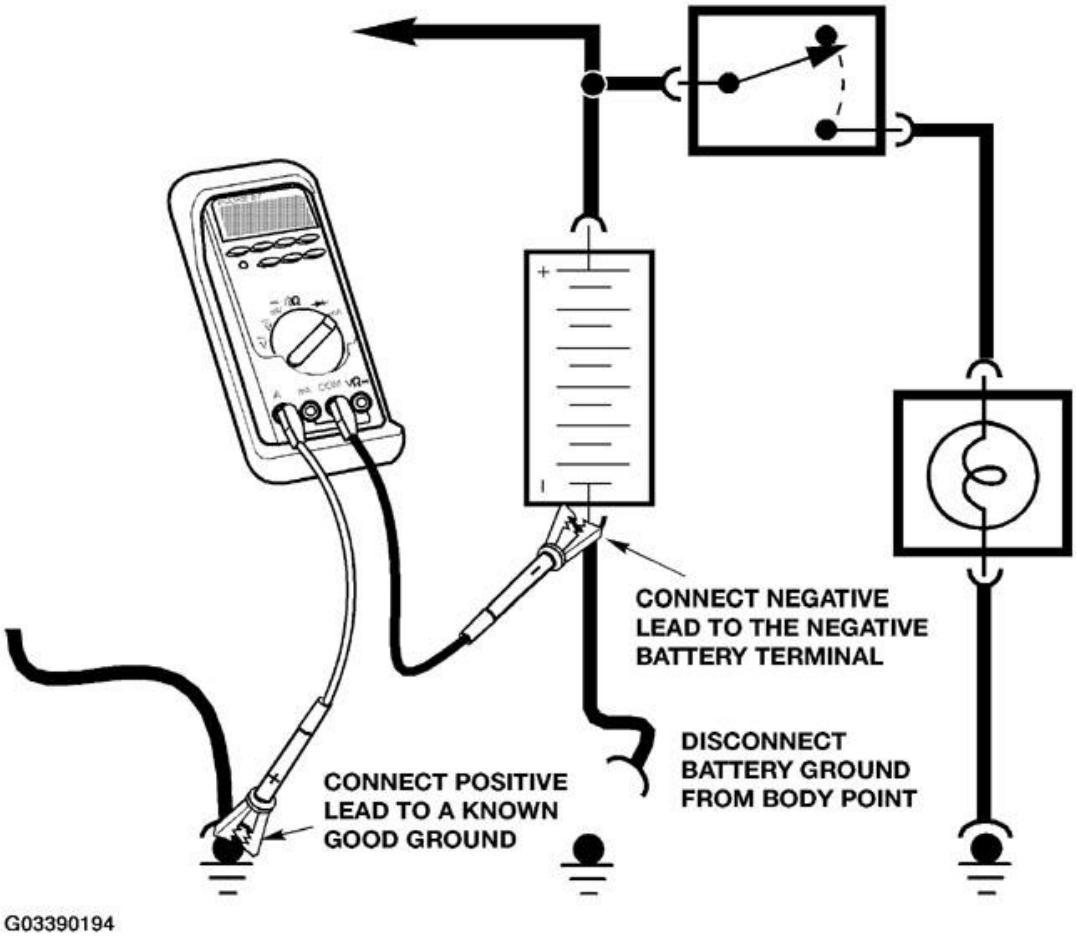


Fig. 23: Identifying Performing Closed Current Draw Test
Courtesy of BMW OF NORTH AMERICA, INC.

MAXIMUM CLOSED CURRENT BY VEHICLE

E31	50mA
E32	50mA
E34	40mA
E36	30mA
E38	50mA
E39	40mA
E46	40mA
E52	50mA
E53	40mA
Z3	30mA

NOTE: Refer to appropriate article for complete instructions to perform closed circuit

current measurement using measurement adapter and MoDIc adapter.

1.0 GENERAL INFORMATION ON LONG-TERM ANTIFREEZE AND CORROSION INHIBITORS

The cooling system of BMW cars must only be filled with reputable brand name ethylene glycol long-term antifreeze having corrosion inhibitors that are compatible with aluminum radiators.

Coolants must fulfill four basic requirements.

- Guarantee sufficient cooling.
- Protect various metals (gray cast iron, steel, aluminum alloys, brass, copper and solder) against corrosion.
- Prevent excessive silicate gel precipitation, which may cause clogging of the cooling system.
- Guarantee operation of cooling system in winter (prevent freezing of coolant) and in summer by boosting the boiling point.

The quality or grade of a long-term antifreeze and corrosion inhibitor is very important to be able to protect metal (gray cast iron, steel, aluminum alloys, brass, copper and solder) in the cooling system against corrosion. It guarantees full operation of the cooling system in winter and also increases the boiling point at high outside temperatures and under heavy loads.

INITIAL FILLING IN FACTORY

The factory fills the cooling system for protection against freezing, for the U.S. and Canada, down to-34°F (-37° C). This means an antifreeze ratio of 50% antifreeze and 50% water. In severely cold areas, the antifreeze can be increased to 60% which provides freezing protection down to-62°F (-52°C). Do not exceed a 60% ratio of antifreeze. The specified antifreeze ratio is important, since an insufficient amount would impair antifreezing and corrosion inhibiting protection. An excessive amount would not improve freezing protection, but instead reduce freezing protection.

CHANGE INTERVALS

Regular checking of coolant concentration is part of Inspection I or II. for change intervals.

LIFETIME COOLANT

The BMW engine coolant has a lifetime rating, except when the cooling system requires repairs. Drained coolant is not to be re-used. Top up with new coolant.

REMARKS AND LIMITATIONS

Only tap water of drinking quality with the following properties may be used as coolant.

DRINKING QUALITY SPECIFICATION

Appearance	-	colorless, clear
Residue	-	without suspended matter
pH value	-	6.5 - 8.0
Total hardness	-	max. 357 PPM Calcium Carbonate
Chloride content	-	max. 100 mg/l
Sulfate content	-	max. 100 mg/l

The antifreeze concentration in a cooling system should be checked before the beginning of winter. When determining the mixture concentration it is important to make sure that there is sufficient protection against freezing.

A hydrometer (radiator antifreeze tester) is required for correct determination of antifreeze concentration. The composition of long-term antifreezes and corrosion inhibitors differs between manufacturers.

BMW Anti-Freeze/Coolant contains no nitrites or phosphates and has been formulated to prevent excessive silicate drop out. Order the 1gallon container under BMW Part No. 82 14 1 467 704.

NOTE: Do not mix BMW Anti-Freeze/Coolant with different antifreezes which contain nitrites and/or phosphates and a high silicate formulation.

2.0 COOLANT ADDITIVES

No aftermarket coolant additives, including but not limited to those which provide additional corrosion inhibition or seal off minor leaks are approved by BMW.

Use of non-approved coolant additives may cause reduced heat transfer from the cylinder head to the coolant and the formation of hot spots. This can cause the burning through of cylinder head gaskets and/or cracking of the cylinder head.

BMW NA cannot accept the liability for the resulting effects and consequential damage caused by the use of coolant additives.

1700 COOLANT, CHECKING COOLING SYSTEM

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Protective measures/rules of conduct

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.
Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

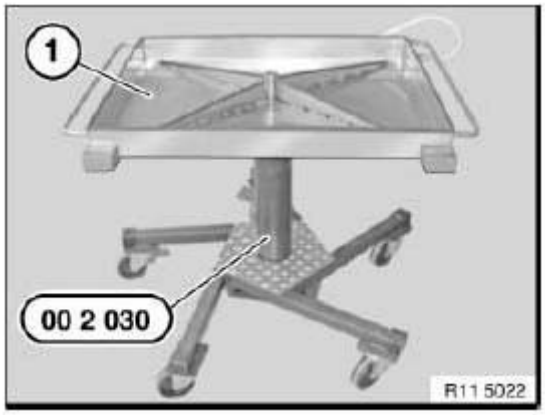


Fig. 1: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open cap on coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

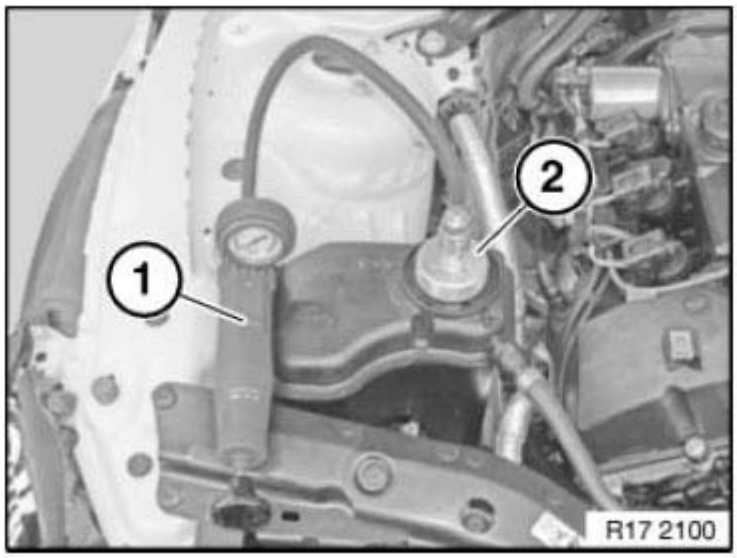


Fig. 2: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101) And (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap

NOTE: While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap

Screw cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

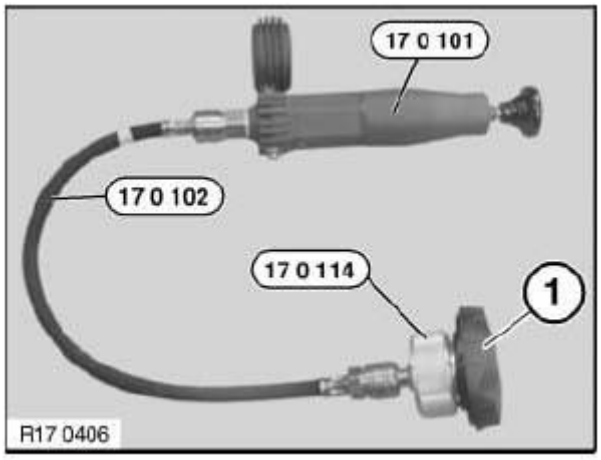


Fig. 3: Checking Pressure Relief Valve In Cap Using Special Tool (Hand Pump 17 0 101)
Courtesy of BMW OF NORTH AMERICA, INC.

17 00 515 CHECKING FUNCTION OF RADIATOR AND HEATING SYSTEM

WARNING: Danger of scalding!
Only carry out work on cooling system after engine has cooled down.

Necessary preliminary tasks:

- Switch off ignition.
- Remove air duct.
- Remove fan cowl with electronic fan.

Check production date.

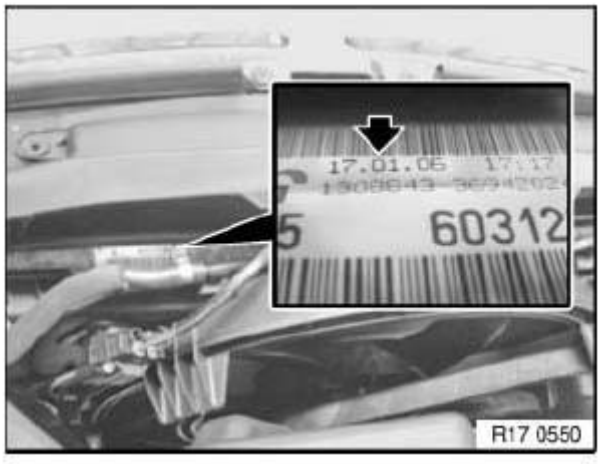


Fig. 4: Locating Production Date
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp off low-temperature feed lines with special tool 13 3 010.

Function test:

Observe diagnosis instructions.

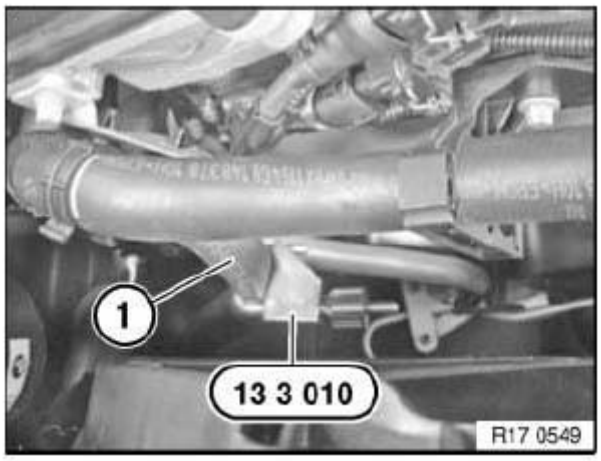


Fig. 5: Identifying Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of radiator.

Clamp off low-temperature feed line (1) at coolant pump outlet or radiator inlet with special tool 13 3 010 (see arrows).

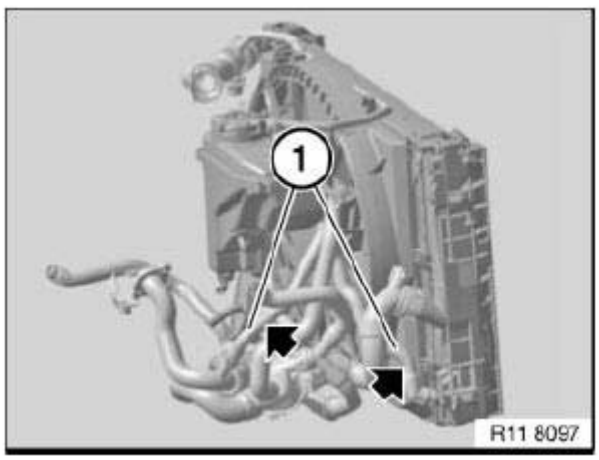


Fig. 6: Locating Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission only

Check function of heat exchanger.

Clamp off low-temperature feed line (1) at coolant pump outlet with special tool 13 3 010.

Clamp off low-temperature feed line (2) at oil-coolant heat exchanger with special tool 13 3 010.

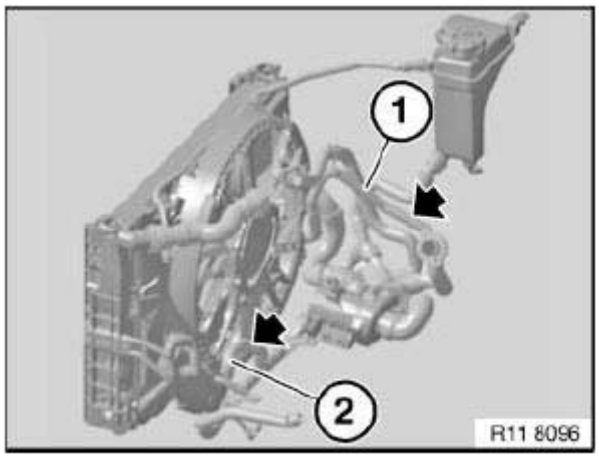


Fig. 7: Locating Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Check heating and cooling circuits in accordance with diagnosis instruction.

17 00 008 DRAINING AND ADDING COOLANT (N52K)

WARNING: Danger of scalding!
These tasks on the cooling system should only be carried out on an engine that has cooled down!

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

Installation:

Use only recommended coolant .See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe mixture ratio.

Protective measures/rules of conduct

- Wear safety goggles

- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: For dirt contamination of the cooling system (e.g. by engine oil), the cooling system must be rinsed with water until all dirt contamination is removed!

**IMPORTANT: Risk of slipping due to coolant on the floor.
Risk of injury!**

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifting equipment).

Recycling:

Observe country-specific waste-disposal regulations.

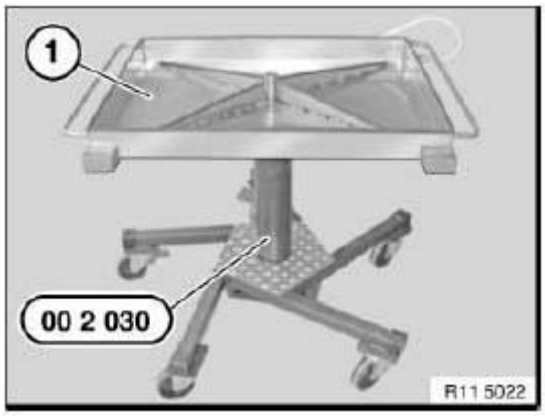


Fig. 8: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove front **UNDERBODY PROTECTION**

Draining coolant

Open cap (1) on coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

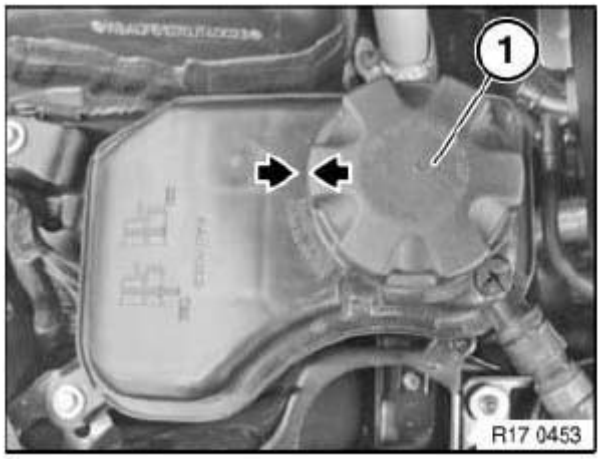


Fig. 9: Locating Cap Of Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten and detach right coolant hose (1) from radiator.

Drain, catch and dispose of coolant.

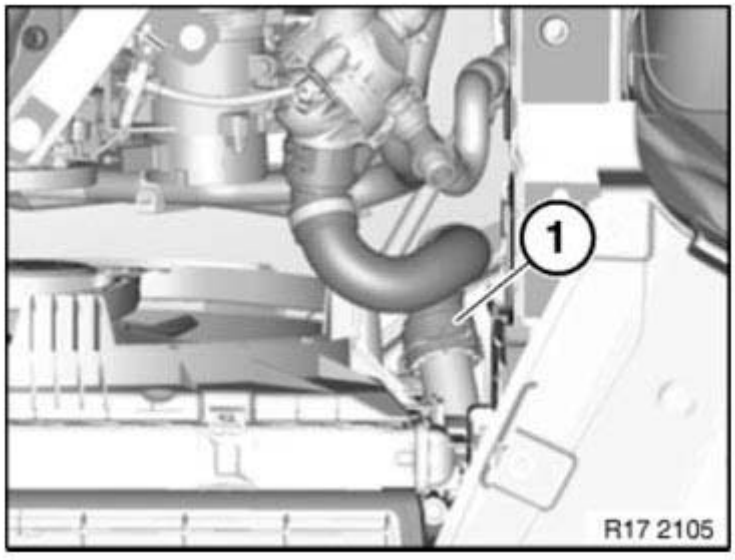


Fig. 10: Identifying Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant

Use recommended coolant **COOLING SYSTEM - OPERATING FLUIDS** .

Observe mixture ratio.

Observe **FILLING CAPACITIES** .

Fill and vent **COOLING SYSTEM** .

Observe venting instructions without fail.

Assemble engine.

Check **COOLANT SYSTEM** for leaks.

17 00 ... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM

WARNING: Danger of scalding! Work on the cooling system should only be carried out when the engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant.
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Open cooling system only when it has cooled down.
Opening the cooling system while hot can result in air entering the system. This can cause overheating with permanent damage to the engine.

IMPORTANT: You must protect the alternator against contamination before carrying out any work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Do not fill coolant expansion tank over MAX level as overfilling will cause the coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leakages.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

NOTE: To disconnect coolant hoses, use commercially available disconnect tools such

as HAZET brand tools (see table).

COMMERCIALLY AVAILABLE DISCONNECT TOOL

HAZET no.:	Description
4590-1	Disconnect tool, length (mm): 150
4590-2	Disconnect tool, length (mm): 180
4590-3	Disconnect tool, length (mm): 253
4590/2	Disconnect/plier set
4590/3	Disconnect/plier set

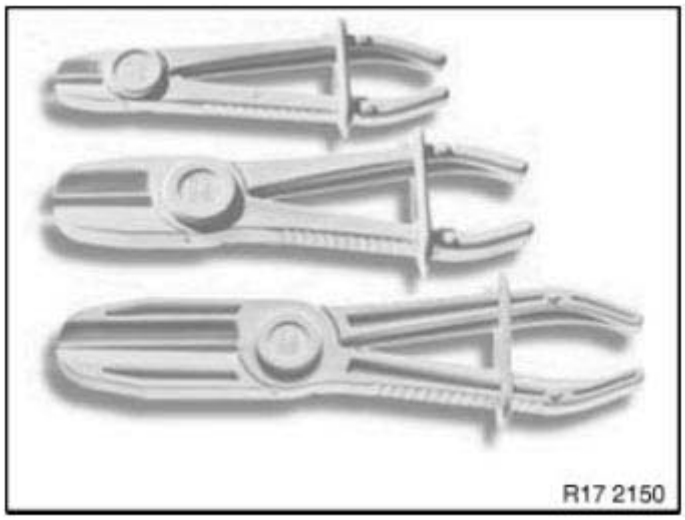


Fig. 11: Identifying Disconnect Tools
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Tightening torque, hose clamps 17 00 1AZ .

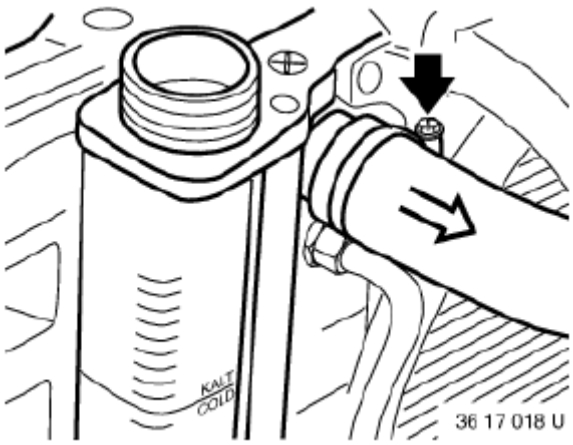


Fig. 12: Disconnecting Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Instructions for disassembly/assembly of coolant hose quick-connect couplings

Disassembly of quick-connect coupling

Pull out lock (1) and (2). Pull off hose.

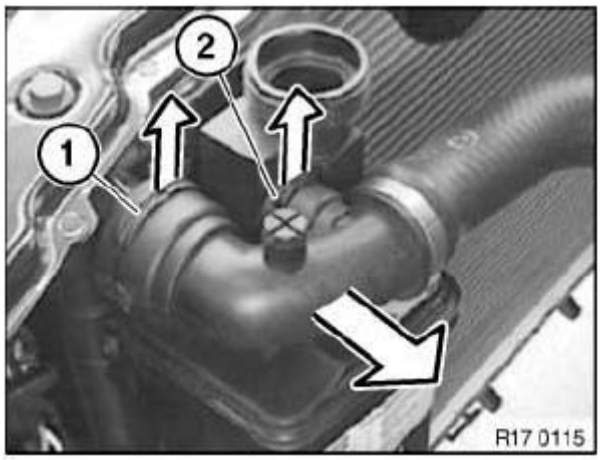


Fig. 13: Disassembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check O-rings (1).

Do not coat O-rings (1) with antiseize agent.

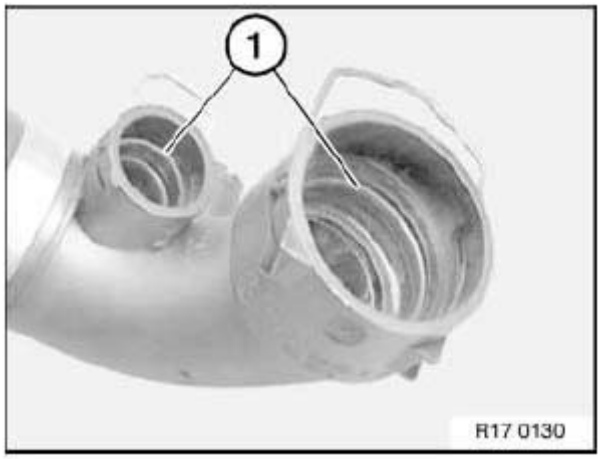


Fig. 14: Identifying O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of quick-connect coupling

Press in lock (1) before installing fast-release coupling.

Push on hose.

Quick-connect coupling must clearly snap audibly into place.

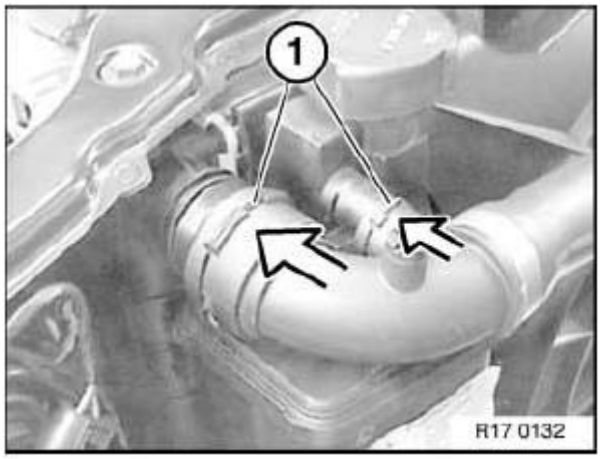


Fig. 15: Assembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

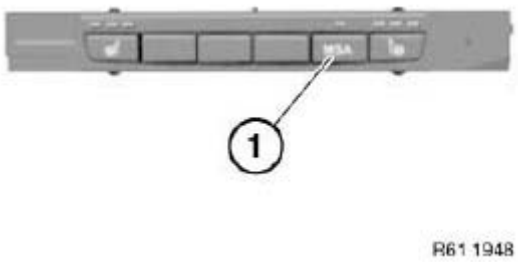


Fig. 16: Identifying Automatic Engine Start/Stop Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

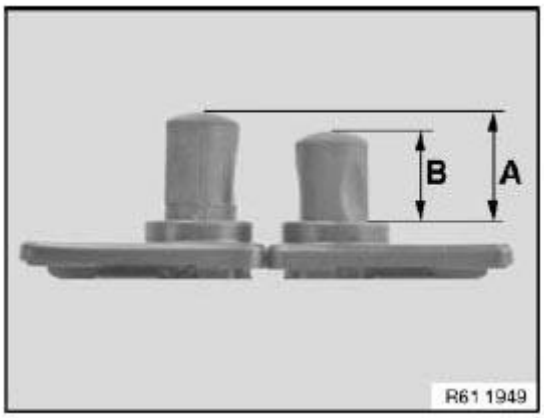


Fig. 17: Identifying Basic Setting For Engine Hood/Bonnet Basic
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

SPECIAL TOOLS REFERENCE CHART

Type	Engine	Adapter Y from 17 0 100

E60/E61/E63/E64	All	17 0 113
E65/E66	M54/N52/N62/N62T/N73	17 0 105
E65/E66	M57S/M57T/M67/M67T	17 0 113
E70/E71/E72	All	17 0 113
E81/E82/E84/E87/E88/E89	All	17 0 113
E83	M54/N46/N52K	17 0 105
E83	M47S/M57S/M57T/M57Y/N47	17 0 113
E85/E86	All	17 0 105
E90/E91/E92/E93	All	17 0 113
F01/F02/F03/F04/F07/F10	All	17 0 113
R50/R52	W10	17 0 107 and 17 0 102
R50	W17	17 0 109
R52/R53	W11	17 0 109
R55/R56/R57/R60	All	17 0 109
F25	All	17 0 113

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- Filler unit no. 81 39 2 152 473
- Collecting vessel no. 81 49 2 152 347
- Adapter: 17 0 100

IMPORTANT: Risk of slipping due to coolant on the floor.
Danger of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifting equipment).

Recycling:

Observe country-specific waste disposal regulations.

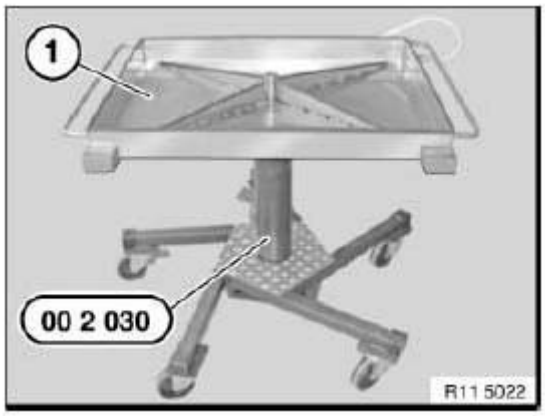


Fig. 18: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.
If necessary, replace damaged and porous coolant hoses.

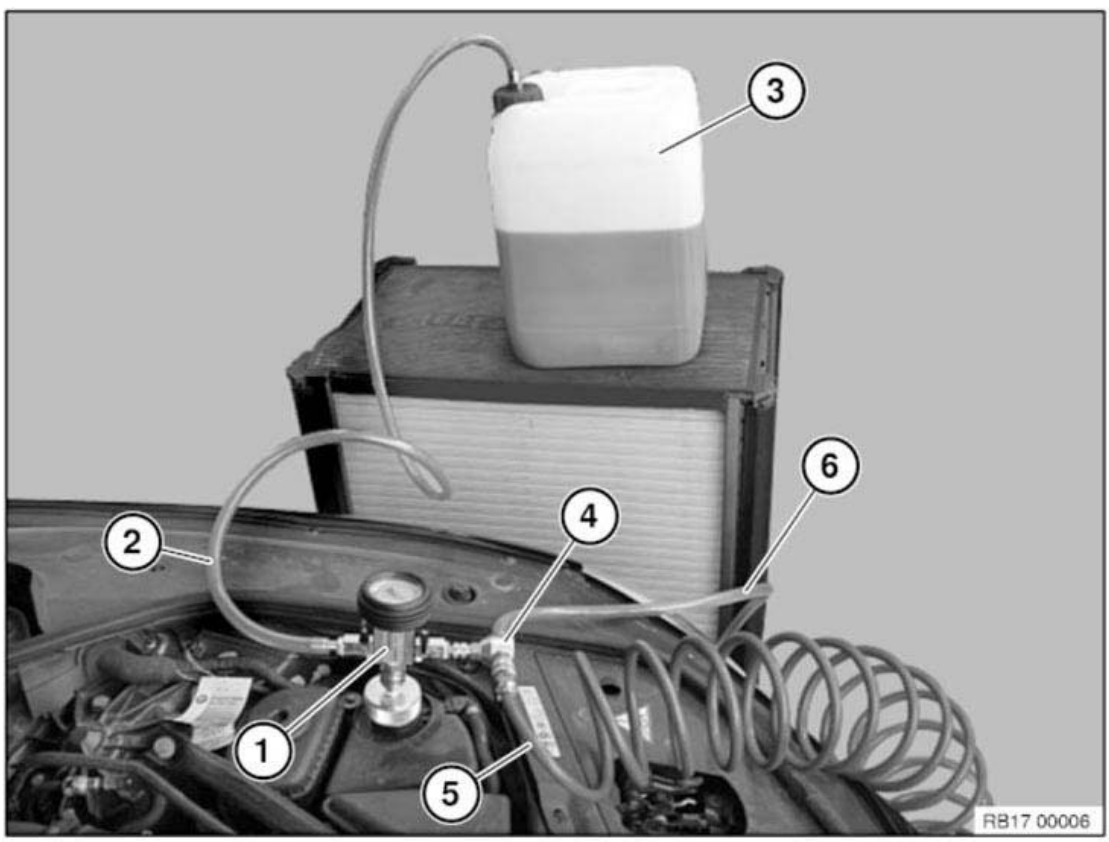


Fig. 19: Identifying Vacuum Filling Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

- 1) Filling unit with vacuum meter and shut-off valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

Requirements

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
  - Use only recommended coolant **COOLING SYSTEM - OPERATING FLUIDS** .
  - Observe mixture ratio .
  - Observe capacities.
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set vehicle heater to maximum temperature.

Select adapter (Y) according to table and connect to coolant expansion tank.

Connect filler unit to adapter connection (X).

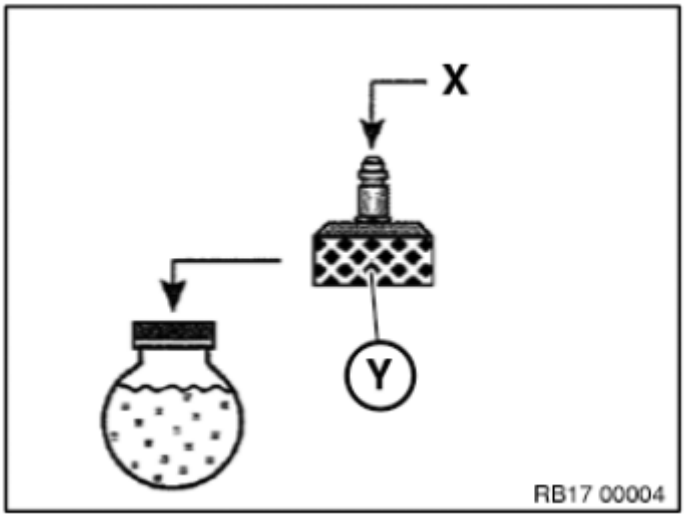


Fig. 20: Identifying Adapter And Adapter Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valves (A) and (B) of the filling unit (1) must be closed.

X) Expansion tank connection

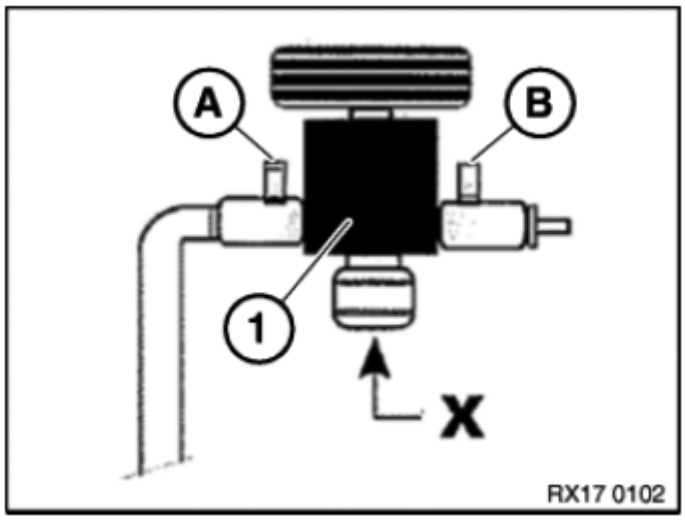


Fig. 21: Identifying Filling Unit Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

X) Expansion tank connection

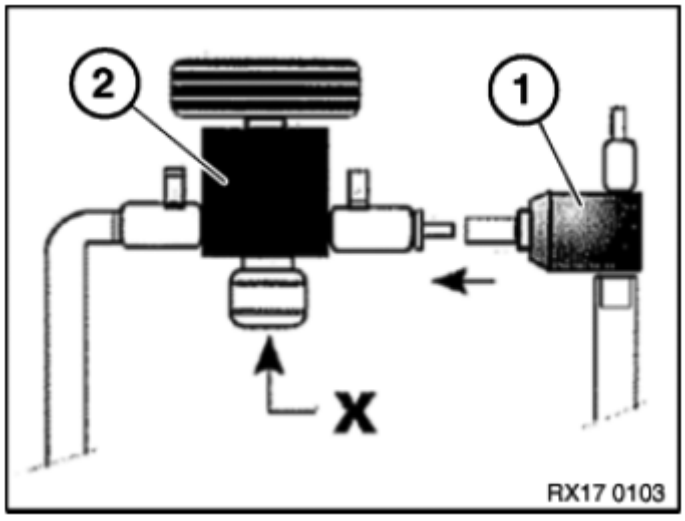


Fig. 22: Connecting Venturi Nozzle To Filling Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1).

X) Expansion tank connection

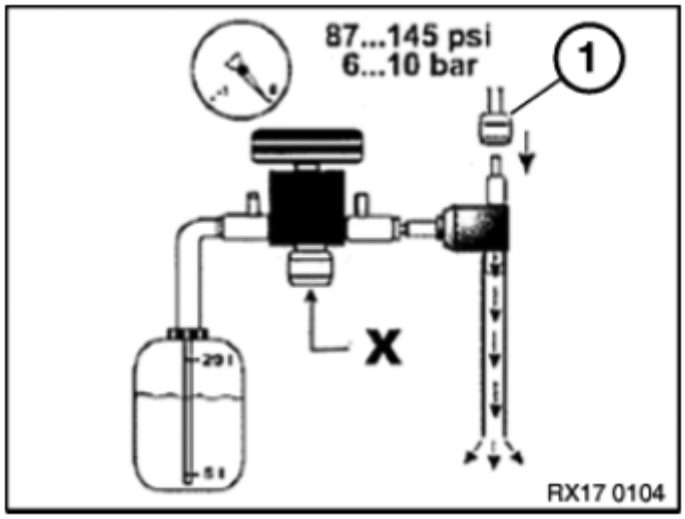


Fig. 23: Connecting Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Open shut-off valve (B).

The venturi nozzle produces a flow noise.

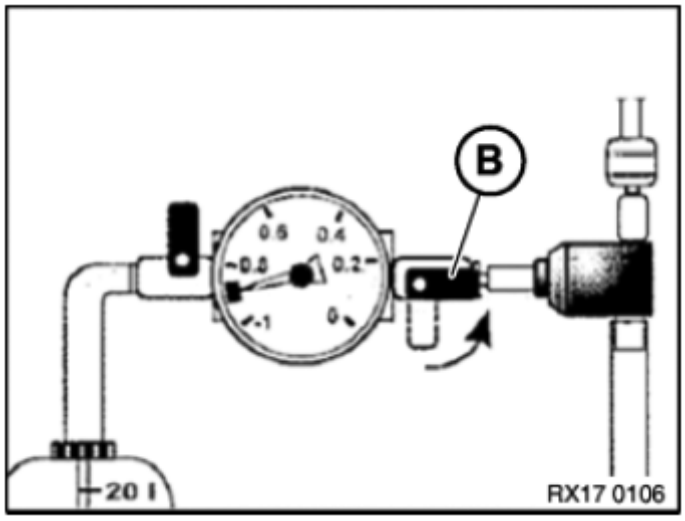


Fig. 24: Opening Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until the filling hose (1) is free of bubbles.

Close shut-off valve (A) again. The filling hose (1) is vented in this way.

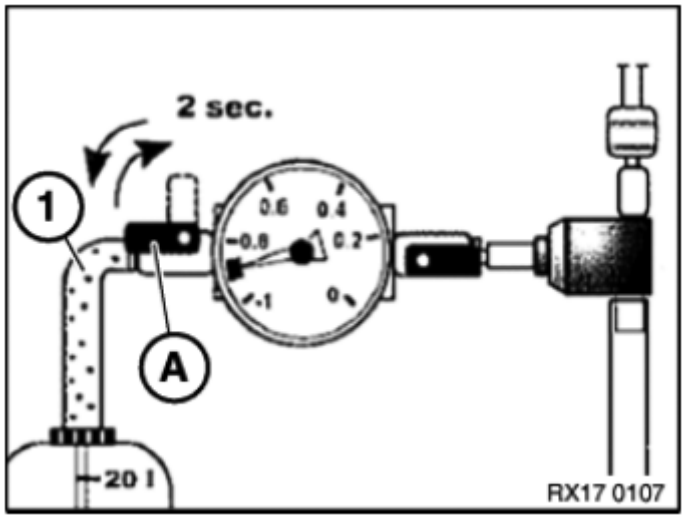


Fig. 25: Opening/Closing Of Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Generate vacuum in coolant system for approx. 2 minutes. The final vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale on the vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

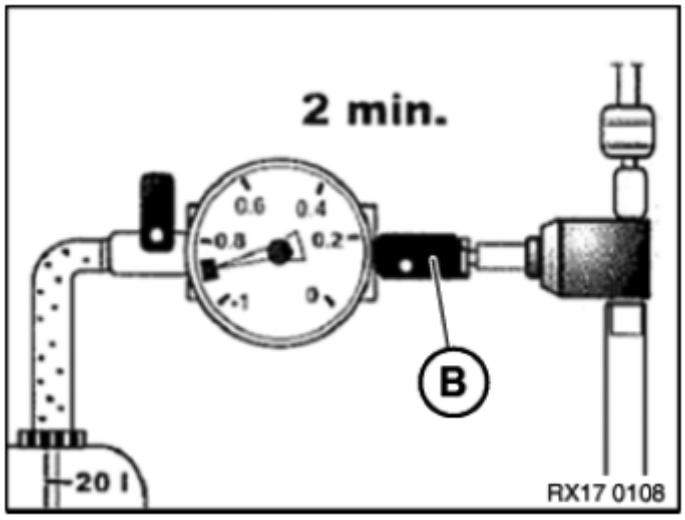


Fig. 26: Checking Shut-Off Valve Opening Time
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal Venturi nozzle (1).

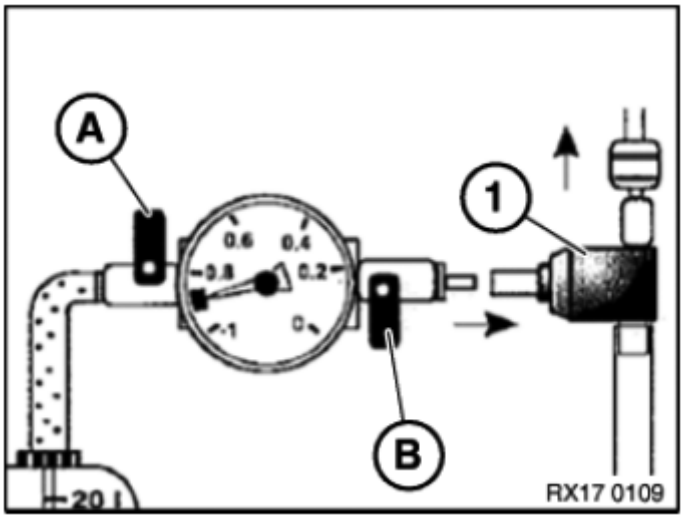


Fig. 27: Closing Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must hold the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check cooling system for leaks.

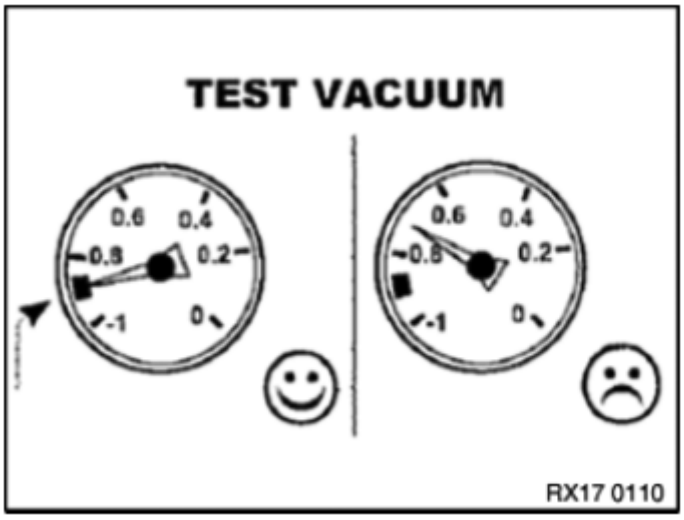


Fig. 28: Identifying Vacuum Meters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently premixed coolant in the filling unit container, 1 - -2 liters more than the vehicle filling capacity.

Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

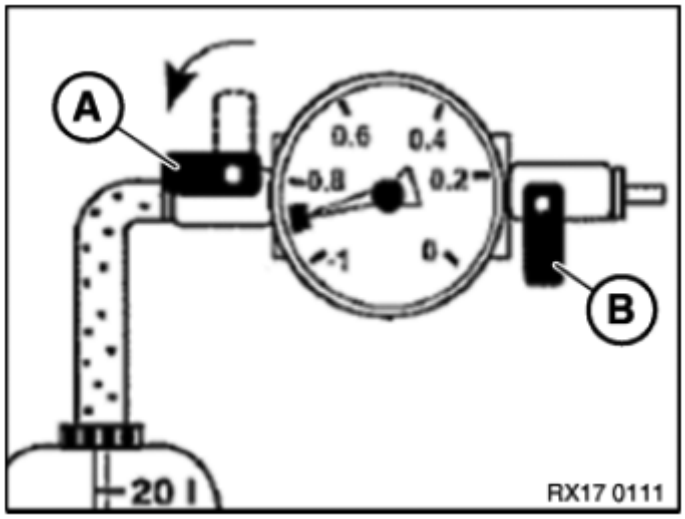


Fig. 29: Opening Shut-Off Valve To Filling Unit Container
Courtesy of BMW OF NORTH AMERICA, INC.

Coolant is now added.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, reduce remaining vacuum. Open shut-off valve (B) to do so.

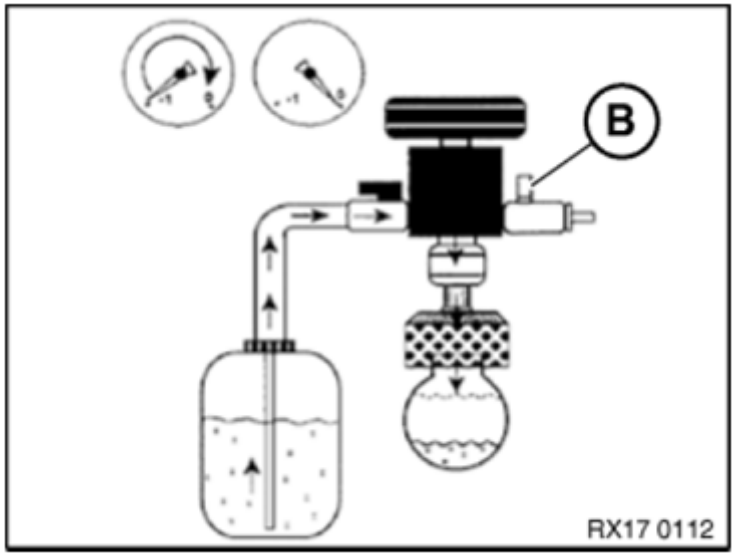


Fig. 30: Filling Coolant

Courtesy of BMW OF NORTH AMERICA, INC.

Remove filling unit with adapter from expansion tank.

Adjust coolant level to max.

Close coolant expansion tank.

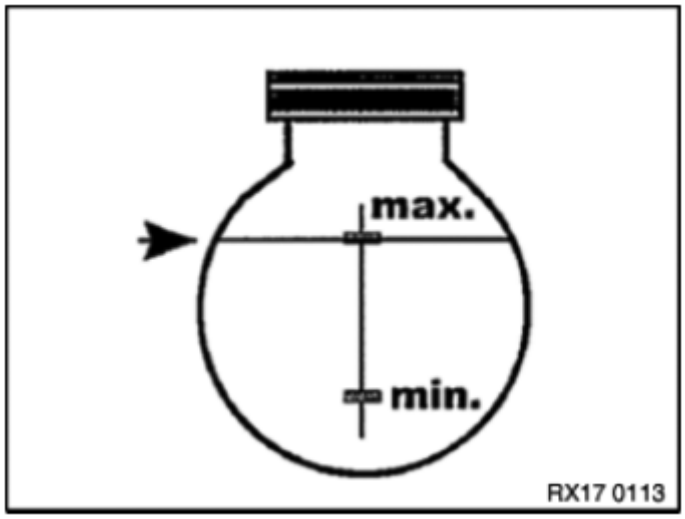


Fig. 31: Adjusting Coolant Level To Max
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of cooling system.

Check cooling system for leaks.

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

IMPORTANT: Lifetime coolant filling:
Never reuse used coolant!
When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.
In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant before carrying out any work on the coolant circuit.
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- No.- 81 93 2 152 473

IMPORTANT: Risk of slipping due to coolant on the floor.
Risk of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

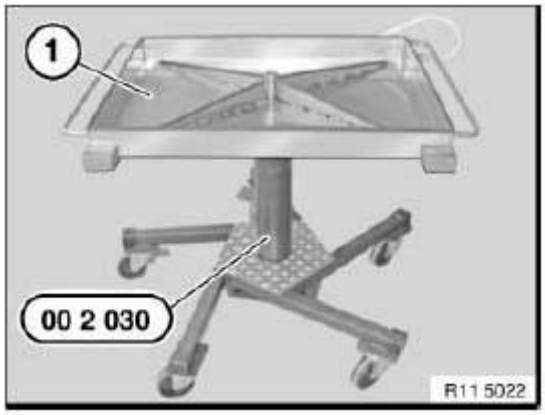


Fig. 32: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.
If necessary, replace damaged and porous coolant hoses.

NOTE: Following graphics shows F01, procedure for other model series is identical.

Vacuum filling unit consists of

- 1) Filling unit with vacuum meter and shut-off valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed-air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

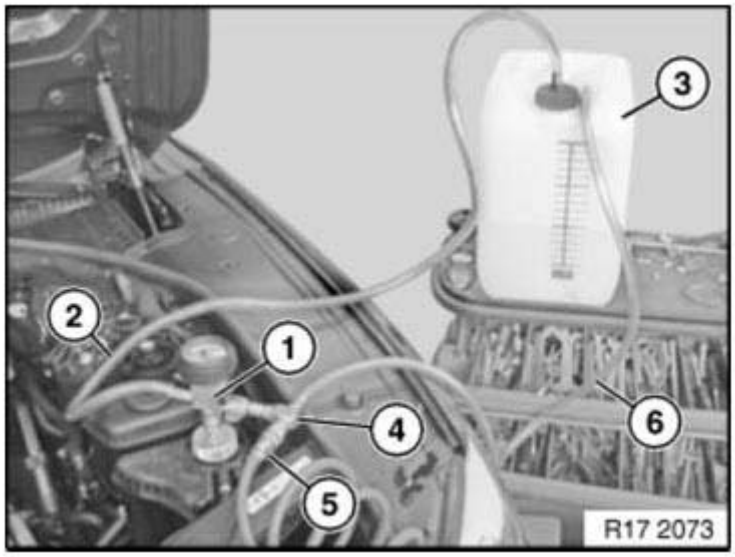


Fig. 33: Identifying Vacuum Filling Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

Preconditions

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
  - Use only recommended coolant **COOLING SYSTEM - OPERATING FLUIDS** .
  - Observe mixture ratio .
  - Observe **FILLING CAPACITIES** .
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set heating to maximum temperature.

Application

Connect filling unit (1) with adapter (2) 17 0 113 to coolant expansion tank.

Shut-off valves (A) and (B) must be closed.

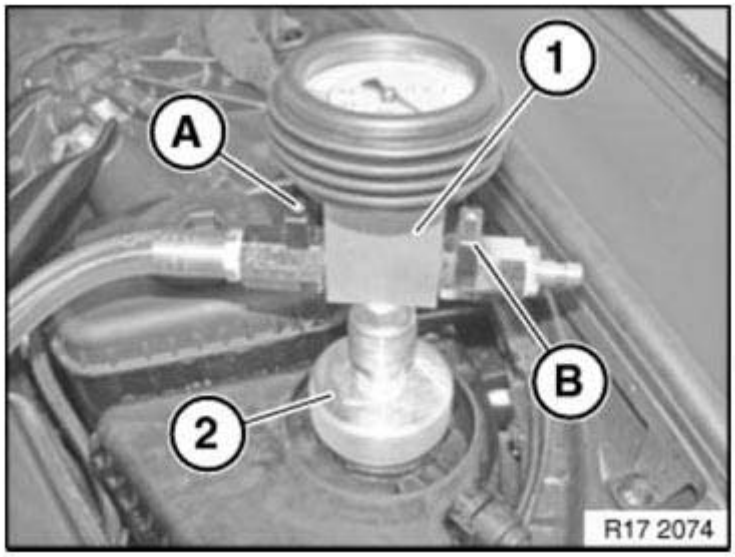


Fig. 34: Identifying Coolant Filling Unit With Adapter And Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

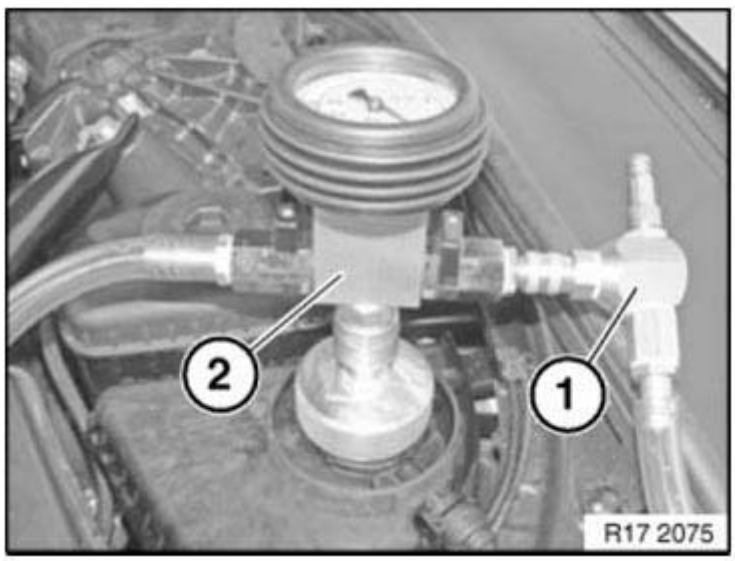


Fig. 35: Identifying Coolant Filling Unit With Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1) and open shut-off valve (B).

The venturi nozzle produces a flow noise.

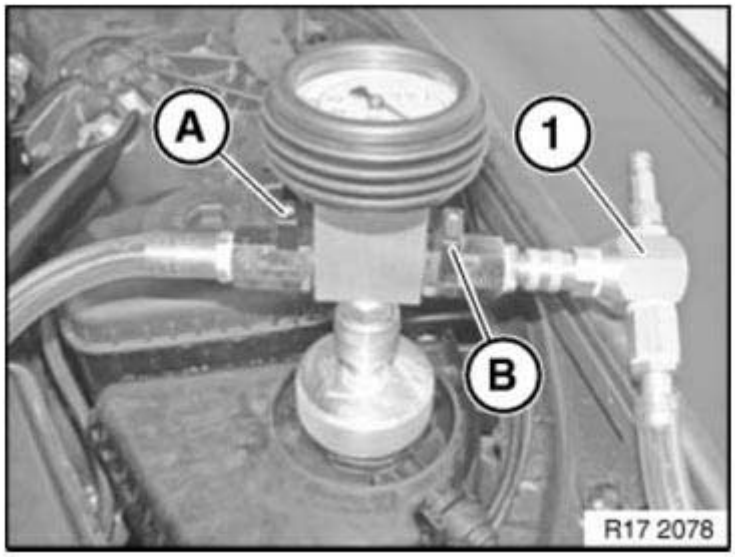


Fig. 36: Identifying Venturi Nozzle With Shut Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until filler hose (1) is filled without bubbles. Close shut-off valve (A) again. This vents the filler hose (1).

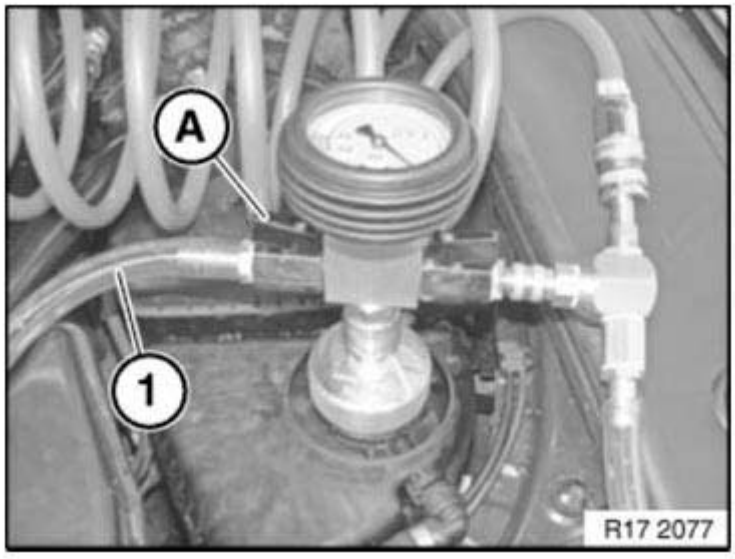


Fig. 37: Identifying Coolant Filling Hose With Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Approx. 1 minute. Generate vacuum in cooling circuit. The end vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale in vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

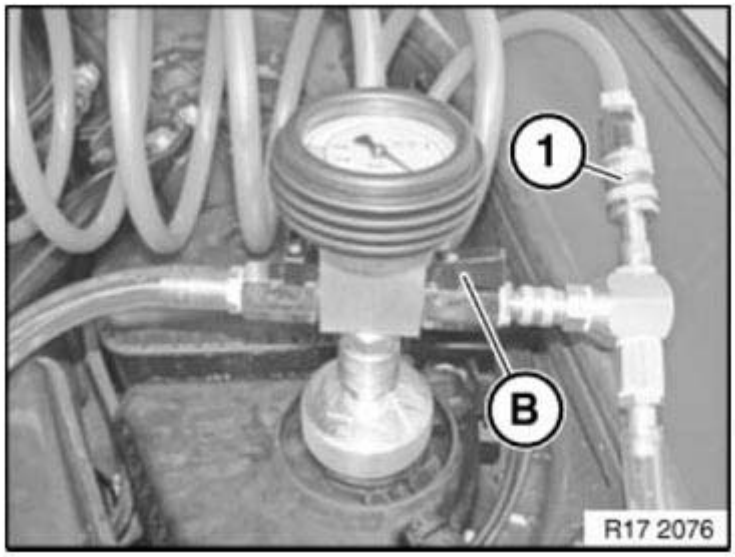


Fig. 38: Identifying Coolant Shut-Off Valves With Vacuum Meter
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal venturi nozzle (1).

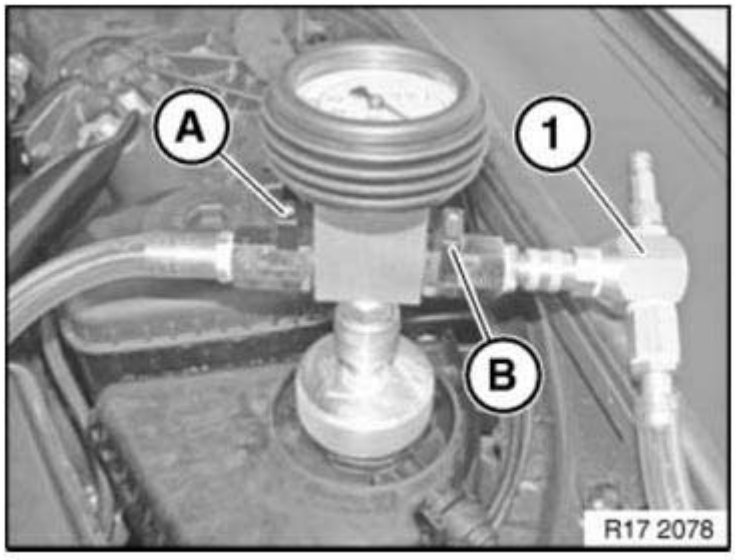


Fig. 39: Identifying Venturi Nozzle With Shut Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must maintain the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check **COOLING SYSTEM FOR LEAKS** .

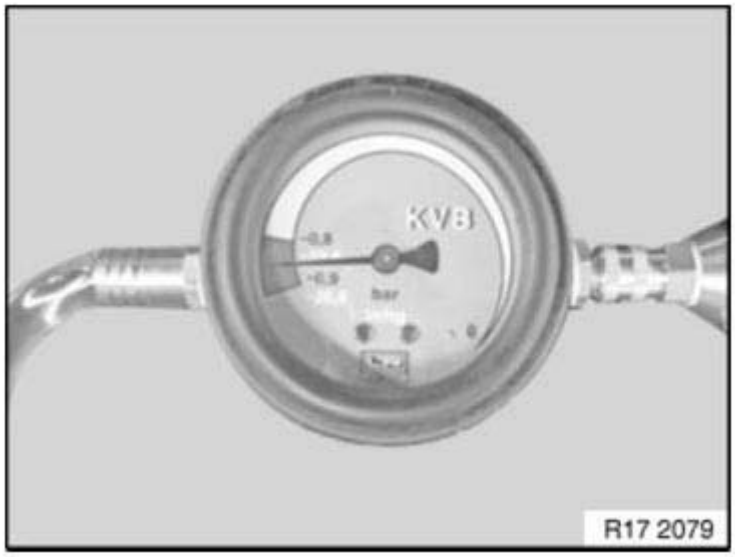


Fig. 40: Checking Cooling System For Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently PREMIXED COOLANT in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.
Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

Coolant is now added.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

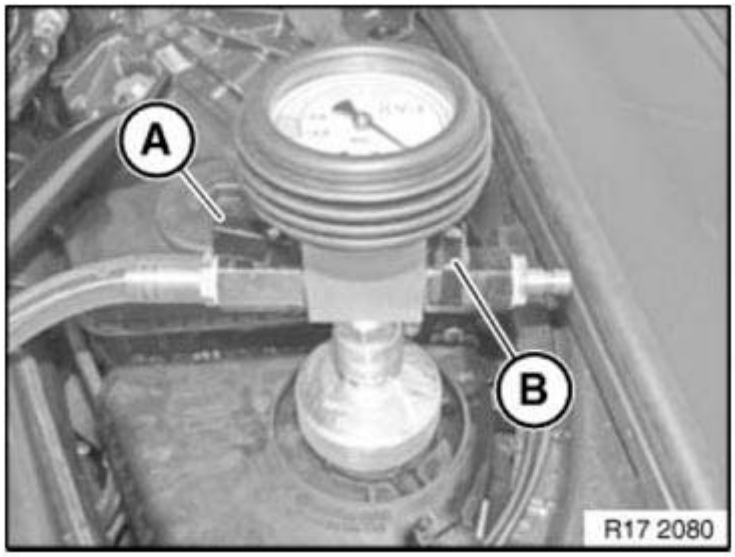


Fig. 41: Identifying Cooling System Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, release remaining vacuum. To do so, open shut-off valve (B).

Remove filling unit with adapter from expansion tank.

Adjust coolant level to max.

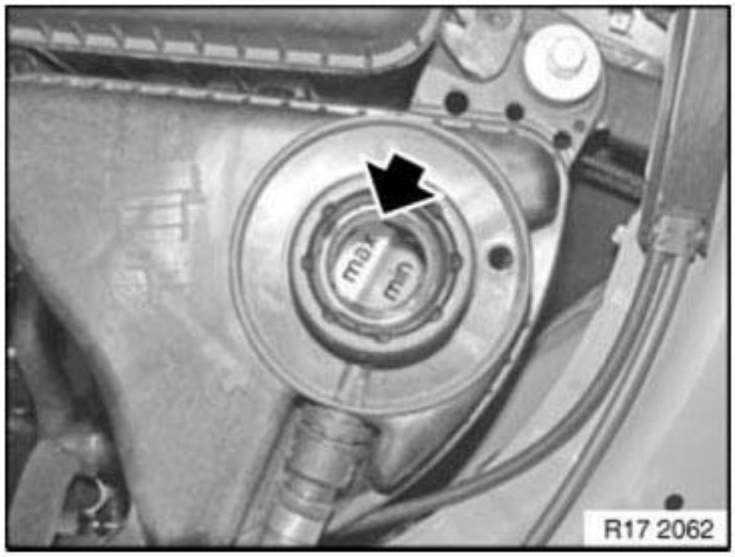


Fig. 42: Adjusting Coolant Level To Maximum
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

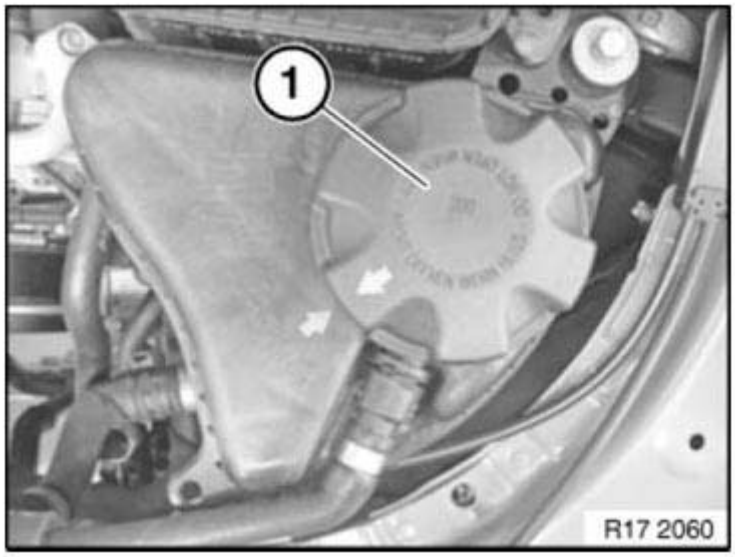


Fig. 43: Identifying Coolant Expansion Tank Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of cooling system.

Check **COOLING SYSTEM FOR LEAKS** .

1710 RADIATOR, EXPANSION TANK, PIPES

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Protective measures/rules of conduct

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.
Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool 00 2 030 (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

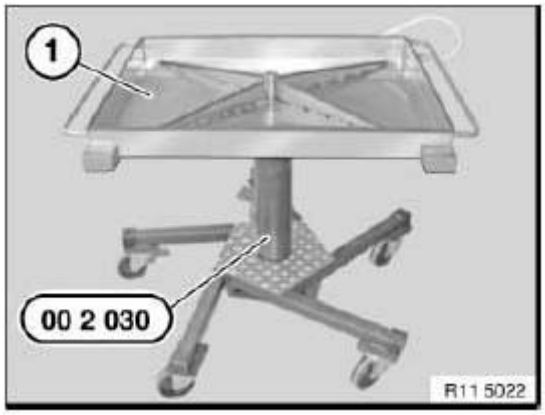


Fig. 44: Identifying Drip Tray And Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open cap on coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

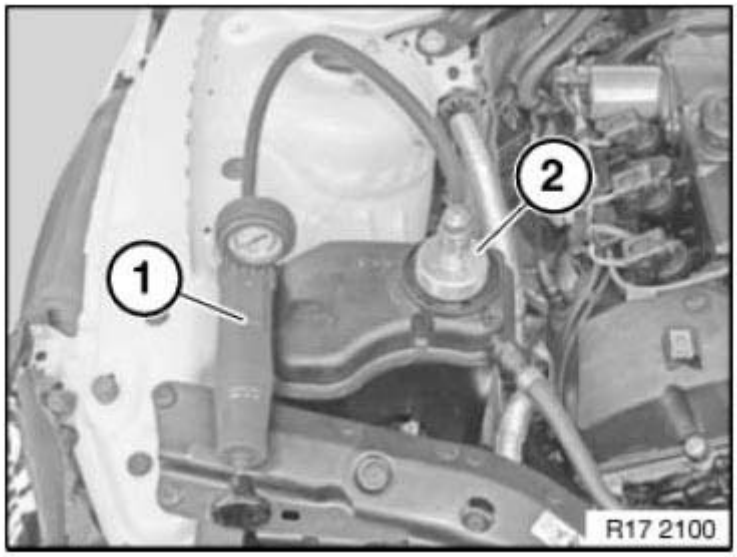


Fig. 45: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101) And (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap

NOTE: **While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.**

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap

Screw cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

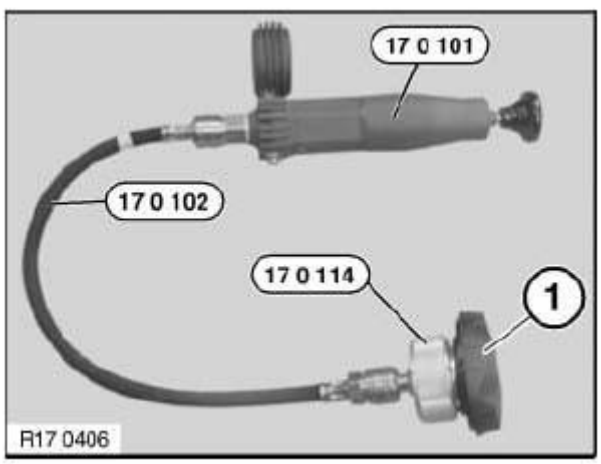


Fig. 46: Checking Pressure Relief Valve In Cap With Special Tool (Hand Pump 17 0 101)
Courtesy of BMW OF NORTH AMERICA, INC.

1711 ENGINE RADIATOR WITH ATTACHMENT

17 11 052 REMOVING AND INSTALLING LEFT MODULE CARRIER (N52K, N54)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Necessary preliminary tasks:

- Remove **FAN COWL**
- **54 only:**

Remove intercooler

Release bolts (1) on radiator on left and right.

Tightening torque **17 10 2AZ** .

Do **not** unfasten or detach coolant hose (2).

Do **not** drain coolant.

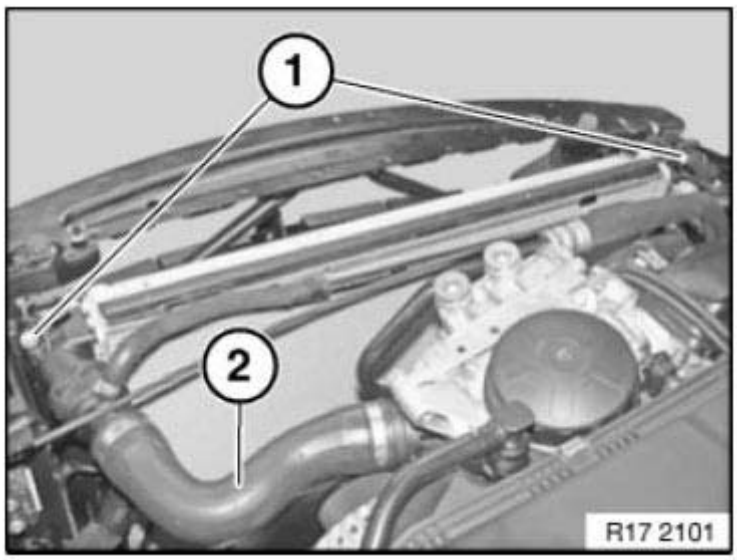


Fig. 47: Identifying Radiator Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Slide radiator and condenser slightly towards rear.

Feed out left module carrier (1) and remove towards top.

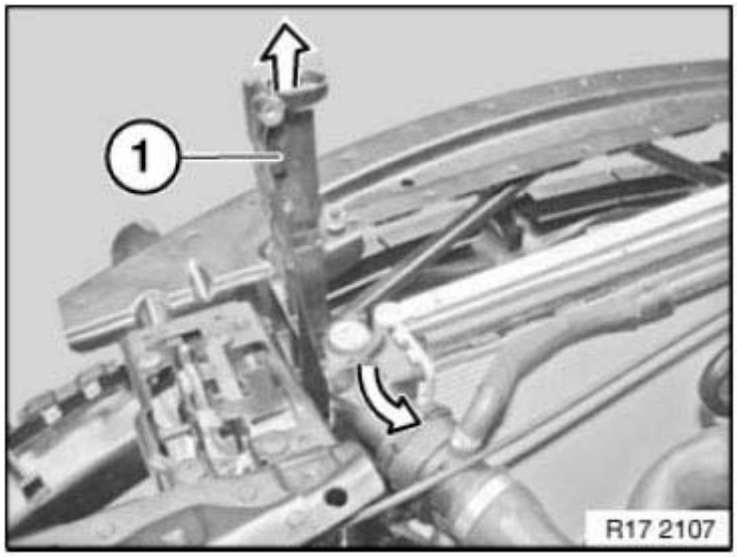


Fig. 48: Removing Left Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

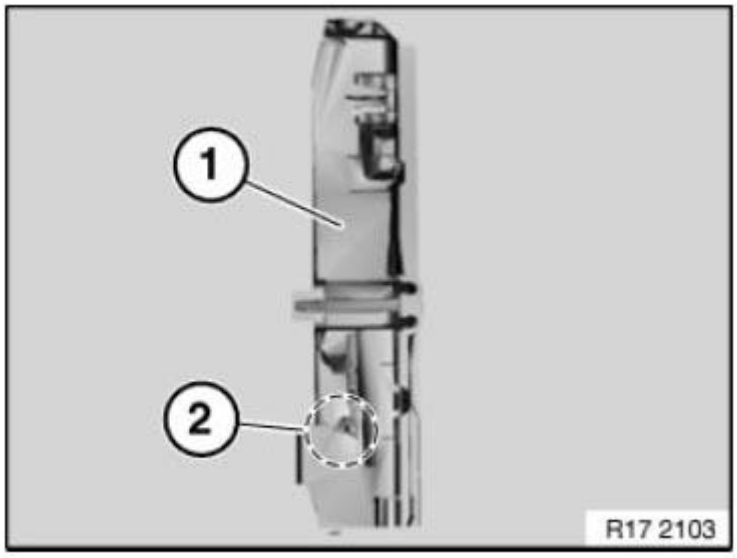


Fig. 49: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

17 11 000 REMOVING AND INSTALLING RADIATOR (N52K, N54)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks:

- Remove **FAN COWL**
- Draining **COOLANT**
- Unlock coolant hoses and detach
- **N54 only:**

Remove intercooler

Release bolts (1) on radiator on left and right.

Tightening torque **17 10 2AZ** .

Unlock and detach coolant hose (2).

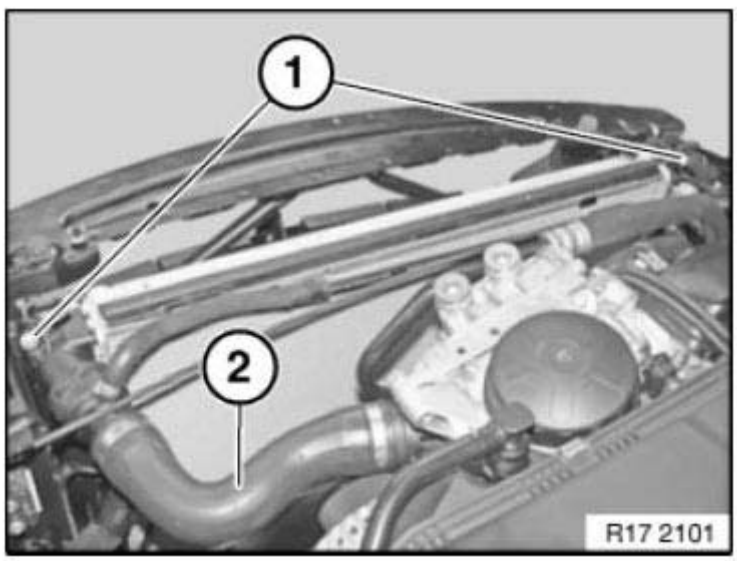


Fig. 50: Identifying Radiator Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out module carrier (1) on left.

Feed out radiator (2) and remove towards top.

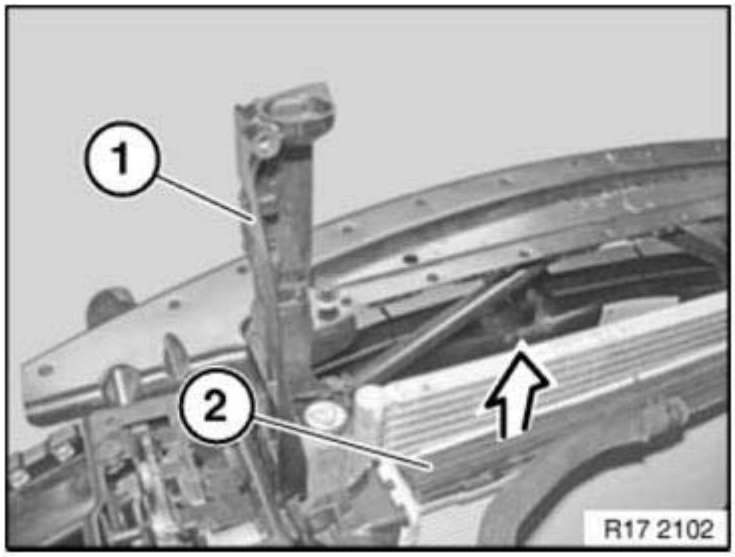


Fig. 51: Lifting Out Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling the radiator and module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

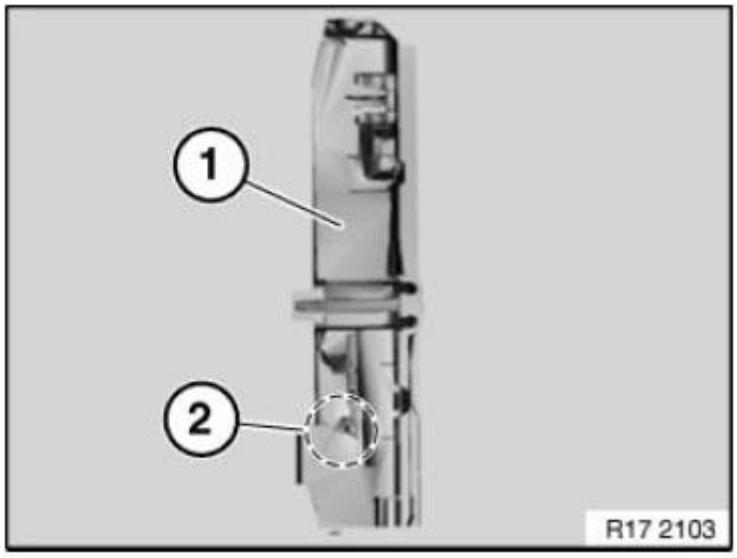


Fig. 52: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Check **COOLING SYSTEM** for leaks.

17 11 054 REMOVING AND INSTALLING RIGHT MODULE CARRIER (N52K, N54)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Follow safety instructions for handling refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A .
Avoid contact with refrigerant and refrigerant oil Follow safety instructions for HANDLING REFRIGERANT OIL .

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.

If A/C system is opened for more than 24 hours: Replace **DESICCANT INSERT** for A/C system.

Necessary preliminary tasks:

- Remove left **MODULE CARRIER**
- Drain off **AIR CONDITIONING SYSTEM**

Release screws (1).

Tightening torque **64 53 6AZ** .

Detach A/C lines (2) from A/C condenser.

Installation:

Replace all sealing rings and moisten with refrigerant oil.

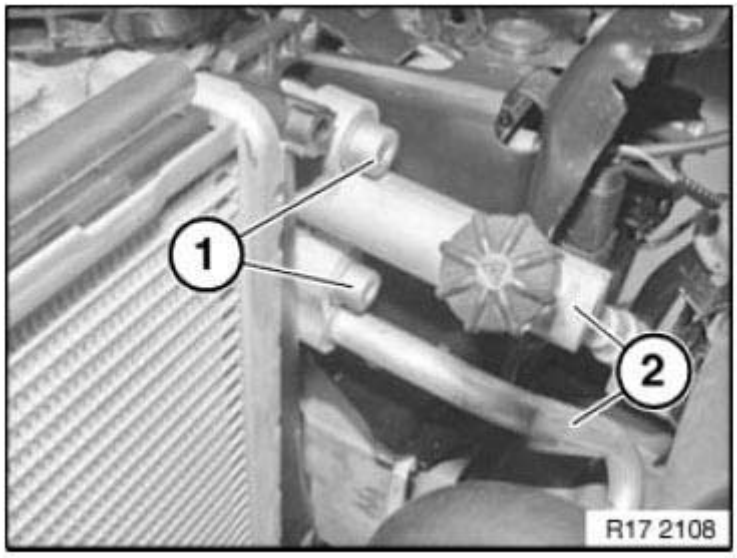


Fig. 53: Identifying Screws And A/C Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out right module carrier (1) together with A/C condenser (2).

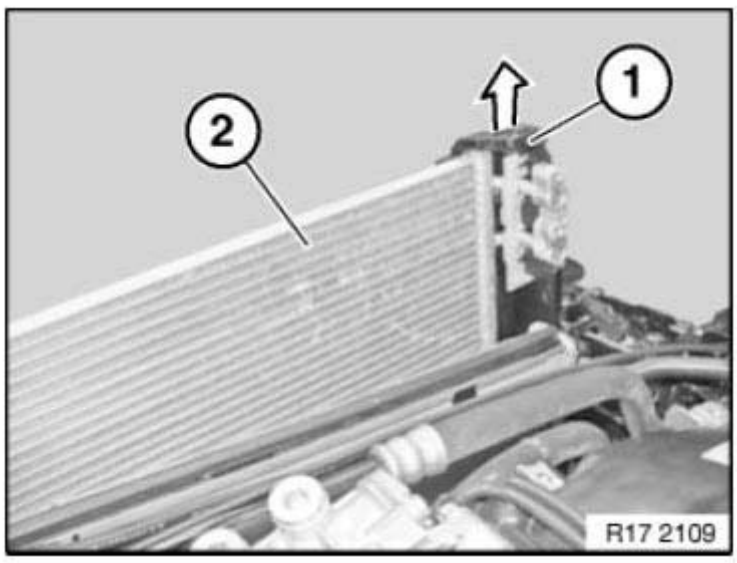


Fig. 54: Lifting Out Right Module Carrier With A/C Condenser
Courtesy of BMW OF NORTH AMERICA, INC.

Release A/C condenser from module carrier. In so doing, release lock (1) on side of module carrier in direction of arrow.

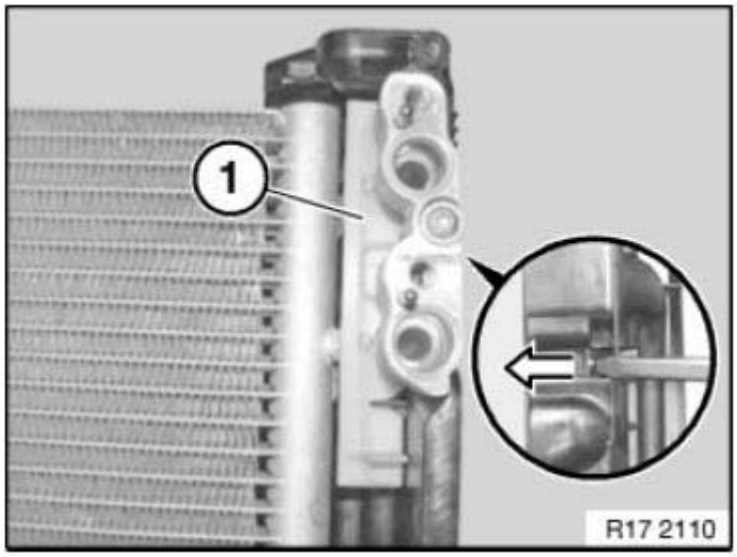


Fig. 55: Removing A/C Condenser From Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling the radiator and module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

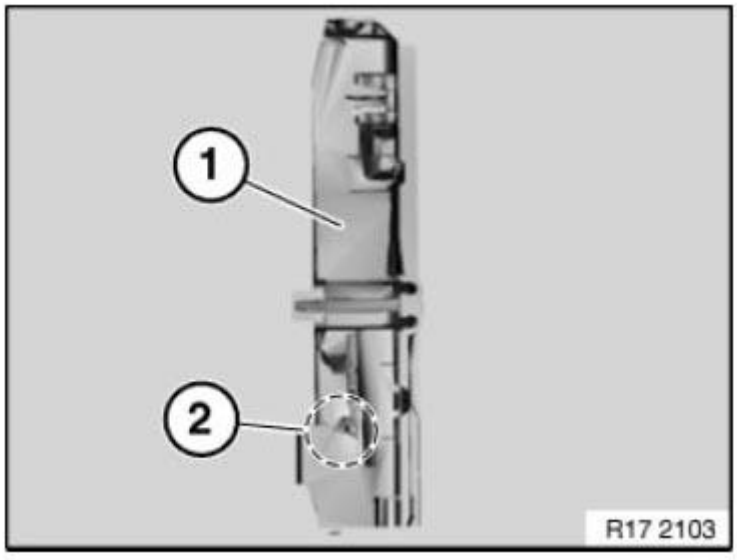


Fig. 56: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Evacuate and fill **A/C SYSTEM** .

17 11 100 REMOVING AND INSTALLING/REPLACING COOLANT EXPANSION TANK (N54, N52K)

Necessary preliminary tasks

- Drain **COOLANT** .

N54 only: Release vacuum line at retainers (1) from expansion tank.

Unfasten screws (2).

Tightening torque **17 10 4AZ** .

Release and disconnect coolant hoses (3).

Raise expansion tank (4)

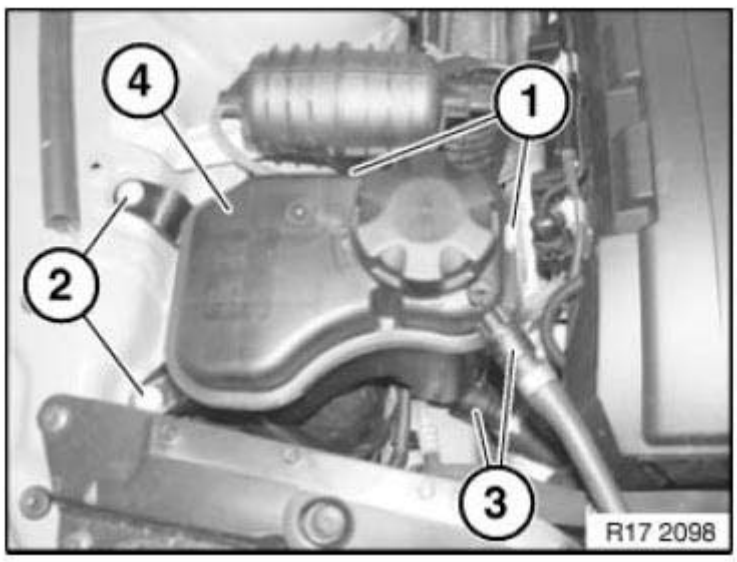


Fig. 57: Identifying Retainers, Coolant Hoses, Screws And Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) on coolant level switch and disconnect.

Remove expansion tank (2).

Installation:

Make sure locating pin (3) is correctly seated in rubber mount (4).

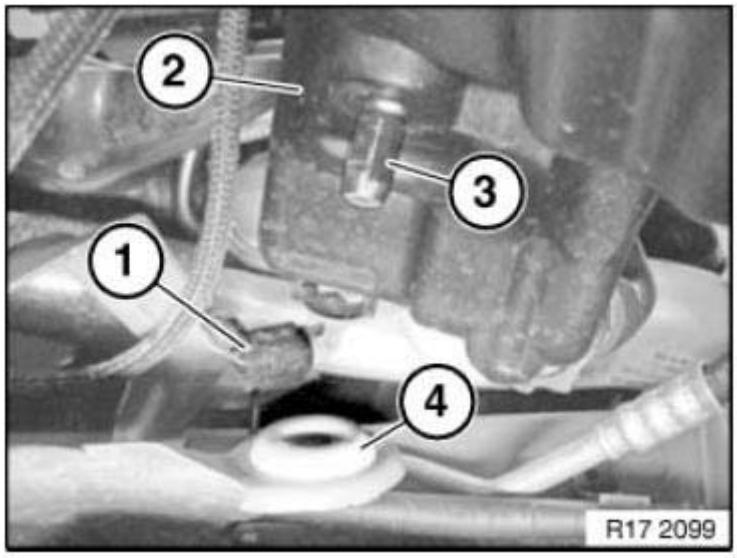


Fig. 58: Identifying Plug, Expansion Tank, Locating Pin And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

Check cooling system for **LEAKS** .

17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N52K, N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Remove **CROSS-MEMBER**
- **Only automatic transmission and twin-clutch gearbox:**

RELEASE TRANSMISSION FLUID COOLER from the fan cowl do not remove

Unclip coolant line (1) from fan cowl.

Unlock and disconnect plug (2) on fan cowl on right.

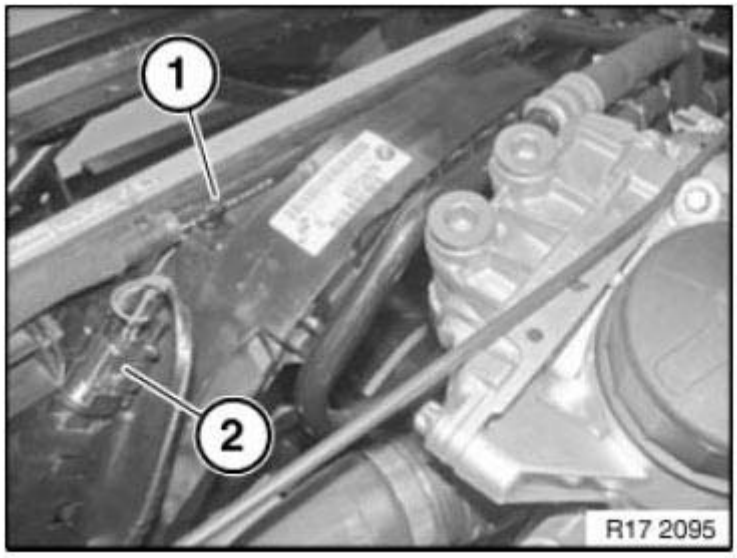


Fig. 59: Identifying Coolant Line And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on fan cowl.

Tightening torque **17 10 1AZ** .

Release lock (2) and remove fan cowl (3) towards top.

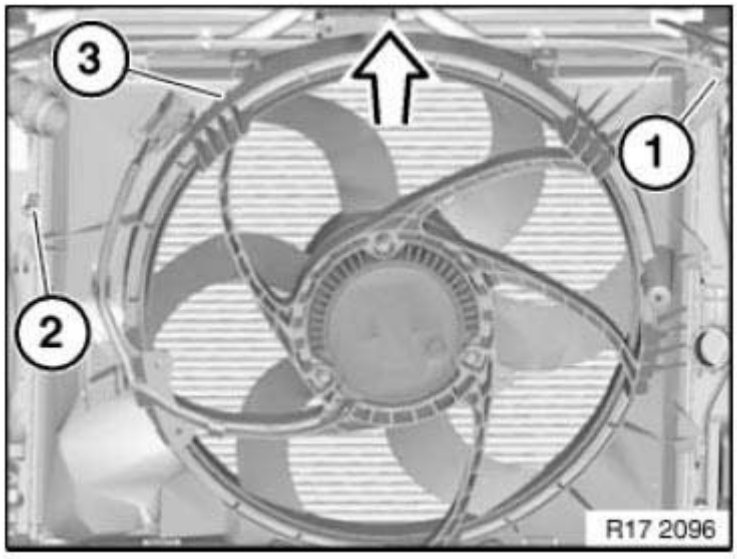


Fig. 60: Removing Fan Cowl Towards Top
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert retaining tabs (1) at bottom on radiator/intercooler.

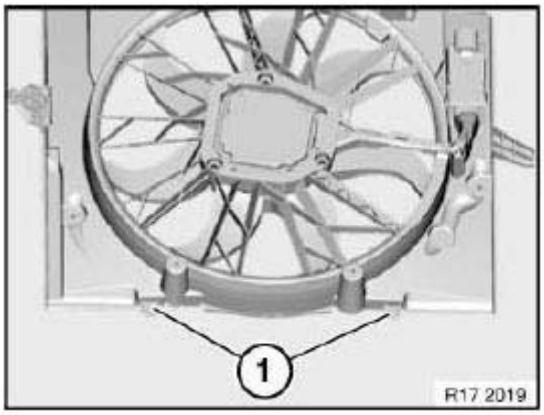


Fig. 61: Identifying Fan Cowl Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Reassemble the vehicle.
clear fault memory.

17 12 010 REMOVING AND INSTALLING/REPLACING COOLANT PIPE ON FRONT AXLE (N52K)

Necessary preliminary tasks: Remove intake filter housing. See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N52K)** . Drain **coolant**.

Release screws (1). Tightening torque 17 10 5AZ. Unfasten and detach coolant pipe from expansion tank (2). Unfasten and detach coolant pipe from coolant thermostat (3). Unfasten and detach coolant pipe from coolant hose (4). Feed out coolant pipe and remove.

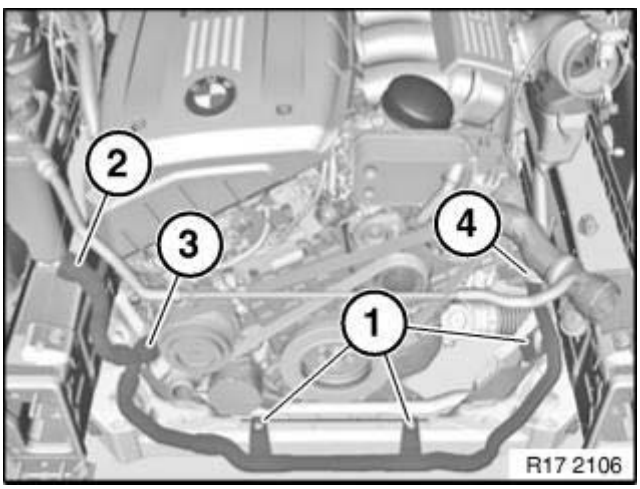


Fig. 62: Replacing Coolant Pipe On Front Axle
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine. Top up **coolant**. Check **cooling system for leaks**.

1721 OIL COOLER

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.
Flushing can only be carried out with the automatic transmission removed.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid through oil lines and transmission oil cooler.

Reposition quick-release couplings.

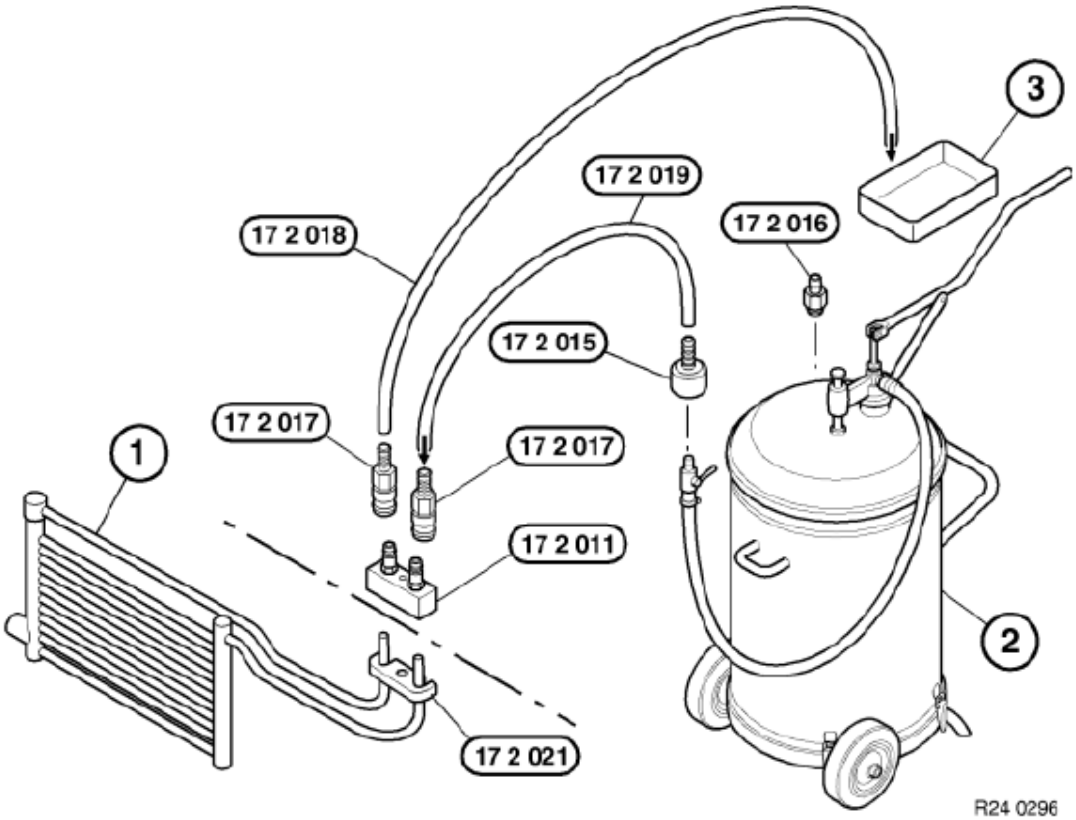
Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Arrangement, flushing apparatus for transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 63: Arrangement - Flushing Apparatus For Transmissions (A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 011 Adapter for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

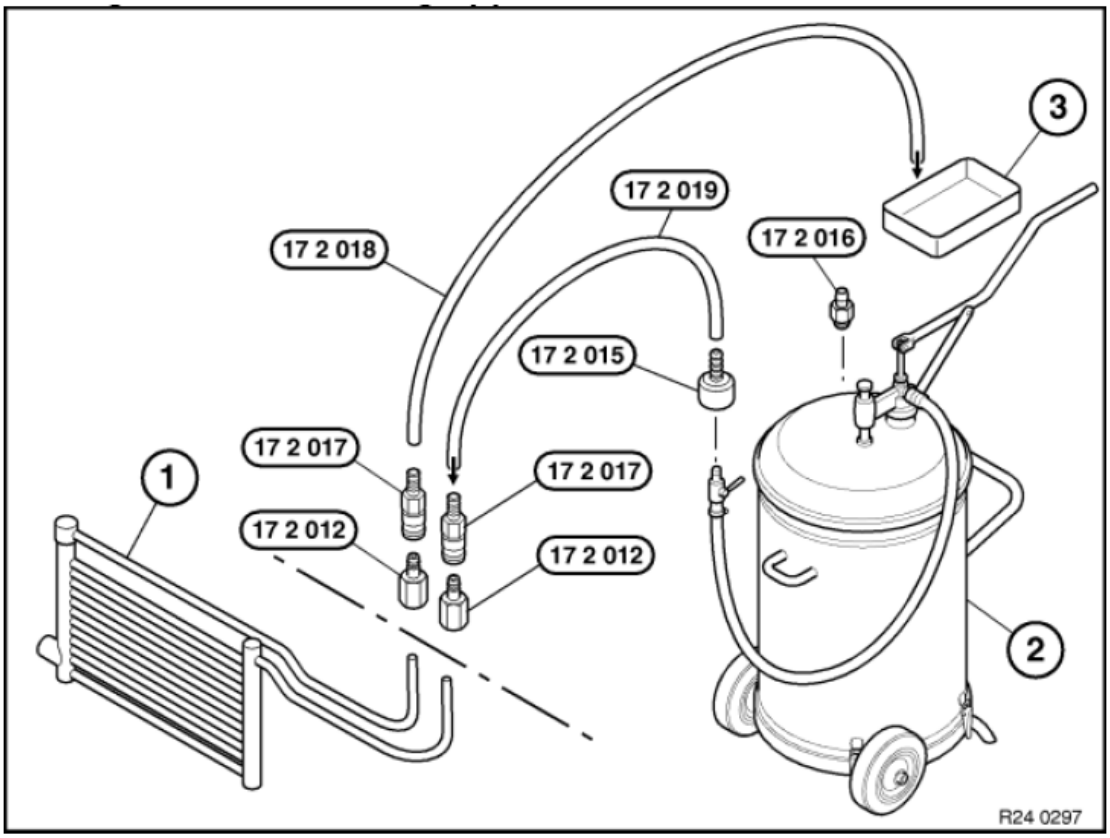
17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z

Arrangement of flushing apparatus for transmission A4S 310R



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray
17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)
17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
17 2 016 Connection for oil collection unit (2), manufacturer: Horn
17 2 017 Quick-release coupling (2 pieces)
17 2 018 Hose to oil drip tray (3)
17 2 019 Hose to oil collection unit (2)

Fig. 64: Arrangement - Flushing Apparatus For Transmissions (A5S 310R)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

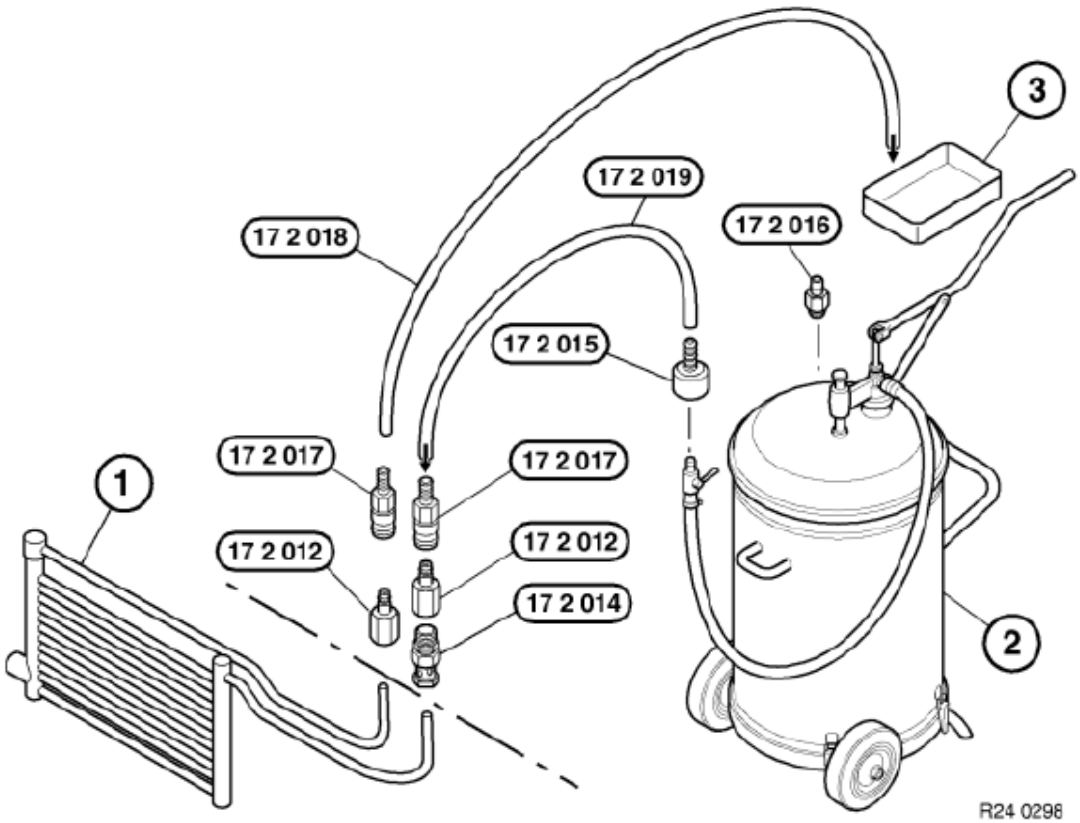
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A4S 300J



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 65: Arrangement - Flushing Apparatus For Transmission (A4S 300J)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

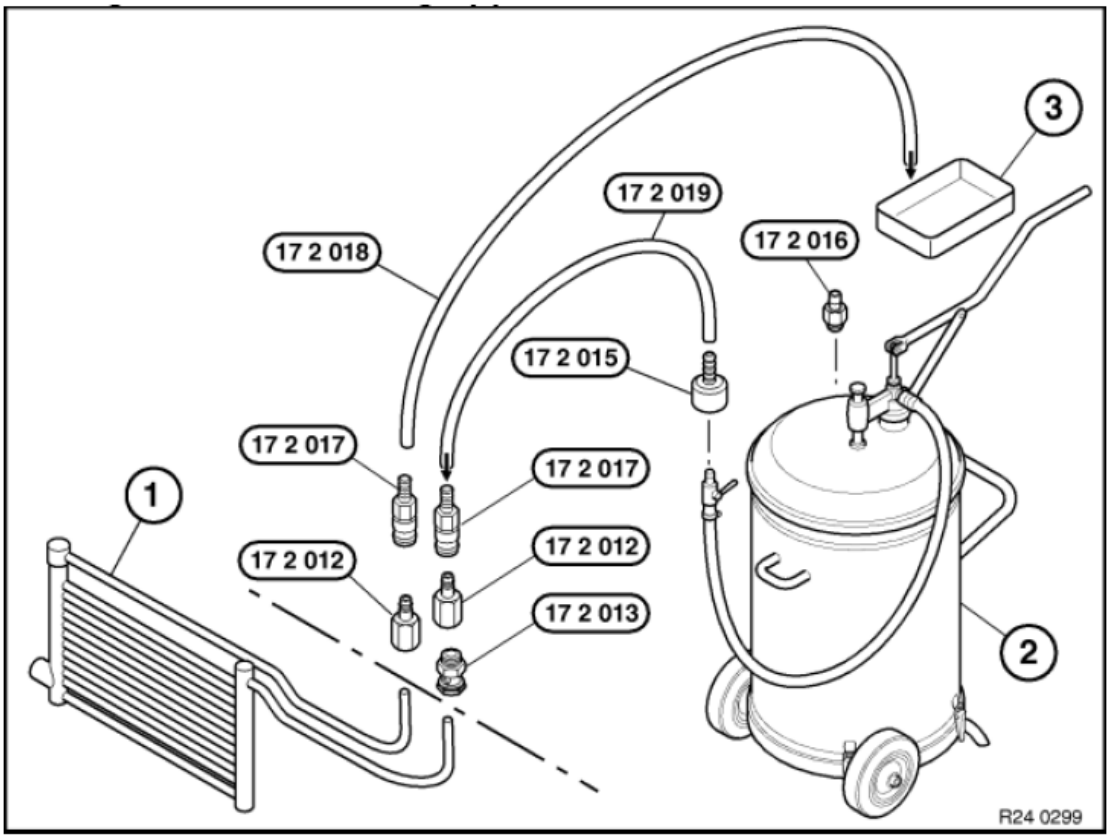
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A5S 440Z



1) Transmission oil cooler with lines
2) Oil collection unit
3) Oil drip tray
17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)
17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)
17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
17 2 016 Connection for oil collection unit (2), manufacturer: Horn
17 2 017 Quick-release coupling (2 pieces)
17 2 018 Hose to oil drip tray (3)
17 2 019 Hose to oil collection unit (2)

Fig. 66: Arrangement - Flushing Apparatus For Transmission (A5S 440Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA6HP19Z, GAHP26Z, GA6HP32Z)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

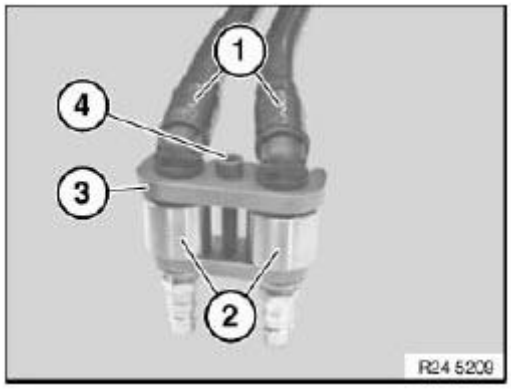


Fig. 67: Identifying Hydraulic Lines, Adapters, Clamping Bar With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for transmissions GA6HP19Z, GA6HP26Z, GA6HP32Z

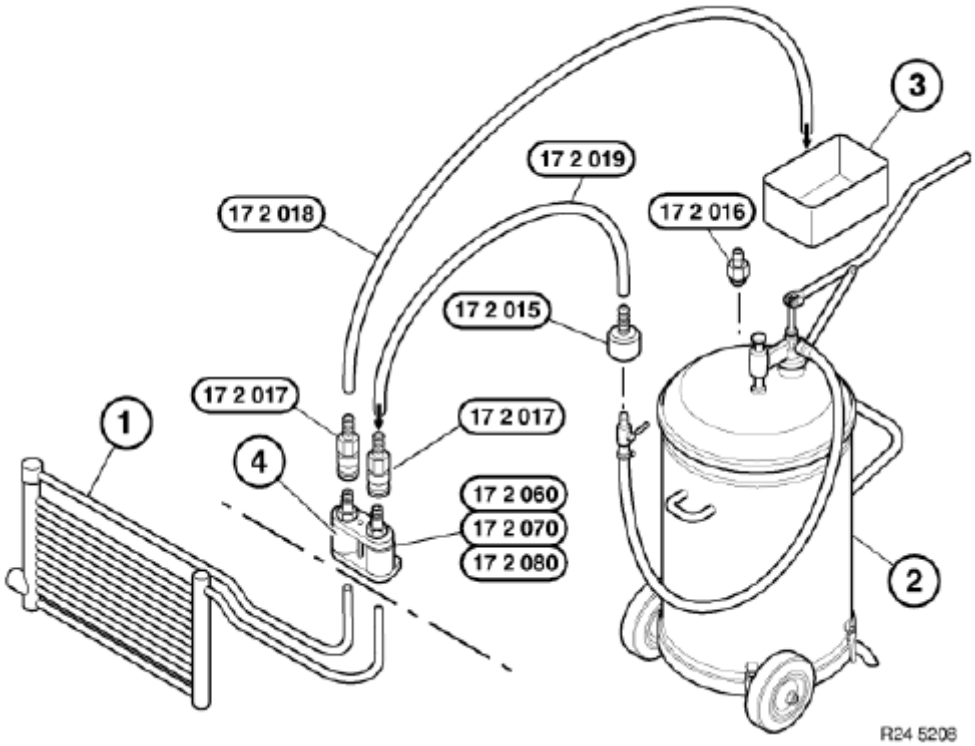


Fig. 68: Arrangement - Flushing Apparatus For Transmissions (GA6HP19Z, GA6HP26Z, GA6HP32Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission-oil cooler with lines
2. Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 019 Hose to oil collection unit (2)

3. Oil drip tray

   17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bar

   17 2 060 Adapter with clamping bar for aluminum lines and steel lines with aluminum connection (line diameter 12 mm) GA6HP19Z

   17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

   17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

1722 OIL COOLER LINES

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.
Flushing can only be carried out with the automatic transmission removed.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to BMW Service Operating Fluids) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid (refer to

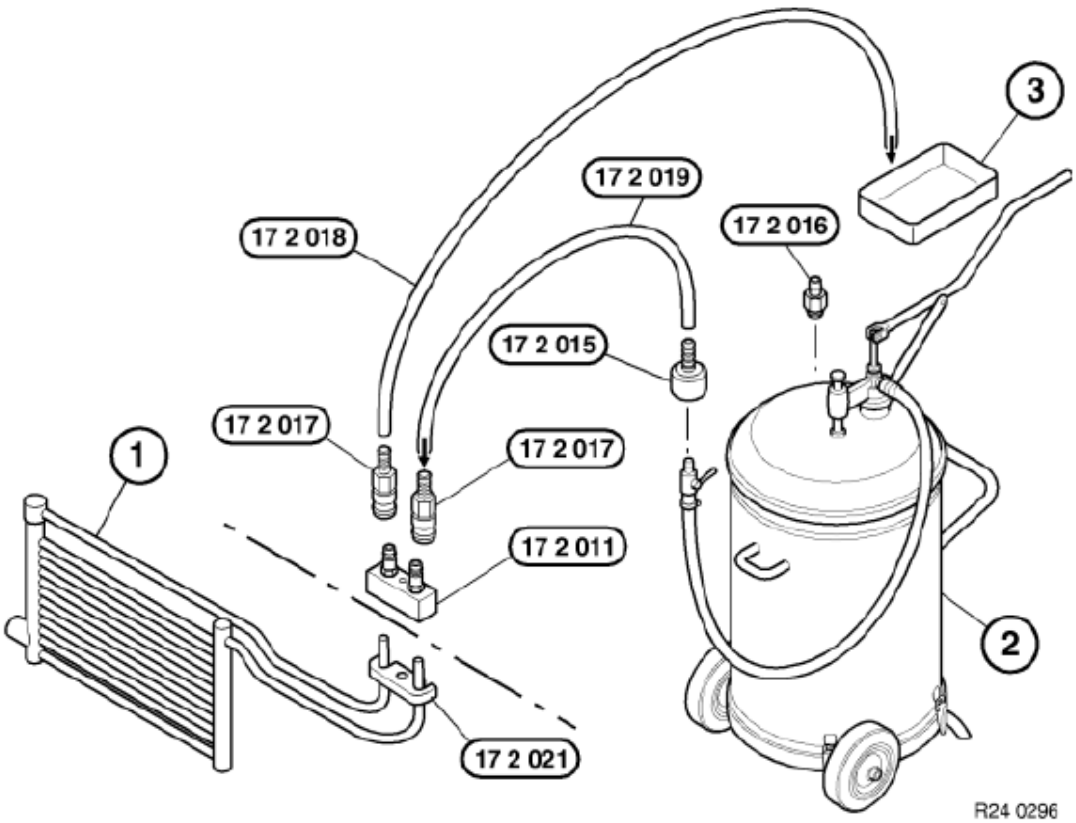
BMW Service Operating Fluids).

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Arrangement, flushing apparatus for transmissions A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 69: Arrangement - Flushing Apparatus For Transmissions (A5S 310Z, A5S 560Z, A5S 360R/390R, A4S 200R, A5S 325Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit

3. Oil drip tray

17 2 011 Adapter for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

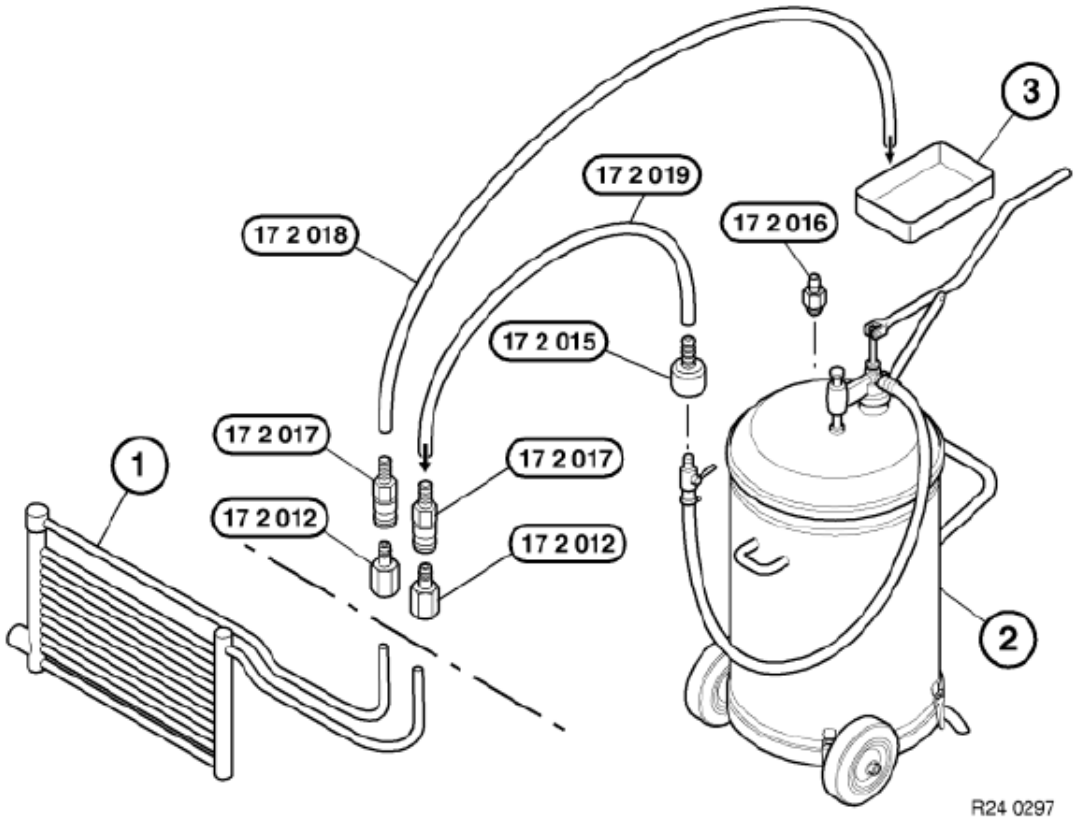
17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 2 021 Mounting plate for adapter 17 2 011 for transmissions A5S 325Z, GA6HP26Z

Arrangement of flushing apparatus for transmission A4S 310R



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 70: Arrangement - Flushing Apparatus For Transmission (A4S 310R)

Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

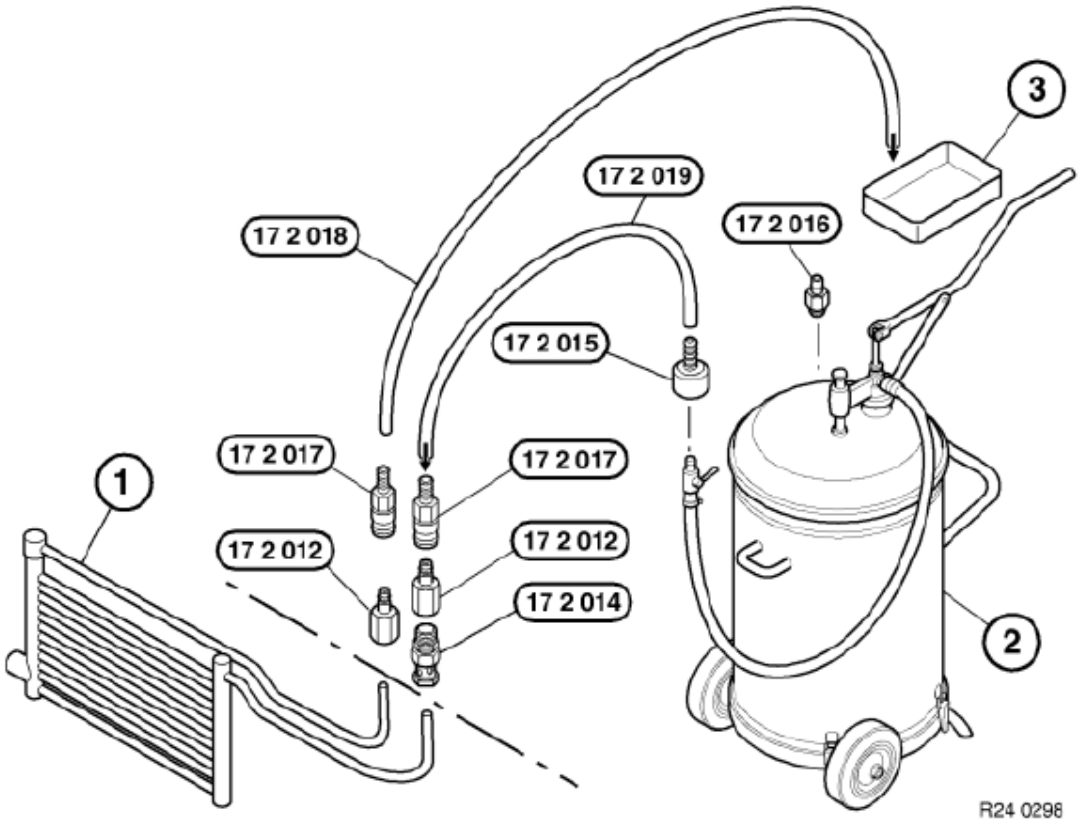
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A4S 300J



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 71: Arrangement - Flushing Apparatus For Transmission (A4S 300J)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 014 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

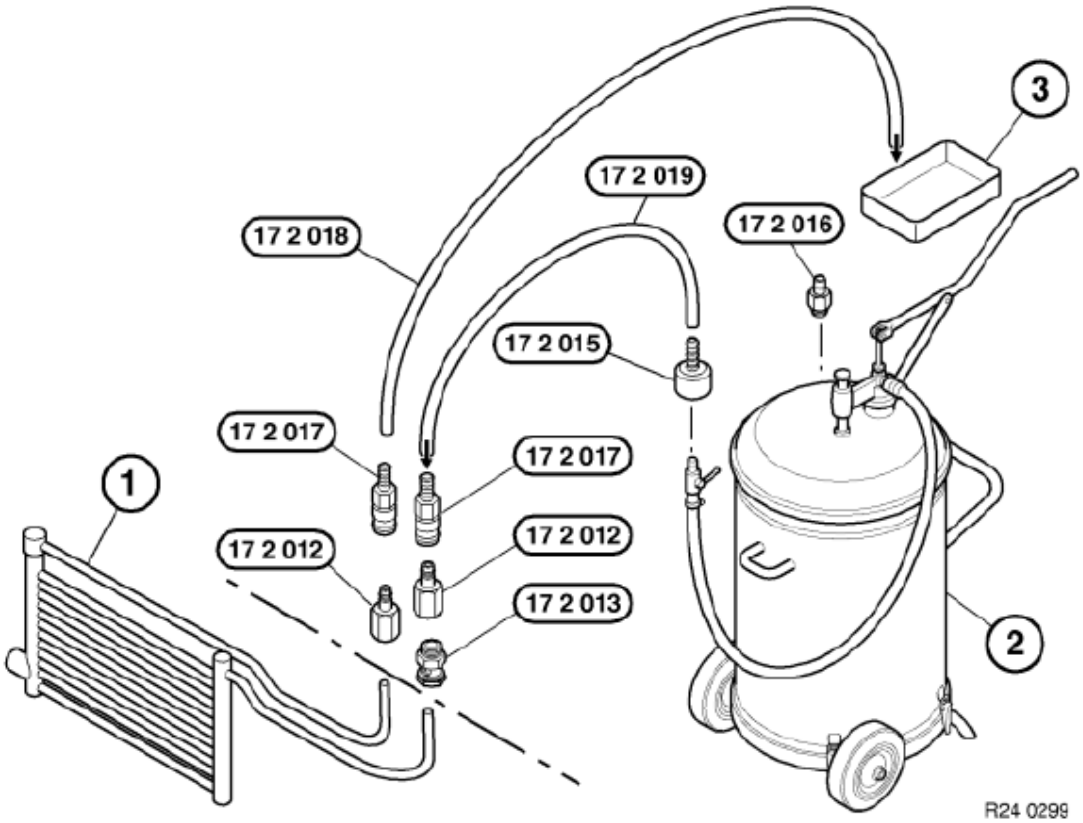
17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

Arrangement of flushing apparatus for transmission A5S 440Z



1) Transmission-oil cooler with lines
2) Oil collection unit
3) Oil drip tray

Fig. 72: Arrangement - Flushing Apparatus For Transmission (A5S 440Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission oil cooler with lines
2. Oil collection unit
3. Oil drip tray

17 2 012 Adapters (2 x) for connecting transmission-side oil cooler lines (1)

17 2 013 Banjo bolt for connecting transmission-side oil cooler lines (1)

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 018 Hose to oil drip tray (3)

17 2 019 Hose to oil collection unit (2)

17 21 500 FLUSHING TRANSMISSION OIL COOLER WITH LINES (AUTOMATIC TRANSMISSION) (GA6HP19Z, GAHP26Z, GA6HP32Z)

NOTE: Carry out the work steps listed when:
Installing a new or replacement transmission.

Procedure

Automatic transmission removed.

Connect appropriate adapters (see description below) to oil lines exiting from automatic transmission.

Connect connecting line 17 2 019 from the oil collection unit with the quick-release coupling.

Connect drain line 17 2 018 using quick-release coupling.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer **AUTOMATIC TRANSMISSION - OPERATING FLUIDS**) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.
Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

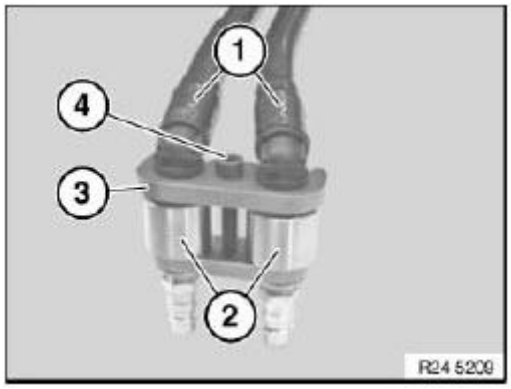


Fig. 73: Identifying Hydraulic Lines, Adapters, Clamping Bar With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for transmissions GA6HP19Z, GA6HP26Z, GA6HP32Z

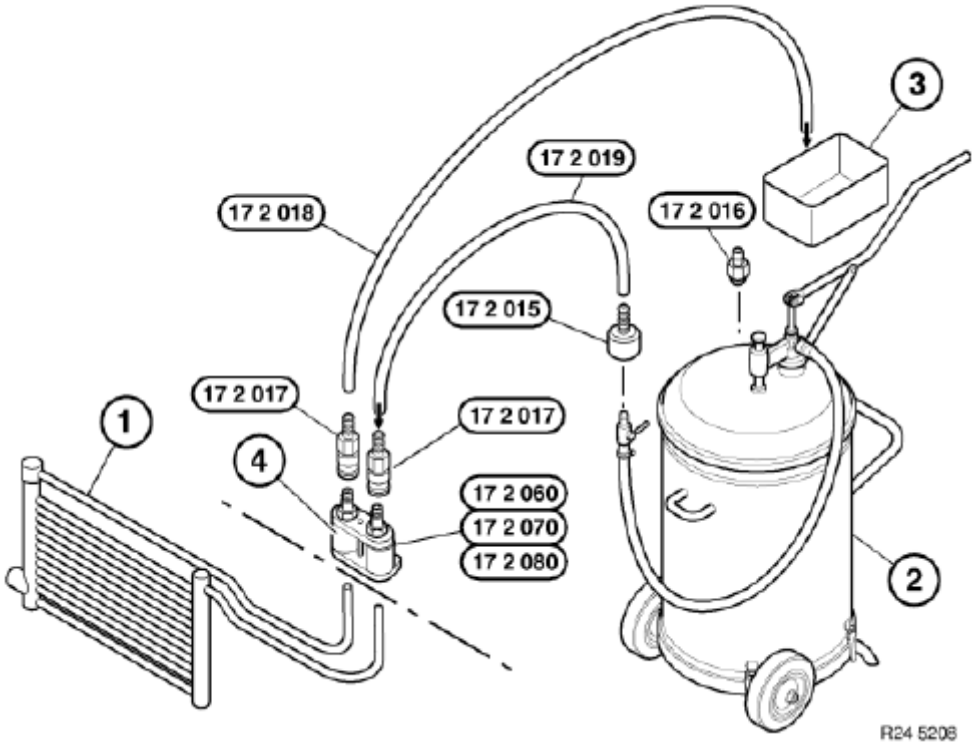


Fig. 74: Arrangement - Flushing Apparatus For Transmissions (GA6HP19Z, GA6HP26Z, GA6HP32Z)
Courtesy of BMW OF NORTH AMERICA, INC.

1. Transmission-oil cooler with lines
2. Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or

17 2 016 Connection for oil collection unit (2), manufacturer: Horn

17 2 017 Quick-release coupling (2 pieces)

17 2 019 Hose to oil collection unit (2)

3. Oil drip tray

   17 2 018 Hose to oil drip tray (3)

4. Adapter with clamping bar

   17 2 060 Adapter with clamping bar for aluminum lines and steel lines with aluminum connection (line diameter 12 mm) GA6HP19Z

   17 2 070 Adapter with clamping bar (line diameter 15 mm) GA6HP26Z, GA6HP32Z, TCT for N54 engine

   17 2 080 Adapter with clamping bar for fuel lines GA6HP26Z

17 22 010 REMOVING AND INSTALLING/REPLACING HEAT EXCHANGER FOR AUTOMATIC TRANSMISSION (N52K)

IMPORTANT: Danger of scalding!
Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Drain **COOLANT**
- Remove **UNDERBODY PROTECTION**

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission fluid emerges when oil lines are detached from heat exchanger.

Catch and dispose of escaping transmission fluid in a suitable container.

Observe country-specific waste-disposal regulations.

Release and disconnect coolant hoses (1).

Unlock transmission fluid lines (2) and detach.

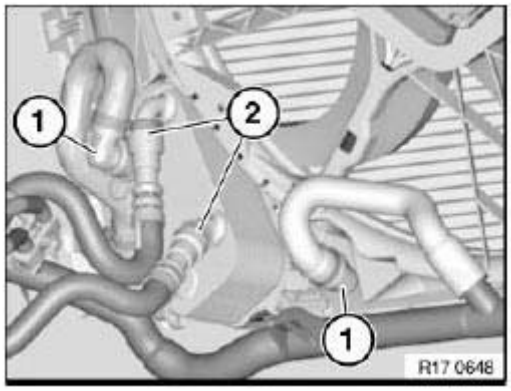


Fig. 75: Identifying Transmission Fluid Lines With Coolant Hoses
Courtesy of BMW OF NORTH AMERICA, INC.

Lay the coolant hose (1) to the side if necessary.

Release screw.

Tightening torque **17 10 6AZ** .

Remove transmission oil cooler.

Fig. 76: Identifying Coolant Hoses With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Assemble engine.**
Check FLUID LEVEL in automatic transmission. If necessary, top up transmission fluid.

1700 COOLANT, CHECKING COOLING SYSTEM

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Protective measures/rules of conduct

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifter).

Recycling:

Observe country-specific waste-disposal regulations.

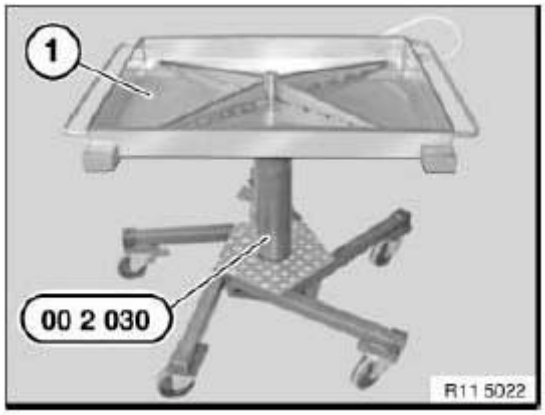


Fig. 1: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open cap on coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

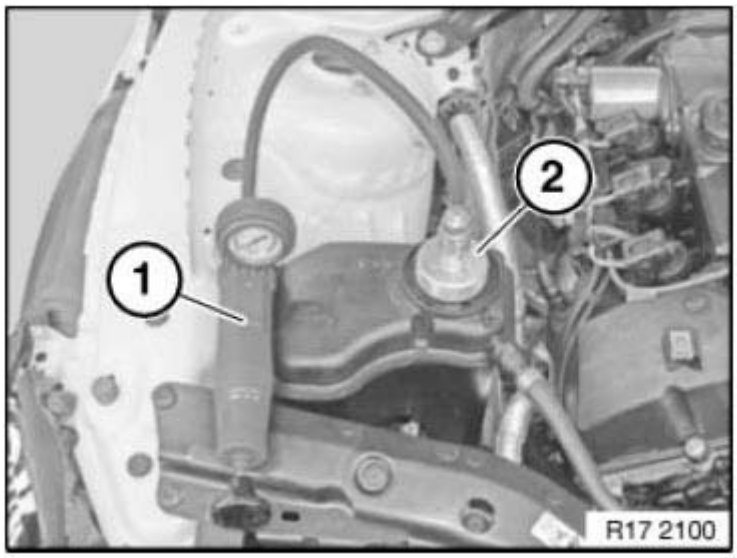


Fig. 2: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101) And (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap

NOTE: **While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.**

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap

Screw cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

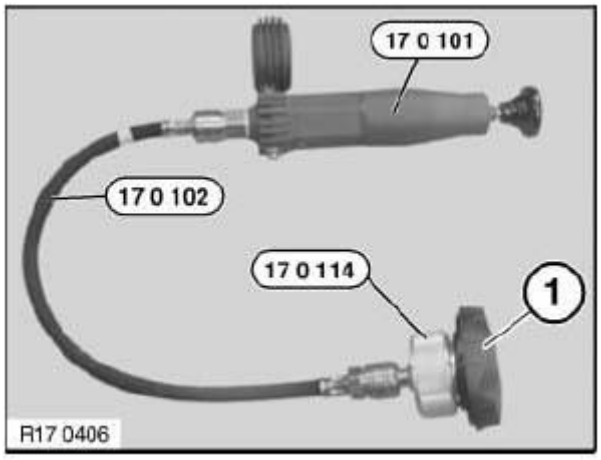


Fig. 3: Checking Pressure Relief Valve In Screw Cap Using Special Tool (17 0 114)
Courtesy of BMW OF NORTH AMERICA, INC.

17 00 515 CHECKING FUNCTION OF RADIATOR AND HEATING SYSTEM

WARNING: Danger of scalding!

Only carry out work on cooling system after engine has cooled down.

Necessary preliminary tasks:

- Switch off ignition.
- Remove air duct.
- Remove fan cowl with electronic fan.

Check production date.

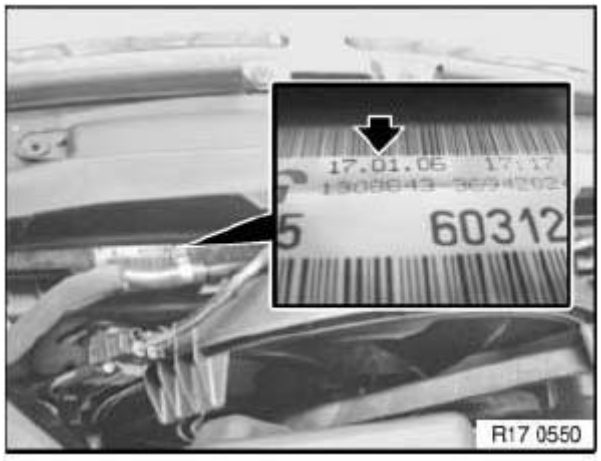


Fig. 4: Locating Production Date
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp off low-temperature feed lines with special tool **13 3 010** .

Function test:

Observe diagnosis instructions.

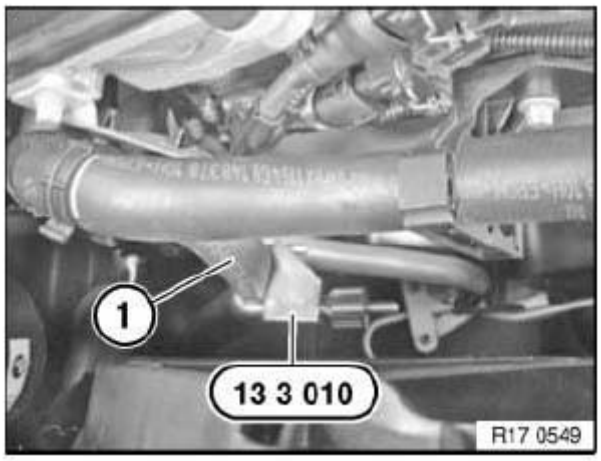


Fig. 5: Identifying Special Tool (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of radiator.

Clamp off low-temperature feed line (1) at coolant pump outlet **or** radiator inlet with special tool **13 3 010** (see arrows).

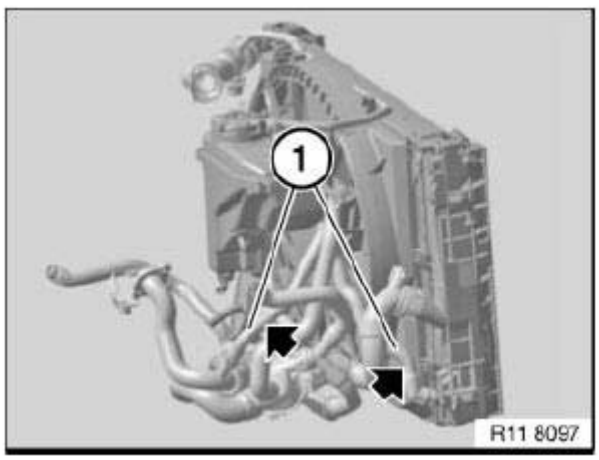


Fig. 6: Locating Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission only

Check function of heat exchanger.

Clamp off low-temperature feed line (1) at coolant pump outlet with special tool **13 3 010** (see arrow).

Clamp off low-temperature feed line (2) at oil-coolant heat exchanger with special tool **13 3 010** (see arrow).

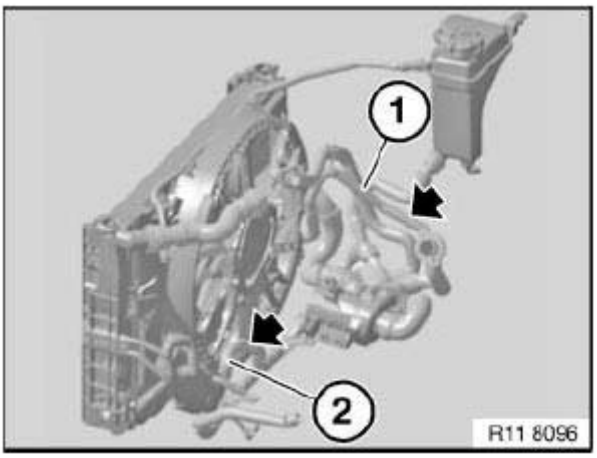


Fig. 7: Locating Low-Temperature Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Check heating and cooling circuits in accordance with diagnosis instruction.

17 00 008 DRAINING AND ADDING COOLANT (N54)

WARNING: Risk of scalding!

This repair work on the cooling system should only be carried out on an engine that has cooled down!

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

Installation note:

Use only recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe **mixture ratio** .

Protective measures/rules of conduct

- Wear safety goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: For dirt contamination of the cooling system (e.g. by engine oil), the cooling system must be rinsed with water until all dirt contamination is removed!

IMPORTANT: Risk of skidding due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

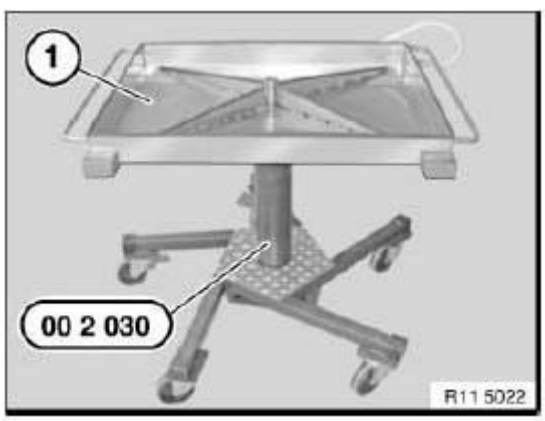


Fig. 8: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary work:

- Remove front **UNDERBODY PROTECTION**
- Remove **FAN COWL**

Draining coolant

Open sealing cap (1) on coolant expansion tank.

Installation note:

Close sealing cap (1) until the arrow marks line up.

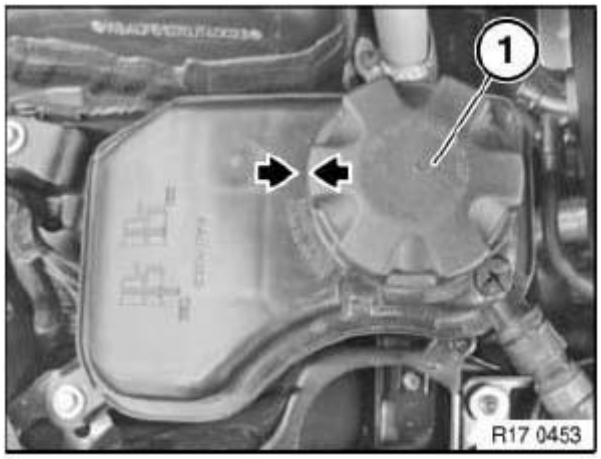


Fig. 9: Locating Sealing Cap And Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten and detach coolant hose (1) from radiator.

Drain, catch and dispose of coolant.

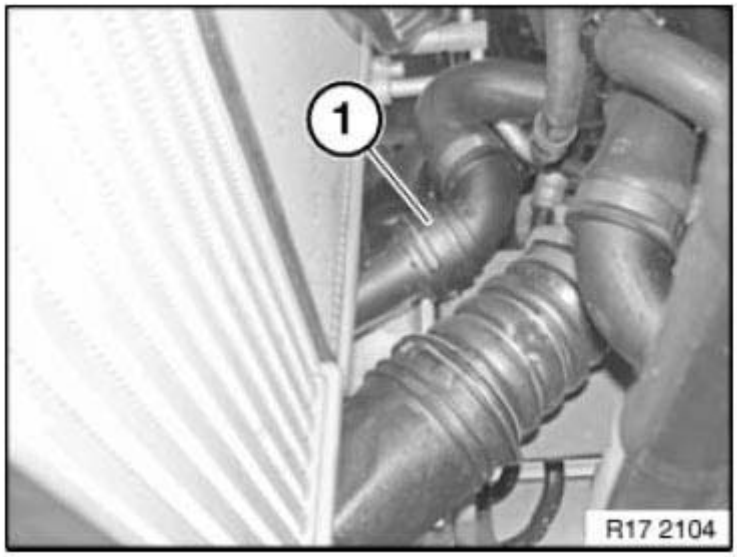


Fig. 10: Identifying Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant

Use recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe **mixture ratio** .

Observe **CAPACITIES** .

Fill and vent **COOLING SYSTEM** .

Observe bleeding instructions without fail.

Assemble engine.

Check **COOLANT SYSTEM** for tightness.

17 00 ... INSTRUCTIONS FOR WORKING ON COOLING SYSTEM

WARNING: Danger of scalding! Work on the cooling system should only be carried out when the engine has cooled down.

IMPORTANT: Wear protective gloves and safety goggles.

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant.

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: Open cooling system only when it has cooled down.

Opening the cooling system while hot can result in air entering the system.

This can cause overheating with permanent damage to the engine.

IMPORTANT: You must protect the alternator against contamination before carrying out any work on the cooling circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Do not fill coolant expansion tank over MAX level as overfilling will cause the coolant to overflow. This may give rise to traces of residual coolant on the expansion tank or in the engine compartment and wrongly suggest possible leakages.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

NOTE: To disconnect coolant hoses, use commercially available disconnect tools such as HAZET brand tools (see table).

HAZET TOOLS DESCRIPTION CHART

HAZET no.:	Description
4590-1	Disconnect tool, length (mm): 150
4590-2	Disconnect tool, length (mm): 180
4590-3	Disconnect tool, length (mm): 253
4590/2	Disconnect/plier set
4590/3	Disconnect/plier set

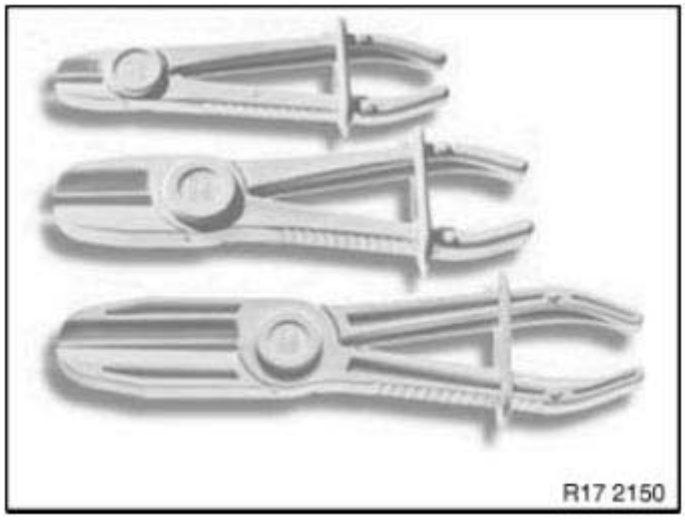


Fig. 11: Identifying Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Tightening torque, hose clamps 17 00 1AZ .

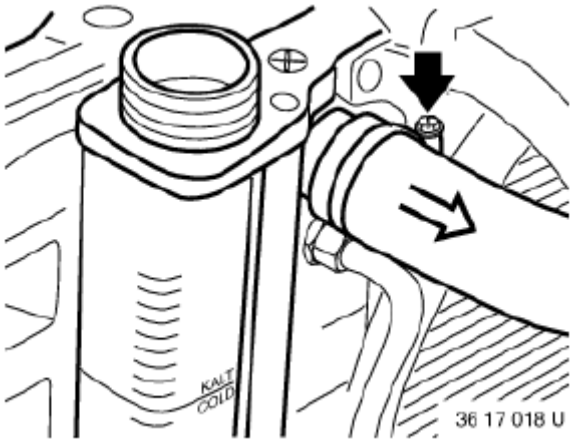


Fig. 12: Locating Hose Clamp Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Instructions for disassembly/assembly of coolant hose quick-connect couplings

Disassembly of quick-connect coupling

Pull out lock (1) and (2). Pull off hose.

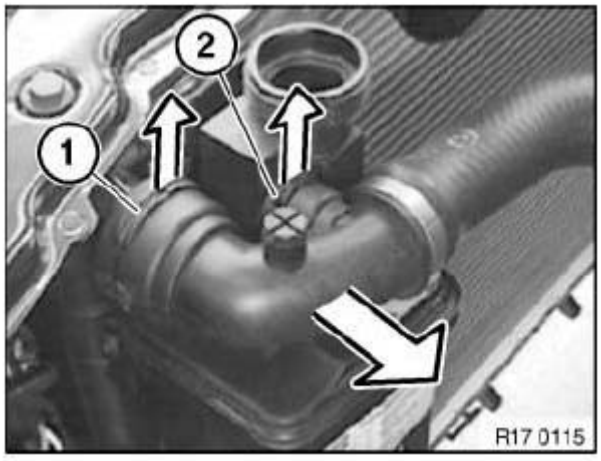


Fig. 13: Disassembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check O-rings (1).

Do not coat O-rings (1) with antiseize agent.

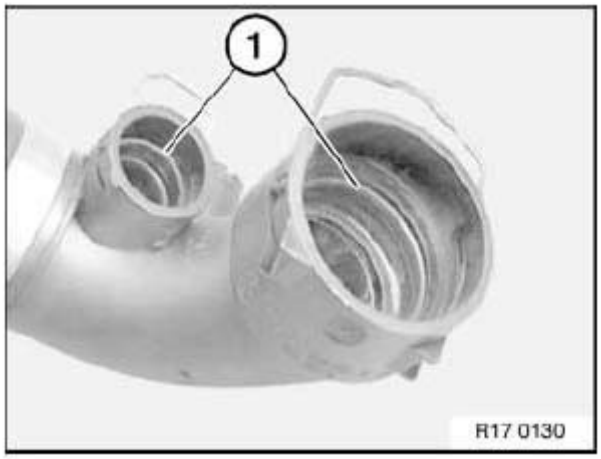


Fig. 14: Identifying O-rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assembly of quick-connect coupling

Press in lock (1) before installing fast-release coupling.

Push on hose.

Quick-connect coupling must clearly snap audibly into place.

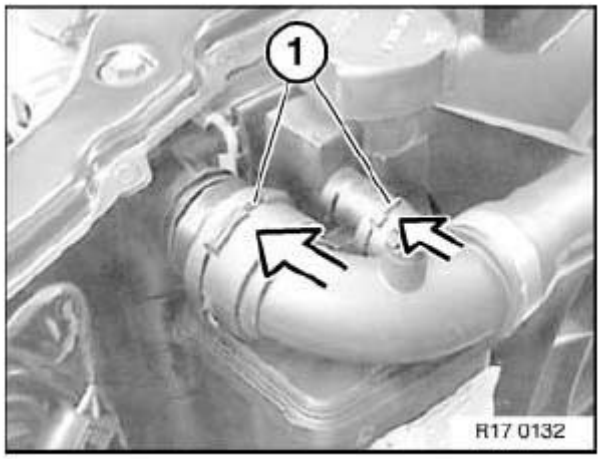


Fig. 15: Assembling Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start stop function is active.

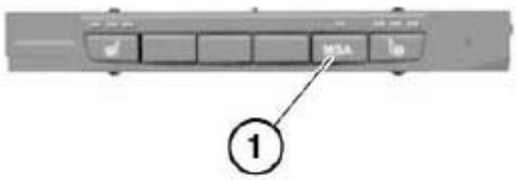
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 16: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

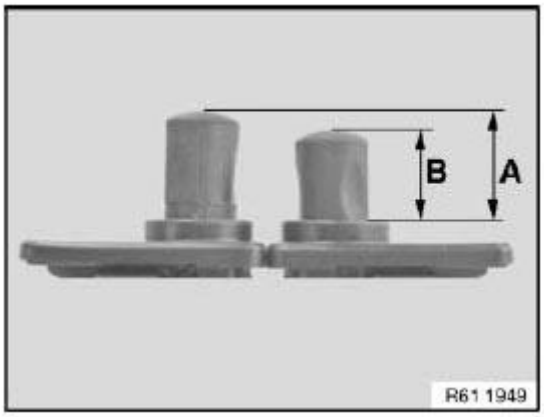


Fig. 17: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

SPECIAL TOOLS DESCRIPTION

Type	Engine	Adapter Y from 17 0 100
E60/E61/E63/E64	All	17 0 113
E65/E66	M54/N52/N62/N62T/N73	17 0 105
E65/E66	M57S/M57T/M67/M67T	17 0 113
E70/E71/E72	All	17 0 113
E81/E82/E84/E87/E88/E89	All	17 0 113
E83	M54/N46/N52K	17 0 105
E83	M47S/M57S/M57T/M57Y/N47	17 0 113
E85/E86	All	17 0 105
E90/E91/E92/E93	All	17 0 113
F01/F02/F03/F04/F07/F10	All	17 0 113
R50/R52	W10	17 0 107 and 17 0 102
R50	W17	17 0 109
R52/R53	W11	17 0 109
R55/R56/R57/R60	All	17 0 109
F25	All	17 0 113

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion

protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of part quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant when carrying out repair work on the cooling circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- Filler unit no. 81 39 2 152 473
- Collecting vessel no. 81 49 2 152 347
- Adapter: **17 0 100**

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifting equipment).

Recycling

Observe country-specific waste disposal regulations.

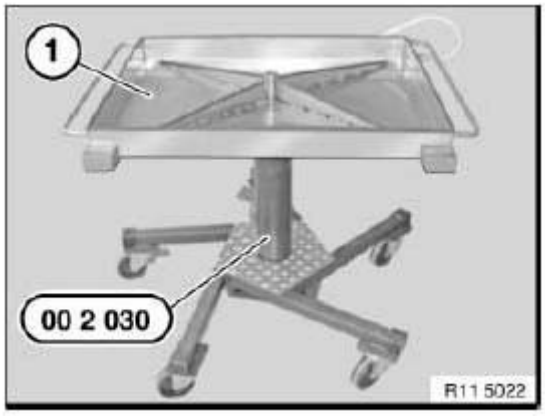


Fig. 18: Lifting Drip Tray Using Special Tool (00 2 030)

Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.

If necessary, replace damaged and porous coolant hoses.

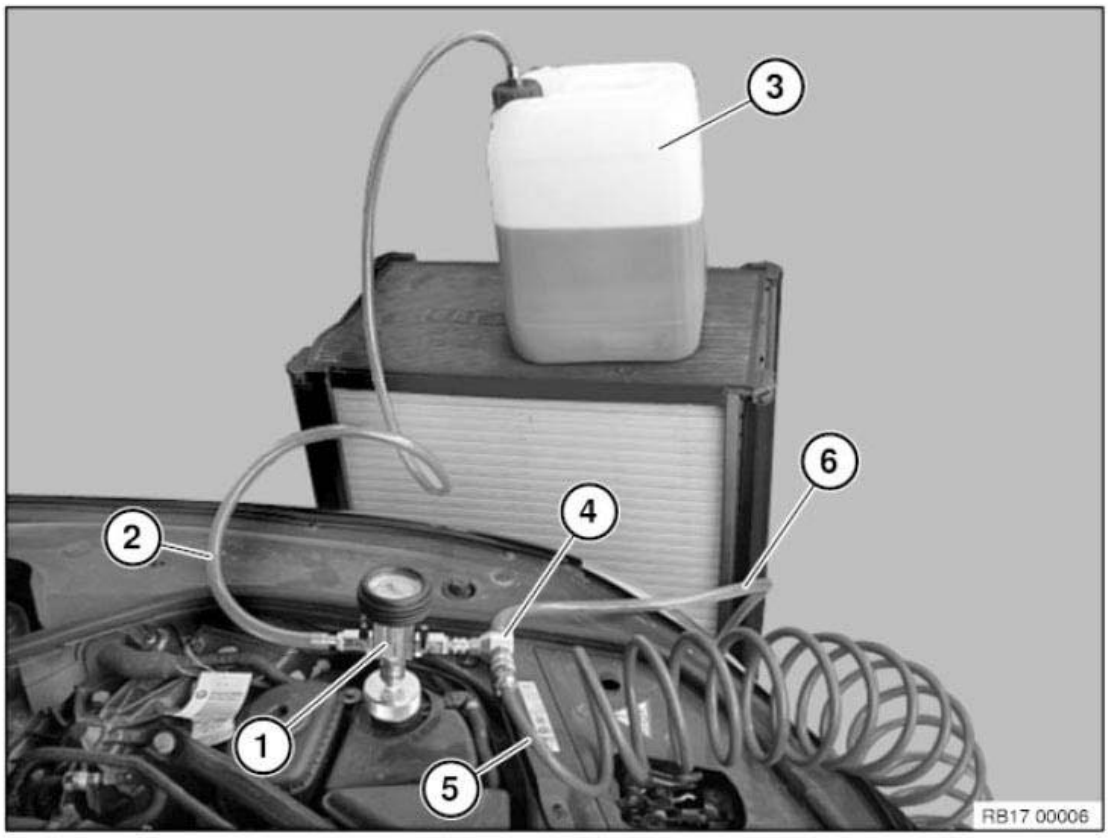


Fig. 19: Identifying Cooling System Components
Courtesy of BMW OF NORTH AMERICA, INC.

- 1) Filling unit with vacuum meter and shut-off values
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

Requirements

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 - 2 liters more than the vehicle filling capacity.

- Use recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .
- Observe **mixture ratio** .
- Observe capacities.

- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set vehicle heater to maximum temperature.

Select adapter (Y) according to table and connect to coolant expansion tank.

Connect filler unit to adapter connection (X).

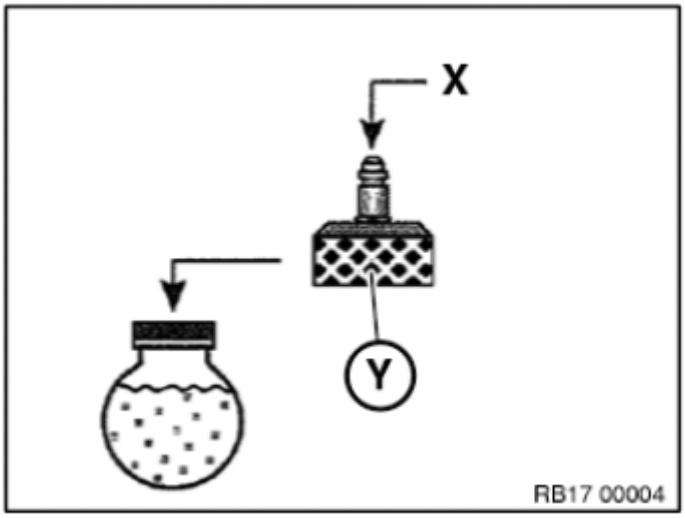


Fig. 20: Identifying Adapter And Adapter Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valves (A) and (B) of the filling unit (1) must be closed.

X) Expansion tank connection

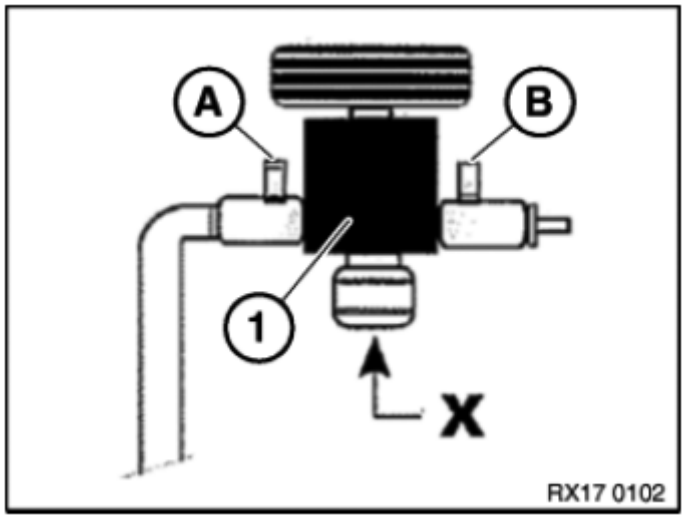


Fig. 21: Identifying Filling Unit Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

X) Expansion tank connection

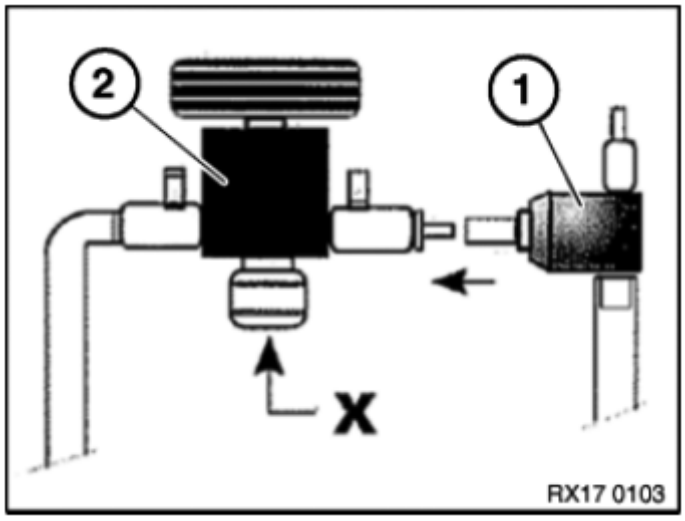


Fig. 22: Connecting Venturi Nozzle To Filling Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1).

X) Expansion tank connection

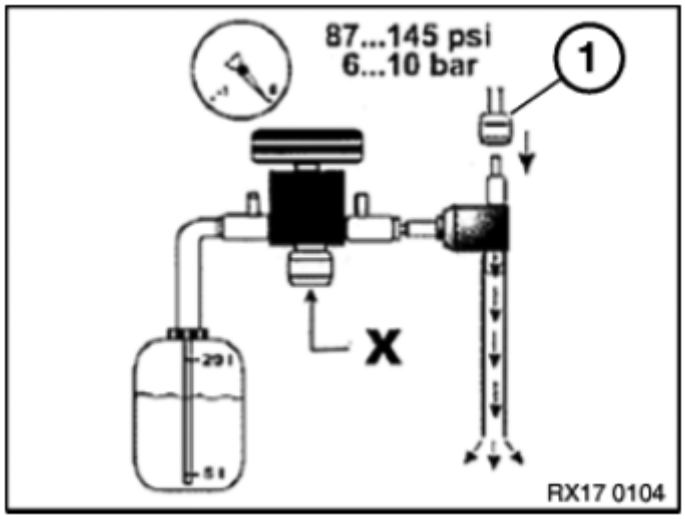


Fig. 23: Connecting Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Open shut-off valve (B).

The venturi nozzle produces a flow noise.

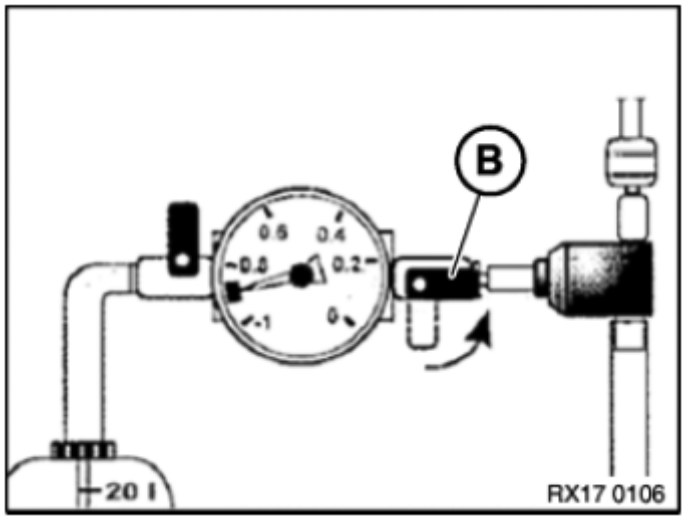


Fig. 24: Opening Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until the filling hose (1) is free of bubbles.

Close shut-off valve (A) again. The filling hose (1) is vented in this way.

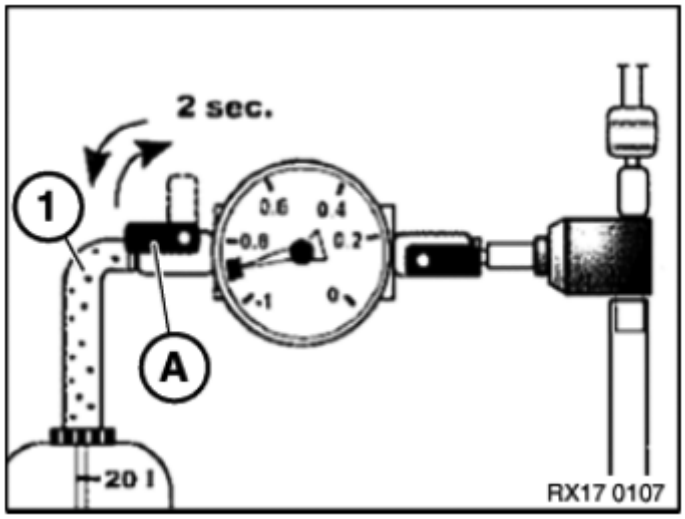


Fig. 25: Opening/Closing Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Generate vacuum in coolant system for approx. 2 minutes. The final vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale on the vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

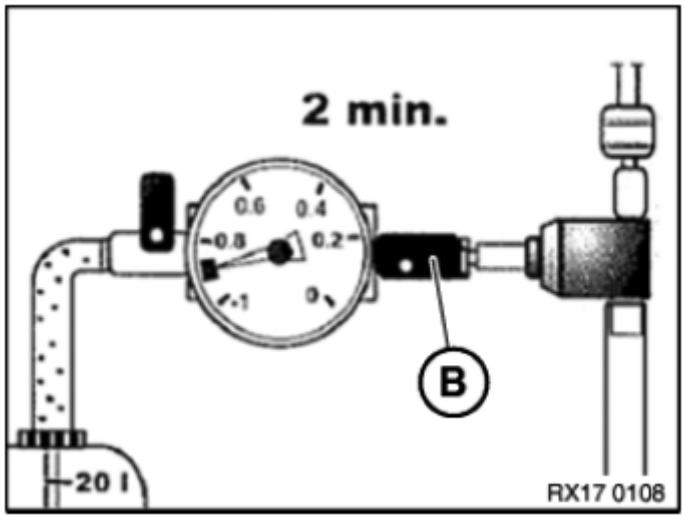


Fig. 26: Identifying Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal Venturi nozzle (1).

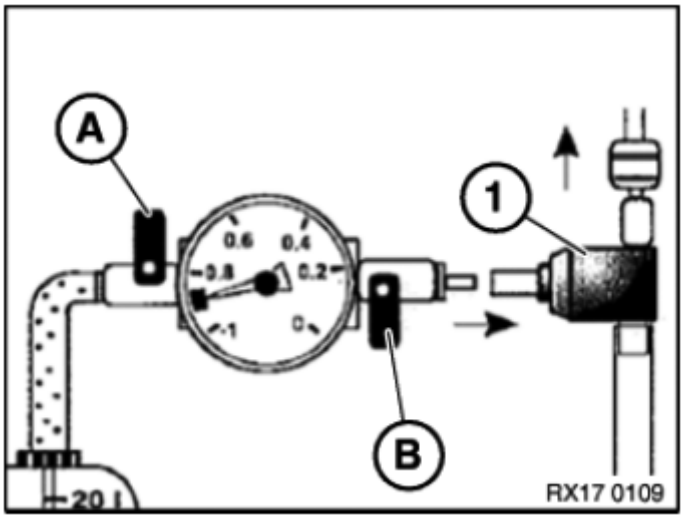


Fig. 27: Sealing Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must hold the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check cooling system for leaks.

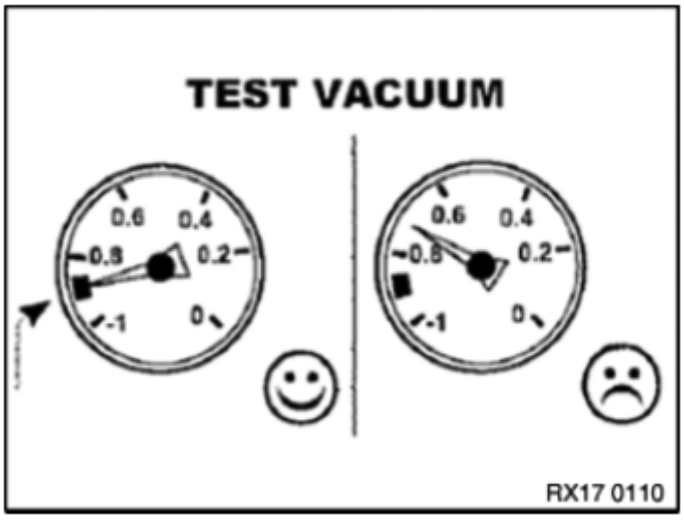


Fig. 28: Testing Cooling System Vacuum
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently premixed coolant in the filling unit container, 1 - -2 liters more than the vehicle filling capacity.

Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

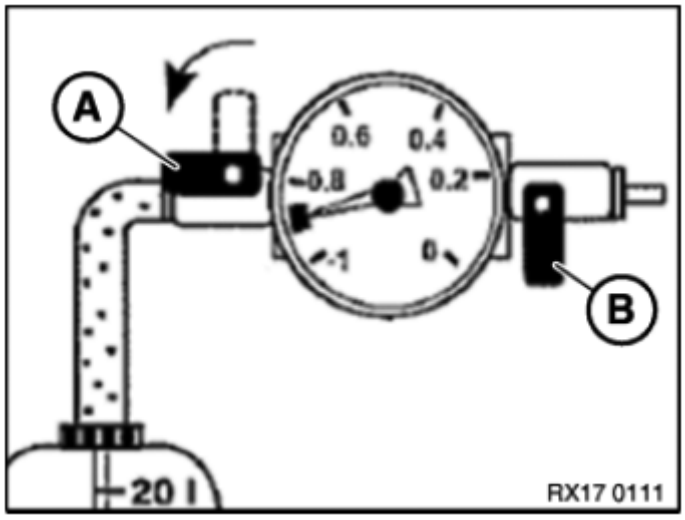


Fig. 29: Opening Shut-Off Valve To Filling Unit Container
Courtesy of BMW OF NORTH AMERICA, INC.

Coolant is now added.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, reduce remaining vacuum. Open shut-off valve (B) to do so.

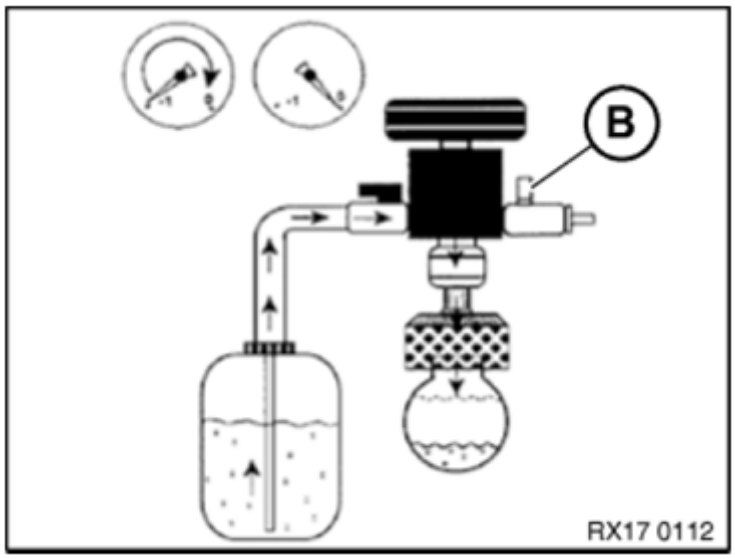


Fig. 30: Identifying Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Remove filling unit with adapter from expansion tank.

Close coolant expansion tank.

Check function of cooling system.

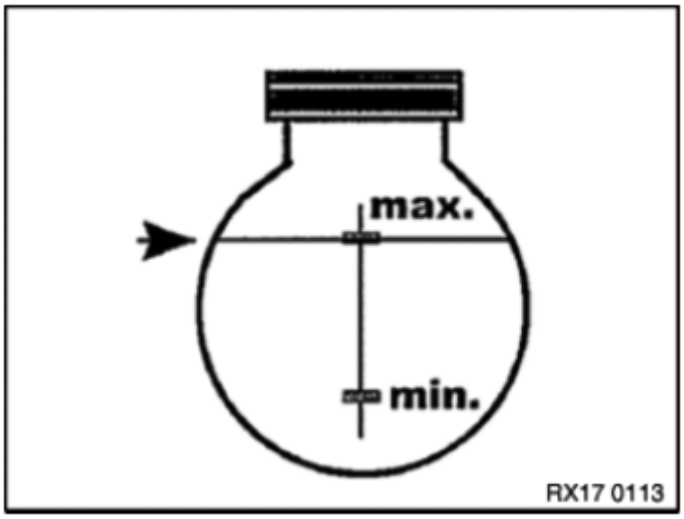


Fig. 31: Adjusting Coolant Level To Max
Courtesy of BMW OF NORTH AMERICA, INC.

Check cooling system for leaks.

Venting and filling cooling system with vacuum filling unit

17 00 039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of coolant, replace these quantities which have been drained with new coolant.

IMPORTANT: You must protect the alternator against contamination by coolant before carrying out any work on the coolant circuit.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Note on ordering:

- Workshop equipment
- Workshop equipment catalogue
- No.- 81 93 2 152 473

IMPORTANT: Risk of slipping due to coolant on the floor.

Risk of injury!

Catch and dispose of emerging coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifter).

Recycling

Observe country-specific waste-disposal regulations.

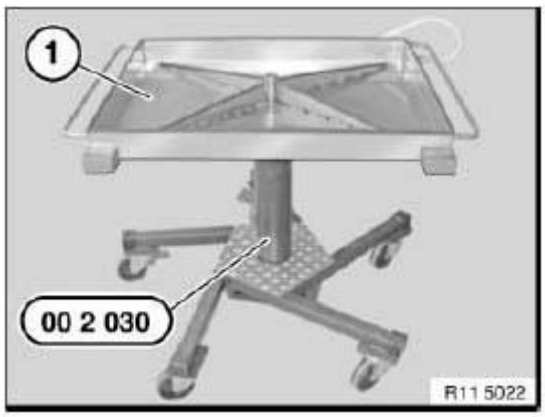


Fig. 32: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check all the coolant hoses before filling the cooling system with the vacuum filling unit.

If necessary, replace damaged and porous coolant hoses.

NOTE: Following graphics shows F01, procedure for other model series is identical.

Vacuum filling unit consists of

- 1) Filling unit with vacuum meter and shut-off valves
- 2) Filler hose
- 3) Coolant container
- 4) Venturi nozzle
- 5) Compressed-air connection (max. 6 bar)
- 6) Outgoing-air hose (lead outgoing-air hose into a collecting container)

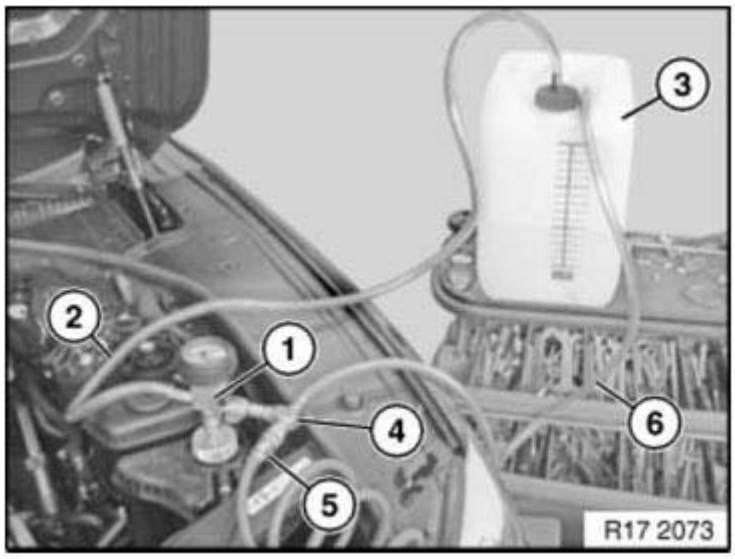


Fig. 33: Identifying Vacuum Filling Unit Components
Courtesy of BMW OF NORTH AMERICA, INC.

Preconditions

- Cooling system expansion tank must be empty.
- There must be sufficiently premixed coolant in the filling unit container, 1 _ 2 liters more than the vehicle filling capacity.
  - Use recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .
  - Observe **mixture ratio** .
  - Observe **FILLING CAPACITIES** .
- Position the filling unit container at the same height as the coolant expansion tank.
- Compressed-air connection with 6 bar pressure present.
- Set heating to maximum temperature.

Application

Connect filling unit (1) with adapter (2) 17 0 113 to coolant expansion tank.

Shut-off valves (A) and (B) must be closed.

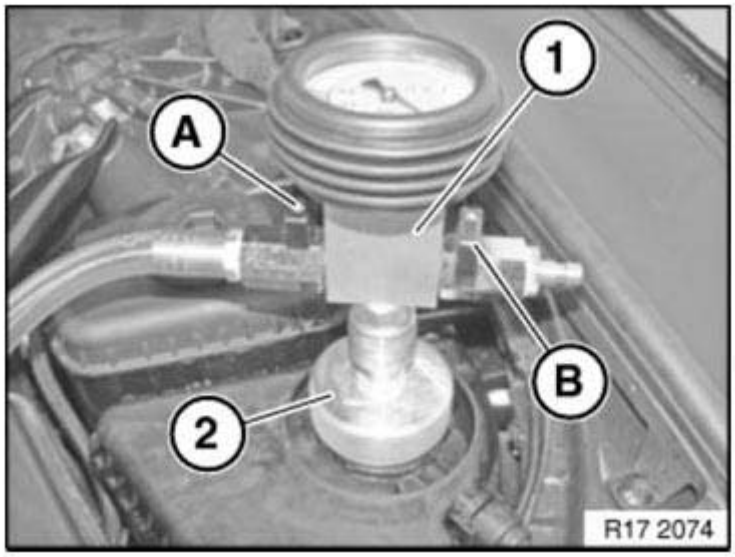


Fig. 34: Identifying Coolant Filling Unit With Adapter And Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Connect venturi nozzle (1) to filling unit (2).

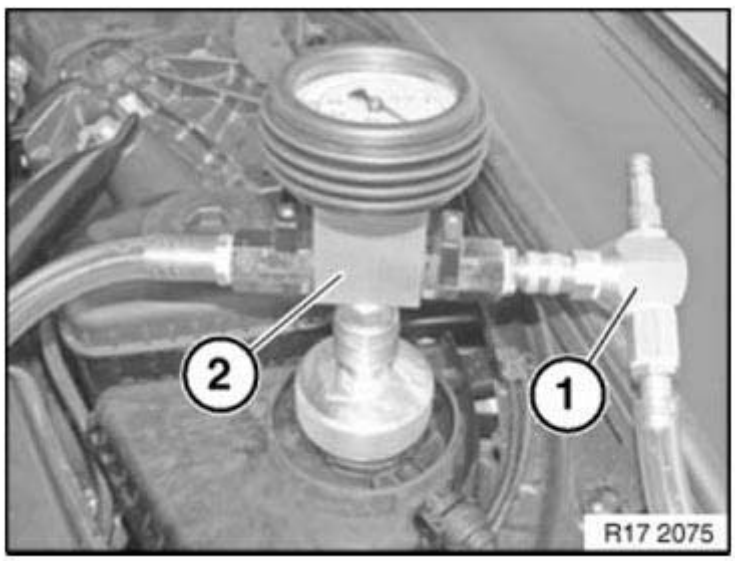


Fig. 35: Identifying Coolant Filling Unit With Venturi Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Connect compressed air (1) and open shutoff valve (B).

The venturi nozzle produces a flow noise.

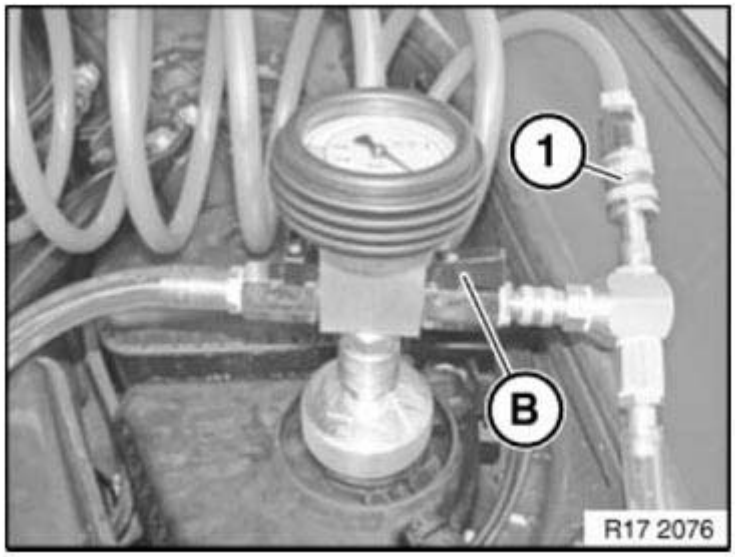


Fig. 36: Identifying Shut-Off Valve With Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Then open shut-off valve (A) until filler hose (1) is filled without bubbles. Close shut-off valve (A) again. This vents the filler hose (1).

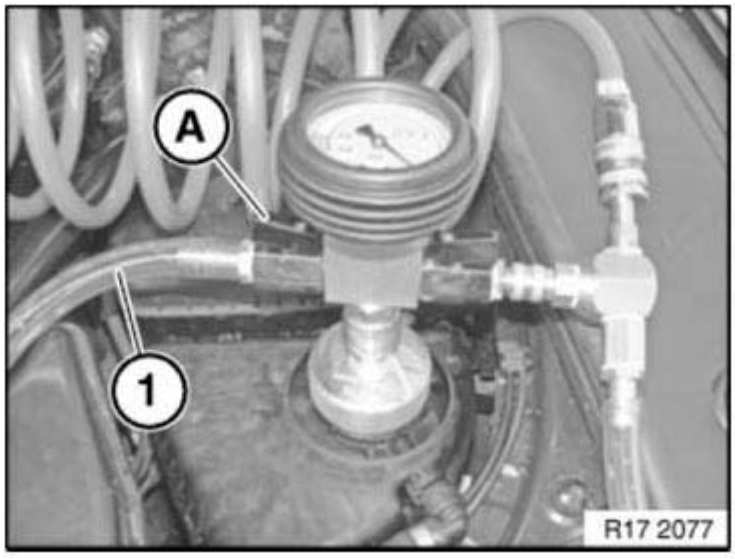


Fig. 37: Identifying Coolant Filling Hose With Shut-Off Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Shut-off valve (B) remains open. Approx. 1 minute. Generate vacuum in cooling circuit. The end vacuum is reached at a vacuum of -0.7 to -0.95 bar. Green scale in vacuum meter.

NOTE: The coolant hoses contract during vacuum build-up.

Then close shut-off valve (B) again.

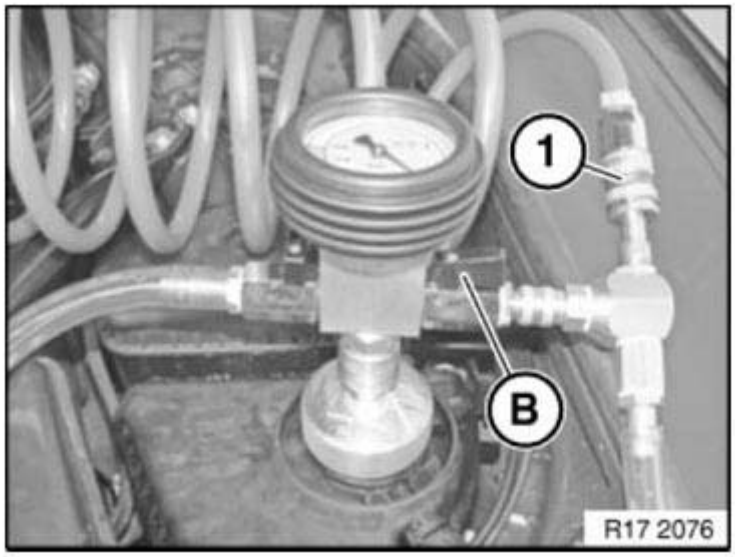


Fig. 38: Identifying Shut-Off Valve With Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Both shut-off valves (A) and (B) must be closed. Then seal venturi nozzle (1).

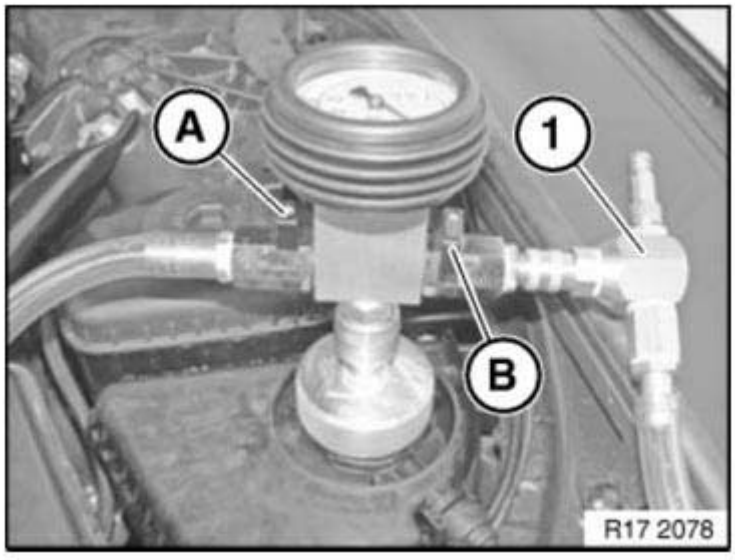


Fig. 39: Identifying Venturi Nozzle With Shut Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

The cooling system must maintain the vacuum for 30 seconds. If the needle in the vacuum meter falls, this indicates a leak in the cooling system.

If the vacuum remains constant, proceed with filling.

In event of leaks, check **COOLING SYSTEM FOR LEAKS** .

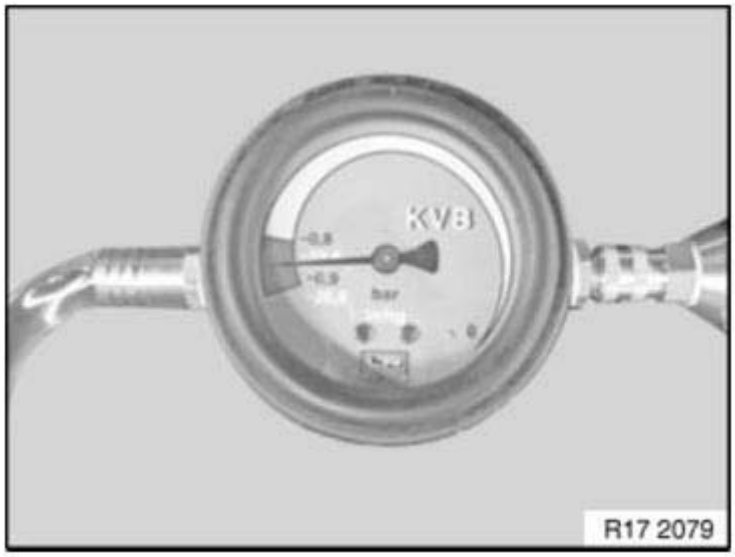


Fig. 40: Checking Cooling System For Leaks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be sufficiently PREMIXED COOLANT in the filling unit container, 1 2 liters more than the vehicle filling capacity.

Position the filling unit container at the same height as the coolant expansion tank.

Shut-off valve (B) remains closed during the filling process.

To fill the cooling system, open shut-off valve (A) to filling unit container.

Coolant is now added.

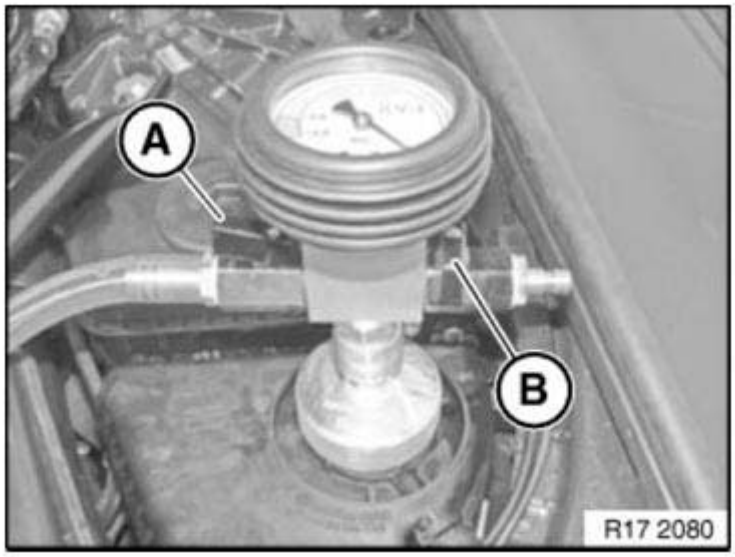


Fig. 41: Identifying Cooling System Shut-Off Valves
Courtesy of BMW OF NORTH AMERICA, INC.

The filling process is finished when the needle in the vacuum meter is at 0 bar or no longer falls.

If necessary, release remaining vacuum. To do so, open shut-off valve (B).

Remove filling unit with adapter from expansion tank.

Adjust coolant level to max.

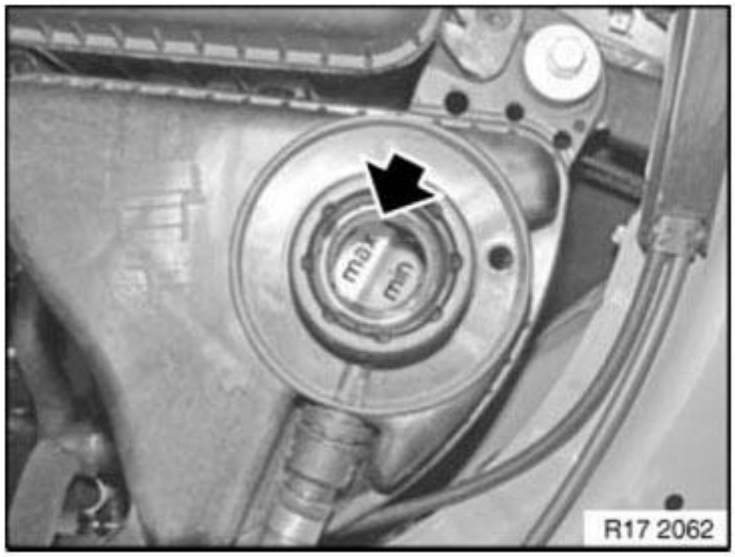


Fig. 42: Identifying Coolant Level
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

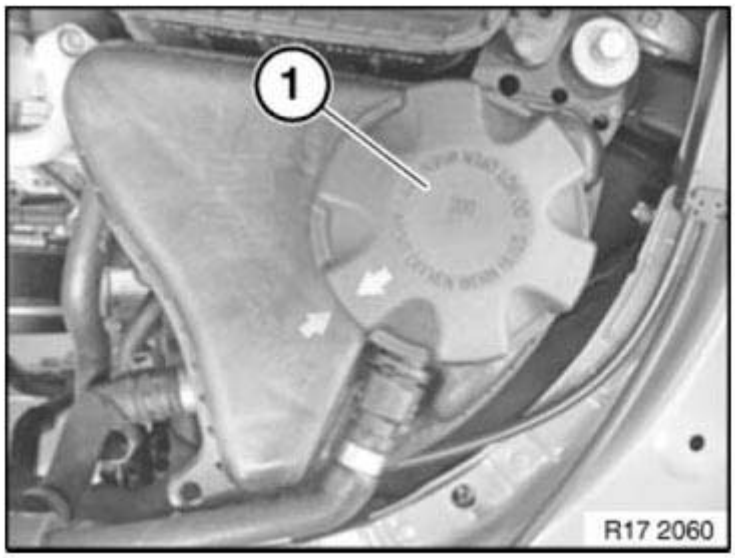


Fig. 43: Identifying Coolant Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Check function of cooling system.

Check **COOLING SYSTEM FOR LEAKS** .

17 00 039 VENTING COOLING SYSTEM AND CHECKING FOR WATER LEAKS (N54)

WARNING: Danger of scalding!

Open sealing cap only after engine has cooled down.

IMPORTANT: Electric coolant pump!

FOLLOW INSTRUCTIONS FOR WORKING ON COOLING SYSTEM .

IMPORTANT: Lifetime coolant filling:

Never reuse used coolant!

When replacing and removing components which rely on the corrosion protection effect of the coolant, it is essential to change the coolant. The cooling system must therefore be drained and refilled.

In the case of other removal work involving the draining of partial quantities of

coolant, replace these quantities which have been drained with new coolant.

Only when refilling!

Use recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** .

Observe **mixture ratio** .

Perform filling operation slowly.

Adjust coolant level to MAX.

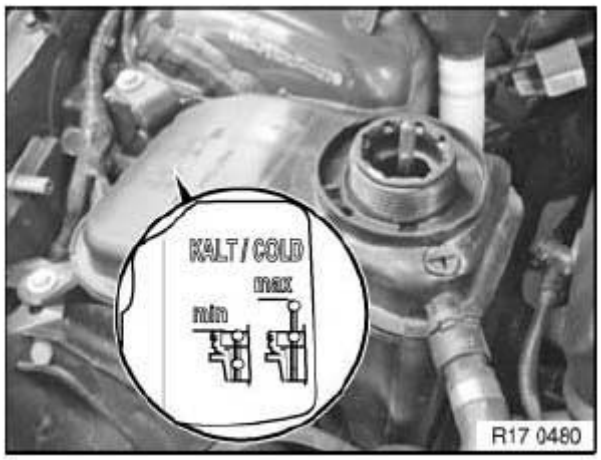


Fig. 44: Identifying Coolant Level To MAX
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

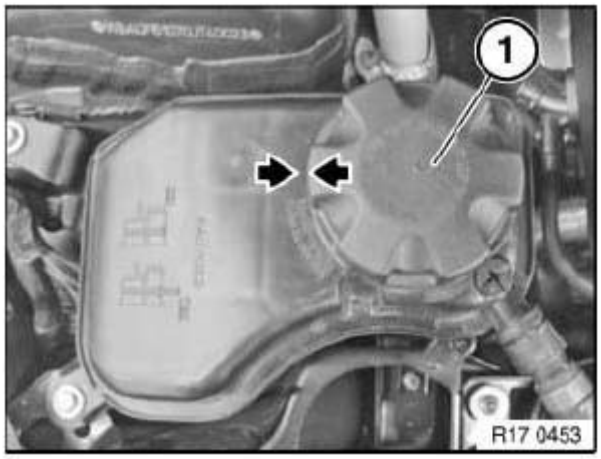


Fig. 45: Locating Sealing Cap And Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following venting procedure is necessary e.g. when a part is replaced in the cooling system or when the cooling system is refilled.

Vehicles with independent heating only

Open vent screw (1).

Tightening torque **17 00 4AZ** .

Slowly fill coolant expansion tank with recommended coolant. See **COOLING SYSTEM - OPERATING FLUIDS** . .

Close vent screw (1) after coolant emerges.

Installation:

Have a cleaning cloth ready and mop up emerging coolant.

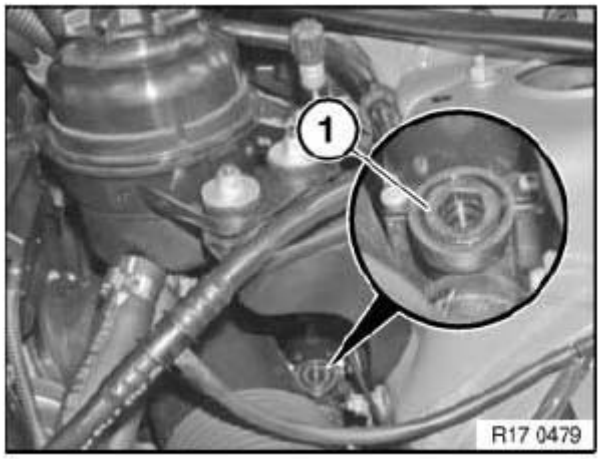


Fig. 46: Identifying Vent Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Adding coolant

NOTE: **Open vent screw (1).**

Fill coolant expansion tank up to lower edge of filler neck with recommended coolant. See COOLING SYSTEM - OPERATING FLUIDS . .

Observe mixture ratio .

Close bleed screw (1).

Close cap on expansion tank.

Installation:

Have a cleaning cloth ready and mop up emerging coolant.

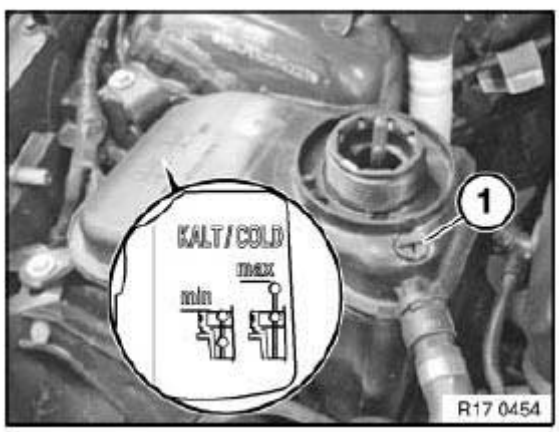


Fig. 47: Identifying Vent Screw

Courtesy of BMW OF NORTH AMERICA, INC.

Only when venting!

NOTE: Do not open the coolant expansion tank cap during the venting procedure.

1. **Connect battery charger.**
2. **Switch on ignition.**
3. **Set heater to maximum temperature and turn fan down to lowest speed.**
4. **Press accelerator pedal for 10 seconds to floor. Engine must not be started.**
5. **The venting procedure is started when the accelerator pedal is pressed and takes approx. 12 minutes. (Electric coolant pump was activated and shuts down automatically after approx. 12 minutes).**
6. **Then top up fill level in coolant expansion tank with 100 ml above max (see illustration).**
7. **Check cooling system for leaks.**
8. **If venting has to be carried out again (e.g. if cooling system is leaking), allow DME to fall completely (leave ignition key removed for approx. 3 minutes), then repeat from Point 3.**

Only when venting!

Perform filling operation slowly.

Fill coolant expansion tank with 100 ml above max.

100 ml corresponds to A=6 mm.

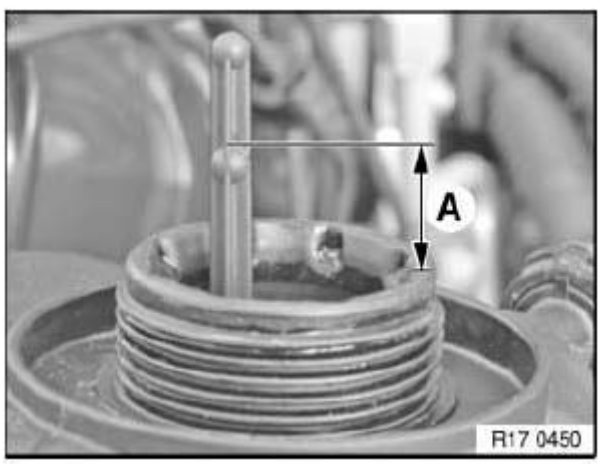


Fig. 48: Identifying Coolant Expansion Tank Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Close coolant expansion tank.

Installation:

Close cap (1) until the arrow marks line up.

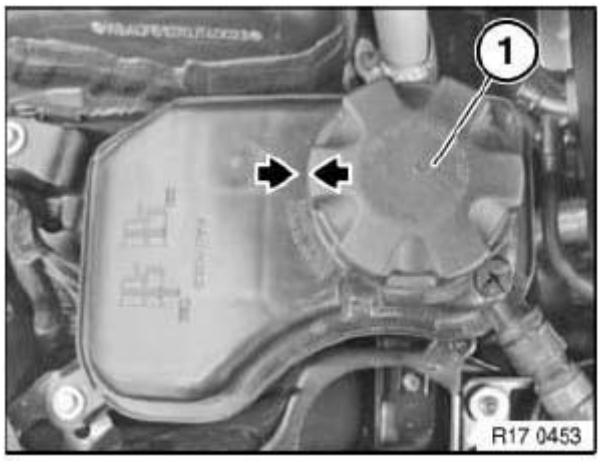


Fig. 49: Locating Sealing Cap And Coolant Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

1710 RADIATOR, EXPANSION TANK, PIPES

17 00 009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Protective measures/rules of conduct

- Wear protective goggles
- Wear protective gloves
- Observe national/country-specific regulations

IMPORTANT: Risk of slipping due to coolant on the floor.

Danger of injury!

Catch and dispose of drained coolant in drip tray (1) and if necessary special tool **00 2 030** (universal hydraulic lifter).

Recycling

Observe country-specific waste-disposal regulations.

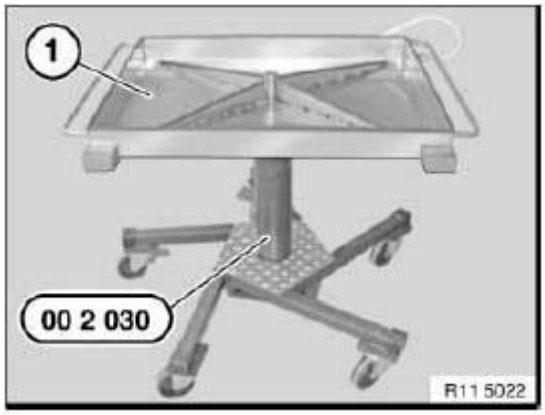


Fig. 50: Lifting Drip Tray Using Special Tool (00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure drop in cooling system

Open cap on coolant expansion tank. Fit special tools (1) 17 0 101 and (2) 17 0 113.

Build up **GAUGE PRESSURE** and wait approx. 2 minutes.

Cooling system is impervious to leaks if pressure drop is max. 0.1 bar.

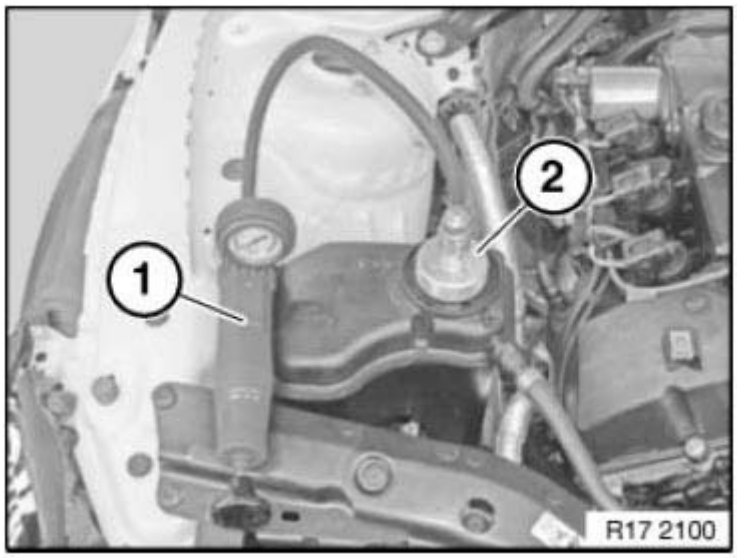


Fig. 51: Checking Pressure Drop In Cooling System Using Special Tools (17 0 101) And (17 0 113)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking pressure relief valve in cap

NOTE: **While the vehicle is driven at high outside temperatures, the design may cause the pressure relief valve in the cap to open slightly and air together with dissolved coolant to escape. This coolant vapor condenses on the surface of the expansion tank and leaves traces when the vehicle has cooled down. These traces do not indicate whether the cap is defective or not. When the vehicle has been parked up for an extended period of time, the residual escaping coolant can cause the pressure relief valve in the cap to stick; therefore check the cap again 2 to 3 times.**

Replace the cap only after you have checked three times and there is an incorrect opening pressure.

Checking pressure relief valve in cap

Screw cap (1) onto special tool 17 0 114.

Build up pressure with special tool (hand pump) 17 0 101; observe pressure gauge to ascertain when opening pressure is achieved.

Compare **OPENING PRESSURE** of pressure relief valve.

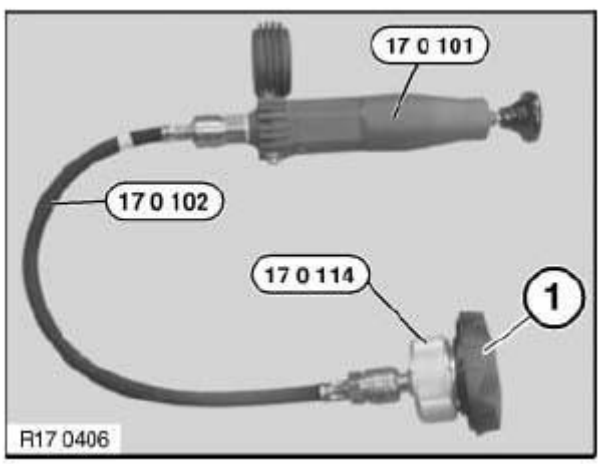


Fig. 52: Checking Pressure Relief Valve In Screw Cap Using Special Tool (17 0 114)
Courtesy of BMW OF NORTH AMERICA, INC.

1711 ENGINE RADIATOR WITH ATTACHMENT

17 11 052 REMOVING AND INSTALLING LEFT MODULE CARRIER (N52K, N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Remove **FAN COWL**
- **54 only:**

Remove **INTERCOOLER**

Release bolts (1) on radiator on left and right.

Tightening torque **17 10 2AZ** .

Do **not** unfasten or detach coolant hose (2).

Do **not** drain coolant.

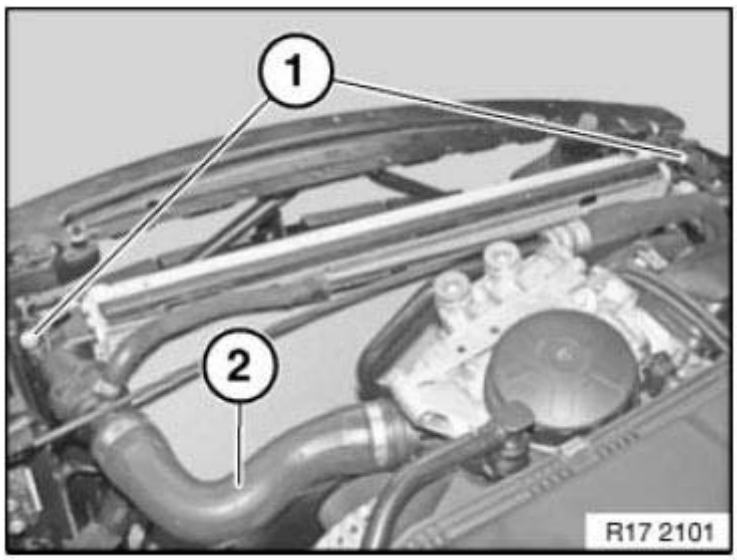


Fig. 53: Identifying Radiator Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Slide radiator and condenser slightly towards rear.

Feed out left module carrier (1) and remove towards top.

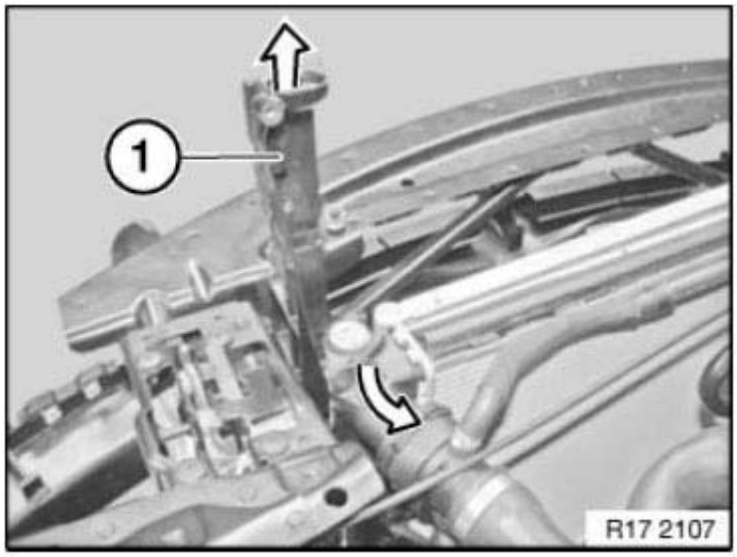


Fig. 54: Removing Left Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

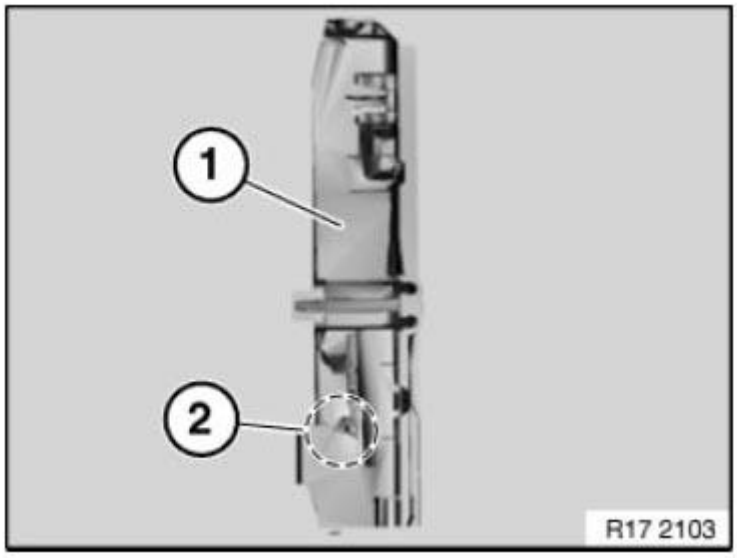


Fig. 55: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

17 11 000 REMOVING AND INSTALLING RADIATOR (N52K, N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks

- Remove **FAN COWL**
- Draining **COOLANT**
- Unlock coolant hoses and detach
- **54 only:**

Remove **INTERCOOLER**

Release bolts (1) on radiator on left and right.

Tightening torque **17 10 2AZ** .

Unlock and detach coolant hose (2).

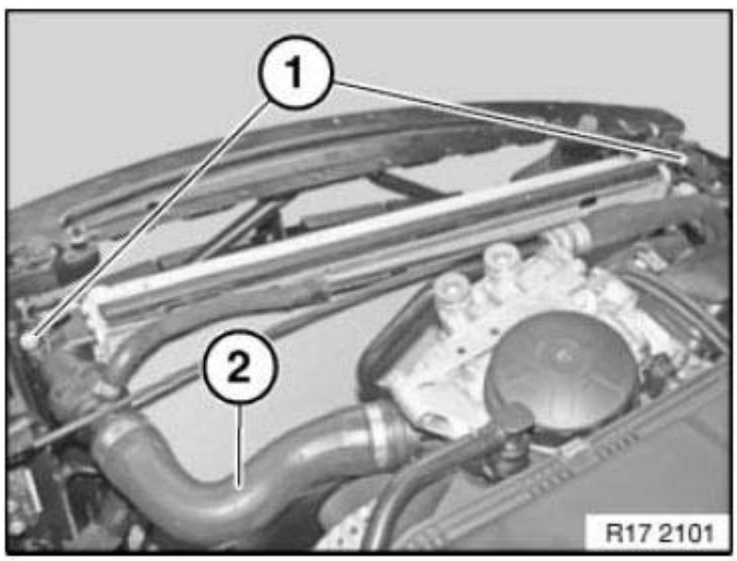


Fig. 56: Identifying Radiator Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out module carrier (1) on left.

Feed out radiator (2) and remove towards top.

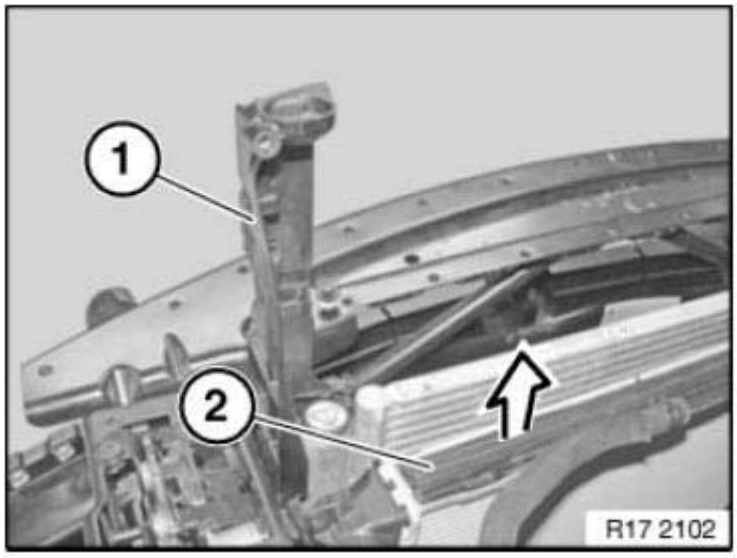


Fig. 57: Removing Radiator
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling the radiator and module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

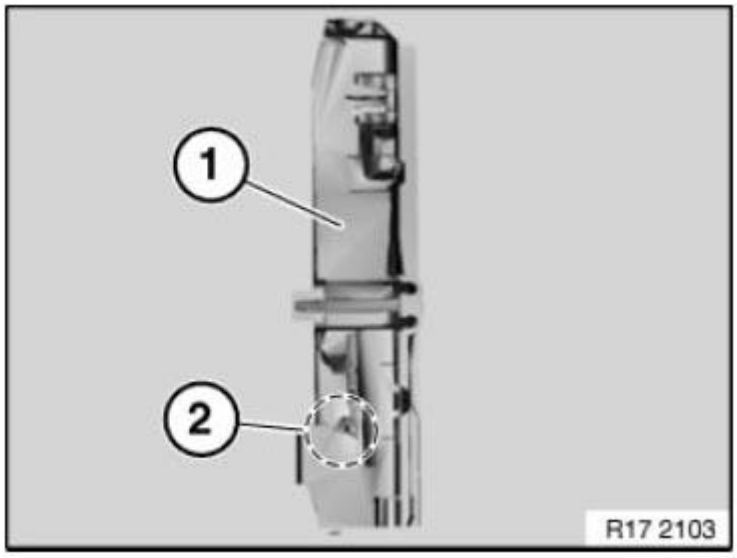


Fig. 58: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Check **COOLING SYSTEM** for leaks.

17 11 054 REMOVING AND INSTALLING RIGHT MODULE CARRIER (N52K, N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

WARNING: Risk of injury!

Refrigerant circuit is under high pressure!

Follow safety INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A .

Avoid contact with refrigerant and refrigerant oil

Follow safety instructions for 64 50 ... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT OIL .

IMPORTANT: Risk of damage!

Restart engine only when A/C system has been correctly filled.

Follow INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT for opening and replacing parts in refrigerant circuit.

If A/C system is opened for more than 24 hours:

Replace DESICCANT INSERT for A/C system.

Necessary preliminary tasks

- Remove left **MODULE CARRIER**
- Drain off **AIR CONDITIONING SYSTEM (R 134A)**

Release screws (1).

Tightening torque, see 64 53 6AZ in **64 53 REFRIGERANT LINES AND EXPANSION VALVE** .

Detach A/C lines (2) from A/C condenser.

Installation:

Replace all sealing rings and moisten with refrigerant oil.

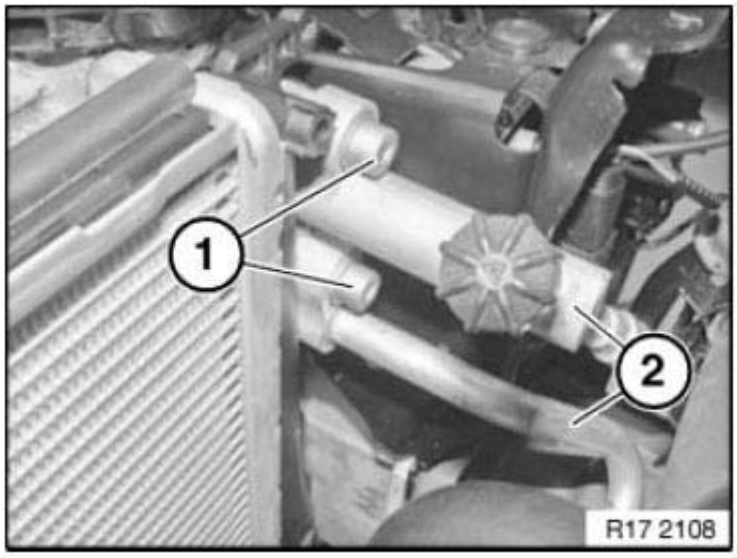


Fig. 59: Identifying Screws And A/C Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out right module carrier (1) together with A/C condenser (2).

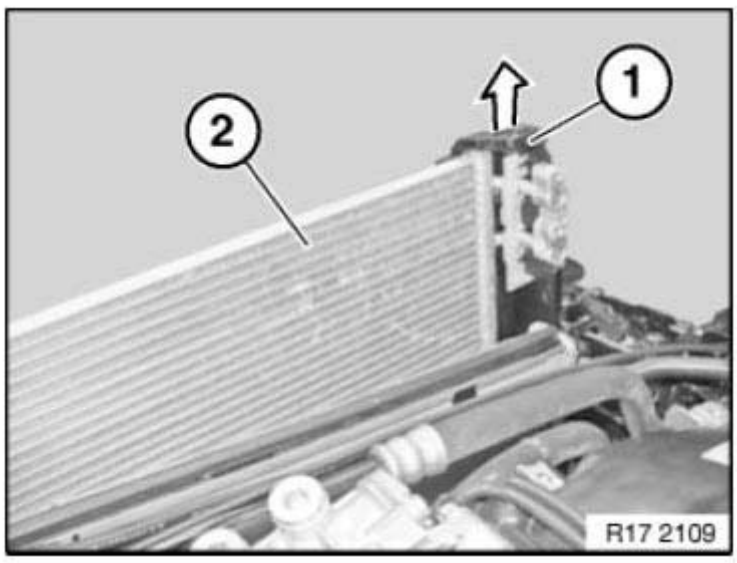


Fig. 60: Lifting Out Right Module Carrier With A/C Condenser
Courtesy of BMW OF NORTH AMERICA, INC.

Release A/C condenser from module carrier. In so doing, release lock (1) on side of module carrier in direction of arrow.

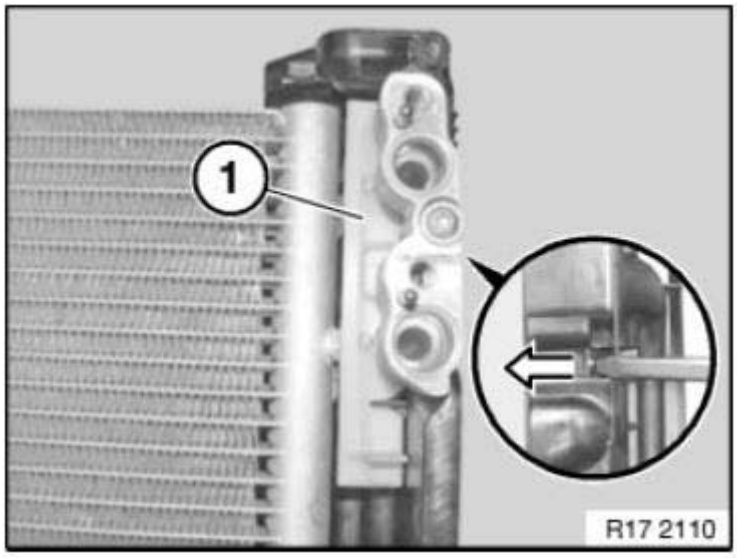


Fig. 61: Removing A/C Condenser From Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When reinstalling the radiator and module carrier (1), ensure without fail that the radiator is correctly seated in mounting (2).

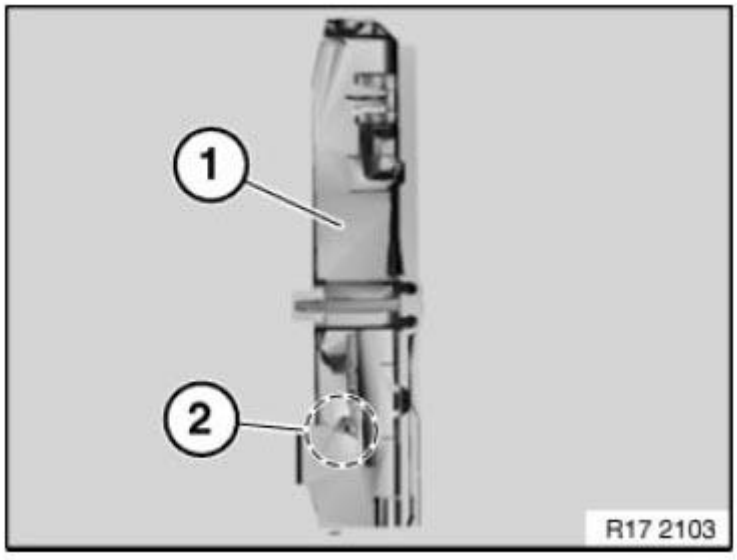


Fig. 62: Identifying Module Carrier And Radiator Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Add final details to vehicle.

Evacuate and fill **AIR CONDITIONING SYSTEM (R 134A)** .

17 11 100 REMOVING AND INSTALLING/REPLACING COOLANT EXPANSION TANK (N54, N52K)

Necessary preliminary tasks

- Drain **COOLANT** .

N54 only: Release vacuum line at retainers (1) from expansion tank.

Unfasten screws (2).

Tightening torque **17 10 4AZ** .

Release and disconnect coolant hoses (3).

Raise expansion tank (4)

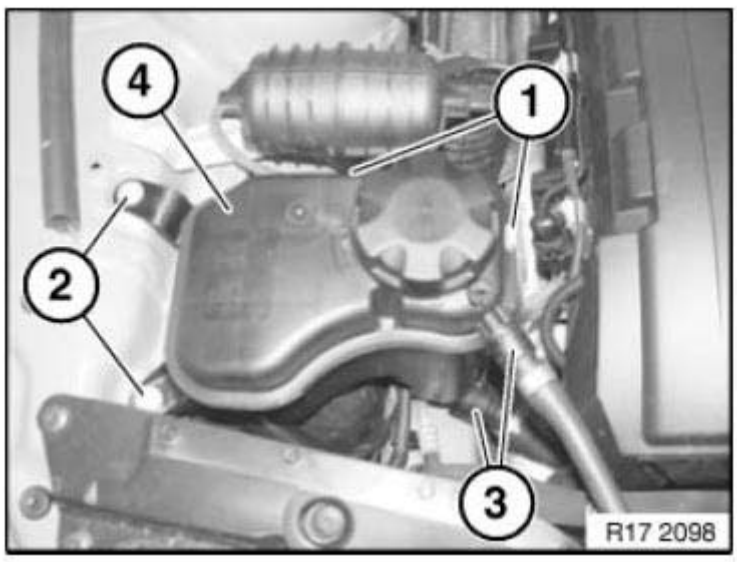


Fig. 63: Identifying Retainers, Coolant Hoses, Screws And Expansion Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) on coolant level switch and disconnect.

Remove expansion tank (2).

Installation:

Make sure locating pin (3) is correctly seated in rubber mount (4).

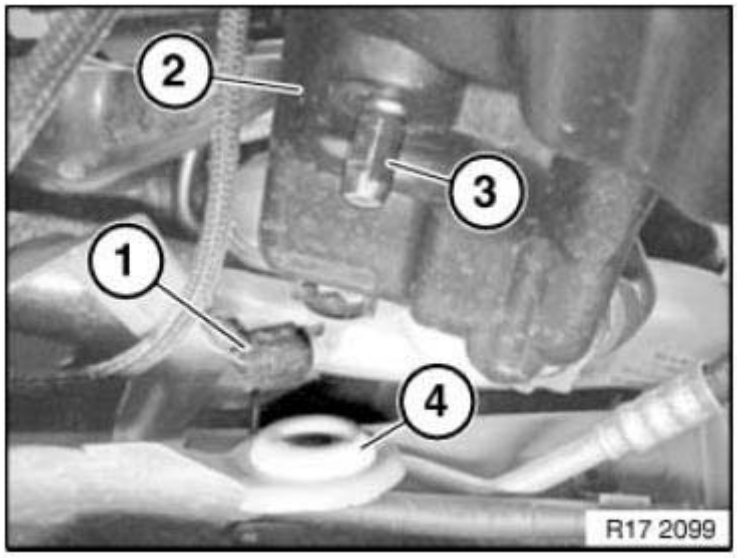


Fig. 64: Identifying Plug, Expansion Tank, Locating Pin And Rubber Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

Check cooling system for **LEAKS** .

17 12 010 REMOVING AND INSTALLING/REPLACING COOLANT PIPE ON FRONT AXLE (N54)

Necessary preliminary tasks

- Remove left **CHARGE-AIR DUCT**
- Draining **COOLANT**

Release screws (1).

Tightening torque **17 10 5AZ** .

Unfasten and detach coolant pipe from expansion tank (2).

Unfasten and detach coolant pipe from coolant thermostat (3).

Unfasten and detach coolant pipe from coolant hose (4).

Feed out coolant pipe and remove.

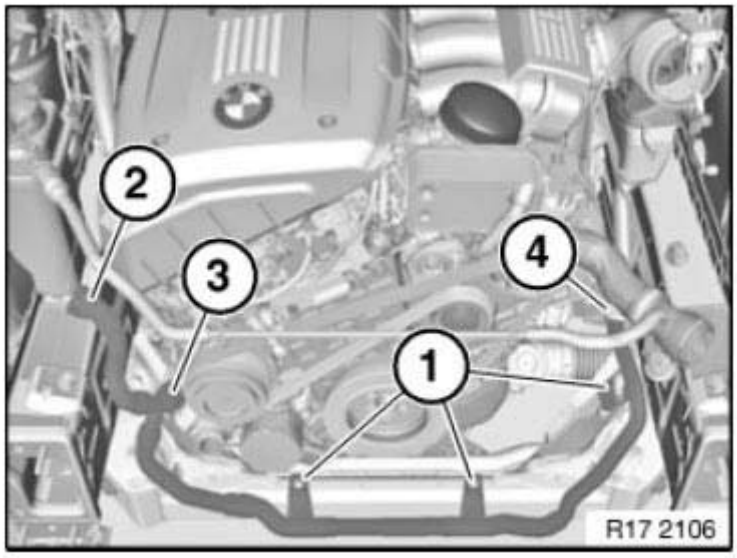


Fig. 65: Identifying Screws, Expansion Tank, Coolant Thermostat And Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

Check cooling system for **LEAKS** .

17 11 150 REMOVING AND INSTALLING/REPLACING ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks

- Remove right **WHEEL ARCH COVER (FRONT SECTION)** front section

Recycling

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Release screw (1).

Tightening torque **17 21 2AZ** .

Detach engine oil line.

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Unfasten screws (2).

Tightening torque **17 21 3AZ** .

Feed out engine oil cooler (3) and remove.

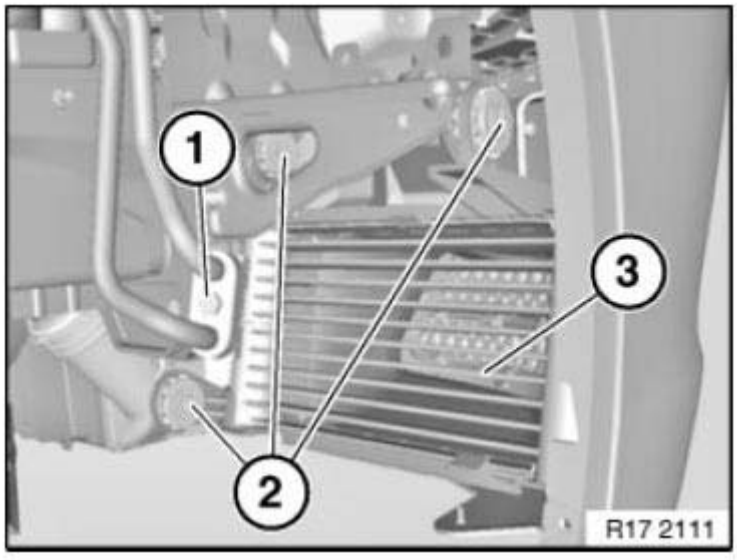


Fig. 66: Identifying Screws And Engine Oil Cooler
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil lines.

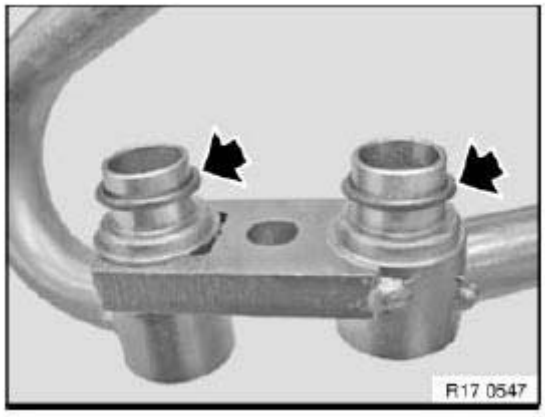


Fig. 67: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

17 11 035 REMOVING AND INSTALLING/REPLACING FAN COWL WITH ELECTRIC FAN (N52K, N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Remove **CROSS-MEMBER**
- **Only automatic transmission and twin-clutch gearbox:**

RELEASE TRANSMISSION FLUID COOLER from the fan cowl do **not** remove

Unclip coolant line (1) from fan cowl.

Unlock and disconnect plug (2) on fan cowl on right.

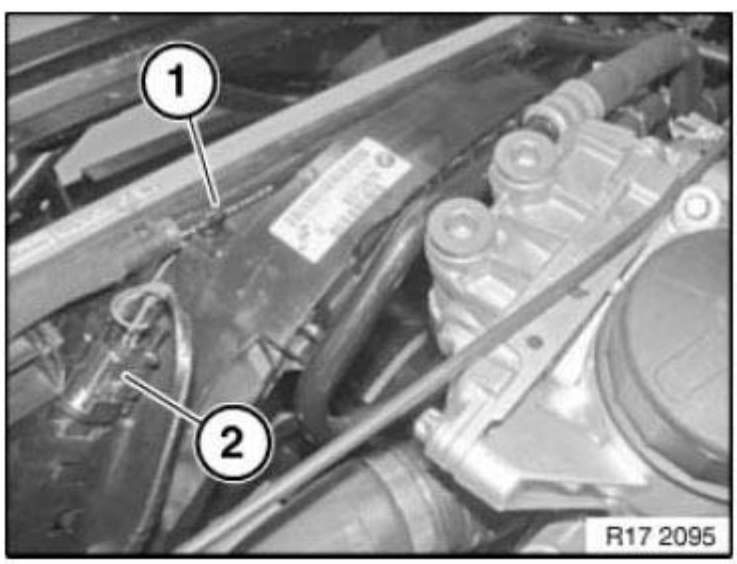


Fig. 68: Identifying Coolant Line And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on fan cowl.

Tightening torque **17 10 1AZ** .

Release lock (2) and remove fan cowl (3) towards top.

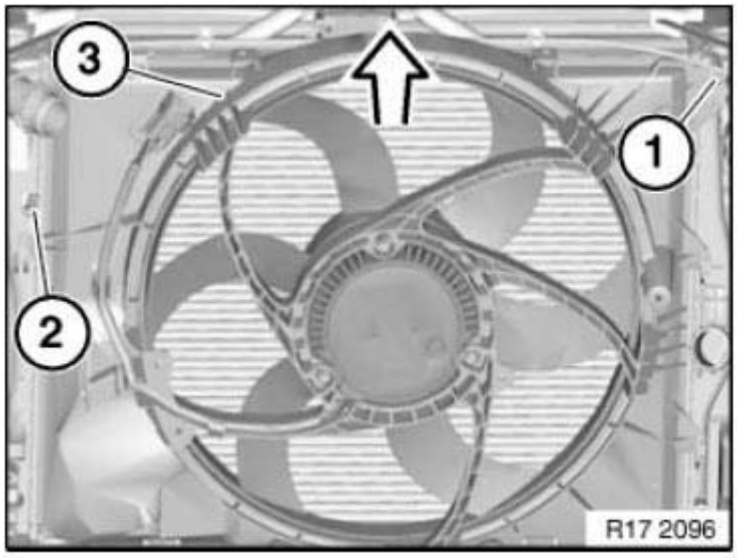


Fig. 69: Removing Fan Cowl Towards Top
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert retaining tabs (1) at bottom on radiator/intercooler.

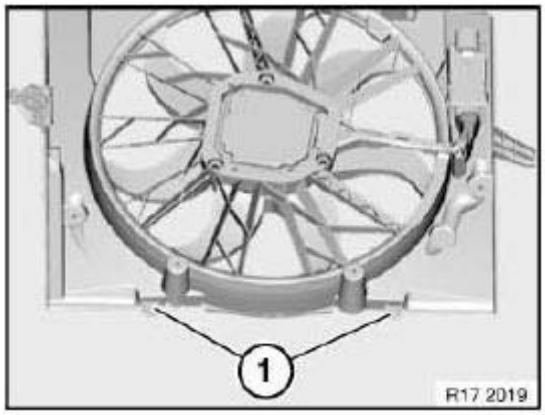


Fig. 70: Identifying Radiator Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.

Reassemble the vehicle.

clear fault memory.

17 22 030 REMOVING AND INSTALLING/REPLACING OIL LINE FOR ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective gloves and goggles.

Recycling

Engine oil escapes when oil line is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Remove **FAN COWL**

Release screw.

Tightening torque **17 21 1AZ** .

Detach oil line (1) from oil filter control housing.

Catch and dispose of emerging engine oil.

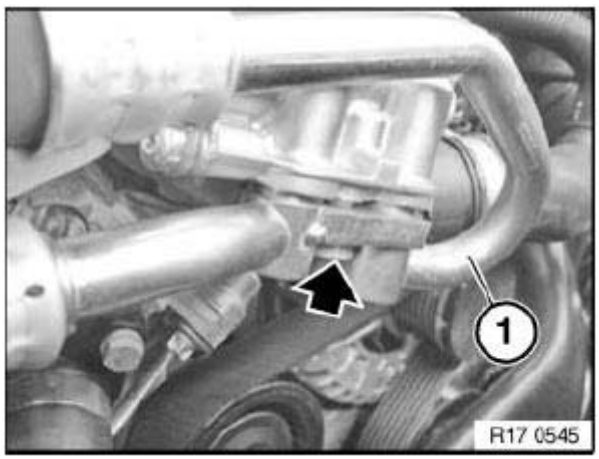


Fig. 71: Locating Oil Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 21 2AZ** .

Disconnect oil line (1) from engine oil cooler flange, feed out and remove.

Catch and dispose of emerging engine oil.

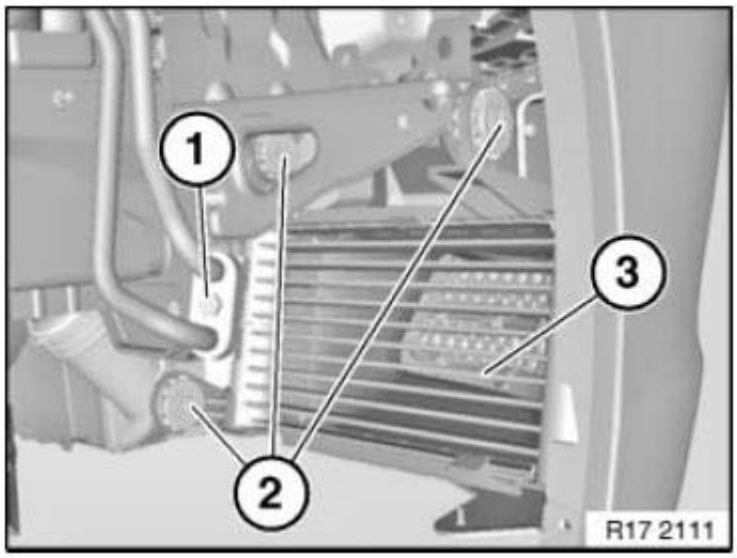


Fig. 72: Identifying Oil Line, Engine Oil Cooler And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil line.

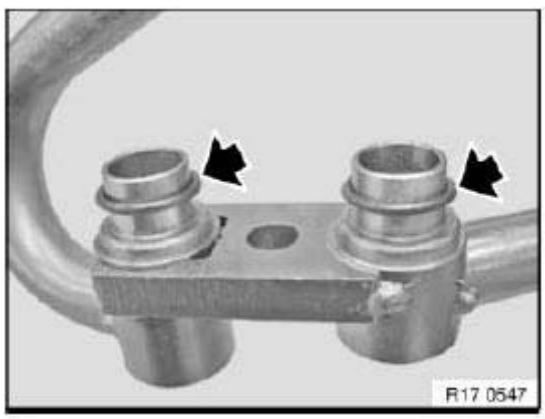


Fig. 73: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

1721 OIL COOLER

17 11 150 REMOVING AND INSTALLING/REPLACING ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective goggles and gloves.

Necessary preliminary tasks

- Remove right **WHEEL ARCH COVER** front section

Recycling

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Release screw (1).

Tightening torque **17 21 2AZ** .

Detach engine oil line.

Engine oil escapes when oil lines are released. Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Unfasten screws (2).

Tightening torque **17 21 3AZ** .

Feed out engine oil cooler (3) and remove.

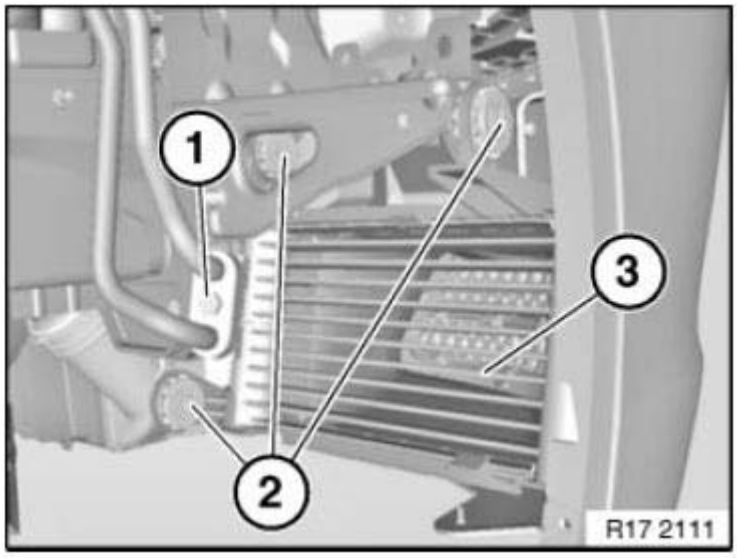


Fig. 74: Identifying Engine Oil Cooler And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil lines.

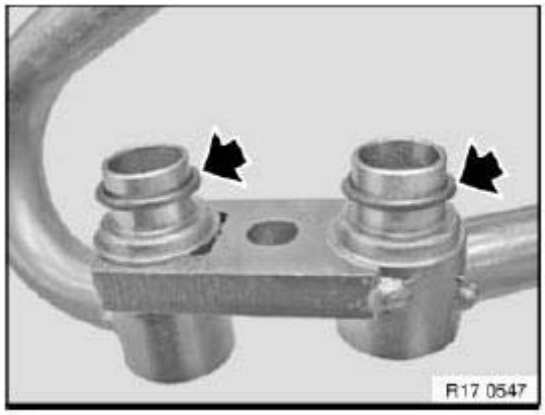


Fig. 75: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

17 22 030 REMOVING AND INSTALLING/REPLACING OIL LINE FOR ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective gloves and goggles.

Recycling

Engine oil escapes when oil line is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Remove **FAN COWL**

Release screw.

Tightening torque **17 21 1AZ** .

Detach oil line (1) from oil filter control housing.

Catch and dispose of emerging engine oil.

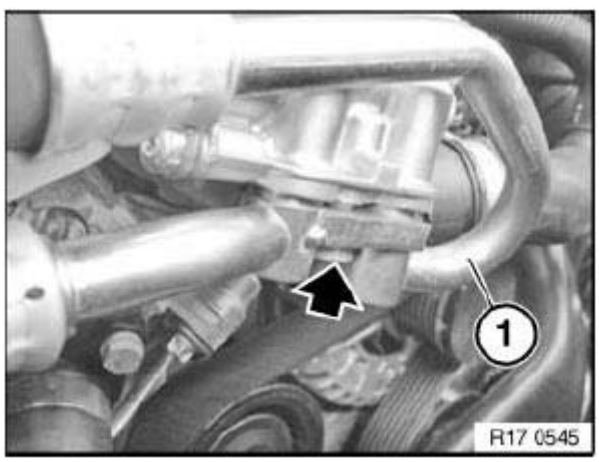


Fig. 76: Locating Oil Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 21 2AZ** .

Disconnect oil line (1) from engine oil cooler flange, feed out and remove.

Catch and dispose of emerging engine oil.

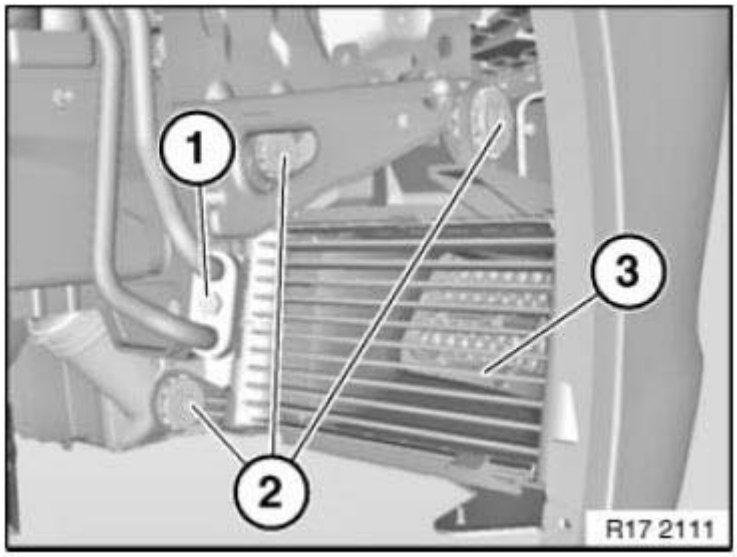


Fig. 77: Identifying Oil Line, Engine Oil Cooler And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil line.

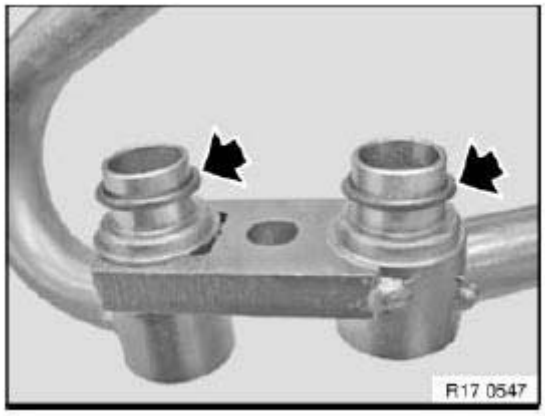


Fig. 78: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

17 21 020 REVOVING AND INSTALLING/REPLACING TRANSMISSION OIL COOLER (DKG) (N54)

IMPORTANT: Danger of scalding!

Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Drain **COOLANT**
- Remove **UNDERBODY PROTECTION**

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission fluid emerges when fluid lines are detached from transmission fluid cooler.

Catch and dispose of escaping transmission fluid in a suitable container.

Observe country-specific waste-disposal regulations.

Release and disconnect coolant hoses (1).

Unlock transmission fluid lines (2) and detach.

Release screw (3).

Tightening torque **17 10 6AZ** .

Remove transmission fluid cooler (4).

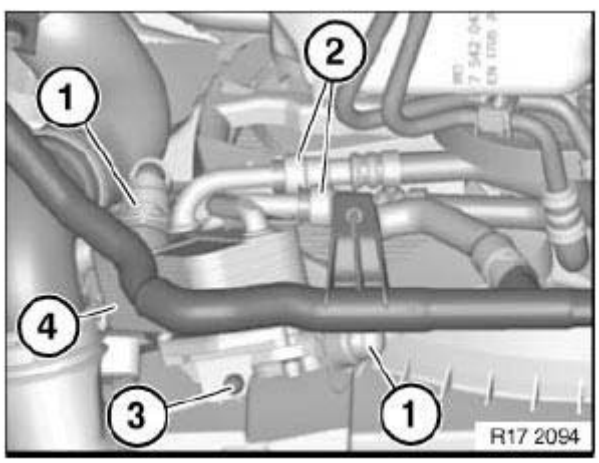


Fig. 79: Identifying Coolant Hoses And Transmission Fluid Lines With Heat Exchanger
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.

CHECKING OIL LEVEL in twin clutch gearbox. If necessary, fill with transmission oil.

17 21 500 RINSE GEARBOX OIL COOLER AND LINES OF TWIN CLUTCH GEARBOX

NOTE: Follow work steps for:

Installing a new or replacement transmission.

Procedure

Double twin clutch gearbox removed.

Connect the respective adapters to all oil pipes leaving the double TCT (see description below).

Use quick-release coupling to connect line 17 2 019 from oil collecting unit.

Use quick-release coupling to connect drain line 17 2 018.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to Gear oil for dual clutch transmission GS7D36SG) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.

Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

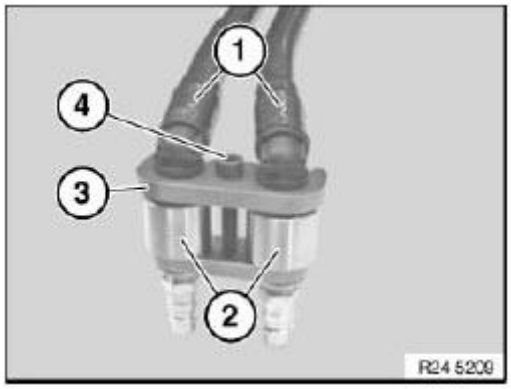
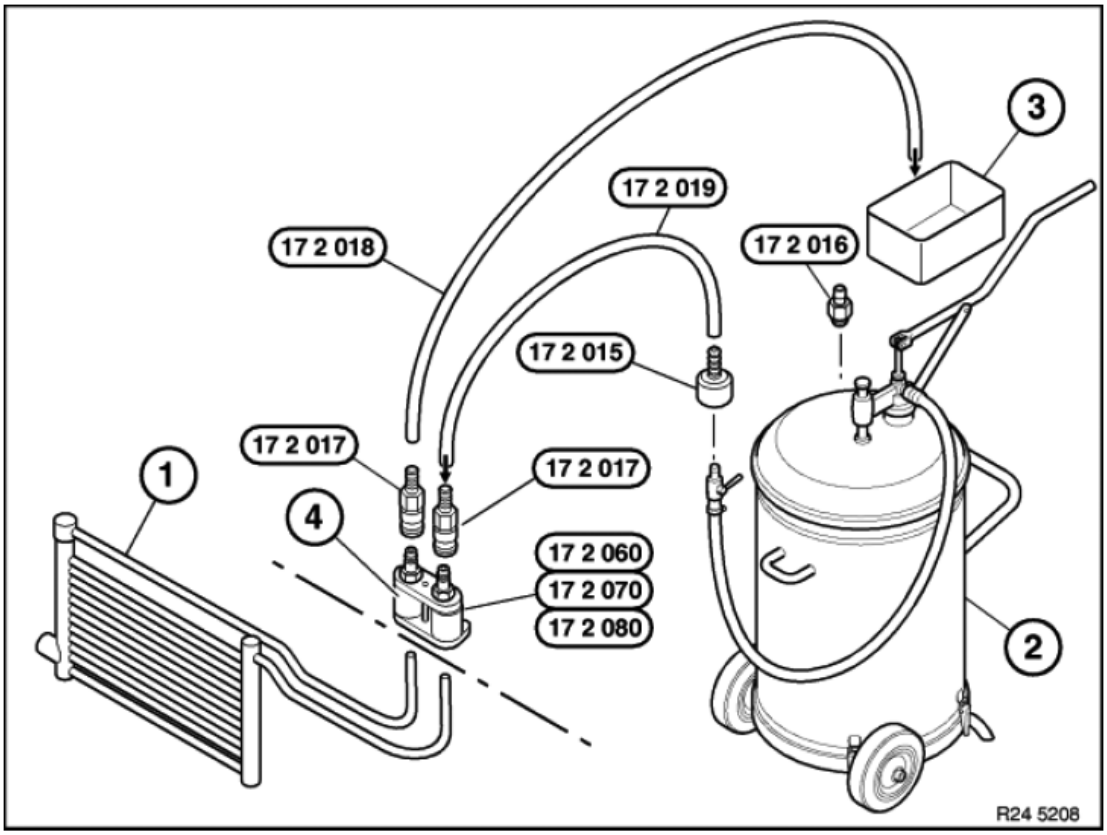


Fig. 80: Identifying Hydraulic Lines, Adapters, Clamping Bars With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for TCT



1) Transmission-oil cooler with lines

2) Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
17 2 016 Connection for oil collection unit (2), manufacturer: Horn
17 2 017 Quick-release coupling (2 pieces)
17 2 019 Hose to oil collection unit (2)

3) Oil drip tray

17 2 018 Hose to oil drip tray (3)

4) Adapter with clamping bar

17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) TCT for engine
17 2 070 Adapter with clamping bar (line diameter15 mm) TS65TCT for TCT engine

Fig. 81: Arrangement Of Flushing Apparatus For TCT
Courtesy of BMW OF NORTH AMERICA, INC.

1722 OIL COOLER LINES

17 22 030 REMOVING AND INSTALLING/REPLACING OIL LINE FOR ENGINE OIL COOLER (N54)

WARNING: Danger of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Wear protective gloves and goggles.

Recycling

Engine oil escapes when oil line is released.

Catch and dispose of emerging engine oil.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Remove **FAN COWL**

Release screw.

Tightening torque **17 21 1AZ** .

Detach oil line (1) from oil filter control housing.

Catch and dispose of emerging engine oil.

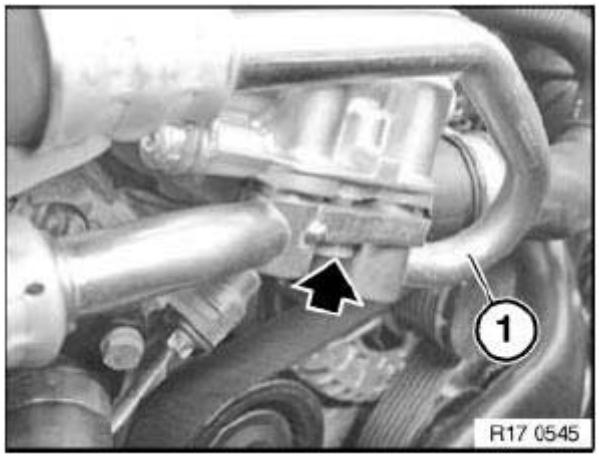


Fig. 82: Locating Oil Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **17 21 2AZ** .

Disconnect oil line (1) from engine oil cooler flange, feed out and remove.

Catch and dispose of emerging engine oil.

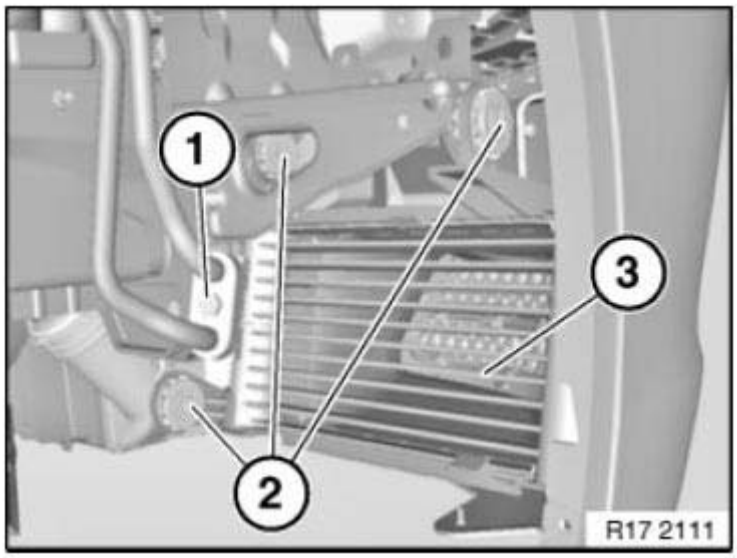


Fig. 83: Identifying Oil Line, Engine Oil Cooler And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing rings on engine oil line.

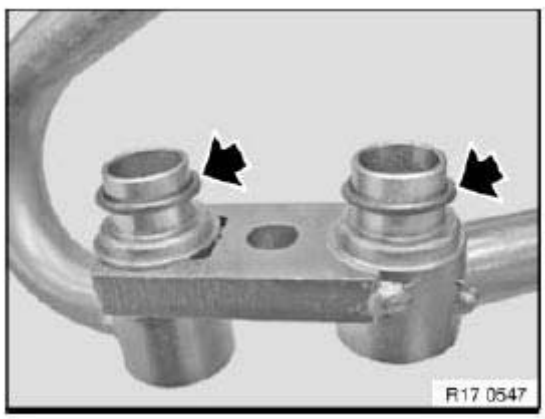


Fig. 84: Identifying Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After completing work, check engine oil level and top up engine oil if necessary.

17 21 020 REVOVING AND INSTALLING/REPLACING TRANSMISSION OIL COOLER (DKG) (N54)

IMPORTANT: Danger of scalding!

Only perform this work after engine has cooled down.

Necessary preliminary tasks

- Drain **COOLANT**
- Remove **UNDERBODY PROTECTION**

Recycling

Catch and dispose of drained coolant in a suitable container.

Transmission fluid emerges when fluid lines are detached from transmission fluid cooler.

Catch and dispose of escaping transmission fluid in a suitable container.

Observe country-specific waste-disposal regulations.

Release and disconnect coolant hoses (1).

Unlock transmission fluid lines (2) and detach.

Release screw (3).

Tightening torque **17 10 6AZ** .

Remove transmission fluid cooler (4).

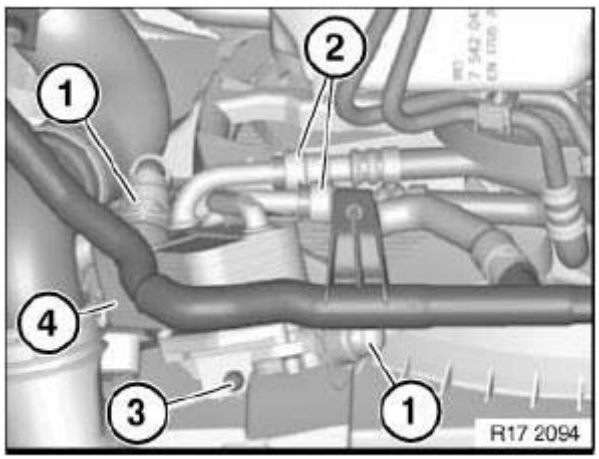


Fig. 85: Identifying Coolant Hoses And Transmission Fluid Lines With Heat Exchanger
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Assemble engine.

<u>CHECKING OIL LEVEL</u> in twin clutch gearbox. If necessary, fill with transmission oil.

17 21 500 RINSE GEARBOX OIL COOLER AND LINES OF TWIN CLUTCH GEARBOX

NOTE: Follow work steps for:

Installing a new or replacement transmission.

Procedure

Double twin clutch gearbox removed.

Connect the respective adapters to all oil pipes leaving the double TCT (see description below).

Use quick-release coupling to connect line 17 2 019 from oil collecting unit.

Use quick-release coupling to connect drain line 17 2 018.

Hold and direct open end of drain line into a suitable drip tray.

Using oil collection unit, flush approx. 1 liter of transmission fluid (refer to Gear oil for dual clutch transmission GS7D36SG) through oil lines and transmission oil cooler.

Reposition quick-release couplings.

Flush oil lines/transmission oil cooler in opposite direction with approx. 1 liter of transmission fluid.

Disconnect quick-release couplings.

Remove adapter.

NOTE: Dispose of flushing oil correctly.

Do not reuse under any circumstances.

Press hydraulic lines (1) into adapters (2).

Slide clamping bar (3) into guides and secure with screw (4).

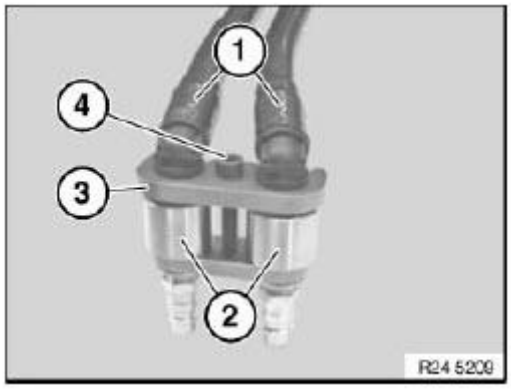
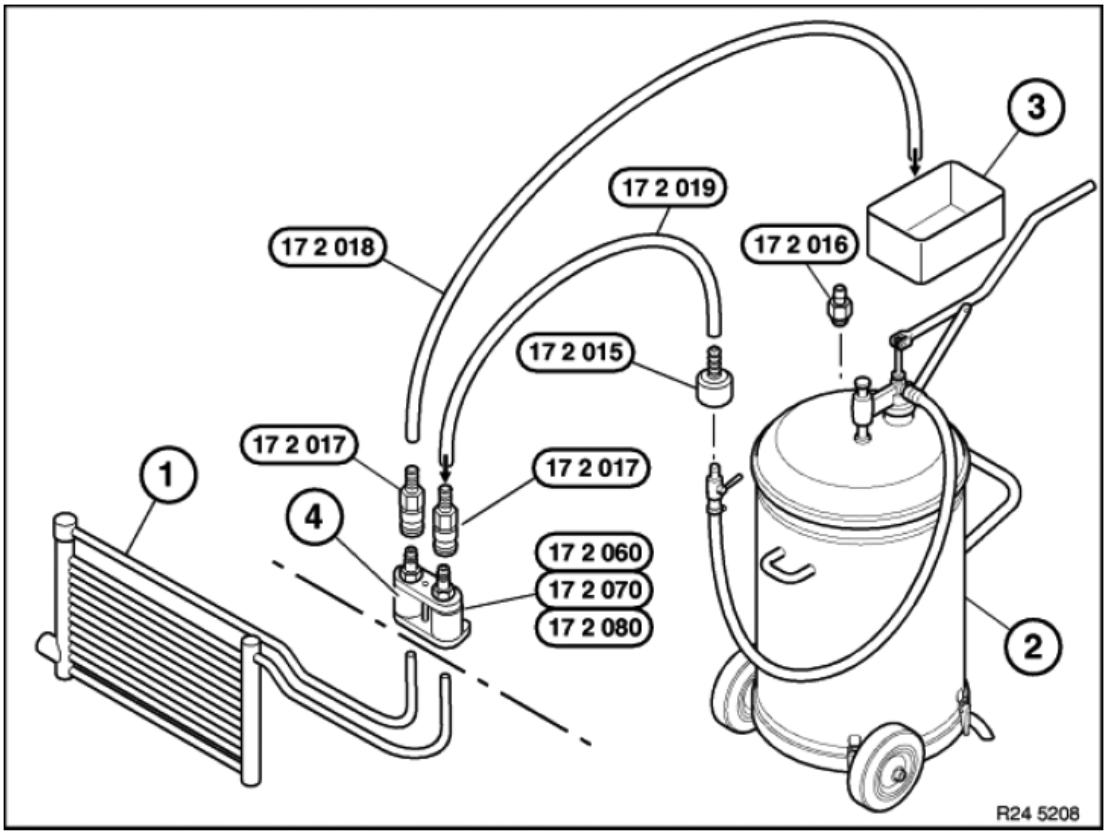


Fig. 86: Identifying Hydraulic Lines, Adapters, Clamping Bars With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement of flushing apparatus for TCT



1) Transmission-oil cooler with lines

2) Oil collection unit

17 2 015 Connection for oil collection unit (2), manufacturer: Deutsche Tecalemit or
17 2 016 Connection for oil collection unit (2), manufacturer: Horn
17 2 017 Quick-release coupling (2 pieces)
17 2 019 Hose to oil collection unit (2)

3) Oil drip tray

17 2 018 Hose to oil drip tray (3)

4) Adapter with clamping bar

17 2 060 Adapter with clamping bar for aluminium lines and steel lines with aluminium connection (line diameter 12 mm) TCT for engine
17 2 070 Adapter with clamping bar (line diameter15 mm) TS65TCT for TCT engine

Fig. 87: Arrangement Of Flushing Apparatus For TCT
Courtesy of BMW OF NORTH AMERICA, INC.

1751 CHARGE AIR COOLER WITH MOUNT

17 51 000 REMOVING AND INSTALLING/REPLACING INTERCOOLER (N54)

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION** .

IMPORTANT: Coat sealing rings of quick-connect couplings with antiseize agent.

Pressure pipes cannot be fitted without antiseize agent.

Unfasten and detach charge-air hoses (1).

Unfasten screws (2).

Tightening torque **17 10 3AZ** .

Remove intercooler (3) towards bottom.

Installation:

Charge-air hoses must audibly snap into place.

Coat sealing rings of charge-air hoses with antiseize agent.

Pressure pipes cannot be fitted without antiseize agent.

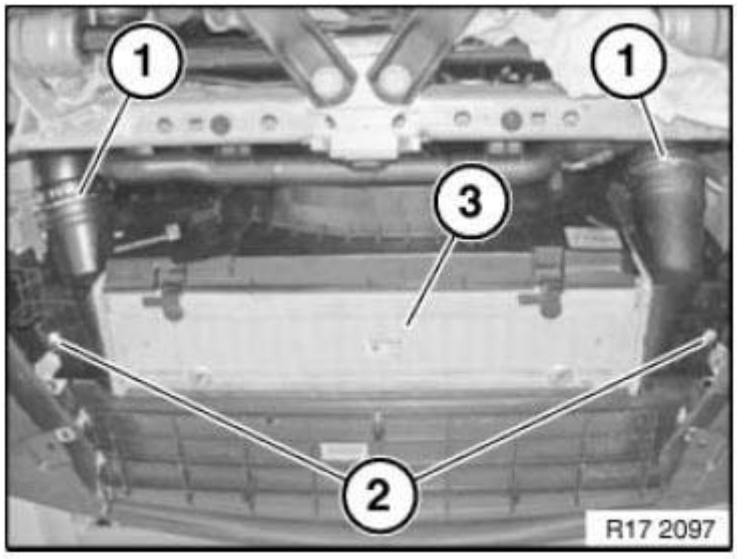


Fig. 88: Identifying Charge Air Hoses, Screws And Intercooler
Courtesy of BMW OF NORTH AMERICA, INC.

Check charge-air duct for leaks.

Assemble engine.

COOLING SYSTEM

17-0130 ADAPTER

Adapter MW

NOTE: (Adapter kit) For connecting the adapters from 17 0 000 with pump 17 0 101 and hose 17 0 102.

SI number

01 07 02 (884)

Consisting of:

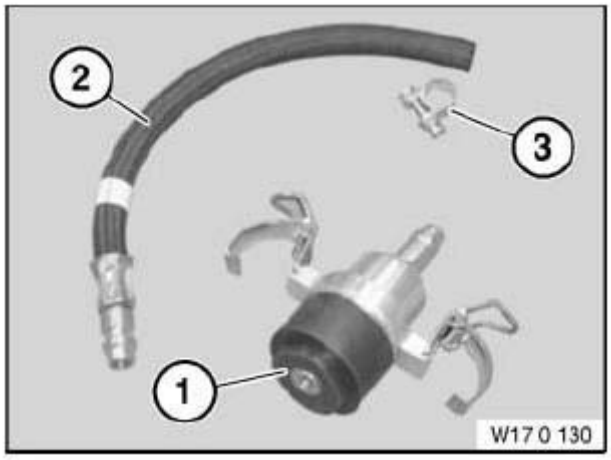


Fig. 1: Identifying Adapter (17-0130)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494430 Adapter

NOTE: For connecting the pump 17 0 101 and hose 17 0 102 to the adapter from 17 0 000

2 = 0494431 Hose

NOTE: (Hose with coupling connection) For connecting pump 17 0 101 to adapter 17 0 007

3 = 0494761 Clamp

NOTE: **(Hose clamp) For hose 17 0 132**

17-2080 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: **For flushing fluid cooler and lines of automatic transmission. Check lines: Plastic tubes**

Storage Location

A25

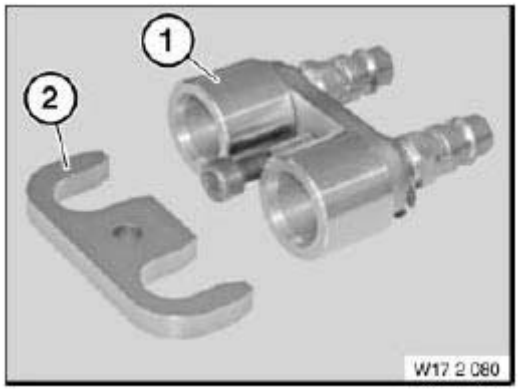


Fig. 2: Identifying Adapter (17-2080)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 14 08 (464)

Consisting of:

1 = 0496492 Adapter

2 = 0496493 Clip

NOTE: **(Clamping bracket)**

17-2010 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: **(Adapter kit) For rinsing the oil cooler in automatic transmissions.**

SI number

01 12 96 (103)

Consisting of:

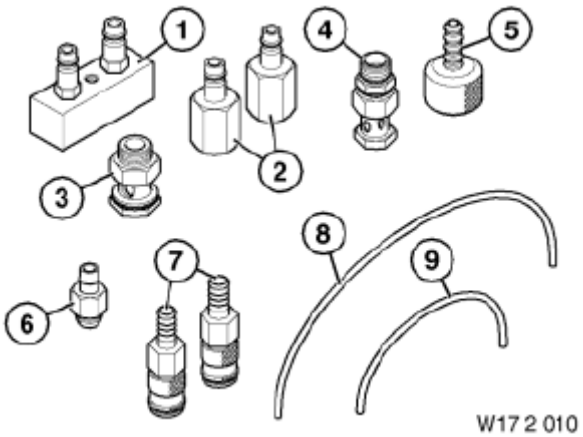


Fig. 3: Identifying Adapter (17-2010)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0493621 Plate

NOTE: (Mounting plate) For adapter 17 2 011 - Transmission: A5S 325Z

1 = 0491404 Adapter

NOTE: For connecting the oil cooler lines to the oil dispenser unit - Transmission: A5S 310Z, A5S 560Z, A5S 325Z

2 = 0491405 Adapter

NOTE: (Adapter (2 pieces)) For connecting the oil cooler lines to the oil dispenser unit - Transmission: A4S 310R

3 = 0491406 Screw

NOTE: (Banjo bolt (2 pieces)) Thread M18x1.5 with nut and gasket for connecting the oil cooler lines to the oil dispenser unit - \Transmission: A5S 440Z

4 = 0491407 Screw

NOTE: (Banjo bolt (2 pieces)) Thread M16x1.5 with nut, gasket and thread piece for connecting the oil cooler lines to the oil dispenser unit - transmission: A5S 300J

5 = 0491408 Connector

NOTE: For the oil dispenser unit from Tecalemit

6 = 0491409 Connector

NOTE: For the oil dispenser unit from Horn

7 = 0491410 Adapter

NOTE: (Clutch) Scope: 2 pcs.

8 = 0491411 Hose

NOTE: (Hose, long)

9 = 0491412 Hose

NOTE: (Hose, short)

17-2070 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: For flushing fluid cooler and lines of automatic transmission. Check lines: Diameter 15 mm

Storage Location

A25

SI number

01 14 08 (464)

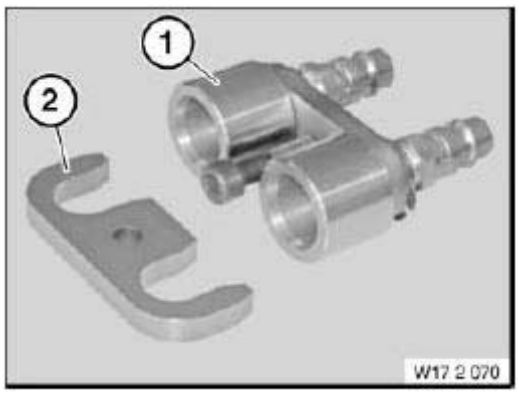


Fig. 4: Identifying Adapter (17-2070)

Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0496490 Adapter

2 = 0496491 Clip

NOTE: (clamping bracket)

17-2060 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: For flushing fluid cooler and lines of automatic transmission. Check lines: Diameter 12 mm

Storage Location

A25

SI number

01 14 08 (464)

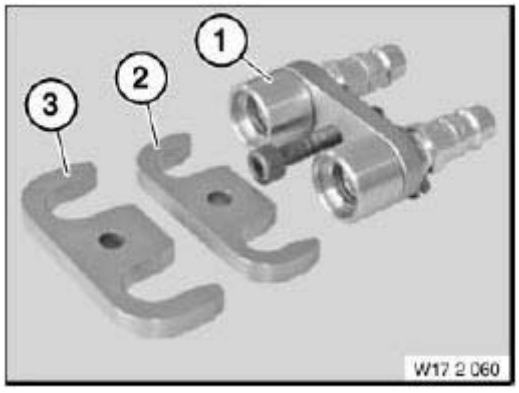


Fig. 5: Identifying Adapter (17-2060)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0496487 Adapter

2 = 0496488 Clip

NOTE: (Clamping bracket) Clamping bracket for aluminium line.

3 = 0496489 Clip

NOTE: **(Clamping bracket) Clamping bracket for steel line with pressed-on aluminium bush (connection).**

17-2050 PLIERS

Pliers MW

NOTE: **(Set of pliers) For assembling and disassembling the spring band clamps (Coolant hoses)**

SI number

01 26 06 (321)

Consisting of:

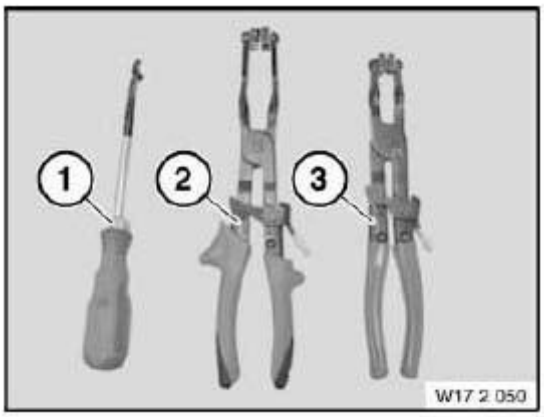


Fig. 6: Identifying Pliers (17-2050)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495795 Release tool

2 = 0495796 Pliers

NOTE: **(Pliers (bent version))**

3 = 0495797 Pliers

NOTE: **(Pliers (straight version))**

17-0100 TESTER

Tester Minimum set: Mechanical tools MW

NOTE: **For checking engine cooling system for watertightness. For checking radiator cap.**

SI number

01 07 02 (884)

Consisting of:

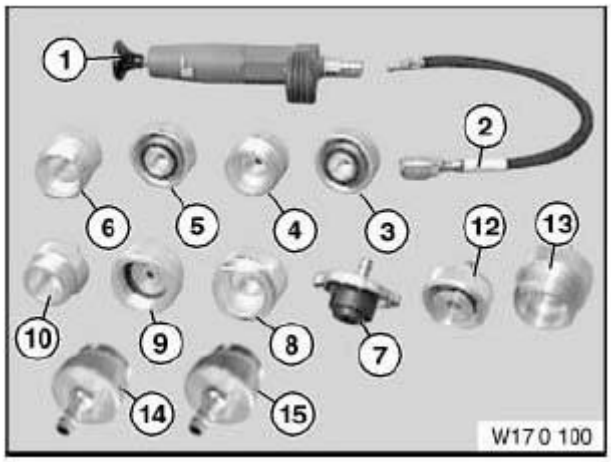


Fig. 7: Identifying Tester (17-0100)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494418 Pump

2 = 0494419 Hose

NOTE: **(hose with quick-release coupling)**

3 = 0494420 Adapter

NOTE: **For radiator cap (normal thread)**

4 = 0494421 Adapter

NOTE: **For radiator cap (normal thread)**

5 = 0494422 Adapter

NOTE: **For radiator cap (sawtooth thread)**

6 = 0494423 Adapter

NOTE: **For radiator cap (sawtooth thread)**

7 = 0494424 Adapter

NOTE: **For radiator cap R50/W10**

8 = 0494425 Adapter

NOTE: **For radiator cap R50/W10**

9 = 0494426 Adapter

NOTE: **For radiator connection R53/W11, R50/W17 adapter corresponds to 17 0 051**

10 = 0494427 Adapter

NOTE: **For radiator cap R53/W11, R50/W17 adapter corresponds to 17 0 052**

11 = 0494428 Case

12 = 0494642 Adapter

NOTE: **For radiator cap Model series: E60, E61, E63, E64 SI no.: 1 08 03 (988)**

13 = 0494643 Adapter

NOTE: **For radiator cap Model series: E60, E61, E63, E64 SI no.: 1 08 03 (988)**

14 = 0495889 Adapter

NOTE: **For radiator cap Model series: N12, N14**

17-0000 TESTER

Tester MW

Replaced by: 0494417

NOTE: **For checking cooling system for leak tightness and function of pressure relief valve in radiator cap. Replaced by 17 0 100 (0 494 417)**

Storage Location

A43

C17

Consisting of:

5 = 0491389 Adapter

NOTE: (Adapter) For screw-on radiator caps (sawtooth thread)/Series: E31, E32, E34, E36, E38, E39 Replaced by 17 0 100 (0 494 417)

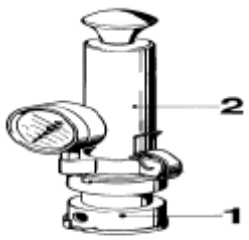


Fig. 8: Identifying Tester (17-0000)
Courtesy of BMW OF NORTH AMERICA, INC.

7 = 0493108 Adapter

NOTE: (Adapter) For testing the expansion tank cover/Series: E31, E32, E34, E36, E38, E39 Replaced by 17 0 100 (0 494 417)

8 = 0494017 Hose

NOTE: (Pressure hose)

1 = 0491385 Adapter

NOTE: (Adapter) For checking the pressure relief valve in the radiator cap/Series: all, except E28

= 0491386

2 = 0491386 Tester

NOTE: (Tester without adapter) Pressure range 0...2.5 bar/Series: all, except E28 Free only for motorcycle!!!

3 = 0491387 Adapter

NOTE: **(Adapter) For screw-on radiator caps (normal thread)/Series: E28, E30, E31, E32 Engine: all, except M51 Free only for motorcycle!!!**

4 = 0491388 Adapter

NOTE: **(Adapter) For screw-on radiator caps (standard thread)/Series: E28, E30, E32/Engine: M51 Free only for motorcycle!!!**

6 = 0491390 Adapter

NOTE: **(Adapter) For screw-on radiator caps (sawtooth thread)/Replaces 06/97 with 17 0 007/Reason: Expansion tank cover design change**

9 = 0491391 Adapter

NOTE: **(Adapter for radiator expansion tank) Series: E36/Model: M3 US engine: W10**

COOLANT, COOLING SYSTEM TEST E89/N52K

17 00 COOLANT, COOLING SYSTEM TEST E89/N52K

COOLANT, COOLING SYSTEM TEST SPECIFICATION

Coolant volume (incl. heater) MT	Litres	
Coolant volume (incl. heater) AT	Litres	
with integrated air conditioner MT	Litres	8.2
with integrated air conditioner AT	Litres	8.5
Test pressure for cooling system (gauge pressure)	bar	1.5

RADIATOR AND MOUNTING PARTS

17 11 RADIATOR AND MOUNTING PARTS E89/N52K

RADIATOR AND MOUNTING PARTS SPECIFICATION

Cap for cooling system		
Pressure relief valve opens at overpressure to ambient pressure	bar	$1{,}4\ ^{+0{,}1}_{-0{,}2}$
Vacuum valve must open at latest at partial vacuum to ambient pressure	bar	0.1
Test pressure, coolant radiator (gauge pressure)	bar	1.5

COOLANT, COOLING SYSTEM TEST E89/N54

17 00 COOLANT, COOLING SYSTEM TEST E89/N54

COOLANT, COOLING SYSTEM TEST SPECIFICATIONS

Coolant volume (incl. heater) MT	Litres	
Coolant volume (incl. heater) AT	Litres	
with integrated air conditioner MT	Litres	8.2
with integrated air conditioner AT	Litres	8.5
Test pressure for cooling system (gauge pressure)	bar	1.5

RADIATOR AND MOUNTING PARTS

17 11 RADIATOR AND MOUNTING PARTS E89/N54

RADIATOR AND MOUNTING PARTS SPECIFICATIONS

Cap for cooling system		
Pressure relief valve opens at overpressure to ambient pressure	bar	$1{,}4\ ^{+0{,}1}_{-0{,}2}$
Vacuum valve must open at latest at partial vacuum to ambient pressure	bar	0.1
Test pressure, coolant radiator (gauge pressure)	bar	1.5

Cooling System - Tightening Torques - Z4

ADDITIONAL FAN (ELECTRIC)

17 40 ADDITIONAL FAN (ELECTRIC)

TIGHTENING TORQUE SPECIFICATION - ADDITIONAL FAN (ELECTRIC)

	Type	Thread	Tightening specification	Measure
1AZ Electric auxiliary fan on fan cowl	E46			6 Nm
2AZ Electronics for auxiliary fan on fan cowl	E46			6 Nm

COOLANT

17 00 COOLANT

TIGHTENING TORQUE SPECIFICATION - COOLANT

	Type	Thread	Tightening specification	Measure
1AZ Hose clamps to coolant hoses 32 ... 48 mm dia.	All			2.5 Nm
2AZ Bleed screw (WAF 8) to thermostat housing	All, without E46			8 Nm
Plastic bleed screws to coolant lines	E46			2 -0.5/+1 Nm
3AZ Level switch (WAF 30) to coolant expansion tank	All			3 Nm
4AZ Bleed screw to water valve or auxiliary water pump	E90/E91			3.5 Nm

ENGINE OIL COOLER

17 21 ENGINE OIL COOLER

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL COOLER

	Type	Thread	Tightening specification	Measure
1AZ Engine oil cooler to body	All			14 Nm
Oil cooler vapor extraction guide to trim panel	E36/M3	B4.8		4 Nm

ENGINE OIL COOLER AND LINES

17 21 ENGINE OIL COOLER AND LINES

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL COOLER AND LINES

	Type	Thread	Tightening specification	Measure
1AZ Engine oil cooler line to oil filter control housing	N54	M8 x 25		19 Nm
2AZ Engine oil cooler line to engine oil cooler flange	N54	M8 x 25		19 Nm
3AZ Engine oil cooler to bracket, engine carrier	N54	M6 x 20		8 Nm

OIL COOLER PIPES

17 22 OIL COOLER PIPES

TIGHTENING TORQUE SPECIFICATION - OIL COOLER PIPES

	Type	Thread	Tightening specification	Measure
5AZ Cap nut on transmission oil cooler (on radiator) and on transmission	All	M18 x 1.5		20 Nm
	5HP30	M22 x 1.5		28 Nm
6AZ Oil lines on transmission				
Hollow bolt	All	M16 x 1.5		37 Nm
7AZ Oil lines on transmission oil cooler	A 5 S 300 J			28 Nm
Hollow bolt	All	M14 x 1.5		27 Nm
8AZ Screw-in fitting on transmission	All	M14x1.5 und M16x1.5		37 Nm
9AZ Oil hose on oil pipe	E23			28 Nm
10AZ Oil pipe bracket on radiator	E23			2 Nm
11AZ Oil pipe bracket on body	E23			6.5 Nm
12AZ Oil cooler on transmission	5HP30			10 Nm
13AZ Transmission oil cooler line to transmission	N42	M8		21 Nm

RADIATOR AND MOUNTING PARTS

17 11 RADIATOR AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - RADIATOR AND MOUNTING PARTS

	Type	Thread	Tightening specification	Measure
1AZ Radiator to body				
self-tapping screw	All	B6.3		9 Nm
	All	M6		10 Nm
2AZ Drain plug to radiator	All			2.5 Nm
3AZ Temperature switch to radiator (91°C/99° C) max.	All			15 Nm
	All			9 Nm

4AZ Expansion tank to body	M57TU/E65			4 Nm
5AZ Radiator on module carrier	E46			4 + 1 Nm
6AZ Retaining plate, expansion tank, to radiator	E46			4 + 1 Nm
7AZ Fan cowl on radiator	E46			4 + 1 Nm
8AZ Plug in radiator (temperature switch omitted)	E36/7/M54	M14 x 1.5		15 Nm
9AZ Mounting plate to radiator	M57TU/E65			4.5 Nm
10AZ Radiator bracket	All			2.5 Nm

RADIATOR, EXPANSION TANK (N52K, N54)

17 10 RADIATOR, EXPANSION TANK (N52K, N54)

TIGHTENING TORQUE SPECIFICATION - RADIATOR, EXPANSION TANK

	Type	Thread	Tightening specification	Measure
1AZ Fan cowl to coolant radiator	N52K/N54			4.5 Nm
2AZ Coolant radiator to module carrier	N52K/N54			4.5 Nm
3AZ Intercooler to module carrier	N54			4.5 Nm
4AZ Coolant expansion tank to body	N52K/N54	M6		8 Nm
5AZ Coolant pipe to front axle carrier	N54	M6		7.3 Nm
6AZ Transmission oil cooler to fan cowl	N52K/N54			4.5 Nm

1.0 GENERAL INFORMATION

The specified engine oil is extremely important for the operation and service life of an engine.

Engine oil requirements will depend on the engine design, operating conditions, oil change intervals and, in the case of diesel engines, the fuel grade.

A modern engine oil provides more than just a lubrication function. The following qualities are required:

GOOD WEAR PROTECTION AND FRICTION REDUCTION

Frictional losses will lead to a reduction of engine power and efficiency. An approved engine oil will minimize frictional losses. Excessive wear will lead to a reduction in service life (e.g. wear of bearings, piston rings, cam lobes) or to mechanical failure.

LIMITED TENDENCY TO PRODUCE COMBUSTION RESIDUE

During engine operation, a limited amount of oil enters the combustion chamber, where it is burned. Combustion residues or deposits, which build up in the combustion chamber, lead to unwanted increases in compression and promote surface ignition ("pinging"). Any approved engine oil will help prevent such a condition.

FAVORABLE VISCOSITY TEMPERATURE BEHAVIOR

Viscosity is the tendency of oil to resist flowing. Engine oil, when cold, should be thin enough so that the engine can be cranked over. Hot oil should be thick enough to maintain proper lubrication.

ANTI-FOAMING

The oil is forcefully mixed with air during engine operation. Heavy foaming will lead to impaired lubrication and reduction in oil flow rate. To prevent foaming, antifoaming additives are mixed with the oil.

GOOD CORROSION INHIBITION

The engine oil must prevent corrosion on engine components under all circumstances. Corrosion and rust inhibitors are added to displace water and acids from metal surfaces so that oil coats them.

MIXING ABILITY/COMPATIBILITY

It must be possible to mix all engine oils with each other, even synthetic with mineral oils, without causing any incompatibility problems. A further requirement is the compatibility with all materials contacted by oil, in particular oil seals, hoses and paint.

GOOD THERMAL CONDUCTIVITY/GOOD COOLING PROPERTY

Engine oil makes an important contribution to the cooling of an engine. It must transfer heat from friction surfaces, and combustion heat away from affected areas. The oil absorbed heat is carried back to the oil pan where it is transferred to the surrounding air.

GOOD DISPERSANT/DETERGENT QUALITIES

To limit or slow down the formation of combustion deposits and acidic components, together with abrasive particles and dirt from the intake air, good engine oils contain a detergent additive. Deposits of carbon and dirt are loosened and suspended in the oil, being drained away at the next oil change.

OXIDATION INHIBITORS AND AGING STABILITY

Oxidation can be described as the oxygen absorption of hydrocarbons formed in the oil. The results of oxidation have a negative impact on viscosity causing corrosion on certain metals and the formation of sludge. Inhibitors are added to prevent oxidation from occurring. A good engine oil must maintain its stability during the required oil change intervals.

Good Lubricating Oil Must:

1. Lubricate moving parts to minimize wear.
2. Lubricate moving parts to minimize loss from friction.
3. Remove heat from engine parts by acting as a cooling agent.
4. Absorb shocks between bearings and other engine parts, reducing engine noise and extending engine life.
5. Form a good seal between piston rings and cylinder walls.
6. Act as a cleaning agent.

2.0 GRADING OF OILS

VISCOSITY NUMBER

A method of classifying an oil by number, based on its resistance to flow at a high temperature.

These numbers are usually prefixed by SAE which is the abbreviation for the Society of Automotive Engineers. A lower SAE Number (i.e. SAE 5W) indicates a thinner oil with a higher flow rate, for use at lower temperatures. A higher SAE Number (i.e. SAE 30) indicates a thicker oil with a slower flow rate, for use at higher temperatures.

MULTIGRADE OILS

A multigrade, or multiviscosity oil has the qualities of a lower number oil at low temperatures and those of a higher number oil at high temperatures. Multigrade oils have numbers such as SAE 5W-30 and SAE 10W-40. For reliable engine performance in all temperature ranges mineral based engine oil viscosity must be matched to the temperature range at which the vehicle will be operated.

SINGLE GRADE OILS

A single grade viscosity oil has a limited temperature/viscosity range compared with multigrade oils. Due to the limited temperature/viscosity range of these oils they are no longer used in BMW engines and thus no longer listed in the BMW Engine Oil Temperature/Viscosity Table.

OIL CLASSIFICATIONS

A method of classifying oil was jointly developed by the SAE, API (American Petroleum Institute), and ASTM (American Society for Testing and Materials). Engine oils are rated according to two engine use categories:

C = Compression Ignition (i.e. CC)

Compression Ignition (C) oils are those that are used for diesel engines. The current service ratings for diesel-engine lubricating oils are: CA, CB, CC, CD, CE, CF and CG. The oils differ in their properties and in the additives they contain.

S = Spark Ignition (i.e. SE)

Spark Ignition (S) oils are those that are used for gasoline engines. The current service ratings for gasoline-engine lubricating oils are: SA, SB, SC, SD, SE, SF, SG, SH and SJ. These oils differ in their properties and in the additives they contain.

Another method of classifying minimum performance standards for gasoline-fueled engine oils has been developed through ILSAC (International Lubrication Standardization Approval Committee). Oils that meet ILSAC GF-1 performance standards must have a "starburst" certification mark displayed on the print of the oil product packaging.

3.0 ENGINE OIL REQUIREMENTS AND SPECIFICATIONS

APPROVED ENGINE OILS

- For BMW gasoline engines with two valves per cylinder, all reputable multiple grade engine oils* which meet or exceed the API classification of SH. (Combination with diesel oil specifications CD or CE quality classifications are also permitted, e.g. SH/CE etc.)

  For BMW gasoline engines with four valves per cylinder, only reputable multiple grade engine oils* which meet or exceed the API classification of SH. (Combination with diesel oil specifications CD or CE quality classifications are also permitted, e.g. SH/CE etc.)

- For BMW turbocharged diesel engines, all reputable multiple grade engine oils* which meet or exceed the API classification CD/CE.

*Engine oil may be mineral or synthetic based.

Special Oils category has been replaced by BMW **High Performance Synthetic** Engine Oil (5W-30). It eliminates the need for seasonal oil changes since it covers all ambient temperature ranges.

BMW of North America has introduced a line of exclusively formulated High Performance Engine Oils which exceed existing international quality specifications (SAE/CCMC) for motor oils. BMW part numbers are:

ENGINE OIL REQUIREMENTS AND SPECIFICATIONS

SAE 5W-30 (SJ/CF) BMW High Performance Synthetic Oil	1 quart	Part No. 07 51 0 017 866
SAE 15W-40 (SJ/CF) BMW High Performance Mineral Oil	1 quart	Part No. 07 51 0 017 868

Motorsport Engines

E46 M3 / S54E36 M roadster, M coupe / S54 from start of production

E39 M5 / S62 Up to 3/2000

E52 Z8 / S62 Up to 3/2000

E60 M5 / S85 From start of production

E63 M6 From start of production

E64 M6 From start of production

E85 Z4 M Coupe / Z4 M Roadster From start of production

BMW High Performance Synthetic Oil Castrol RS SAE 10W-60 also called Castrol TWS Motorsport SAE 10W-60 Synthetic Oil Part No. 07 51 0 009 420 (1quart)

E39 M5 / S62 From 3/2000

E52 Z8 / S62 From 3/2000

BMW High Performance Synthetic Oil SAE 5W-30 Part No. 07 51 0 017 866 Or BMW High Performance Synthetic Oil Castrol RS SAE 10W-60 also called Castrol TWS Motorsport SAE 10W-60 Synthetic Oil Part No. 07 51 0 009 420 (1quart)

BMW High Performance Synthetic Oil 5W-30 and 10W-60 offer several benefits over conventional mineral based oils.

SUPERIOR THERMAL STABILITY

The synthetic based oil resists thickening at very low ambient temperatures providing improved flow, lubrication and less internal engine resistance during cold starts.

Under high heat conditions, the oil resists thermal breakdown/shearing which causes a loss of lubrication quality compared with conventional oils.

SUPERIOR LUBRICATION THROUGHOUT THE LIFE OF THE OIL

Compared to conventional engine oils, BMW High Performance Synthetic Oil is better able to keep engine combustion contaminants in suspension and is less susceptible to the harmful effects of oxidation.

The oil resists sludge buildup thus allowing extended oil change intervals. Synthetic based oils also have a lower volatility which makes them less susceptible to evaporation thereby reducing oil consumption.

This oil has been durability tested on BMW engines and supplies superior lubrication under all operating conditions and over the extended BMW oil change intervals.

4.0 ENGINE OIL CHANGE INTERVALS

With the introduction of the 1999 Model Year vehicles BMW has introduced an extended oil change interval of approximately 15,000 miles (depending on engine operating conditions) on most models.

To coincide with the increased oil change interval, BMW has also introduced "BMW High Performance Synthetic Oil" which must be used on all 1999 Model Year vehicles (except E36 318ti, 323is/iC, 328is/iC, M3, M Roadster and M Coupe models) whenever a service is necessary to avoid engine damage.

NOTE: Only if it is necessary to top up the engine oil between oil changes is it permissible to use synthetic low viscosity engine oils which conform to the API classification SJ or higher.

A label in the engine compartment states the oil specifications and refers to the BMW website (www.bmwusa.com) and toll free number (1-800-831-1117) for additional information.

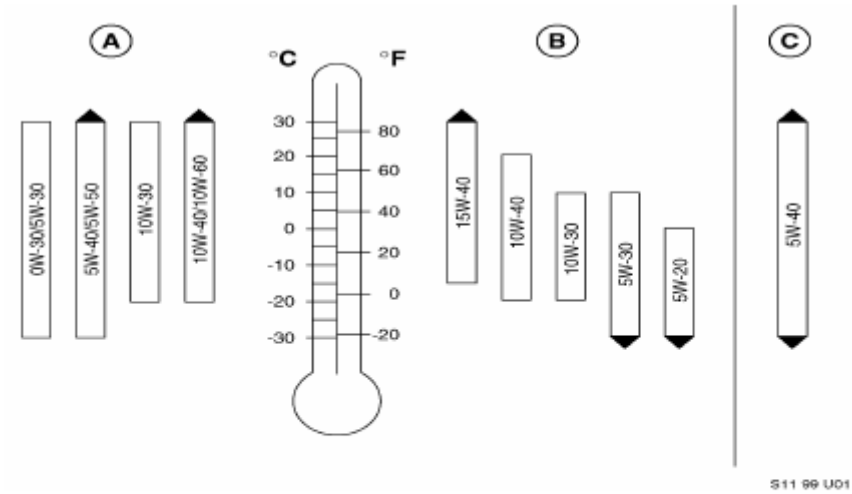
Fig. 1: Identifying Label In Engine Compartment States
Courtesy of BMW OF NORTH AMERICA, INC.

BMW High Performance Synthetic Engine Oil may also be used on Model Year 1999 E36 (3-Series and M models) as well has Model Year 1998 and earlier BMW models.

The oil change intervals should not be extended due to the greater durability of a fully synthetic engine oil. The engine oil and filter should always be changed as per the vehicle's Service Interval Indicator when the "Oil Service" or the "Inspection" display appears regardless of the type of oil being used.

BMW mineral-based High Performance engine oil is also offered for model year 1998 and earlier BMW

models. However, for reliable engine performance in all temperature ranges mineral-based engine oil viscosity must be matched to the temperature range at which the vehicle will be operated. See Engine Oil Temperature/Viscosity Table below.



A/B: Brand name oils approved per API or ACEA (CCMC)

A = Diesel engines

B = Spark-ignition engines

C: BMW High Performance Synthetic Oil

C = Valid for spark-ignition and diesel engines

Fig. 2: Identifying BMW Engine Oil Temperature/Viscosity Table
Courtesy of BMW OF NORTH AMERICA, INC.

Other Oil Changes For Cars Without Service Indicator:

MODEL YEAR/MILLAGE REFERENCE

Model Year(s)	Mileage
1980 and later	7,500
1975 thru 1979	6,500
1974 or earlier	4,000

Including oil filter. However, at least twice annually, preferably before and after the winter season.

Under severe driving conditions it is recommended to increase the number of oil services.

5.0 CONDITION BASED SERVICE

Models: E90, 91, 92, E60, E61, E63, E64 E65, E66

Condition Based Service measures, monitors, and determines the required maintenance of several service items independent from each other. This technology prompts the customer to bring the vehicle for service whenever one of the CBS items requires maintenance or replacement. CBS strikes a compromise between too frequent

maintenance and too rigid service intervals that call for the replacement of service items which may still have substantial remaining useful life. CBS also details the recommended, due, and overdue required maintenance during and after the BMW Vehicle Maintenance Program Agreement. Thus, CBS allows BMW customers to experience a technology that makes service more convenient, transparent and structured.

6.0 ENGINE OIL ADDITIVES

The use of engine oil additives is not recommended and not necessary on BMW engines. Instead, it is mandatory to use BMW High Performance Synthetic Oil in 1999 model year and later BMW models and recommended to use either BMW High Performance Synthetic Oil, BMW High Performance Mineral Oil or one of today's highly advanced brand name lubricating oils conforming to API classification SH or higher in 1998 and earlier BMW models.

7.0 BREAK-IN INSTRUCTIONS

During the break-in period of a new engine or parts of a reconditioned engine (new bearings, crankshaft, pistons, etc.) BMW engines do not require special break-in oils.

All of the multiple grade engine oils can be used, as long as they conform with BMW specifications.

8.0 N52, N52KP AND N54 FRONT AND REAR RADIAL SEAL SEALANT

When replacing the front or rear radial crankshaft seals on new generation 6 cylinder engines, a special Loctite® sealant must be applied to fill the seal grooves at the bedplate seam. Follow the appropriate repair instruction in TIS:

RA 11 14 005 - Front radial crankshaft seal replacement

RA 11 14 151 - Replacing crankshaft radial seal (rear)

All special tools required to perform these repairs have been sent out through the automatic tool shipment program and are listed in S.I. Bulletin 04 01 06.

Required Materials:

P/N 83 19 7 536 051 - Loctite® 128357 sealant compound\

P/N 83 19 7 515 683 - Loctite® 171000 primer

P/N 83 19 7 515 684 - Stamp

10.0 LUBRICANT FOR OXYGEN SENSOR

Apply Bostik NEVER-SEEZ® (Part No. NSBT-16) to threads of oxygen sensor.

11.0 OIL CONSUMPTION

All engines normally consume a certain amount of oil. This is necessary in order to properly lubricate the cylinder walls, pistons, piston rings etc. In addition, engines with less than 6,000 miles will generally consume additional oil because the components are not fully seated. Therefore, oil consumption complaints received prior to 6,000 miles cannot be considered.

Once a new or rebuilt engine has accumulated 6,000 miles this procedure should be used if there is a drastic change in the oil consumption rate (i.e. the oil consumption rate triples) under similar driving conditions or if the oil consumption rate exceeds 1 qt. per 750 miles at any time..

All Motorsport Engines:

Due to their increased output and maximum engine speeds, these engines are allowed a maximum consumption of 2.5 quarts per 1,000 miles.

13.0 OPERATING FLUIDS TABLE AND ALTERNATE SUPPLIERS

OPERATING FLUIDS TABLE AND ALTERNATE SUPPLIERS

BMW Part Number	Description / Application	3M	Wurth	Loctite	CRC
11 12 1 262 571(1)	**Silicone Sealant**	8661		80050/PX66BR	
81 12 9 400 086(1)	**Hylogrip/Loctite 270 Thread Sealant** Secures and seals bolts, studs, nuts, threaded inserts, screw plugs against impact and vibration. Fastens ball, roller and sliding bearings onto shafts or in housings, with play up to 0.25mm. Quick setting.		8932700	21438	
	Oil filter flange bolt				
	-				
81 22 9 400 243(1)	**Sealer** Low viscosity, non-hardening, removeable. For sealing off against mineral oils, grease, gases, air and many chemicals. Application: from-40°C to approx. 200°			Permatex 3D Aviation Form a Gasket 80017	

	C. Tacking cylinder gasket -					
81 22 9 400 339	**Hylomar SQ32M Sealant** Universal sealing compound, applicable by brush. For sealing interfaces between surfaces that require excellent temperature resistance and sealing elasticity. Material: Polyester-urethane mixture.					
81 22 9 407 394[1]	**Loctite 380 Epoxy Cement** Black cyanacrylate adhesive for joining metals, rubber, PVC.	8155	8934103	38050		
81 22 9 400 794[1]	**Copper Paste** Multi-purpose grease for all detachable joints at high temperatures and corrosive conditions, also after long operating periods. Able to withstand high pressures, protection against undesired weld contact, seizure and corrosion, active adhesion properties, effective as lubricant and separator up to 1100°C. Applications: parts subject to high temperatures, such as bolts and flanges on exhaust system, engine, disk brakes, etc.	8945				3046010

81 22 9 407 439[1]	07 58 9 062 376[1]	**Silicone Sealer** A black colored silicone-based sealant for large areas. Resists temperatures up to 250°C. For engine or gearbox; particularly suitable for sealing the timing case on M70 engine, and eliminating oil seepage from E36 M42 cylinder head.	8670 8661	81157/PX16B 80050/PX66BR	
81 22 9 407 760[1]	Engine Cleaner Spray Fast acting cleaner for dirty engines and engine parts. Does not attack painted, rubber, or plastic parts.	8899	890923	80043	14045
N/A	**Lubro Moly Lecksucher** Intake and vacuum system leak detector.				
N/A	**J-B Weld** Repairs pitting in cylinder head sealing surfaces.				
N/A	**Bostik Never-Seez** Thread lubricant for oxygen sensors.				

[1] *These items are no longer available through BMW NA Parts Department.

1100 ENGINE, GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

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  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

ENGINE IDENTIFICATION

Punch engine numbers at marked surface with number punch.

Magnesium crankcase with sticker

M47/M47TU/M47T2

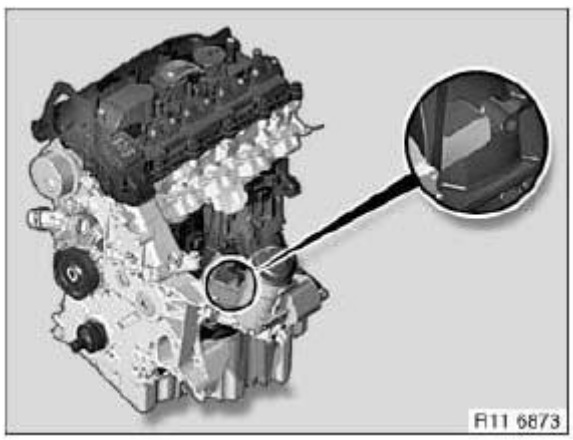

Fig. 1: Identifying Engine Identification Mark - M47/M47TU/M47T2
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

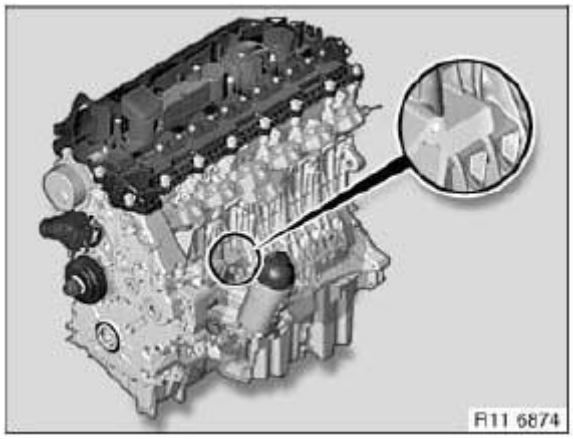

Fig. 2: Identifying Engine Identification Mark - M57/M57TU/M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

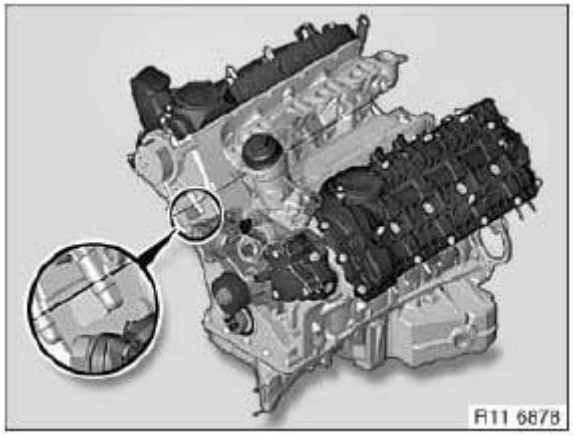

Fig. 3: Identifying Engine Identification Mark - M52/M52TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N57 N57S

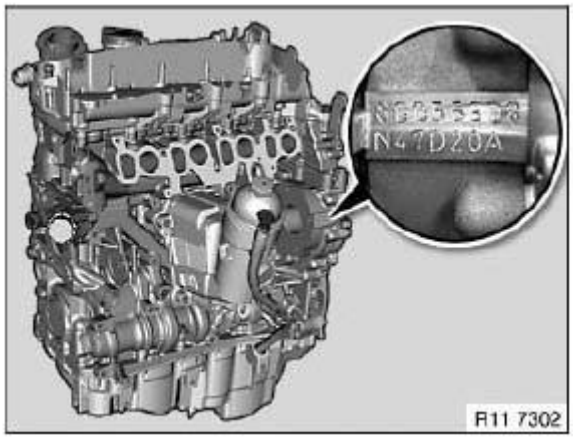

Fig. 4: Identifying Engine Identification Mark - N47/N47S/N47C/N57 N57S
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

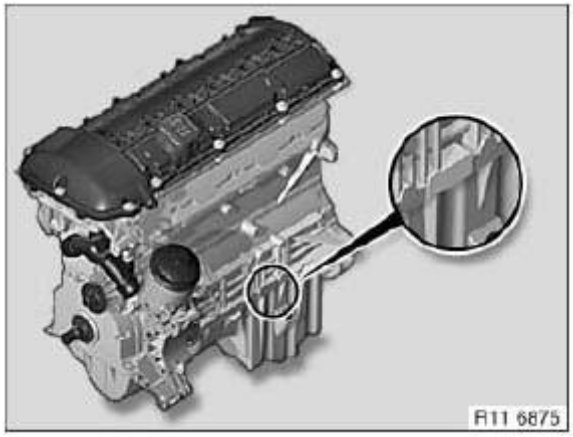

Fig. 5: Identifying Engine Identification Mark - M52/M52TU
Courtesy of BMW OF NORTH AMERICA, INC.

M54

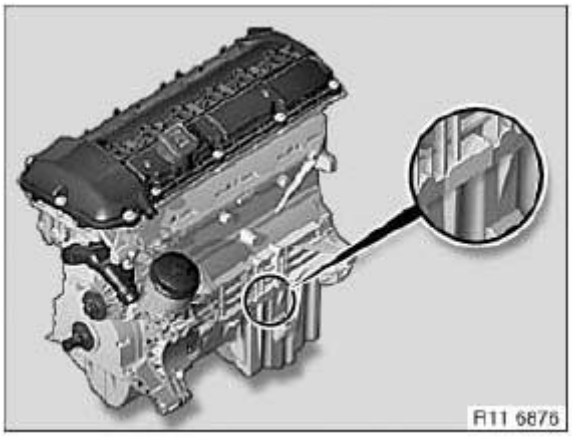

Fig. 6: Identifying Engine Identification Mark - M54
Courtesy of BMW OF NORTH AMERICA, INC.

M56

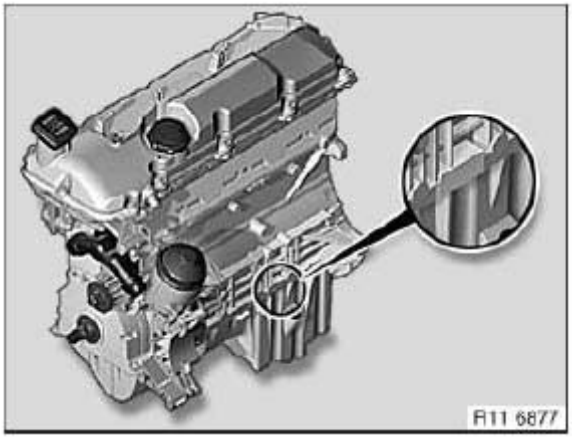

Fig. 7: Identifying Engine Identification Mark - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

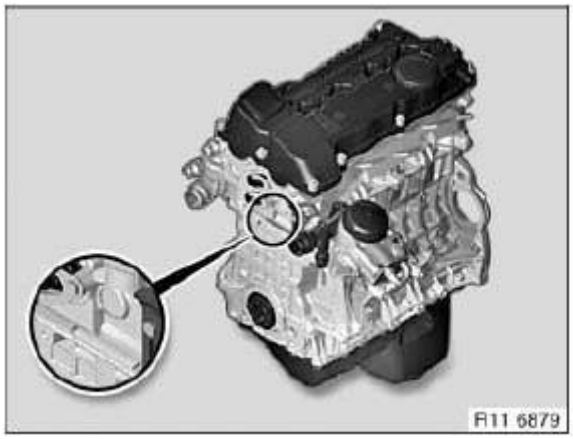

Fig. 8: Identifying Engine Identification Mark - N40/N45/N45T/N43
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

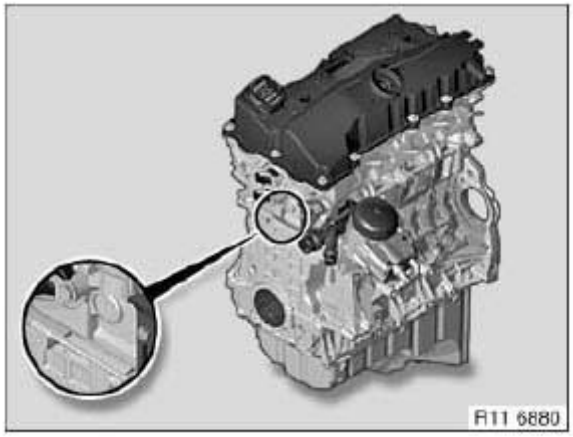

Fig. 9: Identifying Engine Identification Mark - N42/N46/N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51/N52/N52K/N52T/N53/N54/N55

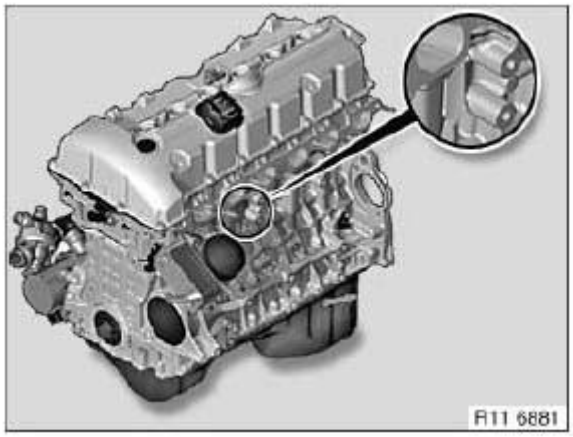

Fig. 10: Identifying Engine Identification Mark - N51/N52/N52K/N52T/N53/N54/N55
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

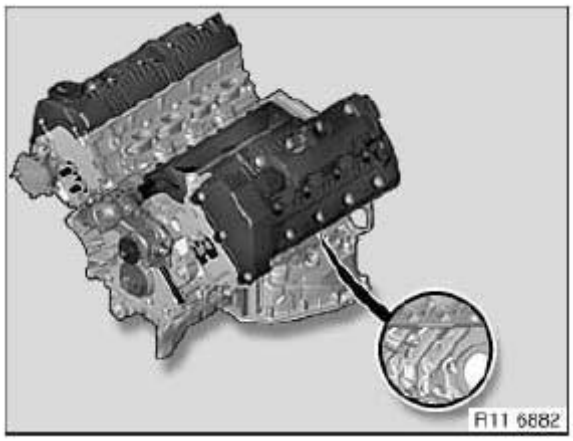

Fig. 11: Identifying Engine Identification Mark - N62/N62TU
Courtesy of BMW OF NORTH AMERICA, INC.

N73

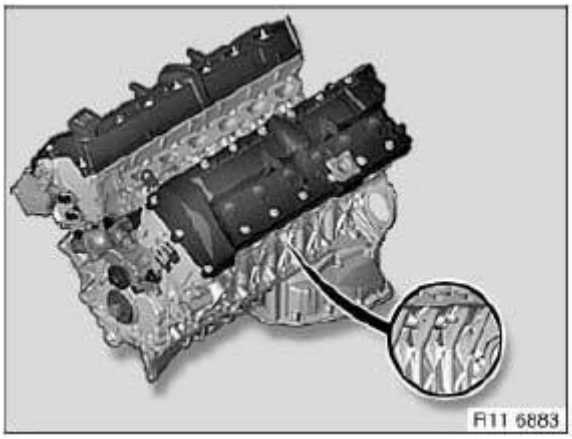

Fig. 12: Identifying Engine Identification Mark - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

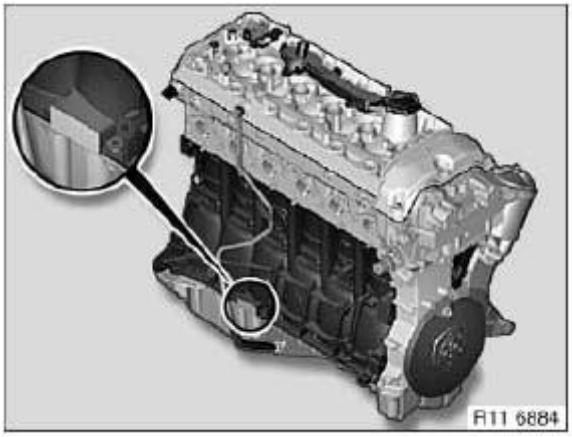

Fig. 13: Identifying Engine Identification Mark - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

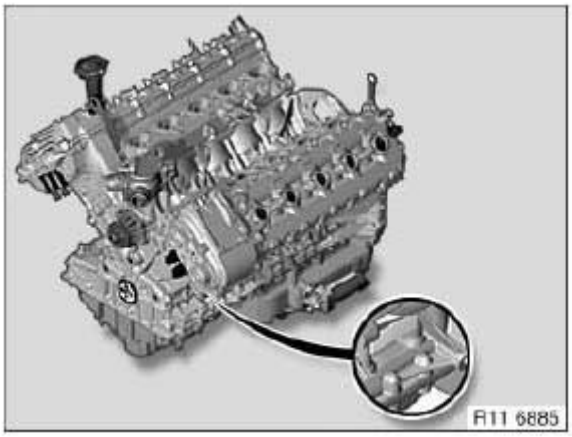

Fig. 14: Identifying Engine Identification Mark - S85/S65
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

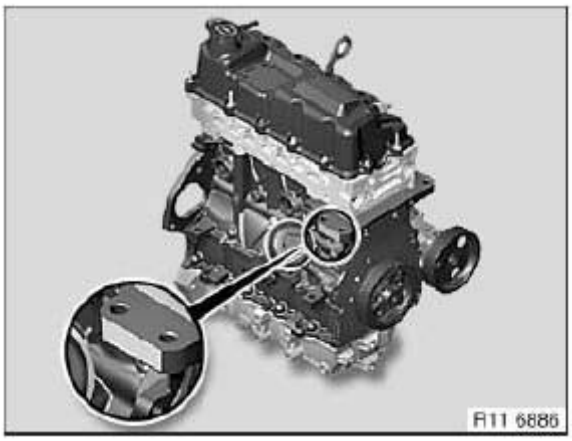

Fig. 15: Identifying Engine Identification Mark - W10/W11
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N14/N16/N18

Fig. 16: Identifying Engine Identification Mark - N12/N14/N16/N18
Courtesy of BMW OF NORTH AMERICA, INC.

W17

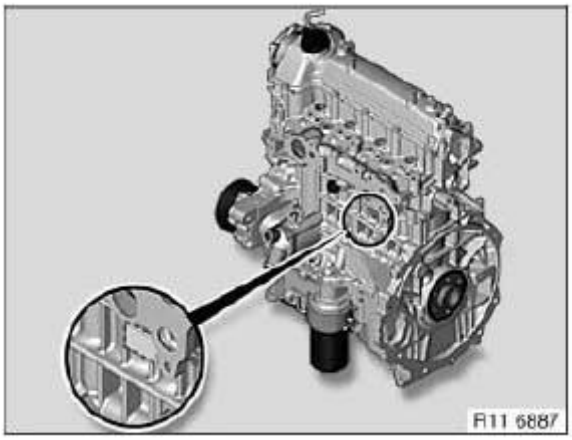

Fig. 17: Identifying Engine Identification Mark - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00 ... ENGINE OIL SERVICE (N52K)

WARNING: Danger of scalding!
Carry out work on the vehicle only when wearing oil- and heat-resistant protective gloves incl. forearm protection, face guard and protective apron.

IMPORTANT: Carry out the engine oil service only when the engine is at normal operating

temperature.
Observe the exact engine oil filling capacity.
Overfilling the engine with engine oil will result in engine damage .
Checking and drop-off times (at least 10 minutes) must be observed.

IMPORTANT: Risk of damage!
Protect belt drive against dirt.
Cover with suitable materials.

Recycling

Catch and dispose of drained engine oil in a suitable container.

Observe country-specific waste-disposal regulations.

Release oil filter cap with special tool 11 9 240 .

Tightening torque **11 42 1AZ** .

NOTE: Engine oil flows out of the oil filter housing and back into the oil sump.

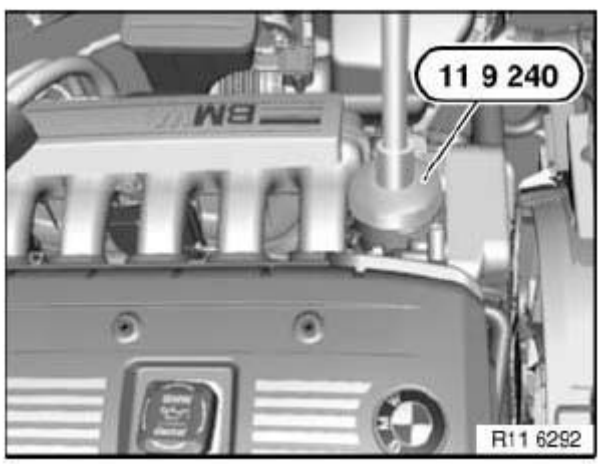

Fig. 18: Identifying Special Tool (11 9 240)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Presentation: E63 without underbody protection.

Unclip service opening on underbody protection.

Remove screw plug (1) from oil sump and drain engine oil.

Tightening torque **11 13 1AZ** .

Installation:

Replace sealing ring.

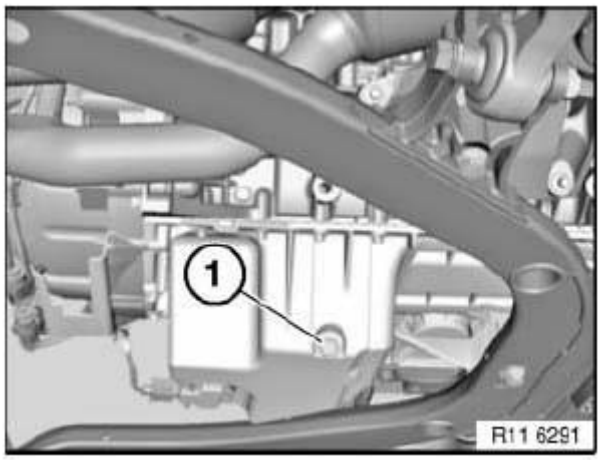

Fig. 19: Identifying Screw Plug On Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

Remove and insert oil filter element (1) in direction of arrow.

Installation:

Replace oil filter element (1) and sealing rings (2).

NOTE: Moisten sealing rings (2) with engine oil.

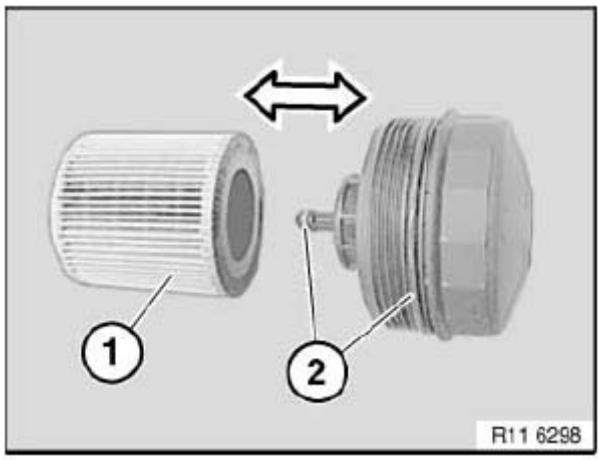

Fig. 20: Identifying Oil Filter Element And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil filter cap with special tool 11 9 240 .

Tightening torque **11 42 1AZ** .

NOTE: Pour in ENGINE OIL .

Start engine and run at idle until oil pressure warning lamp goes out.

Turn off engine.

Check oil filter cap and screw plug on oil sump for leaks.

Assemble engine.

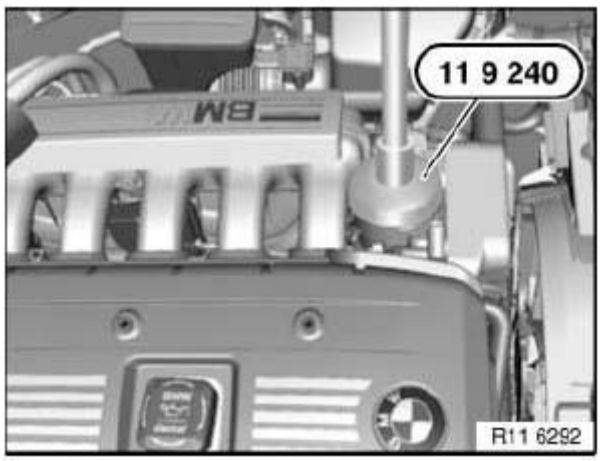

Fig. 21: Identifying Special Tool (11 9 240)
Courtesy of BMW OF NORTH AMERICA, INC.

Checking engine oil level:

- Park vehicle on a horizontal surface
- Allow engine at normal operating temperature to run for three minutes with increased revs (approx. 1100 RPM)
- Read off engine oil level in instrument cluster or on Control Display
- Top up engine oil if necessary

MOUNTING ENGINE ON ASSEMBLY STAND (N52K)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released .
The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove engine

Bolt engine or engine block with steel bolts (1) and aluminum bolts (2) to special tool 11 4 440 .

To release central bolt, bolt on special tools 11 9 261 and 11 9 265 as well.

Mount engine with special tool 11 3 370 to special tool 00 1 450.

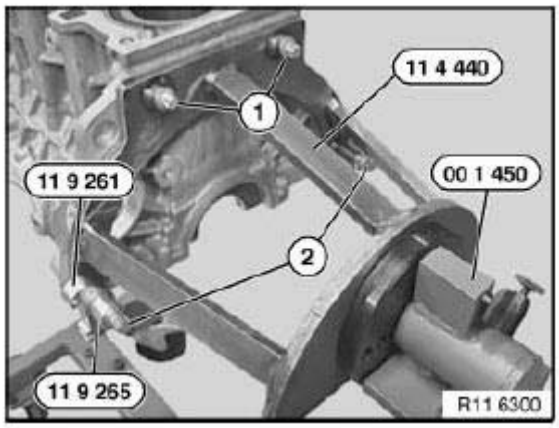

Fig. 22: Identifying Engine Block With Steel Bolts And Aluminum Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 ... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)

1.0 Sealing compound for injection

SEALING COMPOUND INJECTION REFERENCE CHART

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128367 sealing compound
1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound

1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves

2.0 Sealing compound for application

SEALING COMPOUND APPLICATION REFERENCE CHART

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57S N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85 N12, N14, N16, N18	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing separation points on crankcase
2.2	N12, N14, N16, N18 W16, N47top, N47D1, N47C1 N57D1,	Loctite 5970 liquid gasket	83 19 0 404 517 83 19 0 404 517	Sealing between crankcase upper and lower sections. Sealing of gear case cover, oil sump, coolant pump, component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase

3.0 Cleaning agent

CLEANING AGENT REFERENCE CHART

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
3.1	N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63Hyprid, N74	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

4.0 Lubricant for application

LUBRICANT REFERENCE CHART

	Designation in repair	Designation,	Part number,	

	instructions	Electronic Parts Catalogue	Electronic Parts Catalogue	Application examples
4.1	N20, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N73	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the threads on the exhaust turbocharger.
4.3	N12, N14, N16, N18 N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63, N73, N73H, N74. S65, S85.	High temperature paste (NEVER-SEEZ compound)	83 23 0 140 233	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T N47D1 N57 N57D1	Copper paste	81 22 9 400 794	For greasing the double hex head bolt on the exhaust turbocharger.

5.0 Lubricants to loosen locked screw connections

LUBRICANTS REFERENCE CHART

	Designation in repair instructions	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
5.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, W16, W17,	Brunox lubricating grease	83 23 0 445 529	For releasing the glow elements

11 00 050 REMOVING AND INSTALLING ENGINE (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Disconnect **BATTERY NEGATIVE LEAD**
- Move **ENGINE HOOD/BONNET** into service position
- Remove **INTAKE FILTER HOUSING**
- Remove **FAN COWL** with electric fan
- Remove **RADIATOR**
- Remove **CONDENSER**
- Detach all coolant hoses from engine
- Detach vacuum line from brake booster
- Release engine wiring harness from electronics box and lay to one side
- Remove **EXHAUST SYSTEM**
- Remove transmission See **2300017 REMOVING AND INSTALLING TRANSMISSION (GS6-17BG) N52K** or **2400030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP19Z) N52K**
- Release **STEERING SPINDLE** from steering gear (do not remove)
- Release grounding strap on left engine support arm

Release nut (1) and disconnect battery positive lead (2) from terminal.

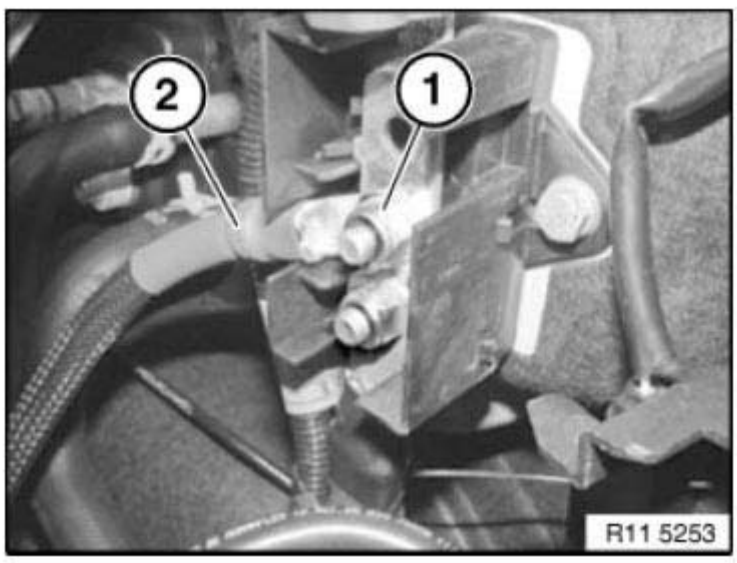

Fig. 23: Identifying Battery Positive Lead And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove A/C line (2) from A/C compressor.

Installation:

Replace seals.

Tightening torque **64 52 1AZ** .

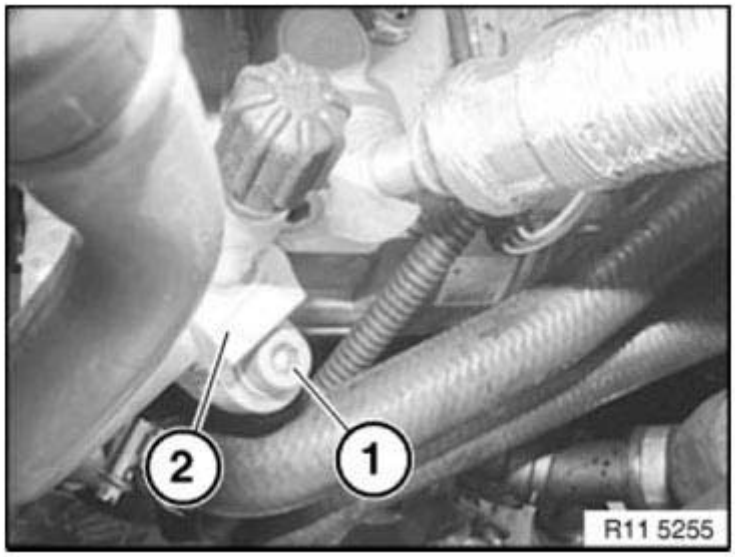

Fig. 24: Identifying A/C Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect fuel lines (1).

Seal off fuel lines with special tools 13 5 161 and 13 5 162.

Disconnect tank vent line (2).

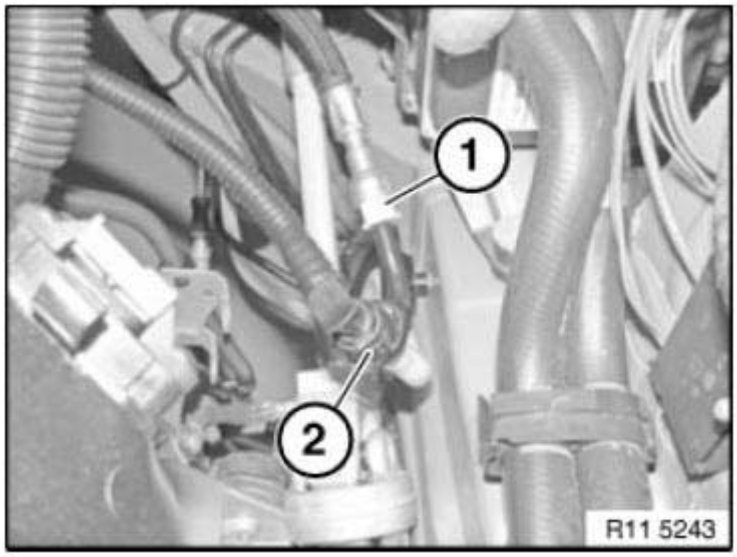

Fig. 25: Identifying Tank Vent Line And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock crankcase breather hose (2) and detach from cylinder head cover (1).

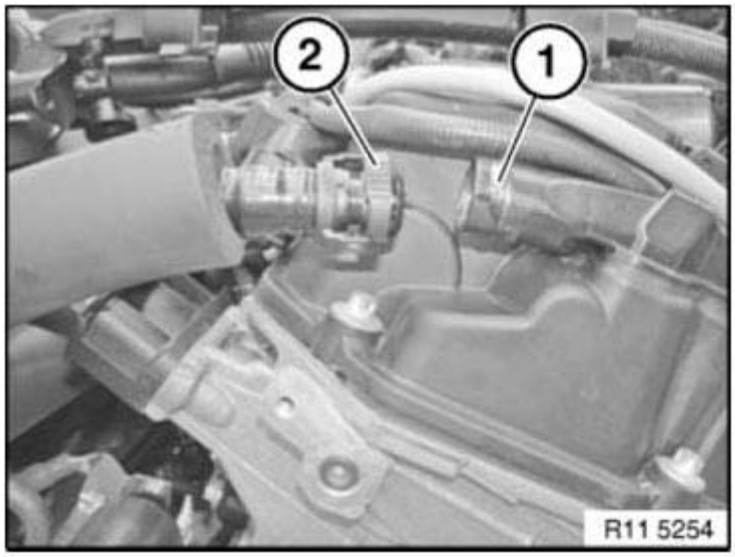

Fig. 26: Identifying Crankcase Breather Hose And Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on engine mount on left and right.

Installation:

Replace self-locking nut.

Tightening torque **22 11 2AZ** .

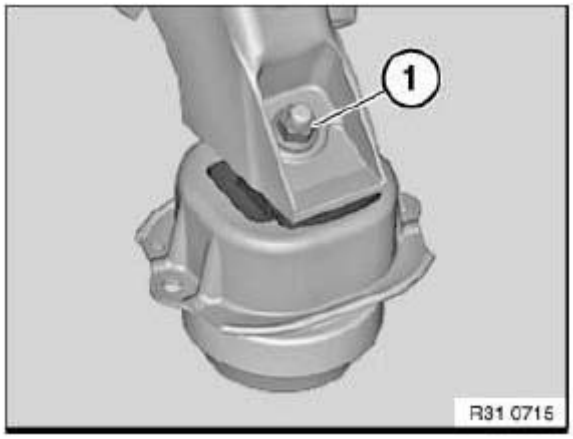

Fig. 27: Identifying Engine Mount Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Screw towing eye (1) into cylinder head.

Tightening torque **11 12 9AZ** .

Suspend special tool 11 0 020 from engine crane.

Suspend special tool 11 0 020 from the designated mounting eyelets (2) only.

Lift engine out with engine crane.

NOTE: For purposes of clarity, engine removed and not showing intake manifold.

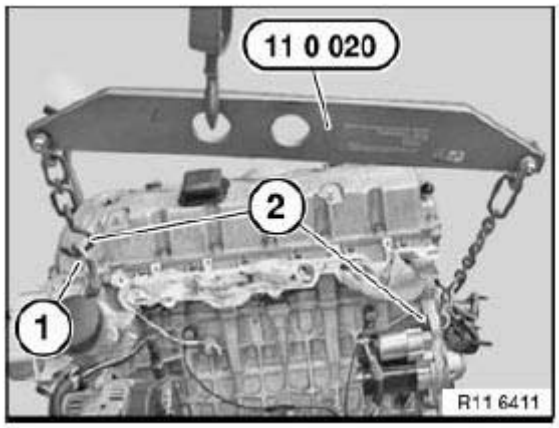

Fig. 28: Lifting Engine Using Special Tool (11 0 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Secure special tool (1) 11 7 310 on steering gear.

Remove again before securing transmission carrier.

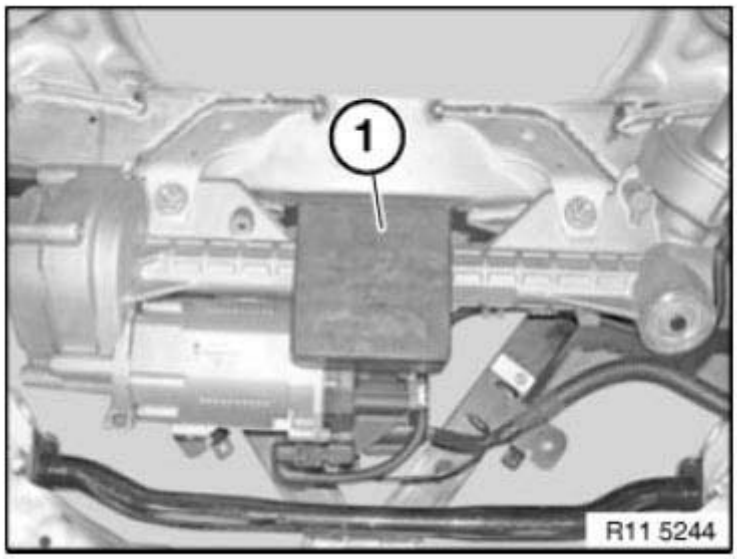

Fig. 29: Identifying Special Tool (11 7 310) On Steering Box

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N52K)

Release screws (1).

Raise acoustic cover slightly and remove towards front.

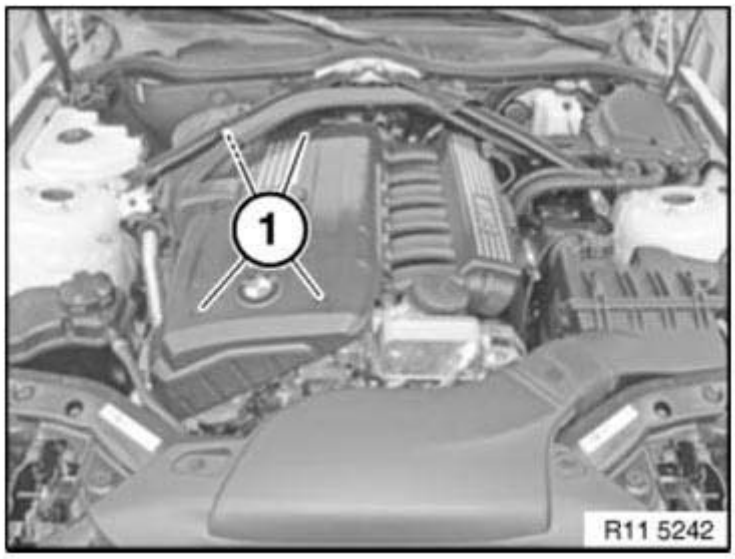

Fig. 30: Identifying Acoustic Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

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Possible symptoms are:

- Impaired sight
- Irritation of the eyes
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- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop

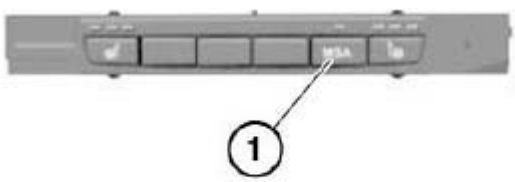
function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 31: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

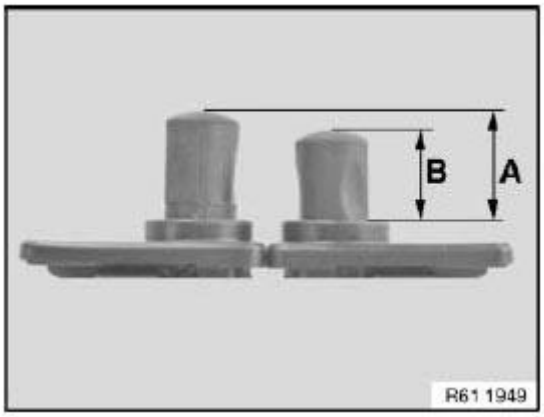


Fig. 32: Identifying Engine Hood/Bonnet Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: **DANGER OF POISONING if oil is ingested/absorbed through the skin!**
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N52)

WARNING: **Risk of injury!**
Observe following instructions relating to special tool:

1. **Prior to each use, check the special tools for defects, modifications**

and operational reliability.

2. **Damaged/modified special tools must not be used!**
3. **No changes or modifications may be made to the special tools!**
4. **Keep special tools dry, clean and free of grease.**

Necessary preliminary tasks:

- Secure **ENGINE COMPARTMENT LID IN SERVICE POSITION**
- Remove **AIR INTAKE FILTER HOUSING**

Lever out expanding rivets (2) and remove cable clip (1).

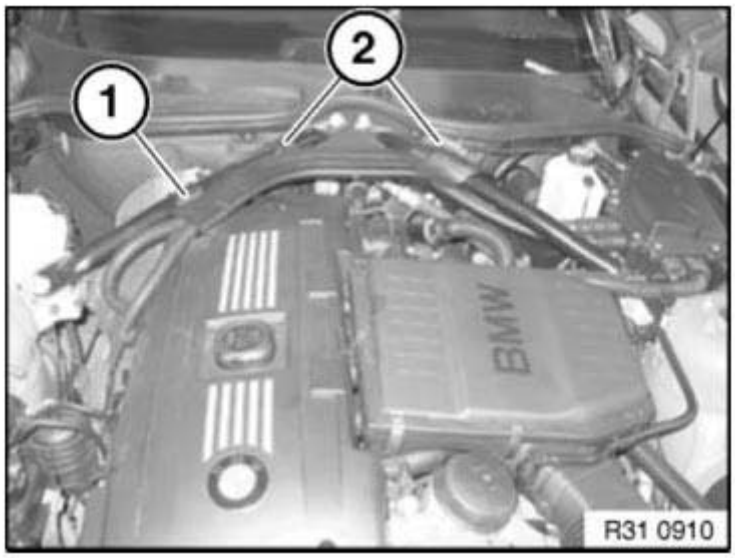


Fig. 33: Identifying Lever Out Expanding Rivets And Cable Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect quick-release coupling (2). Detach vent line from cylinder head cover (1).

Installation:

Make sure quick-release coupling is fitted correctly.

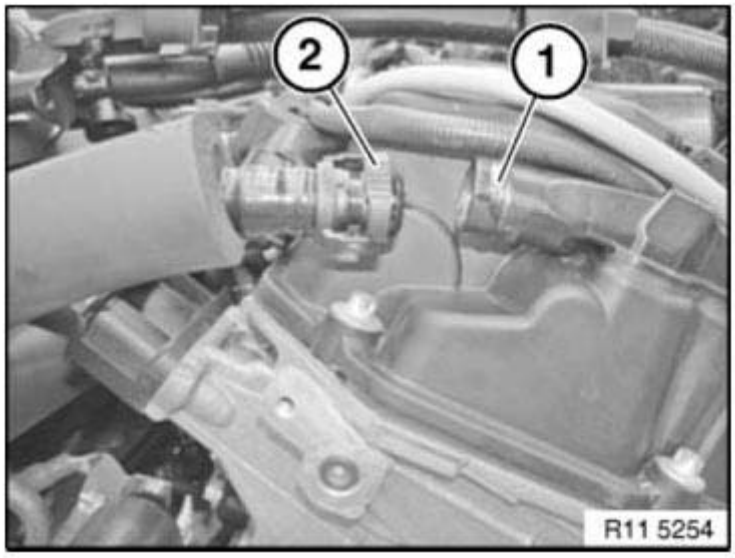


Fig. 34: Identifying Quick-Release Coupling And Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble transverse member 00 6 000 with special tools 00 6 030.

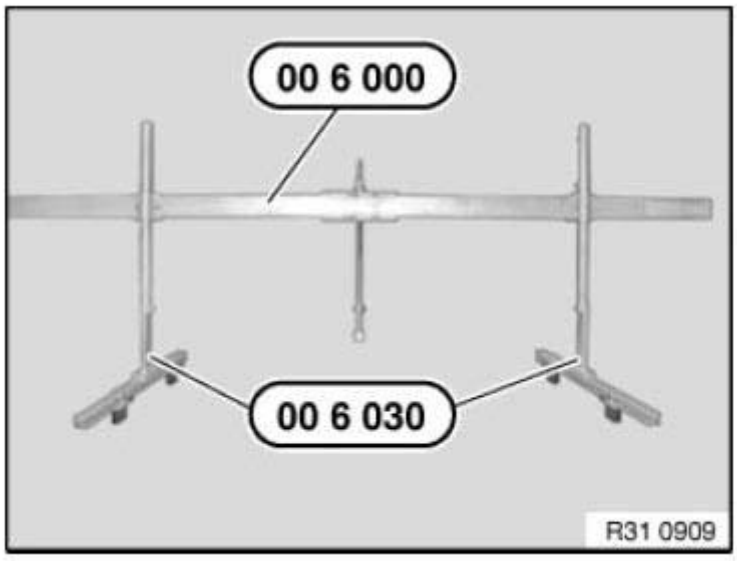


Fig. 35: Assembling Transverse Member 00 6 000 Using Special Tools 00 6 030
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in towing hook (1).

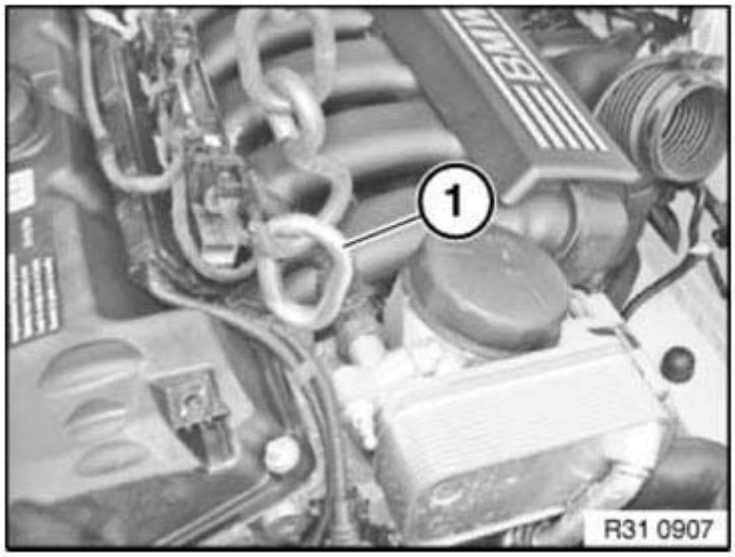


Fig. 36: Identifying Towing Hook
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction. Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

The support points on the left side are shown.

IMPORTANT: Risk of damage!
Position transverse member 00 6 030 with a 2nd person help on designated areas (1,2) of side panel.

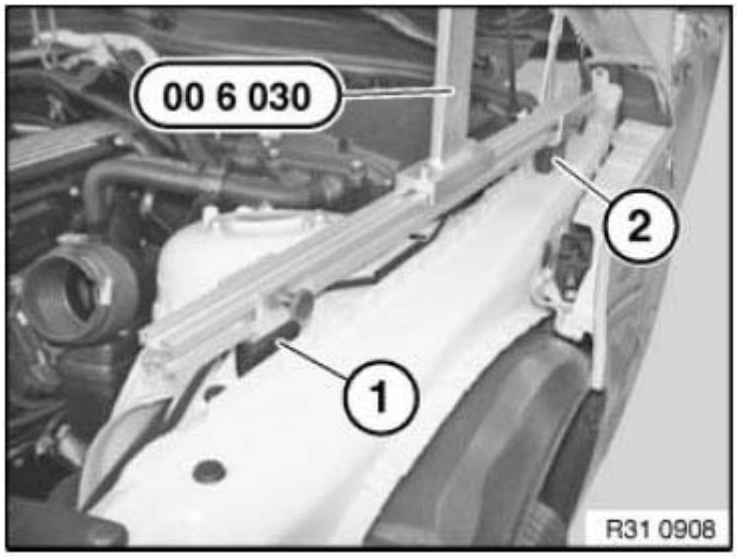


Fig. 37: Positioning Transverse Member 00 6 030 On Side Panel

Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 0 020 to spindle 00 6 002.

Fit suitable chains to special tool 11 0 020 and attach to engine towing hook or lifting eye.

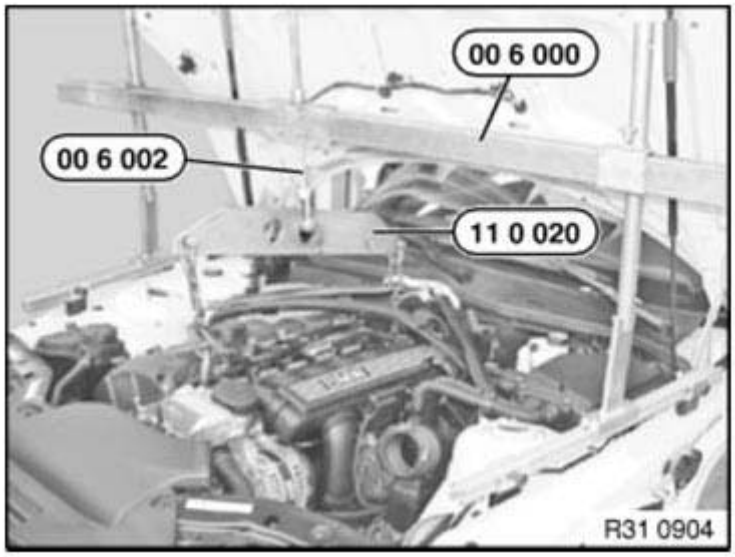


Fig. 38: Fitting Suitable Chains Using Special Tool (11 0 020)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!
Tighten down all adjusting screws and nuts on transverse member 00 6 000, 00 6 030.

Unscrew nuts (1).

Raise engine approx. 10 mm with transverse member.

Installation:

Replace self-locking nuts.

Tightening torque **22 11 2AZ** .

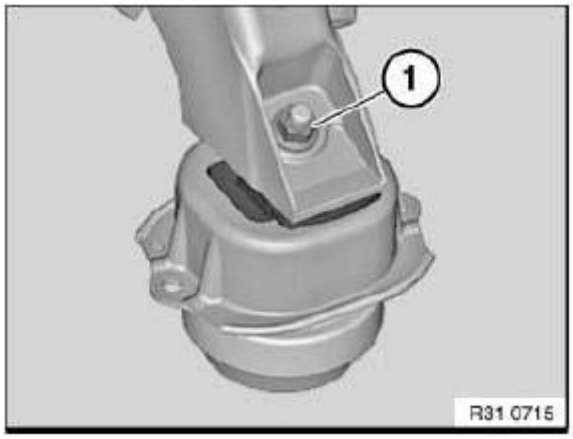


Fig. 39: Identifying Engine Mount Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

1112 CYLINDER HEAD WITH COVER

11 12 729 CHECKING CYLINDER HEAD FOR WATER LEAKS (N52K)

IMPORTANT: Pressure-test cylinder head to max. 3 bar .
Heat cylinder head to 60 °.
Check for bubble formation in a water bath.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Disassemble **CYLINDER HEAD**

NOTE: Observe mounting of special tool 11 4 341 on cylinder.

Secure special tool 11 4 341 with bolts 11 4 345 to 25 Nm.

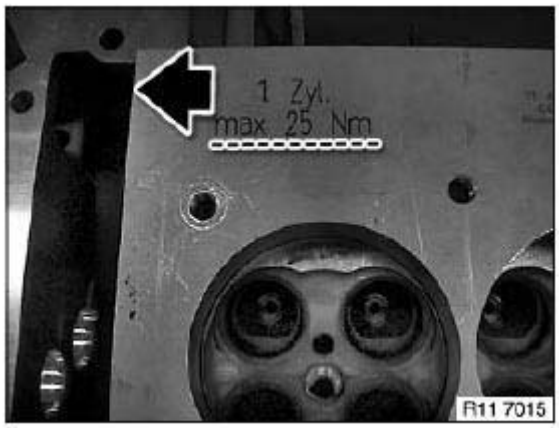


Fig. 40: Identifying Special Tool (11 4 341) On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 11 4 341 with special tool 11 4 345.

Installation:

Cylinder no. 1 is marked.

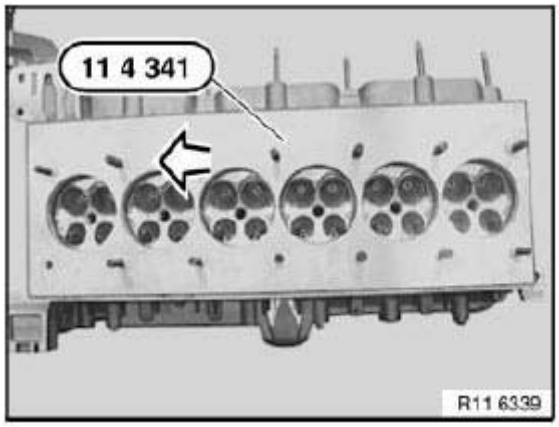


Fig. 41: Identifying Special Tool (11 4 341) On Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 4 342 with bolts (1). Screw in knurled screw in direction of arrow.

Sealing flange must rest flat.

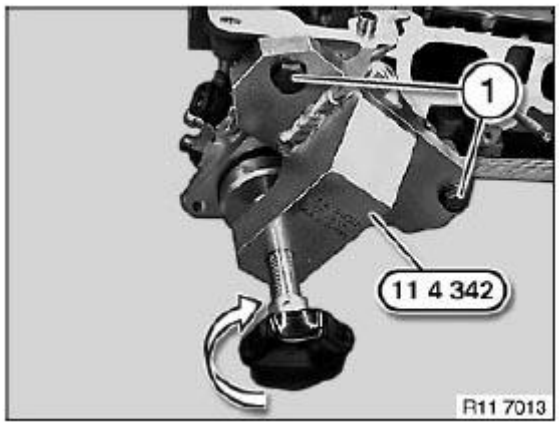


Fig. 42: Identifying Special Tool (11 4 342) With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 344 with bolts (1).

NOTE: Compressed air at valve max. 3 bar .

Heat cylinder head to 60 °.

Check for bubble formation in a water bath.

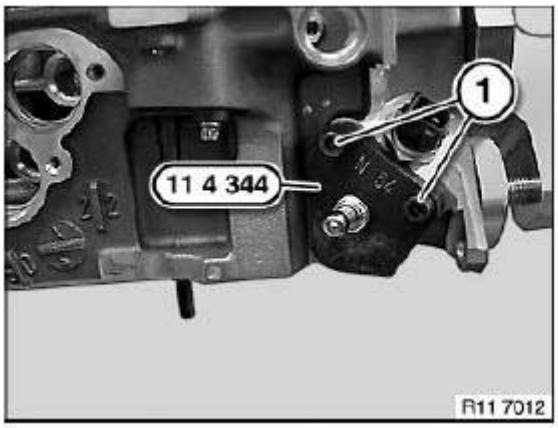


Fig. 43: Identifying Special Tool (11 4 344) With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **EXHAUST SYSTEM**
- Drain **COOLANT**
- Drain off **ENGINE OIL**
- Remove both exhaust manifolds See **1840060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52K)** or **1840050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52K)**
- Remove **INTAKE PLENUM**
- Detach coolant hoses from cylinder head
- Remove **INTAKE AND EXHAUST CAMSHAFT ADJUSTERS**

IMPORTANT: Fit new cylinder head screws.
Do not wash off bolt coating.
There must be no fluids or contaminants in any of the threaded holes for the cylinder head bolt connections.
Risk of corrosion and cracking!
Apply a light coat of oil to washer contact areas and threads of new cylinder head bolts.

Release screws (1).

Unclip timing chain module (2) at junction (3) and remove towards top.

Set down timing chain.

IMPORTANT: If the timing chain is stowed in the gearcase, the crankshaft must no longer be rotated.
This would cause the timing chain on the crankshaft sprocket wheel to jam or jump.

Installation:

The timing chain is lifted out with a hook only during assembly.

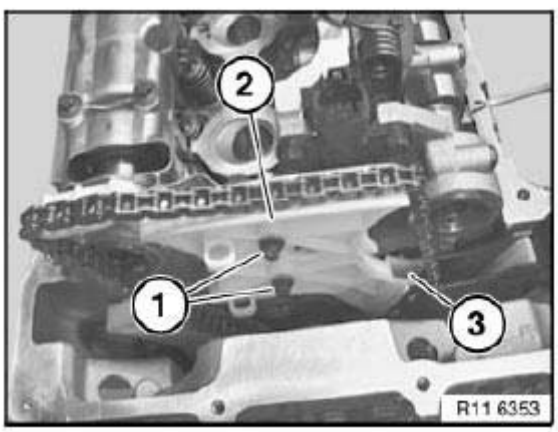


Fig. 44: Identifying Timing Chain Module With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (2) for eccentric shaft sensor (1).

Remove eccentric shaft sensor (1) towards front.

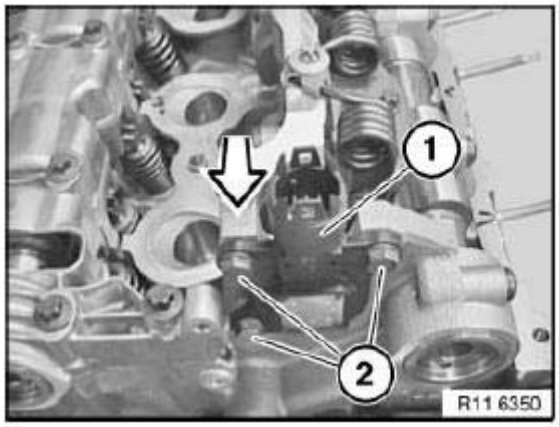


Fig. 45: Removing Eccentric Shaft Sensor Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw (1) is not magnetic and must be secured against falling down.

Release screw (1).

Remove magnet wheel (2) towards front.

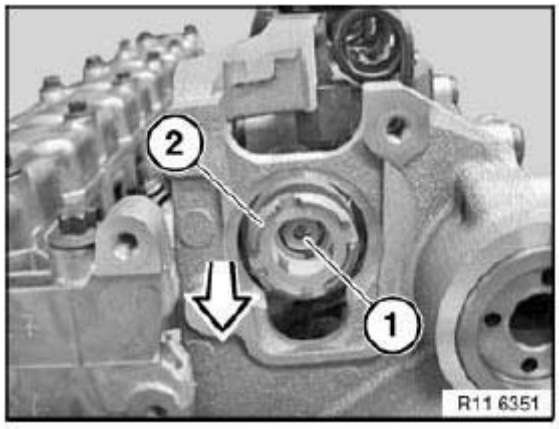


Fig. 46: Removing Magnet Wheel And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is highly magnetic and must be protected against metal filings/borings.

After removing, place magnet wheel (1) in a plastic bag (2) with a seal.

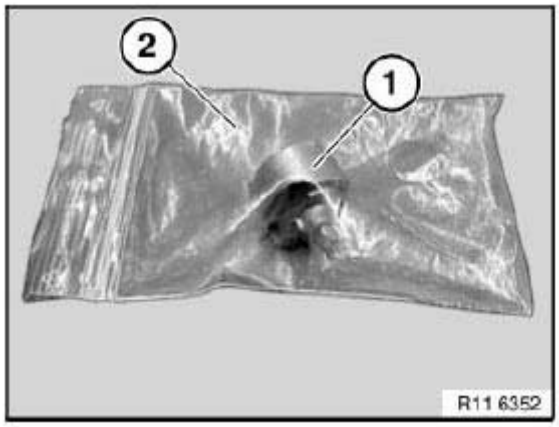


Fig. 47: Identifying Magnet Wheel In Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

Pre-tension eccentric shaft (1) upwards in direction of arrow.

Remove stop screw between 1st and 2nd cylinders.

Tightening torque **11 37 5AZ** .

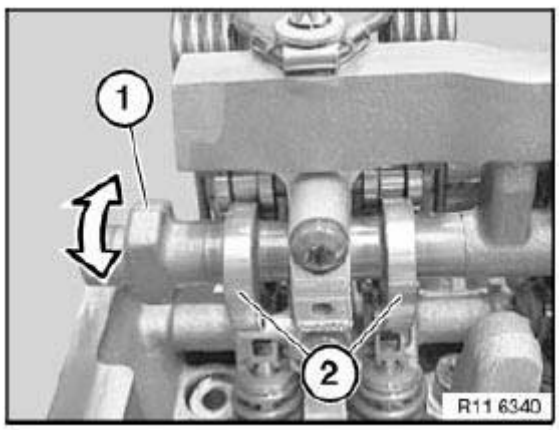


Fig. 48: Identifying Pre-Tension Eccentric Shaft With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Bolt (2) can only be released when the timing chain module is pressed forward slightly.

IMPORTANT: Secure bolt (2) with a gripper against falling down.

Release screw (2).

Tightening torque **11 12 3AZ** .

Release screws (1).

Tightening torque **11 12 4AZ** .

Installation:

Replace aluminum screws.

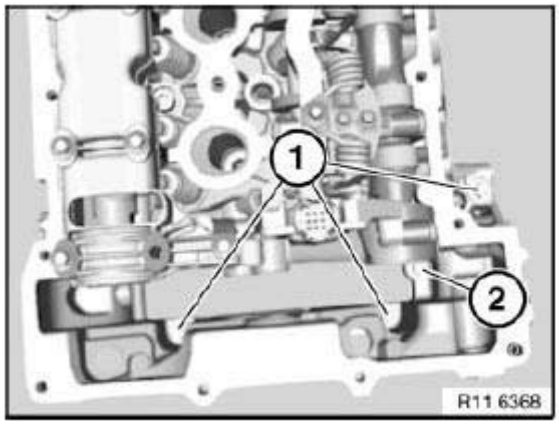


Fig. 49: Identifying Timing Chain Module Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different bolt heads.

Release cylinder head bolts (1) M10 with special tool 11 8 580 .

Release cylinder head bolts (2) M9 with special tool **11 4 420** .

NOTE: Picture shows intake and exhaust camshafts removed.

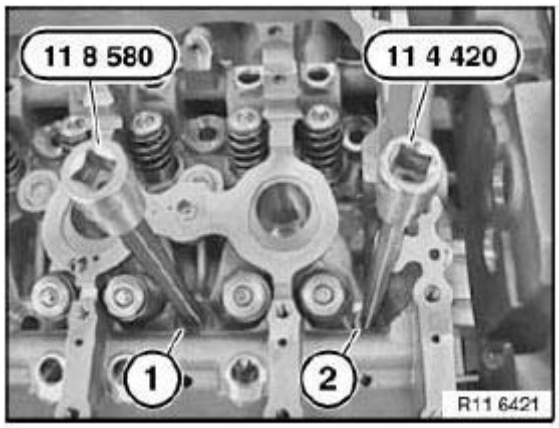


Fig. 50: Identifying Cylinder Head Bolts And Special Tool (11 8 580)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different M9 bolt lengths (1 and 3).

Undo cylinder head bolts (1 and 3) M9 using special tool **11 4 420** .

Tightening torque **11 12 2AZ** .

Release cylinder head bolts (2) M10 with special tool 11 8 580 from outside inwards.

Tightening torque **11 12 1AZ** .

**IMPORTANT: All cylinder head bolts (1, 2 and 3) must be replaced.
Joining torque and angle of rotation must be observed without fail.
Risk of damage!**

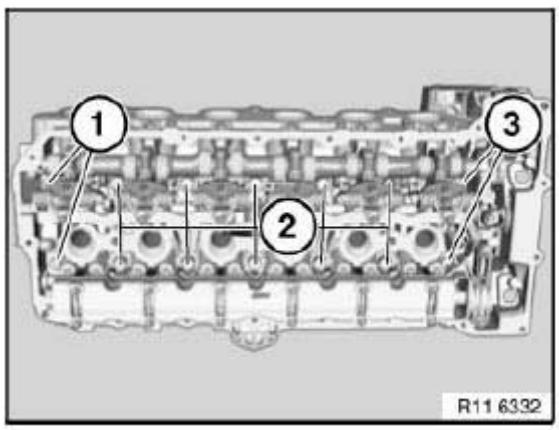


Fig. 51: Identifying Cylinder Head Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 0 320 with existing cylinder head cover bolts (1).

Tightening torque **11 12 5AZ** .

**IMPORTANT: Removing and install cylinder head with a second person helping.
Weight of cylinder head with add-on parts is approx. 40 kg.
Do not rest cylinder head on sealing surface. Risk of damage to valves!**

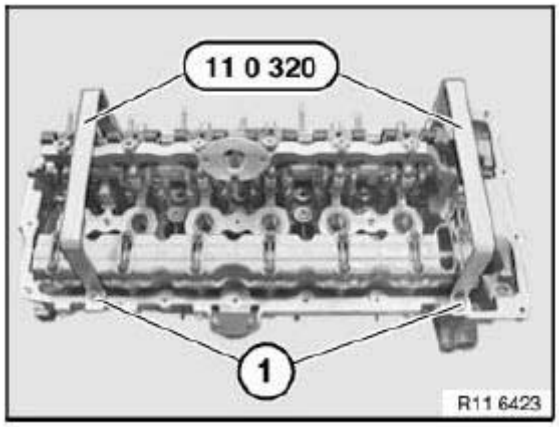


Fig. 52: Identifying Cylinder Head Cover Bolts And Special Tool (11 0 320)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert 11 4 430 special tool into bores.

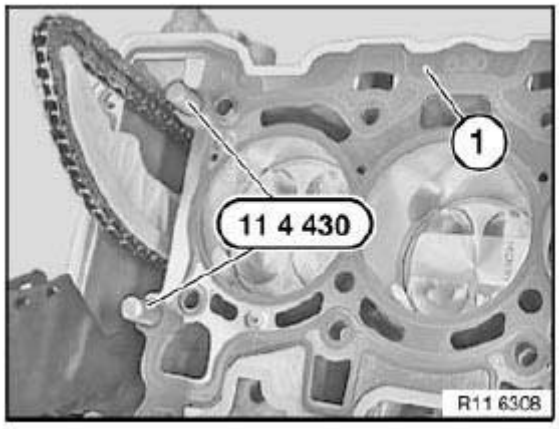


Fig. 53: Identifying Special Tool (11 4 430)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove coarse residues on sealing surfaces with special tool 11 4 471 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

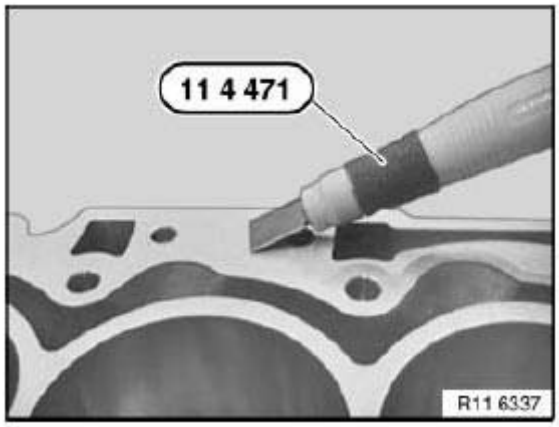


Fig. 54: Removing Coarse Residues On Sealing Surfaces Using Special Tool 11 4 471
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fine residues on sealing surfaces with special tool 11 4 472 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

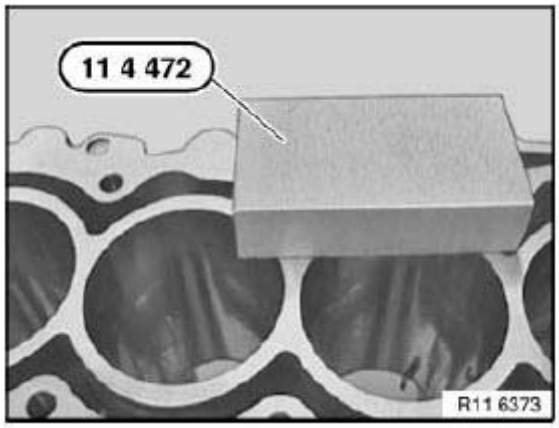


Fig. 55: Removing Fine Residues On Sealing Surfaces Using Special Tool 11 4 472
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

Risk of corrosion and cracking!

Clean all threaded holes.

Replace **CYLINDER HEAD GASKET** .

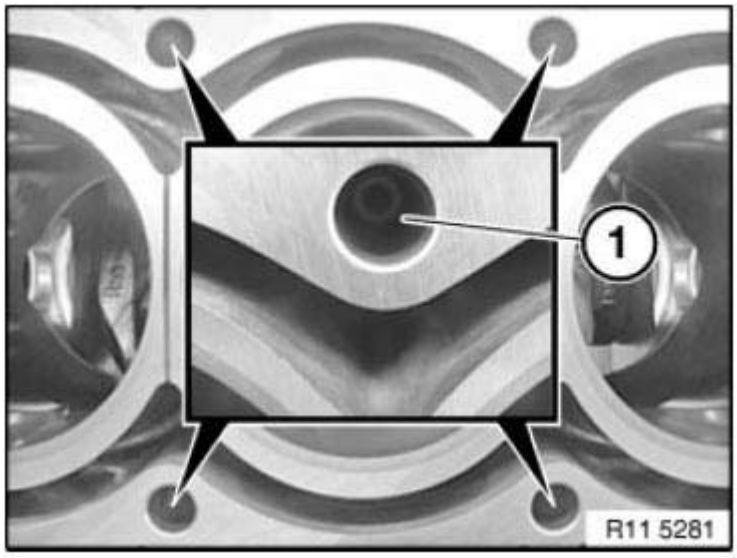


Fig. 56: Identifying Cylinder Head Bolt And Threaded Holes
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe sequence for tightening cylinder head bolts without fail.
Fit new cylinder head screws.
Insert cylinder head bolts (1 to 10) with special tool 11 8 580 .
Tightening torque 11 12 1AZ .
Insert cylinder head bolts (11 to 14) with special tool 11 4 420 .
Tightening torque 11 12 2AZ .

NOTE: Picture shows intake and exhaust camshafts removed.

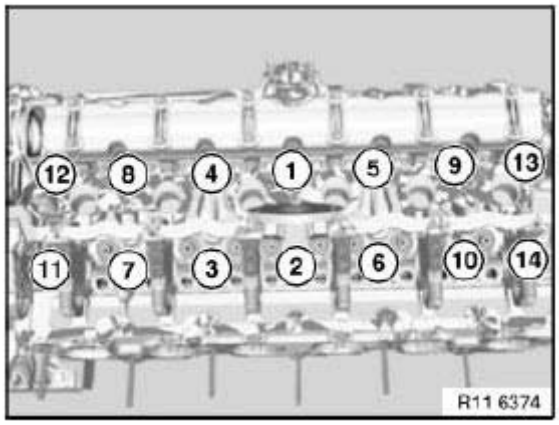


Fig. 57: Identifying Cylinder Head Bolts In Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Observe sequence for tightening cylinder head bolts without fail

IMPORTANT: The 2nd torsion angle relates only to cylinder head bolts 1 to 10.

Installation:

- **Jointing torque:**

  All cylinder head bolts 1 to 14 to 30 Nm

- **1st angle of rotation:**

  All cylinder head bolts 1 to 14 to 90°

- **2nd angle of rotation:**

  Only cylinder head bolts 1 to 10 to 90°

- **3rd angle of rotation:**

  All cylinder head bolts 1 to 14 to 45°

Insert bolts (1).

Tightening torque **11 12 4AZ** .

IMPORTANT: Secure bolt (2) with a gripper against falling down.

Insert bolt (2).

Tightening torque **11 12 3AZ** .

Installation:

Replace aluminum screws.

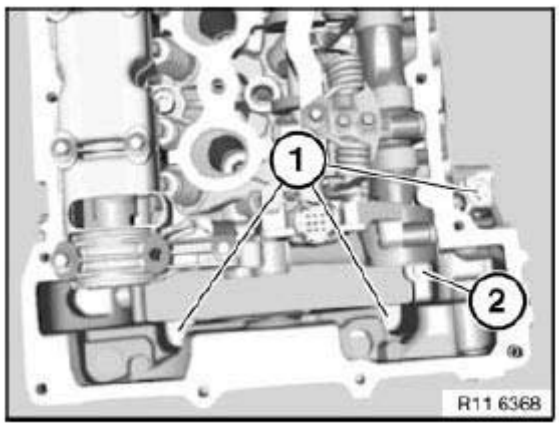


Fig. 58: Identifying Timing Chain Module And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **IGNITION COILS**
- Release **IGNITION WIRING HARNESS** in cylinder head cover area
- Remove **TENSION STRUT**

Unlock and detach vent hose (1).

If necessary, pull off metal bracket (2) in direction of arrow.

Release screws (3) on electric servomotor.

Tightening torque **11 37 3AZ** .

NOTE: A further screw, which cannot be seen in the picture, must be released under the electric servomotor (4).

Release screw on electric servomotor.

Tightening torque **11 37 3AZ** .

Remove servomotor (4) in direction of arrow.

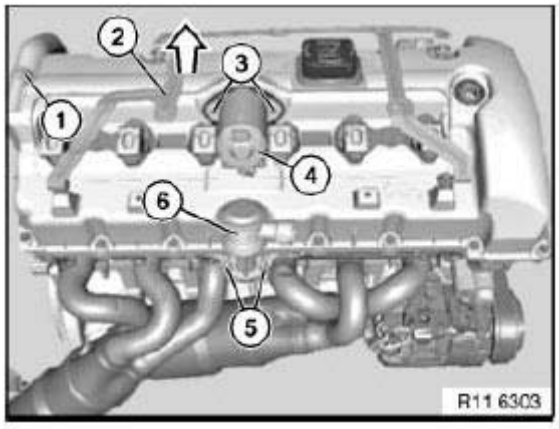


Fig. 59: Pulling Off Metal Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, release nuts (5).

Tightening torque **11 72 1AZ** .

If necessary, remove secondary air valve (6).

IMPORTANT: Observe different screw lengths.
Installation location of screws (1 and 2) is specified by the different bushing shapes.

Release screws in area (1).

Tightening torque **11 12 5AZ** .

Installation:

Replace aluminum screws.

Release threaded pin (2).

Tightening torque **11 12 5AZ** .

Installation:

Replace aluminum screws.

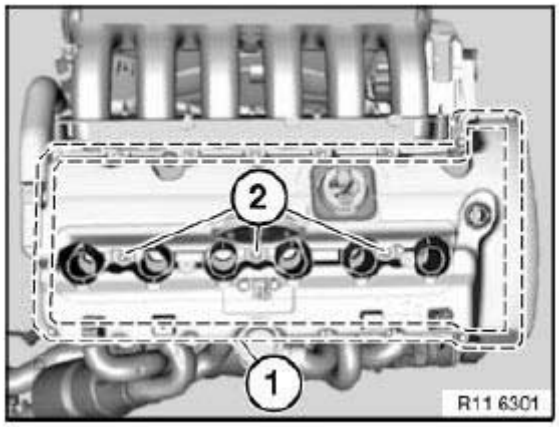


Fig. 60: Identifying Cylinder Head Gasket Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Slotted sleeves (2) for guiding ignition coils in cylinder head cover (1) must be replaced.

Remove slotted sleeves (2).

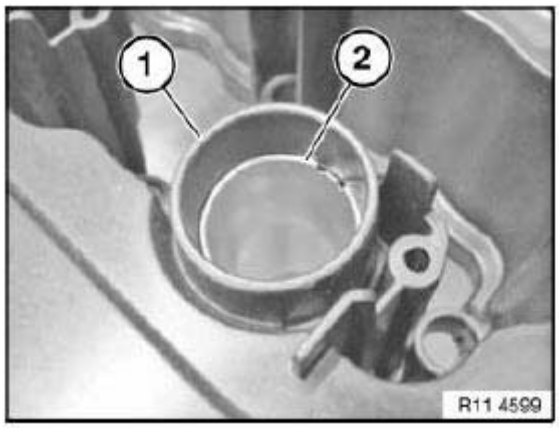


Fig. 61: Identifying Cylinder Head Cover And Slotted Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean all sealing faces (1 and 2).

IMPORTANT: Do not use any metal-cutting tools.

Installation:

Replace gaskets (1 and 2).

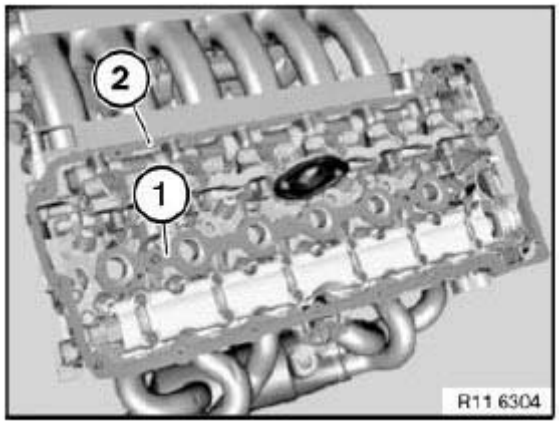


Fig. 62: Identifying Seal On Sealing Faces
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .

Insert 11 4 430 special tool into bores.

Remove cylinder head seal.

IMPORTANT: Check marking (1) on cylinder head gasket (B25 or B30).

- **B = petrol/gasoline engine**
- **30 = displacement (3 litres)**

Do not mix them up as this will cause engine damage .

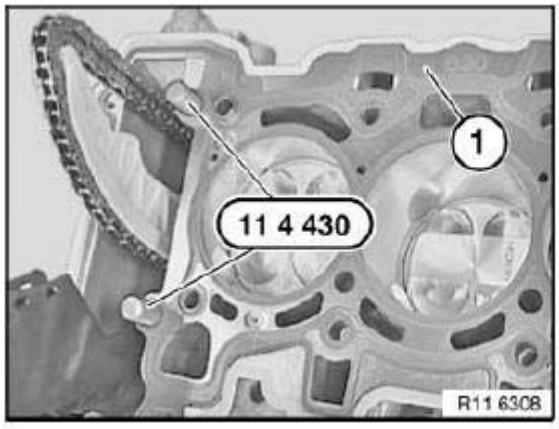


Fig. 63: Identifying Marking On Cylinder Head Gasket And Special Tool (11 4 430)
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

IMPORTANT: Work on sealing surface on engine block and on cylinder head with special tool 11 4 470 only.
Do not use any metal-cutting tools.

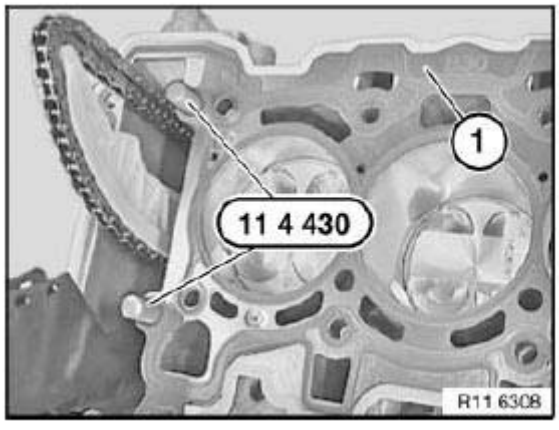


Fig. 64: Identifying Cylinder Head Pocket Threaded Holes
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Rubber coating (2) on cylinder head gasket (3) must not under any circumstances be damaged (electrochemical corrosion).

Cylinder head gasket (3) is a sheet-metal gasket.

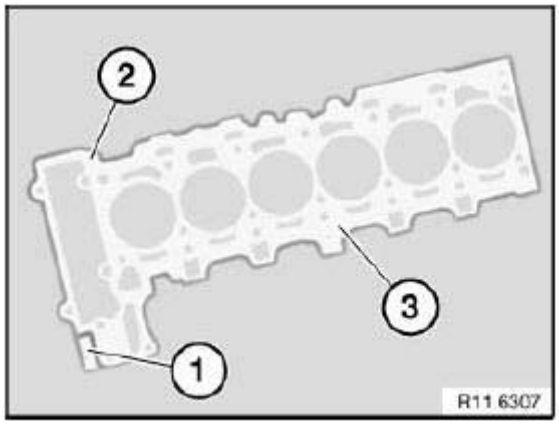


Fig. 65: Identifying Cylinder Head Gasket Identification Mark With Rubber Coating
Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and firm seating.

Place cylinder head gasket (2) in direction of arrow on engine block.

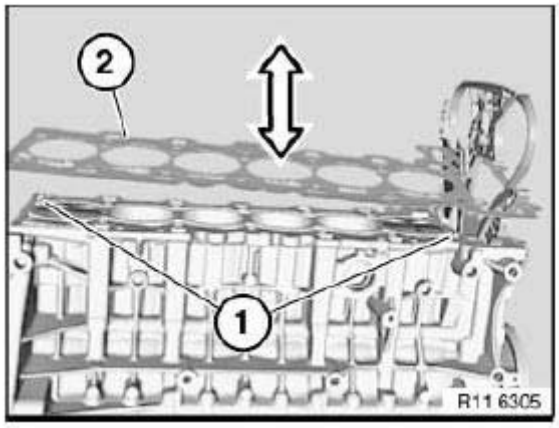


Fig. 66: Mounting Cylinder Head Gasket On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for DEVIATION FROM FLATNESS .
Check cylinder head for WATER LEAKS .

Assemble engine.

11 12 719 RESURFACING CYLINDER HEAD SEALING FACE (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Remove **EXHAUST CAMSHAFT** .

- Remove **INTERMEDIATE LEVER** on inlet side

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

NOTE: Max. deviation from level (longitudinal) 0.10 mm

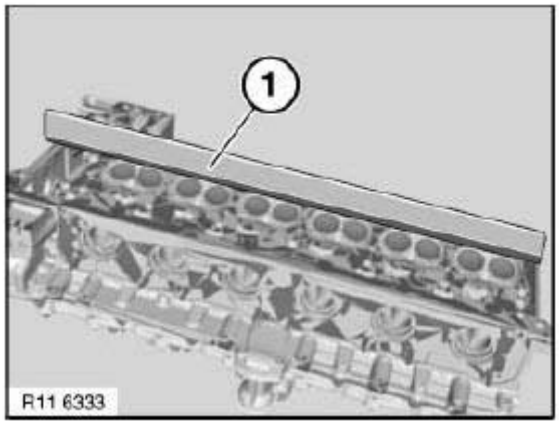


Fig. 67: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check evenness of cylinder head sealing faces with a standard straight-edge (1).

NOTE: Max. deviation from level (transversal) 0.05 mm

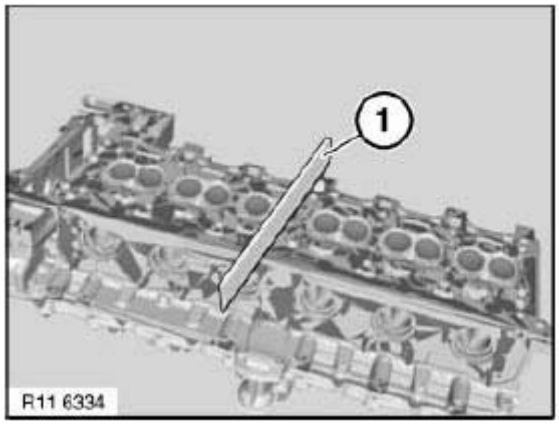


Fig. 68: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for **WATER LEAKS** .

Assemble engine.

1113 OIL SUMP

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N52K)

IMPORTANT: When working on the engine oil, coolant or fuel circuit, you must protect the alternator against contamination.
Risk of damage!
Cover alternator with suitable materials.
Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- **LOWER FRONT AXLE**
- Drain and add **ENGINE OIL**

Release bolts along line (1).

Tightening torque **11 13 5AZ** .

Installation:

Replace aluminum screws.

If necessary, release nuts (4). Remove oil level sensor.

Tightening torque **11 13 11AZ** .

Installation:

Replace sealing ring.

IMPORTANT: There must be no adhesive residues in the lower crankcase retaining threads.
Clean retaining threads and sealing faces.

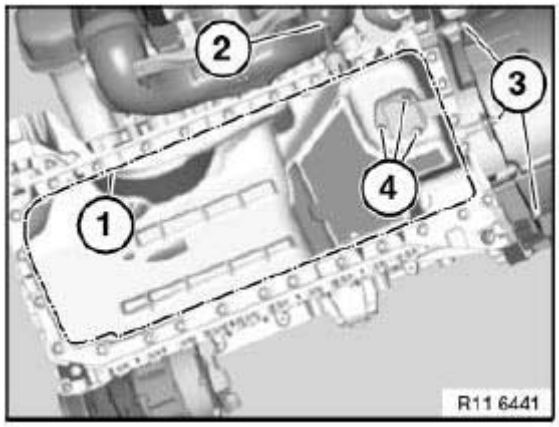


Fig. 69: Identifying Oil Level Sensor And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all seals.

Assemble engine.

1114 HOUSING COVER

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (TRANSMISSION SIDE) (N52K)

Necessary preliminary tasks:

- Remove **TRANSMISSION**
- Remove **FLYWHEEL**

NOTE: Crankshaft radial seal has six removal openings for removal with special tool 11 9 200 .

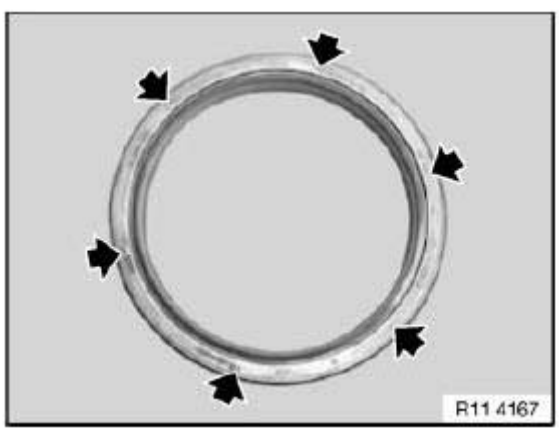


Fig. 70: Locating Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, remove rubber coating (1) on top side of crankshaft radial seal and expose a removal opening (2) (see illustration).

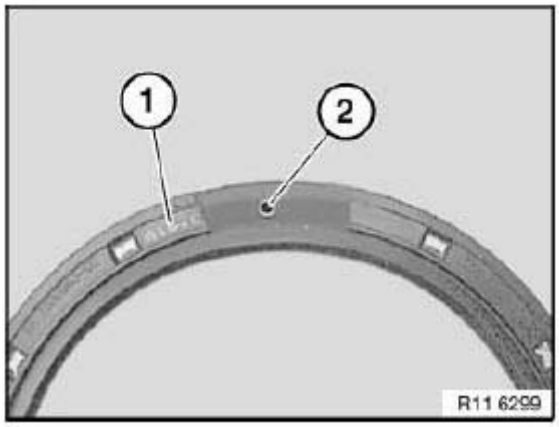


Fig. 71: Identifying Rubber Coatiing And Removal Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 9 200 . Insert sheet metal screws into removal opening of crankshaft radial seal and fasten without play (do **not** overtighten sheet metal screws).

Screw in spindle (1) slowly and carefully and detach crankshaft radial seal.

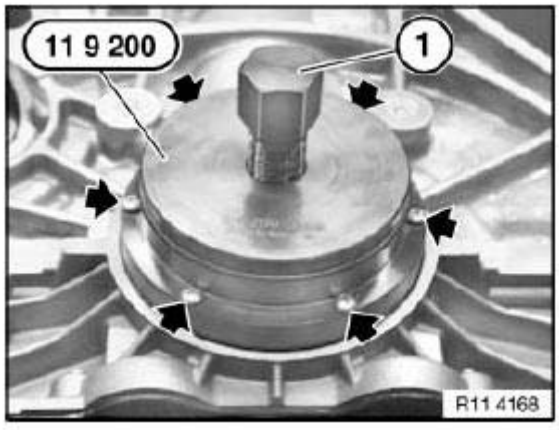


Fig. 72: Locating Crankshaft Radial Seal Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of crankshaft radial seal.

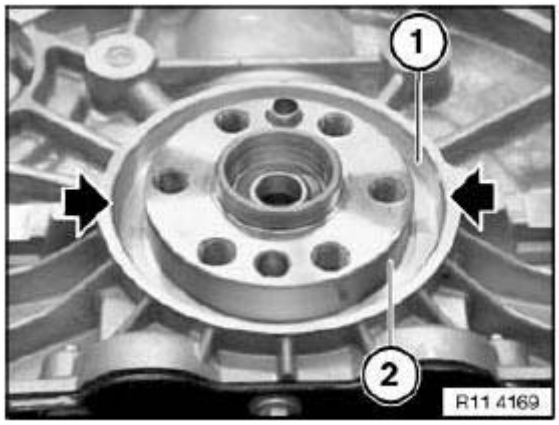


Fig. 73: Locating Crankshaft Radial Seal Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Support bushing (4) is contained in scope of delivery of crankshaft radial seal (1).**
When crankshaft radial seal (1) is installed, only support bushing (4) may be used as a slip bushing.
Crankshaft radial seal (1) has a groove (2) on both left and right sides.

IMPORTANT: **After installation, grooves (2) must be filled with sealing compound.**

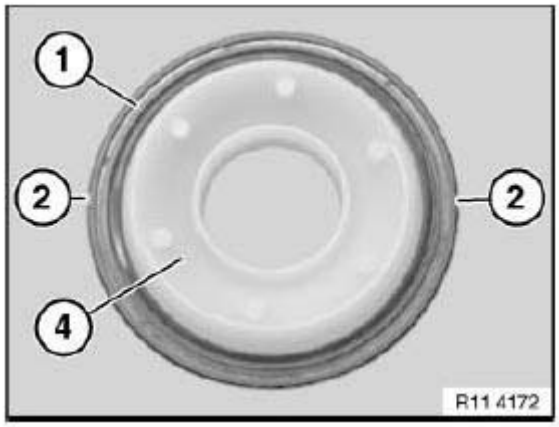


Fig. 74: Identifying Crankshaft Radial Seal With Grooves And Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: **The following text describes installation and sealing between the engine block and crankshaft radial seal.**
The engine block will not be leakproof at the outside of the crankshaft radial seal if you fail to comply with the individual work steps and the work sequence.

NOTE: **The required parts are available from the BMW Parts Department (Electronic Parts Catalogue).**

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

Injector (2) contains the sealing compound Loctite, manufacturer's number 128357.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

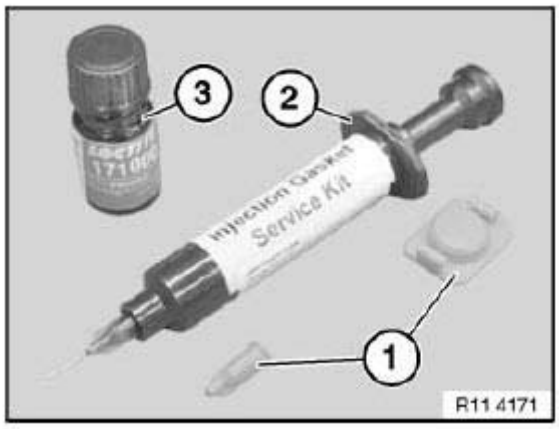


Fig. 75: Identifying Injector And Screw Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit support bushing (4) with crankshaft radial seal (1) on crankshaft.

Align groove (2) centrally to housing partition (3).

Coat both grooves (2) on crankshaft radial seal (1) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

Push crankshaft radial seal (1) by hand as far as possible onto running surface.

Carefully remove support bush (4).

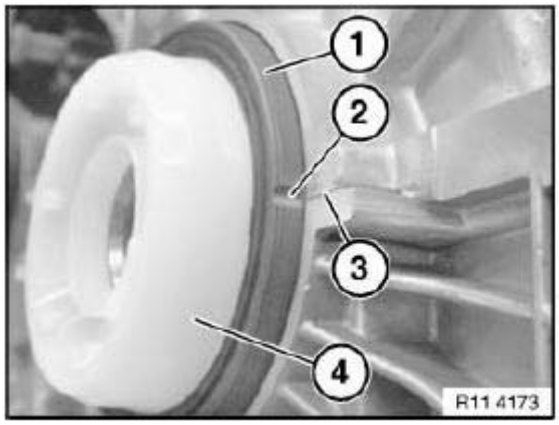


Fig. 76: Identifying Grooves On Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Spacer ring (1) is supplied with radial shaft seal.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to the crankshaft.

Fit spacer ring (1) on preassembled radial shaft seal.

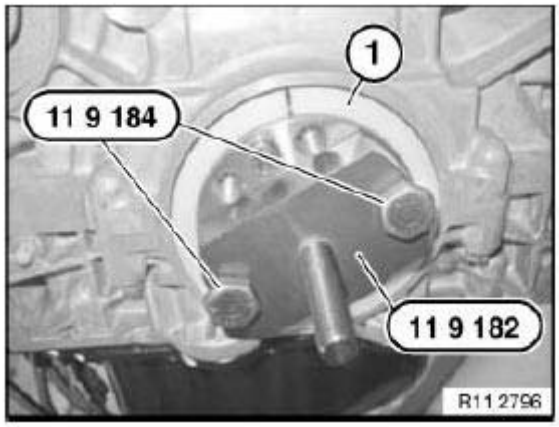


Fig. 77: Fitting Spacer Ring Using Special Tool (11 9 182 And 11 9 184)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal and spacer ring with special tool 11 9 181 in conjunction with special tool 11 9 183.

Then remove spacer ring again.

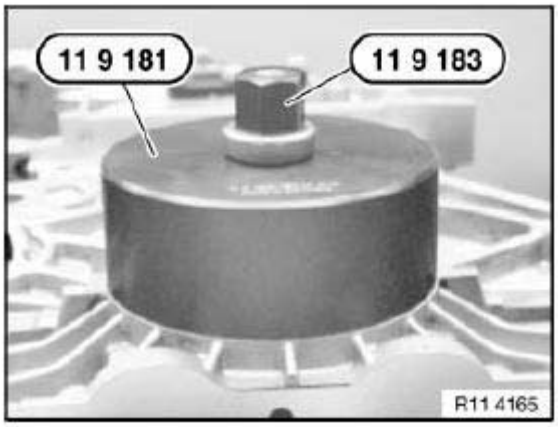


Fig. 78: Identifying Special Tool (11 9 181 And 11 9 183)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Moisten brush with Loctite primer, manufacturer's number 171000. Insert brush as far as possible into grooves (1) on crankshaft radial seal in order to coat housing partition on engine block.

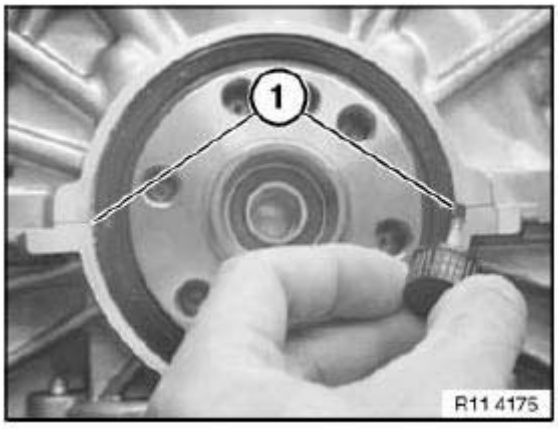


Fig. 79: Coating Sealing Compound Surface Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector, fill both grooves (1) flush with Loctite sealing compound, manufacturer's number 128357.

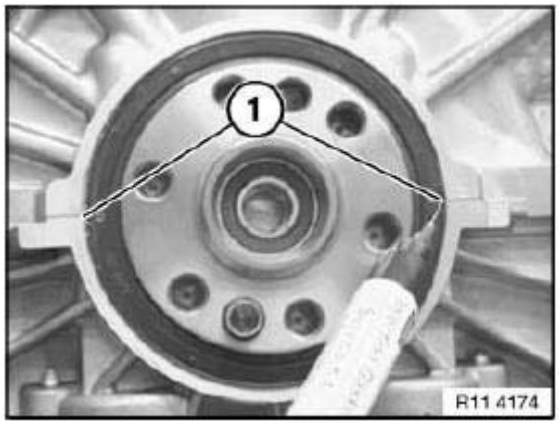


Fig. 80: Filling Grooves With Loctite Sealing Compound Using Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage. Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

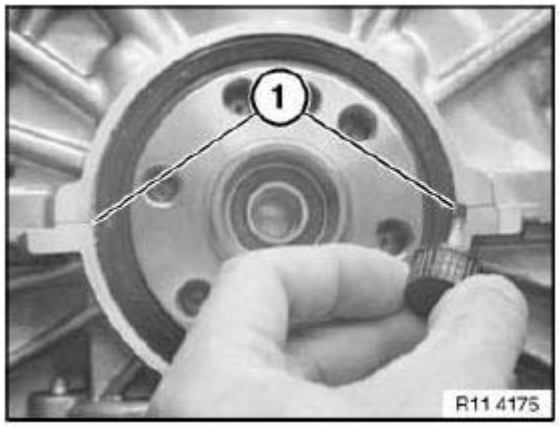


Fig. 81: Coating Sealing Compound Surface Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 005 REPLACING FRONT CRANKSHAFT SEAL (N52K)

Necessary preliminary tasks:

- Remove **VIBRATION DAMPER**

IMPORTANT: Do not release central bolt.
If the central bolt is released, the sprocket wheels of the timing chain and the

oil pump will no longer be non-positively connected to the crankshaft. Inlet and exhaust camshafts can turn in relation to crankshaft.

Risk of damage!

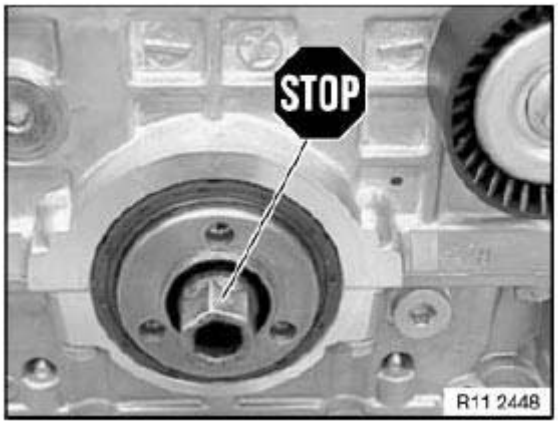


Fig. 82: Caution For Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back special tool 11 9 222.

Push special tool 11 9 221 onto crankshaft.

IMPORTANT: When screws are tightened down (special tool 11 9 224), crankshaft seal is pressed inwards approx. 1 mm and thus slackened for subsequent removal.

Insert screws (special tool 11 9 224) and tighten down to approx. 20 Nm.

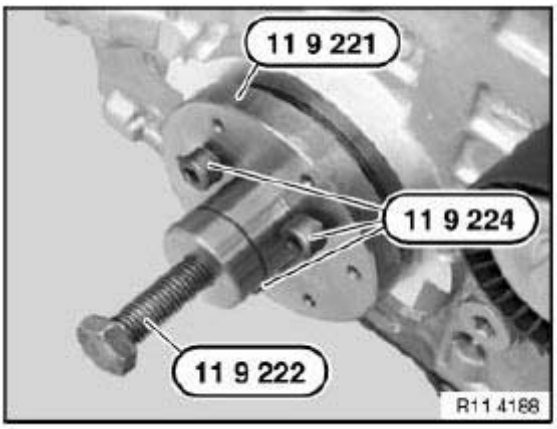


Fig. 83: Identifying Special Tools (11 9 221, 11 9 224 And 11 9 222)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 0 371 to 80 Nm into crankshaft seal.

Screw in spindle 11 0 372.

Release crankshaft seal from housing.

Repeat the operation several times if necessary.

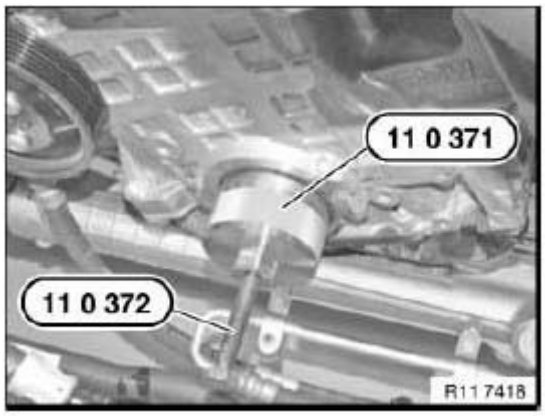


Fig. 84: Identifying Special Tools (11 0 372 And 11 0 371)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully saw open crankshaft seal (1) at cutting line (2).

Remove crankshaft seal (1) from special tool 11 0 371.

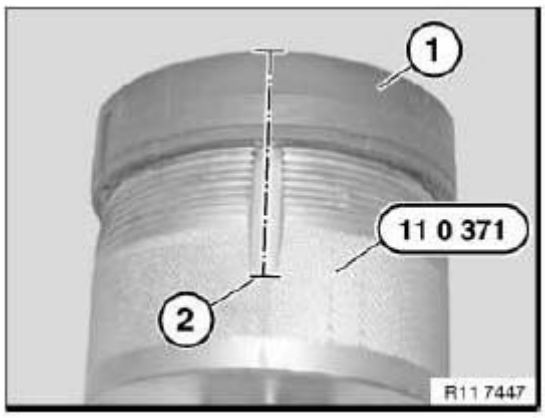


Fig. 85: Identifying Crankshaft Radial Seal And Cutting Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following text describes installation and sealing between the engine block and crankshaft seal.
The engine block will not be leakproof at the outside of the crankshaft seal if you fail to comply with the individual work steps and the work sequence.

Installation:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of crankshaft seal.

Illustration N42.

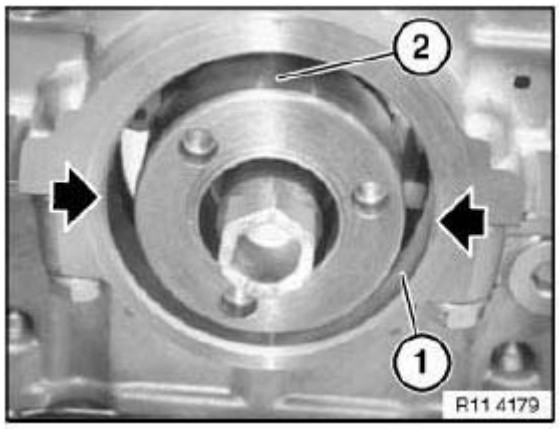


Fig. 86: Identifying Sealing Surface And Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 232 with screws (special tool 11 9 234) to crankshaft.

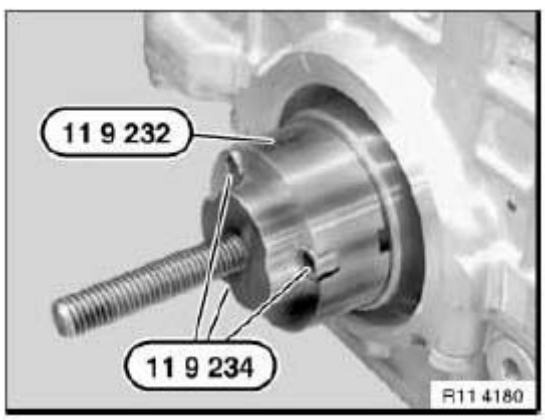


Fig. 87: Identifying Special Tool (11 9 232 And 11 9 234)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support sleeve (1) is supplied with crankshaft seal (2).
When crankshaft seal (2) is installed, only support sleeve (1) may be used as a slip sleeve.
Crankshaft seal (2) has a groove on both left and right sides.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

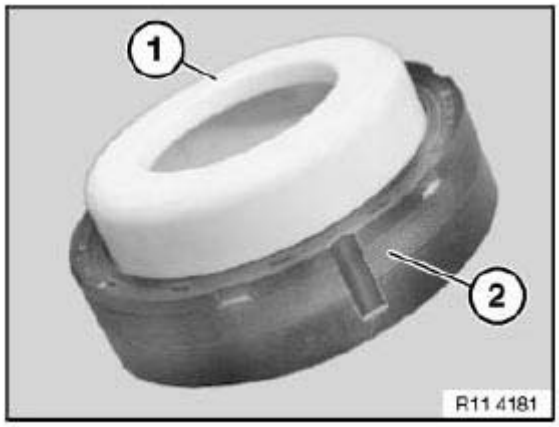


Fig. 88: Identifying Crankshaft Seal And Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The required parts are available from the BMW Parts Service.

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

Injector (2) contains the sealing compound Loctite, manufacturer's number 128357.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

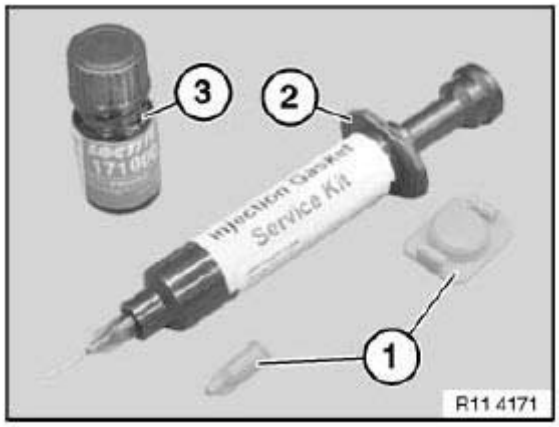


Fig. 89: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Push support sleeve (1) with crankshaft seal (2) onto special tool 11 9 232.

IMPORTANT: Support sleeve (1) remains on special tool 11 9 232, until crankshaft seal is

drawn in.

Align groove (3) centrally to housing partition (4).

Coat both grooves (3) on crankshaft seal (2) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

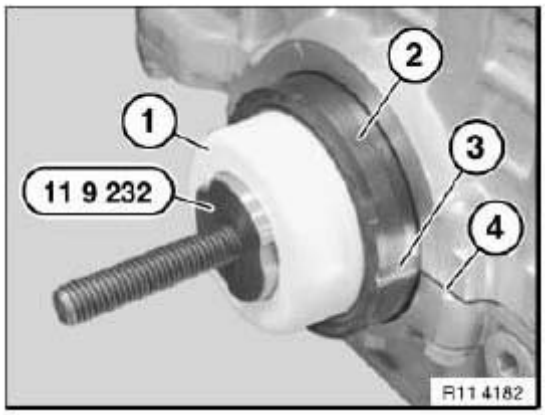


Fig. 90: Identifying Sleeve, Crankshaft Seal, Groove And Housing partition And Special Tool (11 9 232)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in crankshaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

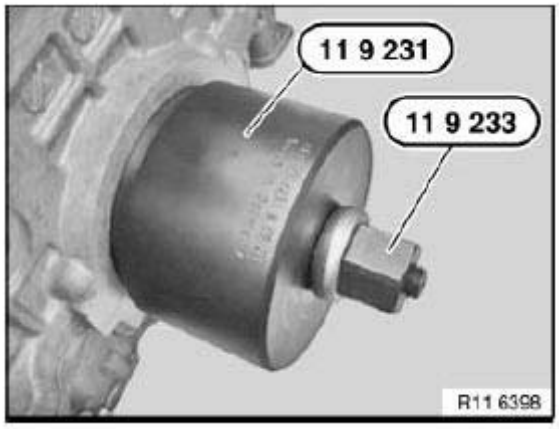


Fig. 91: Identifying Special Tool (11 9 231 And 11 9 233)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Moisten brush with Loctite primer, manufacturer's number 171000. Insert brush as far as possible into grooves (1) on crankshaft seal in order to coat housing partition on engine block.

Illustration N42.

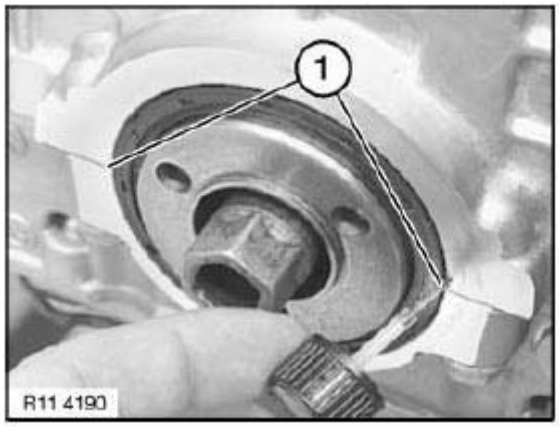


Fig. 92: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector (2), fill both grooves (3) flush with Loctite sealing compound, manufacturer's number 128357.

Illustration N42.

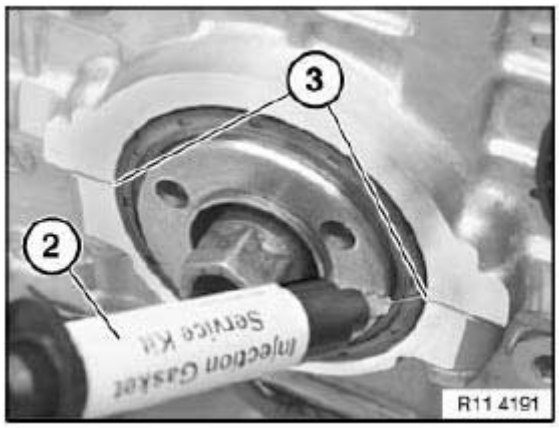


Fig. 93: Filling Both Grooves With Loctite Sealing Compound Using Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

Illustration N42.

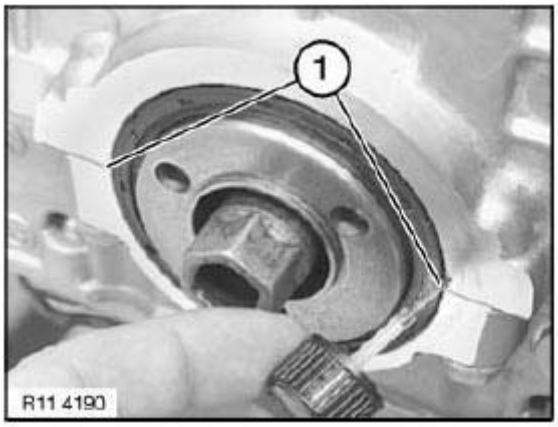


Fig. 94: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 010 REPLACING SEALING COVER FOR VACUUM PUMP (N52K)

Necessary preliminary tasks:

- Remove **FAN COWL** with electric fan
- Remove alternator **DRIVE BELT**
- Remove **DRIVE BELT TENSIONER**

NOTE: The procedure is the same as for the crankshaft radial seal. Expose removal openings on sealing cover.

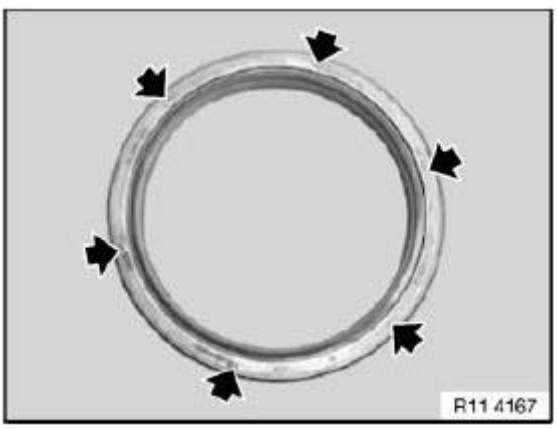


Fig. 95: Locating Crankshaft Radial Seal Openings
Courtesy of BMW OF NORTH AMERICA, INC.

Convert special tool 11 9 200 (see illustration).

Screw special tool 11 9 200 onto sealing cover.

NOTE: Insert screws until flush only with special tool 11 9 200 .

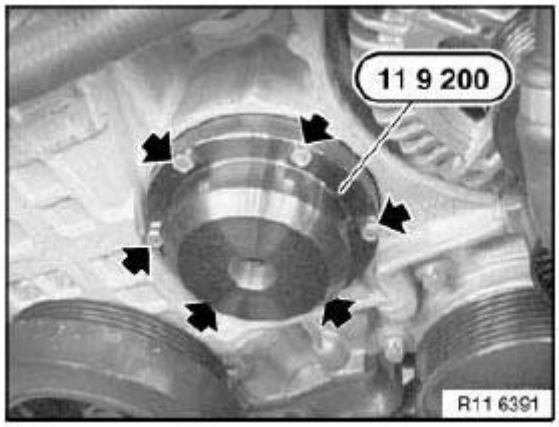


Fig. 96: Locating Sealing Cover Screws And Special Tool (11 9 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 11 4 362.

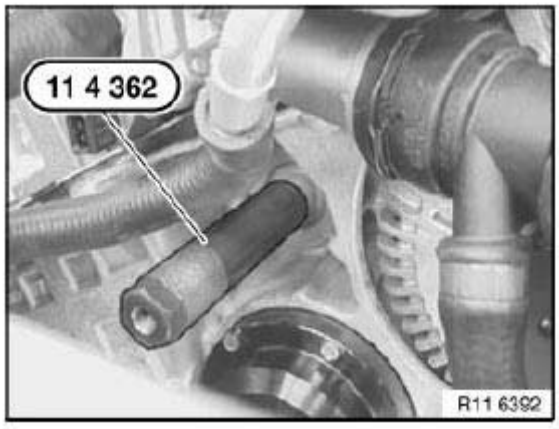


Fig. 97: Identifying Special Tool (11 4 362)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 4 361 to bedplate construction screw connection (see arrow).

Secure with knurled screw (1).

Screw special tool 11 4 364 into special tool 11 9 200 and screw out in direction of arrow.

NOTE: For purposes of clarity, the picture shows the alternator and power steering pump removed.

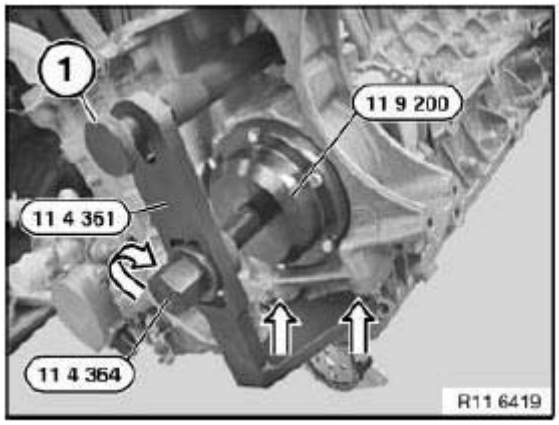


Fig. 98: Connecting Special Tool 11 4 361 To Bedplate Construction Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare new sealing cover (1) with special tool 11 9 200 **without** screws.

Screw in sealing cover with special tool 11 4 363 until it is flush.

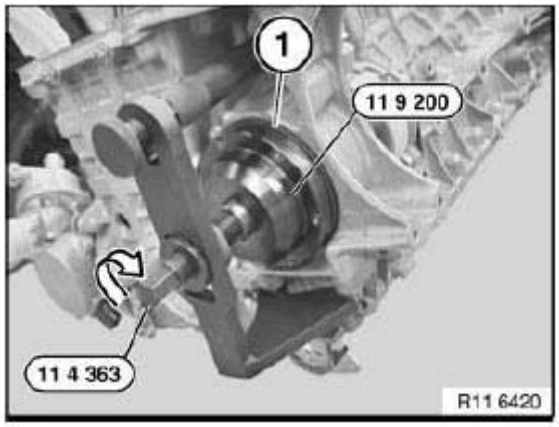


Fig. 99: Installing Sealing Cover Using Special Tool 11 4 363
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1121 CRANKSHAFT WITH BEARING

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove transmission See **2300017 REMOVING AND INSTALLING TRANSMISSION (GS6-17BG) N52K** or **2400030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP19Z) N52K**
- Remove **CLUTCH**

For vehicles with optional extra SA205 (automatic transmission)

Secure flywheel (1) with existing transmission bolt (2) and special tool 11 9 260 .

Installation:

Replace aluminum screws.

Unfasten flywheel screws.

Tightening torque **11 22 1AZ** .

Installation:

Flywheel (1) is secured with an alignment pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

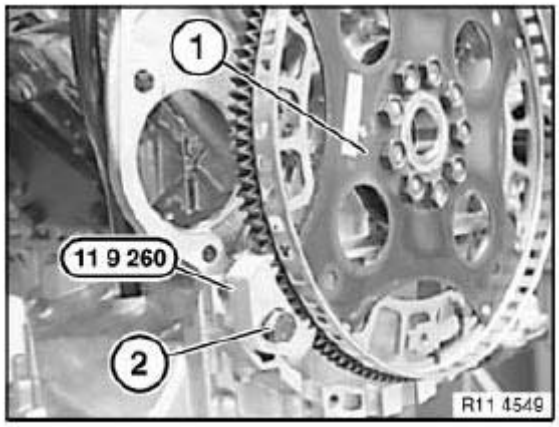


Fig. 100: Identifying Flywheel, Existing Transmission Bolt And Special Tool 11 9 260

Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles without optional extra SA205 (automatic transmission)

Secure flywheel with transmission bolt (1) and special tool 11 9 260 and 11 9 265.

Installation:

Replace aluminum screws.

Release flywheel bolts with special tool 11 4 180 /

Tightening torque **11 22 2AZ** .

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

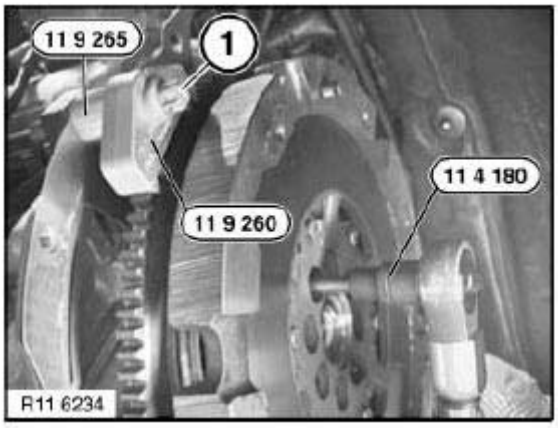


Fig. 101: Tightening Flywheel Bolts Using Special Tool (11 4 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 531 REPLACING ALL MAIN CRANKSHAFT BEARING SHELLS (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CRANKSHAFT**

Checking position of oil spray nozzles

Insert special tool 11 4 251 in screw connection of main bearing.

NOTE: Special tool 11 4 252 must be pre-installed at the seventh main bearing.

Check position of oil spray nozzle (2) according to position (1) on special tool 11 4 251.

If necessary, adjust and secure oil spray nozzle (2).

Tightening torque **11 11 5AZ** .

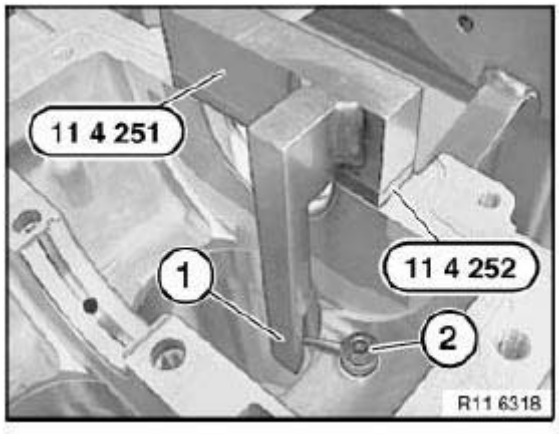


Fig. 102: Identifying Oil Spray Nozzle On Special Tool 11 4 251
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing shells (2) and guide bearing shell (3).

NOTE: Guide bearing shell (3) is a thrust bearing.

Observe bearing classification See **ENGINE BLOCK, CYLINDER CRANKCASE N52K/B30** ; **ENGINE BLOCK, CYLINDER CRANKCASE N52K/B25** ; **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N52K/B30** ; **CRANKSHAFT AND BEARINGS N52K/B25** ; **CRANKSHAFT AND BEARINGS N52K/B30** or **CRANKSHAFT AND BEARINGS N52K/B25** .

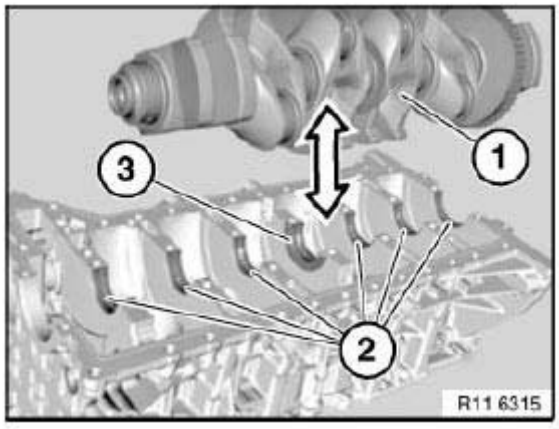


Fig. 103: Checking Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Bearing shell (1) with lubricant groove must be fitted in crankcase.

Bearing shell (2) without lubricant groove must be fitted in bedplate.

IMPORTANT: Allocation of bearing points:
Bearing point 1 is at the front on the timing chain drive in the direction of travel.

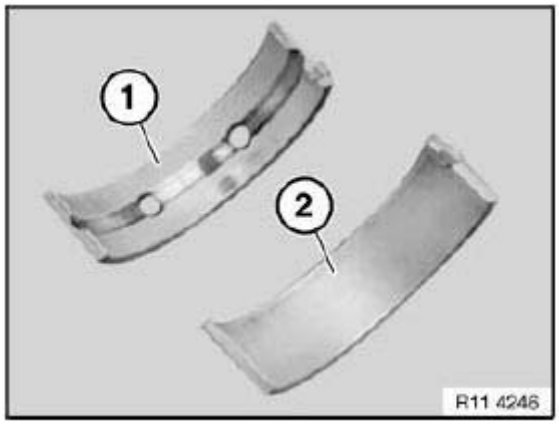


Fig. 104: Identifying Bearing Shell With/Without Lubricant Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Surface (1) for identification on crankshaft web 1.

Seven-digit part number (2).

Main bearing classification (3) for crankcase lower half (bedplate), code numbers 1 2 3, see table.

NOTE: Code letters (4 and 5) are exclusively required for a machined crankshaft.

Code letter (4) as per table, main bearing.

B= build date 1 (B 1 2 3 -0.25 mm).

B= build date 2 (C 1 2 3 -0.50 mm).

Code letter (5) as per table, lift bearing.

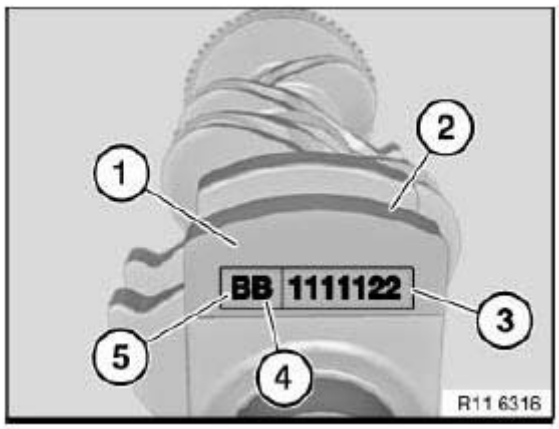


Fig. 105: Identifying Seven Digit Code On Crankshaft Web Surface
Courtesy of BMW OF NORTH AMERICA, INC.

B= construction stage 1 (-0.25 mm).

C = construction stage 2 (-0.50 mm)

Observe bearing classification See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N52K/B30** ; **CRANKSHAFT AND BEARINGS N52K/B25** ; **CRANKSHAFT AND BEARINGS N52K/B30** or **CRANKSHAFT AND BEARINGS N52K/B25** .

Main bearing classification (1) in crankcase, code letters A/B or C, see table.

Installation:

When all the letters and number code have been determined, the bearing shell color must be allocated, see table.

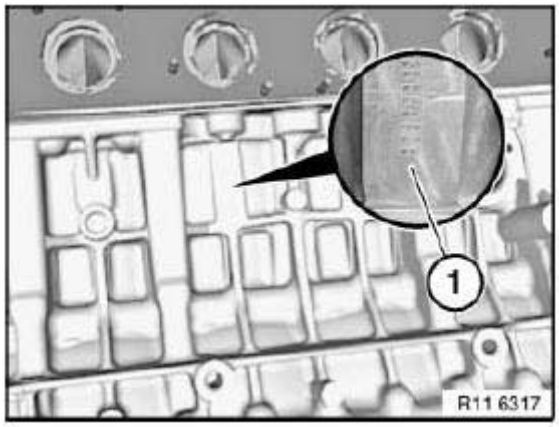


Fig. 106: Identifying Bearing Classification Of Crankcase Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The letter/number combination produces a bearing shell pairing.

Identification by different colors.

IMPORTANT: First bearing point is on the timing drive.
The color combination Yellow and Red must not be fitted.
Engine damage will result if excessively small bearing play is determined.

Code letters on crankcase

Code letter A = bearing shell (1) color Yellow.

Code letter B = bearing shell (1) color Green.

Code letter C = bearing shell (1) color Red.

Code numbers on crankshaft:

Code number 1 = bearing shell (2) Yellow.

Code number 2 = bearing shell (2) Green.

Code number 3 = bearing shell (2) Red.

IMPORTANT: The color combination Yellow and Red must not be fitted; the bearing colors Green/Green must be selected for this color combination, see table.

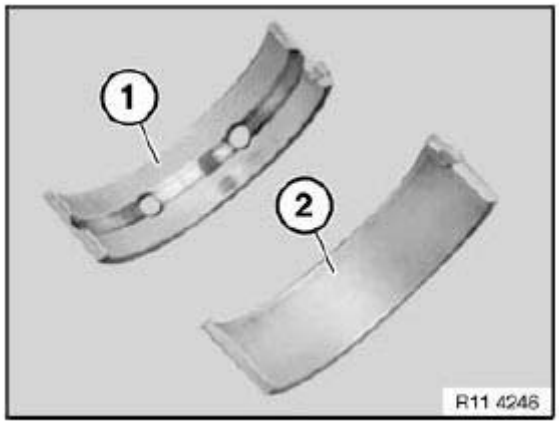


Fig. 107: Identifying Bearing Shell With/Without Lubricant Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Installation example

For bearing 1 with code letter **A** on the **crankcase** and code number **1** on the **crankshaft** bearing shell (1) with the color **Yellow** is required for the **crankcase** and bearing shell (2) with the color **Yellow** for the **crankcase lower half** (bedplate).

Bearing 2: **A** and **2** colors Yellow and Green.

Bearing 3: **B** and **2** colors Green and Green.

Bearing 4: **C** and **2** colors Red and Green.

Bearing 5: **B** and **1** colors Green and Yellow.

Bearing 6: **C** and **3** colors Red and Red.

Bearing 7: **C** and **1** colors Green and Green.

The color combination **Yellow and Red** must not be fitted.

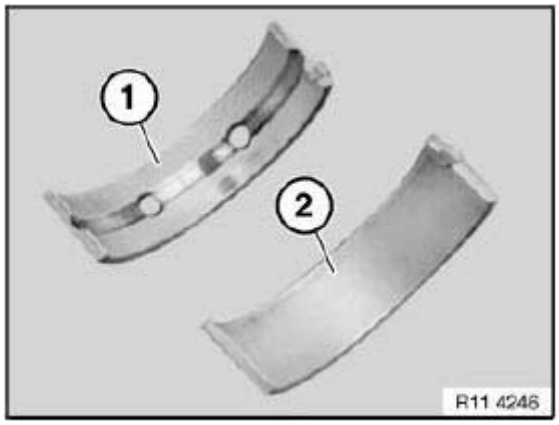


Fig. 108: Identifying Bearing Shell With/Without Lubricant Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Possible color combinations for mounting the crankshaft in the crankcase.

CRANKSHAFT COLOR REFERENCE CHART

(A 1) Crankcase/**Yellow**	**(B 1)** Crankcase/**Green**	**(C 1)** Crankcase/**Green**
(A 1) Crankcase lower half/**Yellow**	**(B 1)** Crankcase lower half/**Yellow**	**(C 1)** Crankcase lower half/**Green**
(A 2) Crankcase/**Yellow**	**(B 2)** Crankcase/**Green**	**(C 2)** Crankcase/**Red**
(A 2) Crankcase lower half/**Green**	**(B 2)** Crankcase lower half/**Green**	**(C 2)** Crankcase lower half/**Green**
(A 3) Crankcase/**Green**	**(B 3)** Crankcase/**Green**	**(C 3)** Crankcase/**Red**
(A 3) Crankcase lower half/**Green**	**(B 3)** Crankcase lower half/**Red**	**(C 3)** Crankcase lower half/**Red**

Install bearing shells (2) and guide bearing shell (3).

Installation:

Clean all sealing surfaces.

IMPORTANT: Do not use any metal-cutting tools.

Clean sealing faces with special tool 11 4 470 only.

Determine bearing play with special tool 00 2 590 .

Installation:

All measuring points must be clean and free from oil and grease. If necessary, clean all measuring points.

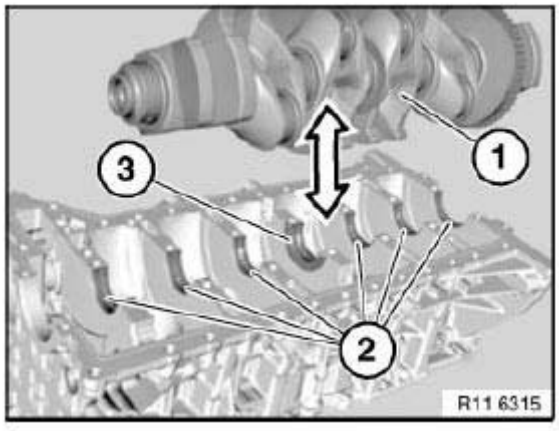


Fig. 109: Checking Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Use the existing screws to determine the bearing play.

Set up **BEDPLATE** with bearing shells.

Remove bedplate.

Read off bearing play at width of flattened plastic thread and measurement scale.

Installation:

Remove plastic thread.

Apply a light coat of oil to bearing shells and crankshaft.

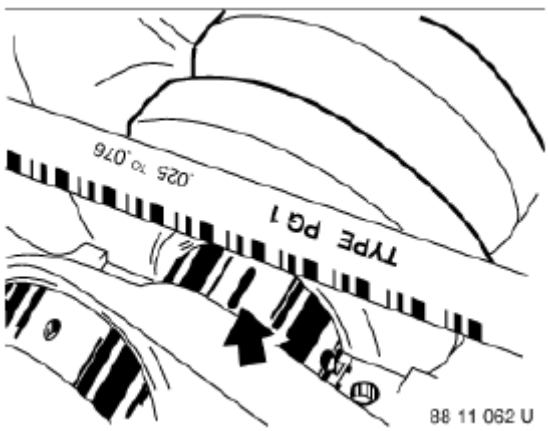


Fig. 110: Checking Radial Clearance At Width Of Flattened Plastic Thread (Plastigage)
Courtesy of BMW OF NORTH AMERICA, INC.

Install **BEDPLATE** .

Assemble engine.

11 21 500 REPLACING CRANKSHAFT (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on assembly stand
- Remove **VIBRATION DAMPER**
- Remove **OIL SUMP**
- Remove **OIL PUMP**
- Remove oil pump/vacuum pump **CHAIN MODULE**
- Remove timing **CHAIN MODULE**
- Remove **CYLINDER HEAD**
- Remove **FLYWHEEL**
- Removing all **PISTONS**

Release screws (1).

Tightening torque **11 13 6AZ** .

Installation:

Replace aluminum screws.

Remove oil deflector (2).

NOTE: Graphic shows the screw connection of the oil deflector (2) for vehicles with optional extra SA203 (all-wheel drive).

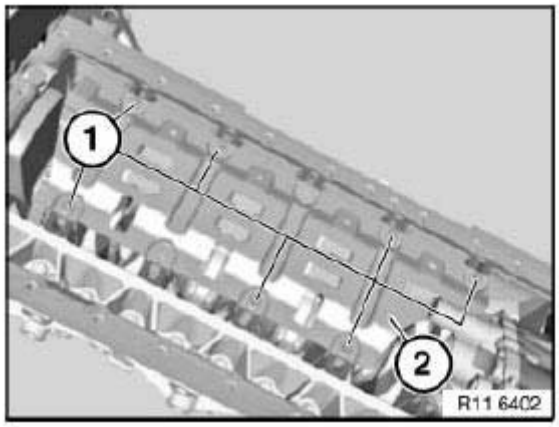


Fig. 111: Identifying Oil Deflector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 2AZ** .

Unfasten screws (2).

Tightening torque **11 11 3AZ** .

Installation:

Replace aluminum screws.

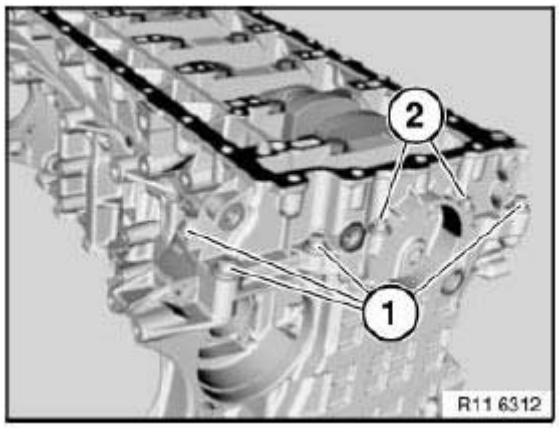


Fig. 112: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 4AZ** .

Unfasten screws (2).

Tightening torque **11 11 2AZ** .

Installation:

Replace aluminum screws.

Release steel screws (1 to 14) from outside inwards.

Tightening torque **11 11 1AZ** .

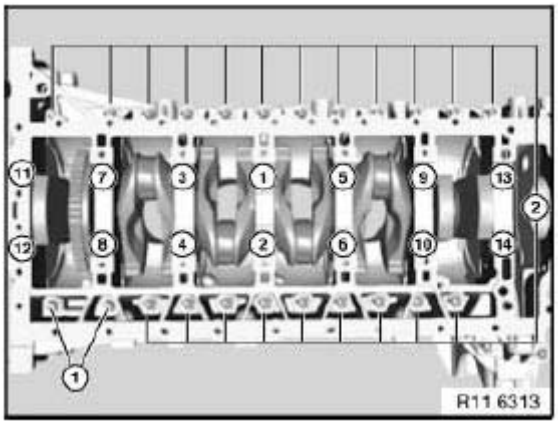


Fig. 113: Identifying Crankshaft Steel Screws In Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 3AZ** .

Installation:

Replace aluminum screws.

Lift out bedplate.

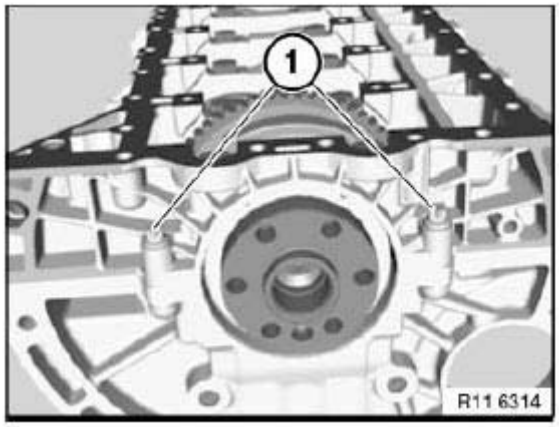


Fig. 114: Identifying Crankshaft Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove crankshaft (1) in direction of arrow.

IMPORTANT: Remove crankshaft with aid of a second person.
Weight of crankshaft approx. 25 kg.

Remove **BEARING SHELLS** (2) and guide bearing shell (3), replace if necessary.

Clean all sealing faces with special tool 11 4 470 .

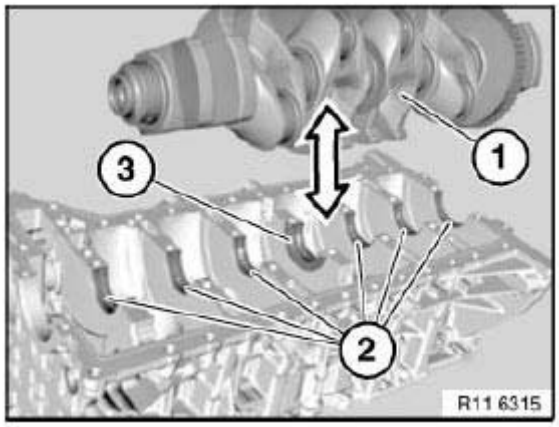


Fig. 115: Checking Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and secure seating; replace if necessary.

Install all **BEARING SHELLS** .

Installation:

Lubricate all bearing points with engine oil.

NOTE: Graphic shows N46.

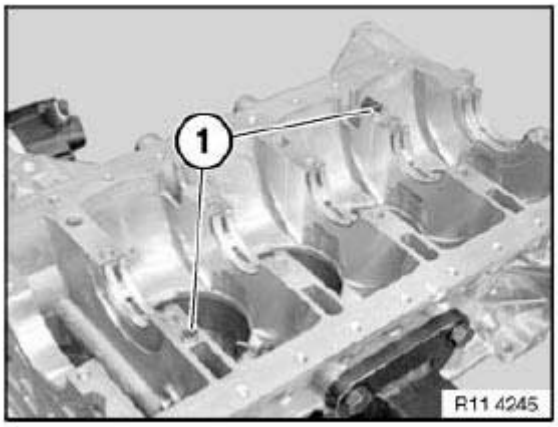


Fig. 116: Identifying Adapter Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Insert crankshaft (1).

IMPORTANT: Install crankshaft with aid of a second person.
Weight of crankshaft approx. 25 kg.

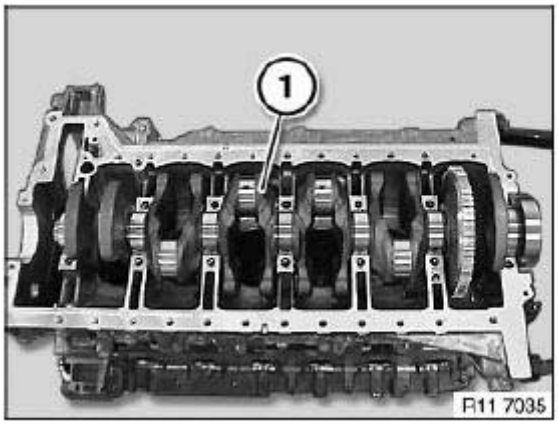


Fig. 117: Identifying Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten steel screws (1 to 14) from inside outwards.

Tightening torque **11 11 1AZ** .

Tighten screws (2) from inside outwards.

Tightening torque **11 11 2AZ** .

Tighten screws (1).

Tightening torque **11 11 4AZ** .

Installation:

Replace aluminum screws.

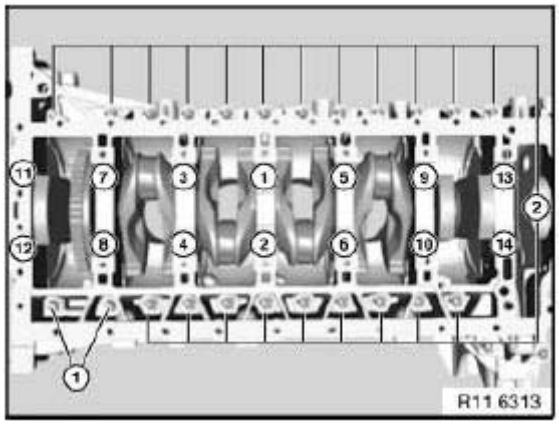


Fig. 118: Identifying Crankshaft Steel Screws In Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten aluminum screws exclusively with special tool 00 9 120 .

IMPORTANT: In the case of aluminum screws, jointing torque and angle of rotation must be observed without fail.

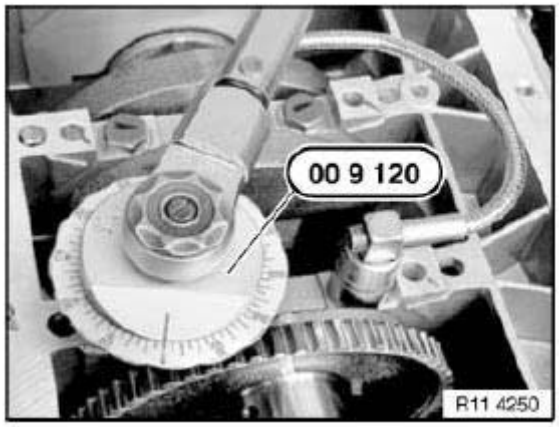


Fig. 119: Tightening Aluminum Screws Using Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Set up stand with magnetic foot (1) on special tool 11 4 440 .

Set up special tool 00 2 510 on stand.

Position special tool 00 2 510 on crankshaft.

Move crankshaft in direction of arrow.

Determine bearing play See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N52K/B30** ; **CRANKSHAFT AND BEARINGS N52K/B25** ; **CRANKSHAFT AND BEARINGS N52K/B30** or **CRANKSHAFT AND BEARINGS N52K/B25** .

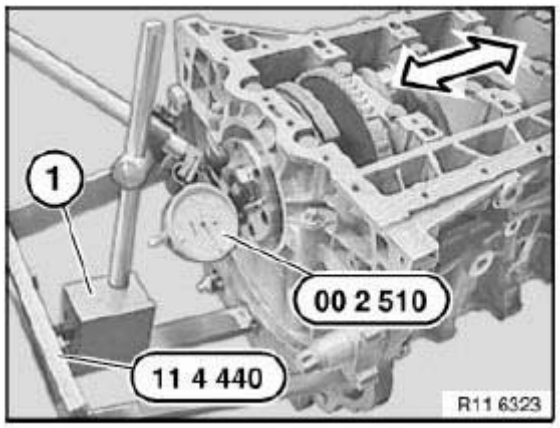


Fig. 120: Moving Crankshaft Using Special Tool (11 4 440)
Courtesy of BMW OF NORTH AMERICA, INC.

Drive in both nozzles (1) with special tool 11 9 360 on left and right into crankcase.

Installation:

Always replace nozzles (1).

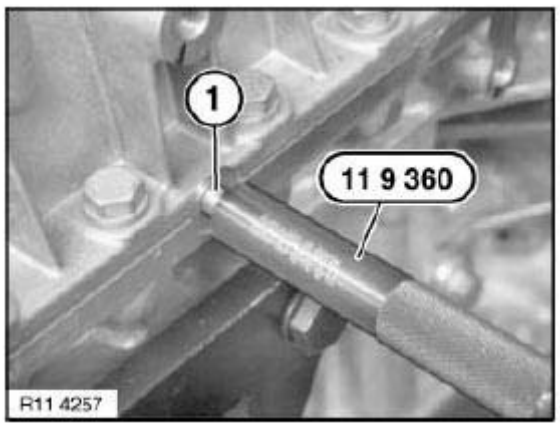


Fig. 121: Driving Nozzles In Crankcase Using Special Tool (11 9 360)
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **CRANKSHAFT RADIAL SEAL** at front.

Replace **CRANKSHAFT RADIAL SEAL** (transmission side).

Installation:

Use **PRIMER 1.3 AND LIQUID GASKET 1.4** .

Prepare liquid gasket (1) in special tool 11 4 370 .

Screw on nozzle for injecting liquid gasket.

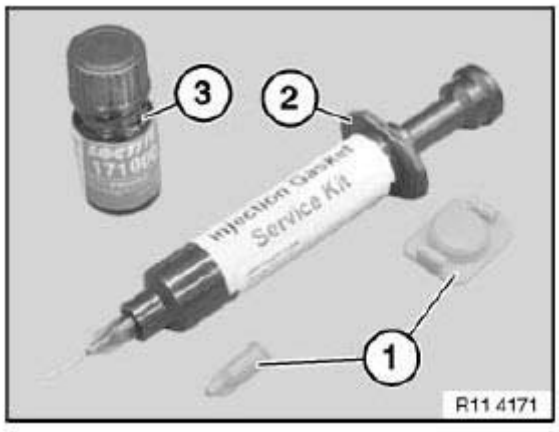


Fig. 122: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Slowly insert liquid gasket (1) with special tool 11 4 370 in direction of arrow.

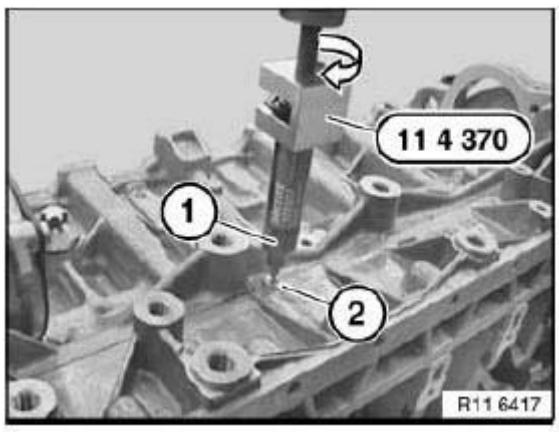


Fig. 123: Inserting Liquid Gasket Using Special Tool (11 4 370)
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid gasket with primer 1.3.

(Picture shows N40).

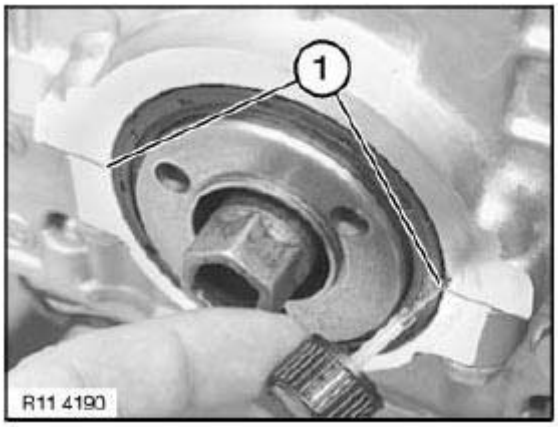


Fig. 124: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 571 REPLACING ROLLER BALL BEARING IN CRANKSHAFT (N52K)

Necessary preliminary tasks:

- Remove **CLUTCH** .

Remove guide bearing with special tool 11 2 340.

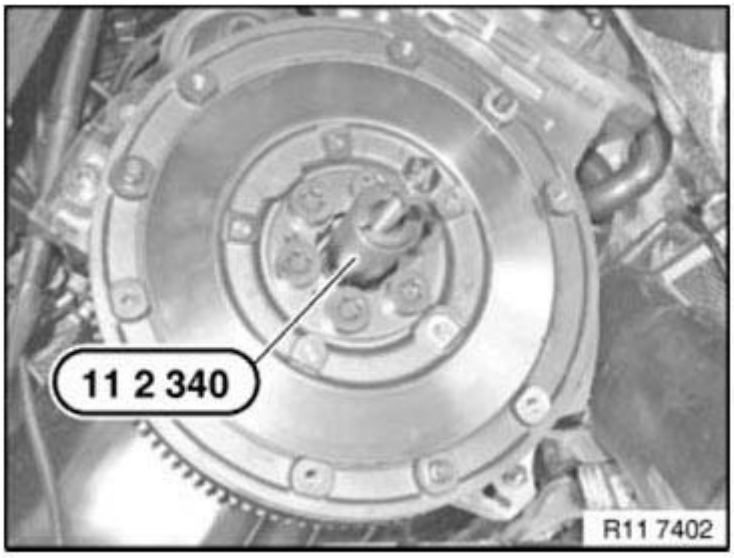


Fig. 125: Removing Guide Bearing Using Special Tool 11 2 340
Courtesy of BMW OF NORTH AMERICA, INC.

Install new thrust bearing and drive firmly home with special tool 11 2 350 in conjunction with special tool 00 5 500 .

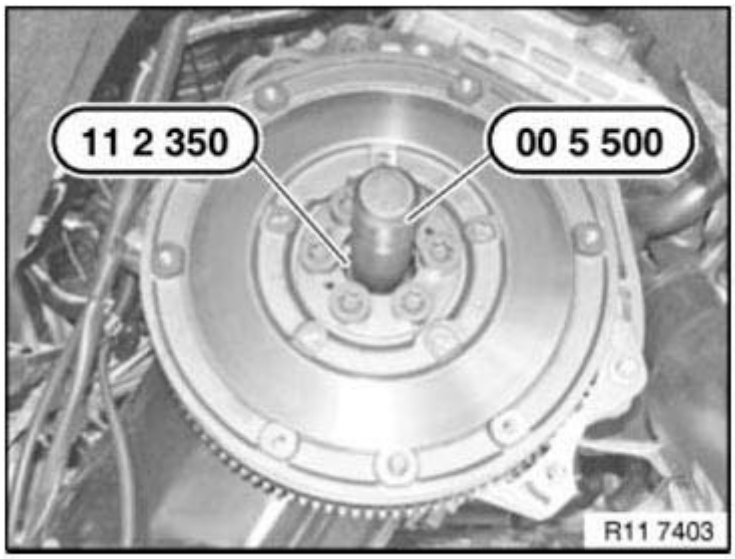


Fig. 126: Installing Thrust Bearing Using Special Tool (11 2 350 And 00 5 500)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 505 SEALING THE CRANKCASE'S LOWER PART(N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Risk of damage!
Joining torque and angle of rotation must be observed without fail.

IMPORTANT: Changed procedure.
It is not necessary to remove the cylinder head and the crankshaft.

Necessary preliminary tasks:

- Remove **ENGINE** .
- Mount engine on assembly stand .
- Remove **CLUTCH** (if fitted).
- Remove left and right engine support arm See **2211100 REPLACING RIGHT ENGINE SUPPORT**

ARM (N52K) or **2211110 REPLACING LEFT ENGINE SUPPORT ARM (N52K)**

- Remove **OIL SUMP** .

Release screws (1).

Pull out oil pump intake pipe (2).

Tightening torque: **11 13 6AZ**

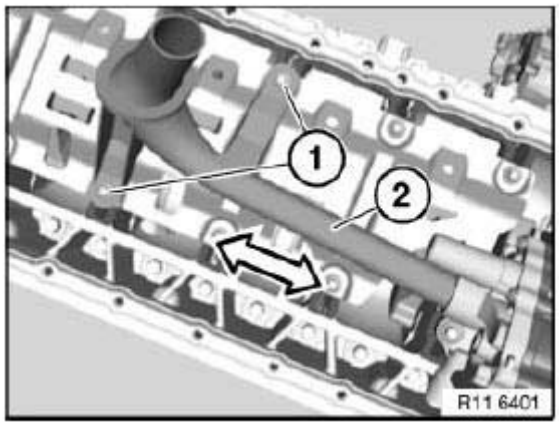


Fig. 127: Pulling Oil Pump Intake Pipe And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: **11 13 6AZ** .

Installation:

Replace aluminum screws.

Remove oil deflector (2).

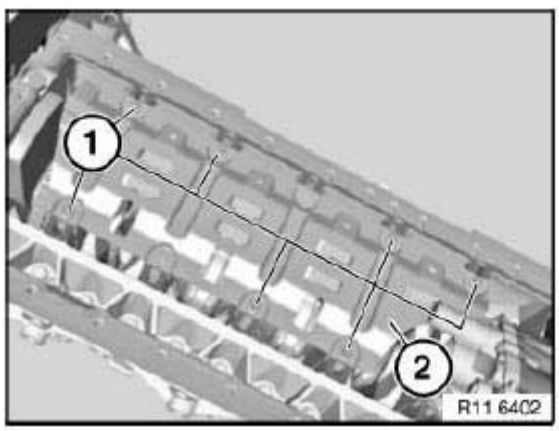


Fig. 128: Identifying Oil Deflector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil pump sprocket with steel pin 6.0 mm (3) to oil pump.

IMPORTANT: Release central bolt (2) only together with steel pin 6.0 mm (3). Do not remove sprocket.

Release central bolt (2).

Tightening torque:**11 41 6AZ** .

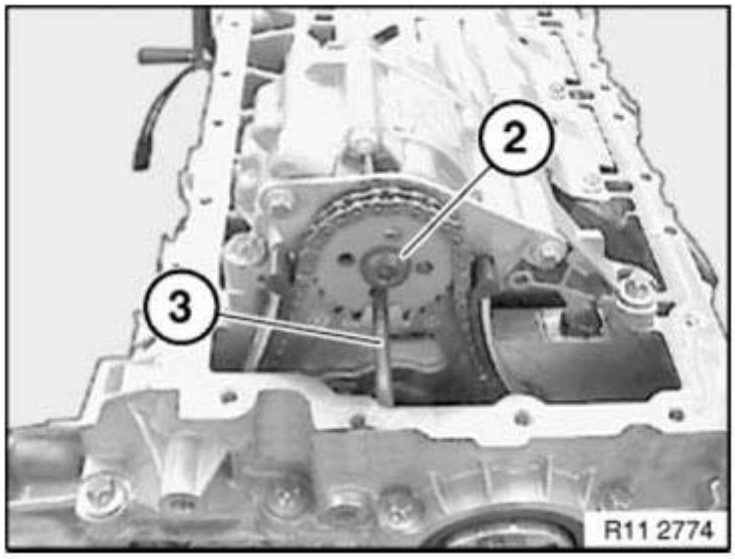


Fig. 129: Identifying Steel Pin And Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque:**11 41 5AZ** .

Installation:

Replace aluminum screws.

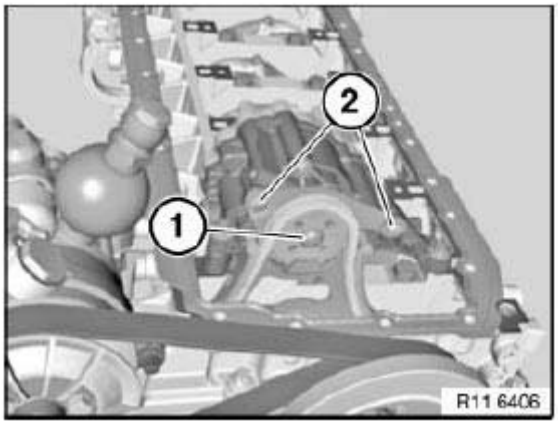


Fig. 130: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw plug (1) from crankcase at front.

NOTE: Replace gasket.

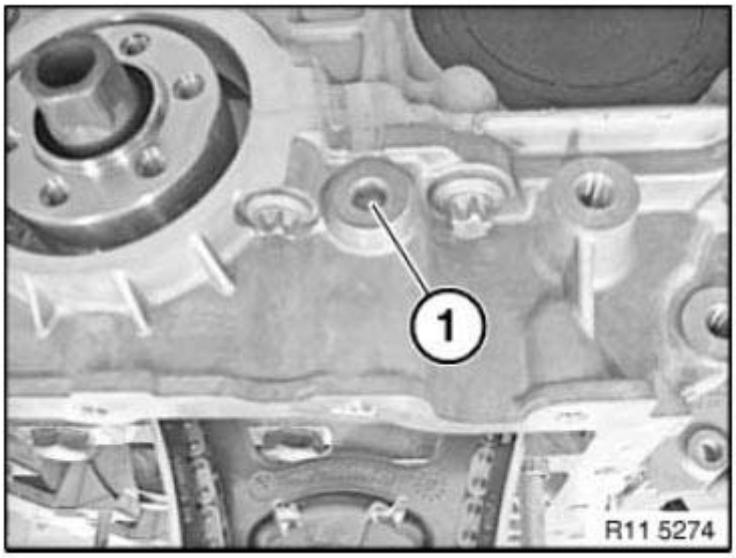


Fig. 131: Identifying Crankcase Screws Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) for oil pump triangular drive with special tool **11 8 640** .

NOTE: It is not necessary to remove the triangular drive.

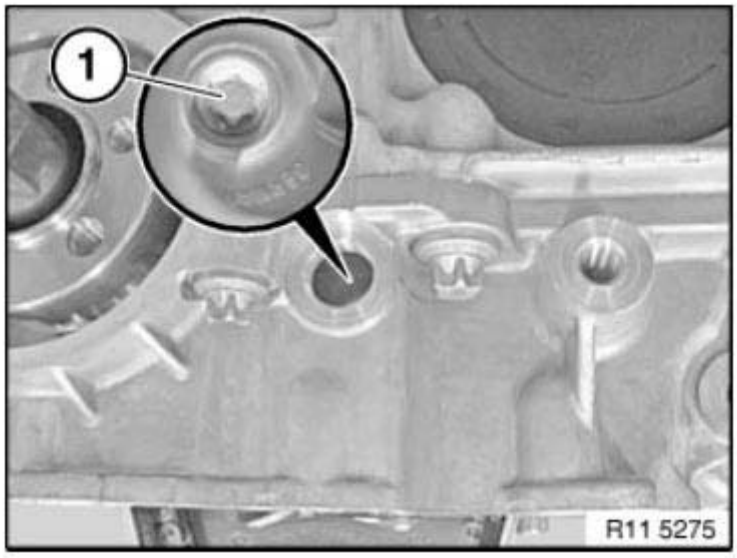


Fig. 132: Identifying Oil Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Version 1:

IMPORTANT: Observe different screw lengths.
Release screws (1).
Tightening torque 11 41 2AZ .
Tightening torque 11 41 3AZ .

Installation:

Replace aluminum screws.

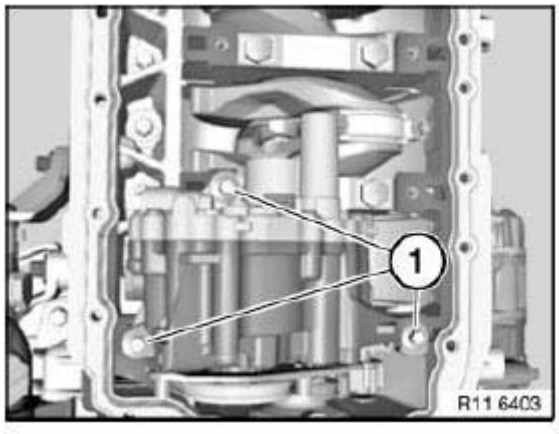


Fig. 133: Identifying Oil Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2:

IMPORTANT: Observe different screw lengths.

Release oil pump screws (1).

Tightening torque: 11 41 2AZ .

Installation:

Replace aluminum screws.

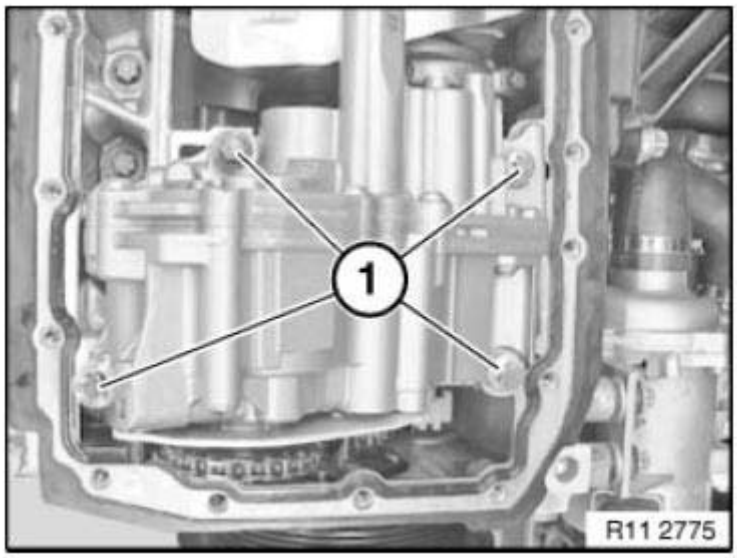


Fig. 134: Identifying Oil Pump Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket (1) in direction of arrow.

NOTE: The chain tensioner pushes the timing chain (3) of the triangular drive upward. Do not remove camshaft sprocket.

Remove oil pump (2) in direction of arrow.

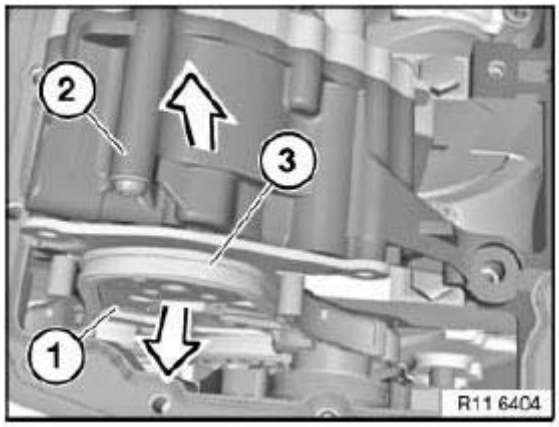


Fig. 135: Detaching Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spacer bushings (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel.

Install oil pump (2).

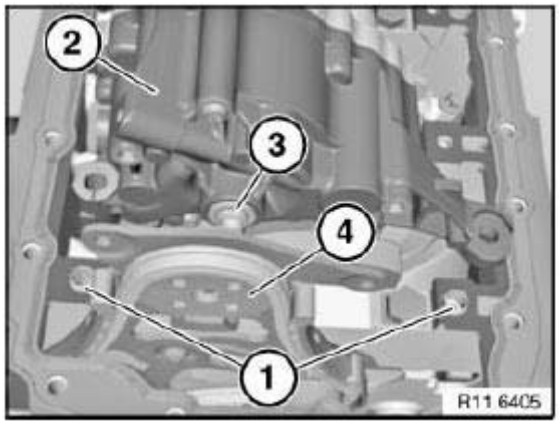


Fig. 136: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The special tool bore for the TDC position is located on the inlet side underneath the starter motor.

Rotate engine at central bolt and secure flywheel in position with special tool .

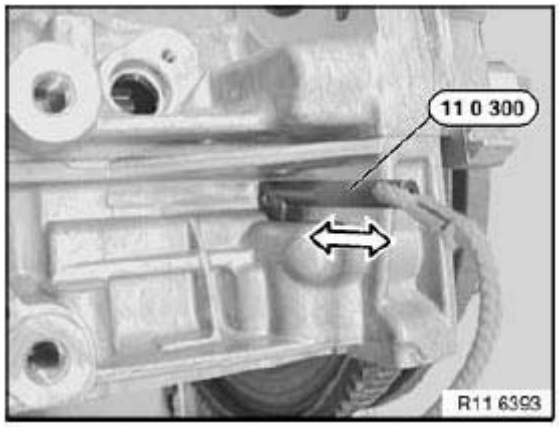


Fig. 137: Rotating Engine Central Bolt Using Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure flywheel with special tool (1) 11 9 260 and special tool (2) 11 9 266.

Tightening torque

NOTE: Make sure that the special tool (1) completely engages in the flywheel teeth (see arrow)

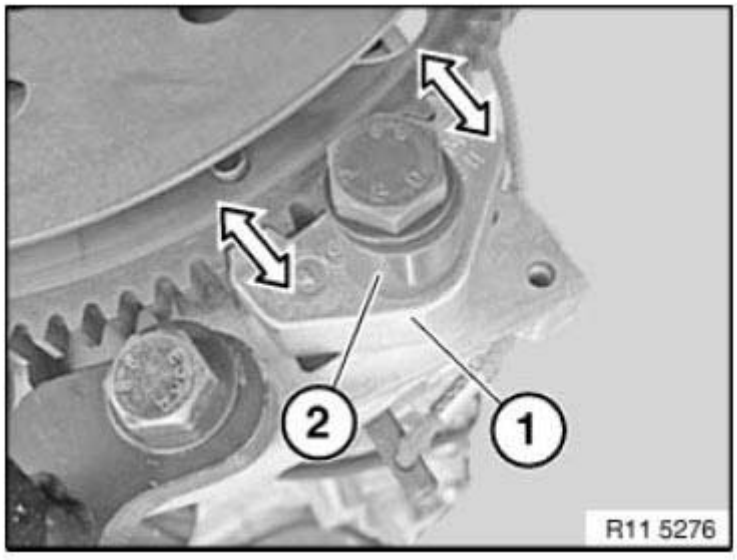


Fig. 138: Installing Flywheel Using Special Tool (11 9 260)
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission

Release flywheel bolts (1).

Release special tool (2).

Remove flywheel (3).

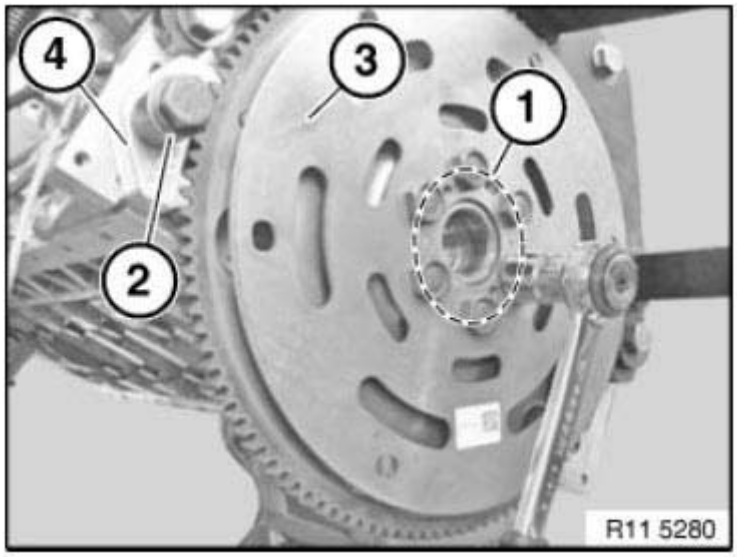


Fig. 139: Removing Flywheel Bolts Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Manual gearbox

IMPORTANT: Position crankshaft at TDC.

Remove dual-mass flywheel.

Secure flywheel with special tool 11 9 260 .

Remove **VIBRATION DAMPER** .

Release flywheel bolts with special tool 11 4 180 /

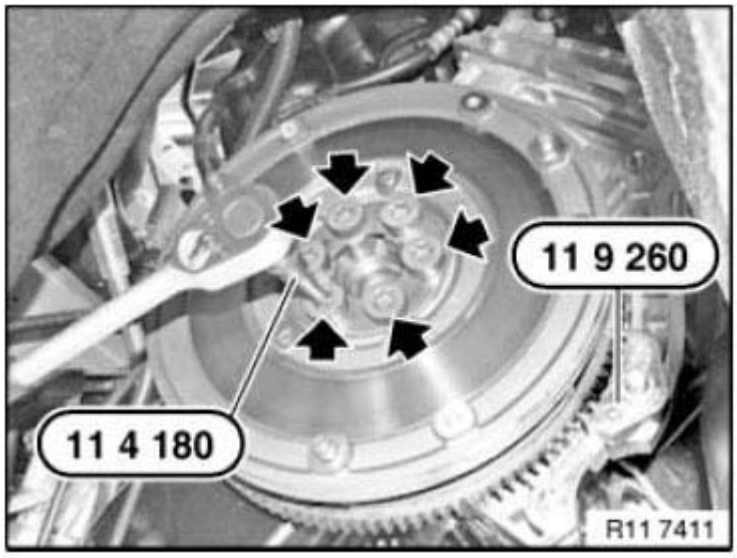


Fig. 140: Locating Flywheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

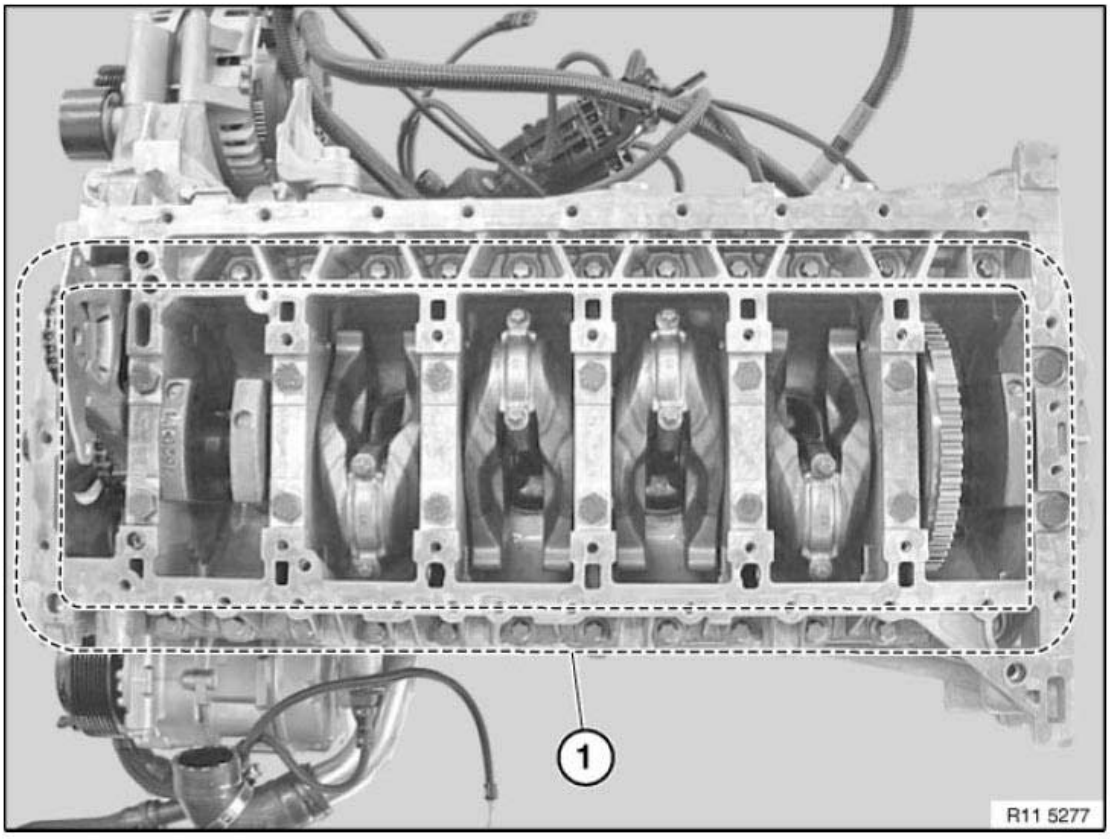


Fig. 141: Identifying Crankcase Bolts Along Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release all crankcase bolts (1) along line (2).

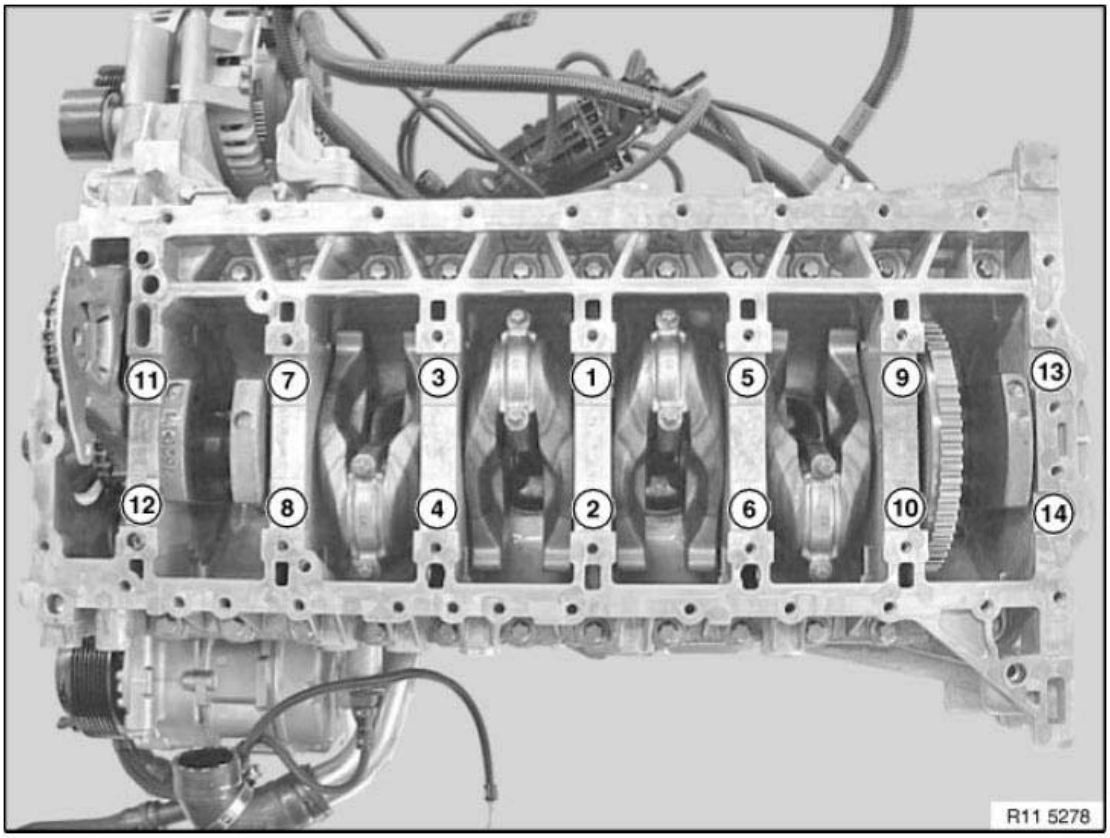


Fig. 142: Identifying Crankcase Bolts M10 In Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release crankcase bolts M10 in sequence 14 to 1.

Release crankcase lower section (1) from crankcase upper section (2) with suitable tool (3)

Remove crankcase lower section (1) upwards.

IMPORTANT: Do not rotate crankshaft without crankcase lower section (1) (risk of damage) .

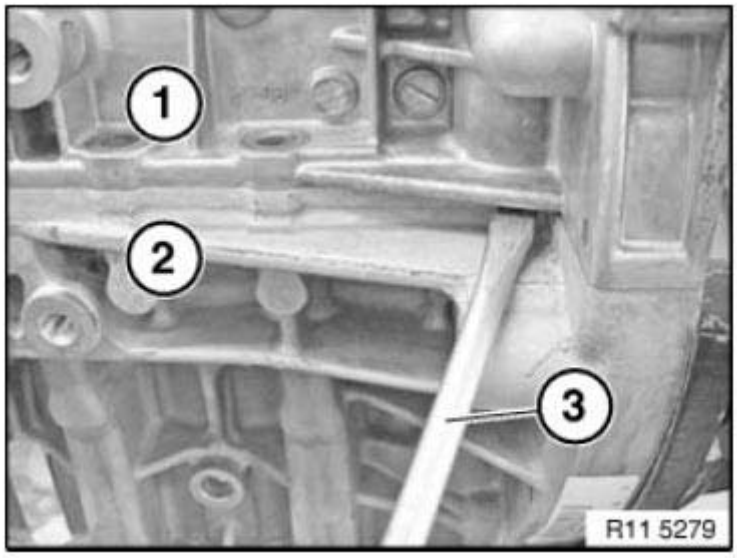


Fig. 143: Releasing Crankcase Lower Section From Crankcase Upper Section Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Timing chain is pre-tensioned.
Do not raise crankshaft.

Carefully remove radial shaft seal (1).

Catch escaping engine oil with a cloth (2).

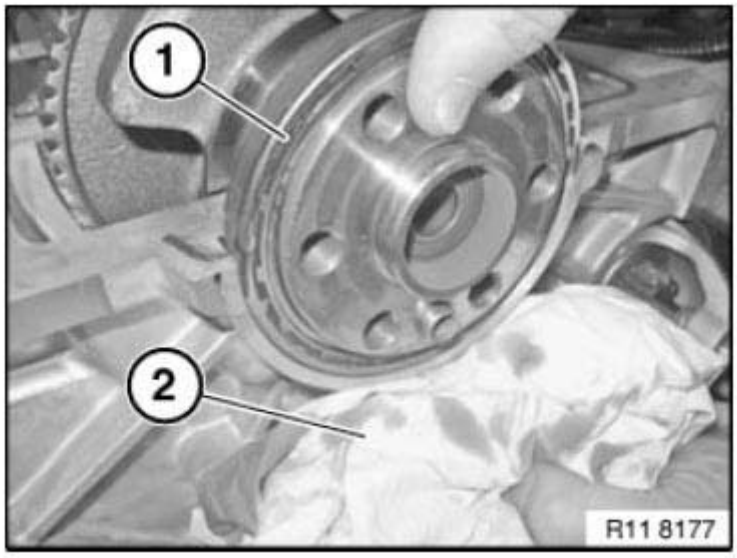


Fig. 144: Removing Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove radial shaft seal (1) towards front.

Catch escaping engine oil with a cloth (2).

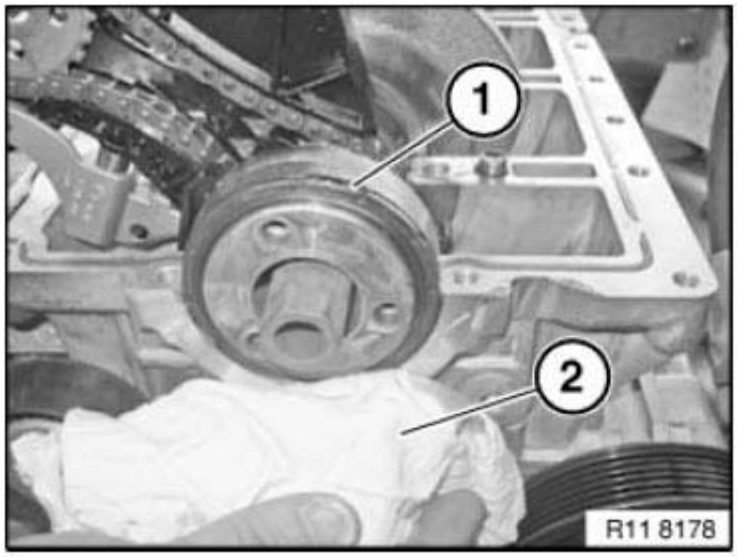


Fig. 145: Catching Escaping Engine Oil Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Protect crankcase against sealant residues with a cloth (1).

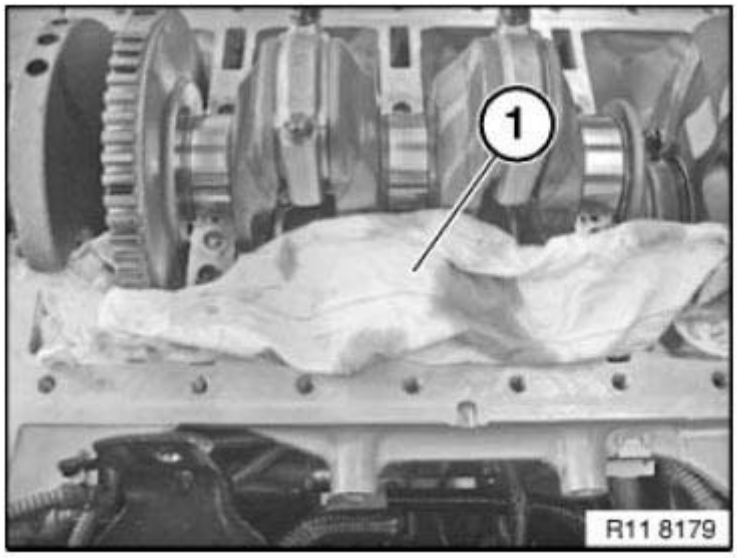


Fig. 146: Identifying Cloth For Protect Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealant residues (1) with special tool 11 4 470 .

Remove injector nozzles (2) for liquid sealing compound on left and right.

Installation:

Replace injector nozzles (2).

Clean all threads with compressed air.

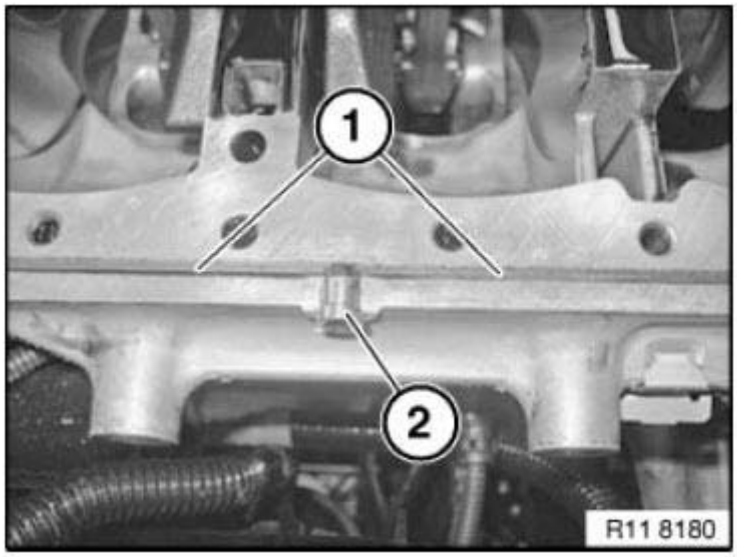


Fig. 147: Identifying Injector Nozzle And Sealant Residue
Courtesy of BMW OF NORTH AMERICA, INC.

Position crankcase lower section (1) on crankcase upper section.

Screw in all M10 crankcase bolts.

Joint all M10 crankcase bolts (1) **20 NM** from inside outwards.

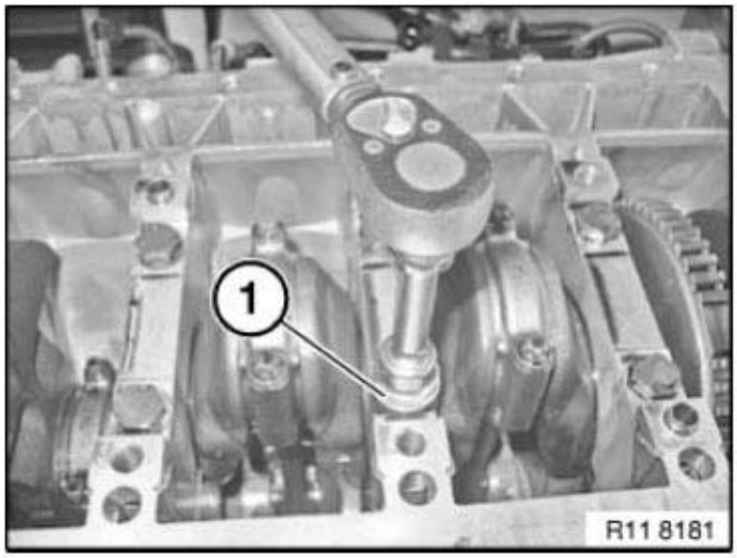


Fig. 148: Tightening M10 Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Identify all M10 crankcase bolts with a colored marking (1) for checking.

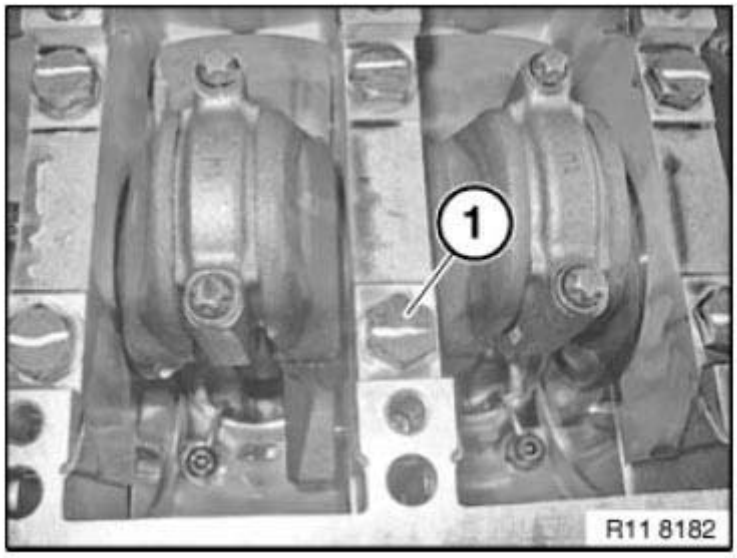


Fig. 149: Identify M10 Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

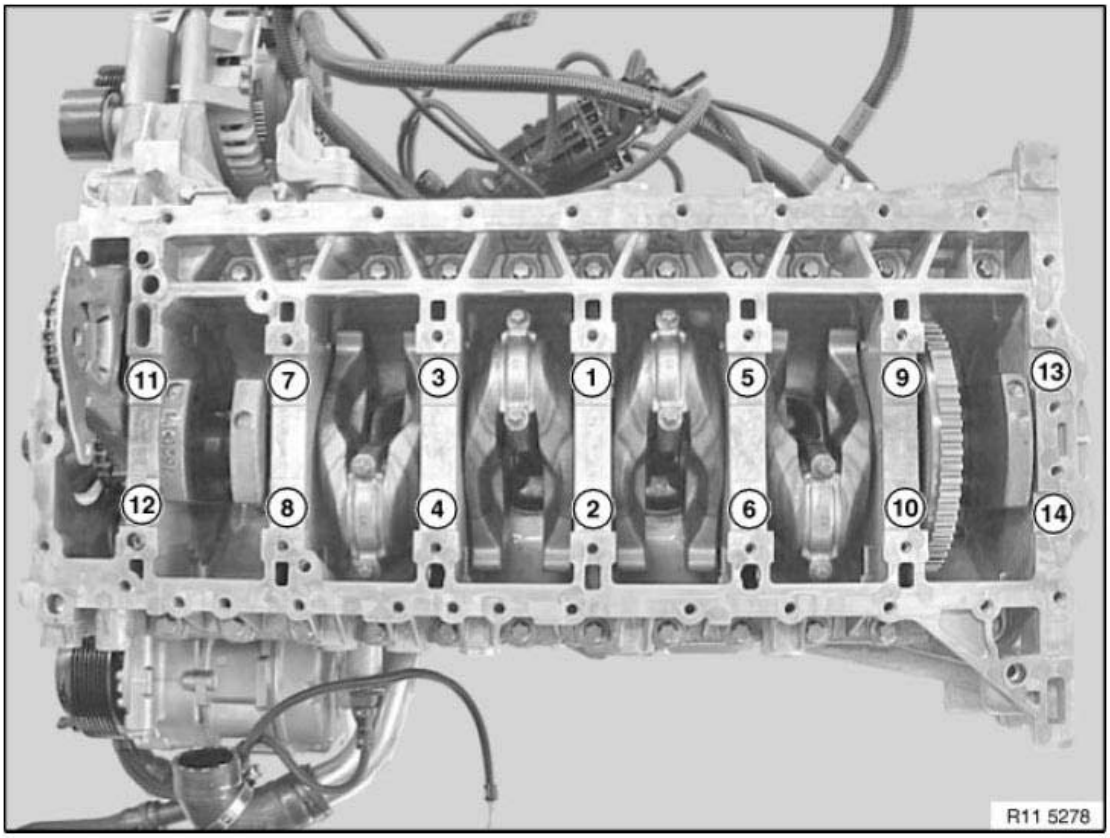


Fig. 150: Identifying M10 Crankcase Bolts In Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankcase bolts M10 in sequence 1 to 14 with special tool 00 9 120 .

Tightening torque: **11 11 1AZ.**

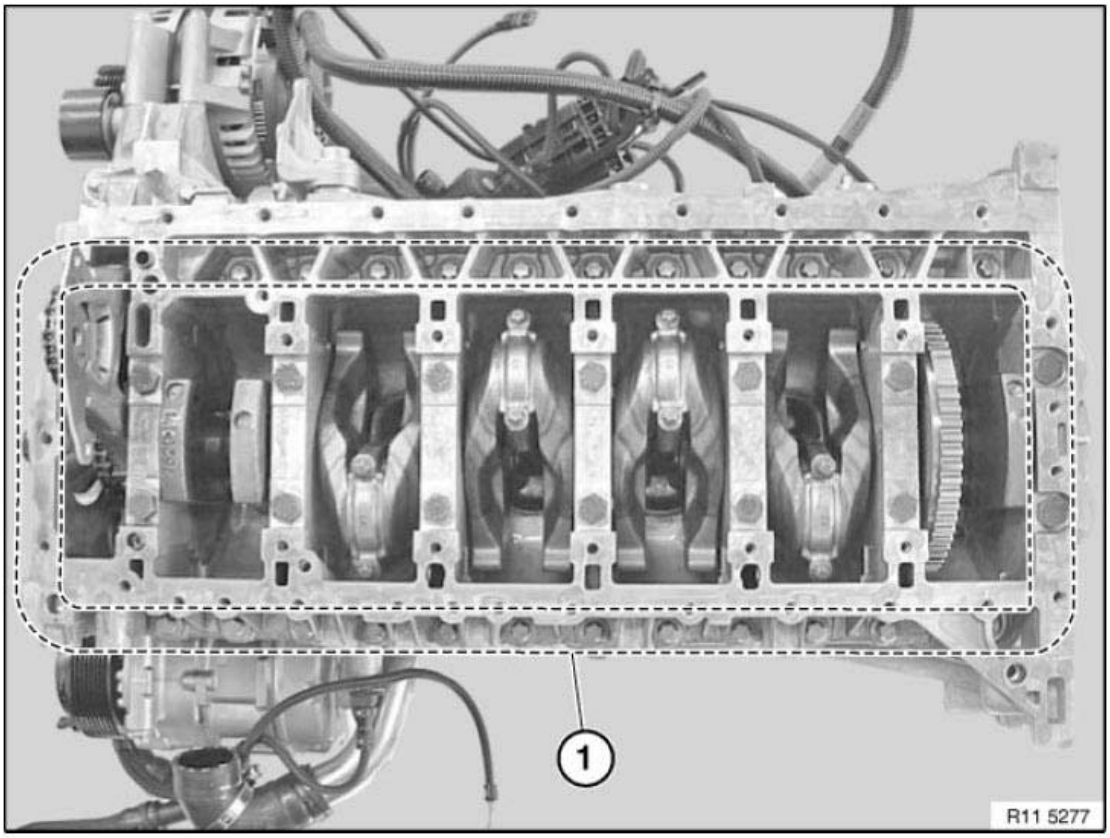


Fig. 151: Identifying Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all crankcase bolts (1).

IMPORTANT: Observe different lengths and sizes of the bolts.
Tightening torque: 11 11 2, 3 AND 4AZ.

Tighten screw (1) for oil pump triangular drive with special tool **11 8 640** .

NOTE: Replace screw.
Tightening torque: 11 41 4 AZ .

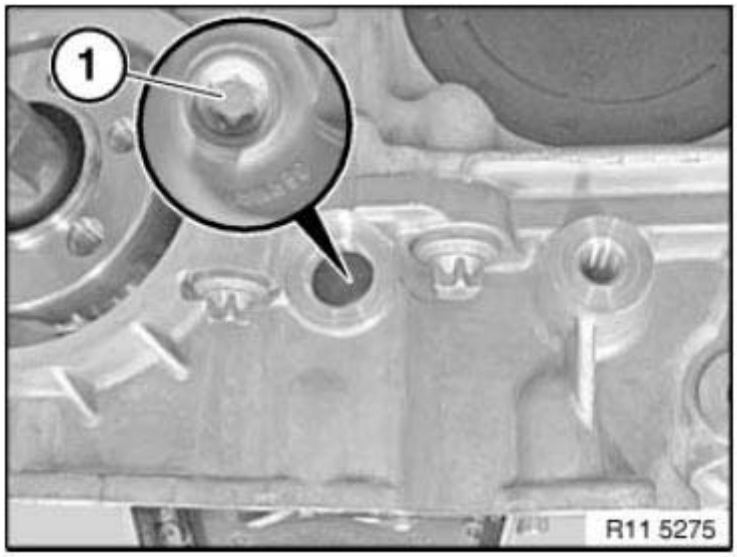


Fig. 152: Identifying Oil Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten screw plug on front of crankcase.

Tightening torque: **11 11 8 AZ.**

Installation:

Replace sealing ring.

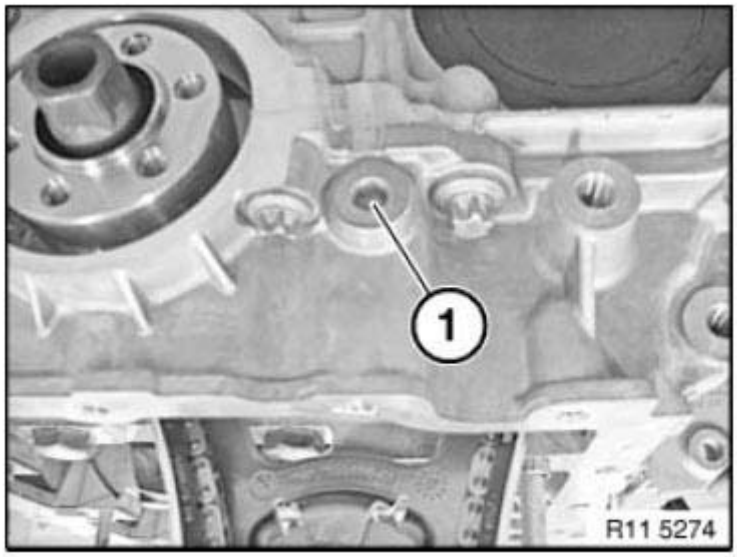


Fig. 153: Identifying Crankcase Screws Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare radial shaft seal (1) on special tool 11 8 220.

Fig. 154: Identifying Radial Shaft Seal And Special Tool (11 8 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Position radial shaft seal (1) with special tool 11 8 220 on the crankshaft.

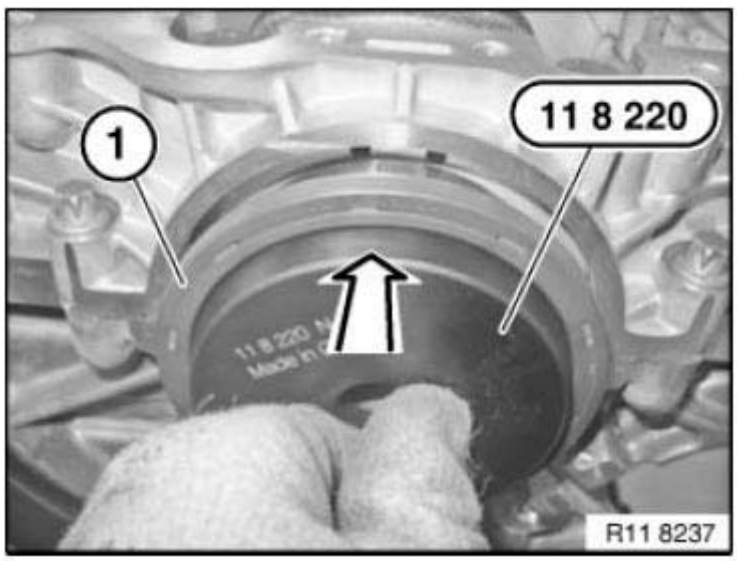


Fig. 155: Positioning Radial Shaft Seal On Crankshaft Using Special Tool (11 8 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Brush radial shaft seal (1) over the special tool 11 8 220.

Move radial shaft seal (1) parallel up against the crankcase.

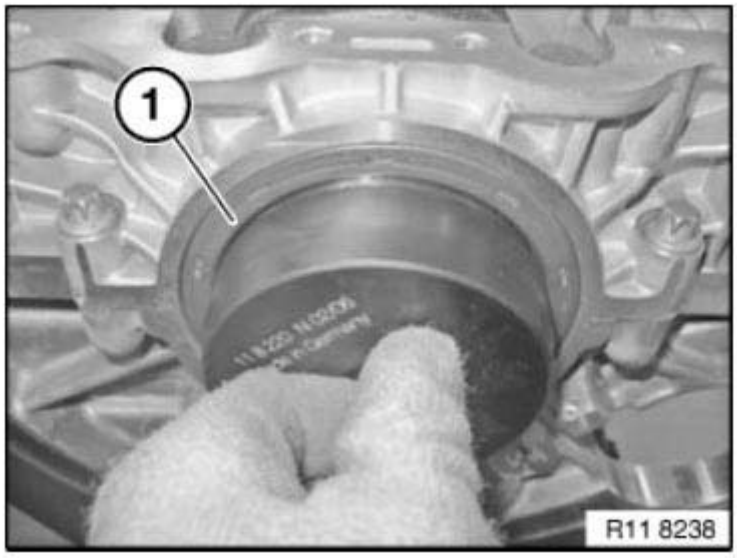


Fig. 156: Moving Radial Shaft Seal Parallel Up Against Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to crankshaft.

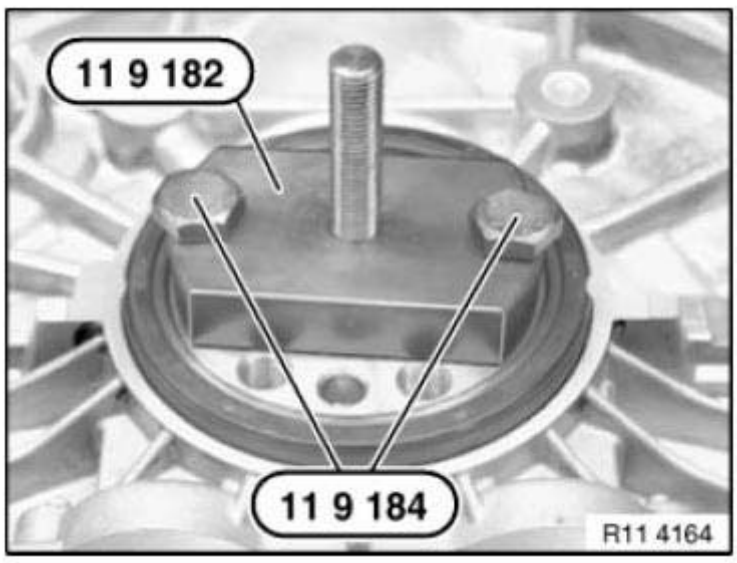


Fig. 157: Identifying Special Tools (11 9 182 And 11 9 184)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Prepare special tool 11 9 181 for installation. Connect special tool 11 9 185 onto special tool 11 8 181.

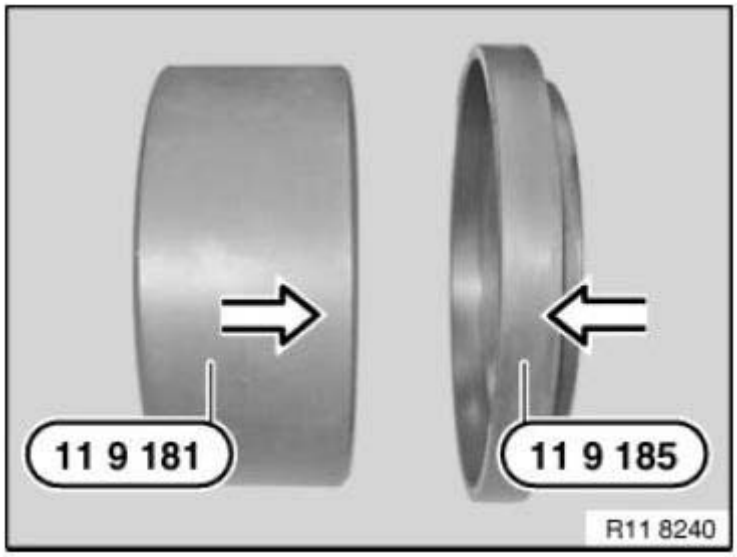


Fig. 158: Connecting Special Tool (11 9 185) Onto Special Tool (11 8 181)
Courtesy of BMW OF NORTH AMERICA, INC.

Pull on radial shaft seal with special tool 11 9 181 and 11 9 185 in combination with special tool 11 9 183.

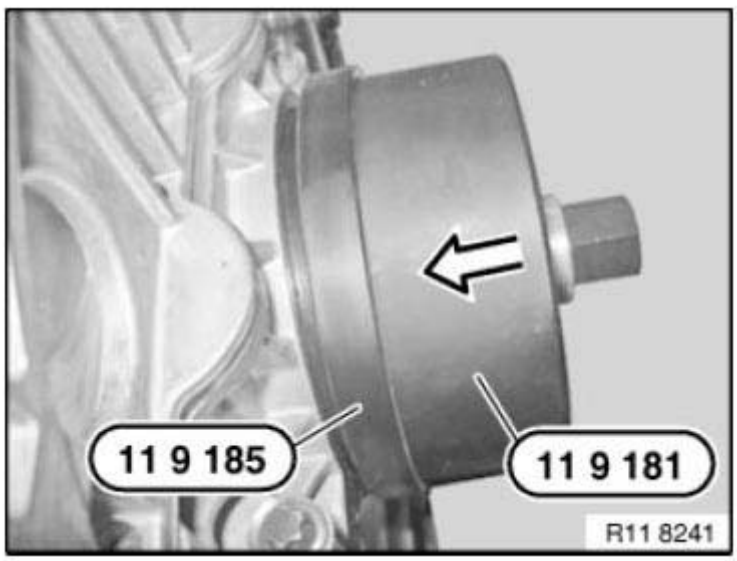


Fig. 159: Pulling Radial Shaft Seal Using Special Tool (11 9 181)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw on radial shaft seal with special tool 11 9 183 to limit position.

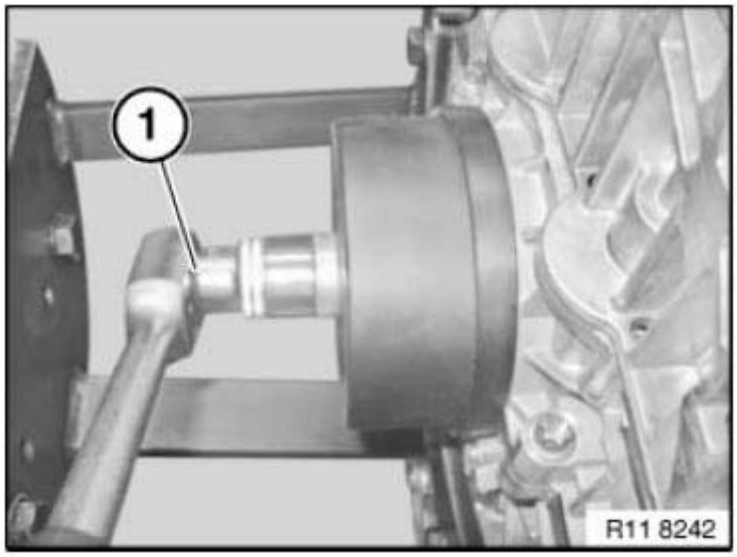


Fig. 160: Tightening Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of radial seal.

NOTE: Graphic N42.

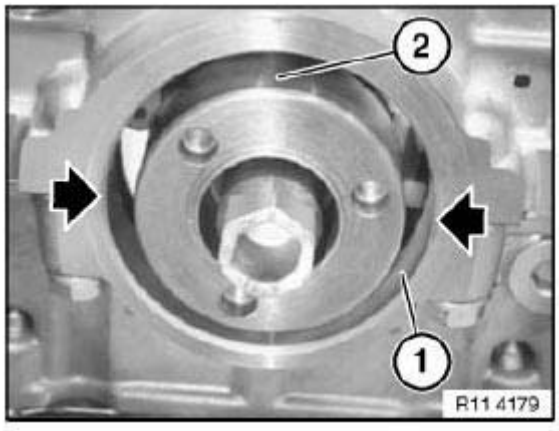


Fig. 161: Locating Sealing Surface And Running Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Push radial shaft seal (1) 11 9 235carefully in direction of arrow on the special tool.

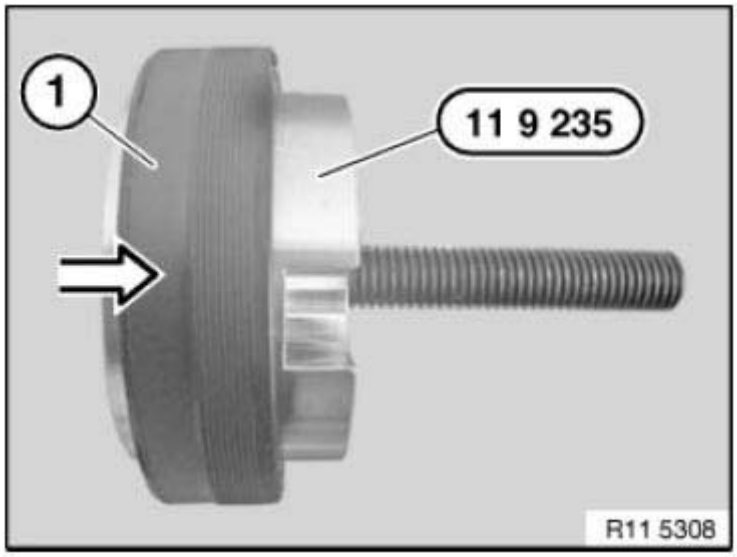


Fig. 162: Pushing Radial Shaft Seal Using Special Tool (11 9 235)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: 11 9 235Special tool can only be fastened with 2 opposite bolts. Determine hole pattern on special tool.

Screw special tool 11 9 235 with special tool 11 9 234 on crankshaft.

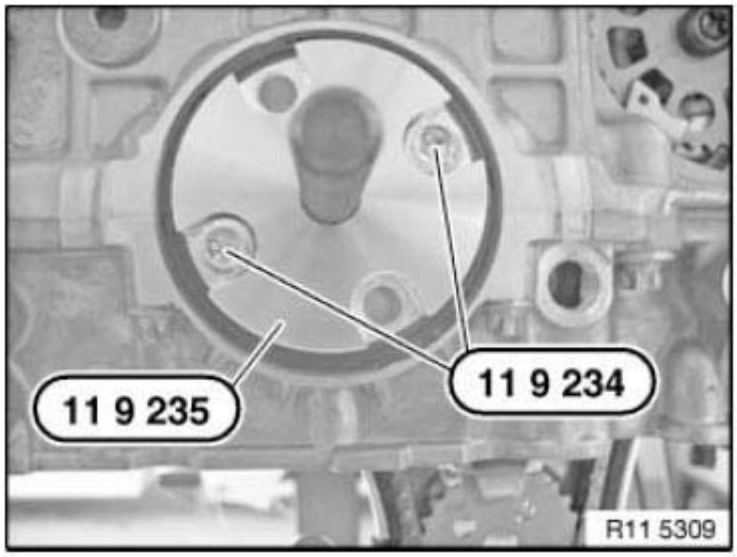


Fig. 163: Identifying Special Tools (11 9 234 And 11 9 235)
Courtesy of BMW OF NORTH AMERICA, INC.

Align groove (2) of radial shaft seal (1) centered to the housing partition (3.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

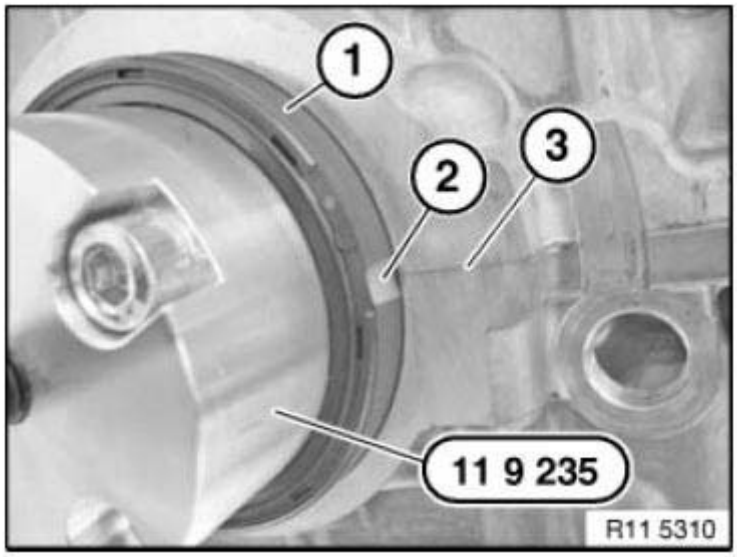


Fig. 164: Aligning Groove Of Radial Shaft Seal Centered To Housing Partition
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial seal with special

tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

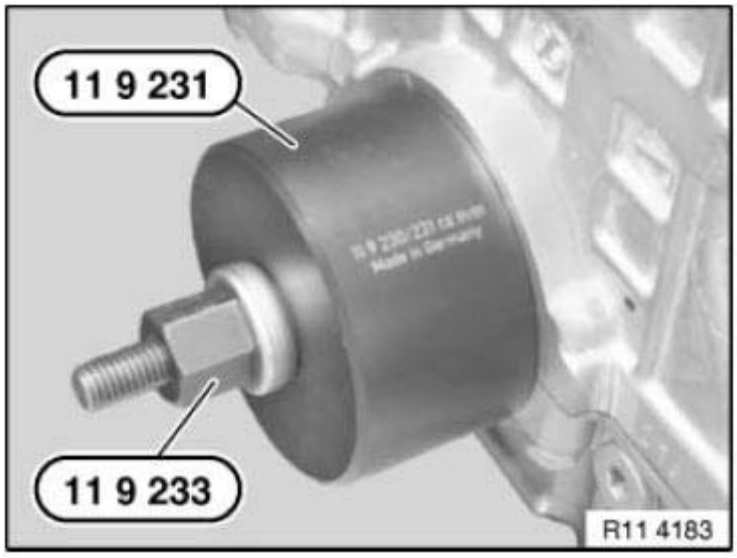


Fig. 165: Identifying Special Tools (11 9 231 And 11 9 233)
Courtesy of BMW OF NORTH AMERICA, INC.

Drive both injector nozzles (1) on left and right with special tool 11 9 360 into crankcase up to stop.

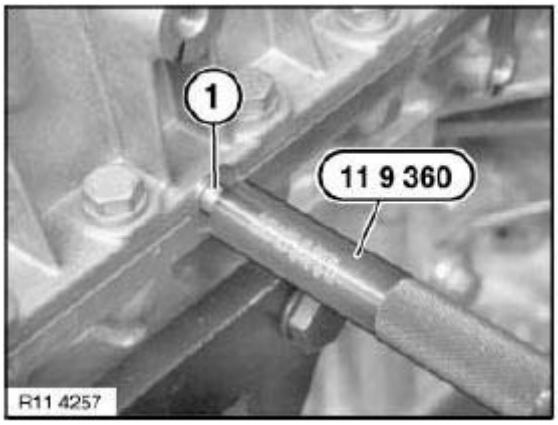


Fig. 166: Driving Nozzles In Crankcase Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

After fitting both sealing rings, check both sealing ducts for clearance.

Blow compressed air (1) at max. 6 bar into injector nozzle (2).

Compressed air must emerge at both sealing rings on left and right from the outlet bores.

IMPORTANT: If the compressed air does not flow out of all ducts. the crankcase must again be taken apart and cleaned.

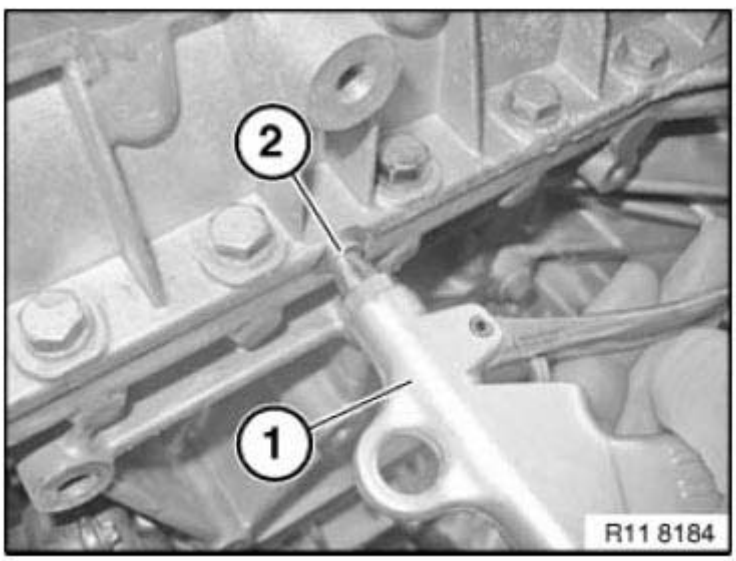


Fig. 167: Blowing Compressed Air Into Injector Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Use **PRIMER 1.3 AND LIQUID SEAL 1.4** .

Prepare liquid sealing compound (1) in special tool 11 4 370 .

Injector nozzles for injecting sealing compound are not required.

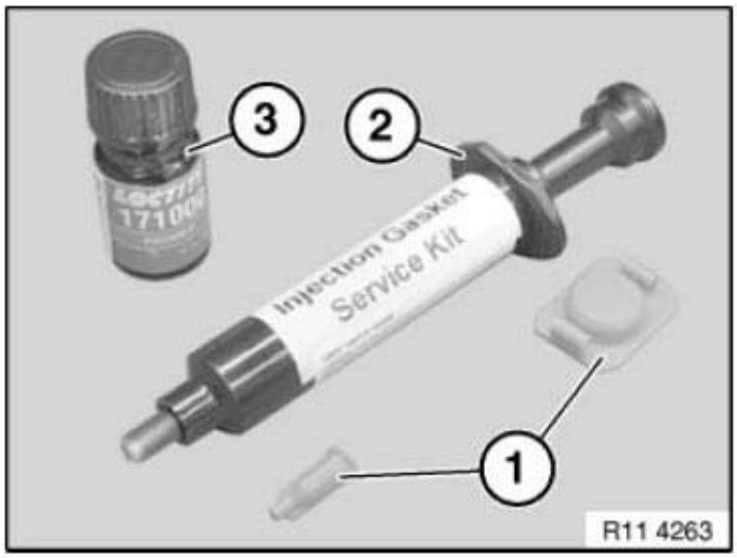


Fig. 168: Identifying Injector With Primer Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Slowly insert liquid sealing compound (1) with special tool 11 4 370 in direction of arrow.

Liquid sealing compound must emerge at radial shaft seals at front and rear.

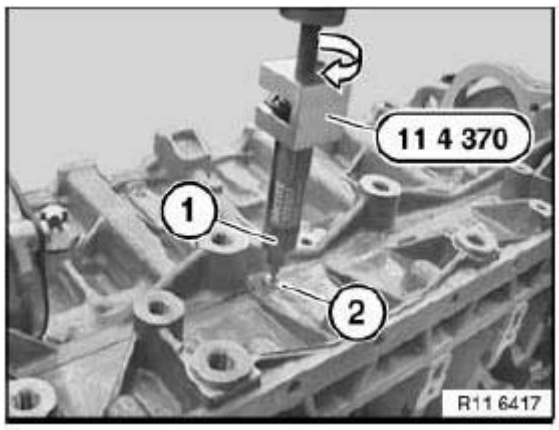


Fig. 169: Inserting Liquid Gasket Using Special Tool (11 4 370)
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid gasket with primer 1.3.

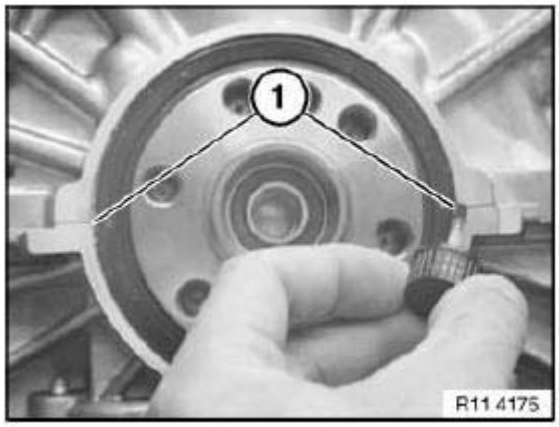


Fig. 170: Coating Sealing Compound Surface Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid gasket with primer 1.3.

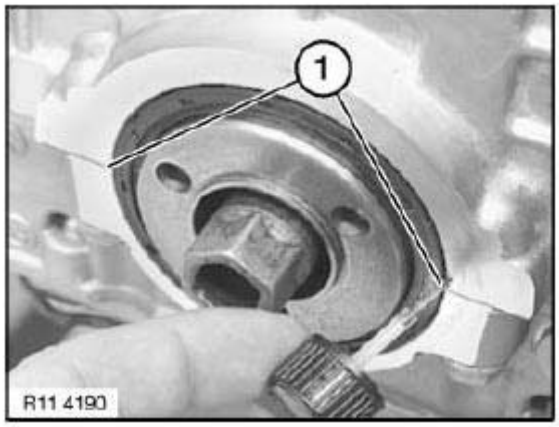


Fig. 171: Coating Housing Partition On Engine Block Using Brush Moistened With Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1122 FLYWHEEL

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:

Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove transmission See **2300017 REMOVING AND INSTALLING TRANSMISSION (GS6-17BG) N52K** or **2400030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP19Z) N52K**
- Remove **CLUTCH**

For vehicles with optional extra SA205 (automatic transmission)

Secure flywheel (1) with existing transmission bolt (2) and special tool 11 9 260 .

Installation:

Replace aluminum screws.

Unfasten flywheel screws.

Tightening torque **11 22 1AZ** .

Installation:

Flywheel (1) is secured with an alignment pin.

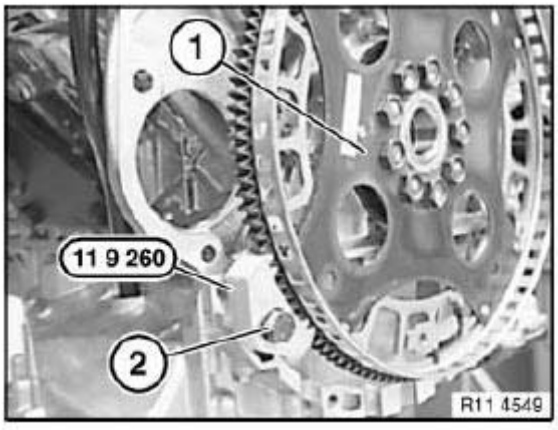


Fig. 172: Supporting Flywheel With Existing Transmission Bolt And Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

For vehicles without optional extra SA205 (automatic transmission)

Secure flywheel with transmission bolt (1) and special tool 11 9 260 and 11 9 265.

Installation:

Replace aluminum screws.

Release flywheel bolts with special tool 11 4 180 /

Tightening torque **11 22 2AZ** .

Installation:

Flywheel is secured with a dowel pin.

Fit new flywheel screws.

Clean all threads for flywheel screws in crankshaft.

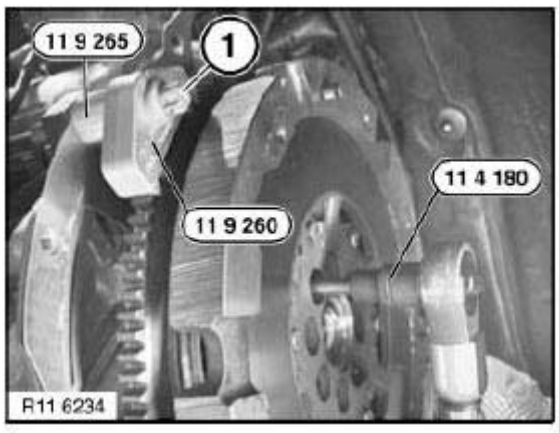


Fig. 173: Tightening Flywheel Bolts Using Special Tools (11 4 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1123 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N52K)

Necessary preliminary tasks:

- Remove **UNDERBODY PROTECTION** .
- Remove **DRIVE BELT**

Release screws (1).

Tightening torque **11 23 1AZ** .

Remove vibration damper (2).

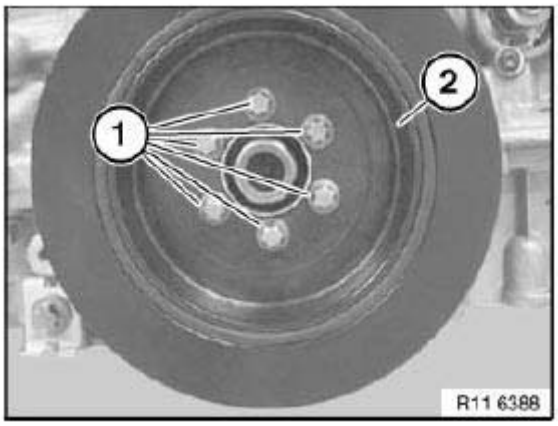


Fig. 174: Identifying Vibration Damper Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1124 CONNECTING ROD WITH BEARING

11 24 571 REPLACING ALL CONNECTING ROD BEARING SHELLS (N52K)

IMPORTANT: All crank pins are connected with the crankshaft.
Modified procedure: The colors of the connecting rod bearing shells are the same at the top and bottom.
The Blue/Red connecting rod bearing shell colors are no longer fitted in combination.

Necessary preliminary tasks:

- Remove **OIL SUMP**

IMPORTANT: All crankshaft crank pins are classified.

Possible classifications per connecting rod at top and bottom:

r: Red

b: Blue

Only **one** color may be fitted per big end bearing cap and connecting rod.

In direction of arrow from (1 to 2) crank pin (1 to 6).

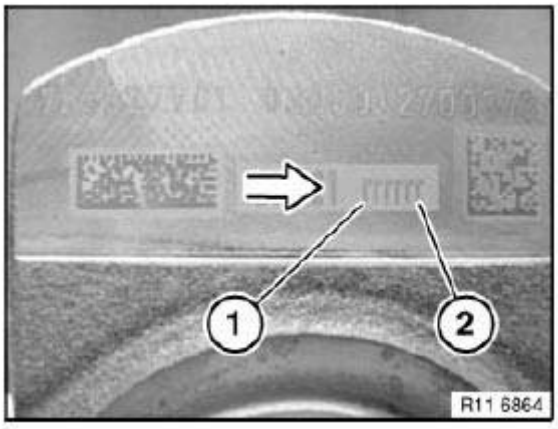


Fig. 175: Direction Of Fitting Color In Connecting Rod And Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Example:

Possible classification: rbbrrb

Cylinder 1: Classification Red/Red

Cylinder 2: Classification Blue/Blue

Cylinder 3: Classification Blue/Blue

Cylinder 4: Classification Red/Red

Cylinder 5: Classification Red/Red

Cylinder 6: Classification Blue/Blue

Release connecting rod bolts (1).

Remove connecting rod bearing cap (2).

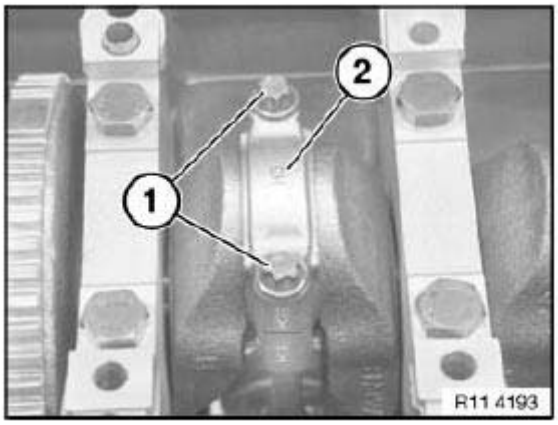


Fig. 176: Identifying Connecting Rod Bearing Cap And Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage to cylinder wall and to crankshaft.

Gently release connecting rod from crankshaft.

Remove connecting rod bearing shells (1 and 2).

Install new connecting rod bearing shells.

Installation:

Pay attention to guide lugs during installation.

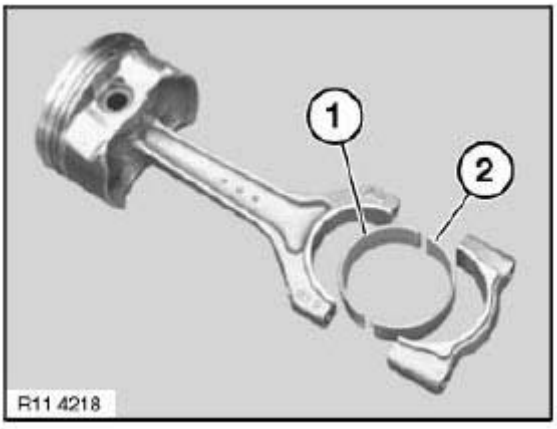


Fig. 177: Identifying Connecting Rod Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: All crankshaft crank pins are classified.

In each case insert only one color of connecting rod bearing shell (1 and 2) for each connecting rod.

Check connecting rod bearing clearance.

Piston in BDC position.

To determine the connecting rod bearing play, make sure that the bearing points are clean and free from oil and grease.

Fit special tool 00 2 590 (Plastigage type PG 1) to oil-free crankshaft.

Fit connecting rod bearing cap so that pairing letters match up.

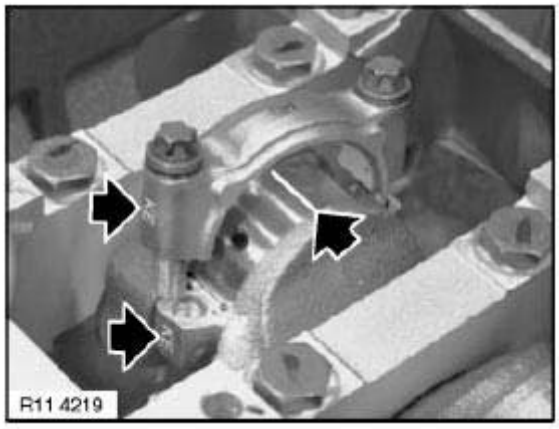


Fig. 178: Locating Bearing Cap Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort connecting rods or crankshaft.

Use the old connecting rod bolts to check connecting rod clearance.

Tighten down connecting rod bolts with special tool 00 9 120 .

Tightening torque **11 24 1AZ** .

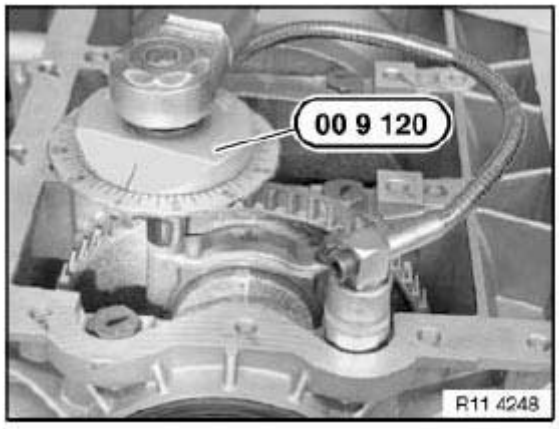


Fig. 179: Adjusting Connecting Rod Torsion Angle Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew connecting rod bearing cap. Read off connecting rod bearing play at width of flattened plastic thread on measurement scale.

Connecting rod bearing play. See **TED-TED-TDMUC1124-N52K-01B1S2 CONNECTING RODS AND BEARINGS N52K/B30** or **TED-TED-TDMUC1124-N52K-01B1S1 CONNECTING RODS AND BEARINGS N52K/B25**

- Remove Plastigage
- Coat crankshaft and connecting rod bearing shells with oil
- Install new connecting rod bolts and tighten down with special tool 00 9 120 .

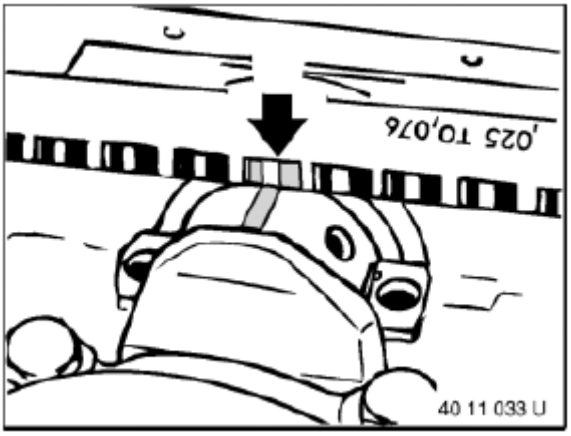


Fig. 180: Checking Bearing Clearance Width Of Crushed Plastic Thread (Plastigage)
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 24 1AZ** .

Assemble engine.

1125 PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING OR REPLACING ALL PISTONS (N16)

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will

result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove engine.
- Mount engine on assembly stand.
- Remove intake plenum.
- Remove cylinder head.
- Remove oil sump.
- Remove oil pump.

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Graphic shows N46.

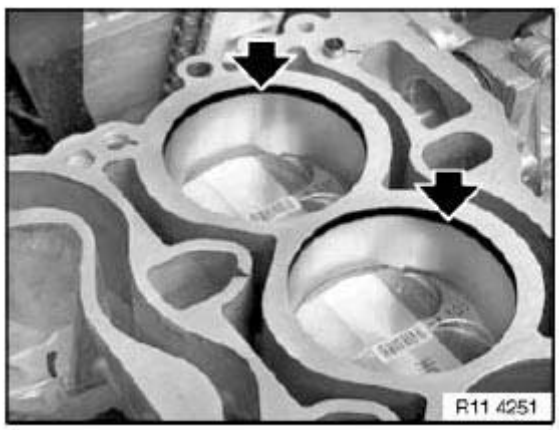


Fig. 181: Locating Oil Carbon Residue On Cylinder Wall
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example N14:

Direction of arrow (1) points to camshaft drive.

Cylinder allocation (2) per cylinder.

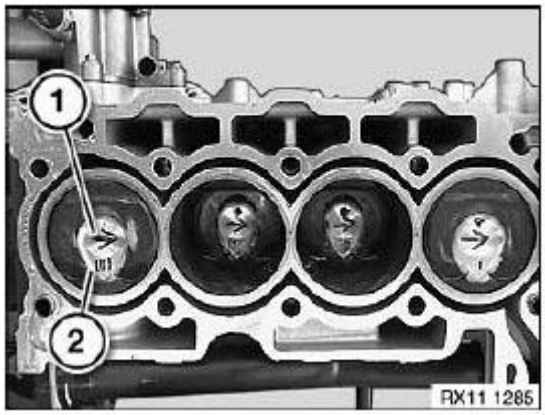


Fig. 182: Identifying Camshaft Drive Direction And Cylinder Allocation
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example:

Mark cylinder assignment (1) for the respective cylinder.

Direction of arrow (2) points to timing chain drive.

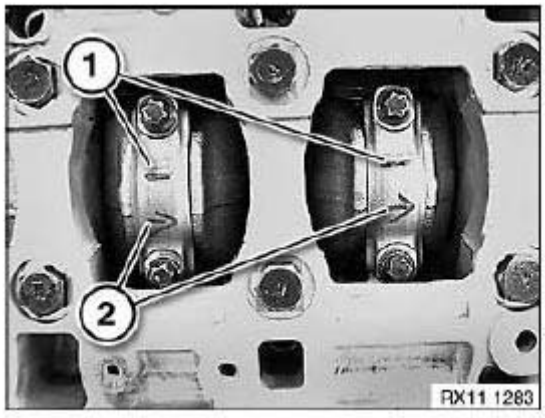


Fig. 183: Identifying Bearing Cap And Direction Of Arrow Towards Timing Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque, **11 24 1AZ** .

Remove conrod bearing cap.

IMPORTANT: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

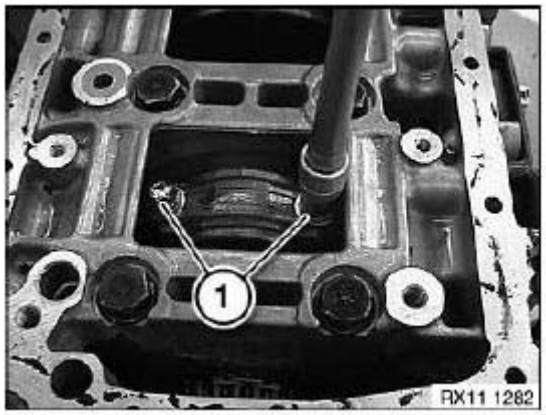


Fig. 184: Identifying Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

11 9 620 Attach special tool in conrod big end.

Press out connecting rod and piston to cylinder head side.

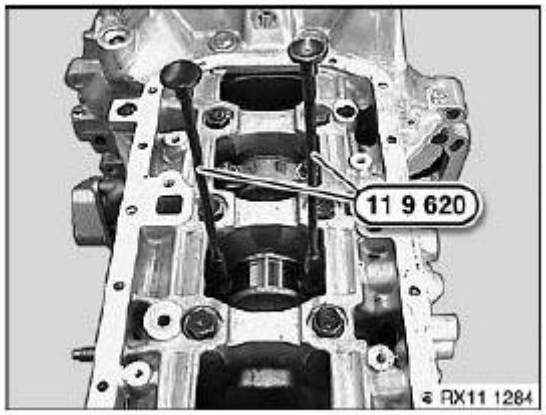


Fig. 185: Attaching Special Tool (11 9 620) In Conrod Big End
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn for the next operation.

WARNING: Safety goggles must be worn.

IMPORTANT: Piston and gudgeon pins are paired and must not be fitted individually.

Lever out piston pin circlip with a screwdriver in direction of arrow.

Fig. 186: Removing Piston Pin Circlip Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

Installation note:

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.

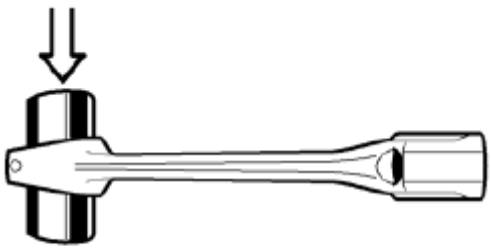


Fig. 187: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Piston diameter at measuring point A.

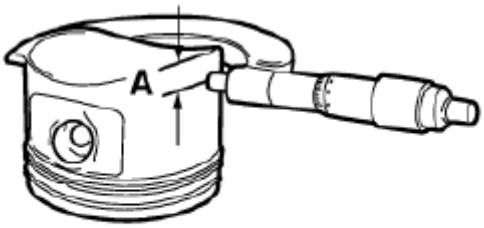


Fig. 188: Measuring Piston Diameter Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance.

If necessary, replace piston.

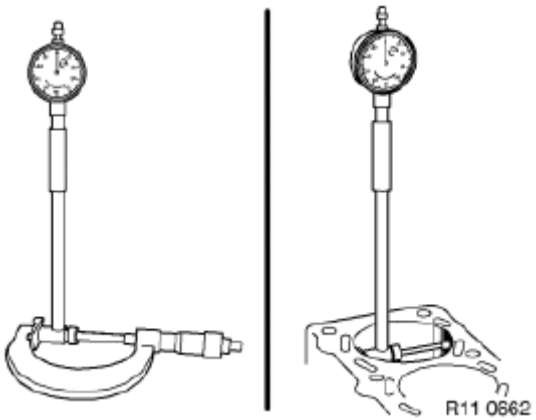


Fig. 189: Checking Cylinder Bore Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Install all piston rings.

Install all bearing shells.

Coat piston and piston rings with oil.

11 9 670 Pre-install piston in special tool.

Screw special tool 11 9 620 into connecting rod.

Installation note:

11 9 620 Check protective lugs on special tool for correct position and damage.

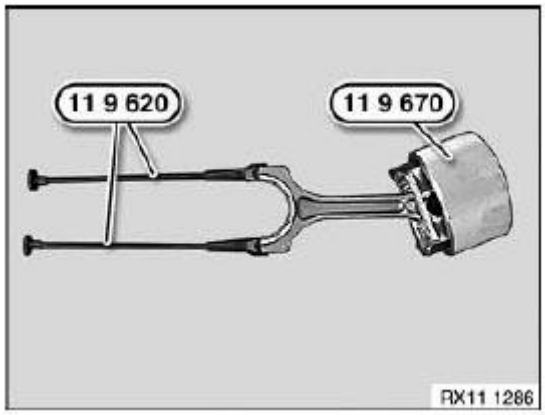


Fig. 190: Identifying Connecting Rod And Screw Special Tool (11 9 620)
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston with connecting rod in cylinder.

IMPORTANT: Risk of breakage of piston rings.
Press in piston with finger pressure only, do not drive in (see arrows).

Insert piston (1) so that arrow on piston crown points to camshaft drive.

If reusing the pistons, assign cylinder allocation (2) to correct cylinder.

Press in piston with special tool 11 9 670.

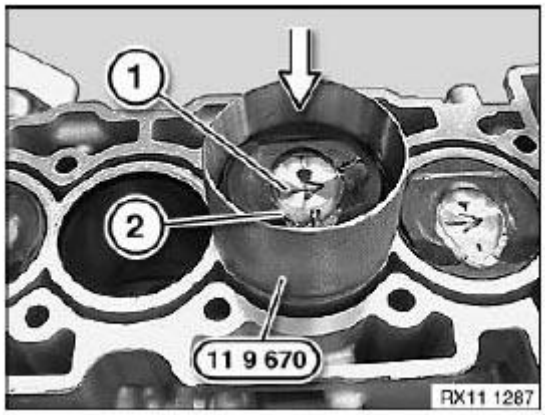


Fig. 191: Inserting Piston With Connecting Rod In Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Point of fracture (1) on conrod.
Conrod and conrod bearing cap are identified with pairing letters (2) and must not be mixed up.
Mixing them up or incorrectly fitting the connecting rod bearing cap on the big end will result in engine damage .

Both pairing letters (2) must be together on one side.

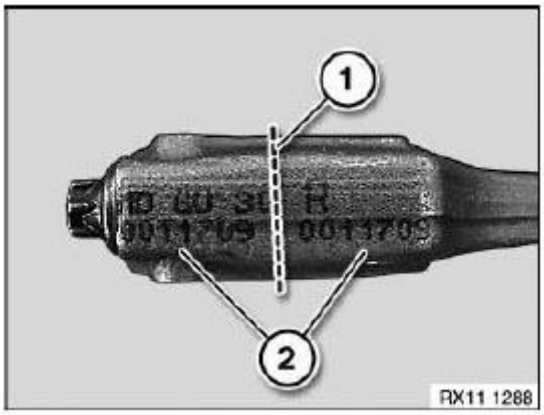


Fig. 192: Identifying Connecting Rod Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crankshaft journals.

Attach connecting rod to crankshaft journal.

Remove special tool 11 9 620.

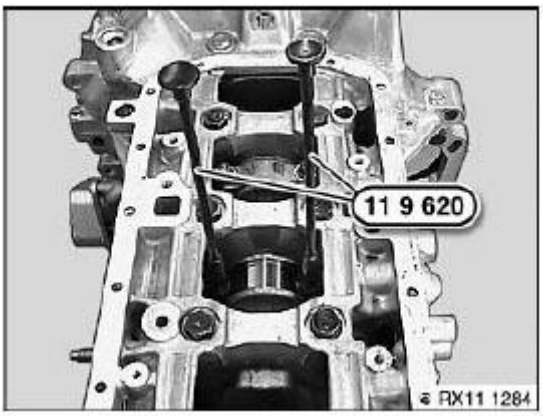


Fig. 193: Attaching Special Tool (11 9 620) In Conrod Big End
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

Check cylinder identification markings (1).

Direction of arrow (2) points to timing chain drive.

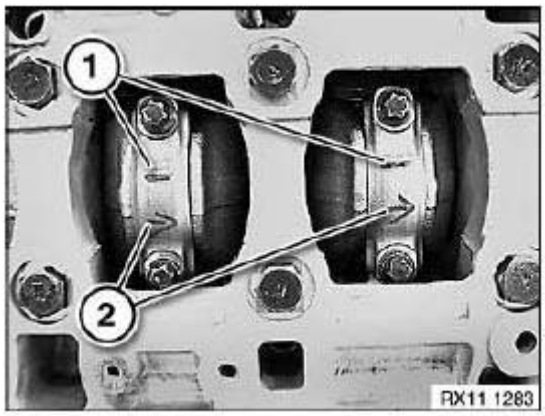


Fig. 194: Identifying Bearing Cap And Direction Of Arrow Towards Timing Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Install new connecting rod bolts (1).

Carry out torsion angle tightening of conrods with special tool 00 9 120

Tightening torque: **11 24 1AZ**

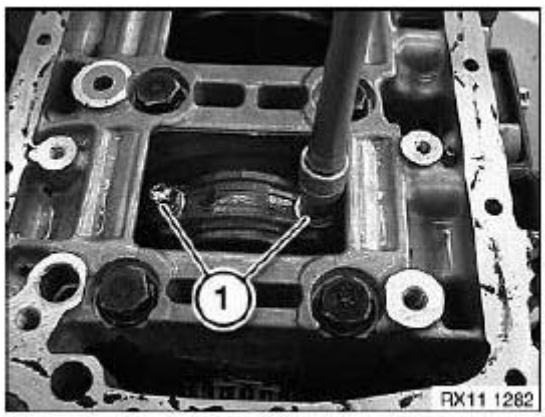


Fig. 195: Identifying Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N52K)

WARNING: Risk of injury!
Carry out work on piston pin circlip wearing protective goggles only.

IMPORTANT: If piston, connecting rod, big end bearing cap and connecting rod bearing shell are to be reused, they must be installed in the same position.

Individual replacement of a connecting rod is not permitted. Connecting rods are classified by weight categories and are only available as a set for all cylinders.

Connecting rod and big end bearing cap are marked with identical pairing letters and must not be mixed up.

Danger of engine damage!

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on assembly stand
- Remove intake **PLENUM**
- Remove **CYLINDER HEAD** .
- Remove **OIL SUMP**
- Remove **OIL PUMP**

NOTE: Carefully remove heavy oil carbon residues from the cylinder wall (arrow).

IMPORTANT: Do not use any metal-cutting tools.

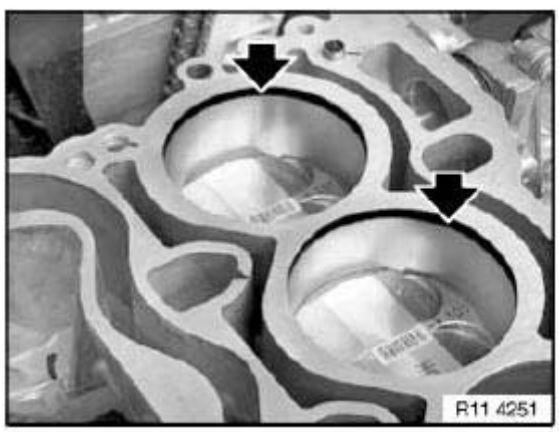


Fig. 196: Locating Oil Carbon Residue On Cylinder Wall
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Oil spray nozzle (2) must not be maladjusted or bent.

Risk of damage!

Do **not** release screw (1) of oil spray nozzle (2).

If necessary, readjust **OIL SPRAY NOZZLE** (2).

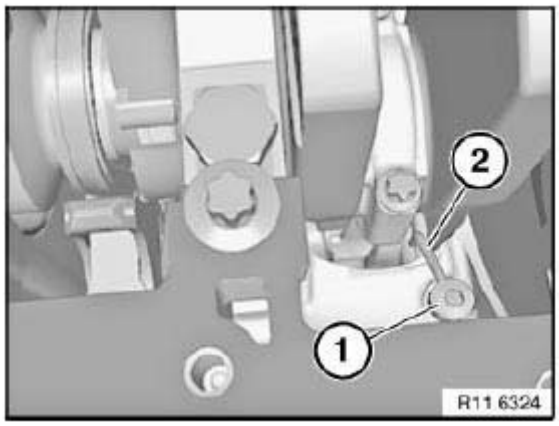


Fig. 197: Identifying Screw And Oil Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque **11 24 1AZ** .

Installation:

Replace screws.

Remove connecting rod bearing cap (2) in direction of arrow.

IMPORTANT: Connecting rod and big end bearing cap (2) are marked with identical pairing letters and must not be mixed up.

Danger of engine damage!

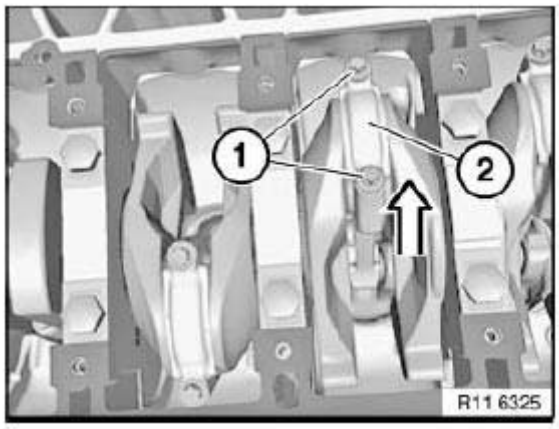


Fig. 198: Removing Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 11 8 330 to connecting rod.

Press out connecting rod and piston with special tool 11 8 330 towards cylinder head side.

NOTE: Special tool 11 8 330 also serves to prevent connecting rod and piston from falling down.

IMPORTANT: Do not touch the oil spray nozzle when removing the components.

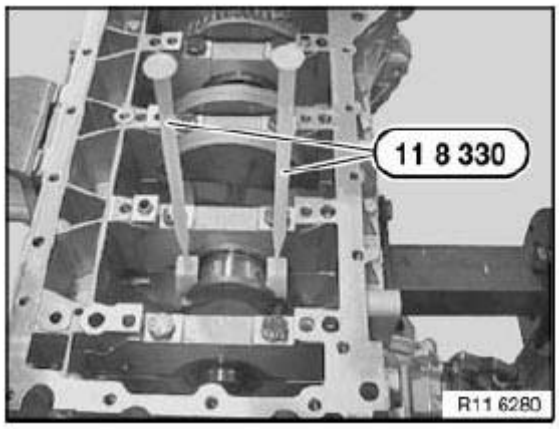


Fig. 199: Identifying Special Tool (11 8 330)
Courtesy of BMW OF NORTH AMERICA, INC.

Risk of damage!

Preliminary work

Clamp special tool 11 4 491 in vice.

Secure piston (1) with connecting rod to special tool 11 4 491 .

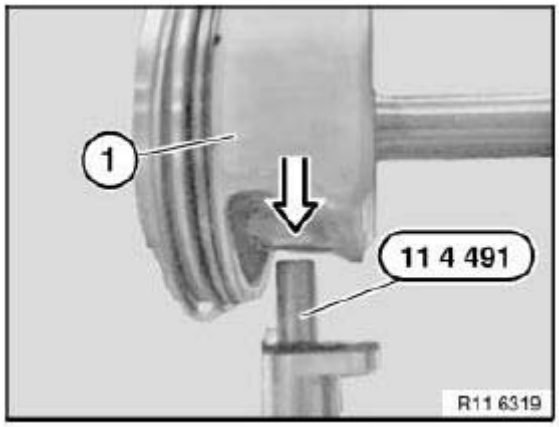


Fig. 200: Securing Piston Using Special Tool (11 4 491)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!
Carry out work on piston pin circlip wearing protective goggles only.

WARNING: Safety goggles must be worn.

Lever out circlip for gudgeon pin with special tool 11 4 492 in direction of arrow.

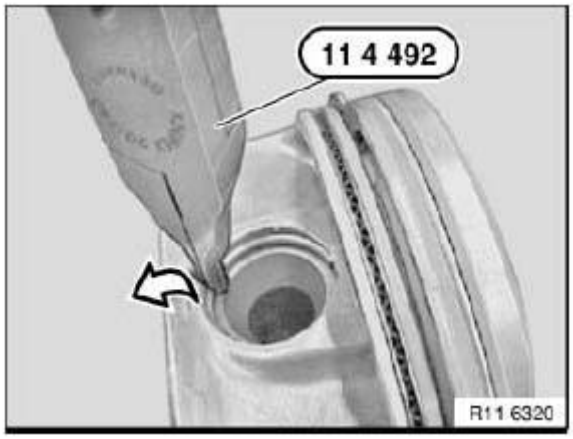


Fig. 201: Removing Gudgeon Pin Circlip Using Special Tool (11 4 492)
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

IMPORTANT: Individual replacement of a connecting rod is not permitted. Connecting rods are classified by weight categories and are only available as a set for all cylinders.
Existing and new connecting rods must not be installed in mixed

combinations.

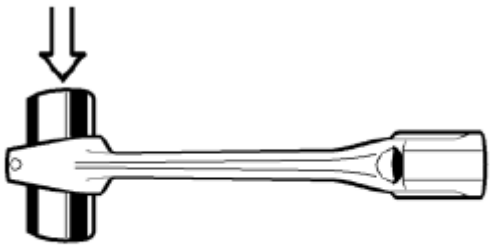


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Fig. 202: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

It must be possible for the piston pin to be pressed with minimal force by hand through the small end bushing. There must be no noticeable play.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point "A" from lower edge of piston and offset by 90° to piston pin axis.

Piston diameter See **PISTONS WITH RINGS AND PINS N52K/B30** or **PISTONS WITH RINGS AND PINS N52K/B25** at measuring point "A".

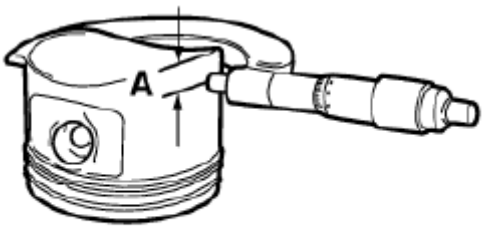

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Fig. 203: Measuring Piston Diameter Using Micrometer
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of crankcase. Set internal caliper on micrometer to "zero". Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance See **ENGINE BLOCK, CYLINDER CRANKCASE N52K/B30** ; **ENGINE BLOCK, CYLINDER CRANKCASE N52K/B25** ; **ENGINE IN GENERAL N52K/B30** ; **ENGINE IN GENERAL N52K/B25** ; **PISTONS WITH RINGS AND PINS N52K/B30** ; **PISTONS WITH RINGS AND PINS N52K/B25** ; **PISTONS WITH RINGS AND PINS N52K/B30** or **PISTONS WITH RINGS AND PINS N52K/B25** .

If necessary, replace piston.

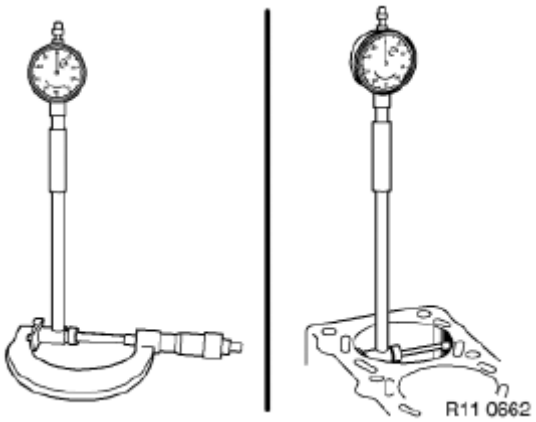


Fig. 204: Checking Cylinder Bore Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

Insert gudgeon pin circlip (2) into groove (1) of special tool 11 4 493 .

Move piston pin circlip (2) into installation position.

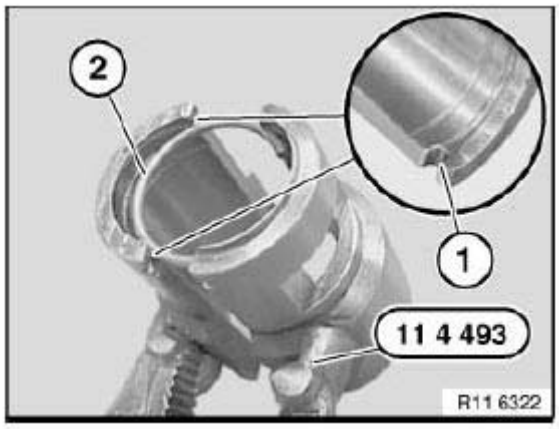


Fig. 205: Inserting Gudgeon Pin Circlip Into Groove Using Special Tool (11 4 493)

Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

Guide lug and aperture on special tool 11 4 493 must point to piston crown. Only then can special tool 11 4 494 be correctly fitted.

When special tools 11 4 493 and 11 4 494 are correctly positioned, the circlip for gudgeon pin must be driven in with a plastic hammer in the direction of the arrow.

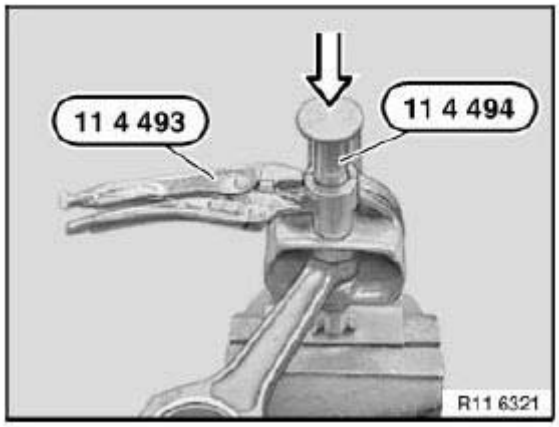


Fig. 206: Driving Piston Pin Using Plastic Hammer
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For vehicles with B30 engine.

Install all **PISTON RINGS** .

Install all **CONNECTING ROD BEARING SHELLS** .

Coat piston (2) and piston rings with oil.

Pre-install piston (2) in special tool 11 6 261.

Attach special tool 11 8 330 to connecting rod (1).

Installation:

11 8 330 Check protective lugs on special tool for correct position and damage.

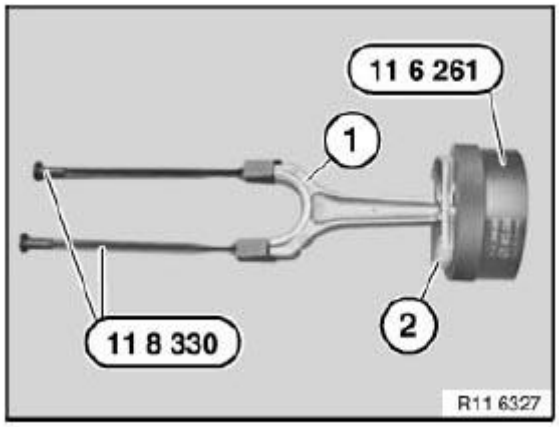


Fig. 207: Attaching Special Tool 11 8 330 To Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For vehicles with B25 engine.

Install all **PISTON RINGS** .

Install all **CONNECTING ROD BEARING SHELLS** .

Coat piston (2) and piston rings with oil.

Pre-install piston (2) in special tool 11 6 241.

Attach special tool 11 8 330 to connecting rod (1).

Installation:

11 8 330 Check protective lugs on special tool for correct position and damage.

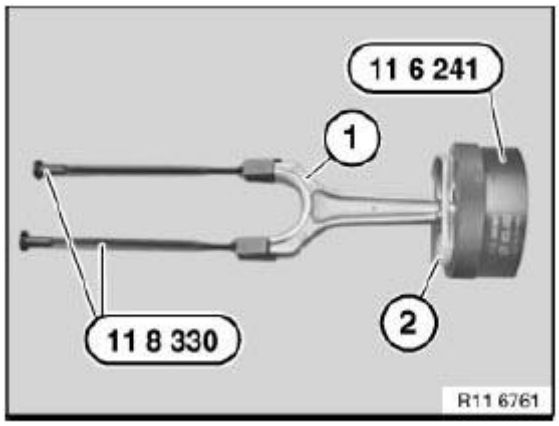


Fig. 208: Attaching Special Tool 11 8 330 To Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston (1) with connecting rod in cylinder.

IMPORTANT: Do not touch the oil spray nozzle when installing the components.
Risk of damage!
Danger of piston ring failure.

Press in piston (1) at marked points (see arrows) with finger pressure only, do not drive in.

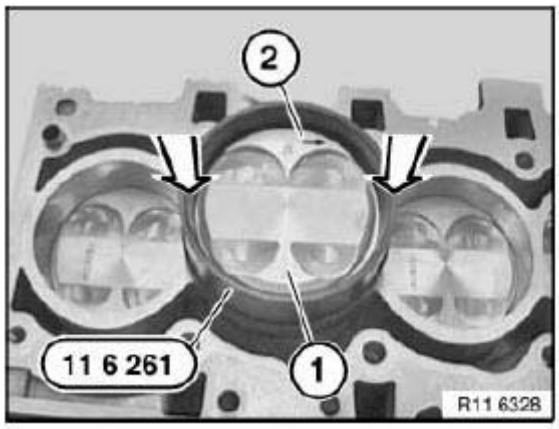


Fig. 209: Pressing Piston On Piston Crown Points
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston (1) so that arrow (2) on piston crown points to camshaft drive.

Press in piston (1) with special tool 11 6 261/11 6 241.

IMPORTANT: Connecting rod and big end bearing cap are marked with identical pairing letters (1) and must not be mixed up.
Mixing them up or incorrectly fitting the big end bearing cap on the connecting rod will result in engine damage .

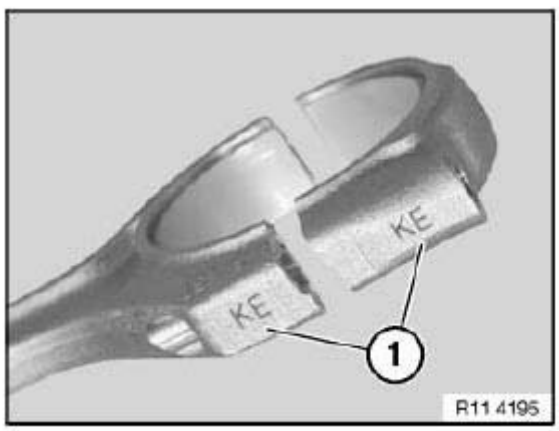


Fig. 210: Identifying Identification Pairing Letters On Conrod Bearing Cap

Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to connecting rod bearing journal.

Join connecting rod and connecting rod bearing journal.

Detach special tool 11 8 330 .

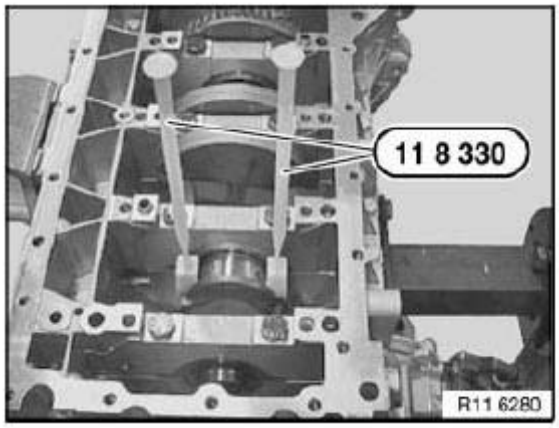


Fig. 211: Identifying Special Tool (11 8 330)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit big end bearing caps (2) so that pairing letters match up.

Installation:

Replace screws.

Install new connecting rod bolts (1).

IMPORTANT: Joining torque and angle of rotation must be observed without fail. Risk of damage!

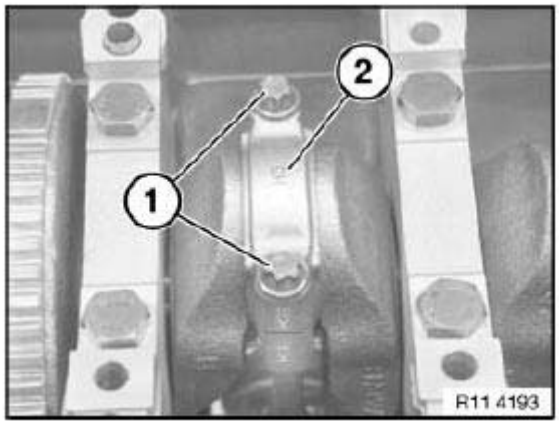


Fig. 212: Identifying Bearing Caps And Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 24 1AZ** .

If necessary, tighten connecting rod bolts to torsion angle with special tool 00 9 120 .

Tightening torque **11 24 1AZ** .

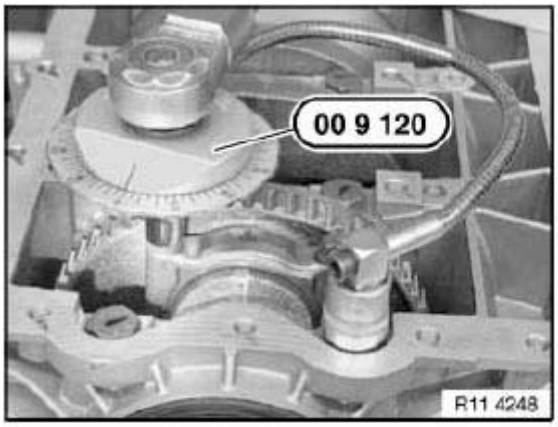


Fig. 213: Adjusting Conrod Torsion Angle Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N52K)

Necessary preliminary tasks:

- Removing all **PISTONS**

Measuring axial clearance of piston rings in piston ring groove.

Technical Data See **PISTONS WITH RINGS AND PINS N52K/B30** ; **PISTONS WITH RINGS AND PINS N52K/B25** ; **PISTONS WITH RINGS AND PINS N52K/B30** or **PISTONS WITH RINGS AND PINS N52K/B25** .

NOTE: It is not possible to measure the axial clearance of the U-flex rings.

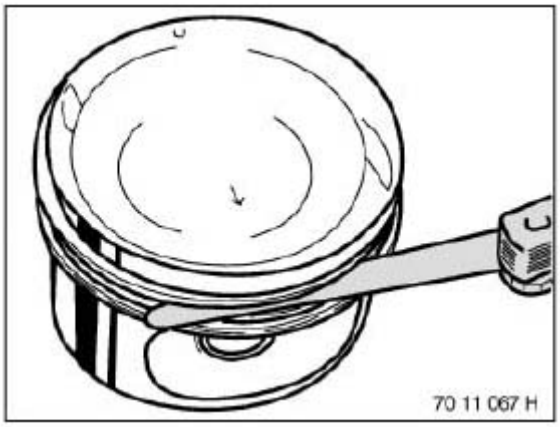


Fig. 214: Measuring Axial Clearance Of Piston Rings In Piston Ring Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Remove plain compression ring and stepped ring upwards with piston ring pliers.

The U-flex ring comprises two steel band rings and a support spring.

NOTE: The U-flex ring cannot be removed with piston ring pliers. Put aside all piston rings in correct sequence and installation position. It might not be possible to find the identification on used piston rings.

Installation:

New pistons may only be installed together with new piston rings.

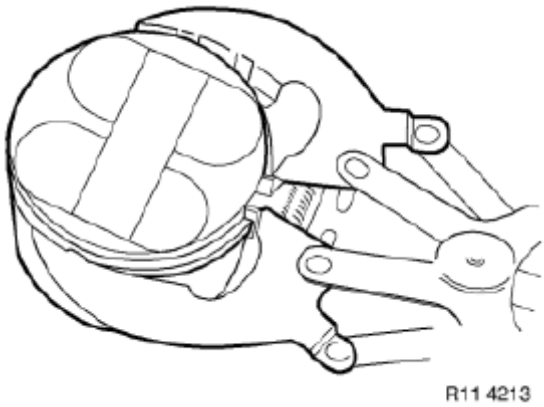


Fig. 215: Removing Compression Ring And Stepped Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Determine end clearance See **PISTONS WITH RINGS AND PINS N52K/B30** ; **PISTONS WITH RINGS AND PINS N52K/B25** ; **PISTONS WITH RINGS AND PINS N52K/B30** or **PISTONS WITH RINGS AND PINS N52K/B25** with a feeler gauge.

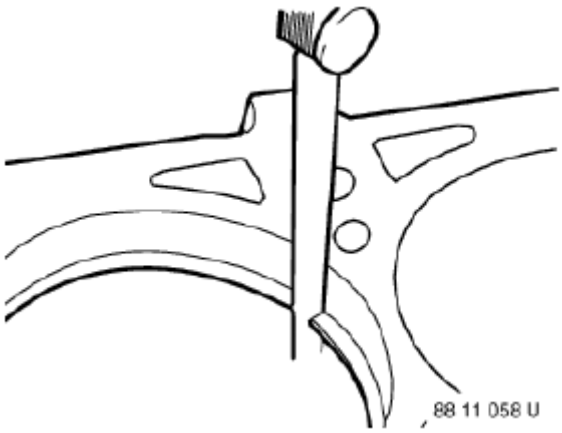


Fig. 216: Measuring Gap Using Feeler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic diagram of piston rings.

Installation:

Piston rings with "TOP" identification must point to piston crown.

1. Plain compression ring
2. Stepped ring "TOP"
3. U-flex ring

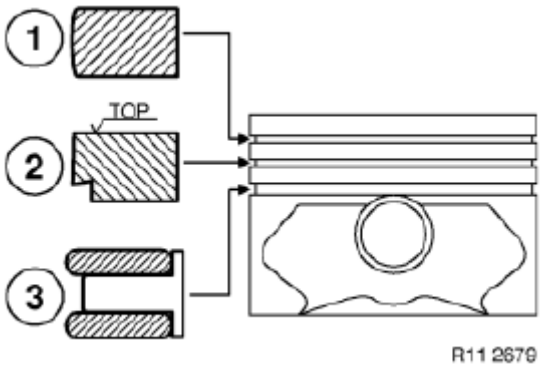


Fig. 217: Identifying Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The U-flex ring comprises two steel band rings (1) and a support spring (2).

Installation:

Insert support spring (2) into piston ring groove and then fit steel band rings (1) so that contact points are offset by approx. 120°.

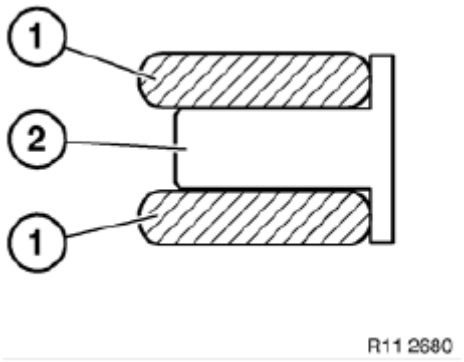


Fig. 218: Identifying Steel Band Ring And Support Spring
Courtesy of BMW OF NORTH AMERICA, INC.

The contact points (1) of the piston rings must be arranged offset by approx. 120°. However, the contact points (1) must not be arranged over the piston pin boss.

NOTE: Picture shows N52.

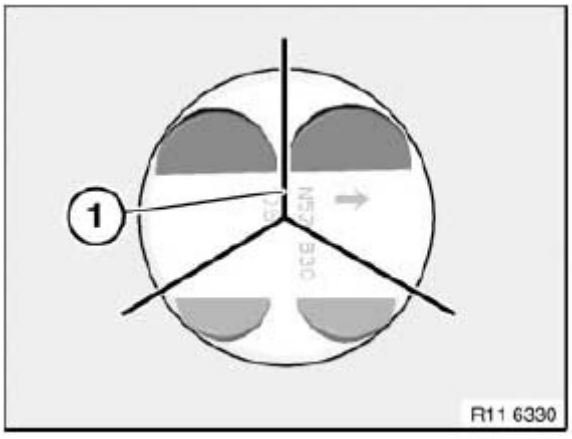


Fig. 219: Identifying Contact Points Of Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1128 V-RIBBED BELT WITH TENSION DEFLECTOR ELEMENT

11 41 115 REMOVING AND INSTALLING/REPLACING HYDRAULIC VALVE (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove front **UNDERBODY PROTECTION**
- Have a cleaning cloth ready to catch escaping oil

Detach plug (1) from hydraulic valve (2).

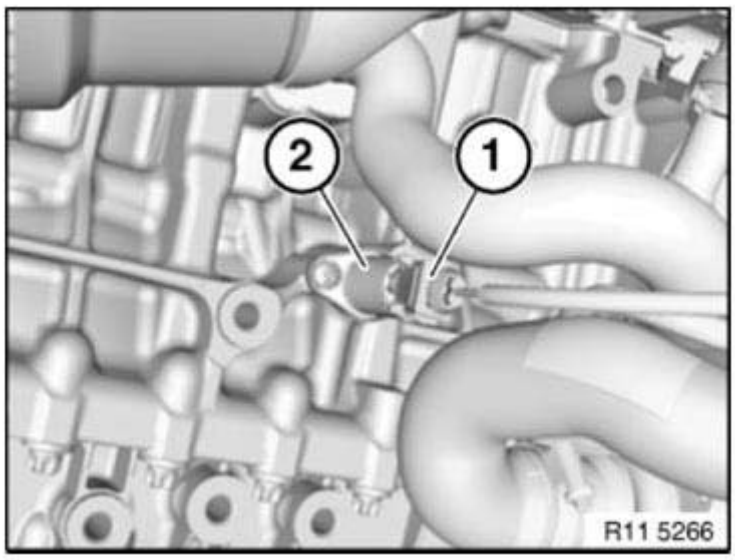


Fig. 220: Identifying Hydraulic Valve And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove hydraulic valve (2).

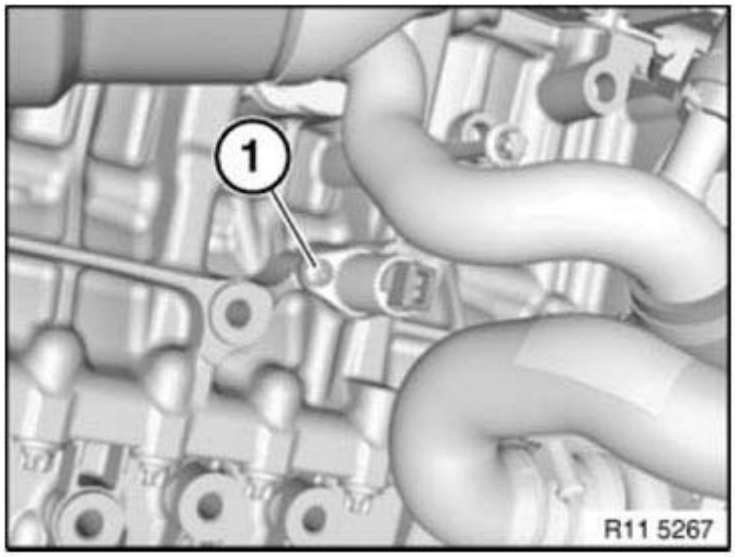


Fig. 221: Identifying Hydraulic Valve Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).

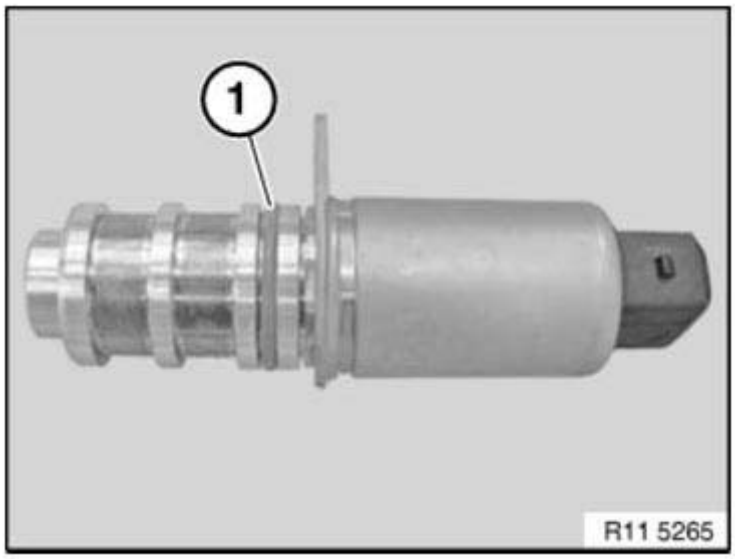


Fig. 222: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

11 28 010 REPLACING ALTERNATOR DRIVE BELT (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **FAN COWL** with electric fan

Drive belt route

Turn belt tensioner (1) in direction of arrow until bore is flush on housing.

Secure belt tensioner (1) with special tool 11 3 340 .

Load is removed from tensioning pulley (2).

Remove drive belt upwards.

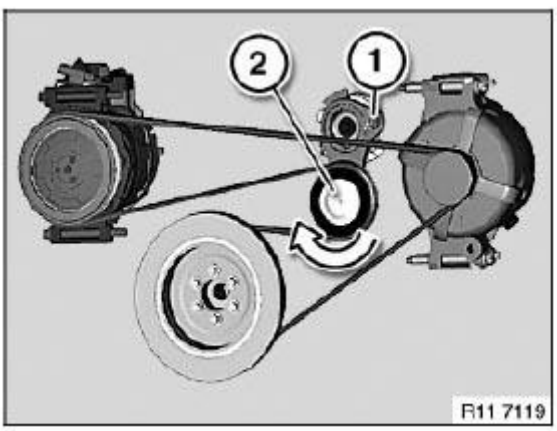


Fig. 223: Turning Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation:

Check drive belt for correct installation position and, if reusing, observe direction of rotation. **Risk of damage** .

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical

corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **DRIVE BELT**

E9x only

Remove special tool 11 3 340 .

Release screw (3) on belt tensioner (4).

Tightening torque **11 28 1AZ** .

Installation:

Replace aluminum screws.

Remove belt tensioner (4).

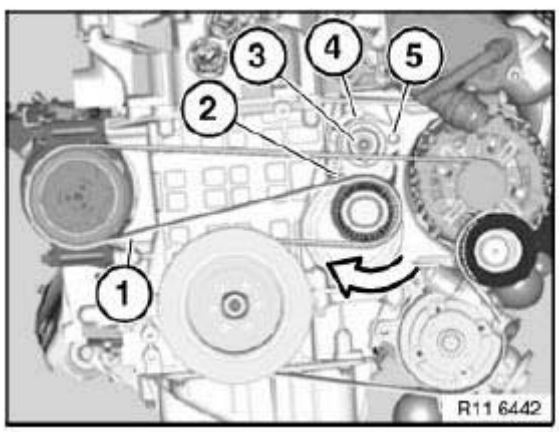


Fig. 224: Turning Belt Tensioner (E9X)
Courtesy of BMW OF NORTH AMERICA, INC.

E85, E89 only

Remove special tool 11 3 340 .

Release screw on belt tensioner (1).

Tightening torque **11 28 1AZ** .

Installation:

Replace aluminum screws.

Remove belt tensioner (1).

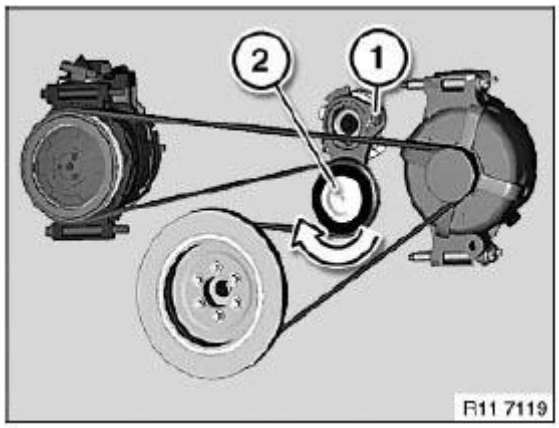


Fig. 225: Turning Belt Tensioner (E85, E89)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1131 CAMSHAFT

11 31 505 ADJUSTING TIMING OF CAMSHAFT(S) (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

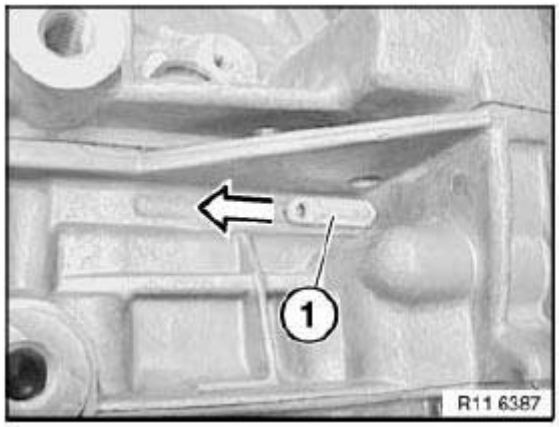


Fig. 226: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide special tool 11 0 300 in direction of arrow into special tool bore and secure crankshaft.

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

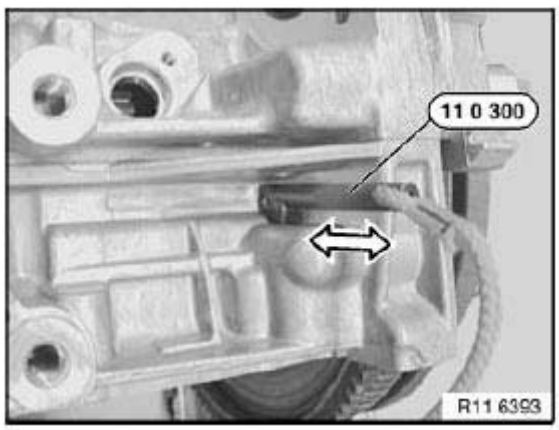


Fig. 227: Rotating Engine Central Bolt Using Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct special tool bore with special tool 11 0 300 , the engine can no longer be moved at the central bolt.

With 1st cylinder in firing TDC position, cams of inlet camshaft (1) at 1st cylinder point upwards at an angle.

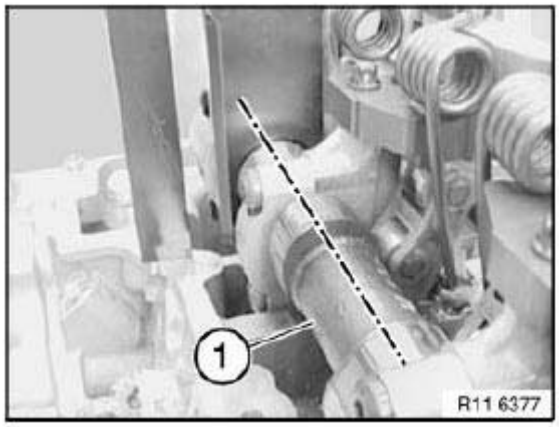


Fig. 228: Identifying Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Part numbers (2) on inlet and exhaust camshafts (1) point upwards.

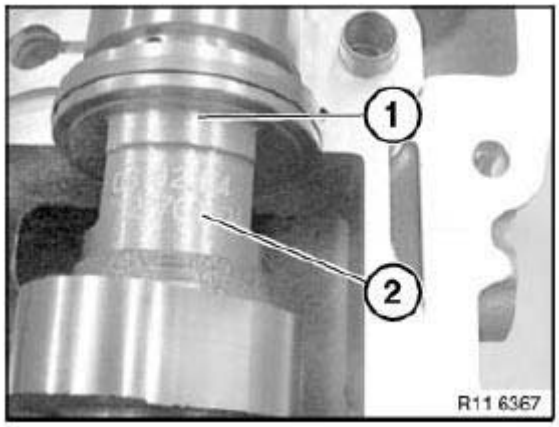


Fig. 229: Identifying Camshafts With Part Number
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (3) at 6th cylinder point downwards at an angle.

Cam follower (1) is not actuated.

NOTE: When the engine is installed, the position of the exhaust camshaft (3) for the timing can only be checked with a mirror.

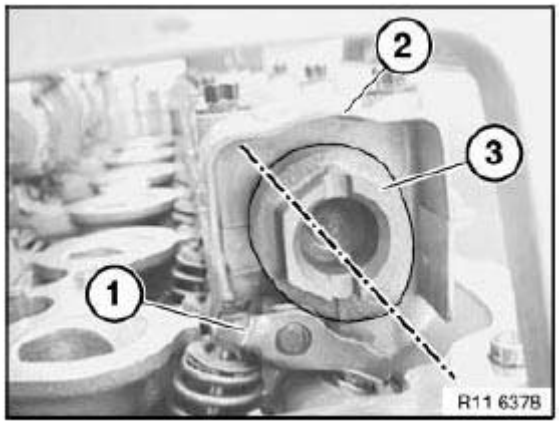


Fig. 230: Identifying Exhaust Camshaft And Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 283 to cylinder head with bolts (1).

NOTE: Fit special tool 11 4 282 underneath on side of inlet camshaft.

Mount special tool 11 4 281 on inlet and exhaust camshafts.

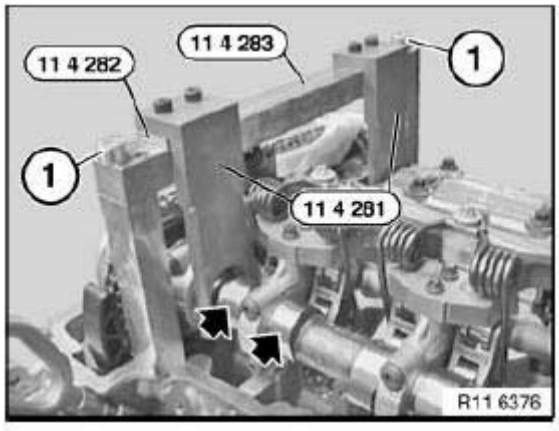


Fig. 231: Identifying Cylinder Head Bolts And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolts (1).

Release central bolts (1) with special tool 11 4 280 only.

Release chain tensioner (2) (have a cleaning cloth ready).

NOTE: Picture in CAD and does not show special tools.

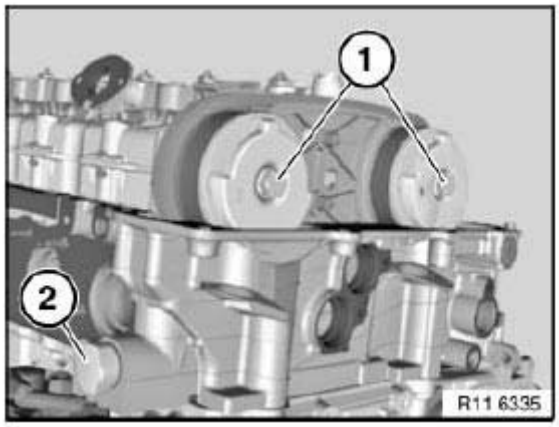


Fig. 232: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Turn sensor gears (2) in direction of arrow until locating pins (1) on special tool 11 4 290 match up.

Slide on special tool 11 4 290 in direction of arrow.

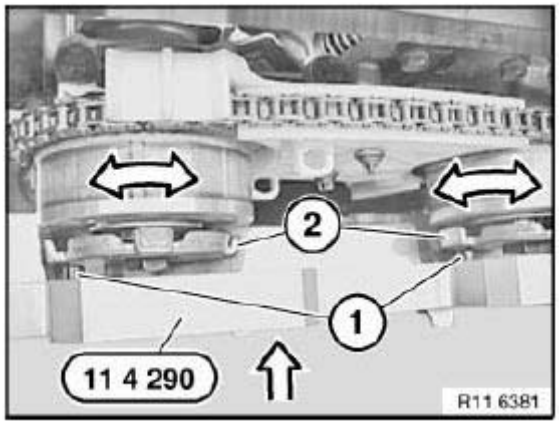


Fig. 233: Turning Sensor Gears
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 290 with bolts (1).

Screw special tool 11 9 340 into cylinder head.

Pretension timing chain with special tool 00 9 250 to **0.6 Nm** .

Secure both central bolts of inlet and exhaust adjustment units with special tool 00 9 120 to inlet and exhaust camshafts.

Tightening torque **11 36 1AZ** .

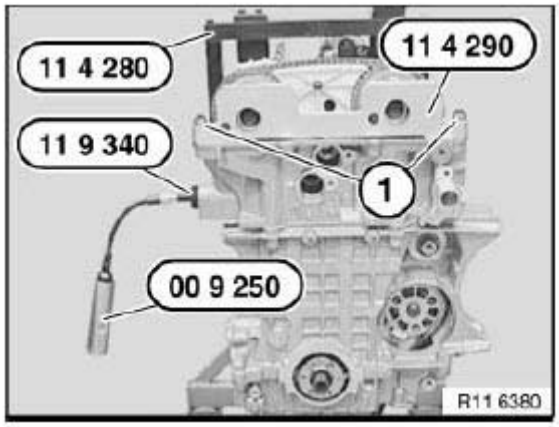


Fig. 234: Identifying Special Tools (11 4 280, 11 4 290, 11 9 340 And 00 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 005 CHECKING TIMING OF CAMSHAFT(S) (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **UNDERBODY PROTECTION** .

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

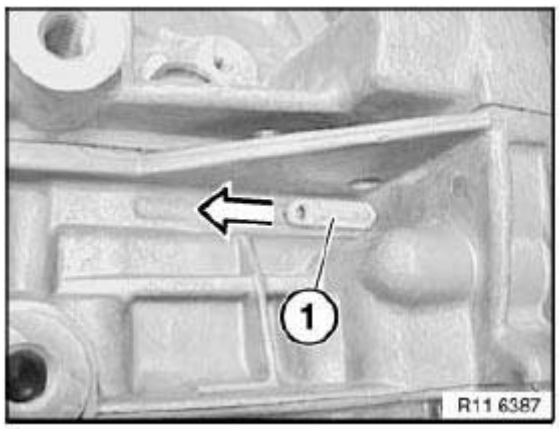


Fig. 235: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide special tool 11 0 300 in direction of arrow into dowel hole and secure crankshaft.

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

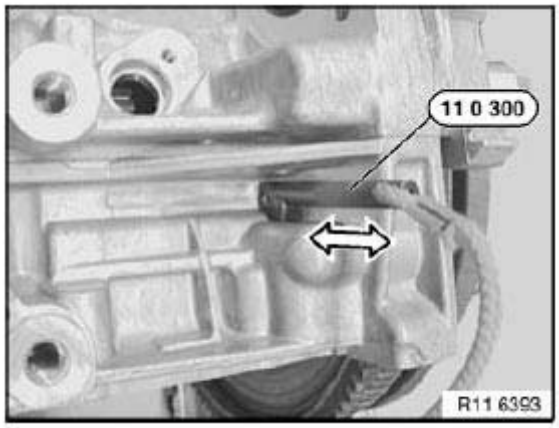


Fig. 236: Rotating Engine Central Bolt Using Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct dowel hole with special tool 11 0 300 , the engine can no longer be moved at the central bolt.

With 1st cylinder in firing TDC position, cams of inlet camshaft (1) at 1st cylinder point upwards at an angle.

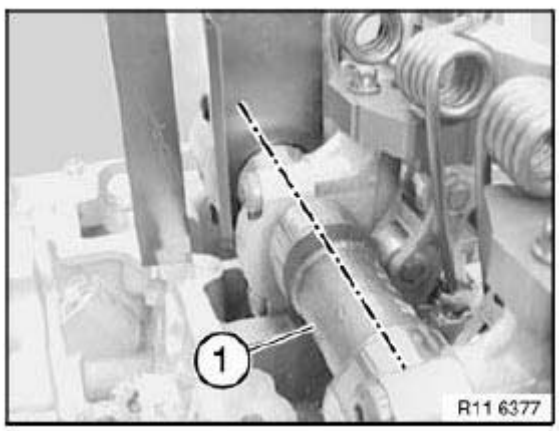


Fig. 237: Identifying Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

The timings are correct when the part numbers (2) on the inlet and exhaust camshafts (1) point upwards.

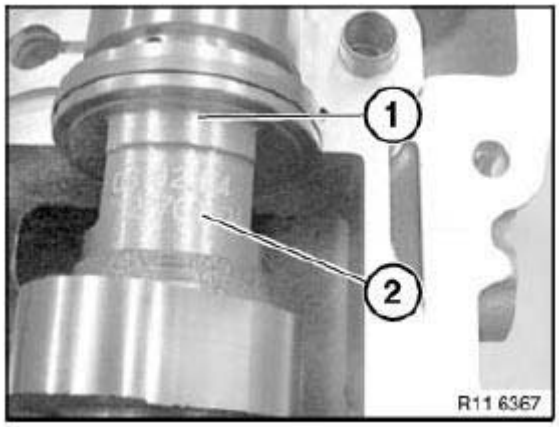


Fig. 238: Identifying Camshafts With Part Number
Courtesy of BMW OF NORTH AMERICA, INC.

With 1st cylinder in firing TDC position, cams of exhaust camshaft (3) at 6th cylinder point downwards at an angle.

Cam follower (1) is not actuated.

NOTE: When the engine is installed, the position of the exhaust camshaft (3) for the timing can only be checked with a mirror.

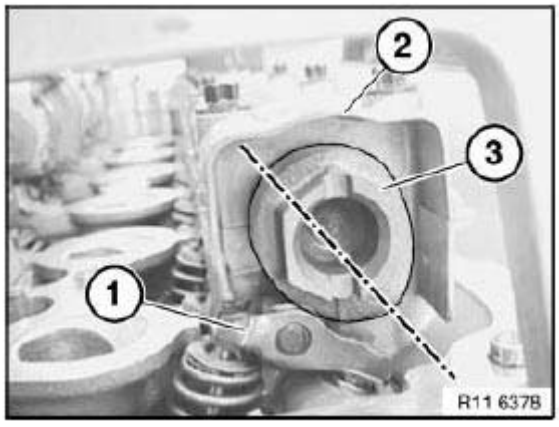


Fig. 239: Identifying Exhaust Camshaft And Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 283 with bolts (1) to cylinder head.

NOTE: Fit special tool 11 4 282 underneath on side of intake camshaft.

Mount special tool 11 4 281 on intake and exhaust camshafts.

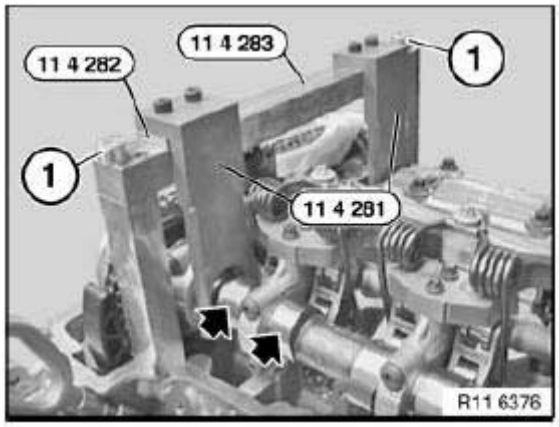


Fig. 240: Identifying Cylinder Head Bolts And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, adjust **VALVE TIMING** .

Assemble engine.

11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N52K)

Release chain tensioner (1).

Tightening torque **11 31 6AZ** .

IMPORTANT: Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.
Make sure no engine oil runs onto belt drive.

Installation:

No sealing ring is fitted during series-production assembly.

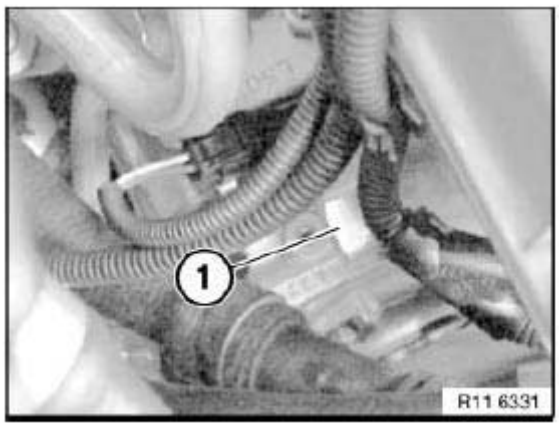


Fig. 241: Identifying Chain Tensioner

Courtesy of BMW OF NORTH AMERICA, INC.

A sealing ring must be fitted by service personnel when the chain tensioner is fitted.

If the chain tensioner is reused, its oil chamber must be drained. Place chain tensioner on a level working surface and slowly compress.

Repeat procedure twice.

Fig. 242: Compressing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 028 REMOVING AND INSTALLING/REPLACING EXHAUST CAMSHAFT (N52K)

IMPORTANT: It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.
Risk of damage!
The upper and lower bearing strips must be pre-tensioned with a total of six special tools 11 4 461.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **EXHAUST CAMSHAFT ADJUSTER**
- Adjust **VALVE TIMING**

The screw connection of the bearing strips must be released from the outside inwards.

Lift out upper and lower bearing strips (1) with exhaust camshaft.

Remove upper bearing strip (1).

Remove exhaust camshaft from lower bearing strip.

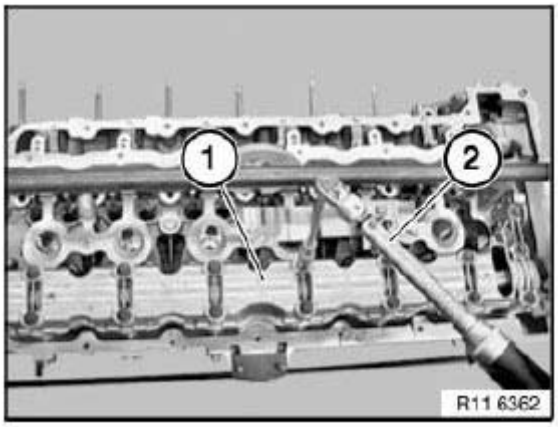


Fig. 243: Lifting Lower And Upper Bearing Strips With Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Markings of intake and exhaust camshafts are different.
Mixing up the intake and exhaust camshaft will result in engine damage .
A Exhaust camshaft.
E Intake camshaft

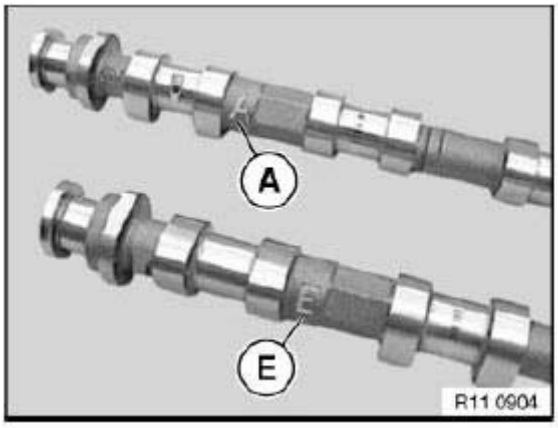


Fig. 244: Identifying Exhaust/Intake Camshafts Marks
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

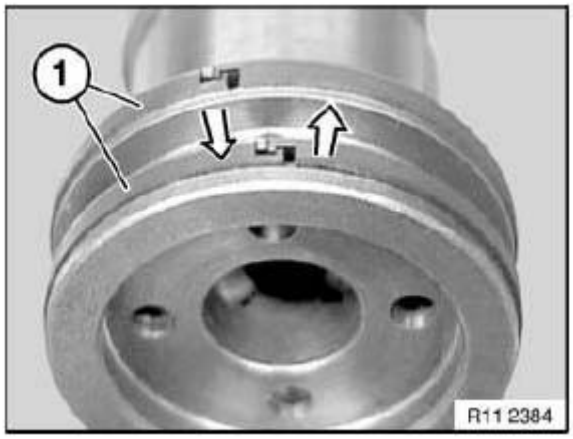


Fig. 245: Pressing Plain Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine:
Set engine to ignition TDC at cylinder No. 1.
Removed cylinder head:
When using special tool 11 9 000 , it will be necessary to remove the aluminum profile insert.

Mounting bearing strip

Pre-install special tool 11 4 462 on cylinder no. 2.

Insert special tool 11 4 463 in screw connection of cylinder head cover.

IMPORTANT: Special tool 11 4 463 is a special screw.

Press down rocker arms (3) on cylinder no. 2 with spindle nut (2) of special tool 11 4 462.

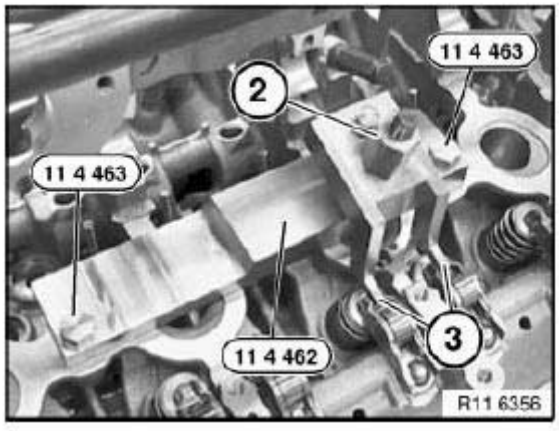


Fig. 246: Identifying Special Tools (11 4 463 And 11 4 462)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before mounting the exhaust camshaft on the correct cam follower seat (1), pay attention to the hydraulic valve clearance adjustment element and the valve.

Refer to Removing and installing/replacing all **CAM FOLLOWERS** .

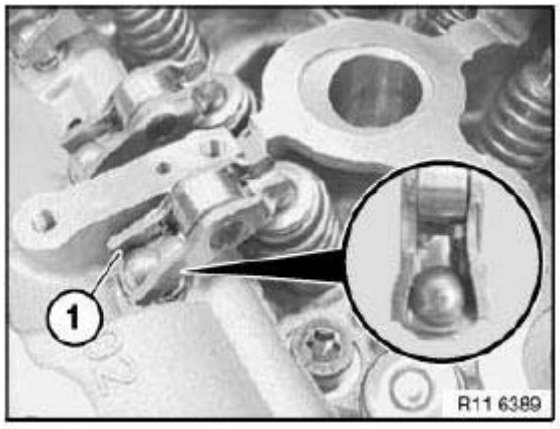


Fig. 247: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Position lower bearing strip (1) with exhaust camshaft (2) on rocker arms.

Align exhaust camshaft (2).

Cylinder nos. 2 and 4 are at valve overlap.

Cams (3) on cylinder no. 1 point upwards at an angle.

Part number (4) on mounting flats of exhaust camshaft (2) points upwards.

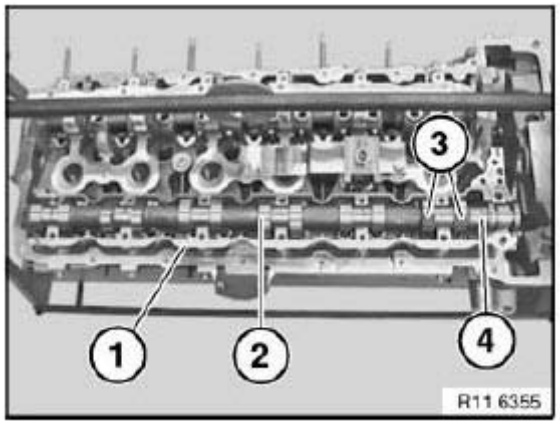


Fig. 248: Identifying Lower Bearing Strip With Exhaust Camshaft And Cams
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: There must be no adhesive residues in the cylinder head tapped holes. Clean threaded holes.

Fit upper bearing strip (1).

Insert bolts dry.

Tension down upper bearing strip (1) with exhaust camshaft at bearing points 3 and 5 through a 1/2 bolt turn.

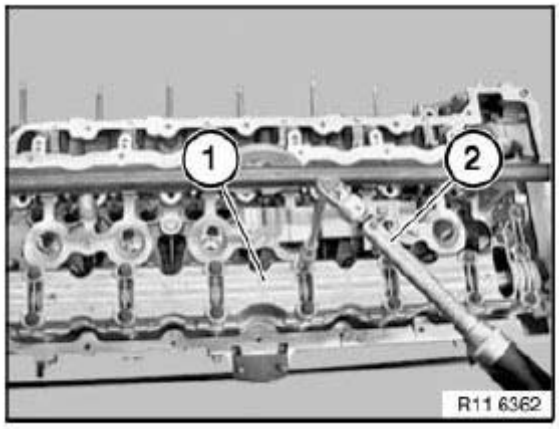


Fig. 249: Lifting Lower And Upper Bearing Strips With Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Join exhaust camshaft to upper and lower bearing strips (1) with torque wrench (2) from inside outwards to **8 Nm** .

Release all screws of upper bearing strip (1) from outside inwards by 90°.

Installation:

Upper and lower bearing strips must be aligned to each other at ground surfaces (1 and 2).

Make sure that the thrust piece and the legs of special tools 11 4 461 rest on the milled surfaces.

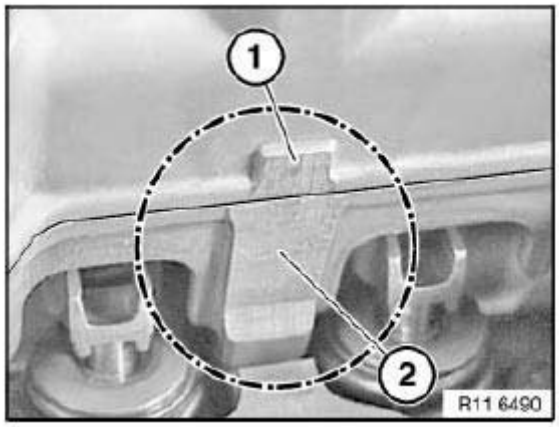


Fig. 250: Identifying Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 4 461 at upper bearing strip (1) and lower bearing strip (2).
Pre-tension all special tools 11 4 461 with special tool 11 4 350 only.

IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm. Risk of damage!

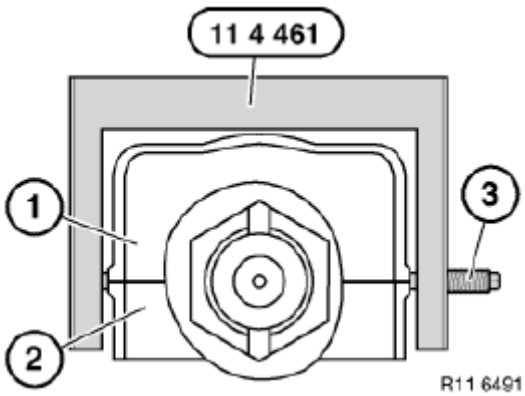


Fig. 251: Identifying Screw, Upper And Lower Bearing Bank And Special Tool (11 4 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 4 461 over screw connection of bearing strips.

Make sure that the legs rest exactly on the ground surfaces of the upper bearing strip (2) and lower bearing strip (1).

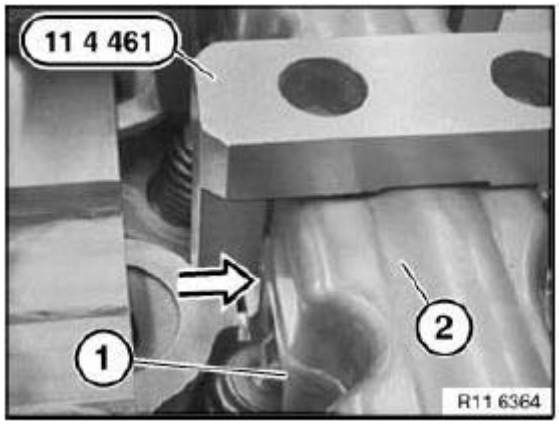


Fig. 252: Identifying Upper Bearing Strip And Lower Bearing Strip
Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 4 461 to ground surfaces of upper bearing strip (1) and lower bearing strip (2).

IMPORTANT: Tighten screws on thrust piece to 2 Nm. Risk of damage!

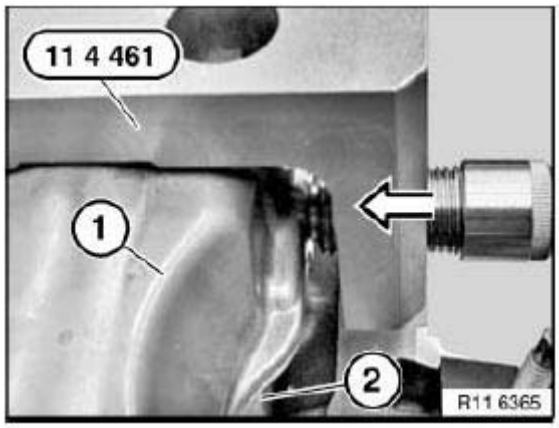


Fig. 253: Tightening Screw Of Special Tool (11 4 461) To Ground Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.
Pre-tension all special tools 11 4 461 with special tool 11 4 350 only.

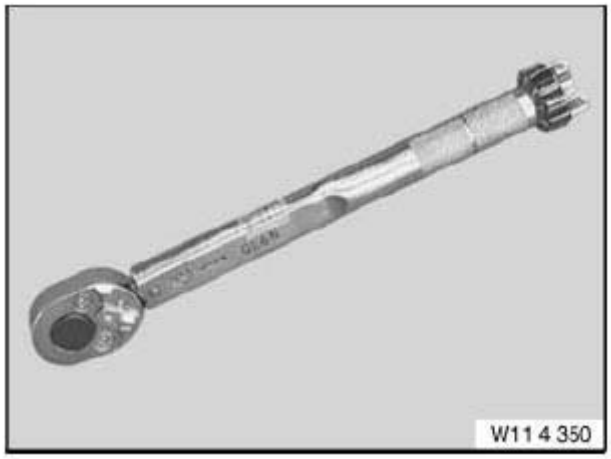


Fig. 254: Identifying Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tools 11 4 461 with screw (1) to inside of cylinder head.

Mount special tool 11 4 461 with screw facing outwards on cylinder no. 2.

Position special tools 11 4 461 so that screw connections (2) of bearing strip are easily accessible.

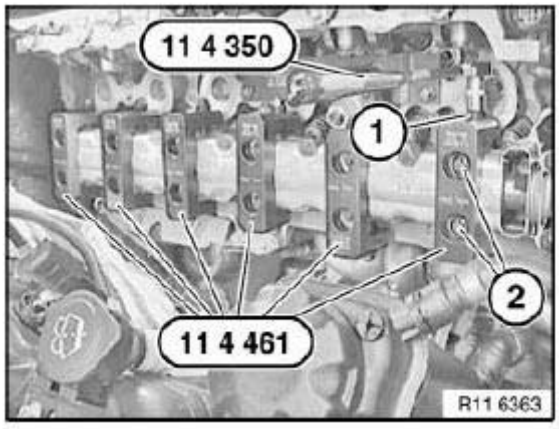


Fig. 255: Identifying Cylinder Head Screw And Special Tools (11 4 350 And 11 4 461)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten upper and lower bearing strips with special tool 00 9 120 .

Tightening torque **11 31 1AZ** .

IMPORTANT: Remove special tool 11 4 461 only when exhaust camshaft screw connection is completed.

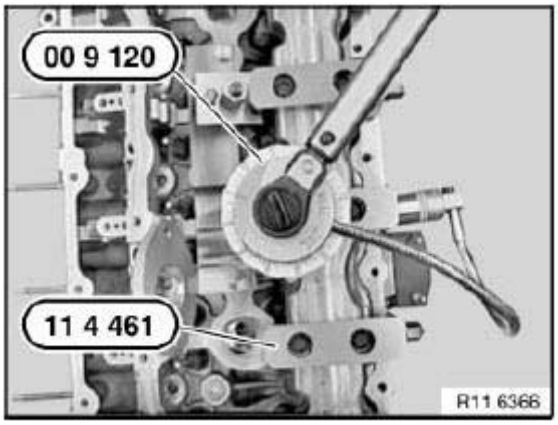


Fig. 256: Tightening Lower/Upper Bearing Strips Using Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 025 REMOVING AND INSTALLING/REPLACING INTAKE CAMSHAFT (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **INTAKE CAMSHAFT ADJUSTER**
- Remove **INTERMEDIATE LEVER**
- Adjust **VALVE TIMING**

NOTE: All bearing caps (1 and 2) are marked with numbers from 1 to 6.

Bearing cap (1) is a thrust bearing.

Release screws on bearing caps 1 to 6 (1 and 2).

Tightening torque **11 31 2AZ** .

Set all bearing caps down in special tool 11 4 481 in a neat and orderly fashion.

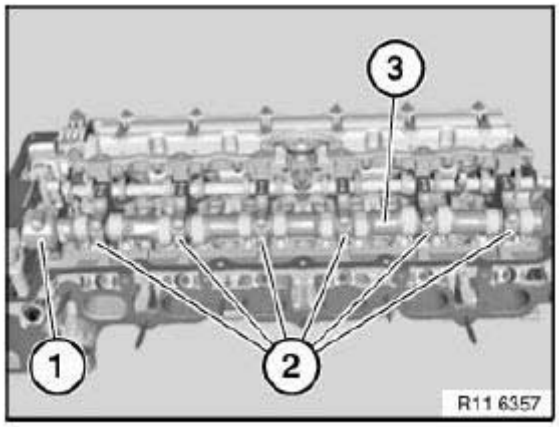


Fig. 257: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Remove intake camshaft (2) towards top.

Installation:

Clean all bearing points and lubricate with oil.

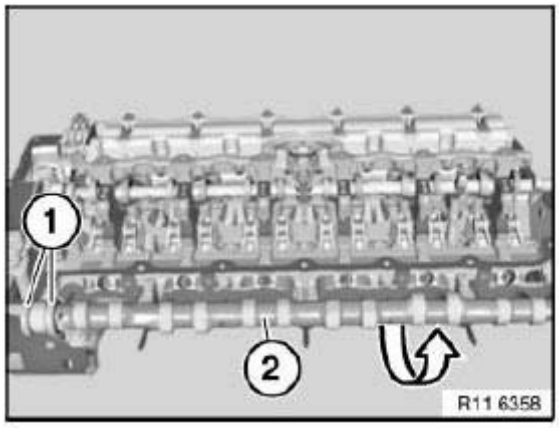


Fig. 258: Removing Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain compression rings (1) can easily break.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

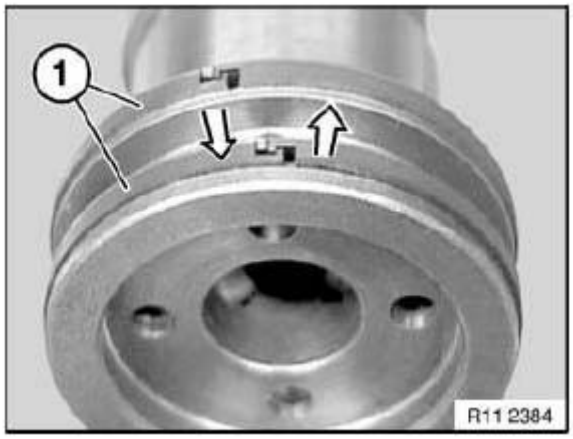


Fig. 259: Pressing Plain Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Markings of intake and exhaust camshafts are different.
Mixing up the intake and exhaust camshafts will result in engine damage .
A Exhaust camshaft.
E Intake camshaft

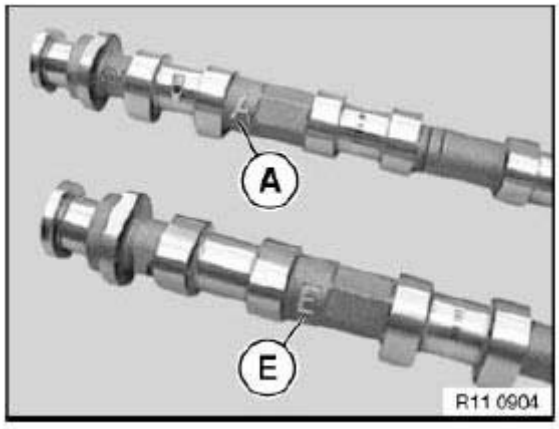


Fig. 260: Identifying Exhaust/Intake Camshafts Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Insert intake camshaft (1) so that part number on mounting flats points upwards.

Position intake camshaft (1) so that cams point upwards at an angle.

Attach special tool 11 4 281 to mounting flats.

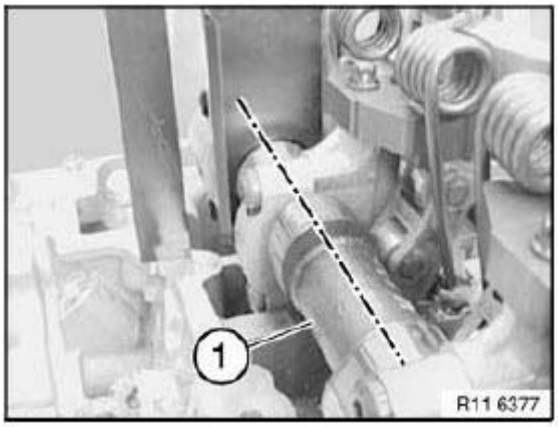


Fig. 261: Identifying Intake Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 051 REPLACING TIMING CHAIN (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove all spark plugs
- Remove **CHAIN TENSIONER** .
- Remove **CRANKSHAFT RADIAL SEAL** at front
- Remove drive belt **TENSIONER**
- Remove **VIBRATION DAMPER**

Remove fastener (1) in direction of arrow.

Installation:

Install fastener (1) with bore facing outwards.

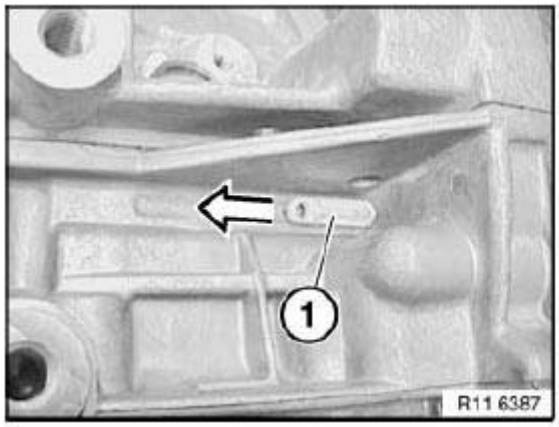


Fig. 262: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide special tool 11 0 300 in direction of arrow into special tool bore and secure crankshaft.

IMPORTANT: On vehicles with optional extra SA205 (automatic transmission), there is a large bore for the TDC position shortly before the special tool bore. This bore can be confused with the special tool bore.

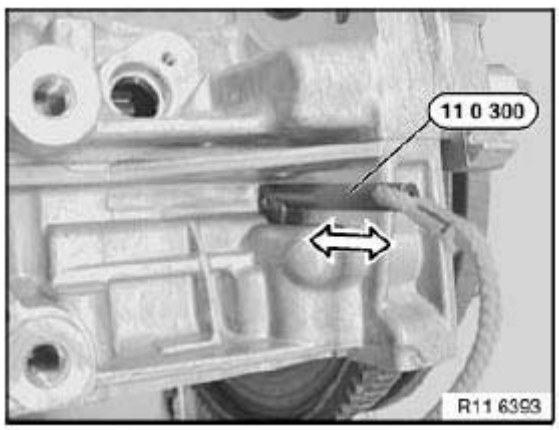


Fig. 263: Rotating Engine Central Bolt Using Special Tool (11 0 300)
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct special tool bore with special tool 11 0 300 , the engine can no longer be moved at the central bolt.

IMPORTANT: Do not remove special tool 11 0 300 to release central bolt (1).
Employ a second person for gripping when releasing central bolt (1).

Screw special tool 11 9 280 onto hub of vibration damper.

Release central bolt (1).

Tightening torque **11 21 1AZ** .

Remove hub towards front.

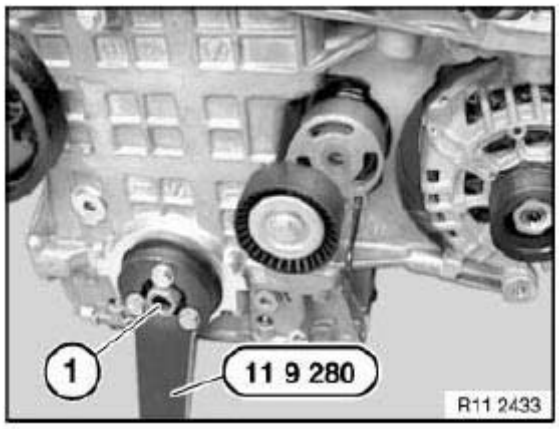


Fig. 264: Identifying Central Bolt With Special Tool (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 31 7AZ** .

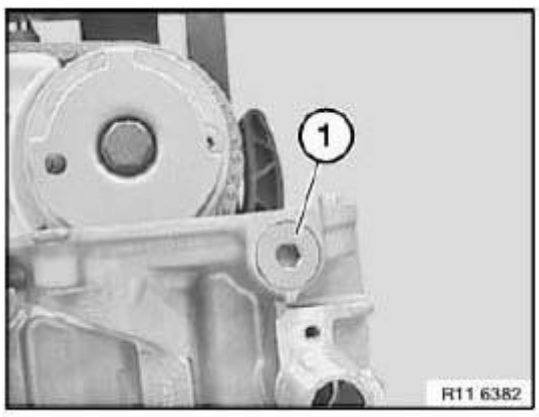


Fig. 265: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 11 7AZ** .

Installation:

Replace aluminum screws.

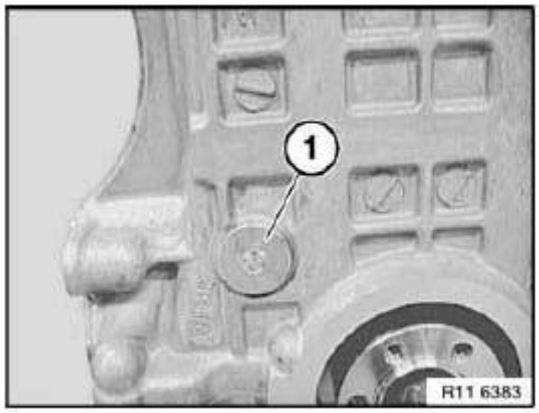


Fig. 266: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pin (1) from timing chain module on cylinder head.

Tightening torque **11 31 5AZ** .

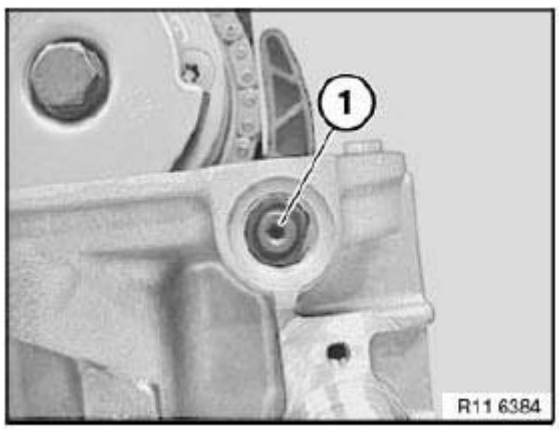


Fig. 267: Identifying Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Release bearing pin (1) from timing chain module on crankcase.

Tightening torque **11 31 4AZ** .

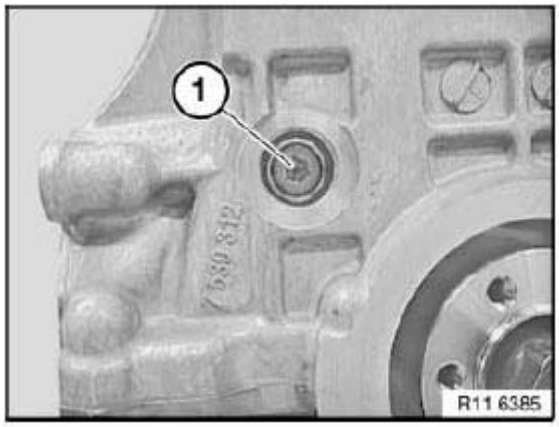


Fig. 268: Identifying Bearing Pin (Bottom)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Install special tool 11 4 280 to release the central bolts on the inlet and exhaust adjustment units.

Secure special tool 11 4 283 to cylinder head with bolts (1).

NOTE: Fit special tool 11 4 282 underneath on side of inlet camshaft.

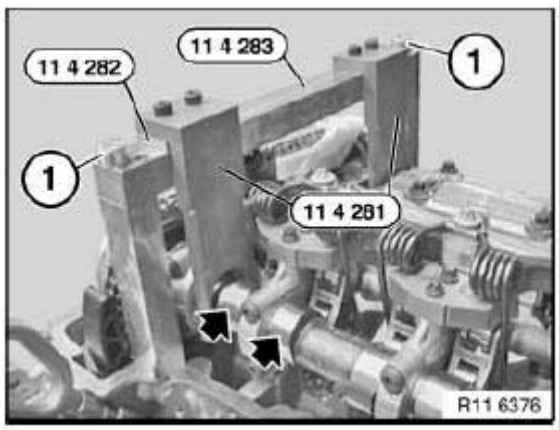


Fig. 269: Identifying Cylinder Head Bolts And Special Tools (11 4 283)
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool 11 4 281 on inlet and exhaust camshafts.

Do not remove special tool 11 4 280 .

Remove **INLET AND EXHAUST ADJUSTMENT UNIT** .

Release bolts (1) from timing chain module on cylinder head.

Tightening torque **11 31 3AZ** .

Remove chain module with timing chain and sprocket wheel upwards in direction of arrow.

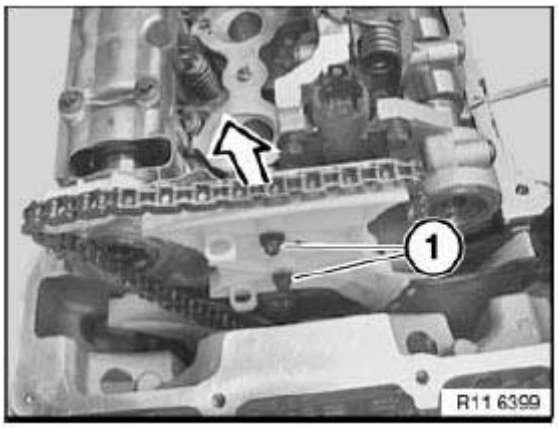


Fig. 270: Removing Chain Module With Timing Chain And Sprocket Wheel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket wheel (2).

Collar (see arrow) on sprocket wheel (2) points to engine .

Incorrect assembly will result in engine damage .

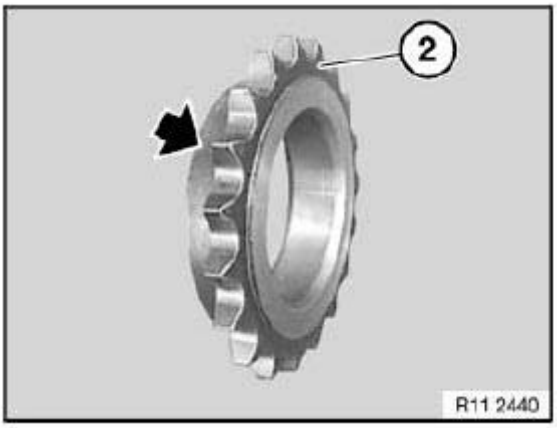


Fig. 271: Locating Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Pull timing chain (1) upwards until sprocket wheel (2) engages chain guide (3).

Install timing chain (1) and sprocket wheel (2) in this position.

Installation:

Always hold timing chain (1) under tension. Timing chain (1) may jam on chain guide (3).

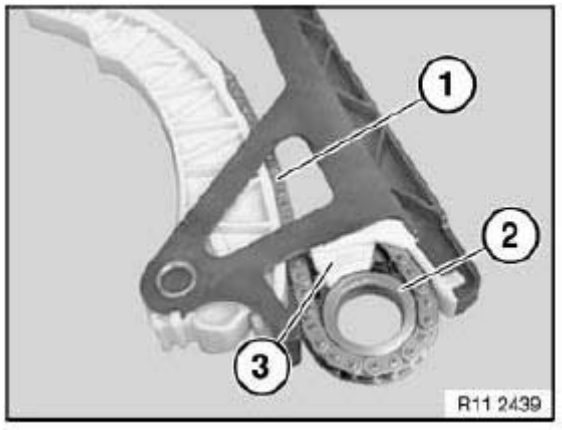


Fig. 272: Identifying Timing Chain And Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

Install hub with central bolt.

Tighten down special tool 11 5 200 with screws (1) to hub.

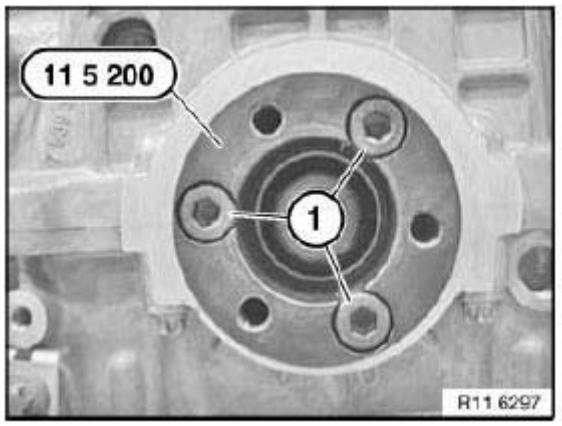


Fig. 273: Identifying Hub Screws With Special Tool (11 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TENSIONER** for drive belt.

Screw in special tool 11 4 362 from special tool kit 11 4 360 .

Mount special tool 11 9 280 on 11 5 200 .

Support special tool 11 9 280 on special tool 11 4 362.

Special tool 11 0 300 secures crankshaft.

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark central bolt and hub with paint.

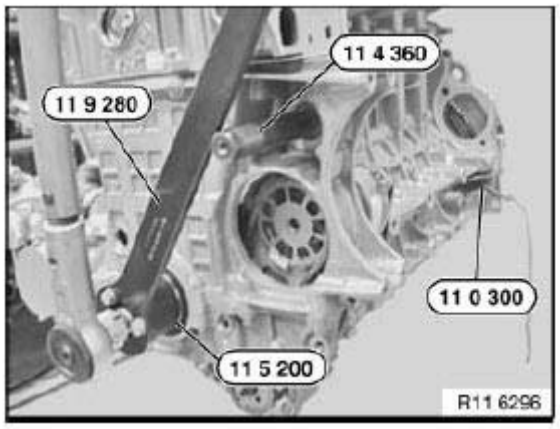


Fig. 274: Tightening Central Bolt Using Special Tools (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Mark special tools with colored line (1).

See picture.

IMPORTANT: Do not remove the special tool while tightening the central bolt to torsion angle.
Risk of damage!

If necessary, tighten central bolt to torsion angle with special tool 00 9 140 .

Tightening torque **11 21 1AZ** .

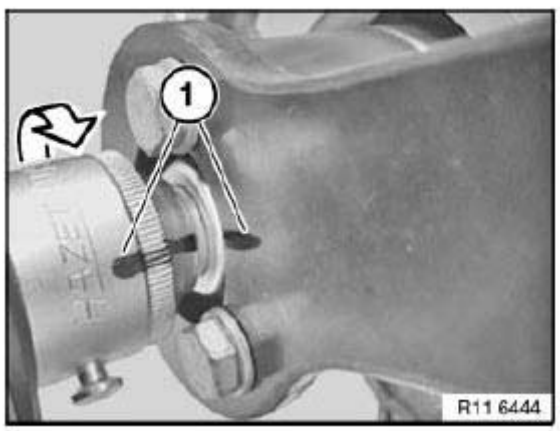


Fig. 275: Tightening Central Bolt And Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten central bolt with a second person helping.

Tightening torque **11 21 1AZ** .

Install **INLET AND EXHAUST ADJUSTMENT UNITS** .

Install **CHAIN TENSIONER** .

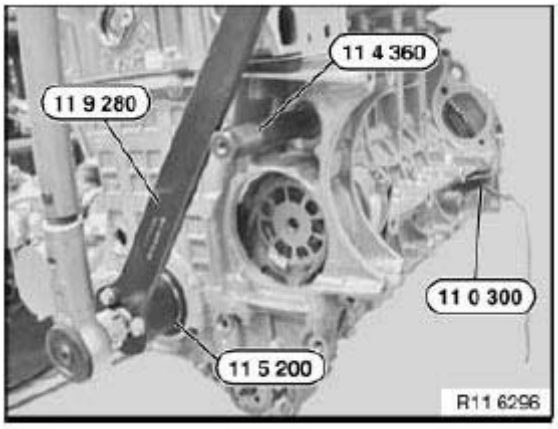


Fig. 276: Tightening Central Bolt Using Special Tools (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine twice.

Check **TIMING** .

If necessary, adjust **VALVE TIMING** .

Assemble engine.

1133 ROCKER ARM WITH BEARING MOUNT

11 33 050 REMOVING AND INSTALLING/REPLACING ALL CAM FOLLOWERS (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **INTERMEDIATE LEVER**
- Remove **EXHAUST CAMSHAFT** .

IMPORTANT: Rocker arms (1) are divided into bearing categories.

The tolerance classes are marked according to the picture in numbers from 1 to 5.
Already used rocker arms (1) may only be reused in the same position.
Detach cam followers (1) from HVCA element and remove.
Set down all cam followers (1) in neat order in special tool 11 4 480 .

Installation:

Before installing exhaust camshaft or intermediate levers, make sure cam followers (1) are correctly seated.

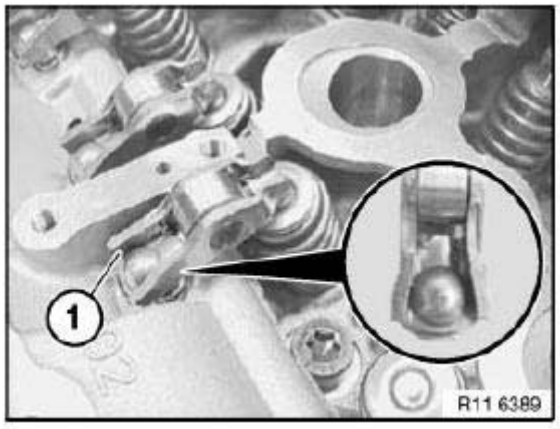


Fig. 277: Identifying Rocker Arms
Courtesy of BMW OF NORTH AMERICA, INC.

Remove HVCA element (1) in direction of arrow.

Installation:

If the HVCA elements (1) are reused, they must be placed together with the cam followers in neat order in special tool 11 4 480 .

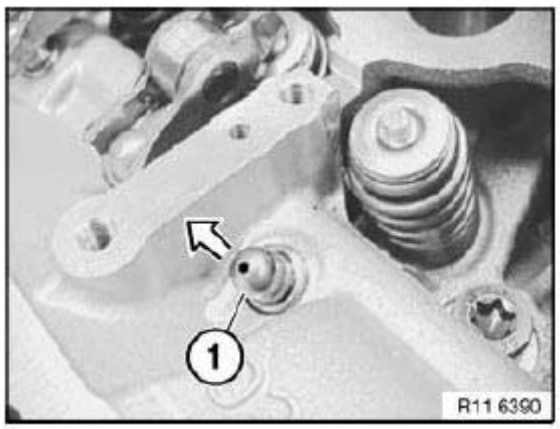


Fig. 278: Removing HVCA Element
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

1134 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING/REPLACING ALL VALVES (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Remove **INTERMEDIATE LEVER**
- Remove **ECCENTRIC SHAFT**
- Remove **INLET CAMSHAFT**
- Remove **EXHAUST CAMSHAFT**
- Remove **CAM FOLLOWERS**
- Remove **VALVE SPRINGS**
- Remove **VALVE STEM SEALS**

Arrangement:

1. Valve
2. Valve stem seal with lower spring plate
3. Valve spring
4. Upper spring plate
5. Valve tapers

If the valves are to be reused, they must be placed in neat order in special tool 11 4 480 .

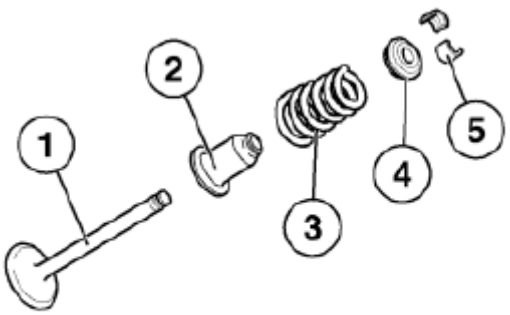


Fig. 279: Identifying Upper/Lower Spring Plate, Valve Spring And Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

11 34 715 REPLACING ALL VALVE SPRINGS (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD**
- Remove **EXHAUST CAMSHAFT** .
- Remove **INTERMEDIATE LEVER**
- Remove **INLET CAMSHAFT**
- Remove **CAM FOLLOWERS**

Place cylinder head on special tool 11 9 000 .

Press down **inlet valves** with special tool 11 9 017.

Press down **exhaust valves** with special tool 11 0 346.

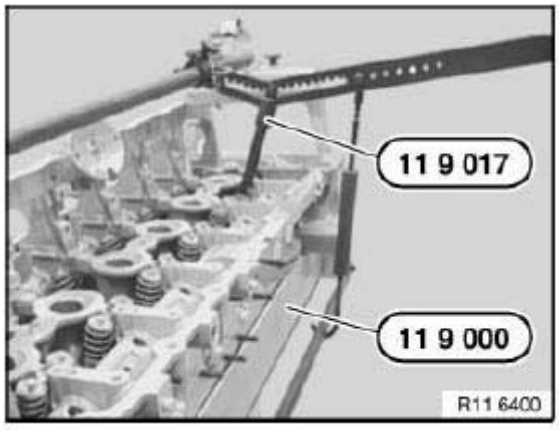


Fig. 280: Pressing Down Inlet Valves Using Special Tool (11 9 017)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve cotters with a magnet.

Remove valve spring with spring plates.

If the individual components are to be reused, they must be placed in neat order in special tool 11 4 480 .

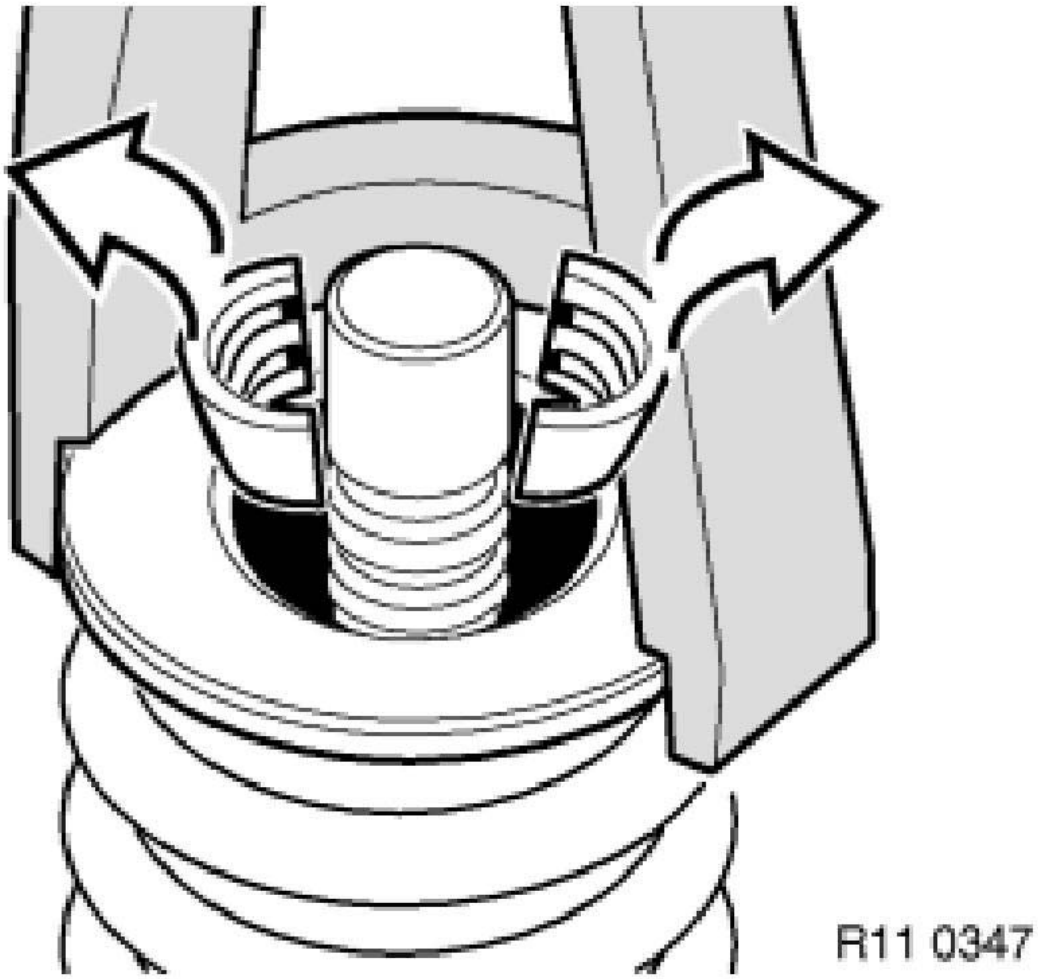


Fig. 281: Removing Valve Spring And Plate Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.
Incorrect installation will result in valve spring breakage.
Risk of mixing up the valve springs for the inlet and exhaust valves.

The valve spring is colour-coded (1) at the lower end.

Install the valve spring so that the larger diameter points to the lower spring plate.

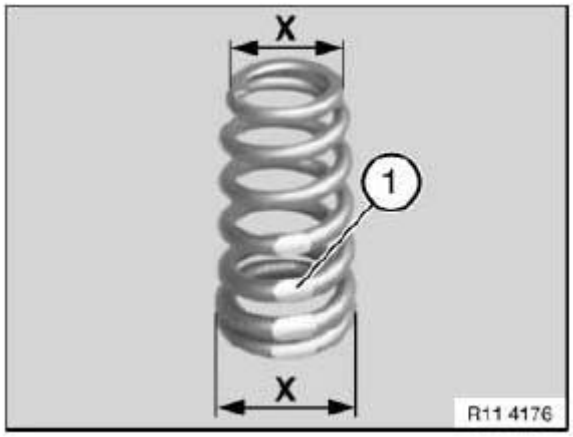


Fig. 282: Identifying Valve Spring Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with lower spring plate
3. Valve spring
4. Upper spring plate
5. Valve tapers

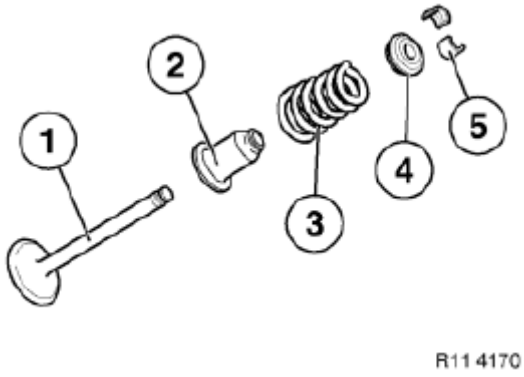


Fig. 283: Identifying Upper/Lower Spring Plate, Valve Spring And Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME; if necessary, readjust uniform mixture distribution.

11 34 560 REPLACING ALL VALVE STEM SEALS (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .
- Remove **INTERMEDIATE LEVER**
- Remove **ECCENTRIC SHAFT**
- Remove **INLET CAMSHAFT**
- Remove **EXHAUST CAMSHAFT** .
- Remove **CAM FOLLOWERS**

Firmly press special tool 11 1 480 onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool 11 1 480 .

Installation:

Insert all **VALVES** .

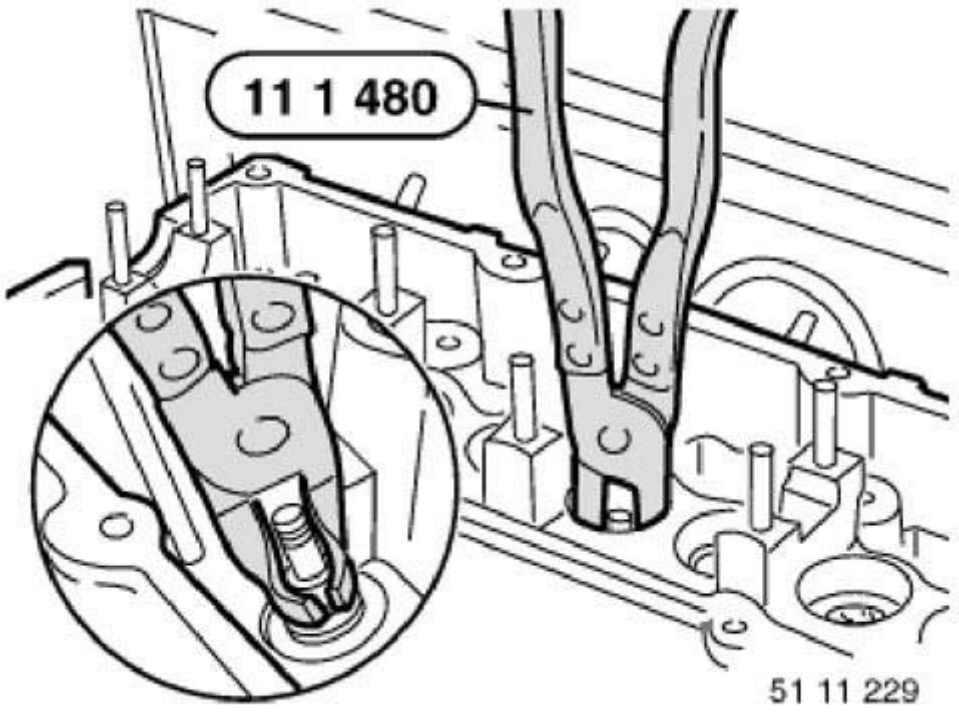


Fig. 284: Inserting Valves Using Special Tool (11 1 480)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N52K engine, special tool 11 6 380 must be remachined according to the picture with a 10 mm dia. drill bit to a depth of B = approx. 23 mm.
This modification has already been taken into account for reordering.

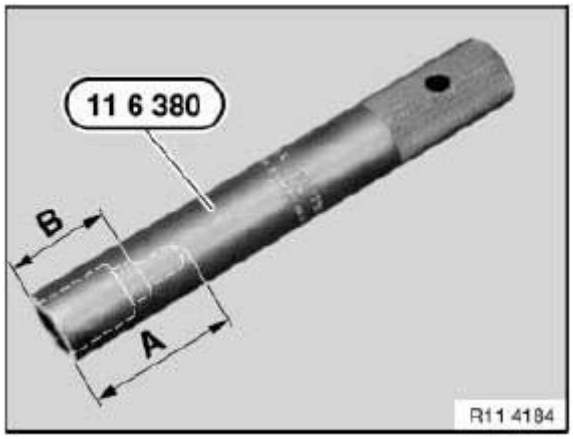


Fig. 285: Identifying Drilling Depth On Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Different diameters at valve stem.
All valve stem seals are colour-coded.

For 5 mm dia. valves, the valve stem seal is marked red or brown.

For 6 mm dia. valves, the valve stem seal is marked green or light green.

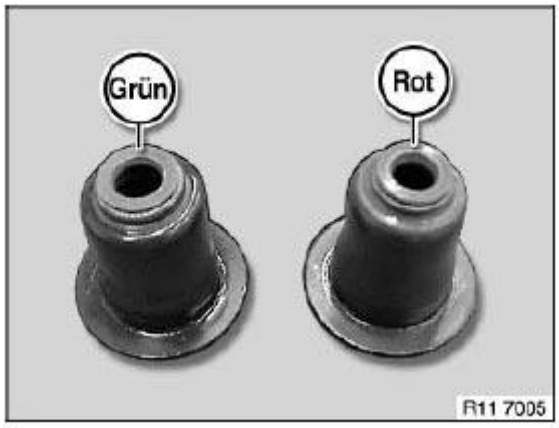


Fig. 286: Identifying Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit the mounting sleeves (plastic sleeves) contained in the delivery specification on the valve stem end.

Lubricate mounting sleeve.

Press on valve stem seal by hand with special tool 11 6 380 as far as it will go.

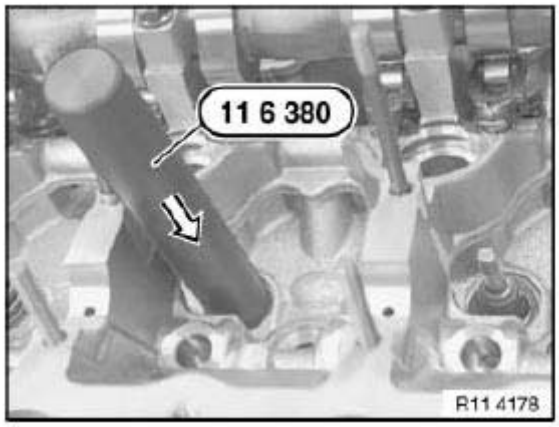


Fig. 287: Pressing Valve Stem Seal Using Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1136 VARIABLE CAMSHAFT TIMING

11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N52K)

IMPORTANT: It is essential to observe conditions of absolute cleanliness when removing and installing the inlet and exhaust solenoid valves.
Possible malfunction if valves are contaminated:

- **Rough running**
- **OBD fault entry**
- **Exhaust emission characteristics**
- **Low engine power**

Necessary preliminary tasks:

- Remove **FAN COWL** (E89 only)

Disconnect plug connection (1) on inlet solenoid valve (2).

Release screw (3).

NOTE: Secure support and sealing ring against falling down.

Remove inlet solenoid valve (2) with bracket towards front.

Disconnect plug connection (6) on exhaust solenoid valve (5).

Release screw (4).

NOTE: Secure support and sealing ring against falling down.

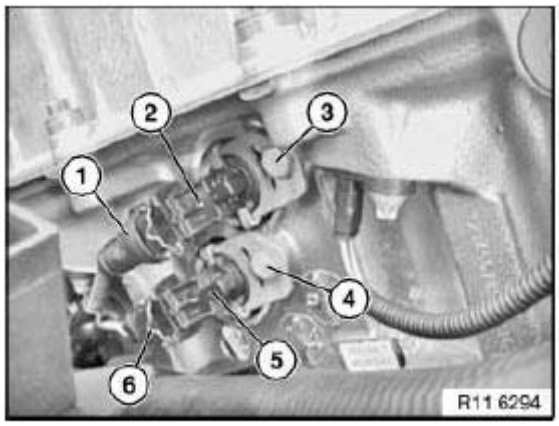


Fig. 288: Identifying Solenoid Valve, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust solenoid valve (5) with bracket towards front.

Tightening torque **11 36 3AZ** .

IMPORTANT: Risk of mixing up plug connections (1 and 6).

Installation:

Replace support and sealing rings.

Assemble engine.

Check function of DME.

11 36 046 REMOVING AND INSTALLING/REPLACING INLET AND EXHAUST ADJUSTMENT UNITS (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Check **TIMING**

IMPORTANT: Install special tool 11 4 280 to release the central bolts on the inlet and exhaust adjustment units and camshafts.

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

IMPORTANT: Fit special tool 11 4 282 underneath on side of inlet camshaft.

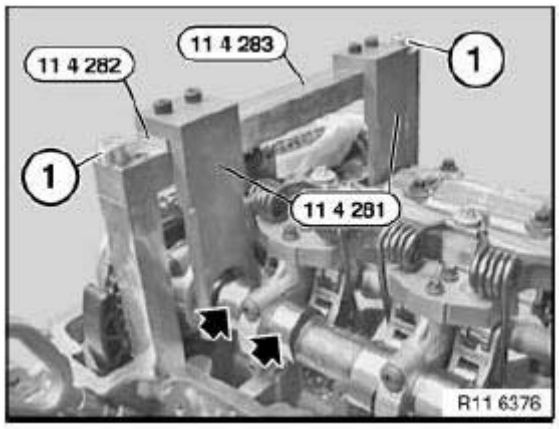


Fig. 289: Identifying Screws And Special Tools (11 4 283)
Courtesy of BMW OF NORTH AMERICA, INC.

Release chain tensioner (2).

Tightening torque **11 31 6AZ** .

Release central bolts on inlet and exhaust adjustment units (1).

Tightening torque **11 36 1AZ** .

Installation:

Replace central bolts.

NOTE: Picture in CAD and does not show special tools.

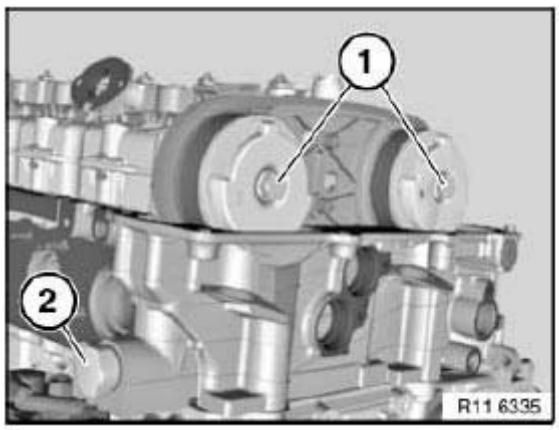


Fig. 290: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Remove exhaust adjustment unit (1) from exhaust camshaft.

Remove inlet adjustment unit (2) from inlet camshaft.

Installation:

To facilitate removal and installation of the inlet and exhaust adjustment units, turn the sensor gears at the opening downwards.

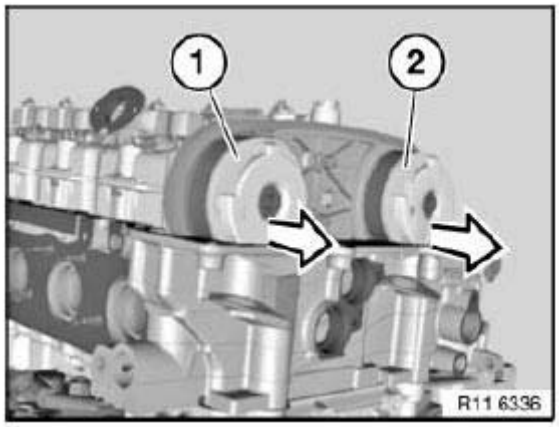


Fig. 291: Removing Exhaust Adjustment Unit From Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of mixing up the inlet and exhaust adjustment units. Danger of engine damage!

Inlet and exhaust adjustment units are different.

VANOS is marked with AUS/EX for the exhaust camshaft.

VANOS is marked with EIN/IN for the inlet camshaft.

Sensor gears can be fitted alternatively.

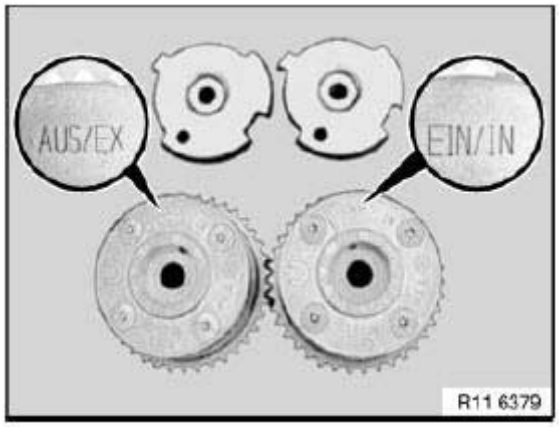


Fig. 292: Identifying AUS/EX Exhaust Camshaft Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Position inlet and exhaust adjustment units on camshafts.

Installation position of inlet and exhaust adjustment units can be freely selected.

Insert central bolts (1).

Tightening torque **11 36 1AZ** .

Installation:

Replace central bolts.

IMPORTANT: Install special tool 11 4 280 to secure the central bolts on the inlet and exhaust adjustment units and camshafts.

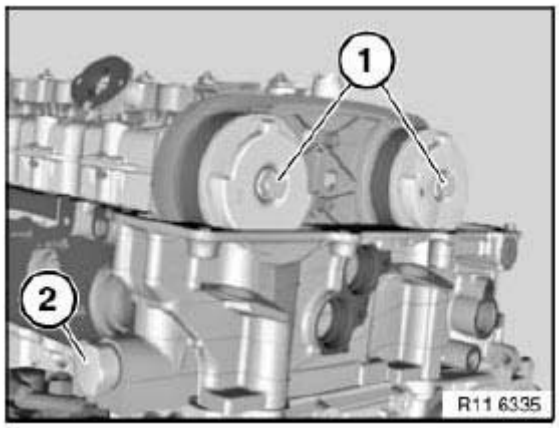


Fig. 293: Identifying Central Bolt And Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Picture in CAD and does not show special tools.

IMPORTANT: Incorrect installation possible!

Press clamping rail (1) by hand against guide rail and make sure timing chain is guided in clamping rail (1).

NOTE: Schematic representation of removed timing chain module.

Adjust **VALVE TIMING** .

Fit **CHAIN TENSIONER** .

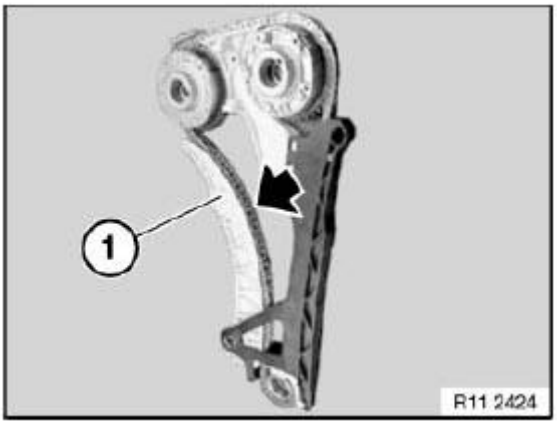


Fig. 294: Locating Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1137 VARIABLE VALVE GEAR

11 37 005 REMOVING AND INSTALLING/REPLACING ECCENTRIC SHAFT (N52K)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **INTERMEDIATE LEVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

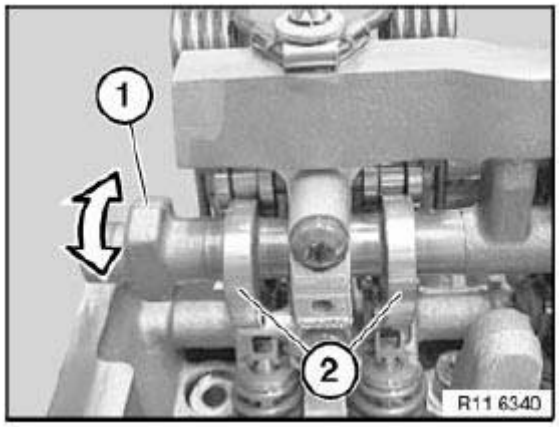


Fig. 295: Moving Eccentric Shaft On Twin Surface Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: All bearing caps (1 and 2) of eccentric shaft are marked with numbers from 1 to 6 (1 for 1st cylinder to 6 for 6th cylinder).
Bearing cap 6 (1) is provided with a stop.

Release screws on bearing cap 6 (1).

Release screws on bearing caps 1 to 5 (2).

Set all bearing caps down in special tool 11 4 481 in a neat and orderly fashion.

Remove eccentric shaft with gentle tilting and turning movements.

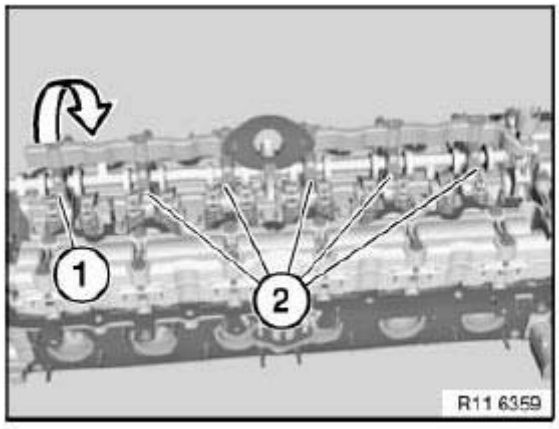


Fig. 296: Installing Bearing Cap On Bearing Cap Number
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Screw is not magnetic and must be secured against falling down.

Release screw.

Remove magnet wheel (1).

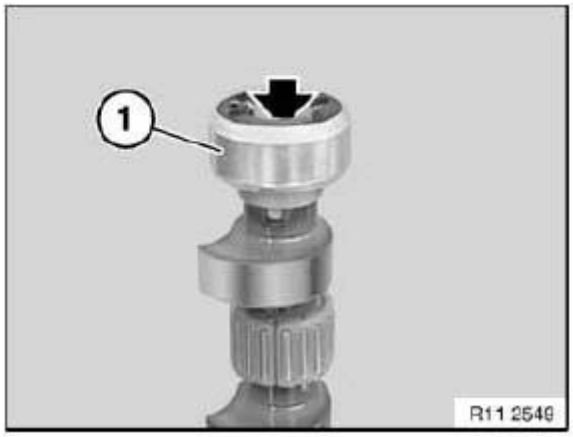


Fig. 297: Locating Magnet Wheel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Magnet wheel (1) is highly magnetic and must be protected against metal filings/borings.
After removing, place magnet wheel (1) in a plastic bag (2) with a seal.

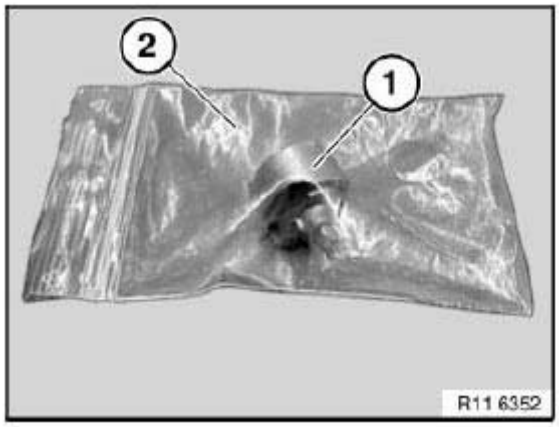


Fig. 298: Identifying Magnet Wheel In Plastic Bag
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Needle bearing (1) can break very easily.

Carefully pull needle bearing (1) apart at point of separation.

Remove all needle bearings (1) from eccentric shaft.

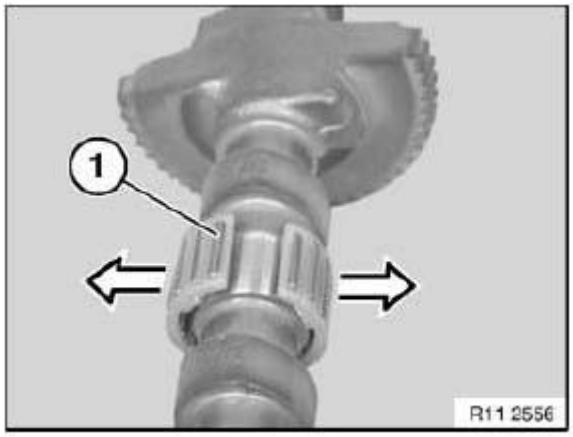


Fig. 299: Removing Needle Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shells (1) as pictured.

NOTE: Always replace bearing shells (1) and needle bearings together.

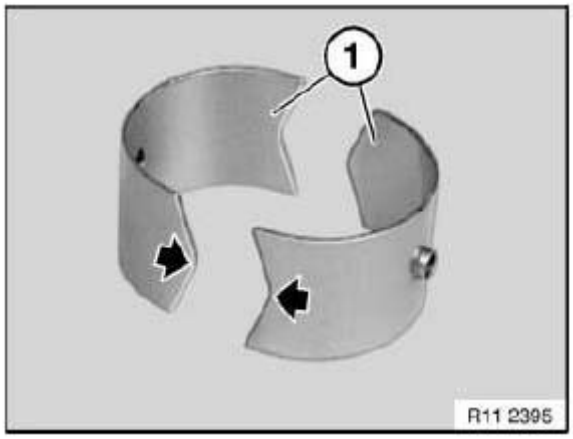


Fig. 300: Locating Bearing Shells Ends
Courtesy of BMW OF NORTH AMERICA, INC.

Install bearing shell (1) with tip facing down (see arrow) in cylinder head.

Install bearing shell (2) with tip facing up in bearing cap.

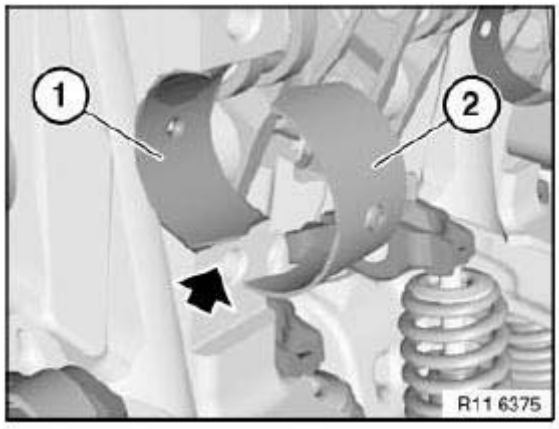


Fig. 301: Locating Bearing Shell Tip
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: All bearing caps (1 and 2) of eccentric shaft are marked with numbers from 1 to 6 (1 for 1st cylinder to 6 for 6th cylinder).
Bearing cap 6 (1) is provided with a stop.

Insert eccentric shaft.

Adjust eccentric shaft on dihedron to minimum stroke.

Fit all bearing caps (1 and 2).

Insert all screws.

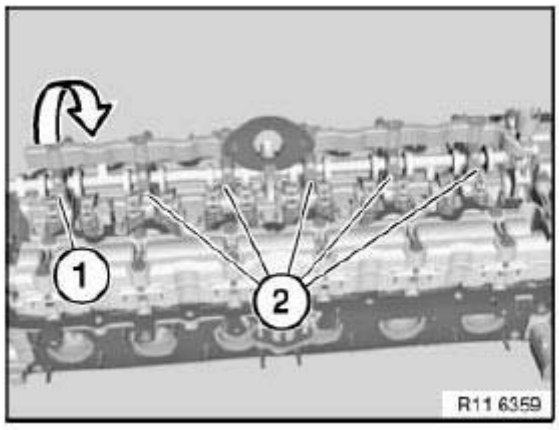


Fig. 302: Installing Bearing Cap On Bearing Cap Number
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 12 7AZ** .

Installation:

Spline teeth of eccentric shaft must be greased with **LONGTIME PD 1 (2.2)** .

Assemble engine.

11 37 010 REMOVING AND INSTALLING/REPLACING INTERMEDIATE LEVERS (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

NOTE: There are 2 different versions of the guide block

IMPORTANT: Establish size of guide blocks.
Version 1
Size 55.2 mm
Version 2
Size 58 mm
The description of version 2 starts on page 8.

Version 1

Size (1) 55.2 mm

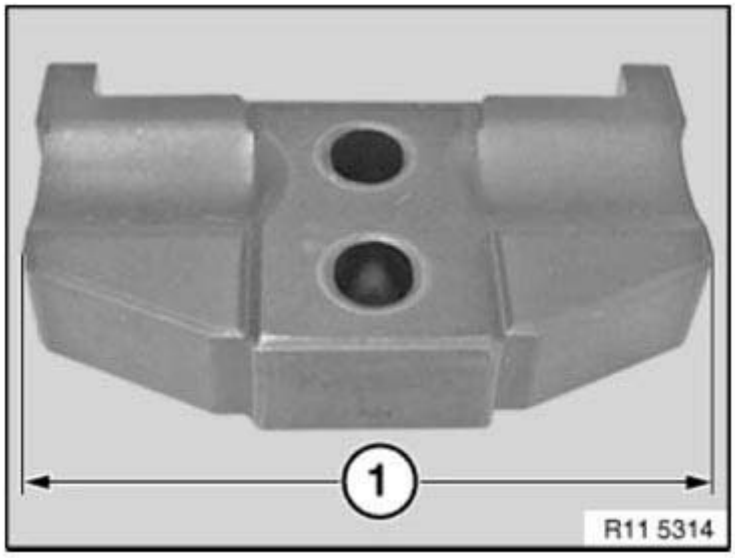


Fig. 303: Identifying Guide Block Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

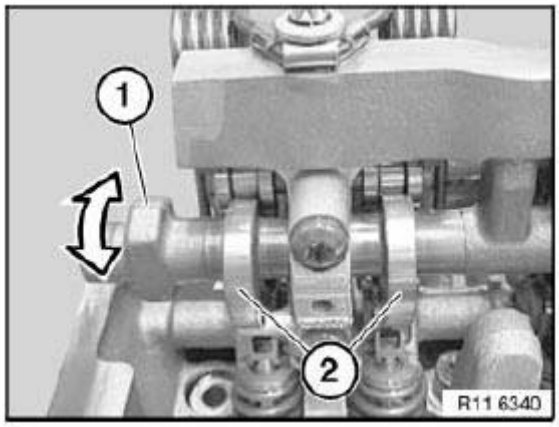


Fig. 304: Moving Eccentric Shaft On Twin Surface
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

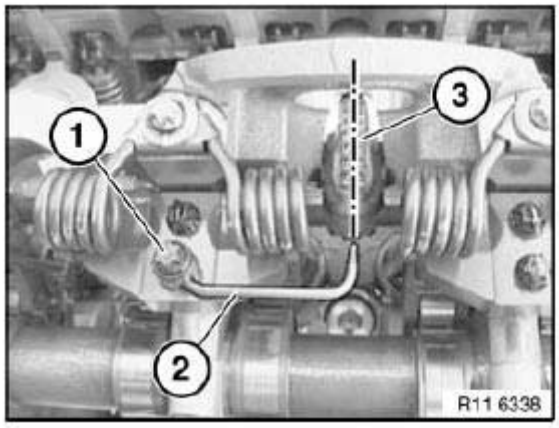


Fig. 305: Identifying Oil Spray Nozzle With Spray
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

Secure special tool 11 4 270 to guide block (2) using locking pliers (3).

IMPORTANT: Special tool 11 4 270 is only secured to guide block (2). The position of the locking pliers (3) on the special tool 11 4 270 must not be altered. Risk of damage!

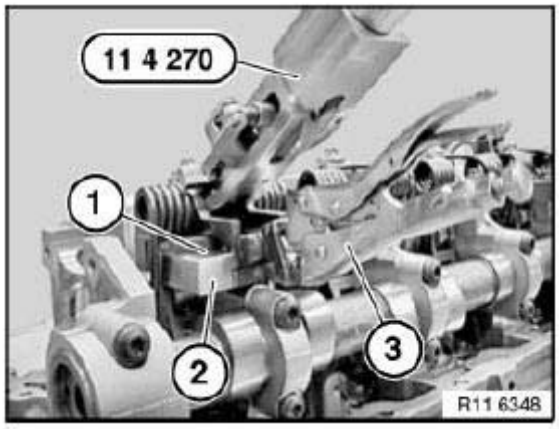


Fig. 306: Identifying Gripping Pliers, Guide Block And Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Secure both bearing pins (2) in torsion springs with knurled screw (1) of special tool 11 4 270 .

Press special tool 11 4 270 to stop in direction of arrow.

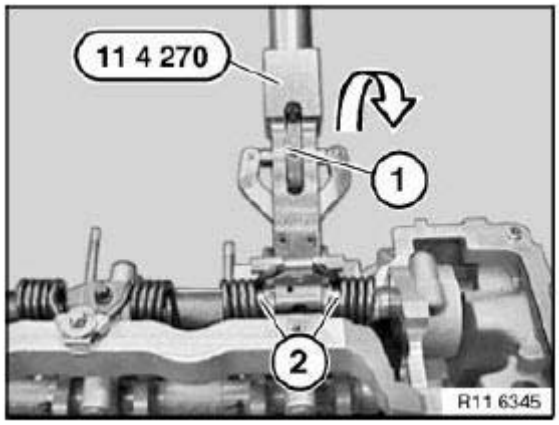


Fig. 307: Pressing Bearing Pins Using Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2) of torsion spring.

Tightening torque **11 37 2AZ** .

To avoid misalignment of screw (2) with torsion spring, it is necessary when releasing screw (2) to relieve the tension on the special tool 11 4 270 evenly.

IMPORTANT: Thread on cylinder head. Risk of damage!

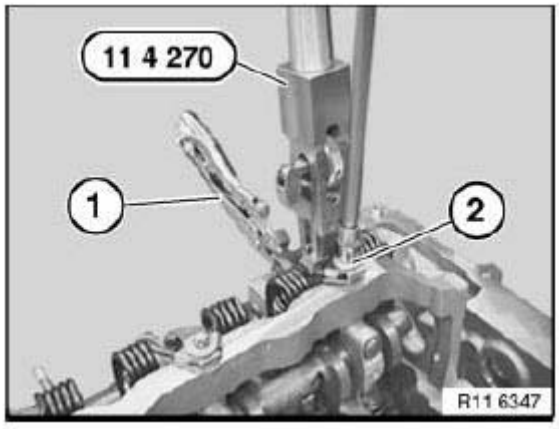


Fig. 308: Releasing Screw Of Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release tension on torsion spring (1) with special tool 11 4 270 .

NOTE: Metal lug (2) can not be disassembled and must not be removed.

Installation:

Replace torsion spring (1) if metal lug (2) is faulty.

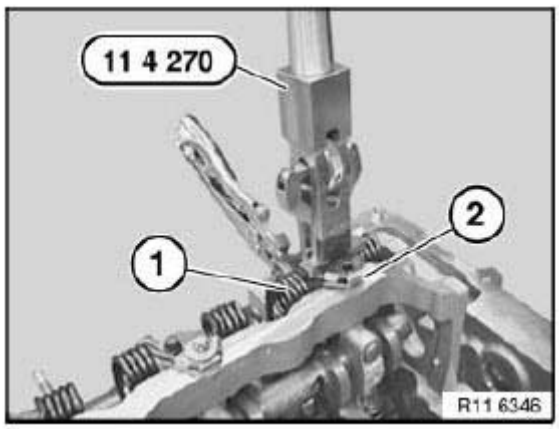


Fig. 309: Removing Metal Lugs Using Special Tool (11 4 270)

Courtesy of BMW OF NORTH AMERICA, INC.

Press torsion spring apart at positions (1).

Remove torsion spring towards top.

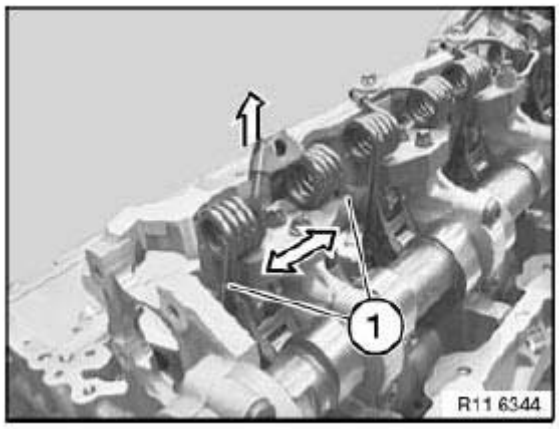


Fig. 310: Pressing Torsion Spring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.
Place all components in clean and orderly condition in special tool 11 4 481.

All components must be reinstalled in the same positions in an engine which has already been in use.

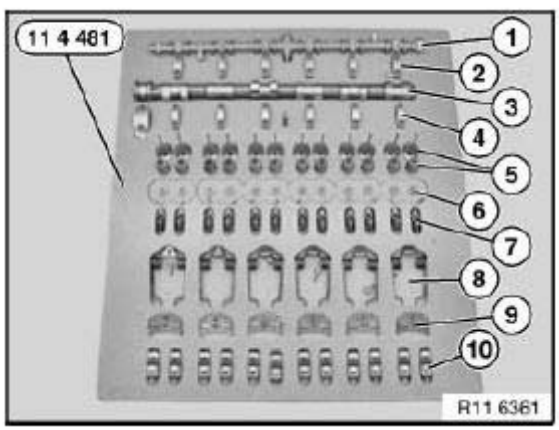


Fig. 311: Identifying Special Tool Kit
Courtesy of BMW OF NORTH AMERICA, INC.

1. Eccentric shaft with bearing
2. Bearing caps of eccentric shaft (set out in order)
3. Intake camshaft
4. Bearing caps of inlet camshaft (set out in order)

5. Intake valves with valve springs
6. Valve plates and valve cotters
7. Cam followers with HVCA elements (set out in order)
8. Torsion springs
9. Guide blocks (set out in order)
10. Intermediate levers (set out in order)

Release screws (1) on guide block (2).

Tightening torque **11 37 1AZ** .

Place all guide blocks (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the guide blocks (2) will cause the engine to suffer idle-speed fluctuations.

This will result in maladjustment of **uniform distribution** .

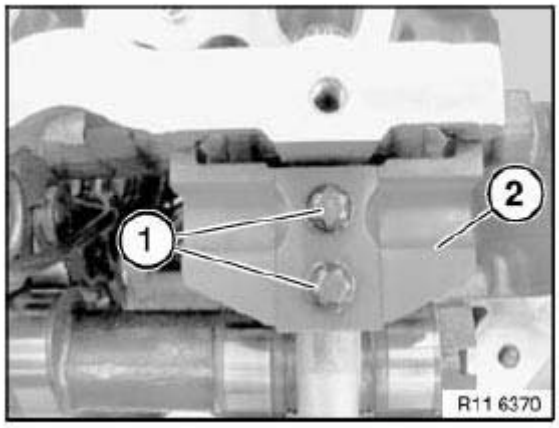


Fig. 312: Identifying Guide Block With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All contact surfaces (1) of guide block must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

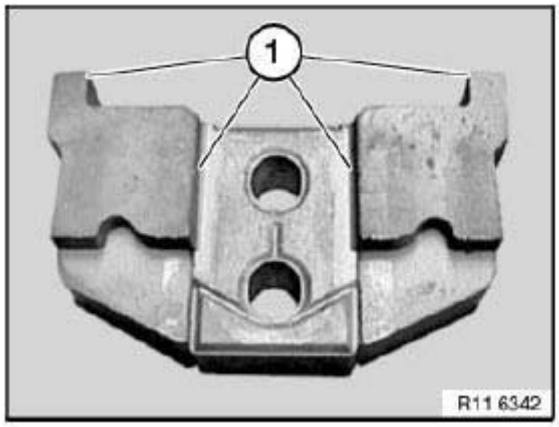


Fig. 313: Identifying Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Place all intermediate levers (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the intermediate levers (2) will cause the engine to suffer idle-speed fluctuations.

Installation:

All contact surfaces (1) must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

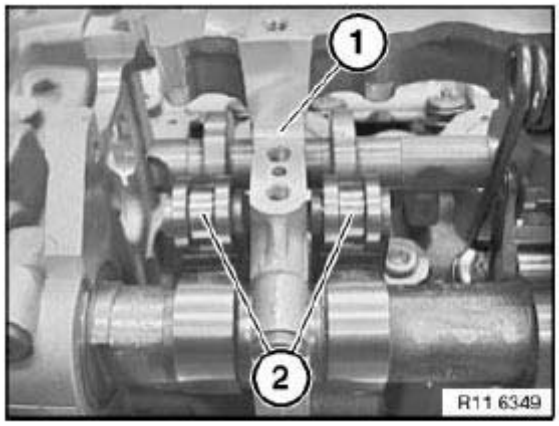


Fig. 314: Identifying Contact Surface And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

All intermediate levers (1) must be reinstalled in the same positions in an engine which has already been in use.

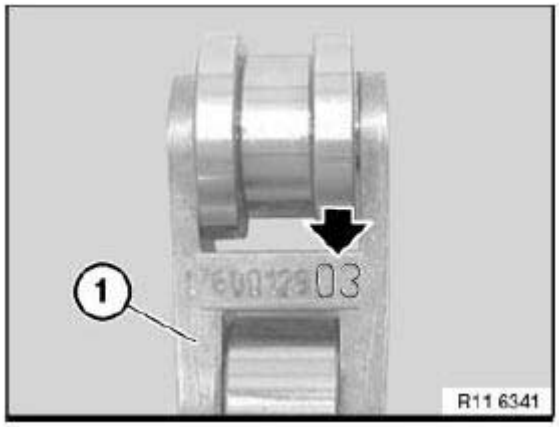


Fig. 315: Locating Marking On Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing intermediate levers (2), make sure cam followers are correctly positioned.
Risk of damage!

Install intermediate levers (2).

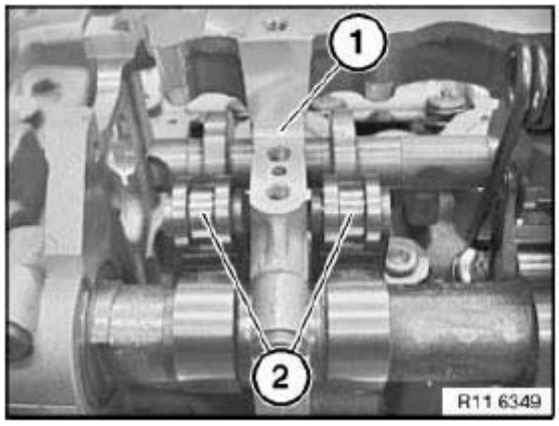


Fig. 316: Identifying Contact Surface And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten screws (1) hand-tight.

Check that intermediate levers are in correct installation position.

Release screws (1) by a 1/4 turn.

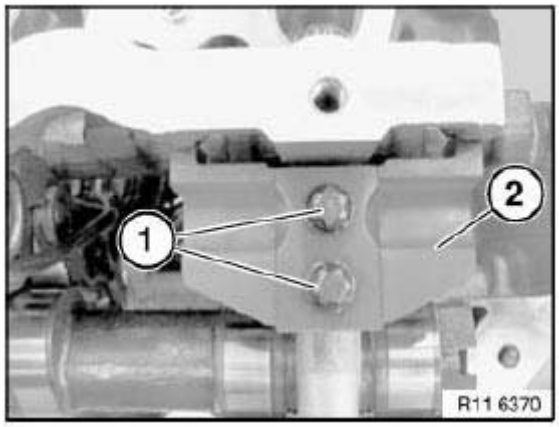


Fig. 317: Identifying Guide Block And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 450 to screw fixing (1) of eccentric shaft.

Move eccentric lever (3) on special tool 11 4 450 in direction of arrow.

Guide block is now pretensioned.

Insert screws (2) of guide blocks.

Tightening torque **11 37 1AZ** .

Installation:

At cylinder no. 3, the guide block can be pre-installed with one screw (internal) only.

Oil spray nozzle is fitted only after torsion spring has been installed.

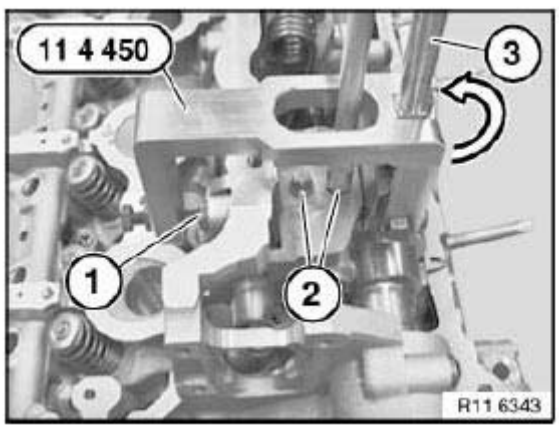


Fig. 318: Moving Eccentric Lever On Special Tool 11 4 450
Courtesy of BMW OF NORTH AMERICA, INC.

Install torsion spring (2) on guide block.

Installation:

Insert torsion spring (2) in intermediate lever (1) (see arrow).

Check that cam follower (3) is in correct installation position.

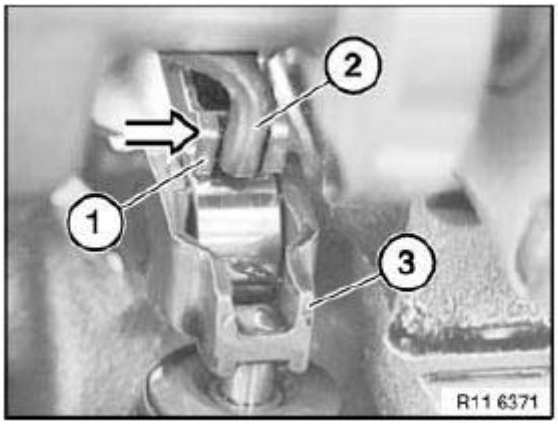


Fig. 319: Inserting Torsion Spring In Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 270 to guide block (2) using locking pliers (3).

IMPORTANT: Special tool 11 4 270 is only secured to guide block (2). The position of the locking pliers (3) on the special tool 11 4 270 must not be altered. Risk of damage!

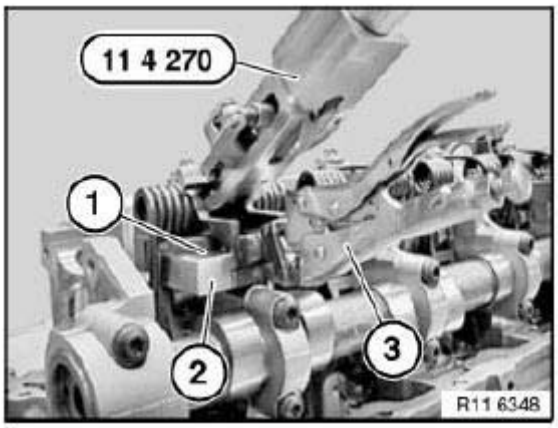


Fig. 320: Securing Special Tool 11 4 270 To Guide Block Using Locking Pliers
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Secure both bearing pins (2) in torsion springs with knurled screw (1) of special tool 11 4 270 .

IMPORTANT: Check torsion spring on intermediate lever to ensure correct installation position.

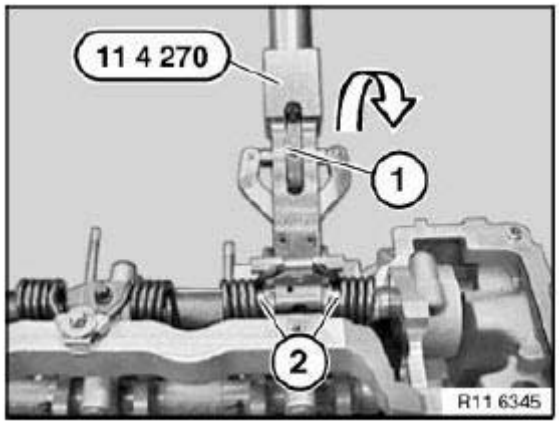


Fig. 321: Pressing Bearing Pins Using Special Tool (11 4 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool 11 4 270 to stop in direction of arrow.

Insert screw (2) of torsion spring.

Tightening torque **11 37 2AZ** .

To avoid misalignment of screw (2) with torsion spring, it is necessary when inserting screw (2) to increase tension on special tool 11 4 270 evenly.

IMPORTANT: Thread on cylinder head. Risk of damage!

Remove special tool 11 4 270 .

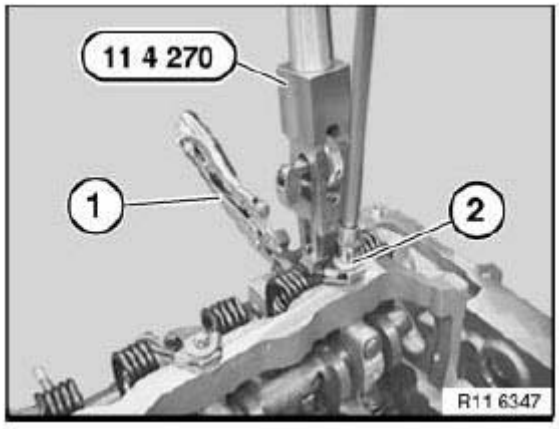


Fig. 322: Inserting Steel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil spray nozzle (2) so that oil spray points precisely towards spline teeth (3).

Insert screw (1) with oil spray nozzle (2) (external).

Tightening torque **11 37 4AZ** .

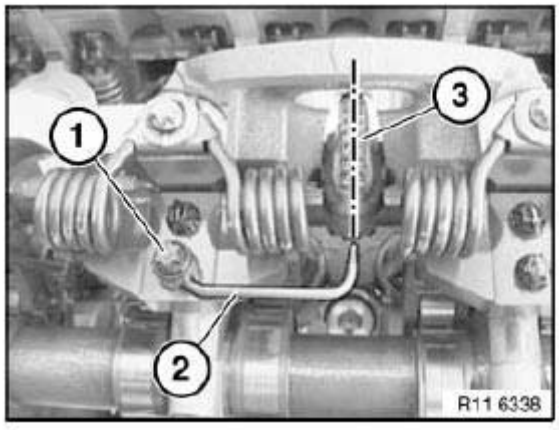


Fig. 323: Identifying Oil Spray Nozzle With Spray
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Version 2

Size (1) 58 mm

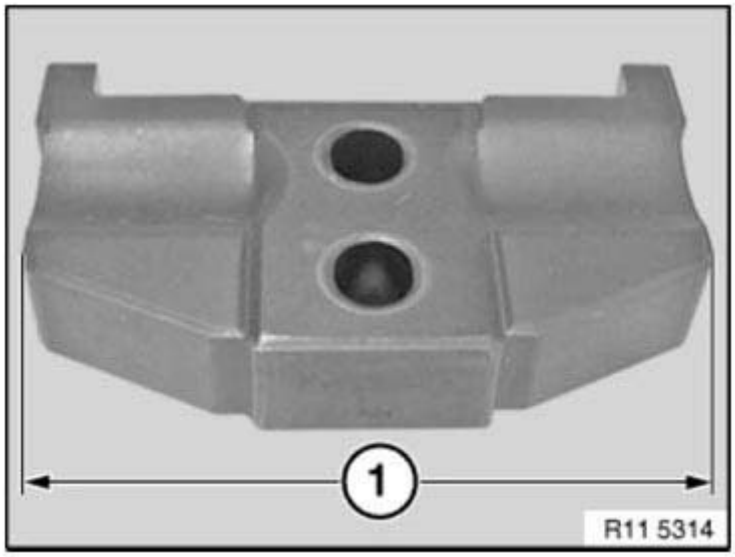


Fig. 324: Identifying Guide Block Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

If necessary, move eccentric shaft (1) on twin surface to minimum lift (2).

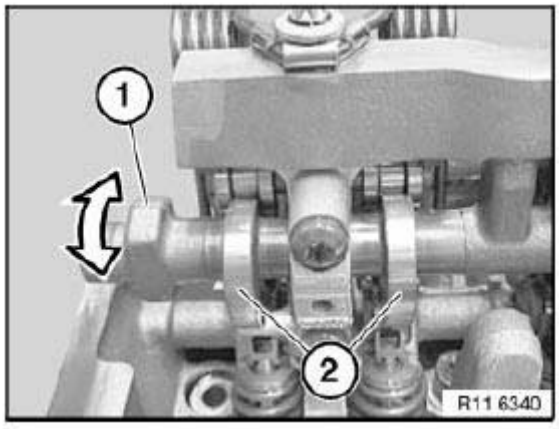


Fig. 325: Moving Eccentric Shaft On Twin Surface And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil spray nozzle must be removed from 3rd cylinder (make a note of installation position of oil spray nozzle).

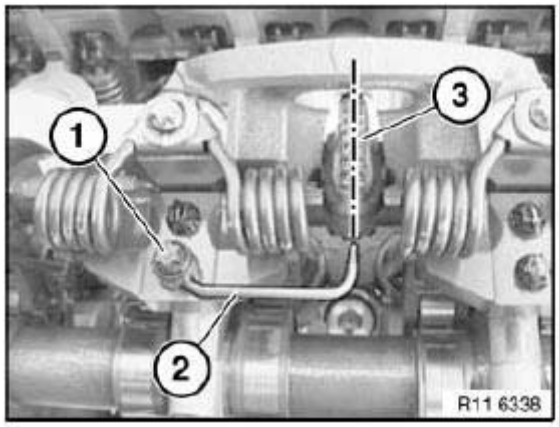


Fig. 326: Identifying Oil Spray Nozzle With Spray
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 7 110 on return spring (1) (see arrows).

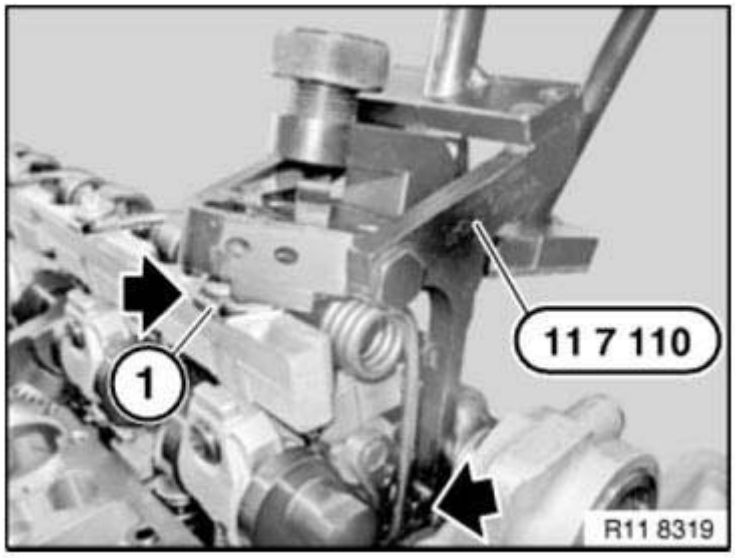


Fig. 327: Locating Special Tool (11 7 110) On Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling. Risk of damage!

Place special tool 11 7 110 flat on cylinder head.

Turn knurled screw (1) in direction of arrow until both clamping levers secure return spring in guide block.

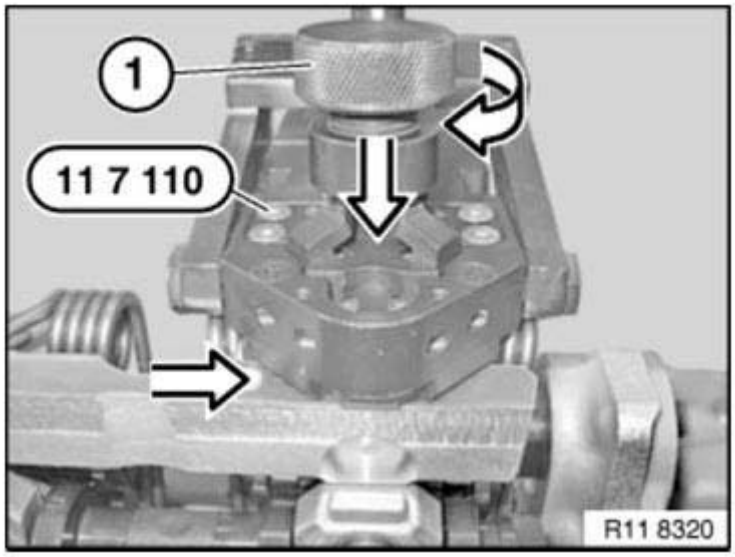


Fig. 328: Turning Knurled Screw Using Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Return spring is correctly preloaded when both clamping levers are parallel to guide block.

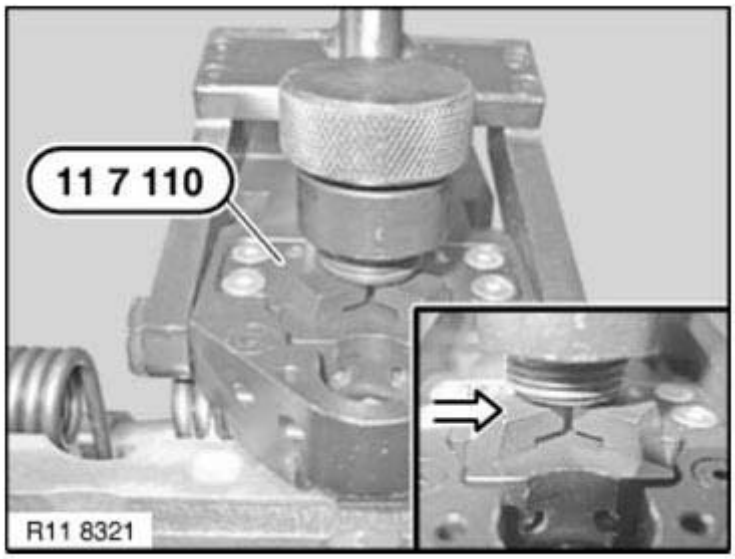


Fig. 329: Installing Return Spring Using Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Left and right return springs (1) must be positioned in lateral guide of special tool 11 7 110 .

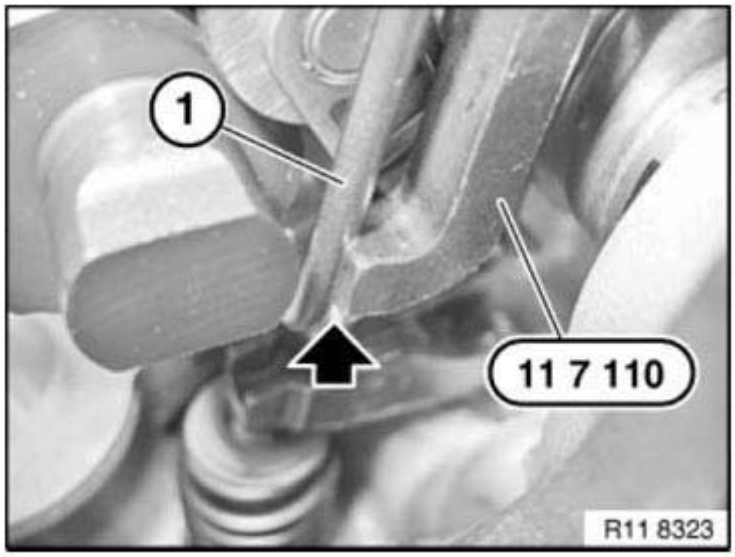


Fig. 330: Locating Return Springs Position In Lateral Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Preload return spring with lever (1) on special tool 11 7 110 in direction of arrow.

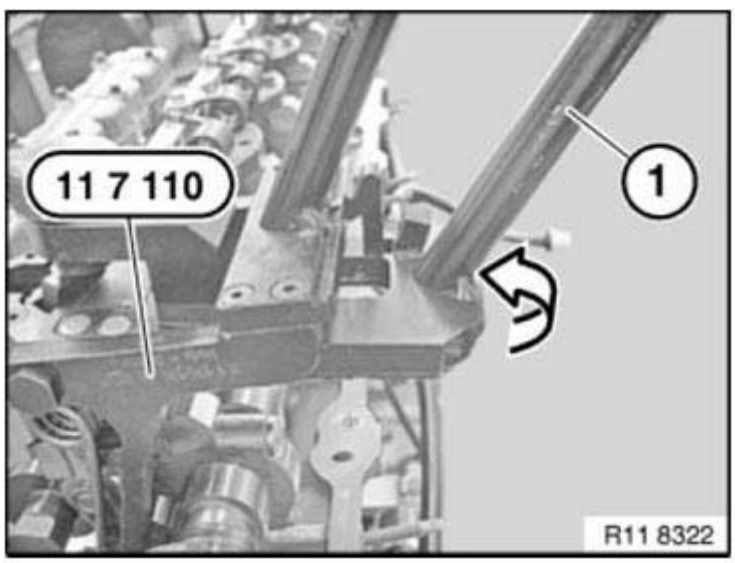


Fig. 331: Preloading Return Spring With Lever On Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Lock special tool 11 7 110 with catch on lever (1).

IMPORTANT: Screw fixing on return spring can only be released with special tool 11 7 110 secured.

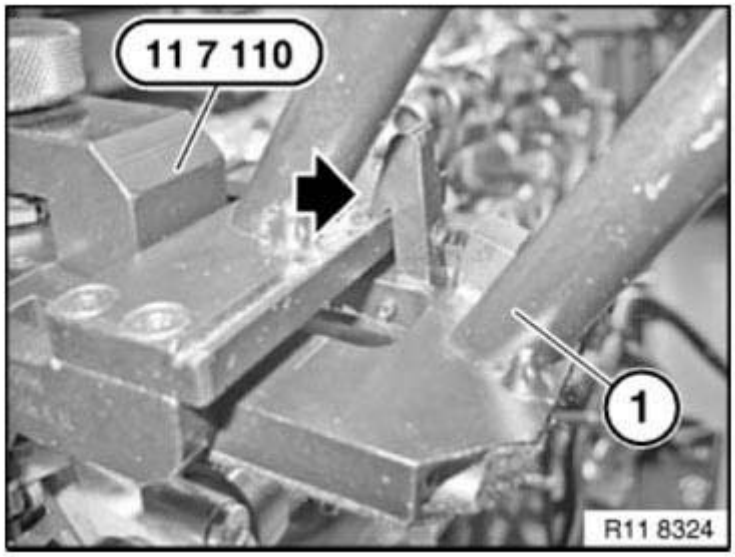


Fig. 332: Locking Special Tool (11 7 110) With Catch On Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

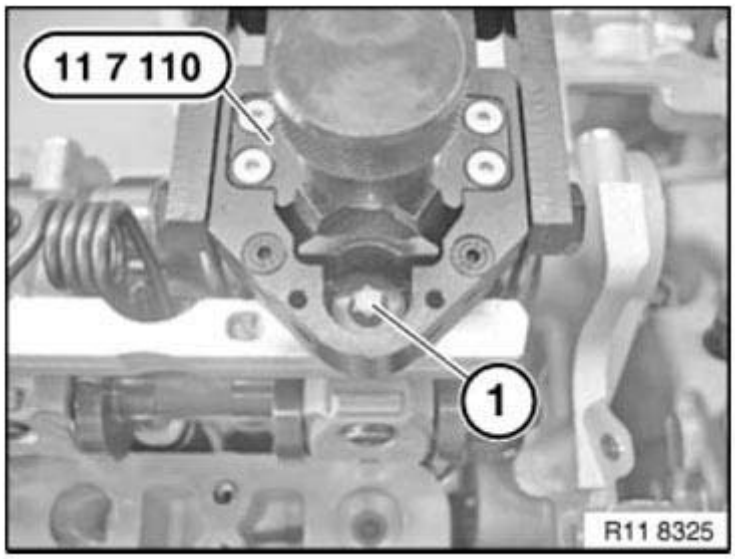


Fig. 333: Identifying Screws And Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.
Lever (1) is under pre-tension.

IMPORTANT: Improper handling.
Risk of damage!

Secure lever (1)

Press back latching hook (2).

Return spring tension can now be released.

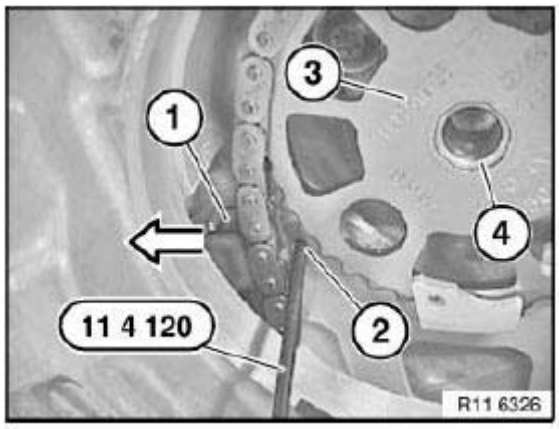


Fig. 334: Pressing Back Latching Hook Using Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screw (1) on special tool 11 7 110 in direction of arrow.

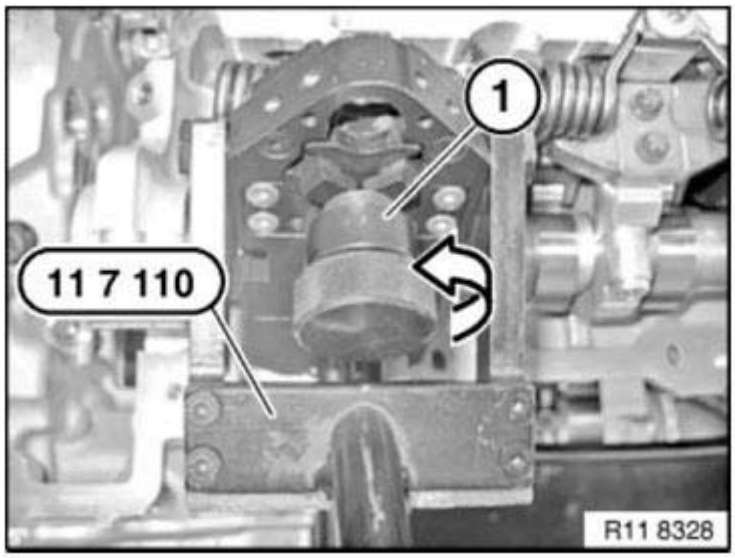


Fig. 335: Releasing Knurled Screw On Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

Release special tool 11 7 110 in direction of arrow from return spring (1).

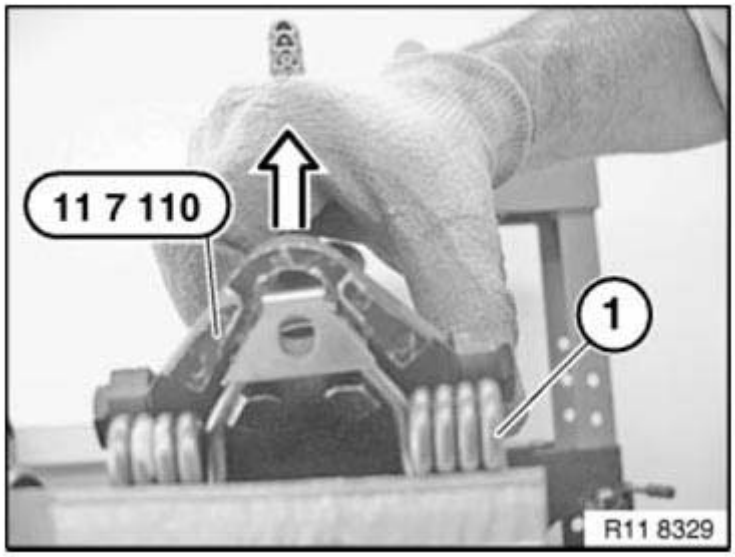


Fig. 336: Releasing Special Tool 11 7 110 From Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Press torsion spring apart at positions (1).

Remove torsion spring towards top.

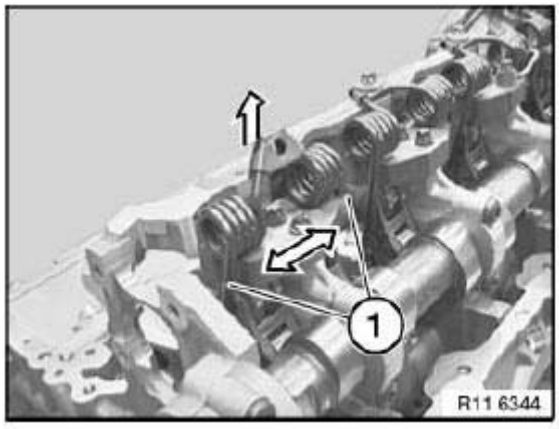


Fig. 337: Pressing Torsion Spring Position
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Uniform distribution must not be changed.
Place all components in clean and orderly condition in special tool 11 4 481.

All components must be reinstalled in the same positions in an engine which has already been in use.

1. Eccentric shaft with bearing
2. Bearing caps of eccentric shaft (set out in order)

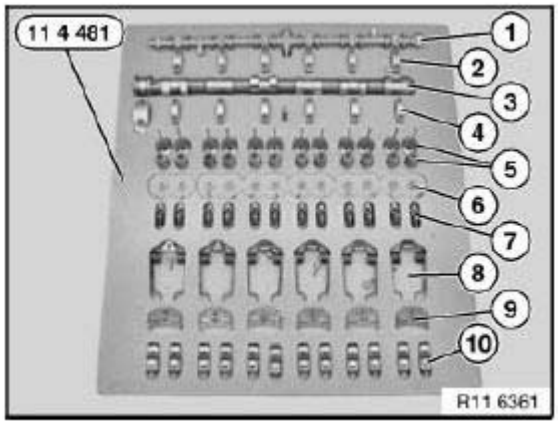


Fig. 338: Identifying Special Tool Kit
Courtesy of BMW OF NORTH AMERICA, INC.

3. Intake camshaft
4. Bearing caps of inlet camshaft (set out in order)
5. Intake valves with valve springs
6. Valve plates and valve cotters
7. Cam followers with HVCA elements (set out in order)
8. Torsion springs
9. Guide blocks (set out in order)
10. Intermediate levers (set out in order)

Release screws (1) on guide block (2).

Tightening torque **11 37 1AZ** .

Place all guide blocks (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the guide blocks (2) will cause the engine to suffer idle-speed fluctuations.

This will result in maladjustment of **uniform distribution** .

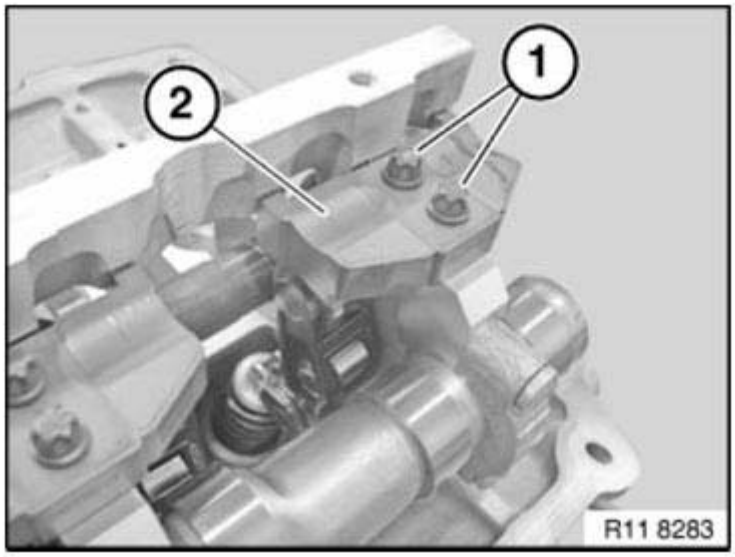


Fig. 339: Identifying Screws On Guide Block
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

All contact surfaces (1) of guide block must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

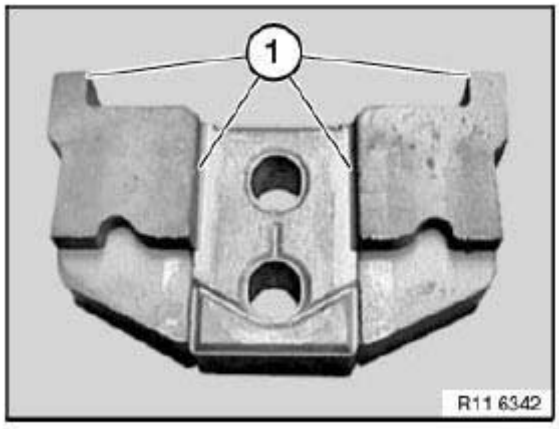


Fig. 340: Identifying Contact Surfaces
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out intermediate levers (2).

Place all intermediate levers (2) in neat order in special tool 11 4 481.

Installation:

Mixing up the intermediate levers (2) will cause the engine to suffer idle-speed fluctuations.

Installation:

All contact surfaces (1) must be clean and free from oil and grease. If necessary, clean contact surfaces (1).

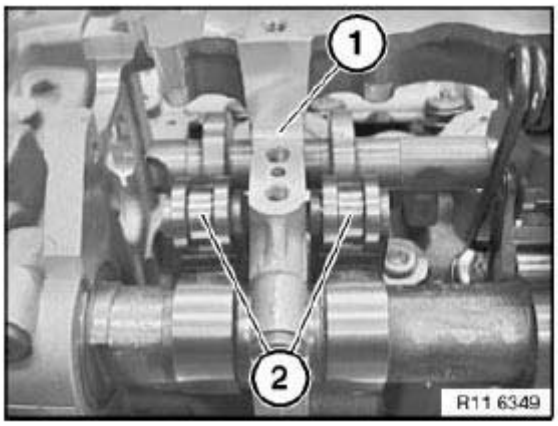


Fig. 341: Identifying Contact Surface And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

All intermediate levers (1) are classified.

All intermediate levers (1) must be reinstalled in the same positions in an engine which has already been in use.

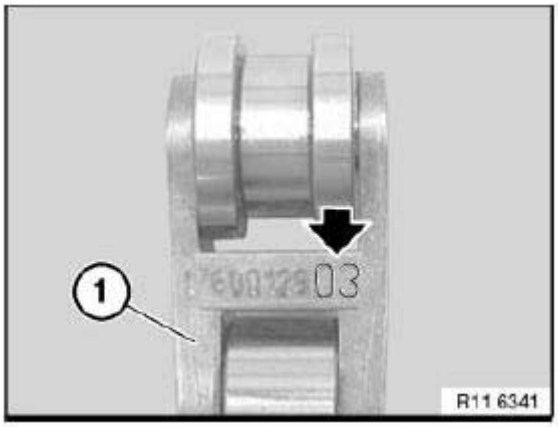


Fig. 342: Locating Marking On Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing intermediate levers (2), make sure cam followers are correctly positioned.
Risk of damage!

Install intermediate levers (2).

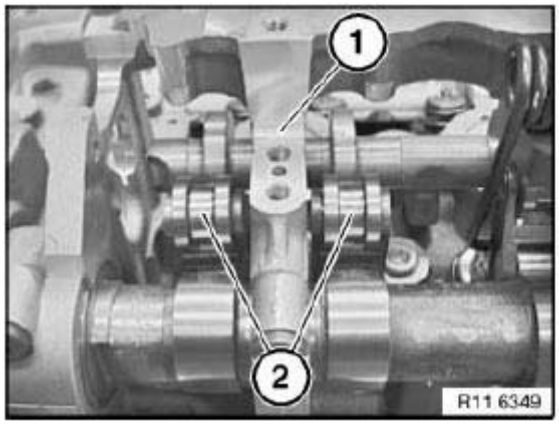


Fig. 343: Identifying Contact Surface And Intermediate Levers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit guide block (2) cleanly into opening.

Tighten screws (1) hand-tight.

Check that intermediate levers are in correct installation position.

Release screws (1) by a 1/4 turn.

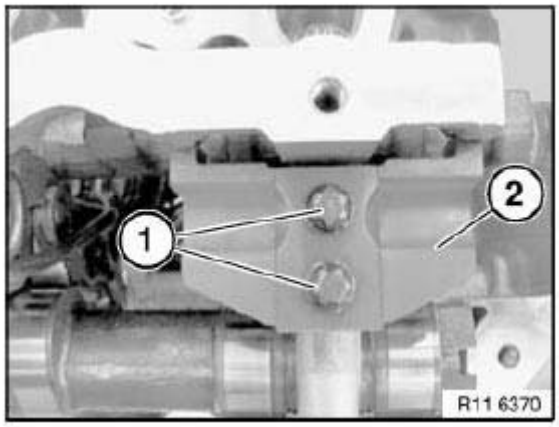


Fig. 344: Identifying Guide Block With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 450 to screw fixing (1) of eccentric shaft.

Move eccentric lever (3) on special tool 11 4 450 in direction of arrow.

Guide block is now pretensioned.

Insert screws (2) of guide blocks.

Tightening torque **11 37 1AZ** .

Installation:

At cylinder no. 3, the guide block can be pre-installed with one screw (internal) only.

Oil spray nozzle is fitted only after torsion spring has been installed.

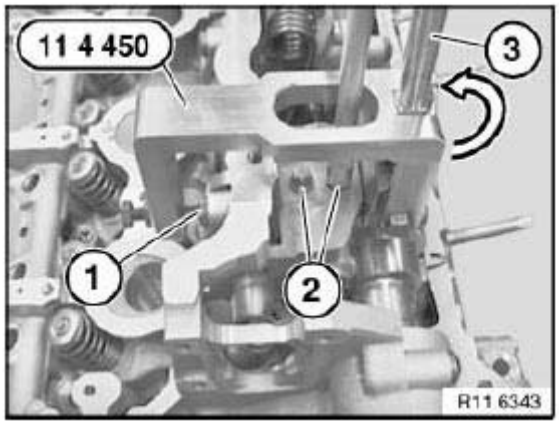


Fig. 345: Moving Eccentric Lever On Special Tool 11 4 450
Courtesy of BMW OF NORTH AMERICA, INC.

Install torsion spring (2) on guide block.

Installation:

Insert torsion spring (2) in intermediate lever (1) (see arrow).

Check that cam follower (3) is in correct installation position.

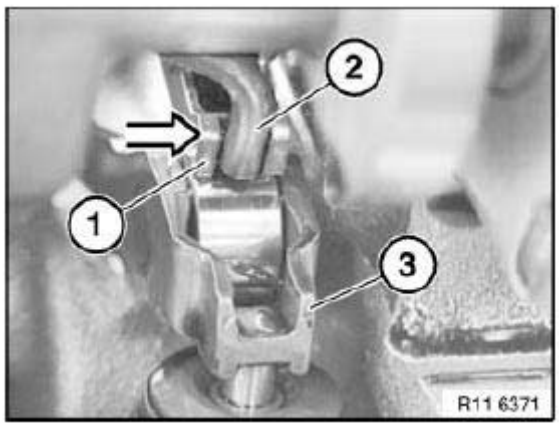


Fig. 346: Inserting Torsion Spring In Intermediate Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 7 110 on return spring.

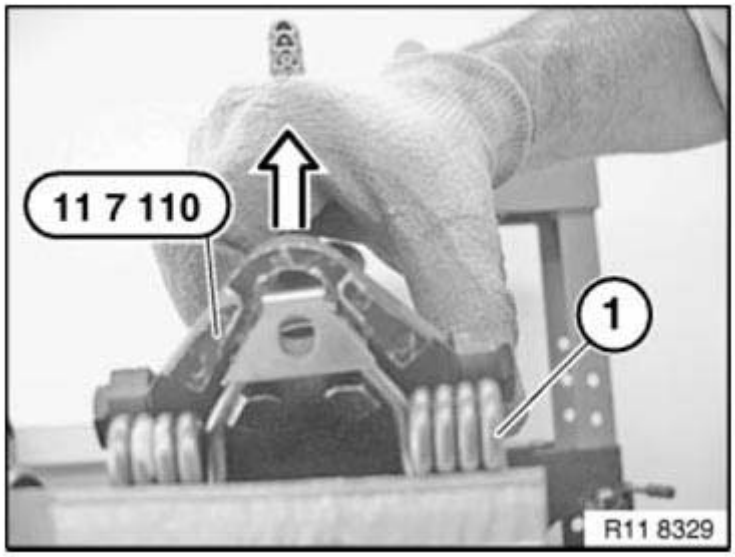


Fig. 347: Positioning Special Tool 11 7 110 On Return Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Clamp return spring with knurled screw (1) in direction of arrow.

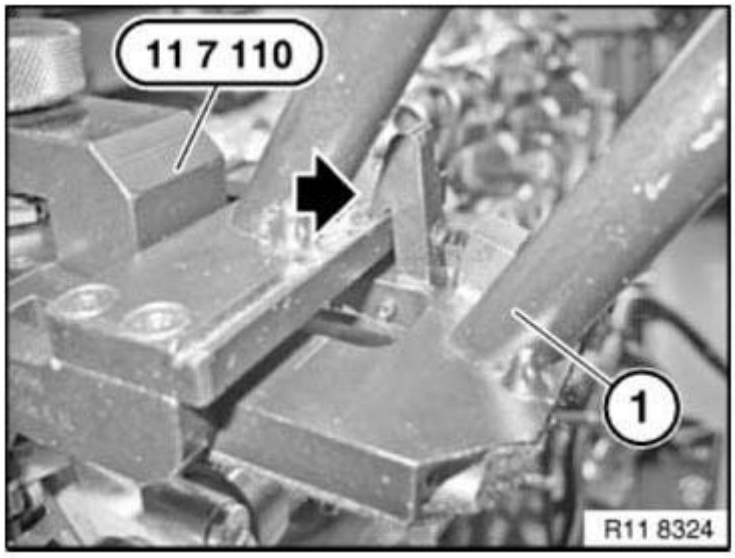


Fig. 348: Locating Clamp Return Spring With Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Return spring (1) is positioned correctly when catches (see arrows) are surrounding return spring (1).

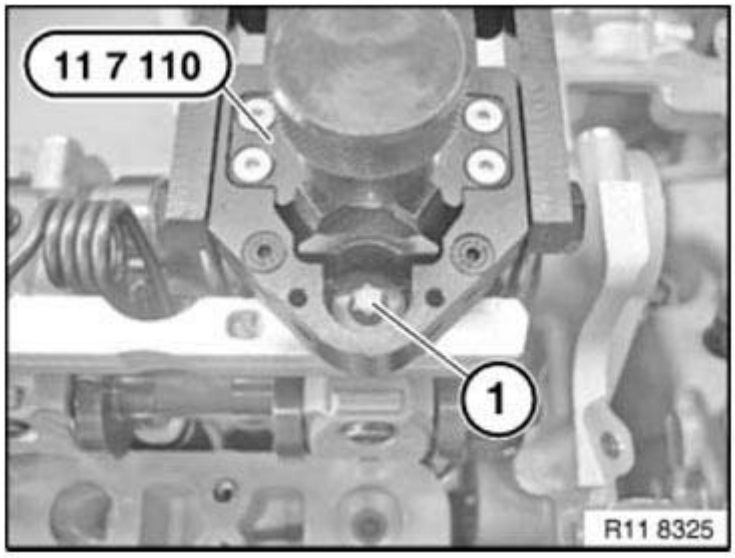


Fig. 349: Identifying Screws And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury in event of incorrect use.

IMPORTANT: Improper handling.
Risk of damage!
Check return spring on intermediate lever to ensure correct installation position.

Press special tool 11 7 110 to stop in direction of arrow.

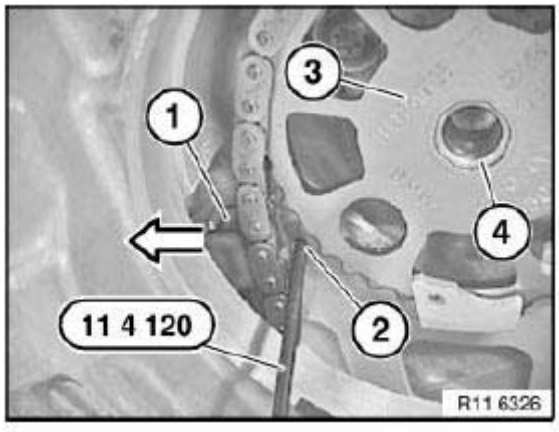


Fig. 350: Pressing Back Latching Hook Using Special Tool (11 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Pay attention to thread on cylinder head.

Risk of damage!

Tighten bolt (1).

Tightening torque **11 37 2AZ** .

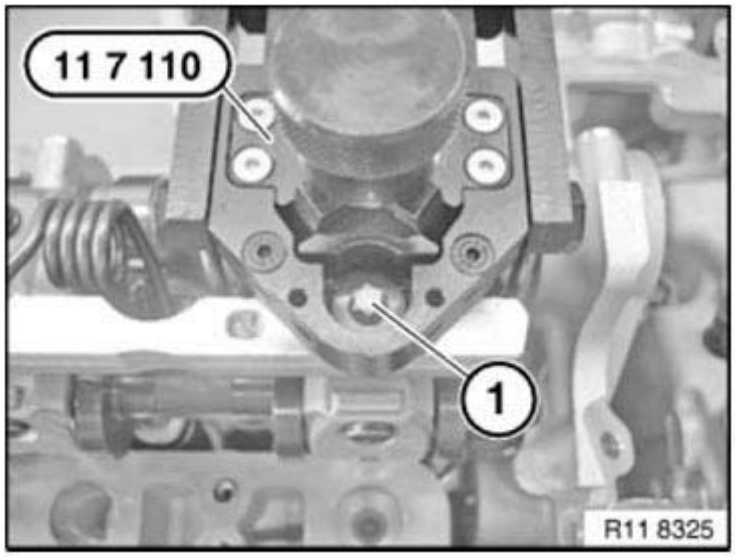


Fig. 351: Identifying Screws And Special Tool 11 7 110
Courtesy of BMW OF NORTH AMERICA, INC.

At cylinder no. 3, adjust oil spray nozzle (2) so that oil spray points precisely towards spline teeth (3).

Insert screw (1) with oil spray nozzle (2) (external).

Tightening torque **11 37 4AZ** .

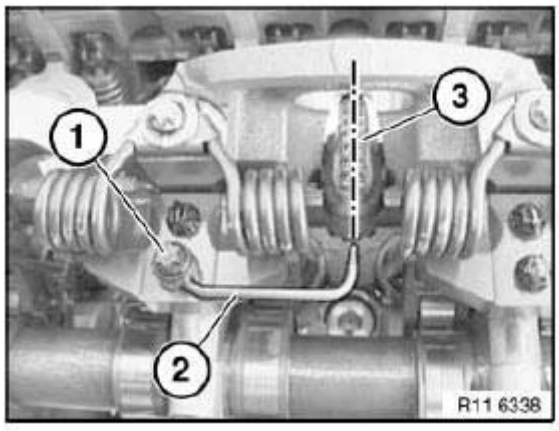


Fig. 352: Identifying Oil Spray Nozzle With Spray
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1140 OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (N52, N52K)

IMPORTANT: The regulated oil pump can only be checked and measured with the diagnosis system.
Vehicles with a regulated oil pump have a HYDRAULIC VALVE fitted.
If a hydraulic valve is fitted, proceed in accordance with CHECKING ENGINE OIL PRESSURE .

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Protect drive belt against dirt
- Have a cleaning cloth ready to catch escaping oil

Disconnect plug connection on oil pressure switch (3)

Remove oil pressure switch (3).

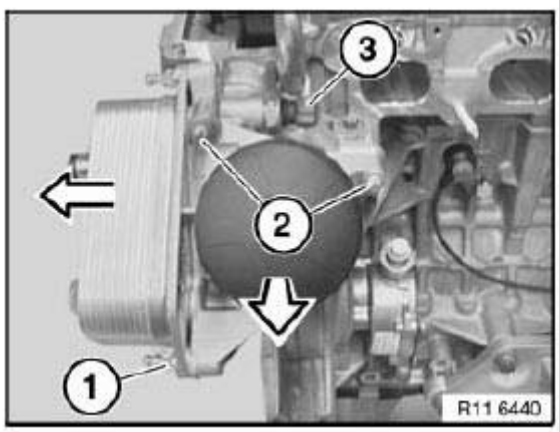


Fig. 353: Disconnecting Plug Connection On Oil Pressure Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 4 050** with sealing ring.

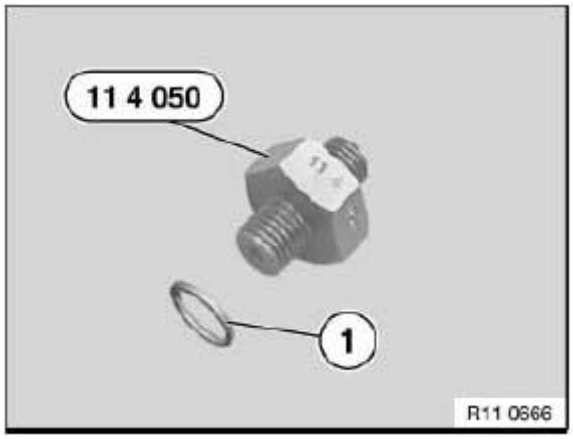


Fig. 354: Identifying Sealing Ring And Special Tool (11 4 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Check engine oil pressure with diagnosis system.

Connect special tools 13 6 054 and 13 6 051.

Check engine oil pressure with pressure gauge.

Connect special tools 13 3 063 and 13 3 061.

Start engine and check engine oil pressure.

Specified values See or **TED-TED-TDMUC1141-N52K-01B1S1 OIL PUMP WITH STRAINER AND DRIVE N52K/B25** .

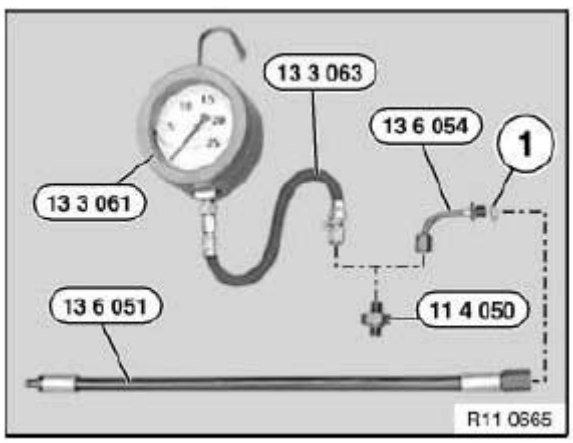


Fig. 355: Checking Engine Oil Pressure With Pressure Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 40 000 CHECKING ENGINE OIL PRESSURE (N53, N52K)

IMPORTANT: The regulated oil pump can only be checked and measured with the diagnosis system.
Vehicles with a regulated oil pump have a HYDRAULIC VALVE fitted.
Diagnosis path:

- **DME Motor Electronics**
- **Complete vehicle**
- **Drive**
- **Engine electronics**
- **Engine oil**
- **Oil-pressure control**

Special tool 11 9 250 must be converted for the N52k and N53.

Necessary preliminary tasks:

- Connect BMW diagnosis system to vehicle.
- Observe diagnosis instructions.
- Protect drive belt against dirt
- Have a cleaning cloth ready to catch escaping oil

Secure special tool 11 9 250 at hexagon head in a vice.

Release insert (2) using a screwdriver (1) in direction of arrow.

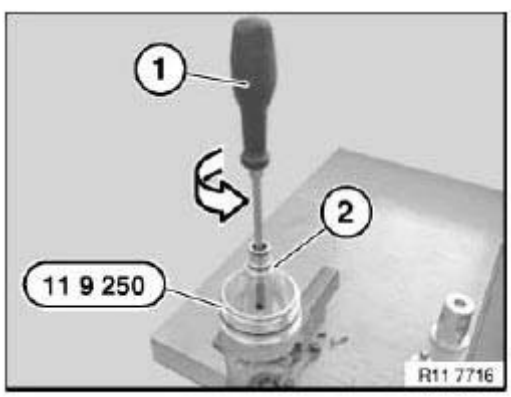


Fig. 356: Releasing Insert Using Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw piece (1) on special tool 11 6 410.

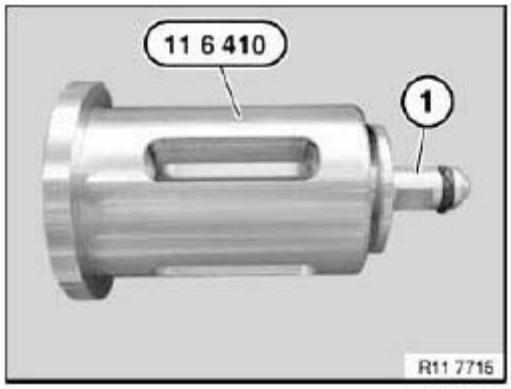


Fig. 357: Releasing Screw Piece On Special Tool 11 6 410
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 11 6 410 in special tool 11 9 250.

Insert central screw with a screwdriver (1) hand-tight.

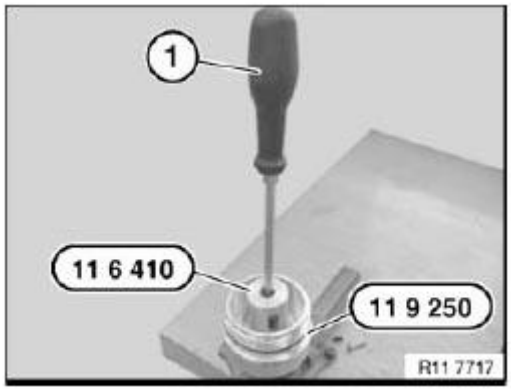


Fig. 358: Inserting Central Screw With Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw piece (1) hand-tight in direction of arrow on special tool 11 6 410.

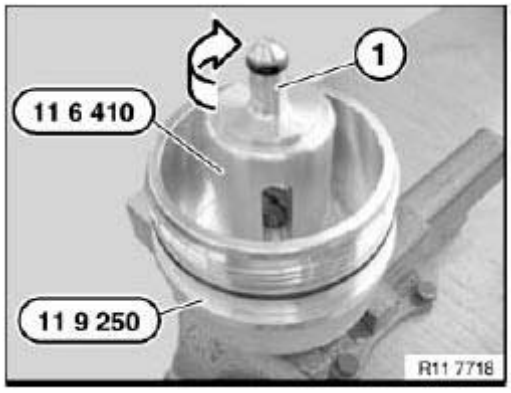


Fig. 359: Inserting Screw Piece With Special Tools (11 6 410 And 11 9 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Release oil filter cap with special tool 11 9 240 .

Tightening torque: **11 42 1 AZ.**

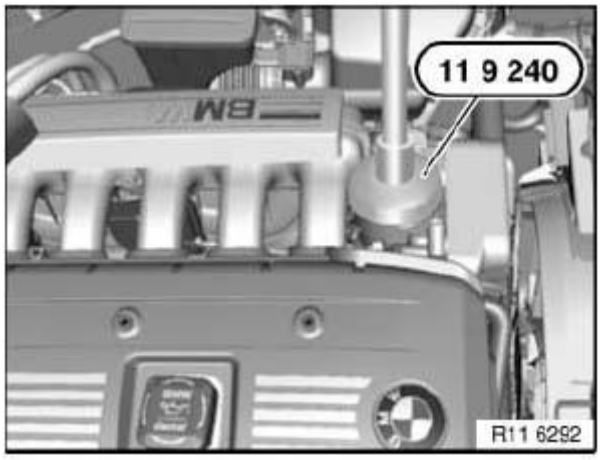


Fig. 360: Releasing Oil Filter Cap Using Special Tool (11 9 240)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully detach filter element.

Installation:

Check all O-rings for damage, replace if necessary.

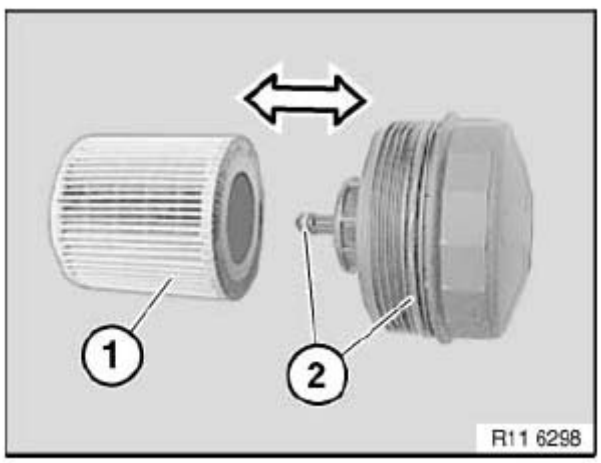


Fig. 361: Identifying Oil Filter Element And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Install filter element (1) in special tool 11 9 250.

Installation:

Coat O-ring with engine oil.

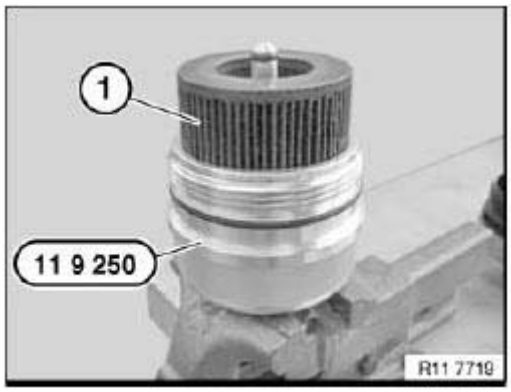


Fig. 362: Installing Filter Element Using Special Tool 11 9 250
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Engine oil pressure measurement is only possible with the diagnosis system.

Screw in special tool 11 9 250 with a filter element.

Secure special tool 13 6 051 with a sealing ring to special tool.

Start engine and check engine oil pressure.

Specified values See **OIL PUMP WITH STRAINER AND DRIVE N53, N52K/B30** or **OIL PUMP WITH STRAINER AND DRIVE N53, N52K/B25** .

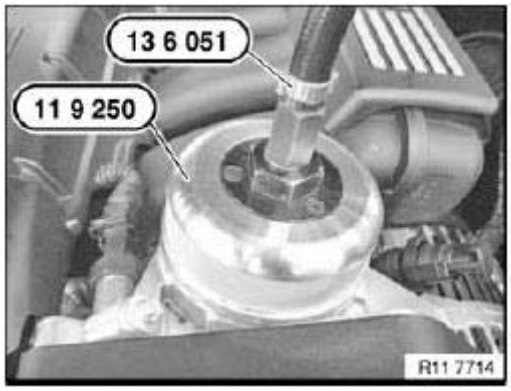


Fig. 363: Identifying Special Tool 13 6 051 With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1141 OIL PUMP WITH FILTER AND DRIVE

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM/OIL PUMP (N47 D20 O1)

IMPORTANT: It is possible to remove and install the vacuum oil pump without removing the transmission.

Necessary preliminary work:

- Removing oil sump.

Release screws (1).

Remove intake snorkel in direction of arrow.

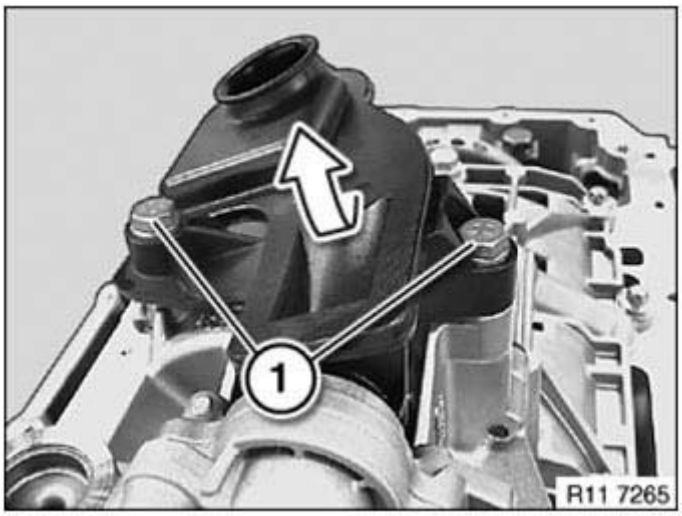


Fig. 364: Removing Intake Snorkel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

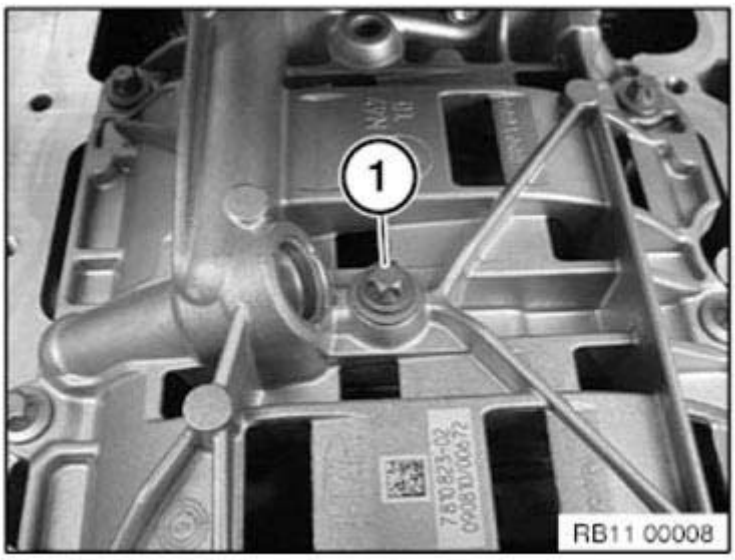


Fig. 365: Identifying Intake Snorkel Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Clean and blow out thread

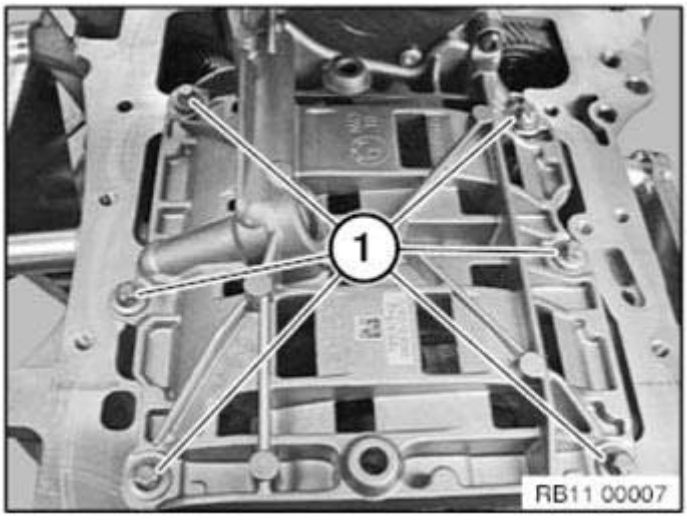


Fig. 366: Identifying Oil Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

When installed, the oil pump chain must be fed out from the sprocket wheel of the oil pump drive gear; the sprocket wheel cannot be removed.

NOTE: Illustration shows gear case cover removed.

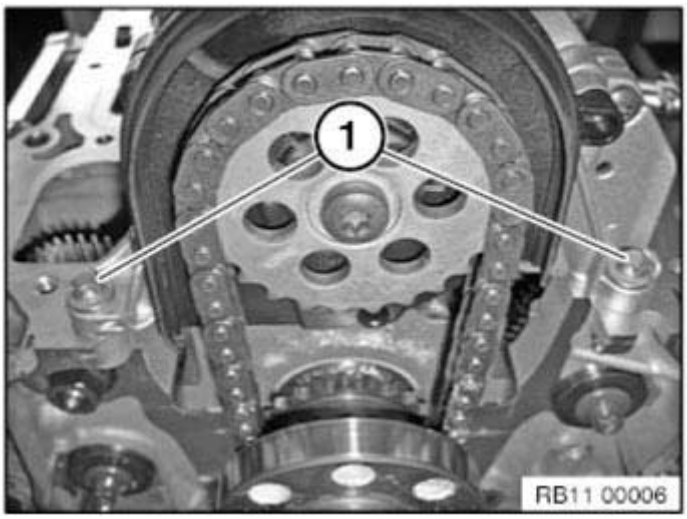


Fig. 367: Identifying Gear Case Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Oil vacuum pump must be fed out at chain drive (1).

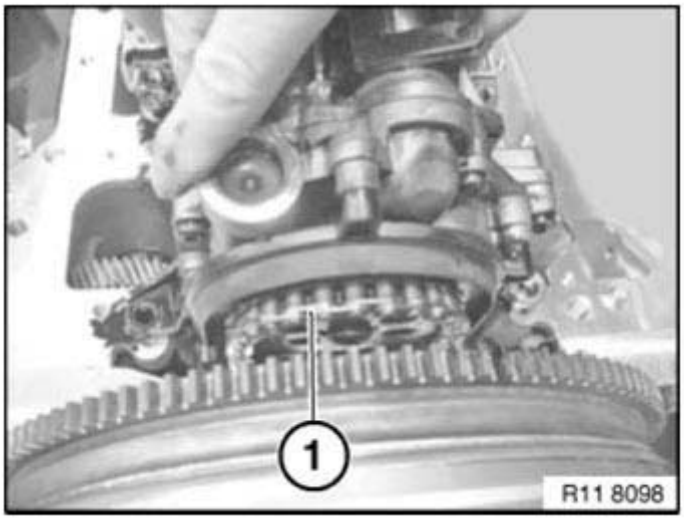


Fig. 368: Identifying Oil Vacuum Pump And Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out oil vacuum pump (1) in direction of arrow and remove.

Installation in reverse sequence.

Installation note:

Clean all sealing surfaces.

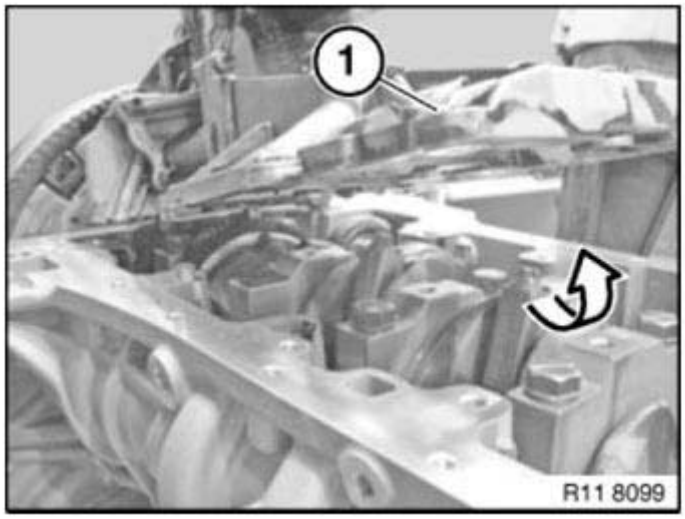


Fig. 369: Removing Oil Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Install all screws (1) and tighten down.

Tightening torque: 11 41 1AZ.

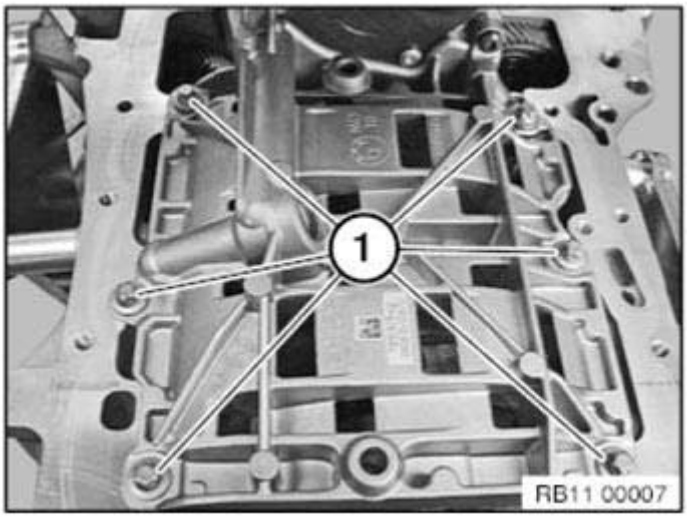


Fig. 370: Identifying Oil Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down screws (1).

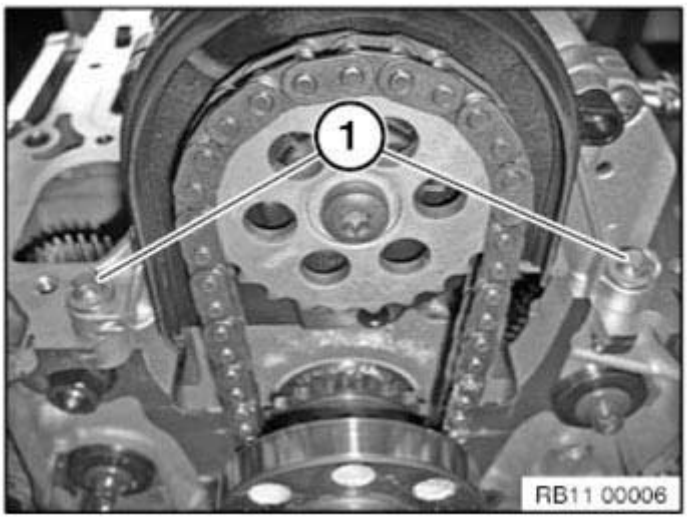


Fig. 371: Identifying Gear Case Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean and blow out thread

Insert and secure screw (1).

Secure screw (1) with special tool 00 9 120 .

Tightening torque, see 11 41 2AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

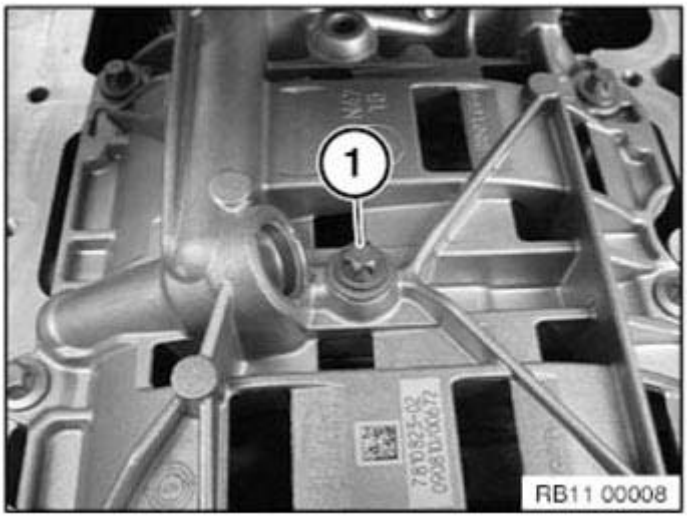


Fig. 372: Identifying Oil Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **OIL SUMP**
- Remove **DRIVE BELT**
- Remove drive belt **TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove **SEALING COVER** for vacuum pump

Procedure on installed engine

Turn sprocket (3) with central bolt at crankshaft into position until special tool 11 0 290 can be secured.

Simultaneously secure special tool 11 0 290 to sprocket (3) and special tool 11 4 362.

Release screw (2) for sprocket (3).

Tightening torque **11 66 2AZ** .

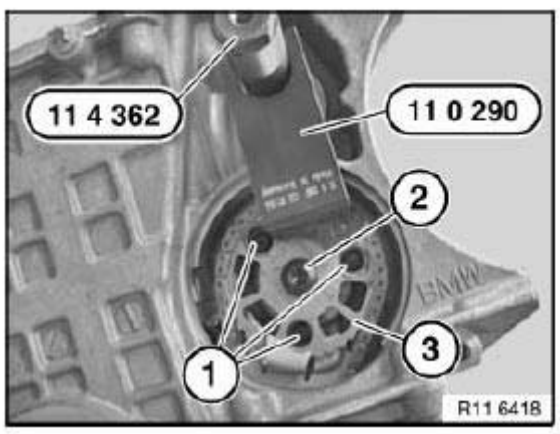


Fig. 373: Turning Sprocket With Central Bolt Using Special Tool (11 0 290)
Courtesy of BMW OF NORTH AMERICA, INC.

Press timing chain with chain tensioner (1) in direction of arrow.

Disconnect timing chain with special tool 11 4 120 .

Feed out sprocket (3) at hexagon head (4) of vacuum pump.

Installation:

If the chain module is replaced, a mounting bar (2) is already pre-installed.

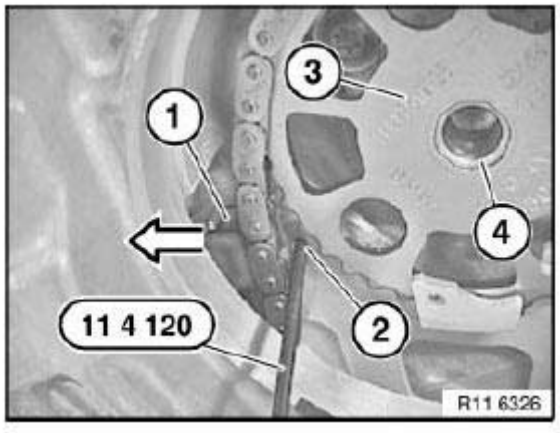


Fig. 374: Disconnecting Timing Chain Using Special Tool (11 4 120)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To release bolt (1), insert a 6 mm drill bit between sprocket and oil pump housing.

Release screw (1) for sprocket.

Tightening torque **11 41 6AZ** .

Release screws (2) for chain module.

Tightening torque **11 41 5AZ** .

Installation:

Replace aluminum screws.

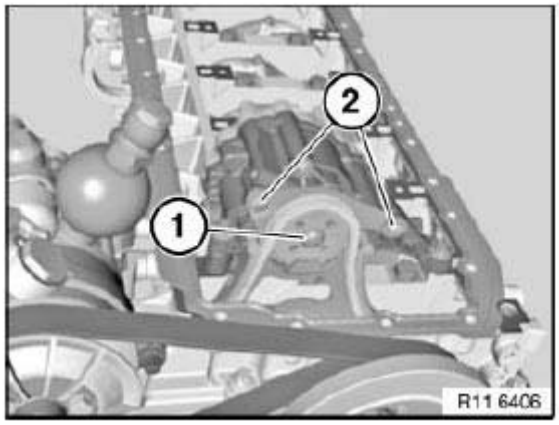


Fig. 375: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankshaft and camshaft with special tools 11 0 300 and 11 4 280 (refer to Checking **TIMING**).

IMPORTANT: Do not remove special tools 11 0 300 and 11 4 280 to release central bolt (1). Employ a second person for gripping when releasing central bolt (1).

Screw special tool 11 9 280 onto hub of vibration damper.

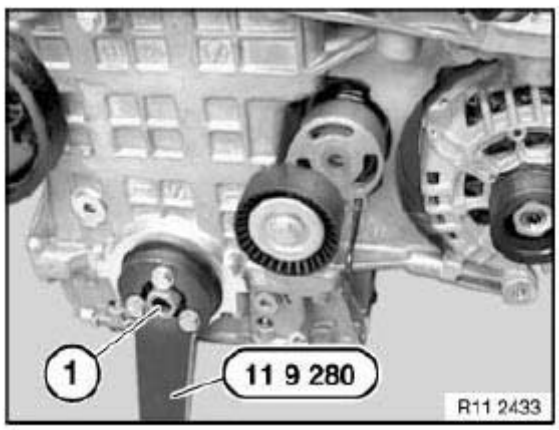


Fig. 376: Tightening Central Bolt Using Special Tool (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Release central screw (1).

Tightening torque **11 21 1AZ** .

Installation:

Replace central bolt (1).

Remove hub (2) towards front.

Installation:

Replace **CRANKSHAFT RADIAL SEAL** at front.

Open screw plug on bedplate.

Tightening torque **11 11 8AZ** .

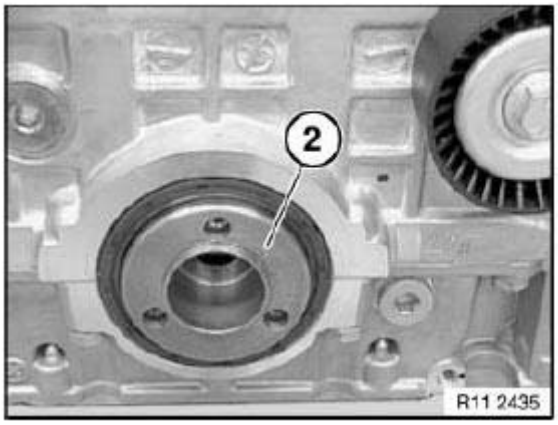


Fig. 377: Identifying Front Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Release aluminum screw (1) with special tool **11 8 640** .

Tightening torque **11 41 4AZ** .

Installation:

Replace aluminum screws.

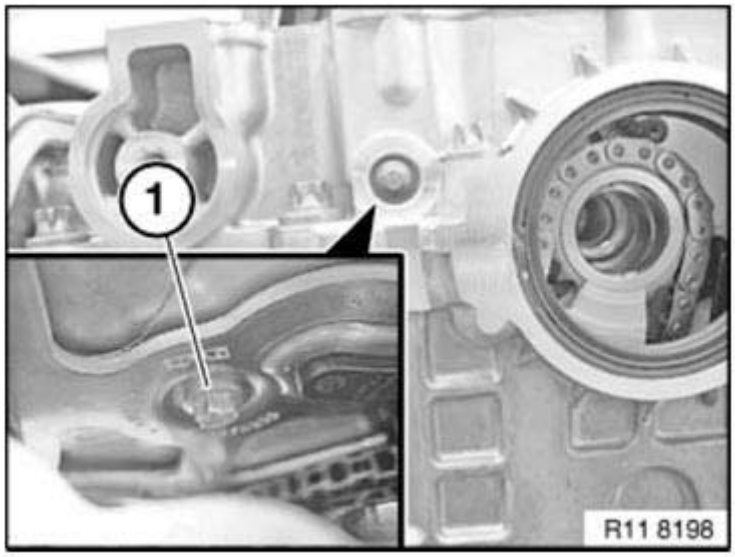


Fig. 378: Identifying Front Hub Aluminum Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove chain module (1) in direction of arrow.

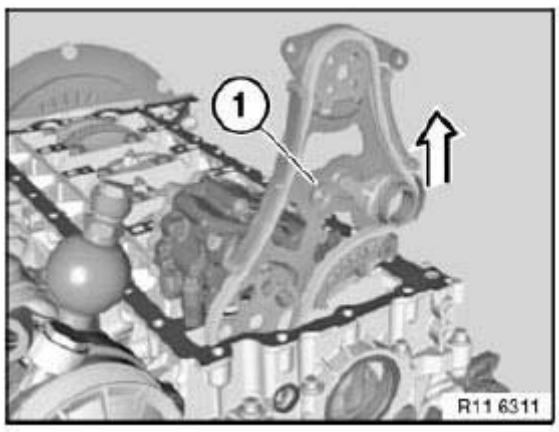


Fig. 379: Removing Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket (2).
Collar (see arrow) on sprocket (2) points to engine .
Incorrect assembly will result in engine damage .

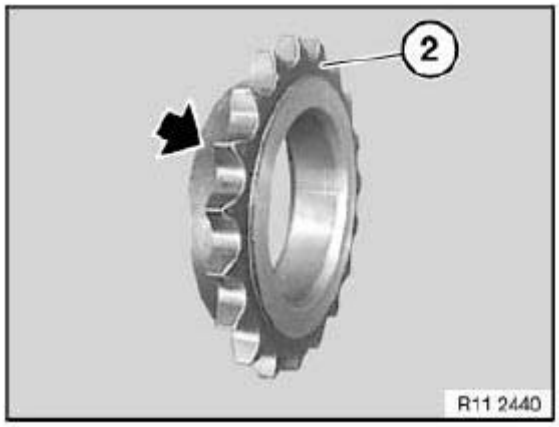


Fig. 380: Locating Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure on removed engine

NOTE: Engine is mounted on special tool 11 4 440 .

Release screw (1) for sprocket.

Tightening torque **11 66 2AZ** .

Release screw (2) for sprocket.

Tightening torque **11 41 6AZ** .

Release central bolt (3).

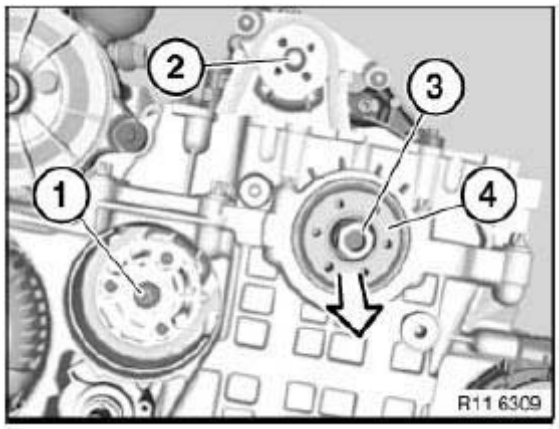


Fig. 381: Removing Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 21 1AZ** .

Installation:

Mark central bolt (3) with a colored dot.

Replace central bolt (3).

Remove hub (4) towards front.

All:

Install hub with new central bolt.

Tighten down special tool 11 5 200 with screws (1) to hub.

Do **not** remove special tools 11 0 300 and 11 4 280 .

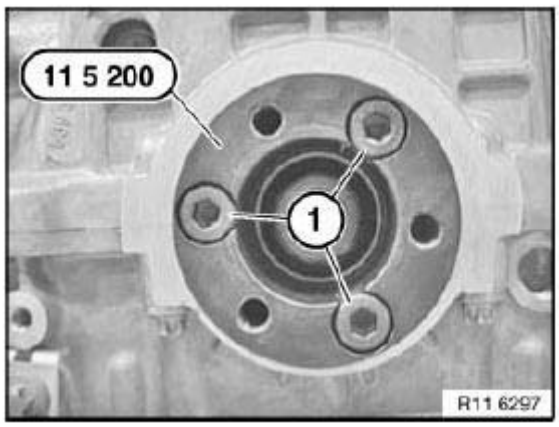


Fig. 382: Identifying Front Hub Screws And Special Tool (11 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TENSIONER** for drive belt.

Screw in special tool 11 4 362 from special tool set 11 4 360 .

Mount special tool 11 9 280 on 11 5 200 .

Support special tool 11 9 280 on special tool 11 4 362.

Special tool 11 0 300 secures crankshaft.

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark central bolt and hub with paint.

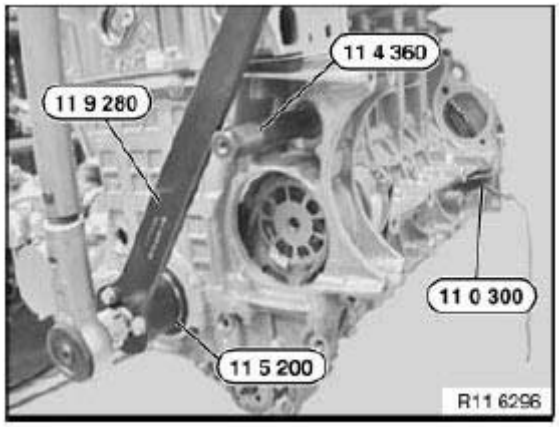


Fig. 383: Tightening Central Bolt Using Special Tools (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Mark special tools with colored line (1).

See picture.

IMPORTANT: Do not remove the special tool while tightening the central bolt to angle of rotation.
Risk of damage!

If necessary, tighten central bolt to angle of rotation with special tool 00 9 140 .

Tightening torque **11 21 1AZ** .

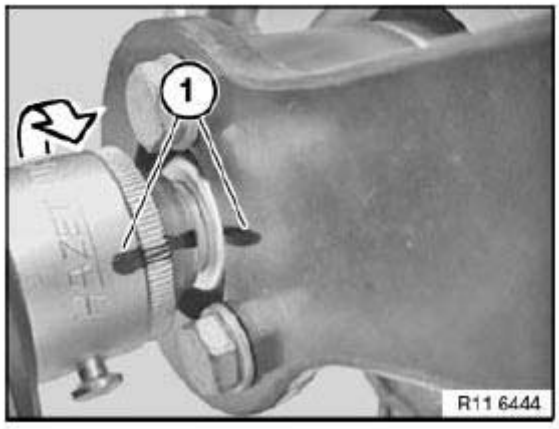


Fig. 384: Tightening Central Bolt And Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace **CRANKSHAFT RADIAL SEAL** at front.

Assemble engine.

11 41 115 REMOVING AND INSTALLING/REPLACING HYDRAULIC VALVE (N52K)

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove front **UNDERBODY PROTECTION**
- Have a cleaning cloth ready to catch escaping oil

Detach plug (1) from hydraulic valve (2).

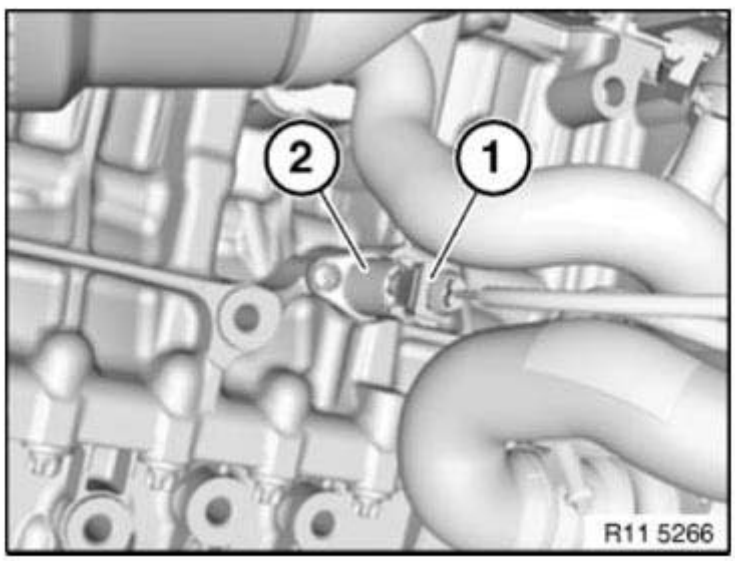


Fig. 385: Identifying Hydraulic Valve With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) and remove hydraulic valve (2).

Tightening torque

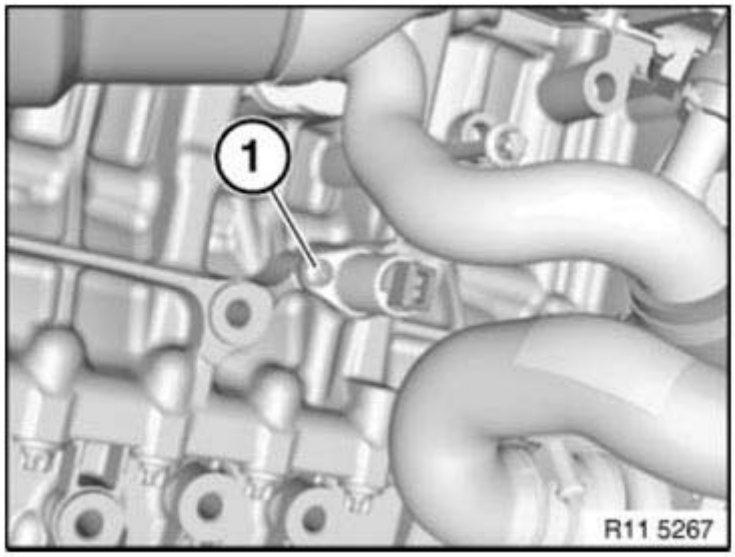


Fig. 386: Identifying Hydraulic Valve Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Replace O-ring (1).

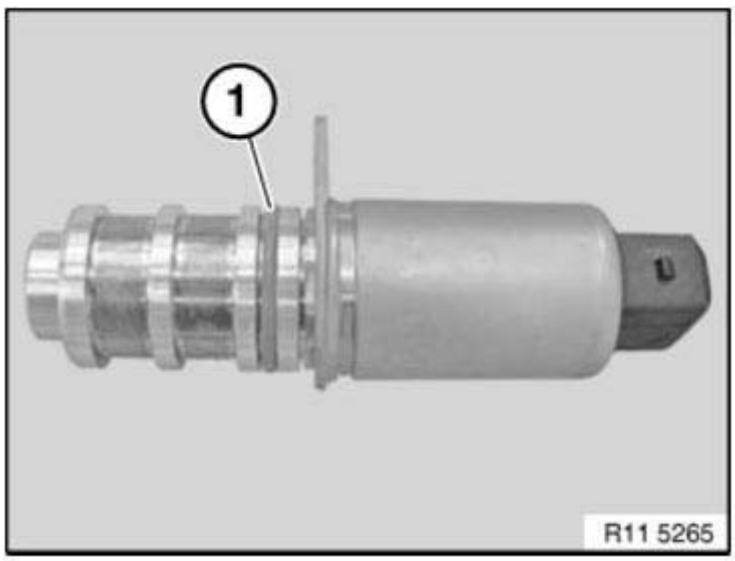


Fig. 387: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

11 41 000 REMOVING AND INSTALLING/REPLACING OIL PUMP (N52K)

Necessary preliminary tasks:

- Remove **OIL SUMP**

Release screws (1).

Tightening torque **11 41 1AZ** .

Installation:

Replace aluminum screws.

Remove intake pipe (2) in direction of arrow.

Installation:

Replace sealing ring.

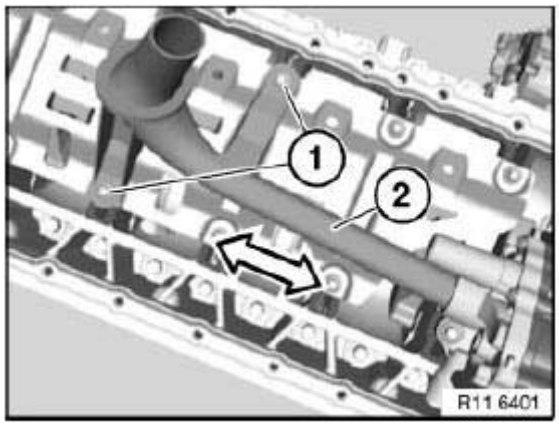


Fig. 388: Removing Oil Pump Intake Pipe And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: To release bolt (1), insert a 6 mm drill bit between sprocket wheel and oil pump housing.

Release bolt (1).

Tightening torque **11 41 6AZ** .

Release screws (2).

Tightening torque **11 41 5AZ** .

Installation:

Replace aluminum screws.

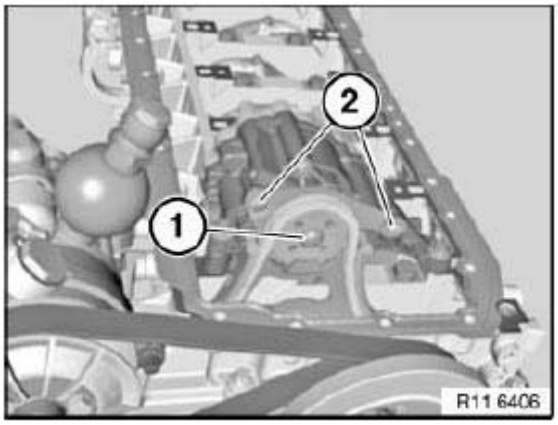


Fig. 389: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different screw lengths.

Release screws (1).

Tightening torque **11 41 2AZ** .

Tightening torque **11 41 3AZ** .

Installation:

Replace aluminum screws.

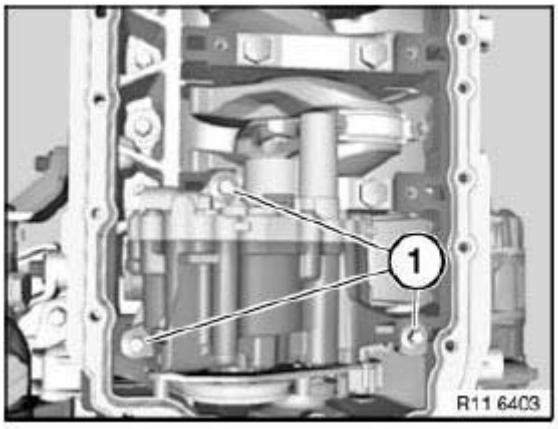


Fig. 390: Identifying Oil Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket wheel (1) in direction of arrow.

NOTE: Chain tensioner presses timing chain (3) upwards.

Do **not** remove sprocket wheel (1).

Remove oil pump (2) in direction of arrow.

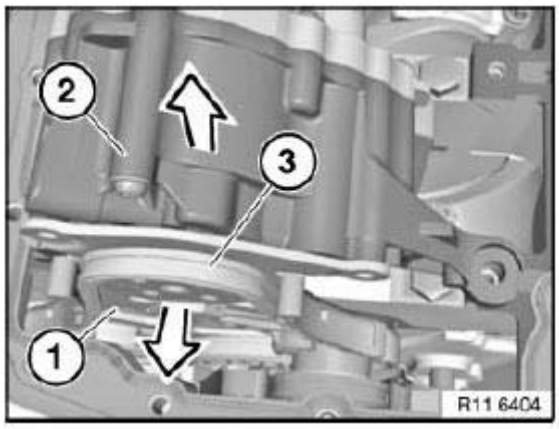


Fig. 391: Detaching Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spacers (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel (4).

Install oil pump (2).

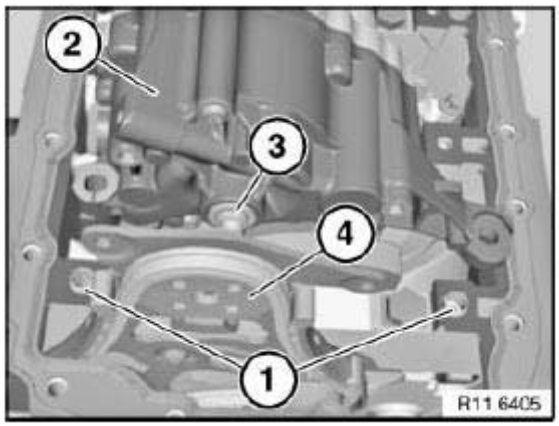


Fig. 392: Identifying Spacers, Oil Pump And Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1142 OIL FILTER AND LINES

11 42 020 REMOVING AND INSTALLING/REPLACING FULLFLOW OIL FILTER (N52)

WARNING: Danger of scalding!
Only perform these tasks on an engine that has cooled down.

Recycling

Catch and dispose of drained coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks:

- Drain **COOLANT** .
- Remove intake air **MANIFOLD** .
- Unfasten oil filter cover.
- Protect drive belt against dirt.

Release screw (1).

Tightening torque: **11 42 2AZ.**

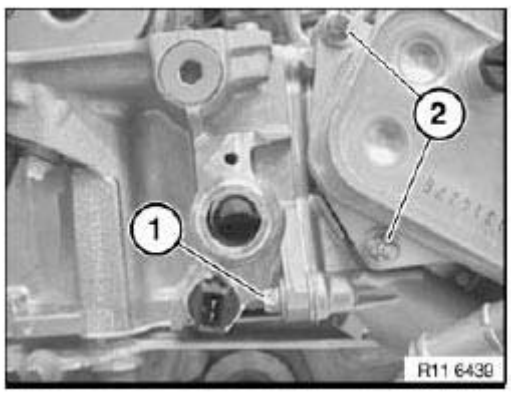


Fig. 393: Identifying Oil Filter Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

NOTE: Have cleaning cloth ready to catch residual oil.

Tightening torque: **11 42 2AZ.**

Installation:

Replace all seals.

If necessary, replace filter element.

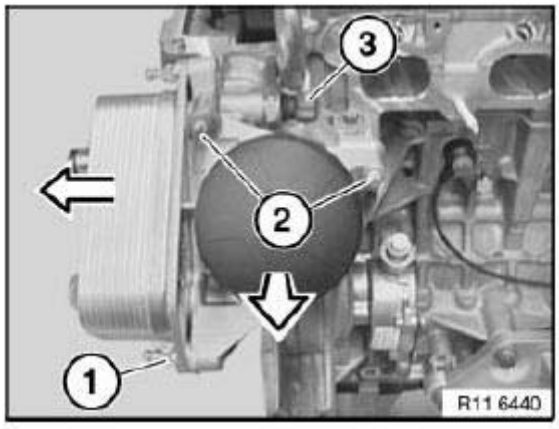


Fig. 394: Disconnecting Plug Connection On Oil Pressure Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

NOTE: Protect drive belt against dirt.

Installation:

VENTING INSTRUCTIONS must be observed without fail.

1151 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/REPLACING WATER PUMP (N52K)

WARNING: Danger of scalding!
Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste-disposal regulations.

IMPORTANT: If a water pump that has already been operated is reused, it must be filled with coolant immediately after removal.
Mixture ratio, water: coolant = 1 : 1

Protect plug connections against coolant and contamination.

Cover plug connections with suitable materials.

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.
Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic .
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

Necessary preliminary tasks:

- Remove **COOLANT THERMOSTAT**
- Remove front right **CROSS STRUT** (**E89 only**)

Loosen hose clamps (1).

Remove coolant hose.

Tightening torque **11 53 5AZ** .

Unfasten hose clip (2).

Remove coolant hose.

Tightening torque **11 53 3AZ** .

Disconnect plug connection (4).

Release screws (3).

Tightening torque **11 53 1AZ** .

Release screws (5).

Tightening torque **11 51 1AZ** .

Installation:

Replace aluminum screws.

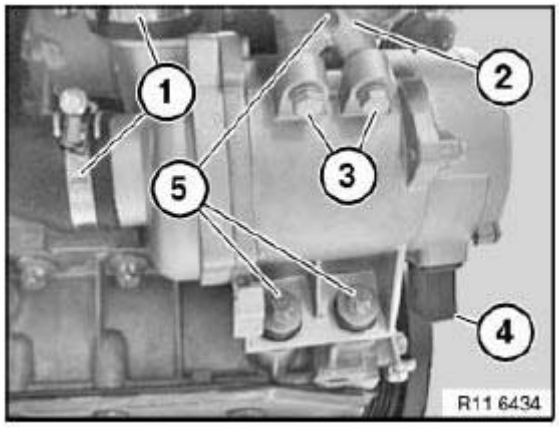


Fig. 395: Identifying Coolant Hose, Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If the electric water pump is reused, it must be rotated one turn due to the breakaway torque at the blade wheels.

Assemble engine.

VENTING INSTRUCTIONS must be observed **without fail** .

1153 THERMOSTAT AND CONNECTIONS

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N52K)

WARNING: Risk of scalding!
Only perform these tasks on an engine that has cooled down.
Danger of injury!
Risk of skidding due to coolant on the floor.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

IMPORTANT: Read and comply with GENERAL NOTES .
Protect plug connections against coolant and dirt contamination.
Cover plug connections with suitable materials.

Necessary preliminary work:

- Remove **FRONT UNDERBODY PROTECTION**

- Release **ANTI-ROLL BAR ON FRONT AXLE (E89 only)**
- Remove **FAN COWL (only E89, E70)**

NOTE: E89 only

Release screws (1) (only on front axle support)

Tightening torque **17 10 5AZ** .

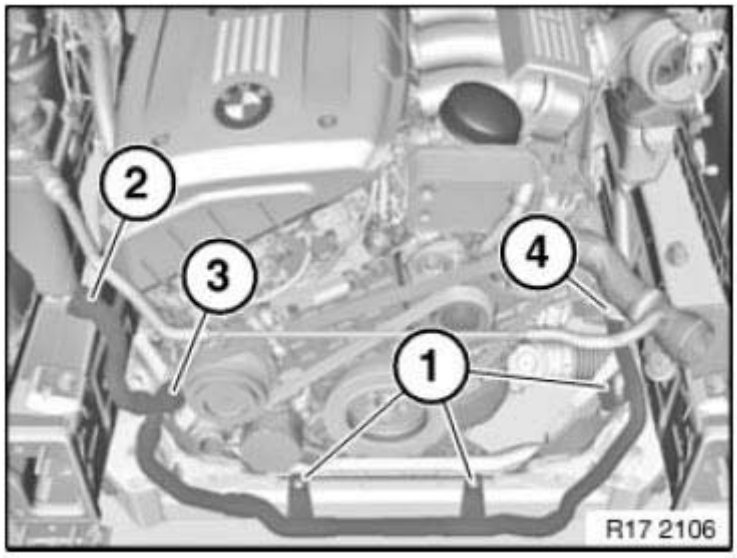


Fig. 396: Identifying Screws On Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration shows coolant thermostat removed.

Disconnect coolant hoses (arrows) on the thermostat (1) with clamping tongs.

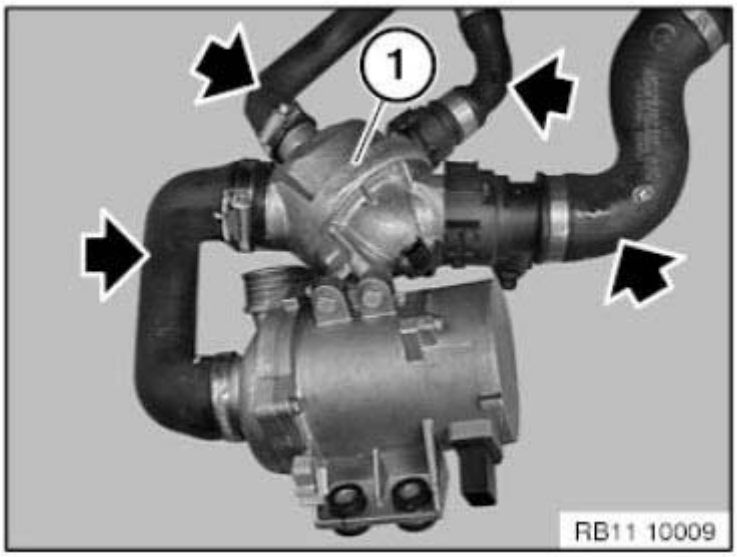


Fig. 397: Locating Coolant Hoses On Thermostat
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For a better overview, the picture and text refer to the component when removed.

Unfasten hose clamp (1).

Tightening torque **11 53 5AZ** .

Remove coolant hose.

Unfasten hose clamp (2).

Tightening torque **11 53 6AZ** .

Remove coolant hose.

Unlock and detach coolant hose (3).

Unlock and detach coolant hose (4).

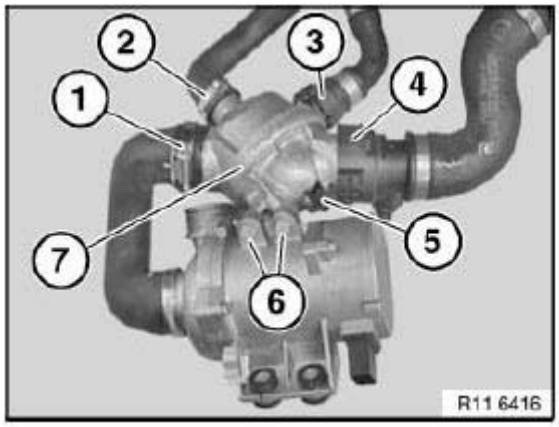


Fig. 398: Identifying Coolant Thermostat, Hose Clamps, Coolant Hoses And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (5).

Release screws (6).

Tightening torque **11 53 1AZ** .

Remove coolant thermostat (7).

Assemble engine.

FILL THE COOLING SYSTEM .

CHECK THE COOLING SYSTEM FOR TIGHTNESS AND FUNCTION.

1161 INTAKE MANIFOLD

11 61 050 REMOVING AND INSTALLING AIR INTAKE MANIFOLD (N52K)

Necessary preliminary tasks:

- Remove **TENSION STRUT**
- Remove **INTAKE FILTER HOUSING**
- Remove **IGNITION COIL COVER**

Open holder (2).

Disconnect plug connection (1) under of air intake manifold.

Release both crankcase breathers (3).

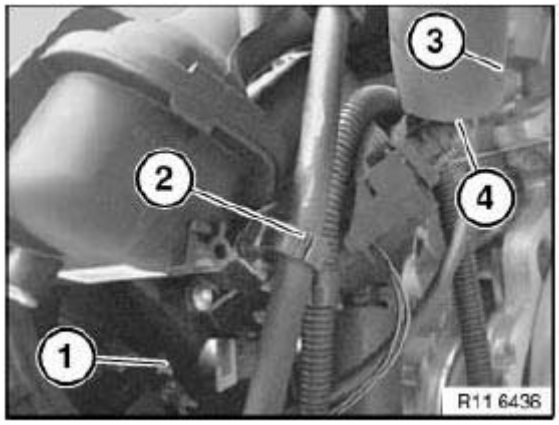


Fig. 399: Identifying Plug Connection, Crankcase Breathers And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Disconnect plug connection (3).

Release screws (4).

Detach engine wiring harness (2) from air intake manifold and lay to one side.

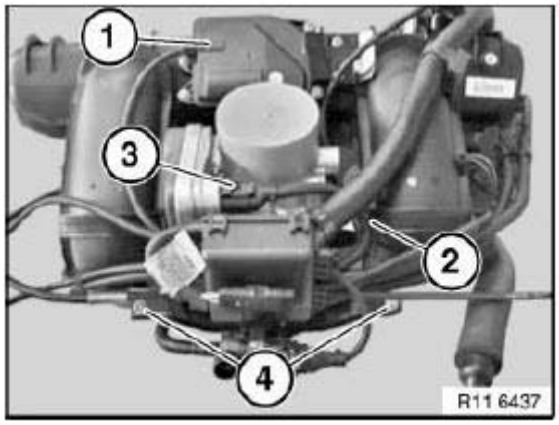


Fig. 400: Identifying Engine Wiring Harness, Plug Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil pressure switch (2).

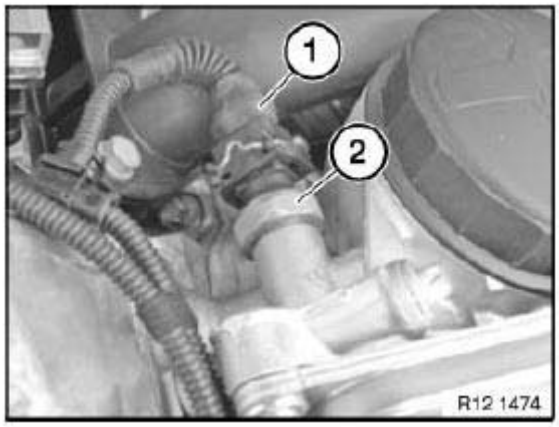


Fig. 401: Identifying Plug Connection On Oil Pressure Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Release fuel rail (2) and lay to one side.

NOTE: Do not detach fuel line.

Release screws (1).

Tightening torque **11 61 1AZ** .

Unscrew nuts (3).

Tightening torque **11 61 2AZ** .

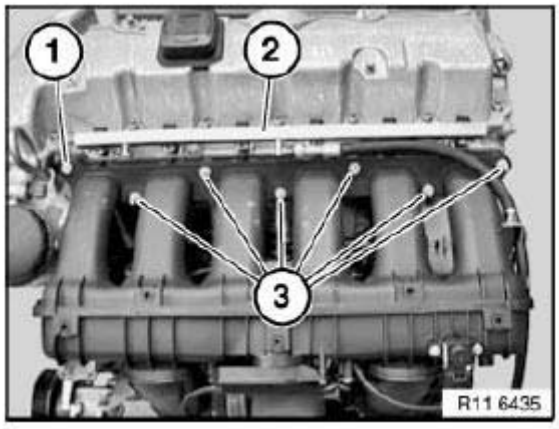


Fig. 402: Identifying Fuel Rail With Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Raise air intake manifold approx. 10 cm.

Disconnect plug connections (1) at bottom.

Release tank vent line behind throttle valve assembly.

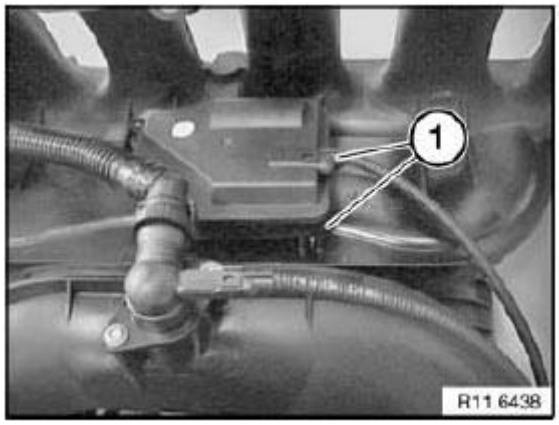


Fig. 403: Identifying Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace all seals.

Assemble engine.

1162 EXHAUST MANIFOLD

18 40 050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52K)

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Follow safety instructions for handling refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A .
Avoid contact with refrigerant and refrigerant oil
Follow safety instructions for HANDLING REFRIGERANT OIL .

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours:
Replace DESICCANT INSERT for A/C system.

Necessary preliminary tasks

- Remove **REAR EXHAUST MANIFOLD**
- Drain off **AIR CONDITIONING SYSTEM**

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **CONTROL SENSOR** from cylinders 1 to 3.

Remove **MONITOR SENSOR** from cylinders 1 to 3.

Release screws (1).

Tightening torque **64 52 1AZ** .

Detach pressure and suction lines from A/C compressor.

Installation:

Replace all sealing rings and moisten with refrigerant oil.

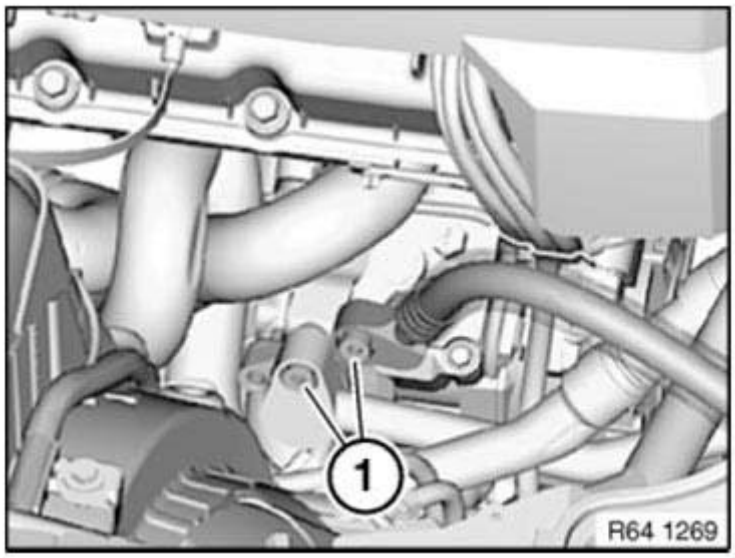


Fig. 404: Identifying Suction Lines Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

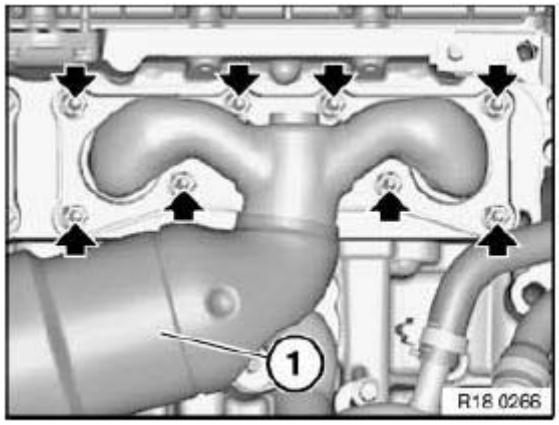


Fig. 405: Locating Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Evacuate and fill **A/C SYSTEM** .

Check exhaust system for leaks.

18 40 060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52K)

Necessary preliminary tasks

- Remove right **TENSION STRUT**
- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Remove **COMPLETE EXHAUST SYSTEM**

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **CONTROL SENSOR** from cylinders 4 to 6.

Remove **MONITOR SENSOR** from cylinders 4 to 6.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

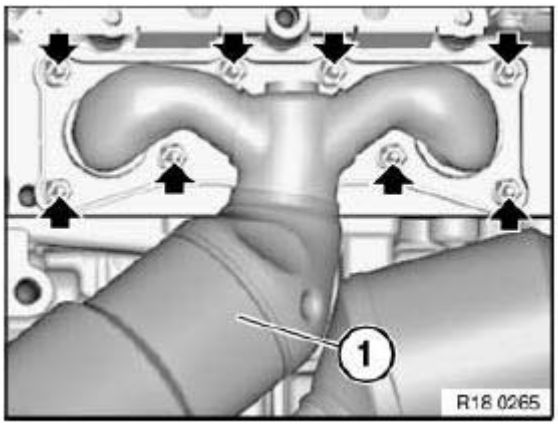


Fig. 406: Locating Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leaks.

1166 VACUUM PUMP

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM/OIL PUMP (N47 D20 O1)

IMPORTANT: It is possible to remove and install the vacuum oil pump without removing the transmission.

Necessary preliminary work:

- Removing oil sump.

Release screws (1).

Remove intake snorkel in direction of arrow.

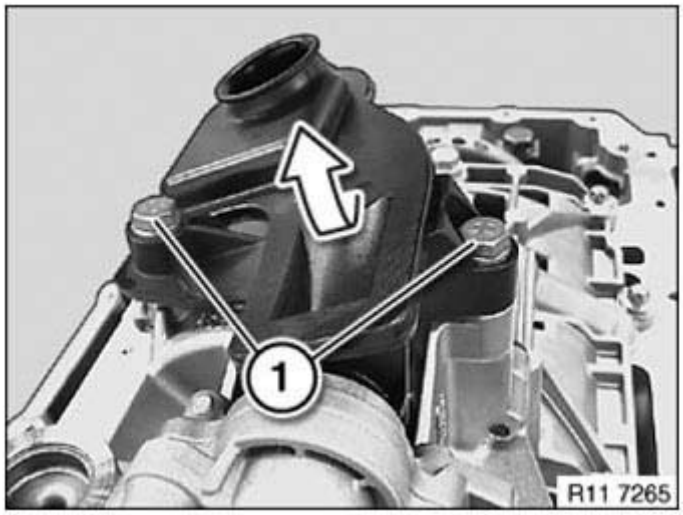


Fig. 407: Removing Intake Snorkel And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

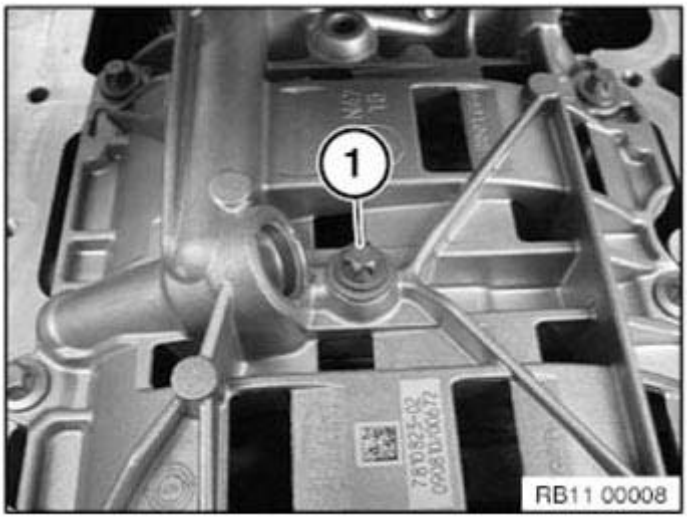


Fig. 408: Identifying Oil Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Clean and blow out thread

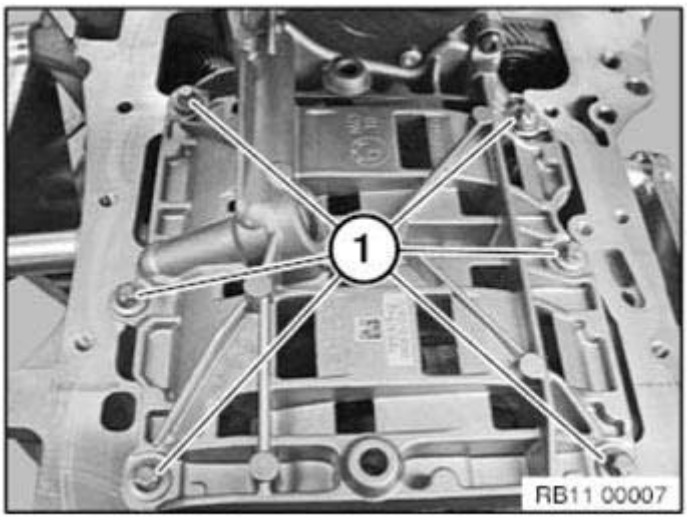


Fig. 409: Identifying Oil Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

When installed, the oil pump chain must be fed out from the sprocket wheel of the oil pump drive gear; the sprocket wheel cannot be removed.

NOTE: Illustration shows gear case cover removed.

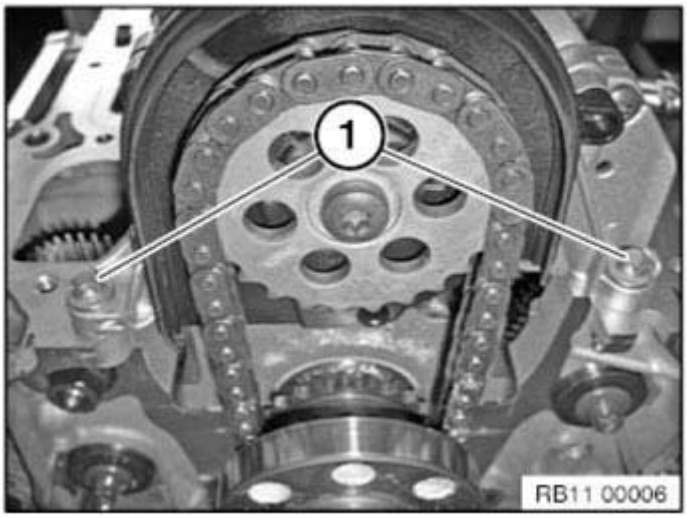


Fig. 410: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Oil vacuum pump must be fed out at chain drive (1).

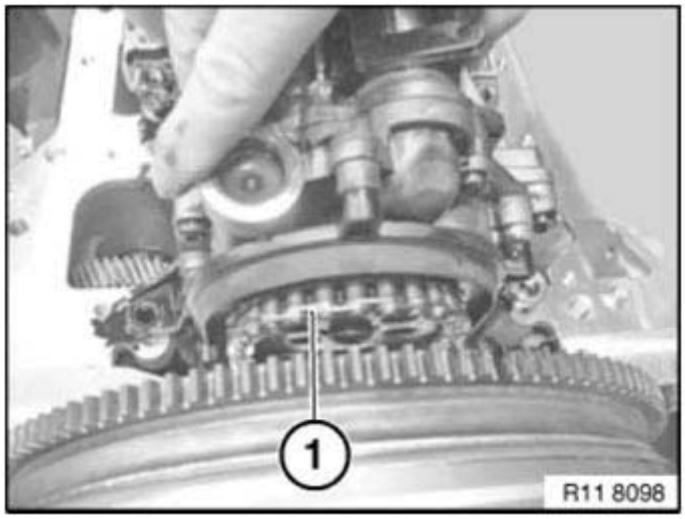


Fig. 411: Identifying Oil Vacuum Pump Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out oil vacuum pump (1) in direction of arrow and remove.

Installation in reverse sequence.

Installation note:

Clean all sealing surfaces.

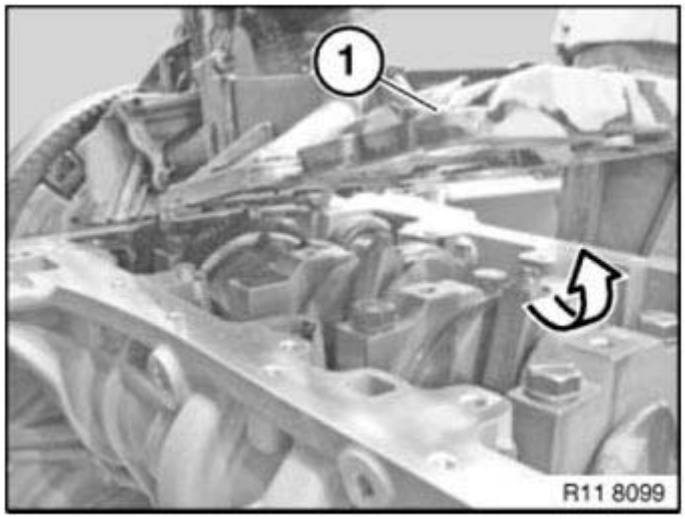


Fig. 412: Feeding Oil Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Install all screws (1) and tighten down.

Tightening torque, see 11 41 1AZ in **OIL PUMP WITH STRAINER AND DRIVE** .

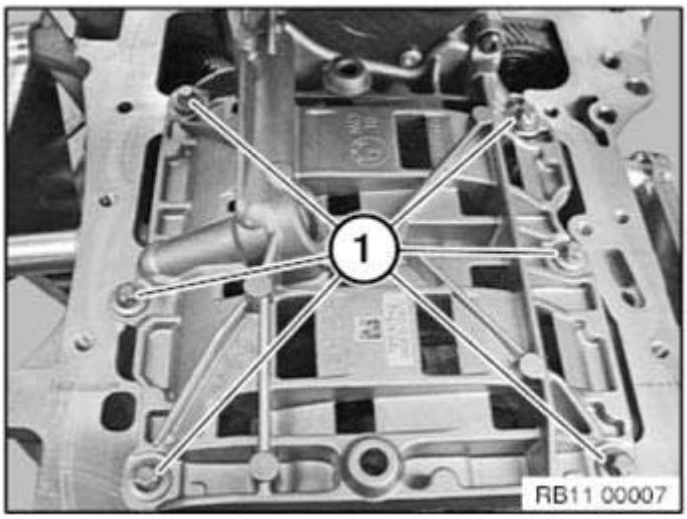


Fig. 413: Identifying Oil Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down screws (1).

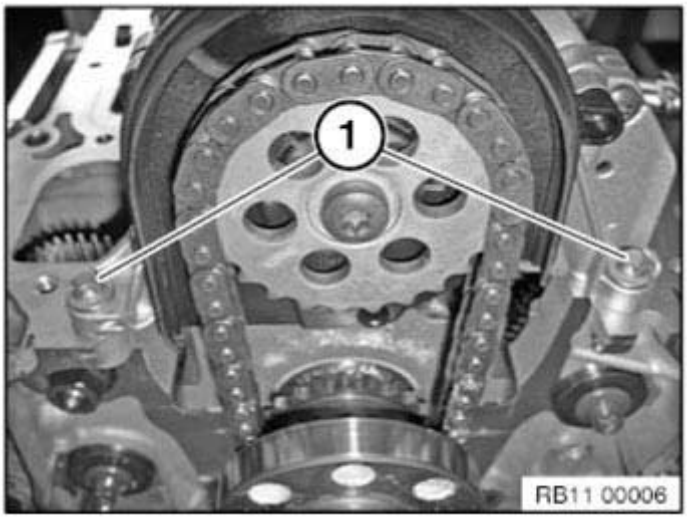


Fig. 414: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean and blow out thread

Insert and secure screw (1).

Secure screw (1) with special tool 00 9 120 .

Tightening torque, see 11 41 2AZ in **OIL PUMP WITH STRAINER AND DRIVE** .

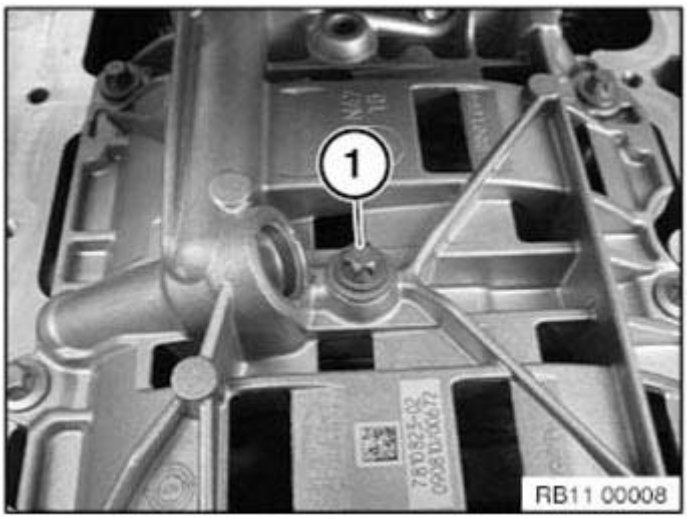


Fig. 415: Identifying Oil Vacuum Pump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1178 EMISSION CONTROL, OXYGEN SENSOR

11 78 513 REPLACING BOTH LAMBDA OXYGEN CONTROL SENSORS (N52K)

WARNING: Scalding hazard!
Work should only be carried out on an exhaust system that has cooled down.

Installation:

The threads of new lambda control sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda control sensor is to be reused, apply a thin and even coating of Never Seez compound to the thread only.

The part of the lambda control sensor which projects into the exhaust system branch (sensor ceramics) must not be cleaned and not coated with lubricant.

Lambda control sensor, cylinder nos. 1 to 3

NOTE: The lambda control sensor on the exhaust manifold of cylinder nos. 1 to 3 is accessible from above.
Disconnect plug connection.
Unclip the cable from the retainer.
Release lambda control sensor on exhaust manifold of cylinder nos. 1 to 3 with

special tool 11 7 020 .

Lambda control sensor, cylinder nos. 4 to 6

NOTE: The lambda control sensor on the exhaust manifold of cylinder nos. 4 to 6 is accessible from above.

Disconnect plug connection.

Unclip the cable from the retainer.

Release screws (1) on retaining plate.

Remove retaining plate (3).

Release lambda control sensor (2) on exhaust manifold of cylinder nos. 4 to 6 with special tool 11 7 020 .

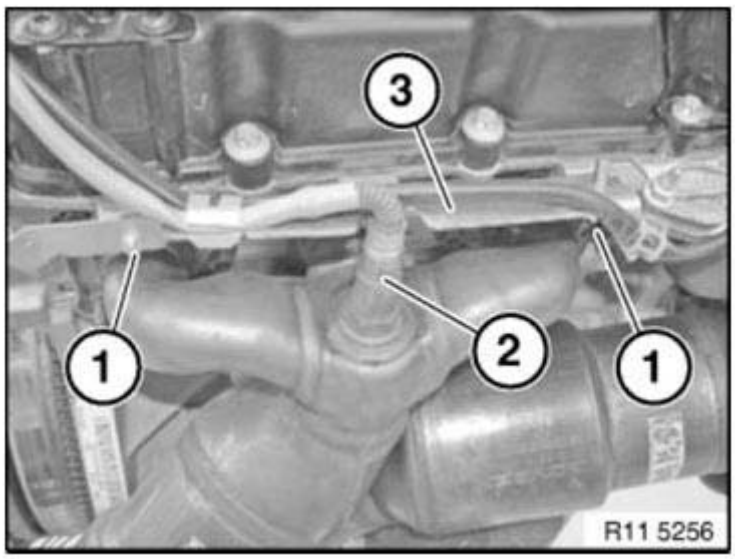


Fig. 416: Identifying Lambda Control Sensor, Retaining Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

All:

Installation:

Cable color of lambda control sensor, cylinders nos. 1 to 3 = black.

Cable color of lambda control sensor, cylinders nos. 4 to 6 = grey.

Tightening torque **11 78 1AZ** .

Assemble engine.

Check function of DME.

11 78 613 REPLACING BOTH LAMBDA OXYGEN MONITORING SENSORS (N52K)

> **WARNING: Scalding hazard!**
> **Work should only be carried out on an exhaust system that has cooled down.**

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION** .

Installation:

The threads of new lambda monitoring sensors are already coated with Never Seez Compound (refer to BMW Parts Department).

If a lambda monitoring sensor is to be reused, apply a thin and even coating of Never Seez Compound to the thread only.

The part of the lambda monitoring sensor which projects into the exhaust system branch (sensor ceramics) must **not** be cleaned and **not** coated with lubricant.

Disconnect plug connection for oxygen monitoring sensor.

Release and tighten lambda monitoring sensor (1) on exhaust manifold of cylinder nos. 1 to 3 with special tool (2) 11 9 150 .

Tightening torque **11 78 1AZ** .

Installation:

Cable color of lambda monitoring sensor (1), cylinders nos. 1 to 3 = black.

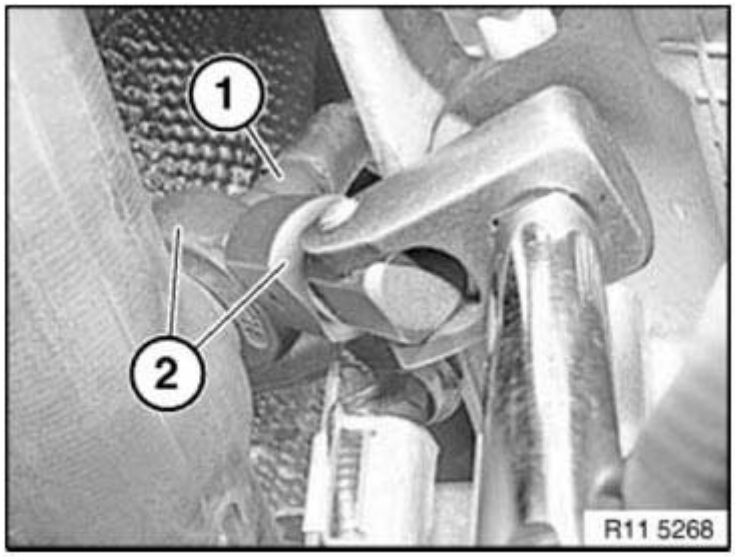


Fig. 417: Removing Lambda Monitoring Sensor Plug Connection Using Special Tool (11 9 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for oxygen monitoring sensor.

Release and tighten lambda monitoring sensor (1) on exhaust manifold of cylinder nos. 4 to 6 with special tool (2) 11 9 150 .

Tightening torque **11 78 1AZ** .

Installation:

Cable color of lambda monitoring sensor (1), cylinders nos. 4 to 6 = grey.

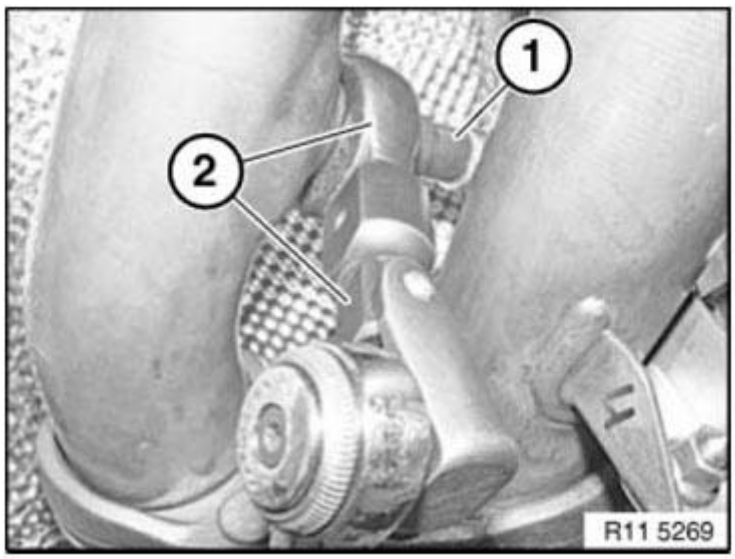


Fig. 418: Removing Lambda Monitoring Sensor Plug Connection Using Special Tool (11 9 150)

Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 00 ENGINE, GENERAL

11 00 039 CHECKING COMPRESSION IN ALL CYLINDERS (N43/N53/N54)

- Read out fault memory of DME control unit
- Check stored faults
- Rectify faults
- Delete fault memory

IMPORTANT: High tension - mortal danger!

Interrupt power supply to ignition coils.

Read and comply with notes on compression pressure check.

Necessary preliminary tasks

- Remove spark plugs

Unscrew tip (1) from special tool 11 0 222.

IMPORTANT: Then check the Schrader valve that is now visible for secure seating.

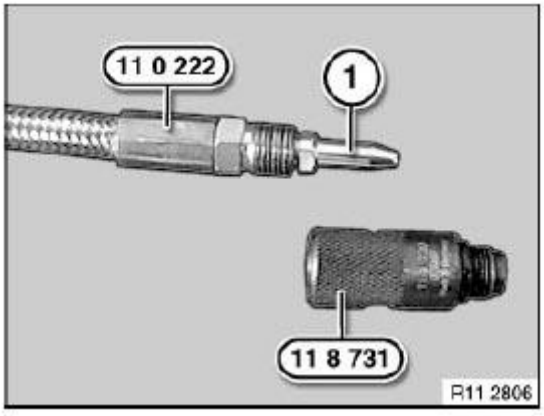


Fig. 1: Removing Tip From Special Tool 11 0 222
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool 11 0 222 in conjunction with 11 8 732 and 11 8 731.

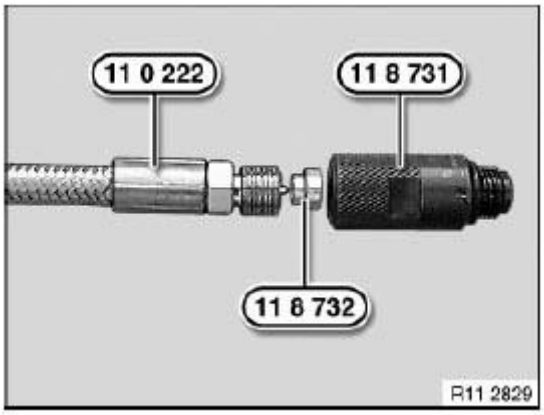


Fig. 2: Identifying Special Tool 11 0 222, 11 8 732 And 11 8 731
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 0 222 into special tool 11 8 731 to 10 Nm.

IMPORTANT: Oil thread on special tool 11 8 731.

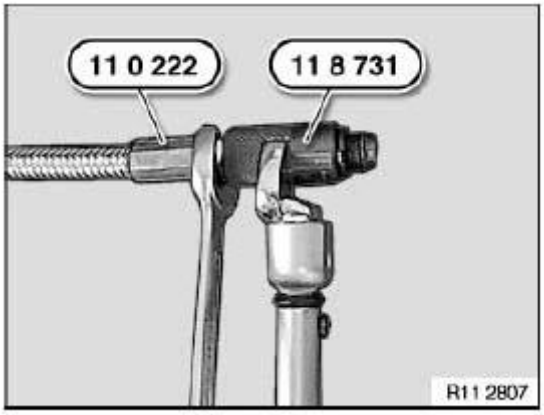


Fig. 3: Inserting Special Tool 11 0 222 Into Special Tool 11 8 731
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 0 222 by hand into spark plug thread and connect special tool 11 0 224.

Use adapter (1) if the compression pressure is being checked with the BMW diagnosis system.

Depress accelerator pedal and actuate starter until compression pressure stops rising.

- **NOMINAL VALUES** , compression pressure

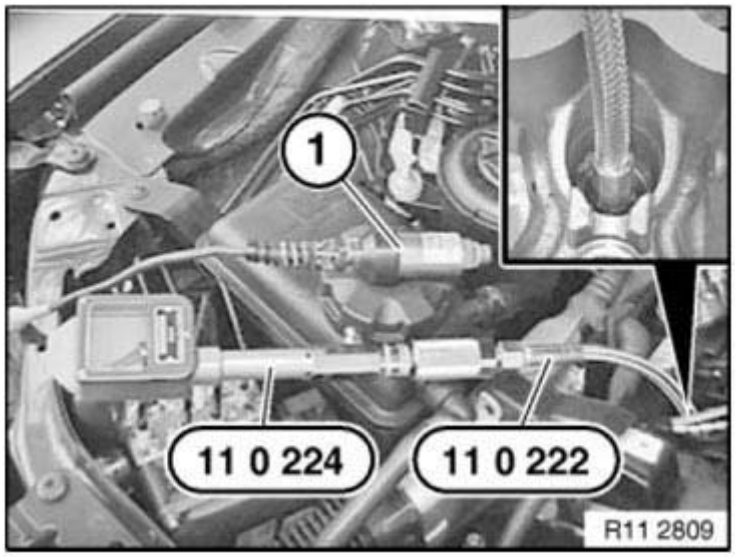


Fig. 4: Installing Special Tool 11 0 222 Into Spark Plug Thread
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine

Delete fault memory.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

ENGINE IDENTIFICATION

Punch engine numbers at marked surface with number punch.

Magnesium crankcase with sticker

M47/M47TU/M47T2

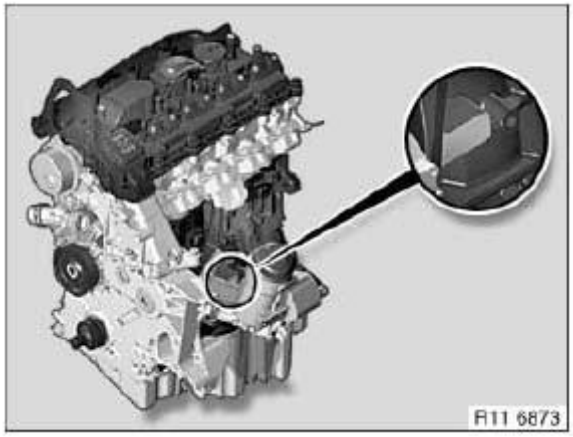


Fig. 5: Identifying Engine Identification Numbers Location (M47/M47TU/M47T2)
Courtesy of BMW OF NORTH AMERICA, INC.

M57/M57TU/M57T2

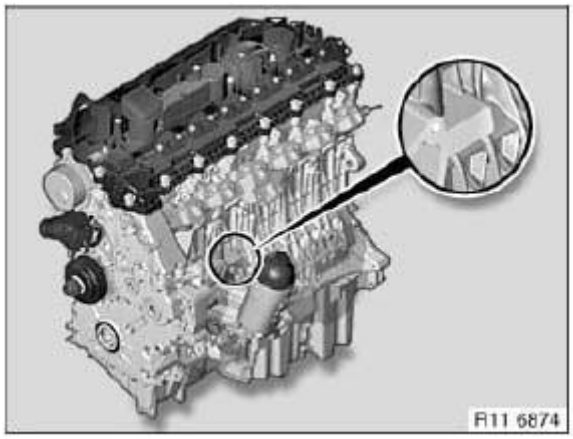


Fig. 6: Identifying Engine Identification Numbers Location - M57/M57TU/M57T2
Courtesy of BMW OF NORTH AMERICA, INC.

M67/M67TU

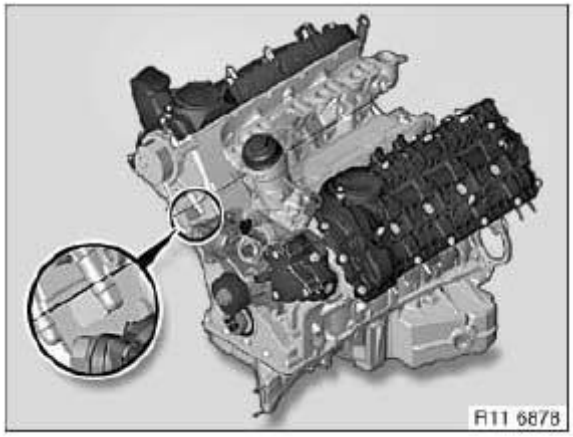


Fig. 7: Identifying Engine Identification Numbers Location - M67/M67TU
Courtesy of BMW OF NORTH AMERICA, INC.

N47/N47S/N47C/N57 N57S

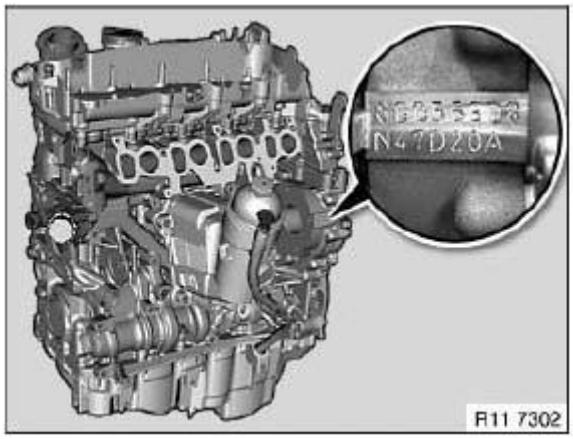


Fig. 8: Identifying Engine Identification Numbers Location - N47/N47S/N47C/N57 N57S
Courtesy of BMW OF NORTH AMERICA, INC.

M52/M52TU

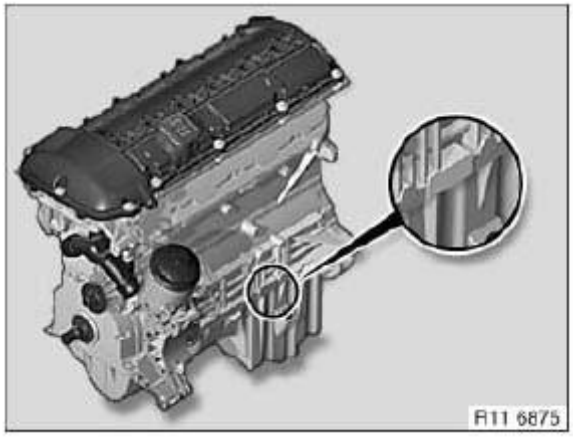


Fig. 9: Identifying Engine Identification Numbers Location (M52 / M52TU)
Courtesy of BMW OF NORTH AMERICA, INC.

M54

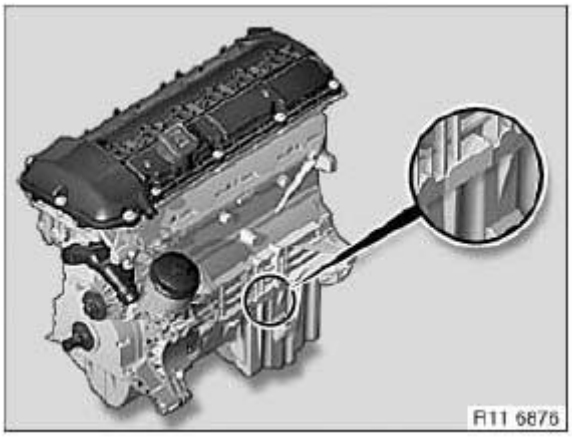


Fig. 10: Identifying Engine Identification Numbers Location (M54)
Courtesy of BMW OF NORTH AMERICA, INC.

M56

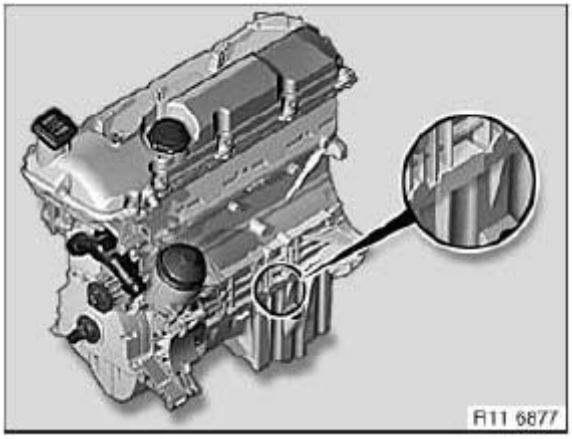


Fig. 11: Identifying Engine Identification Numbers Location - M56
Courtesy of BMW OF NORTH AMERICA, INC.

N40/N45/N45T/N43

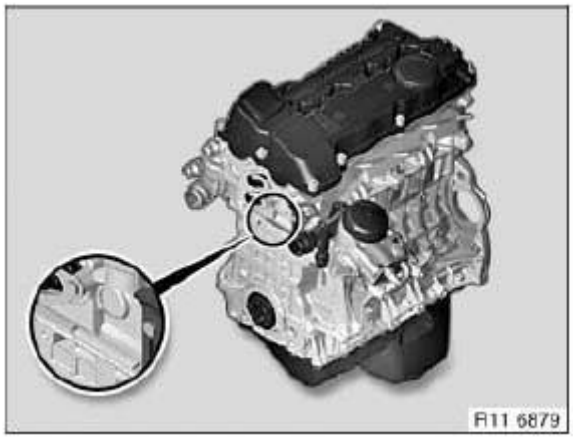


Fig. 12: Identifying Engine Identification Numbers Location - N40/N45/N45T/N43
Courtesy of BMW OF NORTH AMERICA, INC.

N42/N46/N46T

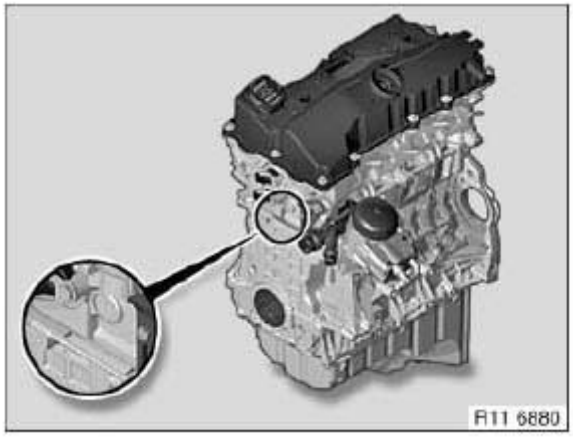


Fig. 13: Identifying Engine Identification Numbers Location - N42/N46/N46T
Courtesy of BMW OF NORTH AMERICA, INC.

N51/N52/N52K/N52T/N53/N54/N55

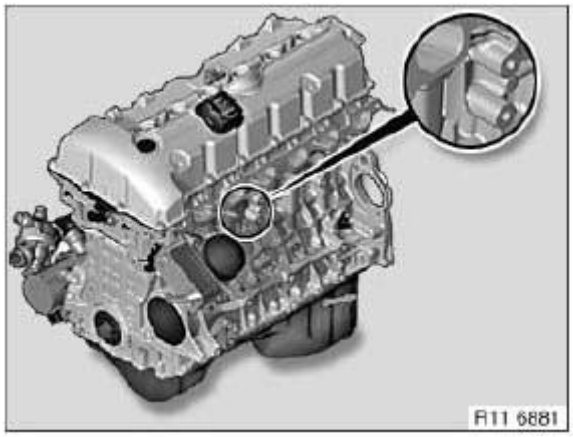


Fig. 14: Identifying Engine Identification Numbers Location - N51/N52/N52K/N52T/N53/N54/N55
Courtesy of BMW OF NORTH AMERICA, INC.

N62/N62TU

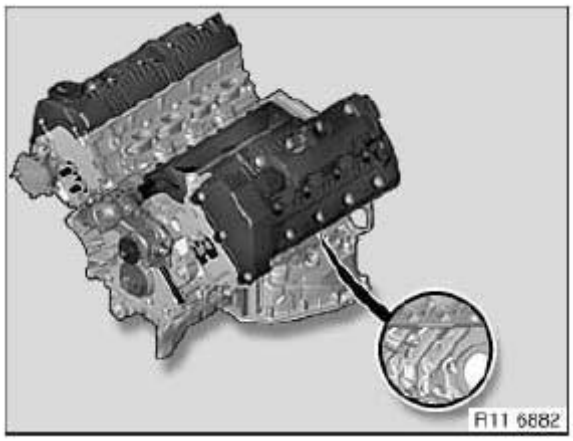


Fig. 15: Identifying Engine Identification Numbers Location - N62/N62TU
Courtesy of BMW OF NORTH AMERICA, INC.

N73

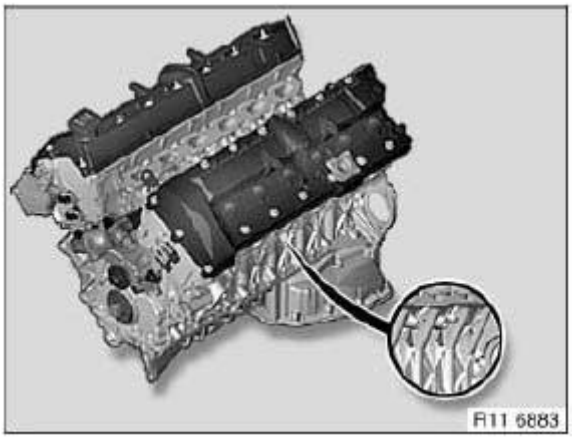


Fig. 16: Identifying Engine Identification Numbers Location - N73
Courtesy of BMW OF NORTH AMERICA, INC.

S54

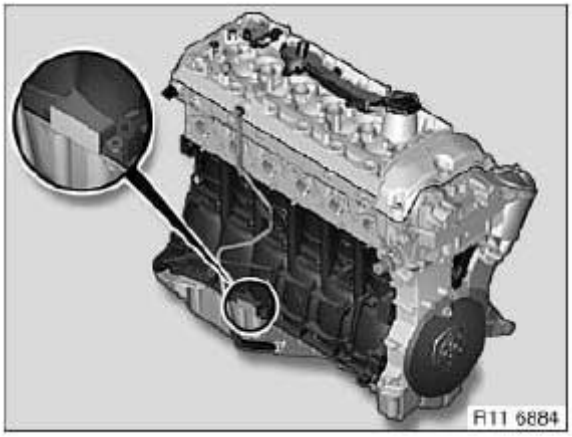


Fig. 17: Identifying Engine Identification Numbers Location - S54
Courtesy of BMW OF NORTH AMERICA, INC.

S85/S65

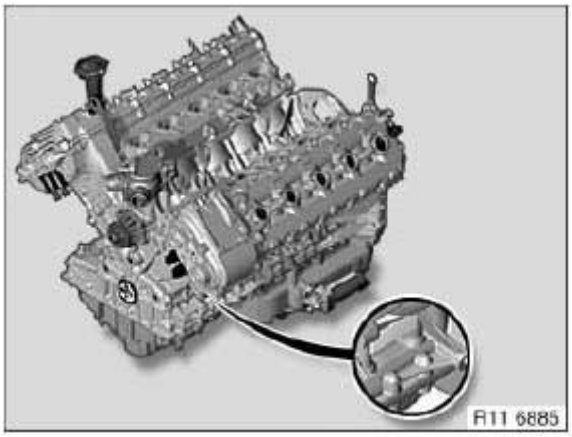


Fig. 18: Identifying Engine Identification Numbers Location - S85/S65
Courtesy of BMW OF NORTH AMERICA, INC.

W10/W11

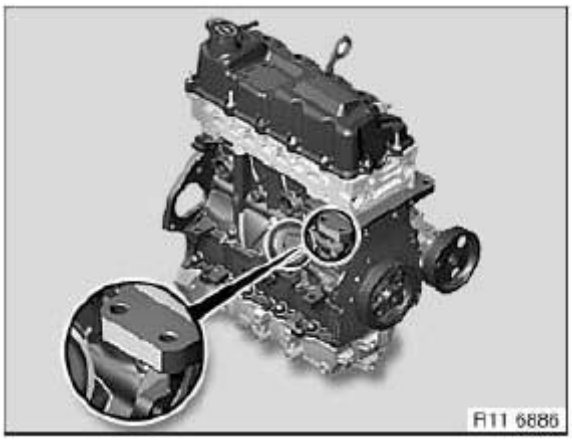


Fig. 19: Identifying Engine Identification - W10/W11
Courtesy of BMW OF NORTH AMERICA, INC.

N12/N14/N16/N18

Fig. 20: Identifying Engine Identification Numbers Location - N12/N14/N16/N18
Courtesy of BMW OF NORTH AMERICA, INC.

W17

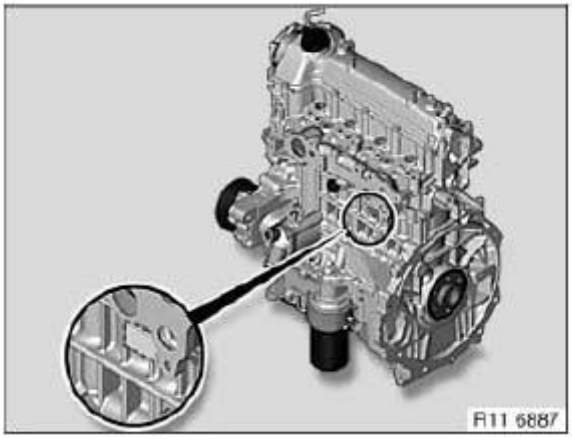


Fig. 21: Identifying Engine Identification Numbers Location - W17
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00 ... ENGINE OIL SERVICE (N54, N54T)

WARNING: Risk of scalding!

Carry out work on the vehicle only when wearing oil- and heat-resistant protective gloves incl. forearm protection, face guard and protective apron.

IMPORTANT: Carry out the engine oil service only when the engine is at operating temperature.

Observe the exact engine oil filling capacity.

Overfilling the engine with engine oil will result in **engine damage.**

Checking and drip-off times (at least 10 minutes) must be observed.

IMPORTANT: Risk of damage!

Protect belt drive against dirt.

Cover with suitable materials.

Recycling

Catch and dispose of drained engine oil in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

Release oil filter cover with special tool **11 9 240** .

Tightening torque **11 42 1AZ** .

NOTE: Engine oil flows out of the oil filter housing and back into the oil sump.

Picture shows E9x

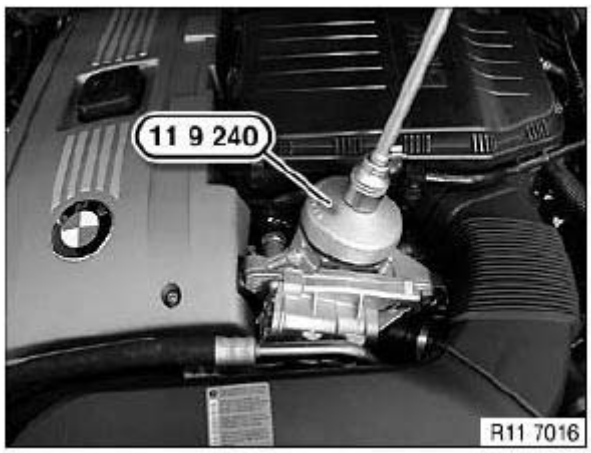


Fig. 22: Removing Oil Filter Cover Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Presentation: without underbody protection.

Unclip service opening on underbody protection.

Remove screw plug (1) from oil sump and drain engine oil.

Tightening torque **11 13 1AZ** .

Installation note

Replace sealing ring.

Picture shows E9x

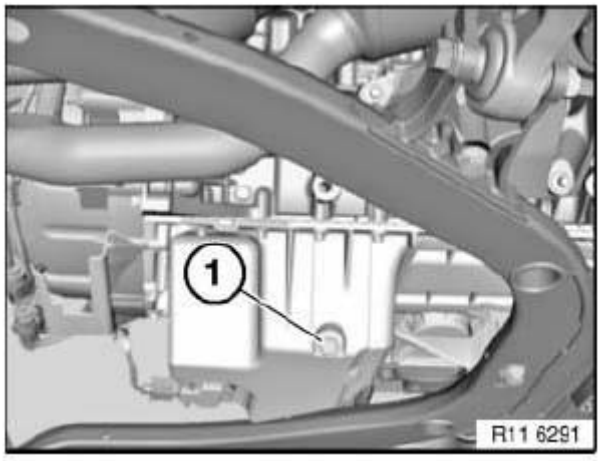


Fig. 23: Identifying Screw Plug On Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

Remove and insert oil filter element (1) in direction of arrow.

Installation note:

Replace oil filter element (1) and sealing rings (2).

NOTE: Coat sealing rings (2) with engine oil.

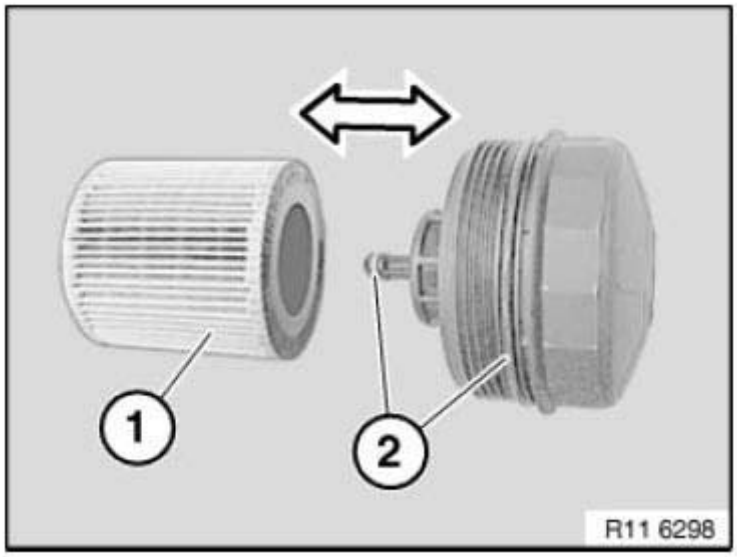


Fig. 24: Removing And Inserting Oil Filter Element
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil filter cover with special tool **11 9 240** .

Tightening torque **11 42 1AZ** .

NOTE: Pour in ENGINE OIL .

Start engine and run at idle until oil pressure indicator light goes out.

Switch off engine

Check oil filter cover and screw plug on oil sump for leaks.

Assemble engine.

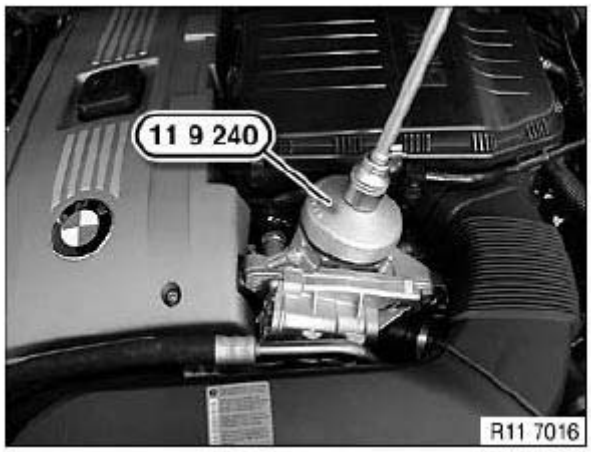


Fig. 25: Installing Oil Filter Cover Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Checking engine oil level:

- Park vehicle on a horizontal surface
- Allow engine to run at operating temperature for three minutes with increased engine speed (approx. 1100 RPM)
- Read off engine oil level in instrument panel or on Control Display
- Top up engine oil if necessary

11 00 590 EXCHANGE ENGINE (N54, N54T)

Necessary preliminary tasks:

- Remove and install **ENGINE** .
- Mount engine on **ASSEMBLY STAND** .
- If necessary, remove foreign bodies from turbocharger group.
- Check all assemblies and convert to replacement power plant.

Remove transportation locks (1).

NOTE: Catch escaping engine oil with a suitable cloth (2).

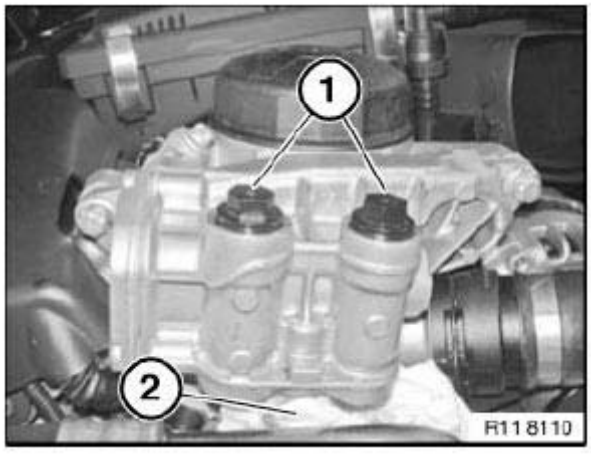


Fig. 26: Identifying Transportation Locks And Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

Transportation locks (1) are no longer needed.

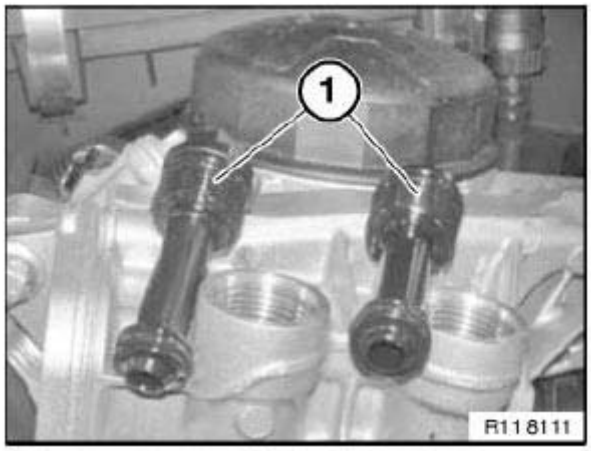


Fig. 27: Identifying Transportation Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Modify screw plugs (1) from old power plant.

Insert screw plugs (1).

Tightening torque: **11 42 11AZ.**

Secure oil cooler lines with mounting bar (2).

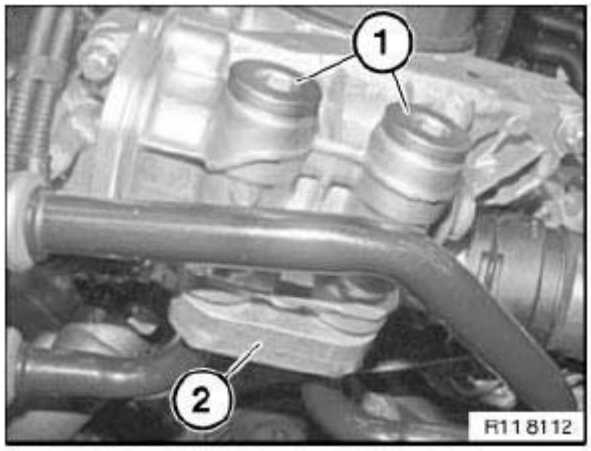


Fig. 28: Identifying Screw Plugs And Mounting Bar
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 00 MOUNTING ENGINE ON ASSEMBLY STAND (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released .

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary work:

- Remove **ENGINE**

Use special tool 11 8 541 to mount engine on special tool **00 2 300** .

Mount engine or engine block with special tool 11 8 542 on 11 8 541.

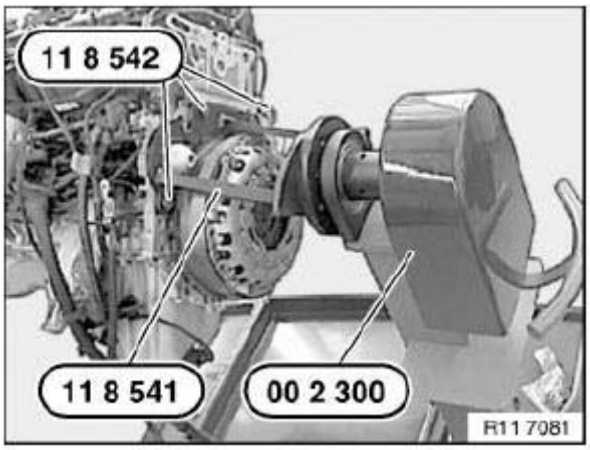


Fig. 29: Mounting Engine Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 ... OVERVIEW OF CONSUMABLES (ELECTRONIC PARTS CATALOGUE)

1.0 Sealing compound for **injection.**

SEALING COMPOUND REFERENCE CHART - INJECTION

	Repair instructions (engine)	Designation, Electronic Parts Catalogue	Part number, Electronic Parts Catalogue	Application examples
1.1	N40, N42, N45, N46, N43, N45N, N46N	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 128367 sealing compound

1.2	N40, N42, N45, N46, N43, N45N, N46N	Loctite 128357 liquid gasket	83 19 7 536 051	Sealing between crankcase upper and lower halves
1.3	N51, N52, N53, N54, N52N, N55	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.4	N51, N52, N53, N54, N52N, N55	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves
1.5	S65, S85	Loctite 171000 primer	83 19 7 515 683	For hardening Loctite 193140 sealing compound
1.6	S65, S85	Loctite 193140 liquid gasket	83 19 0 439 030	Sealing between crankcase upper and lower halves

2.0 Sealing compound for **application.**

SEALING COMPOUND REFERENCE CHART - APPLICATION

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
2.1	M41, M47, M47TU, M47T2, M50, M51, M52, M52TU, M54, M57, M57TU, M57T2, M60, M62 N40, N42, N45, N45N, N46, N46N, N43, N47, N47top, N47C N47D1 N51, N52, N52N, N53, N54, N55, N57, N57S N62, N62TU, N63, N73, N73H, N74 S14, S38, S50, S52, S54, S62, S65, S85 N12, N14, N16, N18	Drei Bond 1209 liquid gasket	07 58 9 062 376	For sealing separation points on crankcase
2.2	N12, N14, N16, N18 W16, N47top, N47D1, N47C1 N57D1,	Loctite 5970 liquid gasket	83 19 0 404 517 83 19 0 404 517	Sealing between crankcase upper and lower sections. Sealing of gear case cover, oil sump, coolant pump,

				component carrier.
2.3	N12, N14, N16, N18 W16	Loctite 648 liquid gasket	07 58 9 067 732	Sealing between cover sleeve and crankcase

3.0 **Cleaning agent.**

CLEANING AGENT REFERENCE CHART

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
3.1	N45, N46, N45T, N46T, N43, N51, N52, N52Kp, N52TU, N53, N55, N63, N63S, N63Hyprid, N74	Cold cleaner (chlorine free)	83 19 0 026 956	Cleaning assemblies, washing engine

4.0 Lubricant for **application.**

LUBRICANT REFERENCE CHART - APPLICATION

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
4.1	N20, N42, N46, N46TU, N51, N52, N52KP, N52TU, N55, N62, N62TU, N73	Lubricating grease Longtime PD1	83 19 2 160 340	For greasing the splined shaft on actuator drive/gearing of intermediate shaft.
4.2	M47, M47TU, M47T2, M57, M57TU, M57T2,	High temperature paste	83 19 2 152 323	For greasing the threads on the exhaust turbocharger.
4.3	N12, N14, N16, N18 N40, N42, N45, N45TU N46, N46TU, N43. N51, N52, N52Kp, N52TU, N53, N54, N55. N62, N62TU, N63, N73, N73H, N74. S65, S85.	High temperature paste (NEVERSEEZ compound)	83 23 0 140 233	For greasing the threads on the oxygen sensors.
4.4	N47, N47O1 N47C1, N47T	Copper paste	81 22 9 400 794	For greasing the double hex head bolt

	N47D1 N57 N57D1			on the exhaust turbocharger.

5.0 Lubricants to loosen locked **screw connections.**

LUBRICANT REFERENCE CHART - SCREW CONNECTION

	Designation in repair instructions	**Designation, Electronic Parts Catalogue**	**Part number, Electronic Parts Catalogue**	**Application examples**
5.1	M47, M47TU, M47TU2, M57, M57TU, M57TU2. N47, N47C, N47D1, N57, N57D1, W16, W17,	Brunox lubricating grease	83 23 0 445 529	For releasing the glow elements

11 .. ... REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N54, N54T)

Release screws (1).

Raise acoustic cover slightly and remove towards front.

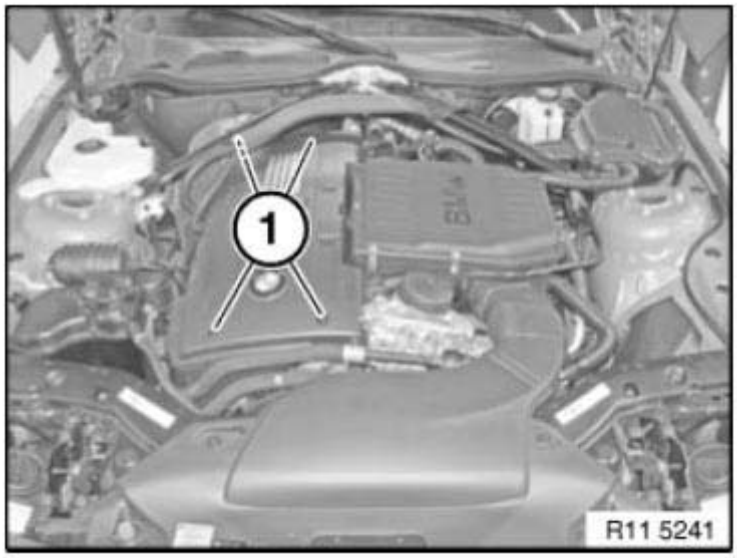


Fig. 30: Identifying Acoustic Cover Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 050 REMOVING AND INSTALLING ENGINE (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Disconnect **BATTERY**
- Secure **ENGINE HOOD/BONNET**
- Remove **AIR FILTER HOUSING**
- Remove **FAN COWL** with electric fan
- Remove **RADIATOR**
- Remove **CAPACITOR FOR HEATING AND AIR CONDITIONING SYSTEM**
- Remove **CHARGE AIR COOLER**
- Remove **EXPANSION TANK** .
- Detach all coolant hoses from engine
- Remove rear **AIR DUCT**
- Detach vacuum line from brake booster
- Unfasten engine wiring harness from electronics box and lay to one side
- Remove **EXHAUST SYSTEM**
- Remove gearbox. See **2300018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** or **28 00 001 REMOVING AND INSTALLING TWIN-CLUTCH GEARBOX (GS7D36SG) N54**
- Release **LOWER SECTION OF STEERING SPINDLE** from steering gear (do not remove)
- Release grounding strap on left engine support arm.

Release nut (1) and disconnect positive battery cable (2) from positive battery connection point.

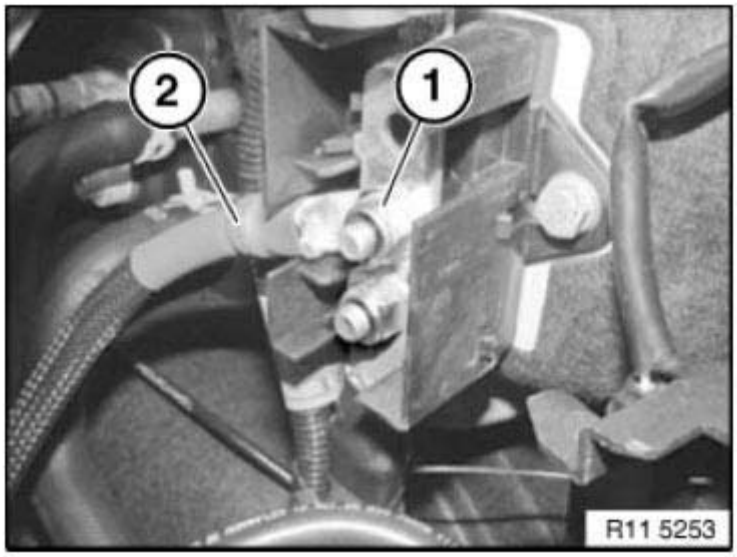


Fig. 31: Identifying Battery Cable And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect fuel lines (1).

Seal fuel lines with special tool 13 5 161 and

13 5 162.

Disconnect tank vent line (2).

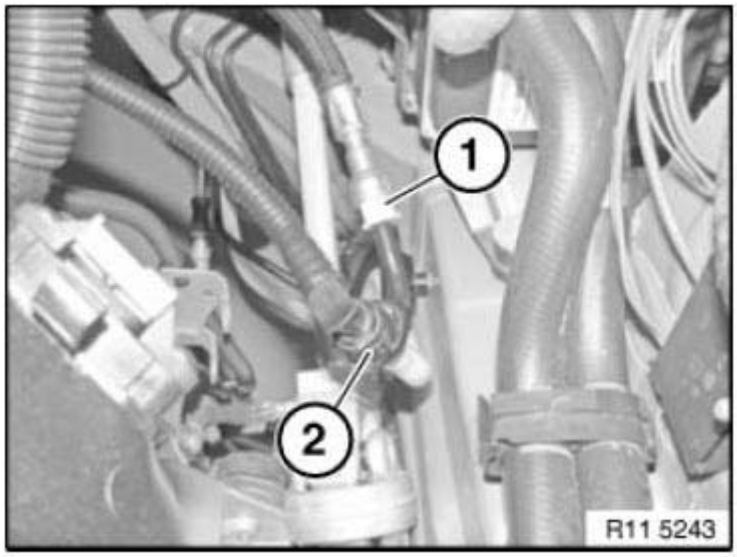


Fig. 32: Identifying Tank Vent Line And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt (1) from engine oil pipe on oil-to-water heat exchanger.

Remove engine oil pipe.

Installation note:

Replace all seals.

Tightening torque **17 21 1AZ** .

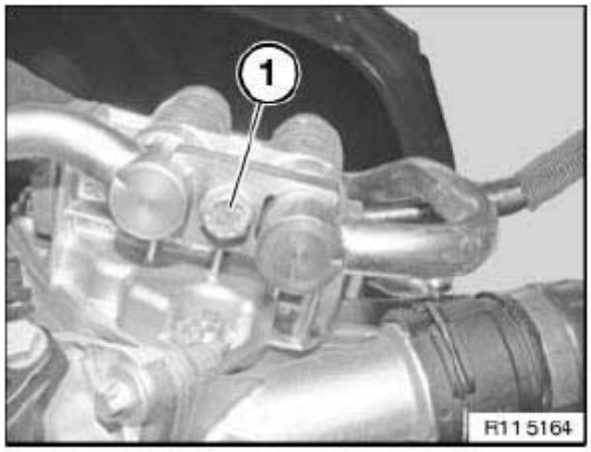


Fig. 33: Identifying Engine Oil Pipe Mounting Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 8 680** to lifting eye on gearbox side.

Press locking pin (1) in direction of arrow until locking balls (2) are loose.

Secure special tool **11 8 680** to lifting eye. Release locking pin (1).

Installation note:

Special tool **11 8 680** is mounted correctly if the locking balls (2) are locked.

Special tool **11 8 680** is firmly secured to lifting eye.

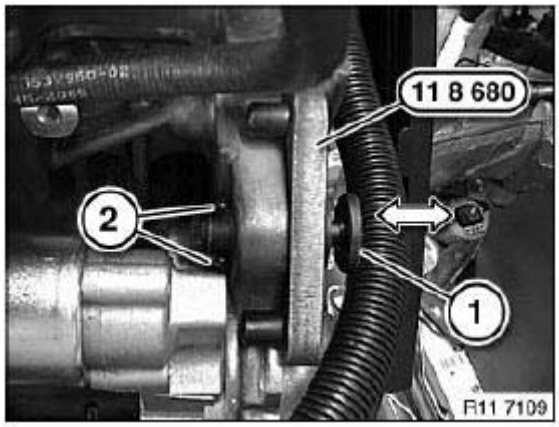


Fig. 34: Pressing Locking Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool **11 0 000** to special tool **11 8 680** in eye (1).

Picture shows E9x.

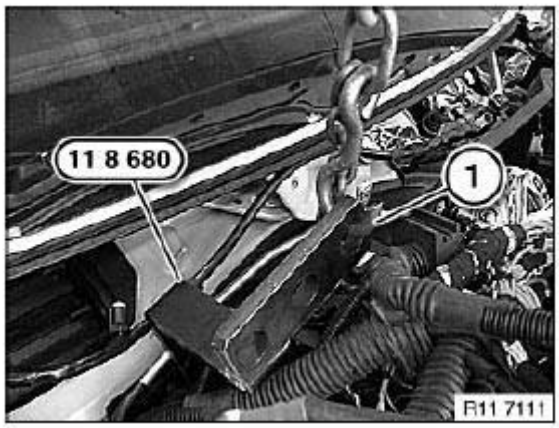


Fig. 35: Connecting Special Tool 11 0 000 To Special Tool 11 8 680
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on engine mount on left and right.

Installation note:

Replace self-locking nut.

Tightening torque **22 11 2AZ** .

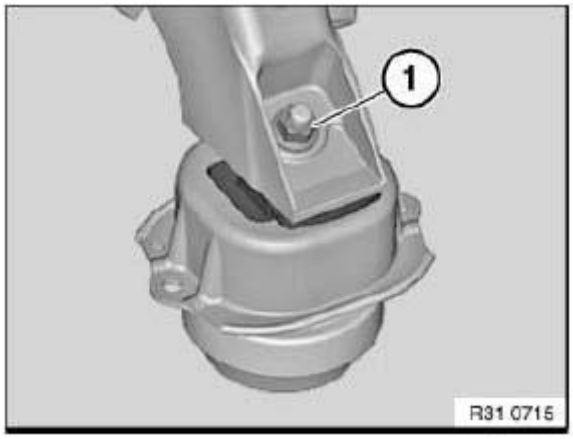


Fig. 36: Identifying Engine Mount Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in towing hook (1).

Suspend special tool (4) **11 0 000** from engine crane.

Suspend special tool **11 0 000** from the designated mounting eyelets (2) only.

Unscrew left and right engine mounts.

Remove left engine support arm.

Lift engine out with crane.

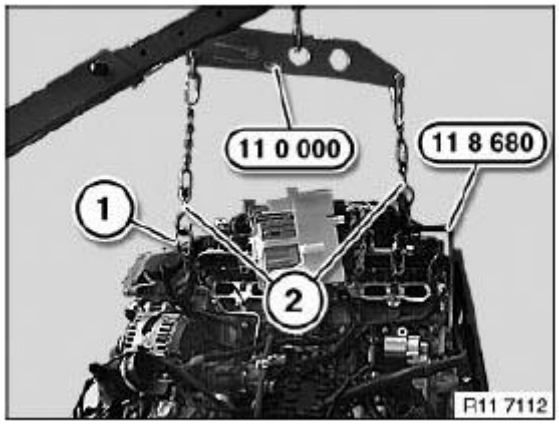


Fig. 37: Identifying Special Tools 11 0 000 And 11 8 680 On Engine Crane
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Secure special tool (1) **11 7 310** to steering box.

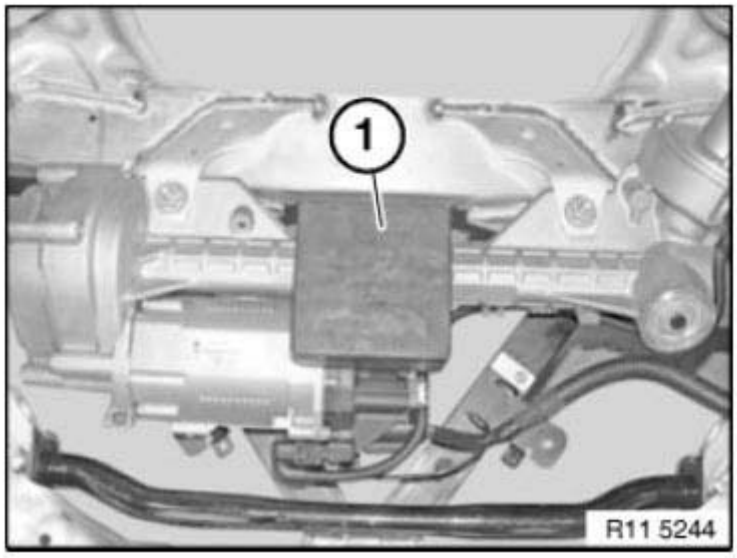


Fig. 38: Connecting Special Tool 11 7 310 To Steering Box
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Observe following in case of **REPLACEMENT ENGINE** .

Check function of Digital Diesel Electronics.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

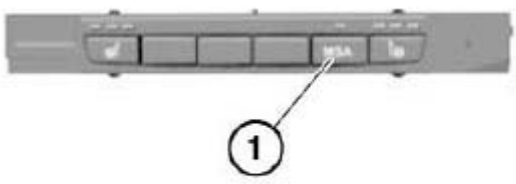


Fig. 39: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

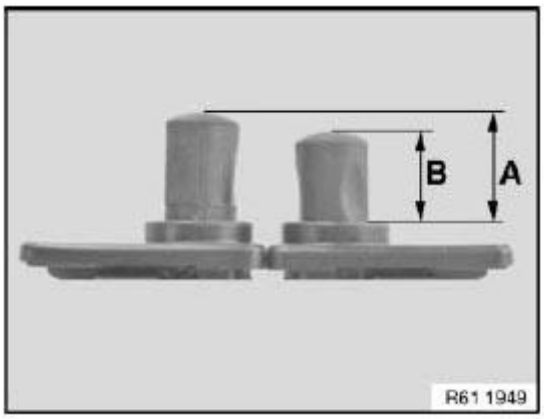


Fig. 40: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

11 00 670 SECURING ENGINE IN INSTALLATION POSITION (N54, N54T)

WARNING: Danger of injury!

Observe following instructions relating to special tool:

1. Prior to each use, check the special tools for defects, modifications and operational reliability.
2. Damaged/modified special tools must not be used!
3. No changes or modifications may be made to the special tools!
4. Keep special tools dry, clean and free of grease.

Necessary preliminary tasks:

- Secure **ENGINE HOOD/BONNET**
- Remove rear **AIR DUCT**

Assemble transverse member 00 6 000 with special tools 00 6 030.

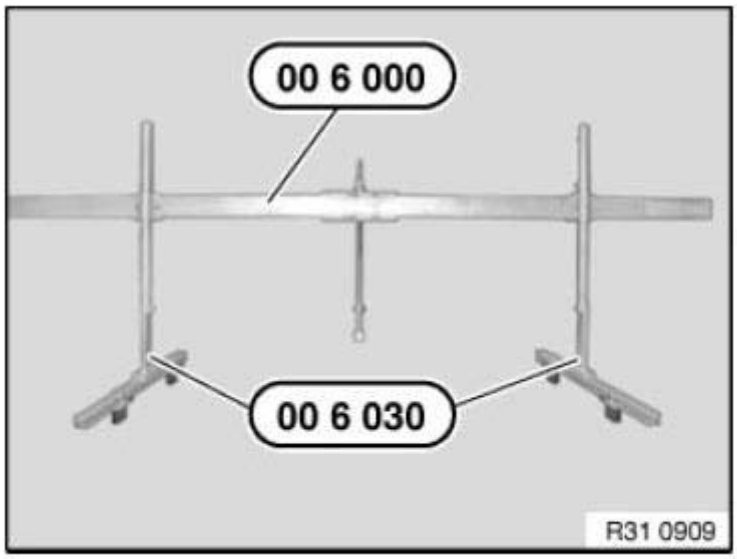


Fig. 41: Assembling Transverse Member 00 6 000 Using Special Tools 00 6 030
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in towing hook (1).

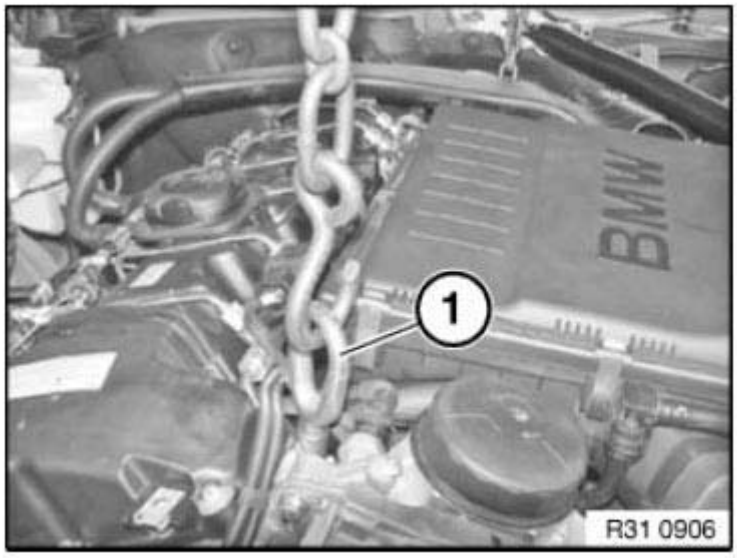


Fig. 42: Identifying Towing Hook
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Avoid a change of engine position in the transverse or longitudinal direction.

Always make sure there is sufficient clearance between the engine (or its attachment parts) and the body.

The support points on the left side are shown.

IMPORTANT: Risk of damage!

Position transverse member 00 6 030 with a 2nd person help on designated areas (1,2) of side panel.

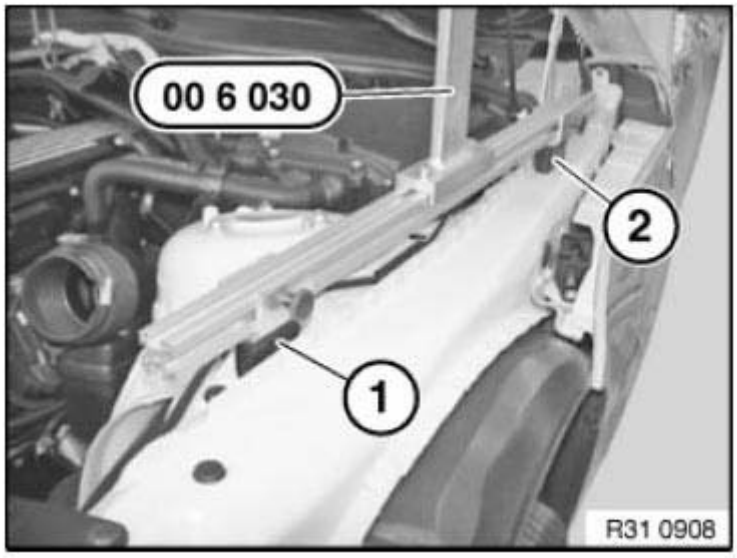


Fig. 43: Positioning Transverse Member 00 6 030 On Side Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 0 020** to spindle 00 6 002.

Fit suitable chains to special tool **11 0 020** and attach to engine towing hook or lifting eye.

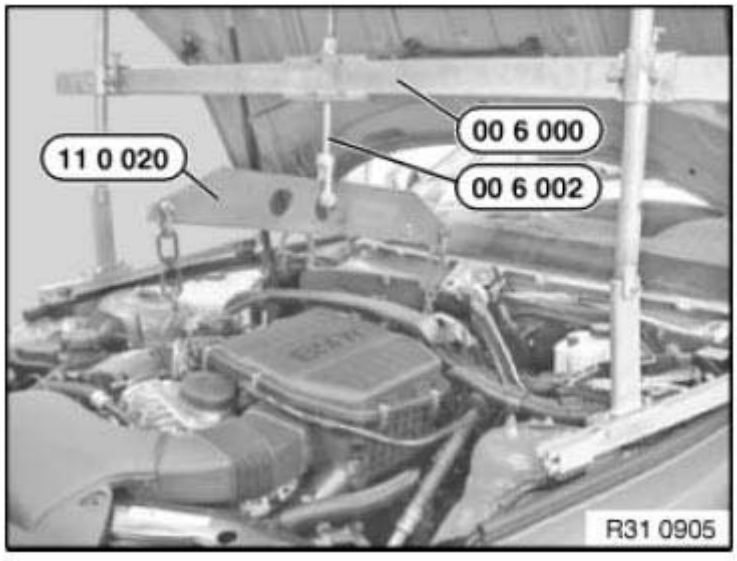


Fig. 44: Connecting Special Tool 110 020 To Engine Towing Hook Or Lifting Eye
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Danger of injury!

Tighten down all adjusting screws and nuts on transverse member 00 6 000.

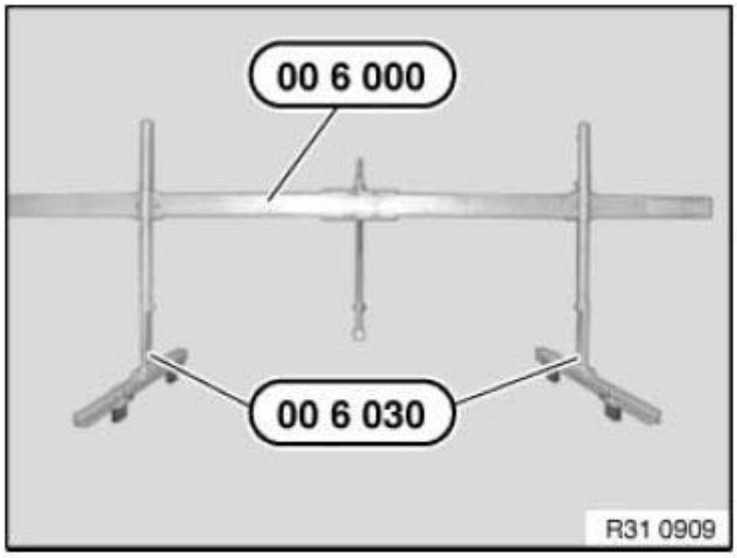


Fig. 45: Identifying Transverse Member On Special Tool 00 6 030
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Raise engine approx. 10 mm with transverse member.

Installation note:

Replace self-locking nuts.

Tightening torque **22 11 2AZ** .

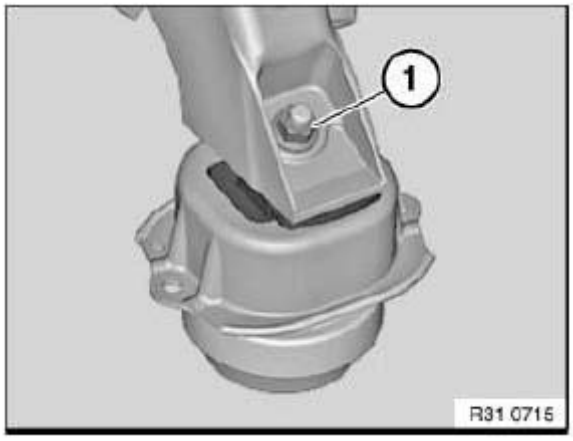


Fig. 46: Identifying Engine Mount Nut
Courtesy of BMW OF NORTH AMERICA, INC.

1112 CYLINDER HEAD WITH COVER

11 12 729 CHECKING CYLINDER HEAD FOR WATERTIGHTNESS (N54, N54T)

IMPORTANT: Pressure-test cylinder head to max. 3 bar.

Heat cylinder head to 60°.

Check for bubble formation in a water bath.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .
- Disassemble **CYLINDER HEAD** .

NOTE: Observe mounting of special tool 11 4 341 on cylinder no. 1

Secure special tool 11 4 341 using bolts 11 4 345 tightened to **25 Nm**

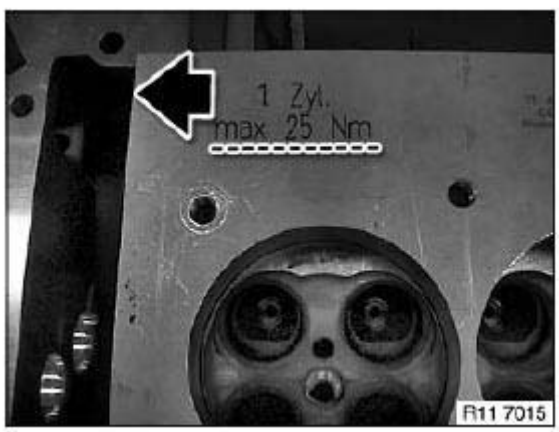


Fig. 47: Identifying Special Tool 11 4 345 On Engine Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Extend special tool 11 4 341 with special tool 11 4 345.

Installation note:

1 cyl is marked.

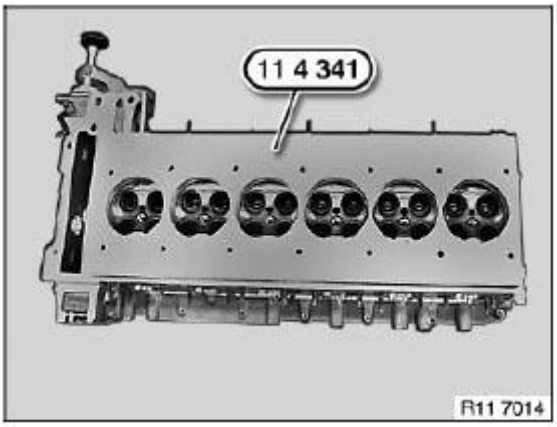


Fig. 48: Identifying Special Tool 11 4 341
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 4 342 with bolts (1), insert knurled screw in direction of arrow.

Sealing flange must rest flat.

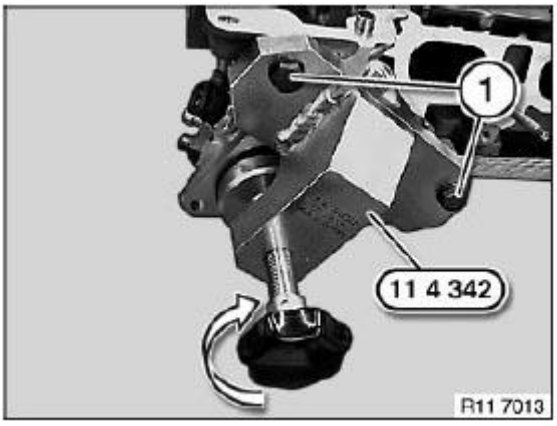


Fig. 49: Installing Special Tool (11 4 342)
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 344 with screws (1).

NOTE: Compressed air at valve (2) must not exceed 3 bar.

Heat cylinder head to 60°.

Check for bubble formation in a water bath.

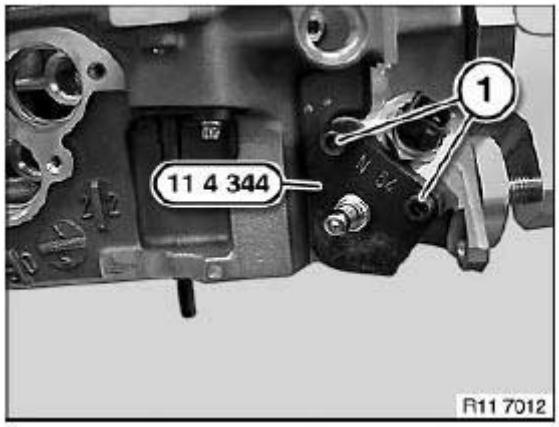


Fig. 50: Identifying Special Tool (11 4 344) With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 719 MILLING CYLINDER HEAD SEALING SURFACE (N54, N54T)

IMPORTANT: Remachining on cylinder head max. 0.3 mm

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .
- Remove **EXHAUST CAMSHAFT** .
- Remove **INTAKE CAMSHAFT** .
- Remove **ROLLER CAM FOLLOWERS** .
- Remove all **VALVES** .

Check evenness of cylinder head sealing faces with a standard straightedge (1).

NOTE: Max. deviation from flatness (longitudinal) 0.10 mm.

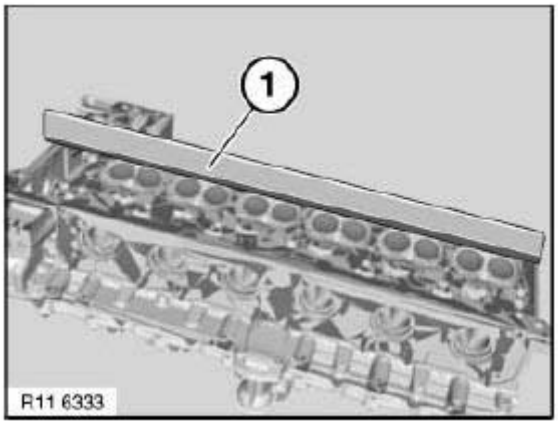


Fig. 51: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check evenness of cylinder head sealing faces with a standard straightedge (1).

NOTE: Max. deviation from flatness (transverse) 0.05 mm

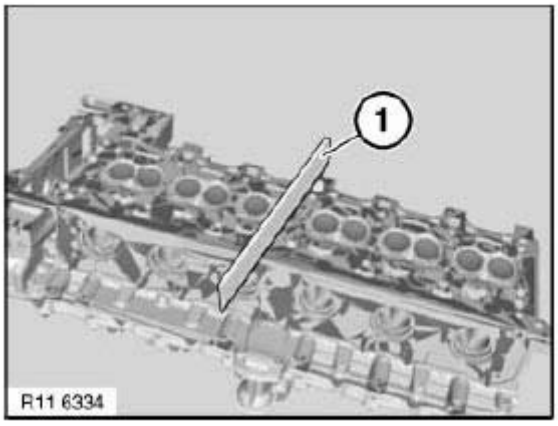


Fig. 52: Checking Cylinder Head Sealing Faces Evenness Using Standard Straight-Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Check cylinder head for **WATER LEAKS** .

Assemble engine.

11 12 100 REMOVING AND INSTALLING CYLINDER HEAD (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **ENGINE**
- Remove **INTAKE AND EXHAUST CAMSHAFT ADJUSTERS**

Release screws (1).

Unclip timing chain module (3) at junction (2) and remove towards top.

Set down timing chain.

IMPORTANT: If the timing chain is stowed in the gear case, the crankshaft must no longer be rotated.

This would cause the timing chain on the crankshaft sprocket to jam or jump.

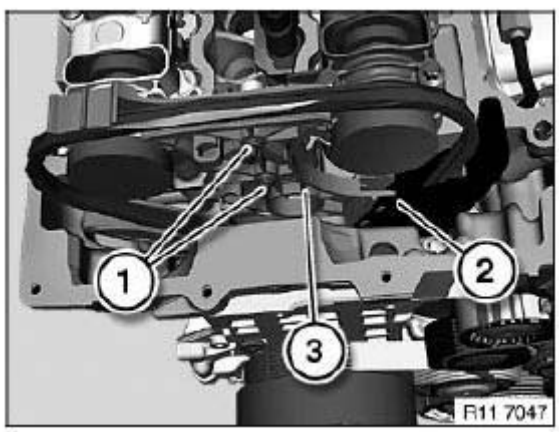


Fig. 53: Identifying Timing Chain Module And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The timing chain is lifted out with a hook only during assembly.

NOTE: The lowest screw can only be released when the timing chain module is pressed forward slightly.

IMPORTANT: Secure the lowest screw with a gripper against falling down.

Release screws (1).

Tightening torque **11 12 3AZ** .

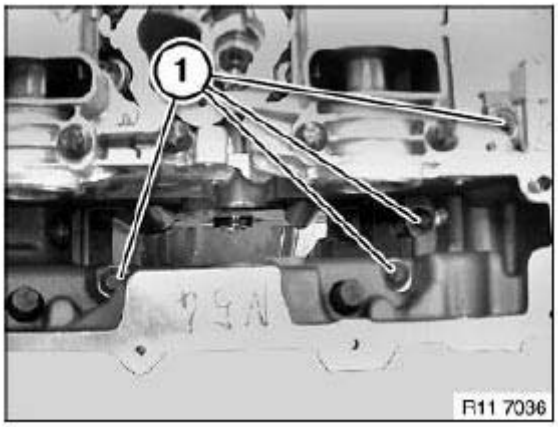


Fig. 54: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe different bolt heads.

Release cylinder head bolts (1) M9 with special tool **11 4 420** .

Tightening torque **11 12 2AZ** .

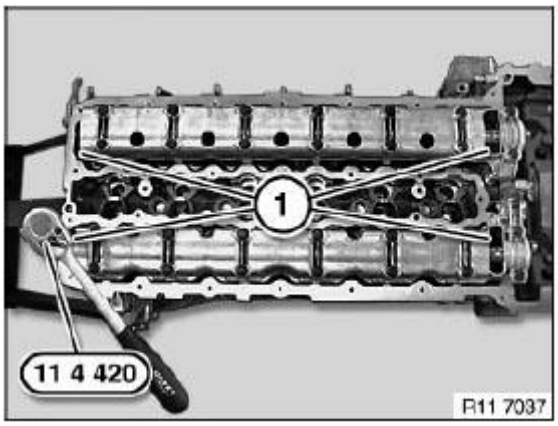


Fig. 55: Removing M9 Cylinder Head Bolts Using Special Tool 11 4 420
Courtesy of BMW OF NORTH AMERICA, INC.

Release cylinder head bolts (1) M10 with special tool **11 8 580** from outside inwards.

Tightening torque **11 12 1AZ** .

IMPORTANT: All cylinder head bolts must be replaced.

Risk of damage!

Jointing torque and angle of rotation must be observed without fail.

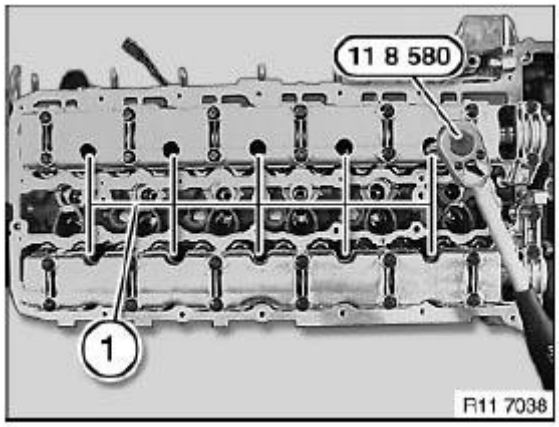


Fig. 56: Removing M10 Cylinder Head Bolts Using Special Tool 11 8 580
Courtesy of BMW OF NORTH AMERICA, INC.

Washers (1) of cylinder head bolts can only be removed with a magnet (2) between cylinder head and bearing strip.

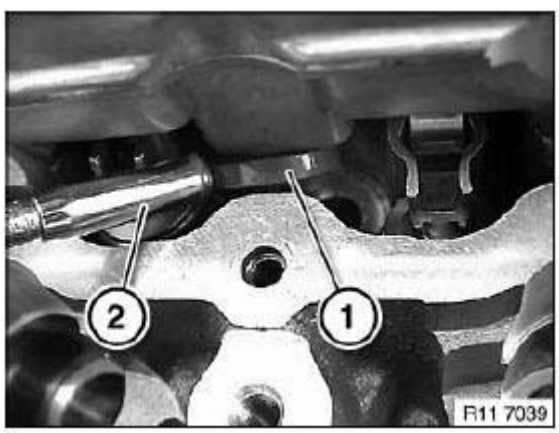


Fig. 57: Removing Cylinder Head Bolt Washer Using Magnet
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **11 0 320** with existing cylinder head cover bolts (1).

Tightening torque **11 12 4AZ** .

IMPORTANT: Removing and install cylinder head with a second person helping.

Weight of cylinder head with add-on parts is approx. 40 kg.

Do not set cylinder head down on sealing face, risk of damage to valves.

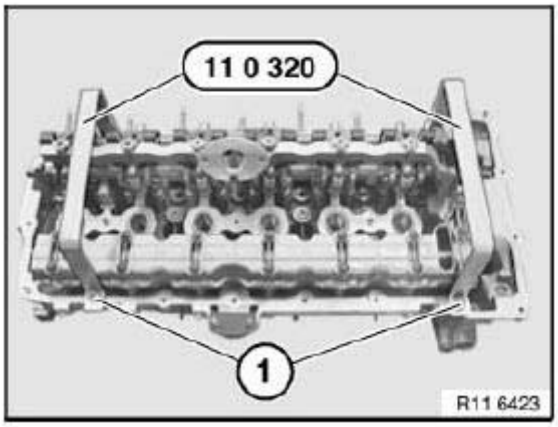


Fig. 58: Installing Cylinder Head Cover Using Special Tool 11 0 320
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set down cylinder head with intake and exhaust camshafts on side only, risk of damage to valves (1).

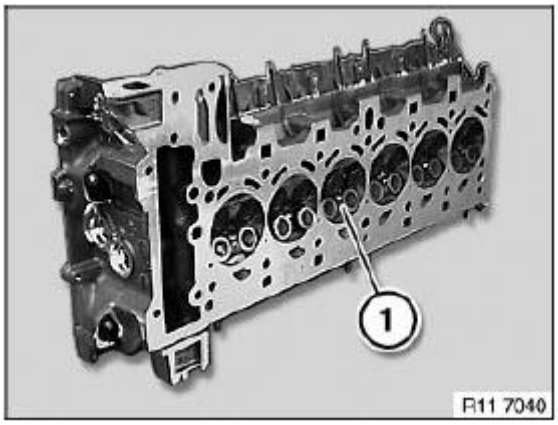


Fig. 59: Identifying Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Insert **11 4 430** special tool into bore holes.

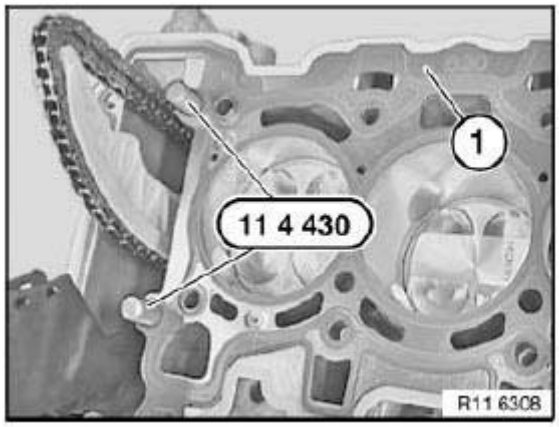


Fig. 60: Inserting Special Tool 11 4 430 Into Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Remove coarse residues on sealing surfaces with special tool 11 4 471 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

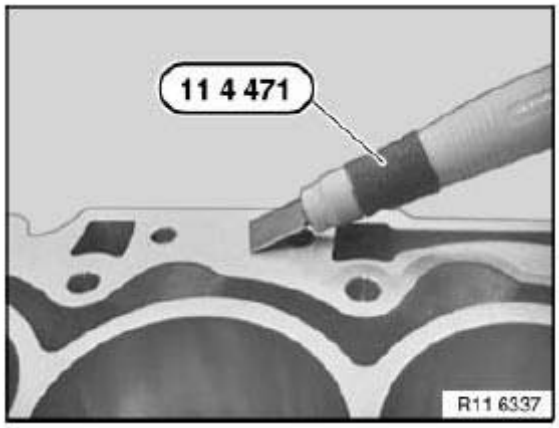


Fig. 61: Removing Coarse Residues On Sealing Surfaces Using Special Tool 11 4 471
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fine residues on sealing surfaces with special tool 11 4 472 from cylinder head and crankcase.

IMPORTANT: Do not use any metal-cutting tools.

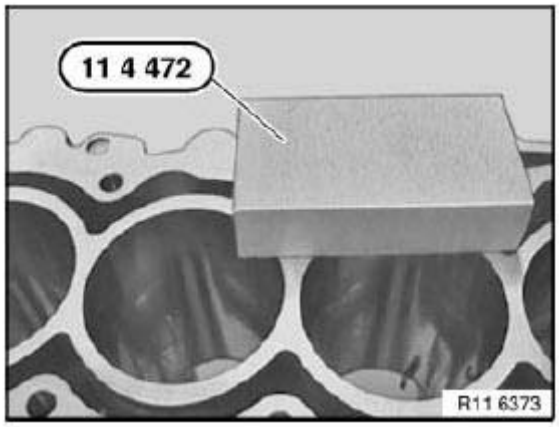


Fig. 62: Removing Fine Residues On Sealing Surfaces Using Special Tool 11 4 472
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

Risk of cracking and corrosion!

Clean all threaded holes.

Installation note:

Replace **CYLINDER HEAD GASKET** .

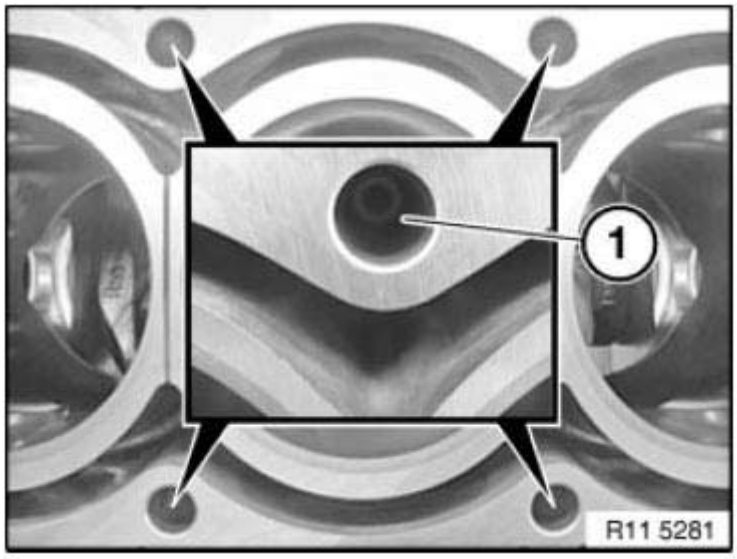


Fig. 63: Identifying Threaded Holes
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Observe sequence for tightening cylinder head bolts without fail.

Installation note:

Fit new cylinder head screws.

Insert cylinder head bolts (1 to 10) with special tool **11 8 580** .

Tightening torque **11 12 1AZ** .

Insert cylinder head bolts (11 to 14) with special tool **11 4 420** .

Tightening torque **11 12 2AZ** .

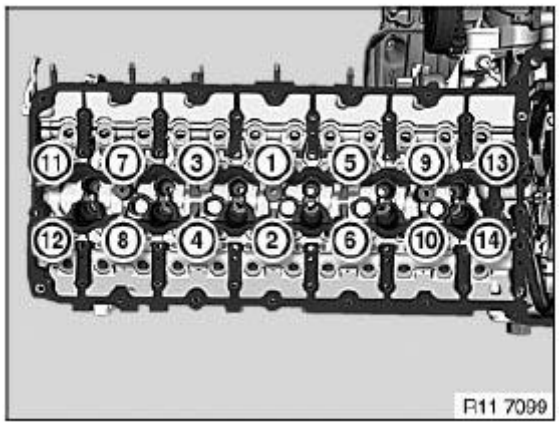


Fig. 64: Identifying Cylinder Head Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Graphic shows intake and exhaust camshafts removed.

Observe sequence for tightening cylinder head bolts without fail

IMPORTANT: The 2nd angle of rotation relates only to cylinder head bolts 1 to 10.

Installation note:

- **Jointing torque:**

  All cylinder head bolts 1 to 14 to 30 Nm

- **1st angle of rotation:**

  All cylinder head bolts 1 to 14 to 90°

- **2nd angle of rotation:**

  Only cylinder head bolts 1 to 10 to 90°

- **3rd angle of rotation:**

All cylinder head bolts 1 to 14 to 45°

Installation note:

Replace screws (1).

Tightening torque **11 12 3AZ** .

IMPORTANT: Secure the lowest screw with a gripper against falling down.

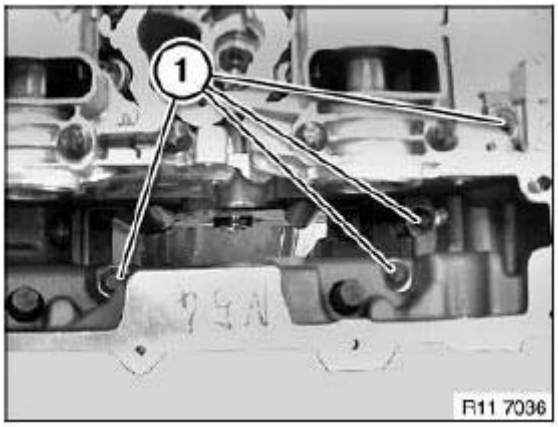


Fig. 65: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 000 REMOVING AND INSTALLING/SEALING CYLINDER HEAD COVER (N54, N54T)

Necessary preliminary tasks:

- Disconnect **BATTERY**
- Remove **ROD-TYPE IGNITION COILS**
- Unclip injector **WIRING HARNESS**
- Remove **INJECTORS**
- Remove right **TENSION STRUT**

Disconnect vacuum lines (2) from vacuum lines (1).

Unclip vacuum lines (1).

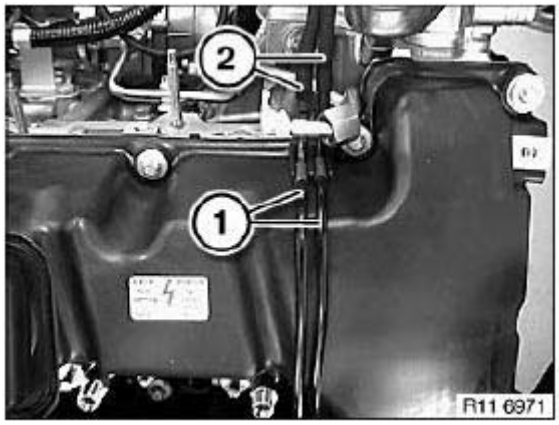


Fig. 66: Identifying Vacuum Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect vacuum lines (1) from vacuum lines (2).

Unclip vacuum line (2) and lay to one side.

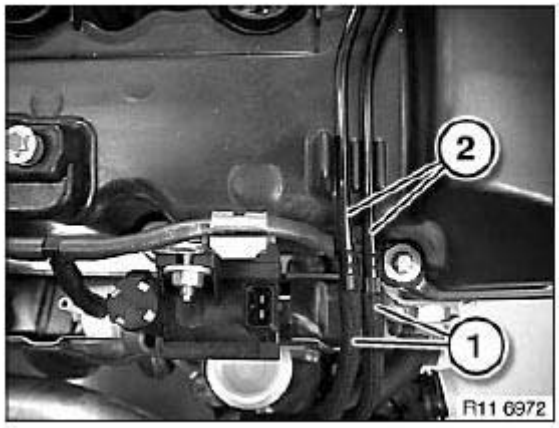


Fig. 67: Identifying Vacuum Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) with special tool **11 8 620** .

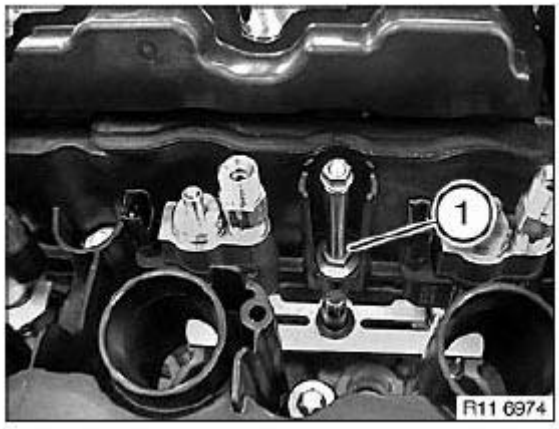


Fig. 68: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on cylinder head cover.

Fig. 69: Identifying Screws On Cylinder Head Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2) along lines.

Tightening torque **11 12 4AZ** .

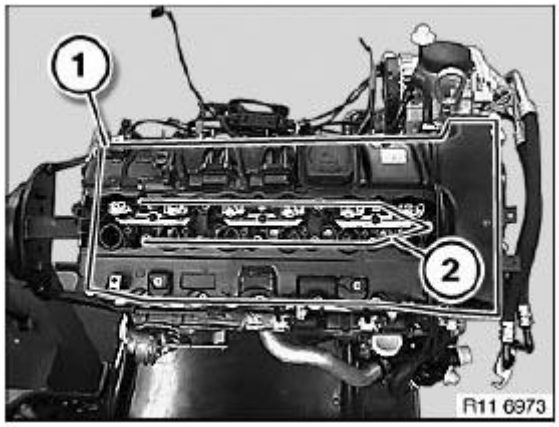


Fig. 70: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace gasket (1).

Press gasket (1) into cylinder head cover.

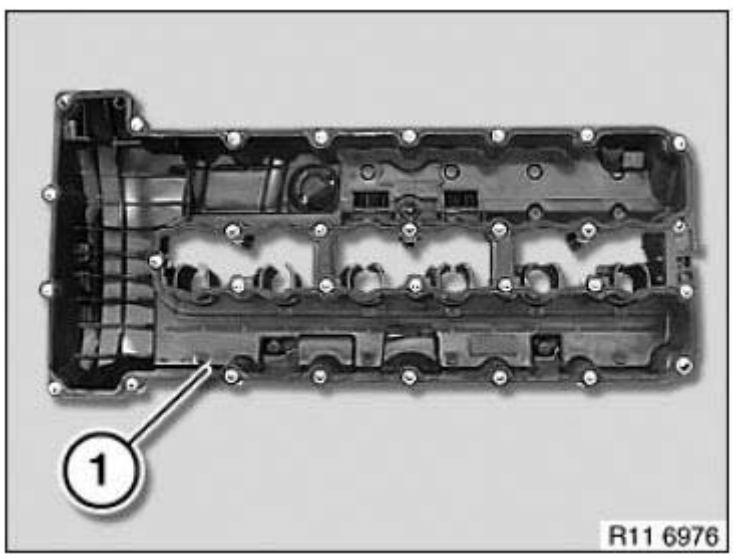


Fig. 71: Identifying Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 12 101 REPLACING CYLINDER HEAD GASKET (N54, N54T)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .

Insert **11 4 430** special tool into bore holes.

Remove head gasket.

IMPORTANT: Check identification (1) on cylinder head gasket (N54).

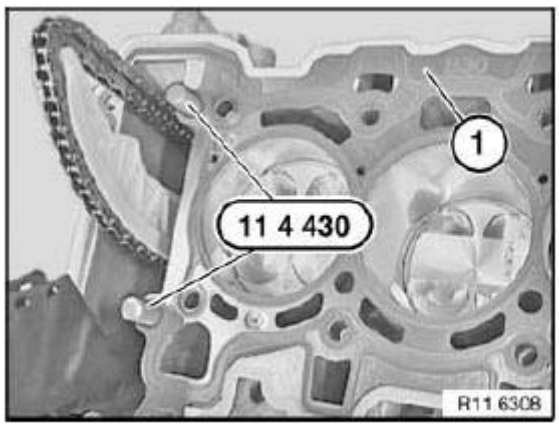


Fig. 72: Inserting 11 4 430 Special Tool Into Bore Holes
Courtesy of BMW OF NORTH AMERICA, INC.

There must be no fluids or contaminants in any of the threaded holes (1) for the cylinder head bolt connections.

IMPORTANT: Work on sealing surface on engine block and on cylinder head with special tool 11 4 470 only.

Do not use any metal-cutting tools.

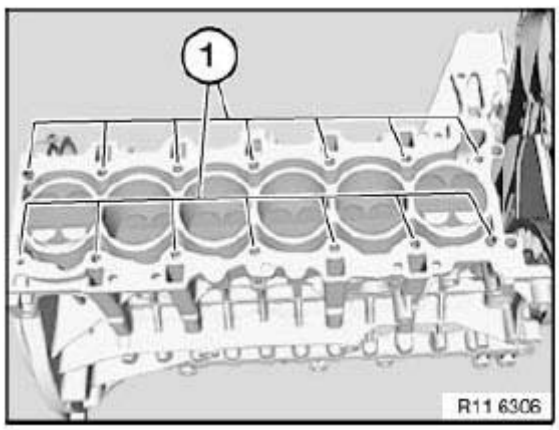


Fig. 73: Identifying Threaded Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Identification (1) of head gasket (N54).

Gasket (3) is a beaded metal gasket with rubber coating.

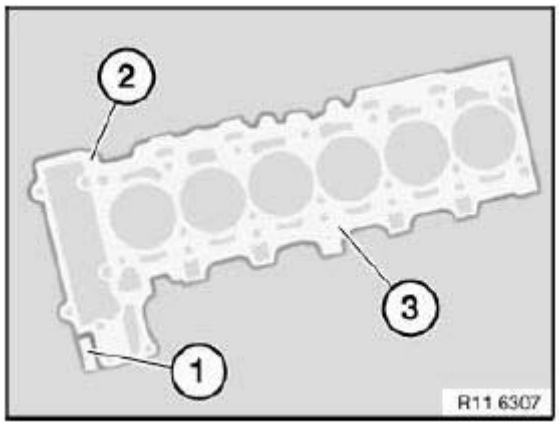


Fig. 74: Identifying Head Gasket Identification Mark
Courtesy of BMW OF NORTH AMERICA, INC.

Check adapter sleeves (1) for damage and firm seating.

Place head gasket (2) in direction of arrow on engine block.

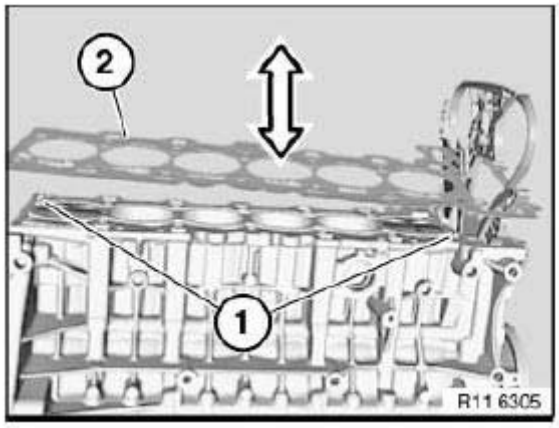


Fig. 75: Placing Head Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check cylinder head for DEVIATION FROM FLATNESS .

Check cylinder head for WATER LEAKS .

Assemble engine.

1113 OIL SUMP

11 13 000 REMOVING AND INSTALLING, SEALING OR REPLACING OIL SUMP (N54, N54T)

IMPORTANT: When working on the engine oil, coolant or fuel circuit, you must protect the alternator against contamination.

Risk of damage!

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove engine guard
- Secure engine in **INSTALLATION POSITION**
- **LOWERING FRONT AXLE**
- **Observe tightening specifications without fail during installation.**
- Drain and add **ENGINE OIL**

NOTE: On vehicles with option SA205 (automatic transmission), it is necessary to remove the transmission oil cooler lines from the oil sump.

Release bolts (3) on transmission.

Tightening torque **11 13 6AZ** .

Detach return hose (2).

IMPORTANT: Bolts of oil sump have different lengths.

Observe different tightening torques.

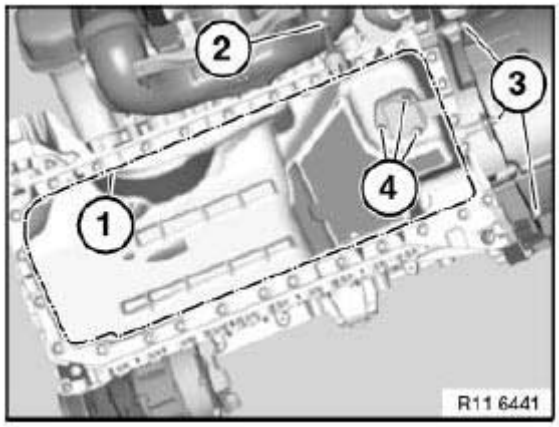


Fig. 76: Identifying Return Hose With Bolts And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts along line (1).

Tightening torque **11 13 2 AND 3AZ** .

Installation note:

Replace aluminum screws.

If necessary, release nuts (4). Remove oil level sensor.

Tightening torque **11 13 8AZ** .

Installation note:

Replace sealing ring.

IMPORTANT: There must be no adhesive residues in the lower crankcase retaining threads.

Clean retaining threads and sealing surfaces.

Installation note:

Replace all seals.

Assemble engine.

1114 HOUSING COVER

11 14 151 REPLACING CRANKSHAFT RADIAL SEAL (N54, N54T)

Necessary preliminary tasks:

- Remove See **2300018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54** or **28 00 001 REMOVING AND INSTALLING TWIN-CLUTCH GEARBOX (GS7D36SG) N54** .
- Remove **FLYWHEEL** .

NOTE: Radial shaft seal has six removal openings for removal with special tool 11 9 200 .

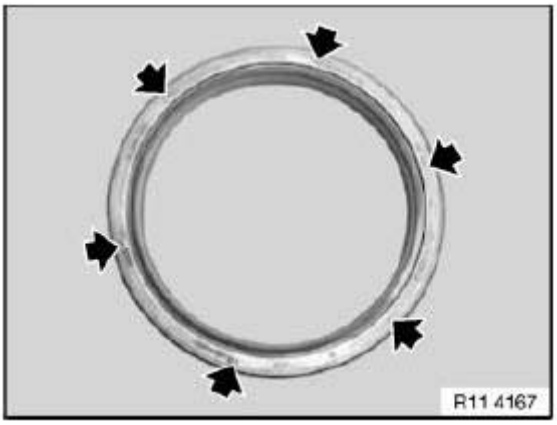


Fig. 77: Locating Crankshaft Radial Seal Removal Openings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If necessary, remove rubber coating (1) on top side of radial shaft seal and expose a removal opening (2) (see graphic).

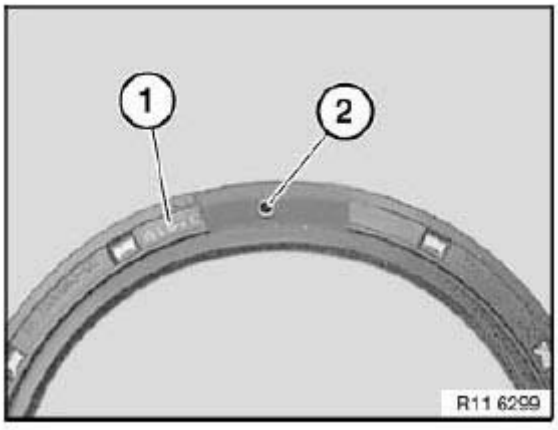


Fig. 78: Identifying Rubber Coating And Removal Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **11 9 200** . Insert sheet metal screws into removal opening of radial shaft seal and fasten without play (do **not** overtighten sheet metal screws).

Screw in spindle (1) slowly and carefully and detach radial shaft seal.

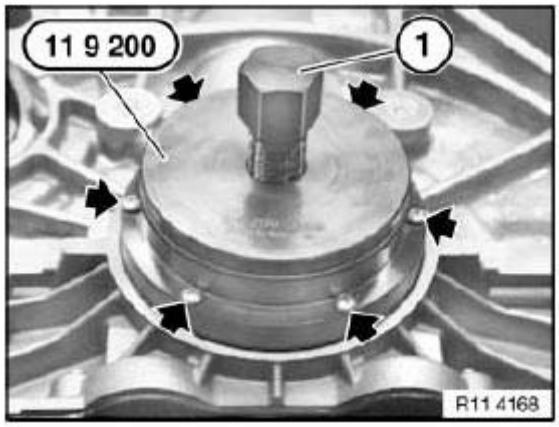


Fig. 79: Identifying Special Tool (11 9 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of radial shaft seal.

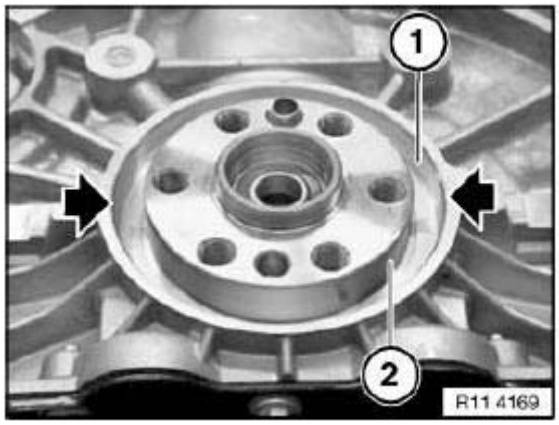


Fig. 80: Identifying Radial Shaft Running Surface Seal
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support bush (4) is supplied with radial shaft seal (1).

When radial shaft seal (1) is installed, only support bush (4) may be used as a slip bush.

Radial shaft seal (1) has a groove (2) on both left and right sides.

IMPORTANT: After installation, grooves (2) must be filled with sealing compound.

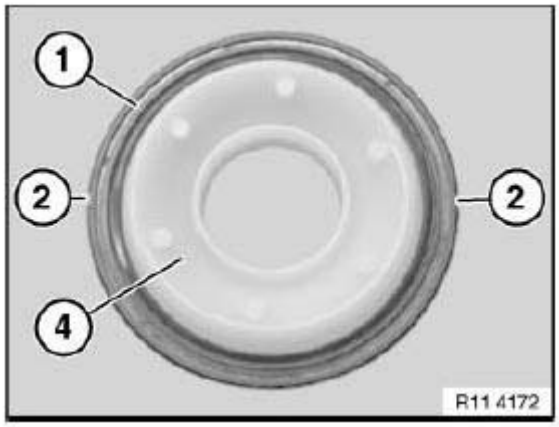


Fig. 81: Identifying Crankshaft Radial Seal, Grooves And Bushing
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The seal between the engine block and radial shaft seal is described below.

The engine block will not be leakproof at the outside of the radial shaft seal if you fail to comply with the individual work steps and the work sequence.

NOTE: The required parts are available from the BMW Parts Department (Electronic Parts Catalogue).

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out.

Injector (2) contains the sealing compound Loctite, manufacturer's number 193140.

Bottle (3) contains the primer Loctite, manufacturer's number 171000.

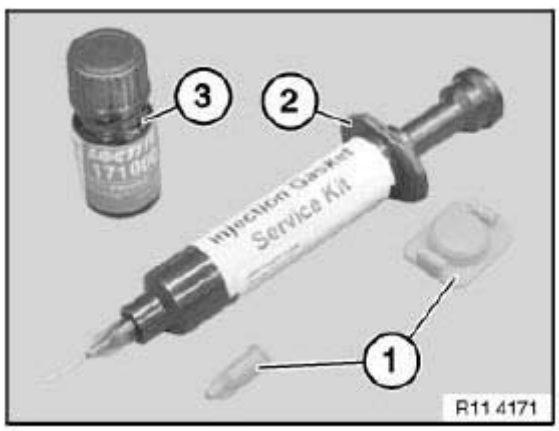


Fig. 82: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Fit support bush (4) with radial shaft seal (1) on crankshaft.

Align groove (2) centrally to housing partition (3).

Coat both grooves (2) on radial shaft seal (1) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

Push radial shaft seal (1) by hand as far as possible onto running surface.

Carefully remove support bush (4).

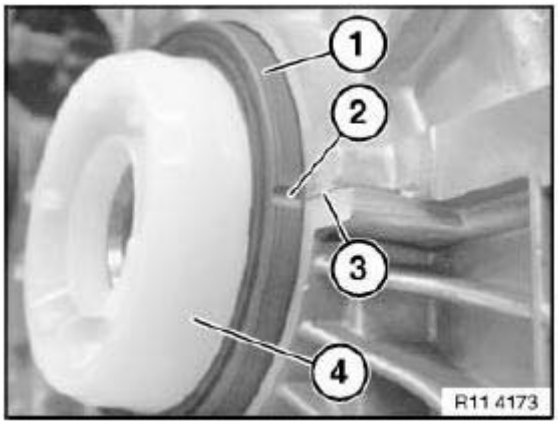


Fig. 83: Identifying Support Sleeve With Radial Shaft Seal On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Spacer ring (1) is supplied with radial shaft seal.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to crankshaft.

Fit spacer ring (1) on preassembled radial shaft seal.

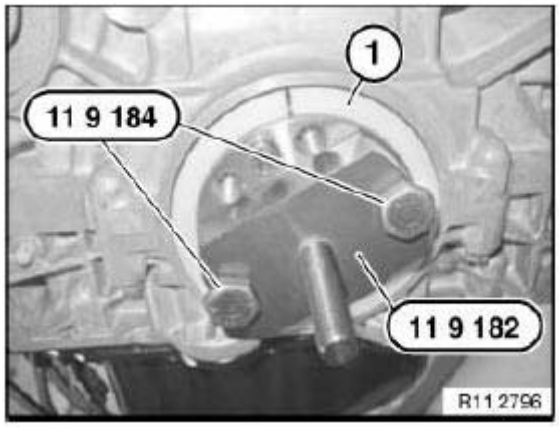


Fig. 84: Identifying Spacer Ring With Special Tool (11 9 182 And 11 9 183)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal and spacer ring with special tool 11 9 181 in conjunction with special tool 11 9 183.

Then remove spacer ring again.

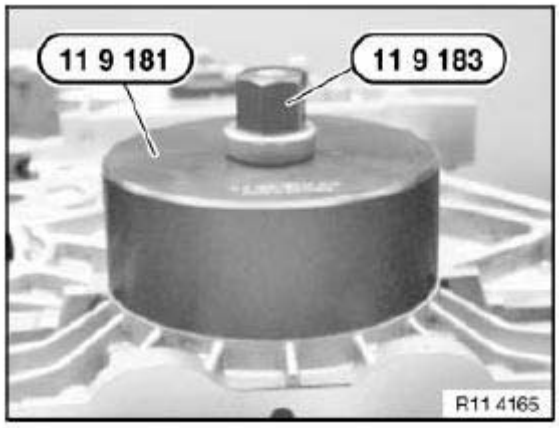


Fig. 85: Identifying Special Tool (11 9 181 And 11 9 183)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Insert brush with Loctite primer, manufacturer's number 171000, as far as possible into grooves (1) on radial shaft seal and coat housing partition on engine block.

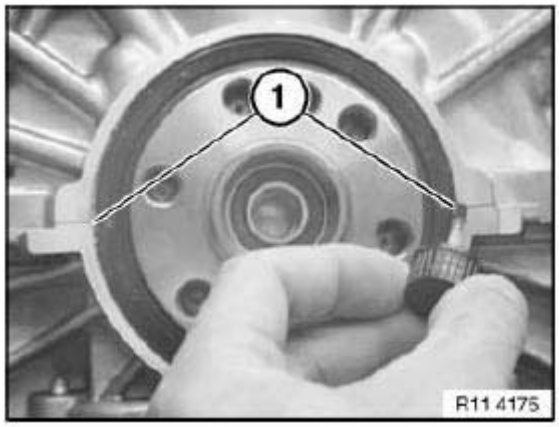


Fig. 86: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Fill both grooves (1) flush with Loctite sealing compound, manufacturer's number 193140.

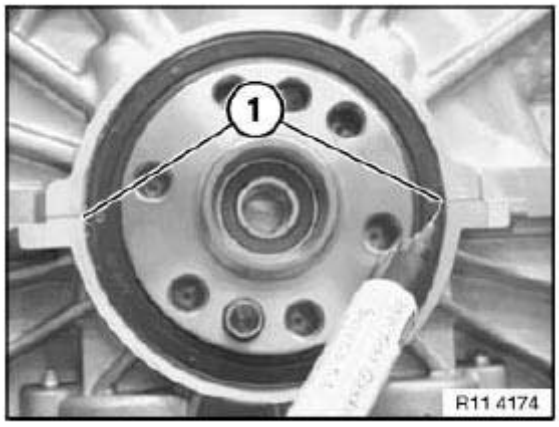


Fig. 87: Filling Both Grooves Flush With Loctite Sealing Compound
Courtesy of BMW OF NORTH AMERICA, INC.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 193140, and prevents leakage.

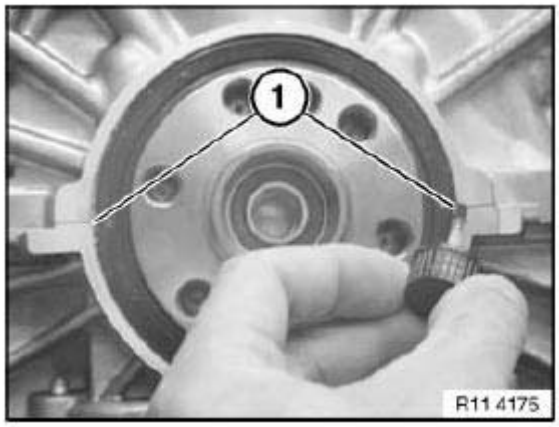


Fig. 88: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 14 005 REPLACING FRONT CRANKSHAFT SEAL (N54, N54T)

Necessary preliminary tasks:

- Remove **VIBRATION DAMPER**

IMPORTANT: Do not release central bolt.

Risk of damage!

If the central bolt is released, the sprockets of the timing chain and the oil pump will no longer be non-positively connected to the crankshaft. The camshafts may turn in relation to the crankshaft.

The timing must be ADJUSTED again.

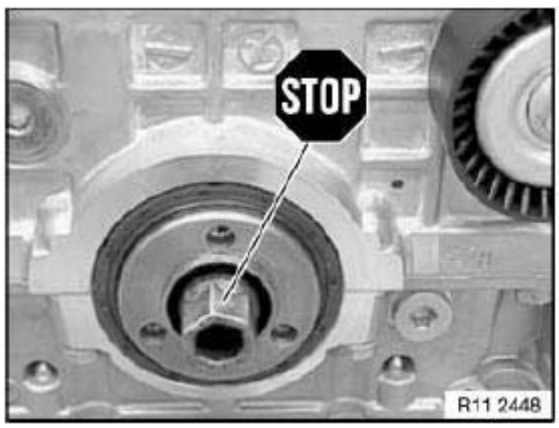


Fig. 89: Identifying Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Turn back special tool 11 9 222.

Push special tool 11 9 221 onto crankshaft hub.

IMPORTANT: When screws are tightened down (special tool 11 9 224) crankshaft seal is pressed inwards approx. 1 mm and thus slackened for subsequent removal.

Insert screws (special tool 11 9 224) and tighten down to approx. 20 Nm.

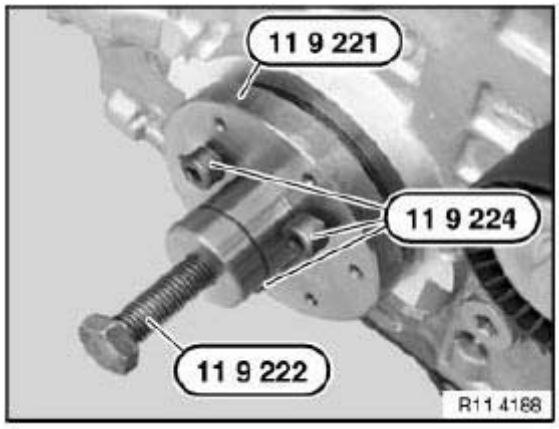


Fig. 90: Identifying Special Tool (11 9 221, 11 9 224 And 11 9 222)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 0 371 to 80 Nm into crankshaft seal.

Screw in spindle 11 0 372.

Release crankshaft seal from crankcase.

NOTE: Repeat this operation several times if necessary.

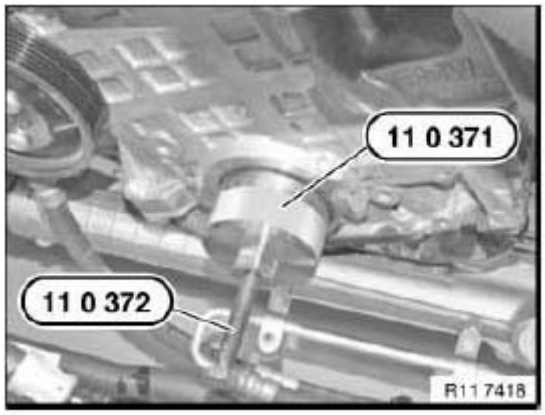


Fig. 91: Identifying Special Tool (11 0 372 And 11 0 371)
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully saw open crankshaft seal (1) at cutting line (2).

Remove crankshaft seal (1) from special tool 11 0 371.

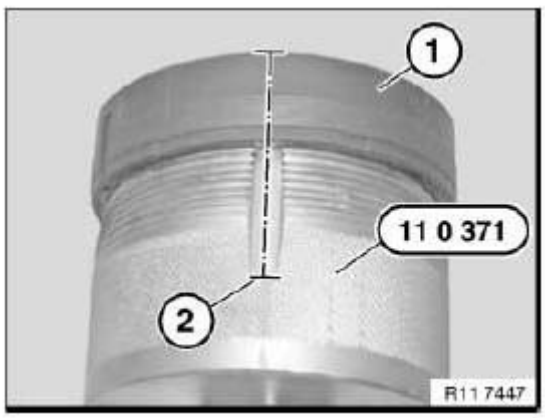


Fig. 92: Identifying Crankshaft Radial Seal And Cutting Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The following text describes installation and sealing between the engine block and crankshaft seal.

The engine block will not be leakproof at the outside of the crankshaft seal if you fail to comply with the individual work steps and the work sequence.

Installation note:

Clean sealing surface (1) and degrease thoroughly in area of crankcase partition.

Apply a light coat of oil to running surface (2) of the crankshaft seal.

NOTE: Graphic shows an N42 engine by way of example.

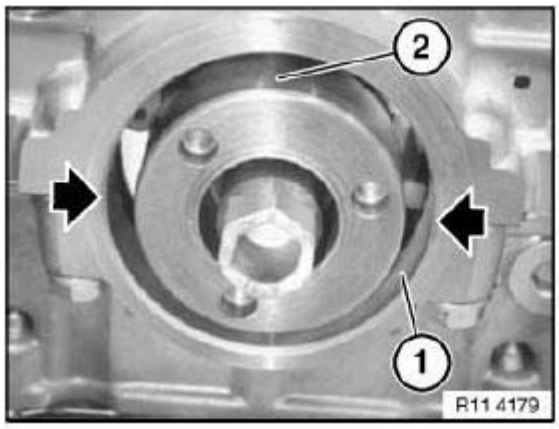


Fig. 93: Identifying Sealing Surface And Running Surface For Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 232 with screws (special tool 11 9 234) to crankshaft hub.

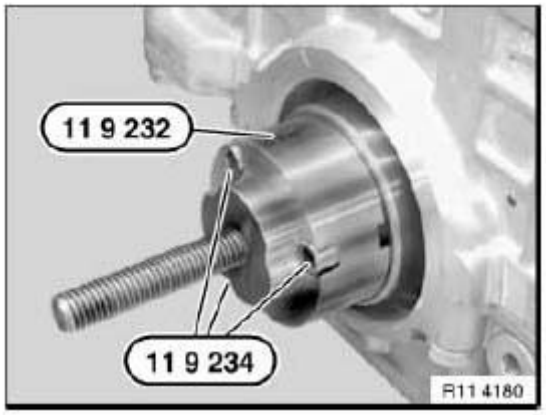


Fig. 94: Identifying Special Tool (11 9 232 And 11 9 234)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Support bush (1) is supplied with crankshaft seal (2).

When crankshaft seal (2) is installed, only support bush (1) may be used as a slip bush.

Crankshaft seal (2) has a groove on both left and right sides.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

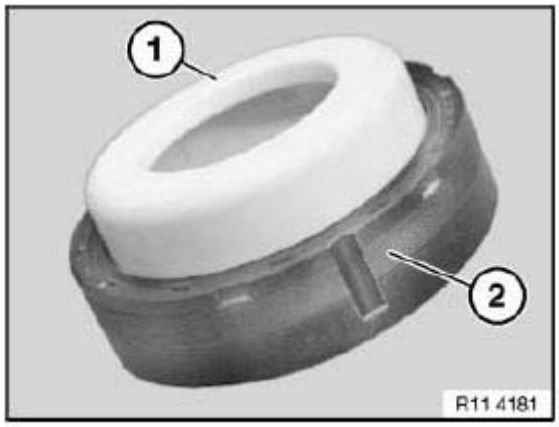


Fig. 95: Identifying Crankshaft Seal And Support Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The required parts are available from the BMW Parts Department (Electronic Parts Catalogue).

Remove screw caps (1) from injector (2).

Screw on metering needle.

Insert piston for pressing out or use special tool **11 4 370** .

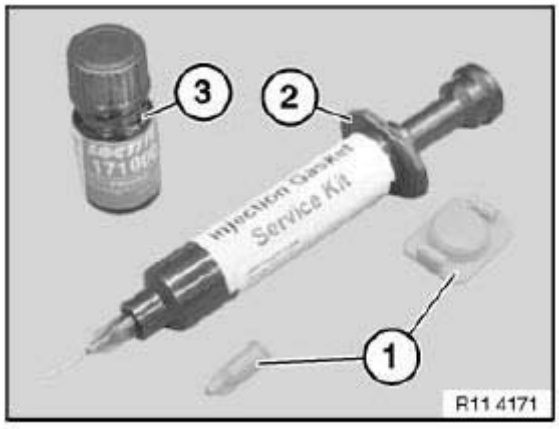


Fig. 96: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Push support bush (1) with crankshaft seal (2) onto special tool 11 9 232.

IMPORTANT: Support bush (1) remains on special tool 11 9 232 until crankshaft seal is drawn in.

Align groove (3) centrally to crankcase partition (4).

Coat both grooves (3) on crankshaft seal (2) with Loctite primer, manufacturer's number 171000, and expose to air for approx. one minute.

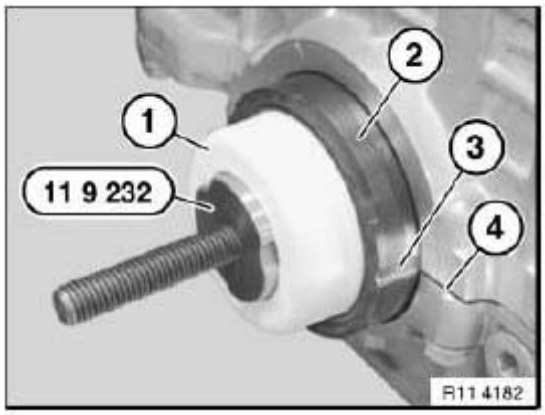


Fig. 97: Identifying Sleeve, Crankshaft Seal, Groove And Housing Partition With Special Tool (11 9 232)
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in crankshaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

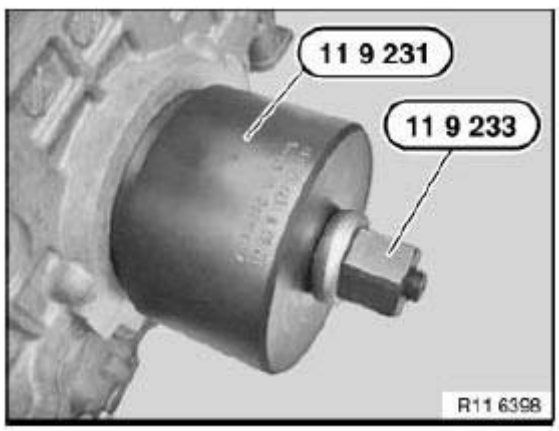


Fig. 98: Identifying Special Tool (11 9 231 And 11 9 233)
Courtesy of BMW OF NORTH AMERICA, INC.

Before filling with sealing compound:

Insert brush with Loctite primer, manufacturer's number 171000, as far as possible into grooves (1) on crankshaft seal and coat crankcase partition on engine block.

NOTE: Graphic shows an N42 engine by way of example.

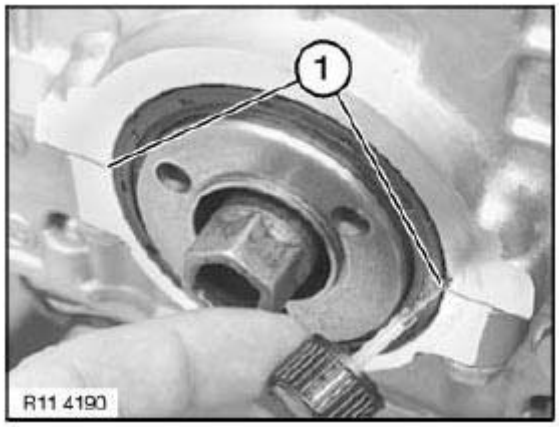


Fig. 99: Inserting Brush With Loctite Primer Into Grooves On Crankshaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Using injector/syringe (2), fill both grooves (3) flush with sealing compound.

NOTE: Graphic shows an N42 engine by way of example.

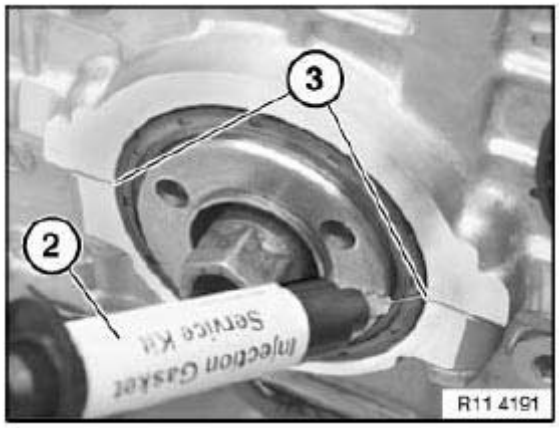


Fig. 100: Filling Grooves Flush With Sealant Using Injector/Syringe
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Loctite primer, manufacturer's number 171000, binds the Loctite sealing compound, manufacturer's number 128357, and prevents leakage.

Coat surface of sealing compound in both grooves (1) with Loctite primer, manufacturer's number 171000.

NOTE: Graphic shows an N42 engine by way of example.

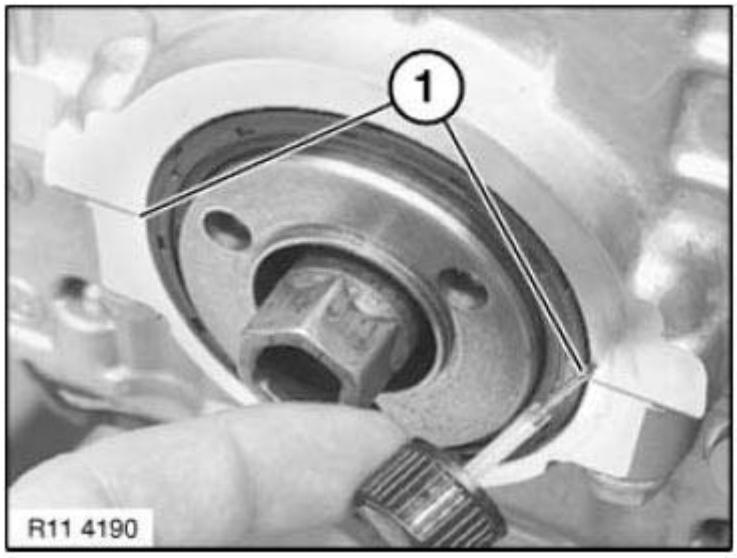


Fig. 101: Coating Surface Of Sealing Compound In Both Grooves Using Loctite Primer
Courtesy of BMW OF NORTH AMERICA, INC.

11 14 010 REPLACING SEALING CAP FOR VACUUM PUMP (N54, N54T)

Necessary preliminary tasks:

- Remove **FAN COWL**
- Remove alternator **DRIVE BELT**
- Remove both drive belt **TENSIONERS**

NOTE: For purposes of clarity, graphics show alternator and power steering pump removed.

Secure special tool 11 8 535 with special tools 11 8 531 and 11 8 537.

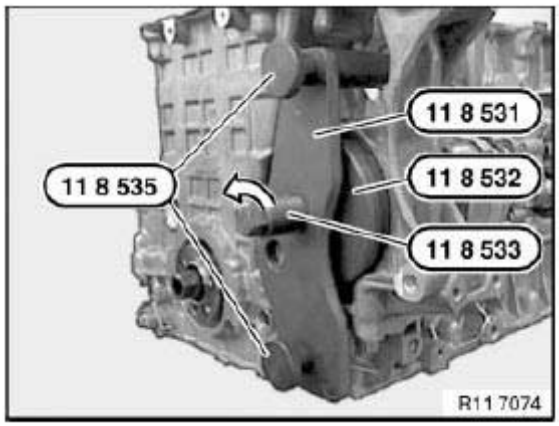


Fig. 102: Identifying Special Tools 11 8 535, 11 8 531 And 11 8 537

Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 8 537 by hand on sealing cover.

Screw in special tool 11 8 534.

NOTE: The sealing cover is pressed out diagonally during this work step

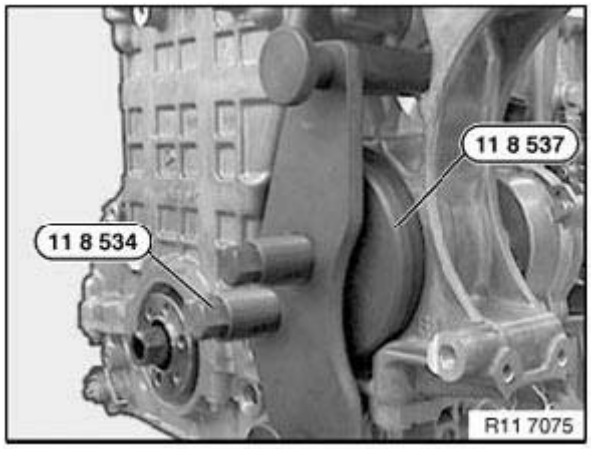


Fig. 103: Identifying Special Tools 11 8 537 And 11 8 534
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in new sealing cover (1) with special tools 11 8 532 and 11 8 533 until flush with crankcase upper section.

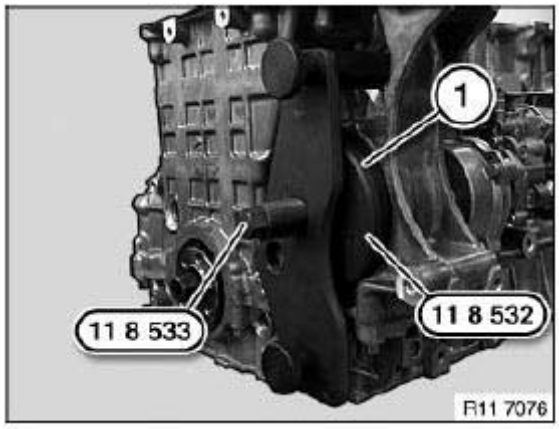


Fig. 104: Identifying Sealing Cover With Special Tools 11 8 532 And 11 8 533
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1121 CRANKSHAFT WITH BEARING

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N54, N54T)

Necessary preliminary tasks:

- Remove **28 00 001 REMOVING AND INSTALLING TWIN-CLUTCH GEARBOX (GS7D36SG) N54**
- Remove **CLUTCH**

Enlarge special tool **11 9 260** with an elongated hole.

Enlarge elongated hole on special tool **11 9 260** to **8 mm.**

Fig. 105: Identifying Slot Dimension On Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with manual gearboxes

Secure flywheel with special tool **11 9 260** .

Release flywheel bolts with special tool **11 4 180** /

Tightening torque **11 22 2AZ** .

Installation note:

The flywheel is secured with a dowel pin.

Fit new flywheel screws

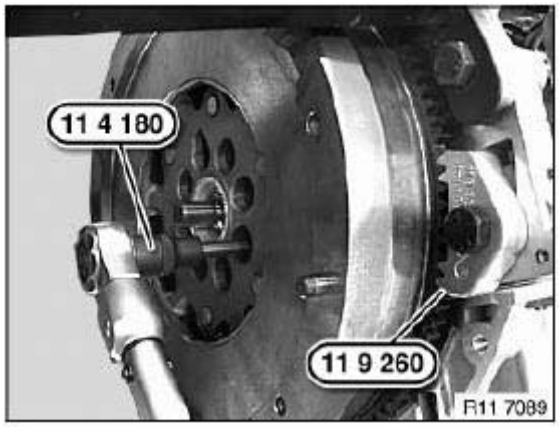


Fig. 106: Removing Flywheel Screws Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with automatic transmissions

Secure flywheel with special tool **11 9 260** .

Release flywheel screws with a suitable tool (1).

Tightening torque **11 22 1AZ** .

Installation note:

The flywheel is secured with a dowel pin.

Fit new flywheel screws

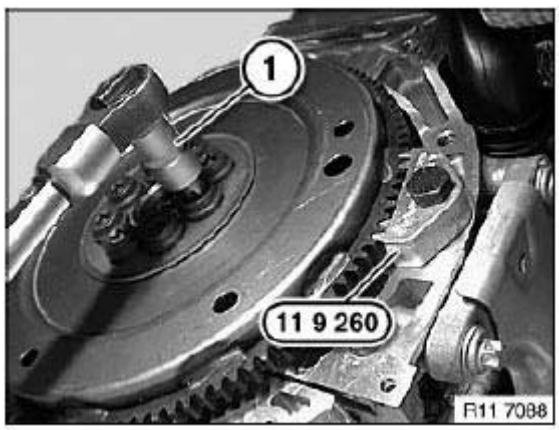


Fig. 107: Mounting Flywheel Using Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 531 REPLACING ALL CRANKSHAFT MAIN BEARINGS (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **CRANKSHAFT**

Check setting of oil spray nozzles, adjusting if necessary

Attach special tool **11 8 510** to main bearing screw connection, secure with bolt (1).

Installation note:

The oil nozzle must be located precisely in the groove of special tool **11 8 510** .

If necessary, adjust oil nozzle.

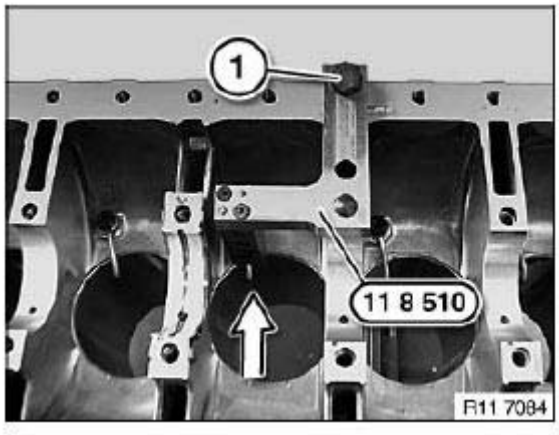


Fig. 108: Locating Oil Nozzle In Groove Of Special Tool 11 8 510
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust oil nozzle.

Release screw (1).

Tightening torque **11 11 5AZ** .

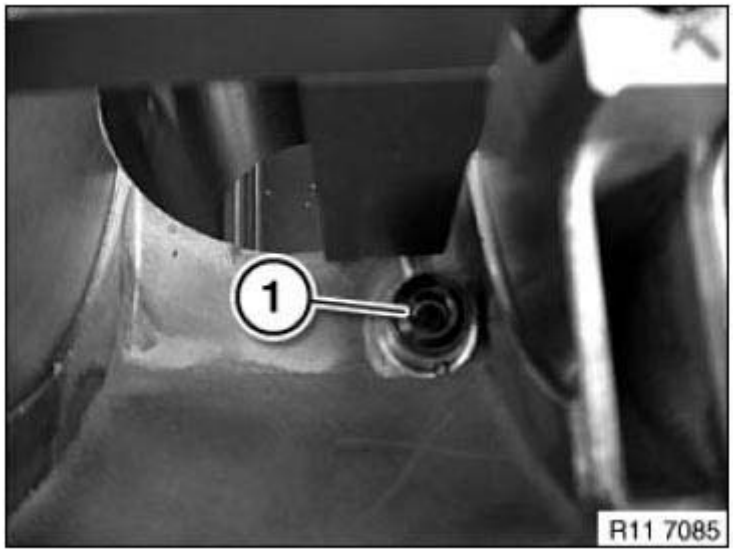


Fig. 109: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing shells (2) and (3).

NOTE: Guide bearing shell (3) is a thrust bearing.

Observe bearing classification. See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N54/B30** ; **CRANKSHAFT AND BEARINGS N54/B30** ; or **CRANKSHAFT AND BEARINGS N54/B30** .

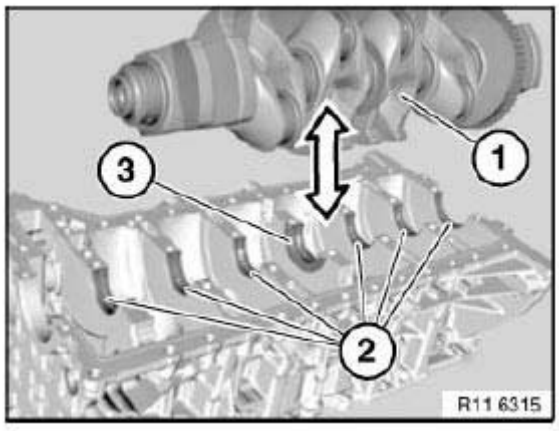


Fig. 110: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Bearing shell (1) with lubricant groove must be fitted in crankcase upper section.

Bearing shell (2) without lubricant groove must be fitted in crankcase lower section (bedplate).

IMPORTANT: Allocation of bearing points:

Bearing point 1 is at the front on the timing chain drive in the direction of travel.

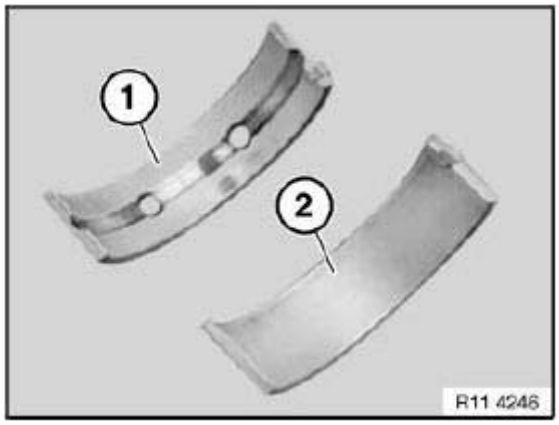


Fig. 111: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Main bearing classification (1) for crankcase lower half (bedplate), code numbers 1 2 3, see table.

Observe bearing classification. See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N54/B30** ; **CRANKSHAFT AND BEARINGS N54/B30** ; **CRANKSHAFT AND BEARINGS N54/B30** .

Bearing classification (2) of **CONNECTING RODS** code letters b and r.

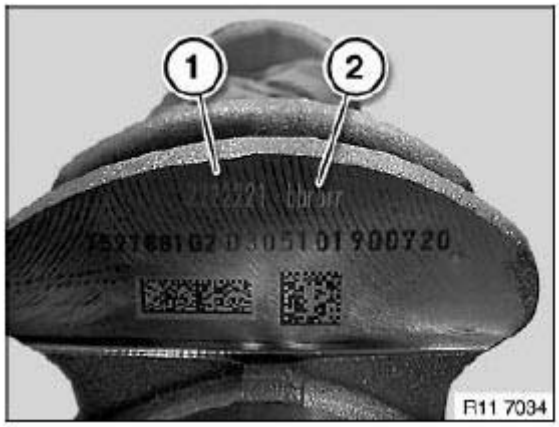


Fig. 112: Identifying Bearing Classifications
Courtesy of BMW OF NORTH AMERICA, INC.

Main bearing classification (1) in crankcase, code letters A/B or C, see table.

Installation note:

When all the letters and number code have been determined, the bearing shell color must be allocated.

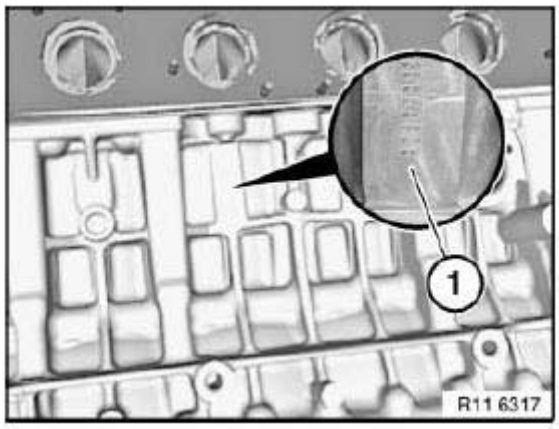


Fig. 113: Identifying Bearing Classification Of Crankcase Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

The letter/number combination produces a bearing shell pairing.

Identification by different colors.

IMPORTANT: First bearing point is on the timing drive.

The color combination Yellow and Red must not be fitted.

Engine damage will result if excessively small bearing play is determined.

Code letters on crankcase

Code letter A = bearing shell (1) color Yellow.

Code letter B = bearing shell (1) color Green.

Code letter C = bearing shell (1) color Red.

Code numbers on crankshaft

Code number 1 = bearing shell (2) Yellow.

Code number 2 = bearing shell (2) Green.

Code number 3 = bearing shell (2) Red.

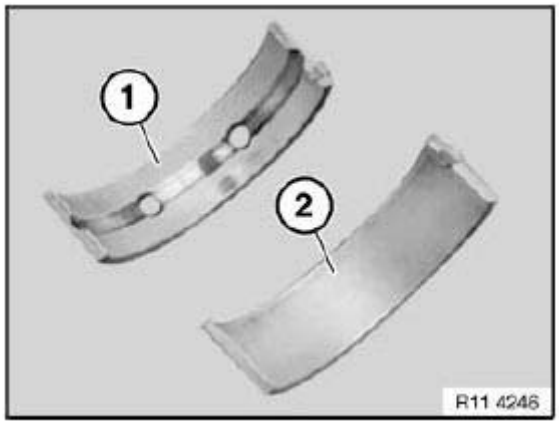


Fig. 114: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The color combination Yellow and Red must not be fitted; the bearing colors Green/Green must be selected for this color combination, see table.

Installation example

For bearing 1 with code letter **A** on the **crankcase** and code number 1 on the **crankshaft** bearing shell (1) with the color **Yellow** is required for the **crankcase** and bearing shell (2) with the color **Yellow** for the **crankcase lower half** (bedplate).

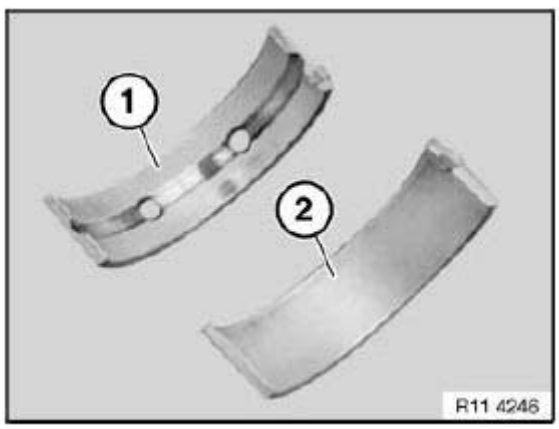


Fig. 115: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Lager 2: **A** and **2** colors Yellow and Green.

Lager 3: **B** and **2** colors Green and Green.

Lager 4: **C** and **2** colors Red and Green.

Lager 5: **B** and **1** colors Green and Yellow.

Lager 6: **C** and **3** colors Red and Red.

Lager 7: **C** and **1** colors Green and Green.

The color combination **Yellow and Red** must not be fitted.

Installation note:

Possible color combinations for mounting the crankshaft in the crankcase.

CRANKCASE COLOR CODE REFERENCE CHART

(A 1) Crankcase/Yellow	**(B 1) Crankcase/Green**	**(C 1) Crankcase/Green**
(A 1) Crankcase lower half/**Yellow**	**(B 1)** Crankcase lower half/**Yellow**	**(C 1)** Crankcase lower half/**Green**

CRANKCASE COLOR CODE REFERENCE CHART

(A 2) Crankcase/Yellow	**(B 2) Crankcase/Green**	**(C 2) Crankcase/Red**
(A 2) Crankcase lower half/**Green**	**(B 2)** Crankcase lower half/**Green**	**(C 2)** Crankcase lower half/**Green**
(A 3) Crankcase/**Green**	**(B 3)** Crankcase/**Green**	**(C 3)** Crankcase/**Red**
(A 3) Crankcase lower half/**Green**	**(B 3)** Crankcase lower half/**Red**	**(C 3)** Crankcase lower half/**Red**

Insert all bearing shells (2 and 3).

IMPORTANT: Clean sealing surfaces.

Do not clean sealing faces with a metal-cutting tool.

Only use special tool **11 4 470** to clean sealing surfaces.

Determine bearing play with special tool **00 2 590** .

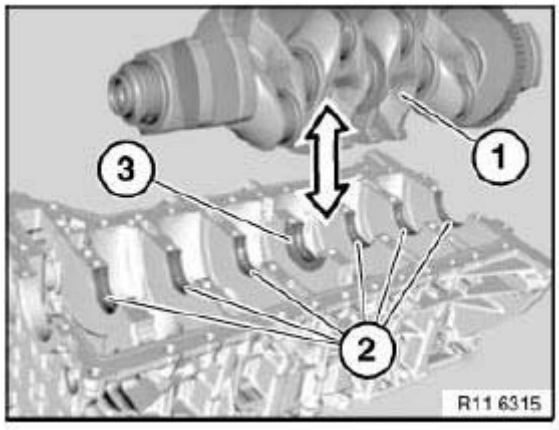


Fig. 116: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

All measuring points must be free from oil and grease.

Use used screws to determine bearing play.

Set up crankcase lower section (bedplate) with bearing shells.

Remove crankcase lower section (bedplate).

Read off bearing play at width of flattened plastic thread and measurement scale.

Crankshaft bearing play **radial** .

Installation note:

Remove plastic thread.

Apply a light coat of oil to bearing shells and crankshaft.

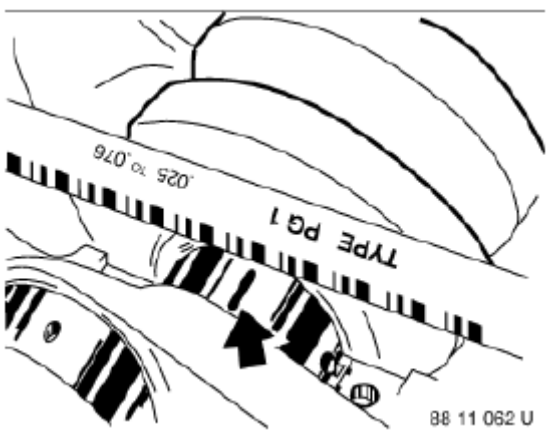


Fig. 117: Checking Radial Clearance At Width Of Flattened Plastic Thread (Plastigage)
Courtesy of BMW OF NORTH AMERICA, INC.

Install crankcase lower section (bedplate).

Assemble engine.

11 21 500 REPLACING CRANKSHAFT (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on **ASSEMBLY STAND**
- Remove **VIBRATION DAMPER**
- Remove **OIL SUMP**
- Remove **OIL PUMP**
- Remove **TRIANGULAR DRIVE** for oil pump
- Remove **TIMING CHAIN MODULE**
- Remove **CYLINDER HEAD** .
- Remove **FLYWHEEL**
- Removing all **PISTONS**

Release screws (1).

Tightening torque **11 13 5AZ** .

Installation note:

Replace aluminum screws.

Remove oil deflector (2).

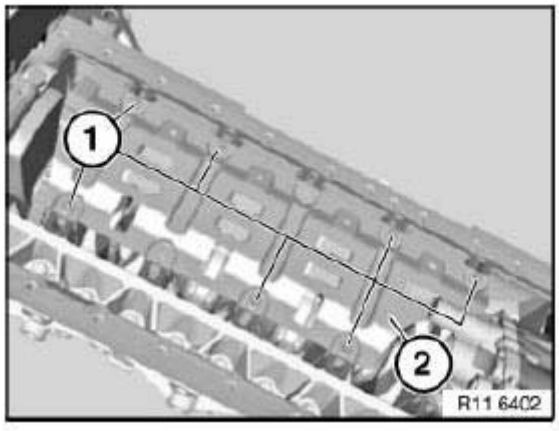


Fig. 118: Identifying Screws And Oil Deflector

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 2AZ** .

Unfasten screws (2).

Tightening torque **11 11 3AZ** .

Installation note:

Replace aluminum screws.

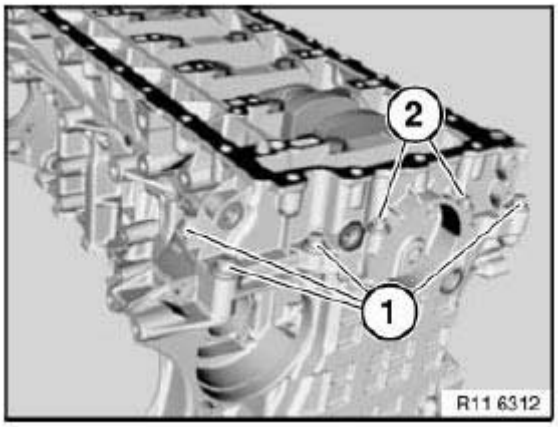


Fig. 119: Identifying Aluminum Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 4AZ** .

Unfasten screws (2).

Tightening torque **11 11 2AZ** .

Installation note:

Replace aluminum screws.

Release steel screws (1 to 14) from outside inwards.

Tightening torque **11 11 1AZ** .

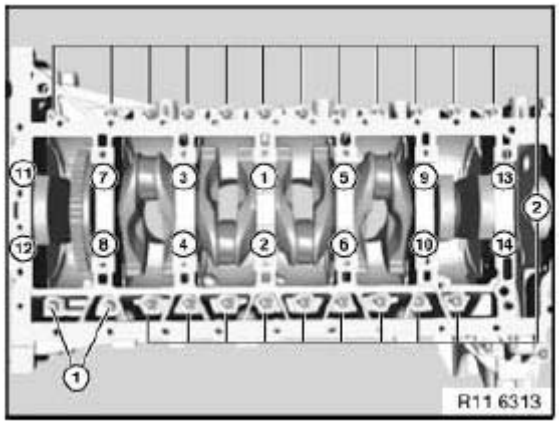


Fig. 120: Identifying Steel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 11 3AZ** .

Installation note:

Replace aluminum screws.

Remove crankshaft lower section in upward direction.

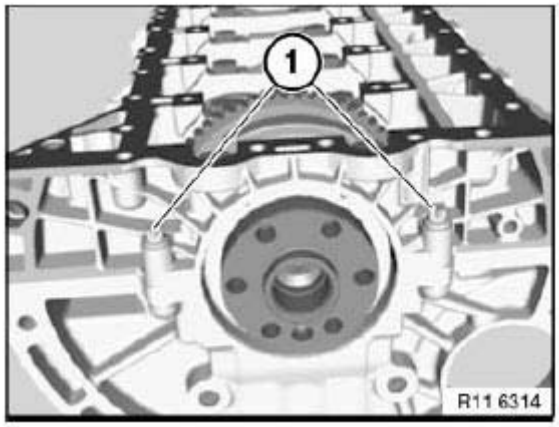


Fig. 121: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove both crankshaft seals (1).

NOTE: Graphic shows N46.

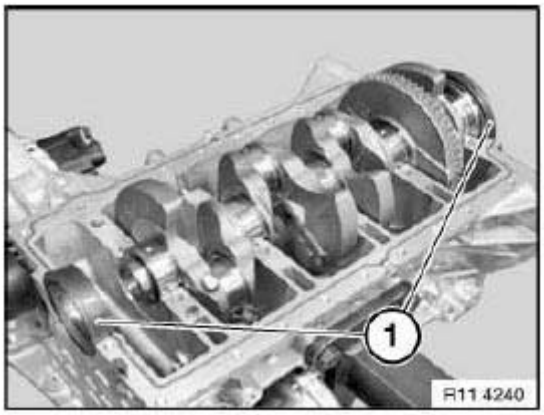


Fig. 122: Identifying Crankshaft Radial Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **MAIN BEARING SHELLS** (2 and 3), replace if necessary.

Remove and install crankshaft (1) in direction of arrow.

IMPORTANT: Remove crankshaft with aid of a second person.

Weight of crankshaft approx. 25 kg.

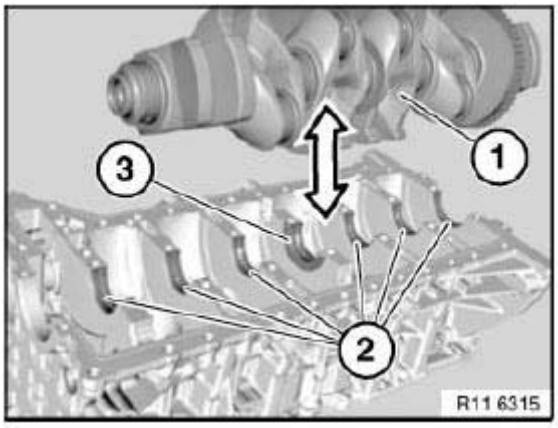


Fig. 123: Identifying Bearing Shells
Courtesy of BMW OF NORTH AMERICA, INC.

Check guide sleeves (1) for damage and correct seating.

Reinstall crankshaft.

Installation note:

Lubricate all bearing points with engine oil.

Clean all sealing surfaces.

NOTE: Graphic shows N46.

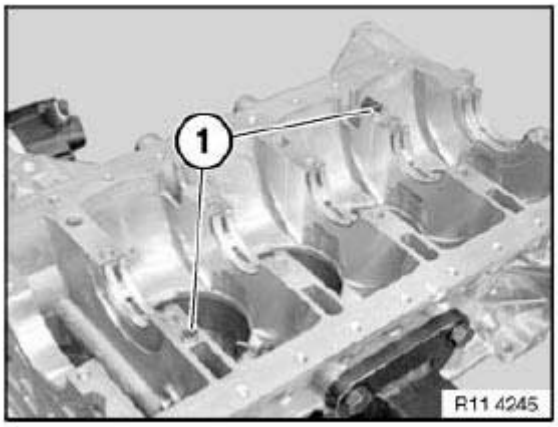


Fig. 124: Identifying Adapter Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten steel screws (1 to 14) from inside outwards.

Tightening torque **11 11 1AZ** .

Tighten screws (2) from inside outwards.

Tightening torque **11 11 2AZ** .

Tighten screws (1).

Tightening torque **11 11 4AZ** .

Installation note:

Replace aluminum screws.

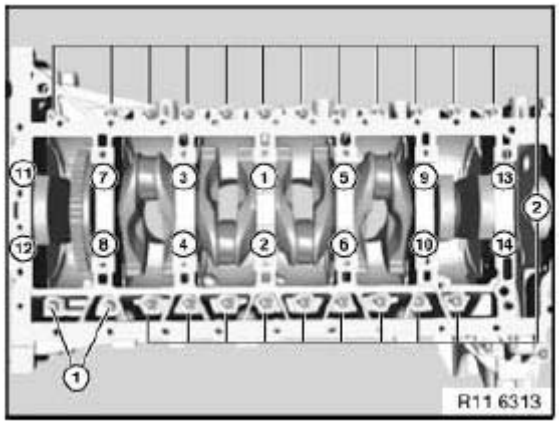


Fig. 125: Identifying Steel Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten aluminum screws exclusively with special tool **00 9 120** .

IMPORTANT: In the case of aluminum screws, jointing torque and angle of rotation must be observed without fail.

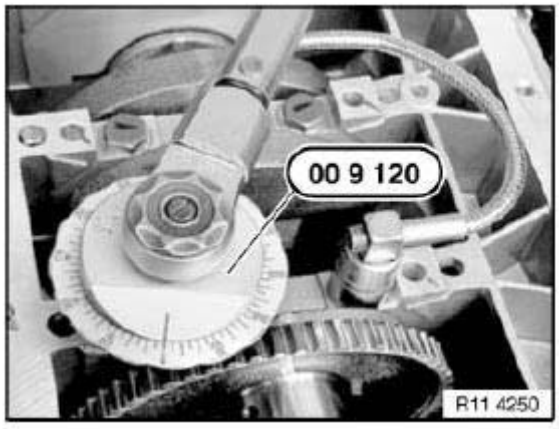


Fig. 126: Tightening Main Bearing Bolts Using Special Tool (00 9 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Set up stand with magnetic base on special tool 11 4 440.

Set up special tool **00 2 510** on stand.

Position special tool **00 2 510** on crankshaft.

Move crankshaft in direction of arrow.

Determine bearing play. See **CRANKSHAFT AND BEARINGS** ; **CRANKSHAFT AND BEARINGS N54/B30** ; **CRANKSHAFT AND BEARINGS N54/B30** ; or **CRANKSHAFT AND BEARINGS N54/B30** .

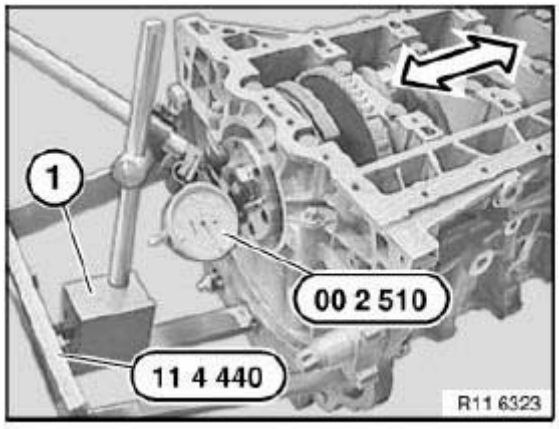


Fig. 127: Setting Up Stand With Magnetic Base On Special Tool 11 4 440
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Always replace nozzles (1).

Drive in both nozzles (1) with special tool **11 9 360** on left and right into crankcase.

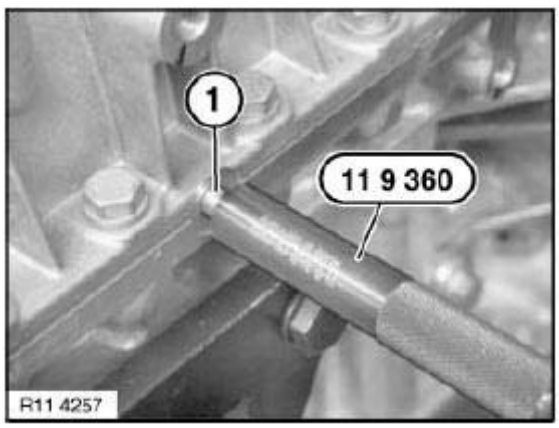


Fig. 128: Inserting Nozzles Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

CRANKSHAFT SEAL - replace front.

CRANKSHAFT SEAL - replace rear.

Installation note:

Use **PRIMER 1.3 AND LIQUID GASKET 1.4** .

Prepare liquid sealing compound (1) in special tool **11 4 370** .

Screw on nozzle for injecting liquid gasket.

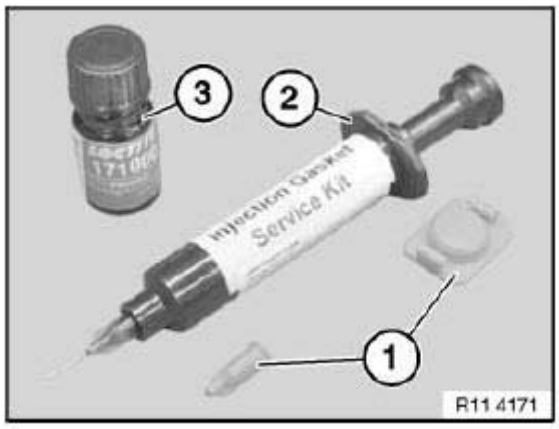


Fig. 129: Identifying Injector, Sealing Compound And Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Slowly insert liquid sealing compound (1) with special tool **11 4 370** in direction of arrow.

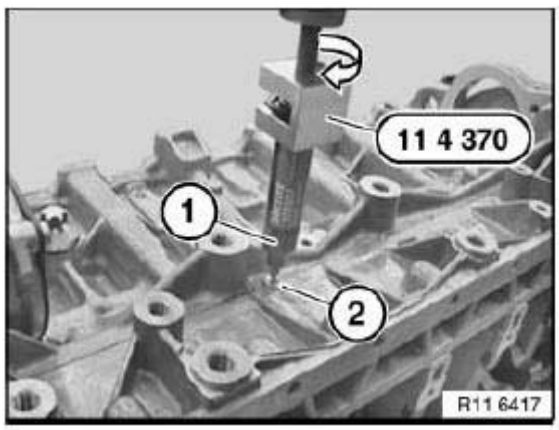


Fig. 130: Inserting Liquid Sealing Compound Using Special Tool 11 4 370
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid sealing compound with primer 1.3.

(Graphic shows N40).

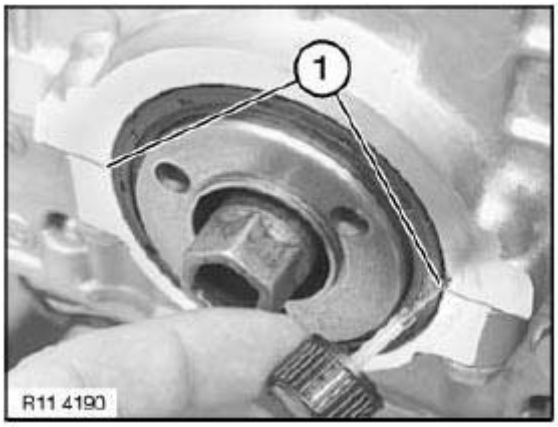


Fig. 131: Stopping Escaping Liquid Sealing Compound Using Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 21 505 SEALING CRANKCASE LOWER SECTION (N54, N54T)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Risk of damage!

Jointing torque and angle of rotation must be observed without fail.

IMPORTANT: Changed procedure.

It is not necessary to remove the cylinder head and the crankshaft.

Necessary preliminary tasks:

- Remove **ENGINE** .

- **MOUNT ENGINE ON ASSEMBLY STAND** .
- Remove **CLUTCH** (if fitted).
- Remove left and right engine support arm. See **2211100 REPLACING RIGHT ENGINE SUPPORT ARM (N54)** ; or **2211110 REPLACING LEFT ENGINE SUPPORT ARM (N54)**
- Remove **OIL SUMP** .

Release screws (1).

Pull out oil pump intake pipe (2).

Tightening torque: **11 13 5AZ**

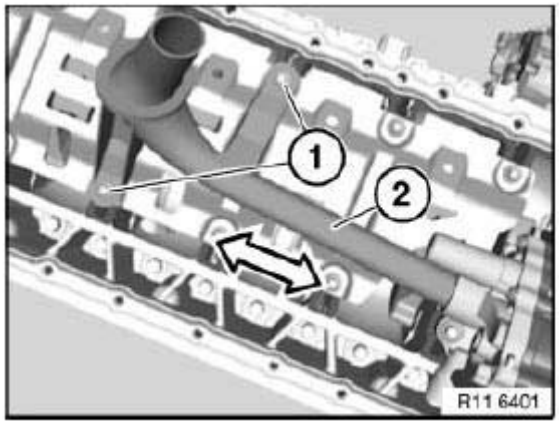


Fig. 132: Removing Pump Intake Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: **11 13 5AZ** .

Installation note:

Replace aluminum screws.

Remove oil deflector (2).

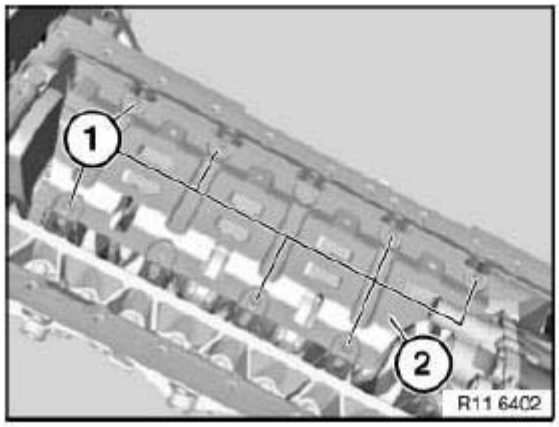


Fig. 133: Identifying Oil Deflector And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil pump drive gear with 6.0 mm dia. steel pin (3) to oil pump.

IMPORTANT: Release central bolt (2) only together with 6.0 mm dia. steel pin (3).

Do not remove sprocket.

Release central bolt (2).

Tightening torque: **11 41 4AZ** .

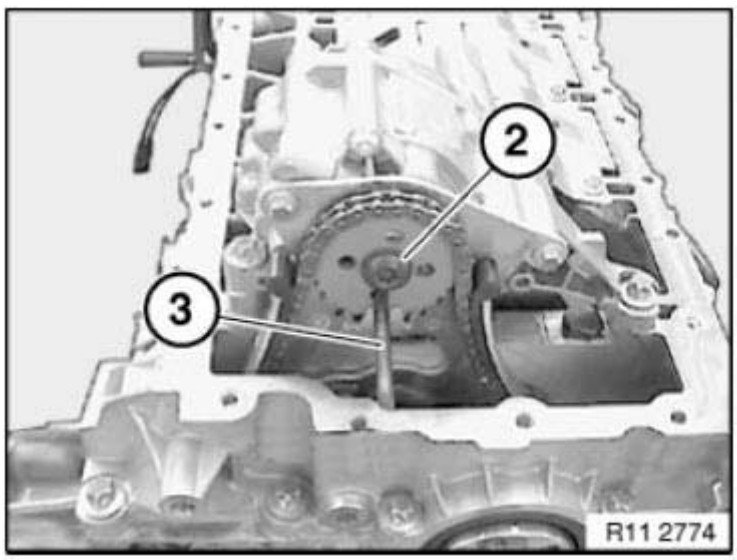


Fig. 134: Identifying Oil Pump Drive Gear And Steel Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque: **11 41 3AZ** .

Installation note:

Replace aluminum screws.

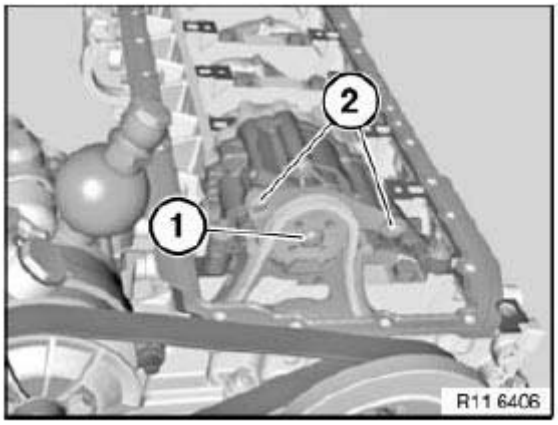


Fig. 135: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screw plug (1) from crankcase at front.

NOTE: Replace gasket.

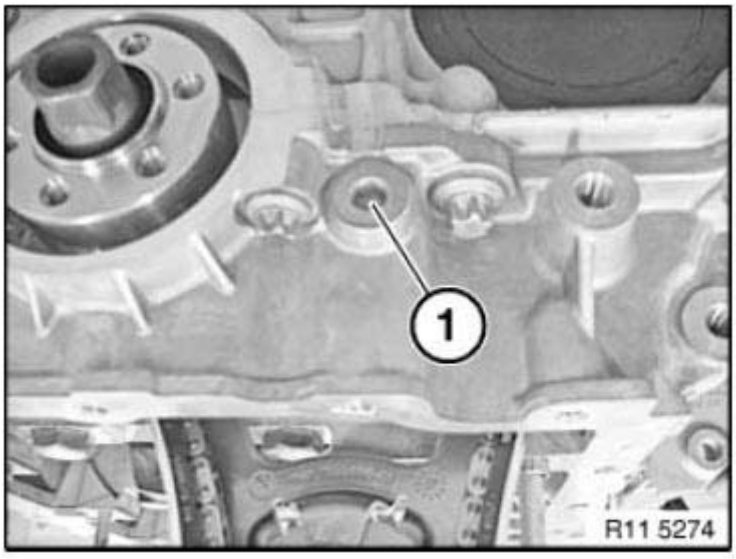


Fig. 136: Identifying Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) for oil pump triangular drive with special tool **11 8 640** .

NOTE: **It is not necessary to remove the triangular drive.**

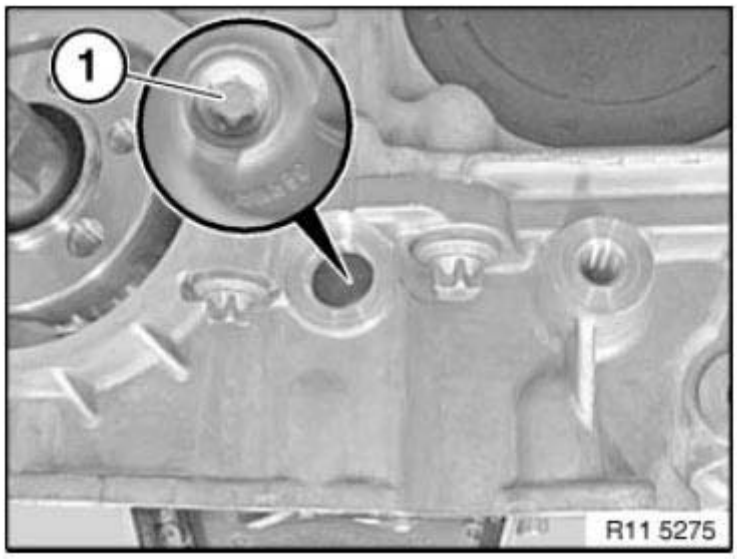


Fig. 137: Identifying Oil Pump Triangular Drive Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Version 1

IMPORTANT: **Observe different screw lengths.**

Release screws (1).

Tightening torque 11 41 2AZ .

Tightening torque 11 41 2AZ .

Installation note:

Replace aluminum screws.

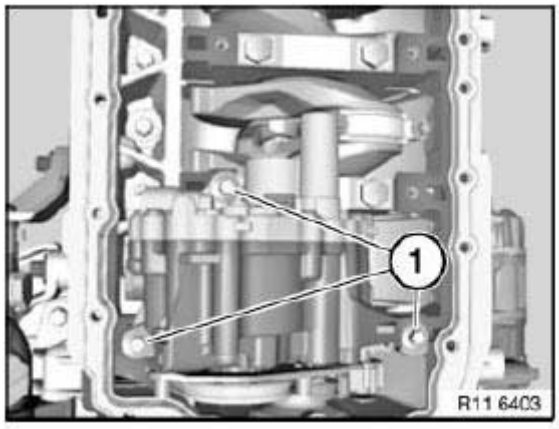


Fig. 138: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2

IMPORTANT: Observe different screw lengths.

Release oil pump screws (1).

Tightening torque: 11 41 2AZ .

Installation note:

Replace aluminum screws.

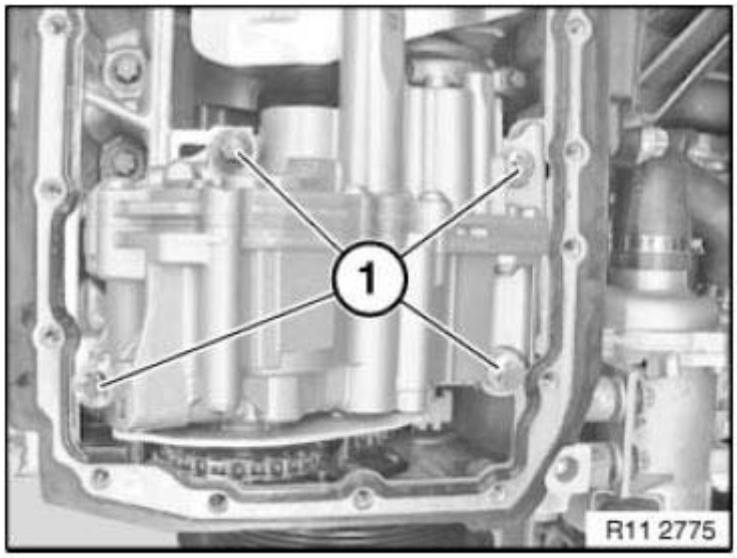


Fig. 139: Identifying Oil Pump Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach sprocket (1) in direction of arrow.

NOTE: The chain tensioner pushes the timing chain (3) of the triangular drive upward.

Do **not** remove camshaft sprocket.

Remove oil pump (2) in direction of arrow.

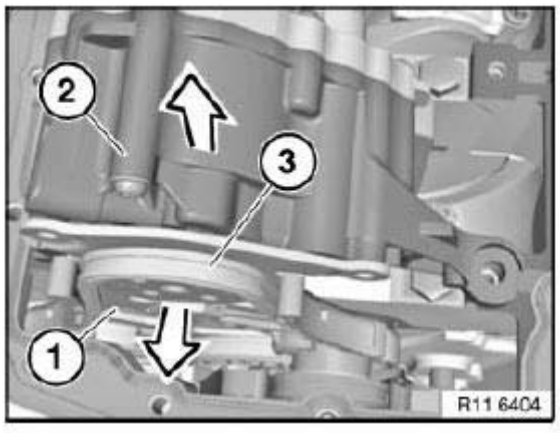


Fig. 140: Removing Sprocket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check spacer bushings (1) for secure seating and damage; replace if necessary.

Align twin surface (3) on oil pump (2) to sprocket wheel.

Install oil pump (2).

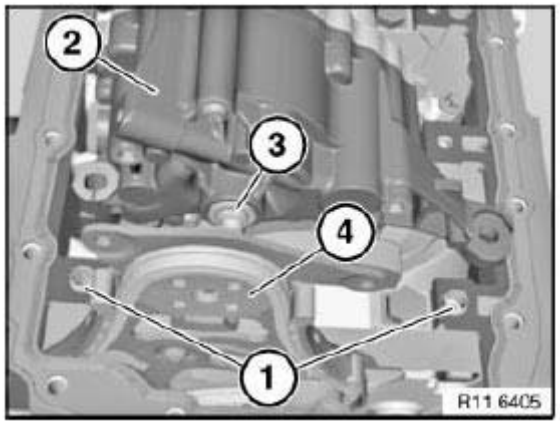


Fig. 141: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The dowel hole for the TDC setting is located on the intake side underneath the starter motor.

Rotate engine at central bolt and secure flywheel in position with special tool **11 0 300** .

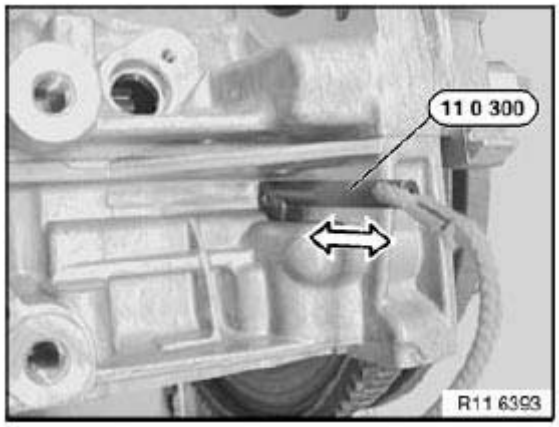


Fig. 142: Securing Flywheel In Position Using Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

Secure flywheel with special tool (1) 11 9 260 and special tool (2) 11 9 266.

NOTE: Make sure that the special tool (1) completely engages in the flywheel teeth (see arrow)

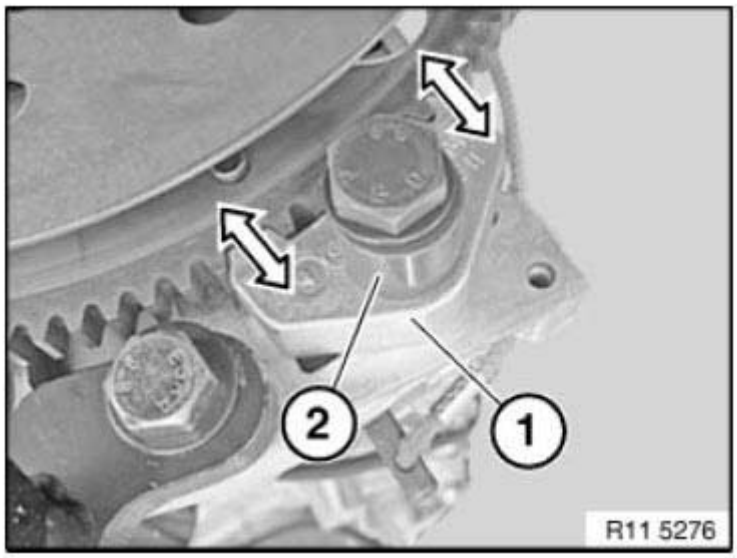


Fig. 143: Securing Flywheel Using Special Tool 11 9 260 And Special Tool 11 9 266
Courtesy of BMW OF NORTH AMERICA, INC.

Automatic transmission

Release flywheel bolts (1).

Release special tool (2).

Remove flywheel (3).

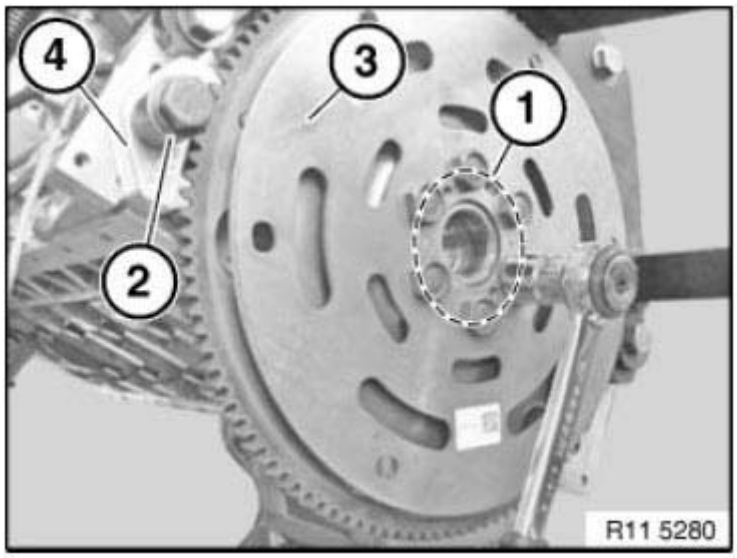


Fig. 144: Identifying Flywheel With Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Manual transmission

IMPORTANT: Position crankshaft at top dead center.

Remove dual-mass flywheel.

Secure flywheel with special tool **11 9 260** .

Remove **VIBRATION DAMPER** .

Release flywheel bolts with special tool **11 4 180** /

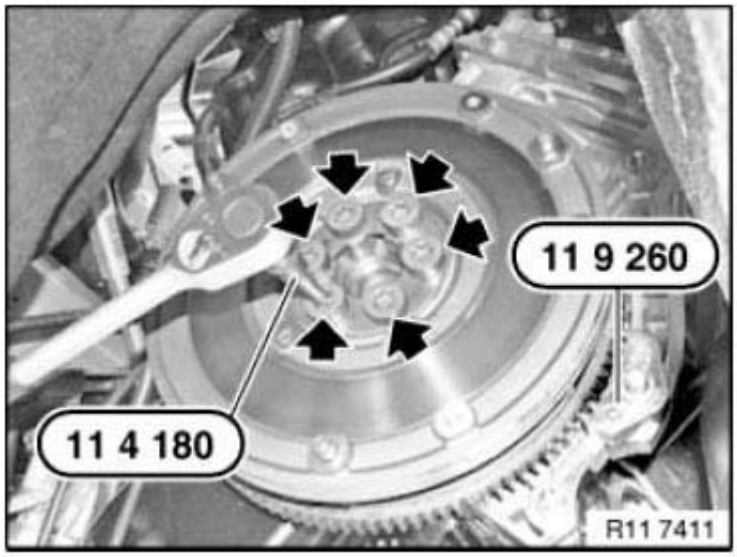


Fig. 145: Removing Flywheel Bolts Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

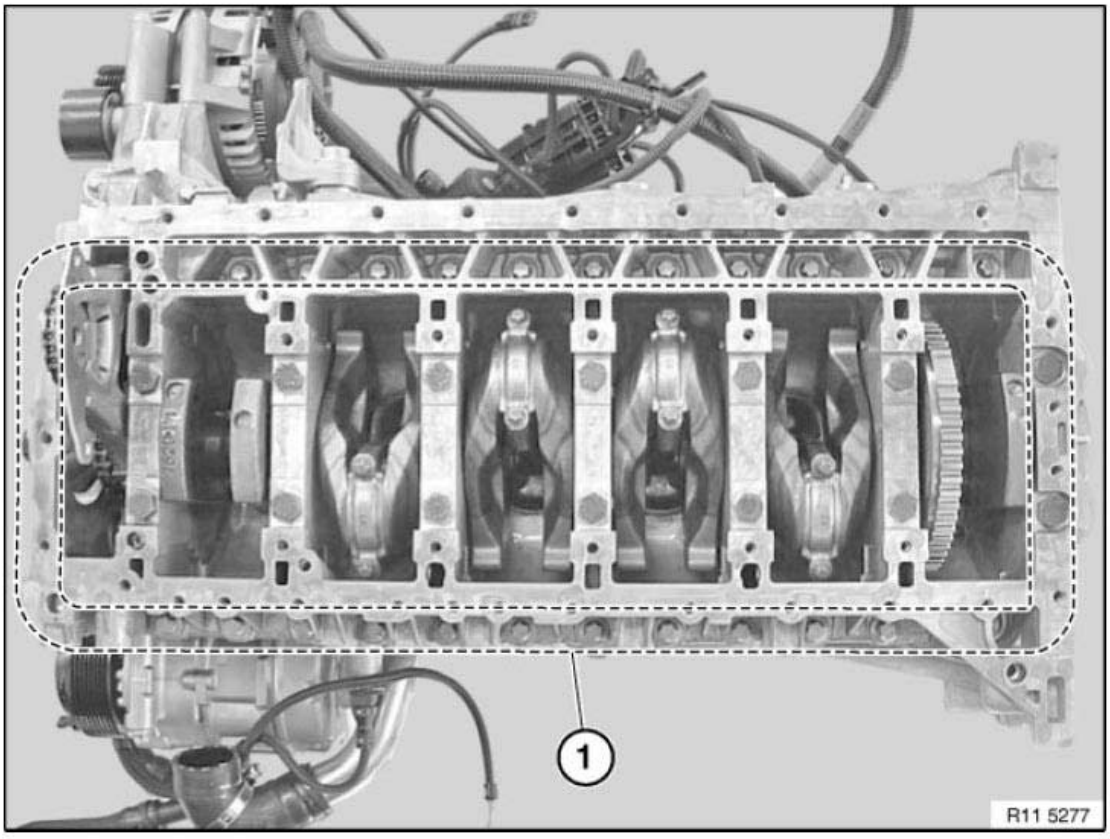


Fig. 146: Identifying Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release all crankcase bolts (1) along line (2).

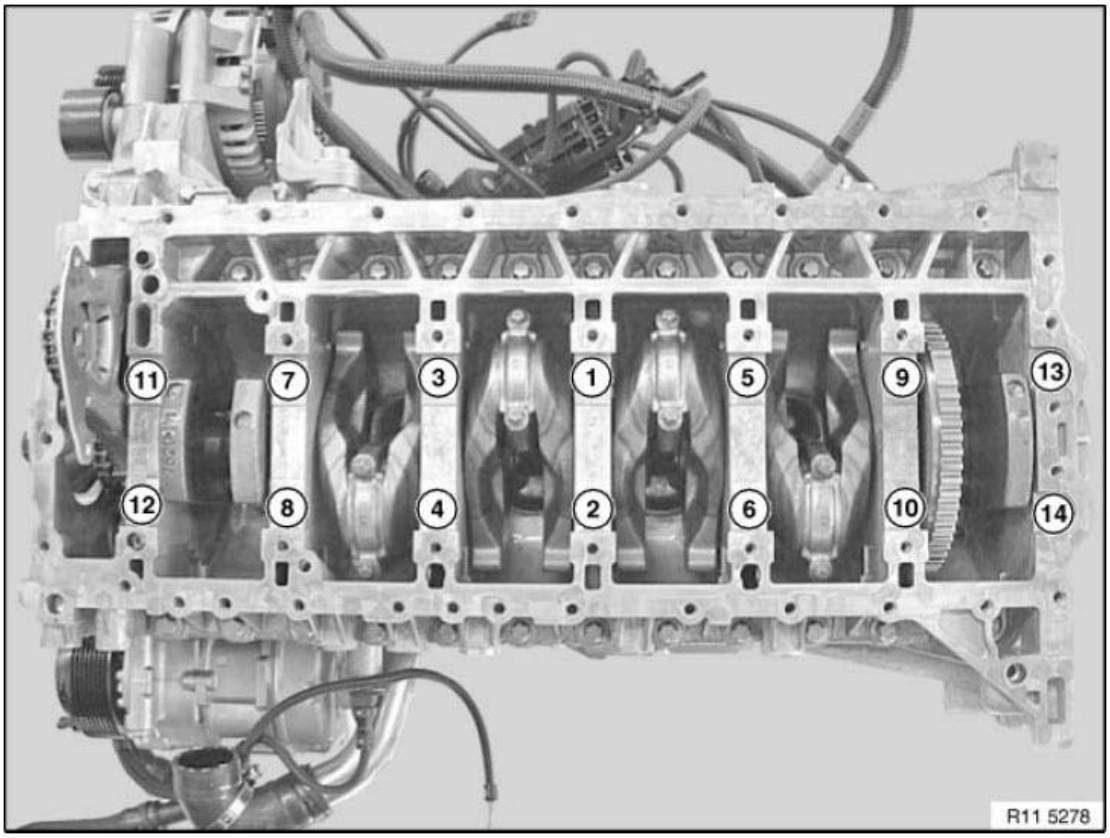


Fig. 147: Identifying Crankcase Bolt Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Release crankcase bolts M10 in sequence 14 to 1.

Release crankcase lower section (1) from crankcase upper section (2) with suitable tool (3)

Remove crankcase lower section (1) upwards.

IMPORTANT: Do not rotate crankshaft without crankcase lower section (1) (risk of damage).

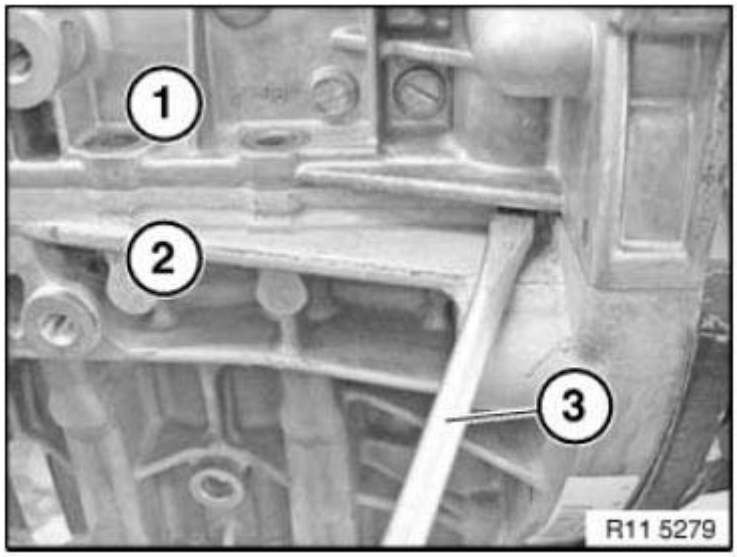


Fig. 148: Removing Crankcase Lower Section From Upper Section Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Timing chain is preloaded.

Do not raise crankshaft.

Carefully remove radial shaft seal (1).

Catch escaping engine oil with a cloth (2).

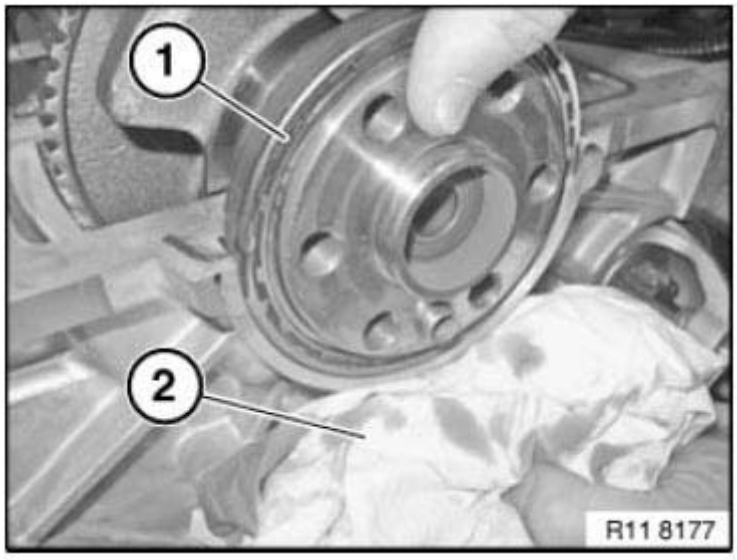


Fig. 149: Removing Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully remove radial shaft seal (1) towards front.

Catch escaping engine oil with a cloth (2).

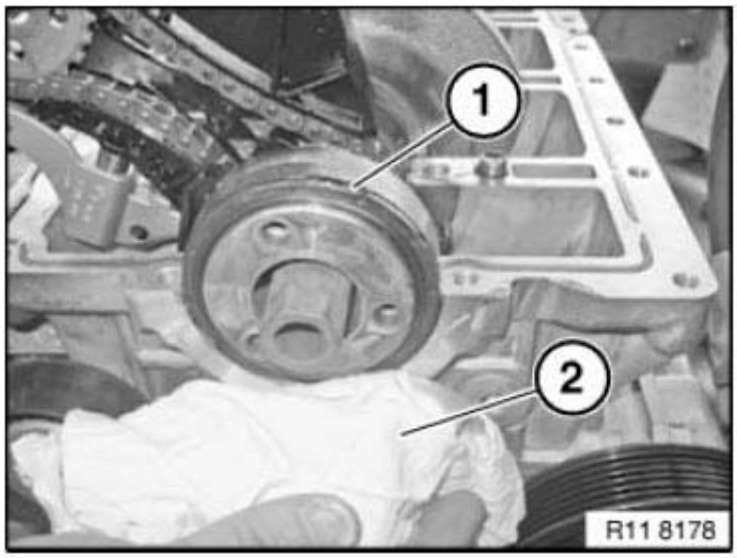


Fig. 150: Catching Escaping Engine Oil Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Protect crankcase against sealant residues with a cloth (1).

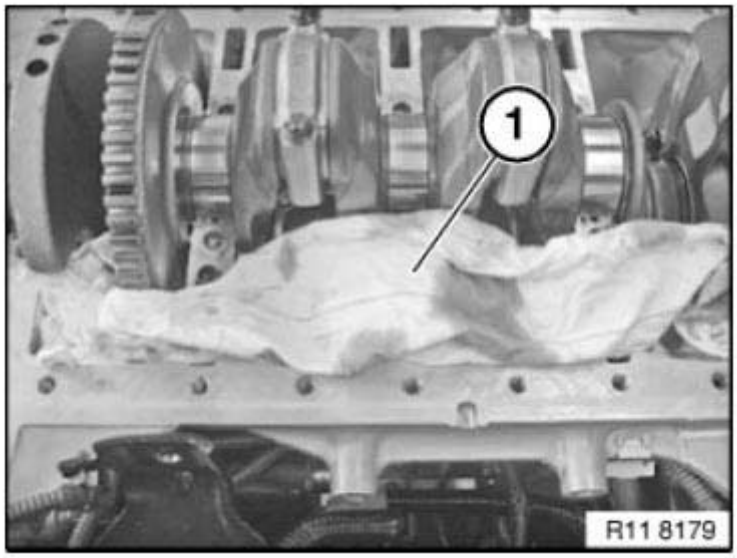


Fig. 151: Protecting Crankcase Against Sealant Residues Using Cloth
Courtesy of BMW OF NORTH AMERICA, INC.

Remove sealing compound residues (1) with special tool **11 4 470** .

Remove injector nozzles (2) for liquid sealing compound on left and right.

Installation note:

Replace injector nozzles (2).

Clean all threads with compressed air.

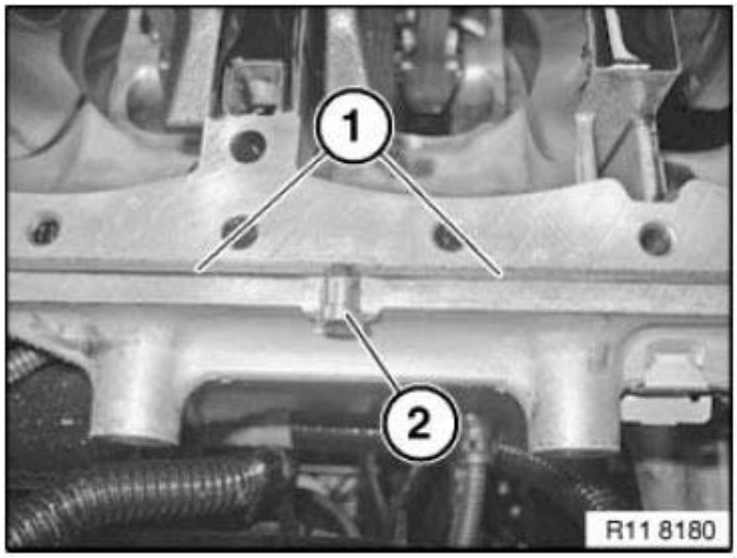


Fig. 152: Identifying Injector Nozzle And Sealing Compound Residue
Courtesy of BMW OF NORTH AMERICA, INC.

Position crankcase lower section (1) on crankcase upper section.

Screw in all M10 crankcase bolts.

Joint all M10 crankcase bolts (1) **20 NM** from inside outwards.

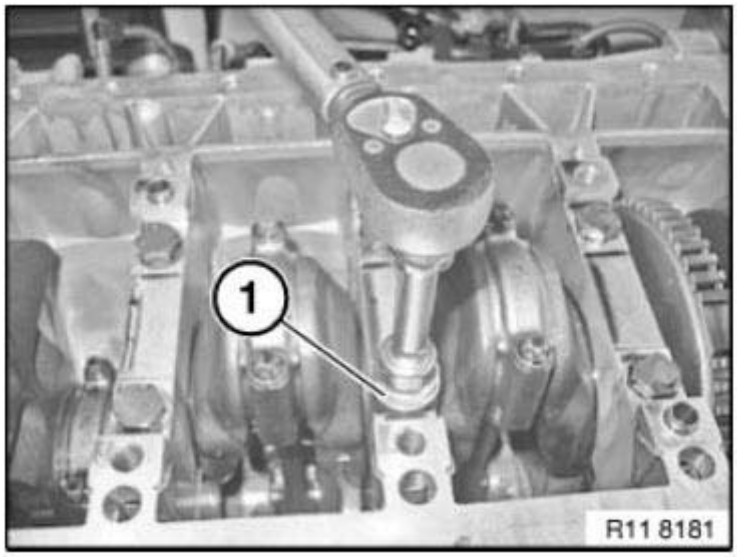


Fig. 153: Positioning Crankcase Lower Section On Crankcase Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Identify all M10 crankcase bolts with a colored marking (1) for checking.

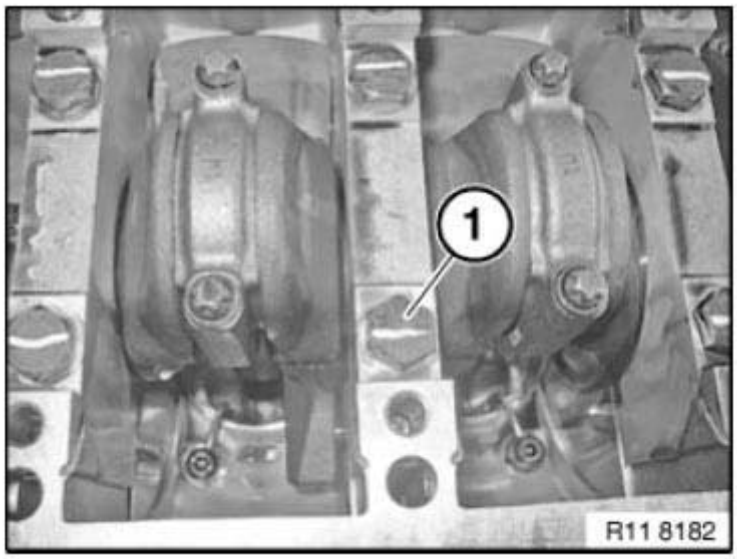


Fig. 154: Identifying M10 Crankcase Bolts With Colored Marking
Courtesy of BMW OF NORTH AMERICA, INC.

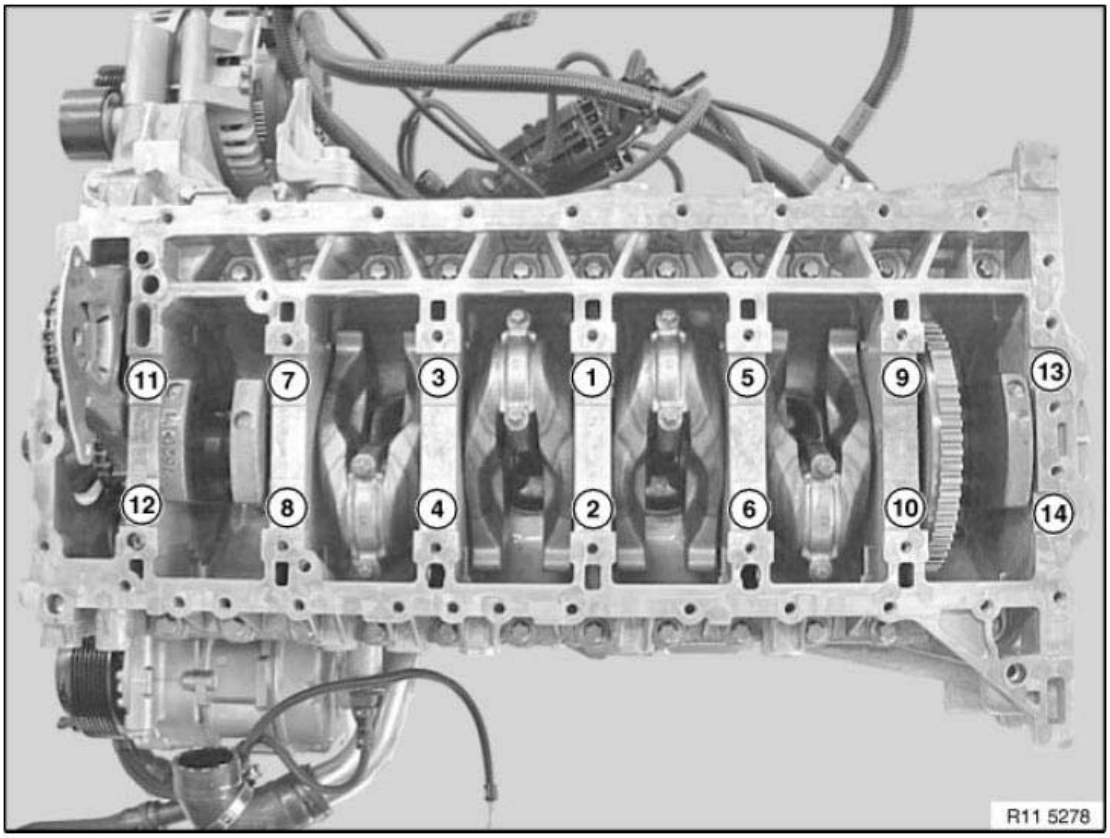


Fig. 155: Identifying M10 Crankcase Bolts Tightening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Secure crankcase bolts M10 in sequence 1 to 14 with special tool **00 9 120** .

Tightening torque: **11 11 1AZ.**

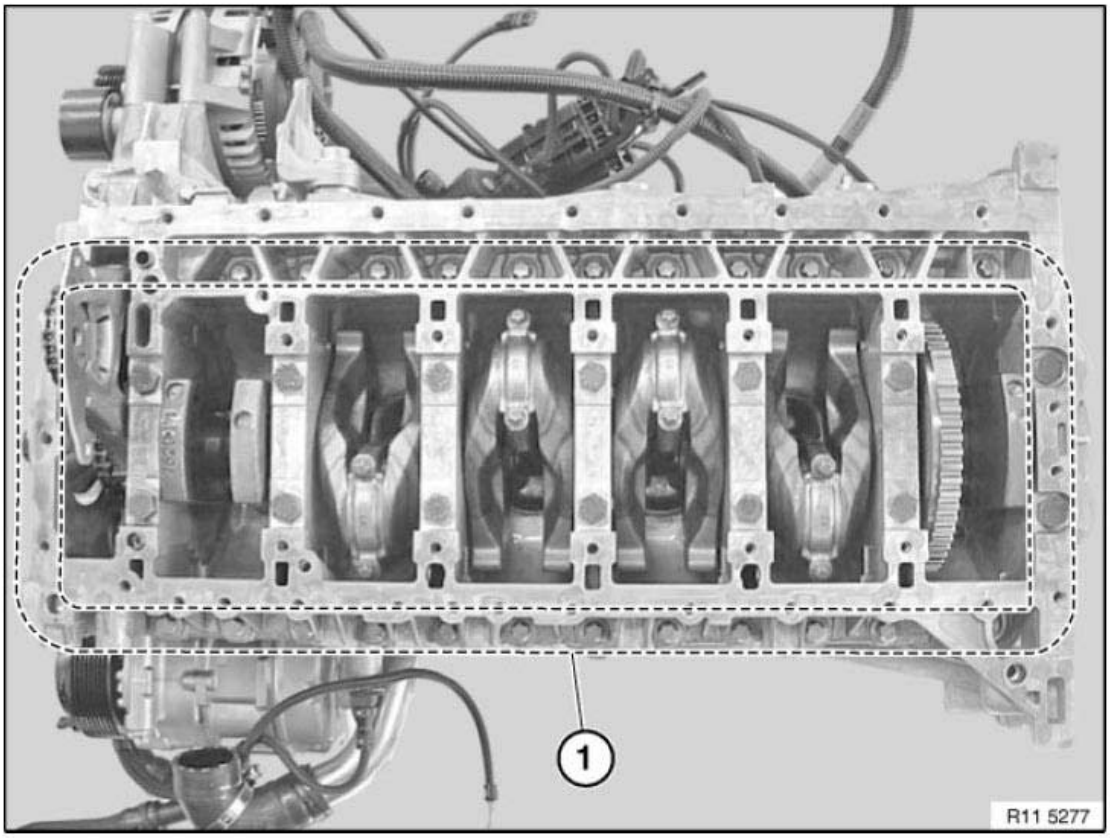


Fig. 156: Identifying Crankcase Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Insert all crankcase bolts (1).

IMPORTANT: Observe different lengths and sizes of the bolts.

Tightening torque: **11 11 2,3 AND 4AZ.**

Tighten screw (1) for oil pump triangular drive with special tool **11 8 640** .

NOTE: Replace screw.

Tightening torque: **11 41 4 AZ** .

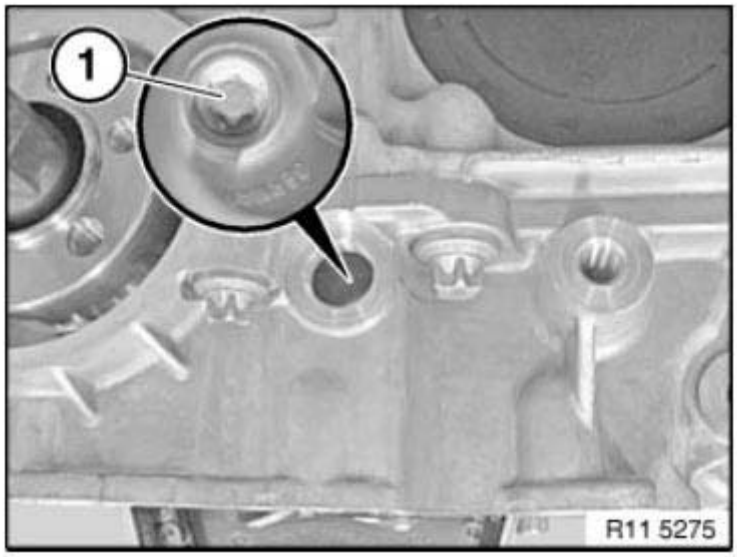


Fig. 157: Identifying Oil Pump Triangular Drive Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten screw plug on front of crankcase.

Tightening torque: **11 41 8.**

Installation note:

Replace sealing ring.

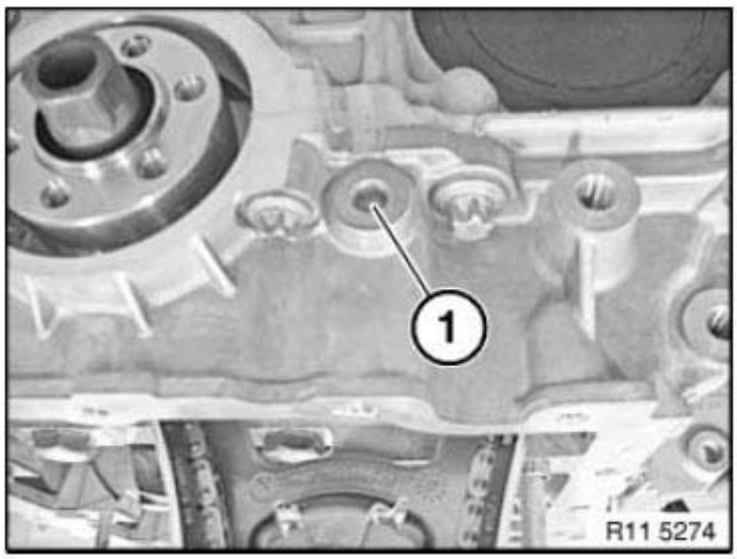


Fig. 158: Identifying Screw Plug On Front Of Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare radial shaft seal (1) on special tool 11 8 220.

Fig. 159: Identifying Radial Shaft Seal On Special Tool 11 8 220
Courtesy of BMW OF NORTH AMERICA, INC.

Position radial shaft seal (1) with special tool 11 8 220 on crankshaft.

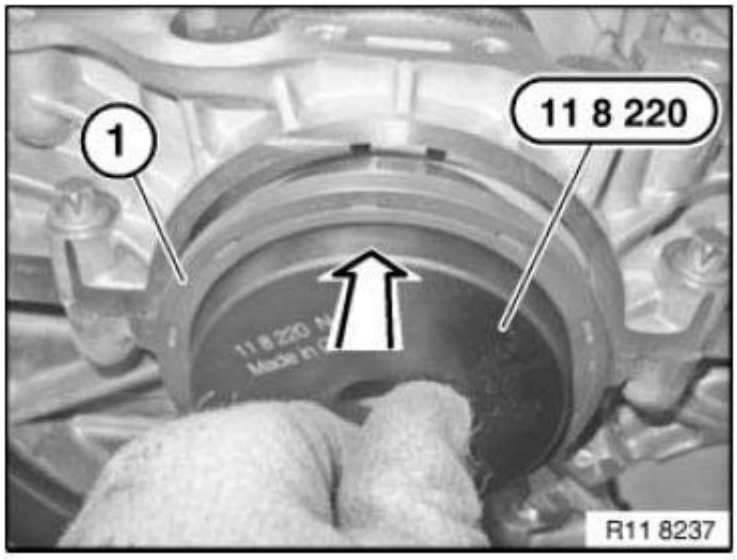


Fig. 160: Positioning Radial Shaft Seal On Crankshaft Using Special Tool 11 8 220
Courtesy of BMW OF NORTH AMERICA, INC.

Brush radial shaft seal (1) over special tool 11 8 220.

Move radial shaft seal (1) parallel up against the crankcase.

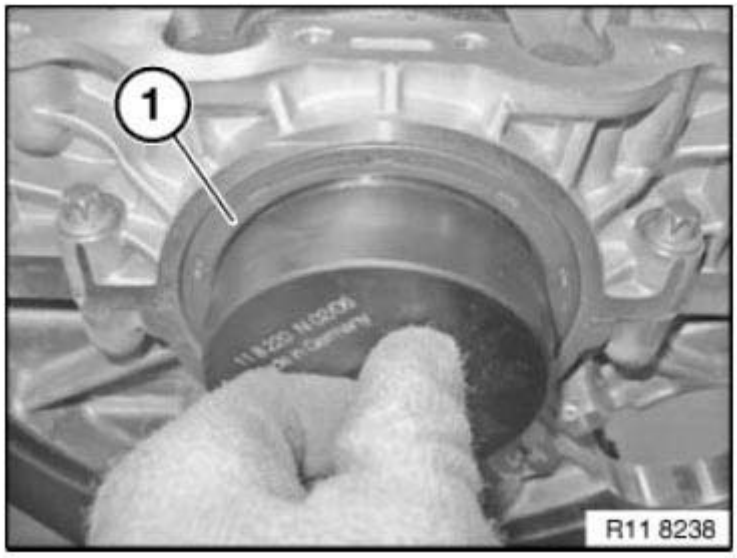


Fig. 161: Moving Radial Shaft Seal Parallel Up Against Crankcase
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 11 9 182 with screws (special tool 11 9 184) to crankshaft.

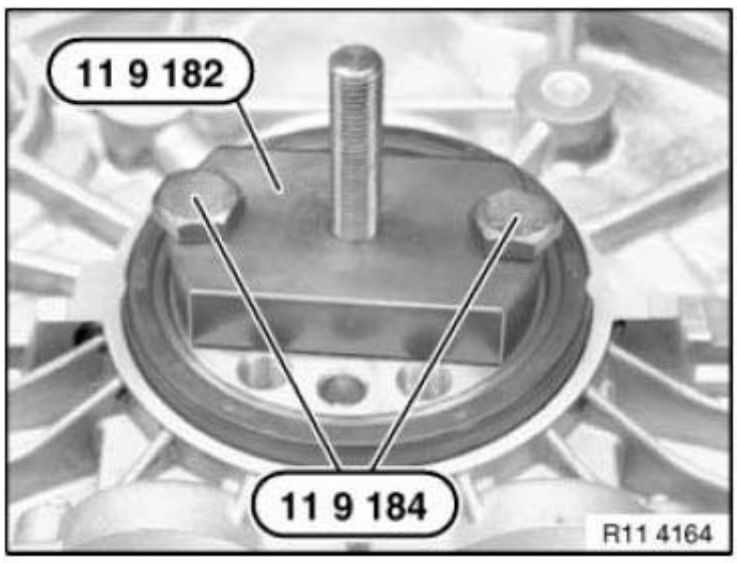


Fig. 162: Mounting Special Tool 11 9 182 Over Crankshaft Using Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Prepare special tool 11 9 181 for installation. Connect special tool 11 9 185 onto special tool 11 8 181.

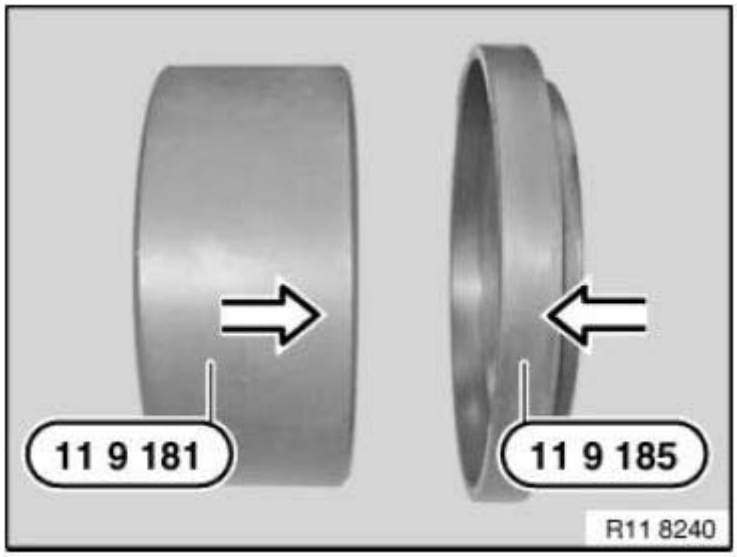


Fig. 163: Connecting Special Tool 11 9 185 To Special Tool 11 8 181
Courtesy of BMW OF NORTH AMERICA, INC.

Pull on radial shaft seal with special tool 11 9 181 and 11 9 185 in combination with special tool 11 9 183.

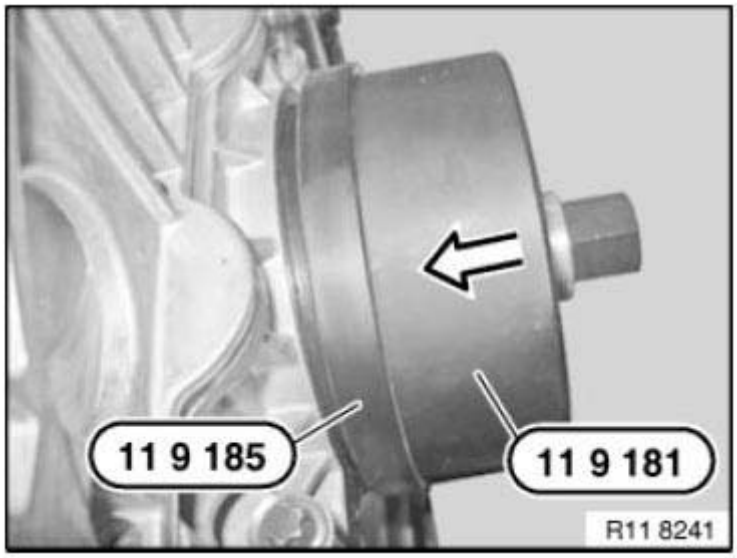


Fig. 164: Pulling Radial Shaft Seal Using Special Tool 11 9 181/11 9 185/11 9 183
Courtesy of BMW OF NORTH AMERICA, INC.

Screw on radial shaft seal with special tool 11 9 183 to limit position.

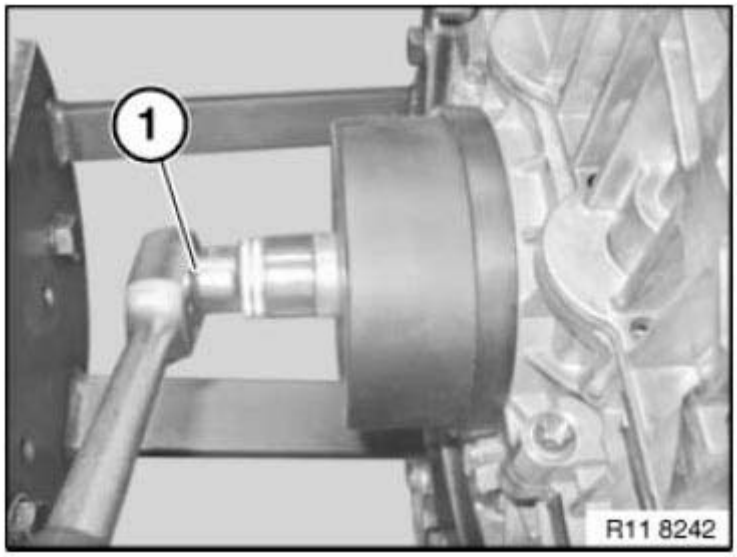


Fig. 165: Installing Radial Shaft Seal Using Special Tool 119 183
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean sealing surface (1) and degrease thoroughly in area of housing partition.

Apply a light coat of oil to running surface (2) of radial shaft seal.

NOTE: Graphic N42.

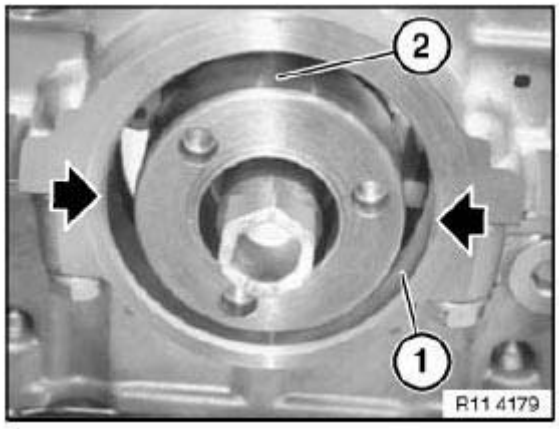


Fig. 166: Identifying Sealing Surface And Running Surface For Crankshaft Radial Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Push radial shaft seal (1) 11 9 235carefully in direction of arrow on the special tool.

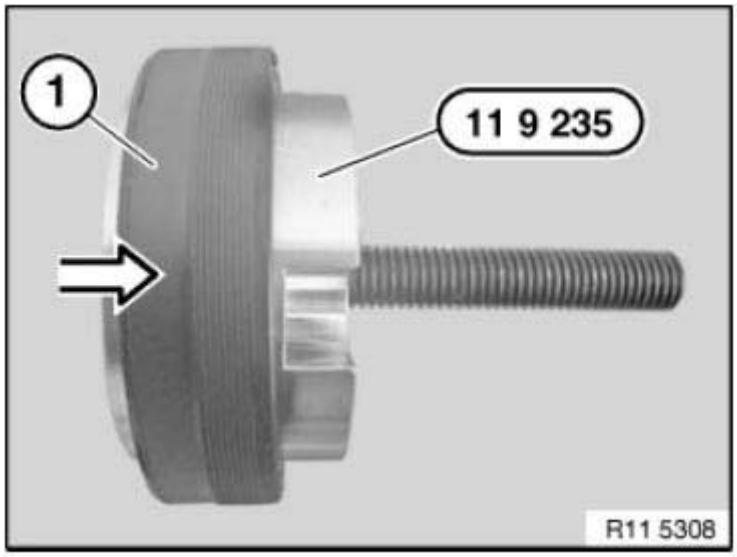


Fig. 167: Pushing Radial Shaft Seal 11 9 235 Carefully On Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: 11 9 235Special tool can only be fastened with

2 opposite bolts.

Determine hole pattern on special tool.

Screw special tool 11 9 235 with special tool 11 9 234 on crankshaft.

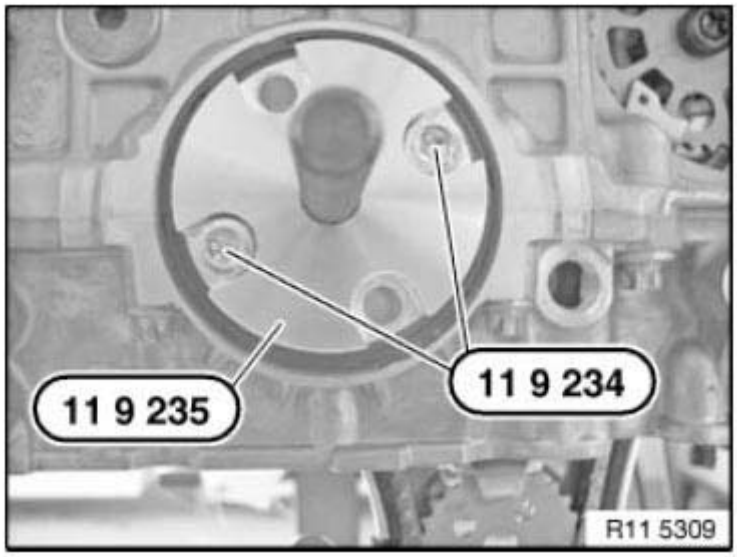


Fig. 168: Identifying Special Tools On Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Align groove (2) of radial shaft seal (1) centered to the housing partition (3.

IMPORTANT: After installation, the grooves must be filled with sealing compound.

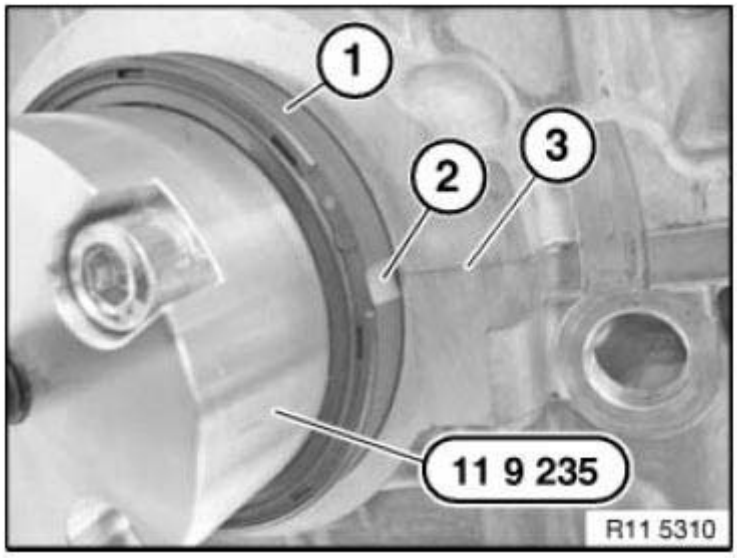


Fig. 169: Identifying Radial Shaft Seal Groove
Courtesy of BMW OF NORTH AMERICA, INC.

Draw in radial shaft seal with special tool 11 9 231 in conjunction with special tool 11 9 233 until flush.

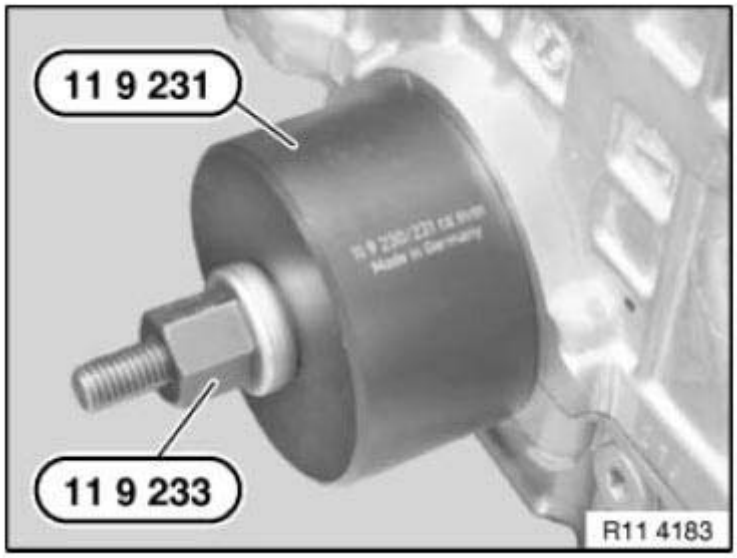


Fig. 170: Identifying Special Tools 119 231 And 11 9 233
Courtesy of BMW OF NORTH AMERICA, INC.

Drive both injector nozzles (1) on left and right with special tool **11 9 360** into crankcase up to stop.

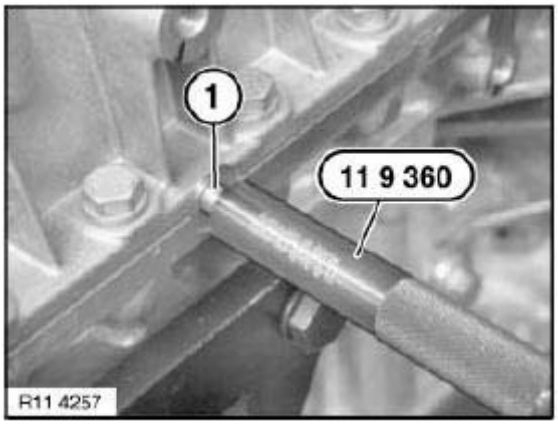


Fig. 171: Installing Nozzles Using Special Tool 11 9 360
Courtesy of BMW OF NORTH AMERICA, INC.

After fitting both sealing rings, check both sealing ducts for clearance.

Blow compressed air (1) at max. 6 bar into injector nozzle (2).

Compressed air must emerge at both sealing rings on left and right from the outlet bores.

IMPORTANT: If the compressed air does not flow out of all ducts. the crankcase must again be taken apart and cleaned.

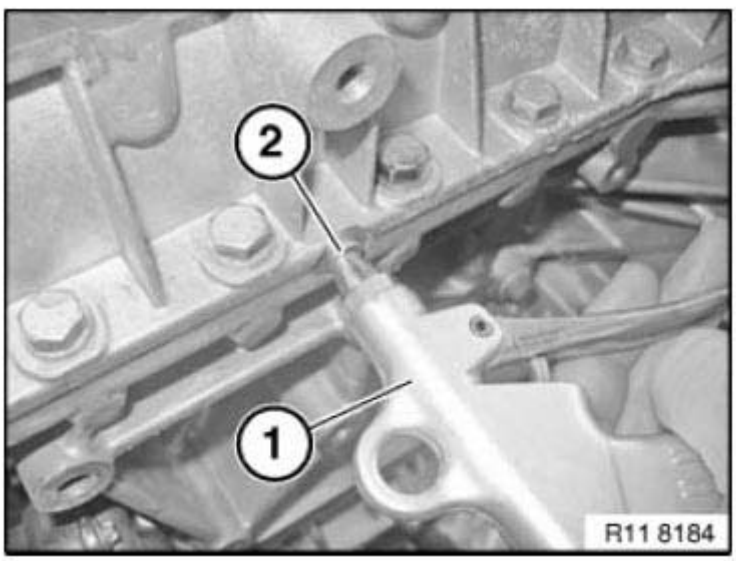


Fig. 172: Blowing Compressed Air Into Injector Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Use **PRIMER 1.3 AND LIQUID SEAL 1.4** .

Prepare liquid sealing compound (1) in special tool **11 4 370** .

Injector nozzles for injecting sealing compound are not required.

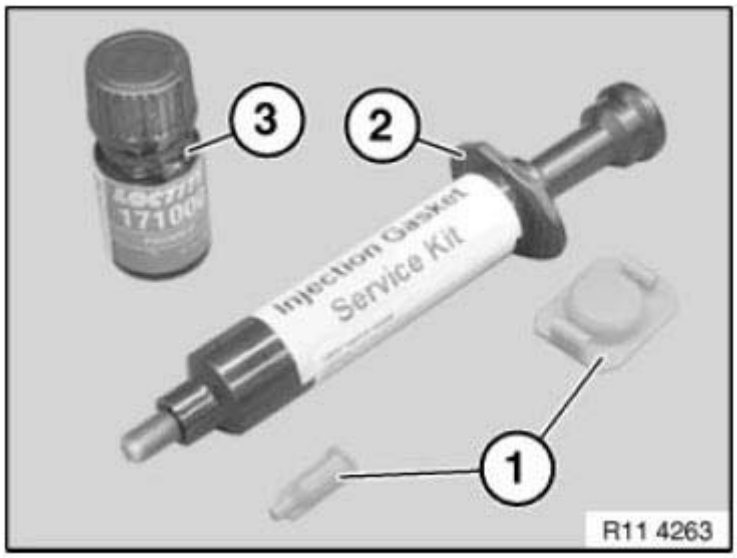


Fig. 173: Identifying Liquid Sealing Compound, Injector Nozzles And Primer Bottle
Courtesy of BMW OF NORTH AMERICA, INC.

Slowly insert liquid sealing compound (1) with special tool **11 4 370** in direction of arrow.

Liquid sealing compound must emerge at radial shaft seals at front and rear.

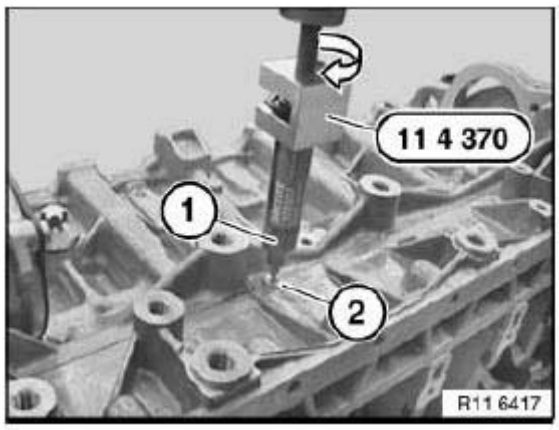


Fig. 174: Inserting Liquid Sealing Compound Using Special Tool 11 4 370
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid sealing compound with primer 1.3.

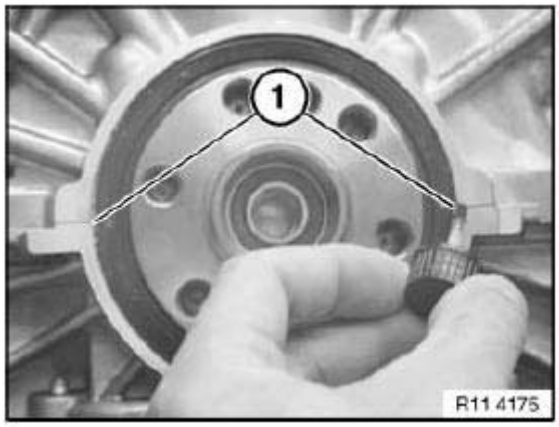


Fig. 175: Stopping Escaping Liquid Sealing Compound With Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Stop (seal off) escaping liquid sealing compound with primer 1.3.

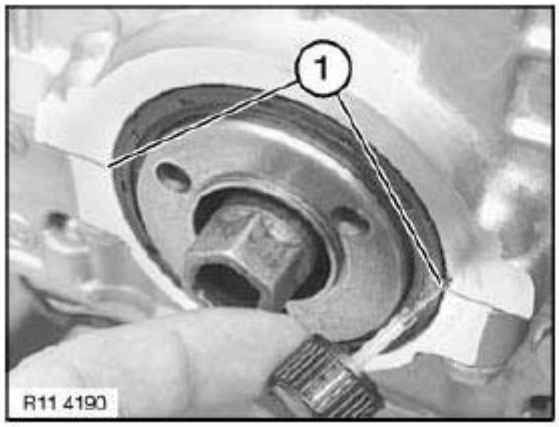


Fig. 176: Stopping Escaping Liquid Sealing Compound With Primer
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1122 FLYWHEEL

11 22 500 REMOVING AND INSTALLING/REPLACING FLYWHEEL (N54, N54T)

Necessary preliminary tasks:

- Remove **TWIN-CLUTCH GEARBOX (GS7D36SG) N54**
- Remove **CLUTCH**

Enlarge special tool **11 9 260** with an elongated hole.

Enlarge elongated hole on special tool **11 9 260** to **8 mm** .

Fig. 177: Identifying Special Tool 11 9 260 With Elongated Hole
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with manual gearboxes

Secure flywheel with special tool **11 9 260** .

Release flywheel bolts with special tool **11 4 180** /

Tightening torque **11 22 2AZ** .

Installation note:

The flywheel is secured with a dowel pin.

Fit new flywheel screws

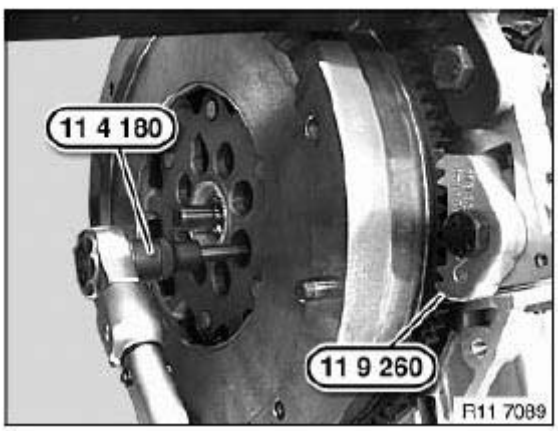


Fig. 178: Removing Flywheel Bolts Using Special Tool 11 4 180
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with automatic transmissions

Secure flywheel with special tool **11 9 260** .

Release flywheel screws with a suitable tool (1).

Tightening torque **11 22 1AZ** .

Installation note:

The flywheel is secured with a dowel pin.

Fit new flywheel screws

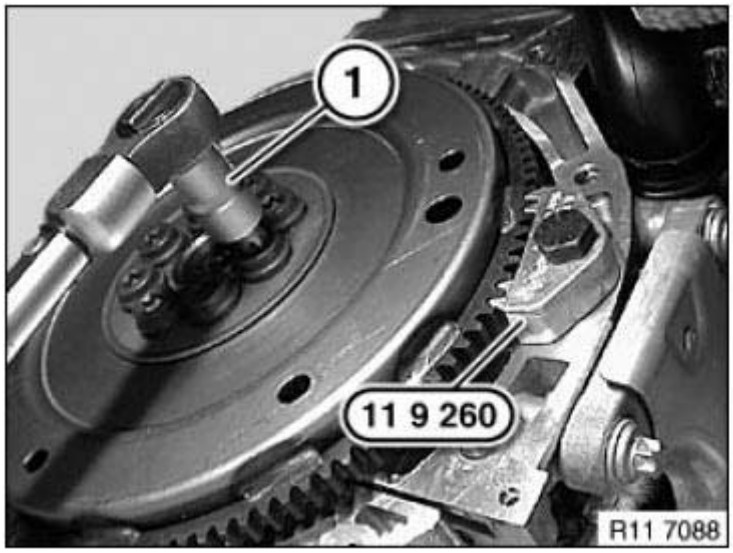


Fig. 179: Removing Flywheel Screws Using Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 22 513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL

Necessary preliminary tasks

- **TRANSMISSION** removed.
- Remove **CLUTCH RELEASE BEARING**

Pressing out roller bearing

Install special tool 23 4 031 in front of drive shaft spline teeth.

Screw in grease spindle 23 4 033 completely.

Brass tip must immerse fully into roller bearing.

Press in grease with grease gun **23 4 040** until roller bearing is disengaged from drive shaft.

When tensioning spring is compressed to full extent, release grease spindle and twist out slightly until spring is relieved.

Repeat grease press-in procedure until roller bearing has released completely.

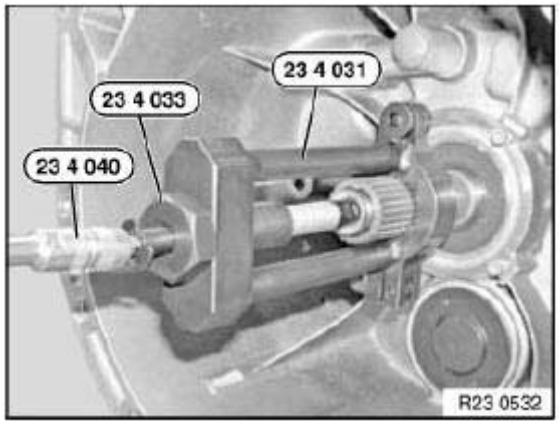


Fig. 180: Identifying Special Tools 23 4 033, 23 4 031 And 23 4 040
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 23 4 031.

Remove pressed-in grease (1) from drive shaft completely.

Then reinstall special tool.

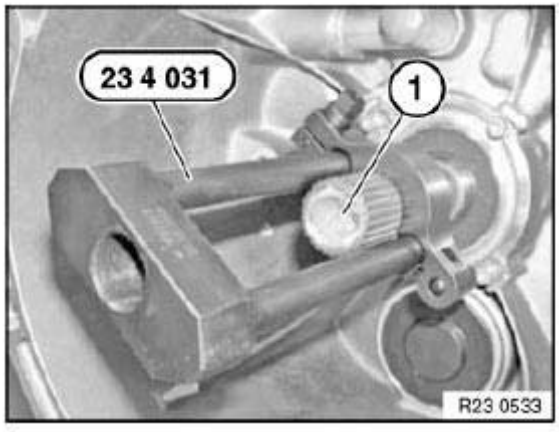


Fig. 181: Identifying Pressed-In Grease On Drive Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Pressing in roller bearing

Slide in pressure spindle 23 4 035.

Attach thrust piece 23 4 036 to pressure spindle.

Push roller bearing (1) onto thrust piece.

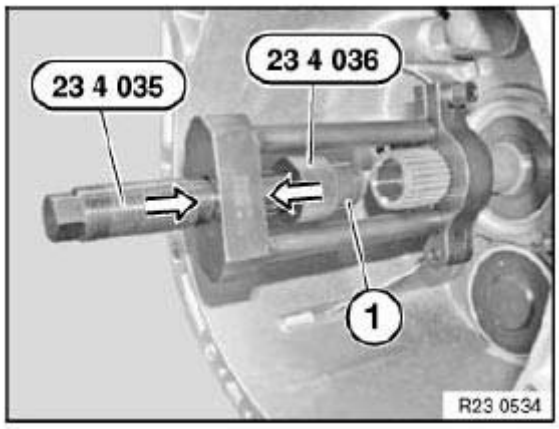


Fig. 182: Pushing Roller Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in pressure spindle (1) until roller bearing is fully pressed in.

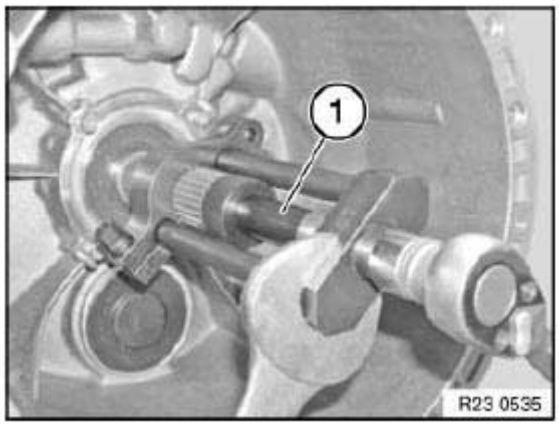


Fig. 183: Installing Pressure Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

1123 VIBRATION DAMPER

11 23 010 REMOVING AND INSTALLING/REPLACING VIBRATION DAMPER (N54, N54T)

Necessary preliminary tasks:

- Remove front underbody protection

- Remove drive belt

Release screws (1).

Tightening torque **11 23 1AZ** .

Remove vibration damper (2).

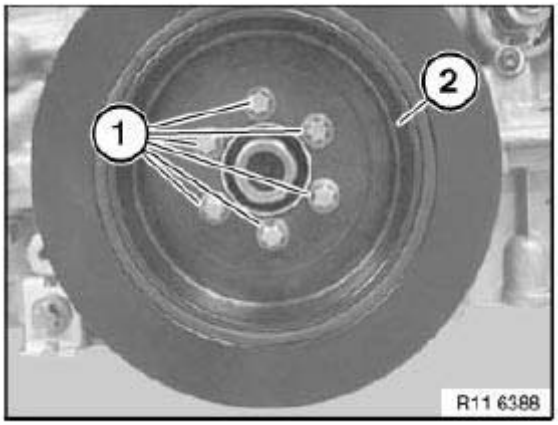


Fig. 184: Identifying Vibration Damper Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1124 CONNECTING ROD WITH BEARING

11 24 571 REPLACING ALL CONNECTING ROD BEARINGS (N54, N54T)

IMPORTANT: All crank pins are connected with the crankshaft.

Blue/Red bearing shell colors are no longer used in combination.

Necessary preliminary tasks:

- Remove all **PISTONS** .

IMPORTANT: All crankshaft crank pins are classified.

Bearing shell colors are different in the connecting and in the connecting rod bearing cap.

Possible classifications per connecting rod at top and bottom:

r: Connecting rod = Yellow.

Connecting rod bearing cap = Red.

b: Connecting rod = Violet.

Connecting rod bearing cap = Blue.

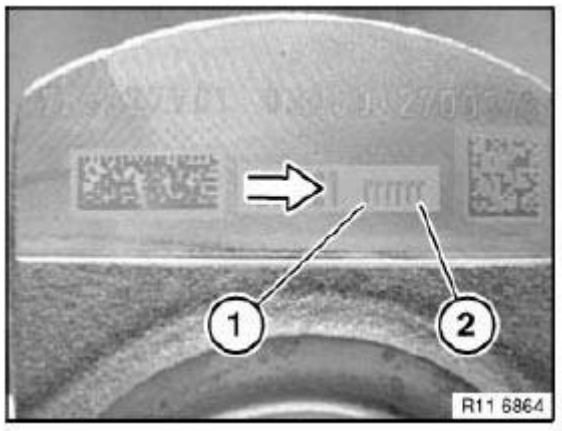


Fig. 185: Direction Of Fitting Color In Connecting Rod And Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Only one color may be fitted per connecting rod and connecting rod bearing cap.

In direction of arrow from (1 to 2) crank pin (1 to 6).

Example:

Possible classification: rbbrrb.

Zyl 1: Classification **r** = rod side Yellow bearing cap side Red.

Zyl 2: Classification **b** = rod side Violet bearing cap side Blue.

Zyl 3: Classification **b** = rod side Violet bearing cap side Blue.

Zyl 4: Classification **r** = rod side Yellow bearing cap side Red.

Zyl 5: Classification **r** = rod side Yellow bearing cap side Red.

Zyl 6: Classification **b** = rod side Violet bearing cap side Blue.

Install new connecting rod bearing shells.

In each case insert only one color of bearing shell (1 and 2) for each connecting rod.

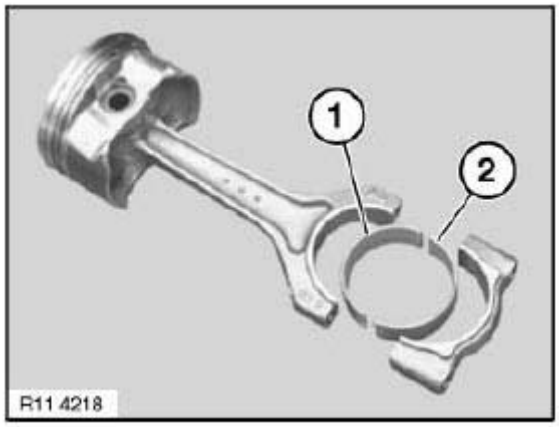


Fig. 186: Identifying Bearing Shell Colors
Courtesy of BMW OF NORTH AMERICA, INC.

Check connecting rod bearing clearance.

Piston in BDC position.

Fit special tool **00 2 590** (Plastigage type PG 1) to oil-free crankshaft.

Fit bearing cap so that pairing letters match up.

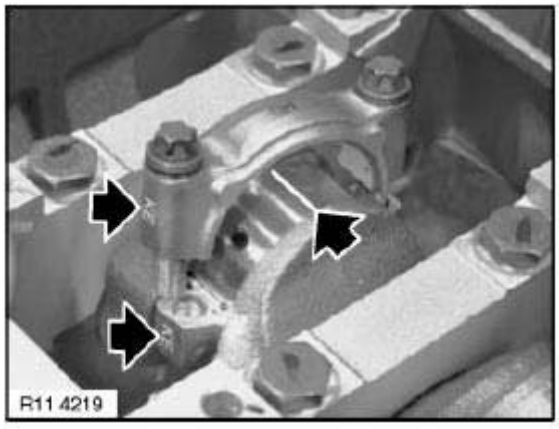


Fig. 187: Locating Bearing Cap Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not distort connecting rods or crankshaft.

Use the old connecting rod bolts to check connecting rod clearance.

Tighten down connecting rod bolts with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

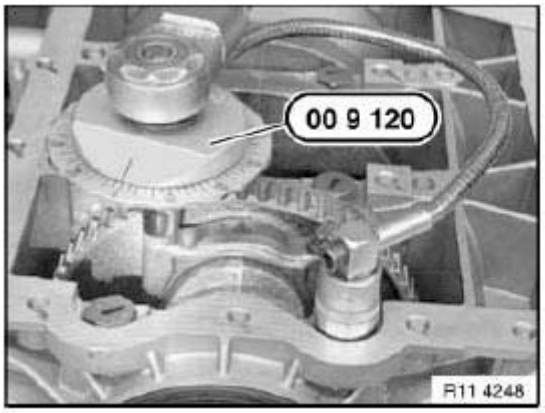


Fig. 188: Identifying Bearing Shell
Courtesy of BMW OF NORTH AMERICA, INC.

Remove bearing cap. Read off bearing clearance at width of crushed plastic thread with aid of measuring scale.

CONNECTING ROD BEARING PLAY.

- Remove plastic thread
- Coat crankshaft and bearing shells with oil.
- Install new connecting rod bolts and tighten down with special tool **00 9 120** .

Tightening torque **11 24 1AZ** .

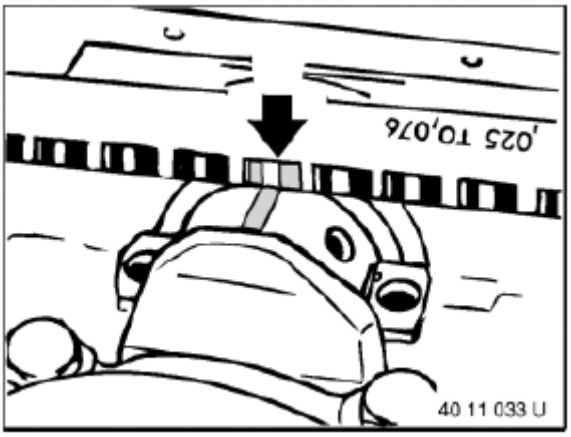


Fig. 189: Checking Connecting-Rod Bearing Play
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1125 PISTON WITH RINGS AND PIN

11 25 530 REMOVING AND INSTALLING OR REPLACING ALL PISTONS (N16)

WARNING: Protective goggles must be worn when working on the gudgeon pin circlip.

IMPORTANT: If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove engine.
- Mount engine on assembly stand.
- Remove intake plenum.
- Remove cylinder head.
- Remove oil sump.
- Remove oil pump.

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Graphic shows N46.

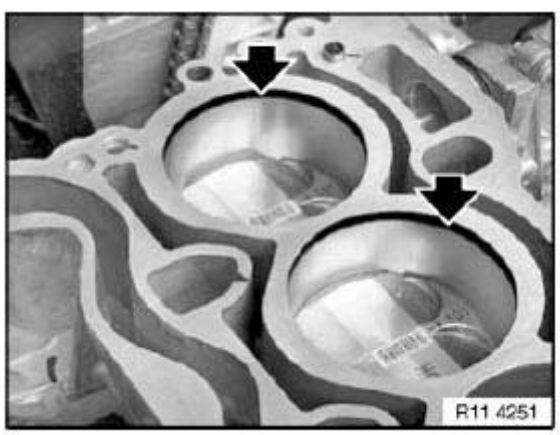


Fig. 190: Locating Oil Carbon Residue
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example N14:

Direction of arrow (1) points to camshaft drive.

Cylinder allocation (2) per cylinder.

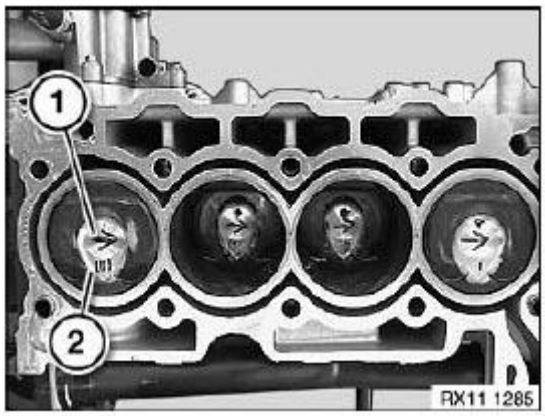


Fig. 191: Identifying Camshaft Drive Direction And Cylinder Allocation
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mark all pistons and conrods with a pen prior to removing.

Example:

Mark cylinder assignment (1) for the respective cylinder.

Direction of arrow (2) points to timing chain drive.

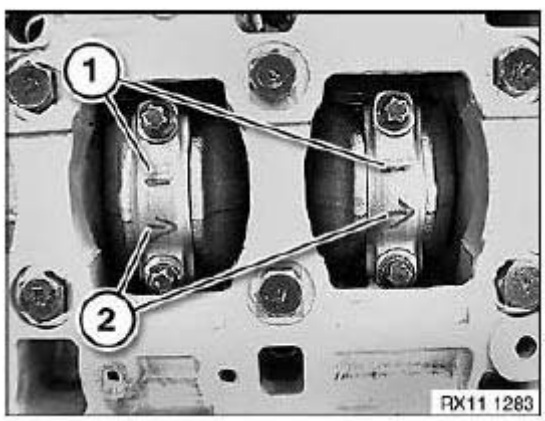


Fig. 192: Identifying Timing Chain Drive Direction And Cylinder Assignment Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque, **11 24 1AZ** .

Remove conrod bearing cap.

IMPORTANT: Connecting rods and connecting rod bearing caps are denoted with the same pairing letters; mixing them up will result in engine damage.

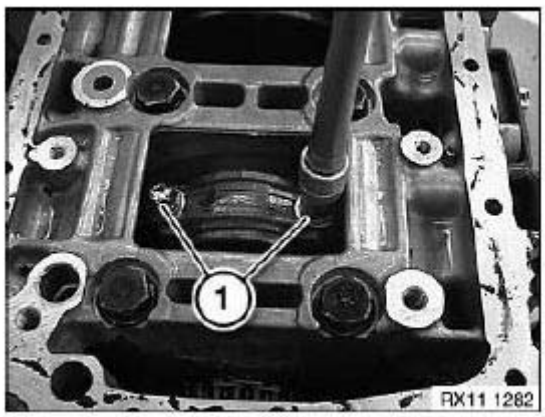


Fig. 193: Removing Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

11 9 620 Attach special tool in conrod big end.

Press out connecting rod and piston to cylinder head side.

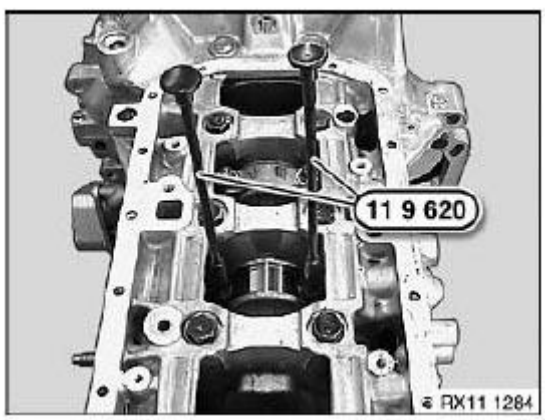


Fig. 194: Attaching Special Tool (11 9 620) In Conrod Big End
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn for the next operation.

WARNING: Safety goggles must be worn.

IMPORTANT: Piston and gudgeon pins are paired and must not be fitted individually.

Lever out piston pin circlip with a screwdriver in direction of arrow.

Fig. 195: Removing Piston Pin Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

If necessary, replace connecting rods.

Installation note:

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.

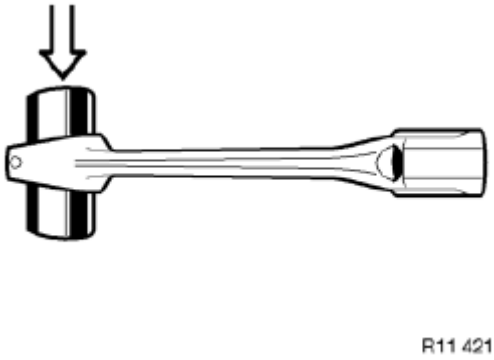


Fig. 196: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Measure piston installation clearance:

Measure piston diameter with micrometer at measuring point A from lower edge of piston and offset by 90° to piston pin axis.

Piston diameter at measuring point A.

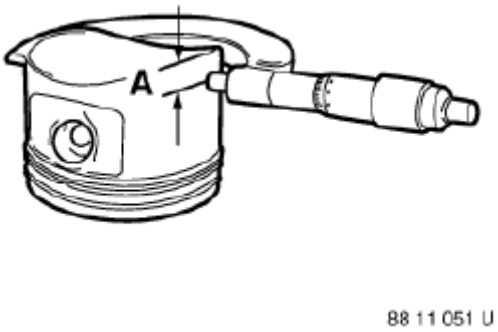


Fig. 197: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

Total permissible wear tolerance.

If necessary, replace piston.

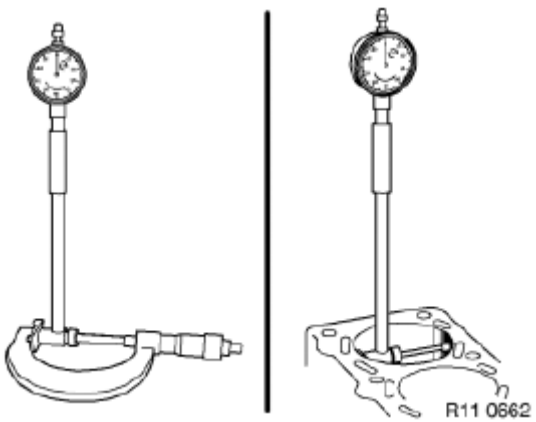


Fig. 198: Checking Cylinder Bore Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Install all piston rings.

Install all bearing shells.

Coat piston and piston rings with oil.

11 9 670 Pre-install piston in special tool.

Screw special tool 11 9 620 into connecting rod.

Installation note:

11 9 620 Check protective lugs on special tool for correct position and damage.

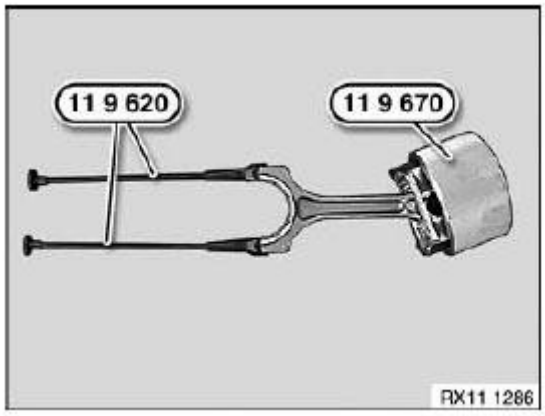


Fig. 199: Identifying Special Tool 11 9 620 And 11 9 670
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston with connecting rod in cylinder.

IMPORTANT: Risk of breakage of piston rings.

Press in piston with finger pressure only, do not drive in (see arrows).

Insert piston (1) so that arrow on piston crown points to camshaft drive.

If reusing the pistons, assign cylinder allocation (2) to correct cylinder.

Press in piston with special tool 11 9 670.

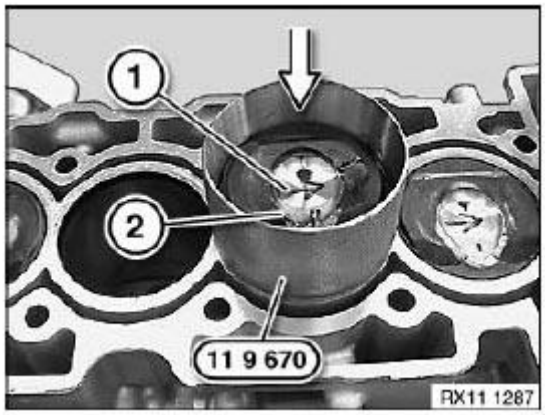


Fig. 200: Inserting Piston With Connecting Rod In Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Point of fracture (1) on conrod.

Conrod and conrod bearing cap are identified with pairing letters (2) and must not be mixed up.

Mixing them up or incorrectly fitting the connecting rod bearing cap on the big end will result in engine damage.

Both pairing letters (2) must be together on one side.

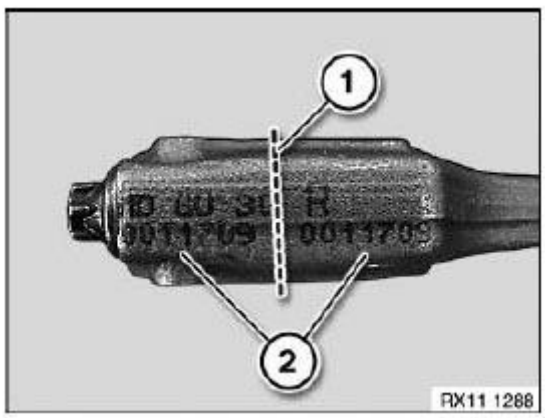


Fig. 201: Identifying Connecting Rod Pairing Letters
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crankshaft journals.

Attach connecting rod to crankshaft journal.

Remove special tool 11 9 620.

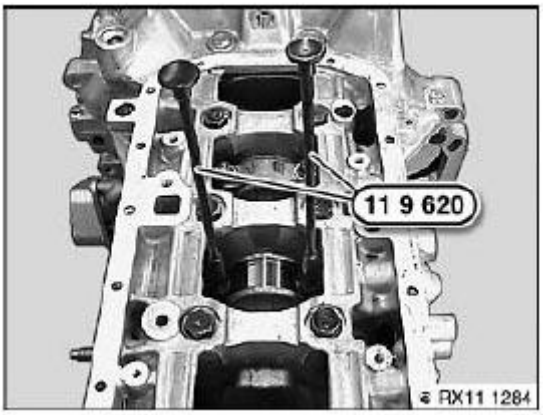


Fig. 202: Attaching Special Tool (11 9 620) In Conrod Big End
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

Check cylinder identification markings (1).

Direction of arrow (2) points to timing chain drive.

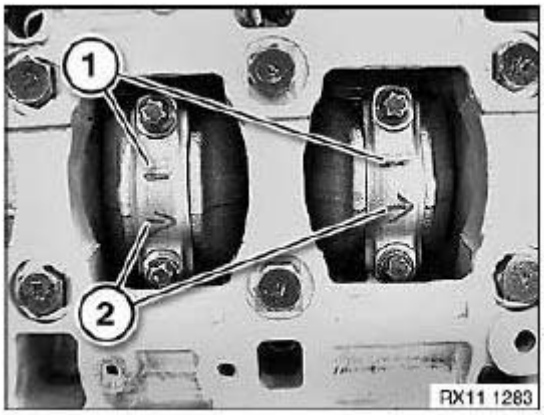


Fig. 203: Identifying Timing Chain Drive Direction And Cylinder Assignment Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Install new connecting rod bolts (1).

00 9 120 Carry out torsion angle tightening of conrods with special tool.

Tightening torque: **11 24 1AZ**

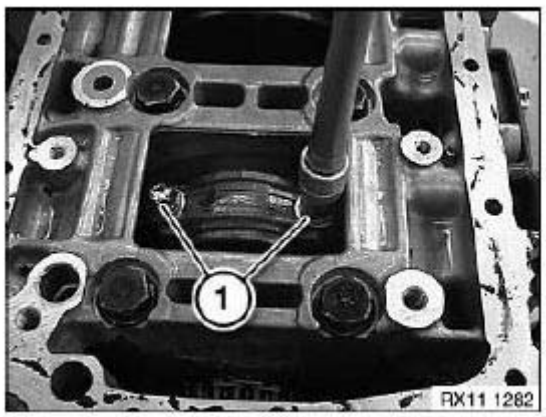


Fig. 204: Removing Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 530 REMOVING AND INSTALLING/REPLACING ALL PISTONS (N54, N54T)

WARNING: Protective goggles must be worn when working on the piston pin circlip.

IMPORTANT: If pistons, connecting rods and bearing shells are reused, they must be reinstalled in the same places.

Individual connecting rod replacement is not permitted; they are classified by weight group.

Connecting rods and connecting rod bearing caps are marked with the same pairing letters; mixing them up will result in engine damage.

Piston and gudgeon pins are paired and must not be fitted individually.

Necessary preliminary tasks:

- Remove **ENGINE**
- Mount engine on **ASSEMBLY STAND**
- Remove intake **PLENUM**
- Remove **CYLINDER HEAD**
- Remove **OIL SUMP**
- Remove **OIL PUMP**

NOTE: In event of heavy oil carbon residue:

Carefully remove oil carbon residue from cylinder wall.

NOTE: Graphic shows N46.

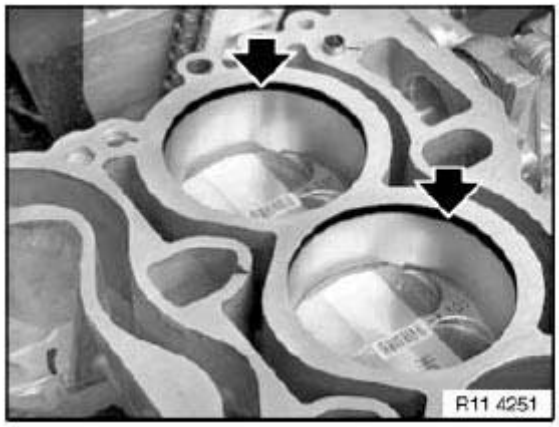


Fig. 205: Locating Oil Carbon Residue
Courtesy of BMW OF NORTH AMERICA, INC.

Do **not** release screw (1).

OIL SPRAY NOZZLE (2) must not be maladjusted or bent.

If necessary, readjust **(risk of damage).**

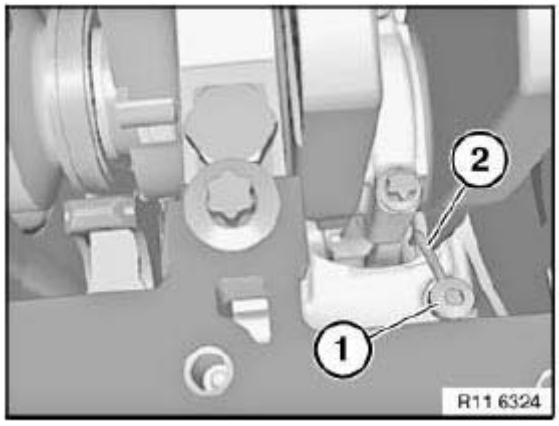


Fig. 206: Identifying Screw And Oil Spray Nozzle
Courtesy of BMW OF NORTH AMERICA, INC.

Release connecting rod bolts (1).

Tightening torque **11 24 1AZ** .

Remove connecting rod bearing cap (2) in direction of arrow.

IMPORTANT: Connecting rods and connecting rod bearing caps are marked with the same pairing letters; mixing them up will result in engine damage.

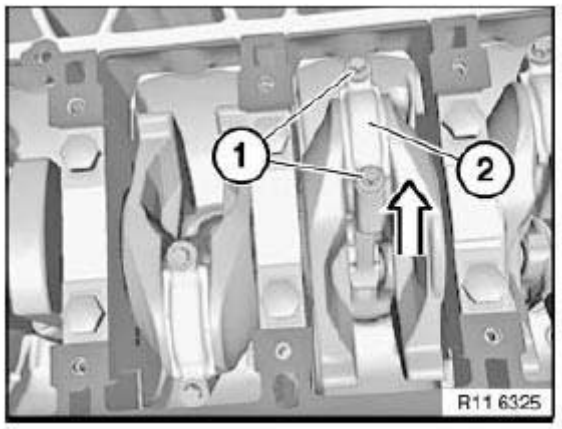


Fig. 207: Removing Connecting Rod Bearing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **11 8 590** into big end of connecting rod.

Press out connecting rod and piston to cylinder head side.

IMPORTANT: Risk of damage to oil spray nozzle.

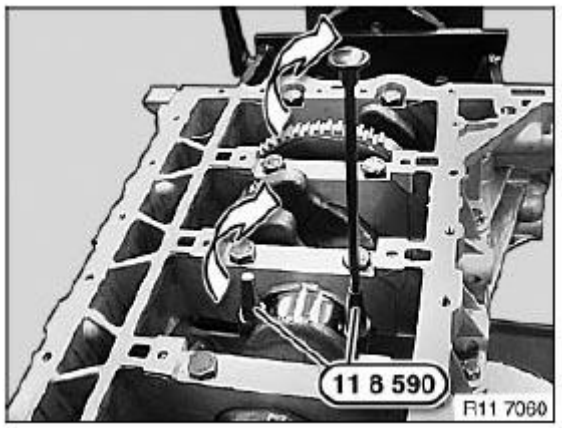


Fig. 208: Inserting Special Tool Into Big End Of Connecting Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Preliminary work

Secure special tool 11 8 561 in vice.

Secure piston (1) with connecting rod to special tool 11 8 561.

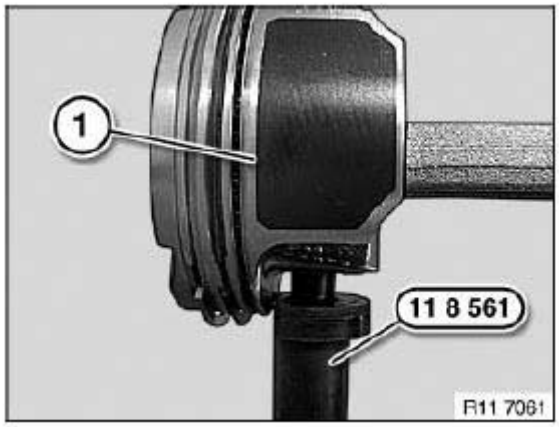


Fig. 209: Securing Piston Using Special Tool 11 8 561
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn for the next operation.

WARNING: Safety goggles must be worn.

To lever out piston circlip (1), support with special tool **11 5 464** on piston (2).

Lever out piston circlip (1) with special tool **11 5 464** in direction of arrow.

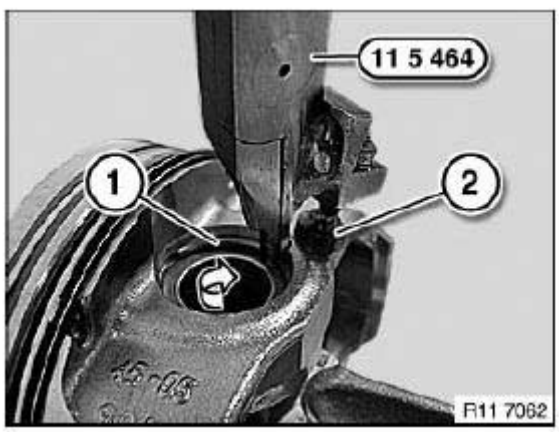


Fig. 210: Removing Piston Circlip Using Special Tool 11 5 464
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

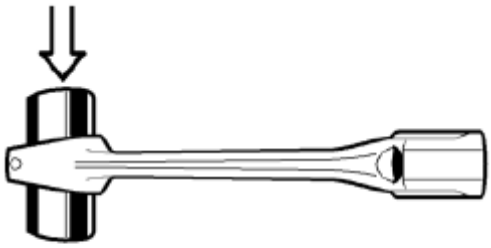
If necessary, replace connecting rods.

IMPORTANT: Connecting rods are divided into weight classes and are only available as a set.

Old and new connecting rods must not be installed in mixed combinations.

Installation note:

The gudgeon pin must be able to be pressed through the liner by hand with little force and must not display any significant play.



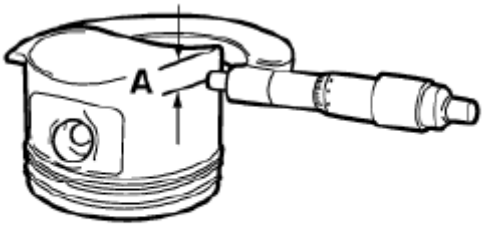
R11 4212

Fig. 211: Installing Gudgeon Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Measuring **PISTON INSTALLATION CLEARANCE** :

Measure piston diameter with micrometer at measuring point A from bottom edge of piston and offset at 90° to the axis of the gudgeon pin.

Piston diameter at measuring point A.



88 11 051 U

Fig. 212: Measuring Piston Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust micrometer to cylinder bore of engine block. Set internal calliper on micrometer to zero. Measure bottom, center and top of cylinder bore in direction of travel and direction of engine rotation.

Diameter of cylinder bore.

Piston installation clearance.

TOTAL PERMISSIBLE WEAR TOLERANCE .

Installation note:

If necessary, replace piston.

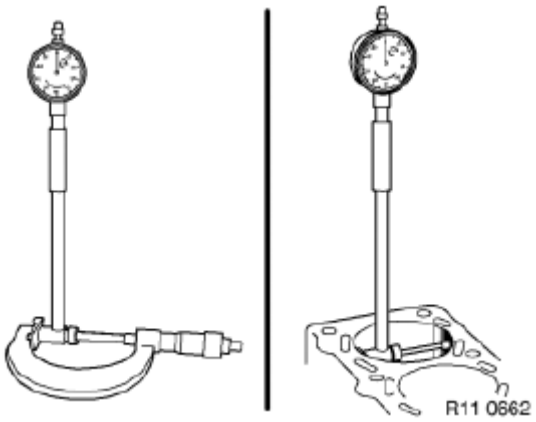


Fig. 213: Checking Cylinder Bore Diameter
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

IMPORTANT: The opening of the piston pin circlip must be installed on the piston in the 6 o'clock position.

Risk of damage!

Insert piston circlip (2) into groove of special tool 11 8 562.

Bring piston circlip (2) into working position (1).

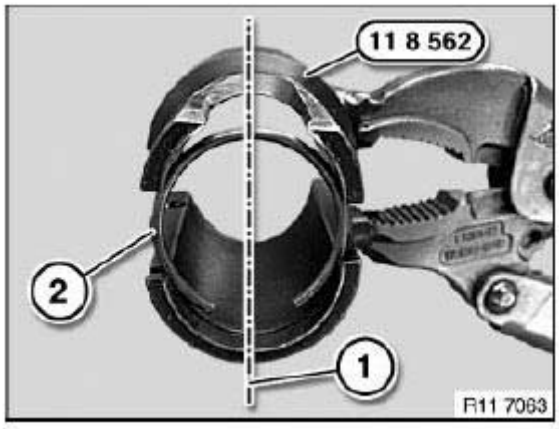


Fig. 214: Inserting Piston Circlip Into Groove Of Special Tool 11 8 562
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

Slide on special tool 11 8 563 up to piston pin circlip (2)

Special tools 11 8 562 and 11 8 563 are prepared.

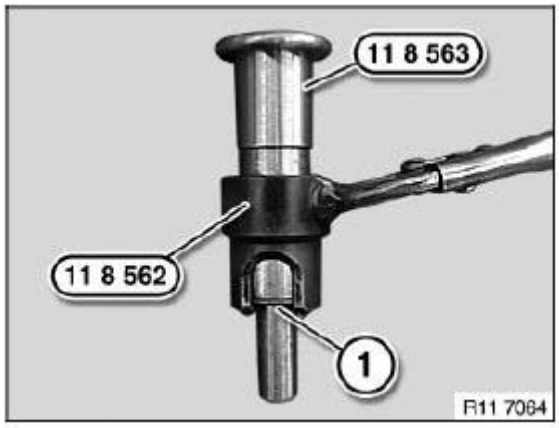


Fig. 215: Identifying Special Tools 11 8 562 And 11 8 563
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Safety goggles must be worn.

Opening on special tool 11 8 562 must point to piston crown; only then can special tool 11 8 563 be fitted correctly.

If the special tools 11 8 562 and 11 8 563 are not positioned correctly, the piston pin circlip must be driven in

using a plastic hammer in direction of arrow.

NOTE: See graphic.

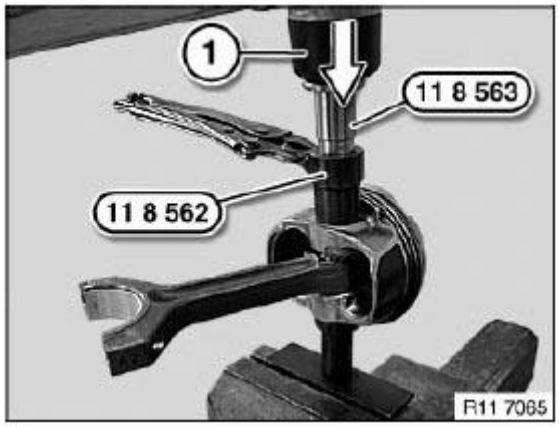


Fig. 216: Inserting Piston Pin Circlip
Courtesy of BMW OF NORTH AMERICA, INC.

Piston pin circlip is correctly installed when opening (1) points downwards.

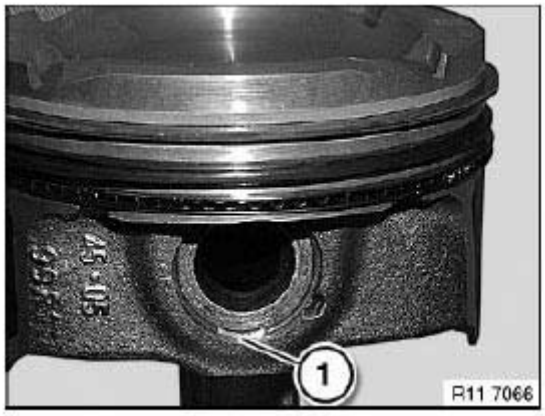


Fig. 217: Identifying Piston Pin Circlip Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: B 30.

Install all **PISTON RINGS** .

Install all **BEARING SHELLS** .

Coat piston and piston rings with oil.

Pre-install piston (2) in special tool 11 8 141.

Screw on special tool **11 8 590** in connecting rod (2).

Installation note:

Make sure protective lugs (1) on special tool **11 8 590** are positioned correctly and check for damage.

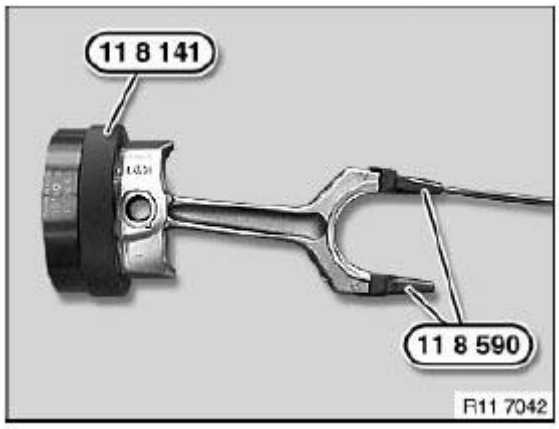


Fig. 218: Identifying Special Tools 11 8 590 And 11 8 141
Courtesy of BMW OF NORTH AMERICA, INC.

Insert piston with connecting rod in cylinder.

IMPORTANT: Risk of damage to oil spray nozzle.

Risk of breakage of piston rings.

Press in piston in direction of arrow with finger pressure only, do not drive in.

Insert piston so that arrow on piston crown points to camshaft drive.

Press in piston (1) with special tool 11 8 141.

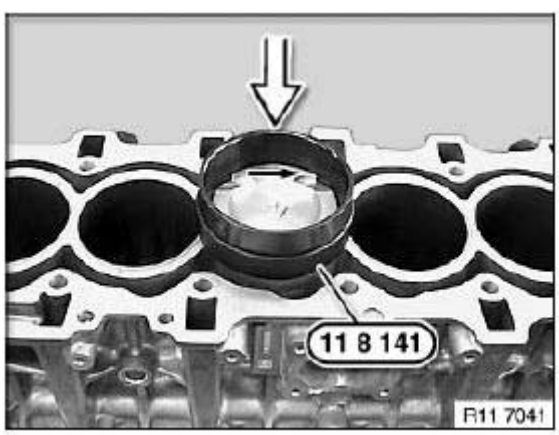


Fig. 219: Pressing Piston Using Special Tool 11 8 141
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connecting rod and connecting rod bearing cap are marked with pairing letters (1) and must not be mixed up.

Swapping or incorrectly fitting the connecting rod bearing cap on the big end will result in engine damage .

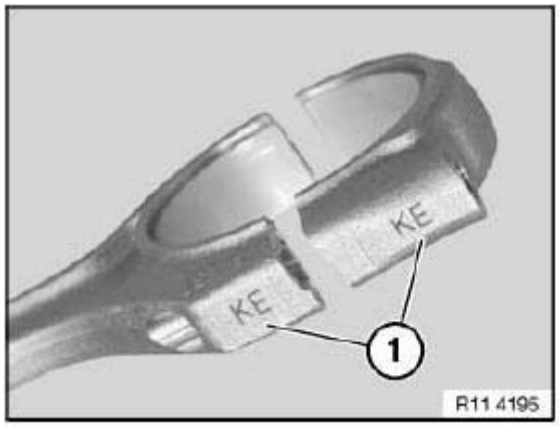


Fig. 220: Identifying Conrod Bearing Cap With Identification Marks
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a light coat of oil to crank pin.

Assemble connecting rod and crankshaft journal.

Screw off special tool **11 8 560** in anticlockwise direction.

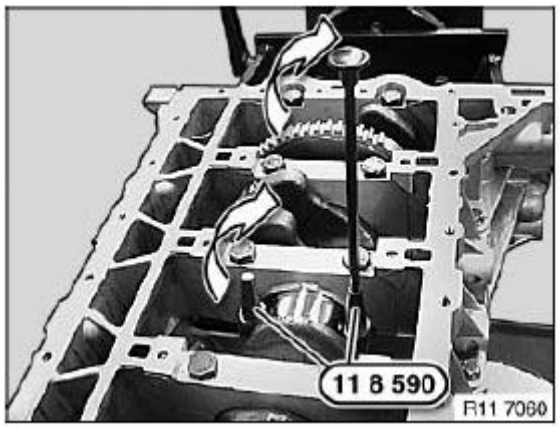


Fig. 221: Removing Special Tool In Counterclockwise Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Fit bearing caps (2) so that pairing letters match up.

Install new connecting rod bolts (1).

Tightening torque **11 24 1AZ** .

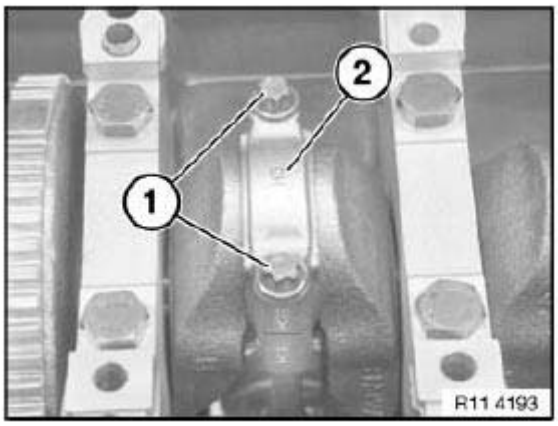


Fig. 222: Identifying Bearing Caps And Connecting Rod Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust torsion angle of connecting rod with special tool **00 9 120** (see illustration).

Tightening torque **11 24 1AZ** .

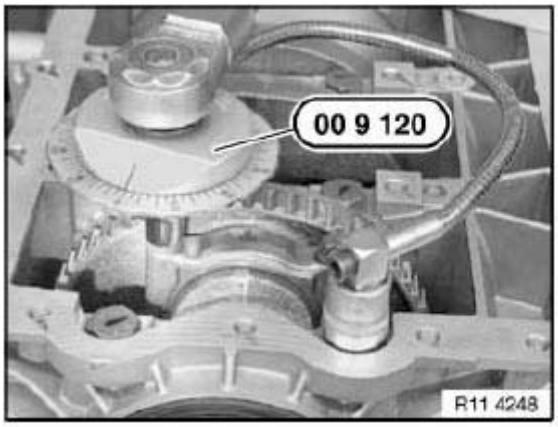


Fig. 223: Adjusting Conrod Torsion Angle Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 25 671 REPLACING PISTON RINGS ON ALL PISTONS (N54, N54T)

Necessary preliminary tasks:

- Remove all **PISTONS** .

Measuring axial clearance of piston rings in piston ring groove.

TECHNICAL DATA.

NOTE: It is not possible to measure the axial clearance of the oil scraper rings.

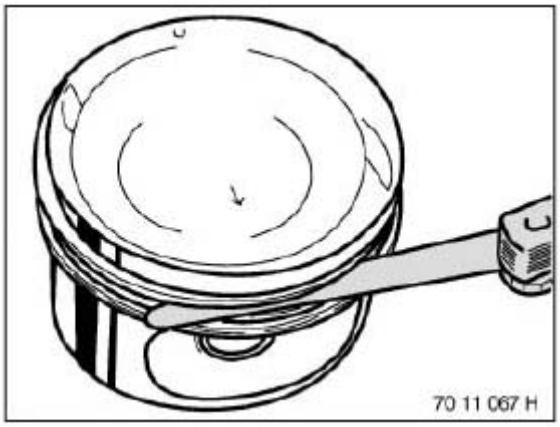


Fig. 224: Checking Piston Ring Clearance
Courtesy of BMW OF NORTH AMERICA, INC.

Remove compression ring and stepped ring upwards with piston ring pliers.

Oil scraper ring comprises two steel band rings and a support spring.

NOTE: Oil scraper ring cannot be removed with piston ring pliers.

Put aside piston rings in correct sequence and installation position.

It might not be possible to find the identification on used piston rings.

Installation note:

New pistons may only be installed together with new piston rings.

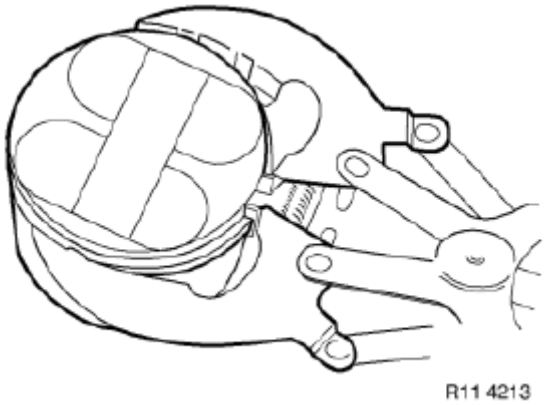


Fig. 225: Removing Compression Ring And Stepped Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Determine See **ENGINE BLOCK, CYLINDER CRANKCASE N54/B30** or **PISTONS WITH RINGS AND PINS N54/B30** with a feeler gauge.

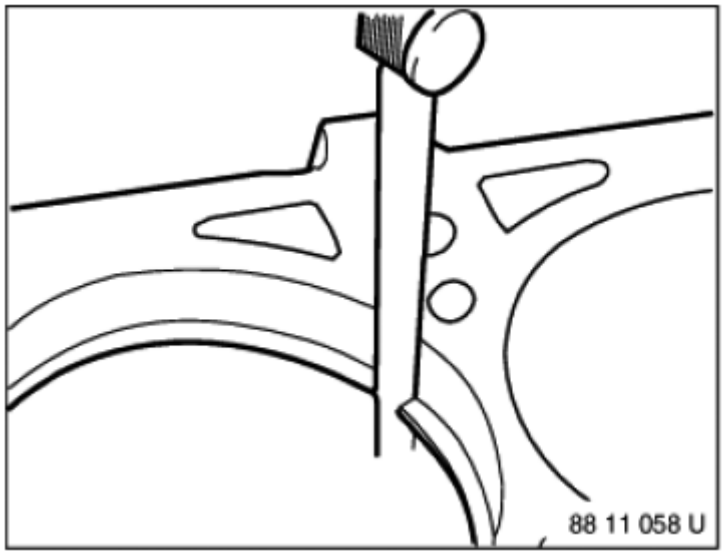


Fig. 226: Determining Piston Ring Gap Using Filler Gauge
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic diagram of piston rings.

Installation note:

Piston rings with "TOP" identification must point to piston crown.

1. Plain compression ring
2. Piston ring "top"
3. Two-part oil scraper ring

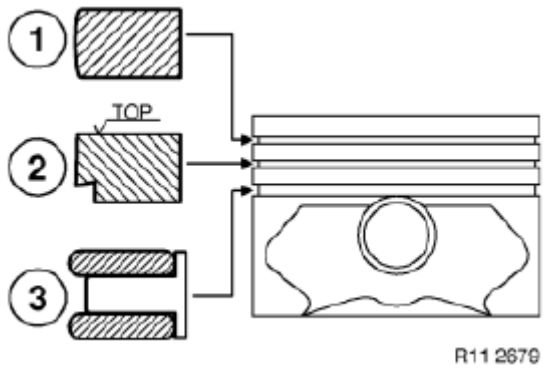


Fig. 227: Identifying Piston Rings
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Oil control ring comprises two steel band rings (1) and a support spring (2).

Installation note:

Insert support spring (2) into piston ring groove and then fit steel band rings (1) so that contact points are offset by approx. 120°.

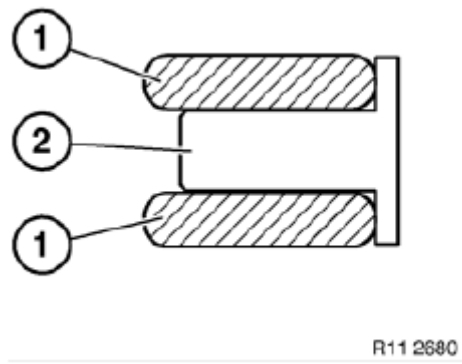


Fig. 228: Identifying Steel Band Ring And Support Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Offset the contact points (1) of the piston rings by approx. 120° to each other but do not position above the gudgeon pin boss.

NOTE: See graphic N52.

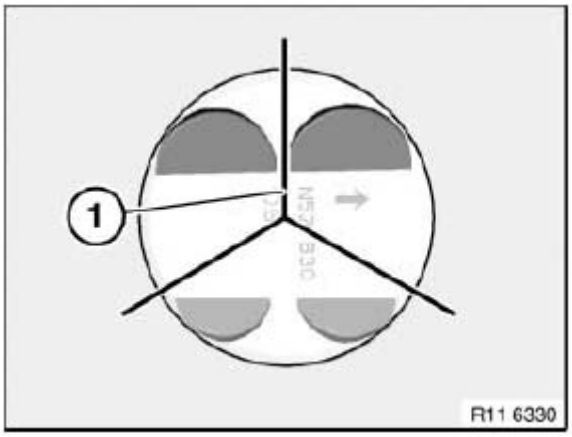


Fig. 229: Identifying Piston Rings Contact Point
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1128 V-RIBBED BELT WITH TENSIONER AND DEFLECTION ELEMENT

11 28 010 REPLACING DRIVE BELT FOR ALTERNATOR (N54, N54T)

IMPORTANT: Mark the direction of rotation of the drive belt if it is to be reused.

Depending on the build date (version), the idler pulleys can be fitted with and without grooves.

Necessary preliminary tasks:

- Remove **FAN COWL**

Unfasten hose clip (1).

Release quick-connect fastener (3) 90° on boost pressure hose in direction of arrow.

Pull off air hose (2).

Installation note:

Bring lock (3) back 90° into installation position.

Recirculated air hose must audibly snap into place.

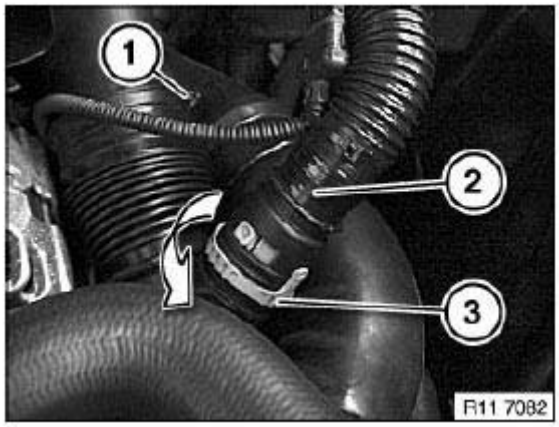


Fig. 230: Removing Quick-Connect Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) from holder (2) in direction of arrow.

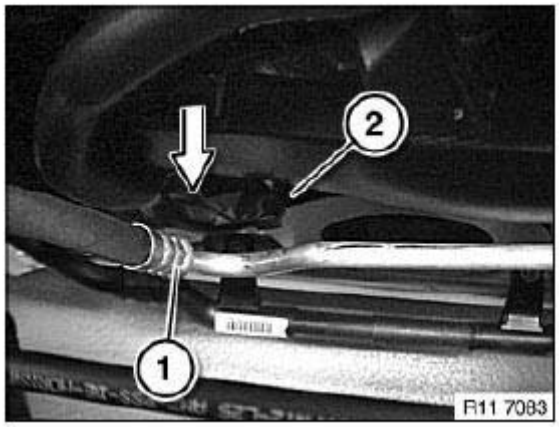


Fig. 231: Unclipping Line From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release coolant hose (1) from bracket (2).

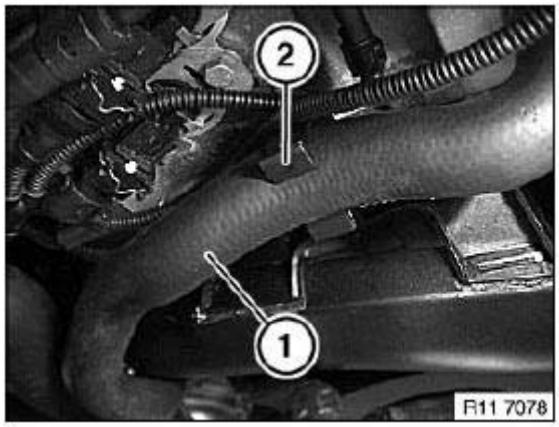


Fig. 232: Identifying Coolant Hose And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Fold air duct (2) down.

NOTE: Do not remove air duct (2).

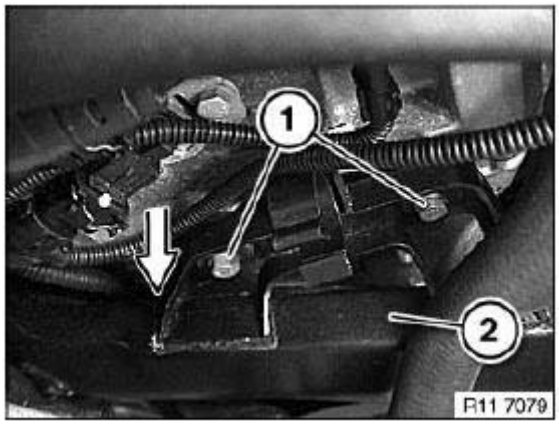


Fig. 233: Folding Air Duct Down
Courtesy of BMW OF NORTH AMERICA, INC.

Turn belt tensioner (1) in direction of arrow until bore is flush on housing.

Secure belt tensioner in place with special tool **11 3 340** .

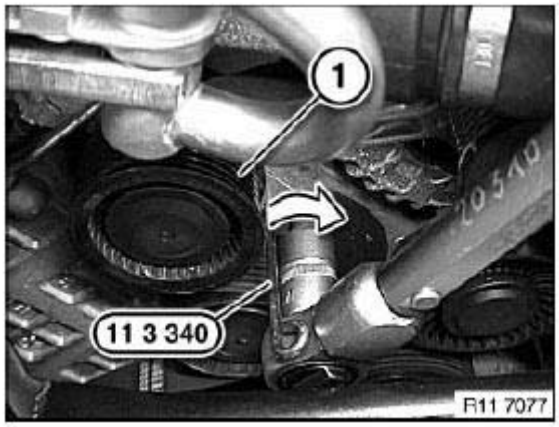


Fig. 234: Turning Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Remove drive belt (1).

Installation note:

Mark the direction of rotation of the drive belt if it is to be reused.

Pretension tensioning pulley (1) in direction of arrow.

Remove special tool **11 3 340** .

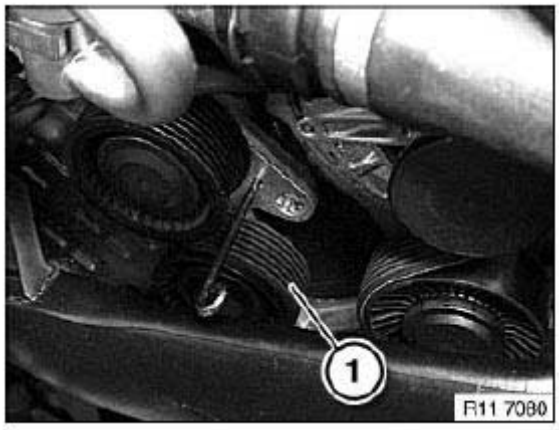


Fig. 235: Identifying Drive Belt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Note arrangement of drive belt

Arrow shows the direction of rotation.

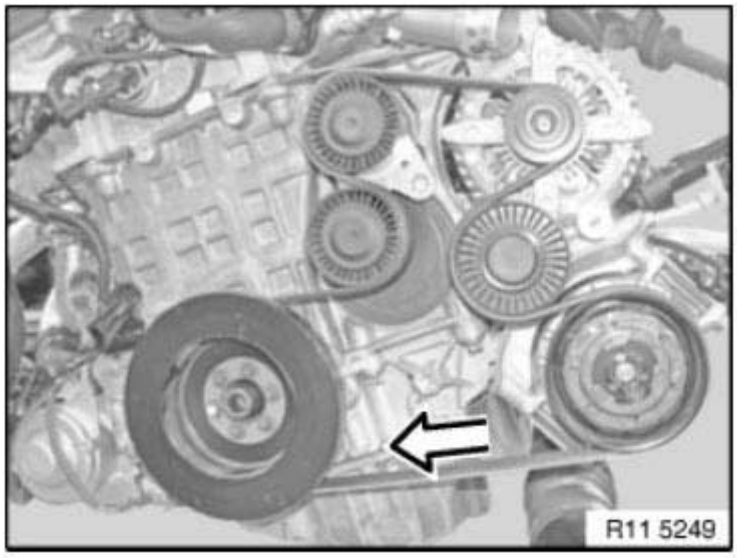


Fig. 236: Identifying Drive Belt Rotation Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Installation note:

Risk of damage!

Check that drive belt is in correct installation position.

11 28 020 REPLACING TENSIONING DEVICE FOR ALTERNATOR DRIVE BELT (N54, N54T)

Necessary preliminary tasks:

- Remove **DRIVE BELT**

Remove protective cap on deflection pulley.

Remove special tool **11 3 340** .

Release screw (1) on belt tensioner.

Tightening torque **11 28 1AZ** .

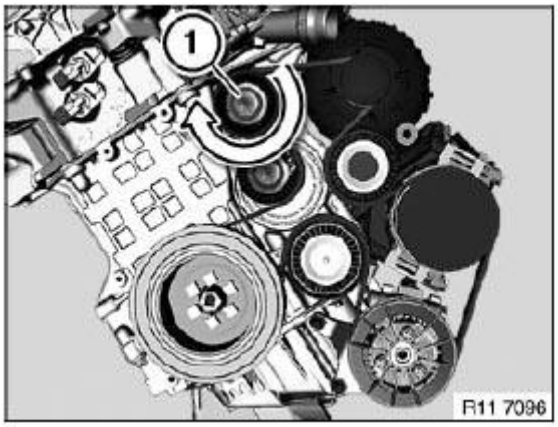


Fig. 237: Removing Screw On Belt Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement and direction of rotation of drive belt.

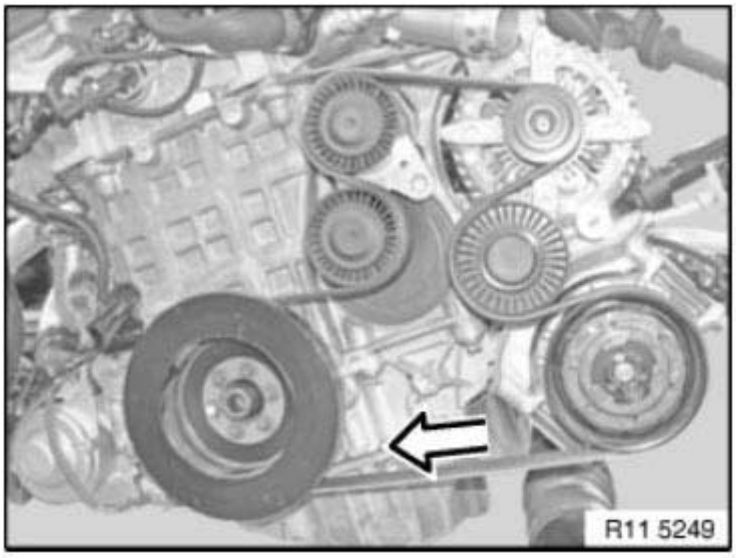


Fig. 238: Identifying Drive Belt Rotation Direction
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1131 CAMSHAFT

11 31 505 ADJUSTING CAMSHAFT TIMING (N54, N54T)

IMPORTANT: Risk of damage!

To open the central bolt at the camshaft, grip hexagon on rear of camshaft.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**

Remove fastener (1) in direction of arrow.

Installation note:

Install fastener (1) with bore facing outwards.

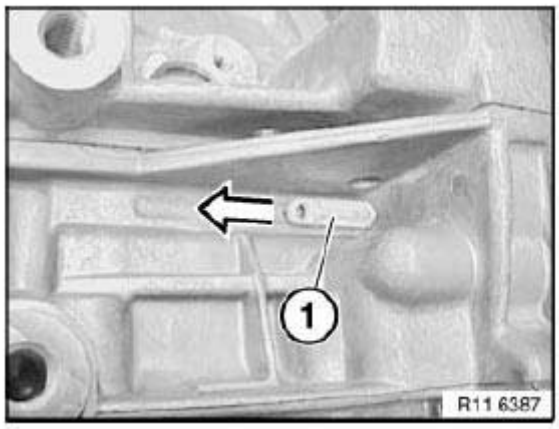


Fig. 239: Removing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide in special tool **11 0 300** in direction of arrow and block crankshaft.

IMPORTANT: On engines with automatic transmissions, there is shortly before the special tool bore for the TDC position a large bore which can be confused with the special tool bore.

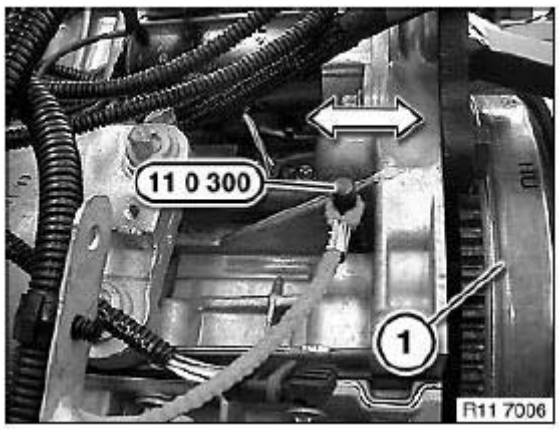


Fig. 240: Sliding In Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct bore with special tool **11 0 300** , the engine can no longer be moved at the central bolt.

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

IMPORTANT: If special tool 11 4 281 cannot be installed, the camshaft must be rotated at the hexagon head at the rear.

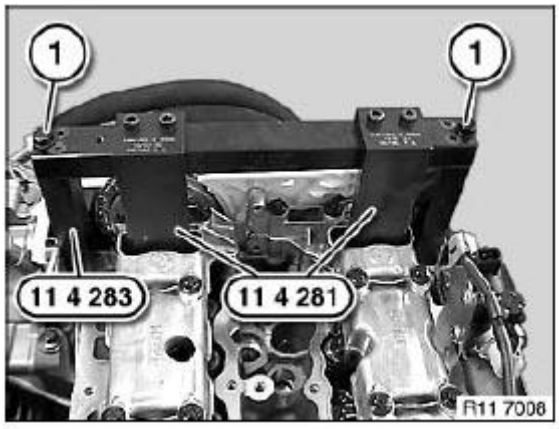


Fig. 241: Identifying Special Tool 11 4 280
Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder No. 1 in ignition TDC position, cams of exhaust camshaft (2) and intake camshaft (1) at 6th cylinder point downwards at an angle.

NOTE: If the timing is adjusted while the engine is installed, the position of the camshaft can only be checked with a mirror.

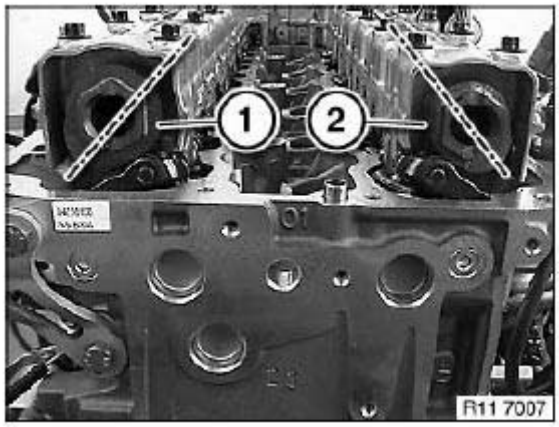


Fig. 242: Identifying Inlet And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt (1) of exhaust camshaft.

Installation note:

Replace screw (1).

Tightening torque **11 36 1AZ** .

Release central bolt (2) of inlet camshaft.

Installation note:

Replace screw (2).

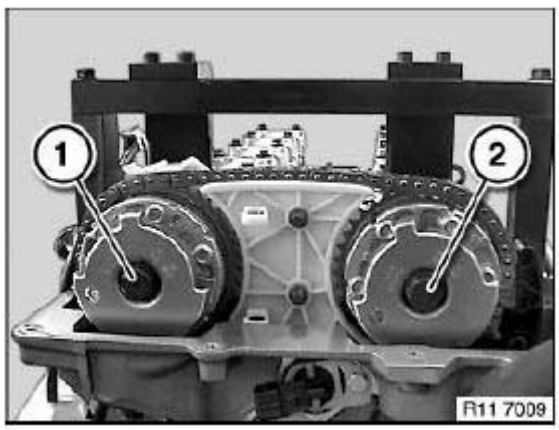


Fig. 243: Identifying Central Bolt Of Inlet And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **11 36 1AZ** .

Rotate increment wheels until retaining pins on special tool **11 8 520** match up.

Push special tool **11 8 520** onto cylinder head.

Secure special tool **11 8 520** with bolts (1 and 2).

NOTE: Bolts M6 x 45 (1 and 2) with captive washer.

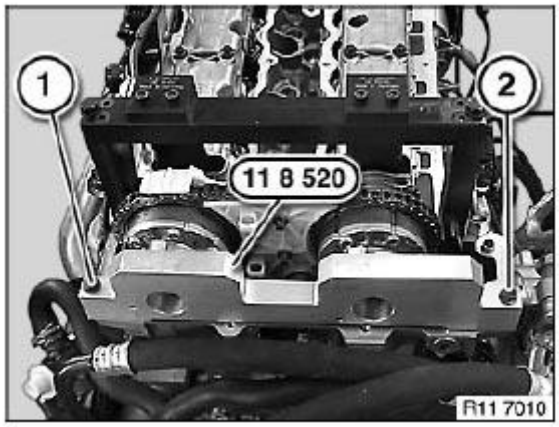


Fig. 244: Identifying Special Tool 11 8 520 With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

REMOVE CHAIN TENSIONER (1).

Screw special tool **11 9 340** into cylinder head.

Pre-tension timing chain with special tool 00 9 250 **to 0.6 Nm.**

Tighten central bolts (2 and 3) with special tool 00 9 120 .

Tightening torque 11 36 1AZ .

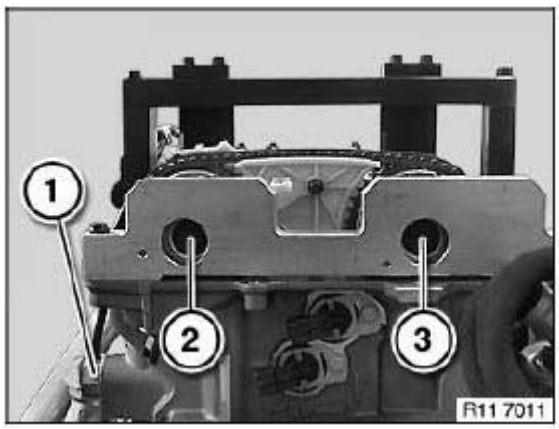


Fig. 245: Identifying Chain Tensioner And Central Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 005 CHECKING CAMSHAFT TIMING (N54, N54T)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove front **UNDERBODY PROTECTION**

Remove fastener (1) in direction of arrow.

Installation note:

Install fastener (1) with bore facing outwards.

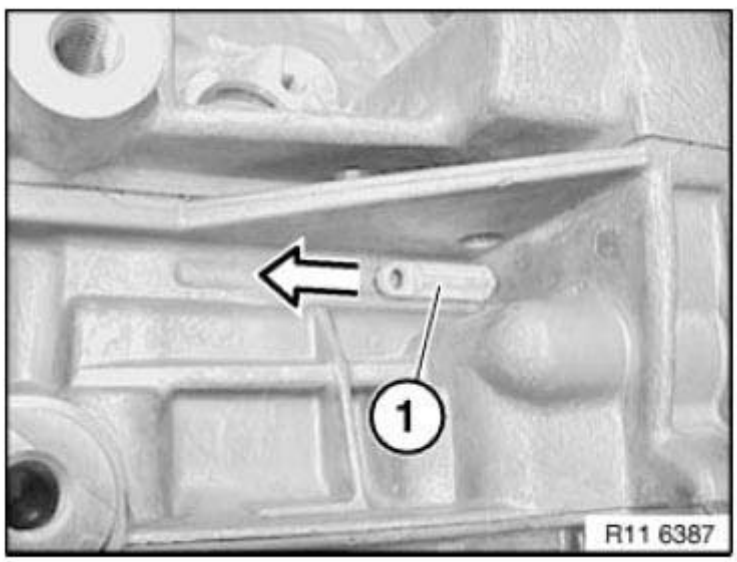


Fig. 246: Identifying Bearing Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate crankshaft at central bolt into TDC position.

Slide in special tool **11 0 300** in direction of arrow and block crankshaft.

IMPORTANT: On engines with automatic transmissions, there is shortly before the special tool bore for the TDC position a large bore which can be confused with the special tool bore.

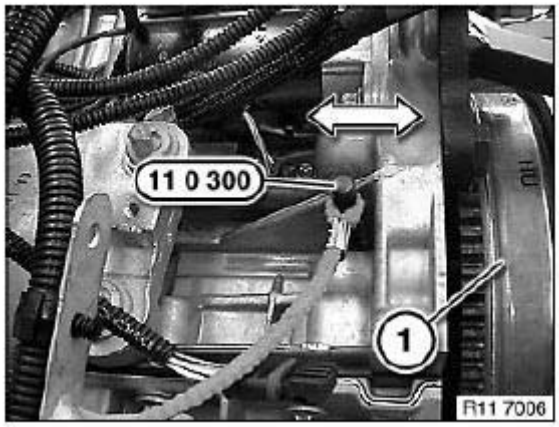


Fig. 247: Sliding In Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

If the flywheel is secured in the correct bore with special tool **11 0 300** , the engine can no longer be moved at the central bolt.

With 1st cylinder in ignition TDC position, cams of intake camshaft (1) at 6th cylinder point downwards at an angle.

With 1st cylinder in ignition TDC position, cams of exhaust camshaft (2) at 6th cylinder point downwards at an angle.

Roller cam follower is not actuated.

NOTE: If the timing is checked while the engine is installed, the position of the camshaft can only be checked with a mirror.

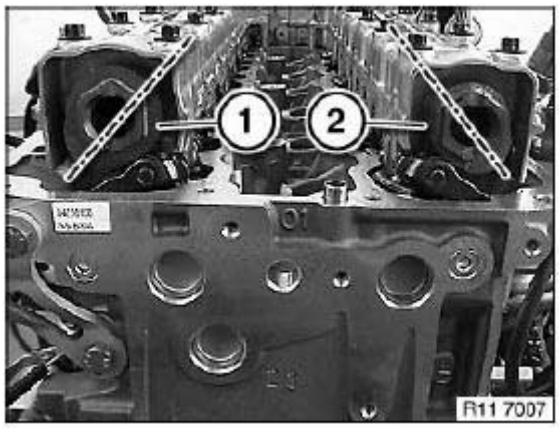


Fig. 248: Identifying Inlet And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool 11 4 283 on cylinder head with screws (1).

Mount special tool 11 4 281 on intake and exhaust camshafts.

If the special tools 11 4 281 cannot be attached, the **TIMING** must be adjusted.

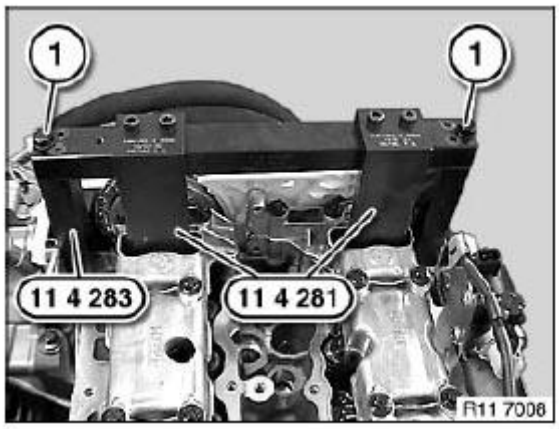


Fig. 249: Identifying Special Tool 11 4 280
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

11 31 090 INSTALLING AND REMOVING/REPLACING CHAIN TENSIONER PISTON (N54, N54T)

Necessary preliminary tasks

Remove **COOLANT EXPANSION TANK** (E89 only)

Release chain tensioner (1).

Tightening torque: **11 31 5AZ** .

IMPORTANT: Have a cleaning cloth ready. A small quantity of engine oil will emerge after the screw connection has been released.

Make sure no oil runs onto the belt drive.

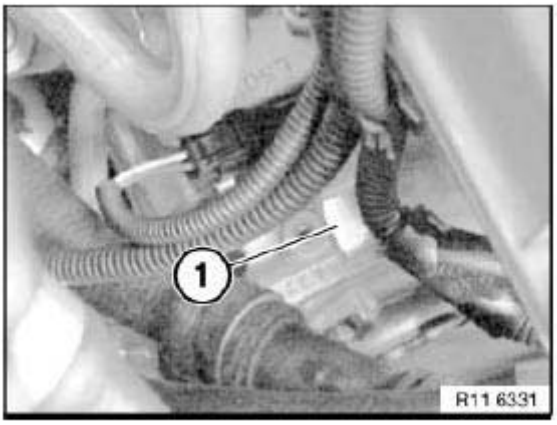


Fig. 250: Identifying Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

No sealing ring is fitted during series-production assembly.

A sealing ring must be fitted by service personnel when the chain tensioner is fitted.

If the chain tensioner is reused, its oil chamber must be drained. Place chain tensioner on a level working surface and slowly compress.

Repeat procedure twice.

Fig. 251: Compressing Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 028 REMOVING AND INSTALLING/REPLACING EXHAUST CAMSHAFT (N54/N54T)

IMPORTANT: Risk of damage!

It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.

The upper and lower bearing strips must be preloaded with a total of six special tools 11 8 553.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **EXHAUST ADJUSTING UNIT** for exhaust camshaft.
- Adjust **VALVE TIMING**

Release bearing cap screw connections from outside inwards.

Lift out lower and upper bearing strips (1) with camshaft.

NOTE: Graphic shows N52.

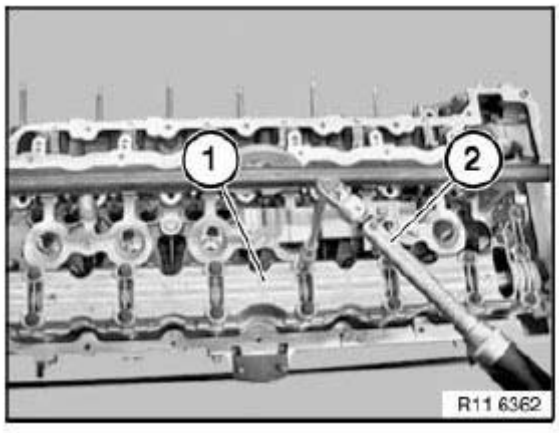


Fig. 252: Lifting Lower And Upper Bearing Strips With Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Both camshafts have different markings.

Mixing up the two camshafts will result in engine damage.

A Exhaust camshaft.

E Intake camshaft

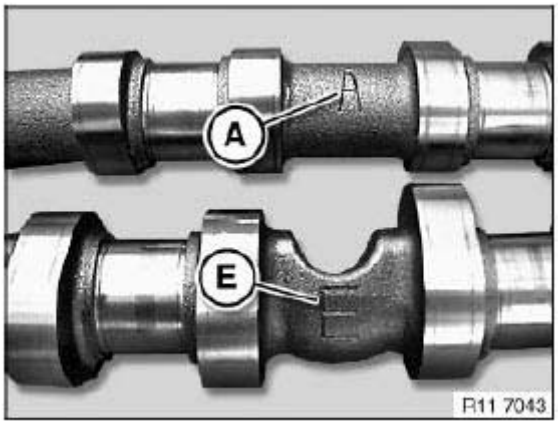


Fig. 253: Identifying Exhaust And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Plain compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

IMPORTANT: Plain rectangular compression rings (1) can easily break.

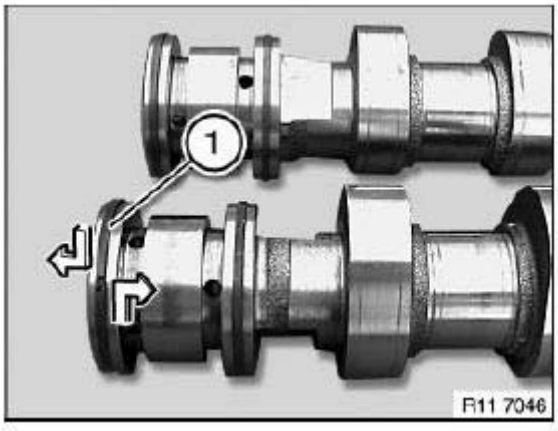


Fig. 254: Pressing Plain Compression Rings
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine:

Engine at cylinder no. 1 firing TDC position.

Removed cylinder head:

When using special tool 11 9 000 , it will be necessary to remove the aluminum strip.

Installation note:

Before installing the exhaust camshaft, make sure the roller cam follower is correctly seated on the hydraulic valve clearance compensating element and the valve.

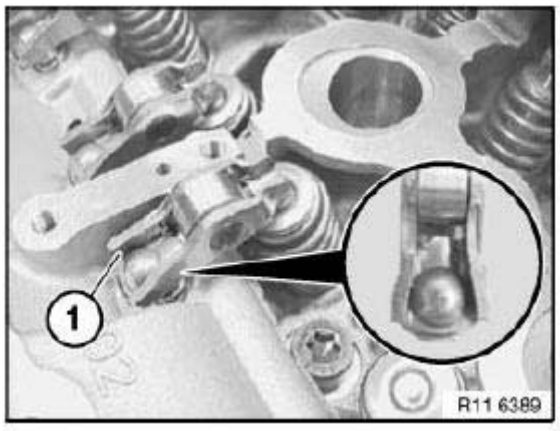


Fig. 255: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Installing camshaft bearing strip

Pre-install special tool 11 8 551 on cylinder no. 2.

Observe markings E and A

E: Intake side

A: Exhaust side

Insert special tool 11 8 552 in screw connection of cylinder head cover.

Press down roller cam follower (1) on cylinder no. 2 with spindle nut of special tool 11 8 551.

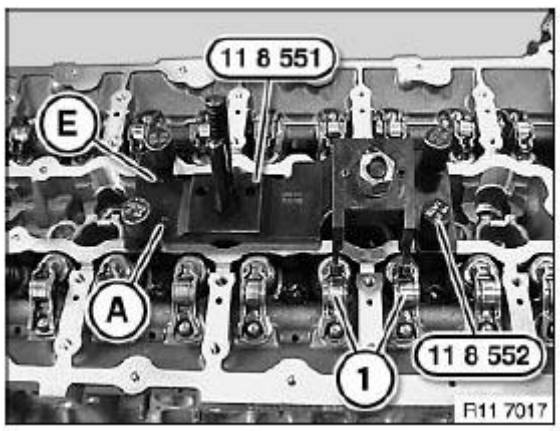


Fig. 256: Identifying Special Tools 11 8 551 And 11 8 552
Courtesy of BMW OF NORTH AMERICA, INC.

Lay lower bearing strip (1) on cylinder head.

Installation note:

Lubricate all bearing points with engine oil.

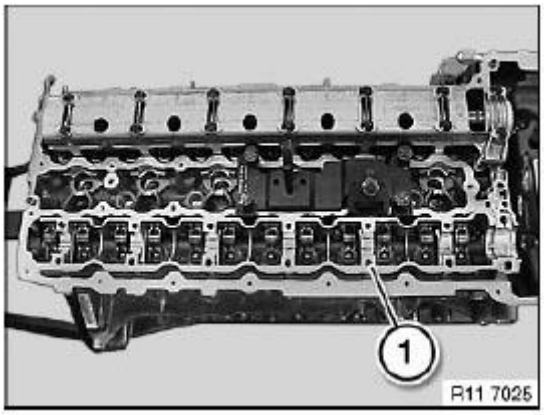


Fig. 257: Identifying Lower Bearing Strip On Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Insert exhaust camshaft (1) in lower bearing strip.

Installation note:

Lubricate all bearing positions and cams with engine oil.

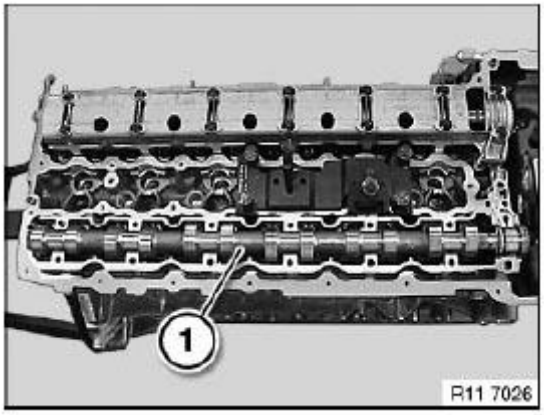


Fig. 258: Identifying Exhaust Camshaft In Lower Bearing Bank
Courtesy of BMW OF NORTH AMERICA, INC.

Installation position (1) of exhaust camshaft (2) at cylinder no. 1.

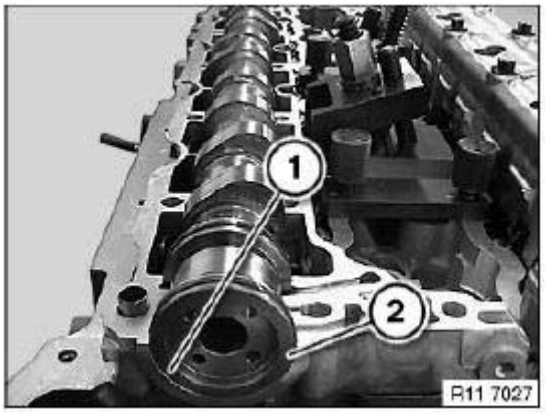


Fig. 259: Identifying Installation Position Of Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Join exhaust camshaft to lower and upper bearing strips with torque wrench from inside outwards to **8 Nm.**

Release all screws of bearing strip (1) from outside inwards by 90°.

Check position of exhaust camshaft (2) at cylinder no. 6.

Roller cam follower (1) is not actuated.

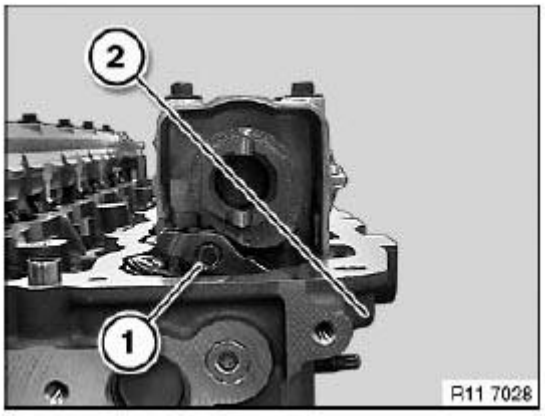


Fig. 260: Identifying Exhaust Camshaft Position And Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Lower and upper bearing strips must be aligned to each other at ground surfaces (1 and 2).

Bring thrust piece and legs of special tools 11 8 553 into contact at milled surfaces.

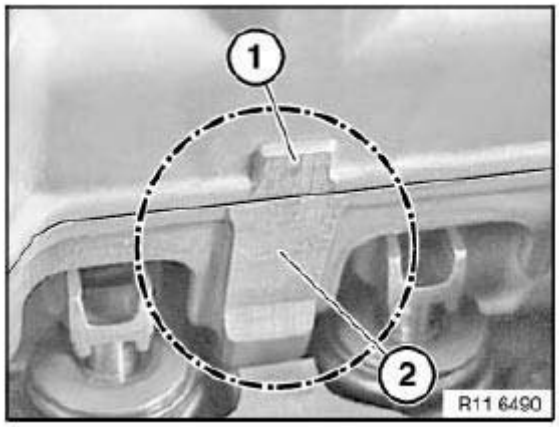


Fig. 261: Identifying Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 8 553 at upper bearing strip (1) and lower bearing strip (2).

IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm.

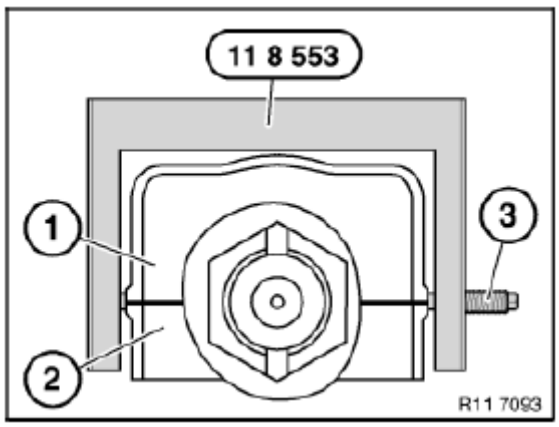


Fig. 262: Identifying Special Tool 11 8 553 Schematic Depiction On Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 8 553 over screw connection of bearing strips.

NOTE: Make sure that legs come into exact contact on ground surfaces, lower bearing strip (1) and upper bearing strip (2).

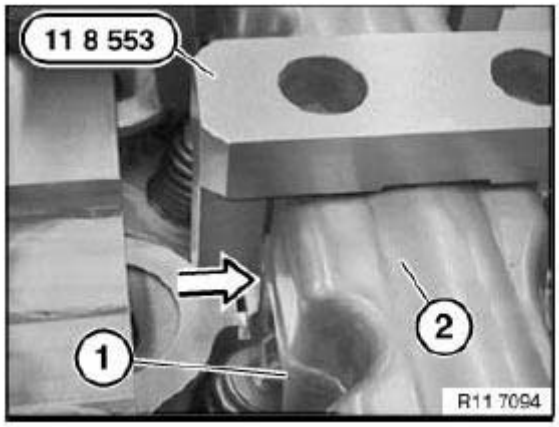


Fig. 263: Positioning Special Tool 11 8 553 Over Bearing Banks Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 8 553 to ground surfaces of lower bearing strip (2) and upper bearing strip (1).

IMPORTANT: Tighten screws on thrust piece to 2 Nm.

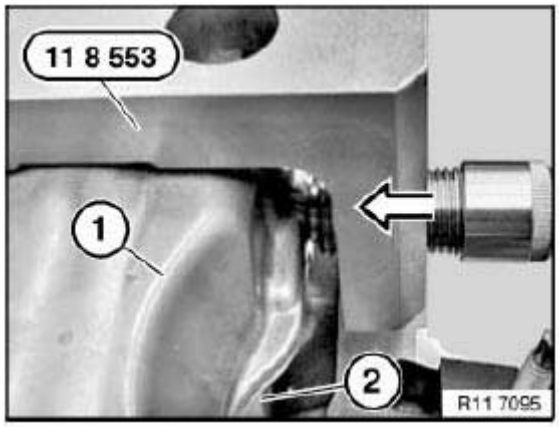


Fig. 264: Tightening Special Tool 11 8 553 Screw
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.

Pre-tension all special tools 11 8 553 with special tool **11 4 350** only.

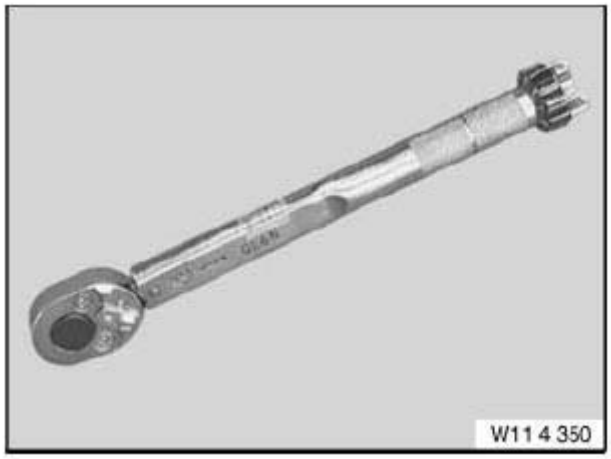


Fig. 265: Identifying 11 4 350 Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tools 11 8 553 with screw (1) to inside of cylinder head.

On cylinder no. 2 mount special tool 11 8 553 with screw (1) facing outwards.

Position special tools **11 4 350** so that screw connections (2) of bearing strip are easily accessible.

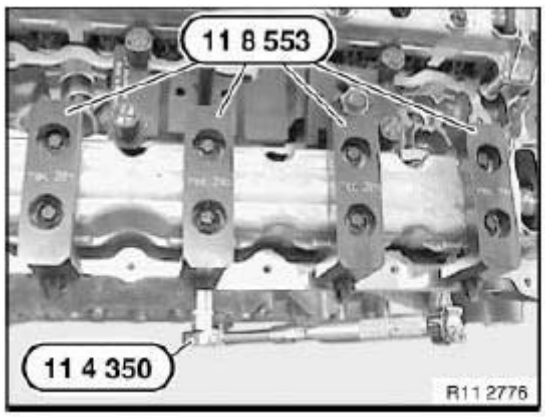


Fig. 266: Identifying Special Tools 11 8 553 And Special Tool 11 4 350
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten lower and upper bearing strips with special tool **00 9 120** .

Position special tool 11 8 553 over screw connection of bearing strips.

Tightening torque **11 31 1AZ** .

IMPORTANT: Remove special tool 11 8 553 only when camshaft screw connection is completed .

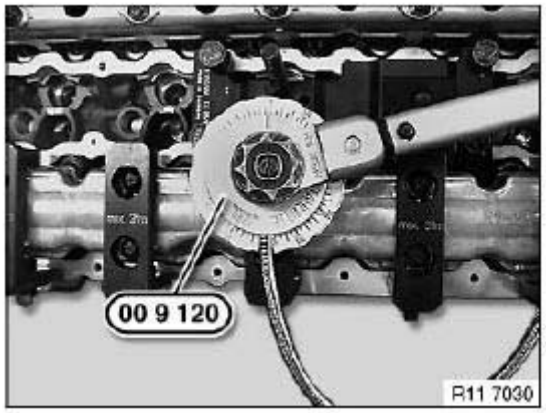


Fig. 267: Tightening Bearing Strips Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 31 025 REMOVING AND INSTALLING/REPLACING INTAKE CAMSHAFT (N54/N54T)

IMPORTANT: Risk of damage!

It is absolutely essential to follow an exact procedure for removing and installing the exhaust camshaft.

The upper and lower bearing strips must be pre-tensioned with a total of six special tools 11 8 553.

Special tool 11 8 550 can be used for intake and exhaust sides.

Necessary preliminary tasks:

Remove **CYLINDER HEAD COVER**

- Remove **INTAKE ADJUSTER** of intake camshaft

Release bearing cap screw connections from outside inwards.

Lift out lower and upper bearing strips (1) with camshaft.

NOTE: Graphic shows N52.

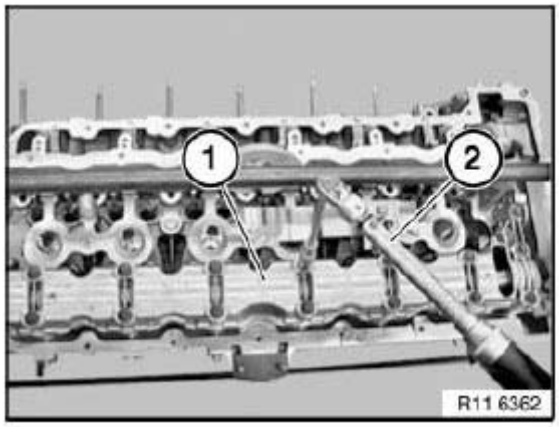


Fig. 268: Lifting Lower And Upper Bearing Strips With Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Remove upper bearing shell.

Remove intake camshaft (1) marked with (E).

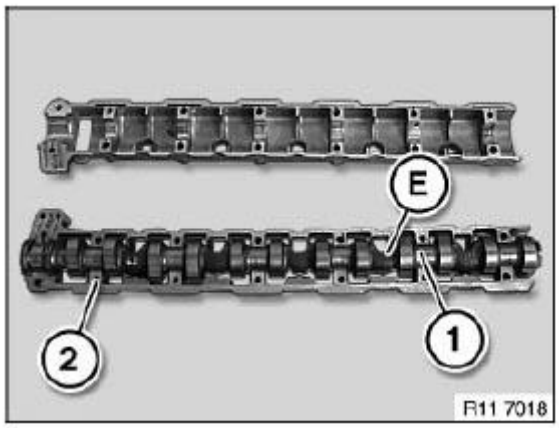


Fig. 269: Identifying Marked Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Both camshafts have different markings.

Mixing up the two camshafts will result in **engine damage.**

A Exhaust camshaft

E Intake camshaft

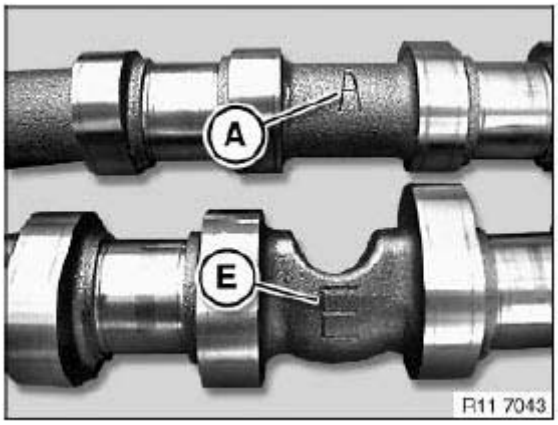


Fig. 270: Identifying Exhaust And Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Plain rectangular compression rings (1) can easily break.

Plain rectangular compression rings (1) are engaged at joint.

Press plain compression rings (1) apart upwards and downwards and removed towards front.

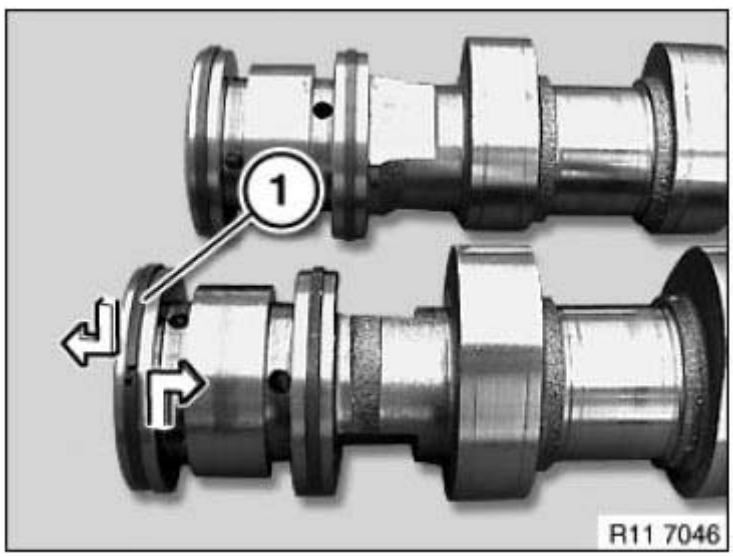


Fig. 271: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Removal on engine:

Engine at cylinder no. 1 firing TDC position.

Removed cylinder head:

When using special tool 11 9 000 , it will be necessary to remove the aluminum strip.

Installing camshaft bearing strip

Pre-install special tool 11 8 551 on cylinder nos. 2 and 3.

Insert special tool 11 8 552 in screw connection of cylinder head cover.

Special tool 11 8 551 is marked with letters E and A.

E= Intake side

A= Exhaust side

Press down roller cam follower on cylinder no. 3 with spindle nut (2) of special tool 11 8 551.

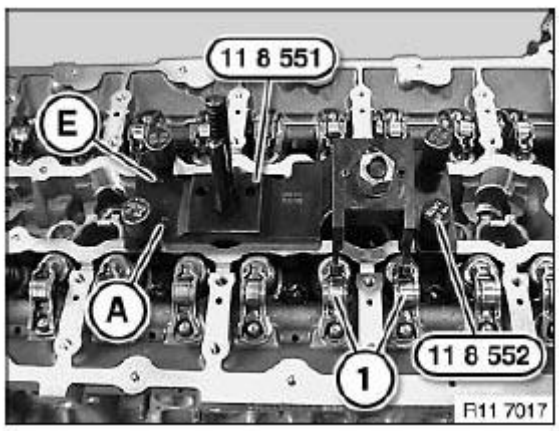


Fig. 272: Identifying Special Tools 11 8 551 And 11 8 552
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Before installing intake camshaft, make sure roller cam follower is correctly seated on hydraulic valve clearance compensating element and valve.

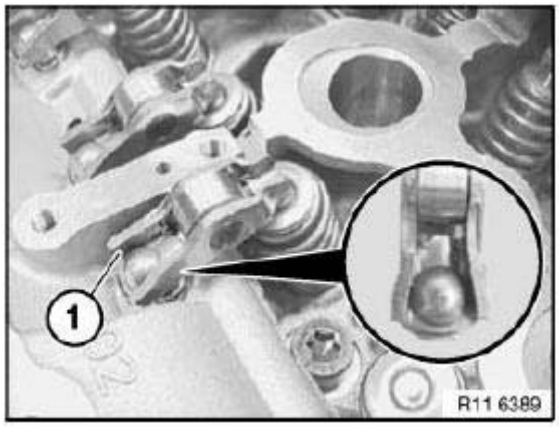


Fig. 273: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Pre-install bearing strip of intake camshaft.

Lubricate all bearing points in lower bearing strip with engine oil.

Installation note:

Lay intake camshaft (1) in bearing strip.

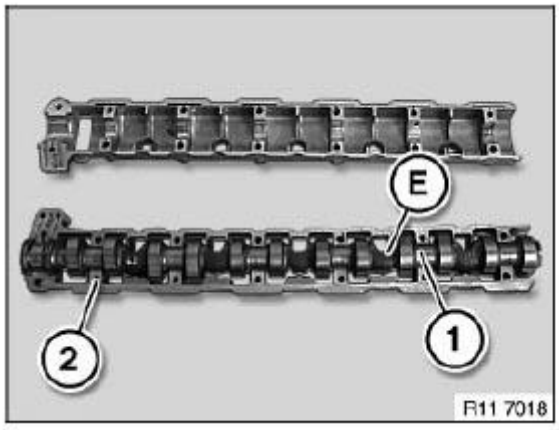


Fig. 274: Identifying Marked Inlet Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate intake camshaft (1) at cylinder no. 1 into position (2).

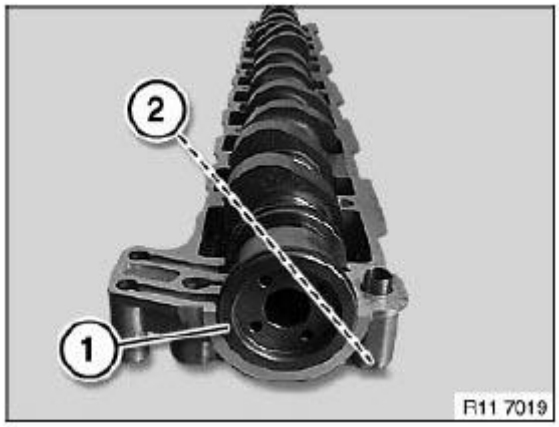


Fig. 275: Identifying Inlet Camshaft With Position
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Lower and upper bearing strips must be aligned to each other at ground surfaces (1 and 2).

Bring thrust piece and legs of special tools 11 8 553 into contact at milled surfaces.

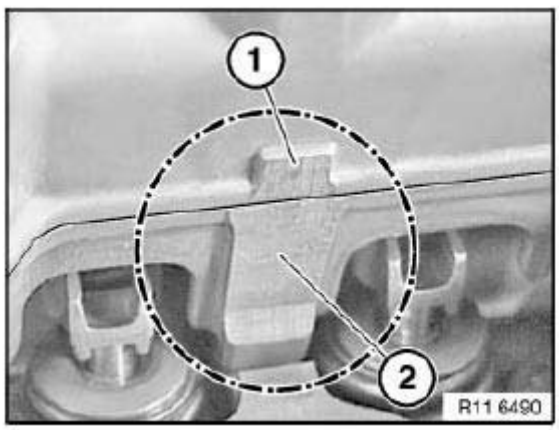


Fig. 276: Identifying Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Schematic depiction of special tool 11 8 553 at lower bearing strip (1) and upper bearing strip (2).

IMPORTANT: Tighten screw (3) on thrust piece to 2 Nm.

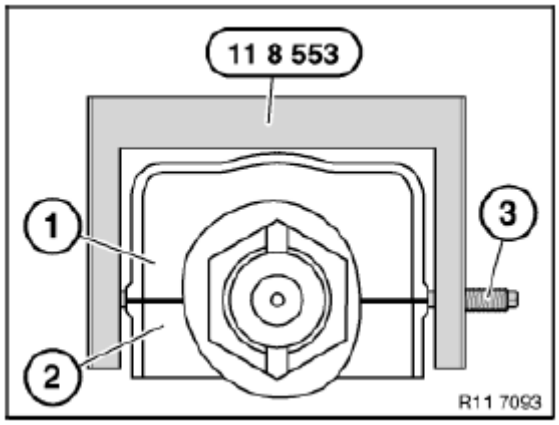


Fig. 277: Identifying Special Tool 11 8 553 Schematic Depiction On Bearing Strips
Courtesy of BMW OF NORTH AMERICA, INC.

Position special tool 11 8 553 over screw connection of bearing strips.

Make sure that legs come into exact contact on ground surfaces, lower bearing strip (1) and upper bearing strip (2).

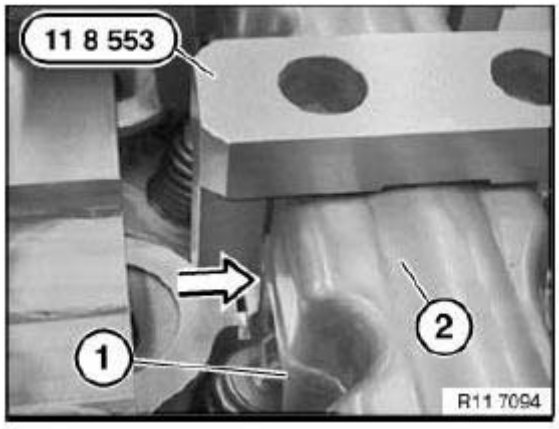


Fig. 278: Positioning Special Tool 11 8 553 Over Bearing Strips Screw Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Initially tighten screw of special tool 11 8 553 to ground surfaces of lower bearing strip (1) and upper bearing strip (2).

IMPORTANT: Tighten screws on thrust piece to 2 Nm.

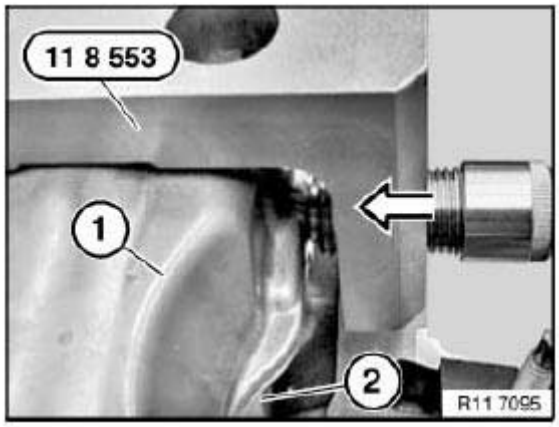


Fig. 279: Tightening Screw Of Special Tool 11 8 553
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Set special tool 11 4 350 to 2 Nm.

Pre-tension all special tools 11 8 553 with special tool 11 4 350 only.

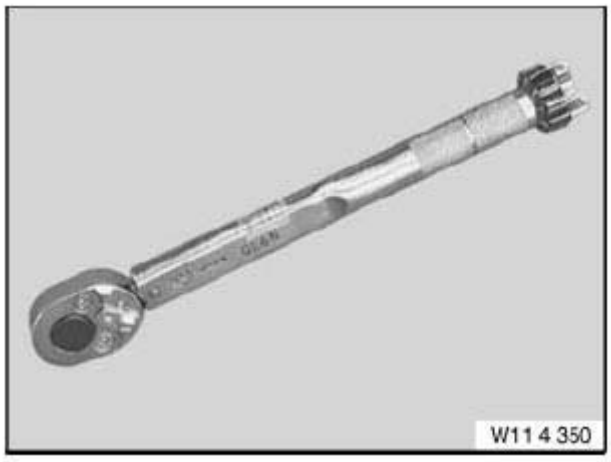


Fig. 280: Identifying 11 4 350 Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Install upper and lower bearing strips (1).

Pre-install all special tools 11 8 553.

IMPORTANT: Secure special tool 11 8 553 to max. 2 Nm.

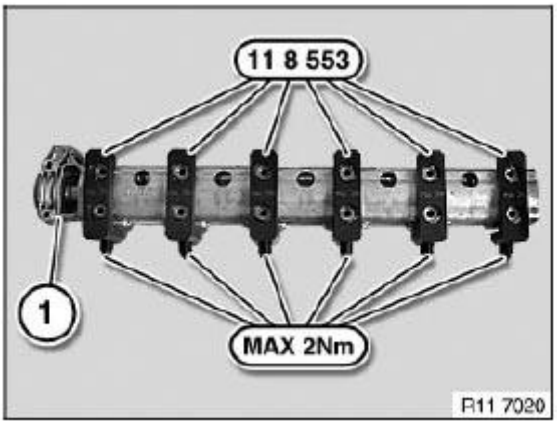


Fig. 281: Identifying Upper And Lower Bearing Strips With Special Tools 11 8 553
Courtesy of BMW OF NORTH AMERICA, INC.

Install intake camshaft with bearing strips (1) on cylinder head.

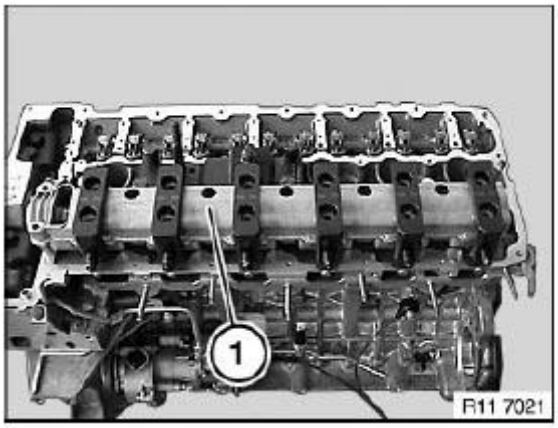


Fig. 282: Identifying Bearing Strips On Cylinder Head
Courtesy of BMW OF NORTH AMERICA, INC.

Check position of intake camshaft (1) at cylinder no. 6.

Roller cam follower (2) is not actuated.

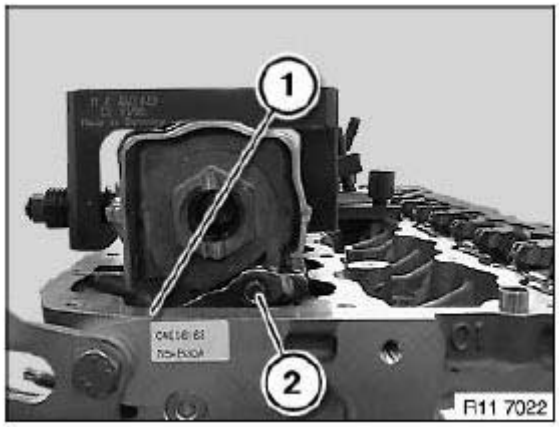


Fig. 283: Identifying Intake Camshaft And Roller Cam Follower
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten lower and upper bearing strips with special tool **00 9 120** .

Tightening torque **11 31 1AZ** .

IMPORTANT: Remove special tool 11 8 553 only when camshaft screw connection is completed.

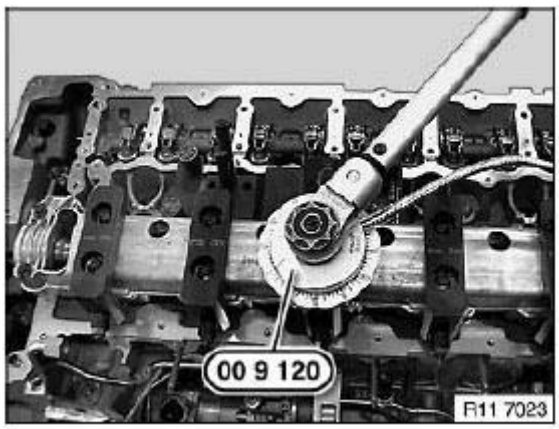


Fig. 284: Tightening Lower And Upper Bearing Strips Using Special Tool 00 9 120
Courtesy of BMW OF NORTH AMERICA, INC.

Adjust **VALVE TIMING** .

Assemble engine.

11 31 051 REPLACING TIMING CHAIN (N54, N54T)

Necessary preliminary tasks:

- Remove **FAN COWL**
- Remove **CYLINDER HEAD COVER**
- Remove all spark plugs
- Remove **CHAIN TENSIONER** .
- Remove **CRANKSHAFT SEAL** at front
- Remove **BELT TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove **INTAKE AND EXHAUST ADJUSTERS**

Remove fastener (1) in direction of arrow.

Installation note:

Install fastener (1) with bore facing outwards.

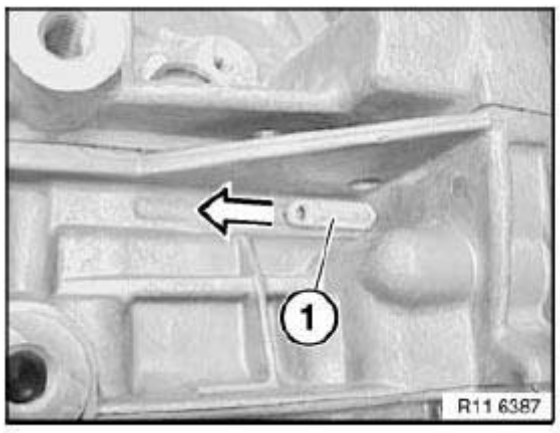


Fig. 285: Installing Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Secure engine in TDC firing position of cylinder no. 1 with special tool **11 0 300** .

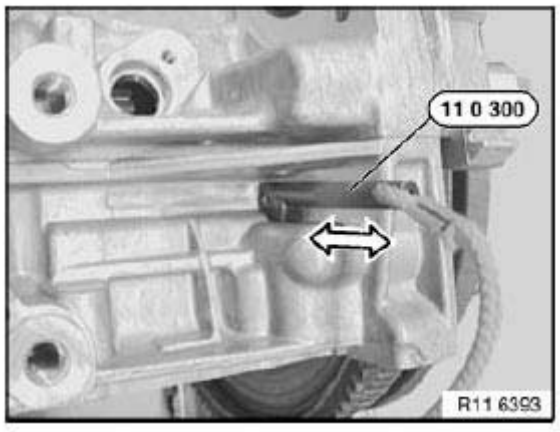


Fig. 286: Securing Crankshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Mark flywheel and transmission housing with a line (1).

NOTE: Graphic shows automatic transmission.

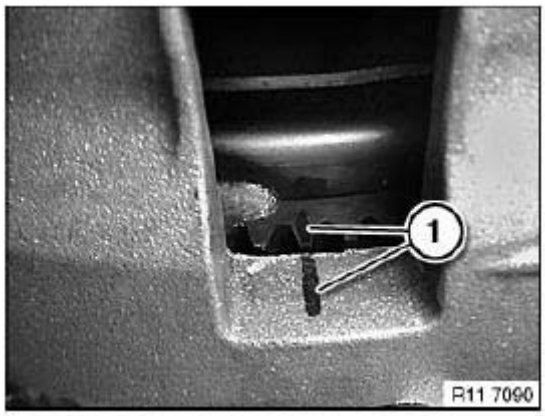


Fig. 287: Identifying Line On Flywheel And Transmission Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Do not remove special tool **11 4 280** .

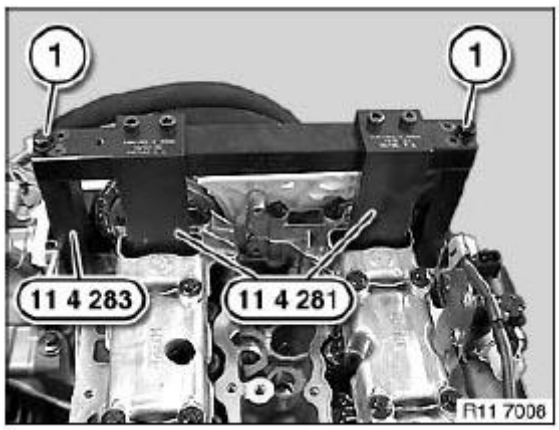


Fig. 288: Identifying Special Tool 11 4 280
Courtesy of BMW OF NORTH AMERICA, INC.

Procedure, transmission removed

Secure flywheel (crankshaft) with special tool **11 9 260** .

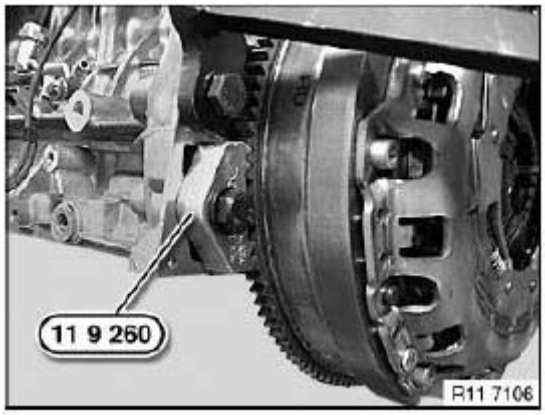


Fig. 289: Securing Flywheel (Crankshaft) Using Special Tool 11 9 260
Courtesy of BMW OF NORTH AMERICA, INC.

Block flywheel (crankshaft) with special tool **11 8 660** on gearbox.

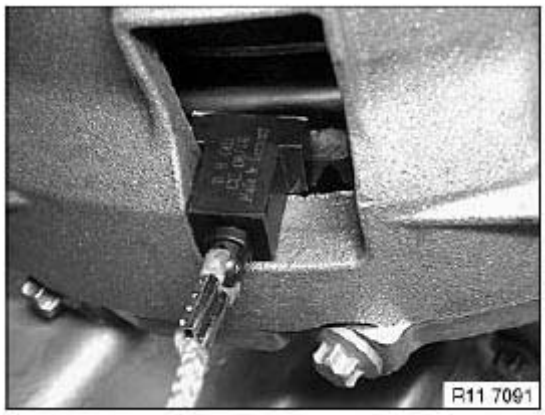


Fig. 290: Securing Flywheel (Crankshaft) Using Special Tool 11 8 660
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **11 8 180** with screws (1).

Secure flywheel in direction of arrow.

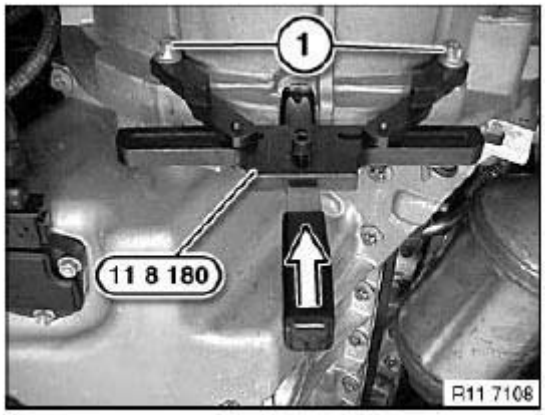


Fig. 291: Securing Flywheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: To release central bolt (1), remove special tool 11 0 300 .

Release central bolt with a 3/4" socket (1) and if necessary with a 3/4" extension (2).

Tightening torque **11 21 1AZ** .

Remove central bolt with hub towards front.

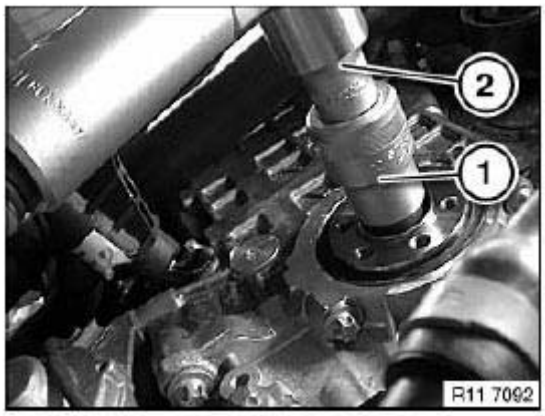


Fig. 292: Removing Central Bolt Using Socket
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 31 6AZ** .

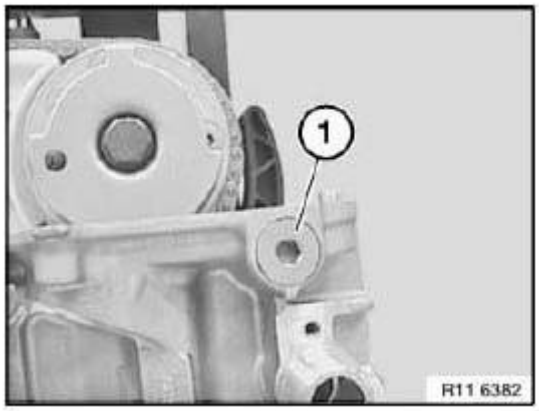


Fig. 293: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Open plug (1).

Tightening torque **11 31 6AZ** .

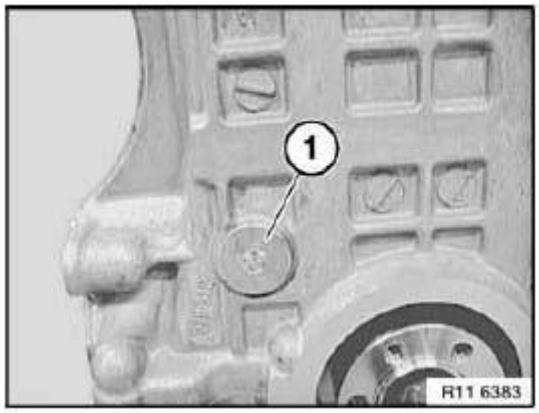


Fig. 294: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on chain drive at top.

Tightening torque **11 31 2AZ** .

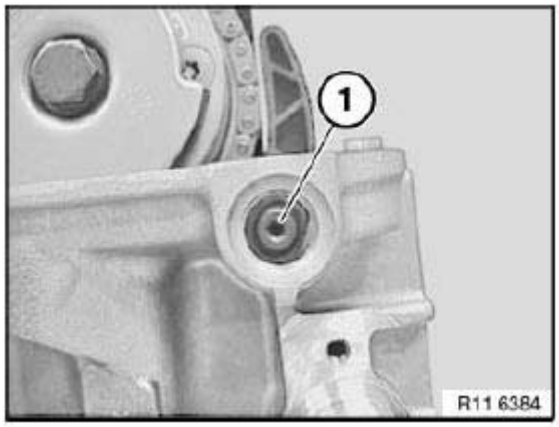


Fig. 295: Identifying Screw On Chain Drive At Top
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on chain drive at bottom.

Tightening torque **11 31 3AZ** .

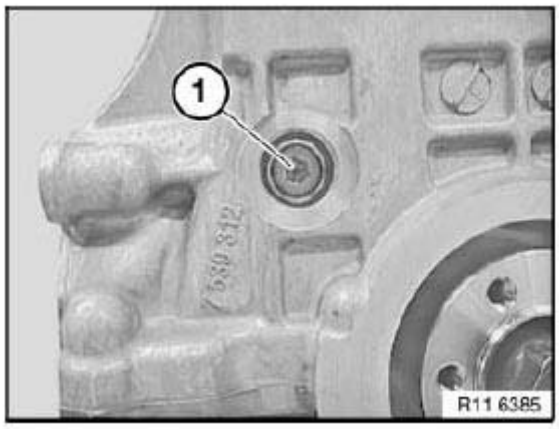


Fig. 296: Identifying Screw On Chain Drive At Bottom
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 31 2AZ** .

Remove timing chain module with timing chain and sprocket upwards in direction of arrow.

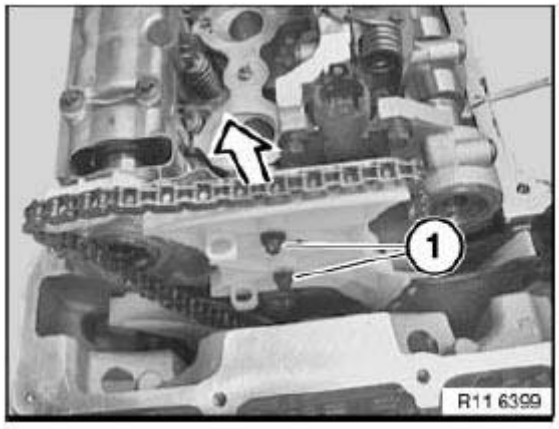


Fig. 297: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket (2).

Collar (see arrow) on sprocket (2) points to crankshaft.

Incorrect assembly will result in engine damage.

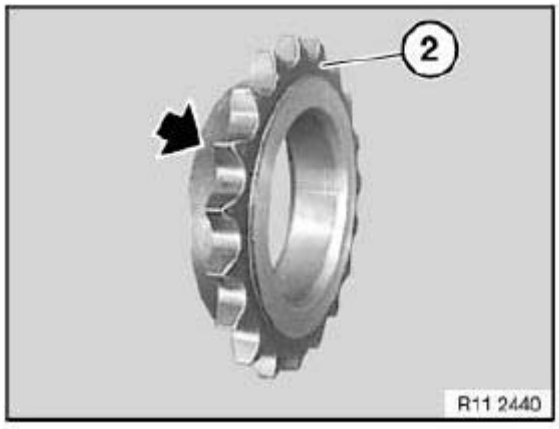


Fig. 298: Identifying Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Pull timing chain (1) upwards until sprocket (2) engages chain guide (3).

Install timing chain (1) and sprocket (2) in this position.

Installation note:

Always hold timing chain under tension.

Timing chain (1) may jam on chain module (3).

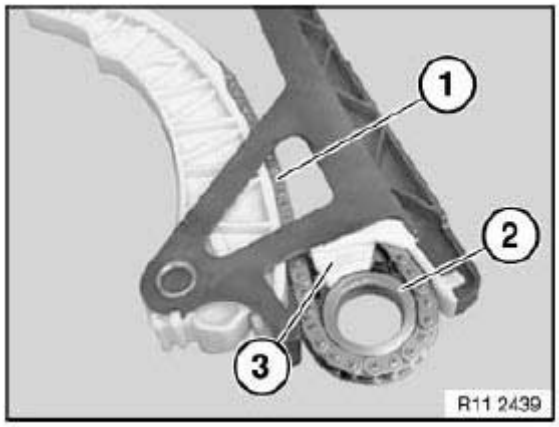


Fig. 299: Identifying Timing Chain And Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The N54 engine requires special friction plates between the friction surfaces.

The engine will incur damage if the friction plates are damaged or are not fitted.

Friction plates (1 and 2) are clipped into place on sprocket wheel/oil pump module.

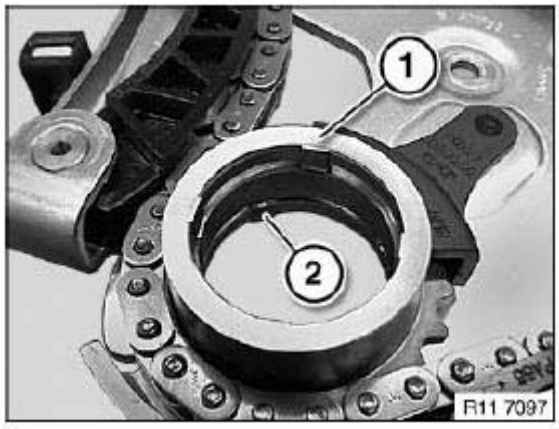


Fig. 300: Identifying Friction Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Make sure friction plate (3) is in correct installation position.

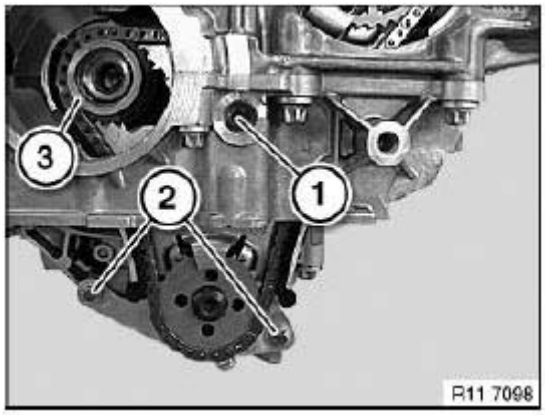


Fig. 301: Identifying Friction Plate Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Push on friction plate (1) without retainers.

IMPORTANT: The N54 engine requires special friction plates between the friction surfaces.

The engine will incur damage if the friction plates are damaged or are not fitted.

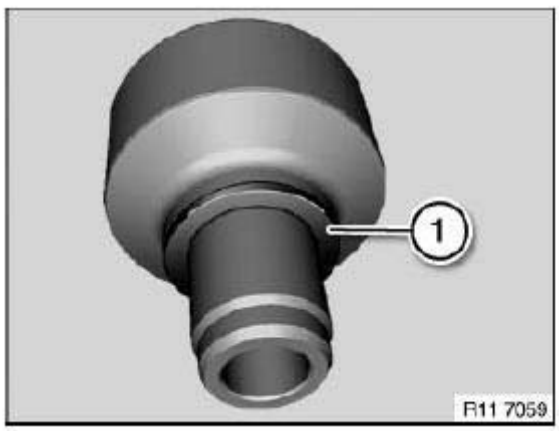


Fig. 302: Identifying Friction Plate Without Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Insert chain module from above and secure with bolt (1).

Make sure gear wheels (2) are in correct installation position.

Insert hub (3) with friction plate.

Tightening torque **11 21 1AZ** .

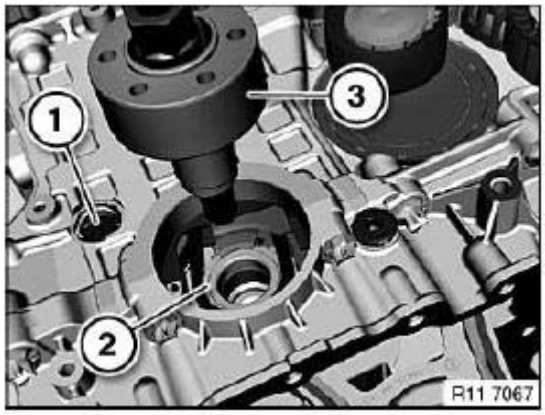


Fig. 303: Identifying Gear Wheels Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Secure special tool **00 9 140** with magnet to engine support (1).

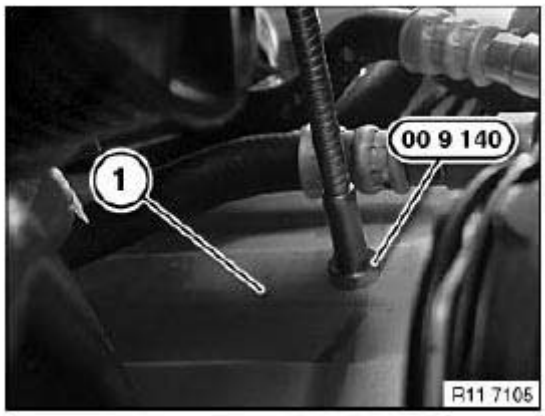


Fig. 304: Securing Special Tool 00 9 140 With Magnet To Engine Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

Secure central bolt with special tool **00 9 140** .

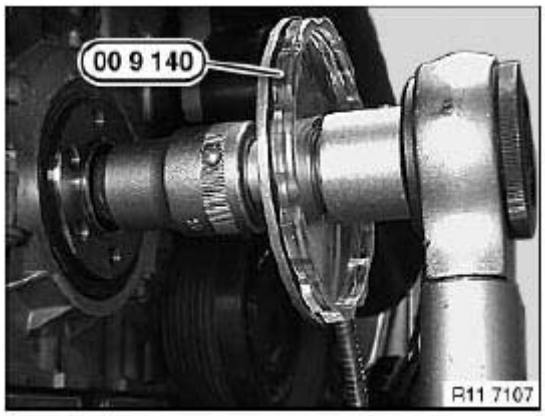


Fig. 305: Securing Central Bolt Using Special Tool 00 9 140
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **CRANKSHAFT SEAL** at front

Install **INTAKE AND EXHAUST ADJUSTERS** .

Install **CHAIN TENSIONER** .

Crank engine twice.

Check **TIMING** .

Assemble engine.

1133 ROCKER ARM WITH BEARING MOUNT

11 33 050 REMOVING AND INSTALLING OR REPLACING ALL ROCKER ARMS (N54, N54T)

IMPORTANT: Rocker arms (1) are divided into bearing categories.

The tolerance classes are identified in numbers from 1 to 6.

Already used rocker arms (1) may only be reused in the same position.

Classification is not required on the N54 engine. All numbers from 1 to 6 can be optionally installed as a replacement.

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **INTAKE CAMSHAFT**
- Remove **EXHAUST CAMSHAFT** .

Detach roller cam followers (1) from hydraulic valve clearance compensating element and remove.

Set down roller cam followers in tidy and orderly fashion; if necessary, set down in special tool **11 4 480** .

Installation note:

Before installing exhaust and inlet camshafts, make sure roller cam followers are correctly seated.

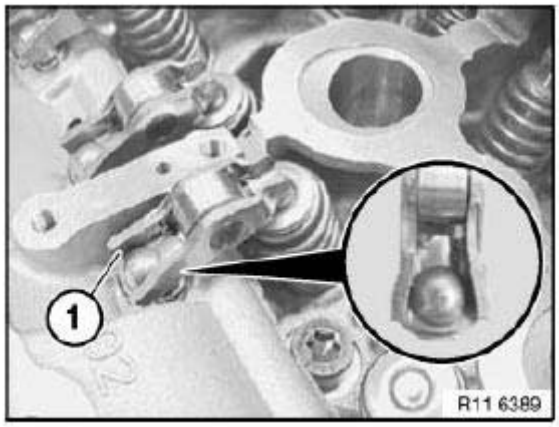


Fig. 306: Identifying Cam Follower Seat
Courtesy of BMW OF NORTH AMERICA, INC.

Remove hydraulic valve clearance compensating element in direction of arrow.

Installation note:

If the hydraulic valve clearance compensating elements are reused, they must be placed together with the roller cam followers in neat order if necessary in special tool **11 4 480** .

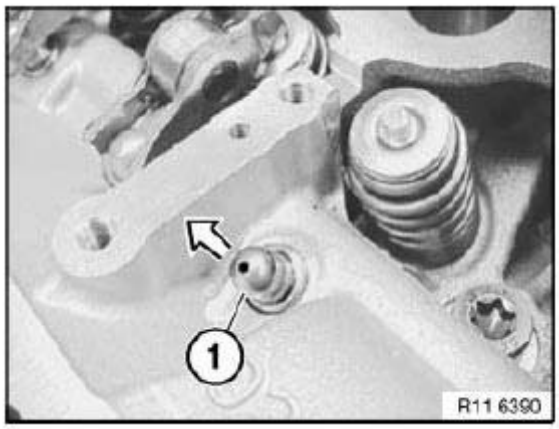


Fig. 307: Removing HVCA Element
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1134 VALVES WITH SPRINGS

11 34 552 REMOVING AND INSTALLING OR REPLACING ALL VALVES (N54, N54T)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .

- Remove **INTAKE CAMSHAFT** .
- Remove **EXHAUST CAMSHAFT** .
- Remove **ROLLER CAM FOLLOWER** .
- Remove **VALVE SPRINGS** .
- Remove **VALVE STEM SEALS** .

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve keys

If the valves are to be reused, set them down in special tool **11 4 480** in a tidy and orderly fashion.

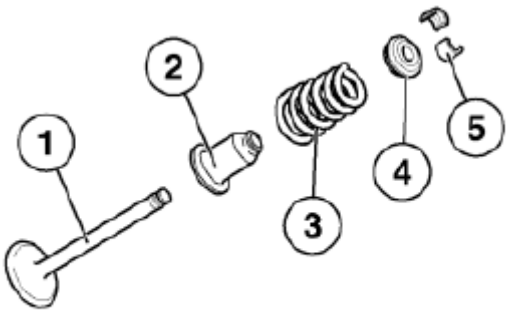


Fig. 308: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME.

11 34 715 REPLACING ALL VALVE SPRINGS (N54, N54T)

IMPORTANT: Different valve stem diameters.

Mixing up the valve springs will result in damage to the engine.

Necessary preliminary tasks:

- Remove cylinder head cover
- Remove **CYLINDER HEAD** .

- Remove **EXHAUST CAMSHAFT** .
- Remove **INTAKE CAMSHAFT**
- Remove **ROLLER CAM FOLLOWERS**

Intake valves

Fit cylinder head on special tool **11 9 000** .

Press valve spring down on spring cup with special tools 11 0 009 and 11 9 017.

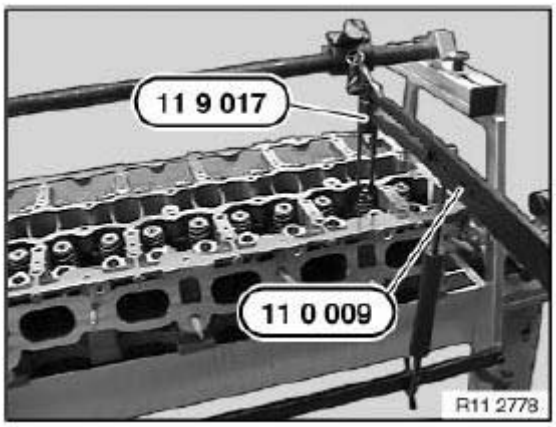


Fig. 309: Pressing Valve Spring Down On Spring Retainer Using Special Tools 11 0 009 And 11 9 017
Courtesy of BMW OF NORTH AMERICA, INC.

Exhaust valves

Fit cylinder head on special tool **11 9 000** .

Press valve spring down on spring cup with special tools 11 0 009 and 11 0 346.

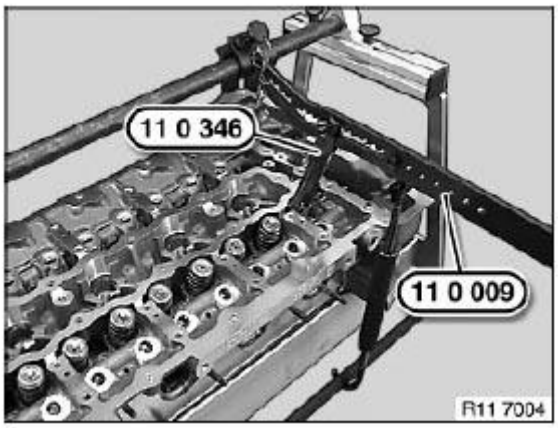


Fig. 310: Pressing Valve Spring Down On Spring Retainer Using Special Tools 11 0 009 And 11 0 346
Courtesy of BMW OF NORTH AMERICA, INC.

Remove valve tapers with a magnet.

Remove valve spring and spring retainer.

Set down on special tool **11 4 480** in a tidy and orderly fashion.

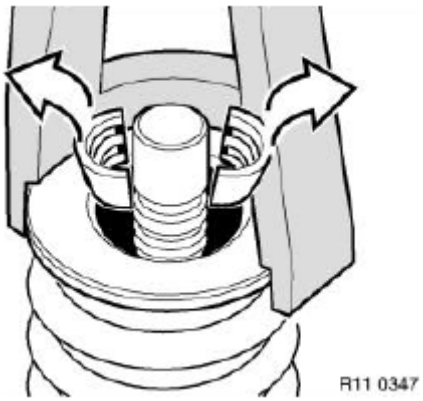


Fig. 311: Removing Valve Spring And Spring Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Incorrect installation will result in valve spring breakage!

Color marking (1) is normally on lower end of valve spring.

Installation note:

Einlassventil: Violet/green or violet/yellow

Auslassventil: White/green or white/yellow

If the colors on the valve springs can no longer be identified, these must be replaced for safety reasons.

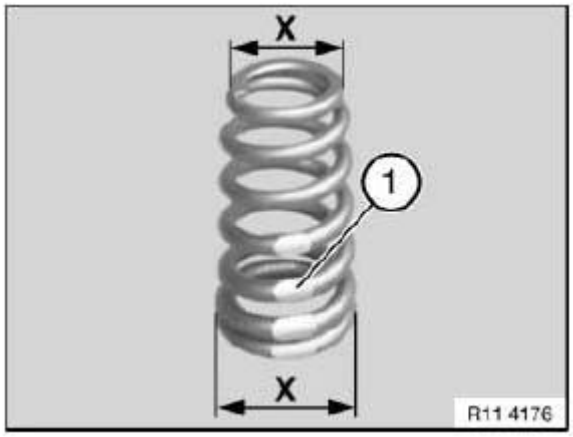


Fig. 312: Dimensions Of Valve Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Arrangement:

1. Valve
2. Valve stem seal with spring plate, bottom
3. Valve spring
4. Top plate spring
5. Valve keys

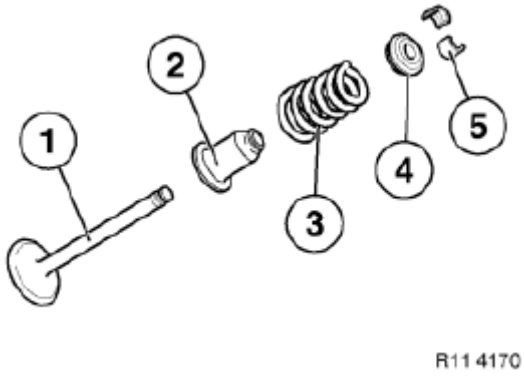


Fig. 313: Exploded View Of Valve Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME control unit.

11 34 560 REPLACING ALL VALVE STEM SEALS (N54, N54T)

Necessary preliminary tasks:

- Remove **CYLINDER HEAD** .
- Remove **INTAKE CAMSHAFT** .
- Remove **EXHAUST CAMSHAFT** .
- Remove **ROLLER CAM FOLLOWER** .
- Remove all **VALVE SPRINGS** .

Firmly press special tool **11 1 480** onto old valve stem seals.

Detach valve stem seal from valve stem by turning and simultaneously pulling special tool **11 1 480** .

Installation note:

Insert all **VALVES** .

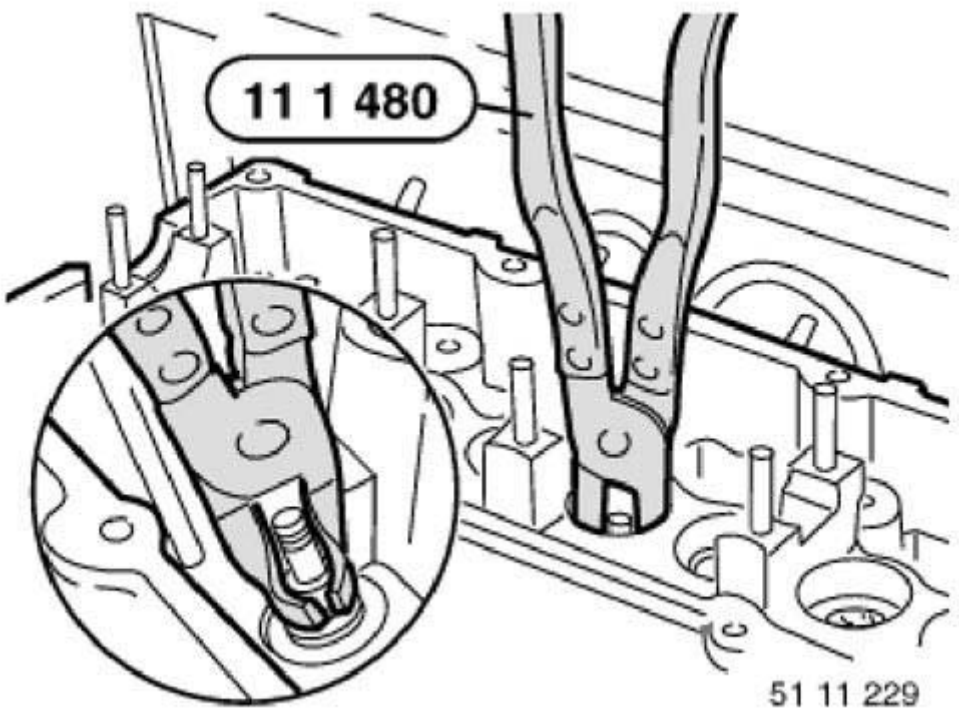


Fig. 314: Identifying Special Tool (11 1 480)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For use on the N54 engine, special tool 11 6 380 must be remachined according to the sketch with a 10 mm drill bit dia. to a depth of B = approx. 23 mm.

This modification has already been taken into account for reordering.

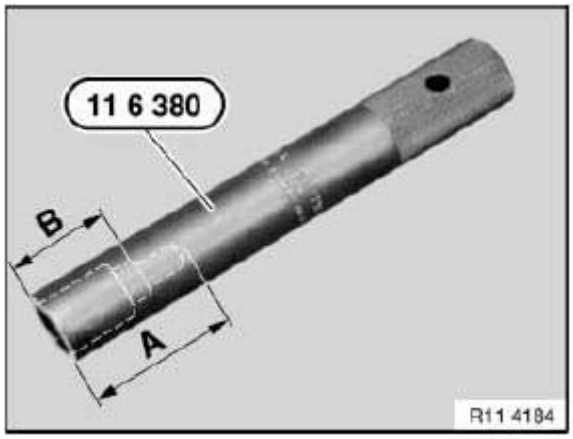


Fig. 315: Identifying Special Tool (11 6 380)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Different diameters at valve stem.

All valve stem seals are colour-coded.

Valve dia. 5 mm: valve stem seal is red or brown.

Valve dia. 6 mm: valve stem seal is green or light green.

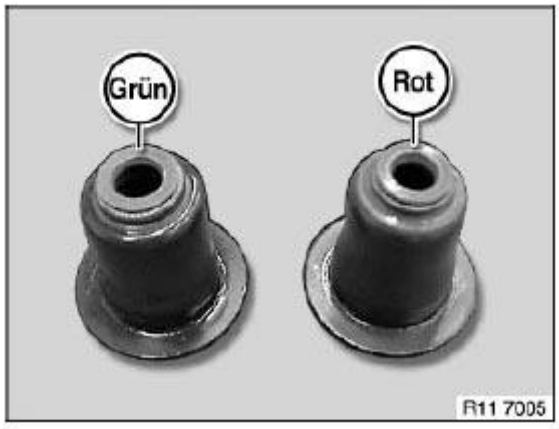


Fig. 316: Identifying Valve Stem Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Fit the mounting sleeves (plastic sleeves) supplied in the spare part on the valve stem end

Lubricate mounting sleeve.

Press on valve stem seal with special tool **11 6 380** by hand up to stop.

NOTE: Graphic shows N46.

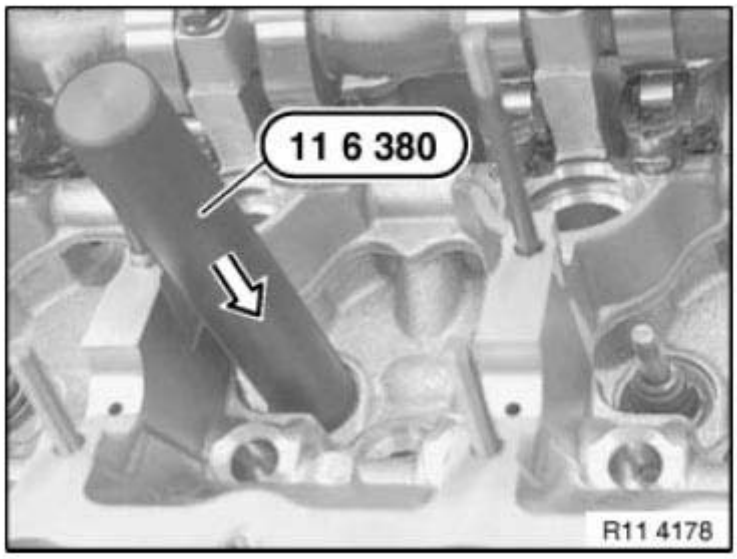


Fig. 317: Pressing Valve Stem Seal Using Special Tool 11 6 380
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1136 VARIABLE CAMSHAFT TIMING

11 36 655 REMOVING AND INSTALLING/REPLACING BOTH SOLENOID VALVES (N54, N54T)

IMPORTANT: Always check that the solenoid valves are clean during removal and installation.

Possible malfunctions if valves are contaminated:

- Rough running
- OBD incorrect entry
- Poor exhaust gas values
- Low engine power

IMPORTANT: Risk of damage!

Do not clean solenoid valves with compressed air.

Necessary preliminary tasks

- Read out fault memory in DME control unit
- Switch off ignition

- Remove **FAN COWL**

NOTE: Carefully press coolant hose and pressure line (not shown) to one side.

NOTE: Solenoid valve (2) controls the intake adjuster.

Solenoid valve (3) controls the exhaust adjuster.

Disconnect plug connections (1 and 4).

Installation note:

Do not mix up plug connections (1 and 4) of solenoid valves.

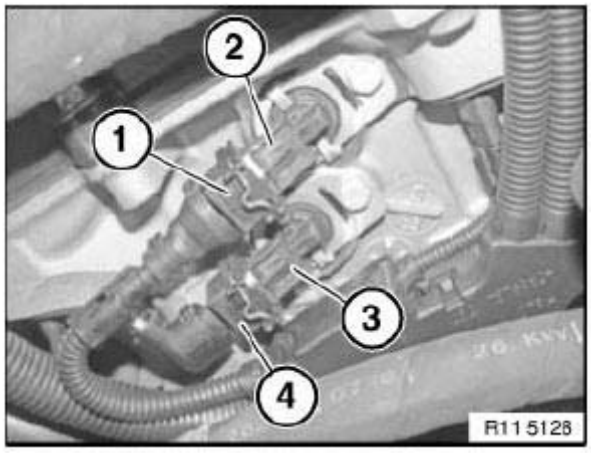


Fig. 318: Identifying Solenoid Valve Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Plug connections (1 and 4) must snap audibly into place!

Unfasten screws (3 and 4).

Tightening torque **11 36 3AZ** .

Carefully pull out solenoid valves (1 and 2).

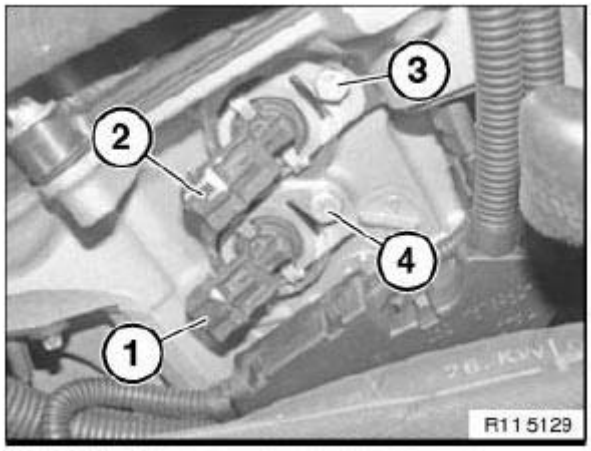


Fig. 319: Identifying Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace sealing ring (1) on solenoid valve (2).

NOTE: Moisten sealing ring (1) with engine oil.

Avoid damaging, e.g. notches or scratches, the solenoid valve (2).

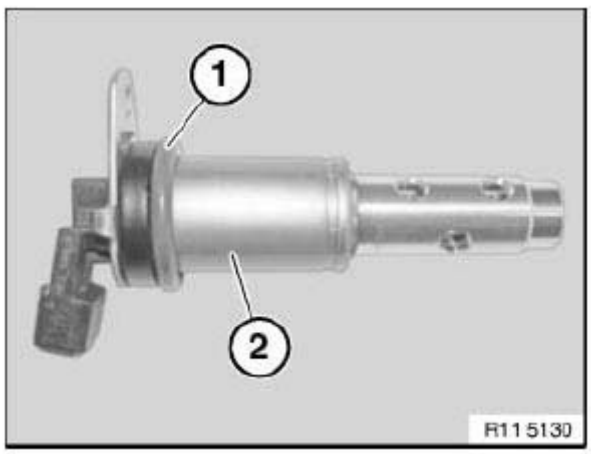


Fig. 320: Identifying Sealing Ring On Solenoid Valve
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Do not tilt solenoid valves (1 and 2) when inserting into cylinder head.

Carefully insert solenoid valves (1 and 2) up to stop.

Ensure correct installation position.

Insert screws (3 and 4) and tighten down.

Tightening torque **11 36 3AZ** .

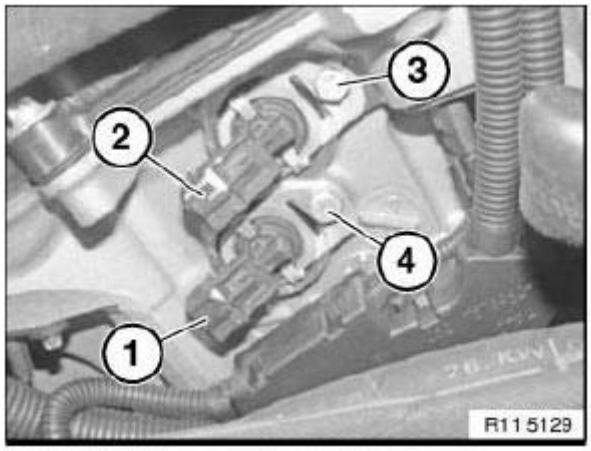


Fig. 321: Identifying Solenoid Valves
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Delete fault memory.

Check function of DME control unit.

11 36 046 REMOVING AND INSTALLING/REPLACING INTAKE AND EXHAUST CAMSHAFT ADJUSTERS (N54, N54T)

IMPORTANT: To open central bolts, release at intake and exhaust adjusters with special tool 11 4 280 only.

Necessary preliminary tasks:

- Remove cylinder head cover

Remove fastener (1) in direction of arrow.

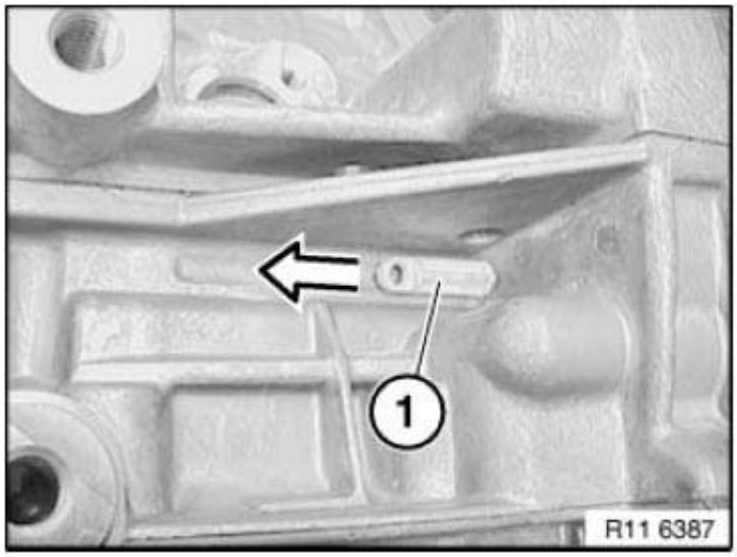


Fig. 322: Identifying Camshafts
Courtesy of BMW OF NORTH AMERICA, INC.

Slide in special tool **11 0 300** in direction of arrow.

Rotate flywheel (1) at central bolt until firing TDC position at cylinder no. 1 is reached.

IMPORTANT: The TDC bore can be mixed up in automatic transmissions.

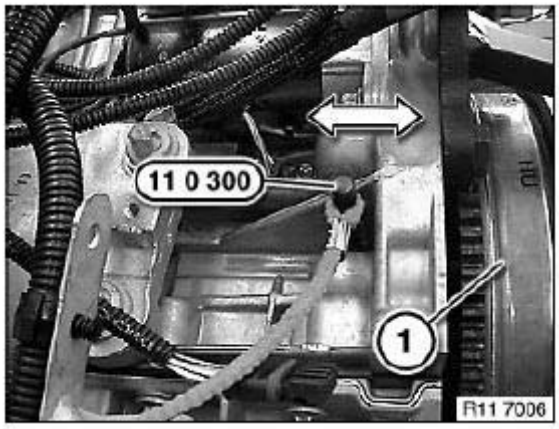


Fig. 323: Sliding Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

With cylinder No. 1 in ignition TDC position, intake camshaft (1) at 6th cylinder points downwards at an angle to the left.

With cylinder No. 1 in ignition TDC position, exhaust camshaft (2) at 6th cylinder points downwards at an angle to the right.

Installation note:

If the timing is checked while the engine is installed, this is only possible with a mirror.

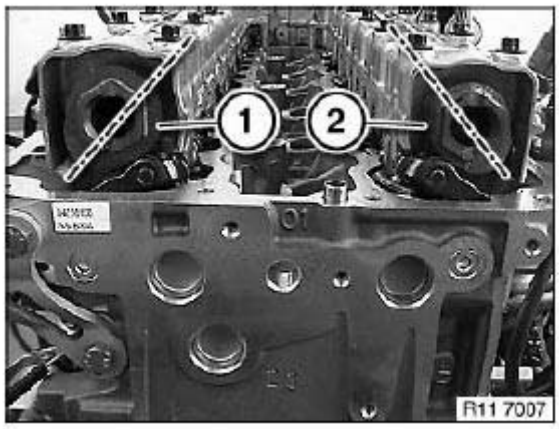


Fig. 324: Identifying Inlet And Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 11 4 283 with screws (1).

Fit special tool 11 4 281 on special tool 11 4 283.

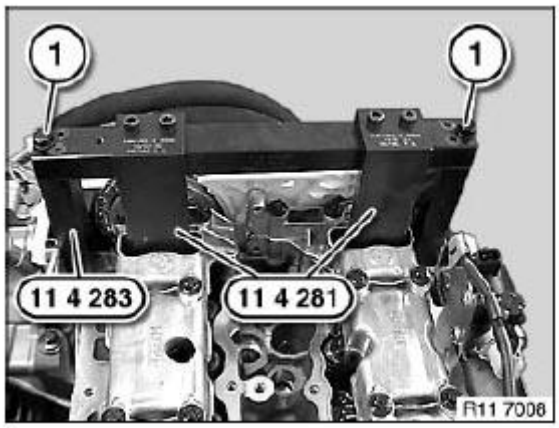


Fig. 325: Identifying Special Tool 11 4 280
Courtesy of BMW OF NORTH AMERICA, INC.

Release central bolt of exhaust camshaft adjuster (1).

Release central bolt of intake camshaft adjuster (2).

Tightening torque **11 36 1AZ** .

Release **CHAIN TENSIONER** .

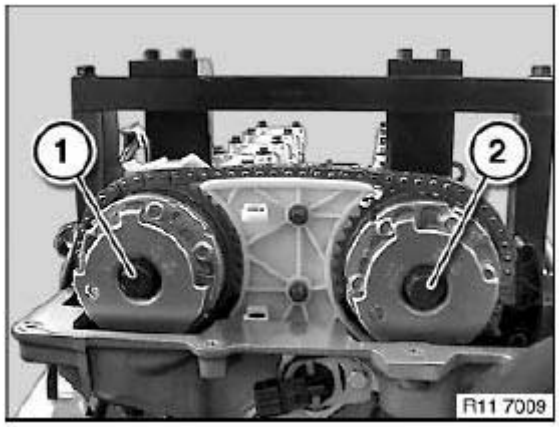


Fig. 326: Identifying Inlet And Exhaust Camshaft Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Detach exhaust camshaft adjuster (1) from exhaust camshaft.

Detach intake camshaft adjuster (2) from intake camshaft.

Installation note:

To facilitate removal and installation of the intake and exhaust adjusters, turn the increment wheels at the aperture downwards.

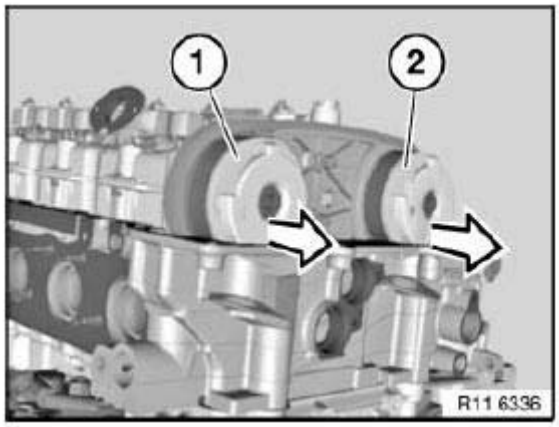


Fig. 327: Identifying Inlet/Exhaust Adjustment Unit
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Risk of mixing up the intake and exhaust adjusters.**
- **Mixing up the intake and exhaust adjusters will cause damage to the engine.**

The intake and exhaust camshaft adjusters are different.

The variable camshaft timing control is marked with AUS and EX for the exhaust camshaft.

The variable camshaft timing control is marked with EIN and IN for the intake camshaft.

The increment wheels can be fitted alternatively.

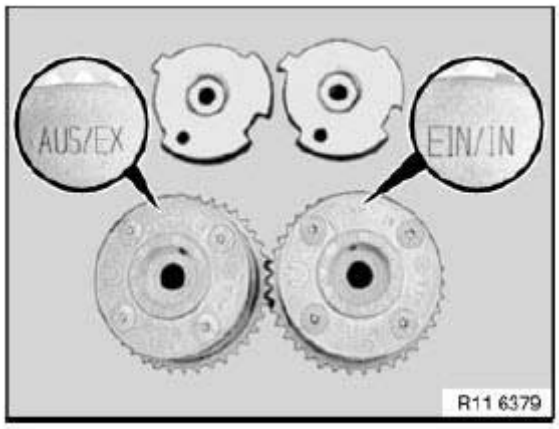


Fig. 328: Identifying AUS And EX Marks For Exhaust Camshaft
Courtesy of BMW OF NORTH AMERICA, INC.

Position intake and exhaust adjusters on camshafts.

Installation position of intake and exhaust adjusters can be freely selected.

Installation note:

Replace screws (1 and 2).

Insert screws (1 and 2).

Adjust **VALVE TIMING** .

Fit **CHAIN TENSIONER** .

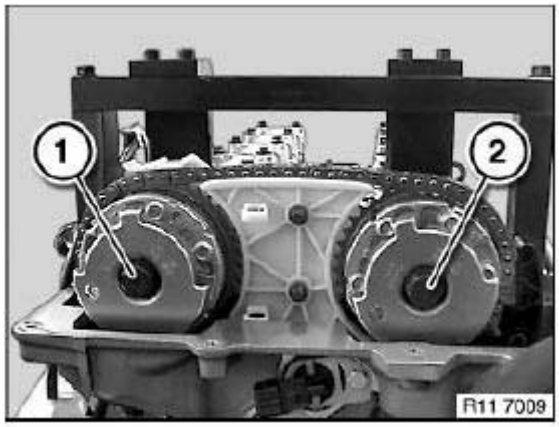


Fig. 329: Identifying Inlet And Exhaust Camshaft Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Incorrect installation possible.

Make sure that timing chain is guided in tensioning rail (1).

NOTE: Schematic representation on removed chain drive.

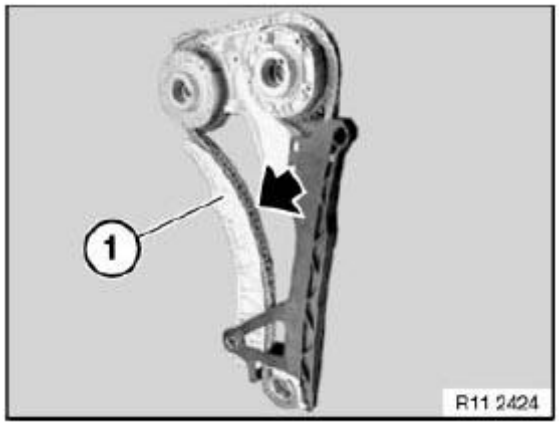


Fig. 330: Locating Tensioning Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Remove all special tools.

Assemble engine.

1140 OIL SUPPLY

11 40 000 CHECKING ENGINE OIL PRESSURE (N54, N54T)

Necessary preliminary tasks:

- Remove front **IGNITION COIL COVER**

Disconnect plug connection (1) on oil pressure switch.

Installation note:

Plug connection (1) must snap audibly into place!

Remove oil pressure switch (2).

Tightening torque **12 61 1AZ** .

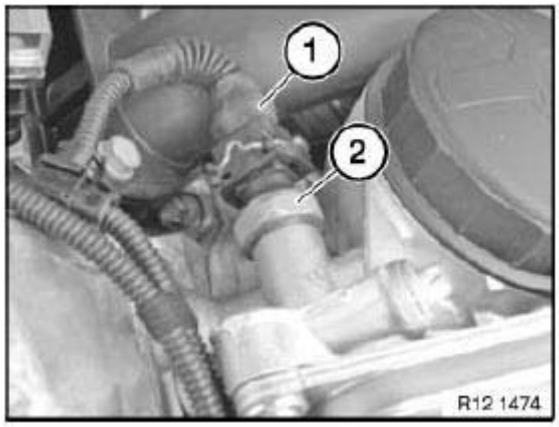


Fig. 331: Identifying Oil Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **11 4 050** with sealing ring (1).

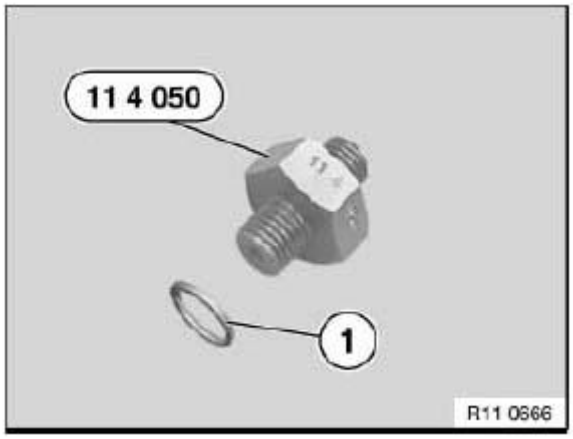


Fig. 332: Identifying Special Tool (11 4 050) And Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Checking engine oil pressure with BMW diagnosis system

Connect special tools 13 6 054 and 13 6 051.

Checking engine oil pressure with pressure gauge

Connect special tools 13 3 063 and 13 3 061.

Start engine and check engine oil pressure.

Compare actual values with prescribed **SETPOINT VALUES** .

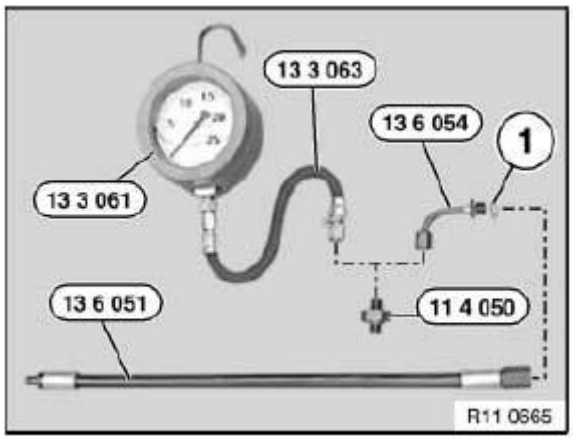


Fig. 333: Checking Engine Oil Pressure Using BMW Diagnosis System
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1141 OIL PUMP WITH FILTER AND DRIVE

11 41 000 REMOVING AND INSTALLING OIL PUMP (N54, N54T)

Necessary preliminary tasks:

- Remove **OIL SUMP**

Release screws (1).

Tightening torque **11 41 1AZ** .

Installation note:

Replace aluminum screws

Remove intake pipe (2) in direction of arrow.

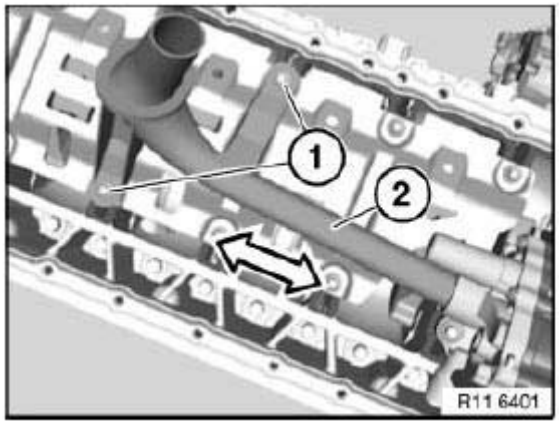


Fig. 334: Removing Intake Pipe
Courtesy of BMW OF NORTH AMERICA, INC.

Secure oil pump drive gear with special tool **11 0 300** to oil pump.

IMPORTANT: Release central bolt (2) only with special tool 11 0 300 .

Tightening torque **11 41 4AZ** .

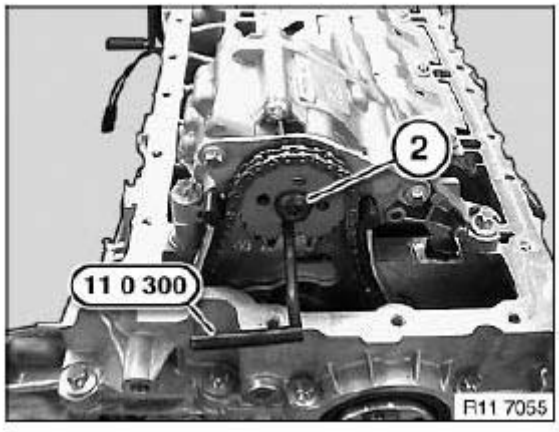


Fig. 335: Securing Oil Pump Drive Gear Using Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque **11 41 3AZ** .

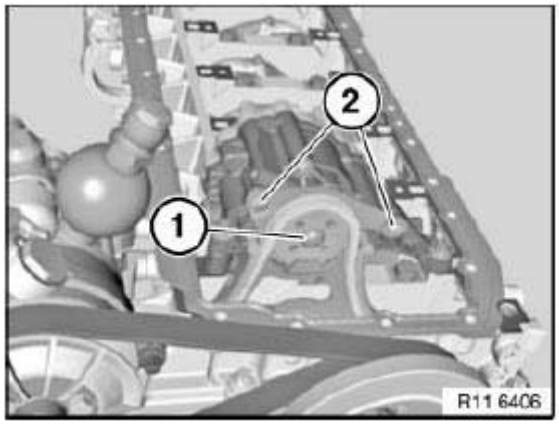


Fig. 336: Identifying Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 41 2AZ** .

Installation note:

Replace aluminum screws

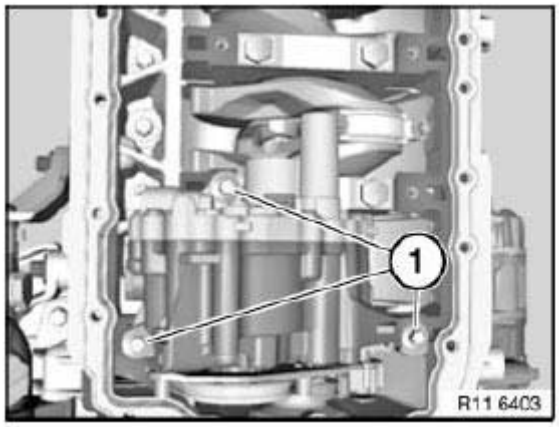


Fig. 337: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull of drive gear (1) in direction of arrow.

NOTE: The chain tensioner pushes the timing chain (3) of the triangular drive upward.

Do not remove drive gear.

Remove oil pump (2) in direction of arrow.

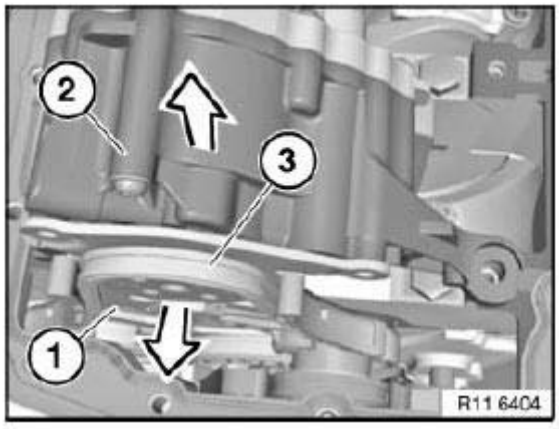


Fig. 338: Pulling Drive Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check spacer bushes (1) for damage and firm seating.

Replace spacer bushes (1) if necessary

Align mounting flats (3) on oil pump (2) to drive gear.

Install oil pump (2).

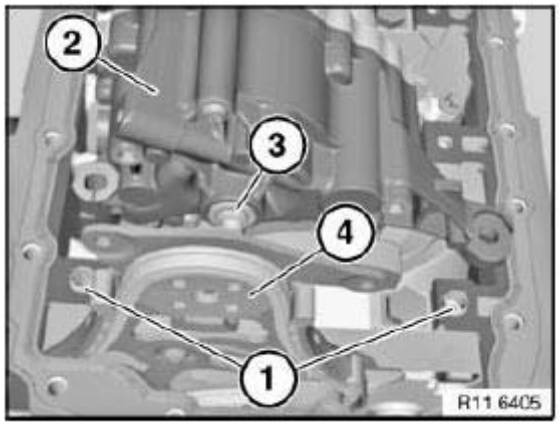


Fig. 339: Identifying Spacer Bushings And Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM/OIL PUMP (N47 D20 O1)

IMPORTANT: It is possible to remove and install the vacuum oil pump without removing the transmission.

Necessary preliminary work:

- Removing oil sump.

Release screws (1).

Remove intake snorkel in direction of arrow.

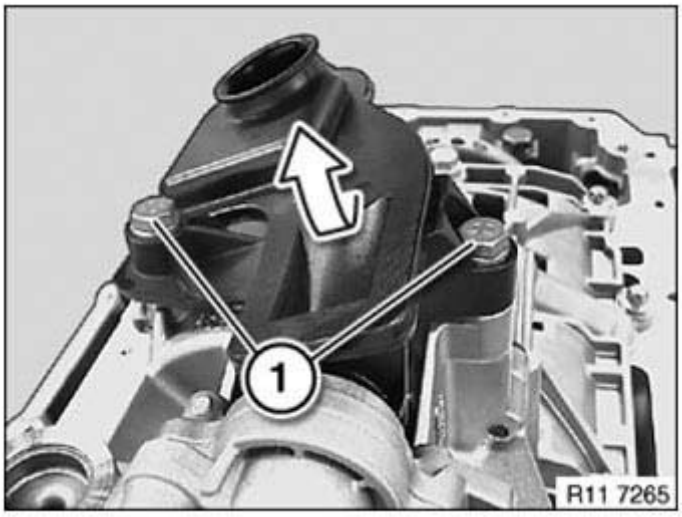


Fig. 340: Removing Intake Snorkel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

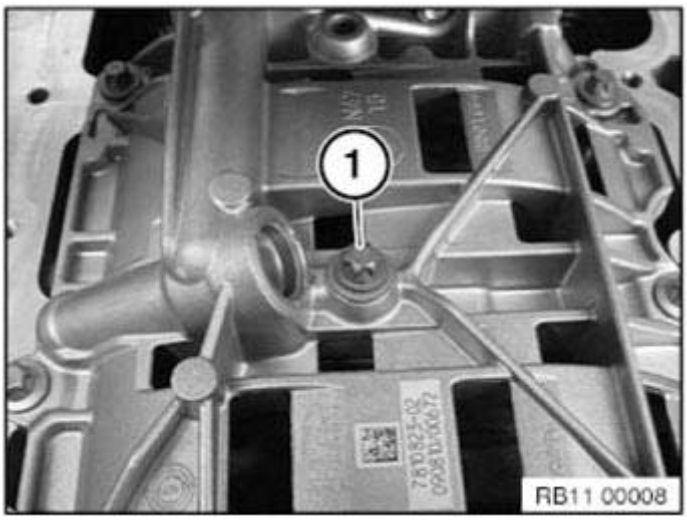


Fig. 341: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Clean and blow out thread

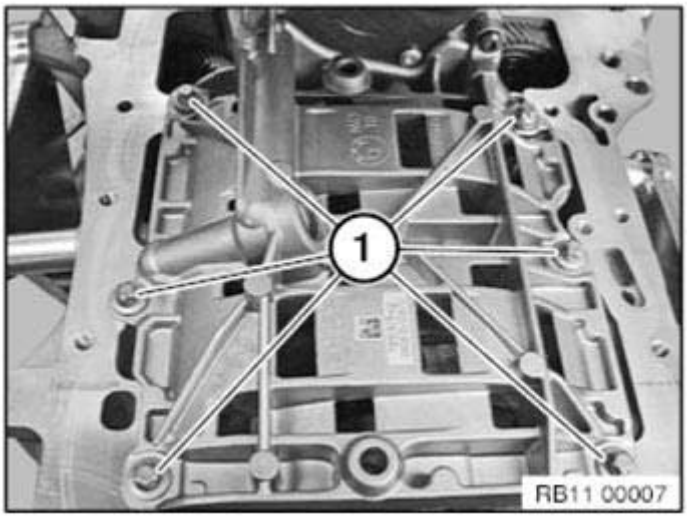


Fig. 342: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

When installed, the oil pump chain must be fed out from the sprocket wheel of the oil pump drive gear; the sprocket wheel cannot be removed.

NOTE: Illustration shows gear case cover removed.

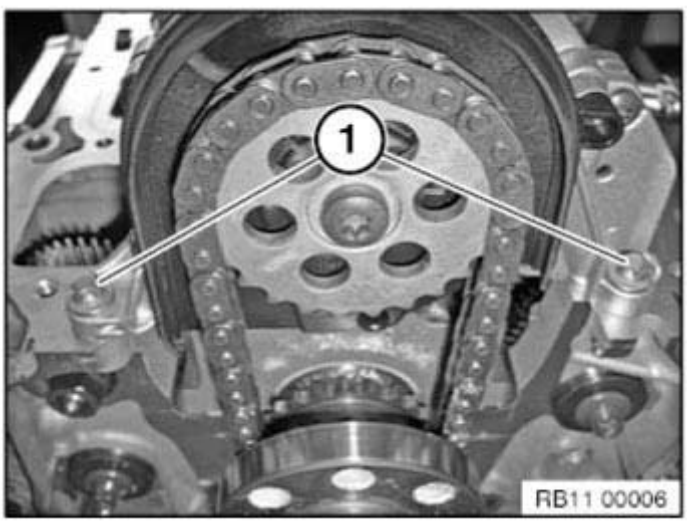


Fig. 343: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Oil vacuum pump must be fed out at chain drive (1).

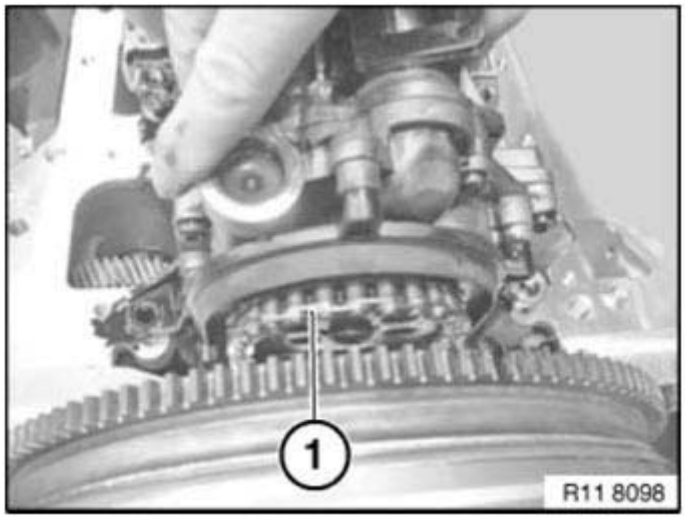


Fig. 344: Identifying Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out oil vacuum pump (1) in direction of arrow and remove.

Installation in reverse sequence.

Installation note:

Clean all sealing surfaces.

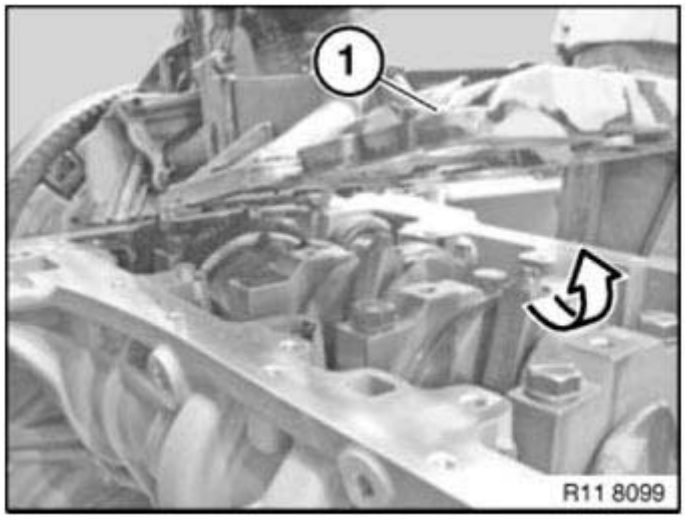


Fig. 345: Identifying Oil Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Install all screws (1) and tighten down.

Tightening torque: **11 41 1AZ** .

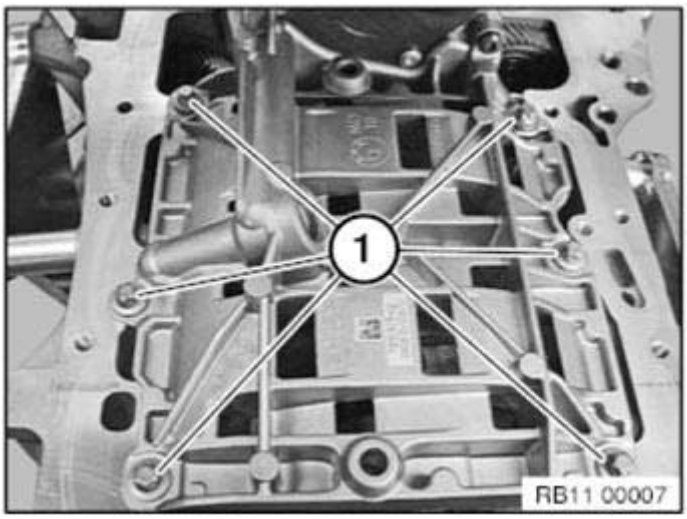


Fig. 346: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down screws (1).

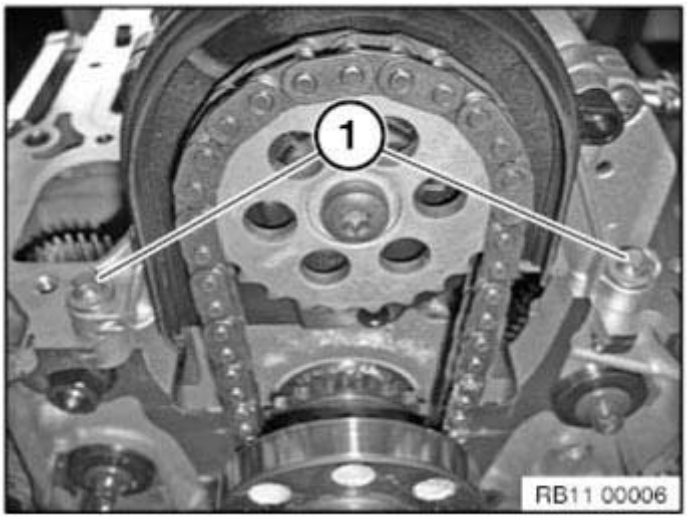


Fig. 347: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean and blow out thread

Insert and secure screw (1).

Secure screw (1) with special tool **00 9 120** .

Tightening torque: **11 41 2AZ** .

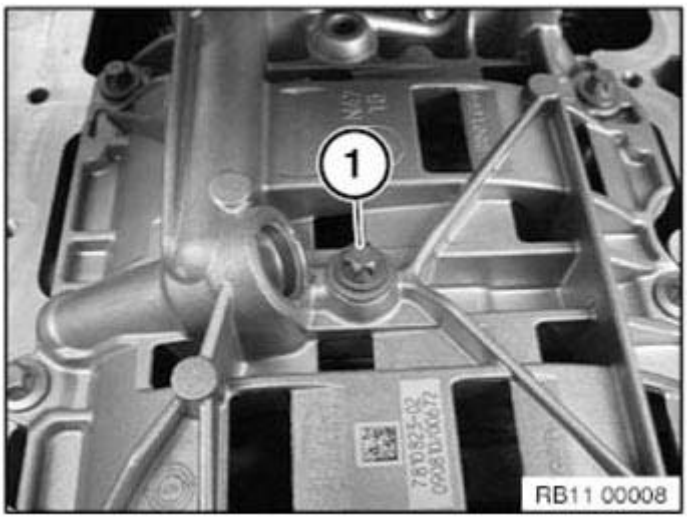


Fig. 348: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 41 010 REMOVING AND INSTALLING/REPLACING CHAIN MODULE FOR OIL PUMP/VACUUM PUMP (N54, N54T)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **CYLINDER HEAD COVER**
- Remove **OIL SUMP**
- Remove **DRIVE BELT**
- Remove drive belt **TENSIONER**
- Remove **VIBRATION DAMPER**
- Remove vacuum pump **SEALING CAP**
- Remove **CHAIN TENSIONER** .

Turn sprocket (3) at central bolt (crankshaft) into position.

Screw special tool **11 8 650** into crankcase.

Position special tool **11 0 290** on sprocket

and on special tool **11 8 650** .

Release screw (1).

Tightening torque **11 66 2AZ** .

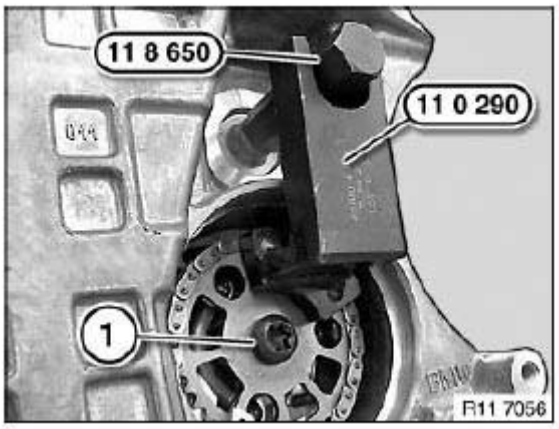


Fig. 349: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650
Courtesy of BMW OF NORTH AMERICA, INC.

Press timing chain with chain tensioner (1) in direction of arrow.

Secure chain module with special tool **11 4 120** in hole (2).

Feed out sprocket (3) at hexagon head (4) of vacuum pump.

Installation note:

A lock pin is pre-installed if the triangular drive is replaced.

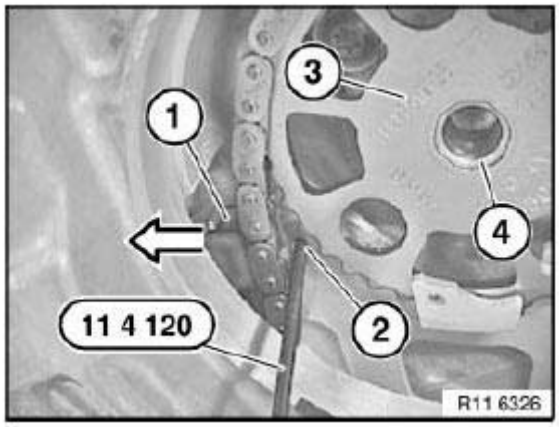


Fig. 350: Pressing Timing Chain Using Chain Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque **11 41 3AZ** .

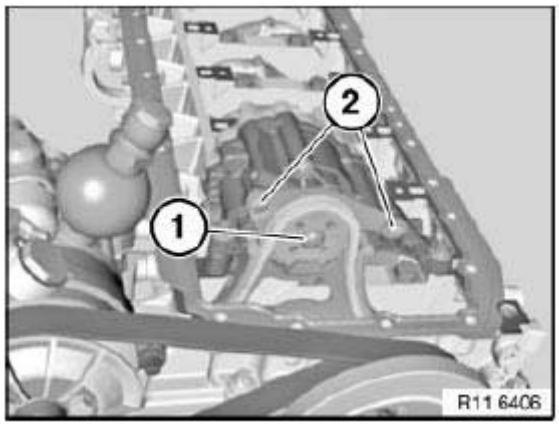


Fig. 351: Identifying Bolt And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Sprocket must be blocked in order to release central bolt (2).

Insert pin (1) with 6 mm dia. between sprocket and housing of oil pump.

Release oil pump central bolt (2).

Tightening torque **11 41 5AZ** .

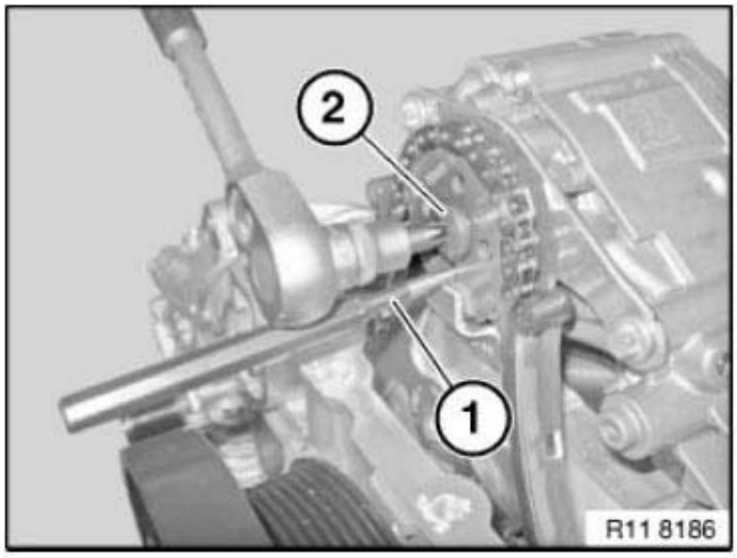


Fig. 352: Identifying Central Bolt And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Secure **CRANKSHAFT AND CAMSHAFT** .

Do **not** remove special tools **11 0 300** and **11 4 280** .

Fit special tool 11 9 280.

Release central screw (1).

NOTE: A 3/4 inch tool is needed to release the central bolt.

A second person is required.

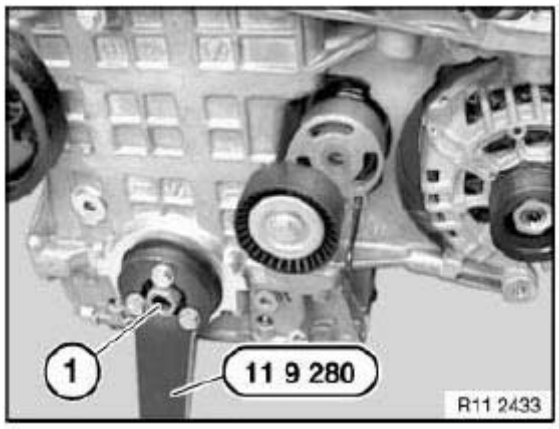


Fig. 353: Identifying Central Bolt With Special Tool (11 9 280)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove hub (2) towards front.

Installation note:

Replace front **CRANKSHAFT SEAL** .

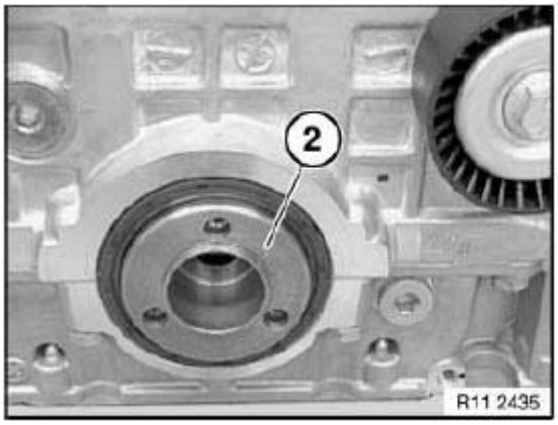


Fig. 354: Identifying Front Hub
Courtesy of BMW OF NORTH AMERICA, INC.

Open screw plug on bedplate.

Installation note:

Replace seal.

Release screw (1) with special tool **11 8 640** on triangular drive.

Tightening torque **11 41 3AZ** .

Installation note:

Replace aluminum screws.

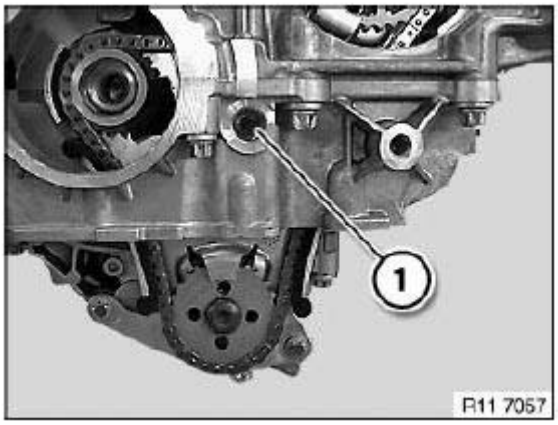


Fig. 355: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove triangular drive (1) in direction of arrow.

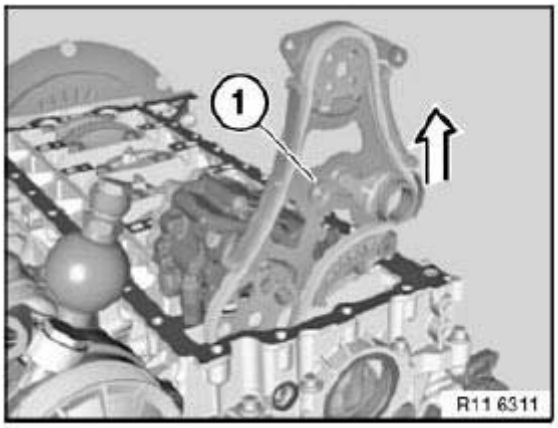


Fig. 356: Removing Chain Module
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Note installation direction of sprocket (2).

Collar on sprocket (2) points to **timing chain drive.**

Incorrect assembly will result in **engine damage.**

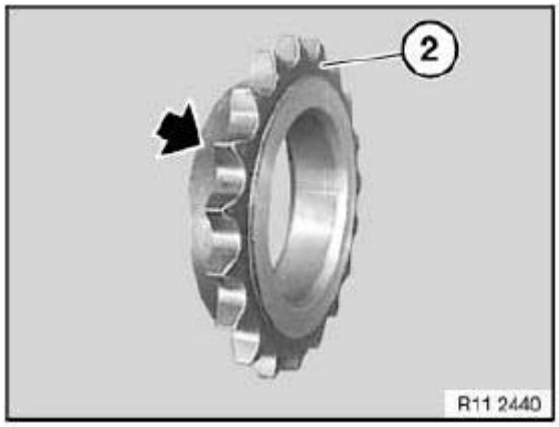


Fig. 357: Identifying Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The N54 engine requires special friction plates between the friction surfaces.

The engine will incur damage if the friction plates are damaged or are not fitted.

Friction plates (1 and 2) must be clipped into place on the oil pump module sprocket.

The third friction plate is attached to the crankshaft hub.

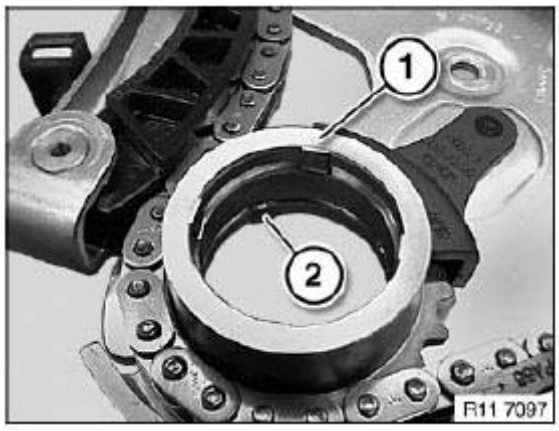


Fig. 358: Identifying Friction Plates
Courtesy of BMW OF NORTH AMERICA, INC.

Feed in oil pump chain module.

Secure oil pump chain module with screws (2).

Tightening torque **11 41 3AZ** .

Secure screw (1) with special tool **11 8 640** .

Tightening torque **11 41 3AZ** .

Installation note:

Check both friction plates (3) with retainers for correct installation position.

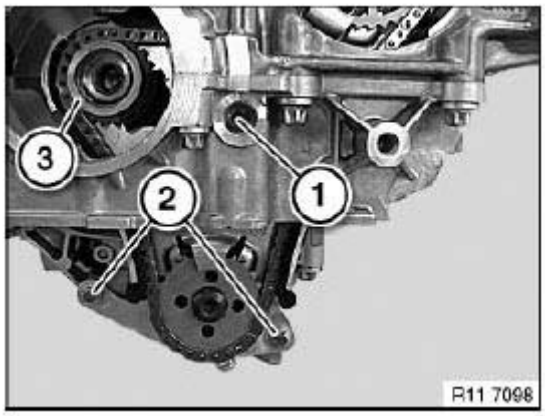


Fig. 359: Identifying Friction Plate Installation Position
Courtesy of BMW OF NORTH AMERICA, INC.

Push on friction plate (1) without retainers.

IMPORTANT: The N54 engine requires special friction plates between the friction surfaces.

The engine will incur damage if the friction plates are damaged or are not fitted.

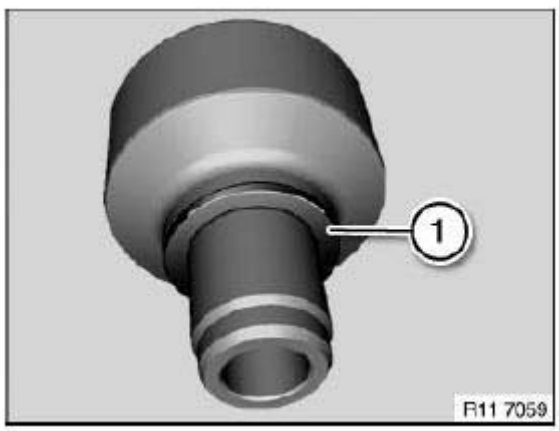


Fig. 360: Identifying Friction Plate Without Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

Fit central bolt (1).

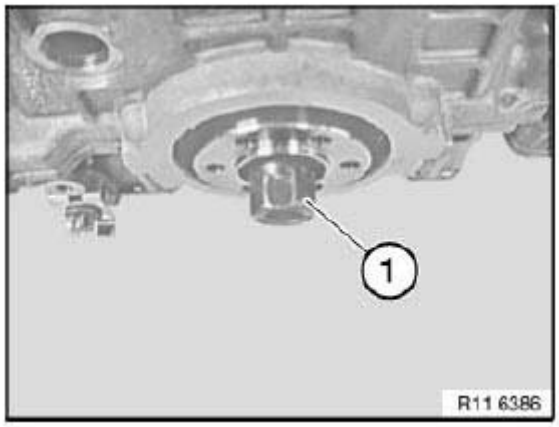


Fig. 361: Identifying Central Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tools **11 8 650** and **11 0 290** .

Tighten bolt (1).

Tightening torque **11 66 2AZ** .

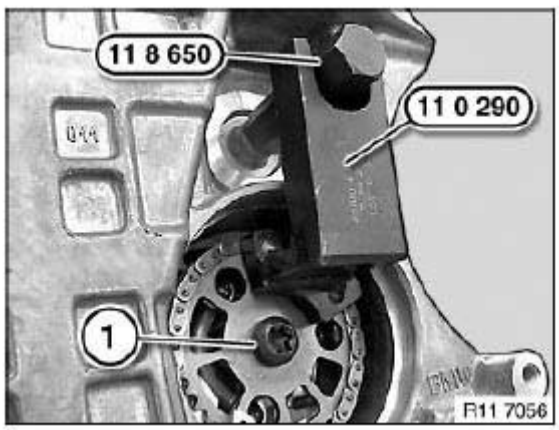


Fig. 362: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool **11 0 300** .

Tighten bolt (2).

Tightening torque **11 41 4AZ** .

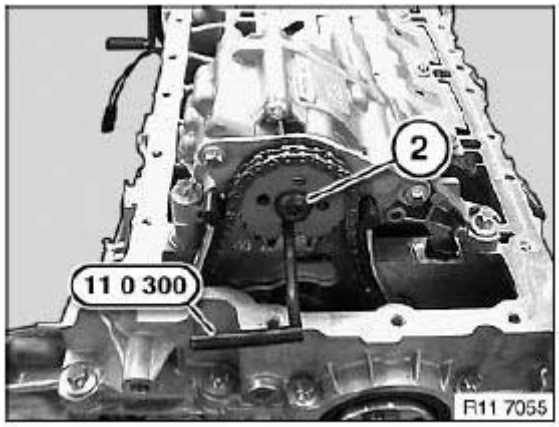


Fig. 363: Securing Oil Pump Drive Gear Using Special Tool 11 0 300
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down special tool **11 5 200** with screws (1) to hub.

Do **not** remove special tools **11 0 300** and **11 4 280** .

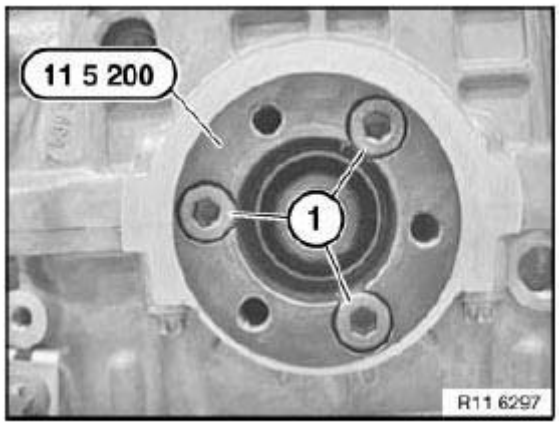


Fig. 364: Identifying Screws With Special Tool (11 5 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten central bolt to jointing torque.

Tightening torque **11 21 1AZ** .

Mark torsion angle tightening on tool with stroke of paint (1).

See graphic.

IMPORTANT: Do not remove tool from central bolt during torsion angle tightening. Risk of damage!

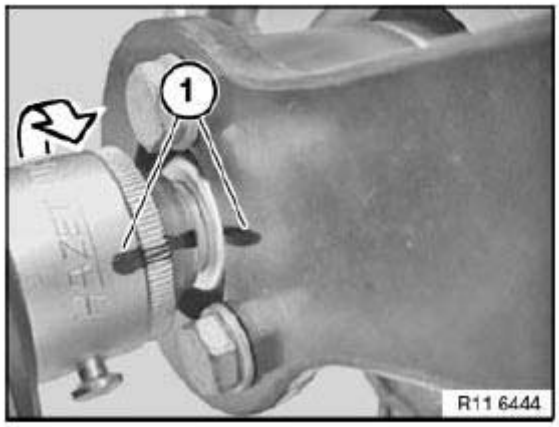


Fig. 365: Identifying Colored Line
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace front **CRANKSHAFT SEAL** .

Assemble engine.

1142 OIL FILTER AND LINES

11 42 020 REMOVING AND INSTALLING/REPLACING FULL-FLOW OIL FILTER (N54, N54T)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

IMPORTANT: Risk of damage!

When working on the engine oil, coolant or fuel circuit, it is essential always to protect the alternator and belt drive against contamination.

Cover alternator with suitable materials.

Necessary preliminary tasks:

- Remove **INTAKE PLENUM**
- Drain **COOLANT**
- Unlock coolant hose and detach
- Remove **OIL-TO-WATER HEAT EXCHANGER**

Release oil filter cover with special tool **11 9 240** . Tightening torque **11 42 1AZ** .

NOTE: Engine oil flows out of the oil filter housing and back into the oil sump.

Installation note:

Replace sealing rings on oil filter cover.

Moisten sealing rings with engine oil.

Fig. 366: Releasing Oil Filter Cap Using Special Tool 11 9 240
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Release screw (2).

NOTE: Have cleaning cloth ready to catch residual oil.

Tightening torque: **11 42 2AZ.**

Installation note:

Replace all seals.

If necessary, replace filter element.

Modify oil pressure switch when replacing.

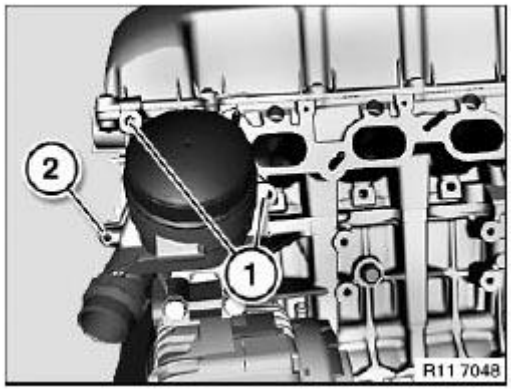


Fig. 367: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1144 OIL COOLER

11 44 000 REMOVING AND INSTALLING/REPLACING OIL-TO-WATER HEAT EXCHANGER (N54, N54T)

WARNING: Risk of scalding!

Only perform these tasks on an engine that has cooled down.

IMPORTANT: You must protect the alternator against contamination before carrying out any work on the oil or cooling circuit.

A residual amount of coolant emerges when the hoses are detached. A residual amount of oil emerges when the oil-coolant heat exchanger is released. Have a cleaning cloth ready.

Cover alternator with suitable apparatus.

Necessary preliminary tasks:

- Drain **COOLANT**
- Remove **FAN COWL**

Release screw (1).

Tightening torque **11 42 3AZ** .

Do not detach engine oil pipe from oil-to-water heat exchanger in downward direction.

Installation note:

Replace O-rings.

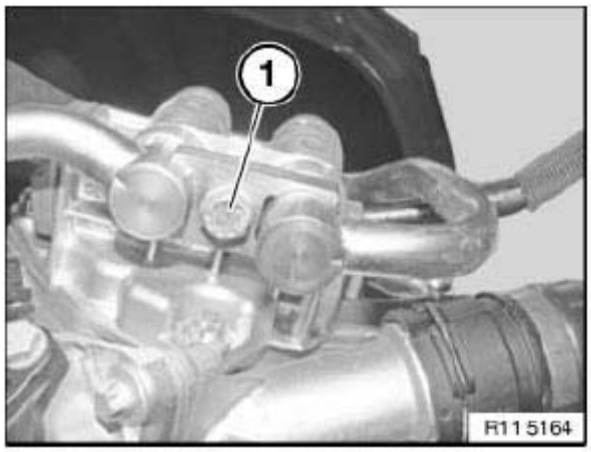


Fig. 368: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) on oil-coolant heat exchanger.

Remove oil-coolant heat exchanger towards front.

Picture shows E9x

Installation note:

Replace seal.

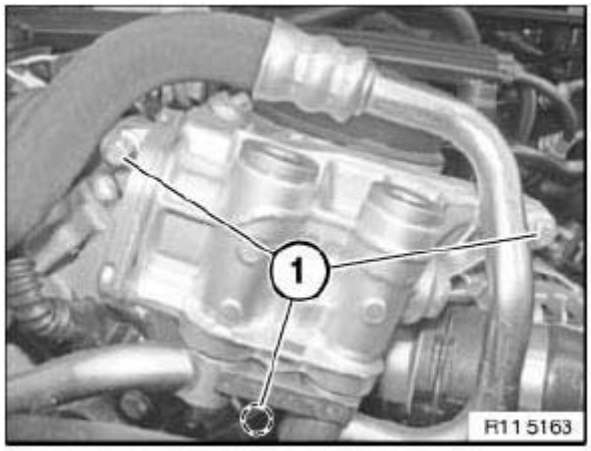


Fig. 369: Identifying Oil-Coolant Heat Exchanger Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Reassemble car and set in horizontal position.

Vent **COOLING SYSTEM** and check for water leaks.

Start engine and run at idle until oil pressure warning lamp goes out.

Turn off engine.

Wait approx. 5 minutes and check oil level.

Top up engine oil if necessary.

1151 WATER PUMP WITH DRIVE

11 51 000 REMOVING AND INSTALLING/RENEWING COOLANT PUMP (N54, N54T)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without

color coding (blue).

For reliable identification:

Aluminum screws/bolts are not magnetic.

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks:

- Remove **COOLANT THERMOSTAT**
- Remove **RIGHT DIAGONAL STRUT**

Release coolant hose (1).

Release coolant hose (3).

Disconnect plug connection (2).

Release screws (5).

Installation note:

Replace aluminum screws.

Tightening torque **11 51 1AZ** .

Installation note:

If a coolant pump is reused, it must be mechanically rotated once (breakaway torque at pump gears).

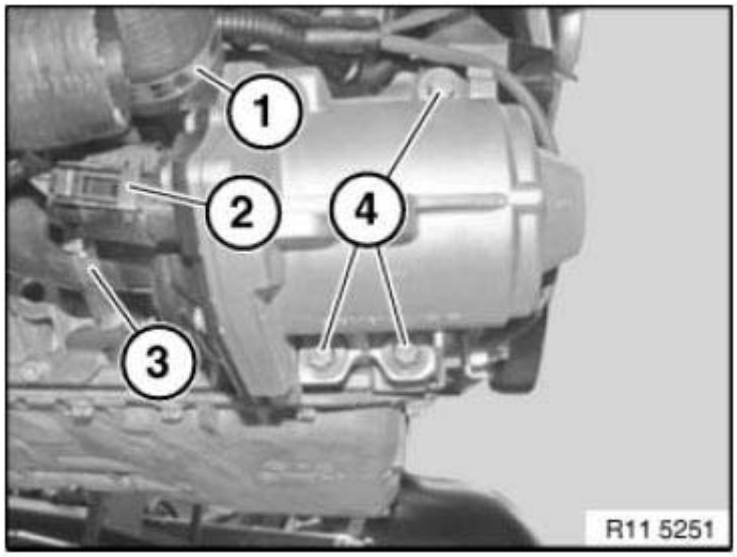


Fig. 370: Identifying Coolant Hose With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

One coolant pump rotation will be sufficient.

Assemble engine.

VENTING INSTRUCTIONS must be observed without fail.

1153 THERMOSTAT AND CONNECTIONS

11 53 000 REMOVING AND INSTALLING/REPLACING COOLANT THERMOSTAT (N54, N54T)

WARNING: Risk of scalding!

Only perform these tasks on an engine that has cooled down.

Danger of injury!

Risk of skidding due to coolant on the floor.

Recycling

Catch and dispose of drained coolant in a suitable collecting vessel.

Observe country-specific waste disposal regulations.

IMPORTANT: Read and comply with GENERAL NOTES .

Protect plug connections against coolant and dirt contamination.

Cover plug connections with suitable materials.

Necessary preliminary work:

- Remove front **UNDERBODY PROTECTION**
- Release **FRONT STABILIZER** on front axle

Release screws (1) (only on front axle support)

Tightening torque **17 10 5AZ** .

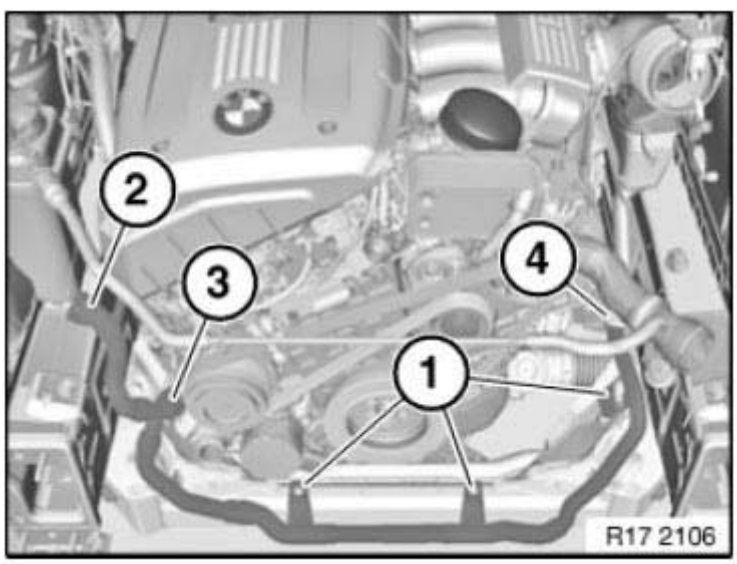


Fig. 371: Identifying Screws On Front Axle Support
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Illustration shows coolant thermostat removed.

Disconnect coolant hoses (arrows) on the thermostat (1) with clamping tongs.

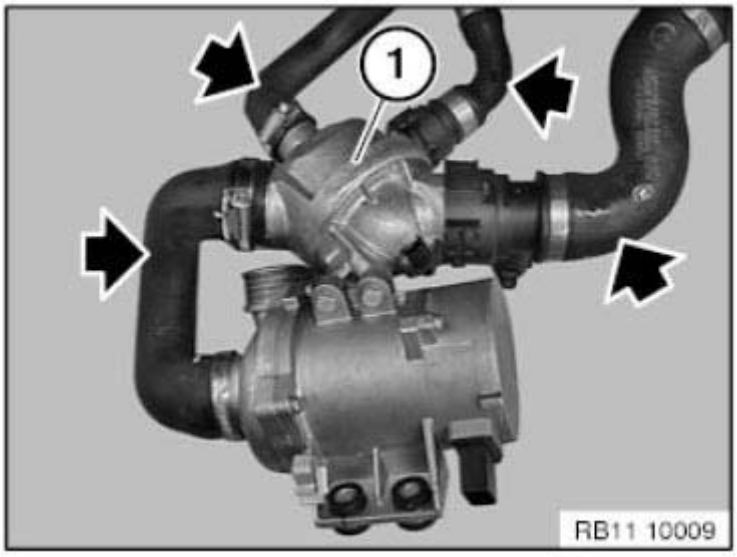


Fig. 372: Locating Coolant Hoses On Thermostat
Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamp (1) and detach coolant hose.

Release hose clamp (2) and detach coolant hose.

Unlock and detach coolant hose (3).

Unlock and detach coolant hose (4).

Disconnect plug connection (5).

Release screws (6).

Tightening torque **11 53 1AZ** .

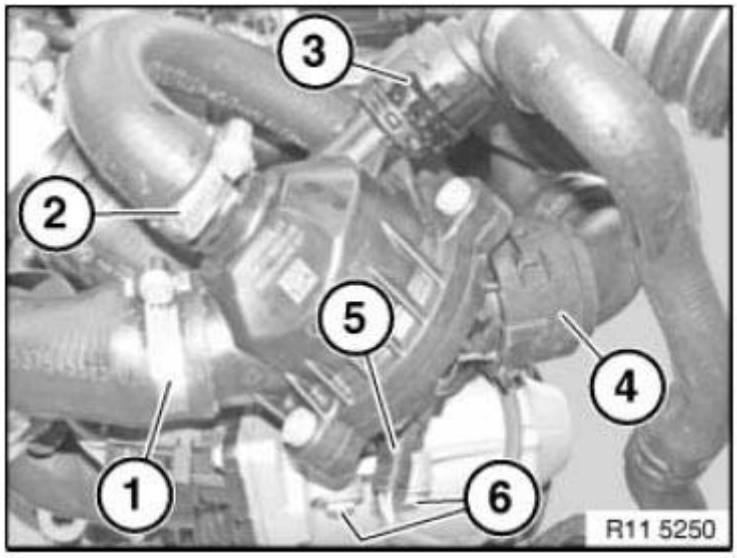


Fig. 373: Identifying Hose, Hose Clamp And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Fill the **COOLING SYSTEM** .

Check function of cooling system.

11 53 740 REMOVING AND INSTALLING/REPLACING FEED LINE (N54, N54T)

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

Recycling

Catch and dispose of drained coolant in a suitable container.

Observe country-specific waste disposal regulations.

Necessary preliminary tasks:

- Drain **COOLANT**
- Remove both See **1832050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **1832060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)** .

Unfasten hose clip (1).

Tightening torque **11 51 4AZ** .

Detach coolant hose of feed line in direction of arrow from coolant pump (2).

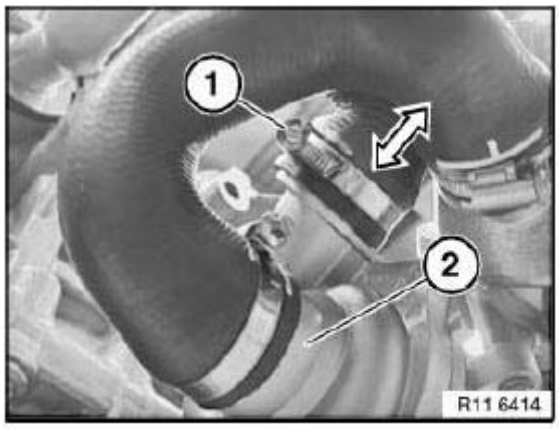


Fig. 374: Disconnecting Coolant Hose From Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!

Where necessary, to release the coolant feed lines (3 and 4), do not place pliers on the pipes.

Release screws (1 and 2).

Tightening torque **11 53 10AZ** .

If necessary, release coolant feed lines (3 and 4) with suitable pliers at connection.

Installation note:

Replace O-rings.

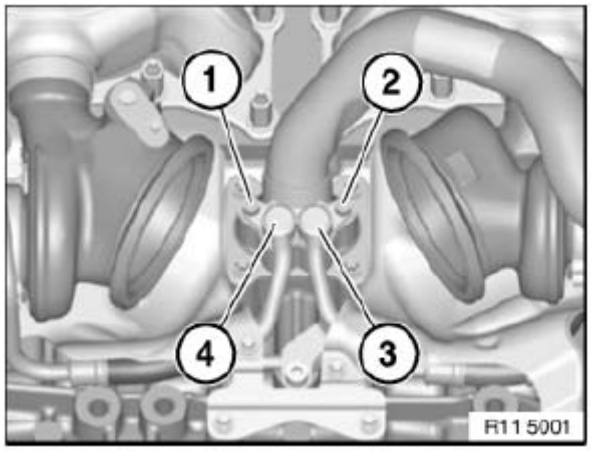


Fig. 375: Identifying Coolant Feed Lines And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purposes of clarity, the graphic shows the released coolant feed lines removed.

Release screws (1).

Tightening torque **11 53 3AZ** .

Remove feed line (2).

Installation note:

Replace seal.

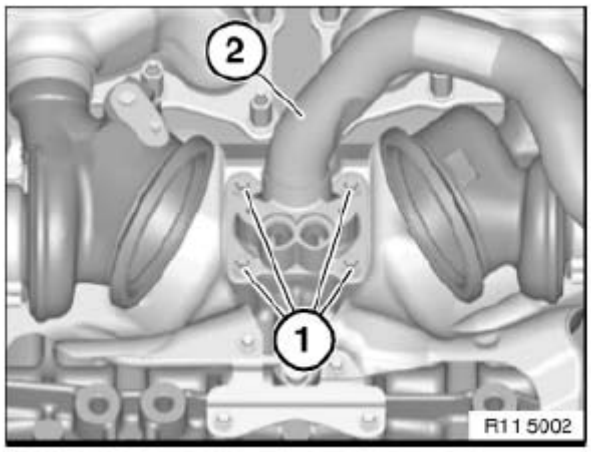


Fig. 376: Identifying Feed Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Top up **COOLANT** .

BLEEDING INSTRUCTIONS must be observed without fail.

1161 INTAKE MANIFOLD

11 61 365 REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR DUCT (N54, N54T)

Necessary preliminary tasks

- Remove **FAN COWL**
- Remove front **UNDERBODY PROTECTION**
- Remove **INTAKE SILENCER HOUSING**

IMPORTANT: Coat sealing rings of snap fasteners with lubricant.

Pressure pipes with quick-connect couplings cannot be fitted without antiseize agent.

Unlock quick-connect coupling.

Detach charge air duct (1) from charge air cooler (2).

Installation note:

- Coat sealing rings of snap fasteners with lubricant.
- Pressure pipes must audibly snap into place.

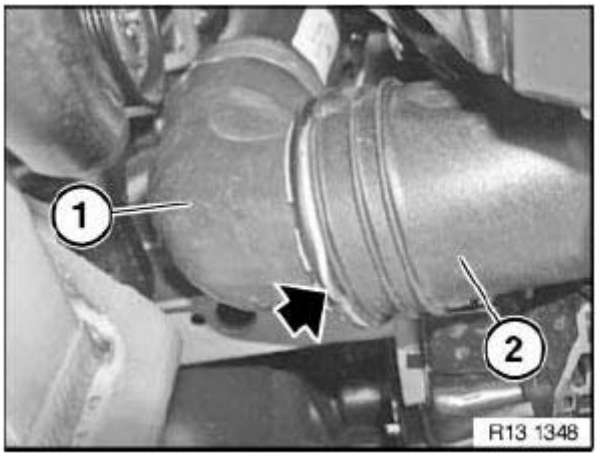


Fig. 377: Identifying Charge-Air Duct And Aircooler
Courtesy of BMW OF NORTH AMERICA, INC.

Release quick-connect couplings (1) by turning lock through 90°.

Detach recirculated-air hoses (2) and lay to one side.

Disconnect plug connection (3).

Unlock quick-connect coupling (5) and detach charge air duct (6) from throttle valve actuator.

Pull charge air duct (6) out of rubber grommet (4) and remove towards top.

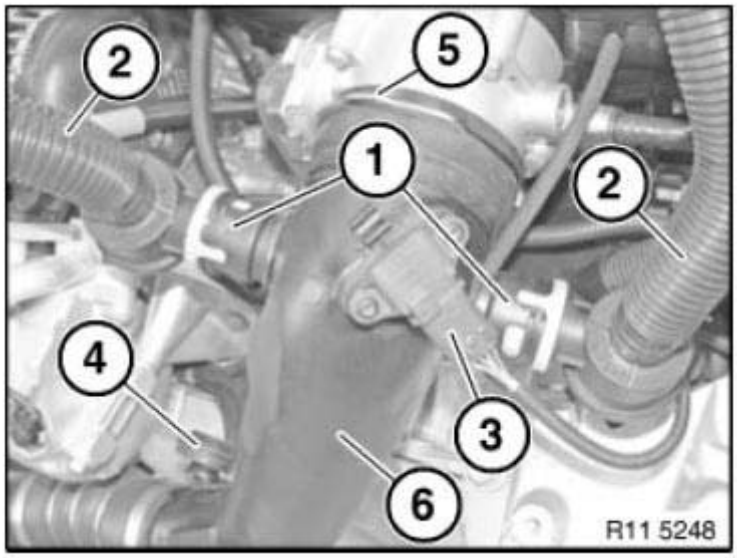


Fig. 378: Identifying Charge Air Duct, Air Hoses, Plug Connection And Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Bring lock (1) back 90° into installation position.

Pay attention to markings.

Recirculated-air hoses must snap audibly into place.

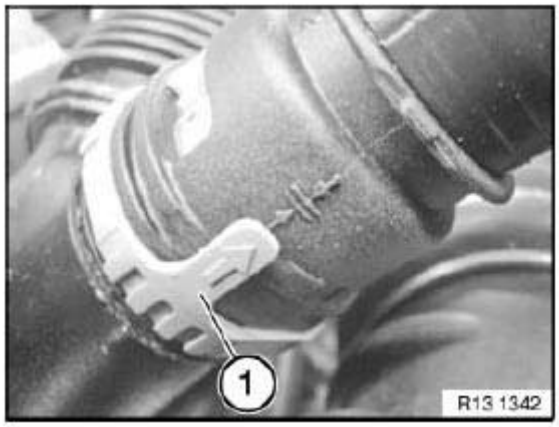


Fig. 379: Identifying Lock
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to sealing rings.

Special tool 11 8 670 is mandatory.

Attach charge air duct (1) with special tool **11 8 670** to charge air cooler (2).

Installation note:

Texts refer to and illustrations show the right side.

The procedure is identical for the left side.

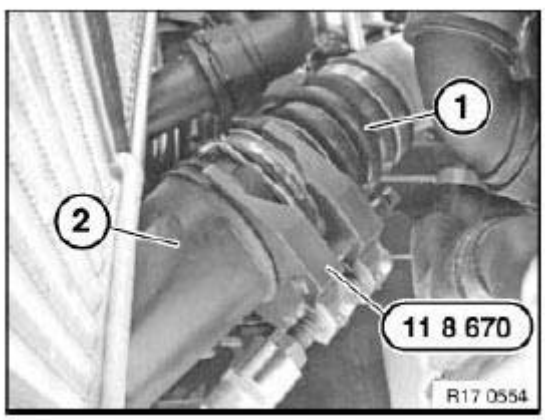


Fig. 380: Identifying Charge-Air Duct With Special Tool 11 8 670 To Intercooler
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Charge air hoses with clamp fastenings must be installed dry and free from grease!

If charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in turbocharger failure!

11 61 362 REMOVING AND INSTALLING/REPLACING RIGHT CHARGE AIR DUCT (N54, N54T)

Necessary preliminary tasks

- Remove **COOLANT EXPANSION TANK**
- Remove **UNDERBODY PROTECTION**
- Remove right **TENSION STRUT**

IMPORTANT: Coat sealing rings of snap fasteners with lubricant.

Pressure pipes cannot be fitted without lubricant.

Mark vacuum hoses (1) and detach.

Mark vacuum hose (2) and detach.

Unscrew nuts (3).

Release screw (4).

Tightening torque, screw **11 65 6AZ** .

Raise bracket slightly.

Mark vacuum hose (5) on underside of pressure accumulator.

Remove vacuum accumulator with bracket.

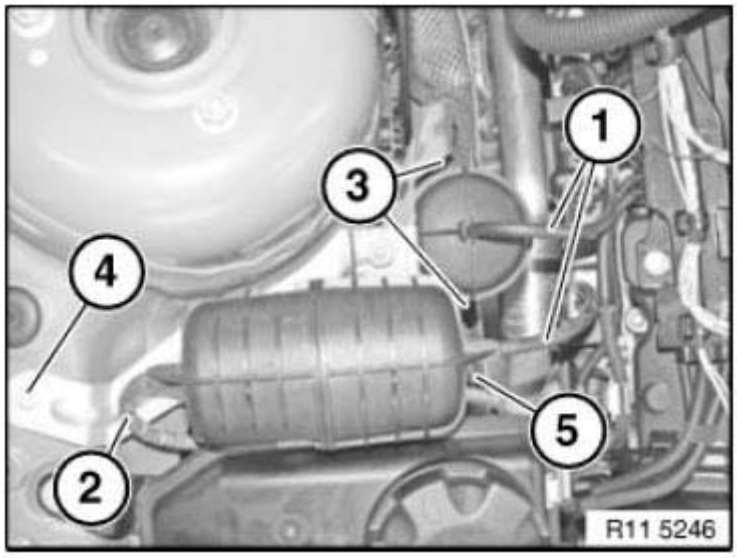


Fig. 381: Identifying Vacuum Hoses And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and screws (2), remove heat shield (3).

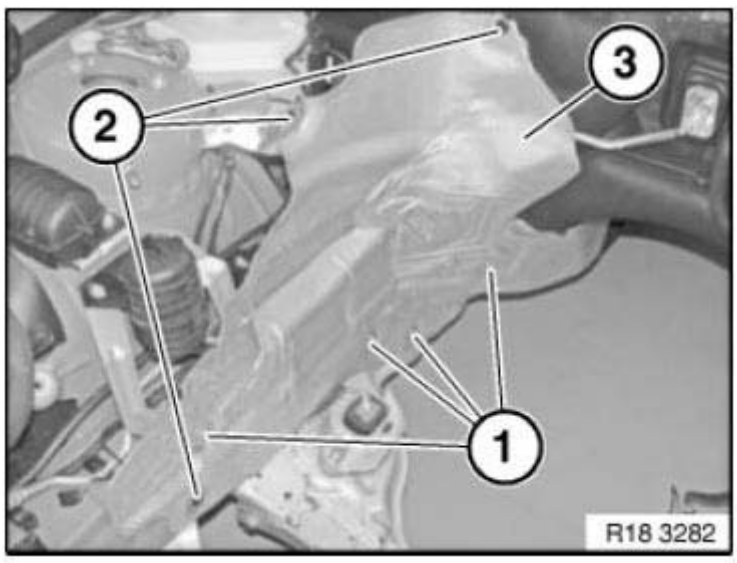


Fig. 382: Identifying Heat Shield With Mounting Nuts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamps (1, 2), detach charge air duct (3).

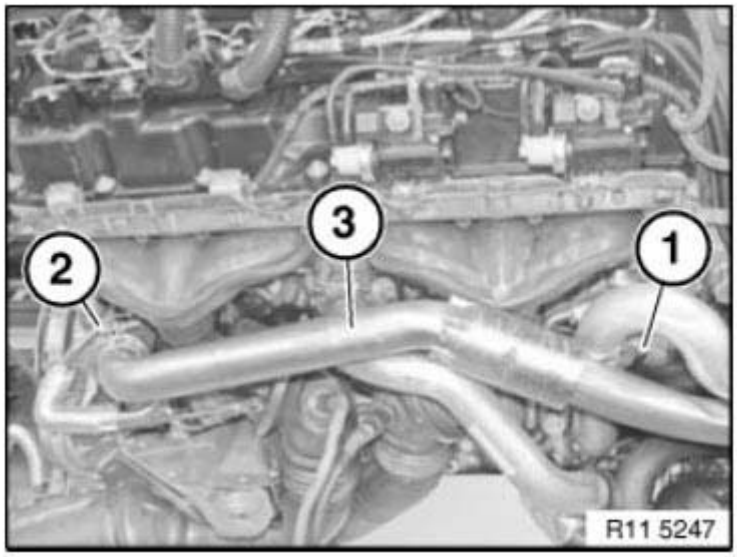


Fig. 383: Identifying Charge Air Duct With Clamps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Faulty O-rings must be replaced.

Prior to fitting, coat O-ring with suitable antiseize agent.

Fig. 384: Locating O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach coolant hose (1).

Unlock quick-connect coupling.

Detach charge air duct (2) from charge air cooler (3) and remove towards top.

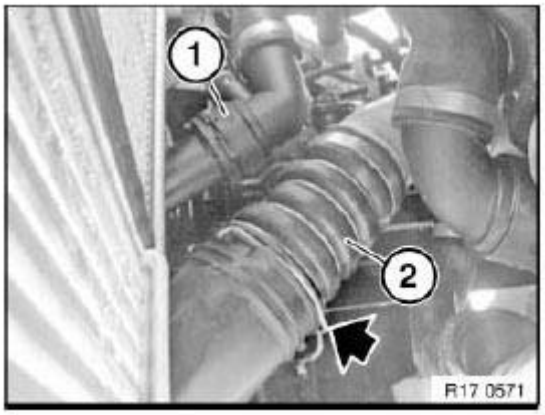


Fig. 385: Locating Coolant Hose And Charge-Air Duct From Intercooler
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to sealing rings!

Special tool **11 8 670** is mandatory.

Attach charge air duct (1) with special tool **11 8 670** to charge air cooler.

Installation note:

- Coat sealing rings of quick-connect couplings with antiseize agent.
- Pressure pipes must audibly snap into place

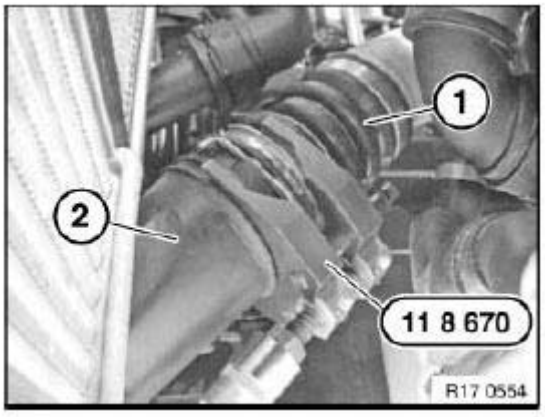


Fig. 386: Identifying Charge-Air Duct With Special Tool 11 8 670
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check DME (turbocharger) for correct operation.

11 61 050 REMOVING AND INSTALLING INTAKE PLENUM (N54, N54T)

Necessary preliminary tasks:

- Remove **INTAKE FILTER HOUSING**
- **REMOVE ENGINE COVER**
- If necessary, remove **TENSION STRUT** (risk of damage to charging pressure sensor)
- Release screws on **CHARGE AIR DUCT** at rear (do not remove)

Pull off vacuum hose (1).

Detach tank vent valve (2) from mounting.

Release hose (3) and lay to one side.

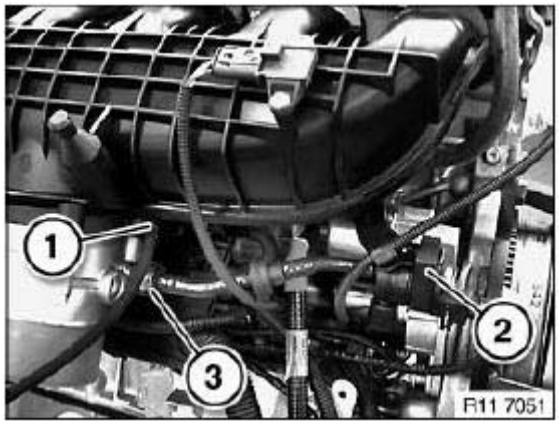


Fig. 387: Identifying Vacuum Hoses And Tank Vent Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) on oil pressure switch (2).

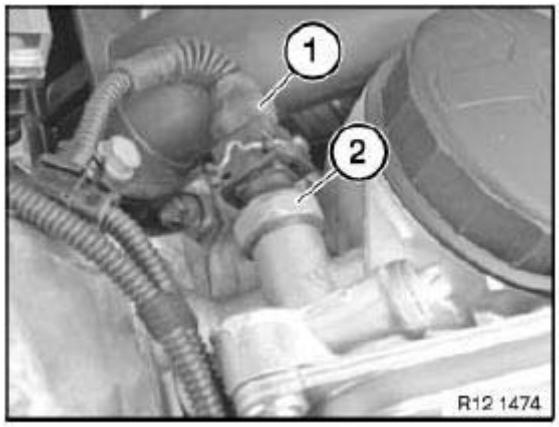


Fig. 388: Identifying Oil Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (2).

NOTE: Do not detach fuel line.

Unscrew nuts (3).

Release screw (4).

Tightening torque 11 61 1AZ .

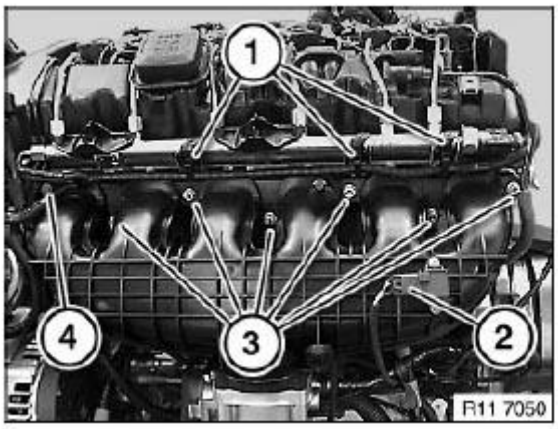


Fig. 389: Identifying Retainers, Plug Connection With Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Raise intake air manifold.

Release screws (1).

Place cable duct (2) to one side.

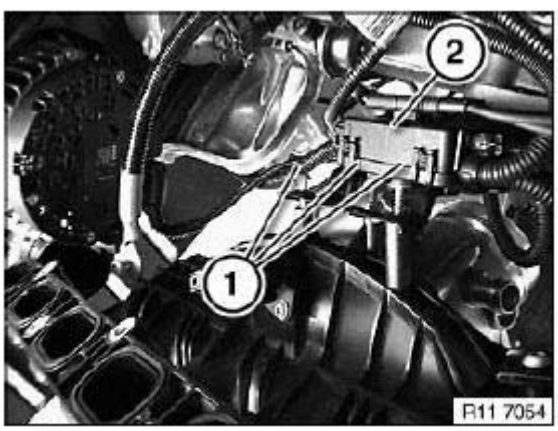


Fig. 390: Identifying Cable Duct And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Cut cable tie (1).

Installation note:

Replace all seals (3).

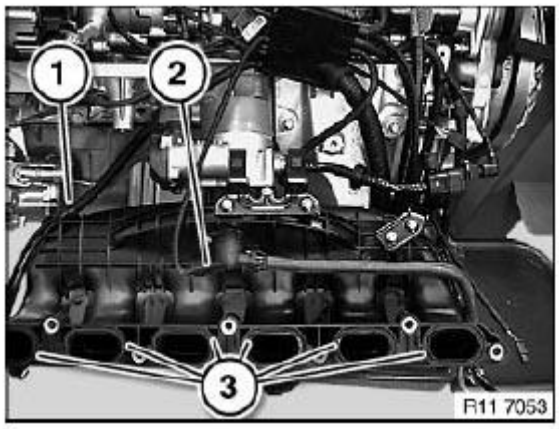


Fig. 391: Identifying Cable Tie, Plug Connection And Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace all seals.

Assemble engine.

1165 SUPERCHARGER WITH CONTROL

11 65 022 REMOVING AND INSTALLING/REPLACE EXHAUST TURBOCHARGER FOR CYLINDERS 1-3 (N54, N54T)

IMPORTANT: It is not necessary to carry out a chassis/wheel alignment check to release the steering tie rod.

Necessary preliminary tasks:

- Remove both See **1832050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **1832060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)**
- Release right **TIE ROD** from steering gear
- Drain **COOLANT**
- Remove coolant **EXPANSION TANK**
- Remove **COOLANT THERMOSTAT**

- Remove **COOLANT PUMP**
- Remove both vacuum accumulators with bracket
- Remove right **CHARGE-AIR DUCT**
- Drain **ENGINE OIL** and collect in a clean container, oil is reused

Release screws (1) and remove protective plate (2) above tie rod.

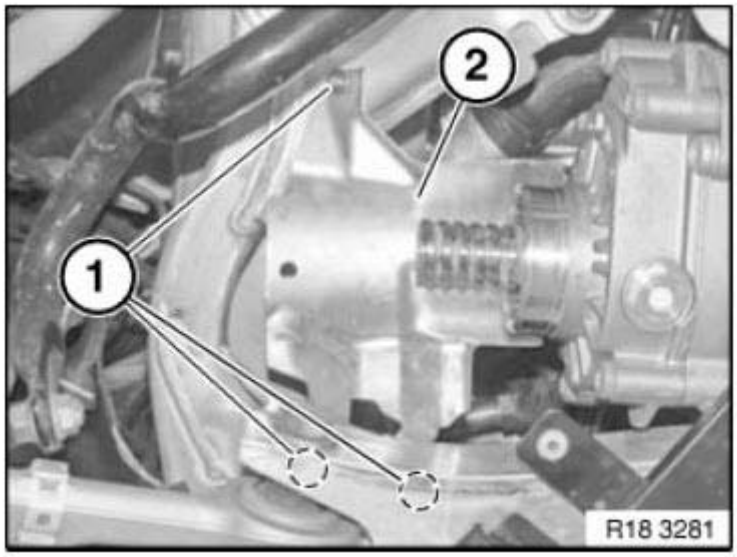


Fig. 392: Identifying Protective Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 42 7AZ** .

Installation note:

Replace gasket.

Release screw (2).

Tightening torque **11 42 8AZ** .

Remove oil return pipe in direction of arrow.

Installation note:

Replace O-ring.

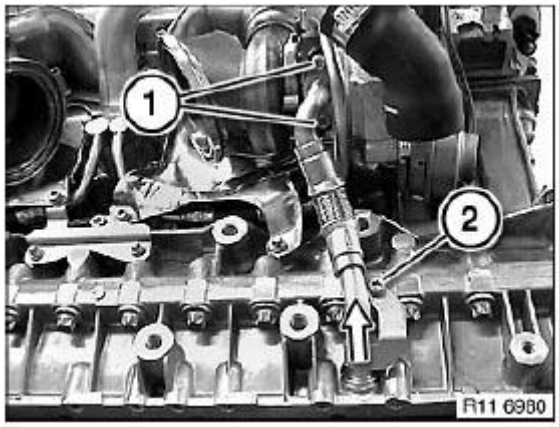


Fig. 393: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Undo screws (1 and 2)

Tightening torque **11 53 10AZ** .

Release coolant feed lines (3 and 4) if necessary with suitable pliers.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

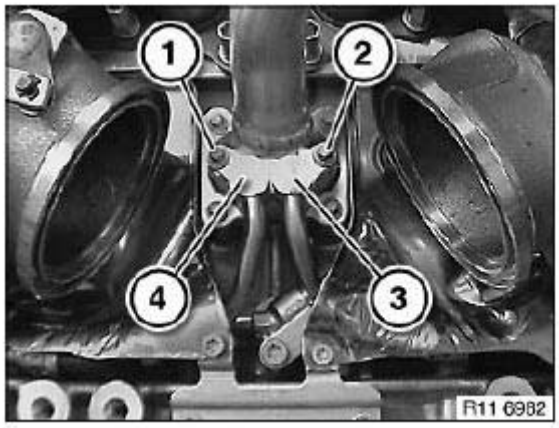


Fig. 394: Identifying Coolant Feed Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 53 3AZ** .

Remove feed line (2).

Installation note:

Replace O-ring.

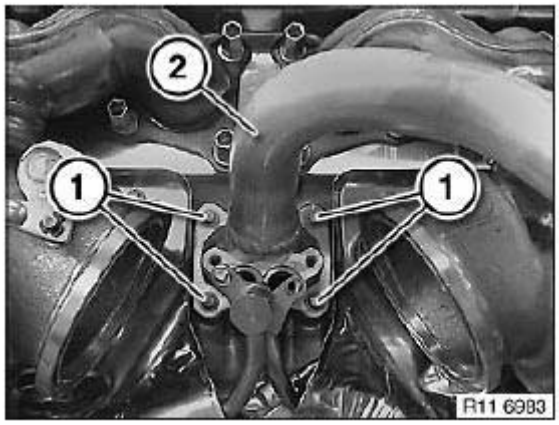


Fig. 395: Identifying Feed Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 53 8AZ** .

Release coolant return pipe at connection (2) if necessary with suitable pliers.

Release screw (3).

Tightening torque **11 53 9AZ** .

Release coolant return pipe at connection (4) if necessary with suitable pliers.

Unfasten coolant return pipe.

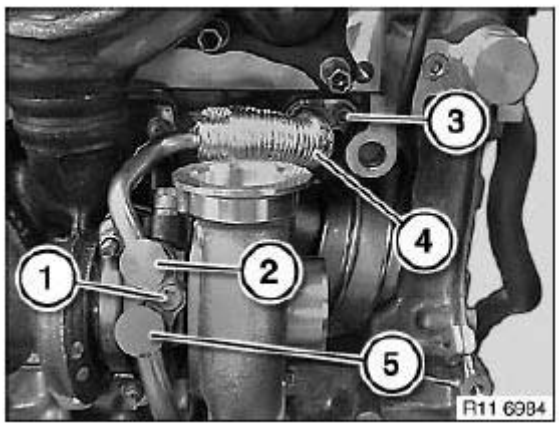


Fig. 396: Identifying Pipe Connections And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

Release screws (1).

Tightening torque **11 65 2AZ** .

Remove retaining plate (2).

Release screws (3).

Tightening torque **11 65 2AZ** .

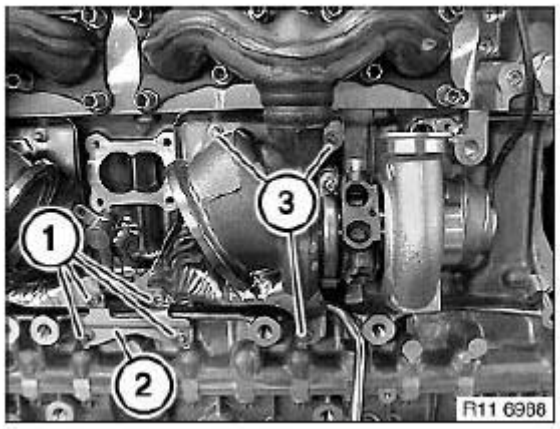


Fig. 397: Identifying Retaining Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove heat shield (1) in direction of arrow.

NOTE: Carefully swing out heat shield (1) in direction of arrow.

Risk of damage!

Coolant feed pipe can be removed with heat shield (1).

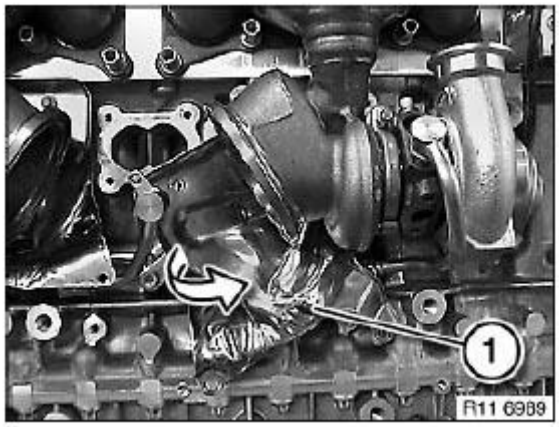


Fig. 398: Identifying Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

Set holder (2) down on cylinder head cover.

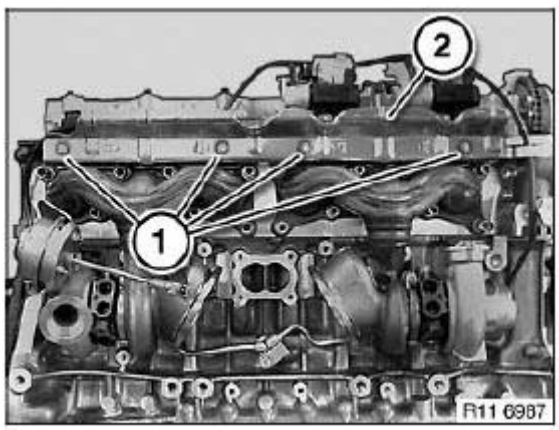


Fig. 399: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 4AZ** .

Detach oil feed line in direction of arrow.

Installation note:

Replace O-ring.

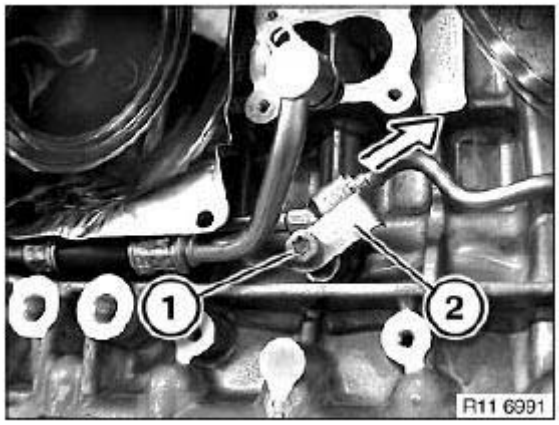


Fig. 400: Disconnecting Oil Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 5AZ** .

Release oil pressure line (2) if necessary with suitable pliers.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

Installation note:

Replace O-rings.

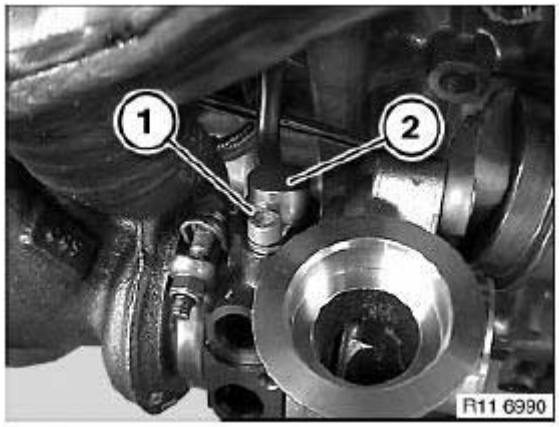


Fig. 401: Identifying Oil Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Detach vacuum hose from vacuum unit (wastegate valve).

Unscrew nuts (1).

Tightening torque **11 65 1AZ** .

Remove turbocharger towards top.

IMPORTANT: Do not misuse linkage of vacuum unit (wastegate valve) for transportation.

Risk of damage!

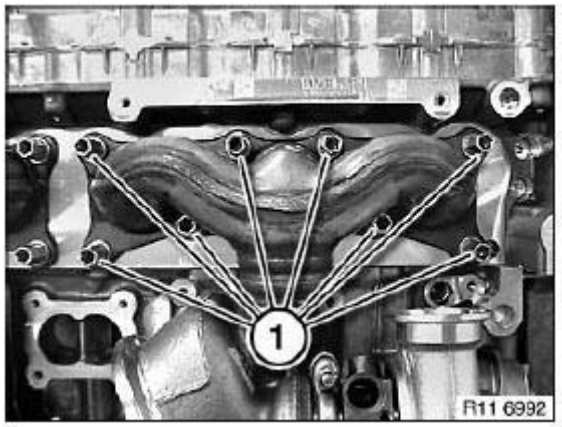


Fig. 402: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 42 5AZ** .

IMPORTANT: Where necessary, to release the oil feed line (3), do not place pliers on the pipe.

Risk of damage!

If necessary, release oil feed line (3) with suitable pliers at connection and remove.

Installation note:

Replace O-rings.

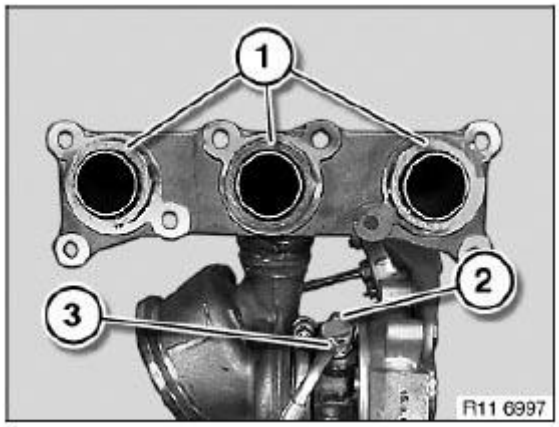


Fig. 403: Identifying Oil Feed Line And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace graphite sealing rings (1).

NOTE: Picture shows turbocharger for cylinders 4 to 6.

Assemble engine.

Delete fault memory in Digital Engine Electronics.

Check air intake system for leaks.

Observe DME instructions.

11 65 024 REMOVING AND INSTALLING/REPLACE EXHAUST TURBOCHARGER FOR CYLINDERS 4-6 (N54, N54T)

Necessary preliminary tasks:

- Remove both See **1832050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **1832060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)**
- Drain **COOLANT**
- Remove coolant **EXPANSION TANK**
- Remove both vacuum reservoirs
- Remove right **CHARGE AIR DUCT**
- Drain **ENGINE OIL** and collect in a clean container, oil is reused
- Remove **RIGHT ENGINE SUPPORT ARM**

Release screws (1).

Tightening torque **11 42 7AZ** .

Installation note:

Replace gasket.

Release screw (2).

Tightening torque **11 42 8AZ** .

Remove oil return pipe in direction of arrow.

Installation note:

Replace O-ring.

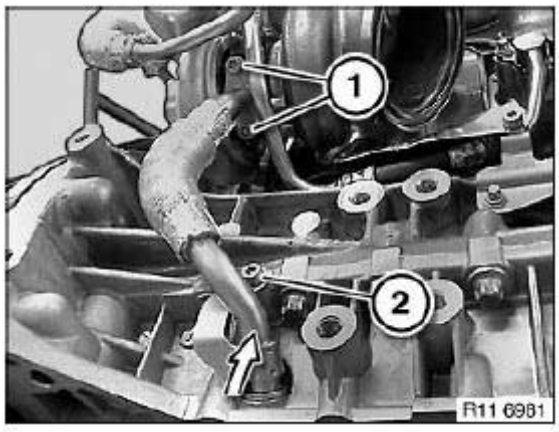


Fig. 404: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1 and 2).

Tightening torque **11 53 10AZ** .

Release coolant feed lines (3 and 4) if necessary with suitable pliers.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

Installation note:

Replace O-rings.

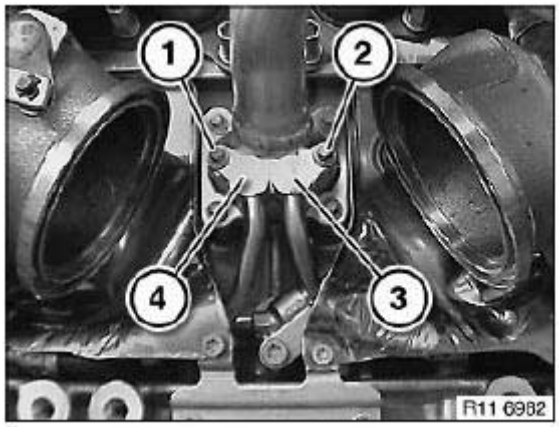


Fig. 405: Identifying Coolant Feed Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 53 3AZ** .

Remove feed line (2).

Installation note:

Replace O-ring.

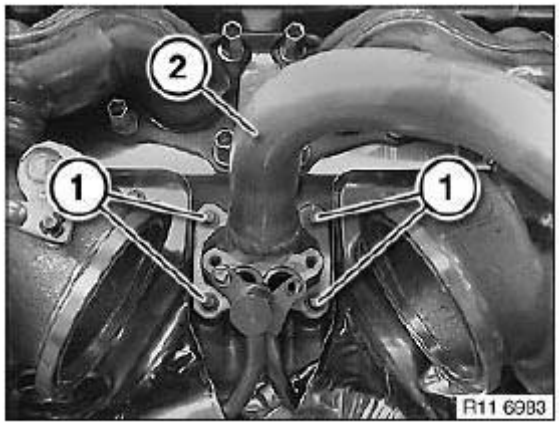


Fig. 406: Identifying Feed Line And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release snap ring (1) from linkage of wastegate valve and disengage linkage.

Release screw (5).

Tightening torque **11 53 9AZ** .

Release coolant return pipe if necessary with suitable pliers.

Release screw (4).

Tightening torque **11 53 8AZ** .

Release coolant feed pipe (2) if necessary with suitable pliers.

Release coolant return pipe (3) if necessary with suitable pliers and remove.

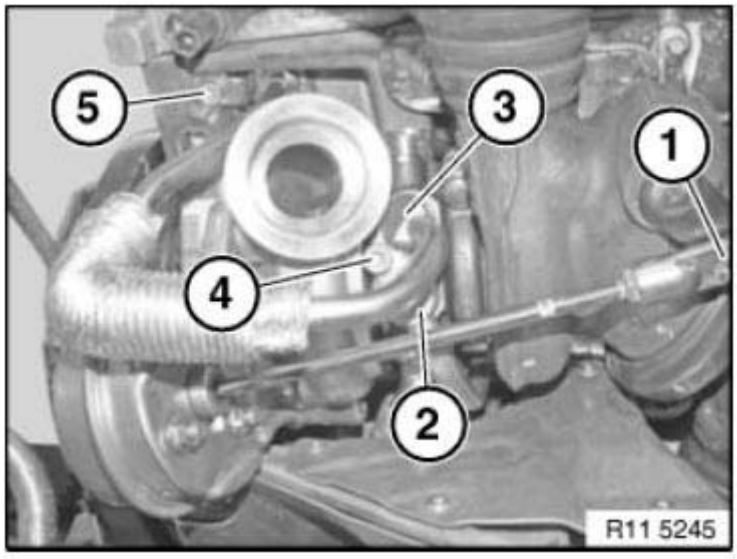


Fig. 407: Identifying Snap Ring, Coolant Return Line And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace O-rings.

IMPORTANT: Do not place pliers on pipes. Risk of damage!

Release screws (1).

Tightening torque **11 65 2AZ** .

Remove retaining plate (2).

Unfasten screws (3 and 4).

Tightening torque **11 65 2AZ** .

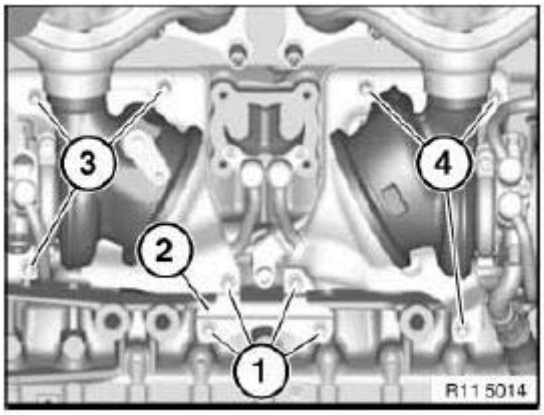


Fig. 408: Identifying Retaining Plates And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Carefully swing out heat shields (2 and 3) in direction of arrow.

Risk of damage!

Remove heat shield (3) in direction of arrow.

Remove heat shield (2) in direction of arrow.

NOTE: Coolant feed pipe (1) can be removed with heat shield (2).

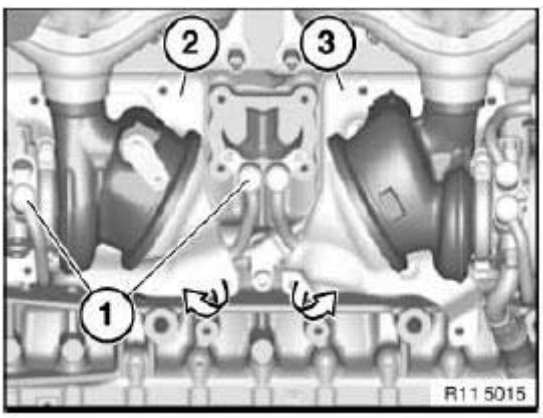


Fig. 409: Removing Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **11 42 4AZ** .

Detach oil feed line in direction of arrow.

Installation note:

Replace O-ring.

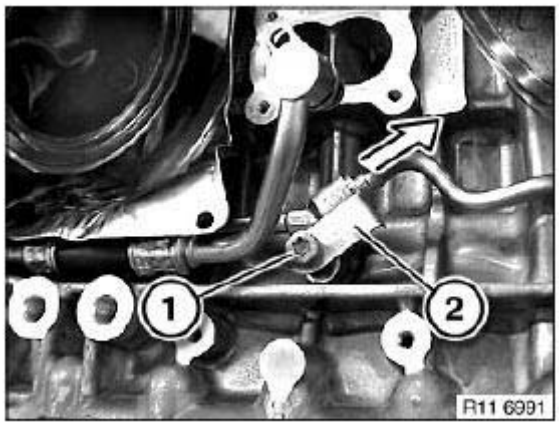


Fig. 410: Removing Oil Feed
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 65 3AZ** .

Set holder (2) down on cylinder head cover.

Picture shows E9x.

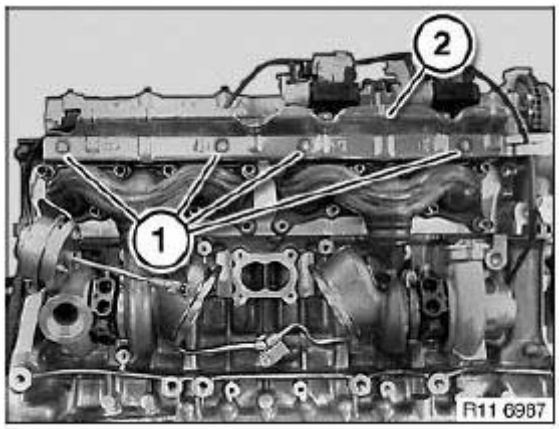


Fig. 411: Identifying Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Detach vacuum hose from vacuum unit (wastegate valve).

Unscrew nuts (1).

Remove turbocharger towards bottom.

Tightening torque **11 65 1AZ** .

IMPORTANT: Do not misuse linkage of vacuum unit (wastegate valve) for transportation.

Risk of damage!

Picture shows E9x.

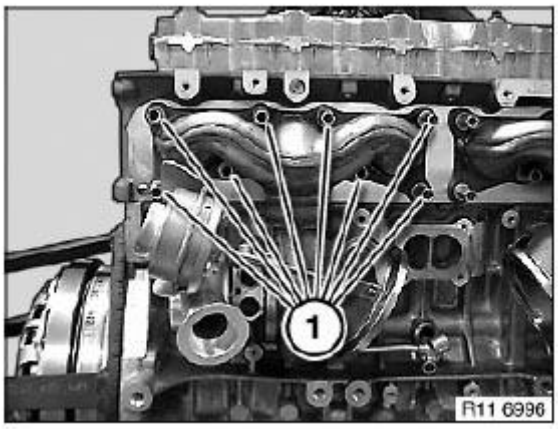


Fig. 412: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (2).

Tightening torque **11 42 5AZ** .

IMPORTANT: Where necessary, to release the oil feed line (3), do not place pliers on the pipe.

Risk of damage!

If necessary, release oil feed line (3) with suitable pliers at connection and remove.

Installation note:

Replace O-rings.

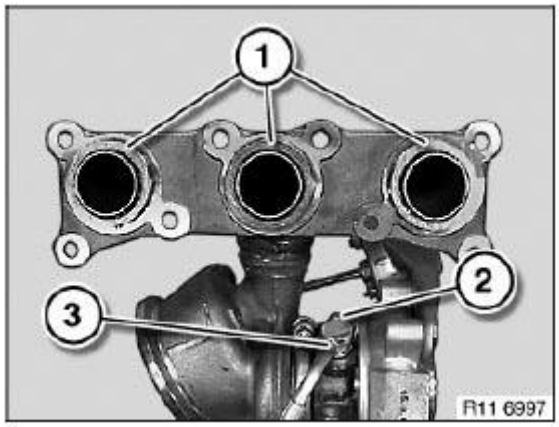


Fig. 413: Identifying Oil Feed Line And Graphite Sealing Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Replace graphite sealing rings (1).

Assemble engine.

Delete fault memory in Digital Engine Electronics.

Check air intake system for leaks.

Observe DME instructions.

11 65 580 REPLACING VACUUM UNIT (WASTEGATE VALVE) (N54, N54T)

IMPORTANT: Overpressure and vacuum lines are identified by the size of the seals and colour-coded Red and Blue and must not be mixed up with each other.

Build up pressure with Blue color.

Generate vacuum pressure with Red color.

Check ease of movement between turnbuckle and pin of adjusting lever (ensure rectangularity).

Note on ordering:

- Workshop equipment
- Workshop planning
- Workshop equipment catalogue
- Measuring and test equipment

- No. 81 29 0 426 464

Necessary preliminary tasks:

- Prepare BMW diagnosis system
- Start diagnosis program

Wahrnehmung:

1. Noises at exhaust turbocharger (clanking)

Oder Fault entry:

1. Drive
2. Engine electronics
3. Air supply
4. Charging pressure control

- Remove both exhaust turbochargers

Release locking clip (2).

Disengage linkage of vacuum unit (wastegate valve).

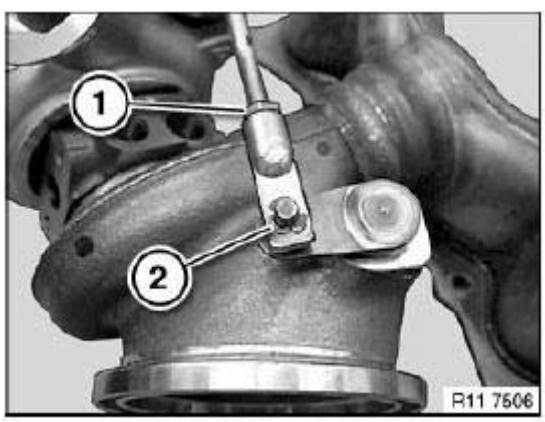


Fig. 414: Identifying Lock Nut And Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Check linkage and valve for wear

Connect vacuum line (1) to vacuum unit (wastegate valve).

Vacuum linkage must retract to stop.

Wastegate valve must be sealed off by hand.

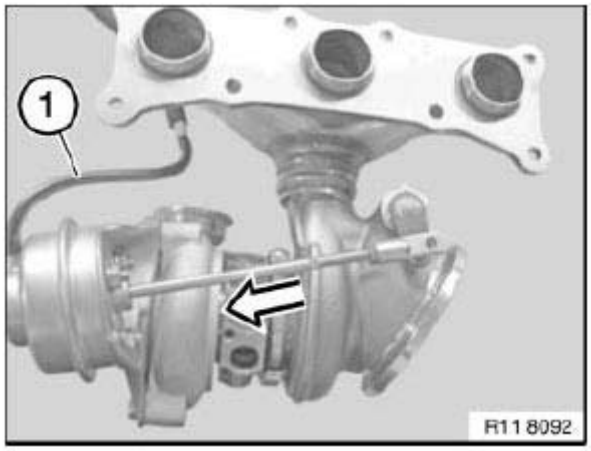


Fig. 415: Identifying Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release lock nut on controller (1).

Press setting with measurement.

- Determine ambient pressure
- Seal stop cock (2) in direction of arrow
- Set controller (1) to **500 ± 10** mbar below ambient pressure (e.g. 980 - 500 = 480 mbar)

Open stop cock (2) again.

Wastegate linkage closes.

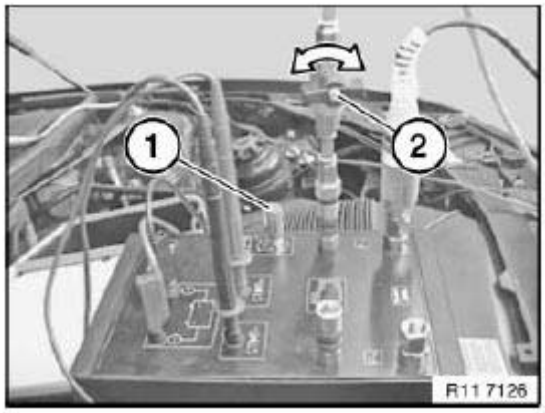


Fig. 416: Releasing Lock Nut On Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Determine gap dimension.

Gap dimension between turnbuckle and adjusting lever.

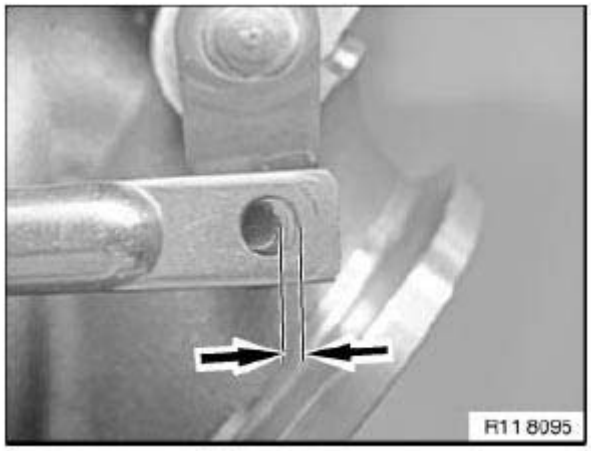


Fig. 417: Identifying Gap Dimension Between Turnbuckle And Adjusting Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Seal off wastegate valve (1) by hand in direction of arrow up to stop.

The turbocharger must be replaced if a 1.5 mm drill bit can be inserted as pictured.

NOTE: Gap dimension = 1.5 mm.

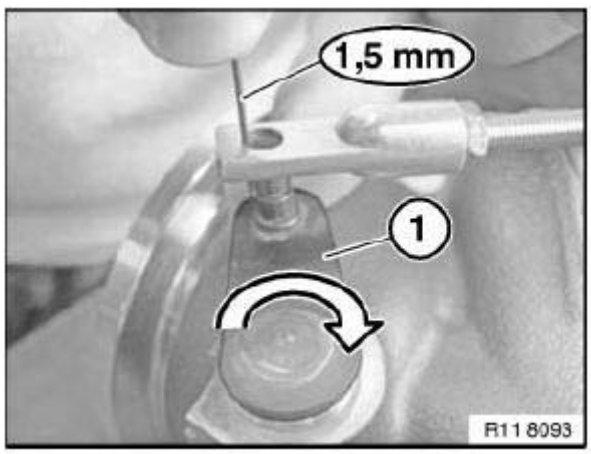


Fig. 418: Sealing Off Wastegate Valve
Courtesy of BMW OF NORTH AMERICA, INC.

The turbocharger is OK if a 1.5 mm drill bit cannot be inserted or can only be inserted at an angle as pictured.

NOTE: Gap dimension > or = 1.5 mm.

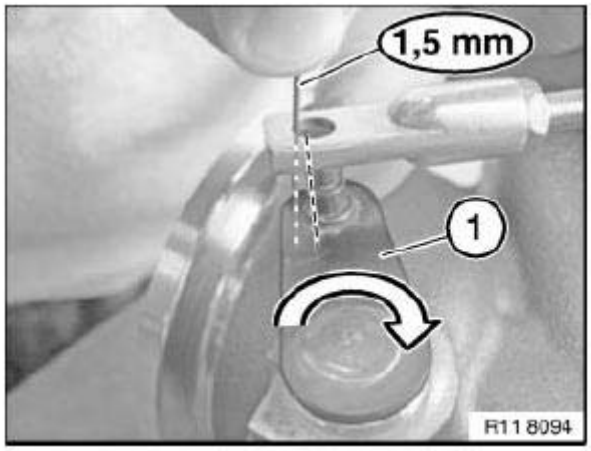


Fig. 419: Identifying Drill Bit Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1 and 3).

Tightening torque **11 65 11AZ** .

Installation note:

Replace vacuum unit 2 (wastegate valve).

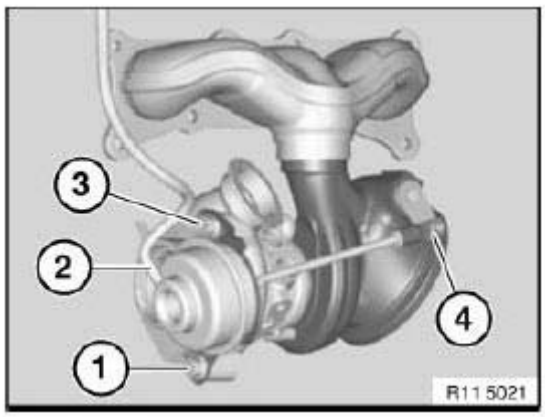


Fig. 420: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting vacuum unit (wastegate valve) linkage

Initial position of vacuum unit (wastegate valve) linkage depressurised.

Connect red vacuum line (1) to vacuum unit (wastegate valve).

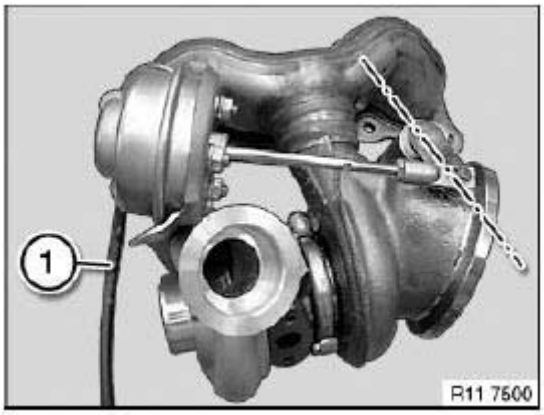


Fig. 421: Identifying Red Vacuum Line
Courtesy of BMW OF NORTH AMERICA, INC.

Vacuum pressure measurement

Prepare BMW diagnosis system on vacuum diagnosis unit.

1. Screw in pressure sensor.
2. Connect 12V battery cables (2) to vehicle battery positive and negative.
3. Connect 12V battery cables (3) to vehicle battery positive and negative **(pump operation max. 3 mins.)** .
4. Controller for vacuum connection.
5. Vacuum connection (Red).

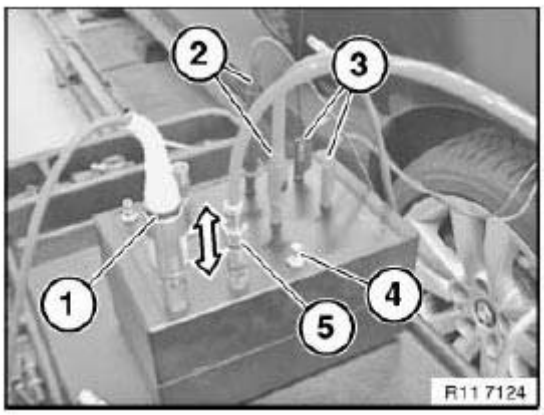


Fig. 422: Identifying Vacuum Pressure Measurement Set-Up
Courtesy of BMW OF NORTH AMERICA, INC.

Calibration for vacuum pressure measurement

Release lock nut on controller (1).

Press setting with measurement.

- Determine ambient pressure
- Seal stop cock (2) in direction of arrow
- Set controller (1) to **200 ± 10 mbar** below ambient pressure (e.g. 980 - 200 = 780 mbar).

Open stop cock (2) again.

Wastegate valve closes.

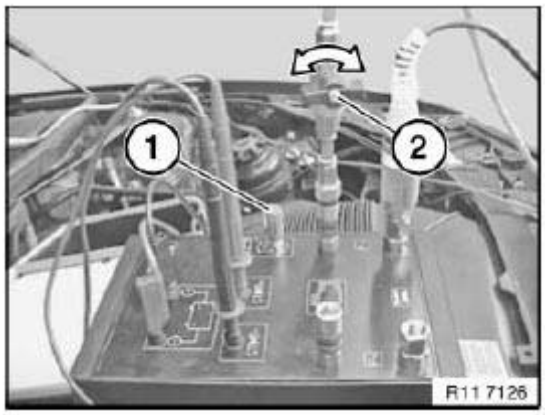


Fig. 423: Releasing Lock Nut On Controller
Courtesy of BMW OF NORTH AMERICA, INC.

Initial position (1) of wastegate linkage with preset vacuum pressure.

Wastegate valve virtually closed.

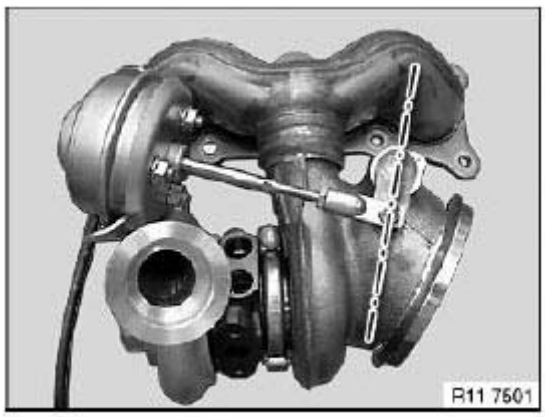


Fig. 424: Identifying Initial Position Of Wastegate Linkage With Preset Vacuum Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Checking turnability at wastegate valve

a. Wastegate valve can be turned with minimal force.

Adjustment at wastegate valve is OK.

b. Wastegate valve has play and can be turned without resistance, wastegate valve open too far.

   Carry out adjustment at wastegate valve, **shorten** linkage.

c. Wastegate valve cannot be turned, wastegate valve closed.

Carry out adjustment at wastegate valve, **lengthen** linkage.

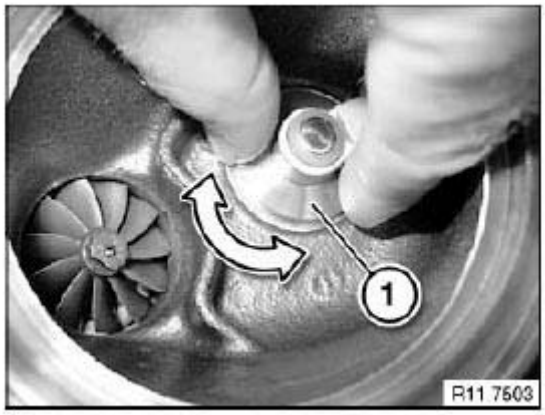


Fig. 425: Checking Wastegate Valve Turnability
Courtesy of BMW OF NORTH AMERICA, INC.

Adjustment at linkage

To **lengthen** linkage, turn turnbuckle (1) max. **180°** in **counterclockwise** direction.

To **shorten** linkage, turn turnbuckle (1) max. 180° in **clockwise** direction.

Engage turnbuckle (1) on adjusting lever in direction of arrow.

IMPORTANT: Check ease of movement between turnbuckle (1) and pin of adjusting lever (ensure rectangularity).

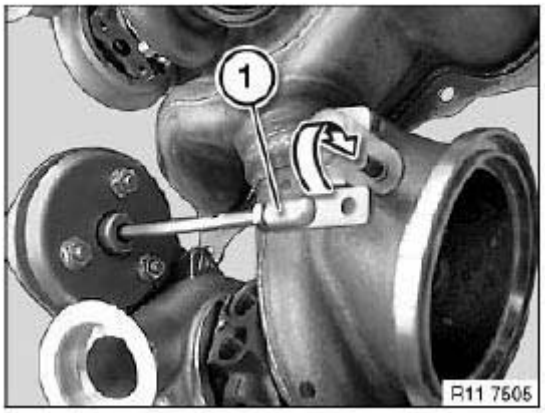


Fig. 426: Engaging Turnbuckle On Adjusting Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Check turnability at wastegate valve again.

Secure lock nut (1); to do so, secure turnbuckle against turning with a suitable tool.

Tightening torque **11 65 10AZ** .

Mount locking clip (2).

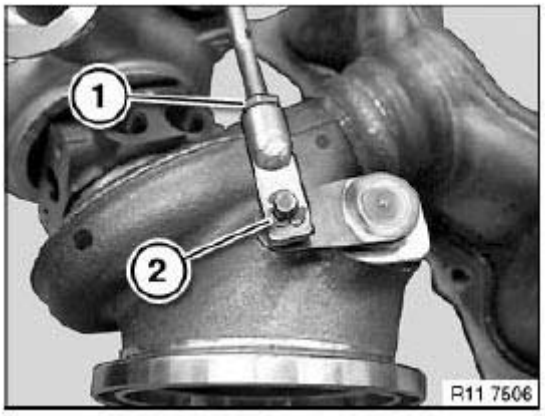


Fig. 427: Identifying Lock Nut And Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Observe diagnosis instructions.

Execute test module for boost pressure control.

1166 VACUUM PUMP

11 66 000 REMOVING AND INSTALLING OR REPLACING VACUUM/OIL PUMP (N47 D20 O1)

IMPORTANT: It is possible to remove and install the vacuum oil pump without removing the transmission.

Necessary preliminary work:

- Removing oil sump.

Release screws (1).

Remove intake snorkel in direction of arrow.

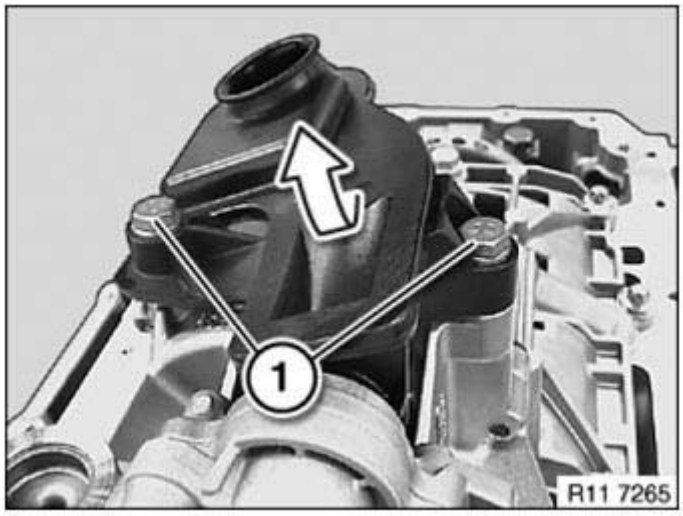


Fig. 428: Removing Intake Snorkel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

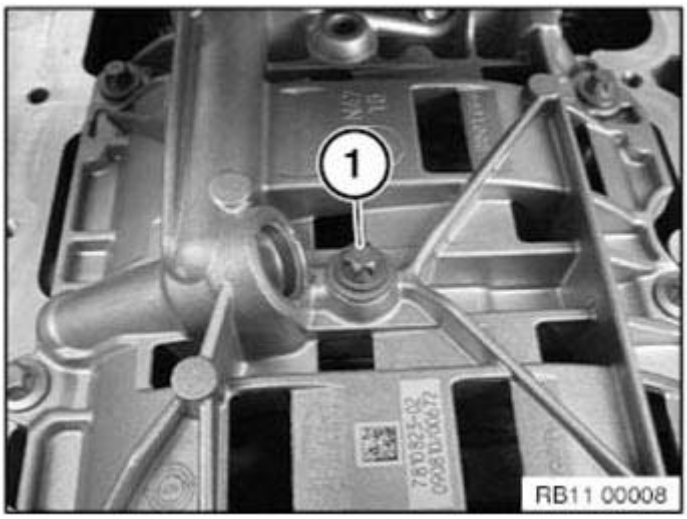


Fig. 429: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation note:

Clean and blow out thread

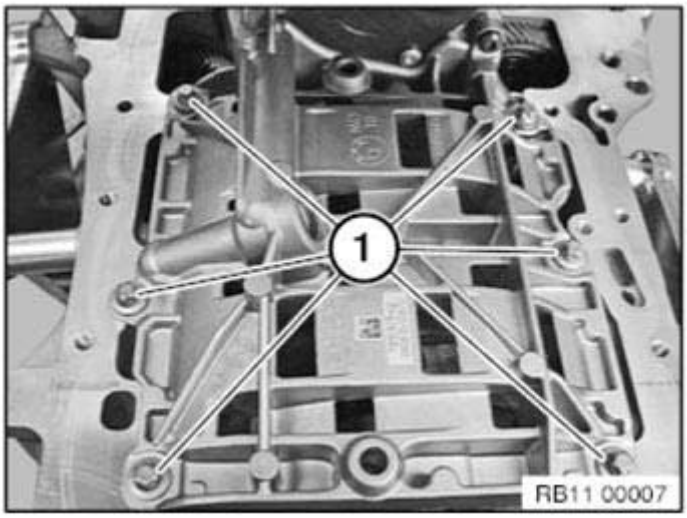


Fig. 430: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

When installed, the oil pump chain must be fed out from the sprocket wheel of the oil pump drive gear; the sprocket wheel cannot be removed.

NOTE: Illustration shows gear case cover removed.

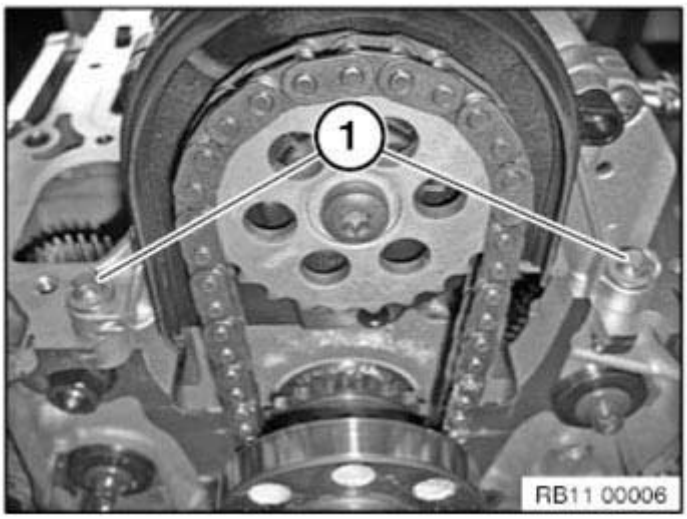


Fig. 431: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Oil vacuum pump must be fed out at chain drive (1).

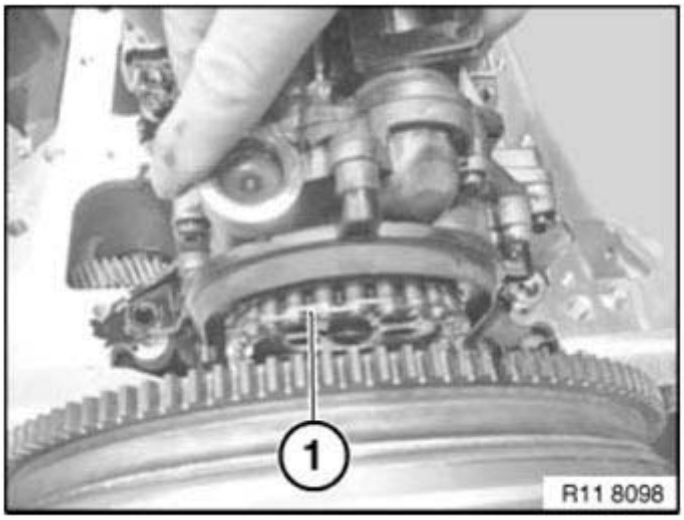


Fig. 432: Identifying Chain Drive
Courtesy of BMW OF NORTH AMERICA, INC.

Feed out oil vacuum pump (1) in direction of arrow and remove.

Installation in reverse sequence.

Installation note:

Clean all sealing surfaces.

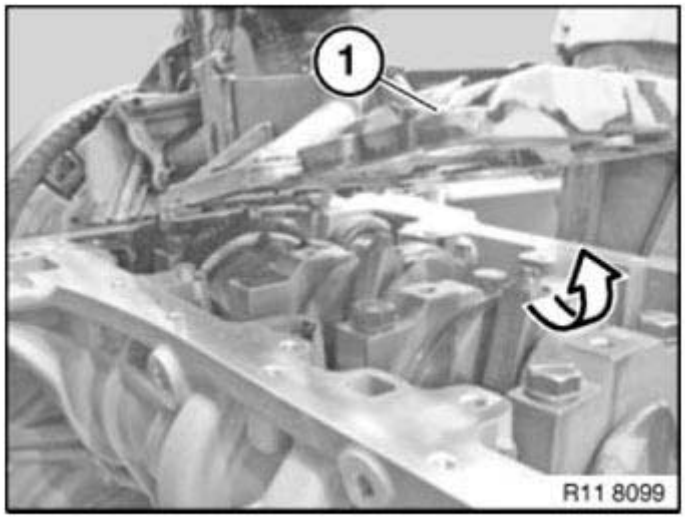


Fig. 433: Identifying Oil Vacuum Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Install all screws (1) and tighten down.

Tightening torque, see 11 41 1AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE**

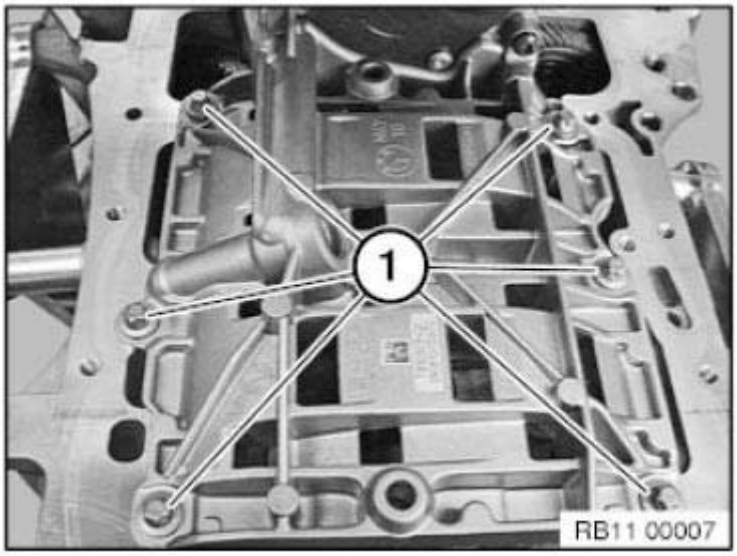


Fig. 434: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Install and tighten down screws (1).

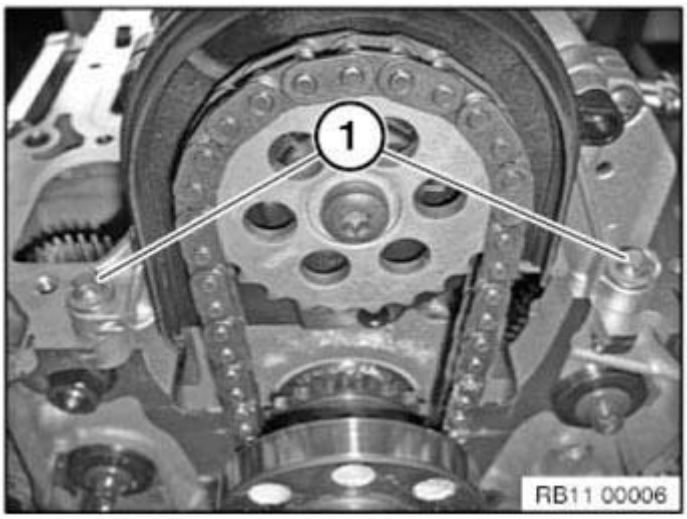


Fig. 435: Identifying Gear Case Cover Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Clean and blow out thread

Insert and secure screw (1).

Secure screw (1) with special tool **00 9 120** .

Tightening torque, see 11 41 2AZ in **11 41 OIL PUMP WITH STRAINER AND DRIVE** .

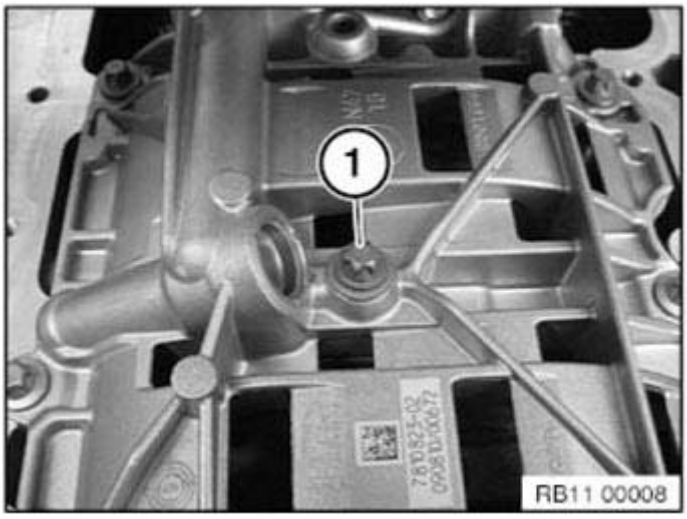


Fig. 436: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

11 66 000 REMOVING AND INSTALLING/REPLACING VACUUM PUMP (N54, N54T)

Necessary preliminary work:

- Remove **DRIVE BELT** .
- Remove **BELT TENSIONER** for drive belt.
- Remove **SEALING CAP** for vacuum pump.
- Remove **HIGH PRESSURE PUMP** .

Rotate crankshaft at central bolt.

Turn camshaft sprocket until drilled holes and screws of vacuum pump match up.

Screw in special tool **11 8 650** .

Secure special tool **11 0 290** in camshaft sprocket and to special tool **11 8 650** .

Release screw (1).

Tightening torque **11 66 2AZ** .

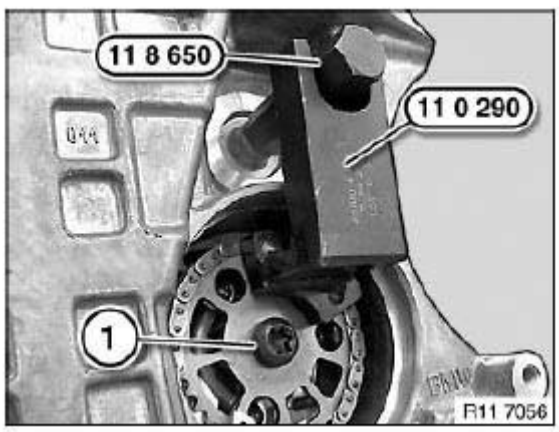


Fig. 437: Positioning Special Tool 11 0 290 On Sprocket Wheel And On Special Tool 11 8 650
Courtesy of BMW OF NORTH AMERICA, INC.

Press chain tensioner (1) with chain in direction of arrow.

Install special tool **11 4 120** .

Remove camshaft sprocket (2) in direction of arrow.

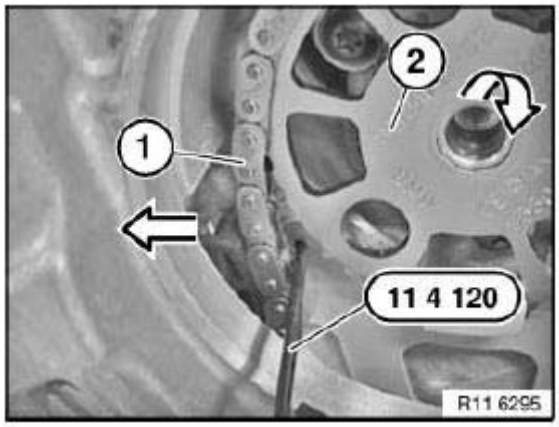


Fig. 438: Removing Sprocket Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque **11 66 1AZ** .

Release screws (1).

Secure screws (1) against falling.

Remove vacuum pump.

Installation note:

Replace gasket.

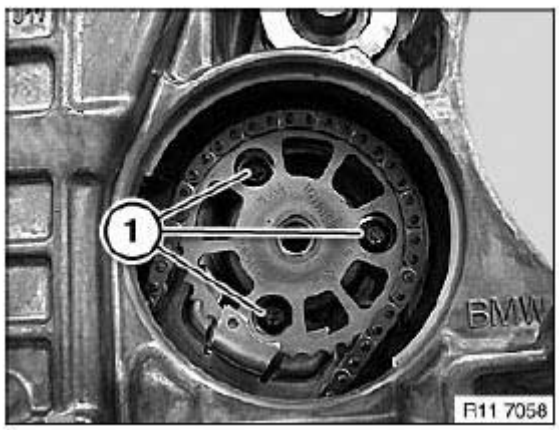


Fig. 439: Identifying Vacuum Pump Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

1178 EMISSION CONTROL, OXYGEN SENSOR

11 78 513 REPLACING BOTH OXYGEN CONTROL SENSORS (N54, N54T)

WARNING: Risk of burning!

Work should only be carried out on an exhaust system that has cooled down.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**
- Release right **TIE ROD** from steering gear

NOTE: It is not necessary to conduct a chassis/wheel alignment check when the track rod is released.

Installation note:

If an oxygen sensor is reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Service) to thread.

The part of the oxygen control sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Remove protective plate over steering gear.

Release screws (1) and remove protective plate (2).

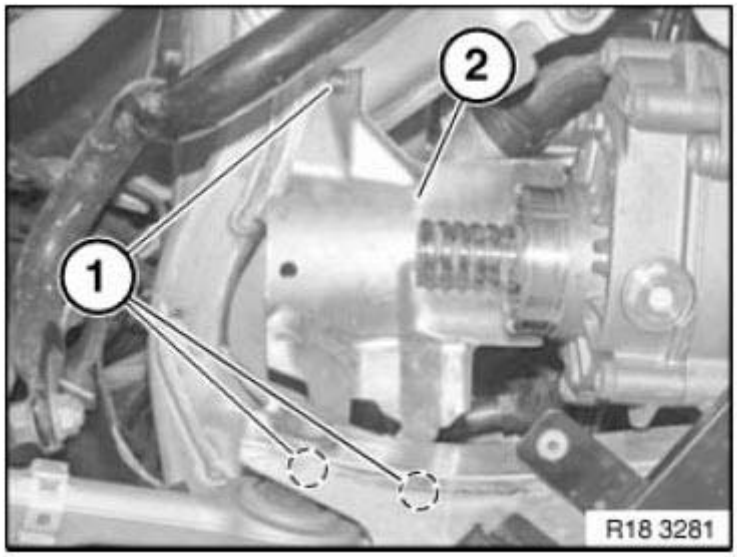


Fig. 440: Identifying Protective Plate And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for oxygen control sensor, cylinders 1 to 3.

Release oxygen control sensor (1) with special tools **11 7 030** and **11 9 150** .

IMPORTANT: When using special tool 11 7 030 in conjunction with special tool 11 9 150 , it is essential to reduce the prescribed tightening torque by 3 Nm.

Tightening torque **11 78 1AZ** .

Installation note:

Cable color black, cylinders 1 to 3.

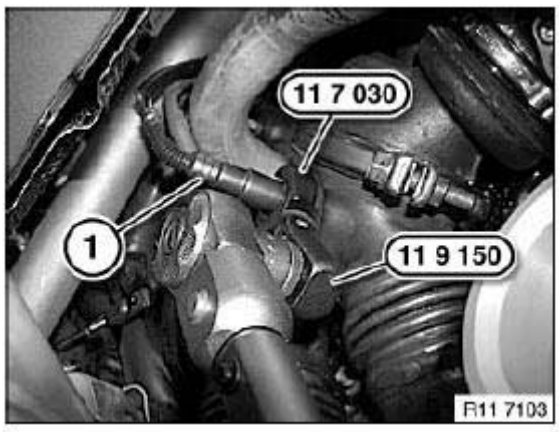


Fig. 441: Identifying Special Tool 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection for oxygen control sensor, cylinders 4 to 6.

Release oxygen control sensor (1) with special tools **11 7 030** and **11 9 150** .

IMPORTANT: When using special tool 11 7 030 in conjunction with special tool 11 9 150 , it is essential to reduce the prescribed tightening torque by 3 Nm.

Tightening torque **11 78 1AZ** .

Installation note:

Cable color grey, cylinders 4 to 6.

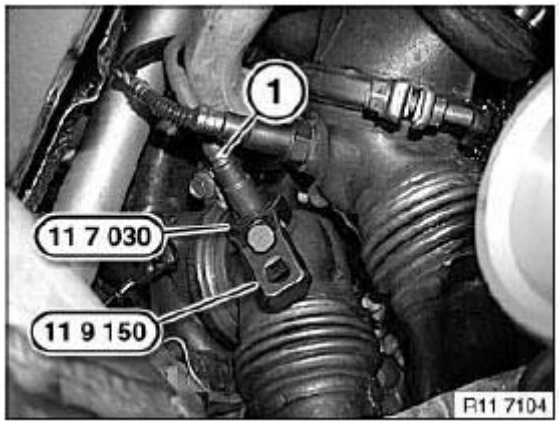


Fig. 442: Removing Oxygen Control Sensor Using Special Tools 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME control unit.

11 78 545 REPLACING BOTH OXYGEN MONITORING SENSORS (N54, N54T)

WARNING: Risk of burning!

Work should only be carried out on an exhaust system that has cooled down.

Necessary preliminary tasks:

- Remove rear **UNDERBODY PROTECTION**

Installation note:

If an oxygen sensor is to be reused, only apply a thin and uniform coat of Never Seez Compound (refer to BMW Parts Department) to thread.

The part of the oxygen monitoring sensor which projects into the exhaust system branch (sensor ceramic) must not be cleaned or come into contact with lubricant.

Disconnect plug connection for oxygen monitoring sensor.

Release monitoring sensor (1) with special tools **11 7 030** and **11 9 150** .

IMPORTANT: When using special tool 11 7 030 in conjunction with special tool 11 9 150 , it is essential to reduce the prescribed tightening torque by 3 Nm.

Tightening torque **11 78 1AZ** .

Installation note:

Cable color black, cylinders 1 to 3.

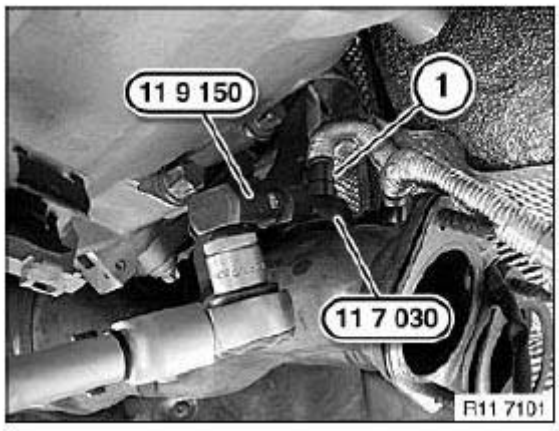


Fig. 443: Removing Monitor Sensor Using Special Tools 11 7 030 And 11 9 150
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Release insulation (2) in direction of arrow.

Disconnect plug connection for oxygen monitoring sensor.

Release monitoring sensor (1) with special tool **11 7 020** .

Tightening torque **11 78 1AZ** .

Installation note:

Cable color grey, cylinders 4 to 6.

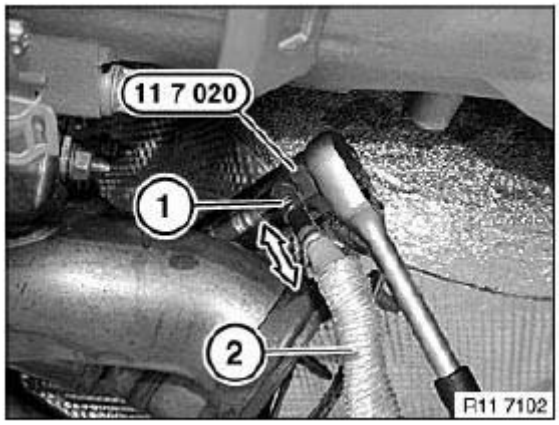


Fig. 444: Removing Insulation
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check function of DME control unit.

11 ENGINE

11-4060 ADAPTER

Adapter MW

Replaced by: 0491003

NOTE: For pressure gauge for checking the oil pressure - Replaced by 11 4 (0 491 003)

Storage Location

B9

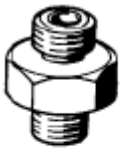
11-4050 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter) For connecting pipe bend 13 6 054 to pressure gauge 13 3 061 or BMW diagnosis and information system for checking oil pressure

Storage Location

A4



W11 4 050

Fig. 1: Identifying Adapter (114050)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8330 ASSEMBLY TOOL

Assembly tool Minimum set: Mechanical tools MW

NOTE: For installing and removing connecting rod with piston

Storage Location

B47

A47

SI number

01 02 04 (069)

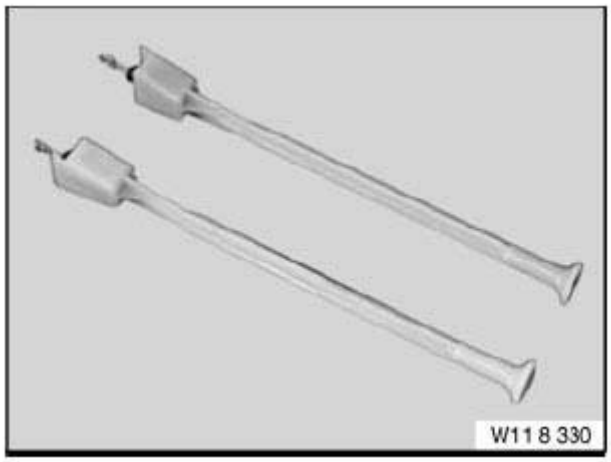


Fig. 2: Identifying Assembly Tool (118330)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6380 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: For fitting valve stem seal

Storage Location

B15

SI number

01 06 98 (306)

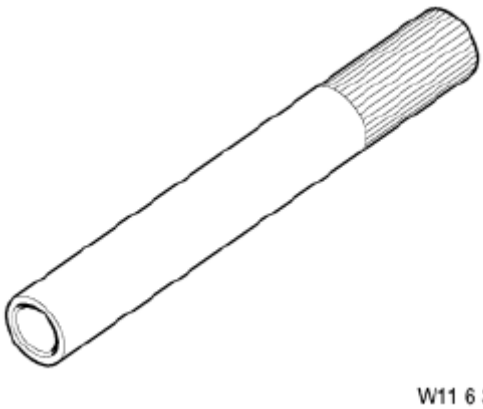


Fig. 3: Identifying Bush (116380)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6260 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: (Assembly bushes with case) For installing pistons of 85 mm diameter (urgently required for pistons with U-Flex ring)

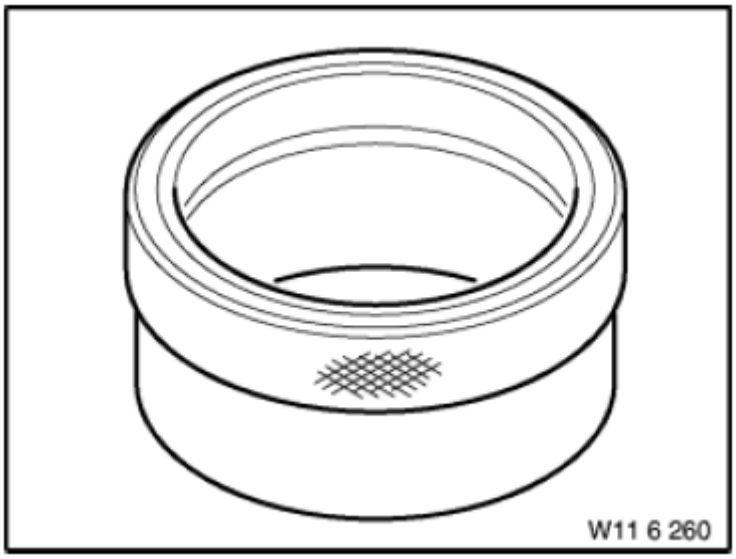


Fig. 4: Identifying Bush (116260)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

4 = 0493142 Bush

NOTE: (Assembly bush) Diameter 85.50 mm, stage 2

1 = 0493139 Bush

NOTE: (Assembly bush) Diameter 85.00 mm

2 = 0493140 Bush

NOTE: (Assembly bush) Diameter 85.08 mm, repair

3 = 0493141 Bush

NOTE: (Assembly bush) Diameter 85.25 mm, stage 1

9 = 0493323 Case

NOTE: (Case) For storing assembly bushes, gauge 11 6 270 and lever dial gauge 11 6 250

11-6240 BUSH

Bush MW

NOTE: (Assembly bush set) For fitting pistons (diameter 82 mm) with connecting rod into the crankcase. Engine: N52B25

SI number

01 02 06 (244)

Consisting of:

1 = 0495526 Bush

NOTE: (assembly bush 82.00 mm)

2 = 0495527 Bush

NOTE: (assembly bush 82.25 mm)

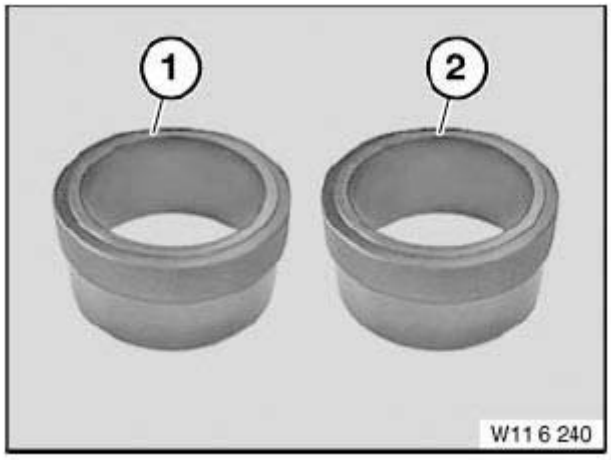


Fig. 5: Identifying Bush (116240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0320 CLIP

Clip MW

NOTE: (Removal and fitting tool) For removing and installing cylinder head.

Storage Location

B51

SI number

01 17 04 (130)

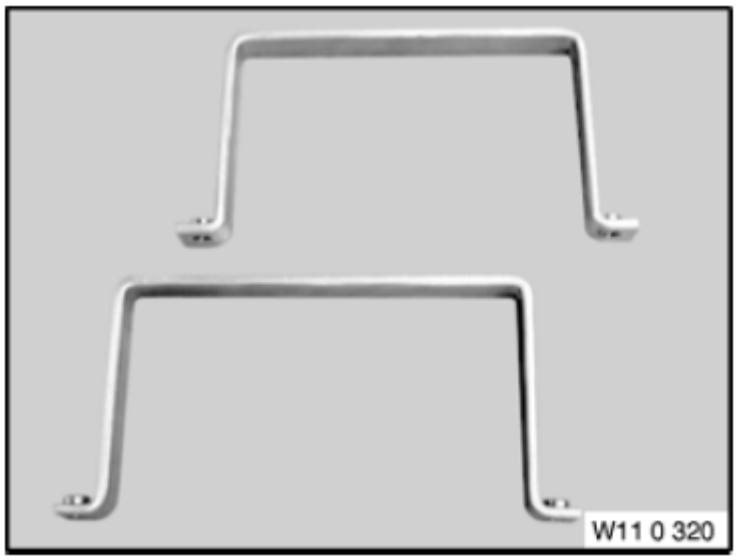


Fig. 6: Identifying Clip (110320)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0220 COMPRESSION TESTER

0490613 110220 Compression tester Minimum set: Mechanical tools MW

NOTE: (Compression pressure testing set) For all petrol and diesel engines.

SI number

01 09 92 (558)

Consisting of:

4 = 0490620 Probe

NOTE: (Test probe) For recording compression testers 11 0 224 and 11 0 160/engine: S14, S38, S50 - Replaced by 11 0 235 (0 493 129)

4 = 0490616 Card

NOTE: (Cards) 100 pieces For recording compression tester 11 0 221

4 = 0490622 Card

NOTE: (Cards) 100 pieces For recording compression tester 11 0 224

2 = 0494517 Adapter

NOTE: Measuring "absolute compression" at all cylinders. Engine: W17

2 = 0493634 Case

NOTE: With foam material insert for recording compression tester

16 = 0495279 Adapter

NOTE: M67, M67TU engine

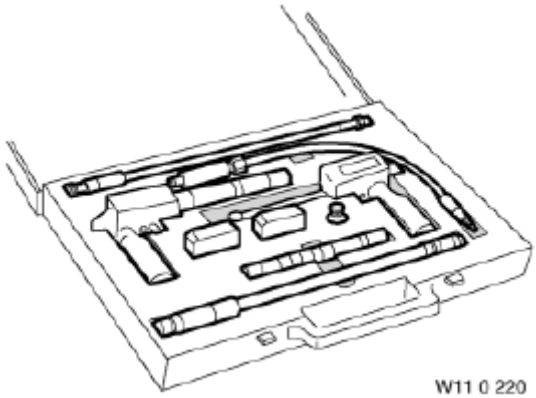


Fig. 7: Identifying Compression Tester (110220)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0490614 Compression tester

NOTE: (Compression tester) For diesel engines.

4 = 0490615 Probe

NOTE: (Test probe) For recording compression testers 11 0 221 and 11 0 160/engine: M21, M41, M47, M51, M57, M57T2

4 = 0490617 Compression tester

NOTE: (Compression tester) For petrol engines.

4 = 0490618 Hose

NOTE: (Extension hose) For rubber tapered section with fitting 11 0 228

4 = 0490619 Probe

NOTE: (Test probe) For recording compression testers 11 0 224 and 11 0 160/engine: M10, M20, M30, M40, M42, M43, M44, M50, M52, M60, M62, M70, M73, N62, S50US, S52US, S62

4 = 0490621 Tapered section

NOTE: (Rubber tapered section) For recording compression testers 11 0 224 and 11 0 160.

4 = 0490625 Valve

NOTE: **(Non-return valve)**

4 = 0490626 Filter

NOTE: **(Filter) 3 x 3 mm**

9 = 0493129 Probe

NOTE: **(Test probe, screw-in) For measuring "absolute compression" at all cylinders, engine: S14, S38, S50B30, S50B32, S50US, S52US, S54, S85**

2 = 0493387 Probe

NOTE: **(Test probe) For recording compression tester 11 0 221 or DIS pressure sensor/engine: M47, M57, M57TU, M57T2**

11-0160 COMPRESSION TESTER

0490593 110160 Compression tester MW

Replaced by: 0490613

NOTE: **(Compression recorder) manufacturer VDO - Replaced by 11 0 220 (0 490 613)**

Consisting of:

1 = 0490594 Card

NOTE: **(Cards) For compression pressure inscriber Discontinuation and replaced by 11 0 220 (0 490 613)**

2 = 0490595 Pressure gauge

NOTE: **Compression pressure inscriber Discontinuation and replaced by 11 0 220 (0 490 613)**

3 = 0490596 Guard

NOTE: **(Rubber protection) Still available as replacement Discontinuation and replaced by 11 0 220 (0 490 613)**

4 = 0490597 Lines

NOTE: **Discontinuation and replaced by 11 0 220 (0 490 613)**

5 = 0490598 Adapter

NOTE: (test adapter for petrol engine) Engine: all, except M70 Discontinuation and replaced by 11 0 220 (0 490 613)

6 = 0490599 Adapter

NOTE: (test adapter for petrol engine) Engine: M70 Discontinuation and replaced by 11 0 220 (0 490 613)

7 = 0490600 Adapter

NOTE: (Test adapter extension) Discontinuation and replaced by 11 0 220 (0 490 613)

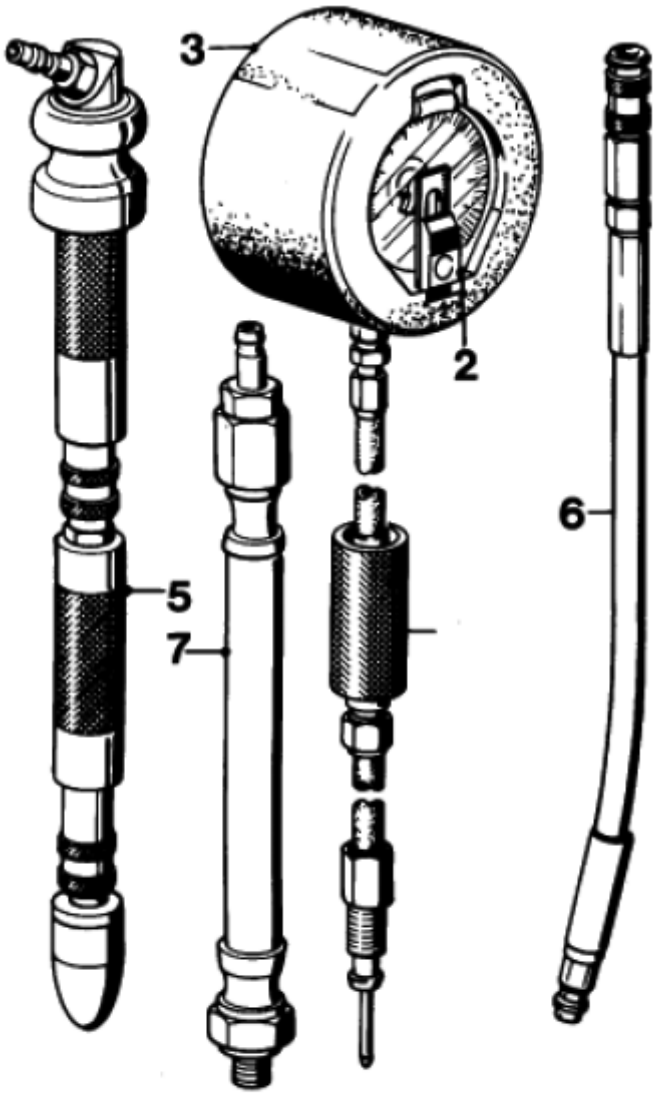


Fig. 8: Identifying Compression Tester (110160)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7110 DEVICE

0496671 117110 Device MW

NOTE: For removing and installing throttle return springs for intermediate levers.

SI number

01 18 09 (578)

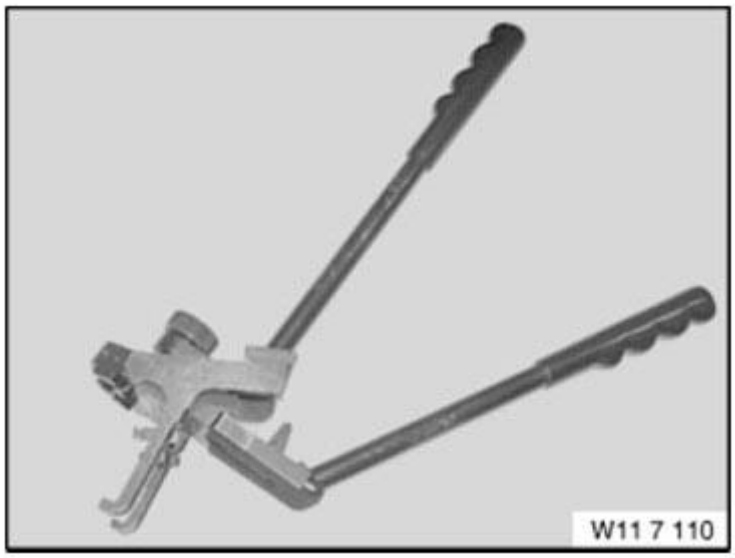


Fig. 9: Identifying Device (117110)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2110 DEVICE

0490826 112110 Device MW

Replaced by: 0490504

NOTE: For retightening the connecting rod and cylinder head bolts - Replaced by 00 9 120 (0 490 504)

Consisting of:

1 = 0490827 Extension

NOTE: (Extension 1/1") Replaced by 00 9 120 (0 490 504)

2 = 0490828 Washer

NOTE: (Graduated disc 180°) Replaced by 00 9 120 (0 490 504)

3 = 0490829 Sleeve

NOTE: (Guide sleeve) Replaced by 00 9 120 (0 490 504)

4 = 0490830 Nut

NOTE: (Knurled nut) Replaced by 00 9 120 (0 490 504)

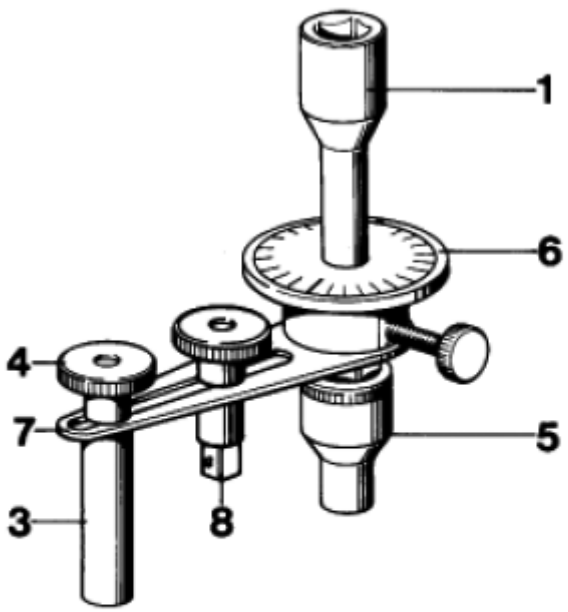
5 = 0490831 Wrench socket

NOTE: (Socket wrench insert WAF 10) Replaced by 00 9 120 (0 490 504)

6 = 0490832 Washer

NOTE: (Graduated disc up to 270°) Replaced by 00 9 120 (0 490 504)

7 = 0490833 Tab



W11 2 110

Fig. 10: Identifying Device (112110)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For counter-holding on the cylinder head Replaced by 00 9 120 (0 490 504)

8 = 0490834 Adapter

NOTE: (Adapter) Replaced by 00 9 120 (0 490 504)

11-4450 DEVICE

0495049 114450 Device Minimum set: Mechanical tools MW

NOTE: (Locating fixture) For securing sliding blocks during installation.

Storage Location

A52

SI number

01 17 04 (130)

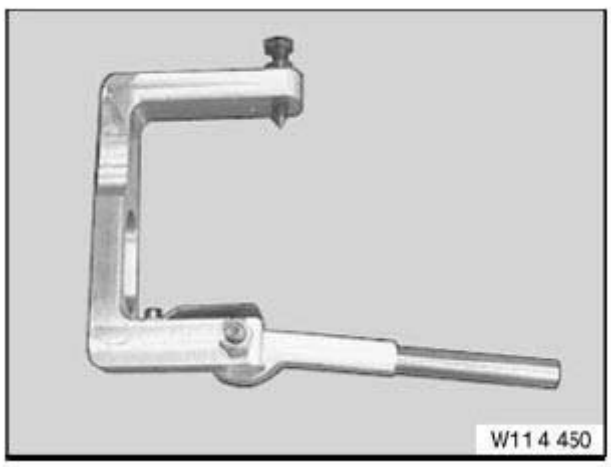


Fig. 11: Identifying Device (114450)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4340 DEVICE

0495014 114340 Device MW

NOTE: (Pressure testing fixture) For pressure-testing cylinder head.

SI number

01 17 04 (130)

Consisting of:

2 = 0495016 Plate

NOTE: (Plate with thrust piece)

1 = 0495015 Plate

NOTE: (base plate with seal)

3 = 0495017 Hose

NOTE: (Hose with air connection)

4 = 0495724 Plate

NOTE: (Adapter plate with valve) N54

5 = 0495725 Screw

NOTE: (set of screws)N54

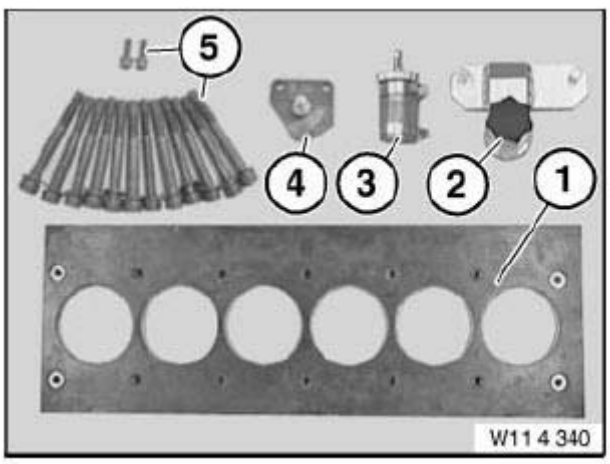


Fig. 12: Identifying Device (114340)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4370 DEVICE

0495024 114370 Device MW

NOTE: (pressing fixture) For pressing out sealant for bedplate.

Storage Location

A52

SI number

01 17 04 (130)

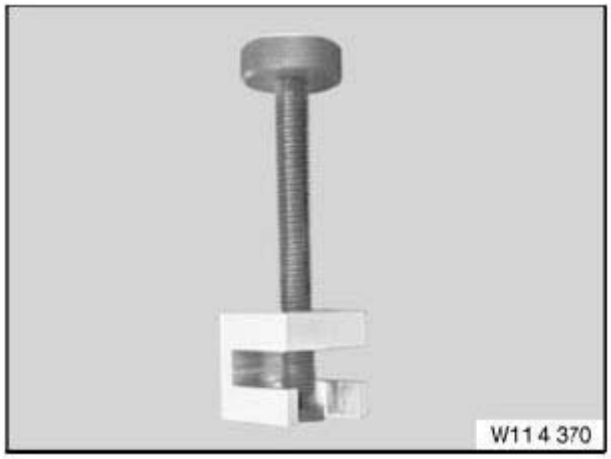


Fig. 13: Identifying Device (114370)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9000 DEVICE

0494362 119000 Device Minimum set: Mechanical tools MW

NOTE: (Cylinder head expander tool)

Storage Location

Individual

SI number

01 03 02 (833)

Consisting of:

17 = 0495028 Cage

NOTE: (Valve spring cage) Engine N52

1 = 0494366 Device

5 = 0494370 Quick fastener

7 = 0494372 Shaped part

NOTE: (Shaped part)

8 = 0494373 Shaped part

NOTE: (Shaped part) Shaped part made of plastic

9 = 0494374 Lever

2 = 0494367 Rod

3 = 0494368 Adapter

NOTE: (Sliding block)

4 = 0494369 Tab

6 = 0494371 Insert

NOTE: (Aluminum strip)

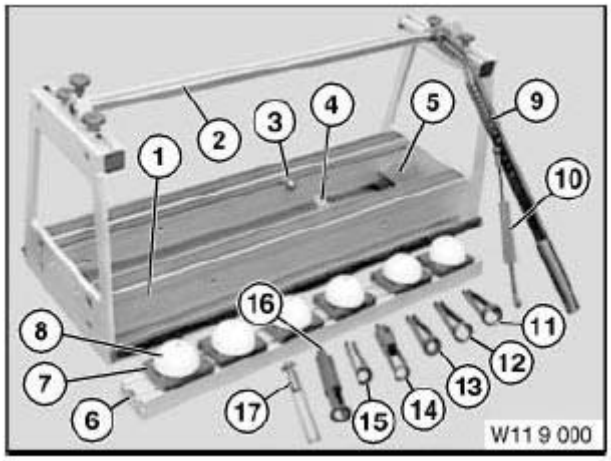


Fig. 14: Identifying Device (119000)
Courtesy of BMW OF NORTH AMERICA, INC.

10 = 0494375 Hook

11 = 0494376 Cage

NOTE: (Valve spring cage) Engine M41, M51, S50

12 = 0494377 Cage

NOTE: (Valve spring cage) Engine M43, M73

13 = 0494378 Cage

NOTE: (Valve spring cage) Engine M44, M52, M54, M56, M62, S52, S54, S62

14 = 0494379 Cage

NOTE: (Valve spring cage) Engine M47, M47TU, M57, M57TU, N40, N42, N62, N73

15 = 0494380 Cage

NOTE: (Valve spring cage) Engine M21, M40

11-4270 DEVICE

0495003 114270 Device Minimum set: Mechanical tools MW

Replaced by: 0496671

NOTE: (Assembly and disassembly tool) For removing and installing pressure spring for intermediate lever. Is replaced by 11 7 110 (0 496 671)

Storage Location

C51

B51

SI number

01 17 04 (130)

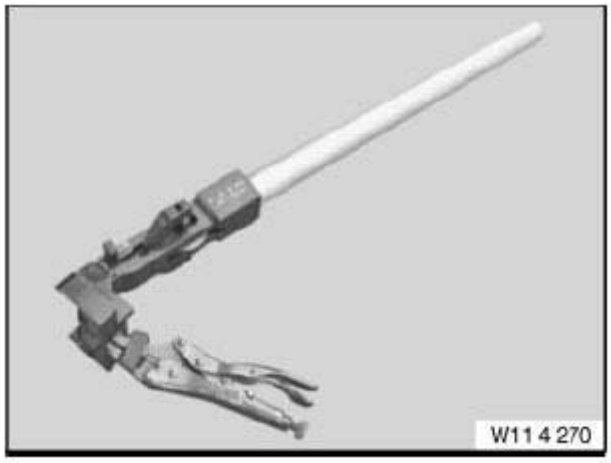


Fig. 15: Identifying Device (114270)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4080 DEVICE

0491008 114080 Device MW

Replaced by: 0491007

NOTE: For installation of the dipstick guide tube - Replaced by 11 4 070 (0 491 007)

11-9340 DEVICE

0493971 119340 Device Minimum set: Mechanical tools MW

NOTE: (Device) For tensioning timing chain when adjusting timing

Storage Location

B43

SI number

01 01 01 (662)

Consisting of:

1 = 0494032 Bolt

2 = 0494033 Spindle

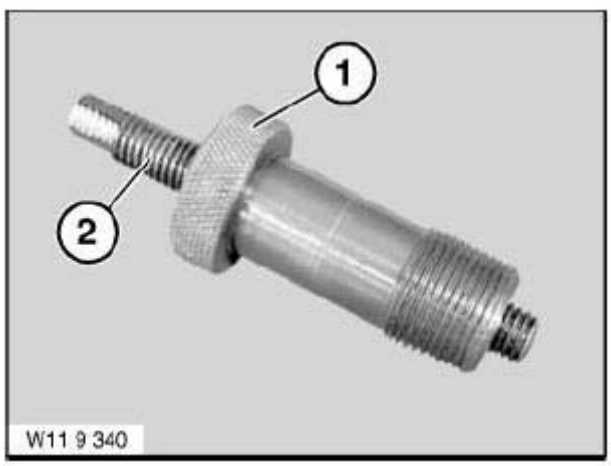


Fig. 16: Identifying Device (119340)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4360 DEVICE

0495019 114360 Device Minimum set: Mechanical tools MW

NOTE: **(Removal and mounting device) For removal and installation of cover of vacuum pump.**

SI number

01 17 04 (130)

Consisting of:

2 = 0495021 Adapter

NOTE: **(Adapter with knurled screw)**

1 = 0495020 Clip

3 = 0495022 Spindle

NOTE: **(pressure spindle)**

4 = 0495023 Spindle

NOTE: **(Drawing spindle)**

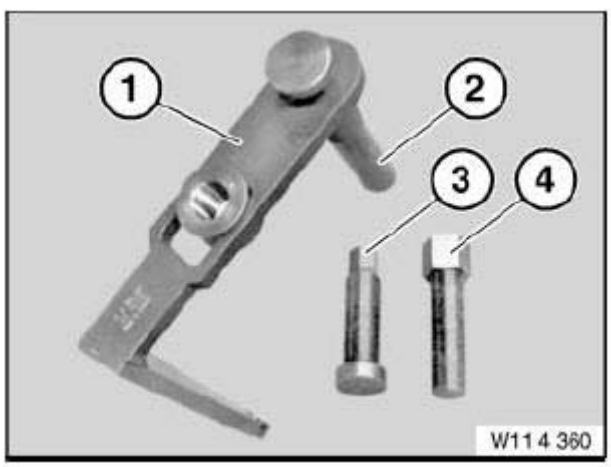


Fig. 17: Identifying Device (114360)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4460 DEVICE

0495050 114460 Device Minimum set: Mechanical tools MW

NOTE: **(Locating device) For locating the upper and lower bearing strips when installing the exhaust camshaft.**

SI number

01 17 04 (130)

Consisting of:

1 = 0495099 Tool

NOTE: (Press-down tool, 2nd cylinder)

2 = 0495100 Bolt

NOTE: (Screws M7 (2 pieces))

3 = 0495101 Synchronizing key

NOTE: (Synchronizing keys 6 pieces)

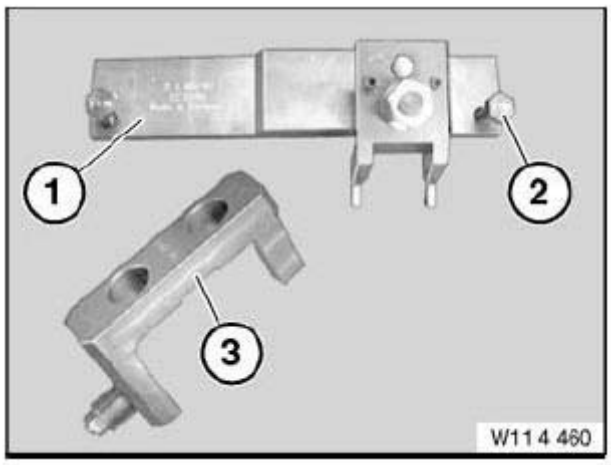


Fig. 18: Identifying Device (114460)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9150 EXTENSION

0493751 119150 Extension Minimum set: Mechanical tools MW

NOTE: (Socket wrench extension) For loosening and tightening the oxygen sensor

Storage Location

A42

SI number

01 15 00 (609)

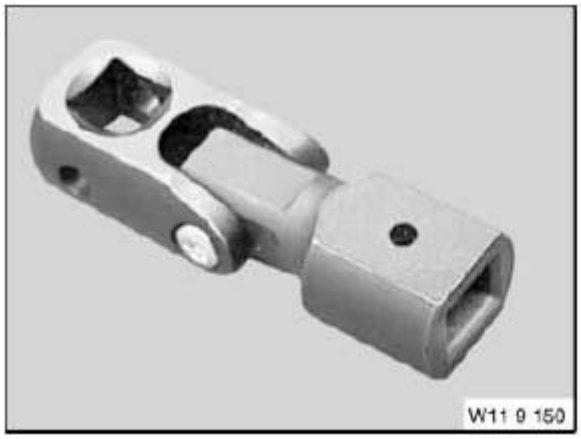


Fig. 19: Identifying Extension (119150)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9200 EXTRACTOR

0493933 119200 Extractor Minimum set: Mechanical tools MW

NOTE: For RSS out of engine block at rear

Storage Location

C43

SI number

01 01 01 (662)

Fig. 20: Identifying Extractor (119200)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9220 EXTRACTOR

0493934 119220 Extractor Minimum set: Mechanical tools MW

NOTE: For radial shaft seal out of engine block at front

Storage Location

C43

SI number

01 01 01 (662)

Consisting of:

1 = 0494040 Bolt

NOTE: Replaced by 11 9 225 (0 496 261)

1 = 0494041 Bolt

NOTE: (screws (6 pieces))

1 = 0494039 Synchronizing key

4 = 0494042 Bolt

NOTE: (Screws (3 pieces))

5 = 0496261 Bolt

6 = 0496262 Puller

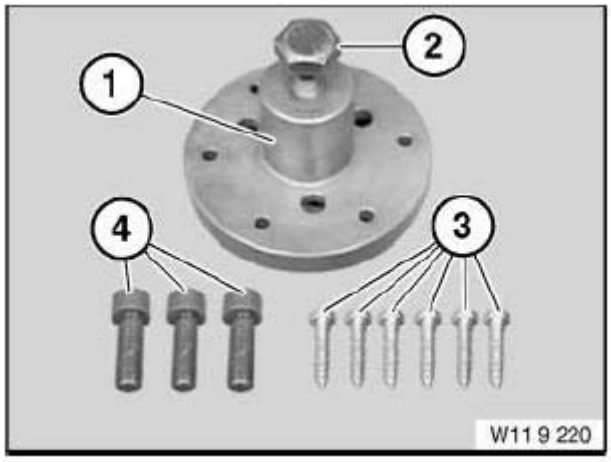


Fig. 21: Identifying Extractor (119220)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0340 FITTING AID

0490646 110340 Fitting aid MW

Replaced by: 0494362

NOTE: (fitting accessories) For removing and fitting the valve springs. Replaced by 11 9 000 (0 494 362)

SI number

01 12 93 (701)

Consisting of:

3 = 0490649 Hook

NOTE: (hook) Length 220 mm - Engine: all, except M10 Replaced by 11 9 000 (0 494 362)

5 = 0490651 Cage

NOTE: (Valve spring cage) Engine: M44, M52, M62, S62, S54 Replaced by 11 9 000 (0 494 362)

1 = 0490647 Cage

NOTE: (Valve spring cage) Engine: M43, M73

2 = 0490648 Lever

NOTE: (compression lever) Engine: all, except M10

6 = 0493285 Cage

NOTE: (Valve spring cage) Engine: M47, M47TU, M57, N40, N42, M67, M67TU

4 = 0490650 Cage

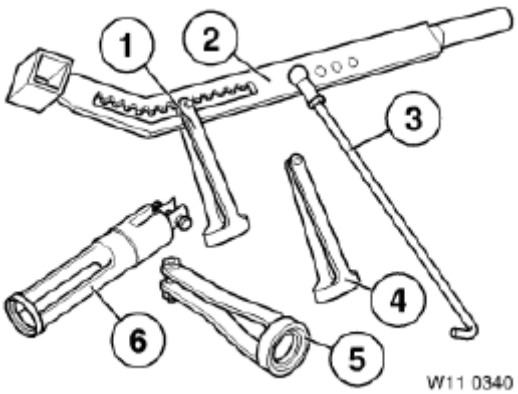


Fig. 22: Identifying Fitting Aid (110340)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (valve spring cage) Replaced by 11 0345, engine: M52

11-1240 FITTING AID

0496084 111240 Fitting aid Minimum set: Mechanical tools MW

NOTE: (installation set) For installing elasto-belt.

SI number

01 01 07 (333)

Consisting of:

1 = 0496085 Fitting aid

NOTE: (Mounting tool)

2 = 0496086 Guard

NOTE: (Belt guard)

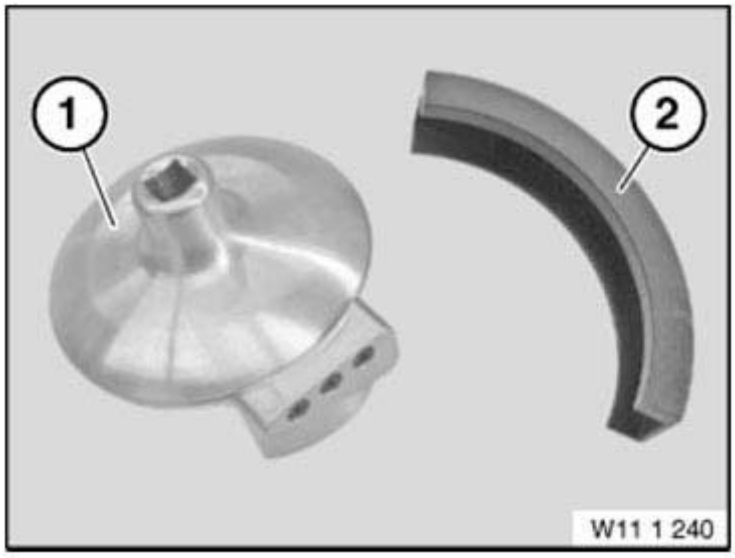


Fig. 23: Identifying Fitting Aid (11-1240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4290 Gauge

0495008 114290 Gauge Minimum set: Mechanical tools MW

NOTE: For disconnecting camshaft sensor gears.

Storage Location

A52

A51

SI number

01 17 04 (130)

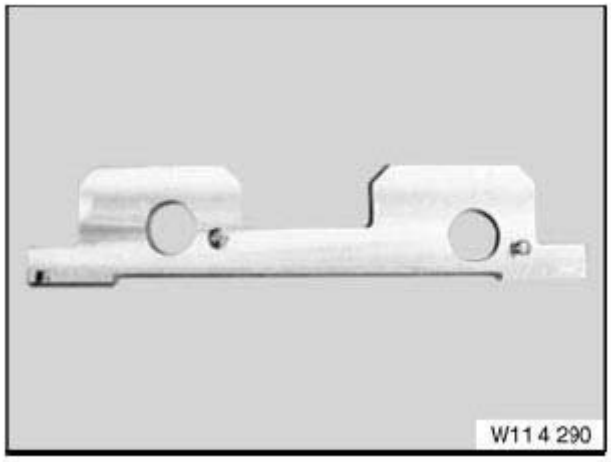


Fig. 24: Identifying Fitting Aid (11-1240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7440 GAUGE

0496942 117440 Gauge Minimum set: Mechanical tools MW

NOTE: For fixing the camshaft at the top dead center.

SI number

01 07 10 (634)

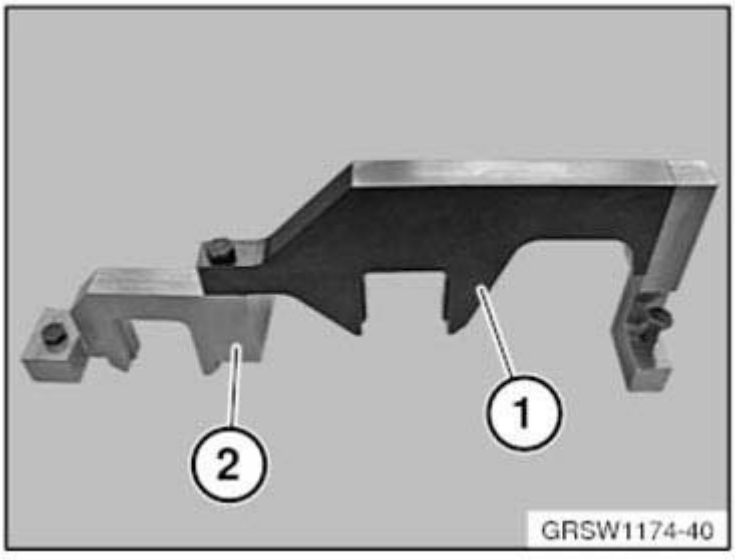


Fig. 25: Identifying Gauge (117440)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4280 GAUGE

0495004 114280 Gauge Minimum set: Mechanical tools MW

NOTE: For locating camshaft in TDC setting.

Storage Location

B52

SI number

01 17 04 (130)

Consisting of:

4 = 0495723 Bolt

NOTE: (Set of screws M6) Engine: N54

1 = 0495005 Gauge

2 = 0495006 Adapter

3 = 0495007 Retaining bracket

5 = 0496673 Bridge

NOTE: For securing camshaft at TDC.

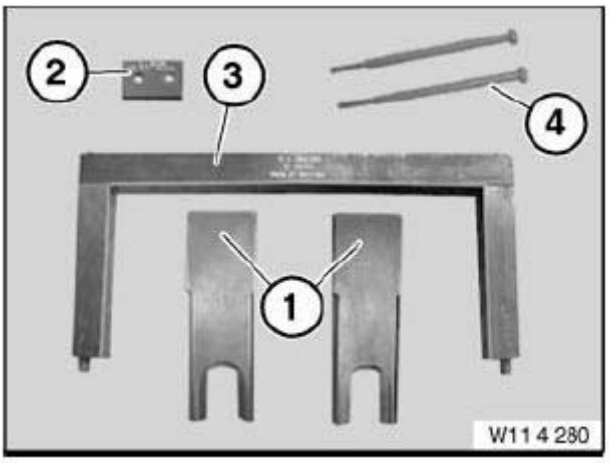


Fig. 26: Identifying Gauge (114280)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4250 GAUGE

0494999 114250 Gauge Minimum set: Mechanical tools MW

NOTE: (Gauge with adapter plate) For securing the oil spray nozzles.

SI number

01 17 04 (130)

Consisting of:

1 = 0495000 Gauge

2 = 0495001 Plate

NOTE: (Adapter plate)

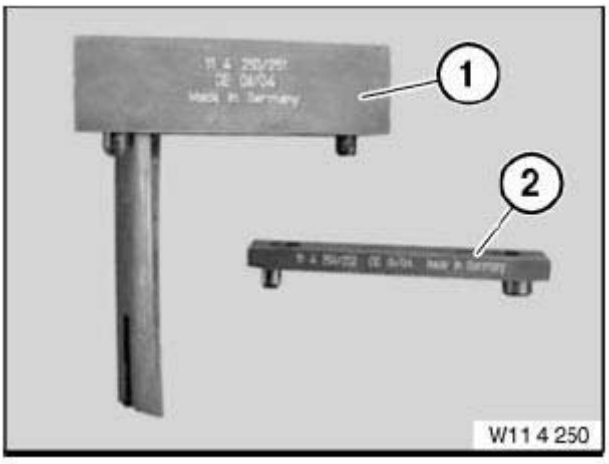


Fig. 27: Identifying Gauge (114250)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9260 HOLDER

0493938 119260 Holder Minimum set: Mechanical tools MW

NOTE: (Counter support with screw connection) For holding the flywheel when gearbox is removed

Storage Location

B43

SI number

01 01 01 (662)

Consisting of:

1 = 0494034 Holder

NOTE: (Individual counter support)

2 = 0494035 Screw

NOTE: (Bolt (thread M10) with washer) For screwing counter support

3 = 0494129 Bush

NOTE: (Bush for counter support) For counter support, for retaining flywheel when gearbox is removed Engine: N62, N73

4 = 0494130 Screw

NOTE: (Bolt (thread M12)) For counter support for retaining flywheel when gearbox is removed

5 = 0494793 Bush

6 = 0495216 Bush

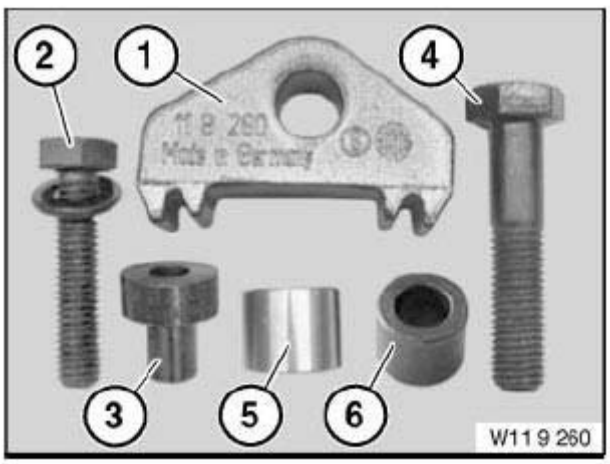


Fig. 28: Identifying Holder (119260)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For counter support, for retaining flywheel when gearbox is removed Engine: M57TU2

11-8180 HOLDER

0493587 118180 Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) Blocking flywheel when releasing and tightening down central bolts on vibration absorber

Storage Location

C45

C46

SI number

01 12 99 (452)

Consisting of:

1 = 0494432 Basic body

NOTE: (Basic body) E65/M67, E38/M67 Discontinuation Replaced by 11 8 183 (0 494 434)

2 = 0494433 Shaped part

NOTE: (Shaped part)

3 = 0494434 Basic body

4 = 0494435 Adapter

NOTE: E65/M67

5 = 0494716 Adapter

NOTE: (Adapter with adjusting sleeve) E46 M47TU

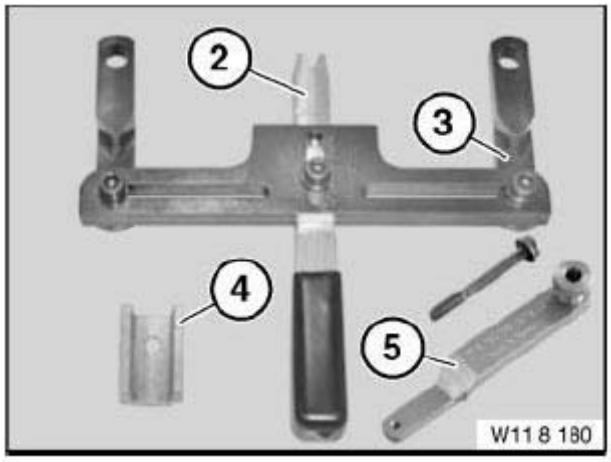


Fig. 29: Identifying Holder (118180)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9280 HOLDER

0493940 119280 Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) For the crankshaft when releasing/tightening the central bolt

Storage Location

B43

C43

A43

SI number

01 01 01 (662)

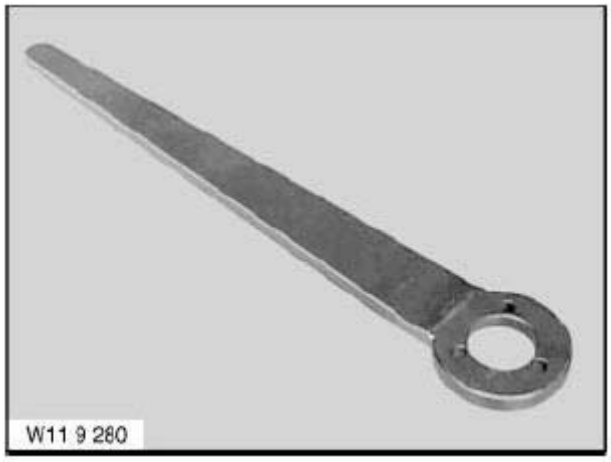


Fig. 30: Identifying Holder (119280)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9811 HOLDER

11 9 811 Holder

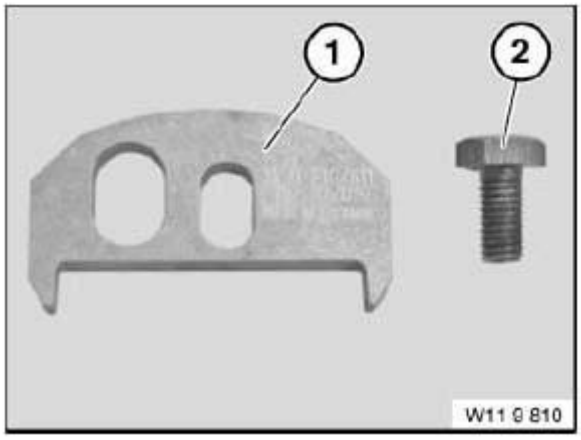


Fig. 31: Identifying Holder (119811)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2220 HOLDER

0490853 112220 Holder MW

Replaced by: 0490855

NOTE: (Counter support) - Nov. 88 Replaced by 11 2 240 (0 490 855)

11-4491 HOLDER

0495010 114491 Holder MW

NOTE: **(Installation bracket)**

Storage Location

A51

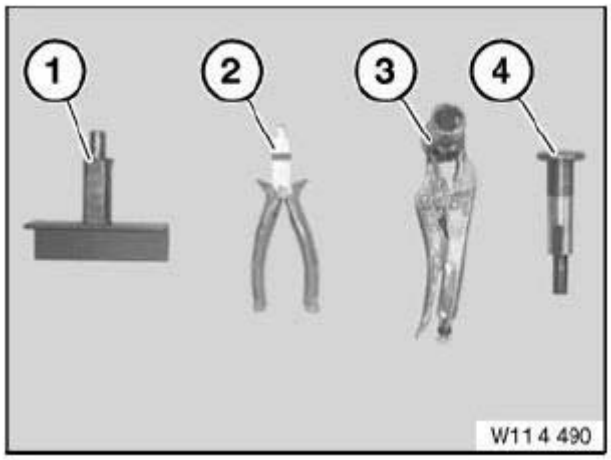


Fig. 32: Identifying Holder (114491)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0290 HOLDER

0495071 110290 Holder Minimum set: Mechanical tools MW

NOTE: **(Counter support) For removing and installing triangular drive (vacuum pump) on crankcase.**

Storage Location

A52

SI number

01 17 04 (130)

Fig. 33: Identifying Holder (110290)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5463 INSTALLATION DRIFT

11 5 463 Installation drift

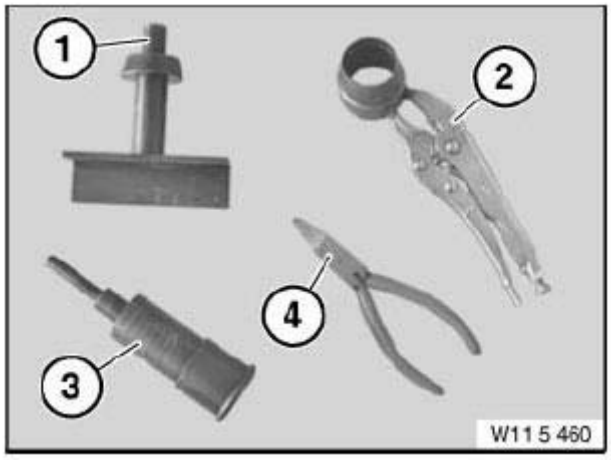


Fig. 34: Identifying Installation Drift (115463)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5461 INSTALLATION HOLDER

11 5 461 Installation holder

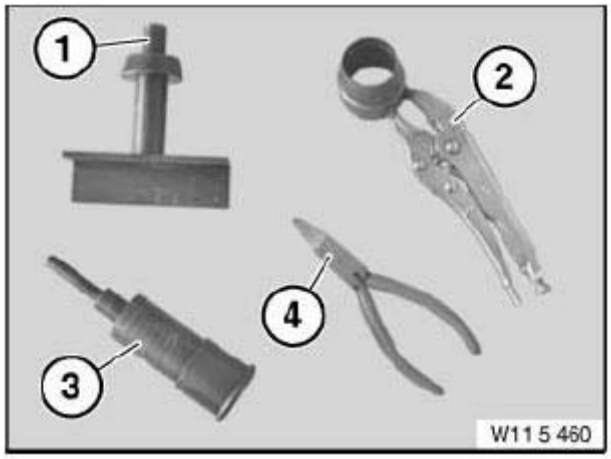


Fig. 35: Identifying Installation Holder (115461)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5462 INSTALLATION PLIERS

11 5 462 Installation pliers

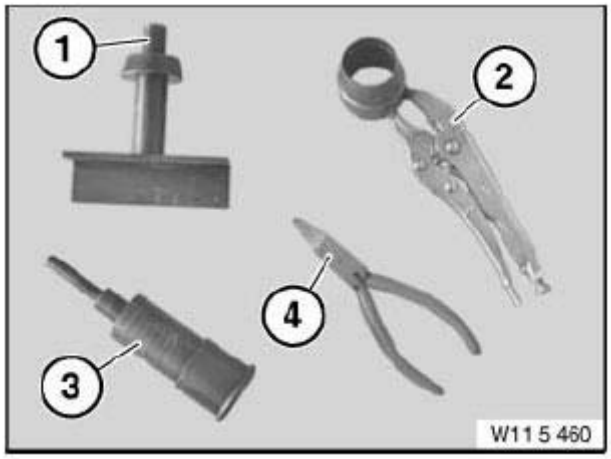


Fig. 36: Identifying Installation Pliers (115462)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0070 LIFTING GEAR

0490579 110070 Lifting gear Minimum set: Mechanical tools MW

NOTE: (Lifting gear) For removing and installing engines

SI number

01 16 96 (107)

Consisting of:

4 = 0493753 Shackle

NOTE: (Shackle) 2 x

1 = 0490580 Lifting gear

NOTE: (cross-member)

2 = 0490581 Chain

NOTE: (Chain) Version: long

3 = 0490582 Chain

NOTE: (Chain) Version: short

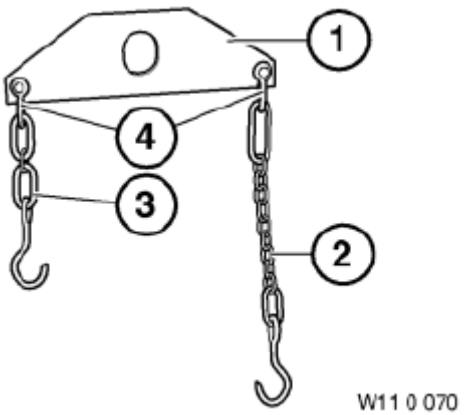


Fig. 37: Identifying Lifting Gear (110070)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0000 LIFTING GEAR

0490561 110000 Lifting gear Minimum set: Mechanical tools MW

NOTE: (Hoist) For removing and installing engines.

SI number

01 13 94 (888)

Consisting of:

1 = 0490562 Lifting gear

NOTE: (Cross-member)

2 = 0490563 Chain

NOTE: (Chain) Version: long

3 = 0490564 Chain

NOTE: (Chain) Version: short

4 = 0490565 Shackle

NOTE: (Shackle) 2 x

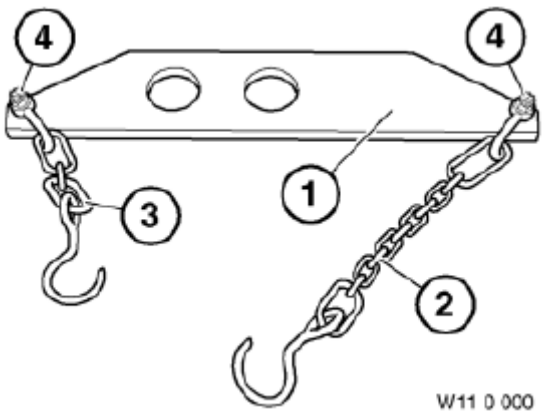


Fig. 38: Identifying Lifting Gear (110000)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0020 LIFTING GEAR

0490567 110020 Lifting gear Minimum set: Mechanical tools MW

NOTE: For removing and installing engines.

SI number

01 13 94 (888)

Consisting of:

1 = 0490568 Lifting gear

NOTE: **(Cross-member)**

2 = 0490569 Chain

NOTE: **(Chain)**

3 = 0490570 Chain

NOTE: **(Chain) Version: long**

4 = 0490571 Chain

NOTE: **(Chain) Version: short**

5 = 0490572 Shackle

NOTE: **(Shackle) 2 pieces**

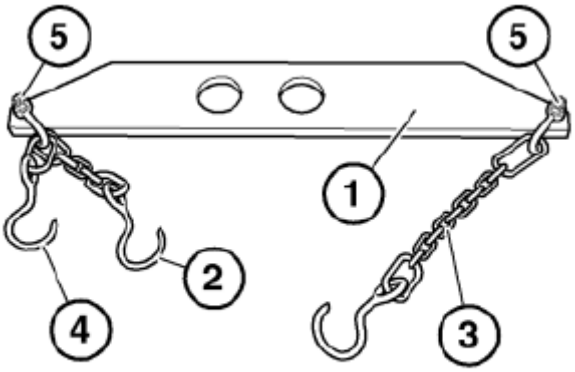


Fig. 39: Identifying Lifting Gear (110020)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1310 MANDREL

0490739 111310 Mandrel MW

NOTE: **(Drift) For driving needle bearing out of crankcase (M20) and pressing out propeller shaft centering mount**

W11 1 310

Fig. 40: Identifying Mandrel (111310)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9360 MANDREL

0493973 119360 Mandrel Minimum set: Mechanical tools MW

NOTE: For driving valve into engine block (sealing compound)

Storage Location

A43

SI number

01 01 01 (662)

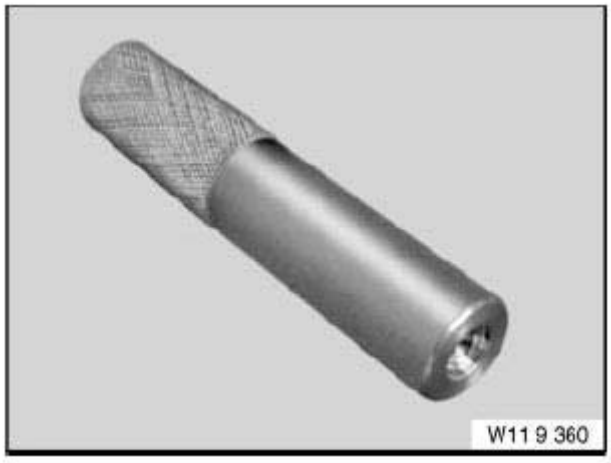


Fig. 41: Identifying Mandrel (119360)
Courtesy of BMW OF NORTH AMERICA, INC.

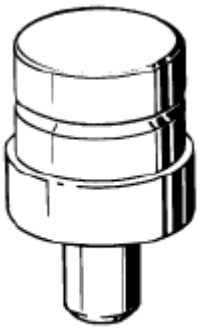
11-2030 MANDREL

0490818 112030 Mandrel Minimum set: Mechanical tools MW

NOTE: **(drift) For driving guide bearing into crankshaft (S14, S38, M10, M20, M21, M30, M40, M42, M50, M51 M52) and driving centering mount into propeller shaft**

Storage Location

A15



W11 2 030

Fig. 42: Identifying Mandrel (112030)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4494 MANDREL

0495013 114494 Mandrel MW

NOTE: **(Installation drift)**

Storage Location

A51

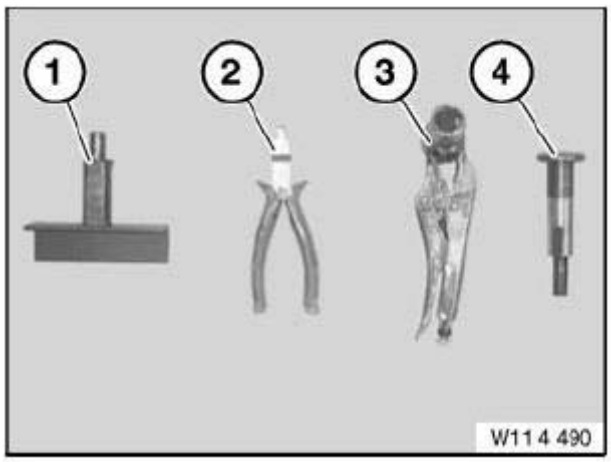


Fig. 43: Identifying Mandrel (114494)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0300 MANDREL

0495070 110300 Mandrel Minimum set: Mechanical tools MW

NOTE: (Alignment pin) For securing the flywheel at the TDC setting

Storage Location

A52

SI number

01 17 04 (130)

Fig. 44: Identifying Mandrel (110300)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1170 MANDREL

0490721 111170 Mandrel MW

NOTE: (Mandrel) Replaced by 11 1 200

11-1190 MANDREL

0490723 111190 Mandrel MW

NOTE: (Drift) Replaced by 11 1 200

11-1140 MANDREL

0490718 111140 Mandrel MW

Replaced by: 0490724

NOTE: (Drift) Replaced by 11 1 200 (0 490 724)

11-4480 ODDMENTS TRAY

0495105 114480 Oddments tray Minimum set: Mechanical tools MW

NOTE: (Boards (2 pieces)) For setting down the individual components of the cylinder head.

SI number

01 17 04 (130)

Consisting of:

1 = 0495106 Oddments tray

NOTE: (Board for intake side)

2 = 0495107 Oddments tray

NOTE: (Board for exhaust side)

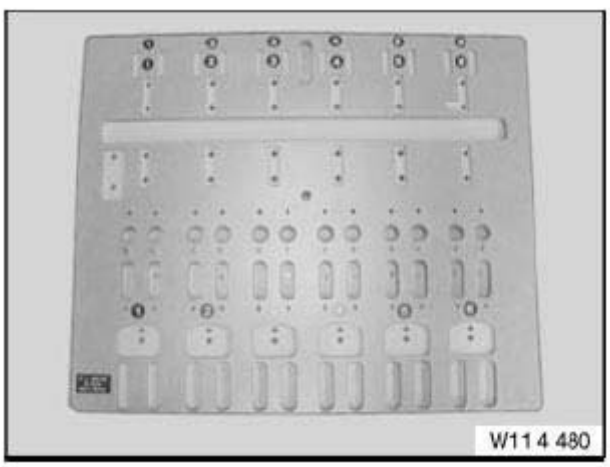


Fig. 45: Identifying Oddments Tray (114480)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9240 OIL FILTER WRENCH

0493936 119240 Oil filter wrench Minimum set: Mechanical tools MW

NOTE: **For unfastening and tightening oil filter cover**

Storage Location

A43

SI number

01 01 01 (662)

Fig. 46: Identifying Oil Filter Wrench (119240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-3340 PIN

0490973 113340 Pin Minimum set: Mechanical tools MW

NOTE: **(lock pin (2 pieces)) For retaining the chain tensioner piston (e.g. when removing and installing the cylinder head) and to lock the drive belt tensioner**

Storage Location

B5

C5

SI number

01 09 91 (416)

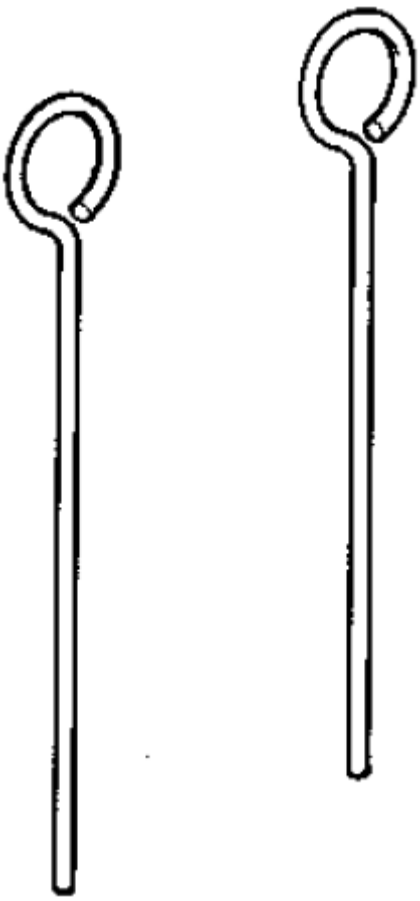


Fig. 47: Identifying Pin (113340)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4120 PIN

0491012 114120 Pin Minimum set: Mechanical tools MW

NOTE: (lock pin) For chain tensioners, for locking the chain tensioner piston (e.g. during cylinder head removal and fitting)

Storage Location

B5

C5

SI number

01 12 93 (701)

W 11 4 120

Fig. 48: Identifying Pin (114120)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8540 PLATE

0495736 118540 Plate MW

NOTE: (Fixture) For mounting engine on assembly stand.

SI number

01 20 06 (299)

Consisting of:

1 = 0495737 Fixture

NOTE: (Engine mount)

2 = 0495738 Screw

NOTE: (Set of screws (4 x))

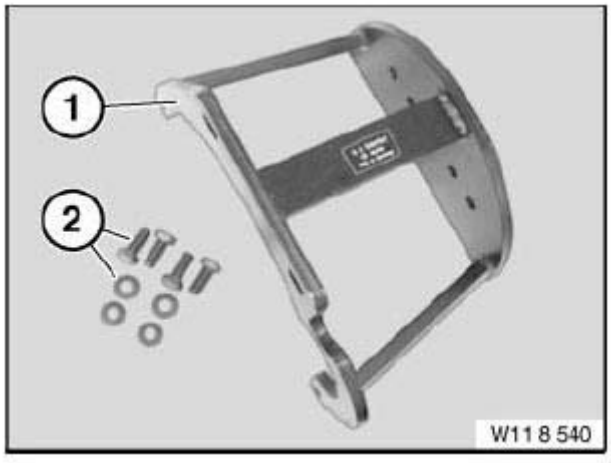


Fig. 49: Identifying Plate (118540)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4440 PLATE

0495048 114440 Plate MW

Replaced by: 0495736

NOTE: (Fixture) For mounting engine on assembly stand. Is replaced by 11 8 540 (0 495 736)

SI number

01 17 04 (130)

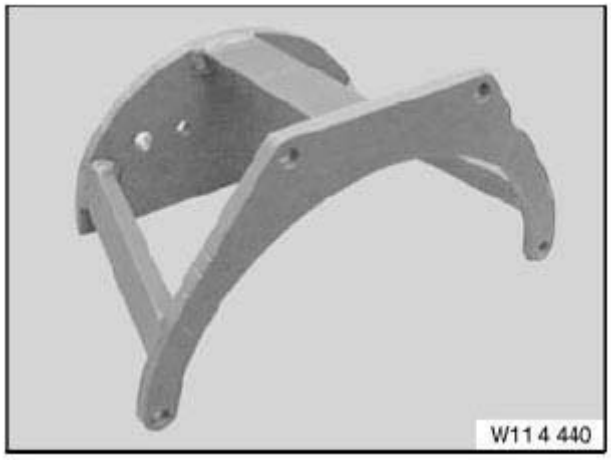


Fig. 50: Identifying Plate (114440)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2090 PLIERS

0490824 112090 Pliers MW

Replaced by: 0490796

NOTE: For removal of the valve stem seals - Replaced by 11 1 480 (0 490 796)

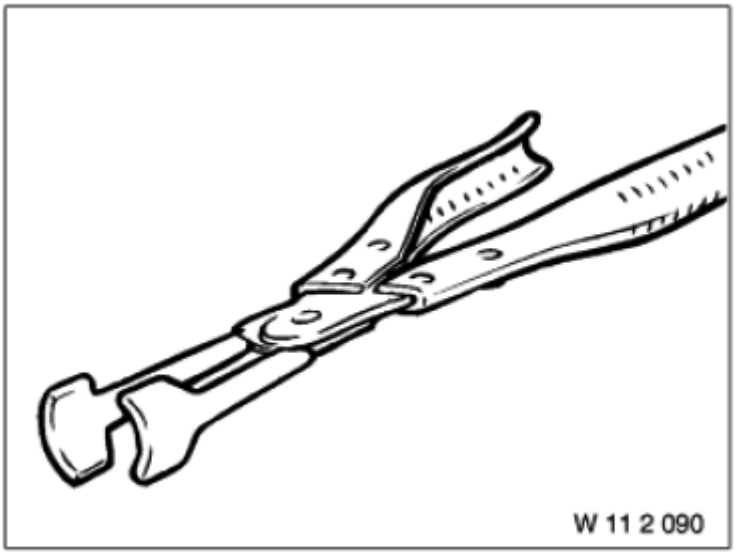


Fig. 51: Identifying Pliers (112090)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1250 PLIERS

0490728 111250 Pliers MW

Replaced by: 0490796

NOTE: For removing and installing the valve stem seal. Only free for motorcycle! Replaced by 11 1 480 (0 490 796)

11-1480 PLIERS

0490796 111480 Pliers Minimum set: Mechanical tools MW

NOTE: For removing valve stem seal

Storage Location

B10

SI number

01 01 93 (621)

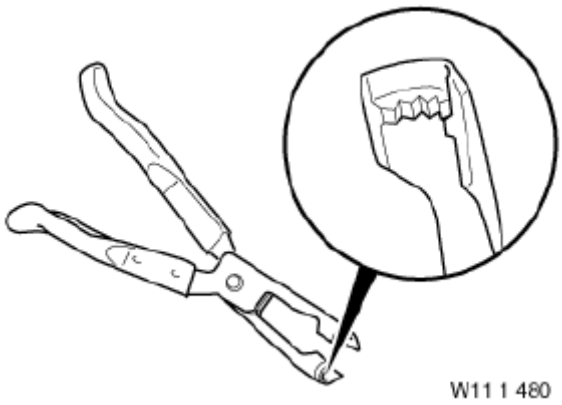


Fig. 52: Identifying Pliers (111480)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4492 PLIERS

0495011 114492 Pliers MW

NOTE: (Removal pliers)

Storage Location

A51

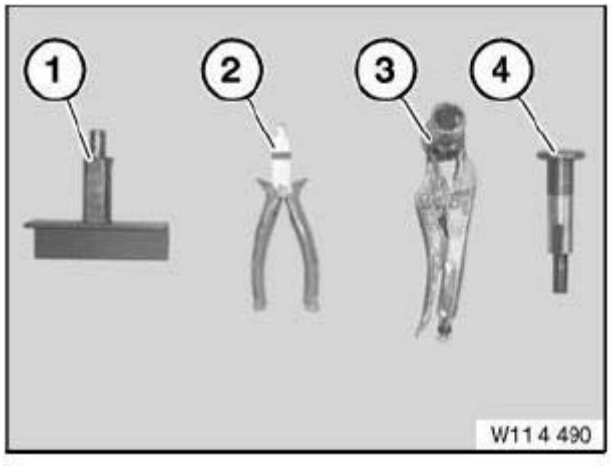


Fig. 53: Identifying Pliers (114492)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4493 PLIERS

0495012 114493 Pliers MW

NOTE: (Installation pliers)

Storage Location

A51

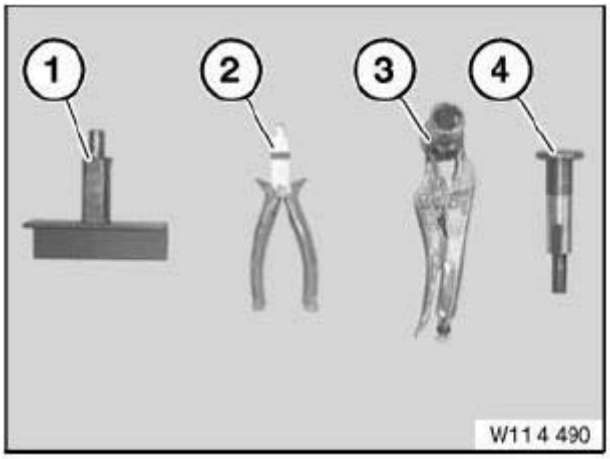


Fig. 54: Identifying Pliers (114493)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4430 PLUG

0495027 114430 Plug Minimum set: Mechanical tools MW

NOTE: (Seal plugs (2x)) For sealing off oil holes in oil pump.

Storage Location

A52

SI number

01 17 04 (130)

Fig. 55: Identifying Plug (114430)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0370 PULLER

0496266 110370 Puller Minimum set: Mechanical tools MW

NOTE: For removing front radial shaft seal.

Storage Location

C23

SI number

01 15 07 (390)

Consisting of:

1 = 0496275 Bell housing

NOTE: (thread housing)

2 = 0496276 Spindle

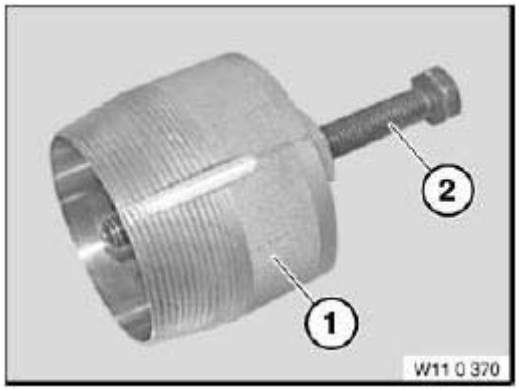


Fig. 56: Identifying Puller (110370)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8530 REMOVAL AND FITTING AID

0495728 118530 Removal and fitting aid Minimum set: Mechanical tools MW

NOTE: (Removal and mounting tool) For removal and installation of sealing cap of vacuum pump.

SI number

01 20 06 (299)

Consisting of:

8 = 0496704 Bush

In conjunction with: 11 8 530

1 = 0495729 Plate

NOTE: (Base plate)

2 = 0495730 Plate

NOTE: (Pressure plate)

3 = 0495731 Spindle

NOTE: (Spindle (pressure plate))

4 = 0495732 Spindle

NOTE: (Spindle (removal plate))

5 = 0495733 Screw

NOTE: (Set of screws M10 (N54))

6 = 0495734 Screw

NOTE: (Set of screws M11 incl. sleeve (N53))

7 = 0495735 Plate

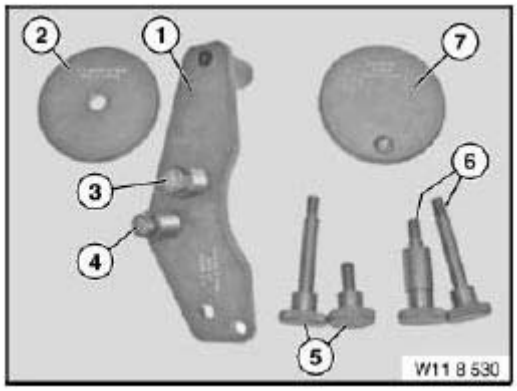


Fig. 57: Identifying Removal And Fitting Aid (118530)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Removal plate)

11-5464 REMOVAL PLIERS

11 5 464 Removal pliers

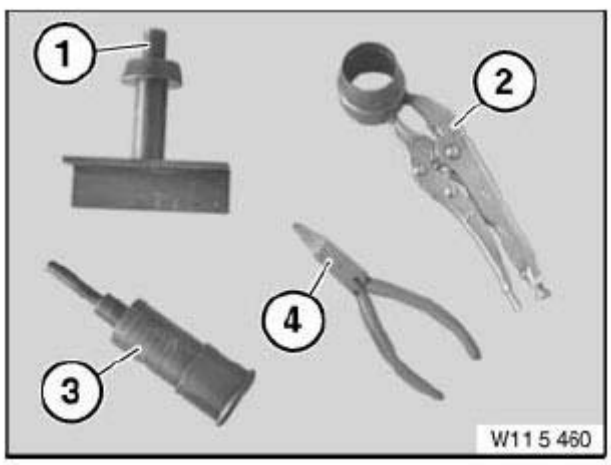


Fig. 58: Identifying Removal Pliers (115464)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9812 SCREW

11 9 812 Screw

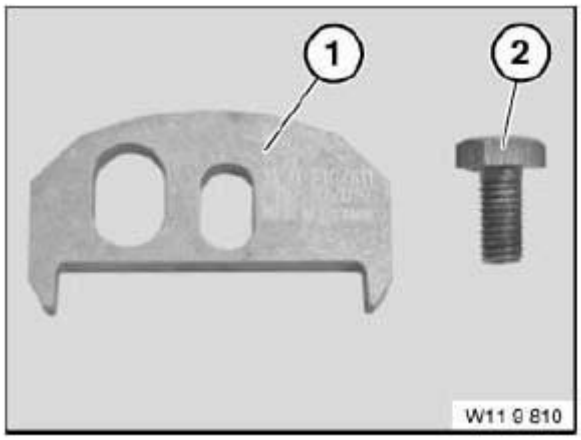


Fig. 59: Identifying Screw (119812)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4180 SCREWDRIVER INSERT

0491018 114180 Screwdriver insert Minimum set: Mechanical tools MW

NOTE: (Screwdriver insert Torx T60) For releasing and tightening down dual-mass flywheel - model year: from Jan 94

Storage Location

A11

SI number

01 02 94 (777)

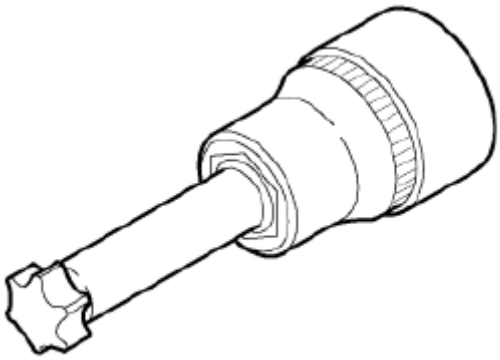


Fig. 60: Identifying Screwdriver Insert (114180)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1380 SLEEVE

0490746 111380 Sleeve Minimum set: Mechanical tools MW

NOTE: (Assembly sleeve) For fitting the valve stem seal, diameter 7 mm

Fig. 61: Identifying Sleeve (111380)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1350 SLEEVE

0490743 111350 Sleeve MW

Replaced by: 0490744

NOTE: (Assembly sleeves) For fitting the valve stem seal - Replaced by 11 1 360 (0 490 744)

11-8580 SOCKET WRENCH

0495747 118580 Socket wrench Minimum set: Mechanical tools MW

NOTE: **(wrench socket Torx T60) For removing and installing cylinder head (outside diameter 13.5 mm).**

Storage Location

B20

A20

SI number

01 20 06 (299)

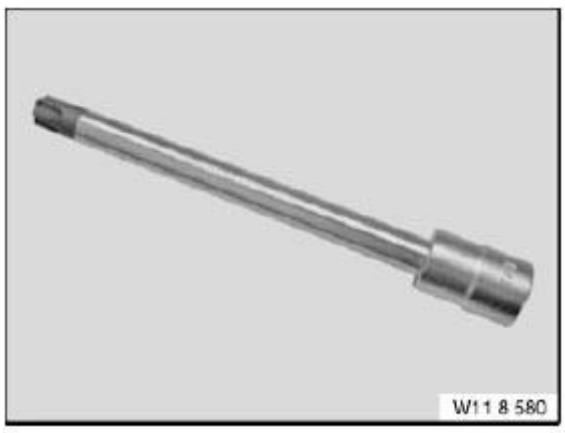


Fig. 62: Identifying Socket Wrench (118580)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4260 SOCKET WRENCH

0495002 114260 Socket wrench MW

NOTE: **For removing and installing lambda oxygen sensors.**

Storage Location

A52

SI number

01 17 04 (130)

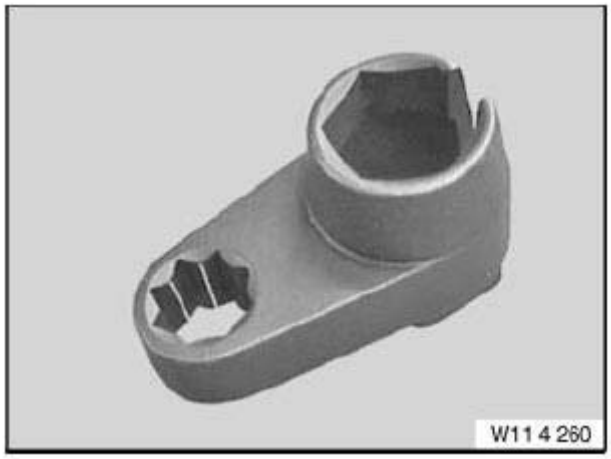


Fig. 63: Identifying Socket Wrench (114260)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9230 TOOL

0493935 119230 Tool Minimum set: Mechanical tools MW

NOTE: (Pulling device) For radial shaft seal at front of engine block

Storage Location

C43

SI number

01 01 01 (662)

Consisting of:

1 = 0494021 Bush

2 = 0494022 Spindle

4 = 0494024 Bolt

NOTE: (Screws (3 pieces))

5 = 0496670 Spindle

NOTE: N55

3 = 0494023 Nut

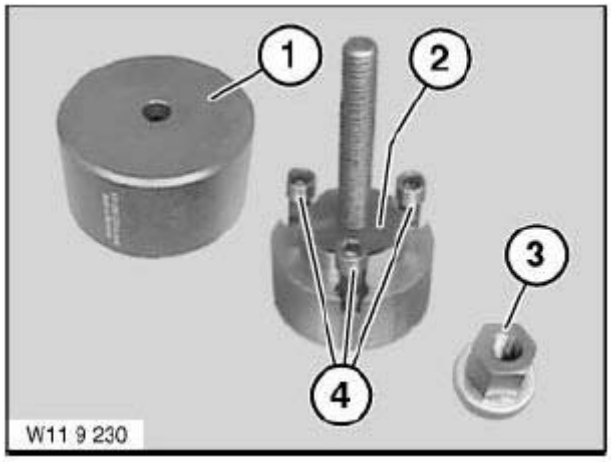


Fig. 64: Identifying Tool (119230)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4470 TOOL

0495102 114470 Tool Minimum set: Mechanical tools MW

NOTE: (cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.

SI number

01 17 04 (130)

Consisting of:

2 = 0495104 Extractor

NOTE: (grindstone)

1 = 0495103 Scraper

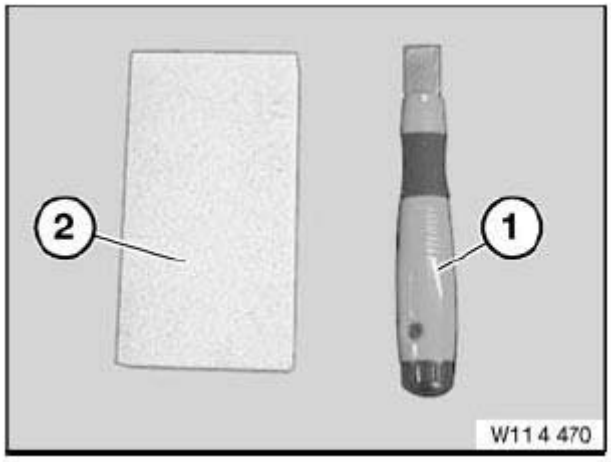


Fig. 65: Identifying Tool (114470)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6370 TOOL

0493248 116370 Tool Minimum set: Mechanical tools MW

NOTE: (Extractor tool) For pulling off the valve stem seal

Storage Location

B15

SI number

01 06 98 (306)

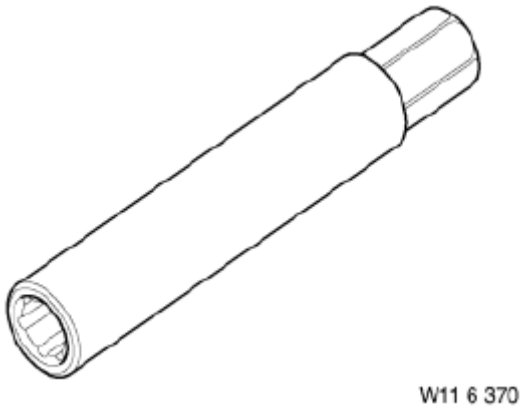


Fig. 66: Identifying Tool (116370)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9180 TOOL

0493881 119180 Tool Minimum set: Mechanical tools MW

NOTE: (pulling tool) For pulling radial shaft seal into engine block, rear

Storage Location

C43

SI number

01 01 01 (662)

Consisting of:

5 = 0496660 Ring

NOTE: For fitting rear radial shaft seal - rim offset 6.6 mm (N55).

1 = 0494028 Bush

2 = 0494029 Thrust piece

3 = 0494030 Nut

4 = 0494031 Screw

NOTE: (screws (2 x))

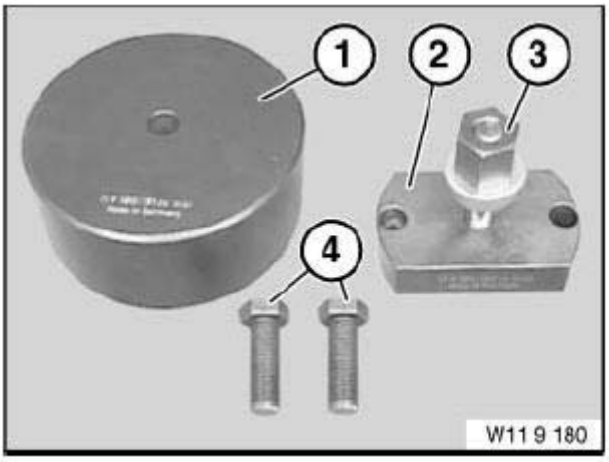


Fig. 67: Identifying Tool (119180)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4490 TOOL SET

0495009 114490 Tool set MW

NOTE: (Tool set) For removal and installation of gudgeon pin circlips.

SI number

01 17 04 (130)

Consisting of:

0495010

0495011

0495012

0495013

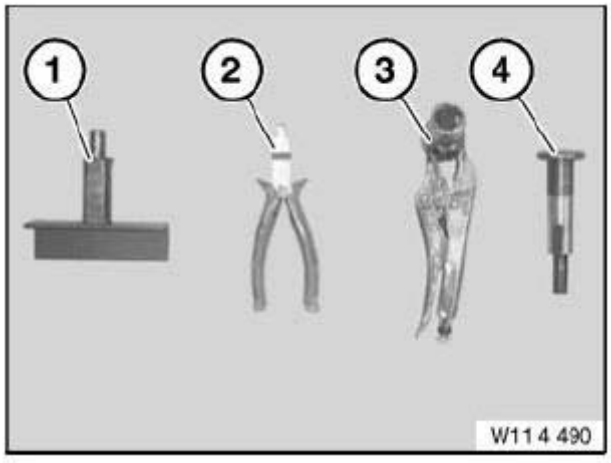


Fig. 68: Identifying Tool Set (114490)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4350 TORQUE WRENCH

0495018 114350 Torque wrench MW

NOTE: For installing camshaft bearing strips.

Storage Location

A51

SI number

01 17 04 (130)

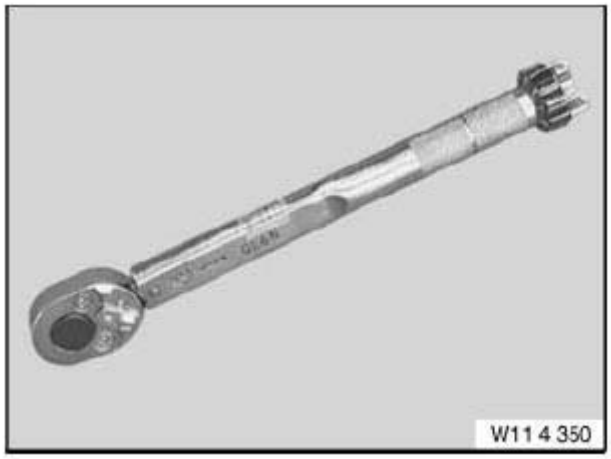


Fig. 69: Identifying Torque Wrench (114350)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8640 TORX

0495750 118640 Torx Minimum set: Mechanical tools MW

NOTE: (Torx) E10 For removing and installing oil pump triangular drive.

Storage Location

B19

SI number

01 20 06 (299)

Fig. 70: Identifying Torx (118640)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5190 TORX

0495110 115190 Torx Minimum set: Mechanical tools MW

Replaced by: 0495747

NOTE: (Torx) T60 For assembly and disassembly of cylinder head. Replaced by 11 8 580 (0 495 747)

Storage Location

A51

SI number

01 17 04 (130)

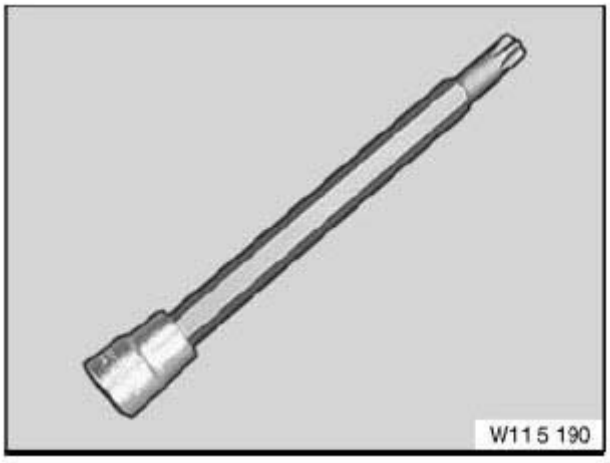


Fig. 71: Identifying Torx (115190)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4420 TORX

0495026 114420 Torx Minimum set: Mechanical tools MW

NOTE: (Torx) T50 For assembly and disassembly of cylinder head.

Storage Location

A51

SI number

01 17 04 (130)

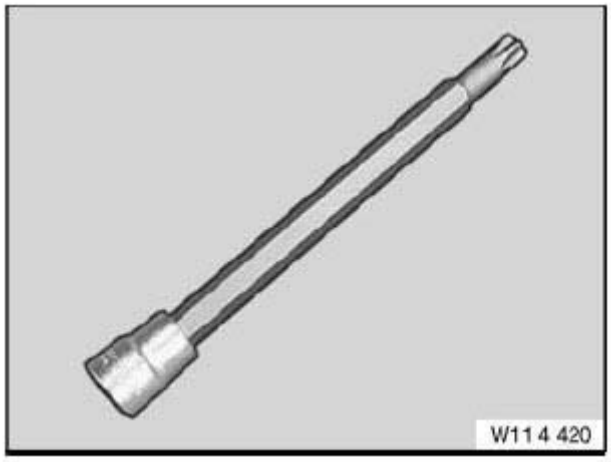


Fig. 72: Identifying Torx (114420)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5200 WASHER

0495111 115200 Washer Minimum set: Mechanical tools MW

NOTE: (Shim) For slackening and tightening the central bolt.

Storage Location

B51

SI number

01 17 04 (130)

Consisting of:

2 = 0495211 Screw

NOTE: (Screws M8x40 mm (3 x))

1 = 0495210 Washer

NOTE: (Shim)

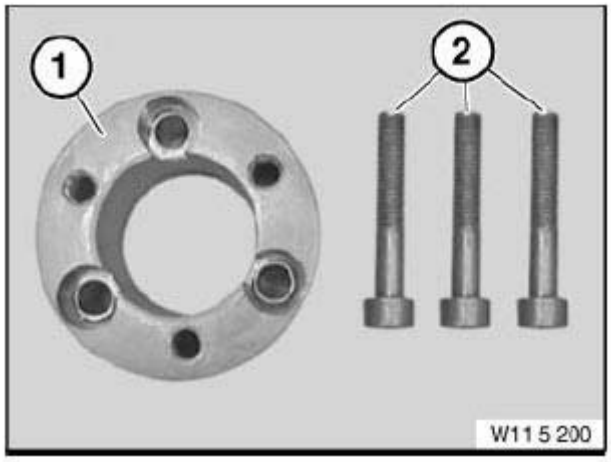


Fig. 73: Identifying Washer (115200)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7020 WRENCH SOCKET

0491074 117020 Wrench socket Minimum set: Mechanical tools MW

NOTE: (Wrench socket 22 mm) For loosening and tightening the oxygen sensor

W11 7 020

Fig. 74: Identifying Wrench Socket (117020)
Courtesy of BMW OF NORTH AMERICA, INC.

11 ENGINE

11-8730 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: For compression testing.

Storage Location

C23

SI number

01 04 07 (352)

Consisting of:

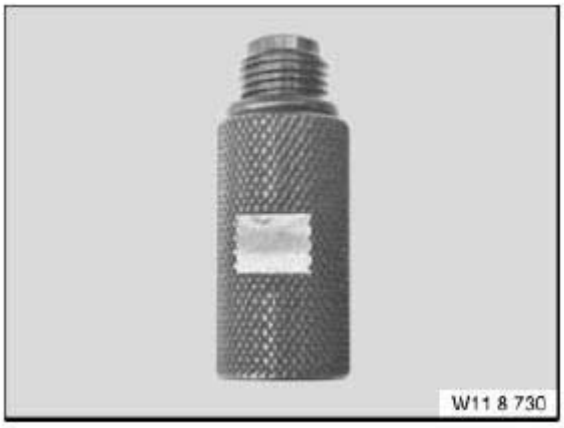


Fig. 1: Identifying Adapter (11-8730)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496305 Adapter

2 = 0496306 Ring

NOTE: (Sealing ring) For secure connection of test probe 11 0 222 and adapter 11 8 730/731.

11-4060 ADAPTER

Adapter MW

Replaced by: 0491003

NOTE: For pressure gauge for checking the oil pressure - Replaced by 11 4 030 (0 491 003)

Storage Location

B9

11-8680 ADAPTER

Adapter MW

NOTE: For securing engine during removal and installation.

SI number

01 20 06 (299)

Fig. 2: Identifying Adapter (11-8680)
Courtesy of BMW OF NORTH AMERICA, INC.

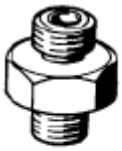
11-4050 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter) For connecting pipe bend 13 6 054 to pressure gauge 13 3 061 or BMW diagnosis and information system for checking oil pressure

Storage Location

A4



W11 4 050

Fig. 3: Identifying Adapter (11-4050)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8590 ASSEMBLY TOOL

Assembly tool MW

NOTE: For installing piston with connecting rod in cylinder head.

Storage Location

B20

A20

SI number

01 20 06 (299)

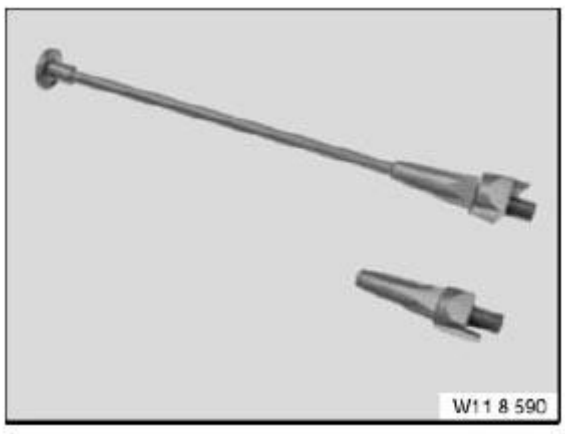


Fig. 4: Identifying Assembly Tool (11-8590)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6380 BUSH

Bush Minimum set: Mechanical tools MW

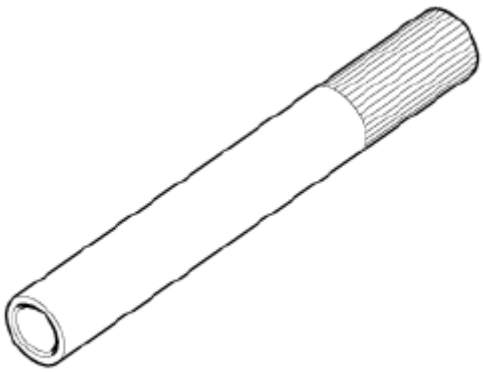
NOTE: For fitting valve stem seal

Storage Location

B15

SI number

01 06 98 (306)



W11 6 380

Fig. 5: Identifying Bush (11-6380)
Courtesy of BMW OF NORTH AMERICA, INC.

11-6260 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: (Assembly bushes with case) For installing pistons of 85 mm diameter (urgently required for pistons with U-Flex ring)

Consisting of:

W11 6 260

Fig. 6: Identifying Bush (11-6260)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0493142 Bush

NOTE: (Assembly bush) Diameter 85.50 mm, stage 2

1 = 0493139 Bush

NOTE: (Assembly bush) Diameter 85.00 mm

2 = 0493140 Bush

NOTE: (Assembly bush) Diameter 85.08 mm, repair

3 = 0493141 Bush

NOTE: (Assembly bush) Diameter 85.25 mm, stage 1

9 = 0493323 Case

NOTE: (Case) For storing assembly bushes, gauge 11 6 270 and lever dial gauge 11 6 250

11-0320 CLIP

Clip MW

NOTE: (Removal and fitting tool) For removing and installing cylinder head.

Storage Location

B51

SI number

01 17 04 (130)

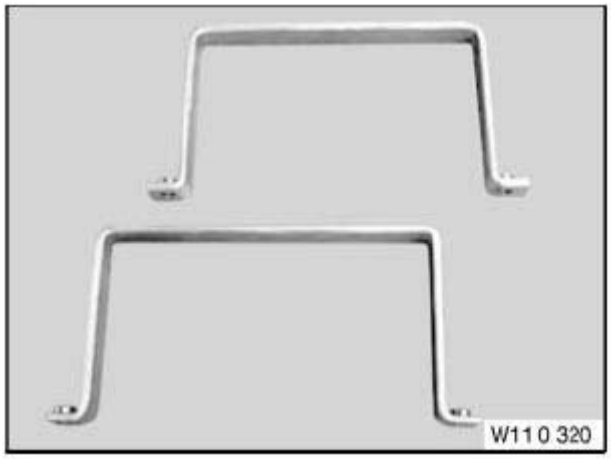


Fig. 7: Identifying Clip (11-0320)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0220 COMPRESSION TESTER

Compression tester Minimum set: Mechanical tools MW

NOTE: (Compression pressure testing set) For all petrol and diesel engines.

SI number

01 09 92 (558)

Consisting of:

4 = 0490620 Probe

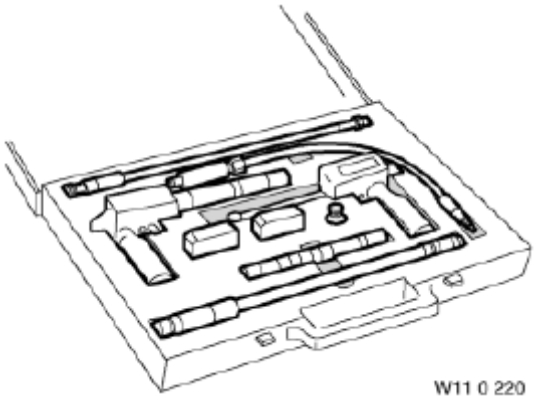


Fig. 8: Identifying Compression Tester (11-0220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Test probe) For recording compression testers 11 0 224 and 11 0 160/engine:

S14, S38, S50 - Replaced by 11 0 235 (0 493 129)

4 = 0490616 Card

NOTE: **(Cards) 100 pieces For recording compression tester 11 0 221**

4 = 0490622 Card

NOTE: **(Cards) 100 pieces For recording compression tester 11 0 224**

2 = 0494517 Adapter

NOTE: **Measuring "absolute compression" at all cylinders. Engine: W17**

2 = 0493634 Case

NOTE: **With foam material insert for recording compression tester**

16 = 0495279 Adapter

NOTE: **M67, M67TU engine**

4 = 0490614 Compression tester

NOTE: **(Compression tester) For diesel engines.**

4 = 0490615 Probe

NOTE: **(Test probe) For recording compression testers 11 0 221 and 11 0 160/engine: M21, M41, M47, M51, M57, M57T2**

4 = 0490617 Compression tester

NOTE: **(Compression tester) For petrol engines.**

4 = 0490618 Hose

NOTE: **(Extension hose) For rubber tapered section with fitting 11 0 228**

4 = 0490619 Probe

NOTE: **(Test probe) For recording compression testers 11 0 224 and 11 0 160/engine: M10, M20, M30, M40, M42, M43, M44, M50, M52, M60, M62, M70, M73, N62,**

S50US, S52US, S62

4 = 0490621 Tapered section

NOTE: **(Rubber tapered section) For recording compression testers 11 0 224 and 11 0 160.**

4 = 0490625 Valve

NOTE: **(Non-return valve)**

4 = 0490626 Filter

NOTE: **(Filter) 3 x 3 mm**

9 = 0493129 Probe

NOTE: **(Test probe, screw-in) For measuring "absolute compression" at all cylinders, engine: S14, S38, S50B30, S50B32, S50US, S52US, S54, S85**

2 = 0493387 Probe

NOTE: **(Test probe) For recording compression tester 11 0 221 or DIS pressure sensor/engine: M47, M57, M57TU, M57T2**

11-0160 COMPRESSION TESTER

Compression tester MW

Replaced by: 0490613

NOTE: **(Compression recorder) manufacturer VDO - Replaced by 11 0 220 (0 490 613)**

Consisting of:

1 = 0490594 Card

NOTE: **(Cards) For compression pressure inscriber Discontinuation and replaced by 11 0 220 (0 490 613)**

2 = 0490595 Pressure gauge

NOTE: **Compression pressure inscriber Discontinuation and replaced by 11 0 220 (0 490 613)**

3 = 0490596 Guard

NOTE: **(Rubber protection) Still available as replacement Discontinuation and replaced by 11 0 220 (0 490 613)**

4 = 0490597 Lines

NOTE: **Discontinuation and replaced by 11 0 220 (0 490 613)**

5 = 0490598 Adapter

NOTE: **(test adapter for petrol engine) Engine: all, except M70 Discontinuation and replaced by 11 0 220 (0 490 613)**

6 = 0490599 Adapter

NOTE: **(test adapter for petrol engine) Engine: M70 Discontinuation and replaced by 11 0 220 (0 490 613)**

7 = 0490600 Adapter

NOTE: **(Test adapter extension) Discontinuation and replaced by 11 0 220 (0 490 613)**

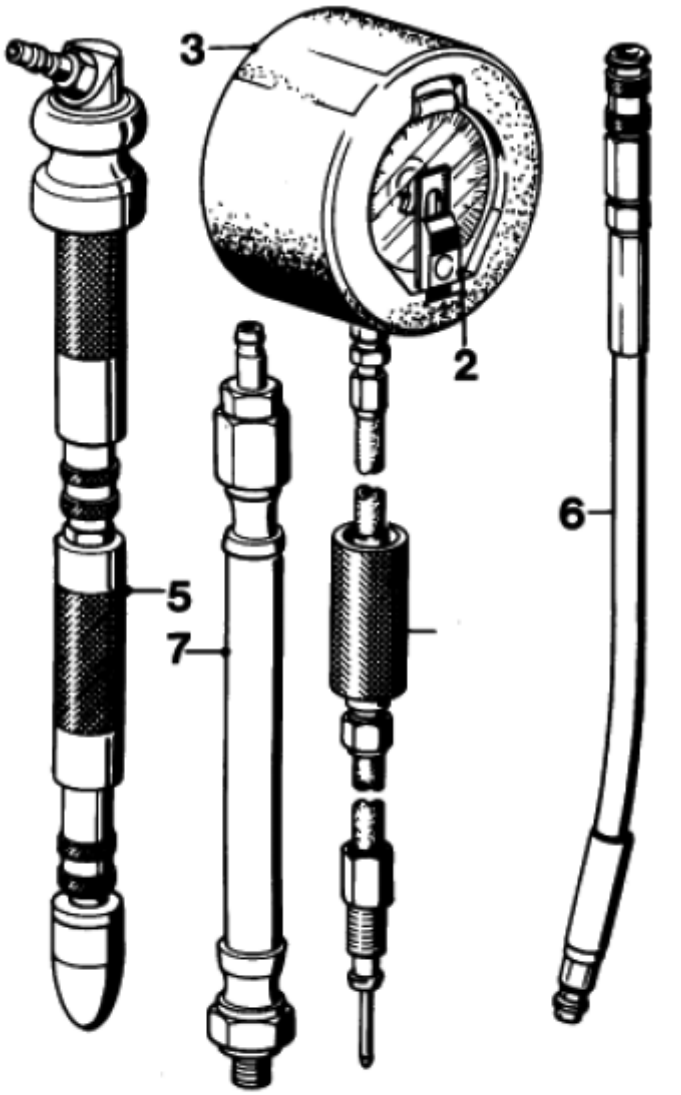


Fig. 9: Identifying Compression Tester (11-0160)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2110 DEVICE

Device MW

Replaced by: 0490504

NOTE: **For retightening the connecting rod and cylinder head bolts - Replaced by 00 9 120 (0 490 504)**

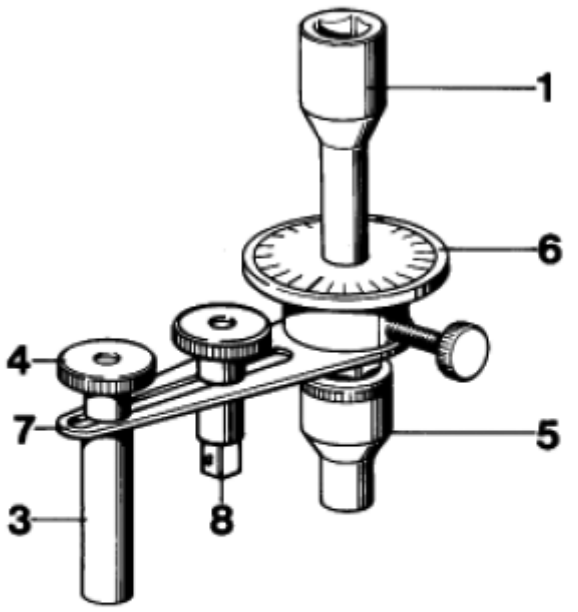
Consisting of:

1 = 0490827 Extension

NOTE: **(Extension 1/1") Replaced by 00 9 120 (0 490 504)**

2 = 0490828 Washer

NOTE: **(Graduated disc 180°) Replaced by 00 9 120 (0 490 504)**



W11 2 110

Fig. 10: Identifying Device (11-2110)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0490829 Sleeve

NOTE: **(Guide sleeve) Replaced by 00 9 120 (0 490 504)**

4 = 0490830 Nut

NOTE: **(Knurled nut) Replaced by 00 9 120 (0 490 504)**

5 = 0490831 Wrench socket

NOTE: **(Socket wrench insert WAF 10) Replaced by 00 9 120 (0 490 504)**

6 = 0490832 Washer

NOTE: **(Graduated disc up to 270°) Replaced by 00 9 120 (0 490 504)**

7 = 0490833 Tab

NOTE: **For counter-holding on the cylinder head Replaced by 00 9 120 (0 490 504)**

8 = 0490834 Adapter

NOTE: **(Adapter) Replaced by 00 9 120 (0 490 504)**

11-8910 DEVICE

Device MW

NOTE: **(Fixing device) For limiting the tilting motion of the engine when the transmission is removed or installed.**

SI number

01 24 08 (501)

Consisting of:

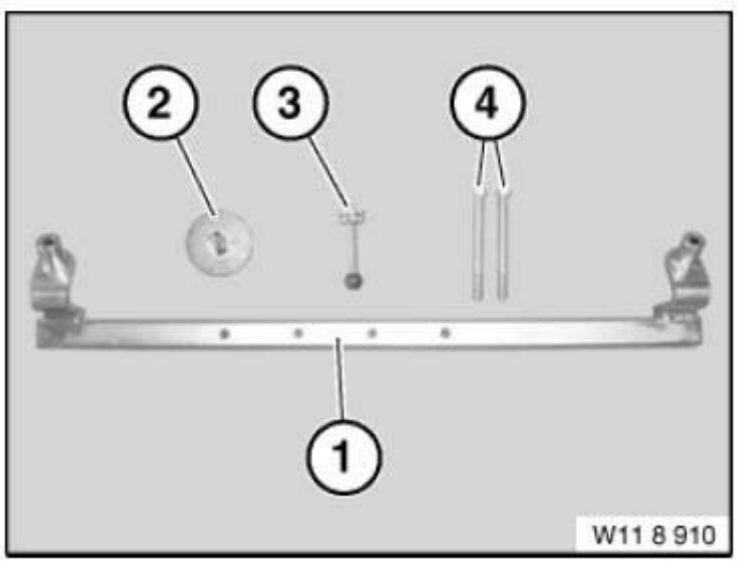


Fig. 11: Identifying Device (11-8910)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496572 Basic body

2 = 0496573 Padding

3 = 0496574 Spindle

4 = 0496575 Screw

NOTE: (Screws (2 x))

11-4340 DEVICE

Device MW

NOTE: (Pressure testing fixture) For pressure-testing cylinder head.

SI number

01 17 04 (130)

Consisting of:

2 = 0495016 Plate

NOTE: (Plate with thrust piece)

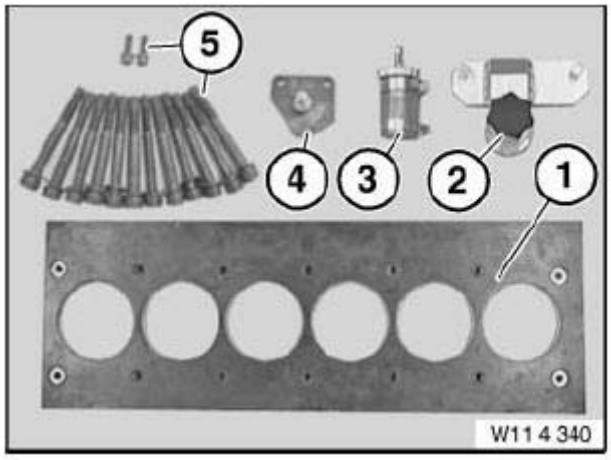


Fig. 12: Identifying Device (11-4340)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495015 Plate

NOTE: (base plate with seal)

3 = 0495017 Hose

NOTE: (Hose with air connection)

4 = 0495724 Plate

NOTE: (Adapter plate with valve) N54

5 = 0495725 Screw

NOTE: (set of screws)N54

11-4370 DEVICE

Device MW

NOTE: (pressing fixture) For pressing out sealant for bedplate.

Storage Location

A52

SI number

01 17 04 (130)

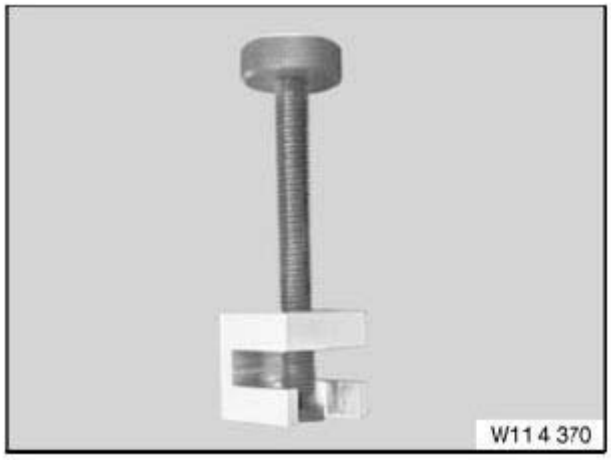


Fig. 13: Identifying Device (11-4370)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9000 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (Cylinder head expander tool)

Storage Location

Individual

SI number

01 03 02 (833)

Consisting of:

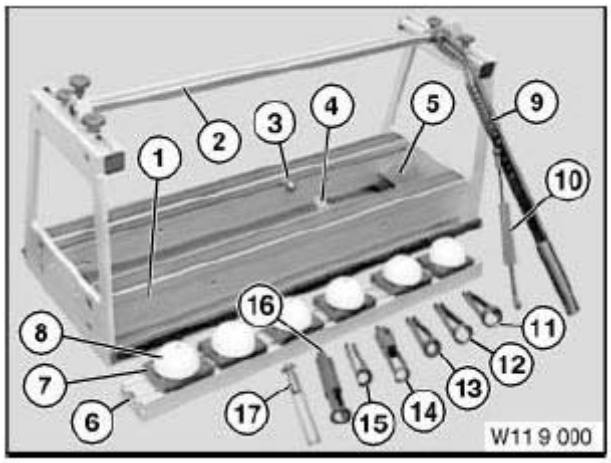


Fig. 14: Identifying Device (11-9000)

Courtesy of BMW OF NORTH AMERICA, INC.

17 = 0495028 Cage

NOTE: (Valve spring cage) Engine N52

1 = 0494366 Device

5 = 0494370 Quick fastener

7 = 0494372 Shaped part

NOTE: (Shaped part)

8 = 0494373 Shaped part

NOTE: (Shaped part) Shaped part made of plastic

9 = 0494374 Lever

2 = 0494367 Rod

3 = 0494368 Adapter

NOTE: (Sliding block)

4 = 0494369 Tab

6 = 0494371 Insert

NOTE: (Aluminum strip)

10 = 0494375 Hook

11 = 0494376 Cage

NOTE: (Valve spring cage) Engine M41, M51, S50

12 = 0494377 Cage

NOTE: (Valve spring cage) Engine M43, M73

13 = 0494378 Cage

NOTE: (Valve spring cage) Engine M44, M52, M54, M56, M62, S52, S54, S62

14 = 0494379 Cage

NOTE: (Valve spring cage) Engine M47, M47TU, M57, M57TU, N40, N42, N62, N73

15 = 0494380 Cage

NOTE: (Valve spring cage) Engine M21, M40

11-4080 DEVICE

Device MW

Replaced by: 0491007

NOTE: For installation of the dipstick guide tube - Replaced by 11 4 070 (0 491 007)

11-9340 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (Device) For tensioning timing chain when adjusting timing

Storage Location

B43

SI number

01 01 01 (662)

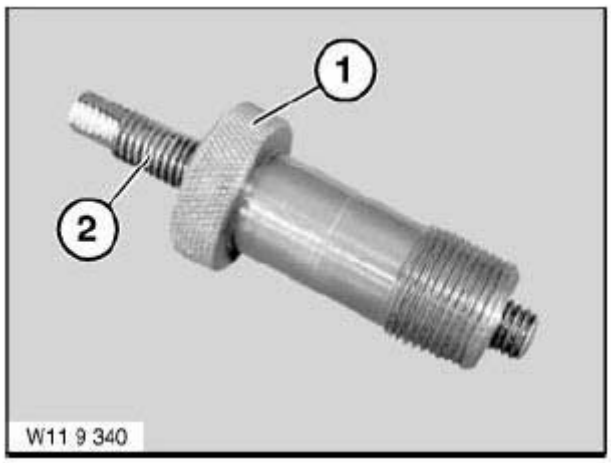


Fig. 15: Identifying Device (11-9340)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494032 Bolt

2 = 0494033 Spindle

11-8550 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (Locking device) For holding the bearing strips in place when fitting intake camshaft.

SI number

01 20 06 (299)

Consisting of:

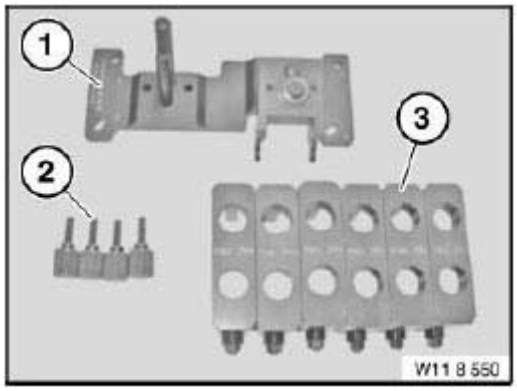


Fig. 16: Identifying Device (11-8550)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495741 Screw

NOTE: (knurled screw (4 pieces))

1 = 0495740 Tool

NOTE: (hold-down tool)

3 = 0495742 Thrust piece

NOTE: **(thrust piece (6 pieces))**

11-9150 EXTENSION

Extension Minimum set: Mechanical tools MW

NOTE: **(Socket wrench extension) For loosening and tightening the oxygen sensor**

Storage Location

A42

SI number

01 15 00 (609)

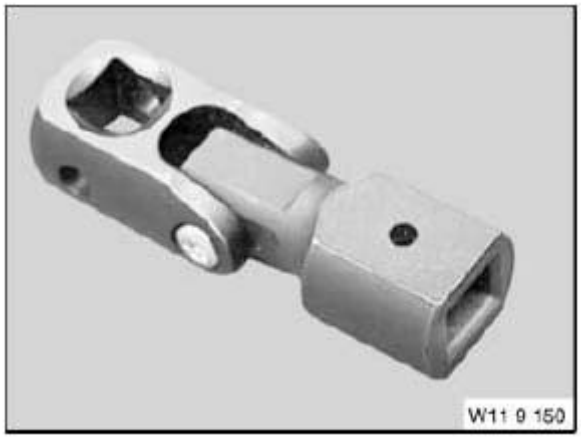


Fig. 17: Identifying Extension (11-9150)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9200 EXTRACTOR

Extractor Minimum set: Mechanical tools MW

NOTE: **For RSS out of engine block at rear**

Storage Location

C43

SI number

01 01 01 (662)

Fig. 18: Identifying Extractor (11-9200)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9220 EXTRACTOR

Extractor Minimum set: Mechanical tools MW

NOTE: For radial shaft seal out of engine block at front

Storage Location

C43

SI number

01 01 01 (662)

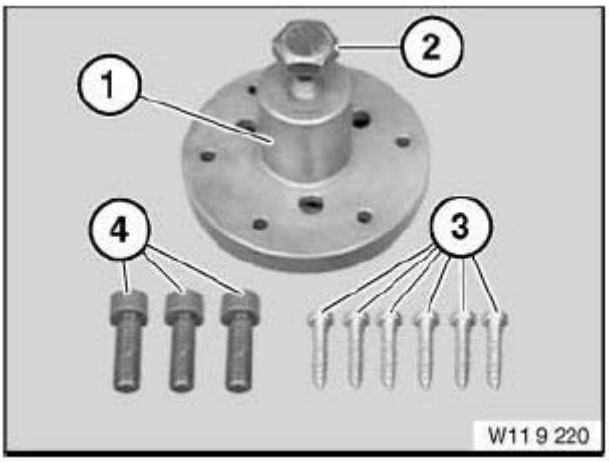


Fig. 19: Identifying Extractor (11-9220)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494040 Bolt

NOTE: Replaced by 11 9 225 (0 496 261)

1 = 0494041 Bolt

NOTE: (screws (6 pieces))

1 = 0494039 Synchronizing key

4 = 0494042 Bolt

NOTE: (Screws (3 pieces))

5 = 0496261 Bolt

6 = 0496262 Puller

11-0340 FITTING AID

Fitting aid MW

Replaced by: 0494362

NOTE: (fitting accessories) For removing and fitting the valve springs. Replaced by 11 9 000 (0 494 362)

SI number

01 12 93 (701)

Consisting of:

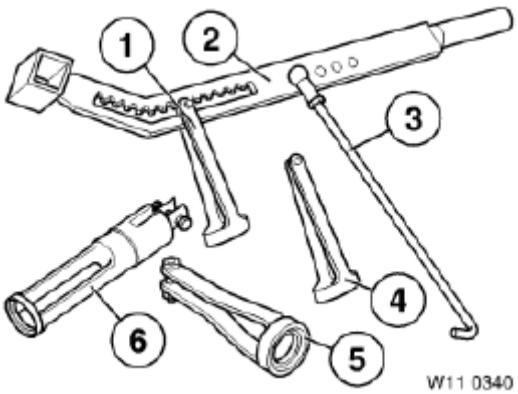


Fig. 20: Identifying Fitting Aid (11-0340)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0490649 Hook

NOTE: **(hook) Length 220 mm - Engine: all, except M10 Replaced by 11 9 000 (0 494 362)**

5 = 0490651 Cage

NOTE: **(Valve spring cage) Engine: M44, M52, M62, S62, S54 Replaced by 11 9 000 (0 494 362)**

1 = 0490647 Cage

NOTE: **(Valve spring cage) Engine: M43, M73**

2 = 0490648 Lever

NOTE: **(compression lever) Engine: all, except M10**

6 = 0493285 Cage

NOTE: **(Valve spring cage) Engine: M47, M47TU, M57, N40, N42, M67, M67TU**

4 = 0490650 Cage

NOTE: **(valve spring cage) Replaced by 11 0345, engine: M52**

11-7440 GAUGE

Gauge Minimum set: Mechanical tools MW

NOTE: For fixing the camshaft at the top dead center.

SI number

01 07 10 (634)

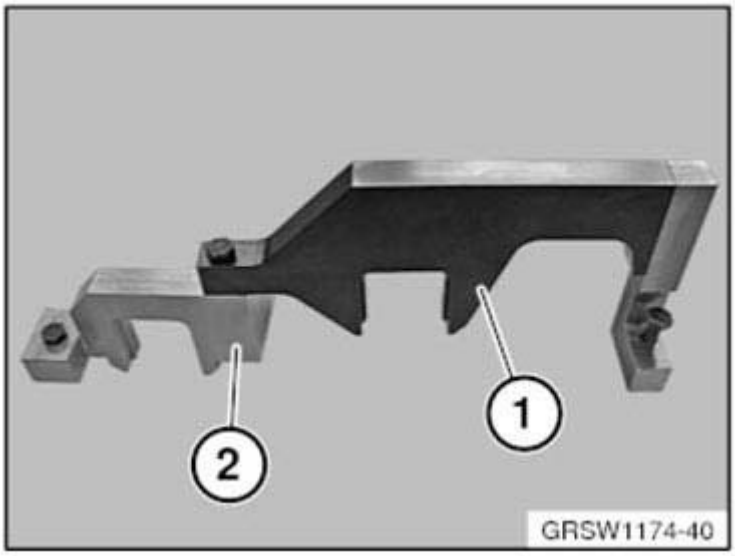


Fig. 21: Identifying Gauge (11-7440)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8510 GAUGE

Gauge MW

NOTE: For securing oil spray nozzles

Storage Location

B20

SI number

01 20 06 (299)

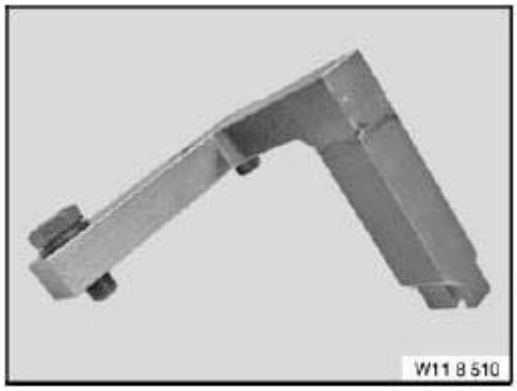


Fig. 22: Identifying Gauge (11-8510)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8520 GAUGE

Gauge Minimum set: Mechanical tools MW

NOTE: (gauge with screws) For disconnecting the camshaft sensor gears.

Storage Location

A19

A20

SI number

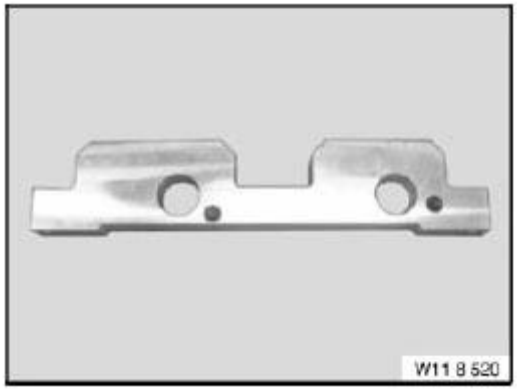


Fig. 23: Identifying Gauge (11-8520)
Courtesy of BMW OF NORTH AMERICA, INC.

01 20 06 (299)

Consisting of:

1 = 0495823 Gauge

2 = 0495825 Screw

NOTE: (screws M6x45 (2 x))

11-4280 GAUGE

Gauge Minimum set: Mechanical tools MW

NOTE: For locating camshaft in TDC setting.

Storage Location

B52

SI number

01 17 04 (130)

Consisting of:

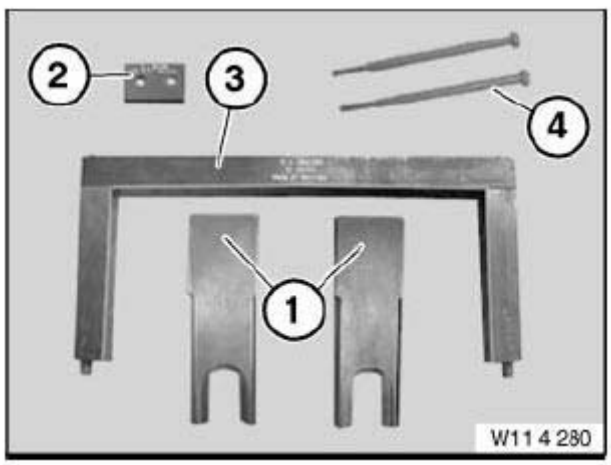


Fig. 24: Identifying Gauge (11-4280)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0495723 Bolt

NOTE: (Set of screws M6) Engine: N54

1 = 0495005 Gauge

2 = 0495006 Adapter

3 = 0495007 Retaining bracket

5 = 0496673 Bridge

NOTE: For securing camshaft at TDC.

11-8660 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) For locking flywheel with A-transmission installed.

Storage Location

A19

C19

B19

SI number

01 20 06 (299)

Fig. 25: Identifying Holder (11-8660)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9260 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support with screw connection) For holding the flywheel when gearbox is removed

Storage Location

B43

SI number

01 01 01 (662)

Fig. 26: Identifying Holder (11-9260)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494034 Holder

NOTE: (Individual counter support)

2 = 0494035 Screw

NOTE: (Bolt (thread M10) with washer)

For screwing counter support

3 = 0494129 Bush

NOTE: (Bush for counter support) For counter support, for retaining flywheel when gearbox is removed Engine: N62, N73

4 = 0494130 Screw

NOTE: (Bolt (thread M12)) For counter support for retaining flywheel when gearbox is removed

5 = 0494793 Bush

6 = 0495216 Bush

NOTE: For counter support, for retaining flywheel when gearbox is removed Engine: M57TU2

11-8180 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) Blocking flywheel when releasing and tightening down central bolts on vibration absorber

Storage Location

C45

C46

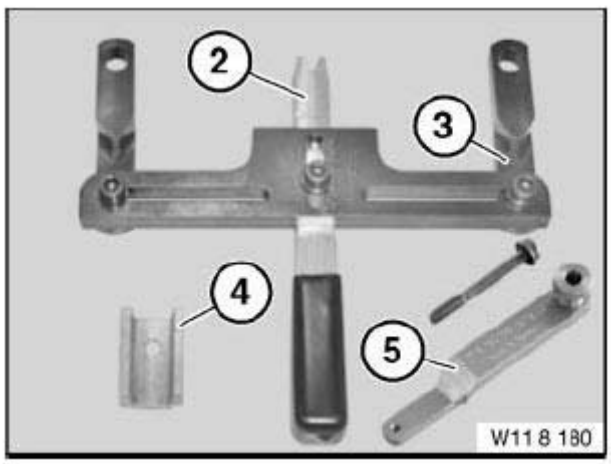


Fig. 27: Identifying Holder (11-8180)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 12 99 (452)

Consisting of:

1 = 0494432 Basic body

NOTE: (Basic body) E65/M67, E38/M67 Discontinuation Replaced by 11 8 183 (0 494 434)

2 = 0494433 Shaped part

NOTE: (Shaped part)

3 = 0494434 Basic body

4 = 0494435 Adapter

NOTE: E65/M67

5 = 0494716 Adapter

NOTE: (Adapter with adjusting sleeve) E46 M47TU

11-9811 HOLDER

Holder

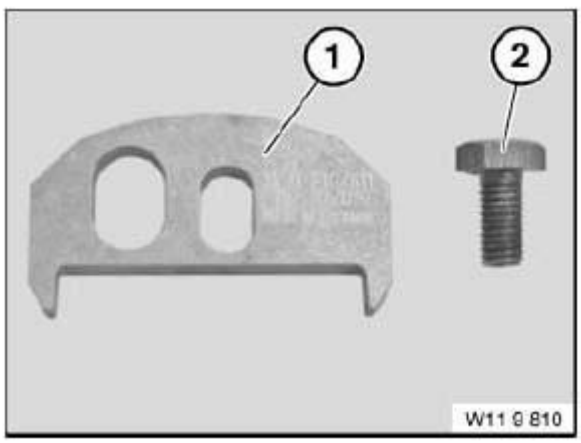


Fig. 28: Identifying Holder (11-9811)
Courtesy of BMW OF NORTH AMERICA, INC.

11-2220 HOLDER

Holder MW

Replaced by: 0490855

NOTE: (Counter support) - Nov. 88 Replaced by 11 2 240 (0 490 855)

11-4491 HOLDER

Holder MW

NOTE: (Installation bracket)

Storage Location

A51

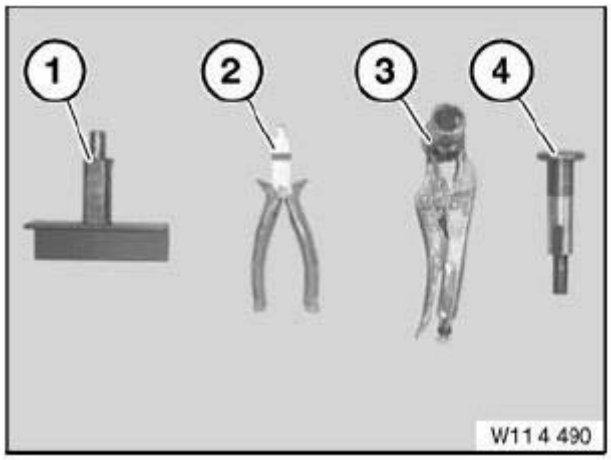


Fig. 29: Identifying Holder (11-4491)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8650 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) For removing and installing ring gear of oil pump drive.

Storage Location

C19

C20

SI number

01 20 06 (299)

Fig. 30: Identifying Holder (11-8650)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0290 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) For removing and installing triangular drive (vacuum pump) on crankcase.

Storage Location

A52

SI number

01 17 04 (130)

Fig. 31: Identifying Holder (11-0290)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5463 INSTALLATION DRIFT

Installation drift

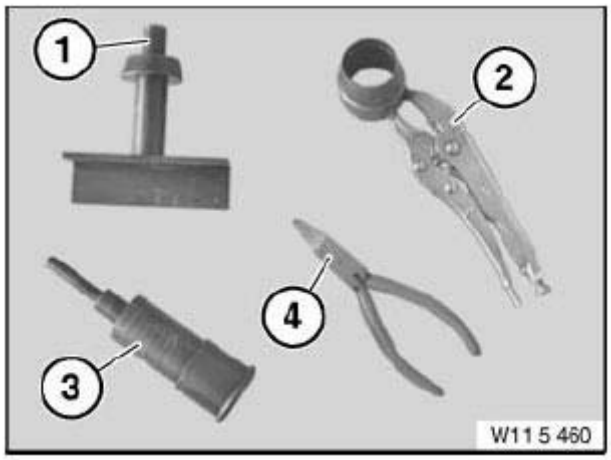


Fig. 32: Identifying Installation Drift (11-5463)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5461 INSTALLATION HOLDER

Installation holder

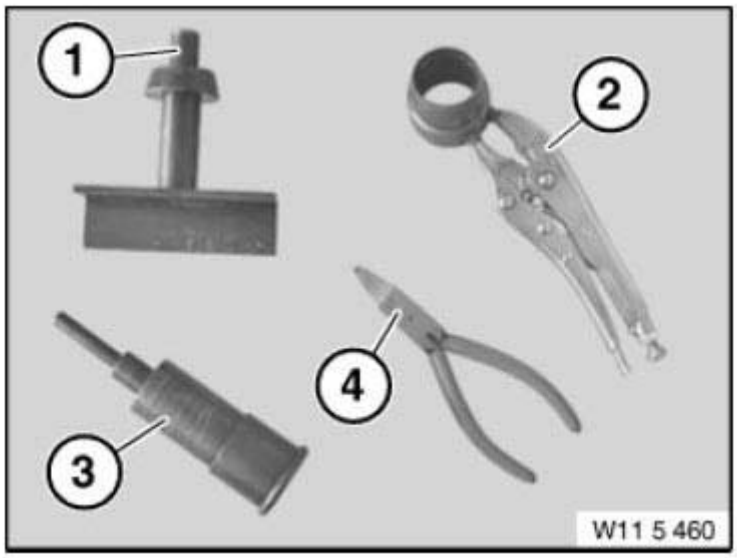


Fig. 33: Identifying Installation Holder (11-5461)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5462 INSTALLATION PLIERS

Installation pliers

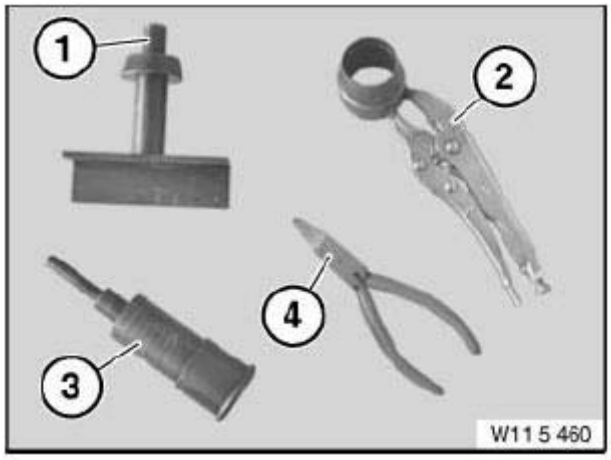


Fig. 34: Identifying Installation Pliers (11-5462)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0000 LIFTING GEAR

Lifting gear Minimum set: Mechanical tools MW

NOTE: (Hoist) For removing and installing engines.

SI number

01 13 94 (888)

Consisting of:

1 = 0490562 Lifting gear

NOTE: (Cross-member)

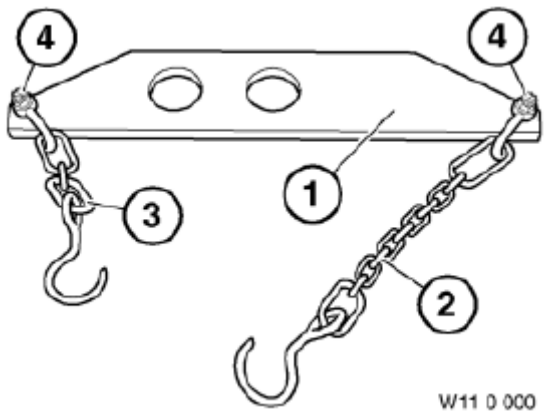


Fig. 35: Identifying Lifting Gear (11-0000)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0490563 Chain

NOTE: (Chain) Version: long

3 = 0490564 Chain

NOTE: (Chain) Version: short

4 = 0490565 Shackle

NOTE: (Shackle) 2 x

11-0020 LIFTING GEAR

Lifting gear Minimum set: Mechanical tools MW

NOTE: For removing and installing engines.

SI number

01 13 94 (888)

Consisting of:

1 = 0490568 Lifting gear

NOTE: (Cross-member)

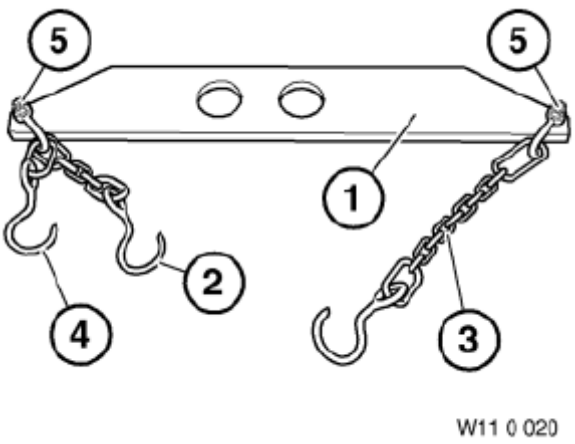


Fig. 36: Identifying Lifting Gear (11-0020)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0490569 Chain

NOTE: **(Chain)**

3 = 0490570 Chain

NOTE: **(Chain) Version: long**

4 = 0490571 Chain

NOTE: **(Chain) Version: short**

5 = 0490572 Shackle

NOTE: **(Shackle) 2 pieces**

11-1310 MANDREL

Mandrel MW

NOTE: **(Drift) For driving needle bearing out of crankcase (M20) and pressing out propeller shaft centering mount**

W11 1 310

Fig. 37: Identifying Mandrel (11-1310)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9360 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: **For driving valve into engine block (sealing compound)**

Storage Location

A43

SI number

01 01 01 (662)

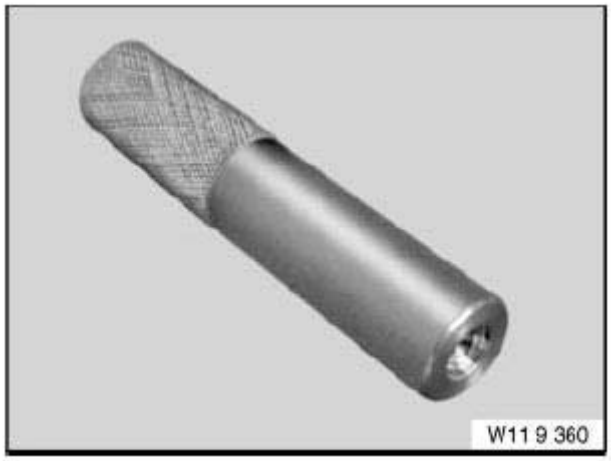


Fig. 38: Identifying Mandrel (11-9360)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9190 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (alignment pin) For securing flywheel at TDC position

Storage Location

B43

SI number

01 01 01 (662)

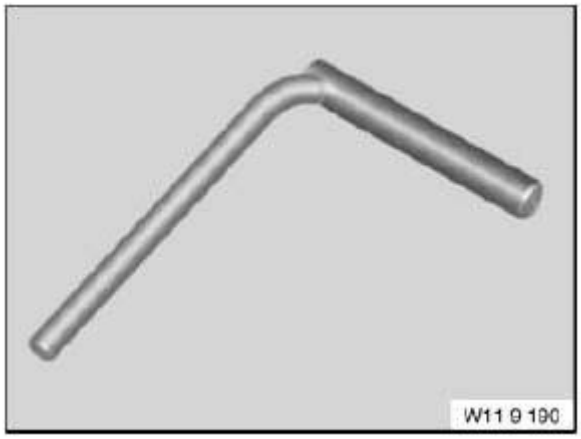


Fig. 39: Identifying Mandrel (11-9190)
Courtesy of BMW OF NORTH AMERICA, INC.

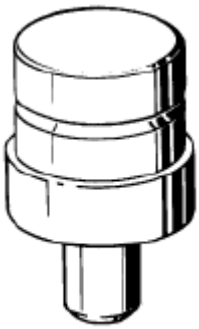
11-2030 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (drift) For driving guide bearing into crankshaft (S14, S38, M10, M20, M21, M30, M40, M42, M50, M51 M52) and driving centering mount into propeller shaft

Storage Location

A15



W11 2 030

Fig. 40: Identifying Mandrel (11-2030)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4494 MANDREL

Mandrel MW

NOTE: (Installation drift)

Storage Location

A51

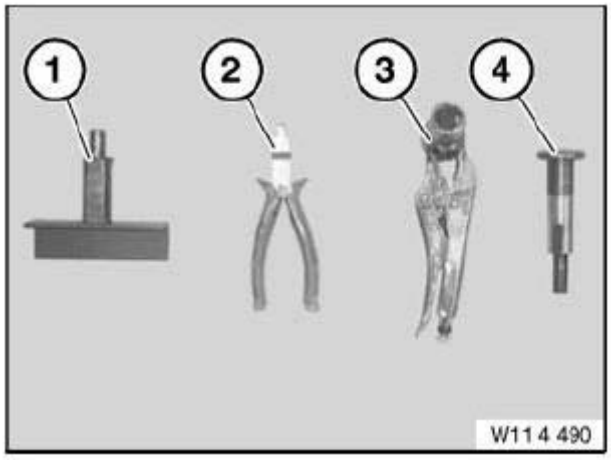


Fig. 41: Identifying Mandrel (11-4494)
Courtesy of BMW OF NORTH AMERICA, INC.

11-0300 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Alignment pin) For securing the flywheel at the TDC setting

Storage Location

A52

SI number

01 17 04 (130)

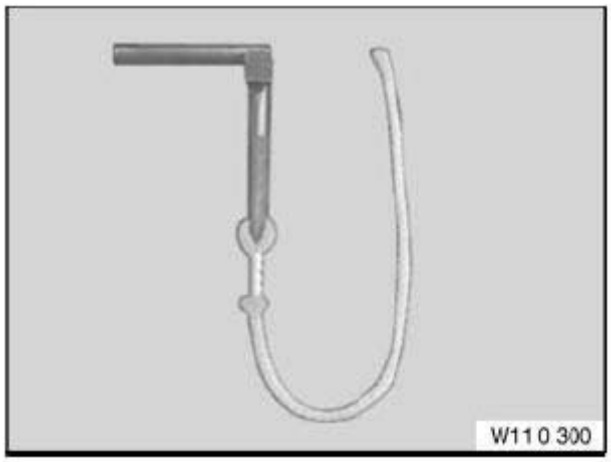


Fig. 42: Identifying Mandrel (11-0300)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1170 MANDREL

Mandrel MW

NOTE: (Mandrel) Replaced by 11 1 200

11-1190 MANDREL

Mandrel MW

NOTE: (Drift) Replaced by 11 1 200

11-1140 MANDREL

Mandrel MW

Replaced by: 0490724

NOTE: (Drift) Replaced by 11 1 200 (0 490 724)

11-4480 ODDMENTS TRAY

Oddments tray Minimum set: Mechanical tools MW

NOTE: (Boards (2 pieces)) For setting down the individual components of the cylinder head.

SI number

01 17 04 (130)

Consisting of:

1 = 0495106 Oddments tray

NOTE: (Board for intake side)

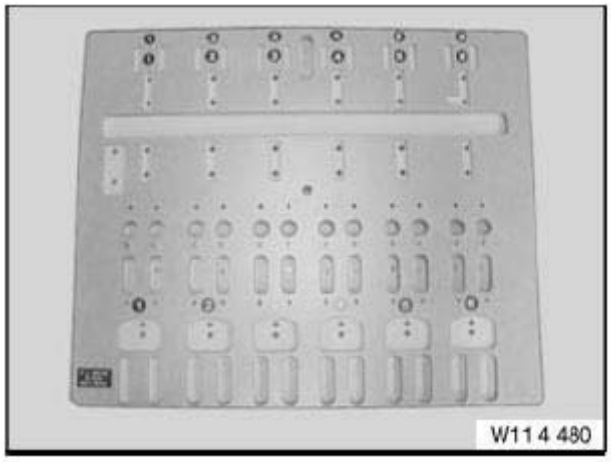


Fig. 43: Identifying Oddments Tray (11-4480)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495107 Oddments tray

NOTE: (Board for exhaust side)

11-9240 OIL FILTER WRENCH

Oil filter wrench Minimum set: Mechanical tools MW

NOTE: For unfastening and tightening oil filter cover

Storage Location

A43

SI number

01 01 01 (662)

Fig. 44: Identifying Oil Filter Wrench (11-9240)
Courtesy of BMW OF NORTH AMERICA, INC.

11-3340 PIN

Pin Minimum set: Mechanical tools MW

NOTE: **(lock pin (2 pieces)) For retaining the chain tensioner piston (e.g. when removing and installing the cylinder head) and to lock the drive belt tensioner**

Storage Location

B5

C5

SI number

01 09 91 (416)

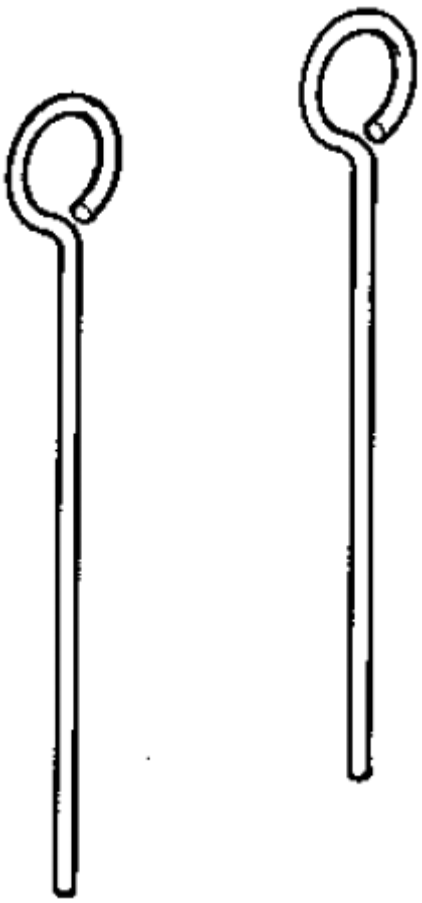


Fig. 45: Identifying Pin (11-3340)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4120 PIN

Pin Minimum set: Mechanical tools MW

NOTE: **(lock pin) For chain tensioners, for locking the chain tensioner piston (e.g. during cylinder head removal and fitting)**

Storage Location

B5

C5

SI number

01 12 93 (701)

W 11 4 120

Fig. 46: Identifying Pin (11-4120)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8540 PLATE

Plate MW

NOTE: (Fixture) For mounting engine on assembly stand.

SI number

01 20 06 (299)

Consisting of:

1 = 0495737 Fixture

NOTE: (Engine mount)

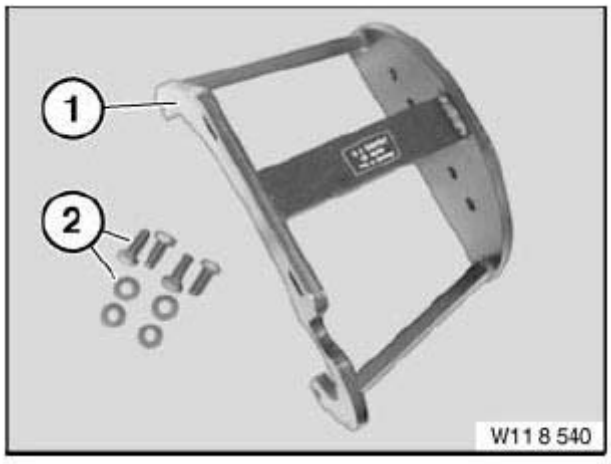


Fig. 47: Identifying Plate (11-8540)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495738 Screw

NOTE: (Set of screws (4 x))

11-2090 PLIERS

Pliers MW

Replaced by: 0490796

NOTE: For removal of the valve stem seals - Replaced by 11 1 480 (0 490 796)

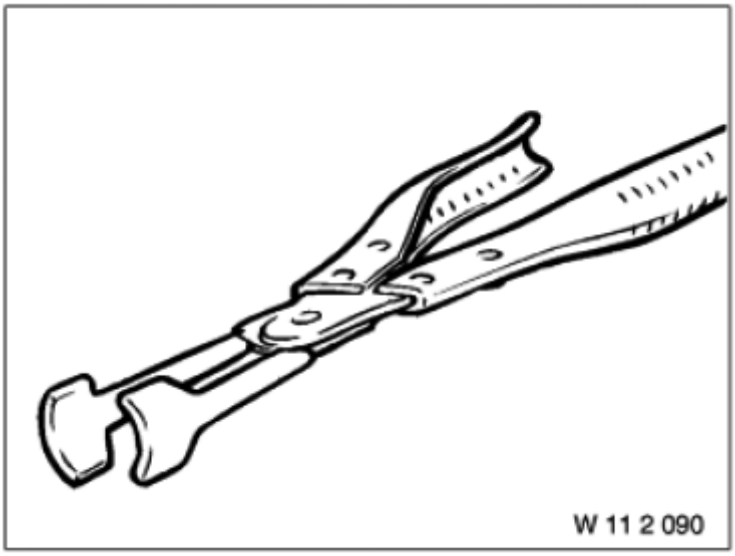


Fig. 48: Identifying Pliers (11-2090)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1250 PLIERS

Pliers MW

Replaced by: 0490796

NOTE: For removing and installing the valve stem seal. Only free for motorcycle! Replaced by 11 1 480 (0 490 796)

11-1480 PLIERS

Pliers Minimum set: Mechanical tools MW

NOTE: For removing valve stem seal

Storage Location

B10

SI number

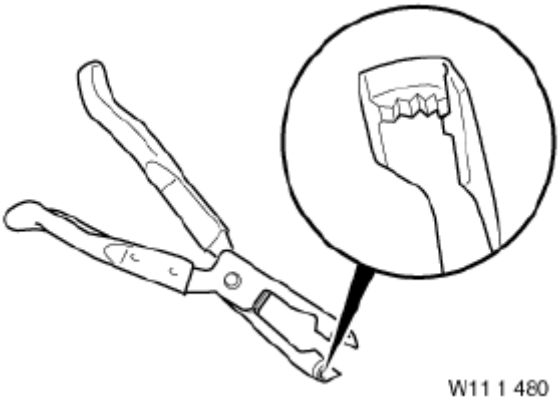


Fig. 49: Identifying Pliers (11-1480)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4492 PLIERS

Pliers MW

NOTE: (Removal pliers)

Storage Location

A51

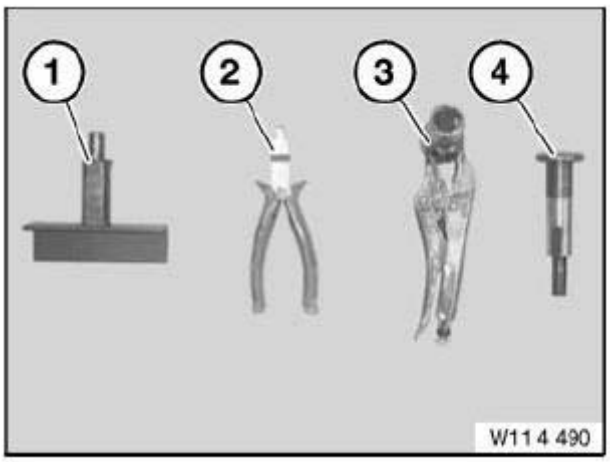


Fig. 50: Identifying Pliers (11-4492)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8670 PLIERS

Pliers MW

NOTE: For removing and installing boost air line.

Storage Location

C20

SI number

01 20 06 (299)

Fig. 51: Identifying Pliers (11-8670)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4493 PLIERS

Pliers MW

NOTE: (Installation pliers)

Storage Location

A51

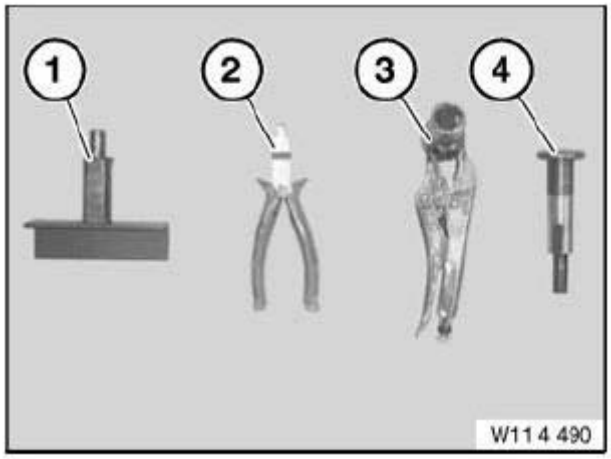


Fig. 52: Identifying Pliers (11-4493)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4430 PLUG

Plug Minimum set: Mechanical tools MW

NOTE: (Seal plugs (2x)) For sealing off oil holes in oil pump.

Storage Location

A52

SI number

01 17 04 (130)

Fig. 53: Identifying Plug (11-4430)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8530 REMOVAL AND FITTING AID

Removal and fitting aid Minimum set: Mechanical tools MW

NOTE: (Removal and mounting tool) For removal and installation of sealing cap of vacuum pump.

SI number

01 20 06 (299)

Consisting of:

8 = 0496704 Bush

In conjunction with: 11 8 530

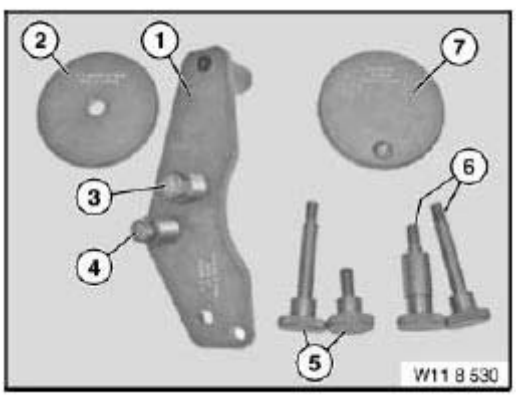


Fig. 54: Identifying Removal And Fitting Aid (11-8530)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495729 Plate

NOTE: (Base plate)

2 = 0495730 Plate

NOTE: (Pressure plate)

3 = 0495731 Spindle

NOTE: (Spindle (pressure plate))

4 = 0495732 Spindle

NOTE: (Spindle (removal plate))

5 = 0495733 Screw

NOTE: (Set of screws M10 (N54))

6 = 0495734 Screw

NOTE: (Set of screws M11 incl. sleeve (N53))

7 = 0495735 Plate

NOTE: (Removal plate)

11-5464 REMOVAL PLIERS

Removal pliers

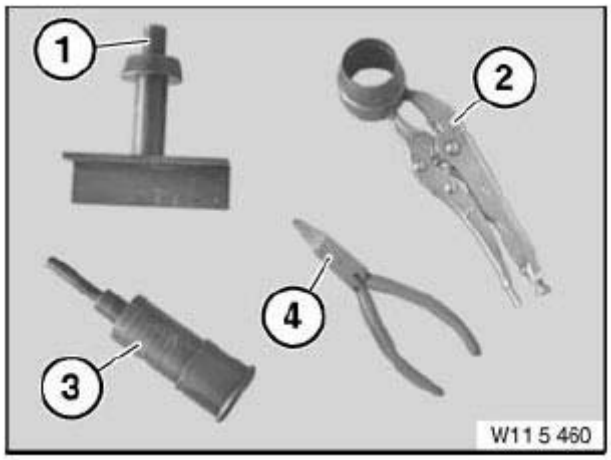


Fig. 55: Identifying Removal Pliers (11-5464)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9812 SCREW

Screw

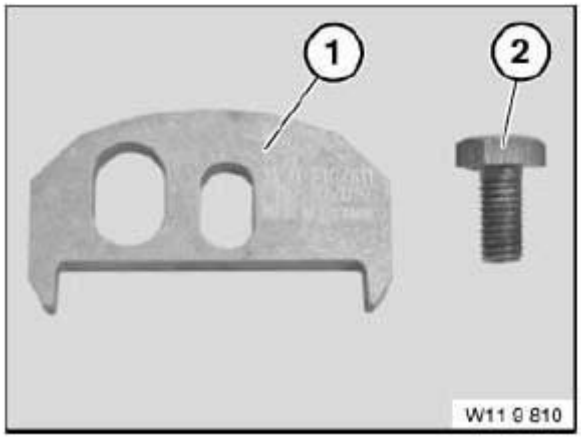


Fig. 56: Identifying Screw (11-9812)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4180 SCREWDRIVER INSERT

Screwdriver insert Minimum set: Mechanical tools MW

NOTE: (Screwdriver insert Torx T60) For releasing and tightening down dual-mass flywheel - model year: from Jan 94

Storage Location

A11

SI number

01 02 94 (777)

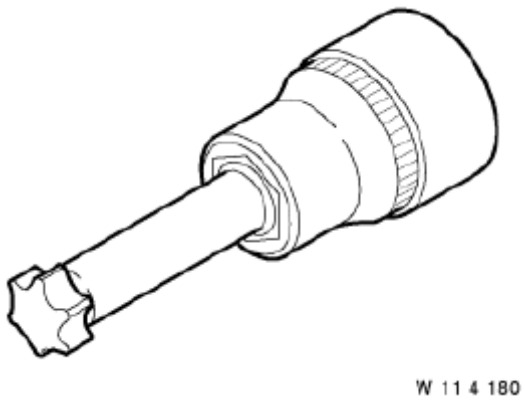


Fig. 57: Identifying Screwdriver Insert (11-4180)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1380 SLEEVE

Sleeve Minimum set: Mechanical tools MW

NOTE: (Assembly sleeve) For fitting the valve stem seal, diameter 7 mm

W11 1 340

Fig. 58: Identifying Sleeve (11-1380)
Courtesy of BMW OF NORTH AMERICA, INC.

11-1350 SLEEVE

Sleeve MW

Replaced by: 0490744

NOTE: (Assembly sleeves) For fitting the valve stem seal - Replaced by 11 1 360 (0 490 744)

11-8580 SOCKET WRENCH

Socket wrench Minimum set: Mechanical tools MW

NOTE: (wrench socket Torx T60) For removing and installing cylinder head (outside diameter 13.5 mm).

Storage Location

B20

A20

SI number

01 20 06 (299)

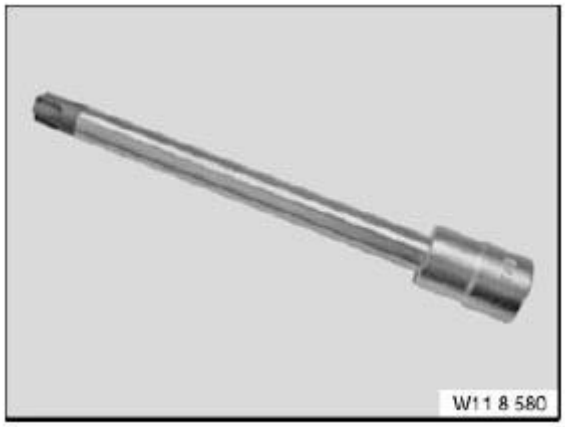


Fig. 59: Identifying Socket Wrench (11-8580)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4260 SOCKET WRENCH

Socket wrench MW

NOTE: For removing and installing lambda oxygen sensors.

Storage Location

A52

SI number

01 17 04 (130)

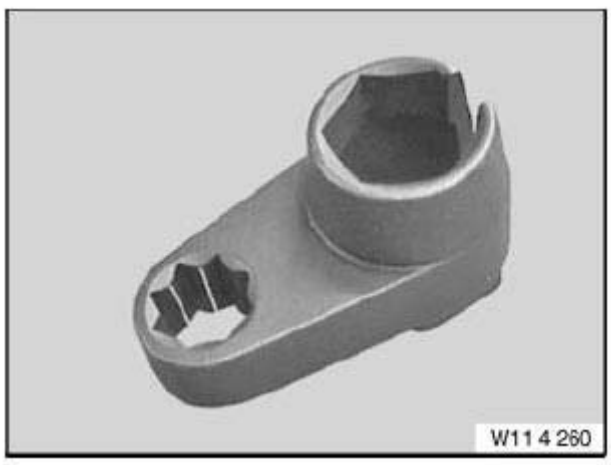


Fig. 60: Identifying Socket Wrench (11-4260)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8620 SOCKET WRENCH

Socket wrench Minimum set: Mechanical tools MW

NOTE: (Wrench socket AF 10) For fitting and removing the earth connector screws on the injectors

Storage Location

A19

SI number

01 20 06 (299)

Fig. 61: Identifying Socket Wrench (11-8620)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8610 SOCKET WRENCH

Socket wrench Minimum set: Mechanical tools MW

NOTE: (Wrench socket AF 5) For removing and installing the high-pressure pump (length 125 mm).

Storage Location

A20

SI number

01 20 06 (299)

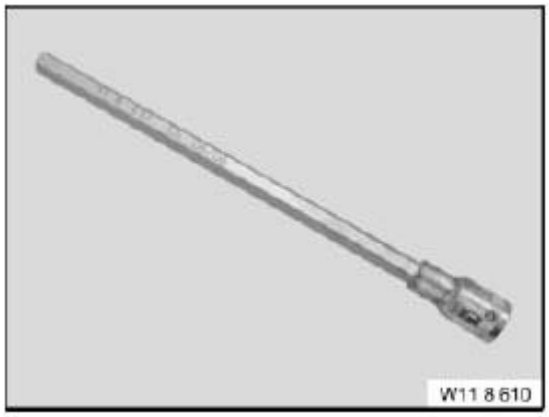


Fig. 62: Identifying Socket Wrench (11-8610)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7030 SOCKET WRENCH INSERT

Socket wrench insert Minimum set: Mechanical tools MW

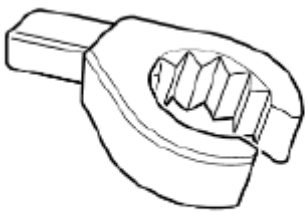
NOTE: (Wrench socket 22 mm) For loosening and tightening the oxygen sensor

Storage Location

A11

SI number

01 06 95 (963)



W11 7 030

Fig. 63: Identifying Socket Wrench Insert (11-7030)
Courtesy of BMW OF NORTH AMERICA, INC.

11-7310 SPACER

Spacer Minimum set: Mechanical tools MW

NOTE: For supporting engine during removal and installation of transmission

Storage Location

B6

SI number

01 11 94 (858)

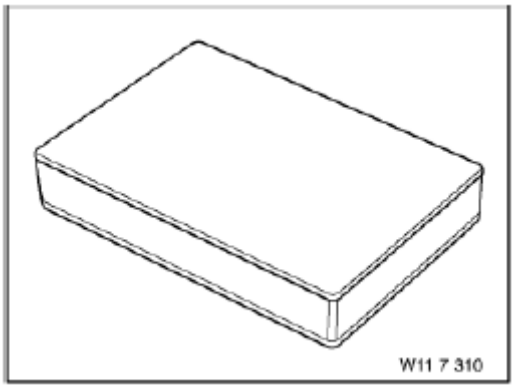


Fig. 64: Identifying Spacer (11-7310)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9230 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (Pulling device) For radial shaft seal at front of engine block

Storage Location

C43

SI number

01 01 01 (662)

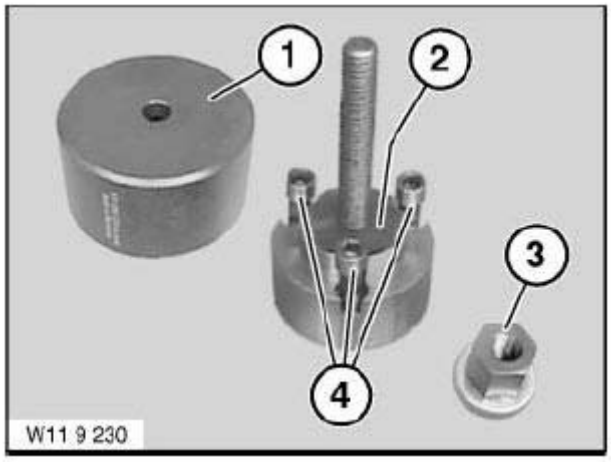


Fig. 65: Identifying Tool (11-9230)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494021 Bush

2 = 0494022 Spindle

4 = 0494024 Bolt

NOTE: (Screws (3 pieces))

5 = 0496670 Spindle

NOTE: N55

3 = 0494023 Nut

11-4470 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (cleaning kit) For cleaning sealing surfaces on magnesium crankcase/cylinder head.

SI number

01 17 04 (130)

Consisting of:

2 = 0495104 Extractor

NOTE: **(grindstone)**

1 = 0495103 Scraper

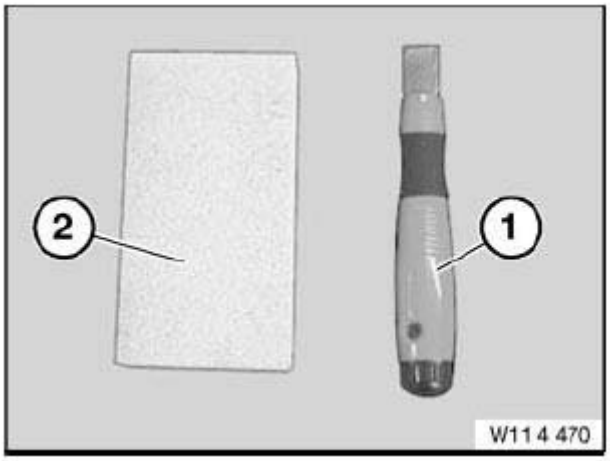


Fig. 66: Identifying Tool (11-4470)
Courtesy of BMW OF NORTH AMERICA, INC.

00-7300 TOOL

Tool MW

NOTE: **Infos available under the Technical Campaign Number 0013920100 and also under the PuMA Number 32600043.**

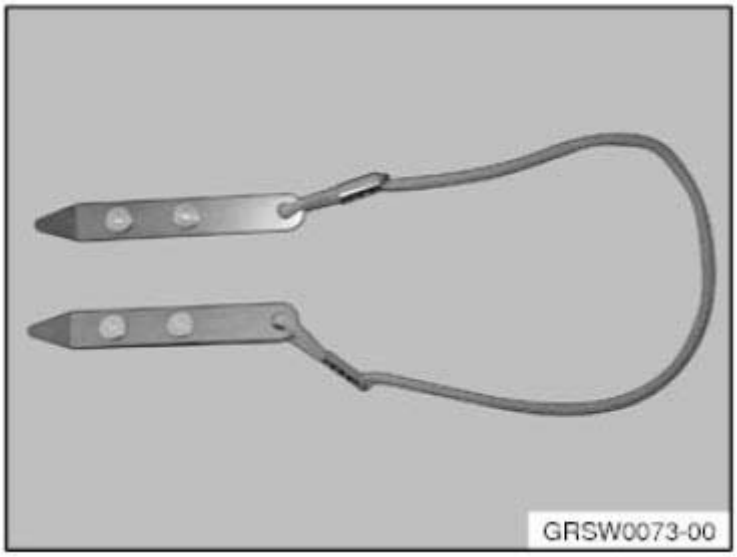


Fig. 67: Identifying Tool (00-7300)
Courtesy of BMW OF NORTH AMERICA, INC.

11-9180 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (pulling tool) For pulling radial shaft seal into engine block, rear

Storage Location

C43

SI number

01 01 01 (662)

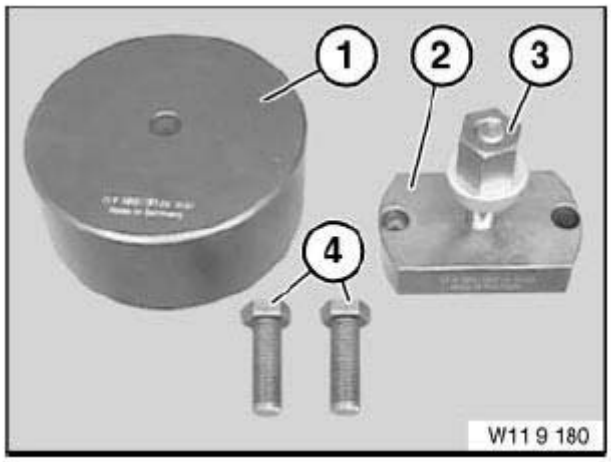


Fig. 68: Identifying Tool (11-9180)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

5 = 0496660 Ring

NOTE: For fitting rear radial shaft seal - rim offset 6.6 mm (N55).

1 = 0494028 Bush

2 = 0494029 Thrust piece

3 = 0494030 Nut

4 = 0494031 Screw

NOTE: (screws (2 x))

11-4490 TOOL SET

Tool set MW

NOTE: (Tool set) For removal and installation of gudgeon pin circlips.

SI number

01 17 04 (130)

Consisting of:

0495010

0495011

0495012

0495013

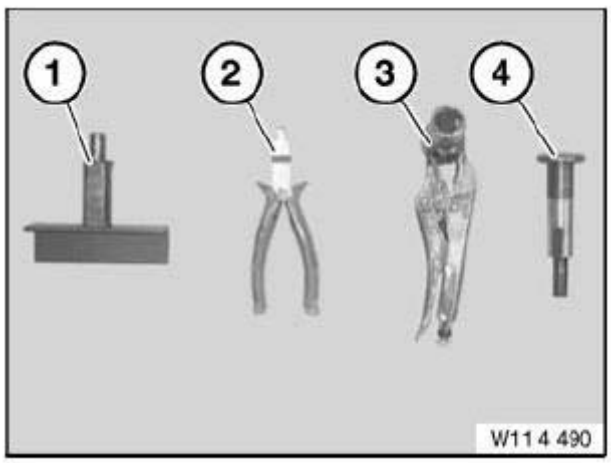


Fig. 69: Identifying Tool Set (11-4490)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8560 TOOL SET

Tool set MW

NOTE: (Tool set) For removal and installation of gudgeon pin circlips.

SI number

01 20 06 (299)

Consisting of:

1 = 0495744 Holder

NOTE: (Installation bracket)

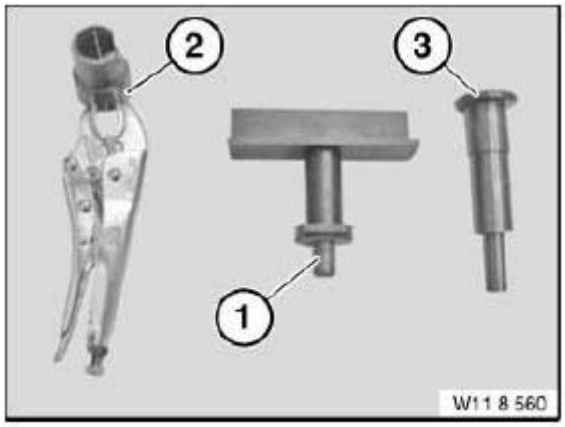


Fig. 70: Identifying Tool Set (11-8560)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495745 Pliers

NOTE: (Installation pliers)

3 = 0495746 Mandrel

NOTE: (Installation mandrel)

4 = 0496658 Mandrel

NOTE: For installing circlip on gudgeon pin (N55).

11-4350 TORQUE WRENCH

Torque wrench MW

NOTE: For installing camshaft bearing strips.

Storage Location

A51

SI number

01 17 04 (130)

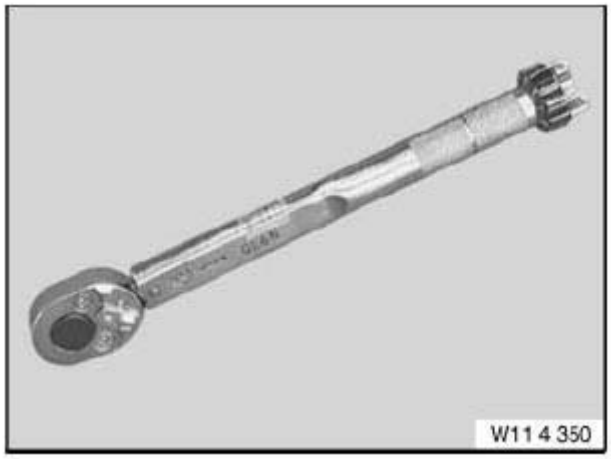


Fig. 71: Identifying Torque Wrench (11-4350)
Courtesy of BMW OF NORTH AMERICA, INC.

11-8640 TORX

Torx Minimum set: Mechanical tools MW

NOTE: (Torx) E10 For removing and installing oil pump triangular drive.

Storage Location

B19

SI number

01 20 06 (299)

Fig. 72: Identifying Torx (11-8640)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5190 TORX

Torx Minimum set: Mechanical tools MW

Replaced by: 0495747

NOTE: (Torx) T60 For assembly and disassembly of cylinder head. Replaced by 11 8 580 (0 495 747)

Storage Location

A51

SI number

01 17 04 (130)

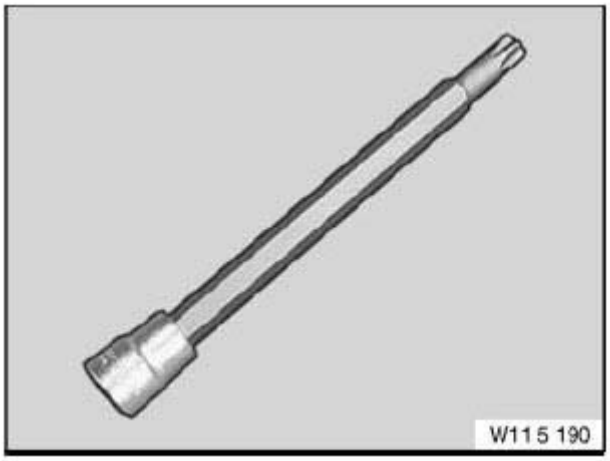


Fig. 73: Identifying Torx (11-5190)
Courtesy of BMW OF NORTH AMERICA, INC.

11-4420 TORX

Torx Minimum set: Mechanical tools MW

NOTE: (Torx) T50 For assembly and disassembly of cylinder head.

Storage Location

A51

SI number

01 17 04 (130)

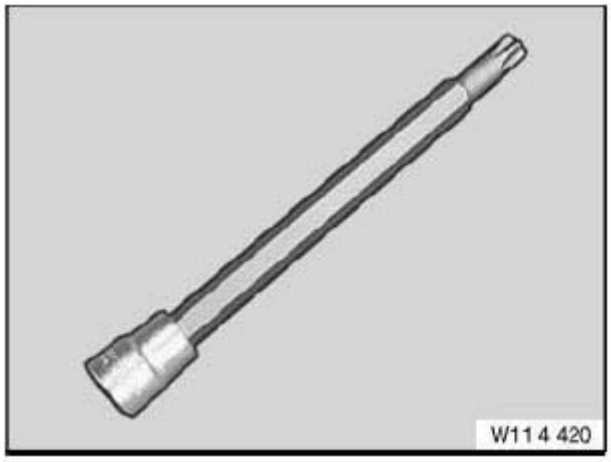


Fig. 74: Identifying Torx (11-4420)
Courtesy of BMW OF NORTH AMERICA, INC.

11-5200 WASHER

Washer Minimum set: Mechanical tools MW

NOTE: (Shim) For slackening and tightening the central bolt.

Storage Location

B51

SI number

01 17 04 (130)

Consisting of:

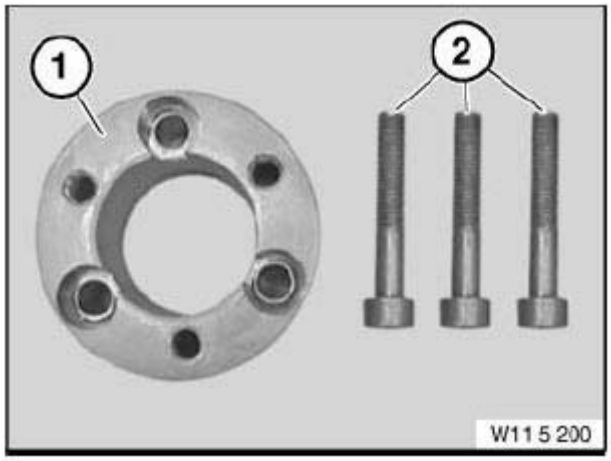


Fig. 75: Identifying Washer (11-5200)

Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0495211 Screw

NOTE: (Screws M8x40 mm (3 x))

1 = 0495210 Washer

NOTE: (Shim)

11-7020 WRENCH SOCKET

Wrench socket Minimum set: Mechanical tools MW

NOTE: (Wrench socket 22 mm) For loosening and tightening the oxygen sensor

W11 7 020

Fig. 76: Identifying Wrench Socket (11-7020)
Courtesy of BMW OF NORTH AMERICA, INC.

CAMSHAFT N52K/B25

11 31 CAMSHAFT N52K B25

CAMSHAFT SPECIFICATION

Guide bearing (width)	mm	$20.000^{+0.052}$
Radial play	mm	0.054...0.099
Axial play	mm	0.020...0.162

CAMSHAFT N52K/B30

11 31 CAMSHAFT N52K B30

CAMSHAFT SPECIFICATION

Guide bearing (width)	mm	$20.000^{+0.052}$
Radial play	mm	0.054...0.099
Axial play	mm	0.020...0.162

CONNECTING RODS AND BEARINGS N52K/B25

11 24 CONNECTING RODS AND BEARINGS N52K B25

CONNECTING RODS AND BEARINGS SPECIFICATION

Large connecting rod eye (without bearing)	mm	$53.600^{+0.016}$
Conrod bushing: Inside diameter	mm	$20.000^{+0.013}{}_{+0.004}$
Connecting rod bearing, installation clearance	mm	0.025... 0.061
Permissible total deviation of connecting rods in one engine (without bearing shells)	g	± 5

CONNECTING RODS AND BEARINGS N52K/B30

11 24 CONNECTING RODS AND BEARINGS N52K B30

CONNECTING RODS AND BEARINGS SPECIFICATION

Large connecting rod eye (without bearing)	mm	$53.600^{+0.016}$
Conrod bushing: Inside diameter	mm	$20.000 +0.013^{+0.004}$
Connecting rod bearing, installation clearance	mm	0.025... 0.061

Permissible total deviation of connecting rods in one engine (without bearing shells)	g	± 5

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS N52K B30

CRANKSHAFT AND BEARINGS SPECIFICATION

Ground sizes of conrod bearing journals		
Identification mark (b)	mm	49.9820... 49.9924
Identification mark (R)	mm	49.9925... 50.0020
Radial conrod bearing play	mm	0.025 ... 0.061

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS N52K B25

CRANKSHAFT AND BEARINGS SPECIFICATION

Ground sizes of conrod bearing journals		
Identification mark (b)	mm	49.9820... 49.9924
Identification mark (R)	mm	49.9925... 50.0020
Radial conrod bearing play	mm	0.025 ... 0.061

CRANKSHAFT AND BEARINGS N52K/B25

11 21 CRANKSHAFT AND BEARINGS N52K B25

CRANKSHAFT AND BEARINGS SPECIFICATION

Ground sizes of main bearing journals		main bearing journal
Original (designation S1)	mm	55.998 ... 55.993
Original (designation S2)	mm	55.992 ... 55.987
Original (designation S3)	mm	55.986 ... 55.981
Crankshaft bearing clearance, radial	mm	0.020 ... 0.046
Max. permitted runout at centre crankshaft journal	mm	0.150

CRANKSHAFT AND BEARINGS N52K/B25

11 21 CRANKSHAFT AND BEARINGS N52K B25

CRANKSHAFT AND BEARINGS SPECIFICATION

Grinding stages, crankshaft guide bearing		
Standard	mm	24.0 F8

Crankshaft axial play	mm	0.060 ... 0.250

CRANKSHAFT AND BEARINGS N52K/B30

11 21 CRANKSHAFT AND BEARINGS N52K B30

CRANKSHAFT AND BEARINGS SPECIFICATION

Grinding stages, crankshaft guide bearing		
Standard	mm	24.0 F8
Crankshaft axial play	mm	0.060 ... 0.250

CRANKSHAFT AND BEARINGS N52K/B30

11 21 CRANKSHAFT AND BEARINGS N52K B30

CRANKSHAFT AND BEARINGS SPECIFICATION

Ground sizes of main bearing journals		Guide bearing journal
Original (designation S1)	mm	64.998 ... 64.993
Original (designation S2)	mm	64.992 ... 64.987
Original (designation S3)	mm	64.986 ... 64.981
Crankshaft bearing clearance, radial	mm	0.020 ... 0.046
Max. permitted runout at centre crankshaft journal	mm	0.150

CYLINDER HEAD WITH COVER N52K/B25

11 12 CYLINDER HEAD WITH COVER N52K B25

CYLINDER HEAD WITH COVER SPECIFICATION

Cylinder head height: Original dimension	mm	112.000 ± 0.050
Machining limit	mm	111.700 ± 0.050
Valve guides are not available as replacement parts.		
Inside diameter of installed valve guide		
Original inlet valve	mm	$5.000^{+0.012}$
Original exhaust valve	mm	$6.000^{+0.012}$
Tilt clearance, maximum (wear between valve and valve guide)	mm	0.500

CYLINDER HEAD WITH COVER N52K/B30

11 12 CYLINDER HEAD WITH COVER N52K B30

CYLINDER HEAD WITH COVER SPECIFICATION

Cylinder head height: Original dimension	mm	112.000 ± 0.050
Machining limit	mm	111.700 ± 0.050
Valve guides are not available as replacement parts.		
Inside diameter of installed valve guide		
Original inlet valve	mm	$5.000^{+0.012}$
Original exhaust valve	mm	$6.000^{+0.012}$
Tilt clearance, maximum (wear between valve and valve guide)	mm	0.500

CYLINDER HEAD WITH VALVE SEAT COVER N52K/B25

11 12 CYLINDER HEAD WITH VALVE SEAT COVER N52K B25

CYLINDER HEAD WITH VALVE SEAT COVER SPECIFICATION

Valve seat angle	°	**45**
Correction angle: outer	°	15
Correction angle: inner	°	60
Valve seat width: Inlet	mm	$1.0^{+0.1}$
Valve seat width: Exhaust	mm	$1.2^{+0.1}$
Valve seat		
Valve seat surface: Outside dia. inlet	mm	$27.7^{+0.1}$
Valve seat surface: Outside dia. exhaust	mm	$26.6^{+0.1}$

CYLINDER HEAD WITH VALVE SEAT COVER N52K/B30

11 12 CYLINDER HEAD WITH VALVE SEAT COVER N52K B30

CYLINDER HEAD WITH VALVE SEAT COVER SPECIFICATION

Valve seat angle	°	45
Correction angle: outer	°	15
Correction angle: inner	°	60
Valve seat width: Inlet	mm	$1.0^{+0.1}$
Valve seat width: Exhaust	mm	$1.2^{+0.1}$
Valve seat		
Valve seat surface: Outside dia. inlet	mm	$27.7^{+0.1}$
Valve seat surface: Outside dia. exhaust	mm	$26.6^{+0.1}$

ENGINE BLOCK, CYLINDER CRANKCASE N52K/B25

11 11 ENGINE BLOCK, CYLINDER CRANKCASE N52K B25

ENGINE BLOCK, CYLINDER CRANKCASE SPECIFICATION

Bore	stage 0[a)]	mm	82.000+0.014
Bore	stage 00 (1))	mm	
Bore	stage 1 (1))	mm	$82.250^{+0.014}$
Permitted out-of-round of cylinder bore (1))		mm	0.005
Permitted conicity of cylinder bore (1))		mm	0.010
Permissible total wear tolerance between piston and cylinder (engine operated)		mm	0.150
(1) new status or recondition			

ENGINE BLOCK, CYLINDER CRANKCASE N52K/B30

11 11 ENGINE BLOCK, CYLINDER CRANKCASE N52K B30

ENGINE BLOCK, CYLINDER CRANKCASE SPECIFICATION

Bore	stage 0(1))	mm	85.000+0.014
Bore	stage 00 (1))	mm	
Bore	stage 1 (1))	mm	$85.250^{+0.014}$
Permitted out-of-round of cylinder bore (1))		mm	0.005
Permitted conicity of cylinder bore (1))		mm	0.010
Permissible total wear tolerance between piston and cylinder (engine operated)		mm	0.150
(1) new status or recondition			

ENGINE IN GENERAL N52K/B25

11 00 ENGINE IN GENERAL N52K B25

ENGINE SPECIFICATION

Cylinder		6
Bore	mm	82
Stroke	mm	79
Effective displacement	cm^3	2497
Compression ratio	:1	11
Max. permissible engine speed	rpm	6500±50
Permissible constant speed	rpm	6300
Compression pressure: Minimum and maximum values depending on position of Valvetronic.		9 ... 18
Compression pressure: Maximum deviation of all cylinders to each other.	bar	2

ENGINE IN GENERAL N52K/B30

11 00 ENGINE IN GENERAL N52K B30

ENGINE SPECIFICATION

Cylinder		6
Bore	mm	85
Stroke	mm	88
Effective displacement	cm^3	2996
Compression ratio	:1	10.7
Max. permissible engine speed	rpm	6550±50
Permissible constant speed	rpm	6300
Compression pressure: Minimum and maximum values depending on position of Valvetronic.		9 ... 18
Compression pressure: Maximum deviation of all cylinders to each other.	bar	2

OIL PUMP WITH STRAINER AND DRIVE N52K/B25

11 41 OIL PUMP WITH STRAINER AND DRIVE N52K B25

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATION

Oil pressure at idle (engine at normal operating temperature)	min bar	1.5
Control pressure (engine at normal operating temperature)	bar	4.0 ... 6.0

OIL PUMP WITH STRAINER AND DRIVE N52K/B25

11 41 OIL PUMP WITH STRAINER AND DRIVE N52K B25

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATION

Oil pressure at idle (engine at normal operating temperature)	min bar	1.5
Control pressure (engine at normal operating temperature)	bar	4.0 ... 6.0

OIL PUMP WITH STRAINER AND DRIVE N53, N52K/B25

11 41 OIL PUMP WITH STRAINER AND DRIVE N53/N52K B25

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATION

Regulated pressure	bar	Observe diagnosis instruction

OIL PUMP WITH STRAINER AND DRIVE N53, N52K/B30

11 41 OIL PUMP WITH STRAINER AND DRIVE N53/N52K B30

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATION

Regulated pressure	bar	Observe diagnosis instruction

OIL SUPPLY N52K/B25, B30

11 40 OIL SUPPLY N52K B25 B30

OIL SUPPLY SPECIFICATION

Oil grades and consumption: see **ENGINE - OPERATING FLUIDS**		
Filling capacity, engine oil change with oil filter element	Litres	6.50
Filling capacity engine oil change with oil filter element for auxiliary engine oil cooler	Litres	7.00

PISTONS WITH RINGS AND PINS

11 25 PISTONS WITH RINGS AND PINS N18

PISTONS WITH RINGS AND PINS SPECIFICATION

1st groove		
End clearance	mm	0.20 ... 0.40
End clearance (wear limit)	mm	0.95
Side clearance	mm	0.015 ... 0.070
2nd groove		
End clearance	mm	0.30 ... 0.55
End clearance (wear limit)	mm	1.06
Side clearance	mm	0.015 ... 0.060
3rd groove		
End clearance	mm	0.10 ... 0.40
End clearance (wear limit)	mm	0.82
Side clearance	mm	0.040 ... 0.10

PISTONS WITH RINGS AND PINS N52K/B25

11 25 PISTONS WITH RINGS AND PINS N52K B25

PISTONS WITH RINGS AND PINS SPECIFICATION

Piston and pin are paired to each other - replace together only.		
Measuring point "A" (position)	mm	10
Piston diameter at measuring point "A"		
Original (new dimension)	mm	$81.985^{\pm 0.014}$
Repair stage (new dimension)	mm	%
Oversize (new dimension)	mm	$82.235^{\pm 0.014}$

Piston installation clearance (piston new)	mm	0.000...0.043
Piston installation clearance (piston worn)	mm	0.020...0.047
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.150

PISTONS WITH RINGS AND PINS N52K/B25

11 25 PISTONS WITH RINGS AND PINS N52K B25

PISTONS WITH RINGS AND PINS SPECIFICATION

1st groove		
End clearance	mm	0.180 ... 0.330
Axial play	mm	0.020 ... 0.060
2nd groove		
End clearance	mm	0.300 ... 0.500
Axial play	mm	0.020 ... 0.060
3rd groove		
End clearance	mm	cannot be measured
Axial play	mm	cannot be measured

PISTONS WITH RINGS AND PINS N52K/B30

11 25 PISTONS WITH RINGS AND PINS N52K B30

PISTONS WITH RINGS AND PINS SPECIFICATION

1st groove		
End clearance	mm	0.150 ... 0.300
Axial play	mm	0.020 ... 0.070
2nd groove		
End clearance	mm	0.300 ... 0.500
Axial play	mm	0.020 ... 0.060
3rd groove		
End clearance	mm	cannot be measured
Axial play	mm	cannot be measured

PISTONS WITH RINGS AND PINS N52K/B30

11 25 PISTONS WITH RINGS AND PINS N52K B30

PISTONS WITH RINGS AND PINS SPECIFICATION

Piston and pin are paired to each other - replace together only.		
Measuring point "A" (position)	mm	14

Piston diameter at measuring point "A"		
Original (new dimension)	mm	$84.990^{\pm 0.010}$
Repair stage (new dimension)	mm	%
Oversize (new dimension)	mm	$85.240^{\pm 0.010}$
Piston installation clearance (piston new)	mm	0.000...0.034
Piston installation clearance (piston worn)	mm	0.020...0.047
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.150

VALVES WITH SPRINGS N52K/B25

11 34 VALVES WITH SPRINGS N52K B25

VALVES WITH SPRINGS SPECIFICATION

Plate dia.		
Inlet	mm	$32.2^{\pm 0.05}$
Exhaust	mm	27.0± 0.1
Stem		
Inlet	mm	$5.0^{-0.1}_{-0.06}$
Exhaust	mm	$6.0^{-0.1}_{-0.06}$

VALVES WITH SPRINGS N52K/B30

11 34 VALVES WITH SPRINGS N52K B30

VALVES WITH SPRINGS SPECIFICATION

Plate dia.		
Inlet	mm	$34.2^{\pm 0.05}$
Exhaust	mm	$29.0^{\pm 0.1}$
Stem		
Inlet	mm	$5.0^{-0.1}_{-0.06}$
Exhaust	mm	$6.0^{-0.1}_{-0.06}$

VIBRATION DAMPER N52K/B25

11 23 VIBRATION DAMPER N52K B25

VIBRATION DAMPER SPECIFICATION

Max. permitted radial runout	mm	0.100
Max. permitted axial runout	mm	0.100

VIBRATION DAMPER N52K/B30

11 23 VIBRATION DAMPER N52K B30

VIBRATION DAMPER SPECIFICATION

Max. permitted radial runout	mm	0.100
Max. permitted axial runout	mm	0.100

CAMSHAFT N54/B30

11 31 CAMSHAFT N54 B30

CAMSHAFT SPECIFICATIONS

Guide bearing (width)	mm	$20.000^{+0.052}$
Radial runout	mm	0.054...0.099
Axial play	mm	0.02 ... 0.162

CONNECTING RODS AND BEARINGS N54/B30

11 24 CONNECTING RODS AND BEARINGS N54 B30

CONNECTING RODS AND BEARINGS SPECIFICATIONS

Large connecting rod eye (without bearing)	mm	$53.600^{+0.016}$
Conrod bushing: Inside diameter	mm	$22^{+0.013}_{+0.004}$
Permissible total deviation of connecting rods in one engine (without bearing shells)	g	± 5

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS N54 B30

CRANKSHAFT AND BEARINGS SPECIFICATIONS

Ground sizes of conrod bearing journals		
Stage (b)	mm	49.9730 ... 49.9834
Stage (r)	mm	49.9835 ... 49.9930
Radial conrod bearing play	mm	0.025 ... 0.070

CRANKSHAFT AND BEARINGS N54/B30

11 21 CRANKSHAFT AND BEARINGS N54 B30

CRANKSHAFT AND BEARINGS SPECIFICATIONS

Ground sizes of main bearing journals		**main bearing journal**
Original (designation S1)	mm	55.998...55.993
Original (designation S2)	mm	55.992...55.987
Original (designation S3)	mm	55.986...55.981

Crankshaft bearing clearance, radial	mm	0.020...0.046
Max. permitted runout at center crankshaft journal	mm	0.15

CRANKSHAFT AND BEARINGS N54/B30

11 21 CRANKSHAFT AND BEARINGS N54 B30

CRANKSHAFT AND BEARINGS SPECIFICATIONS

Ground sizes of main bearing journals		**Guide bearing journal**
Original (designation S1)	mm	64.998...64.993
Original (designation S2)	mm	64.992...64.987
Original (designation S3)	mm	64.986...64.981
Crankshaft bearing clearance, radial	mm	0.020...0.046
Max. permitted runout at center crankshaft journal	mm	0.15

CRANKSHAFT AND BEARINGS N54/B30

11 21 CRANKSHAFT AND BEARINGS N54 B30

CRANKSHAFT AND BEARINGS SPECIFICATIONS

Grinding stages, crankshaft guide bearing		
Standard	mm	24.0 F8
Size 1	mm	24.2 F8
Size 2	mm	24.4 F8
Crankshaft axial play	mm	0.060...0.250

CYLINDER HEAD WITH COVER N54/B30

11 12 CYLINDER HEAD WITH COVER N54 B30

CYLINDER HEAD WITH COVER SPECIFICATIONS

Cylinder head height: Original dimension	mm	112.00 ± 0.05
Machining limit	mm	111.70 ± 0.05
Valve guides are not available as replacement parts.		
Inside diameter of installed valve guide		
Original inlet valve	mm	$5.0^{+0.012}$
Original exhaust valve	mm	$6.0^{+0.012}$
Tilt clearance, maximum (wear between valve and valve guide)	mm	cannot be measured
Bearing of camshaft		
Guide bearing (width)	mm	22.000...22.052

CYLINDER HEAD WITH VALVE SEAT COVER N54/B30

11 12 CYLINDER HEAD WITH VALVE SEAT COVER N54 B30

CYLINDER HEAD WITH VALVE SEAT COVER SPECIFICATIONS

Valve seat angle	°	45
Correction angle: outer	°	15
Correction angle: inner	°	60
Valve seat width: Inlet	mm	$1.0^{+0.1}$
Valve seat width: Exhaust	mm	$1.2^{+0.1}$
Valve seat		
Valve seat surface: Outside dia. inlet	mm	$27.7^{+0.1}$
Valve seat surface: Outside dia. exhaust	mm	$26.6^{+0.1}$

ENGINE BLOCK, CYLINDER CRANKCASE N54/B30

11 11 ENGINE BLOCK, CYLINDER CRANKCASE N54 B30

ENGINE BLOCK, CYLINDER CRANKCASE SPECIFICATIONS

Bore _ stage 0[a)]	mm	$84.000^{+0.014}$
Bore _ stage 00 a)	mm	
Bore _ stage 1 a)	mm	$84.250^{+0.014}$
Permitted out-of-round of cylinder bore a)	mm	0.005
Permitted conicity of cylinder bore a)	mm	0.01
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.15

[a)] new status or recondition

ENGINE IN GENERAL N54/B30

11 00 ENGINE IN GENERAL N54 B30

ENGINE IN GENERAL SPECIFICATIONS

Cylinder		6
Bore	mm	84
Stroke	mm	89.6
Effective displacement	cm^3	2979
Compression ratio	:1	10.2
Max. permissible engine speed	rpm	7000
Permissible constant speed	rpm	6550
Compression pressure: Minimum and maximum values depending on position of Valvetronic.		14...16
Compression pressure:	bar	2

Maximum deviation of all cylinders to each other.		

OIL PUMP WITH STRAINER AND DRIVE N54/B30

11 41 OIL PUMP WITH STRAINER AND DRIVE N54 B30

OIL PUMP WITH STRAINER AND DRIVE SPECIFICATIONS

Oil pressure at idle speed with engine at operating temperature	min bar	1.5
Control pressure with engine at operating temperature	bar	4.0...6.0

OIL SUPPLY E82, E88, E89/N54/B30

11 40 OIL SUPPLY E82/E88/E89/N54 B30

OIL SUPPLY SPECIFICATIONS

Oil grades and consumption: **see ENGINE - OPERATING FLUIDS**		
Filling capacity, engine oil change with oil filter element	Litres	6.50

PISTONS WITH RINGS AND PINS

11 25 PISTONS WITH RINGS AND PINS N18

PISTONS WITH RINGS AND PINS SPECIFICATIONS

1st groove		
End clearance	mm	0.20 ... 0.40
End clearance (wear limit)	mm	0.95
Side clearance	mm	0.015 ... 0.070
2nd groove		
End clearance	mm	0.30 ... 0.55
End clearance (wear limit)	mm	1.06
Side clearance	mm	0.015 ... 0.060
3rd groove		
End clearance	mm	0.10 ... 0.40
End clearance (wear limit)	mm	0.82
Side clearance	mm	0.040 ... 0.10

PISTONS WITH RINGS AND PINS N54/B30

11 25 PISTONS WITH RINGS AND PINS N54 B30

PISTONS WITH RINGS AND PINS SPECIFICATIONS

Piston and pin are paired to each other - replace together only.		

Measuring point "A" (position)	mm	15
Piston diameter at measuring point "A"		
Original (new dimension)	mm	$83.967^{+0.004}_{-0.009}$
Repair stage (new dimension)	mm	%
Oversize (new dimension)	mm	$84.217^{+0.004}_{-0.009}$
Piston installation clearance (piston new)	mm	0.000...0.034
Piston installation clearance (piston worn)	mm	0.020...0.047
Permissible total wear tolerance between piston and cylinder (engine operated)	mm	0.15

PISTONS WITH RINGS AND PINS N54/B30

11 25 PISTONS WITH RINGS AND PINS N54 B30

PISTONS WITH RINGS AND PINS SPECIFICATIONS

1st groove		
End clearance	mm	0.18...0.33
Axial play	mm	0.020...0.060
2nd groove		
End clearance	mm	0.30...0.50
Axial play	mm	0.020...0.060
3rd groove		
End clearance	mm	cannot be measured
Axial play	mm	cannot be measured

VALVES WITH SPRINGS N54/B30

11 34 VALVES WITH SPRINGS N54 B30

VALVES WITH SPRINGS SPECIFICATIONS

Plate dia.		
Inlet	mm	$31.4^{\pm 0.05}$
Exhaust		$28.0^{\pm}$ 0.1
Stem		
Inlet	mm	$5.0\ ^{-0.1}_{-0.06}$
Exhaust	mm	$6.0\ ^{-0.1}_{-0.06}$

VIBRATION DAMPER N54/B30

11 23 VIBRATION DAMPER N54 B30

VIBRATION DAMPER SPECIFICATIONS

Max. permitted radial runout	mm	0.10
Max. permitted axial runout	mm	0.10

AIR PUMP, LINES AND CONTROL VALVES

11 72 AIR PUMP, LINES AND CONTROL VALVES

TIGHTENING TORQUE SPECIFICATION - AIR PUMP, LINES AND CONTROL VALVES

	Type	Thread	Tightening specification	Measure
1AZ Secondary air valve to cylinder head	N52	M6		8 Nm
2AZ Secondary air pump to mounting bracket/pump carrier	N52	M6		8 Nm
3AZ Intake hose/intake line to body	N52	M6		8 Nm

CAMSHAFT

11 31 CAMSHAFT

TIGHTENING TORQUE SPECIFICATION - CAMSHAFT

	Type	Thread	Tightening specification	Measure
1AZ Upper and lower bearing strip of camshaft (steel screw 10.9)	N54	M7x70	Insert screws dry	
			Jointing torque	8 Nm
			Torque angle	60 °
2AZ Chain drive module to cylinder head	N54	M6x35		8.5 Nm
3AZ Guide rail to crankcase	N54	M8		20 Nm
4AZ Guide rail to cylinder head	N54	M7		14 Nm
5AZ Chain tensioner to cylinder head	N54	M22 x 1.5	Replace sealing ring	55 Nm
6AZ Screw plug in cylinder head	N54	M18x1.5		25 Nm

CASE COVERS

11 14 CASE COVERS

TIGHTENING TORQUE SPECIFICATION - CASE COVERS

	Type	Thread	Tightening specification	Measure
1AZ Transmission cover plate to crankcase Aluminum screws/bolts are permitted	N54	M6x16	Replace screws Thread repairs exclusively with Al Helicoil Jointing torque and angle of rotation must be observed without fail.	

with and without color coding (blue).			Jointing torque	4 Nm
			Torque angle	45 °

CONNECTING RODS AND BEARINGS

11 24 CONNECTING RODS AND BEARINGS

TIGHTENING TORQUE SPECIFICATION - CONNECTING RODS AND BEARINGS

	Type	Thread	Tightening specification	Measure
1AZ Connecting rod bolts	N54	M9	Replace, wash and oil screws	
			Jointing torque	20 Nm
			Torque angle	140 °

COOLANT PUMP WITH DRIVE

11 51 COOLANT PUMP WITH DRIVE

TIGHTENING TORQUE SPECIFICATION - COOLANT PUMP WITH DRIVE

	Type	Thread	Tightening specification	Measure
1AZ Coolant pump to crankcase	N54	M8 x 26	Replace screws. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	10 Nm
			Torque angle	90 °
2AZ ASA screw Coolant pump to bracket.	N54	M8 x 27		20.5 Nm
3AZ Hose clamp Coolant hose between coolant pump and coolant thermostat.	N54	L42-48		3 Nm
4AZ Hose clamp Coolant hose between coolant pump and feed line.	N54	L42-48		3 Nm

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS

TIGHTENING TORQUE SPECIFICATION - CRANKSHAFT AND BEARINGS

	Type	Thread	Tightening specification	Measure
1AZ Torsion damper (hub) to crankshaft (central bolt 12.9)	N54	M16x80	Replace screws Lightly oil screws and threads	
			Jointing torque	100 Nm

			Torque angle	360 °

CRANKSHAFT AND BEARINGS

11 21 CRANKSHAFT AND BEARINGS

TIGHTENING TORQUE SPECIFICATION - CRANKSHAFT AND BEARINGS

	Type	Thread	Tightening specification	Measure
1AZ Increment wheel on crankshaft	S54	M5 10.9	Replace screws	
			Jointing torque	5.0 Nm
			Torque angle	45 °
Increment wheel on crankshaft		M5 10.9	Replace screws	13 Nm
Increment wheel on crankshaft		M5 8.8	Replace screws	5.5 Nm

CYLINDER HEAD WITH COVER

11 12 CYLINDER HEAD WITH COVER

TIGHTENING TORQUE SPECIFICATION - CYLINDER HEAD WITH COVER

	Type	thread	tightening specification	Measure
11AZ Cylinder head cover	All	M6		10 Nm
	All	M7		15 Nm
	M21	M8		15 Nm
12AZ Oil trap to cylinder head cover	M21	M8		17 Nm
13AZ Timing case to cylinder head	All	M7		15 Nm
	All	M8		20 Nm
14AZ Plug for oil channel (microencapsulated)	M47/M57	M12 x 1.5		20 Nm
15AZ Vent plugs to cylinder head (coolant)	M67			2 Nm

CYLINDER HEAD WITH CYLINDER HEAD COVER

11 12 CYLINDER HEAD WITH CYLINDER HEAD COVER

TIGHTENING TORQUE SPECIFICATION - CYLINDER HEAD WITH CYLINDER HEAD COVER

	Type	Thread	Tightening specification	Measure
1AZ Cylinder head bolt	N54	M11 x 135	Replace screws.	
			Jointing torque	30 Nm
			1st angle of rotation	90 °
			2. Angle of rotation	90 °
			3. Angle of rotation	45 °
			Replace screws.	

2AZ Cylinder head bolt	N54	M9 x 95 M9 x 125	Jointing torque	30 Nm
			1st angle of rotation	90 °
			2. Angle of rotation	omitted
			3. Angle of rotation	45 °
3AZ Cylinder head bolt	N54	M9 x 30 M9 x 70		22 Nm
4AZ Cylinder head cover to cylinder head.	N54	M6		8.5 Nm
5AZ Metal bracket to cylinder head.	N54	M6 x 16		8 Nm
6AZ Lifting eye to cylinder head.	N54	M8 x 20		19 Nm
7AZ Ignition coil cover to cylinder head cover.	N54	M6 x 20		4 Nm
8AZ Hexagon screw (2 x) Metal bracket for ignition coil cover to cylinder head cover.	N54	M6 x 12		4 Nm

EMISSIONS CONTROL, CONTROL SENSOR/MONITOR SENSOR

11 78 EMISSIONS CONTROL, CONTROL SENSOR/MONITOR SENSOR

TIGHTENING TORQUE SPECIFICATION - EMISSIONS CONTROL, CONTROL SENSOR/MONITOR SENSOR

	Type	Thread	Tightening specification	Measure
1AZ Control sensor/monitor sensor	N54	M18 x 1.5		50 Nm
2AZ Bracket, oxygen sensor, to transmission	N54	M8x16		20 Nm

EMISSIONS CONTROL, CONTROL SENSOR/MONITORING SENSOR

11 78 EMISSIONS CONTROL, CONTROL SENSOR/MONITORING SENSOR

TIGHTENING TORQUE SPECIFICATION - EMISSIONS CONTROL, CONTROL SENSOR/MONITORING SENSOR

	Type	Thread	Tightening specification	Measure
1AZ Control sensor/monitoring sensor	N74	M18 x 1.5		50 Nm
2AZ Bracket, oxygen sensor, to cylinder head cover	N74	M6		10 Nm

EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR

11 78 EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR

TIGHTENING TORQUE SPECIFICATION - EMISSIONS-CONTROL, LAMBDA OXYGEN SENSOR

	Type	Thread	Tightening specification	Measure
1AZ Oxygen control sensor; oxygen monitor sensor	All	M18 x 1.5		50 Nm

ENGINE BLOCK

11 11 ENGINE BLOCK

TIGHTENING TORQUE SPECIFICATION - ENGINE BLOCK

	Type	Thread	Tightening specification	Measure
1AZ Main bearing bolts (steel bolts 10.9)	N54	M10x100	Replace screws	
			Jointing torque	20 Nm
			Torque angle	70 °
2AZ Bedplate Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M10x27	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	15 Nm
			Torque angle	90 °
3AZ Bedplate Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M8x37	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	10 Nm
			Torque angle	90 °
4AZ Bedplate Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M10x41	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	15 Nm
			Torque angle	90 °
5AZ Oil spray nozzles to engine block	N54		Hollow bolt	12 Nm
6AZ Screw plug, water drain	N54	M14x1.5	Replace seal	25 Nm
7AZ Screw plug, gear case upper section	N54	M22x1.5	Replace seal	50 Nm
8AZ Screw plug, gear case lower section	N54	M16x1.5	Replace seal	30 Nm

EXHAUST MANIFOLD

11 62 EXHAUST MANIFOLD

TIGHTENING TORQUE SPECIFICATION - EXHAUST MANIFOLD

	Type	Thread	Tightening specification	Measure
1AZ Exhaust manifold to cylinder head Coat screw connections with CRC copper paste	N54	M8	Replace nuts	20 Nm

EXHAUST MANIFOLD

11 62 EXHAUST MANIFOLD

TIGHTENING TORQUE SPECIFICATION - EXHAUST MANIFOLD

	Type	Thread	Tightening specification	Measure
1AZ Exhaust manifold to cylinder head Coat screw connections with CRC copper paste	All	M6	Replace nuts	10 Nm
	M50/M52/M52TU/M54/M56/S52/S50 US	M7	Replace nuts	20 Nm
	All/others	M7	Replace nuts	15 Nm
	M10	M8	Upper row of staybolts installed with bolt cement	23 Nm
	M21	M8	Replace nuts Retighten after 2000 km Slacken nuts by a 1/4 turn	12 Nm 12 Nm
	M41/M47/M47TU/M51/M57/M57TU	M8	Replace nuts	20 Nm
	All/others	M8	Replace nuts	23 Nm

FAN

11 52 FAN

TIGHTENING TORQUE SPECIFICATION - FAN

	Type	Thread	Tightening specification	Measure
1AZ Fan clutch on water pump Coupling nut (left-hand threads)	All			40 Nm
	M54			45 Nm
2AZ Fan to fan clutch	All			10 Nm

FLYWHEEL

11 22 FLYWHEEL

TIGHTENING TORQUE SPECIFICATION - FLYWHEEL

	Type	Thread	Tightening specification	Measure
1AZ Flywheel to crankshaft (automatic transmission)	N54	M12x1.5x25.5	Replace screws	
			1. Jointing torque	30 Nm
			2. Final tightening	125 Nm
2AZ DM flywheel to crankshaft (manual transmission)	N54	M12x1.5x25.35	Replace screw	120

INTAKE MANIFOLD

11 61 INTAKE MANIFOLD

TIGHTENING TORQUE SPECIFICATION - INTAKE MANIFOLD

	Type	Thread	Tightening specification	Measure
1AZ Hexagon screw Air intake manifold to cylinder head.	N54	M7 x 50		15 Nm
2AZ Hexagon nut Air intake manifold to cylinder head.	N54	AM7		15 Nm
3AZ Hose clamp Gaiter, rear charge-air duct to front charge-air duct.	N54	L65-72		3 Nm

INTAKE MANIFOLD

11 61 INTAKE MANIFOLD

TIGHTENING TORQUE SPECIFICATION - INTAKE MANIFOLD

	Type	thread	tightening specification	Measure
1AZ Intake manifold on cylinder head	All	M8		22 Nm
	All	M7		15 Nm
	All	M6		10 Nm
2AZ Soundproofing hood to holder	M60/1/M60/2/M62	M6		8 Nm

OIL FILTER AND PIPES

11- 42 OIL FILTER AND PIPES

TIGHTENING TORQUE SPECIFICATION - OIL FILTER AND PIPES

	Type	Thread	Tightening specification	Measure
1AZ Oil filter cap to oil filter housing	N54			25 Nm
2AZ Oil filter housing to cylinder head	N54	M8 x 78 M8 x 48 M8 x 28		22 Nm
3AZ Oil-coolant heat exchanger to oil filter housing.	N54	M8 x 20		16 Nm
4AZ ISA screw Assembly, oil feed line to crankcase top section	N54	M8 x 35		19 Nm
5AZ ISA screw Assembly, oil feed line to exhaust turbocharger	N54	M6 x 12		8 Nm
6AZ Oil pressure line to crankcase	N54	M8 x 12		20 Nm
7AZ ISA screw Oil return line to exhaust turbocharger	N54	M6 x 12		8 Nm
8AZ ISA screw Oil return line to crankcase bottom section	N54	M6 x 16		8 Nm

9AZ Oil feed to exhaust turbocharger	N54	M6 x 12		8 Nm
10AZ Oil return to crankcase	N54	M12 x 10		20 Nm
11AZ Screw plug to oil filter housing	N54	M20 x 1.5	Replace sealing ring	50 Nm

OIL PUMP WITH STRAINER AND DRIVE

11 41 OIL PUMP WITH STRAINER AND DRIVE

TIGHTENING TORQUE SPECIFICATION - OIL PUMP WITH STRAINER AND DRIVE

	Type	Thread	Tightening specification	Measure
1AZ Intake pipe to bedplate	N54	M6x30	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	4 Nm
			Torque angle	100 °
2AZ Oil pump to bedplate	N54	M8x123	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	10 Nm
			Torque angle	180 °
	N54	M8x31	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	10 Nm
			Torque angle	90 °
3AZ Chain module to crankcase and oil pump	N54	M6x16	Replace screws Thread repairs exclusively with Al Helicoil. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	4 Nm
			Torque angle	45 °
4AZ Sprocket to oil pump	N54	M8	Jointing torque	20 Nm
			Torque angle	45 °

OIL SUMP

11 13 OIL SUMP

TIGHTENING TORQUE SPECIFICATION - OIL SUMP

	Type	Thread	Tightening specification	Measure
1AZ Plug		M12 x		

Oil drain to oil sump.	N54	1.5	Replace sealing ring.	25 Nm
2AZ ASA screw Oil sump (aluminum) to crankcase lower half. Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M8 x 26	Replace screw. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	8 Nm
			Torque angle	90 °
3AZ ASA screw Oil sump (aluminum) to crankcase lower half. Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M8	Replace screw. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	8 Nm
			Torque angle	180 °
4AZ ASA screw Oil sump (aluminum) to crankcase lower half. Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M8 x 36	Replace screw. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	8 Nm
			Torque angle	90 °
5AZ ASA screw Oil deflector to crankcase lower half. Aluminum screws/bolts are permitted with and without color coding (blue).	N54	M6 x 20	Replace screw. Thread repairs exclusively with aluminum Helicoil threaded insert. Jointing torque and angle of rotation must be observed without fail.	
			Jointing torque	4 Nm
			Torque angle	90 °
6AZ ASA screw Transmission to oil sump.	N54	M8 x 50		19 Nm
7AZ Hexagon screw Holder, transmission oil cooler line, to oil sump.	N54	M6 x 30		8 Nm
8AZ Hexagon nut Oil level sensor to oil sump.	N54	M6		8 Nm
9AZ Transmission fluid cooler bracket to oil sump	N54	M8		9 Nm

THERMOSTAT AND CONNECTIONS

11 53 THERMOSTAT AND CONNECTIONS

TIGHTENING TORQUE SPECIFICATION - THERMOSTAT AND CONNECTIONS

	Type	Thread	Tightening specification	Measure
1AZ Thermostat housing to coolant pump.	N54	M6 x 25		8 Nm
2AZ Thermostat housing to coolant pump.	N54	M8 x 16		20 Nm
3AZ ASA screw Assembly, feed line to crankcase top section	N54	M6 x 20		9 Nm
4AZ Feed line to coolant pump.	N54	L42-48	Hose clamp	3 Nm
5AZ Feed line to thermostat	N54		Hose clamp	3 Nm
6AZ Coolant hose to cylinder head	N54	M6 x 23		9 Nm
7AZ ISA screw Coolant feed line to exhaust turbocharger	N54	M6 x 12		8 Nm
8AZ ISA screw Coolant return line to exhaust turbocharger	N54	M6 x 12		8 Nm
9AZ ISA screw Coolant return line to crankcase top section	N54	M6 x 16		8 Nm
10AZ ISA screw Coolant feed lines to assembly, feed line	N54	M6 x 16		8 Nm
11AZ EJOT screw Housing, coolant thermostat, to holder.	N54	M5 x 21.8		9 Nm
12AZ Hose clamp Coolant hose between coolant thermostat and radiator.	N54	L42-48		3 Nm

TURBOCHARGER AND CONTROL

11 65 TURBOCHARGER AND CONTROL

TIGHTENING TORQUE SPECIFICATION - TURBOCHARGER AND CONTROL

	Type	Thread	Tightening specification	Measure
1AZ Flange nut (with internal serrations) Exhaust turbocharger to cylinder head	N54	M7	Replace flange nut.	20 Nm
2AZ ASA screw Heat shield/retaining plate to crankcase top section	N54	M6 x 16		8 Nm
3AZ ASA screw Holder EPPC to cylinder head	N54	M6 x 20		9 Nm
4AZ Bracket, air duct, compressor 2, to cylinder head	N54	M6 x 15		9 Nm
5AZ Vacuum reservoir to bracket for vacuum reservoir	N54	M8		20 Nm

6AZ Bracket, vacuum reservoir, to body	N54	M6 x 14		5 Nm
7AZ Bracket to engine longitudinal member	N54	M6		5 Nm
8AZ EPPC to bracket, EPPC, with heat shield	N54	M6		5 Nm
9AZ Hexagon nut Vacuum unit (wastegate valve) to bracket	N54	M6		8 Nm
10AZ Lock nut to vacuum unit (wastegate valve) linkage	N54	M6		7 Nm
11AZ Hexagon screw Bracket, vacuum unit (wastegate valve), to turbocharger	N54	M8		20 Nm
12AZ Band clamp Charge-air duct to turbocharger.	N54	M6	Replace band clamp.	3.5 Nm

V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT

11 28 V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT

TIGHTENING TORQUE SPECIFICATION - V-RIBBED BELT WITH TENSION AND DEFLECTION ELEMENT

	Type	Thread	Tightening specification	Measure
1AZ ISA screw Belt tensioner with deflection pulley to engine block.	N54	M10 x 110		40 Nm
2AZ ISA screw Deflection pulley 80 x 30	N54	M10 x 40		38 Nm
3AZ ISA screw Deflection pulley 90 x 30	N54	M10 x 40		38 Nm
4AZ ASA screw Belt tensioner to crankcase upper section.	N54	M10 x 65		38 Nm
5AZ Deflection pulley 65 x 33	N54	M10 x 65		40 Nm
6AZ Deflection pulley 72 x 32	N54	M10 x 40		40 Nm
7AZ ISA screw Deflection pulley 73.8 x 24.92 to crankcase upper section.	N54	M10 x 40		38 Nm

VACUUM PUMP

11 66 VACUUM PUMP

TIGHTENING TORQUE SPECIFICATION - VACUUM PUMP

	Type	Thread	Tightening specification	Measure
1AZ Vacuum pump to crankcase	N54	M6x40	Flat mushroom head screw 10.9 Replace screws	11 Nm

2AZ Sprocket wheel to vacuum pump	N54	M10x30	Screw 12.9 washed and oiled	66 Nm

VARIABLE CAMSHAFT CONTROL

11 36 VARIABLE CAMSHAFT CONTROL

TIGHTENING TORQUE SPECIFICATION - VARIABLE CAMSHAFT CONTROL

	Type	Thread	Tightening specification	Measure
1AZ VANOS with sensor wheel to inlet and exhaust camshafts	N54	M10x94	Replace screw	
			Jointing torque	20 Nm
			Torque angle	180 °
2AZ Non-return valve VANOS to cylinder head	N54	M14 x 1.5		13 Nm
3AZ Solenoid valve holder to cylinder head	N54	M6x12		10 Nm

VIBRATION DAMPER

11 23 VIBRATION DAMPER

TIGHTENING TORQUE SPECIFICATION - VIBRATION DAMPER

	Type	Thread	Tightening specification	Measure
3AZ Belt pulley/vibration damper to hub	S38/B36	M8 10.9		34 Nm
	N40/N42/N45/N46/S38/B38	M8 10.9		34 Nm
	All/others	M8		22 Nm
4AZ Belt pulley to vibration damper	S38/B35	M8 8.8		22 Nm
	S50	M8 8.8		22 Nm
5AZ Sprocket with hub or hub to crankshaft	M40	M16 x 1.5	Replace screw	310 Nm
	M42/M43/M43TU/M44	M16 x 1.5	Replace screw	330 Nm
6AZ Hub to crankshaft	N40/N42/N45/N46	M16 x 1.5	Replace screw	300 Nm

VIBRATION DAMPER

11 23 VIBRATION DAMPER

TIGHTENING TORQUE SPECIFICATION - VIBRATION DAMPER

	Type	Thread	Tightening specification	Measure
1AZ ASA screw Vibration damper to crankshaft hub.	N54	M8 x 16		35 Nm

ENGINE SUSPENSION

22 11 011 REPLACING LEFT ENGINE MOUNT (N52K)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove underbody protection at front and rear

Release screws (1) and remove engine mount.

Tightening torque **22 11 1AZ** .

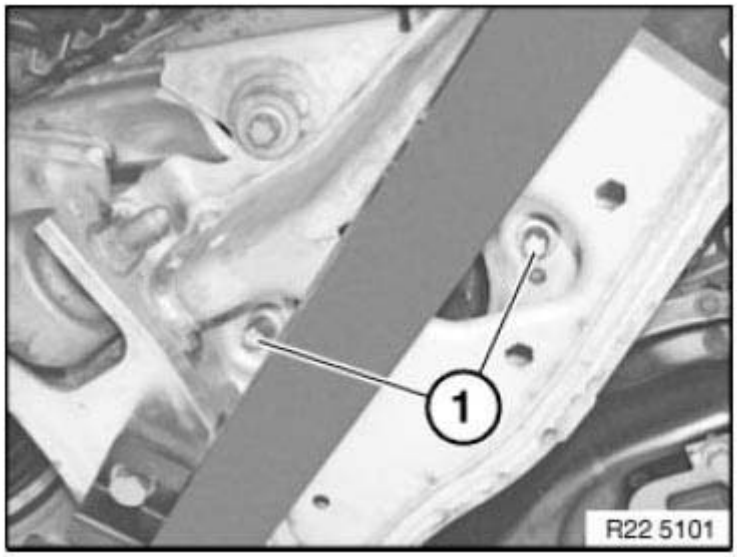


Fig. 1: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

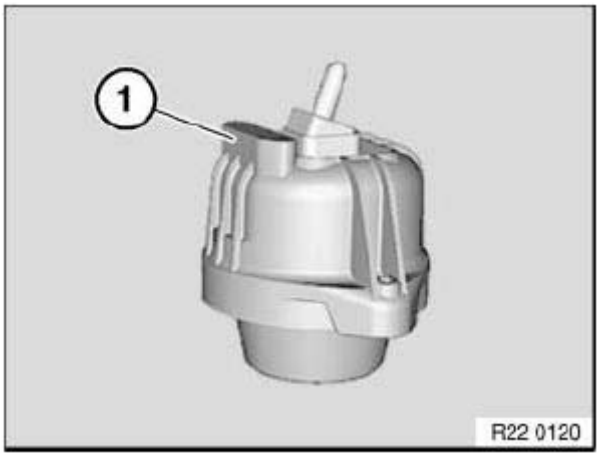


Fig. 2: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 110 REPLACING LEFT ENGINE SUPPORT ARM (N52K)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove underbody protection at front and rear

Release grounding strap (1) from engine support arm.

Unfasten screws (2).

Remove engine support arm.

Installation:

Aluminum screws/bolts **must** be replaced.

Tightening torque **22 11 3AZ**

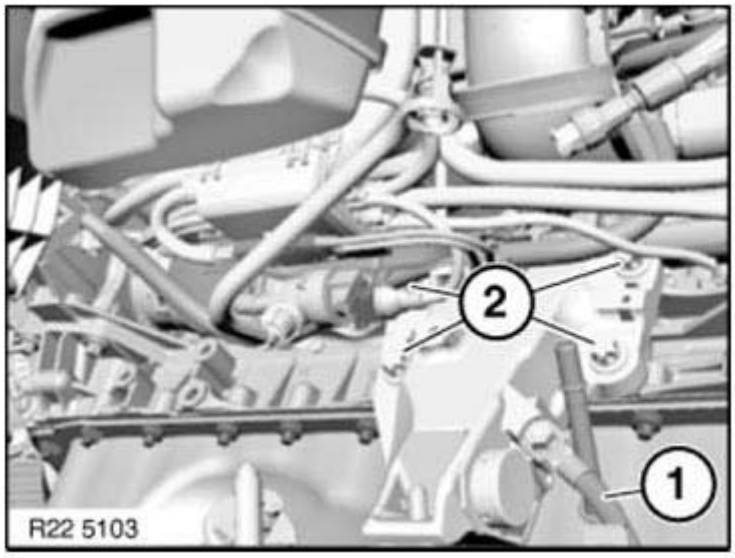


Fig. 3: Identifying Screw And Grounding Strap
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 001 REPLACING RIGHT ENGINE MOUNT (N52K)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove front underbody protection

Release screws (1) and remove engine mount.

Tightening torque **22 11 1AZ** .

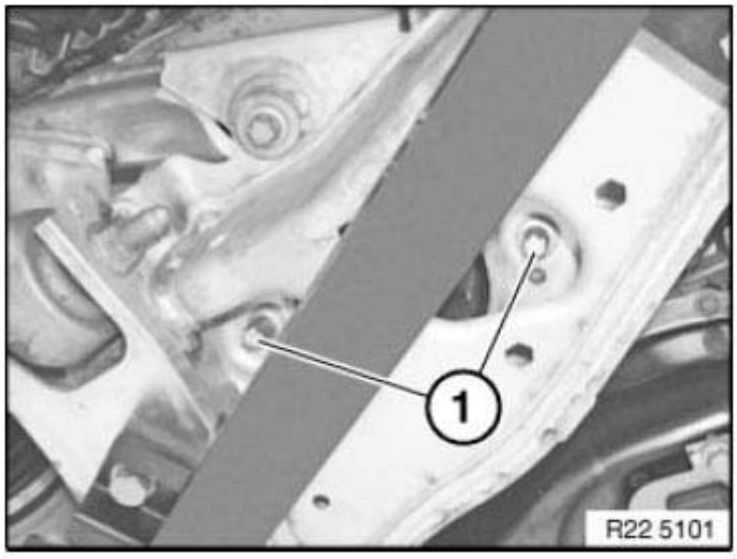


Fig. 4: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

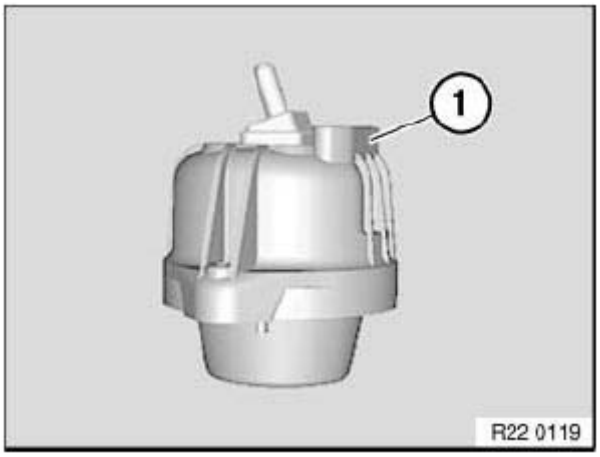


Fig. 5: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 100 REPLACING RIGHT ENGINE SUPPORT ARM (N52K)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove front underbody protection

Release screws (1).

Remove engine support arm from engine.

Installation:

Aluminum screws/bolts **must** be replaced.

Tightening torque **22 11 3AZ**

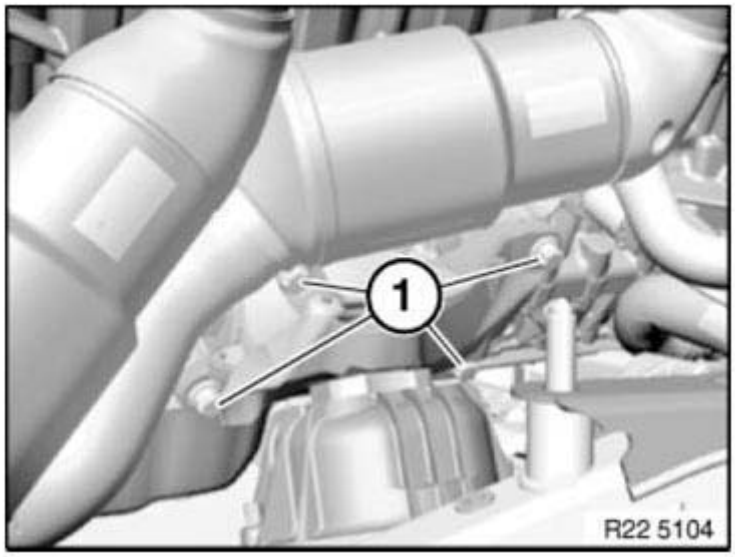


Fig. 6: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION SUSPENSION, MANUAL TRANSMISSION

22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING

NOTE: **Operations are identical to Replacing rubber mount See 2231001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING or 2231001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (AUTOMATIC TRANSMISSION) for transmission mounting.**

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- Remove heat shield
- Support transmission with jack.

Remove screws and nuts.

Remove transmission cross member.

Remove rubber mount from transmission cross member.

Tightening torque **22 32 3AZ/4AZ** .

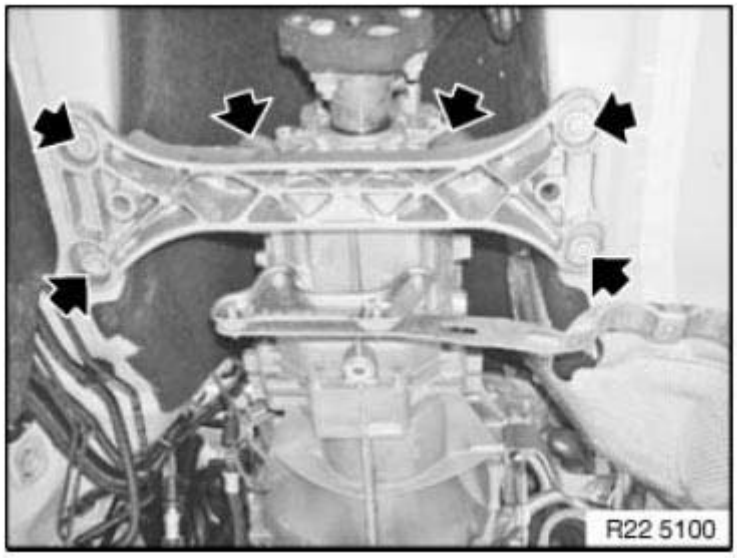


Fig. 7: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (AUTOMATIC TRANSMISSION)

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- Remove heat shield
- Support transmission with jack.

Unfasten screws (1) and nuts (2).

Remove transmission cross member.

Remove rubber mount from transmission cross member.

Tightening torque **22 32 3AZ/4AZ** .

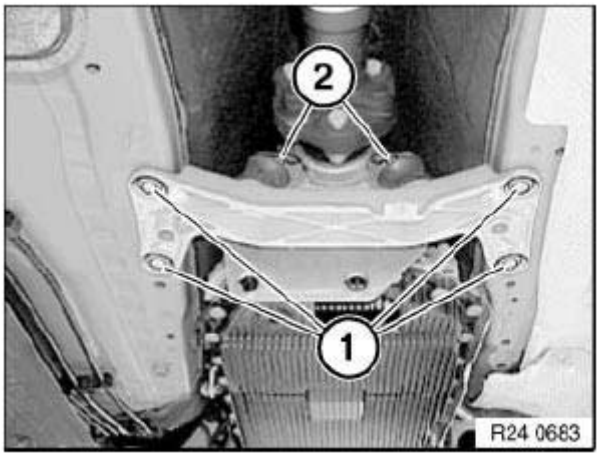


Fig. 8: Identifying Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION SUSPENSION, AUTOMATIC TRANSMISSION

22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING

NOTE: Operations are identical to Replacing rubber mount See 2231001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING or 2231001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (AUTOMATIC TRANSMISSION) for transmission mounting.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- Remove heat shield
- Support transmission with jack.

Remove screws and nuts.

Remove transmission cross member.

Remove rubber mount from transmission cross member.

Tightening torque **22 32 3AZ/4AZ** .

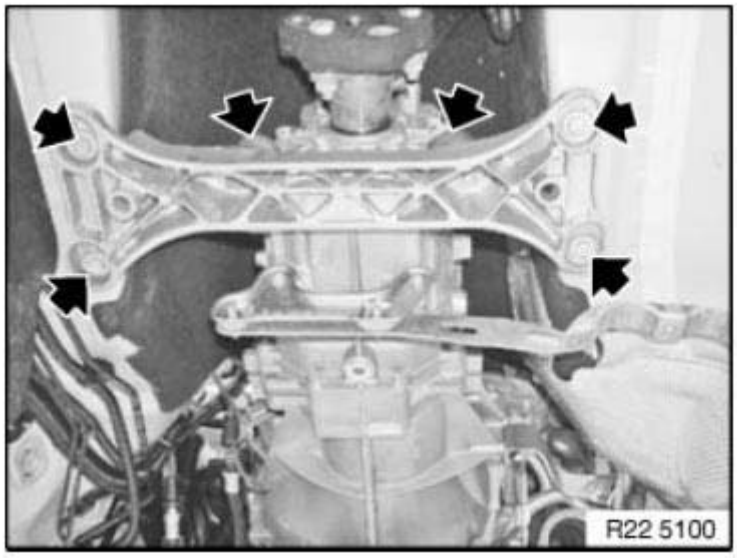


Fig. 9: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING (AUTOMATIC TRANSMISSION)

Necessary preliminary work

- Remove rear **UNDERBODY PROTECTION**
- Remove heat shield
- Support transmission with jack.

Unfasten screws (1) and nuts (2).

Remove transmission cross member.

Remove rubber mount from transmission cross member.

Tightening torque **22 32 3AZ/4AZ** .

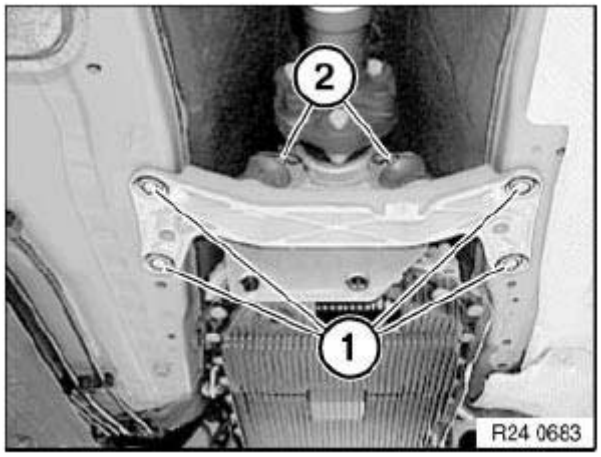


Fig. 10: Identifying Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

2211 ENGINE SUSPENSION

22 11 011 REPLACING LEFT ENGINE MOUNT (N54)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove rear underbody protection
- Detach ground cable from body

Release screws (1) and remove engine mount.

Tightening torque **22 11 1AZ** .

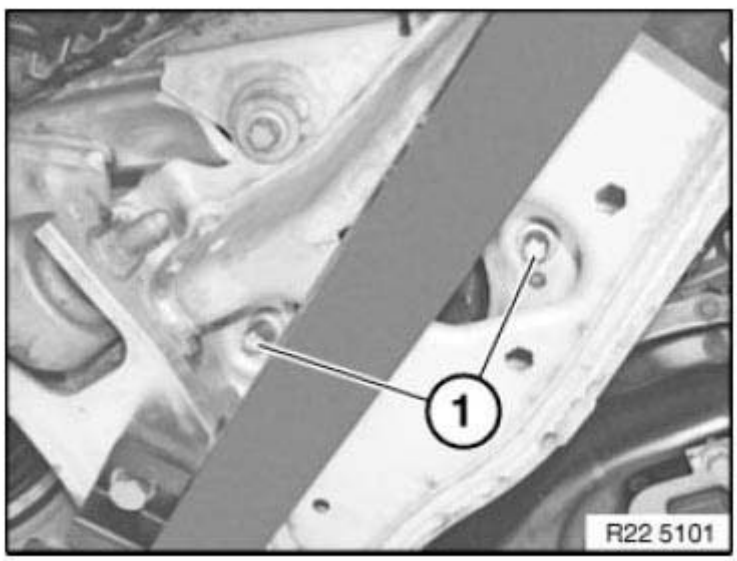


Fig. 1: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

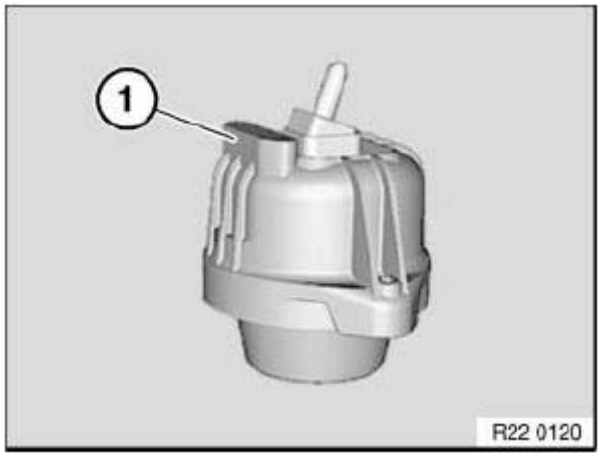


Fig. 2: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 110 REPLACING LEFT ENGINE SUPPORT ARM (N54)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove underbody protection at front and rear

Release grounding strap (1) from engine support arm.

Release screw (2).

Take off holder (3).

Release screws (4).

Remove engine support arm.

Tightening torque **22 11 3AZ**

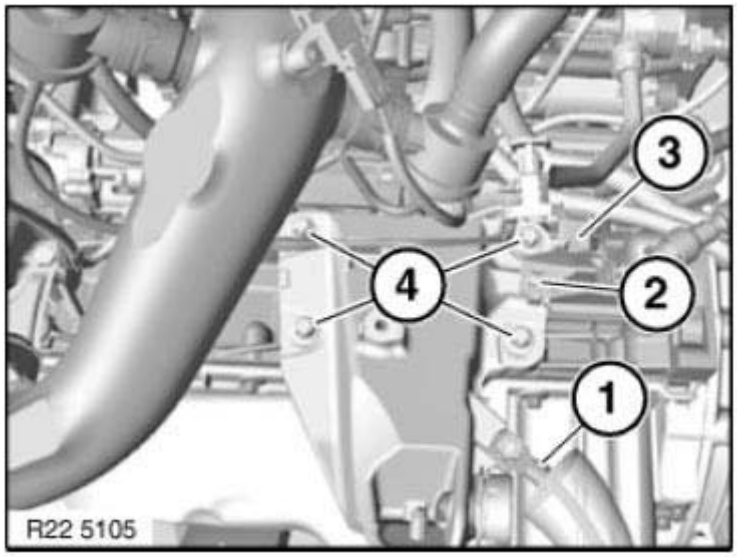


Fig. 3: Identifying Grounding Strap, Screw, Holder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 001 REPLACING RIGHT ENGINE MOUNT (N54)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove rear underbody protection
- Lower **FRONT AXLE SUPPORT**

Release screws (1) and remove engine mount.

Tightening torque **22 11 1AZ** .

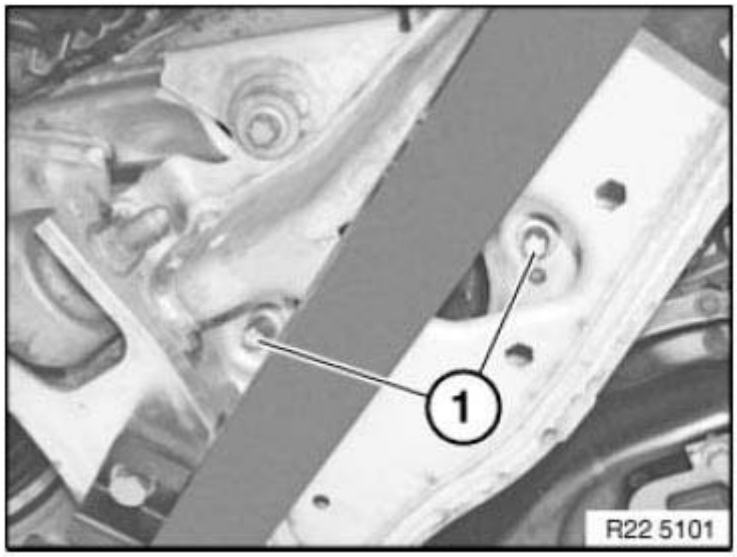


Fig. 4: Identifying Engine Mount Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Stop (1) is mounted on engine support arm.

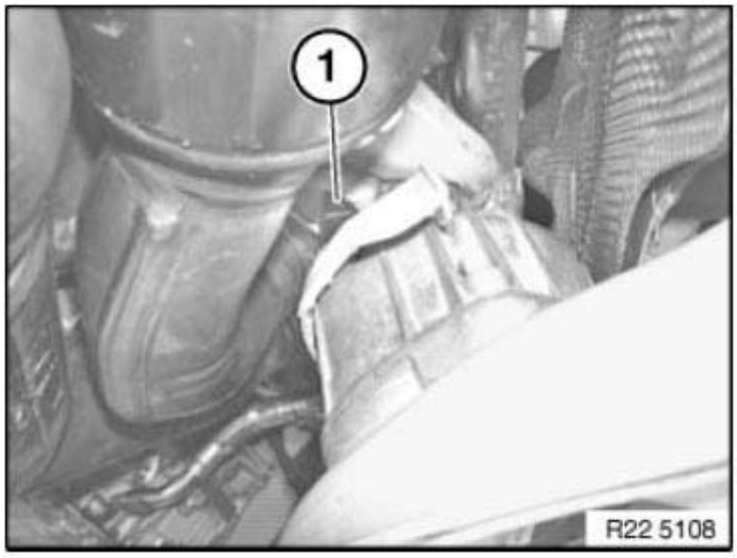


Fig. 5: Identifying Engine Support Arm Stop
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rubber section (1) of engine mount must point to middle of vehicle.

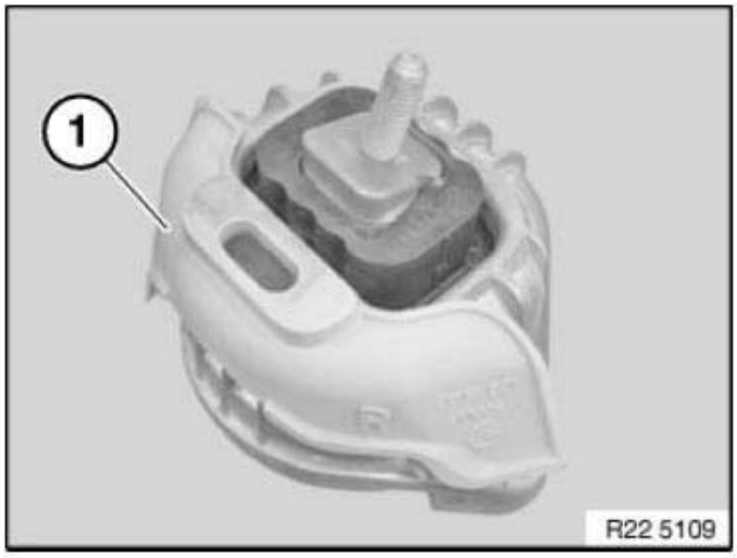


Fig. 6: Identifying Engine Mount Rubber Section
Courtesy of BMW OF NORTH AMERICA, INC.

22 11 100 REPLACING RIGHT ENGINE SUPPORT ARM (N54)

Necessary preliminary tasks

- Secure engine in **INSTALLATION POSITION**
- Remove underbody protection at front and rear
- Remove both catalytic converters. See **1832050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)** or **1832060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)**

Release screws (1).

Remove engine support arm from engine.

Tightening torque **22 11 3AZ**

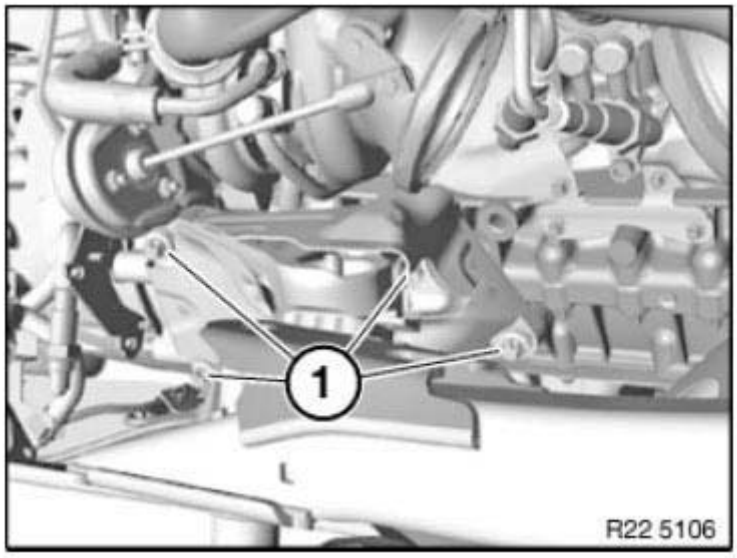


Fig. 7: Identifying Engine Support Arm Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2231 TRANSMISSION SUSPENSION, MANUAL TRANSMISSION

22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING

NOTE: Operations are identical to Replacing RUBBER MOUNT for transmission mounting.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary work

- Remove rear underbody protection
- Remove heat shield
- Support transmission with jack.

Remove screws and nuts.

Remove transmission cross member.

Remove rubber mount from transmission cross member.

Tightening torque **22 32 3AZ/4AZ** .

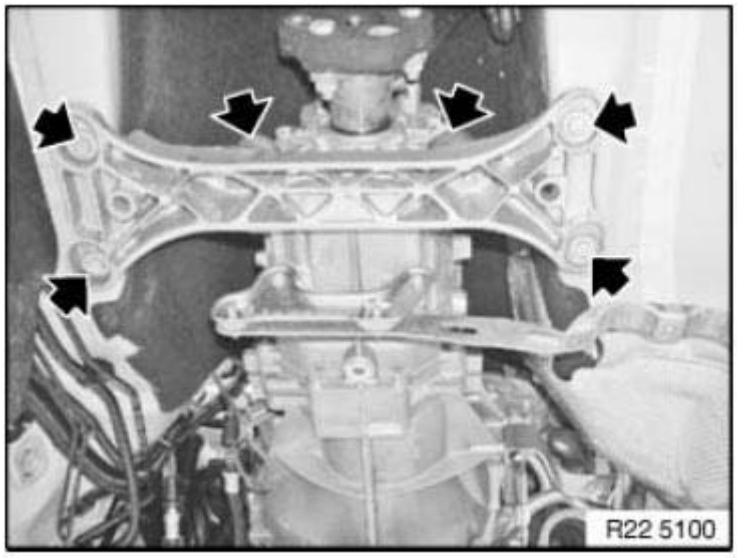


Fig. 8: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

2232 TRANSMISSION SUSPENSION, AUTOMATIC TRANSMISSION

22 31 050 REPLACING CROSS MEMBER FOR TRANSMISSION MOUNTING

NOTE: Operations are identical to Replacing RUBBER MOUNT for transmission mounting.

22 31 001 REPLACING RUBBER MOUNT FOR TRANSMISSION MOUNTING

Necessary preliminary work

- Remove rear underbody protection.
- Remove heat shield
- Support transmission with jack.

Remove screws and nuts.

Remove transmission cross member.

Remove rubber mount from transmission cross member.

Tightening torque **22 32 3AZ/4AZ** .

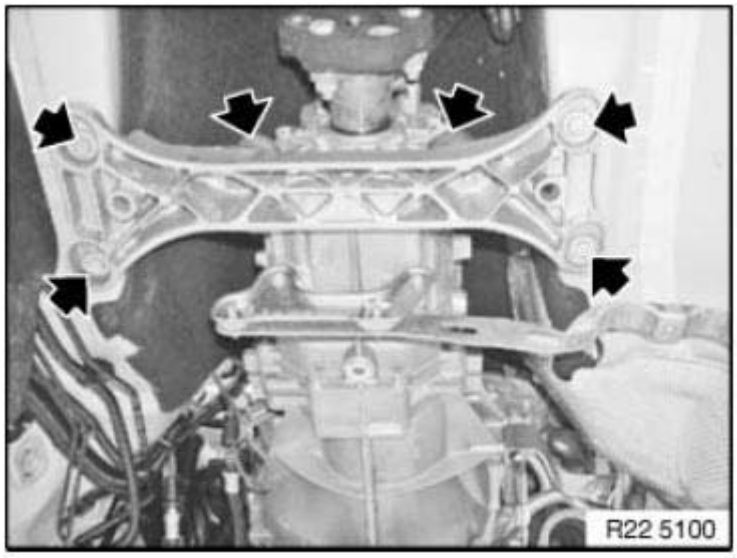


Fig. 9: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Engine and Gearbox Suspension - Tightening Torques - Z4

ENGINE MOUNTING

22 11 ENGINE MOUNTING

TIGHTENING TORQUE SPECIFICATION - ENGINE MOUNTING

		Type
1AZ	Engine mount to front axle support	E52/E85/E86
		E65/E66/E67
		E60/E61/E63/E64/E83
		E53
		E87/E90/E91/E92/E93/E70/E71/E83/E81/E82/E88/E89/E84
		E70/E71/E72/E83/E84/E90/E91/E92/E93
		E92/E90/S65
2AZ	Engine mount to engine support arm	E60/E61/E63/E64/E65/E66/E67/E53/E83/E87/E90/E91/E92/E93/E70/E71/E81/E82/E88/E8
		E65/E66/E67
		E70/E71/E72/E83/E84/E90/E91/E92/E93
		E85/E86/E52
3AZ	Engine support arm to engine	E60/E61/E63/E64/E65/E66/E67/E70/E71/E72/E81/E82/E83/E84/E87/E88/E89/E90/E91/E9
		N51/N52/N52K/N53
		E60/E61/E65/E66/E67
		E85/E83
		E70/E71
		E53 (N62/M54)
		E53 (M57)
		N54/N55
		N42

4AZ	Engine mount to console	E65/E60/E61/E63/E64
5AZ	Console to front axle support	E65/E60/E61/E63/E64
6AZ	Vibration absorber to engine support	E70/E71
7AZ	Reinforcement plate to front axle support	E90/E91/E92
8AZ	Support angle to engine mount or front axle support	E90/E91/E92

TRANSMISSION MOUNTING

22 32 TRANSMISSION MOUNTING

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION MOUNTING

		Type
1AZ	Bolt to transmission cross member	E60/E65/E66/E67
2AZ	Transmission bearing block to transmission	E60/E61/E63/E64/E65/E66/E67/E81/E82/E84/E85/E86/E87/E88/E89/E90/E91/
3AZ	Transmission mount to transmission/transmission cross member	E60/E61/E63/E64/E67/E81/E82/E84/E85/E86/E87/E88/E89/E90/E91/E92/E93
4AZ	Transmission cross member to body	E85/E86/E46/E83
		E60/E61/E63/E64/E67/E81/E82/E84/E87/E88/E89/E90/E91/E92/E93
		E53
		E70/E71/E72
5AZ	Transmission cross member to rubber mounts	E46/E53/E83
		E70/E71/E72
6AZ	Vibration absorber to transmission cross member	E60/E61

Engine and Gearbox Suspension - Tightening Torques - Z4

ENGINE MOUNTING

22 11 ENGINE MOUNTING

TIGHTENING TORQUE SPECIFICATION - ENGINE MOUNTING

	Type
1AZ Engine mount to front axle support	E52/E85/E86
	E65/E66/E67
	E60/E61/E63/E64/E83
	E53
	E87/E90/E91/E92/E93/E70/E71/E83/E81/E82/E88/E89/E84
	E70/E71/E72/E83/E84/E90/E91/E92/E93
	E92/E90/S65
2AZ Engine mount to engine support arm	E60/E61/E63/E64/E65/E66/E67/E53/E83/E87/E90/E91/E92/E93/E70/E71/E81/E82/E88/E89/E8
	E65/E66/E67
	E70/E71/E72/E83/E84/E90/E91/E92/E93
	E85/E86/E52
3AZ Engine support arm to engine	E60/E61/E63/E64/E65/E66/E67/E70/E71/E72/E81/E82/E83/E84/E87/E88/E89/E90/E91/E92/E9
	N51/N52/N52K/N53
	E60/E61/E65/E66/E67
	E85/E83
	E70/E71
	E53 (N62/M54)
	E53 (M57)
	N54/N55
	N42

4AZ Engine mount to console	E65/E60/E61/E63/E64
5AZ Console to front axle support	E65/E60/E61/E63/E64
6AZ Vibration absorber to engine support	E70/E71
7AZ Reinforcement plate to front axle support	E90/E91/E92
8AZ Support angle to engine mount or front axle support	E90/E91/E92

TRANSMISSION MOUNTING

22 32 TRANSMISSION MOUNTING

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION MOUNTING

	Type
1AZ Bolt to transmission cross member	E60/E65/E66/E67
2AZ Transmission bearing block to transmission	E60/E61/E63/E64/E65/E66/E67/E81/E82/E84/E85/E86/E87/E88/E89/E90/E91/E92/I
3AZ Transmission mount to transmission/transmission cross member	E60/E61/E63/E64/E67/E81/E82/E84/E85/E86/E87/E88/E89/E90/E91/E92/E93
4AZ Transmission cross member to body	E85/E86/E46/E83
	E60/E61/E63/E64/E67/E81/E82/E84/E87/E88/E89/E90/E91/E92/E93
	E53
	E70/E71/E72
5AZ Transmission cross member to rubber mounts	E46/E53/E83
	E70/E71/E72
6AZ Vibration absorber to transmission cross member	E60/E61

1200 TROUBLESHOOTING

61 20 ... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular motorization and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, only one work scope will be provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery replacement

- Service functions
- Body
- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 13 ... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

IMPORTANT:

1. **Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).**
2. **Read out fault memory**
3. **Eliminate cause of damage.**
4. **Disconnect battery negative terminal**
5. **Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced. Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)**
6. **Carry out function test and read out fault memories again**
7. **Eliminate new faults if applicable and clear fault memories**

NOTE: **The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.**
The case can no longer be ordered.

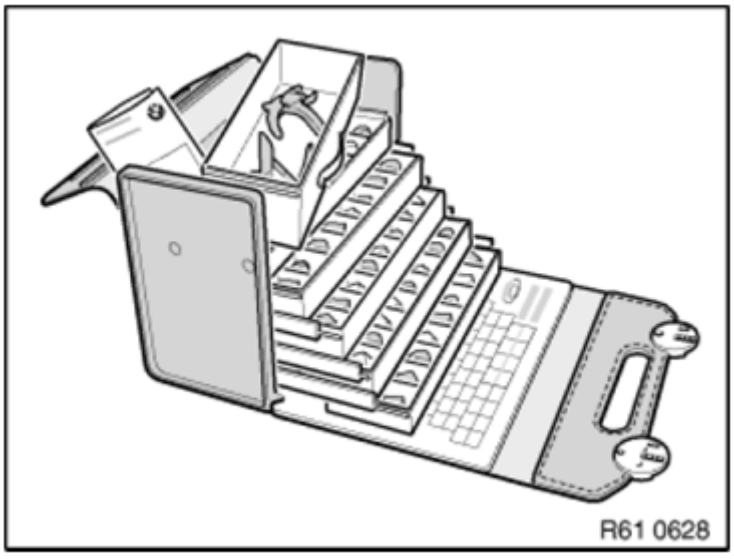


Fig. 1: Retrofitting Tool Box
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.

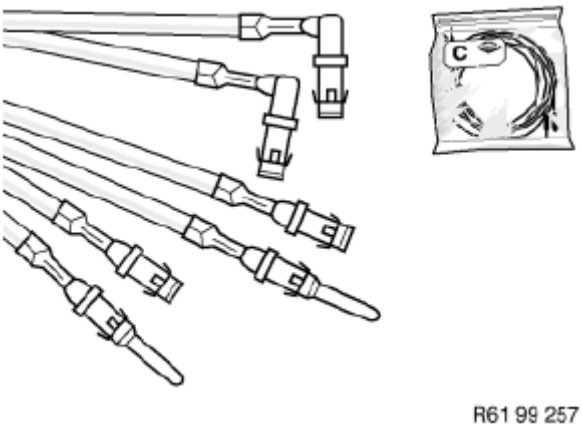


Fig. 2: Identifying Circular Plug System D 2.5
Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts:

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose

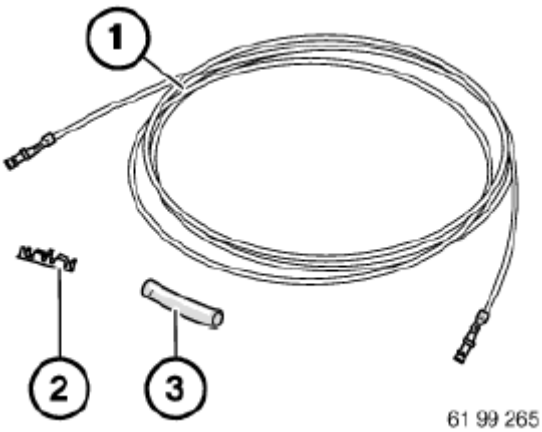


Fig. 3: Identifying Cable With Requisite Wire Cross-Section, Crimp Connector And Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool kit 61 0 300).

See repair instructions

INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS of different plug contact systems.

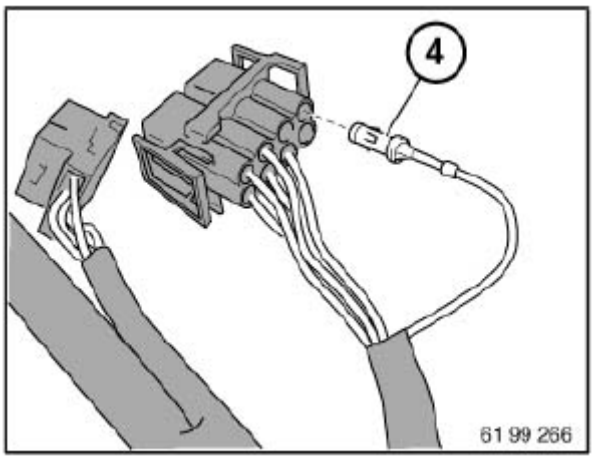


Fig. 4: Identifying Damaged Cable With Socket Number
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Check maximum length of repair cable**
- **If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.**

Adhere to following procedure:

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Refer also to repair instruction:

CUTTING TO LENGTH AND STRIPPING INSULATION FROM CABLES

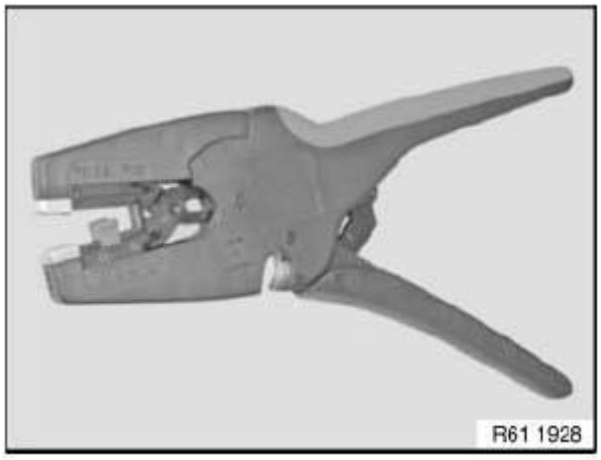


Fig. 5: Identifying Crimp Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp butt connector on preassembled wire end.

Special tools:

- 61 4 328 (0.35 - 2.5 mm^2
- 61 0 240 (4.0 - 6.0 mm^2

See repair instructions

CRIMPING ON STOP PARTS

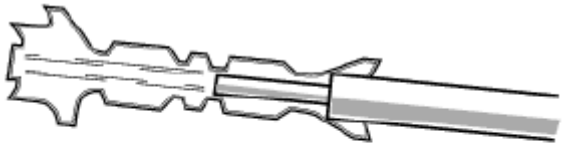


Fig. 6: Identifying Crimp Butt Connector On Preassembled Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

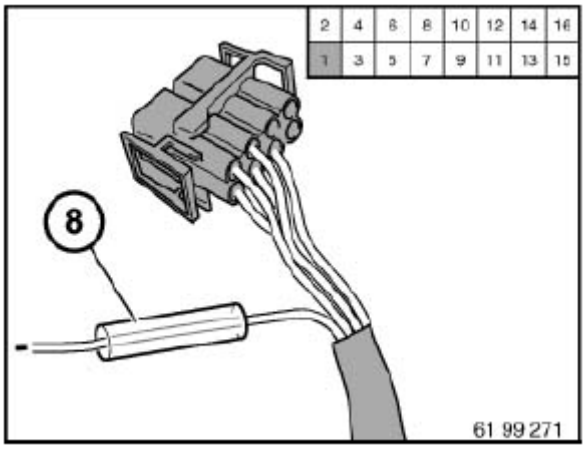


Fig. 7: Identifying Shrink-Fit Hose On Free Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

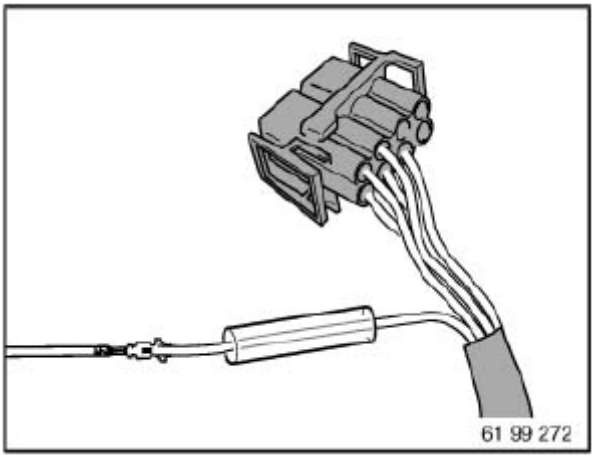


Fig. 8: Crimping Of Unused Wire End To Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

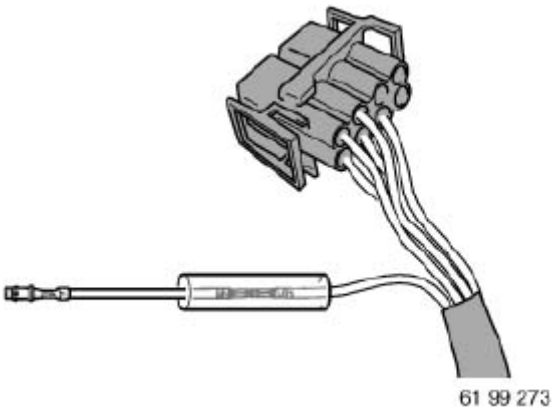


Fig. 9: Identifying Shrink-On Sleeve And Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

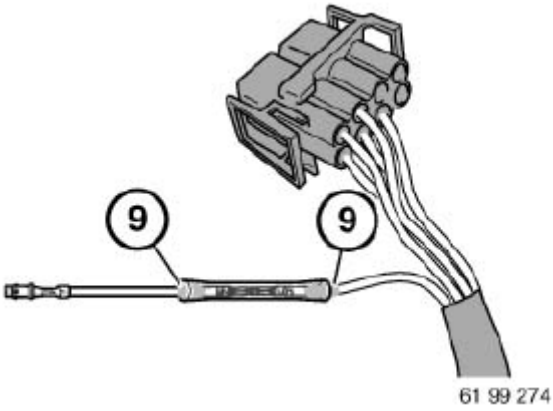


Fig. 10: Identifying Shrink On Shrink-On Sleeve Ends
Courtesy of BMW OF NORTH AMERICA, INC.

12 00 CONTENTS OF ENGINE ELECTRICAL SYSTEM GENERAL

General Information

- **WORKING ON IGNITION SYSTEM**
- **REMOVING AND INSTALLING ELECTRONIC CONTROL UNITS**
- Welding work (overload protection of control units)

- **Disconnecting and connecting battery**
- Disconnecting and connecting test equipment
- Component inspection:
- **EXTERNAL JUMP-STARTING AID**
- Compression testing

61 00 ... INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY

Observe **SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY** .

Before disconnecting battery

Turn off the ignition and other electrical loads/consumers to prevent sparking when reconnecting.

NOTE: If the ignition is not turned off when the battery is disconnected, fault memories may be set in some control units.

IMPORTANT:

- **There is a danger of mixing up battery leads: If the battery positive and negative leads are the same color and you are in doubt, follow the polarity to the battery, then mark and cover the leads.**
- **The on-board computer and clock may lose your data.**

General notes on disconnecting battery

- Do not disconnect battery leads and leads from alternator and starter motor while engine is running.
- Cars with IBS on battery negative terminal:

  Do not under any circumstances pull/lever off pole shoes by force.

  Do not under any circumstances release socket-head cap screw of IBS.

- Disconnect terminal of **BATTERY NEGATIVE LEAD** from vehicle battery. Cover battery negative terminal(s) and secure.
- When work is carried out on the electrical system, faults may be caused in the fault memories of some control units when the battery is connected.
- When installing battery terminal: Tightening torque **61 21 1AZ** .

After connecting battery

IMPORTANT: The scope of application of some systems may be restricted after a power supply interruption.
Likewise, individual settings may be lost.
Settings or activations must be carried out, depending on the equipment specification.

For example:

- **If necessary, carry out adjustment of active steering**
- **If necessary, activate slide/tilt sunroof**
- **If necessary, activate POWER WINDOWS**

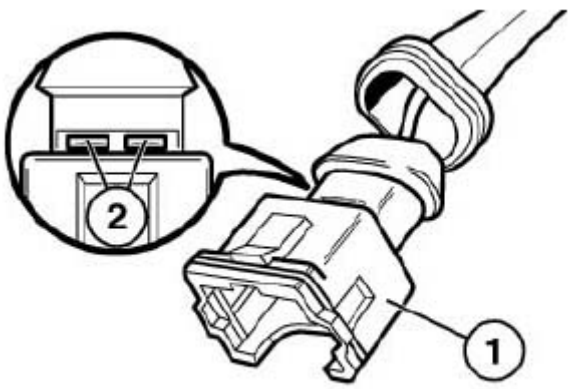
61 13 ... INSTRUCTIONS FOR OPENING CONTACTS AND LOCKS OF DIFFERENT PLUG CONTACT SYSTEMS

SPECIAL TOOL DESCRIPTION

Abbreviations of contacts and what they mean:	
ELA	**Strand seal**
D 1.5/2.5/3.5	**Round contacts with 1.5 mm, 2.5 mm or 3.5 mm diameter**
MDK	**Miniature double flat spring contact**
JPT	Junior Power timer
DFK	Double flat spring contacts
Elo	Electronic contacts
Elo Power	Electronic contacts for heavy load
MQS	Micro Quadlock system
MPQ	Micro Power Quadlock
MLK	Mini laminated contact
SLK	Sensor laminated contact
LSK	Load current contact
MLK	Mini laminated contact
Mcon	Multi contact

IMPORTANT: The contacts can be changed on ultrasonically welded plugs (1). Ultrasonically welded plugs (1) must be replaced completely.

Ultrasonic-welded connectors (1) can be identified by the welds (2) on their longitudinal side.



36 61 126

Fig. 11: Identifying Ultrasonic-Welded Connectors And Weld Area
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Special tools referred to in the repair instructions below are contained in the following special tool kits:

- **Release and pressing-off tool61 1 150 will be replaced on 09/2005 by 61 0 300 (BMW) and 61 0 400 (MINI)**
- **Release and pressing-off tool 61 1 100 (engine)**

12 00 ... INSTRUCTIONS FOR WORKING ON THE IGNITION SYSTEM

CAUTION: Always switch off ignition before working on ignition system.
Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).
Comply with operating instructions of the respective testing instrument used.
Comply with the country-specific safety regulations.
Never touch components under current with engine running!
Comply with instructions of DIS tester.
Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.
Terminal 1 of ignition coil must not be connected to ground or battery positive lead.
If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.
When working on ignition system, always disconnect supply leads to ignition coils.
High tension! - High tension!

IMPORTANT: Hazardous voltages occur at:

- Ignition lead
- spark-plug connectors
- spark plugs
- Ignition coil (high voltage at terminal 4 is approx. 40 kV)
- Lead of terminal 1 from ignition coil to DME control unit (high voltage approx. 350 V)

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults

- Further fault patterns with evaluation

Oscillograms

- Normal oscillogram
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools .

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: **Optical fibre cables are colored differently as follows:**

- **Green = MOST (M edia O riented Systems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange = repair optical fibre cables**

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat > or = 85 °**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** or **6113... CRIMPING OPTICAL FIBRES**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

12 00 ... NOTES/INFORMATION ON REMOVING AND INSTALLING CONTROL UNITS

IMPORTANT:

- **Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any**

faults have been remedied, cancel the fault memory.

- **Control unit plugs should only ever be connected and disconnected while the ignition is turned off.**
- **The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.**
- **Investigate stored faults and, once any faults have been remedied, cancel the fault memory.**
- **If necessary, initialize power window units**

When replacing the DME/DDE control unit, observe the following:

- **In each case read out the hardware/software status of the relevant control unit using the BMW diagnosis system.**

  Comply with the instructions of the DIS diagnosis system on the steps pertaining to coding and programming.

  On vehicles with electronic vehicle immobilization, comply with the instructions of the BMW diagnosis system.

- **Each control unit is programmed with certain basic values, which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.**
- **If the DME control unit is without current for a long time (more than one hour), its adaptive system loses the stored values. When a cleared control unit is restarted or a new control unit is installed, the adaptive system must read in and store the input values of the associated engine as new basic values itself.**
- **This procedure could lead to erratic idling and disturbed overrunning of the engine after starting. Depending on the engine it could require some time before all values are adapted to the engine condition.**
- **Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit:**
  1. **If possible before exchanging control unit, run engine up to operating temperature.**
  2. **Exchange control units and run the vehicle at alternating engine speeds.**

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.
- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode),

the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

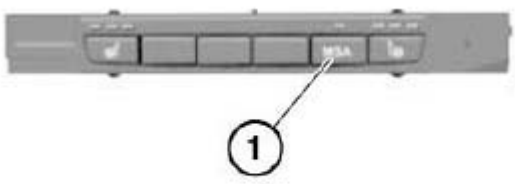


Fig. 12: Identifying Automatic Engine Start/Stop Button (MSA)
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

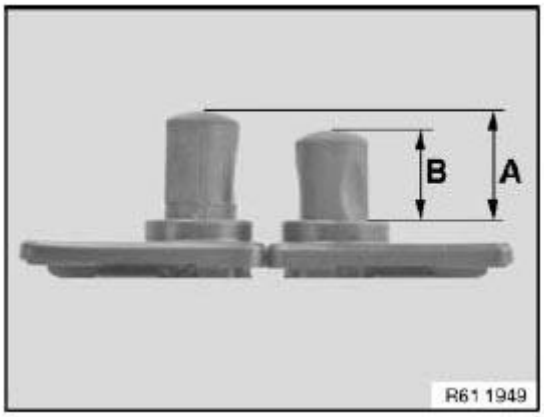


Fig. 13: Identifying Basic Setting For Engine Hood/Bonnet Basic
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1212 IGNITION WIRES, SPARK PLUGS

12 12 011 REPLACING ALL SPARK PLUGS (N52K)

Necessary preliminary work:

- Switch off ignition.
- Remove **IGNITION COILS** .

IMPORTANT: Wear safety goggles.
Oil and dirt particles may get into your eyes!

Clean spark connector slot with compressed air.

Unscrew spark plugs with special tool 12 1 171 and an extension with a joint.

Installation note:

First, hand-thighten the spark plugs with special tool 12 1 171 and with an extension with a joint into the engine.

Then tighten the spark plugs using a torque wrench, special tool 12 1 171 and an extension with a joint.

Observe tightening torque.

Tightening torque **12 12 2AZ** .

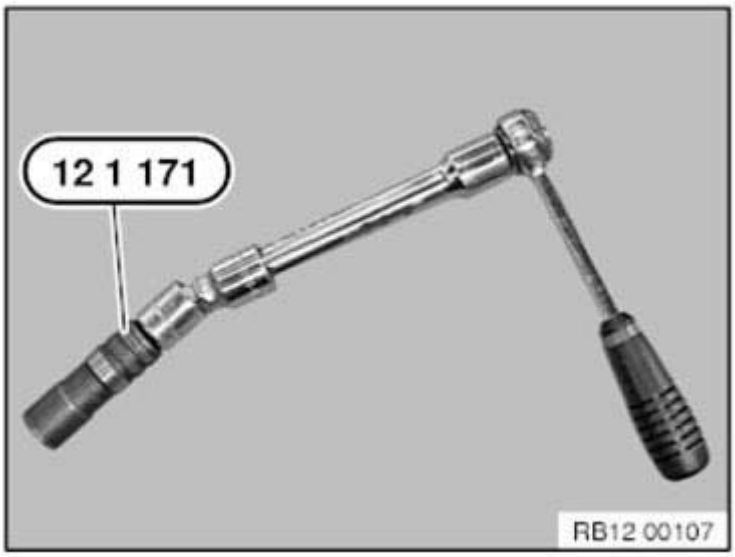


Fig. 14: Removing Spark Plug Using Special Tool (12 1 171)
Courtesy of BMW OF NORTH AMERICA, INC.

1213 IGNITION COIL

12 13 009 CHECKING ROD-TYPE IGNITION COILS (M54, M56, N40, N42, N43, N45, N46, N52, N62, N62TU, N73)

Necessary preliminary tasks:

- Read out fault memory in DME (Digital Engine Electronics)
- N52: Remove sound absorption hood

Unlock plug fastener (1) of ignition coil.

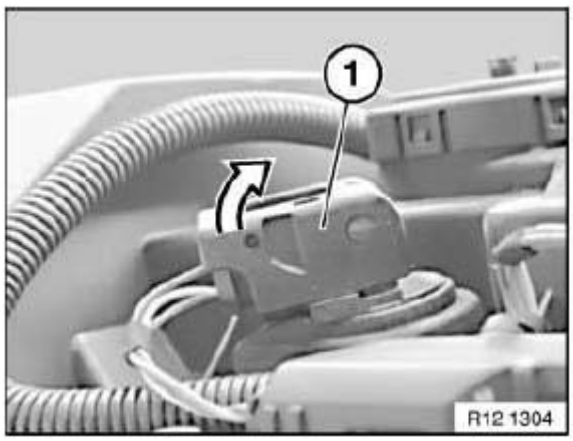


Fig. 15: Removing Ignition Coil Plug Fastener
Courtesy of BMW OF NORTH AMERICA, INC.

Detach plug (1) in direction of arrow.

Pull out ignition coil (2) towards top.

NOTE: Procedure applies to all rod-type ignition coils.

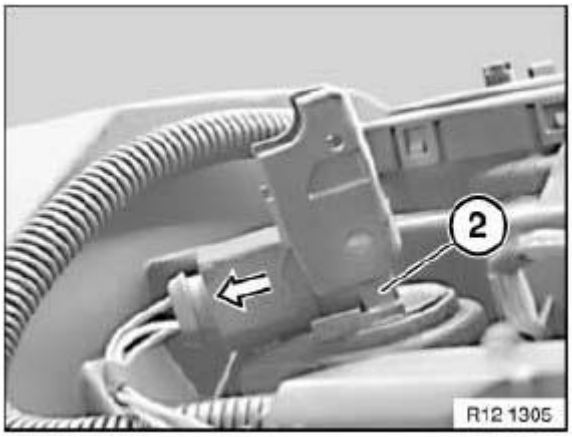


Fig. 16: Pulling Out Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool 12 7 050 .

Installation:

Special tool 12 7 050 is attached between spark plug and rod-type ignition coil.

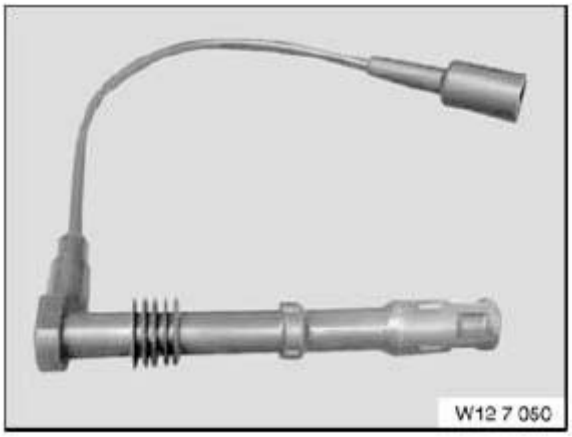


Fig. 17: Identifying Special Tool (12 7 050) Between Spark Plug And Rod-Type Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Secondary measurement

Connect KV clip-on probe (1) of DIS Tester to special tool 12 7 050 .

Procedure on DIS Tester:

- Select <Measurement>.
- Select <Preset measurement>.
- Select <Secondary ignition signal>.
- Connect <TD cable to diagnostic head>.
- Select <static ignition distribution>.
- Select <Number of cylinders>.

For subsequent procedure, follow DIS instructions.

NOTE: Illustration shows: KV clip-on probe (1) US version.

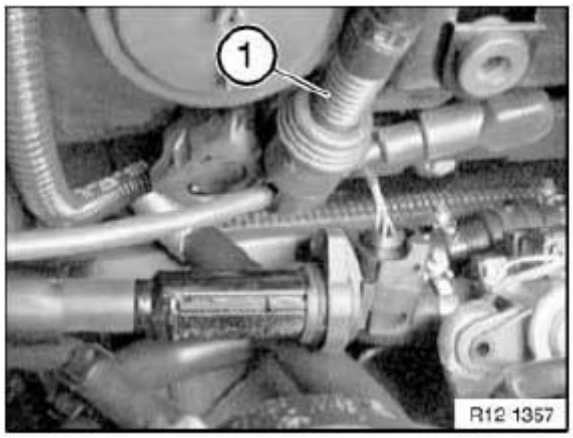


Fig. 18: Identifying KV Clip-On DIS Tester Probe
Courtesy of BMW OF NORTH AMERICA, INC.

Primary measurement

Connect 26-pin pin box with special tool 12 1 301 to connector (1) DME module 5.

Procedure on DIS Tester:

- Select <Measurement>.
- Select <Preset measurement>.
- Select <Ignition signal term.1>.

For subsequent procedure, follow DIS instructions.

NOTE: Pin assignment acc. to connection scheme.
Illustration shows N42.

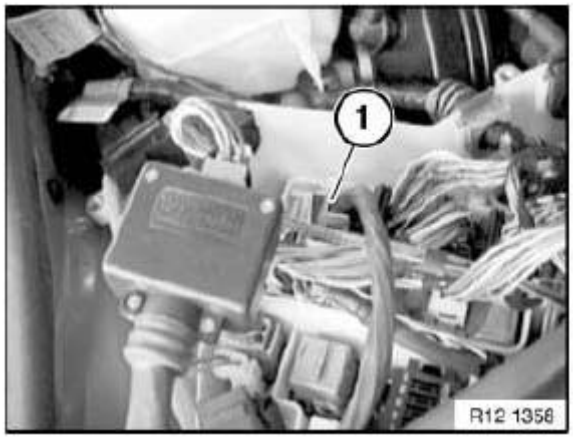


Fig. 19: Connecting 26-Pin Pin Box To Connector DME Module 5 Using Special Tool (12 1 301)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Ignition signal is a multiple spark ignition.

Illustration of multiple spark ignition

1. Start of ignition peak.
2. Level of ignition voltage.
3. Level of sparking voltage.
4. Spark duration.
5. Sparking voltage curve.
6. Start of decay process.
7. Decay process.

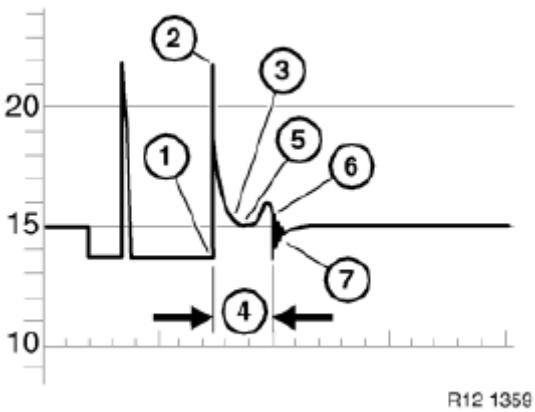


Fig. 20: Multiple Spark Ignition Illustration
Courtesy of BMW OF NORTH AMERICA, INC.

M54/M56/N40/N42/N45/N46/N62/N73:

The following ignition oscillogram applies to engines with multiple spark ignition from a production date of April 2001:

Depending on **engine temperature** (approx. -20° to 100°) and **engine speed** (< 2000 RPM.), some ignition voltage peaks (approx. 1-5 ignition peaks) can occur before the typical ignition voltage characteristic.

The additional ignition peaks play **no** role in diagnosis.

The **last** ignition peak (1) on the oscillogram is decisive.

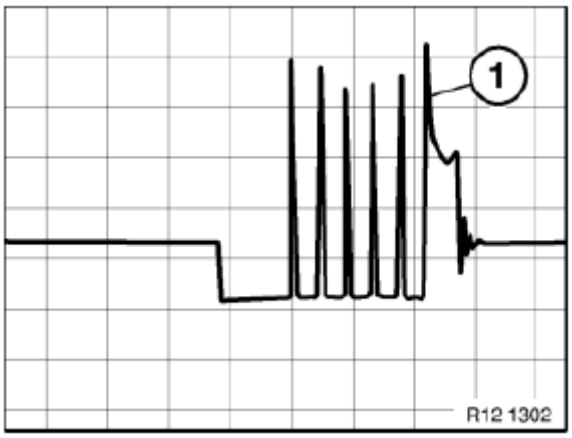


Fig. 21: Identifying Ignition Peaks Graph
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The display of the ignition voltage peak is approx. 20-25 % lower than the real value.
It is not the height of the ignition voltage peaks but rather the uniformity of all the cylinders that is important.
Differences of 3000 to 4000 volts are permitted.

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults
- Further fault patterns with evaluation

Oscillograms

- Normal oscillogram
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

12 13 511 REPLACING IGNITION COILS (N52K)

Necessary preliminary tasks:

- Read out fault memory of DME control unit.
- Check stored fault messages
- Switch off ignition
- Remove **ACOUSTIC COVER**
- Remove right **TENSION STRUT**

Unlock plug fastener of ignition coil (1) and disconnect plug.

Pull ignition coil (1) up and out.

This procedure is applicable to all ignition coils.

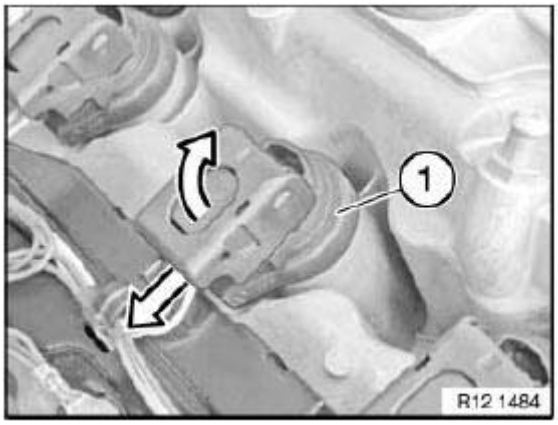


Fig. 22: Pulling Ignition Coil Up And Out
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check that rubber seal of ignition coil (1) is correctly seated.

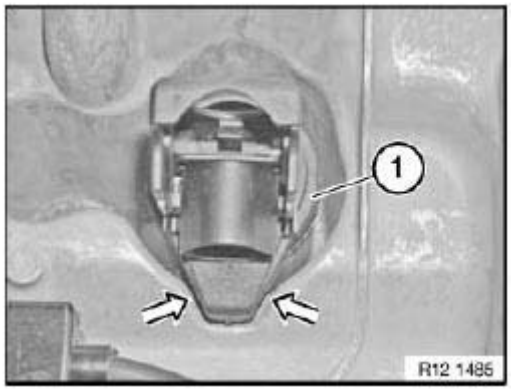


Fig. 23: Checking Ignition Coil Rubber Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Push plug (1) with plug fastener (2) open onto ignition coil.

Carefully close plug fastener (2) in direction of arrow.

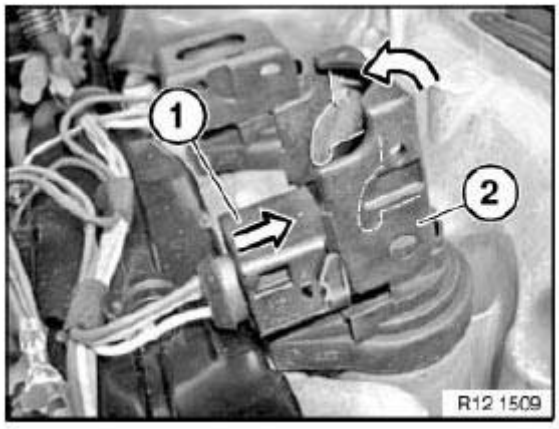


Fig. 24: Pushing Plug With Plug Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The plug fastener must snap into place without great effort.

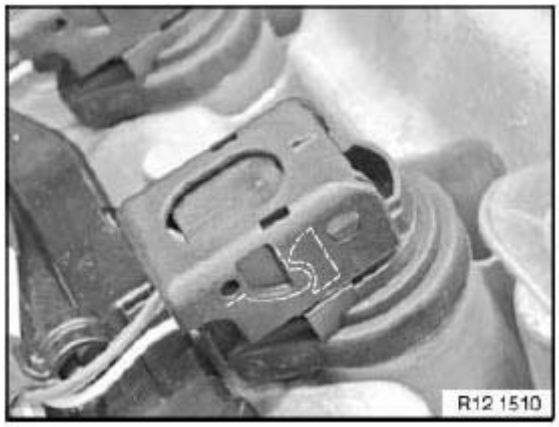


Fig. 25: Identifying Plug Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

1214 ELECTRONIC SWITCHING OR CONTROL UNITS

12 14 700 CODING CONTROL MODULE (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

Select "Coding" program.

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

12 14 705 PROGRAMMING CONTROL UNIT (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

Select "Programming".

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics) or
- DDE (Digital Diesel Electronics)

12 14 600 REMOVING/REPLACING KNOCK SENSORS (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **INTAKE AIR MANIFOLD**

Unlock plug (1) and remove.

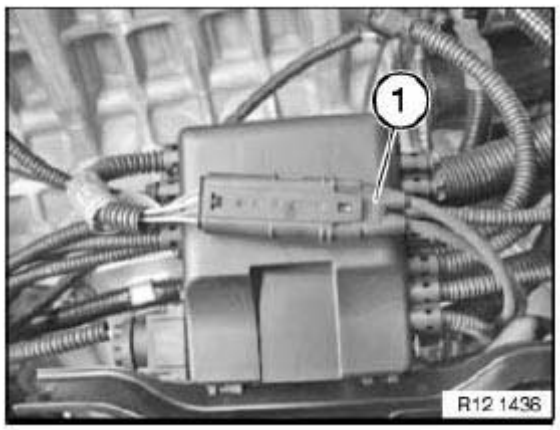


Fig. 26: Identifying Plug

Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on both knock sensors (1) and remove knock sensors (1).

Installation:

Replace aluminum screws.

Tightening torque **13 62 3AZ** .

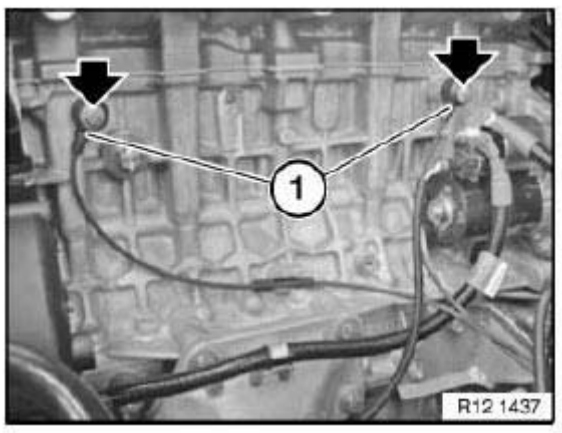


Fig. 27: Locating Knock Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean support face of knock sensors on engine block.

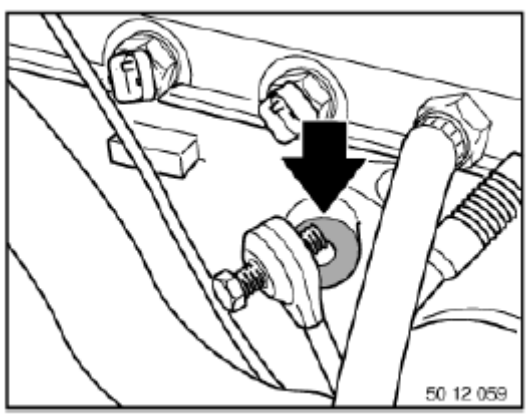


Fig. 28: Locating Knock Sensors Contact Surface On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N52K)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION)

Necessary preliminary tasks:

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**

IMPORTANT: Follow instructions for REMOVING AND INSTALLING CONTROL UNITS

Replacement:

- Carry out programming/encoding

IMPORTANT: It is absolutely essential to read out the fault memory with the BMW diagnosis system and to create a fault memory printout.

Switch off ignition.

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

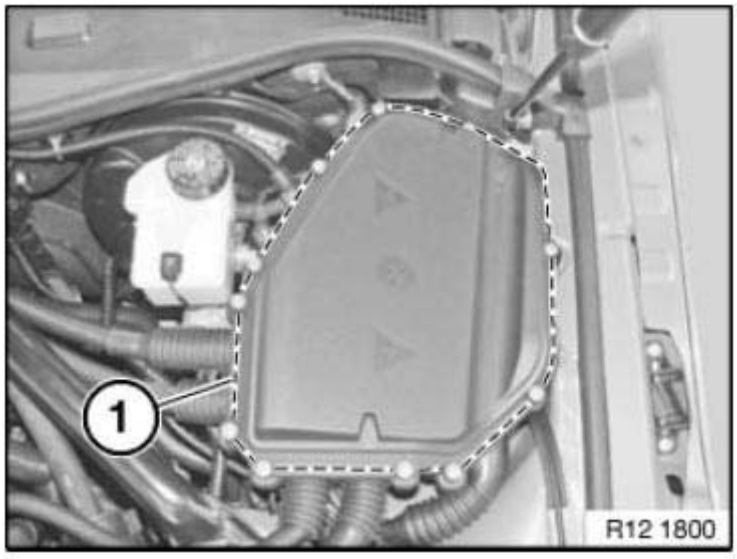


Fig. 29: Identifying Electronic Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrow and pull control unit upwards slightly.

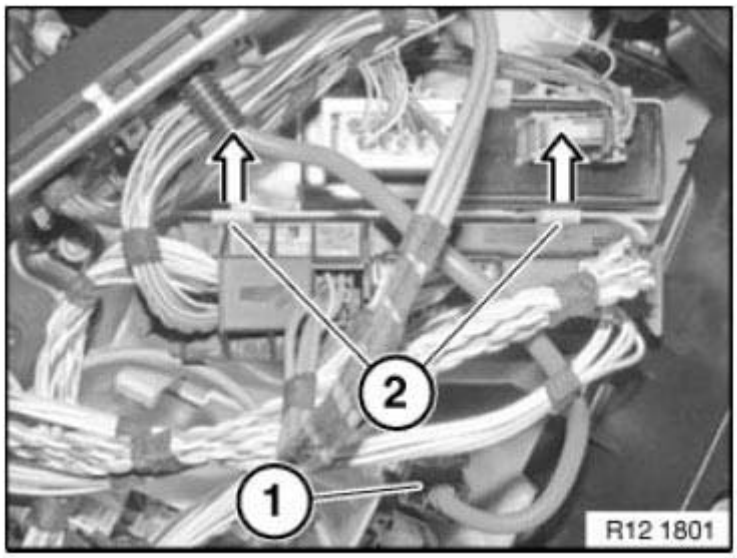


Fig. 30: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

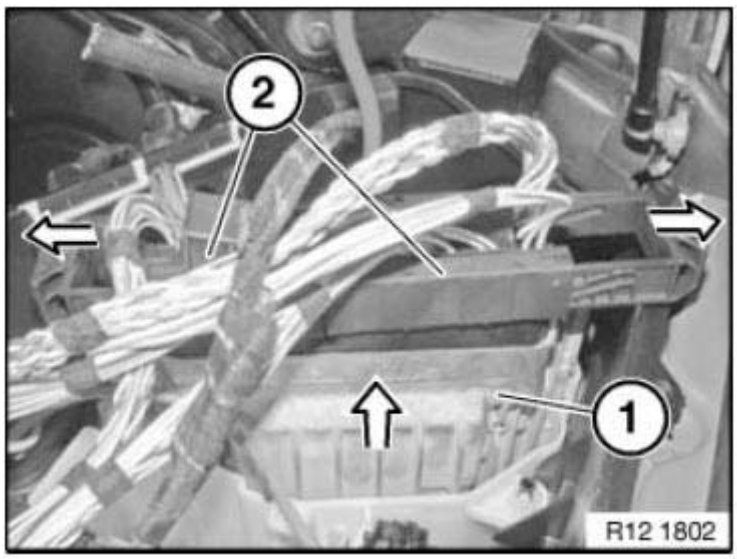


Fig. 31: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out control unit (1).

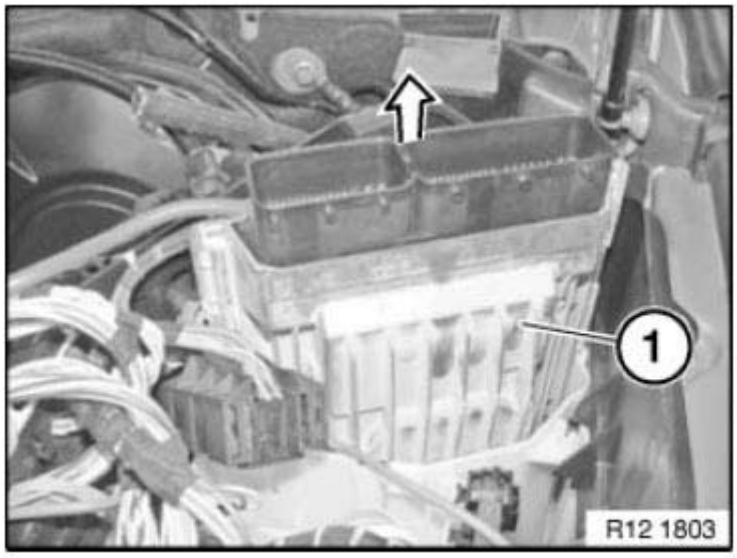


Fig. 32: Lifting Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
clear fault memory.

12 14 521 REPLACING CRANKSHAFT PULSE GENERATOR (N52K)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks:

- Read out fault memory of DME control unit

- Switch off ignition

NOTE: Installation location of pulse generator for crankshaft is underneath starter motor.

Detach plug (1) from crankshaft pulse generator (2).

Release screw.

Installation:

Replace aluminum screws.

Tightening torque **13 62 2AZ** .

Withdraw pulse generator (2) from crankcase.

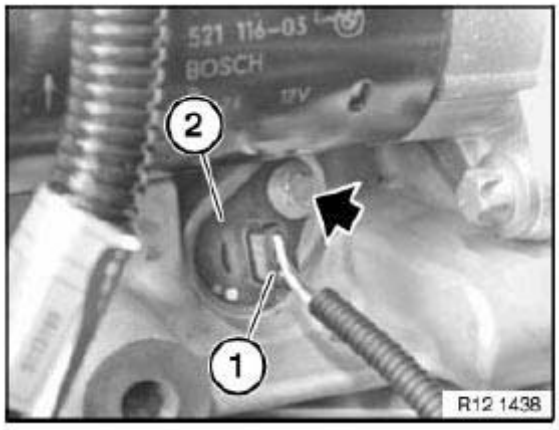


Fig. 33: Removing Plug From Crankshaft Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Replace sealing ring.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 524 REPLACING PULSE GENERATOR ON EXHAUST CAMSHAFT (N52K)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition

Unlock plug (1) and remove.

Release screw.

Installation:

Replace screw.

Tightening torque **13 62 1AZ** .

Remove pulse generator (2).

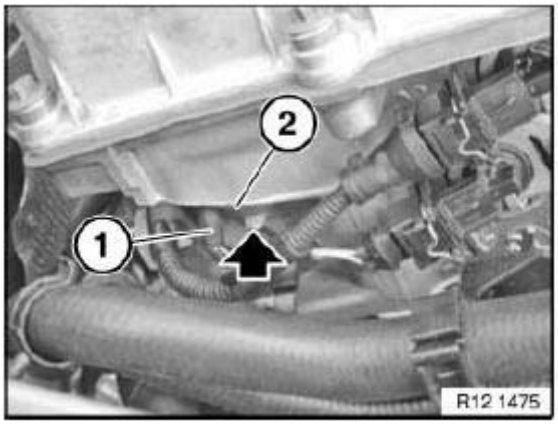


Fig. 34: Identifying Plug And Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 523 REPLACING PULSE GENERATOR ON INLET CAMSHAFT (N52K)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Switch off ignition

Unlock plug (1) and remove.

Release screw.

Installation:

Replace screw.

Tightening torque **13 62 1AZ** .

Remove pulse generator (2).

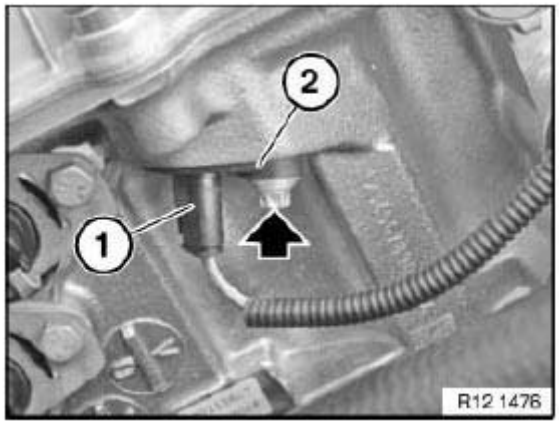


Fig. 35: Locating Pulse Generator With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

1231 ALTERNATOR WITH DRIVE AND MOUNTING

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks:

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **INTAKE FILTER HOUSING**
- Remove **ALTERNATOR DRIVE BELT**

Unlock plug (1) and remove.

Slacken nut (2).

Installation:

Tightening torque **12 31 1AZ** .

Disconnect battery positive lead from alternator.

Release screws (3) and remove alternator.

Installation:

Replace aluminum screws.

Tightening torque **12 31 2AZ** .

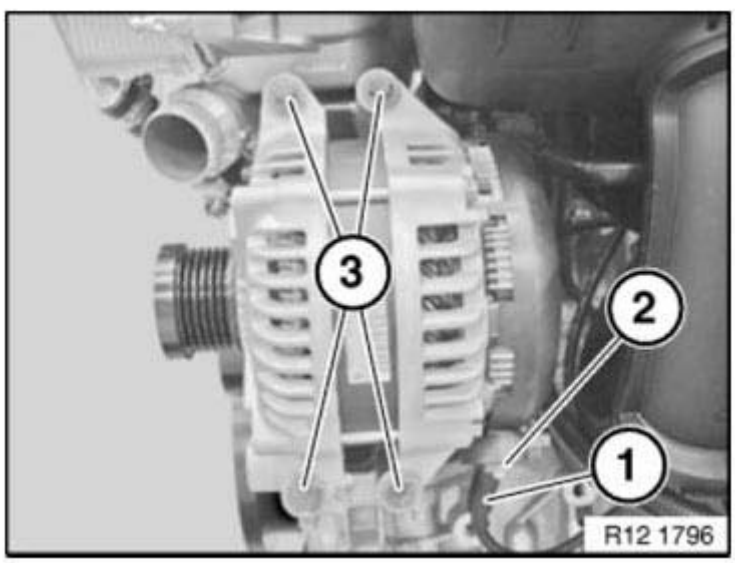


Fig. 36: Identifying Plug, Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

12 31 ... REPLACING ALTERNATOR BELT PULLEY

Remove and install alternator drive belt.

Depending on alternator type, grip shaft with:

- hexagon socket
- multi-tooth socket or
- Torx socket wrench

Release nut with special tool 12 7 110 .

Installation:

TIGHTENING TORQUE, 12 31 2AZ/12 31 3AZ .

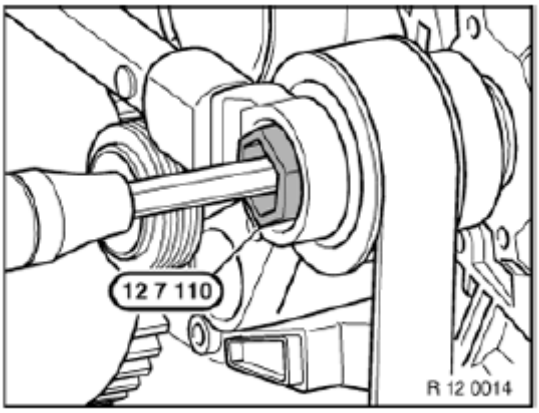


Fig. 37: Removing Nut Using Special Tool (12 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

12 31 ... REPLACING ALTERNATOR BELT PULLEY (WITH OVERRUNNING CLUTCH)

Special tools required

Remove and install alternator drive belt.

Grip alternator shaft with:

- internal serration

Release nut with special tools 12 7 120.

Installation:

Tightening torque **12 31 3AZ**

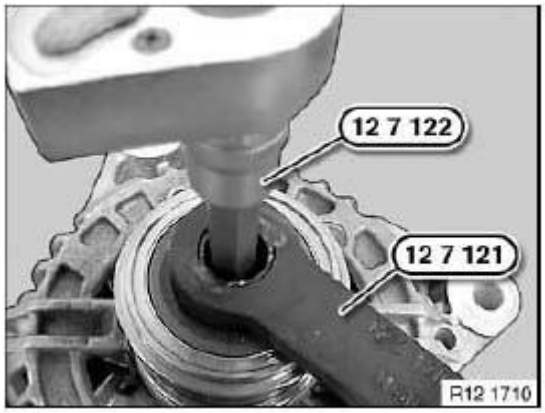


Fig. 38: Removing Nut Using Special Tool (12 7 120)
Courtesy of BMW OF NORTH AMERICA, INC.

1232 REGULATOR

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks:

- Switch off ignition
- Disconnect battery negative lead
- Remove alternator

Bosch

Release protective caps (1).

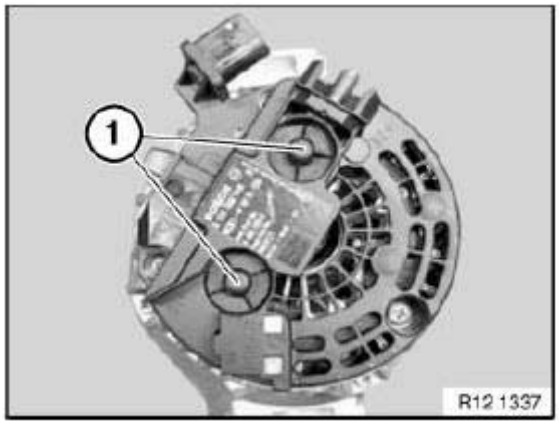


Fig. 39: Identifying Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screw (1) and nuts (2), remove cover.

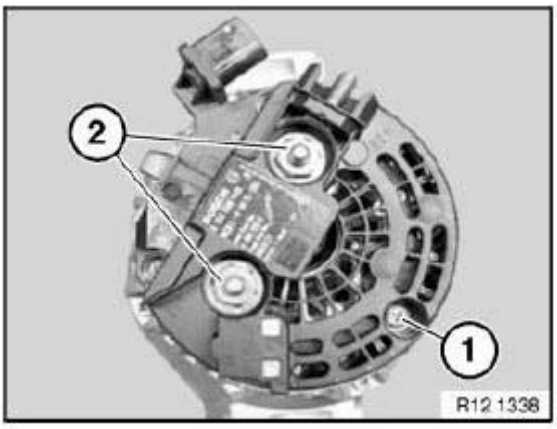


Fig. 40: Identifying Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screws and remove regulator switch (1) in direction of arrow.

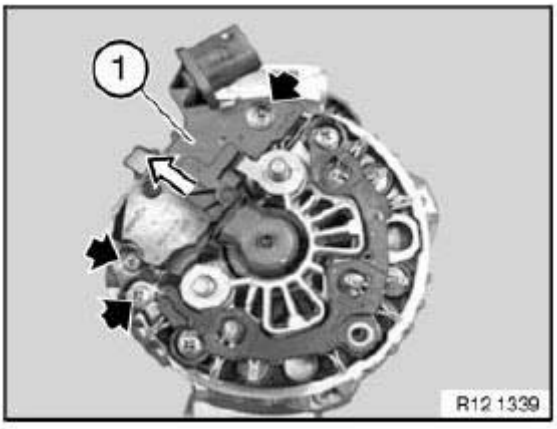


Fig. 41: Removing Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

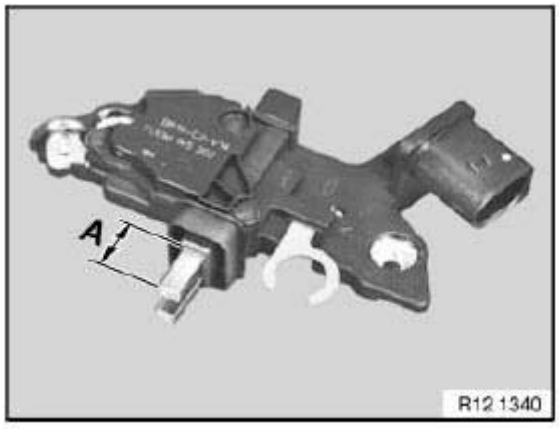


Fig. 42: Checking Contact Spring Pretension
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

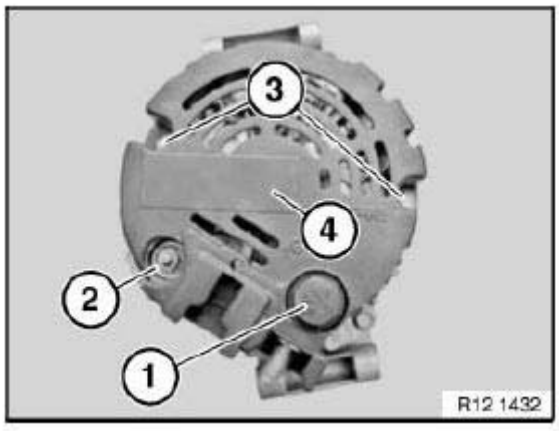


Fig. 43: Identifying Nut, Screw And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Release screws.

Remove regulator switch (1) towards top.

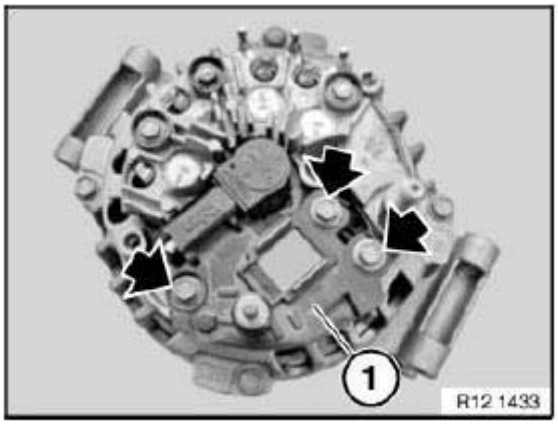


Fig. 44: Locating Regulator Switch Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

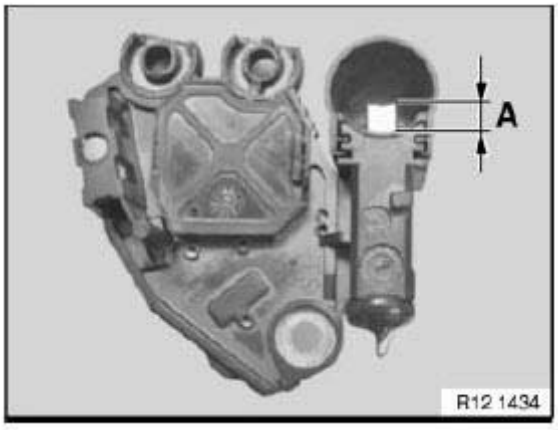


Fig. 45: Checking Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit new regulator (1) with attached mounting sleeve (2) or locked carbon brush.

Pull off mounting sleeve (2) and replace with cover (3).

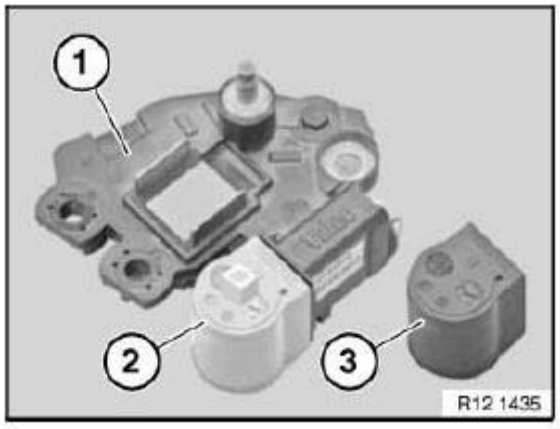


Fig. 46: Identifying Regulator, Mounting Sleeve And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

1241 STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks

- Switch off ignition
- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **INTAKE AIR MANIFOLD**

Unlock plug (1) and remove.

Unfasten nut.

Tightening torque **12 42 2AZ** .

Remove battery positive lead (2).

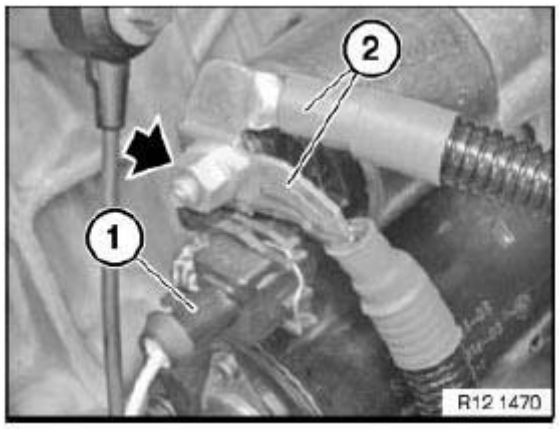


Fig. 47: Identifying Plug And Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Installation:

Replace aluminum screws.

Tightening torque **12 41 1AZ** .

Unfasten screws (2).

Installation:

Replace aluminum screws.

Tightening torque **12 41 2AZ** .

Remove starter motor (3).

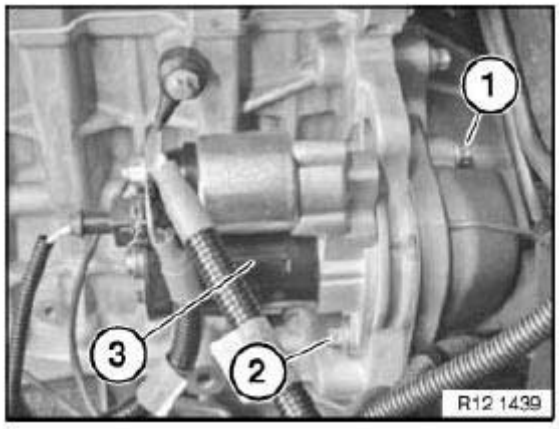


Fig. 48: Identifying Starter Motor And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check starter pinion and ring gear for damage. Replace starter if necessary.

Assemble engine.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).

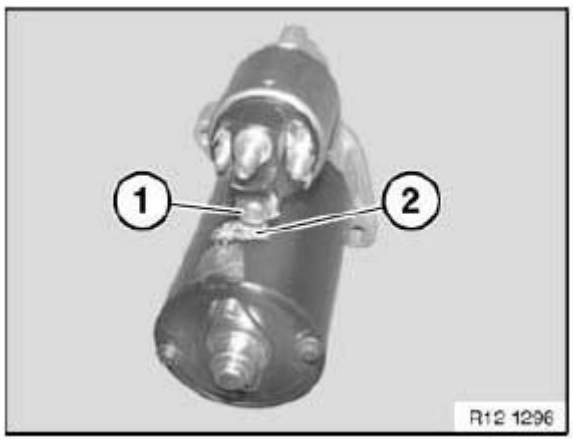


Fig. 49: Identifying Starter Motor Nut And Cable Lug
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.
Tightening torque, see 12 41 4AZ in 12 41 STARTER MOTOR WITH MOUNTING

Release screws (1).

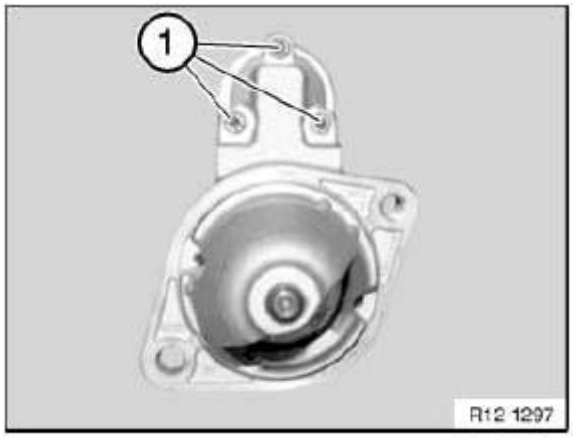


Fig. 50: Identifying Starter Motor Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove solenoid switch (1) and spring (2).

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.

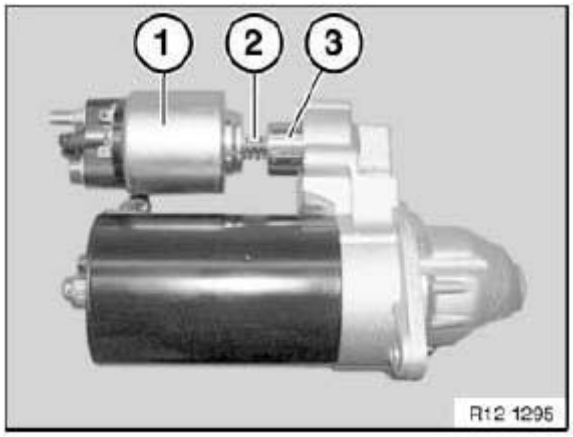


Fig. 51: Identifying Solenoid Switch, Spring And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

1242 STARTER LEAD

12 42 500 REPLACING BATTERY POSITIVE LEAD BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL (N52K)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **INTAKE AIR MANIFOLD**

Open cover.

Slacken nut (1).

Tightening torque **12 42 3AZ** .

Remove battery positive lead (2) from battery positive terminal.

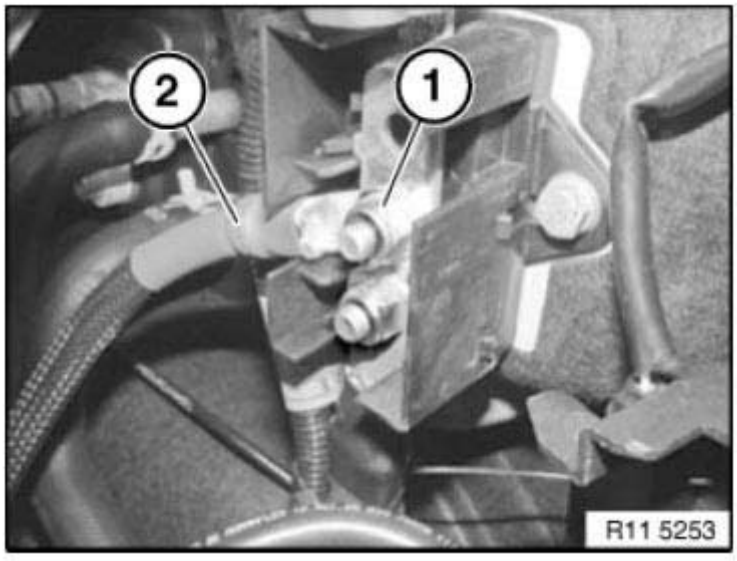


Fig. 52: Identifying Battery Cable And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on starter.

Tightening torque **12 42 2AZ** .

Disconnect battery positive lead from starter.

Release nut (2) on alternator.

Tightening torque **12 42 1AZ** .

Release battery positive lead from retainer (3), feed out and remove.

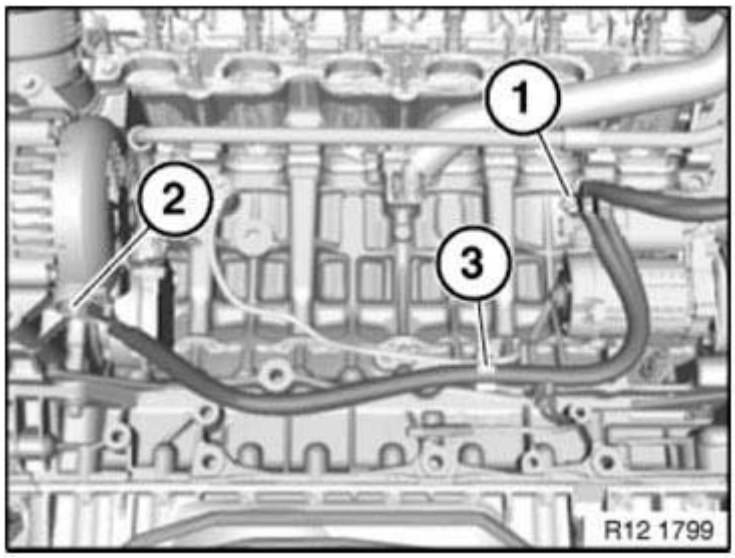


Fig. 53: Identifying Nut On Starter And Alternator
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 42 540 REPLACING SAFETY BATTERY TERMINAL (SBK)

CAUTION: Observe safety regulations.
Investigate cause of triggering of safety battery terminal.
To do so, read out fault memory of airbag control unit. Note fault messages stored in memory. Rectify faults. Then clear fault memory.

Use of safety battery terminal:

- From model year 1998 in Series E38, E39, E46
- From 4/99 in E36/Z3
- in each of following new Series

The different models have different installation locations:

Battery in engine compartment

Safety battery terminal is replaced with cable up to battery positive support point.

Safety battery terminal is omitted as from 03/2002 from all E46 LHD models with 4-cylinder engines.

Battery in luggage compartment behind side trim panel

Remove side trim panel.

Follow instructions for disconnecting and connecting battery.

Disconnect and cover battery negative lead.

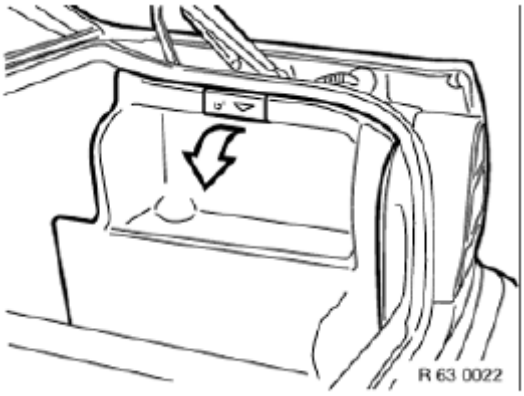


Fig. 54: Removing Luggage Compartment Battery
Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.

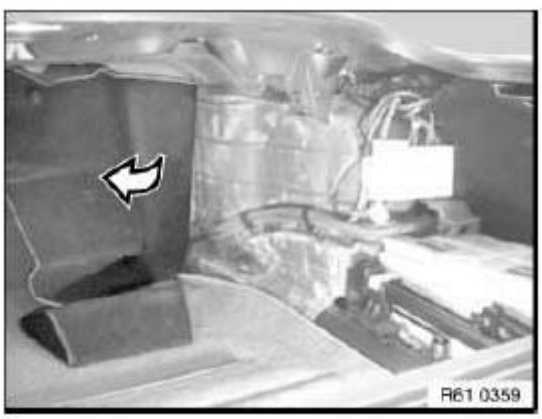


Fig. 55: Removing Front Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under floor trim panel

Follow instructions for disconnecting and connecting battery.

Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).

Remove battery cover.

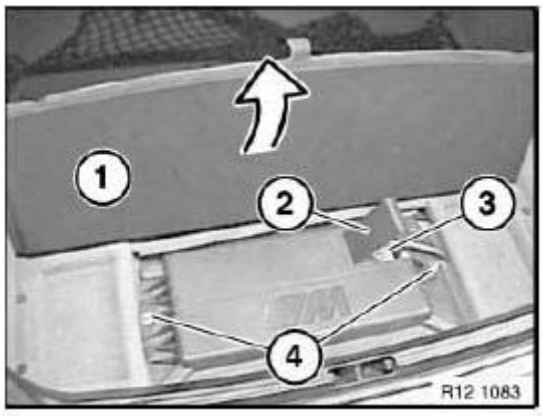


Fig. 56: Folding Back Floor Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under spare wheel

Remove spare wheel.

Release screws.

CAUTION: Do not kink air pipes.

Set air supply system (1) to one side.

Follow instructions for disconnecting and connecting battery.

Disconnect battery negative lead.

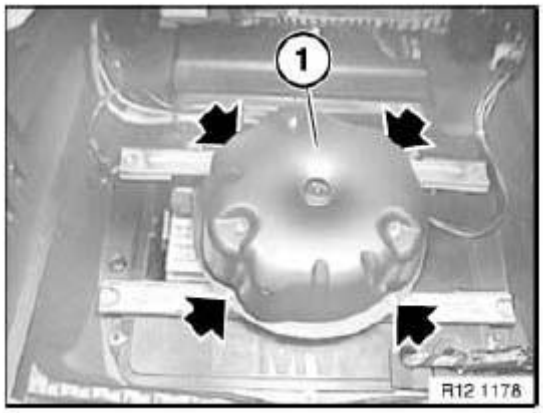


Fig. 57: Locating Air Supply System Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation:

Remove faulty fuses and carry out troubleshooting.

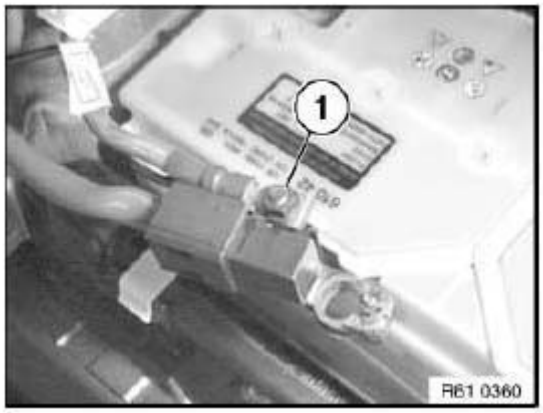


Fig. 58: Identifying Vehicle Electrical System Supply Cable
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Pay attention to interface.
The repair cable is always a standard length.
The heavy-current connector of the repair cable has a larger diameter than the battery positive lead.
In some Series (e.g. E46 touring), the heavy-current connector of the repair cable can lead to installation problems.
This is the case when the interface is in the area of the close-fitting trim panels.
Find matching interface (e.g. approx. 10 cm behind rear seat backrest in E46 touring).

Lay repair cable parallel to battery positive lead.

Mark interface of battery positive lead at end of repair cable.

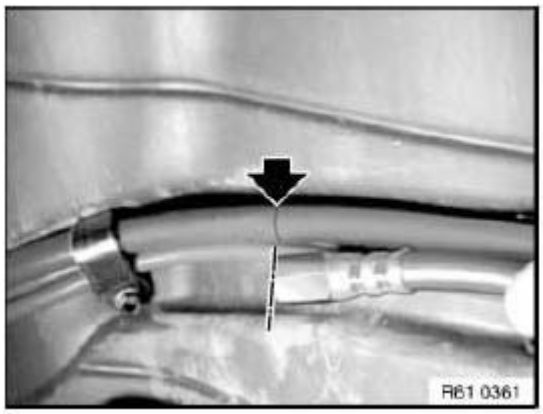


Fig. 59: Locating Interface Mark On Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

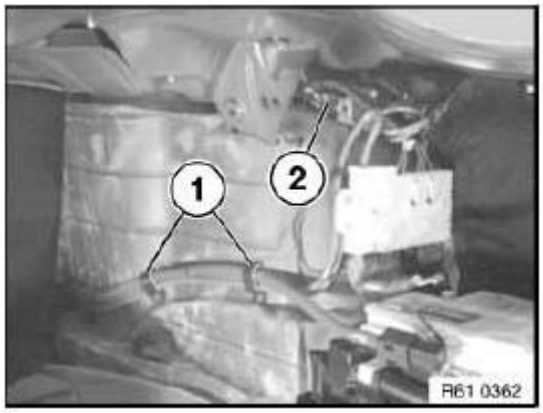


Fig. 60: Identifying Cable Ties And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not use bolt cutters or similar tools to cut through the cable. A cable end that has been squashed flat will no longer fit into the clamping sleeve.

Saw through battery positive cable at marked point with an iron saw.

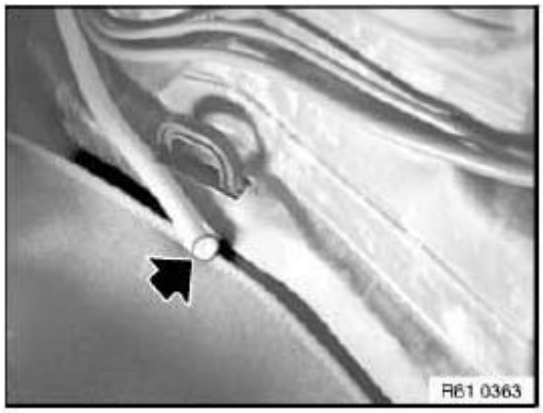


Fig. 61: Locating Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Strip insulation - length (A) - from cable end.

Distance (A) = 15 mm.

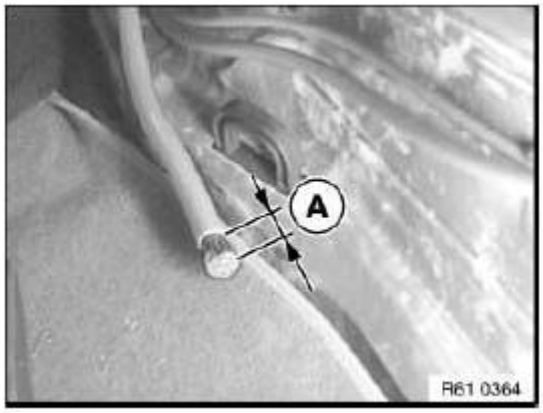


Fig. 62: Identifying Cable End Distance
Courtesy of BMW OF NORTH AMERICA, INC.

Push heavy-current connector (1) over stripped cable end and screw into position.

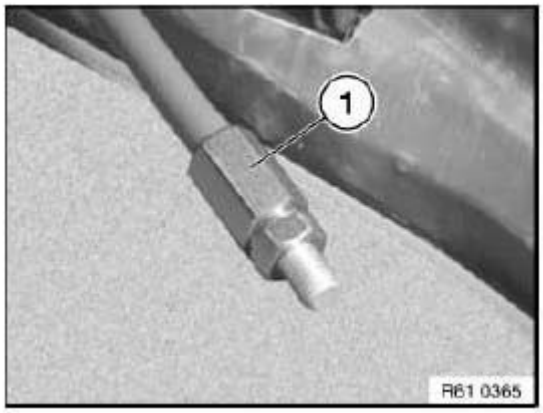


Fig. 63: Identifying Heavy-Current Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (3) over repair cable.

Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.

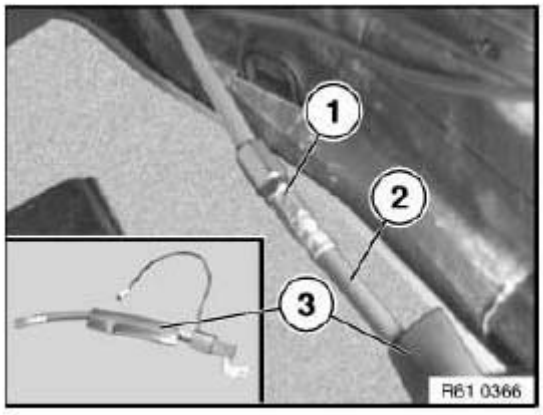


Fig. 64: Identifying Shrink-Fit Hose And Threaded Sleeve Of Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (1) over connecting point and shrink on with a hot-air blower (2).

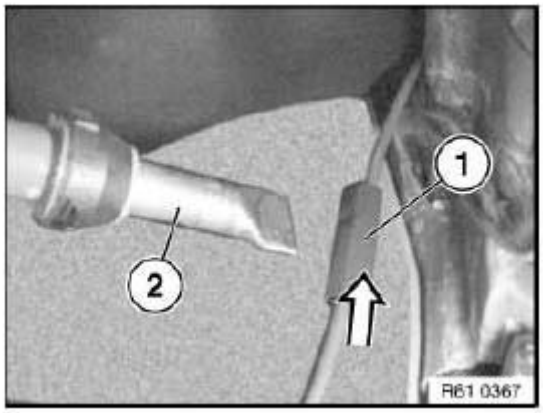


Fig. 65: Pushing Shrink-Fit Hose Over Connecting Point
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Heat up shrink-fit hose until it has settled completely around the connection point.

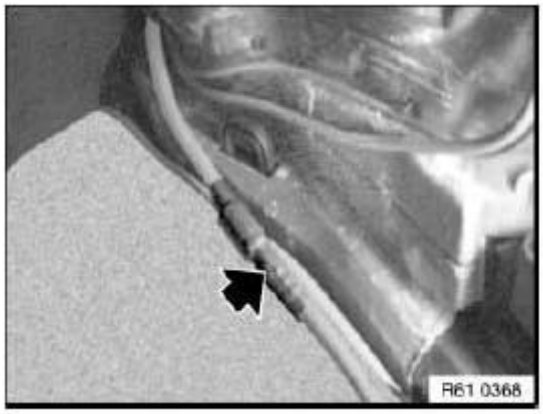


Fig. 66: Locating Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

When laying the repaired battery positive cable, observe the following:

- The shrink-fit hose must not be scuffed during any movement.
- The repair cable must not cause any disturbing noises during driving operation.

NOTE: Offsetting cutting line by approx. 10 cm produces excess length of battery positive lead (1).
Lay battery positive lead (1) without kinks or abrasions.
(Shown on E46 touring.)

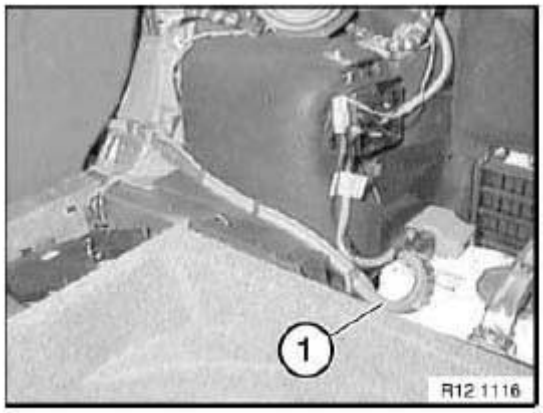


Fig. 67: Identifying Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

1251 ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N52K)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Partially remove **WIRING HARNESS** for ignition coils
- Remove **INTAKE AIR MANIFOLD**

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

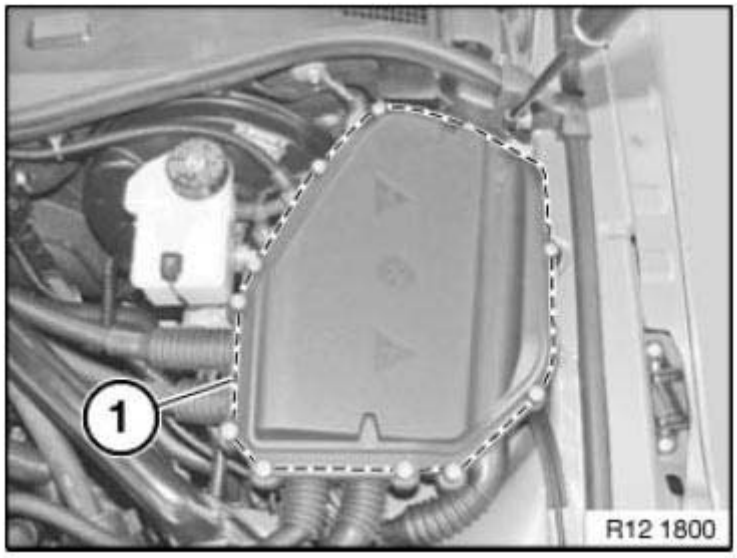


Fig. 68: Identifying Electronic Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrows and pull control unit upwards slightly.

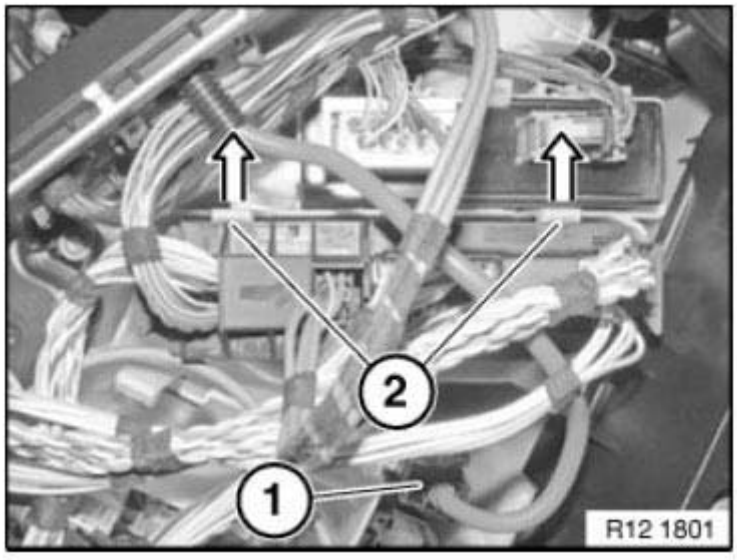


Fig. 69: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

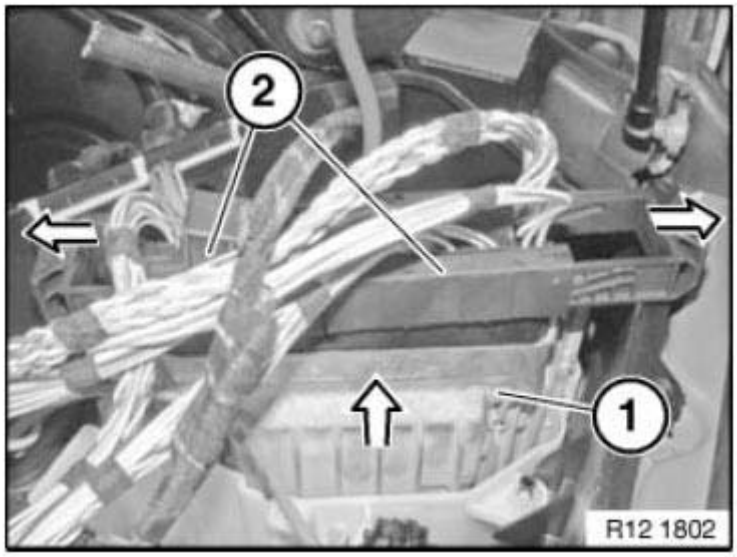


Fig. 70: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach all plugs from engine wiring harness in electronics box (1).

Unclip rubber grommet hold-down devices (2) and (3) and release engine wiring harness from electronics box.

Installation:

Make sure rubber grommets are correctly seated (watertightness).

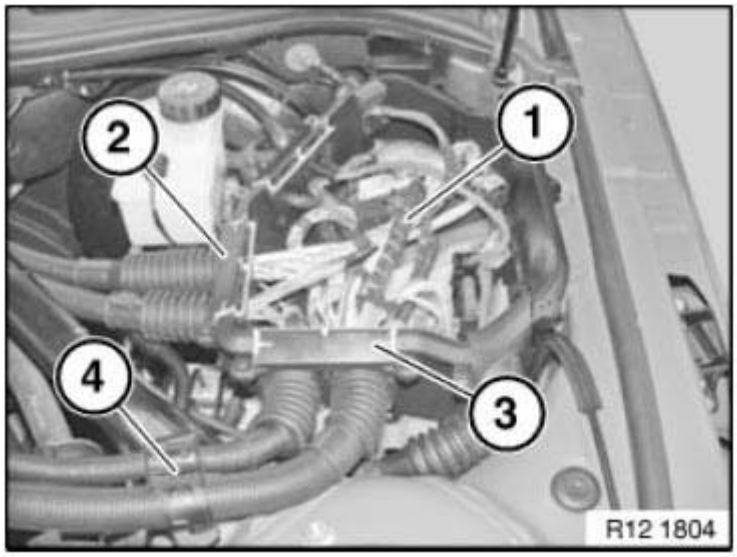


Fig. 71: Identifying Electronic Box With Rubber Grommet Hold Down Device And Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Long plug:

Press in retaining lugs and withdraw lock (1) in direction of arrow from plug housing.

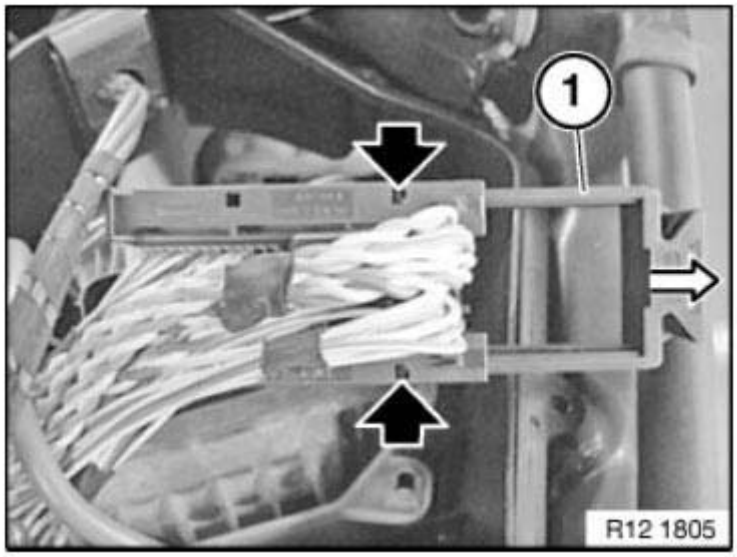


Fig. 72: Removing Locks By Pressing Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

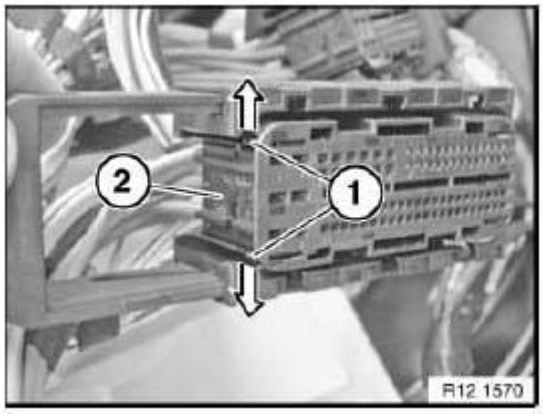


Fig. 73: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

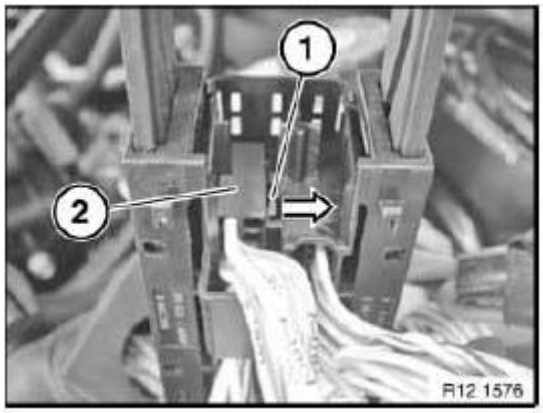


Fig. 74: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

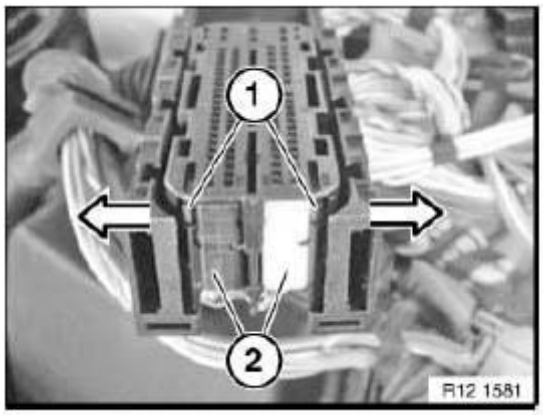


Fig. 75: Opening Locking Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Short plug:

Press in retaining lugs (1) and withdraw lock (2) in direction of arrow from plug housing.

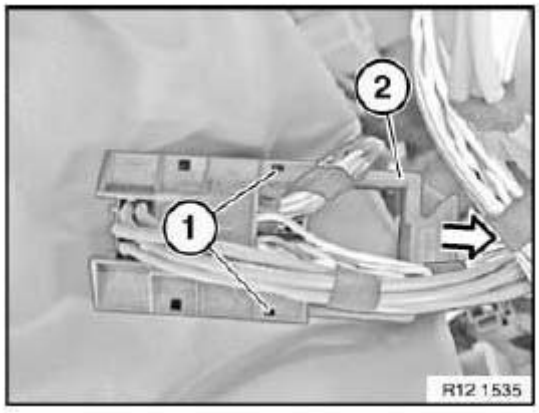


Fig. 76: Removing Locks From Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

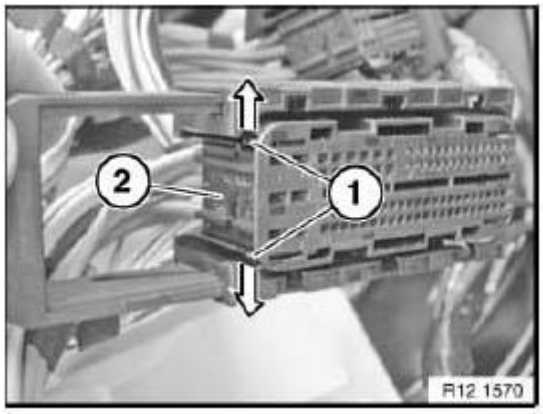


Fig. 77: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

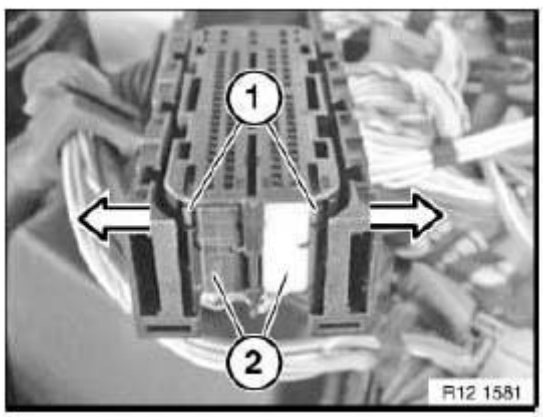


Fig. 78: Opening Locking Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct upper section (1) and expose wiring harnesses.

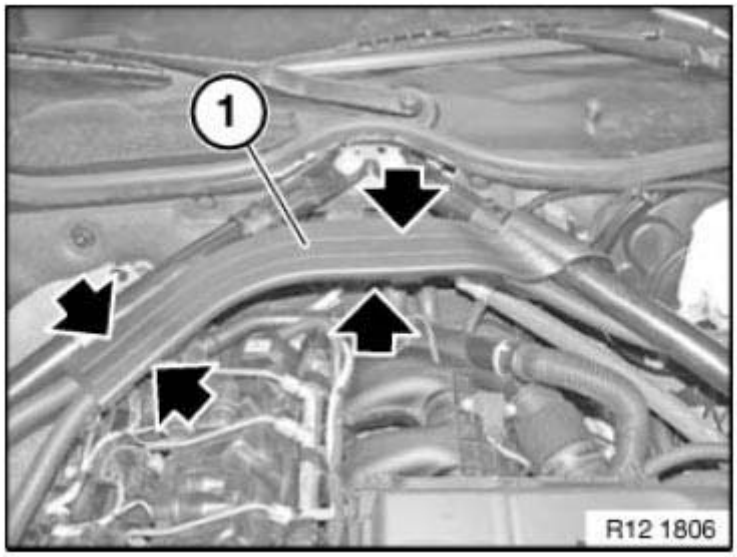


Fig. 79: Locating Wiring Harness In Cable Duct Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct (1) and remove from cylinder head cover.

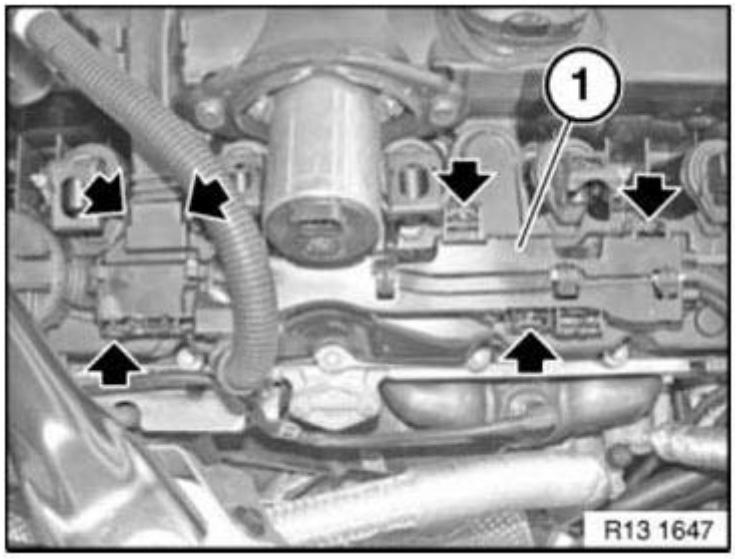


Fig. 80: Uncliping Cable Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip plug connection (1) from holder (2) and disconnect.

Unclip wiring harness from holder (2).

Unclip holder (2) from fuel rail and remove.

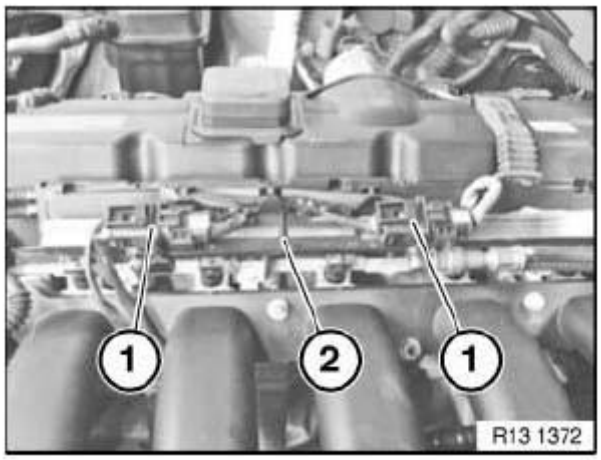


Fig. 81: Identifying Plug Connection And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Detach connector strip (2) in direction of arrow.

Do **not** remove fuel rail (3) and fuel line (1).

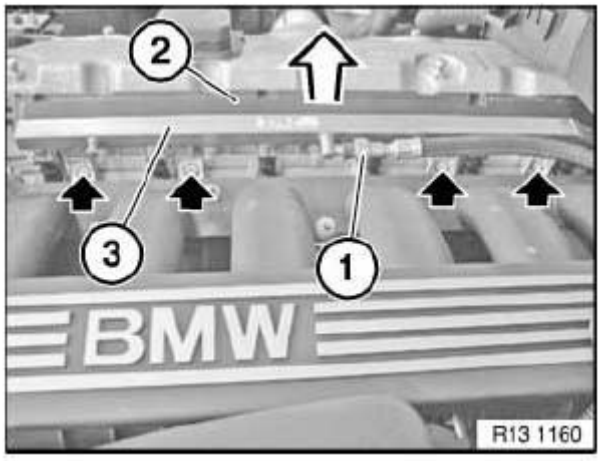


Fig. 82: Removing Connector Strip With Fuel Rail And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

WIRING HARNESS REPLACEMENT PROCEDURE

Work step	Note
Unlock plug connections on control sensors and disconnect	
Unlock plug on alternator and disconnect	
Unlock plug connection on knock sensors and disconnect	

Unlock plug on crankshaft sensor and disconnect	
Unlock plug on starter motor and disconnect	
Unlock plug on throttle valve assembly and disconnect	
Unlock plug connections on monitoring sensors and disconnect	
Unlock plug on oil condition sensor and disconnect	
Unlock plug on tank vent valve and remove	
Unlock plug on transmission and disconnect	
Unlock plug on air-mass meter and disconnect	
Unlock plug on differential-pressure sensor and disconnect	
Unlock plug on intake system servomotors and disconnect	
Unlock plug on eccentric shaft sensor and disconnect	
Unlock plug on solenoid valves and disconnect	
Unlock plug on coolant temperature sensor and disconnect	
Unlock plug on oil pressure sensor and disconnect	
Disconnect connector strip on fuel injectors	
Unlock plug on A/C compressor and disconnect	
Unlock plug on coolant thermostat and disconnect	
Unlock plug on hydraulic valve and disconnect	
Unlock plug on coolant pump and disconnect	
Release earth connection and remove Tightening torque **12 90 3AZ** .	

Release wiring harness if necessary from clips and retainers

Feed out wiring harness and remove.

Installation:

Check wiring harness routing.

Check plug connections for correct seating.

NOTE: Check stored fault messages.
clear fault memory.

12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION COILS (N52K)

IMPORTANT: Aluminium-magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks:

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **IGNITION COIL COVER**

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

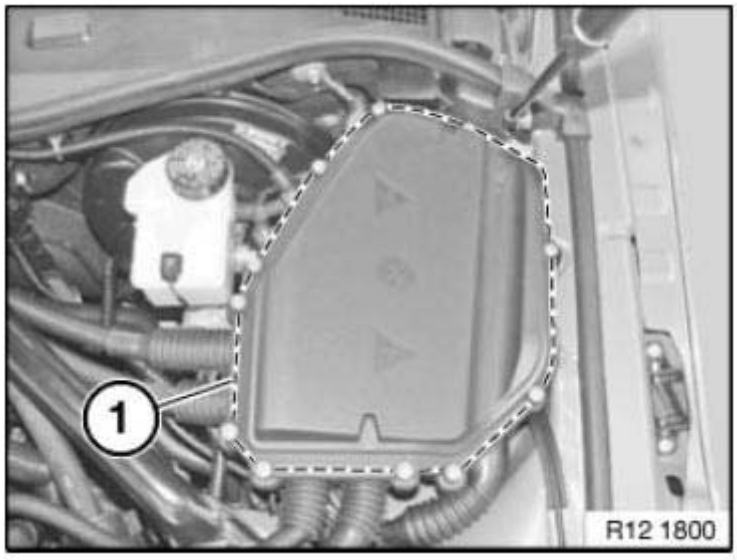


Fig. 83: Identifying Electronic Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrows and pull control unit upwards slightly.

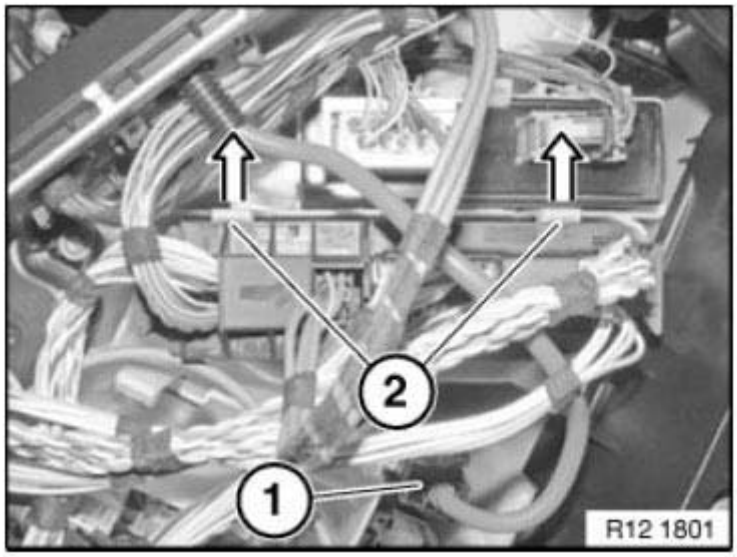


Fig. 84: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

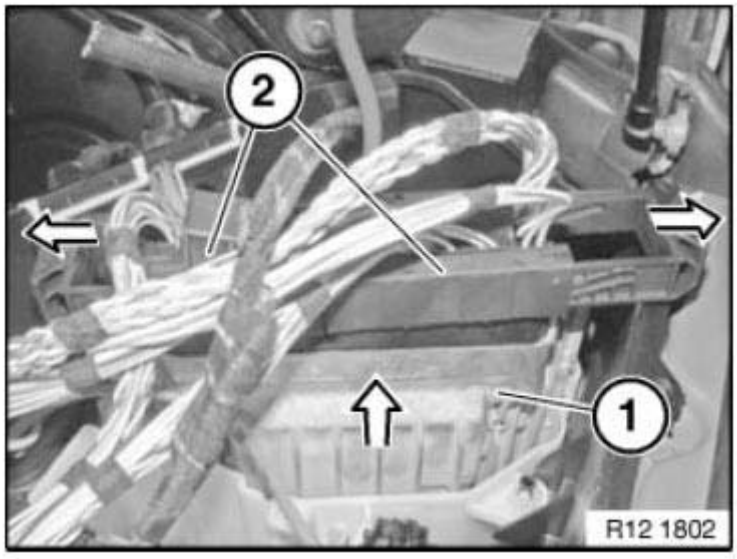


Fig. 85: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach all plugs (1) from ignition coil wiring harness in electronics box.

Unclip rubber grommet hold-down device (2) and release ignition coil wiring harness from electronics box.

Installation:

Make sure rubber grommets are correctly seated (watertightness).

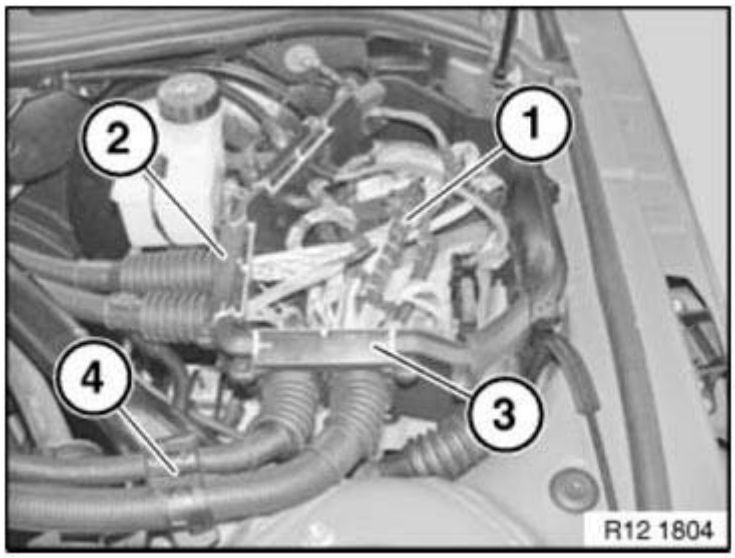


Fig. 86: Identifying Plugs And Rubber Grommet Hold Down Device
Courtesy of BMW OF NORTH AMERICA, INC.

Press in retaining lugs and withdraw lock (1) in direction of arrow from plug housing.

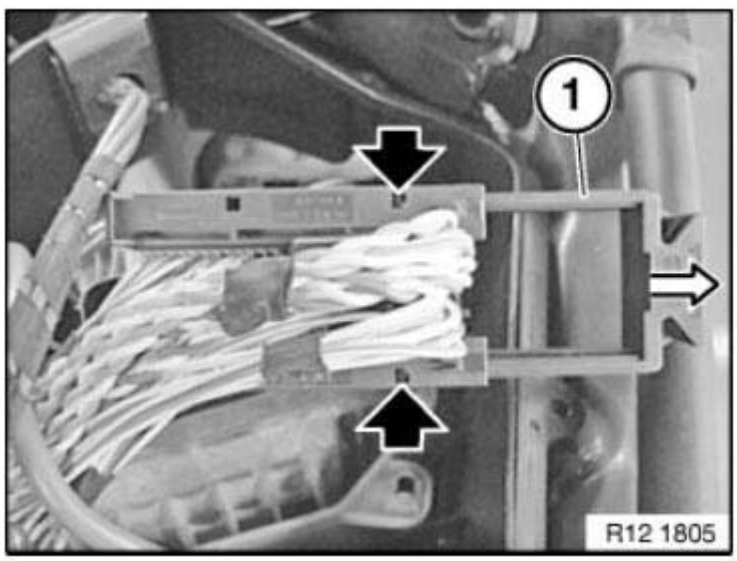


Fig. 87: Removing Locks By Pressing Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

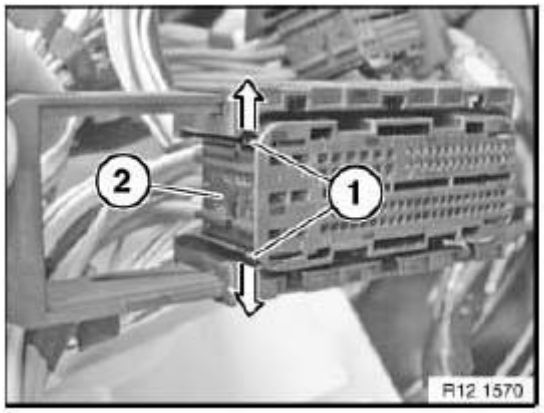


Fig. 88: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

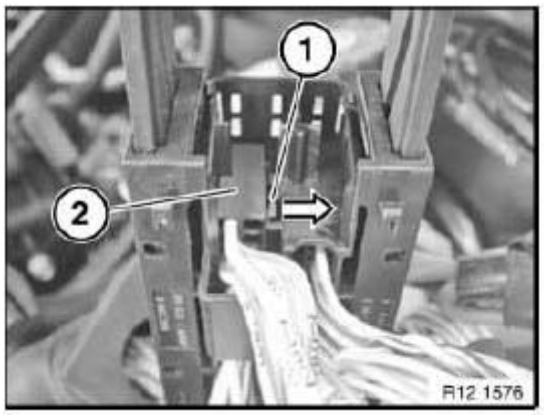


Fig. 89: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct upper section (1) and expose wiring harnesses.

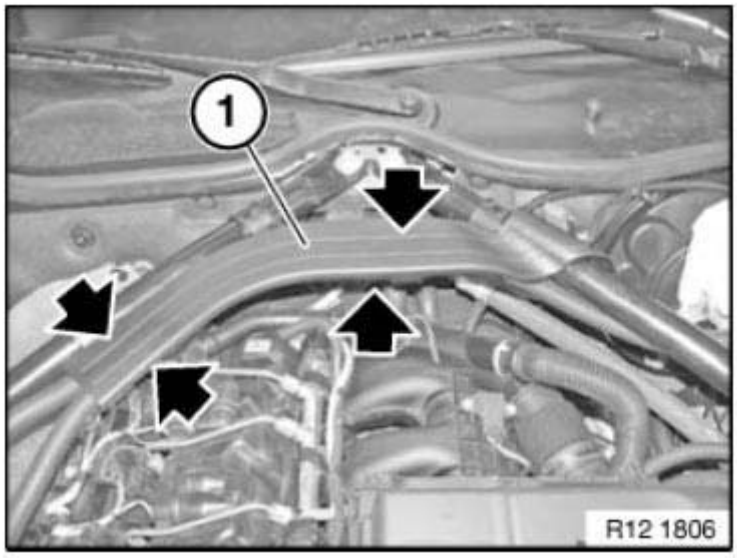


Fig. 90: Locating Wiring Harness In Cable Duct Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and remove clip (1).

Unlock all plugs on ignition coils and disconnect.

Unlock plug (2) on Valvetronic servomotor and disconnect.

Release wiring harness from retainers and cable ties (3).

Replace defective cable ties.

Release nuts (4) and remove earth connections.

Tightening torque **12 90 2AZ** .

Feed out ignition coil wiring harness and remove.

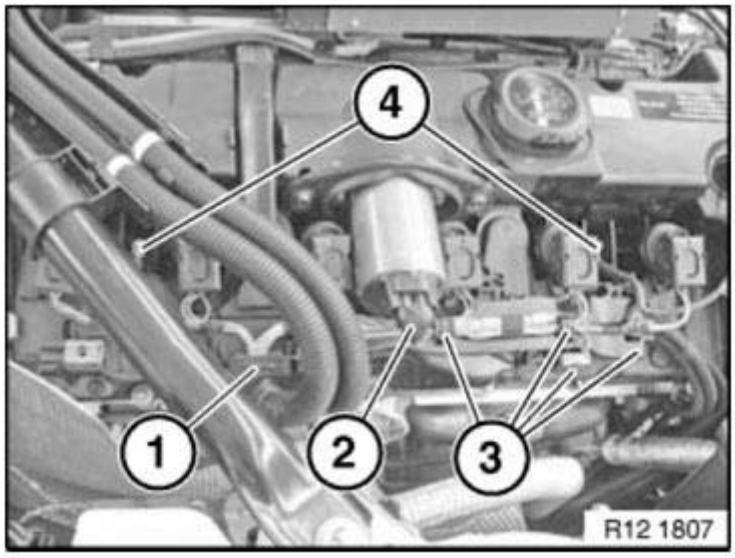


Fig. 91: Identifying Clip, Plug, Cable Ties And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Check wiring harness routing.

Check plug connections for correct seating.

Check stored fault messages.

clear fault memory.

1261 OIL PRESSURE/OIL TEMPERATURE/OIL GAUGE

12 61 285 REMOVING AND INSTALLING/RENEWING OIL LEVEL SENSOR FOR ENGINE OIL (N52K)

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary work

- Switch off ignition
- Remove front **UNDERBODY PROTECTION**
- Drain off **ENGINE OIL**

Release connector (1) and remove.

Unscrew nuts (2).

Tightening torque **12 61 2AZ** .

Remove oil level sensor.

Installation note:

Clean sealing surface on oil sump.

Replace gasket on oil level sensor.

An excessively low torque value will result in oil leaks.

An excessively high torque value will result in damage to the oil level sensor.

Top up engine oil.

Reinstall holder for ground cable.

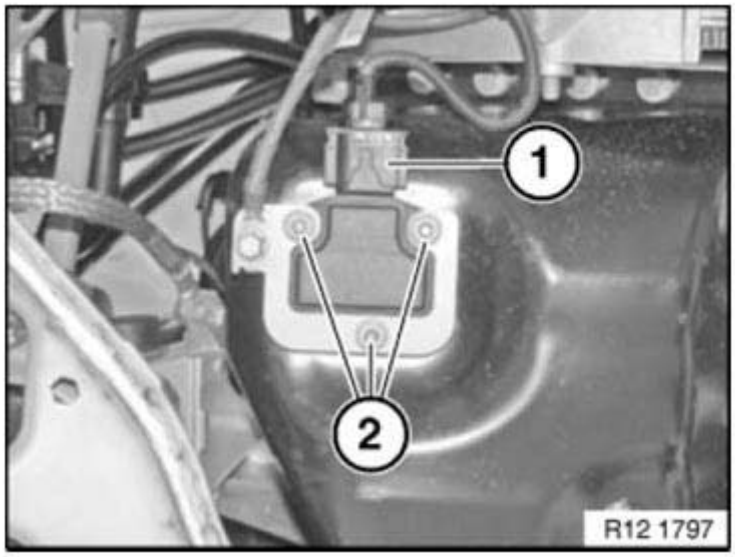


Fig. 92: Identifying Connector And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N52K)

WARNING: Scalding hazard!
Only perform this task on an engine that has cooled down.

Necessary preliminary tasks:

- Remove **ACOUSTIC COVER**

Installation location

Oil filter housing, front left.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.

Unlock plug (1) and remove.

Release oil pressure sensor (2).

Tightening torque **12 61 1AZ** .

Installation:

Check engine oil level, top up engine oil if necessary.

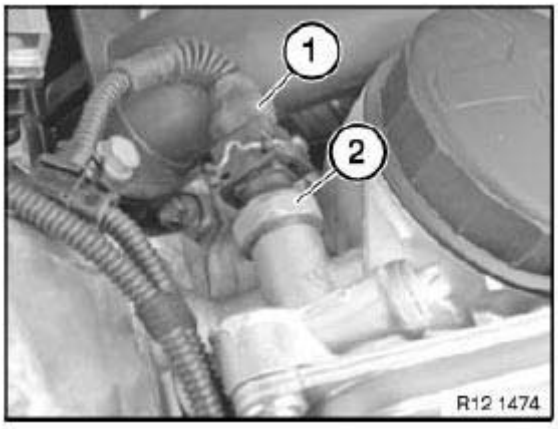


Fig. 93: Identifying Oil Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

1200 TROUBLESHOOTING

61 20 ... BATTERY REPLACEMENT INFORMATION

A vehicle battery is constructed for the installation location and the individual power requirements of the particular vehicle. These individual power requirements depend on the motorization and different types of optional equipment. The individually assigned vehicle battery is the ideal compromise between the power requirements of the vehicle electrical system and the weight and service life of the vehicle battery.

Vehicles with the automatic engine start-stop function or particular motorization and optional equipment are equipped with a special vehicle battery (AGM battery), since only this battery type can provide elevated power requirements over the extended service life. Installing a different vehicle battery can cause problems with vehicle electronics, can reduce functions or can cause leakage of battery acid.

In the event of an accident where the airbags are deployed in vehicles with a vehicle battery in the luggage compartment, the electrical connection between the vehicle battery and the trigger is automatically disconnected through pyrotechnics. This prevents a possible short circuit.

Proper operation of all of these safety and convenience functions requires a battery that conforms with specifications and that is properly registered in vehicles with energy management systems (IBS, power module).

Vehicles with energy management systems (IBS, power module): Register battery replacement

The vehicle electrical system is informed about the vehicle battery characteristic data, such as type, size, age and current power capacity. Therefore, only one work scope will be provided that is permitted by the current status of information.

When installing a new vehicle battery, the battery must be registered and thus must also be registered with the vehicle electrical system.

Diagnosis system:

Register battery replacement

- Service functions
- Body
- Voltage supply
- Register battery replacement
- Test plan

When retrofitting, a more powerful battery may be used. Standard batteries may always be replaced by AGM batteries with the same specifications.

When installing a battery of a different size or a different battery type, this change in vehicle data must be programmed into the vehicle data in accordance with specifications.

Programming system:

- Battery retrofitting

61 13 ... BUTT CONNECTOR FOR REPAIRING A PLUG CONNECTION

IMPORTANT:

1. **Identify cause of damage (e.g. sharp-edged body parts, faulty electrical loads, jammed mechanisms, corrosion caused by ingress of water, etc.).**
2. **Read out fault memory**
3. **Eliminate cause of damage.**
4. **Disconnect battery negative terminal**
5. **Make sure that no safety-related system according to circuit diagram (e.g. antilock braking system, active rear-axle kinematics, airbags, etc.) are influenced.**

   Otherwise replace faulty wiring harness or use repair cable (sourcing reference: BMW Parts Service)

6. **Carry out function test and read out fault memories again**
7. **Eliminate new faults if applicable and clear fault memories**

NOTE: **The repair range IV for vehicle electrical system contained the required special tools and individual parts for retrofitting and repair work with the aid of fan connectors.**

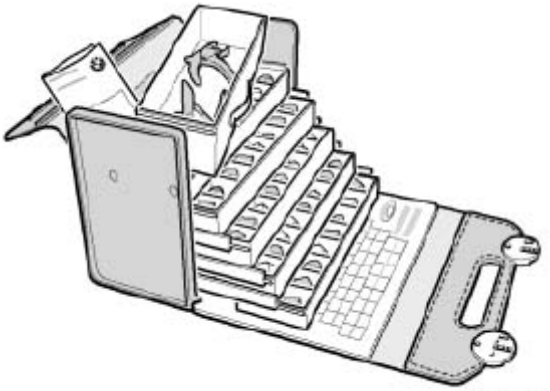


Fig. 1: Identifying Wiring Harness Repair Kit
Courtesy of BMW OF NORTH AMERICA, INC.

Choose repair kit.

Example: Repair kit, circular plug system D 2.5.

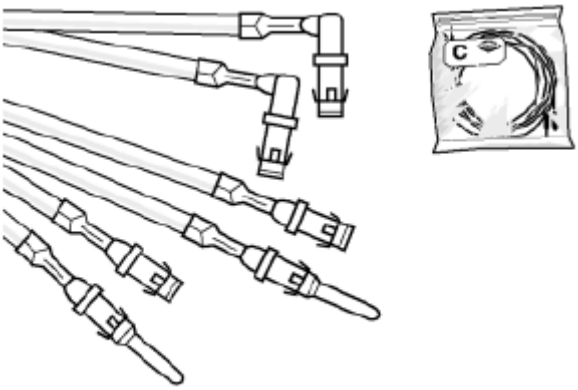


Fig. 2: Identifying Repair Kit, Circular Plug System D 2.5
Courtesy of BMW OF NORTH AMERICA, INC.

Remove following parts

1. Pre-packaged end of cable with requisite wire cross-section
2. Crimp connector for selected wire cross-section
3. Shrink-fit hose

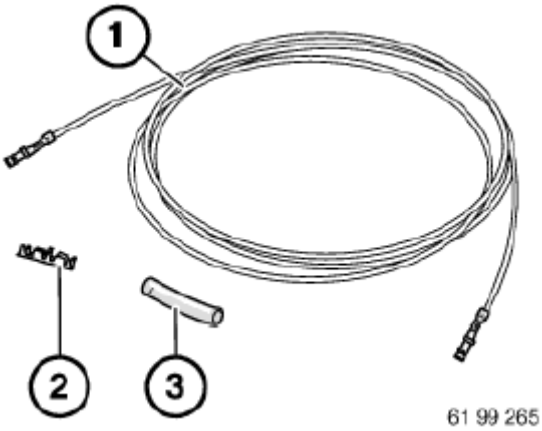


Fig. 3: Identifying Cable With Wire Cross-Section, Crimp Connector And Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Open secondary lock on housing.

Mark damaged contact (4) with socket number of housing and press it out of housing using appropriate special tool contained in special tool kit 61 0 300).

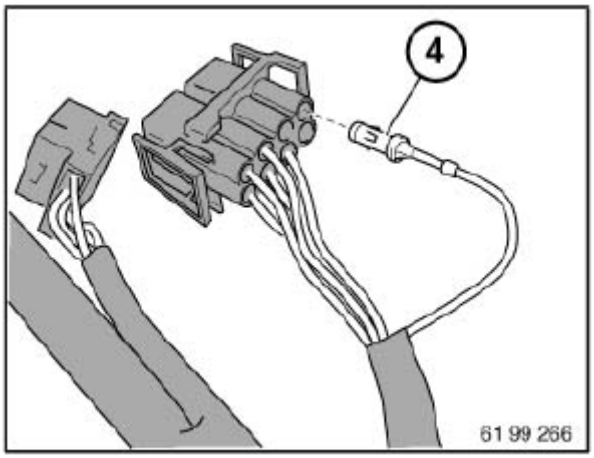


Fig. 4: Identifying Damaged Cable With Socket Number
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

- **Check maximum length of repair cable**
- **If more than one wire is to be repaired, the individual interfaces must be offset so that the wiring harness is not too thick at the repaired point.**

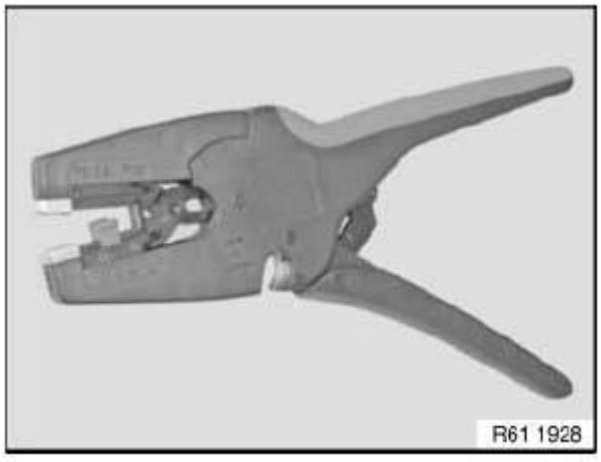


Fig. 5: Identifying Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

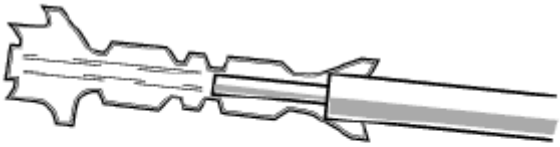
Adhere to following procedure

- Cut off wire with faulty contact at point which is easily accessible
- Strip insulation from end of wire at wiring harness end
- Cut preassembled wire end to length and strip insulation

Crimp butt connector on preassembled wire end.

Special tools:

- 61 4 328 (0.35 - 2.5 mm^2
- 61 0 240 (4.0 - 6.0 mm^2



61 99 270

Fig. 6: Identifying Crimp Butt Connector On Preassembled Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (8) onto free wire end.

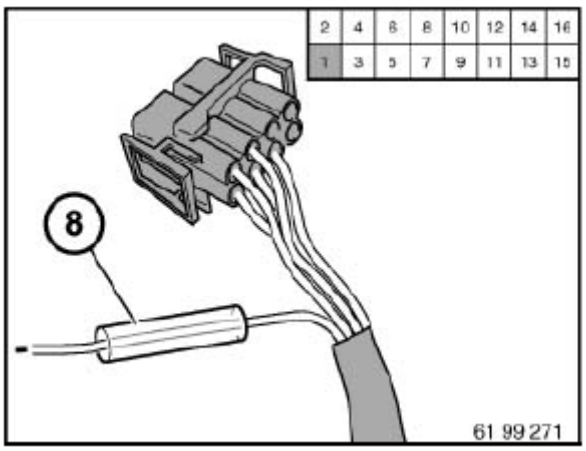


Fig. 7: Identifying Shrink-Fit Hose On Free Wire End
Courtesy of BMW OF NORTH AMERICA, INC.

Crimp unused wire end to butt connector.

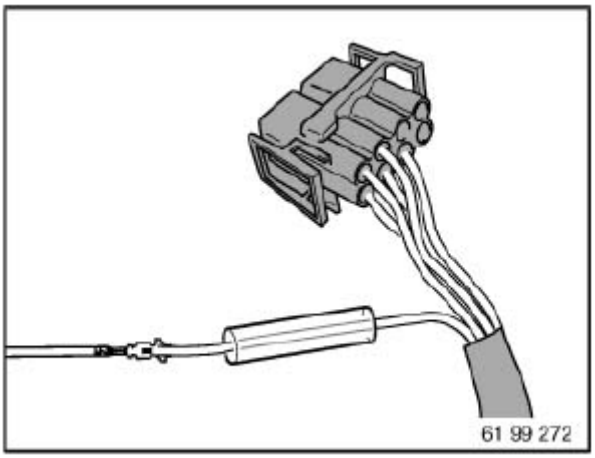


Fig. 8: Crimping Unused Wire End To Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shrink-on sleeve over butt connector.

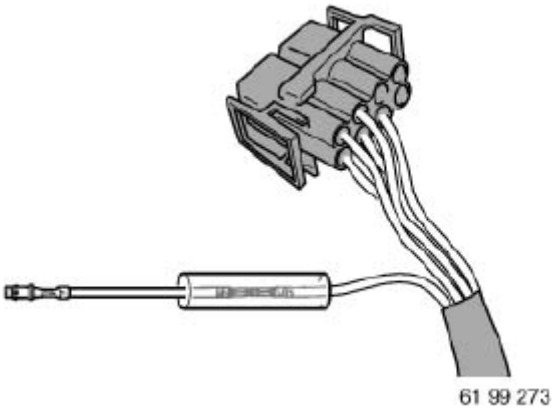


Fig. 9: Identifying Shrink-On Sleeve Over Butt Connector
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not burn shrink-on sleeve.

With hot air blower, shrink the shrink-on sleeve on both sides (9) of shrink-fit hose until glue emerges uniformly all round.

Insert contact in housing.

Close secondary lock on housing.

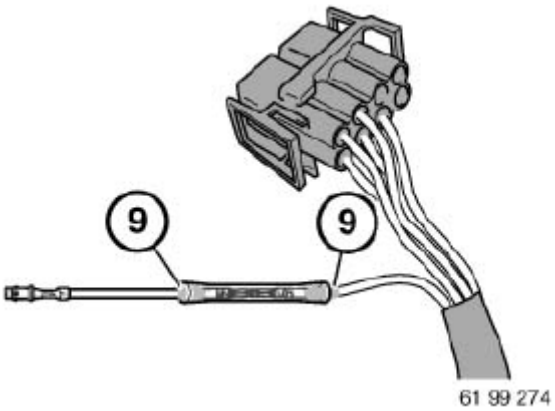


Fig. 10: Identifying Shrink-On Sleeve Ends
Courtesy of BMW OF NORTH AMERICA, INC.

12 00 ... INSTRUCTIONS FOR WORKING ON THE IGNITION SYSTEM

CAUTION: Always switch off ignition before working on ignition system.
Use only test leads which have been approved and belong to these testing instruments (e.g. DIS Tester).
Comply with operating instructions of the respective testing instrument used.
Comply with the country-specific safety regulations.
Never touch components under current with engine running!
Comply with instructions of DIS tester.
Do not connect any suppression capacitors or inspection lamps to terminal 1 on the ignition coil.
Terminal 1 of ignition coil must not be connected to ground or battery positive lead.
If an alarm system is subsequently installed, lead of terminal 1 must not be used for start prevention.
When working on ignition system, always disconnect supply leads to ignition coils.

High tension! - High tension!

IMPORTANT: Hazardous voltages occur at:

- **Ignition lead**
- **spark-plug connectors**
- **spark plugs**
- **Ignition coil (high voltage at terminal 4 is approx. 40 kV)**
- **Lead of terminal 1 from ignition coil to DME control unit (high voltage approx. 350 V)**

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults
- Further fault patterns with evaluation
- Additional fault notes for troubleshooting

Oscillograms

- Normal oscillators
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools .

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: Optical fibre cables are colored differently as follows:

- Green = **MOST** (**M** edia **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (**I** ntelligent **S** afety **I** ntegration **S** ystem) optical fibre
- Orange = repair optical fibre cables

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat = 85°**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts

- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- Green = **MOST** (**M** edia **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (**I** ntelligent **S** afety **I** ntegration **S** ystem) optical fibre
- Orange=repair fibre-optic cables

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85°**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

12 00 ... NOTES/INFORMATION ON REMOVING AND INSTALLING CONTROL UNITS

IMPORTANT:

- **Disconnecting the vehicle battery will cancel the fault memories of control units. Consequently, before disconnecting the car's battery, always interrogate the fault memories. Investigate stored faults and, once any**

faults have been remedied, cancel the fault memory.

- **Control unit plugs should only ever be connected and disconnected while the ignition is turned off.**
- **The removal and installation of components, relays, fuses etc. can cause faults to be stored in fault memories capable of self diagnosis. Always interrogate the fault memories after completing work on the electrical system.**
- **Investigate stored faults and, once any faults have been remedied, cancel the fault memory.**
- **If necessary, initialize power window units**

When replacing the DME/DDE control unit, observe the following:

- In each case read out the hardware/software status of the relevant control unit using the BMW diagnosis system.

  Comply with the instructions of the DIS diagnosis system on the steps pertaining to coding and programming.

  On vehicles with electronic vehicle immobilization, comply with the instructions of the BMW diagnosis system.

- Each control unit is programmed with certain basic values, which serve as mean values. The control unit receives different input values, depending on engine condition, which are compared with the stored values. The adaptive system compares the input values with the stored map values. The control commands are routed to the relevant actuators.
- If the DME control unit is without current for a long time (more than one hour), its adaptive system loses the stored values. When a cleared control unit is restarted or a new control unit is installed, the adaptive system must read in and store the input values of the associated engine as new basic values itself.
- This procedure could lead to erratic idling and disturbed overrunning of the engine after starting. Depending on the engine it could require some time before all values are adapted to the engine condition.
- Therefore observe the following procedure before replacing or reinstalling a DME/DDE control unit:
  1. If possible before exchanging control unit, run engine up to operating temperature.
  2. Exchange control units and run the vehicle at alternating engine speeds.

12 00 ... NOTES/INFORMATION ON START ASSISTANCE (JUMP STARTING)

Do not start the engine with help of starting sprays.

Preparation

Conform with the following when starting the engine with a jump starting cable.

- Ensure that the jump starting cable wires are of appropriate cross-section size.

- Only use fuse-protected jump starting cables.
- Check whether the current-supplying battery has 12 V voltage.
- If the engine is started from the battery of another vehicle, ensure that there is no contact between the bodies of both vehicles.

IMPORTANT: Never touch electrically live ignition system components: high voltage - danger of injury!

If the battery in the vehicle supplying power is weak, start the engine of this vehicle and let it run at idling speed.

Operation

It is essential to conform to the procedures so as to avoid injury to persons or damage to parts.

- Automatic transmission: select drive position "P", apply parking brake.
- Manual transmission: move gear lever to neutral position, apply parking brake.
- Ensure that the jump leads cannot get caught in rotating parts, e.g. fan.
- First connect both positive poles of the batteries with one jump starting cable (red).
- Use the battery positive terminal in the engine compartment for vehicles with the battery in the luggage compartment.
- Then use the second jump starting cable (black) to connect the negative post of the current-supplying battery with the earth/ground point (not the negative pole or the body) of the vehicle to be started.

IMPORTANT: Do not connect the second jump starting cable (black) with the negative pole of the battery in the vehicle to be started. Produced gas could be ignited by sparks.

Risk of explosion!

After the engine of the vehicle to be started has fired, first disconnect the jump starting cable between the negative pole and the earth/ground point. Then remove the starting cable from the positive poles.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

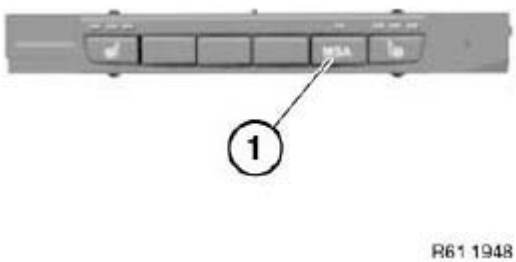


Fig. 11: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

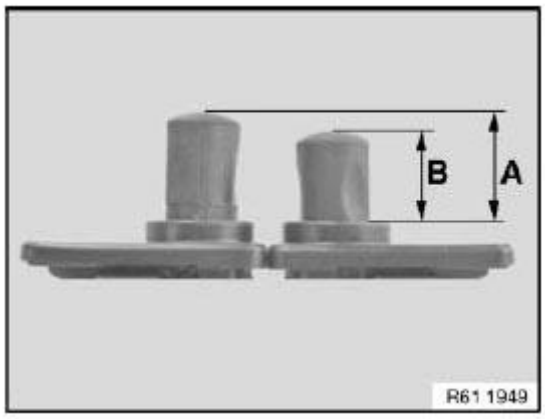


Fig. 12: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1212 IGNITION WIRES, SPARK PLUGS

12 12 011 REPLACING ALL SPARK PLUGS (N54)

Necessary preliminary work

- Switch off ignition.
- Remove **IGNITION COILS** .

IMPORTANT: Wear safety goggles.

Oil and dirt particles may get into your eyes!

Clean spark plug slot with compressed air.

Unscrew the spark plugs with special tool **12 1 220** and an extension with a minimum kink of 8°.

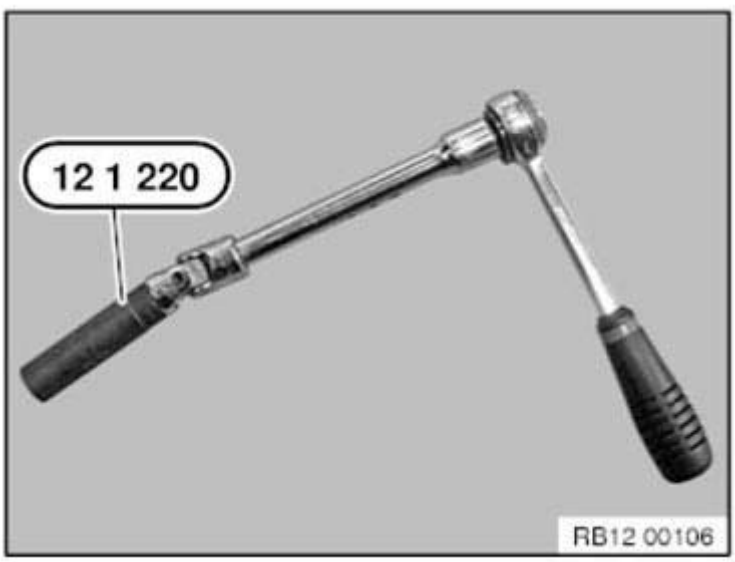


Fig. 13: Removing Spark Plugs Using Special Tool (12 1 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach new spark plug (1) **12 1 230** to special tool.

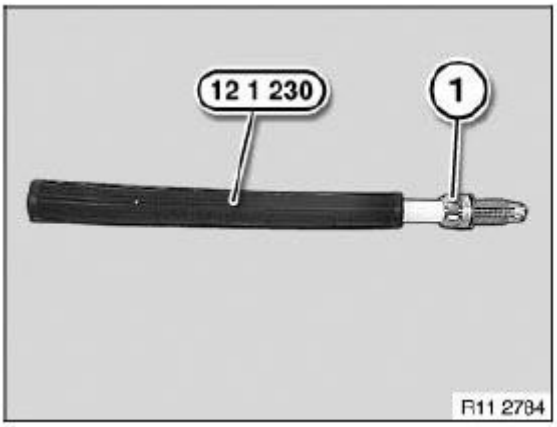


Fig. 14: Attaching Spark Plug To Special Tool (12 1 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw the spark plug hand-tight with special tool **12 1 230** into the cylinder head plug thread to the limit position.

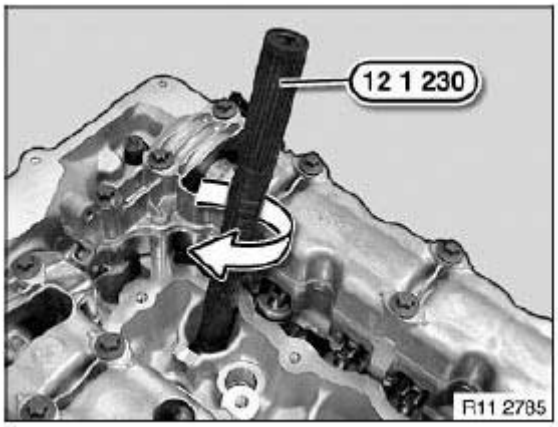


Fig. 15: Installing Spark Plug Using Special Tool (12 1 230)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten the spark plugs with a torque wrench, special tool **12 1 220** and an extension with a minimum kink of 8°.

Observe tightening torque.

Tightening torque **12 12 2AZ** .

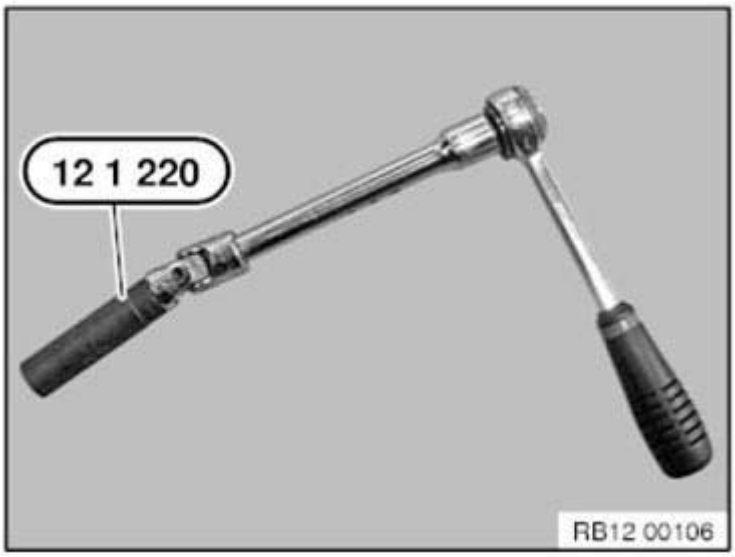


Fig. 16: Removing Spark Plugs Using Special Tool (12 1 220)
Courtesy of BMW OF NORTH AMERICA, INC.

1213 IGNITION COIL

12 13 CARRYING OUT ENGINE CLEANING (N54, N53, N43)

IMPORTANT: When cleaning the engine, it is absolutely essential to keep the ignition coil covers fitted in order to protect the injectors.

12 13 NOTES ON CHECKING IGNITION SYSTEM

Troubleshooting

- Fault in fuel injection system
- Spark plug faults
- Ignition coil faults
- Further fault patterns with evaluation
- Additional fault notes for troubleshooting

Oscillograms

- Normal oscillators
- Oscillograms of ignition coils from different manufacturers

Check

- Secondary signal for stationary ignition distribution

12 13 511 REPLACING IGNITION COILS (N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit.
- Switch off ignition.
- Remove **ACOUSTIC COVER**
- Remove right **TENSION STRUT**

IMPORTANT: Ignition coils must not be fouled by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Unlock plug catch (1) of ignition coil (2) and disconnect plug.

Pull ignition coil (2) up and out.

This procedure is applicable to all ignition coils.

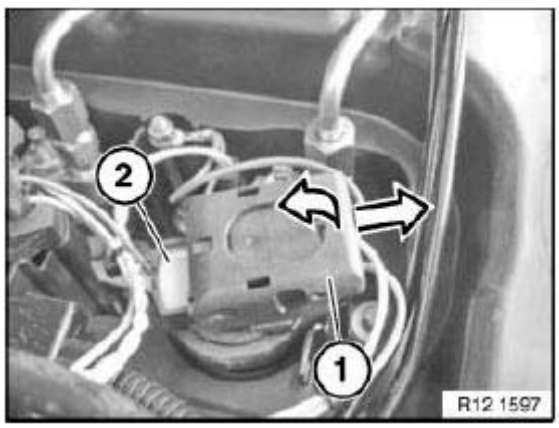


Fig. 17: Removing Ignition Coil
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check that rubber seal of ignition coil (1) is correctly seated.

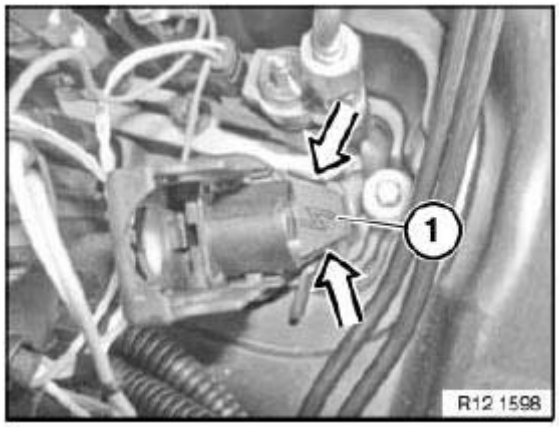


Fig. 18: Identifying Ignition Coil Rubber Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Push plug (1) with plug catch (2) open onto ignition coil.

Carefully close plug catch (2) in direction of arrow.

The plug catch must snap into place without great effort.

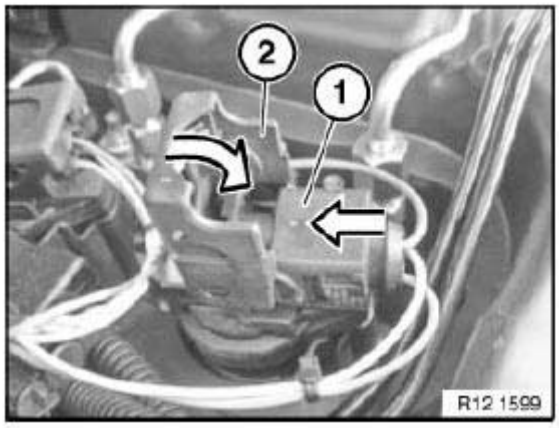


Fig. 19: Closing Plug Catch
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Now clear the fault memory.

1214 ELECTRONIC SWITCHING OR CONTROL UNITS

12 14 700 CODING CONTROL MODULE (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

Select "Coding" program.

For subsequent procedure, follow

instructions in MoDiC or DIS/GT1 Tester. Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics)

  or

- DDE (Digital Diesel Electronics)

Refer to "Diagnosis and Coding" service information bulletins on subject of coding.

12 14 705 PROGRAMMING CONTROL UNIT (DME/DDE)

Switch on ignition.

Connect MoDiC or DIS/GT1 Tester.

Select "Programming".

For subsequent procedure, follow instructions in MoDiC or DIS/GT1 Tester.

Carry out adjustment of following control units:

- EWS (electronic immobilizer)
- DME (Digital Motor Electronics)

  or

- DDE (Digital Diesel Electronics)

Refer to "Diagnosis and Coding" service information bulletins on subject of programming.

12 14 600 REMOVING/REPLACING KNOCK SENSORS (N54)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks

- Read out fault memory of DME control unit.
- Switch off ignition.
- Remove **INTAKE AIR MANIFOLD** .

Unlock plug (1) and remove.

Feed out plug (1) behind feed line, remove **FEED LINE** if necessary.

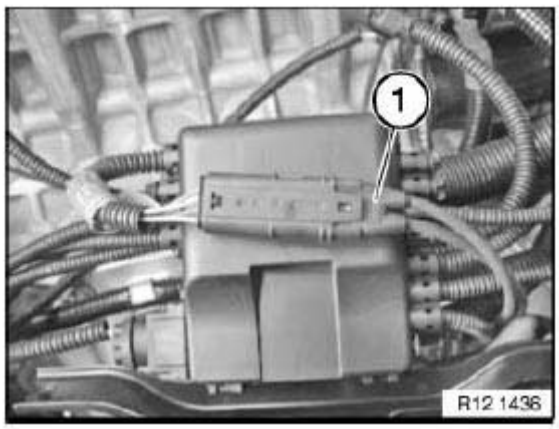


Fig. 20: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws on both knock sensors (1) and remove knock sensors (1).

Installation:

- Replace aluminum screws.
- Tightening torque **13 62 5AZ** .

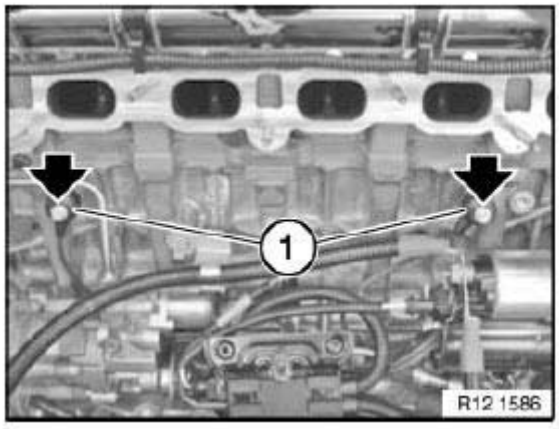


Fig. 21: Locating Knock Sensors
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Clean contact surface of knock sensors on engine block.

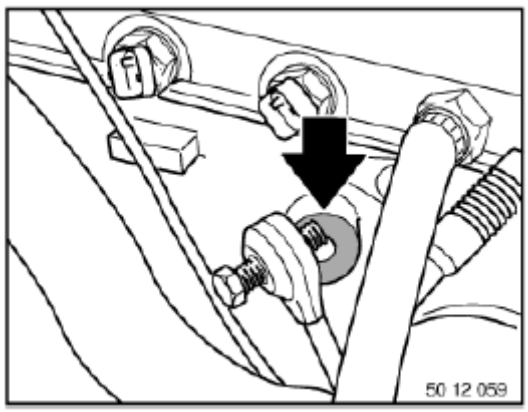


Fig. 22: Locating Contact Surface Of Knock Sensors On Engine Block
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle.

Check stored fault message.

Now clear the fault memory.

12 14 550 REPLACING CONTROL UNIT (DME) (N54)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION (ELECTRO STATIC DISCHARGE))

Necessary preliminary tasks

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**

IMPORTANT: Follow INSTRUCTIONS for removing and installing control units

Replacement

- Carry out programming/encoding
- If no data can be read out from the previous control unit, carry out injection quantity adjustment (description at end of instruction).

IMPORTANT: It is absolutely essential to read out the fault memory with the BMW diagnosis system and to create a fault memory printout.

Switch off ignition.

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

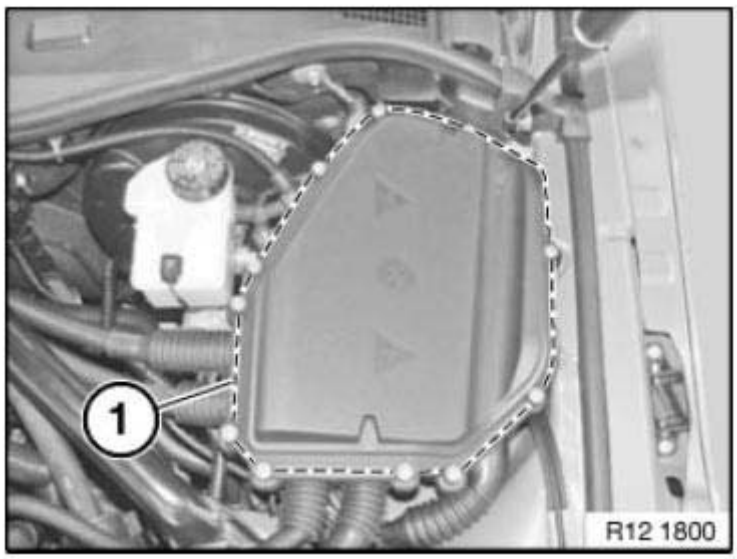


Fig. 23: Identifying Electronic Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrow and pull control unit upwards slightly.

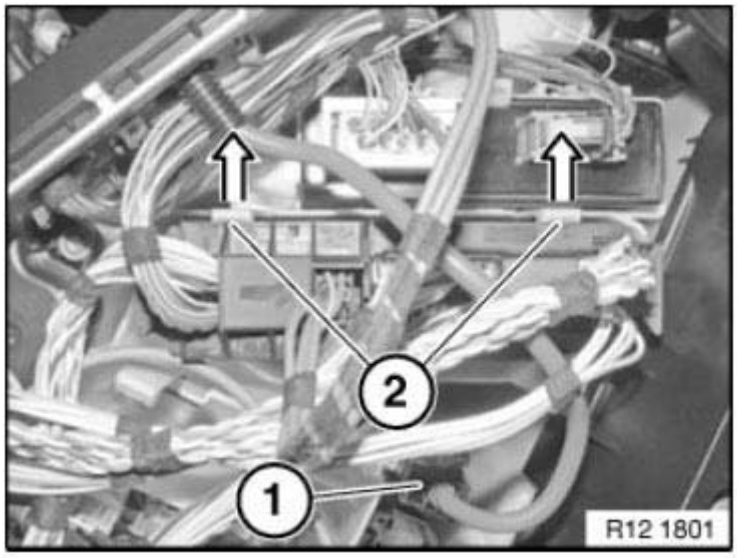


Fig. 24: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

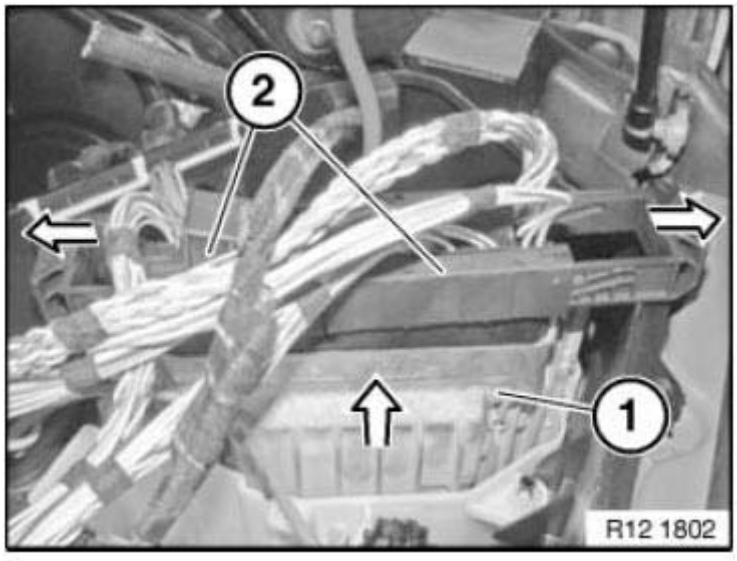


Fig. 25: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out control unit (1).

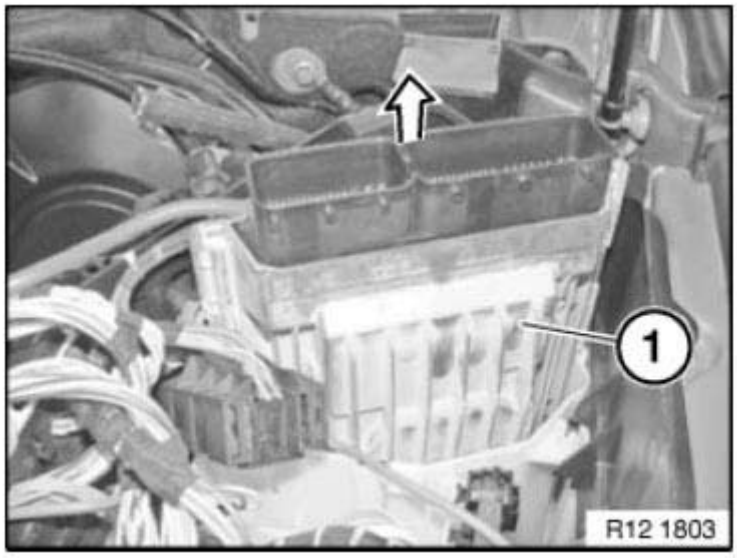


Fig. 26: Lifting Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Injector adjustment

If the DME control unit has been replaced, it will also be necessary to carry out adjustment of the injectors!

Injector adjustment is carried out with the aid of so-called adjustment values.

The adjustment values are printed in two blocks of three digits on each injector.

The adjustment values must be stored in the new control unit!

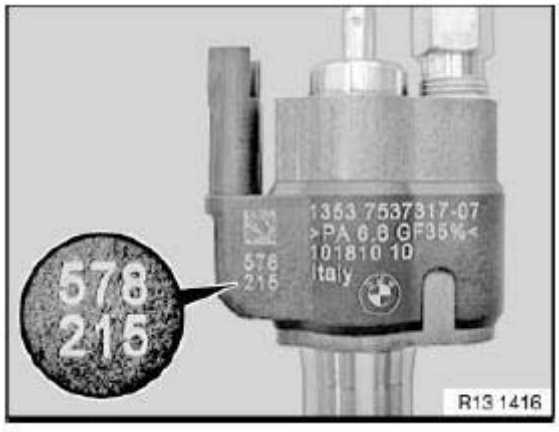


Fig. 27: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Read off the adjustment values and enter according to the installation location (cylinder) of the injectors:

- Connect DIS Tester
- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment programs"
- Select "Adjust injectors"
- Select "Test schedule"
- The adjustment value must be entered for each cylinder.

Fig. 28: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
clear fault memory.

12 14 521 REPLACING CRANKSHAFT PULSE GENERATOR (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition

NOTE: Installation location of pulse generator for crankshaft is underneath starter motor.

Detach plug (1) from crankshaft pulse generator (2).

Release screw.

Installation:

Replace aluminum screws.

Tightening torque **13 62 4AZ** .

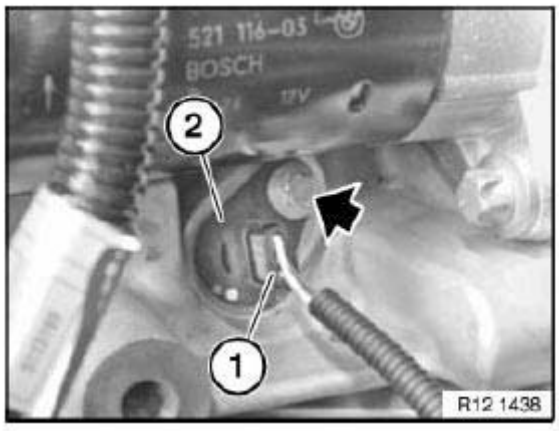


Fig. 29: Locating Crankshaft Pulse Generator With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw pulse generator (2) from crankcase.

Installation:

Replace sealing ring.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 524 REPLACING PULSE GENERATOR ON EXHAUST CAMSHAFT (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC

DISCHARGE) .

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **FAN COWL**

Unlock plug (1) and remove.

Release screw.

Tightening torque **13 62 3AZ** .

Remove pulse generator (2).

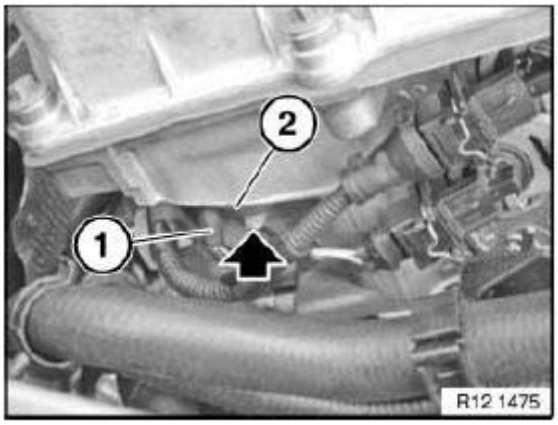


Fig. 30: Locating Plug And Pulse Generator
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 523 REPLACING PULSE GENERATOR ON INLET CAMSHAFT (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- **REMOVE FAN COWL**

Unlock plug (1) and remove.

Release screw.

Tightening torque **13 62 3AZ** .

Remove pulse generator (2).

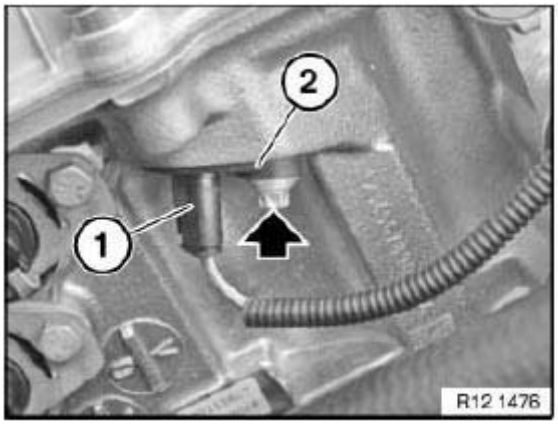


Fig. 31: Locating Pulse Generator With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

12 14 651 REPLACING SUCTION PRESSURE SENSOR ON CHARGE-AIR DUCT (N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **INTAKE FILTER HOUSING**

NOTE: The installation location of the suction pressure sensor is at the rear end of the charge-air duct.

Unlock plug (1) and remove.

Release screws and pull suction pressure sensor (2) out of charge-air duct.

Tightening torque **13 62 2AZ** .

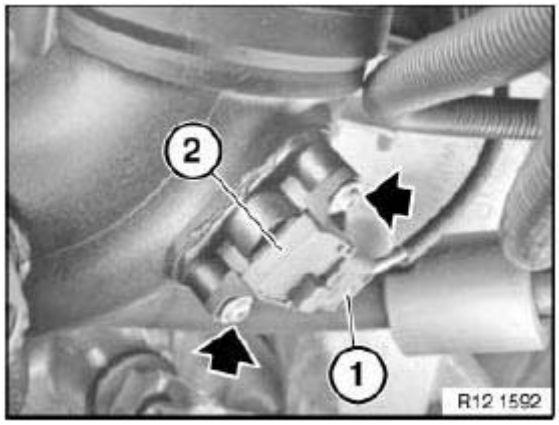


Fig. 32: Identifying Suction Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check sealing ring for damage. Replace sealing ring if damaged.

When installing, coat sealing ring with suitable antiseize agent.

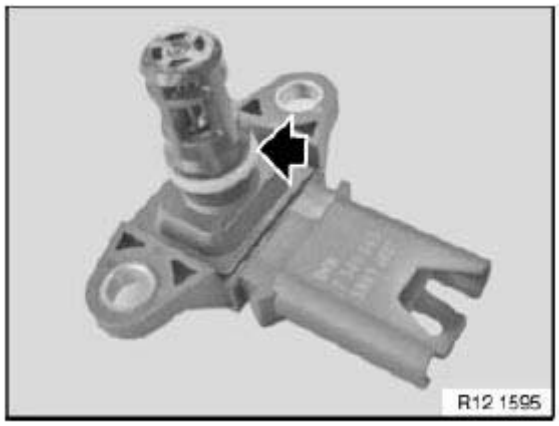


Fig. 33: Locating Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle.
Check stored fault messages.
Now clear the fault memory.

12 14 650 REPLACING SUCTION PRESSURE SENSOR ON INTAKE AIR MANIFOLD (N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit

- Switch off ignition

NOTE: The installation location of the suction pressure sensor is at the rear end of the intake air manifold.

Unlock plug (1) and remove.

Release screws and pull suction pressure sensor (2) out of intake air housing.

Tightening torque **13 62 2AZ** .

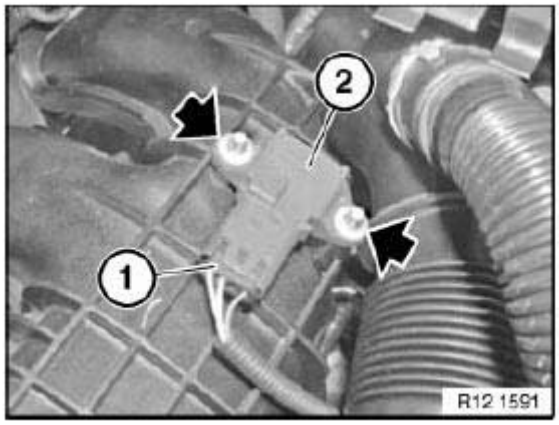


Fig. 34: Identifying Suction Pressure Sensor And Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check sealing ring for damage. Replace sealing ring if damaged.

When installing, coat sealing ring with suitable antiseize agent.

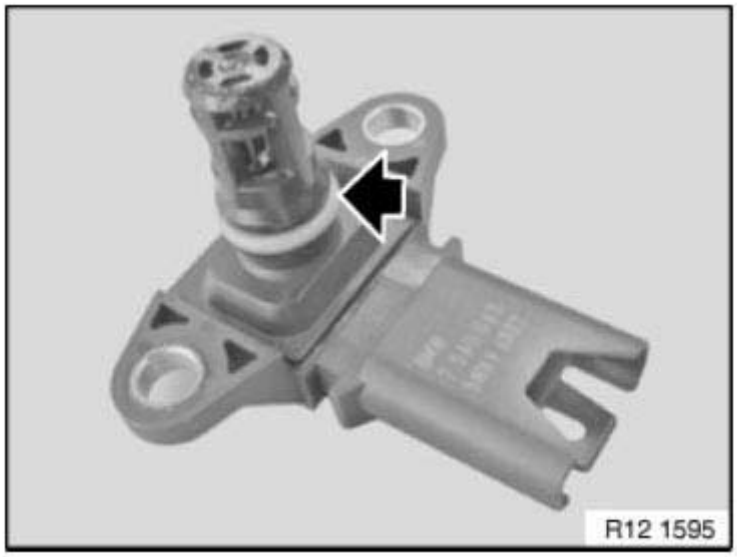


Fig. 35: Locating Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.
Now clear the fault memory.

1231 ALTERNATOR WITH DRIVE AND MOUNTING

12 31 020 REMOVING AND INSTALLING OR REPLACING ALTERNATOR (N54)

Necessary preliminary tasks

- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD** and cover
- Remove **INTAKE FILTER HOUSING**
- Release **CHARGE-AIR DUCT** at front, do not remove
- Remove alternator **DRIVE BELT**

NOTE: In order to remove the alternator, it is necessary to remove the air-conditioning compressor for the air conditioning system.
In so doing:

- **Do not draw off A/C system refrigerant.**
- **Do not detach refrigerant lines from A/C compressor.**
- **Do not remove A/C compressor; instead, remove from bracket only and place to one side.**

See 64 52 521 REPLACING AIR CONDITIONING COMPRESSOR (N54) .

NOTE: **For purposes of improved clarity, illustrations and description show A/C compressor removed.**

Release bolts a few turns until bracket (1) is loose. Do **not** remove bracket (1).

Tightening torque, see **64 52 A/C COMPRESSOR** .

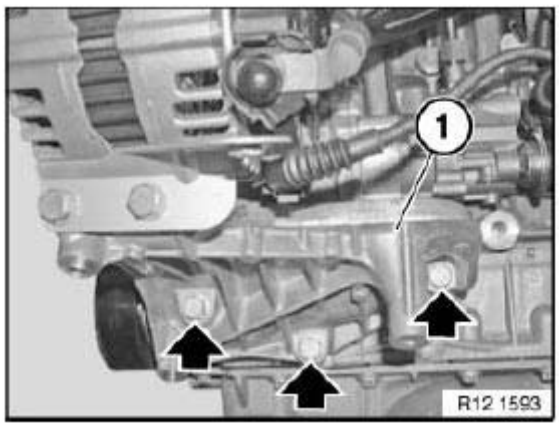


Fig. 36: Locating Bracket Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug (1) and remove.

Remove protective cap (2) and release nut underneath.

Tightening torque **12 42 1AZ** .

Remove battery positive lead.

Release screws (3).

Tightening torque **12 31 1AZ** .

Tightening torque **12 31 2AZ** .

Remove alternator.

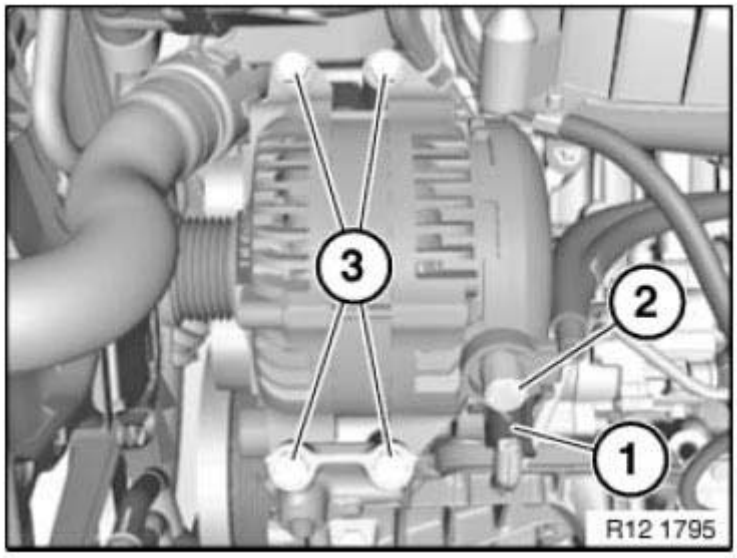


Fig. 37: Identifying Alternator Plug And Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

12 31 ... REPLACING ALTERNATOR BELT PULLEY

Remove and install alternator drive belt.

Depending on alternator type, grip shaft with:

- hexagon socket
- multi-tooth socket or
- Torx socket wrench

Release nut with special tool 12 7 110.

Installation:

TIGHTENING TORQUE, 12 31 2AZ/12 31 3AZ .

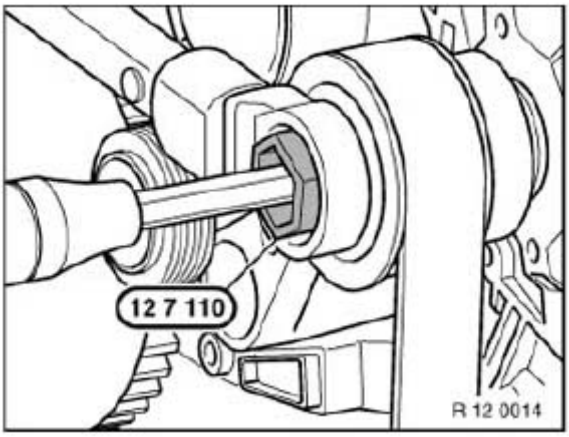


Fig. 38: Removing Belt Pulley Mounting Nut Using Special Tool (12 7 110)
Courtesy of BMW OF NORTH AMERICA, INC.

12 31 ... REPLACING ALTERNATOR BELT PULLEY (WITH OVERRUNNING CLUTCH)

Remove and install alternator drive belt.

Grip alternator shaft with:

- internal serration

Release nut with special tools 12 7 120.

Installation:

Tightening torque, see 12 31 3AZ in **12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS** .

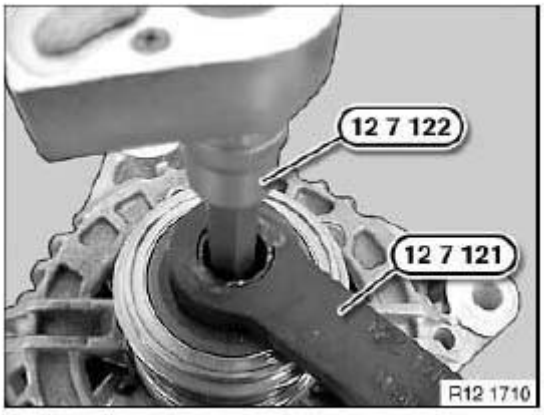


Fig. 39: Removing Nut Using Special Tools (12 7 120)
Courtesy of BMW OF NORTH AMERICA, INC.

1232 REGULATOR

12 32 501 REPLACING VOLTAGE REGULATOR

Necessary preliminary tasks

- Switch off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove alternator

Bosch

Release protective caps (1).

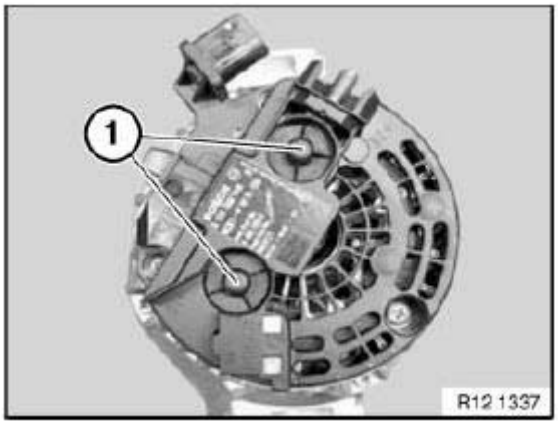


Fig. 40: Identifying Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screw (1) and nuts (2), remove cover.

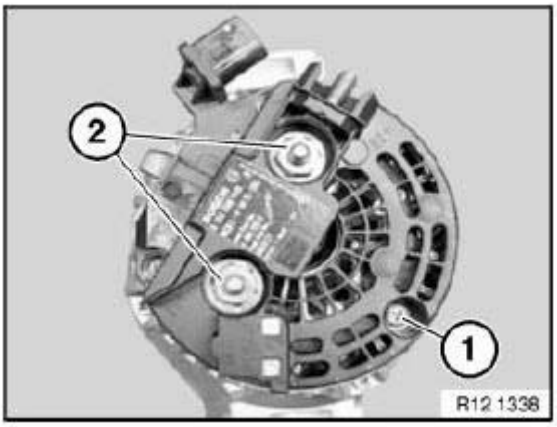


Fig. 41: Identifying Screw And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Release screws and remove regulator switch (1) in direction of arrow.

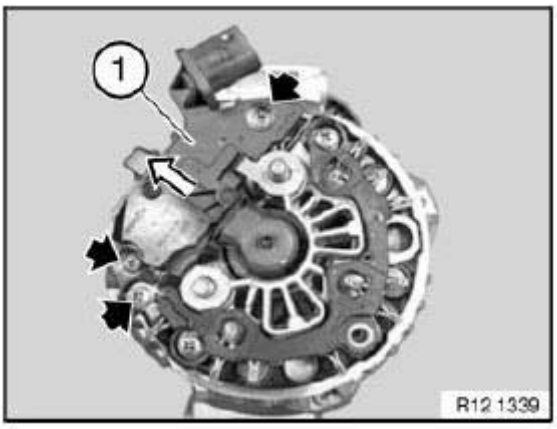


Fig. 42: Removing Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Bosch

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

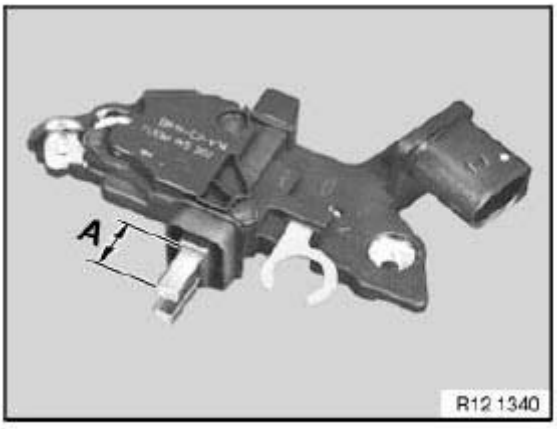


Fig. 43: Identifying Regulator Switch Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Slacken nut (1).

Slacken nut (2).

Release screws (3).

Release cover (4).

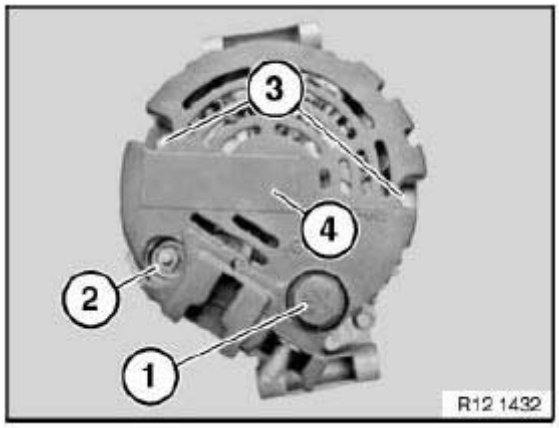


Fig. 44: Identifying Nut, Screw And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Release screws.

Remove regulator switch (1) towards top.

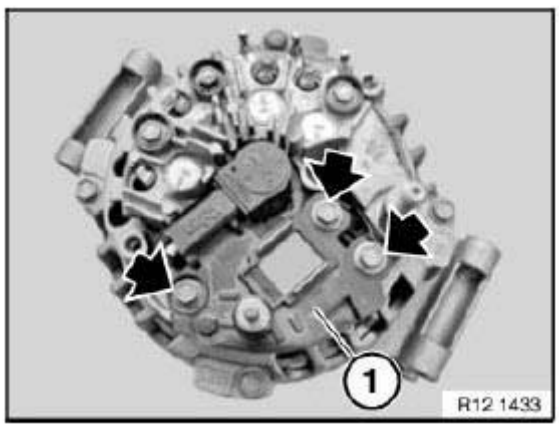


Fig. 45: Locating Regulator Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Valeo

Installation:

Clean contact surfaces and check pretension of contact spring, replace regulator switch if necessary.

Measurement A = min. 5 mm.

Check collector ring for wear and recondition if necessary.

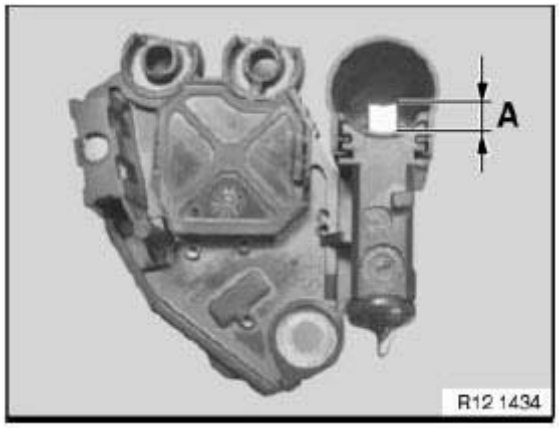


Fig. 46: Identifying Regulator Switch Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Fit new regulator (1) with attached mounting sleeve (2) or locked carbon brush.

Pull off mounting sleeve (2) and replace with cover (3).

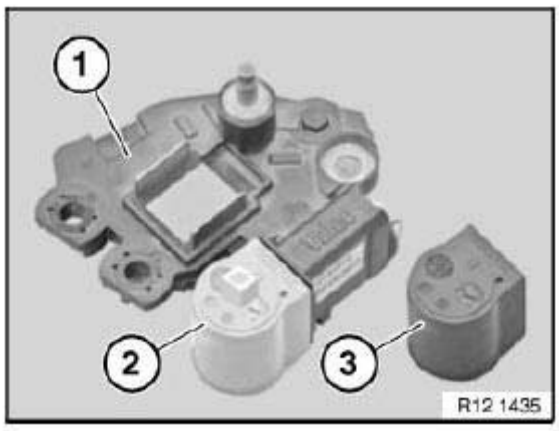


Fig. 47: Identifying Regulator, Mounting Sleeve And Cover
Courtesy of BMW OF NORTH AMERICA, INC.

1241 STARTER WITH MOUNTING

12 41 020 REMOVING AND INSTALLING/REPLACING STARTER MOTOR (N54)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary tasks

- Switch off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **INTAKE AIR MANIFOLD**

Unlock plug (1) and remove.

Release nuts (2) and disconnect battery positive leads.

Tightening torque **12 42 2AZ** .

Release screws (3).

Installation:

Replace aluminum screws.

Tightening torque **12 41 1AZ** .

Remove starter motor (4).

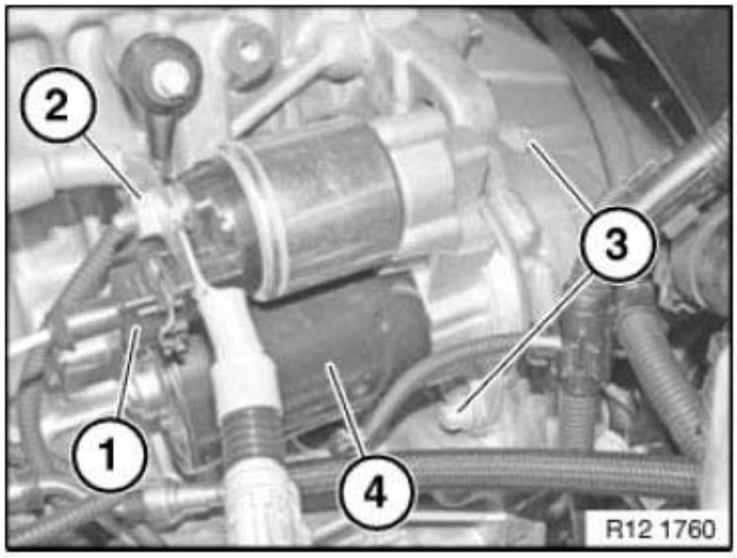


Fig. 48: Identifying Plug, Nuts And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check starter pinion and ring gear for damage. Replace starter if necessary.

Assemble engine.

12 41 041 REPLACING SOLENOID SWITCH

Turn off ignition.

Remove starter motor.

Release nut (1).

Remove cable lug (2).

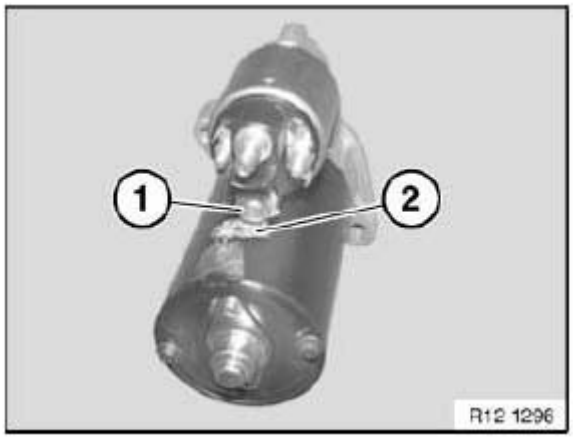


Fig. 49: Identifying Starter Motor Nut And Cable Lug
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not turn cable lug (2) while tightening down - risk of short circuit to starter motor housing.
Tightening torque 12 41 4AZ

Release screws (1).

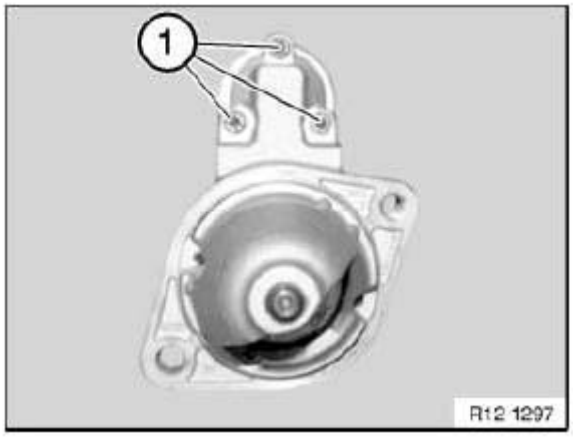


Fig. 50: Identifying Starter Motor Housing Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Remove solenoid switch (1) and spring (2).

Unhook pin (3).

Installation:

Check pin (3) for wear and apply grease.

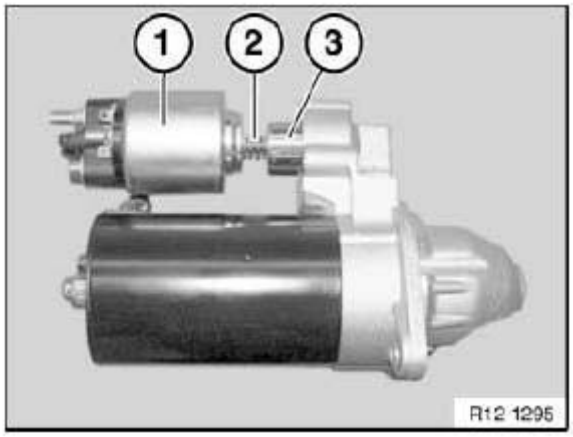


Fig. 51: Identifying Solenoid Switch, Spring And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

1242 STARTER LEAD

12 42 500 REPLACING BATTERY POSITIVE LEAD BETWEEN STARTER, ALTERNATOR AND BATTERY POSITIVE TERMINAL (N54)

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **INTAKE AIR MANIFOLD**

Open cover.

Slacken nut (1).

Tightening torque **12 42 3AZ** .

Remove battery positive lead (2) from battery positive terminal.

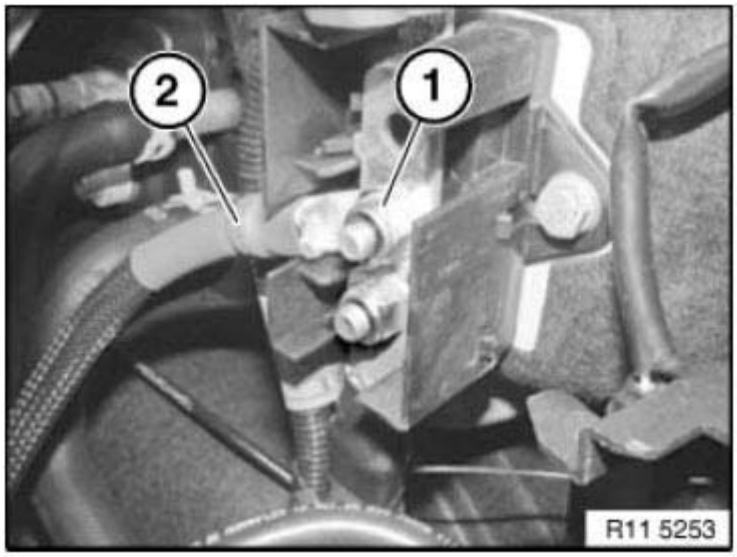


Fig. 52: Identifying Battery Positive Lead And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) on starter.

Tightening torque **12 42 2AZ** .

Disconnect battery positive lead from starter.

Release nut (2) on alternator.

Tightening torque **12 42 1AZ** .

Release battery positive lead from retainer (3), feed out and remove.

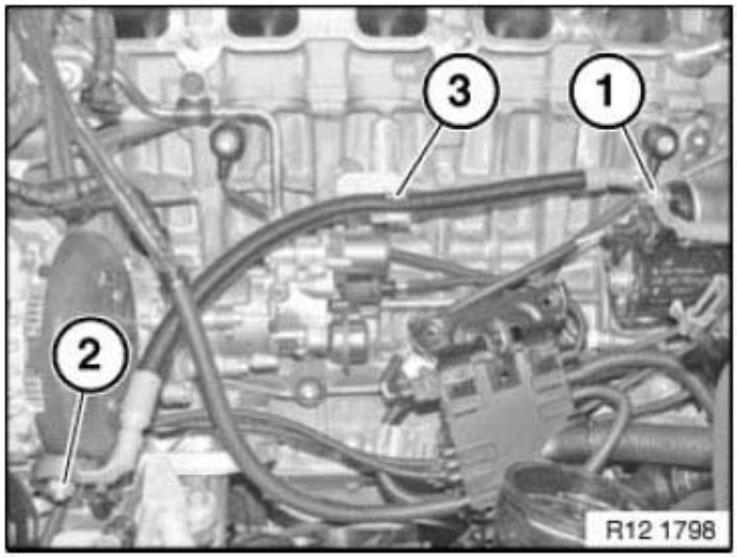


Fig. 53: Identifying Retainer And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Add final details to vehicle.
Check stored fault messages.
Now clear the fault memory.

12 42 540 REPLACING SAFETY BATTERY TERMINAL (SBK)

CAUTION: Observe safety regulations.
Investigate cause of triggering of safety battery terminal.
To do so, read out fault memory of airbag control unit. Note fault messages stored in memory. Rectify faults. Then clear fault memory.

Use of safety battery terminal:

- From model year 1998 in Series E38, E39, E46
- From 4/99 in E36/Z3
- in each of following new Series

The different models have different installation locations:

Battery in engine compartment

Safety battery terminal is replaced with cable up to battery positive support point.

Safety battery terminal is omitted as from 03/2002 from all E46 LHD models with 4-cylinder engines.

Battery in luggage compartment behind side trim panel

Remove side trim panel.

Follow instructions for disconnecting and connecting battery.

Disconnect and cover **BATTERY NEGATIVE LEAD** .

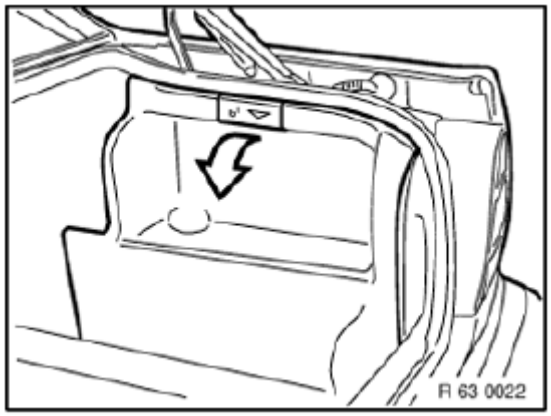


Fig. 54: Removing Side Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Release front side trim panel partly and fold forward.

Fig. 55: Removing Front Side Trim Panel Partly
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under floor trim panel

Follow instructions for disconnecting and connecting battery.

Fold back floor trim panel (1).

Lift cover (2) on battery negative lead.

Disconnect and cover battery negative lead (3).

Release nuts (4).

Remove battery cover.

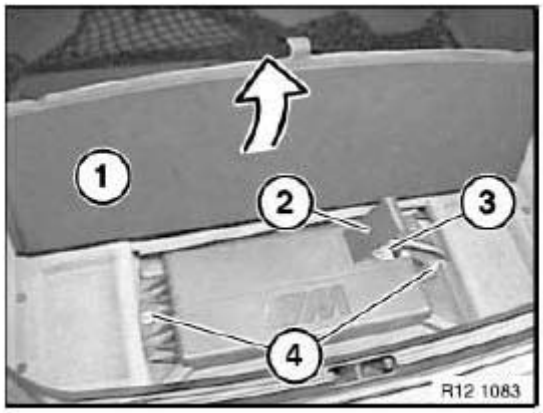


Fig. 56: Folding Back Floor Trim Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Battery in luggage compartment under spare wheel

Remove spare wheel.

Release screws.

CAUTION: Do not kink air pipes.

Set air supply system (1) to one side.

Follow instructions for disconnecting and connecting battery.

Disconnect **BATTERY NEGATIVE LEAD** .

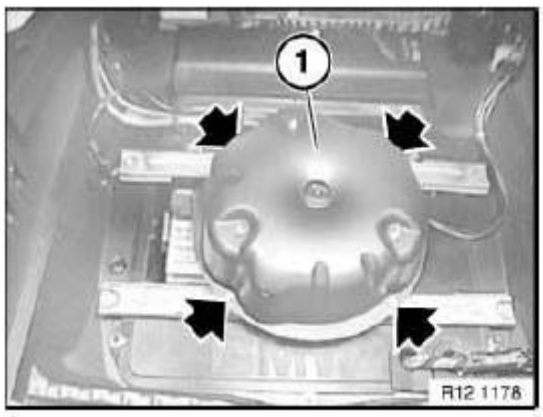


Fig. 57: Locating Air Supply System Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect supply cable (1) for vehicle electrical system.

Installation:

Remove faulty fuses and carry out troubleshooting.

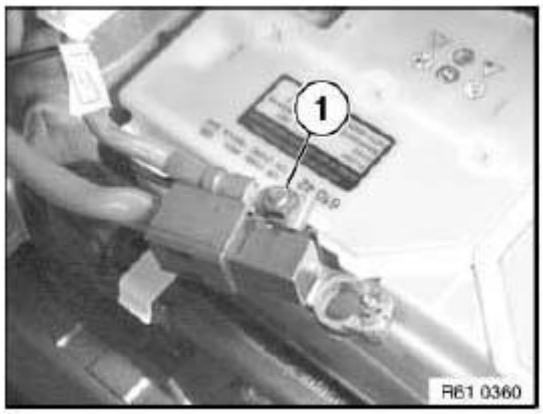


Fig. 58: Identifying Vehicle Electrical System Supply Cable
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Pay attention to interface.

The repair cable is always a standard length.

The heavy-current connector of the repair cable has a larger diameter than the battery positive lead.

In some Series (e.g. E46 touring), the heavy-current connector of the repair cable can lead to installation problems.

This is the case when the interface is in the area of the close-fitting trim panels.

Find matching interface (e.g. approx. 10 cm behind rear seat backrest in E46 touring).

Lay repair cable parallel to battery positive lead.

Mark interface of battery positive lead at end of repair cable.

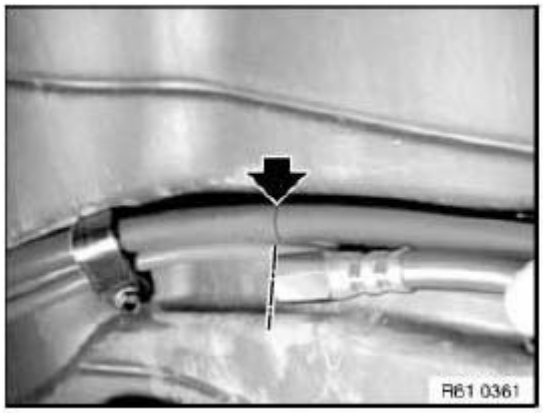


Fig. 59: Locating Interface Mark On Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

Release cable ties (1).

Disconnect plug connection (2).

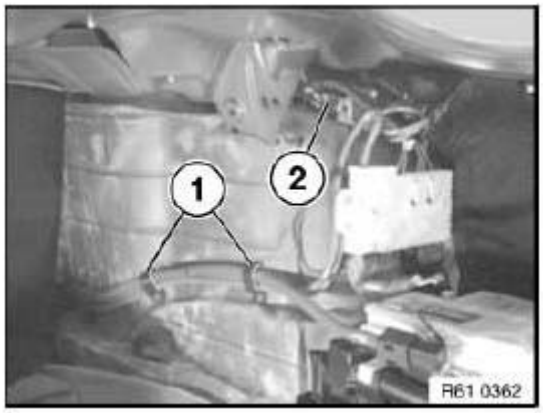


Fig. 60: Identifying Cable Ties And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not use bolt cutters or similar tools to cut through the cable. A cable end that has been squashed flat will no longer fit into the clamping sleeve.

Saw through battery positive cable at marked point with an iron saw.

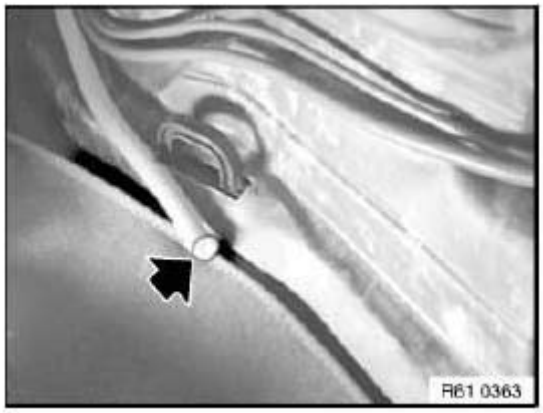


Fig. 61: Locating Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Strip insulation - length (A) - from cable end.

Distance (A) = 15 mm.

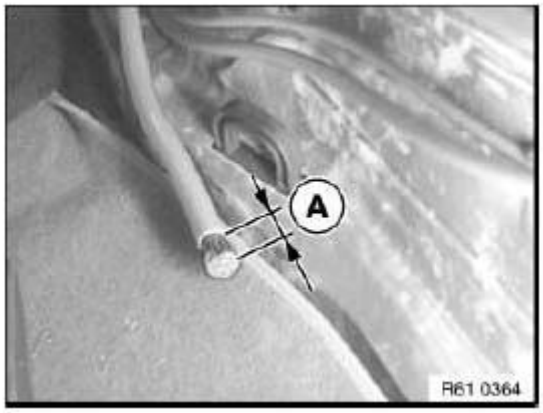


Fig. 62: Identifying Strip Insulation Length From Cable End
Courtesy of BMW OF NORTH AMERICA, INC.

Push heavy-current connector (1) over stripped cable end and screw into position.

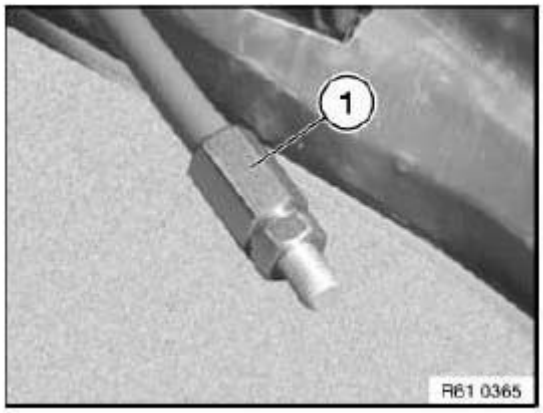


Fig. 63: Identifying Heavy-Current Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (3) over repair cable.

Screw threaded sleeve (1) of repair cable (2) to heavy-current connector.

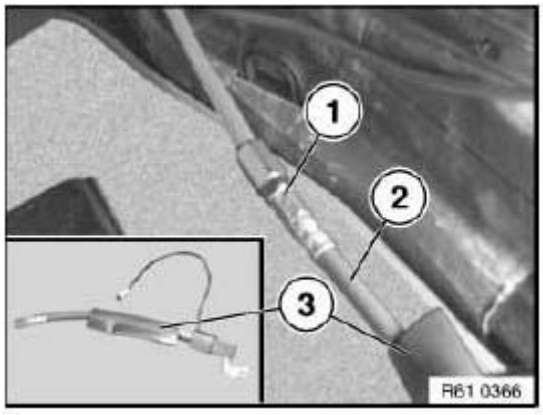


Fig. 64: Identifying Shrink-Fit Hose And Threaded Sleeve Of Repair Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Push shrink-fit hose (1) over connecting point and shrink on with a hot-air blower (2).

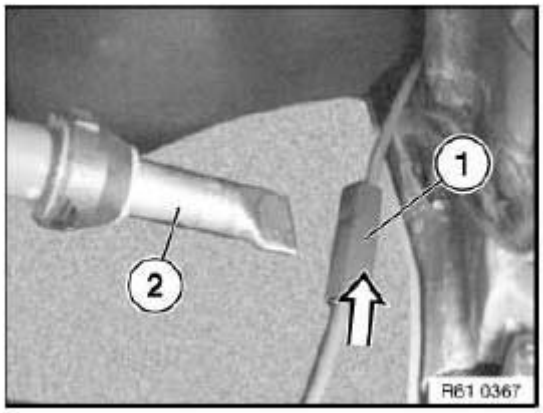


Fig. 65: Pushing Shrink-Fit Hose Over Connecting Point
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Heat up shrink-fit hose until it has settled completely around the connection point.

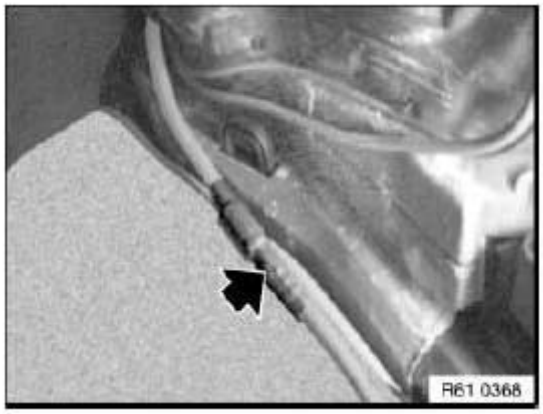


Fig. 66: Locating Shrink-Fit Hose
Courtesy of BMW OF NORTH AMERICA, INC.

When laying the repaired battery positive cable, observe the following:

- The shrink-fit hose must not be scuffed during any movement.
- The repair cable must not cause any disturbing noises during driving operation.

NOTE: Offsetting cutting line by approx. 10 cm produces excess length of battery positive lead (1).
Lay battery positive lead (1) without kinks or abrasions.
(Shown on E46 touring.)

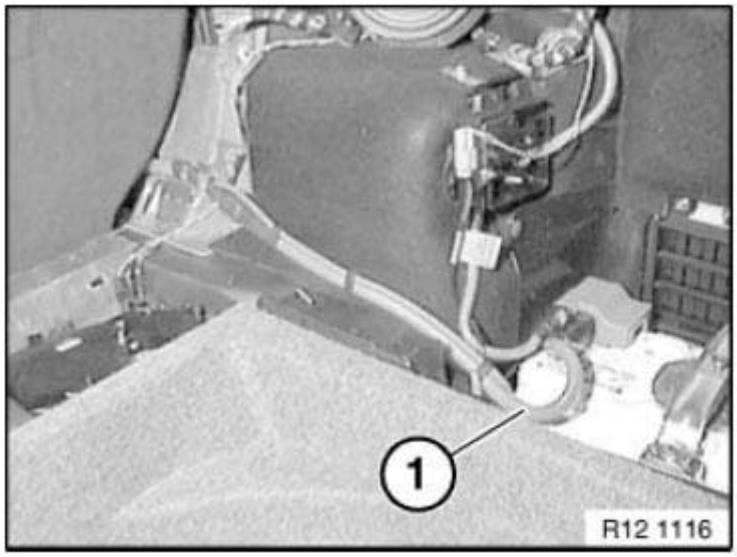


Fig. 67: Identifying Battery Positive Lead
Courtesy of BMW OF NORTH AMERICA, INC.

1251 ENGINE WIRING LOOM

12 51 001 REPLACING WIRING HARNESS SECTION FOR ENGINE (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Partially remove **WIRING HARNESS** for ignition coils and injectors
- Remove **INTAKE AIR MANIFOLD**
- Remove front **UNDERBODY PROTECTION**
- Remove rear underbody protection

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

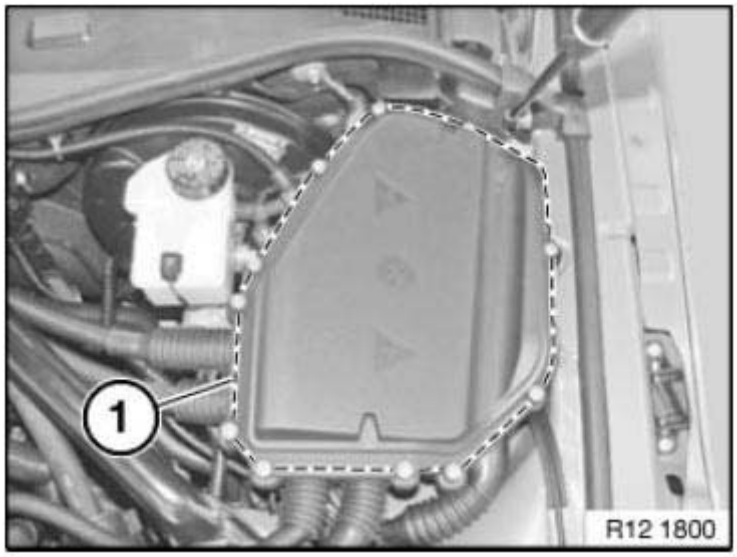


Fig. 68: Identifying Electronics Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrows and pull control unit upwards slightly.

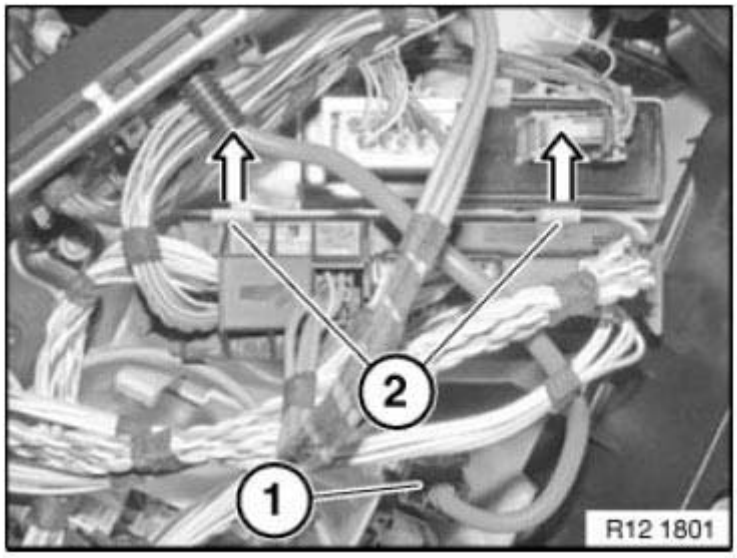


Fig. 69: Opening Control Unit Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

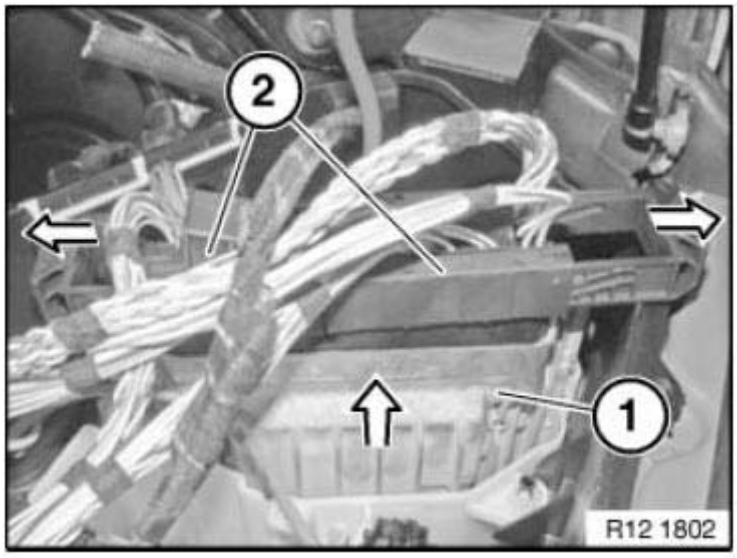


Fig. 70: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach all plugs from engine wiring harness in electronics box (1).

Unclip rubber grommet hold-down devices (2) and (3) and release engine wiring harness from electronics box.

Installation:

Make sure rubber grommets are correctly seated (watertightness).

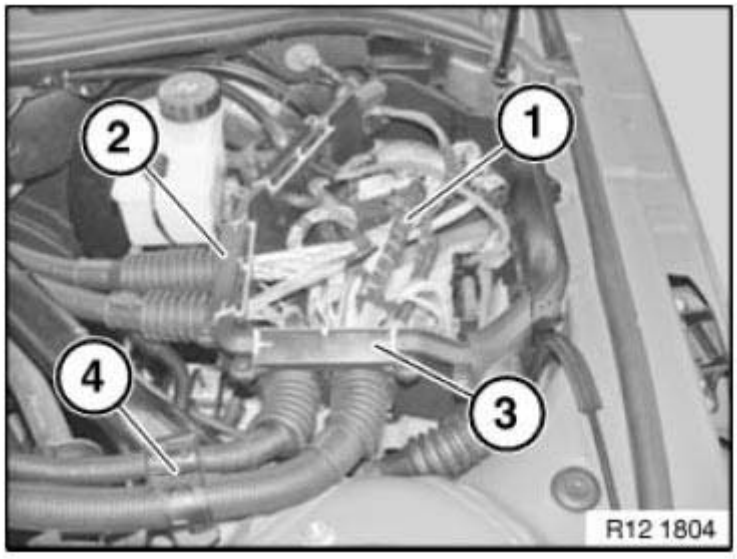


Fig. 71: Identifying Electronic Box With Rubber Grommet Hold Down Device
Courtesy of BMW OF NORTH AMERICA, INC.

Long plug:

Press in retaining lugs and withdraw lock (1) in direction of arrow from plug housing.

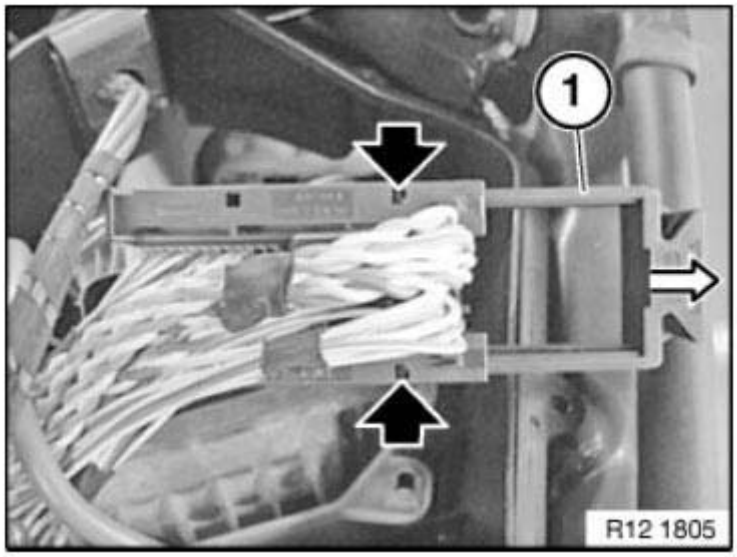


Fig. 72: Removing Locks From Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

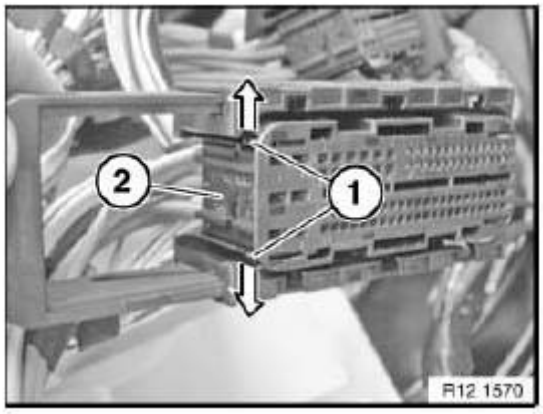


Fig. 73: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

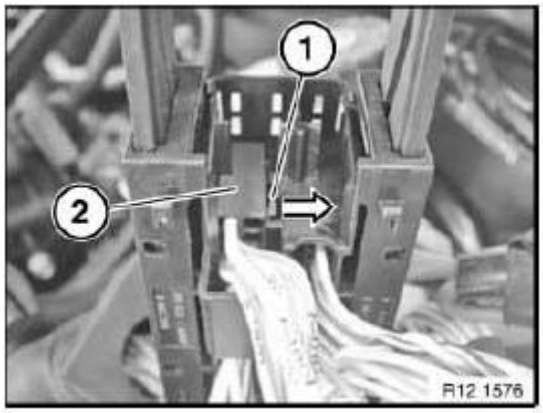


Fig. 74: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

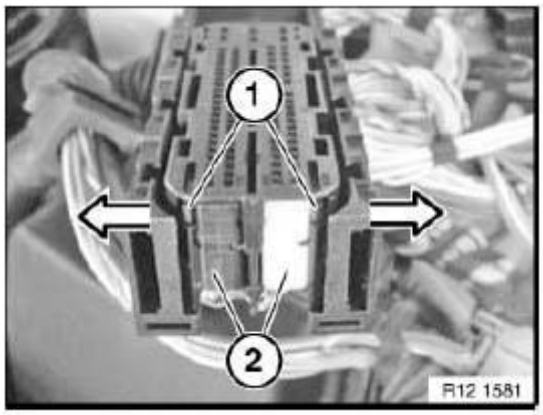


Fig. 75: Opening Locking Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Short plug

Press in retaining lugs (1) and withdraw lock (2) in direction of arrow from plug housing.

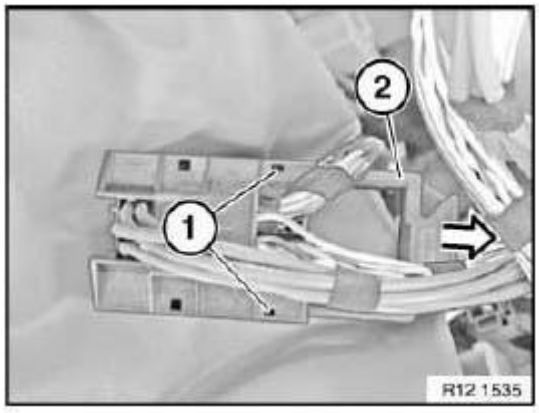


Fig. 76: Removing Locks From Plug Hosing
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

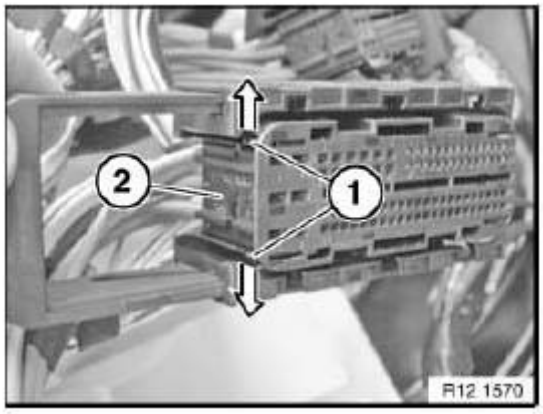


Fig. 77: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

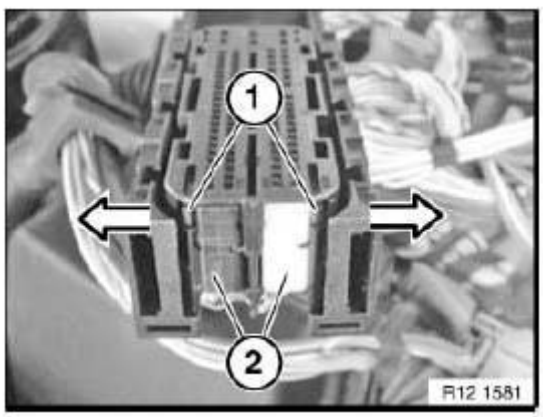


Fig. 78: Opening Locking Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct upper section (1) and expose wiring harnesses.

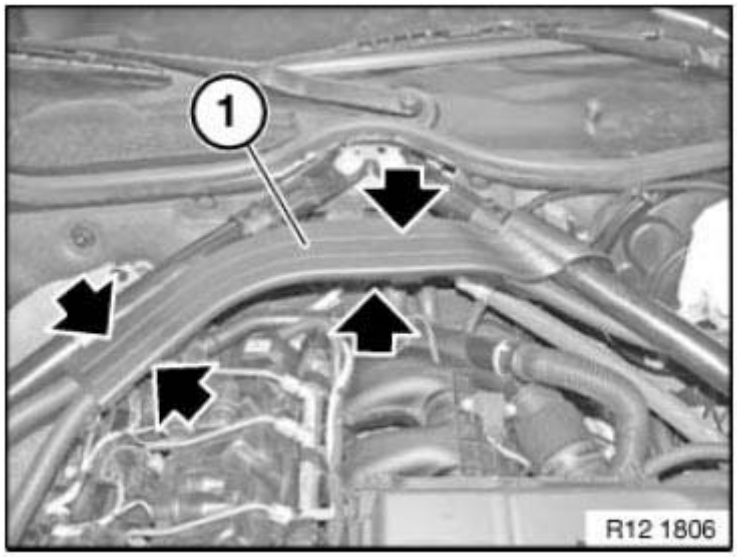


Fig. 79: Locating Wiring Harness In Cable Duct Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1).

Tightening torque **12 90 4AZ** .

Remove cable duct (2).

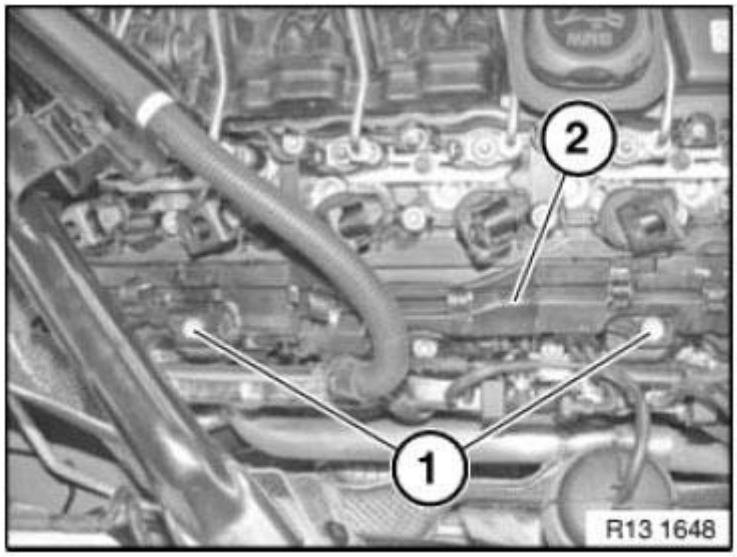


Fig. 80: Identifying Cable Duct And Screws

Courtesy of BMW OF NORTH AMERICA, INC.

ENGINE WIRING HARNESS REPLACEMENT PROCEDURE

Work step	Note
Unlock plug connections on control sensors and disconnect	
Unlock plug on heating element and disconnect	
Unlock plug on alternator and disconnect	
Unlock plug on intake pressure sensor and disconnect	
Unlock plug on throttle valve assembly and disconnect	
Unlock plug connection on knock sensors and disconnect	
Unlock plug on crankshaft sensor and disconnect	
Unlock plug on starter motor and disconnect	
Unlock plug on crankshaft pulse sensor and disconnect	
Unlock plug on high-pressure pump and disconnect	
Unlock plug on air-conditioning compressor and disconnect	
Unlock plug on transmission and disconnect	
Unlock plug on tank venting valve and disconnect	
Unlock plug connections on monitoring sensors and disconnect	
Unlock plug on oil condition sensor and disconnect	
Unlock plug on intake temperature sensor and disconnect	
Unlock plug on oil pressure sensor and disconnect	
Unlock plug on coolant temperature sensor and disconnect	
Unlock plug on intake camshaft pulse sensor and disconnect	
Unlock plug on Valvetronic valves and disconnect	
Unlock plug on exhaust camshaft pulse sensor and disconnect	
Unlock plug on both pressure converters and disconnect	
Unlock plug on coolant thermostat and disconnect	
Unlock plug on coolant pump and disconnect	
Release earth connection on crankcase lower section Tightening torque **12 90 3AZ** .	

Release wiring harness from clips and retainers.

Feed out wiring harness and remove.

Installation:

Check wiring harness routing.

Check plug connections for correct seating.

NOTE: Check stored fault messages.
clear fault memory.

12 51 100 REPLACING WIRING HARNESS SECTION FOR IGNITION AND INJECTORS (N54)

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released .
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Jointing torque and angle of rotation must be observed without fail (risk of damage) .

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Turn off ignition
- Disconnect **BATTERY NEGATIVE LEAD**
- Remove **ACOUSTIC COVER**

Release bolts along line (1).

Tightening torque **12 90 1AZ** .

Remove electronics box cover.

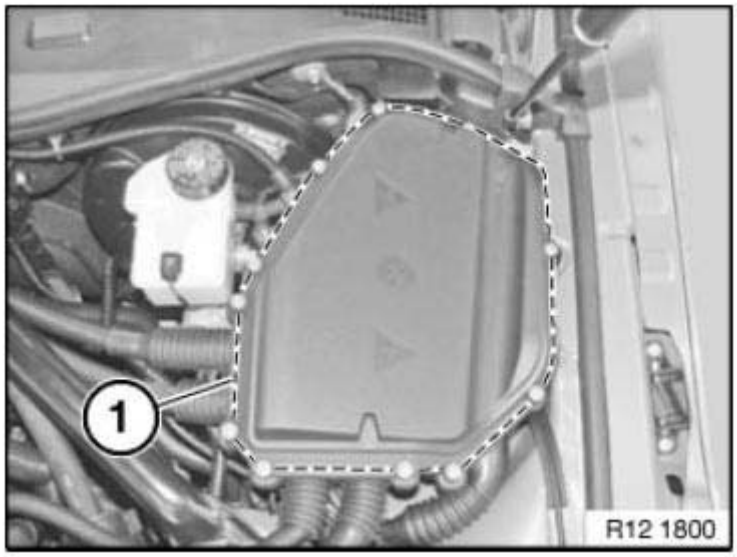


Fig. 81: Identifying Electronics Box Cover Mounting Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock battery positive lead (1), detach and lay to one side.

Release locks (2) in direction of arrows and pull control unit upwards slightly.

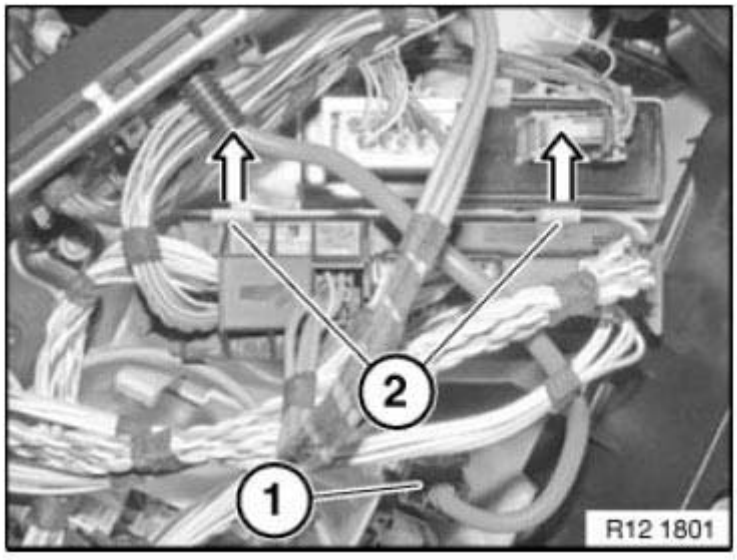


Fig. 82: Opening Locks
Courtesy of BMW OF NORTH AMERICA, INC.

Pull control unit (1) upwards slightly until plug (2) can be released from control unit in direction of arrow.

Unlock plug (2) and detach from control unit (1).

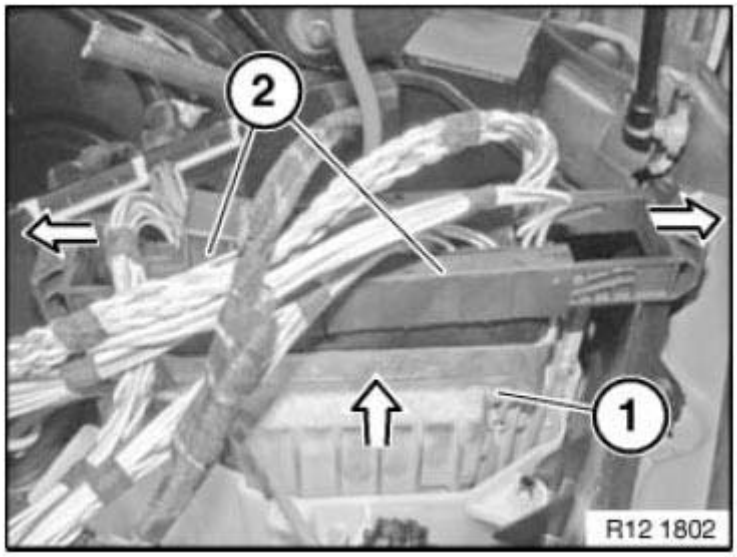


Fig. 83: Pulling Control Unit Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach all plugs (1) from ignition coil wiring harness in electronics box.

Unclip rubber grommet hold-down device (2) and release ignition coil wiring harness from electronics box.

Installation:

Make sure rubber grommets are correctly seated (watertightness).

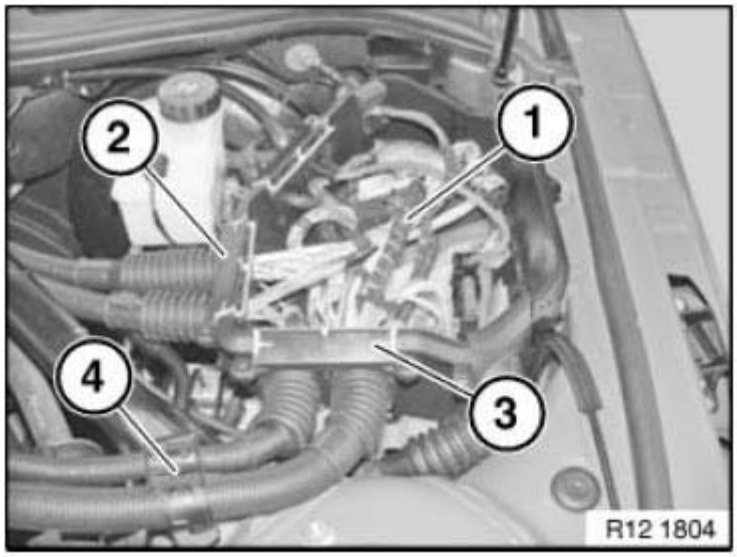


Fig. 84: Identifying Electronic Box With Rubber Grommet Hold Down Device And Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

Press in retaining lugs and withdraw lock (1) in direction of arrow from plug housing.

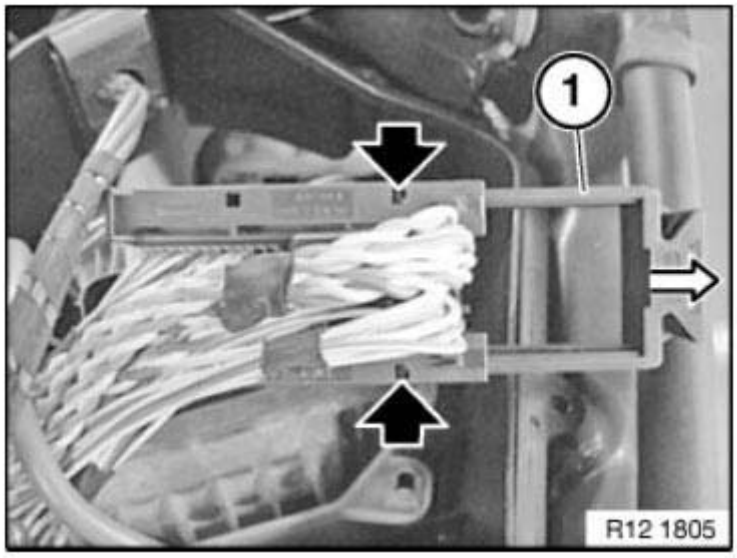


Fig. 85: Removing Locks By Pressing Retaining Tabs
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tabs (1) in direction of arrow and pull contact carrier (2) out of housing.

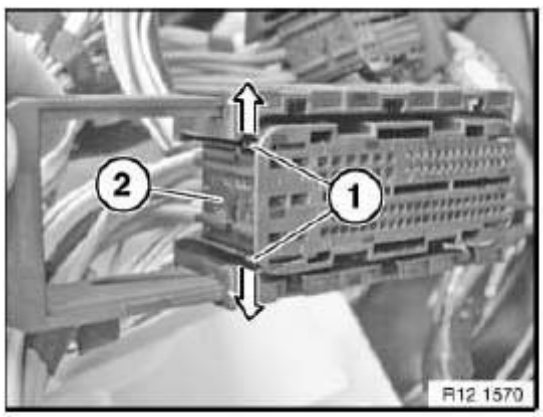


Fig. 86: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Press locking tab (1) in direction of arrow and pull contact carrier (2) out of housing.

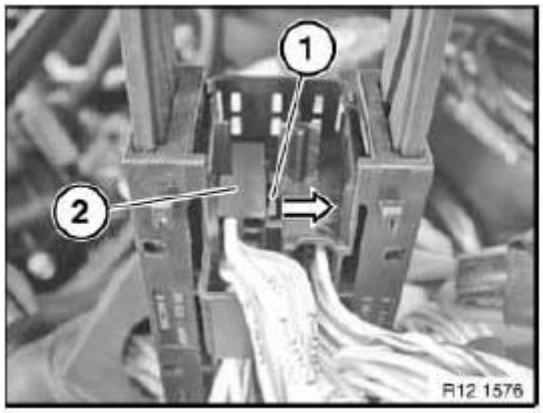


Fig. 87: Pressing Locking Tab
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable duct upper section (1) and expose wiring harnesses.

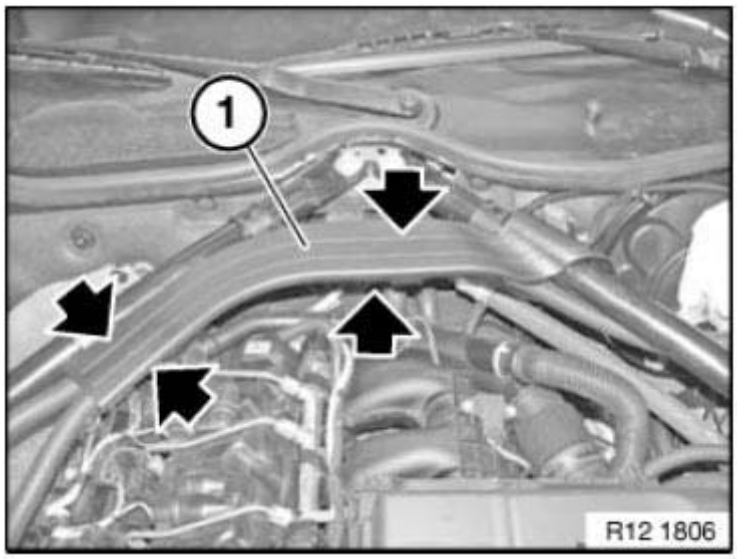


Fig. 88: Locating Wiring Harness In Cable Duct Upper Section
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and remove clip (1).

Release nuts (2) and remove earth connections.

Tightening torque **12 90 2AZ** .

Unlock all plugs on ignition coils and injectors and detach.

Release wiring harness (3) from retainers and cable ties, feed out and remove.

Replace defective cable ties.

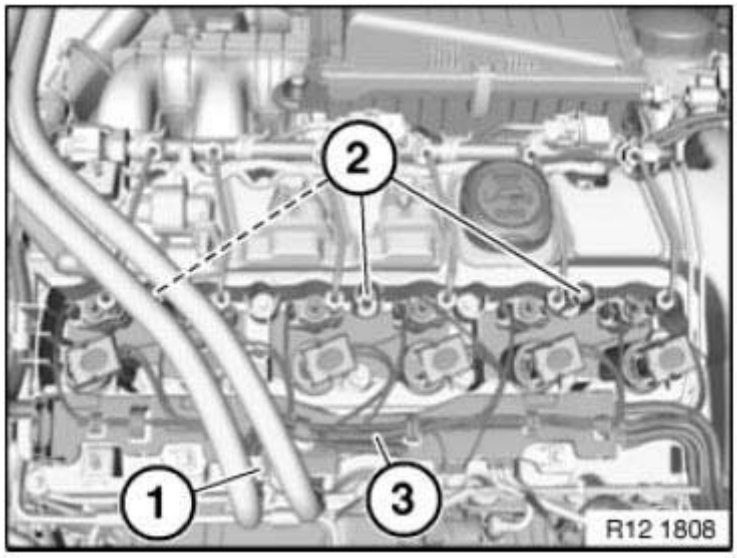


Fig. 89: Identifying Wiring Harness With Clips And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check wiring harness routing.
Check plug connections for correct seating.
Check stored fault messages.
clear fault memory.

1261 OIL PRESSURE OIL TEMPERATURE OIL GAUGE

12 61 285 REMOVING AND INSTALLING/REPLACING OIL LEVEL SENSOR FOR ENGINE OIL (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary work

- Switch off ignition
- Remove front **UNDERBODY PROTECTION**
- Drain off **ENGINE OIL**

Release connector (1) and remove.

Unscrew nuts.

Tightening torque **12 61 2AZ** .

Remove oil level sensor (2).

Installation note:

Clean sealing surface on oil sump.

Replace gasket on oil level sensor.

An excessively low torque value will result in oil leaks.

An excessively high torque value will result in damage to the oil level sensor.

Top up engine oil.

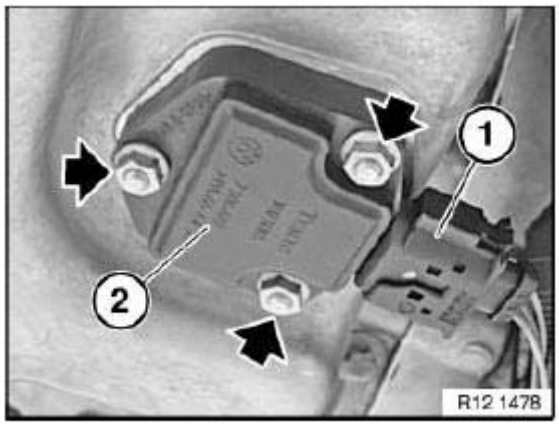


Fig. 90: Identifying Oil Level Sensor And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault message.
Delete fault memory.

12 61 280 REMOVING AND INSTALLING/REPLACING OIL PRESSURE SENSOR (N54)

Necessary preliminary tasks

- Switch off ignition
- Remove **ACOUSTIC COVER**

WARNING: Scalding hazard!

Only perform this task on an engine that has cooled down.

Installation location

Oil filter housing, front left.

Engine oil may emerge when oil pressure sensor is replaced; have a cleaning cloth ready.

Unlock plug (1) and remove.

Release oil pressure sensor (2).

Tightening torque, **12 61 1AZ** .

Installation:

Check engine oil level, top up engine oil if necessary.

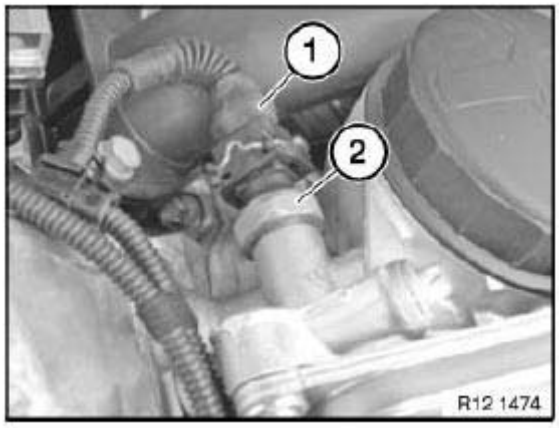


Fig. 91: Identifying Oil Pressure Sensor With Plug
Courtesy of BMW OF NORTH AMERICA, INC.

12 ENGINE ELECTRICAL SYSTEM

12-8010 ADAPTER

Adapter MW

NOTE: **(plug adapter for CNG wiring harness) For reducing the gas pressure in the CNG system**

Storage Location

W 2..

SI number

01 14 95 (014)

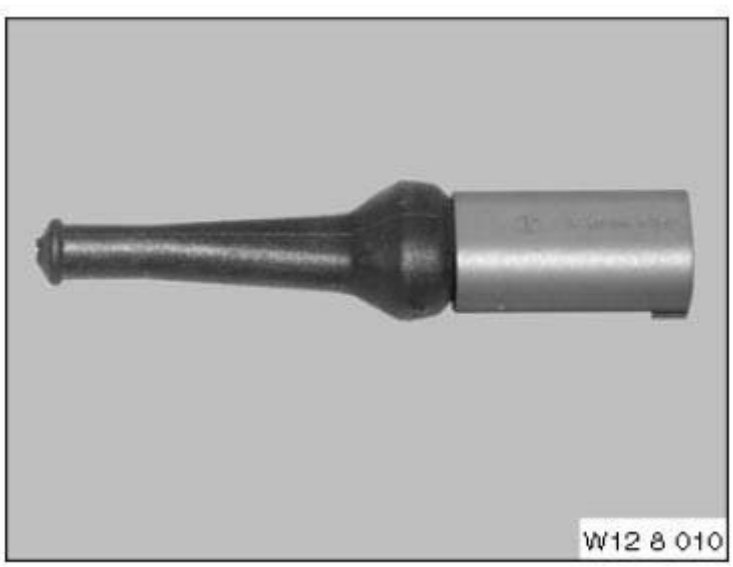


Fig. 1: Identifying Adapter (128010)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7011 ADAPTER

Adapter MW

NOTE: **(Electronic engine power control adapter) For checking of electronic engine power control safety circuit with 20-pin engine connector**

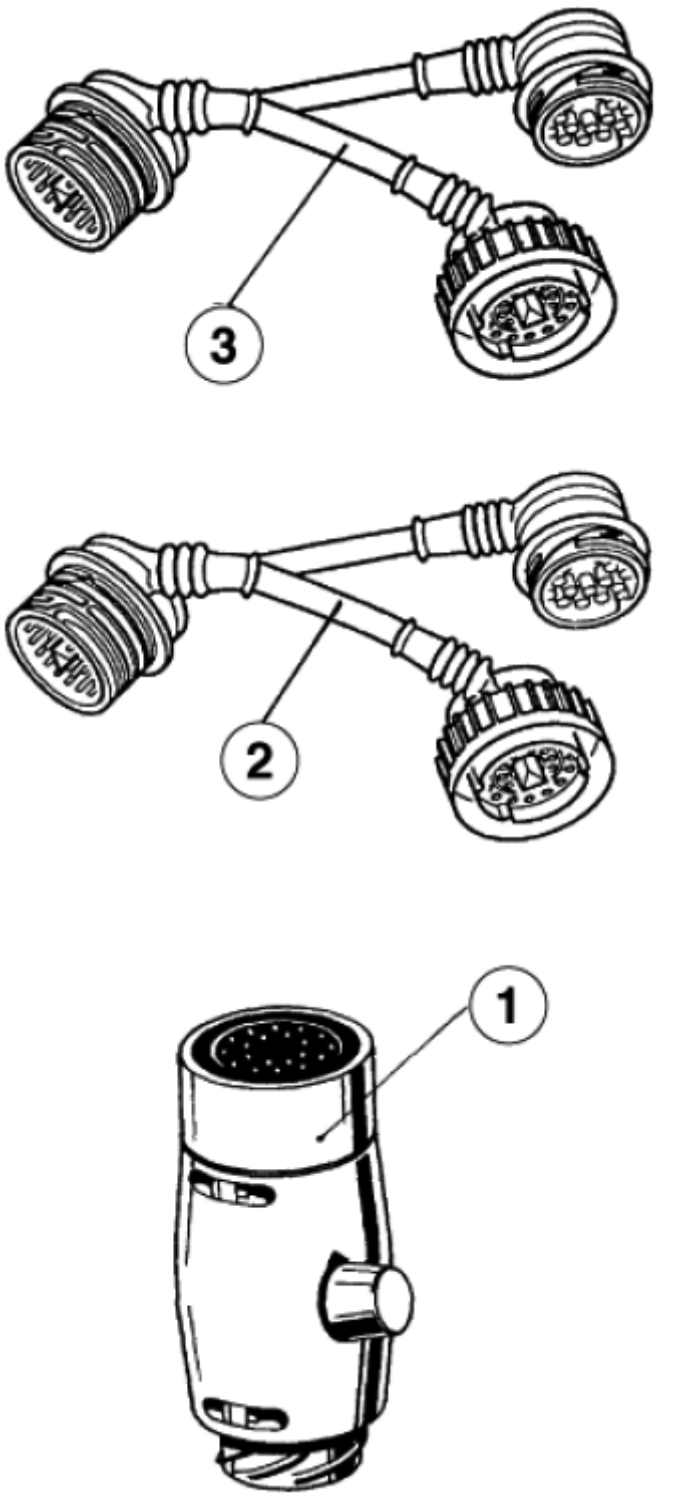


Fig. 2: Identifying Adapter (127011)
Courtesy of BMW OF NORTH AMERICA, INC.

12-8000 ADAPTER

Adapter MW

NOTE: (Test adapter, 56-pin) For checking the engine wiring harness on compressed natural gas vehicles

Storage Location

W 2..

SI number

01 14 95 (014)

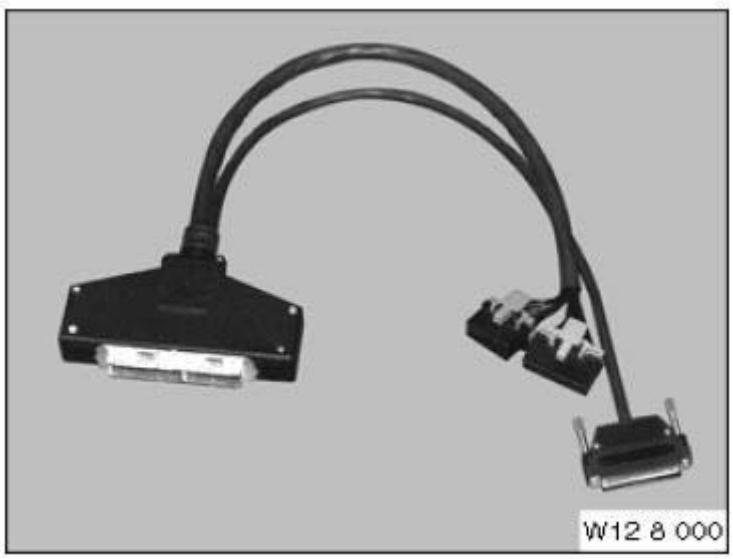


Fig. 3: Identifying Adapter (128000)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1300 ADAPTER

Adapter MP

NOTE: (Adapter kit) For 134-pin module connector For diagnosis and troubleshooting in Digital Motor Electronics and transmission control unit - from model year 98

SI number

02 04 97 (248)

Consisting of:

2 = 0491135 Adapter cable

NOTE: (Adapter cable) 9-pin

2 = 0491136 Measuring module

NOTE: (Measuring module) 24-pin

2 = 0491137 Measuring module

NOTE: (Measuring module) 40-pin

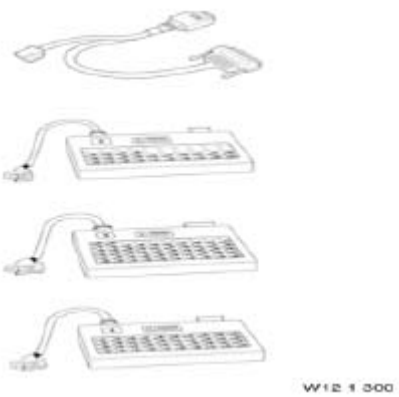


Fig. 4: Identifying Adapter (121300)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491138 Measuring module

NOTE: (Measuring module) 52-pin Delivered from 08/2004 in combination with 12 1 305 (zero-encoded protective cap for new SGM control unit in E6x).

4 = 0495069 Cap

NOTE: (Zero-encoded protective cap for test box, 52-pin (12 1300/304)) New connector in E61/E61/E63 and E64 on SGM control unit protective cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 protective cap will be supplied with test box.

12-7012 ADAPTER CABLE

Adapter cable MW

NOTE: (Adapter cable, 25-pin) Encoding A

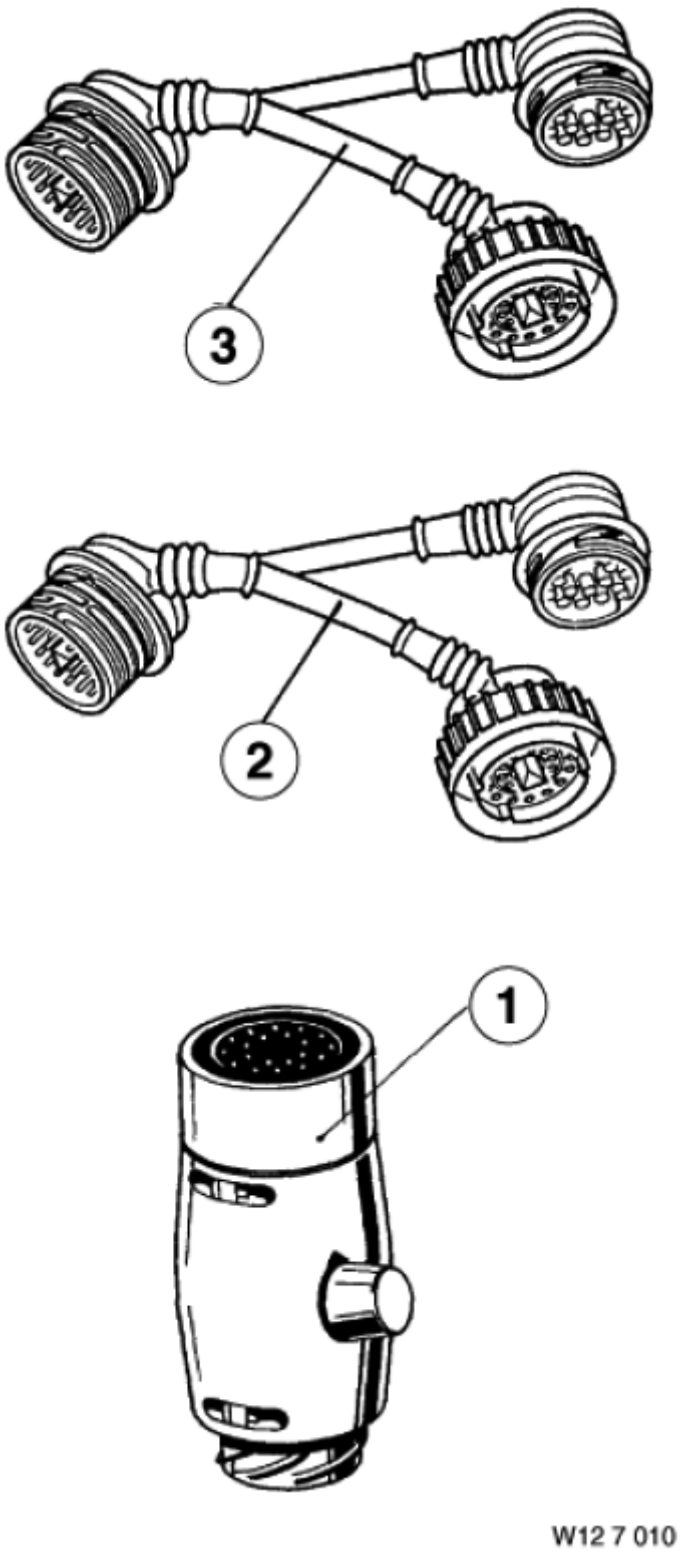


Fig. 5: Identifying Adapter Cable (127012)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7013 ADAPTER CABLE

Adapter cable MW

NOTE: **(Adapter cable 25-pin) For checking/encoding B of electronic engine power control safety circuit - model series: E31/engine: M70**

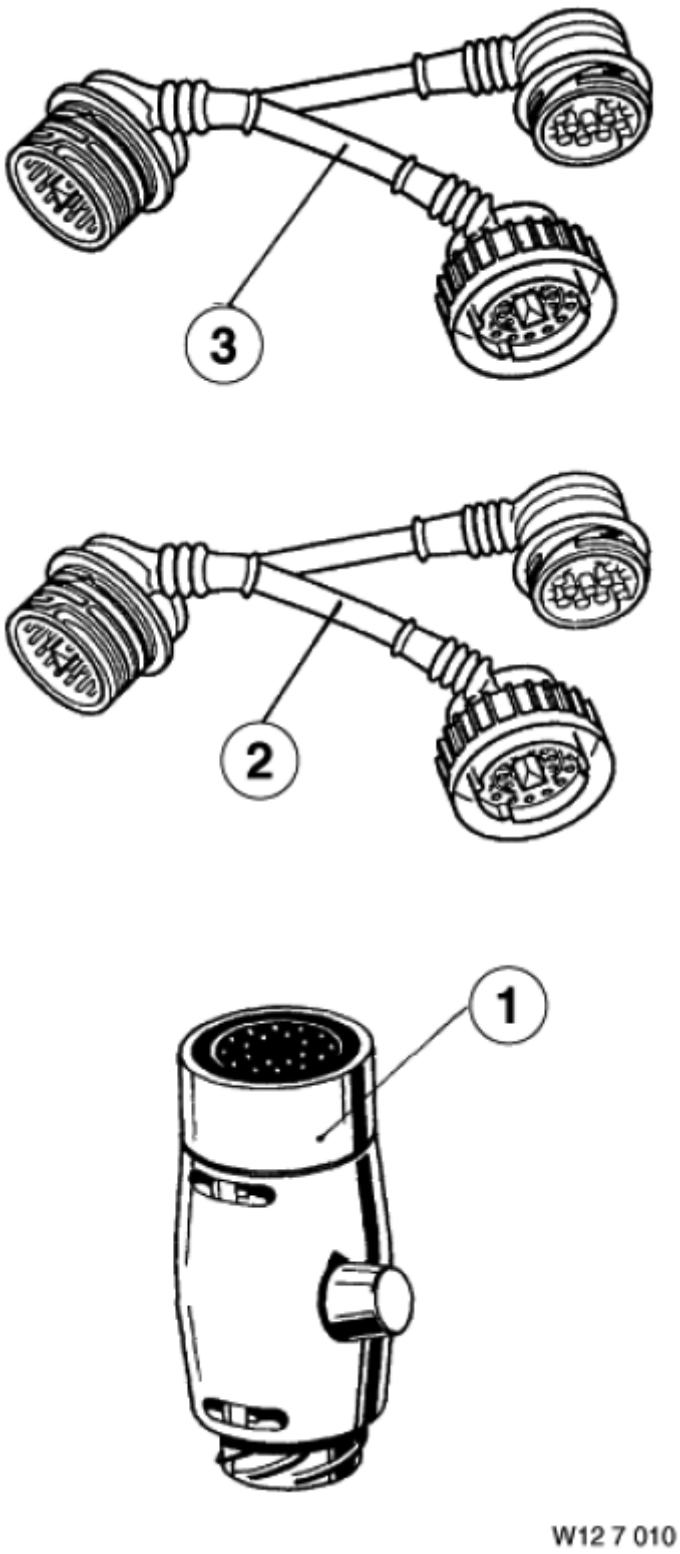


Fig. 6: Identifying Adapter Cable (127013)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7050 ADAPTER CABLE

Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: For engines with rod-type ignition coils for measuring secondary voltage

Storage Location

F 104

SI number

02 01 01 (671)

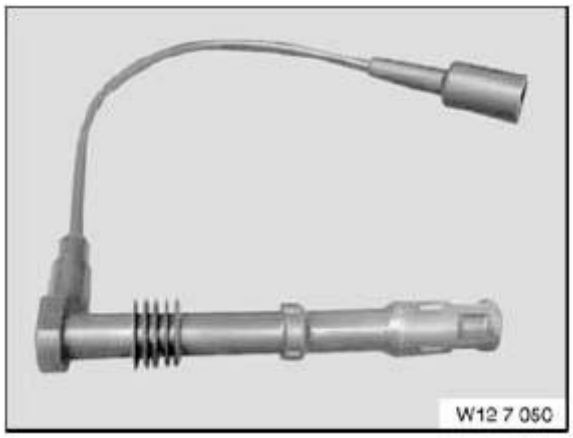


Fig. 7: Identifying Adapter Cable (127050)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7420 ADAPTER CABLE

Adapter cable Minimum set: Measuring and testing equipment MP

NOTE: (V adapter cable set 58-pin) For diagnosis and troubleshooting at control unit DDE 5.0 04/04 Coding with special pliers (002250) removed - for N46, N52 and S85 engine. Set 12 7 420 consisting of 12 7 421 adapter cable and 12 7 422 cover plate 05/2004 set modification SI 2 03 04 (106)

Storage Location

Q204

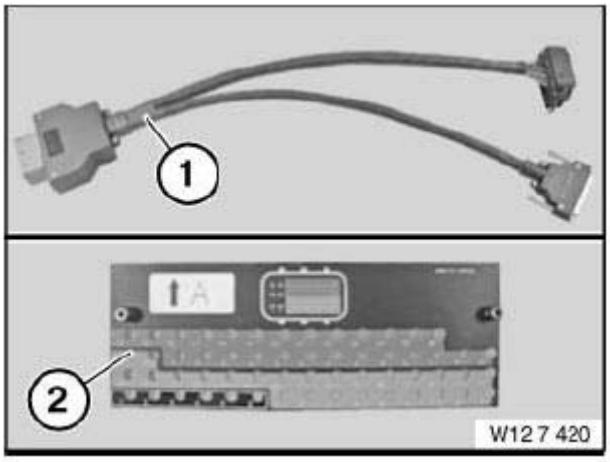


Fig. 8: Identifying Adapter Cable (127420)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

02 05 01 (479)

Consisting of:

1 = 0494963 Adapter cable

NOTE: (Adapter cable 58-pin)

2 = 0494964 Plate

NOTE: (Cover plate for test box) For pin allocation on 105-pin test box (61 4 380)

12-7060 ANTISTATIC MAT

Antistatic mat MW

NOTE: (Antistatic mat) ESD (Electronic Static Discharge) = electrostatic discharge For protection against ESD during repairs to electronic components. (Replaces the subnumber 12 7 192 from EPROM tool kit 12 7 190)

SI number

02 06 04 (128)

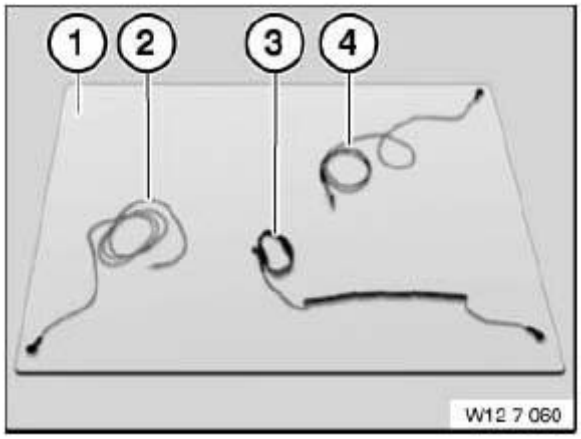


Fig. 9: Identifying Antistatic Mat (127060)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7121 COUNTERHOLDER WRENCH

Counterholder wrench

In conjunction with: Socket

NOTE: Alternator N42 engine

12-7019 OPERATING INSTRUCTIONS

Operating instructions MW

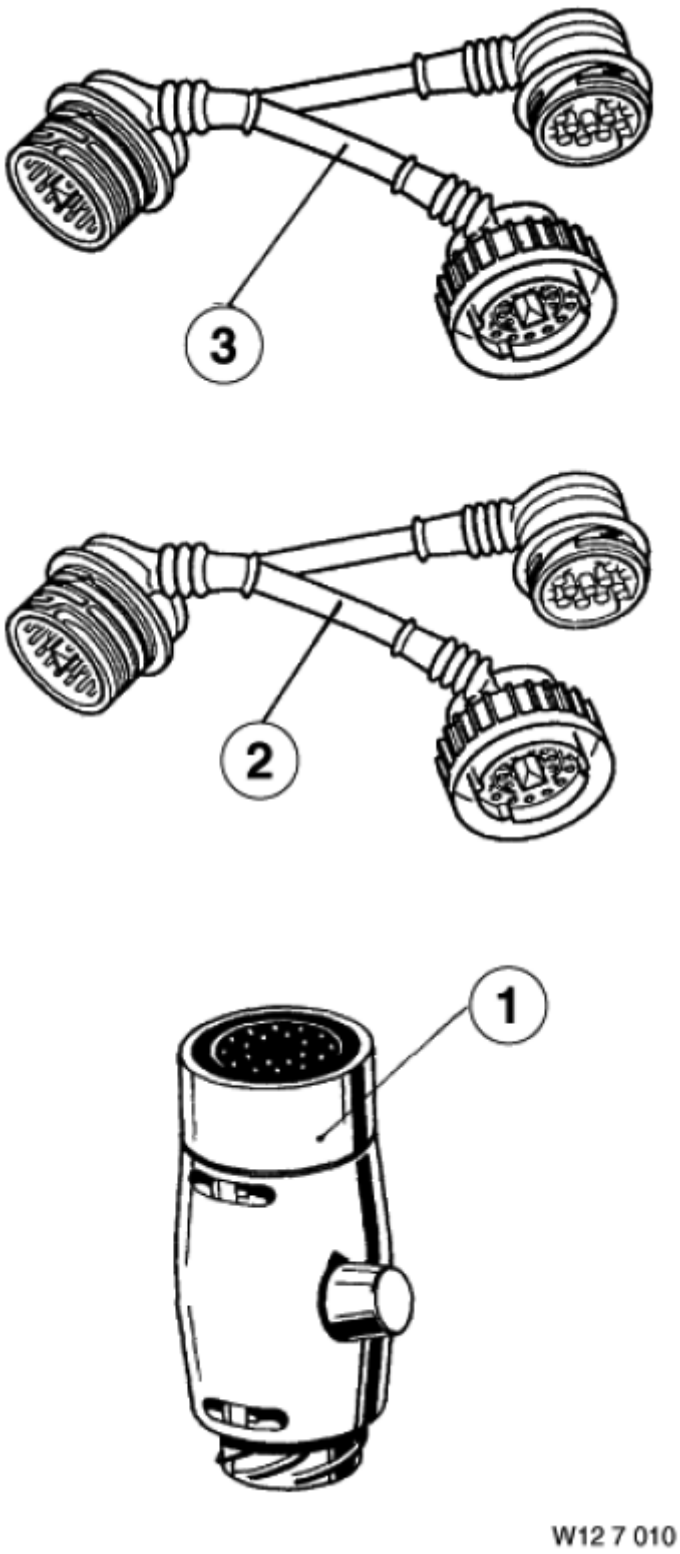


Fig. 10: Identifying Operating Instructions (127019)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7122 SOCKET

Socket

In conjunction with: Counterholder wrench

NOTE: Hazet 8808 lg10

SI number

1 28 03 (051)

12-7110 SOCKET WRENCH INSERT

Socket wrench insert Minimum set: Mechanical tools MW

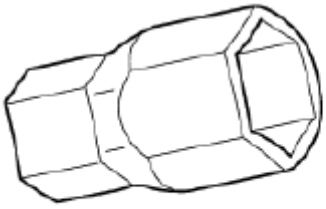
NOTE: (Socket wrench insert WAF 24) For removing and installing the belt pulley on the alternator

Storage Location

A12

SI number

01 12 93 (701)



W 12 7 110

Fig. 11: Identifying Socket Wrench Insert (127110)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1200 TORQUE LIMITER

Torque limiter Minimum set: Mechanical tools MW

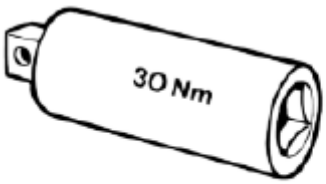
NOTE: (torque limiter) 30 Nm For tightening the spark plugs to a limited torque setting

Storage Location

A9

SI number

01 05 92 (507)



W 12 1 200

Fig. 12: Identifying Torque Limiter (121200)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1305 ZERO-CODED COVER CAP FOR 52-PIN TEST BOX (12 1300/304)

Zero-coded cover cap for 52-pin test box (12 1300/304)

NOTE: New plugs in E61/E61/E63 and E64 on SGM control unit Cover cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 cover cap will be supplied with test box.

SI number

2 07 04 (138)

12 ENGINE ELECTRICAL SYSTEM

12-8010 ADAPTER

Adapter MW

NOTE: **(plug adapter for CNG wiring harness) For reducing the gas pressure in the CNG system**

Storage Location

W 2..

SI number

01 14 95 (014)

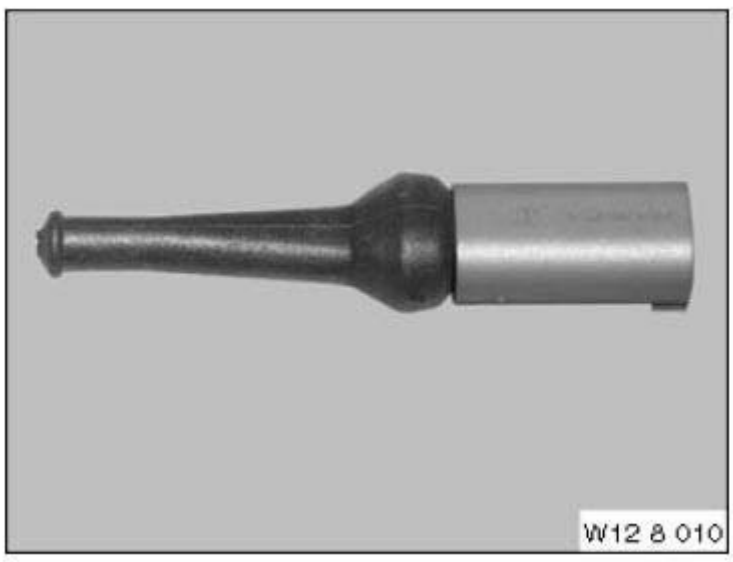


Fig. 1: Identifying Adapter (12-8010)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7011 ADAPTER

Adapter MW

NOTE: **(Electronic engine power control adapter) For checking of electronic engine power control safety circuit with 20-pin engine connector**

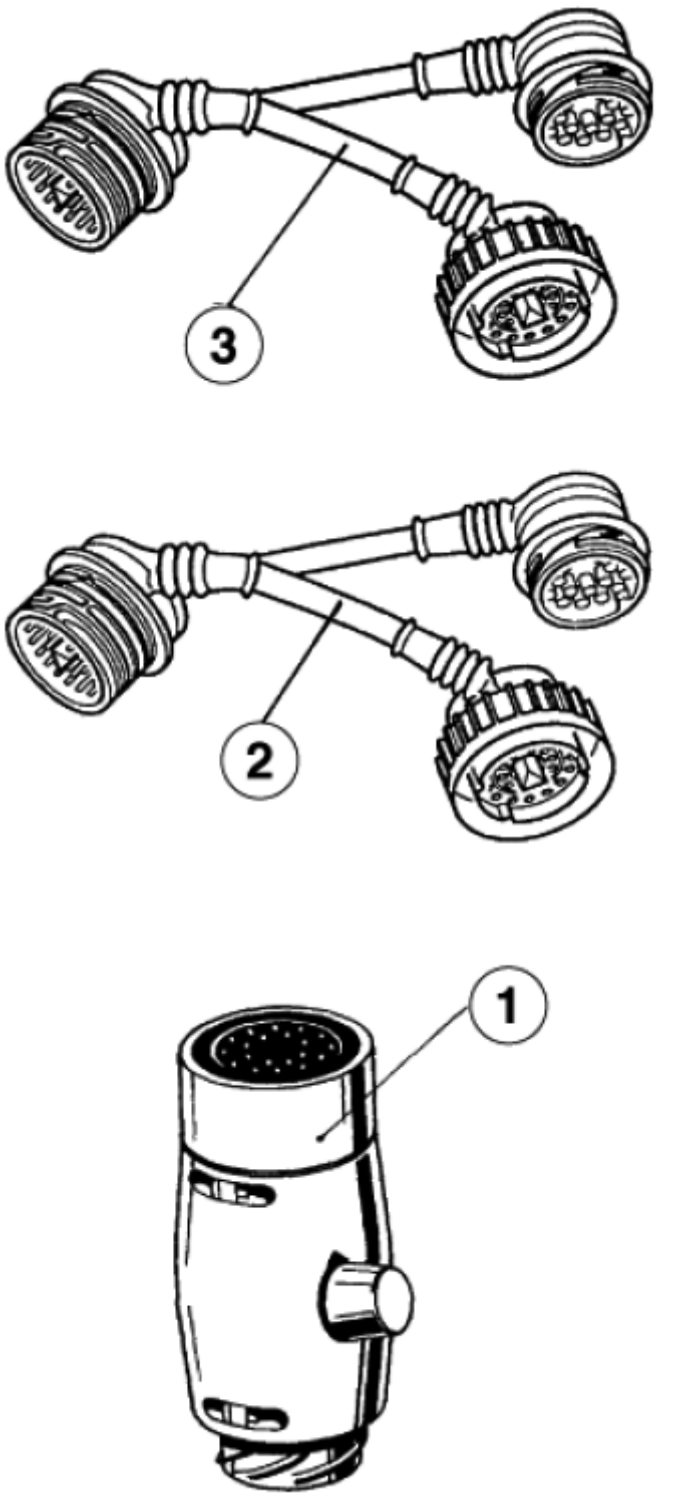


Fig. 2: Identifying Adapter (12-7011)
Courtesy of BMW OF NORTH AMERICA, INC.

12-8000 ADAPTER

Adapter MW

NOTE: (Test adapter, 56-pin) For checking the engine wiring harness on compressed natural gas vehicles

Storage Location

W 2..

SI number

01 14 95 (014)

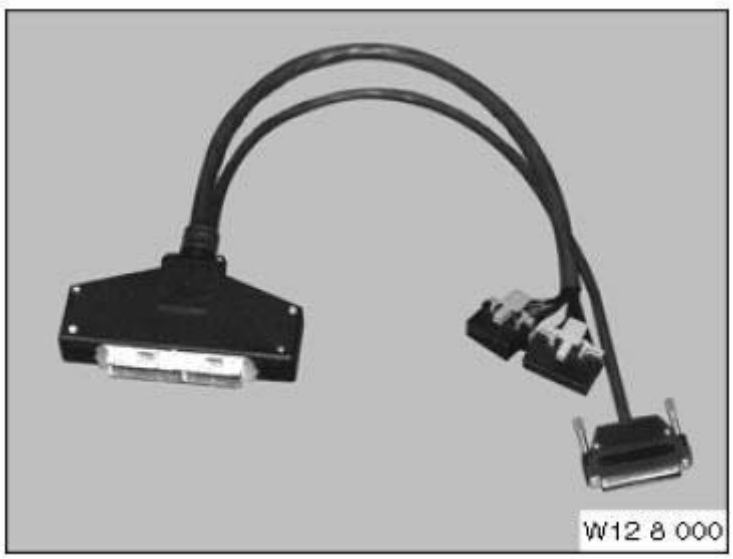


Fig. 3: Identifying Adapter (12-8000)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1300 ADAPTER

Adapter MP

NOTE: (Adapter kit) For 134-pin module connector For diagnosis and troubleshooting in Digital Motor Electronics and transmission control unit - from model year 98

SI number

02 04 97 (248)

Consisting of:

2 = 0491135 Adapter cable

NOTE: (Adapter cable) 9-pin

2 = 0491136 Measuring module

NOTE: (Measuring module) 24-pin

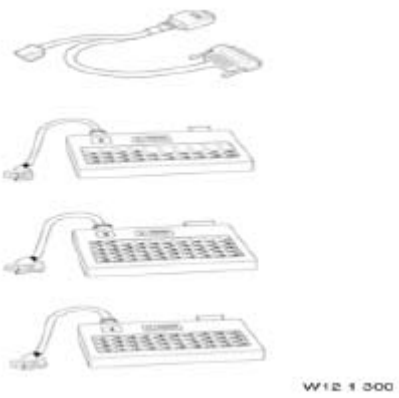


Fig. 4: Identifying Adapter (12-1300)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491137 Measuring module

NOTE: (Measuring module) 40-pin

2 = 0491138 Measuring module

NOTE: (Measuring module) 52-pin Delivered from 08/2004 in combination with 12 1 305 (zero-encoded protective cap for new SGM control unit in E6x).

4 = 0495069 Cap

NOTE: (Zero-encoded protective cap for test box, 52-pin (12 1300/304)) New connector in E61/E61/E63 and E64 on SGM control unit protective cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 protective cap will be supplied with test box.

12-7012 ADAPTER CABLE

Adapter cable MW

NOTE: (Adapter cable, 25-pin) Encoding A

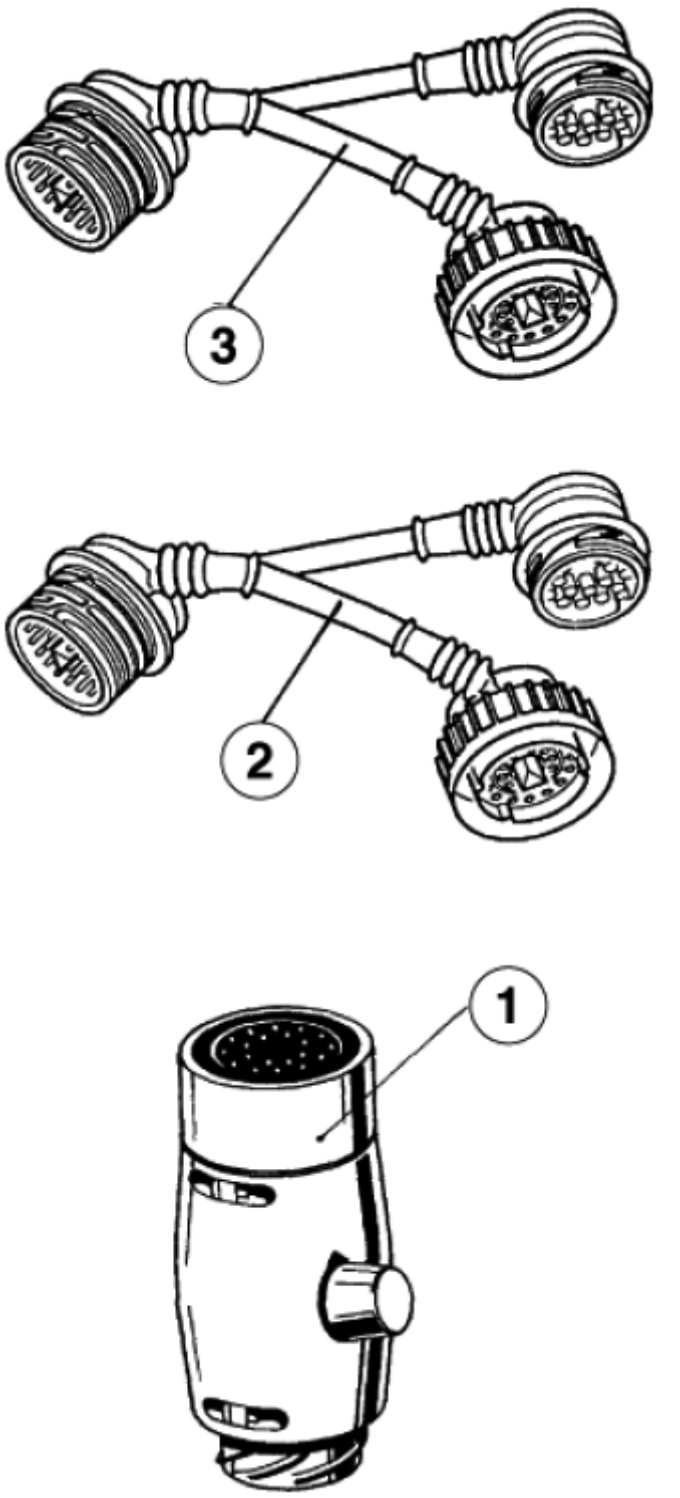


Fig. 5: Identifying Adapter Cable (12-7012)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7013 ADAPTER CABLE

Adapter cable MW

NOTE: **(Adapter cable 25-pin) For checking/encoding B of electronic engine power control safety circuit - model series: E31/engine: M70**

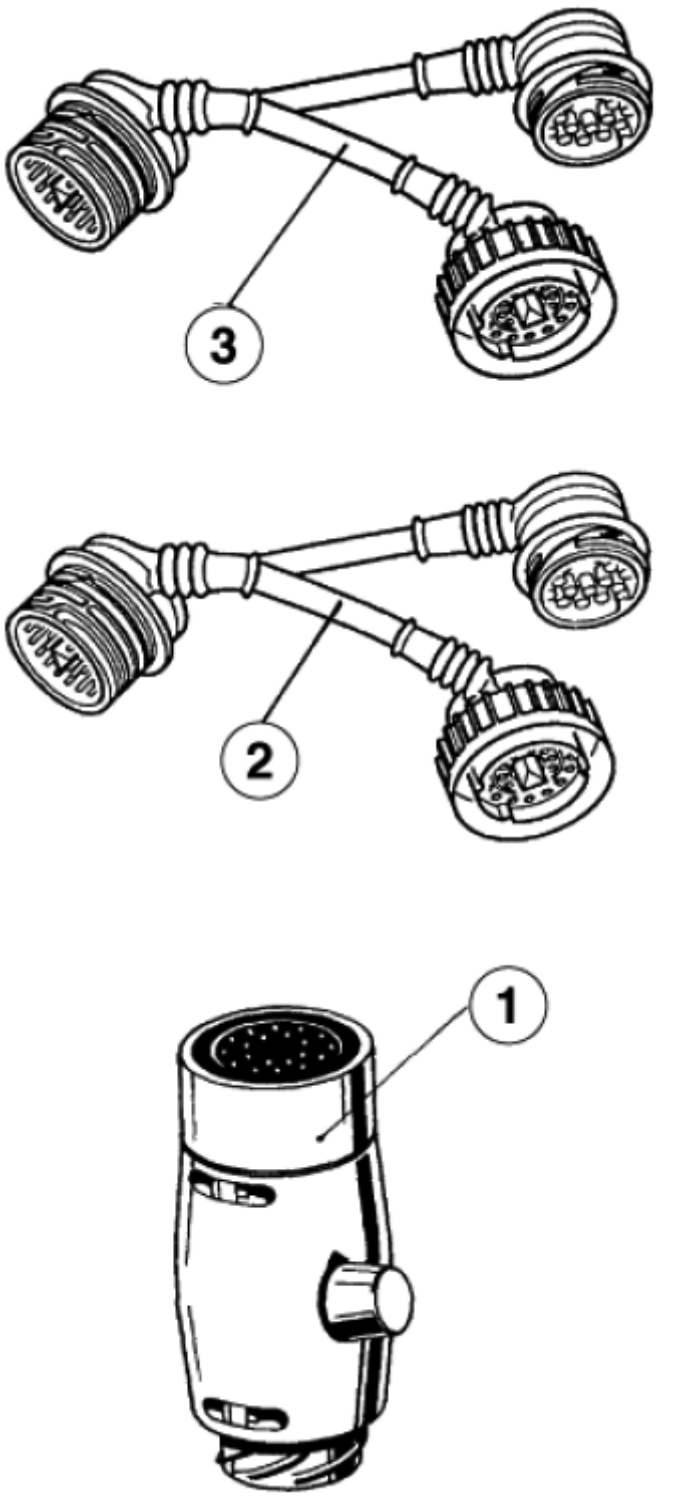


Fig. 6: Identifying Adapter Cable (12-7013)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7060 ANTISTATIC MAT

Antistatic mat MW

NOTE: (Antistatic mat) ESD (Electronic Static Discharge) = electrostatic discharge For protection against ESD during repairs to electronic components. (Replaces the subnumber 12 7 192 from Eprom tool kit 12 7 190)

SI number

02 06 04 (128)

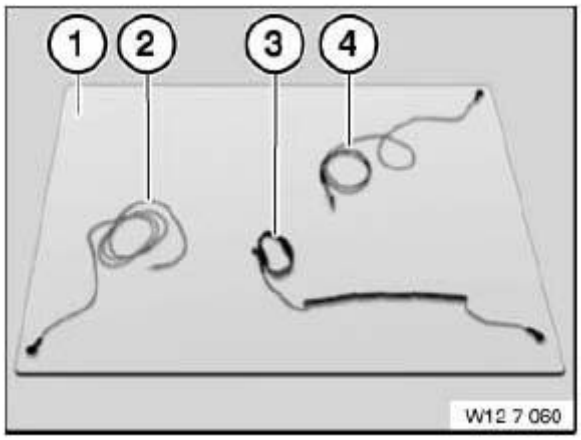


Fig. 7: Identifying Antistatic Mat (12-7060)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7121 COUNTERHOLDER WRENCH

Counterholder wrench

In conjunction with: Socket

NOTE: Alternator N42 engine

12-1230 FITTING AID

Fitting aid MW

NOTE: Fitting aid for spark plug installation. Original BERU ZMH 001 rubber hose 0 890 00 001.

SI number

01 04 07 (352)

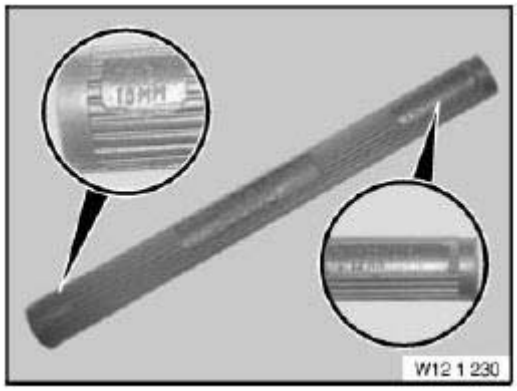


Fig. 8: Identifying Fitting Aid (12-1230)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7019 OPERATING INSTRUCTIONS

Operating instructions MW

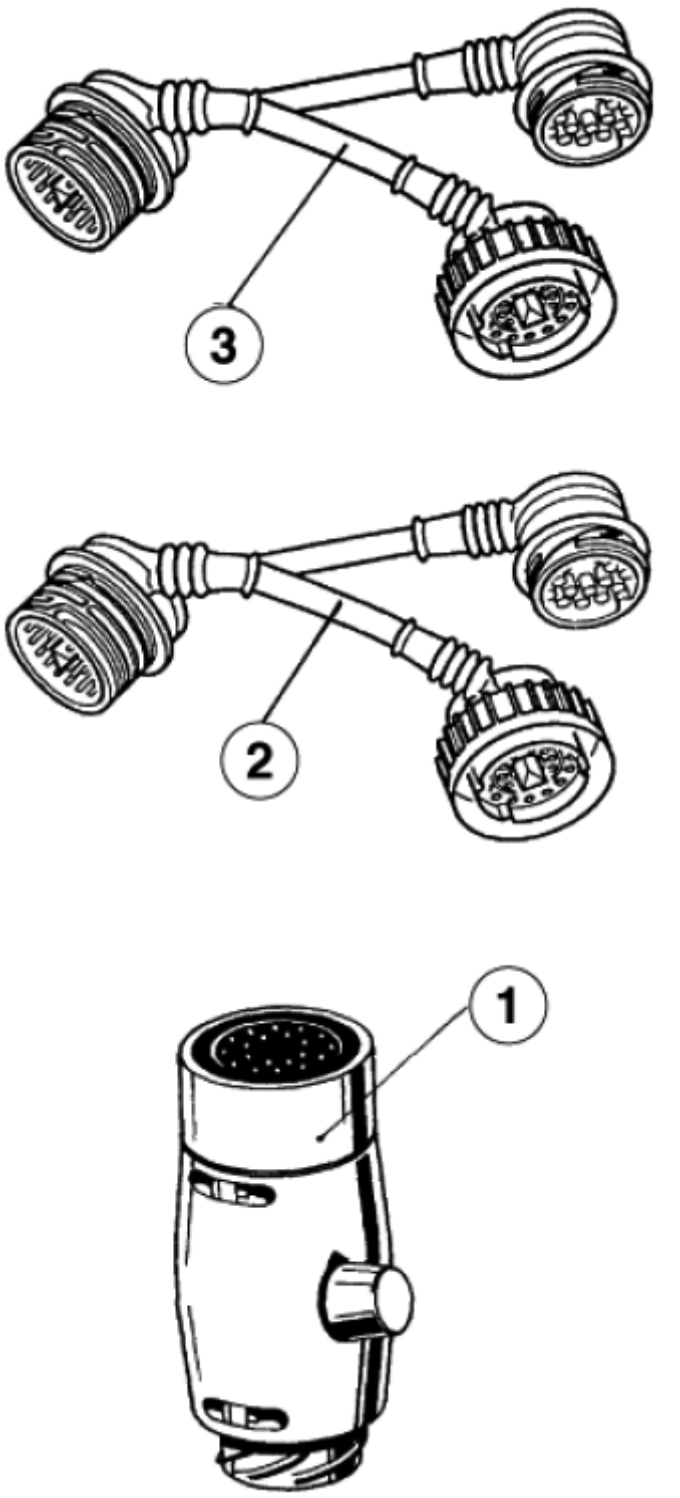


Fig. 9: Identifying Operating Instructions (12-7019)
Courtesy of BMW OF NORTH AMERICA, INC.

12-1220 SOCKET

Socket Minimum set: Mechanical tools MW

NOTE: For removing and installing the spark plugs (WAF 14 bihexal).

SI number

01 04 06 (246)

Fig. 10: Identifying Socket (12-1220)
Courtesy of BMW OF NORTH AMERICA, INC.

12-7122 SOCKET

Socket

In conjunction with: Counterholder wrench

NOTE: Hazet 8808 lg 10

SI number

1 28 03 (051)

12-1305 ZERO-CODED COVER CAP FOR 52-PIN TEST BOX (12 1300/304)

Zero-coded cover cap for 52-pin test box (12 1300/304)

NOTE: New plugs in E61/E61/E63 and E64 on SGM control unit Cover cap 12 1 300/305 for diagnosis on wiring harness. From 08/2004 cover cap will be supplied with test box.

SI number

2 07 04 (138)

ALTERNATOR LEAD

12 42 ALTERNATOR LEAD

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR LEAD

		Type	Thread	Tightening specification	Measure
1AZ	Battery positive lead to alternator	N52K	M8		19 Nm
2AZ	Battery positive lead to starter	N52K	M8		13 Nm
3AZ	Battery positive lead to battery positive terminal	N52K	M8	Flange nut	15 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

		Type	Thread	Tightening specification	Measure
1AZ	Wires to alternator				
Terminal D+		M10/M20			5 Nm
		All/others	M6		7 Nm
Terminal B+		S38/B38			8 Nm
		All/others	M8		13 Nm
2AZ	Pulley	All			45 Nm
3AZ	Pulley (ribbed drive belt)	Alternator with cooling jacket			80 Nm
		all others			70 Nm
		N42, N46 Valeo			75 Nm
		N42, N46 Bosch			65 Nm
4AZ	Rear holder	All			3.5 Nm
5AZ	Fillister head screw for wire holder	All			3.5 Nm
6AZ	Alternator on	M40/M42/M43/M44			43 Nm

	bearing block				
7AZ	Alternator to crankcase	N42, N46, N62	M8		21 Nm
8AZ	Belt pulley (ribbed V-belt) with freewheel (Ina) fitted to Bosch and Valeo alternators	N42, N43			80 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

		Type	Thread	Tightening specification	Measure
1AZ	Battery positive lead to alternator	N52K	M8		19 Nm
2AZ	Alternator to crankcase	N52K	M8x82	Replace screws Jointing torque Torque angle	 10 Nm 190 °

BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

12 52 BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

TIGHTENING TORQUE SPECIFICATION - BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

		Type	Thread	Tightening specification	Measure
1AZ	Earth strap to bracket and cable bracket on transmission	N43/N45T/N51/N52/N52K/N53/N54	M6		8 Nm

CONTROL UNIT HOUSING

12 90 CONTROL UNIT HOUSING

TIGHTENING TORQUE SPECIFICATION - CONTROL UNIT HOUSING

		Type	Thread	Tightening specification	Measure
1AZ	Assembly of upper	E32/E34/E36			5 Nm

	and lower sections				
2AZ	Center section to body	E32/E34			3 Nm
3AZ	Control unit holder in E box	E36			5 Nm
4AZ	Control unit box cover	E38/E39/E52			4 Nm
		E46			6 Nm
		E53/E36/7/E54			3 Nm
5AZ	Electronics box to firewall	E65	Plastic screw		6 Nm

COOLANT TEMPERATURE

12 62 COOLANT TEMPERATURE

TIGHTENING TORQUE SPECIFICATION - COOLANT TEMPERATURE

		Type	Thread	Tightening specification	Measure
1AZ	Temperature sensor to water flange (glow time/coolant temperature gauge)	M21			18 Nm
		M51			13 Nm
2AZ	Temperature switch (5.5 °C/17 °C) to fuel filter/cylinder head	M21			18 Nm
3AZ	Coolant temperature sensor (2- pin plug-in connection)	S38/S50			13 Nm
		S85	M12/1.52		13.5 Nm
		All/others			20 Nm
4AZ	Remote thermometer sensor (2-pin plug-in connection)	All			20 Nm
Remote thermometer sensor (4-pin plug-in connection)		M62			16 Nm
		S62	M12 x 1.5		14 Nm
5AZ	Remote thermometer sensor on coolant	S50			18 Nm

	flange				
6AZ	Temperature sensor - air	S38/S50			13 Nm
7AZ	Temperature sensor - oil	S38/S50			13 Nm

ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

12 90 ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

TIGHTENING TORQUE SPECIFICATION - ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

		Type	Thread	Tightening specification	Measure
1AZ	Electronics box lid to electronics box	N54/N52K			5 Nm
2AZ	Earth cable to cylinder head cover	N52K/N54	M5		5 Nm
3AZ	Earth cable to holder, electric coolant pump	N52K/N54	M8	Replace aluminium screw Jointing torque Torque angle	 8 Nm 45 °
4AZ	Cable duct to cylinder head cover	N54	M6		8 Nm

ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

12 61 ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

		Type	Thread	Tightening specification	Measure
1AZ	Engine oil pressure switch/engine oil temperature sensor	N52K/N54	M12x1.5	 Jointing torque Torque angle	 20 Nm 16 °
2AZ	Oil condition sensor for engine oil	N52K/N54	M6	Jointing torque 2 Nm	8.5 Nm

GOVERNOR

12 32 GOVERNOR

TIGHTENING TORQUE SPECIFICATION - GOVERNOR

		Type	thread	tightening specification	Value
1AZ	Regulator switch	All	M4		2 Nm
		All	M5		4 Nm

OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

12 61 OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

TIGHTENING TORQUE SPECIFICATION - OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

		Type	Thread	Tightening specification	Measure
1AZ	Oil-pressure switch/oil-temperature switch	All	M12x1.5		27 Nm
2AZ	Level switch for engine oil	N62/N73/M67TU		Jointing torque 2 Nm	8.5 Nm
3AZ	Oil pressure switch	N46	M12 x 1.5		27 Nm
4AZ	Level sensor to oil sump	N46	M6		9 Nm

SENDERS FOR CONTROL UNIT

12 72 SENDERS FOR CONTROL UNIT

TIGHTENING TORQUE SPECIFICATION - SENDERS FOR CONTROL UNIT

		Type	Thread	Tightening specification	Measure
1AZ	Lever to pedal value sender	E32/E34/E31/E36			9 Nm
2AZ	Pedal value sender to pedal console	E32/E34/E31			5 Nm

SPARK PLUGS

12 12 SPARK PLUGS

TIGHTENING TORQUE SPECIFICATION - SPARK PLUGS

		Type	Thread	Tightening specification	Measure
1AZ	Spark plugs (ungreased)	All	M12x1.25		23 ± 3 Nm
		All	M14x1.25		30 ± 3 Nm

STARTER LINE

12 42 STARTER LINE

TIGHTENING TORQUE SPECIFICATION - STARTER LINE

		Type	Thread	Tightening specification	Measure
1AZ	Starter line to jump-start connection point	N52, N52K, N51, N53	M8		19 Nm
2AZ	Starter line to jump-start connection point	E70/N52K	M8		13 Nm

STARTER MOTOR WITH MOUNTING

12 41 STARTER MOTOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - STARTER MOTOR WITH MOUNTING

		Type	Thread	Tightening specification	Measure
1AZ	Starter motor mounting to crankcase	N52K	M10x85	Replace screw	
				Jointing torque	20 Nm
				Torque angle	180 °
2AZ	Starter motor mounting to crankcase	N52K	M10x30	Replace screw	
				Jointing torque	20 Nm
				Torque angle	90 °

WIRES TO STARTER

12 42 WIRES TO STARTER

TIGHTENING TORQUE SPECIFICATION - WIRES TO STARTER

		Type	Thread	Tightening specification	Measure
1AZ	Battery positive terminal in/on distribution box	E32/E34/E31/E36/E46/E87/E90/E85/E86/E81	M8		20 Nm
		E39/M57	M8		11 Nm
		E38/M67	M8		11 Nm
		E46/M47TU	M8		11 Nm
		E60/N62	M8		15 Nm
		E65/N62/N73	M8		15 Nm
2AZ	Wiring harness on distributor	E36/M41	M8		10 Nm

ALTERNATOR LEAD

12 42 ALTERNATOR LEAD

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR LEAD

	Type	Thread	Tightening specification	Measure
1AZ Battery positive lead to alternator	N54	M8		19 Nm
2AZ Battery positive lead to starter	N54	M8		13 Nm
3AZ Battery positive lead to battery positive terminal	N54	M8	Flange nut	15 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

	Type	Thread	Tightening specification	Measure
1AZ Wires to alternator				
Terminal D+	M10/M20			5 Nm
	All/others	M6		7 Nm
Terminal B+	S38/B38			8 Nm
	All/others	M8		13 Nm
2AZ Pulley	All			45 Nm
3AZ Pulley (ribbed drive belt)	Alternator with cooling jacket			80 Nm
	all others			70 Nm
	N42, N46 Valeo			75 Nm
	N42, N46 Bosch			65 Nm
4AZ Rear holder	All			3.5 Nm
5AZ Fillister head screw for wire holder	All			3.5 Nm
6AZ Alternator on bearing block	M40/M42/M43/M44			43 Nm

7AZ Alternator to crankcase	N42, N46, N62	M8		21 Nm
8AZ Belt pulley (ribbed V-belt) with freewheel (Ina) fitted to Bosch and Valeo alternators	N42, N43			80 Nm

ALTERNATOR WITH DRIVE AND MOUNTING PARTS

12 31 ALTERNATOR WITH DRIVE AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - ALTERNATOR WITH DRIVE AND MOUNTING PARTS

	Type	Thread	Tightening specification	Measure
1AZ Alternator to crankcase, top	N54	M8 x 85		19 Nm
1AZ Alternator to crankcase with A/C compressor carrier	N54	M8x105		19 Nm

BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

12 52 BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

TIGHTENING TORQUE SPECIFICATION - BRACKET FOR OIL LEVEL SENSOR EARTH STRAP

	Type	Thread	Tightening specification	Measure
1AZ Earth strap to bracket and cable bracket on transmission	N43/N45T/N51/N52/N52K/N53/N54	M6		8 Nm

CONTROL UNIT HOUSING

12 90 CONTROL UNIT HOUSING

TIGHTENING TORQUE SPECIFICATION - CONTROL UNIT HOUSING

	Type	Thread	Tightening specification	Measure
1AZ Assembly of upper and lower sections	E32/E34/E36			5 Nm
2AZ Center section to body	E32/E34			3 Nm
3AZ Control unit holder in E box	E36			5 Nm
4AZ Control unit box cover	E38/E39/E52			4 Nm
	E46			6 Nm
	E53/E36/7/E54			3 Nm
5AZ Electronics box to firewall	E65	Plastic screw		6 Nm

COOLANT TEMPERATURE

12 62 COOLANT TEMPERATURE

TIGHTENING TORQUE SPECIFICATION - COOLANT TEMPERATURE

	Type	Thread	Tightening specification	Measure
1AZ Temperature sensor to water flange (glow time/coolant temperature gauge)	M21			18 Nm
	M51			13 Nm
2AZ Temperature switch (5.5°C/17°C) to fuel filter/cylinder head	M21			18 Nm
3AZ Coolant temperature sensor (2-pin plug-in connection)	S38/S50			13 Nm
	S85	M12/1.52		13.5 Nm
	All/others			20 Nm
4AZ Remote thermometer sensor (2-pin plug-in connection)	All			20 Nm
Remote thermometer sensor (4-pin plug-in connection)	M62			16 Nm
	S62	M12 x 1.5		14 Nm
5AZ Remote thermometer sensor on coolant flange	S50			18 Nm
6AZ Temperature sensor - air	S38/S50			13 Nm
7AZ Temperature sensor - oil	S38/S50			13 Nm

ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

12 90 ELECTRONICS BOX, WIRING HARNESS (N54, N52K)

TIGHTENING TORQUE SPECIFICATION - ELECTRONICS BOX, WIRING HARNESS

	Type	Thread	Tightening specification	Measure
1AZ Electronics box lid to electronics box	N54/N52K			5 Nm
2AZ Earth cable to cylinder head cover	N52K/N54	M5		5 Nm
3AZ Earth cable to holder, electric coolant pump	N52K/N54	M8	Replace aluminium screw	
			Jointing torque	8 Nm
			Torque angle	45 °
4AZ Cable duct to cylinder head cover	N54	M6		8 Nm

ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

12 61 ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

	Type	Thread	Tightening specification	Measure
1AZ Engine oil pressure switch/engine oil temperature sensor	N52K/N54	M12x1.5		
			Jointing torque	20 Nm
			Torque angle	16 °
2AZ Oil condition sensor for engine oil	N52K/N54	M6	Jointing torque 2 Nm	8.5 Nm

ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

12 61 ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

TIGHTENING TORQUE SPECIFICATION - ENGINE OIL PRESSURE, ENGINE OIL TEMPERATURE, OIL CONDITION DISPLAY

	Type	Thread	Tightening specification	Measure
1AZ Engine oil pressure switch	N54	M12x1.5	1. Tightening 2. Further angle of rotation	20 Nm 16°±2°
2AZ Oil condition sensor	N54	M6		8 Nm

GOVERNOR

12 32 GOVERNOR

TIGHTENING TORQUE SPECIFICATION - GOVERNOR

	Type	thread	tightening specification	Value
1AZ Regulator switch	All	M4		2 Nm
	All	M5		4 Nm

OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

12 61 OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

TIGHTENING TORQUE SPECIFICATION - OIL PRESSURE, OIL TEMPERATURE, OIL LEVEL DISPLAY

	Type	Thread	Tightening specification	Measure
1AZ Oil-pressure switch/oil-temperature switch	All	M12x1.5		27 Nm
2AZ Level switch for engine oil	N62/N73/M67TU		Jointing torque 2 Nm	8.5 Nm
3AZ Oil pressure switch	N46	M12 x 1.5		27 Nm
4AZ Level sensor to oil sump	N46	M6		9 Nm

SENDERS FOR CONTROL UNIT

12 72 SENDERS FOR CONTROL UNIT

TIGHTENING TORQUE SPECIFICATION - SENDERS FOR CONTROL UNIT

	Type	Thread	Tightening specification	Measure
1AZ Lever to pedal value sender	E32/E34/E31/E36			9 Nm
2AZ Pedal value sender to pedal console	E32/E34/E31			5 Nm

SPARK PLUGS

12 12 SPARK PLUGS

TIGHTENING TORQUE SPECIFICATION - SPARK PLUGS

	Type	Thread	Tightening specification	Measure
1AZ Spark plugs (ungreased)	All	M12x1.25		23 ± 3 Nm
	All	M14x1.25		30 ± 3 Nm

STARTER MOTOR WITH MOUNTING

12 41 STARTER MOTOR WITH MOUNTING

TIGHTENING TORQUE SPECIFICATION - STARTER MOTOR WITH MOUNTING

	Type	Thread	Tightening specification	Measure
1AZ Starter to crankcase	N54	M10x30		38 Nm
2AZ Starter to transmission housing	N54	M10x85		38 Nm

WIRES TO STARTER

12 42 WIRES TO STARTER

TIGHTENING TORQUE SPECIFICATION - WIRES TO STARTER

	Type	Thread	Tightening specification	Measure
1AZ Battery positive terminal in/on distribution box	E32/E34/E31/E36/E46/E87/E90/E85/E86/E81	M8		20 Nm
	E39/M57	M8		11 Nm
	E38/M67	M8		11 Nm
	E46/M47TU	M8		11 Nm
	E60/N62	M8		15 Nm
	E65/N62/N73	M8		15 Nm
2AZ Wiring harness on distributor	E36/M41	M8		10 Nm

1.0 GENERAL INFORMATION

Detachable joints such as exhaust manifold bolts and exhaust system flange connections can be treated with a grease able to withstand high temperatures and corrosive conditions.

Use Copper Paste (former BMW Part No. 81 22 9 400 794).

BMW PART NUMBER SPECIFICATION

3M	Part No. 8945
CRC	Part No. 3046010

1800 EXHAUST SYSTEM, COMPLETE

18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N52K)

WARNING: Scalding hazard!
Only perform this work after engine has cooled down.
Danger of injury!
Removal of the exhaust system must be carried out with the assistance of a second person.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE** from rear axle
- Remove left **TENSION STRUT** on rear axle

Support exhaust system with special tool 31 2 220.

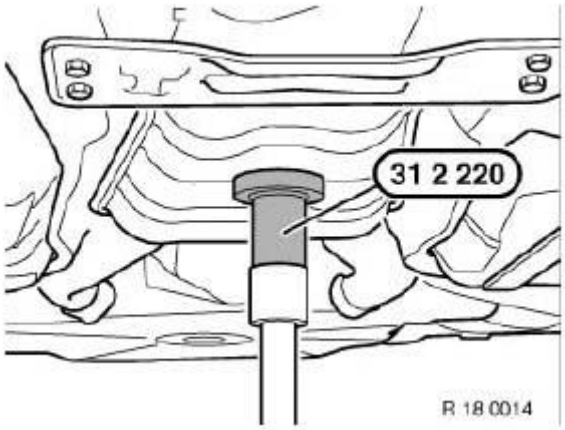


Fig. 1: Support Exhaust System With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Remove holder (2).

Installation:

Replace seals.

Replace self-locking nuts.

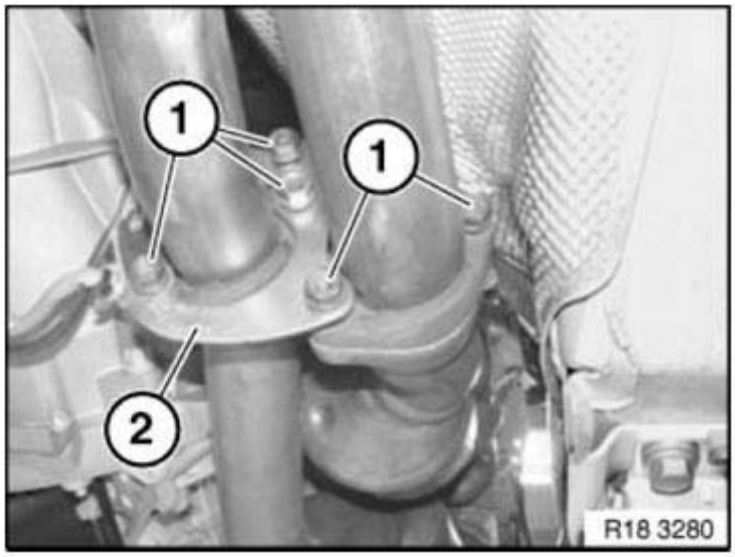


Fig. 2: Identifying Nuts And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1) and (2).

Tightening torque **18 31 2AZ** .

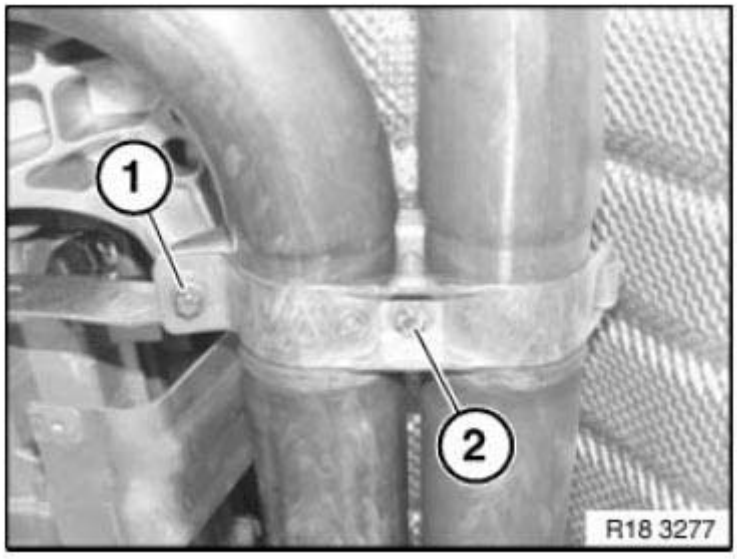


Fig. 3: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on rubber mount.

Tightening torque **18 31 3AZ** .

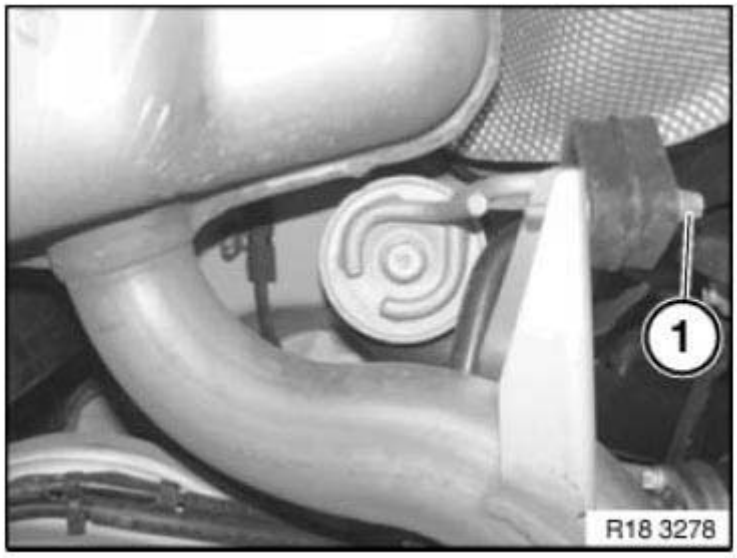


Fig. 4: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 4AZ** .

Lower and remove exhaust system with assistance of a second person.

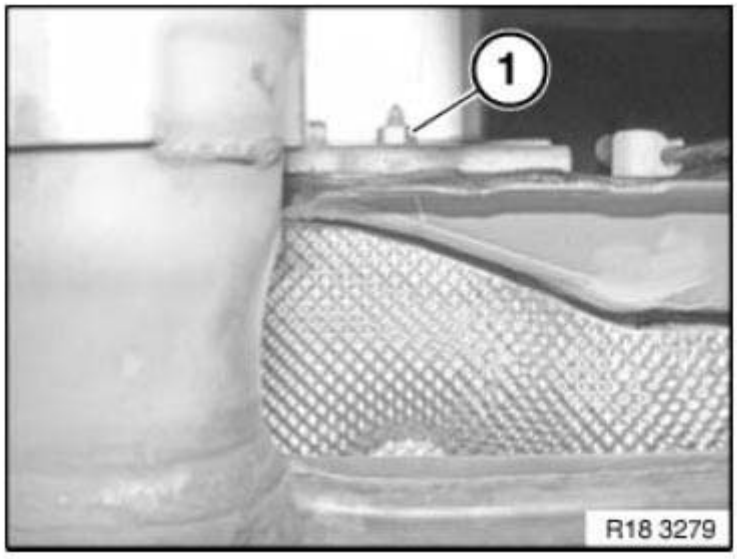


Fig. 5: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leaks.

1810 MUFFLERS, DIESEL

18 12 040 REPLACING FRONT SILENCER (N52K)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220.

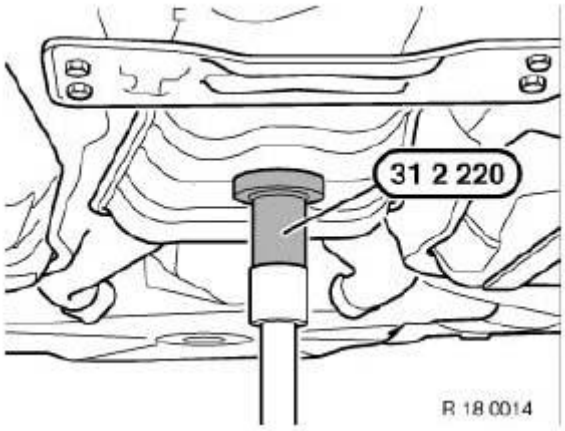


Fig. 6: Support Front Silencer With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.
Carry over cutting line to faulty front silencer and mark.
Cut through exhaust pipes at marked point with a suitable tool.

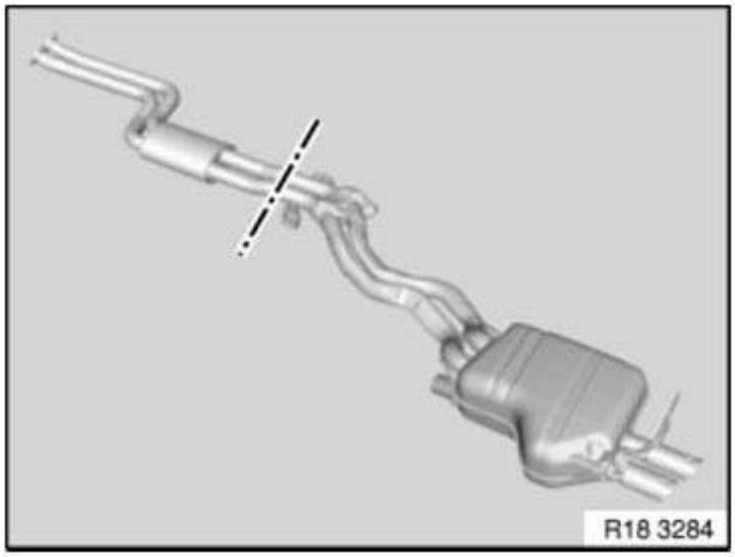


Fig. 7: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Remove holder (2).

Installation:

Replace self-locking nuts.

Replace seal.

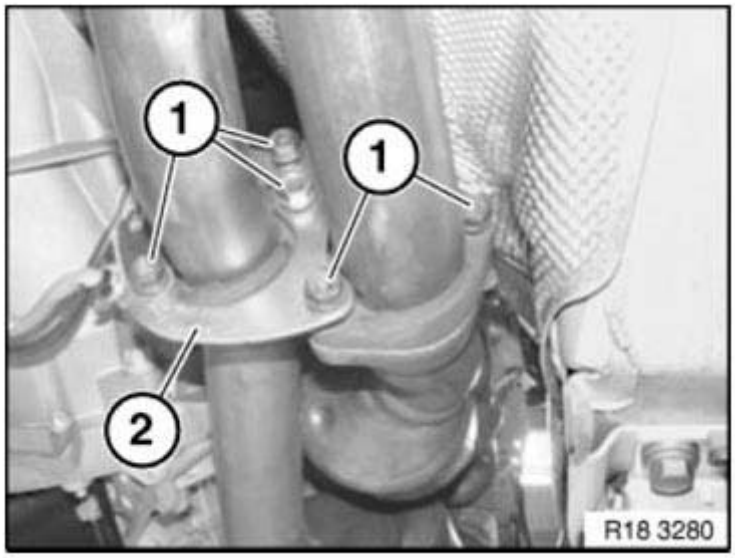


Fig. 8: Identifying Self-Locking Nuts And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1) and (2).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

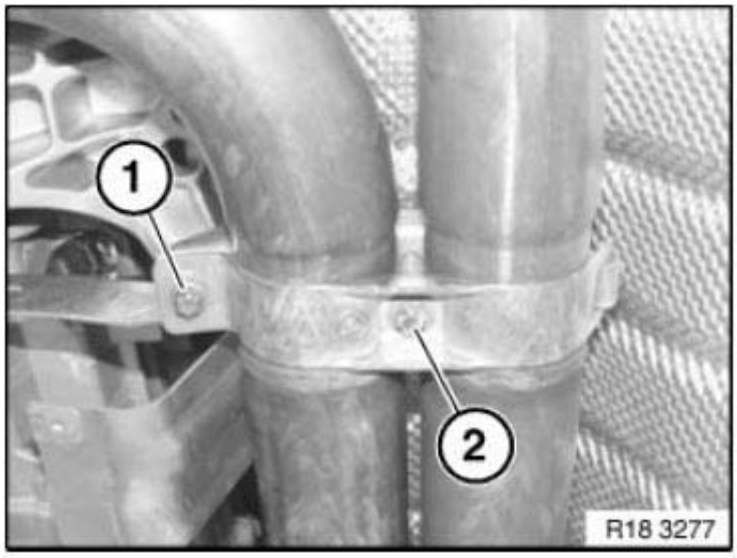


Fig. 9: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align front silencer to rear silencer and connect with clamps.

Centre clamp and tighten down.

Tightening torque **18 31 5AZ** .

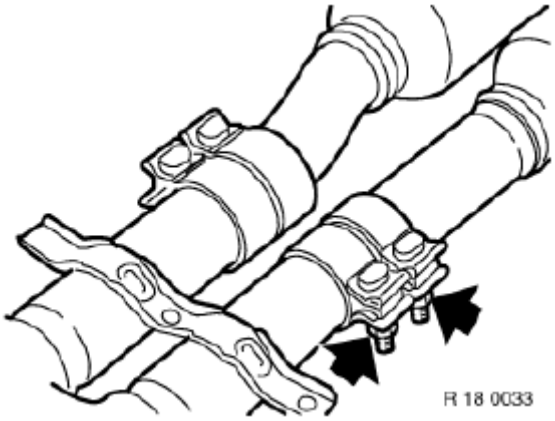


Fig. 10: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 10 031 REPLACING REAR SILENCER (N52K)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE** from rear axle
- Remove left **TENSION STRUT** on rear axle

Support rear silencer with special tool 31 2 220.

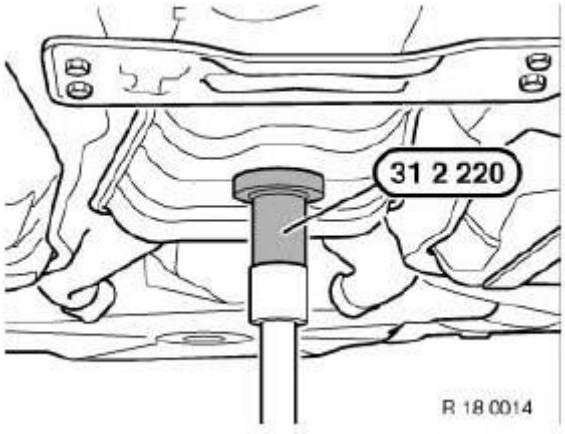


Fig. 11: Support Rear Silencer With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear silencer.**
Carry over cutting line to faulty rear silencer and mark.
Cut through exhaust pipes at marked point with a suitable tool.

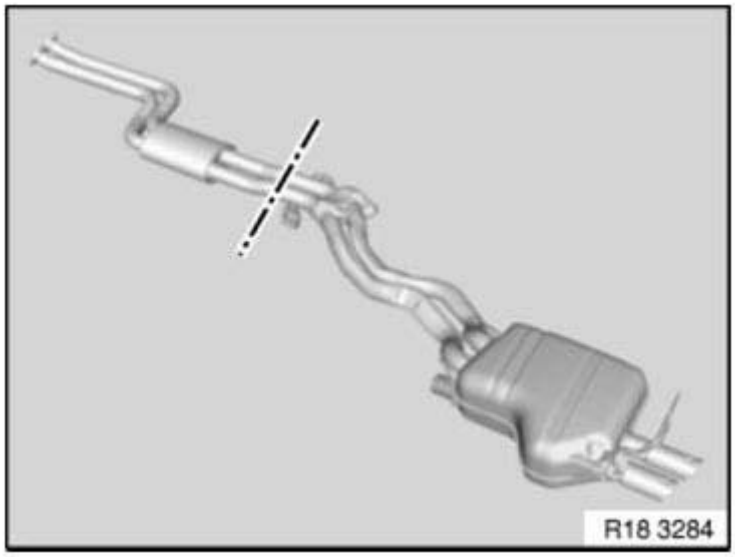


Fig. 12: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Tightening torque **18 31 3AZ** .

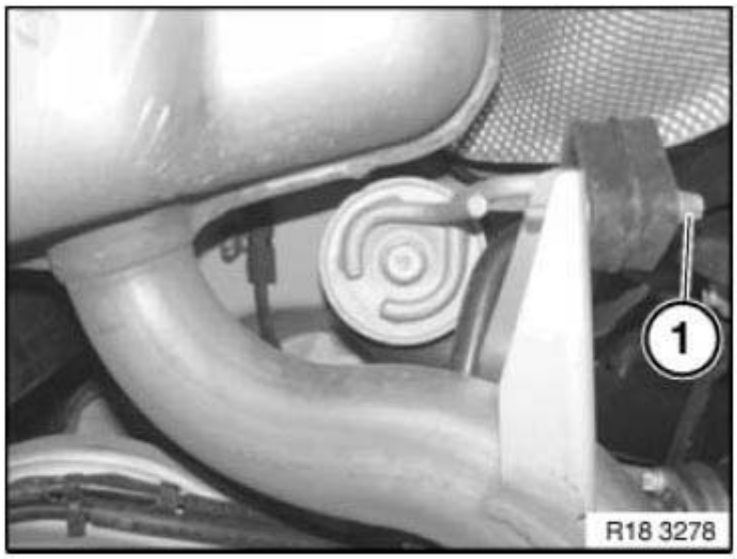


Fig. 13: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 4AZ** .

Lower and remove rear silencer with assistance of a second person.

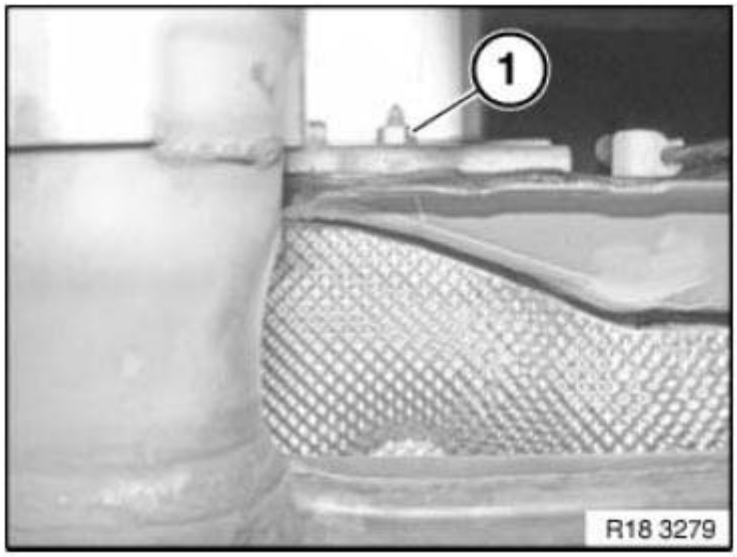


Fig. 14: Identifying Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 31 5AZ** .

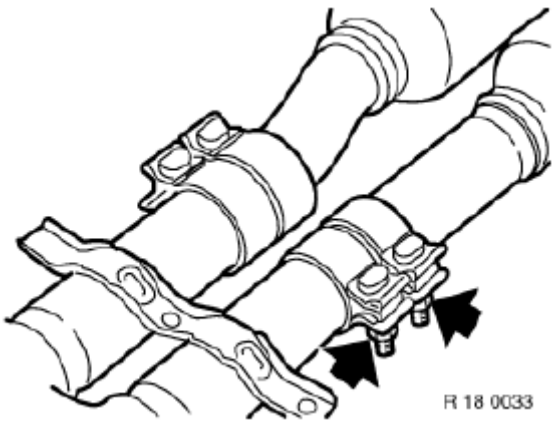


Fig. 15: Locating Clamps Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

1812 MUFFLERS, PETROL

18 12 040 REPLACING FRONT SILENCER (N52K)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220.

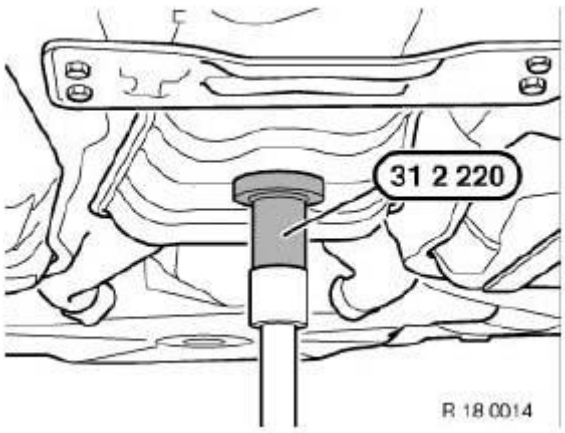


Fig. 16: Support Front Silencer With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.
Carry over cutting line to faulty front silencer and mark.
Cut through exhaust pipes at marked point with a suitable tool.

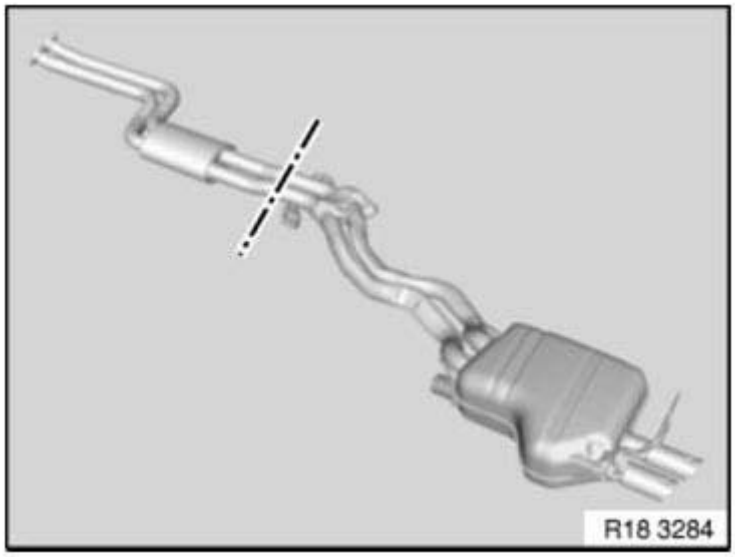


Fig. 17: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Remove holder (2).

Installation:

Replace self-locking nuts.

Replace seal.

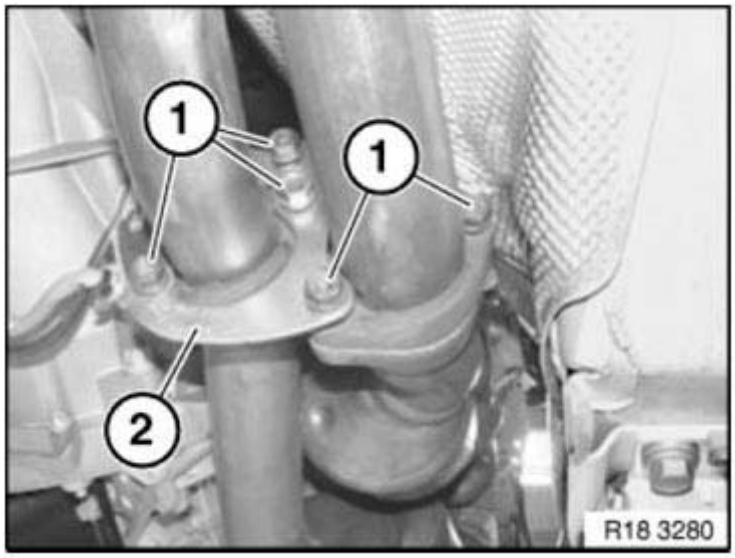


Fig. 18: Identifying Self-Locking Nuts And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1) and (2).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

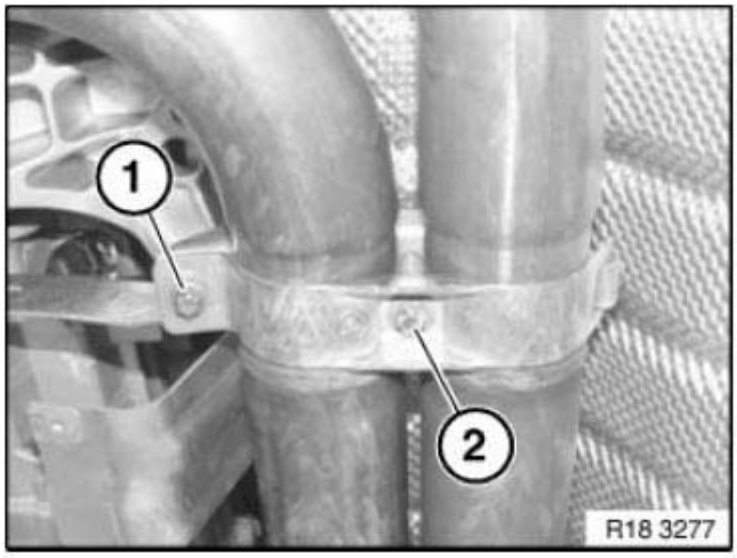


Fig. 19: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align front silencer to rear silencer and connect with clamps.

Centre clamp and tighten down.

Tightening torque **18 31 5AZ** .

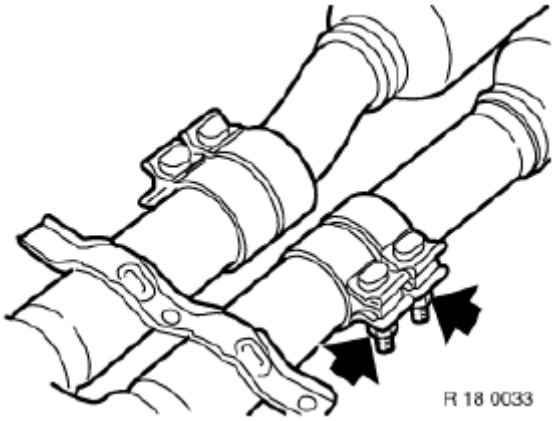


Fig. 20: Locating Clamps, Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 10 031 REPLACING REAR SILENCER (N52K)

WARNING: Scalding hazard!
Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE** from rear axle
- Remove left **TENSION STRUT** on rear axle

Support rear silencer with special tool 31 2 220.

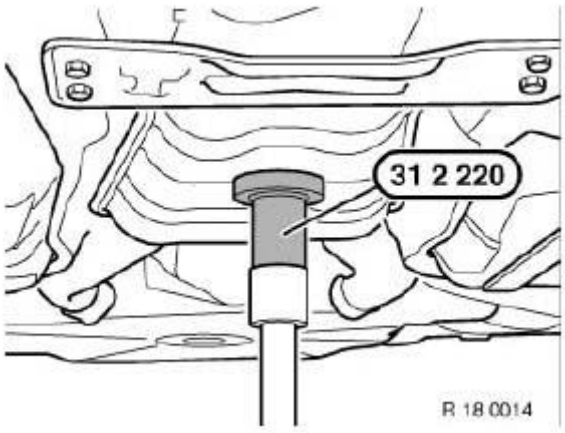


Fig. 21: Support Rear Silencer With Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear silencer.**
Carry over cutting line to faulty rear silencer and mark.
Cut through exhaust pipes at marked point with a suitable tool.

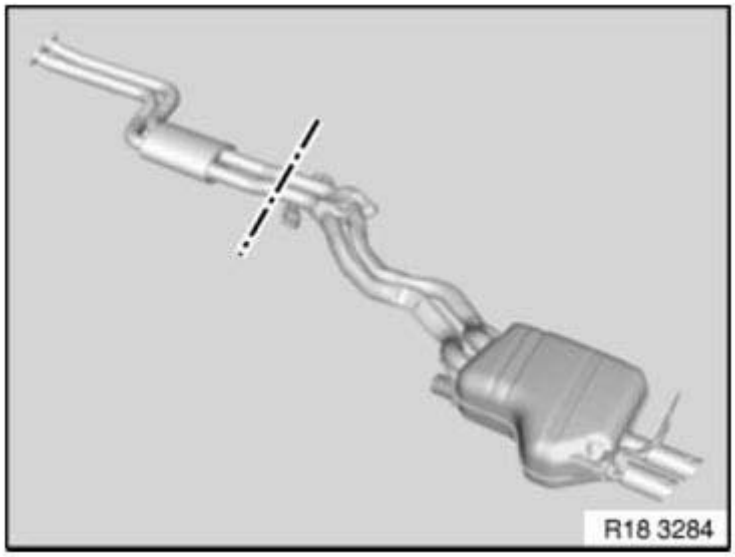


Fig. 22: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten nut.

Tightening torque **18 31 3AZ** .

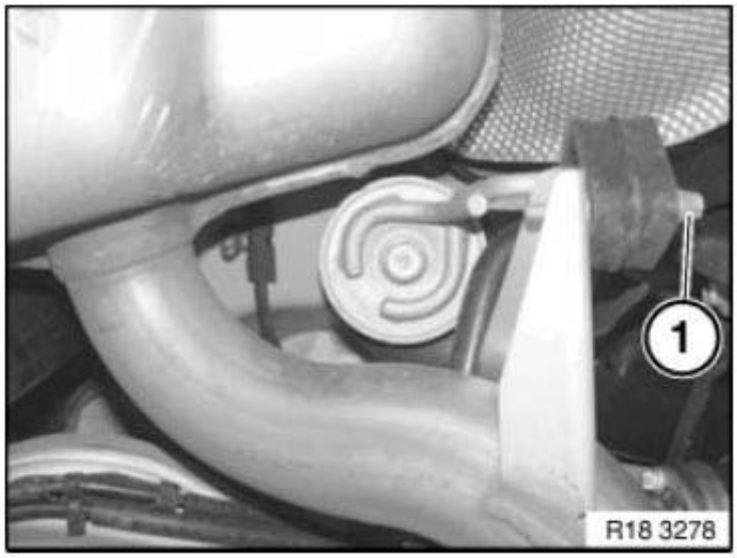


Fig. 23: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 4AZ** .

Lower and remove rear silencer with assistance of a second person.

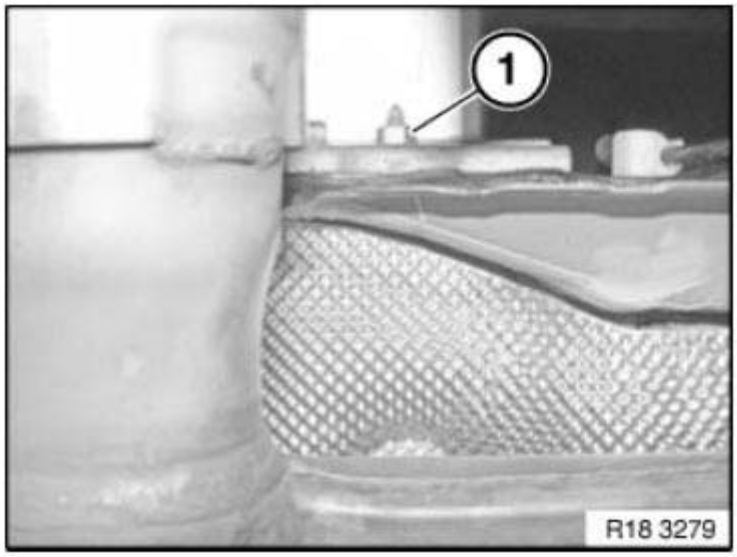


Fig. 24: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 31 5AZ** .

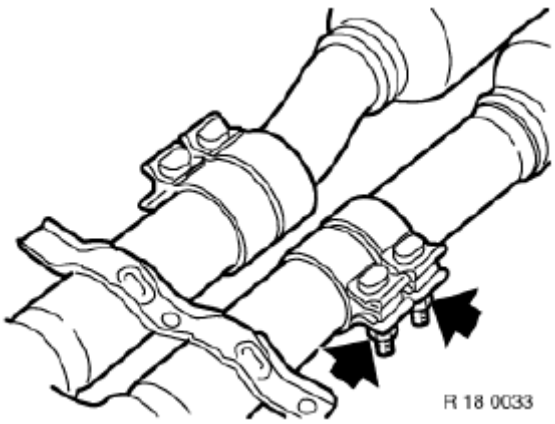


Fig. 25: Locating Clamps Bolts

Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Check exhaust system for leaks.**
Check rubber mount for damage.
If necessary, replace damaged rubber mounts.

1840 EXHAUST MANIFOLD WITH INTEGRATED CATALYTIC CONVERTER

18 40 050 REMOVING AND INSTALLING/REPLACING FRONT EXHAUST MANIFOLD (N52K)

WARNING: **Risk of injury!**
Refrigerant circuit is under high pressure!
Follow safety instructions for handling refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A .
Avoid contact with refrigerant and refrigerant oil
Follow safety instructions for HANDLING REFRIGERANT OIL .

IMPORTANT: **Risk of damage!**
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours:
Replace DESICCANT INSERT for A/C system.

Necessary preliminary tasks

- Remove **REAR EXHAUST MANIFOLD**
- Drain off **AIR CONDITIONING SYSTEM**

NOTE: **The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.**

Remove **CONTROL SENSOR** from cylinders 1 to 3.

Remove **MONITOR SENSOR** from cylinders 1 to 3.

Release screws (1).

Tightening torque **64 52 1AZ** .

Detach pressure and suction lines from A/C compressor.

Installation:

Replace all sealing rings and moisten with refrigerant oil.

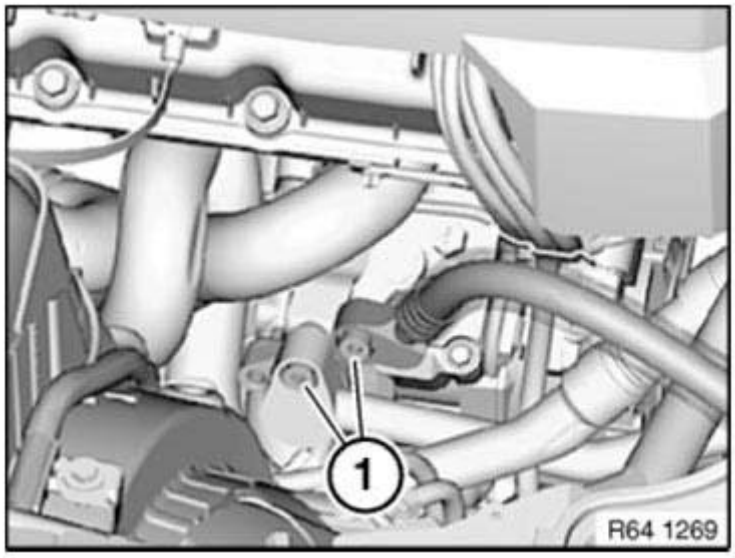


Fig. 26: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

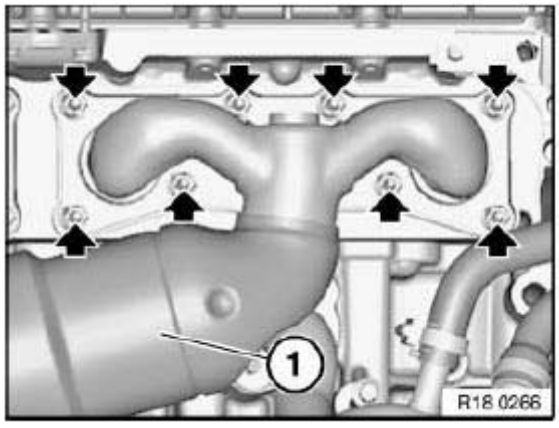


Fig. 27: Identifying Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Evacuate and fill **A/C SYSTEM** .

Check exhaust system for leaks.

18 40 060 REMOVING AND INSTALLING/REPLACING REAR EXHAUST MANIFOLD (N52K)

Necessary preliminary tasks

- Remove right **TENSION STRUT**
- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Remove **COMPLETE EXHAUST SYSTEM**

NOTE: The oxygen sensors are in danger of being damaged when the exhaust manifolds are removed and installed.

Remove **CONTROL SENSOR** from cylinders 4 to 6.

Remove **MONITOR SENSOR** from cylinders 4 to 6.

Unscrew nuts.

Remove exhaust manifold (1).

Installation:

Clean sealing faces and replace seals.

Replace nuts.

Tightening torque **18 40 1AZ** .

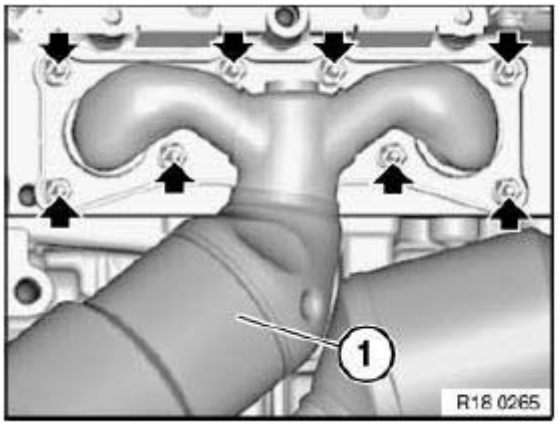


Fig. 28: Identifying Exhaust Manifold Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check exhaust system for leaks.

1800 EXHAUST SYSTEM, COMPLETE

18 00 020 REMOVING AND INSTALLING COMPLETE EXHAUST SYSTEM (N54)

WARNING: Scalding hazard!

Only perform this work after engine has cooled down.

Risk of injury!

Removal of the exhaust system must be carried out with the assistance of a second person.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE ON REAR AXLE** from rear axle
- Remove **LEFT OR RIGHT TENSION STRUT** on left and right from rear axle

Support exhaust system with special tool 31 2 220.

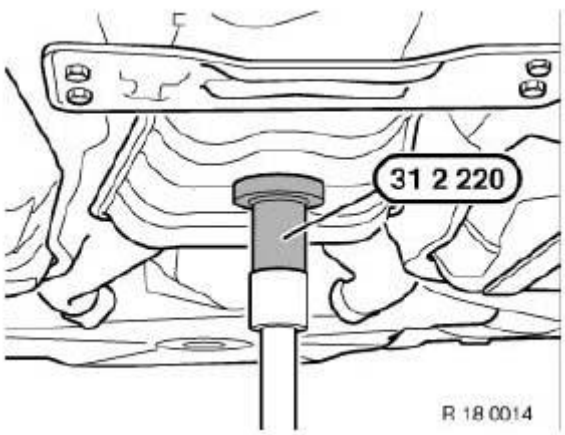


Fig. 1: Supporting Exhaust System Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Installation:

Replace seals.

Replace nuts (1).

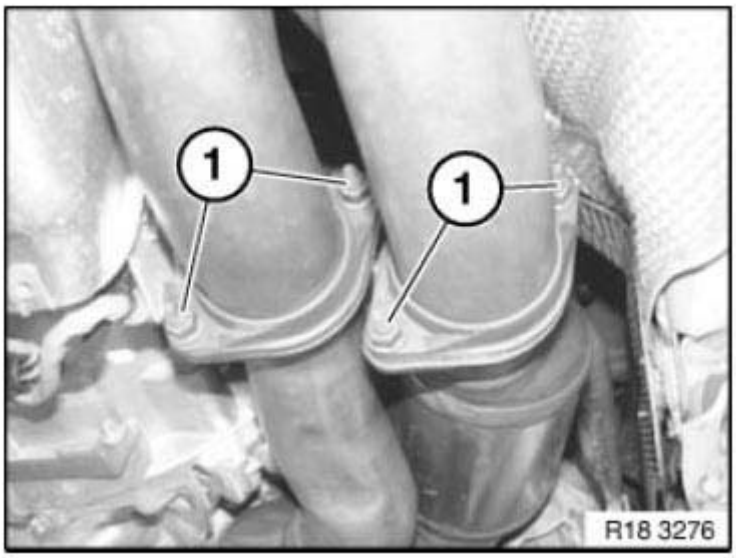


Fig. 2: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew screws (1) and (2).

Tightening torque **18 31 2AZ** .

Remove retaining clip.

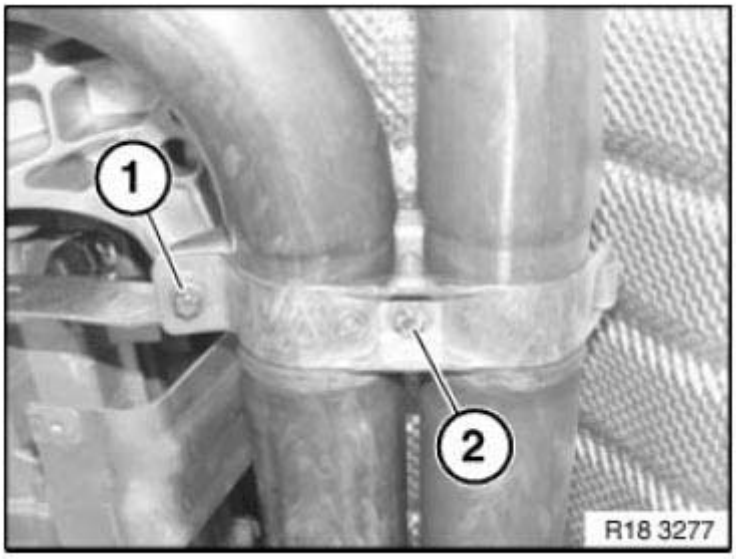


Fig. 3: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release screw (1) on rubber mount.

Tightening torque **18 31 3AZ** .

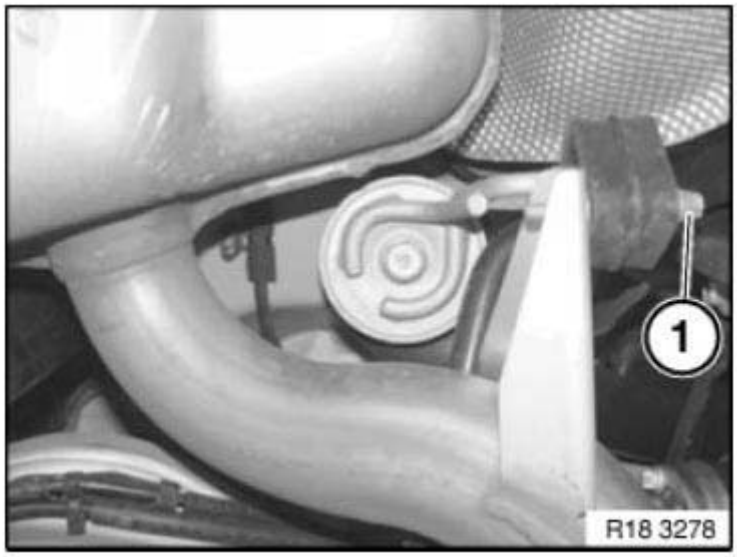


Fig. 4: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 4AZ** .

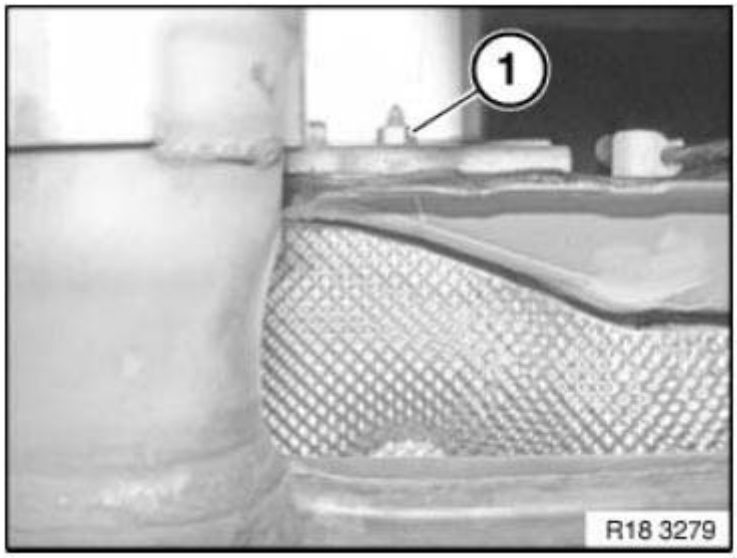


Fig. 5: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off vacuum hose (1).

Slacken nut (2).

Tightening torque **18 31 4AZ** .

Lower and remove exhaust system with assistance of a second person.

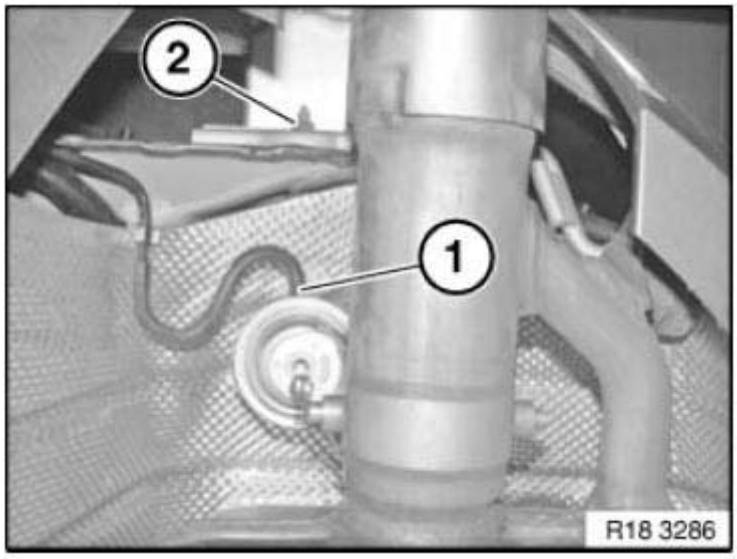


Fig. 6: Identifying Slacken Nut And Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

Check exhaust system for leaks.

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**

- Remove **EXHAUST SYSTEM**
- Release right **TIE ROD** from steering gear

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 1 to 3.

Remove MONITOR SENSOR from cylinders 1 to 3.

Release screws (1).

Remove guard plate (2).

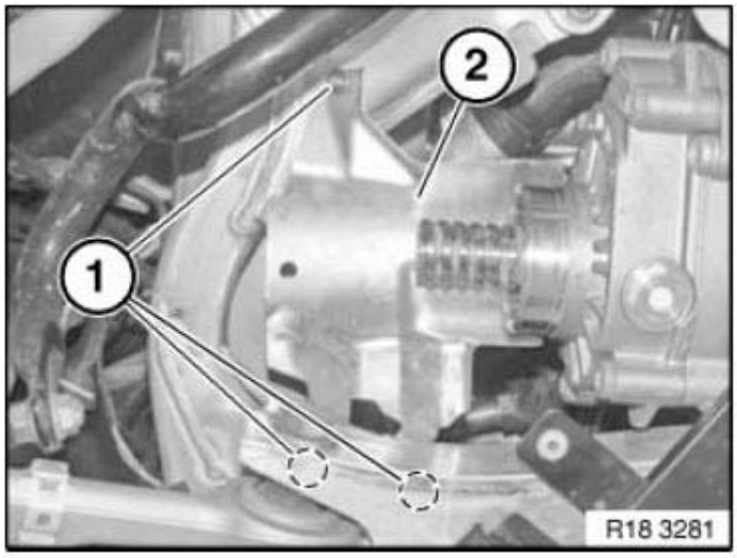


Fig. 7: Locating Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 20 2AZ** .

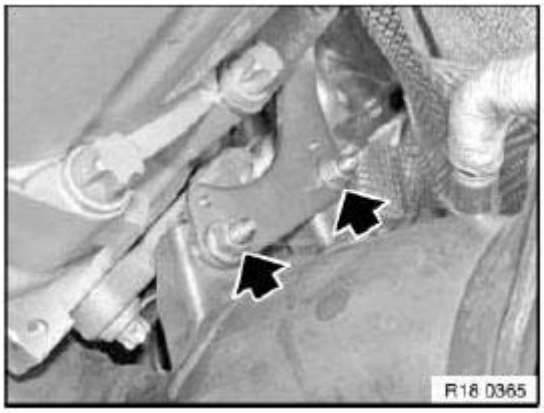


Fig. 8: Locating Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove holder (1).

Replace aluminium screws.

Tightening torque, manual gearbox **23 00 2AZ** .

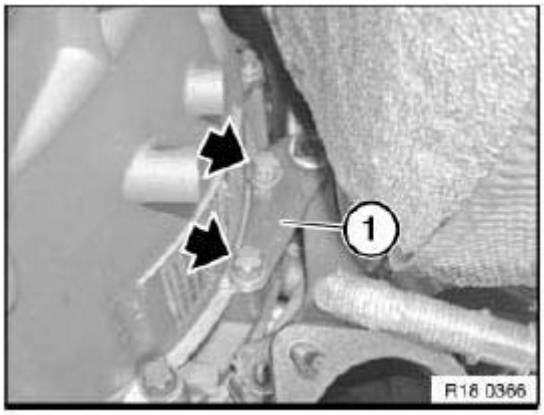


Fig. 9: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

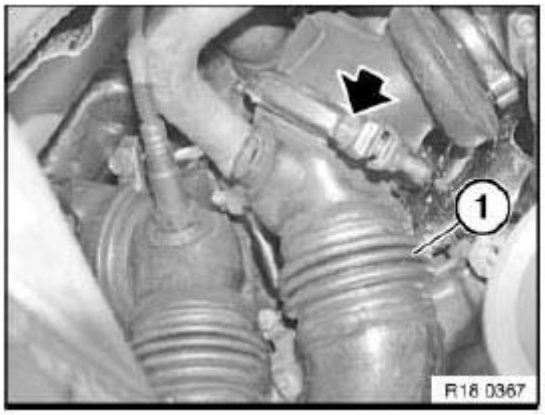


Fig. 10: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connecting piece and tighten down.

Add final details to vehicle.

Check exhaust system for leaks.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove **CATALYTIC CONVERTER** for cylinders 1-3

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 4 to 6.

Remove MONITOR SENSOR from cylinders 4 to 6.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

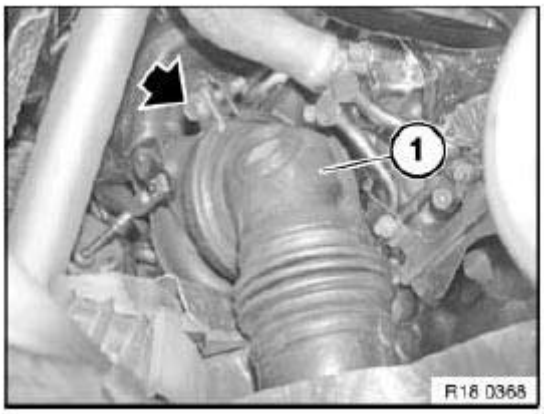


Fig. 11: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connection flange and tighten down.

Check exhaust system for leaks.

Add final details to vehicle.

1810 MUFFLERS, DIESEL

18 32 085 REPLACE BOTH EXHAUST PIPES WITH CATALYTIC CONVERTERS (N54)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220 and secure against falling out.

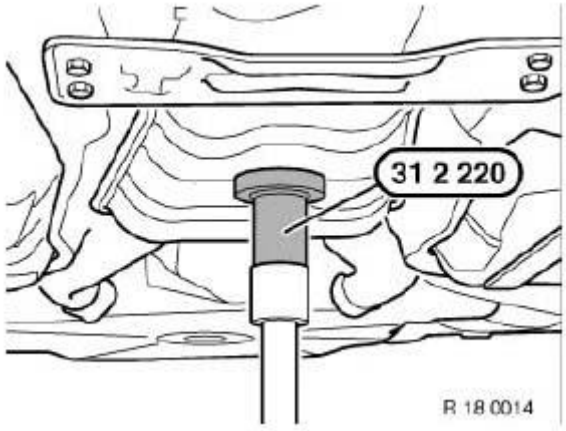


Fig. 12: Supporting Exhaust System Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.

Carry over cutting line to faulty front silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

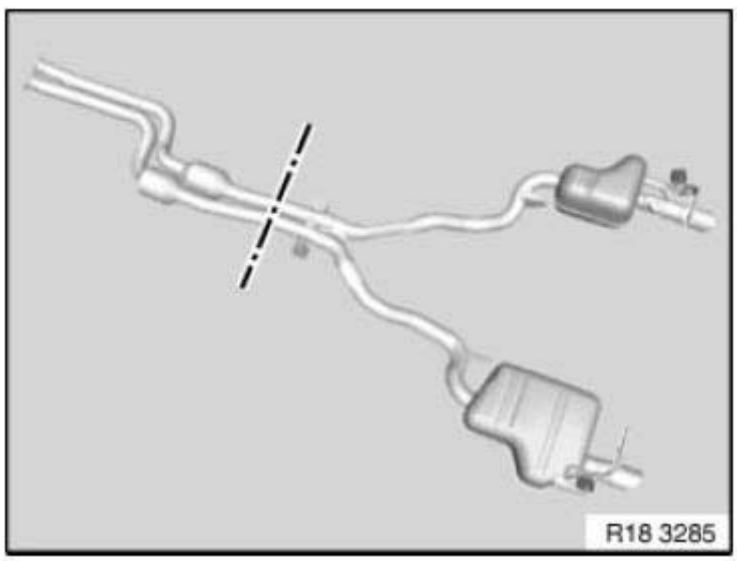


Fig. 13: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Replace self-locking nuts.

Replace seals.

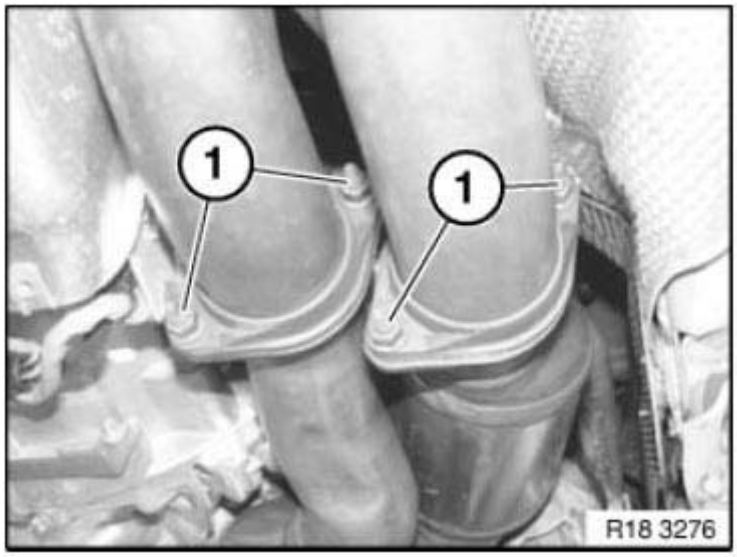


Fig. 14: Identifying Self-Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt and remove bracket (1).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

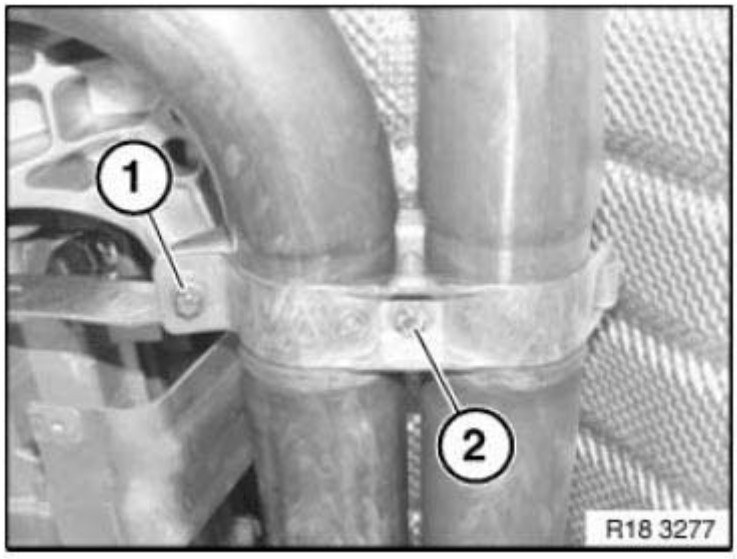


Fig. 15: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 20 3AZ** .

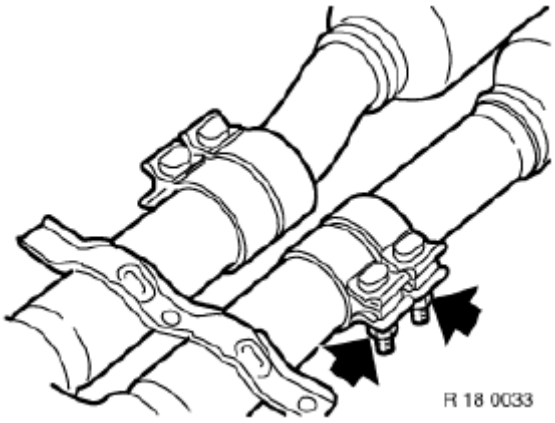


Fig. 16: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 10 034 REPLACING BOTH REAR SILENCERS

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE ON REAR AXLE** from rear axle
- Remove **LEFT OR RIGHT TENSION STRUT** on left and right from rear axle

Support rear silencer with special tool 31 2 220.

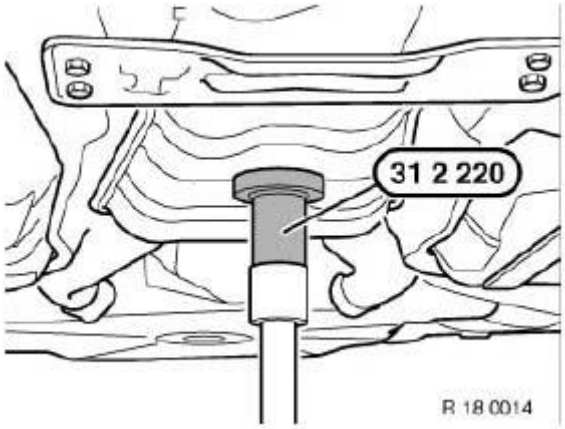


Fig. 17: Supporting Rear Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear silencer.

Carry over cutting line to faulty rear silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

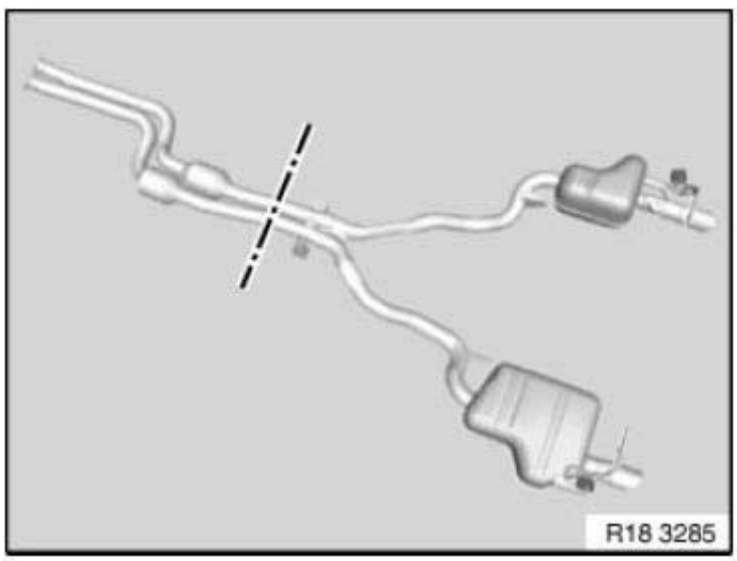


Fig. 18: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release screw (1) on rubber mount.

Tightening torque **18 31 4AZ** .

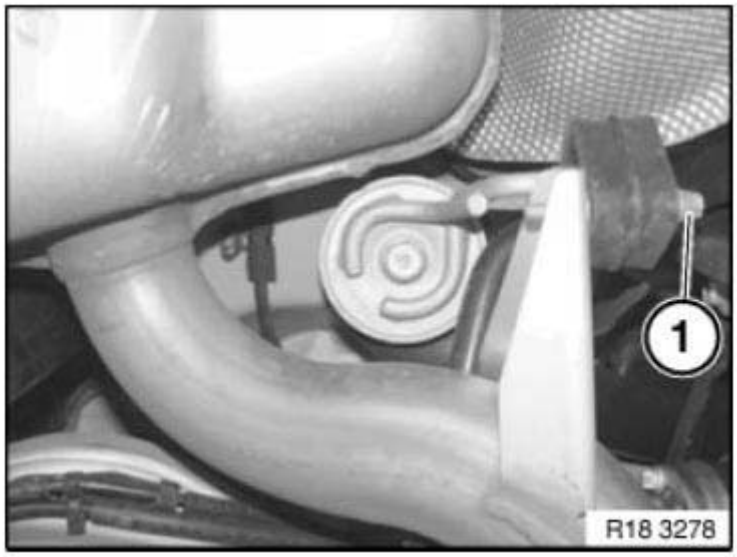


Fig. 19: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 5AZ** .

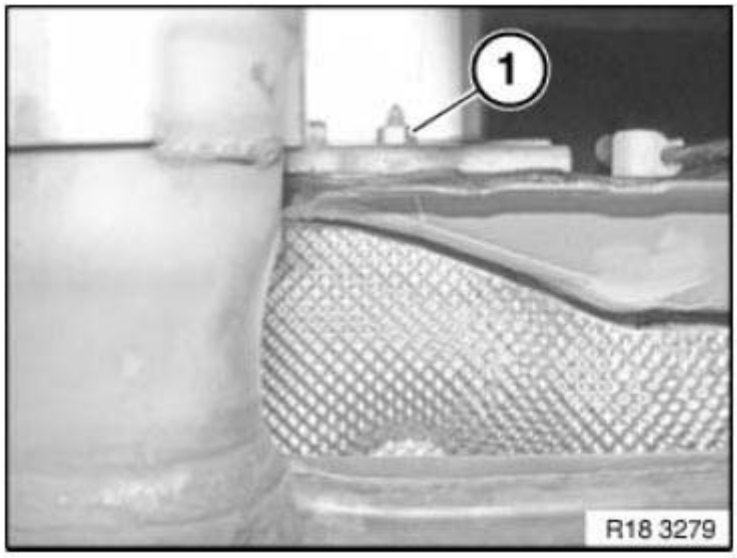


Fig. 20: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off vacuum hose (1).

Slacken nut (2).

Tightening torque **18 31 5AZ** .

Lower and remove rear silencer with assistance of a second person.

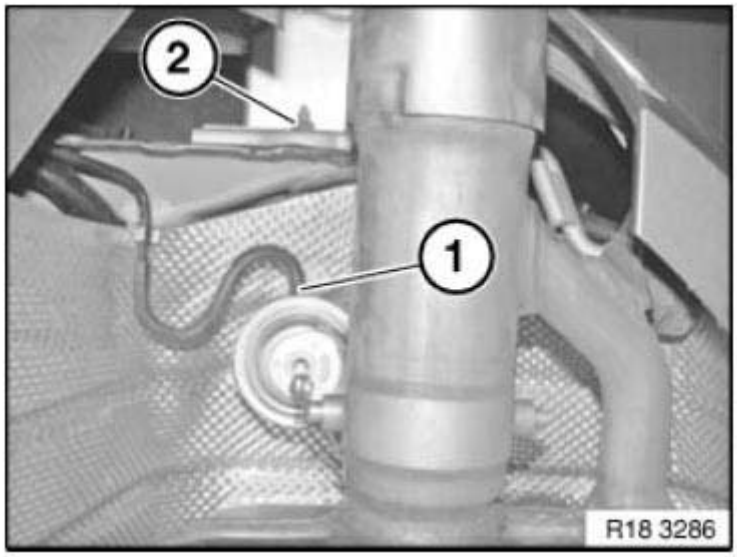


Fig. 21: Identifying Vacuum Hose And Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front pipes to rear silencers by means of clamps and align.

Centre clamps and tighten down.

Tightening torque **18 20 3AZ** .

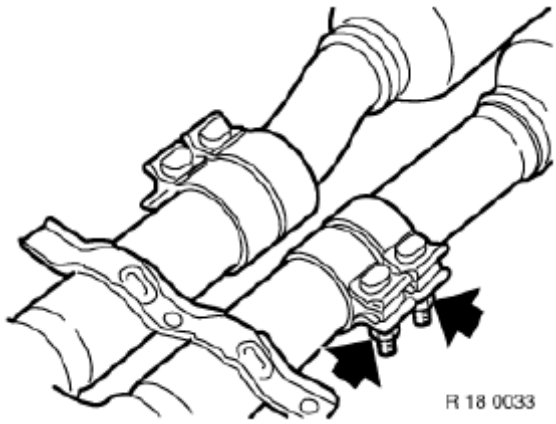


Fig. 22: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

1812 MUFFLERS, PETROL

18 32 085 REPLACE BOTH EXHAUST PIPES WITH CATALYTIC CONVERTERS (N54)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220 and secure against falling out.

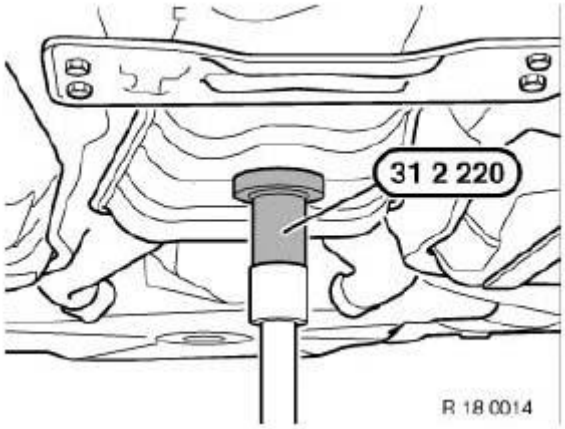


Fig. 23: Supporting Front Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.

Carry over cutting line to faulty front silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

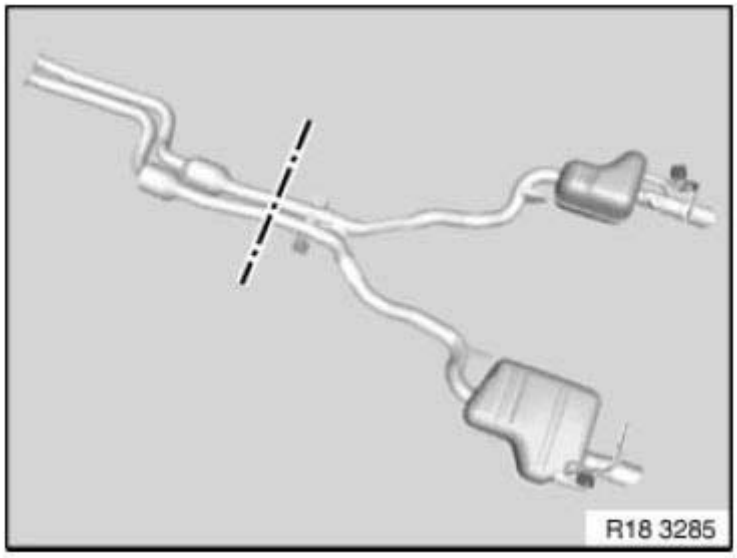


Fig. 24: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Replace self-locking nuts.

Replace seals.

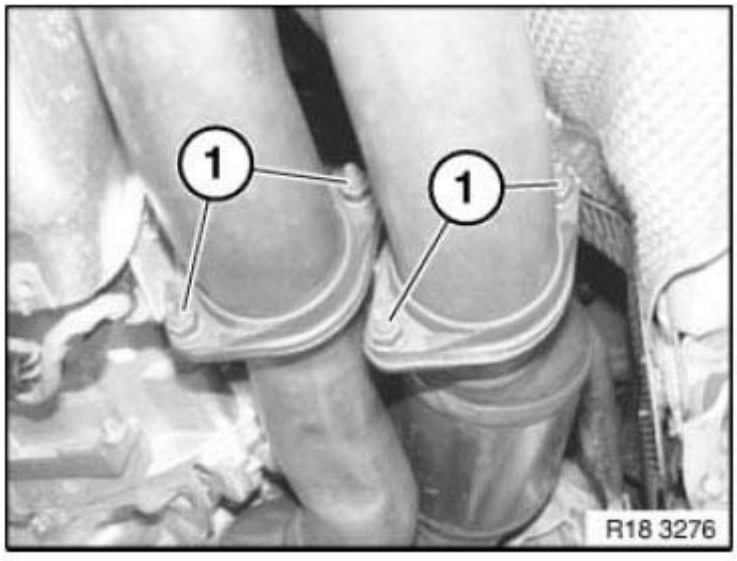


Fig. 25: Identifying Self-Locking Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt and remove bracket (1).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

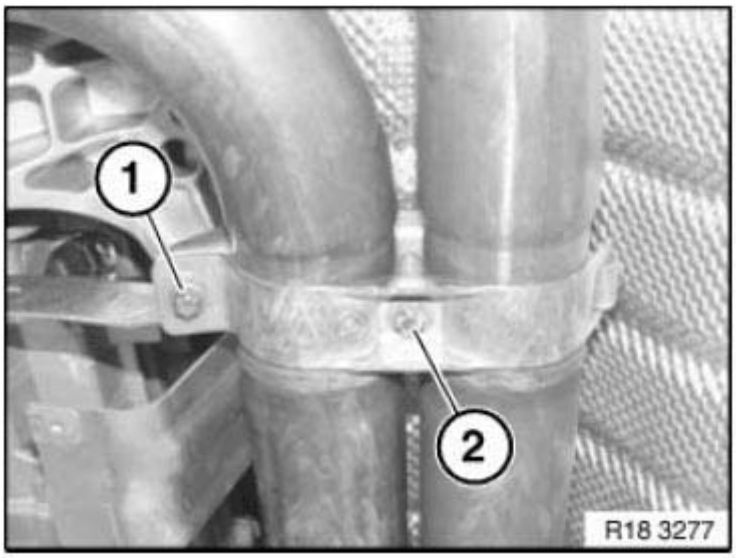


Fig. 26: Identifying Bracket With Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 20 3AZ** .

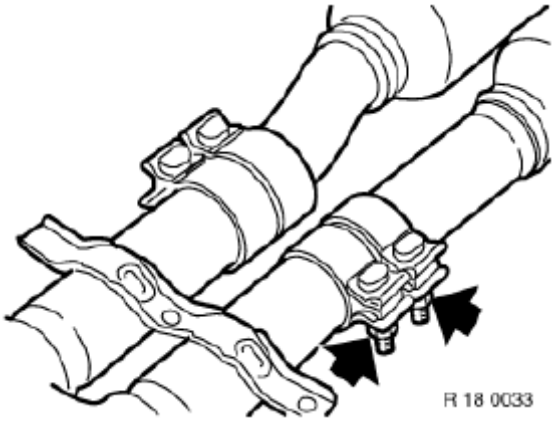


Fig. 27: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

18 10 034 REPLACING BOTH REAR SILENCERS (N54)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Necessary preliminary tasks

- Remove **REINFORCEMENT PLATE ON REAR AXLE** from rear axle
- Remove **LEFT OR RIGHT TENSION STRUT** on left and right from rear axle

Support rear silencer with special tool 31 2 220.

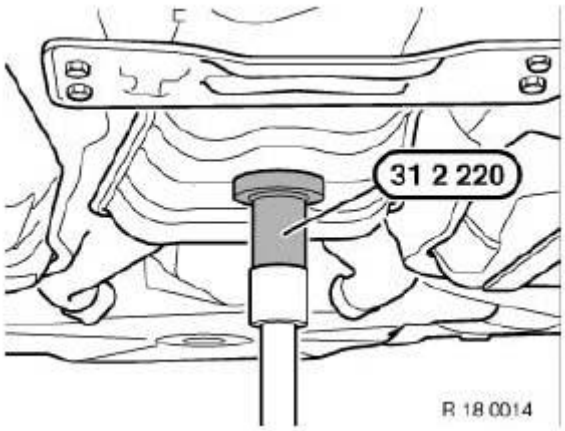


Fig. 28: Supporting Rear Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new rear silencer.

Carry over cutting line to faulty rear silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

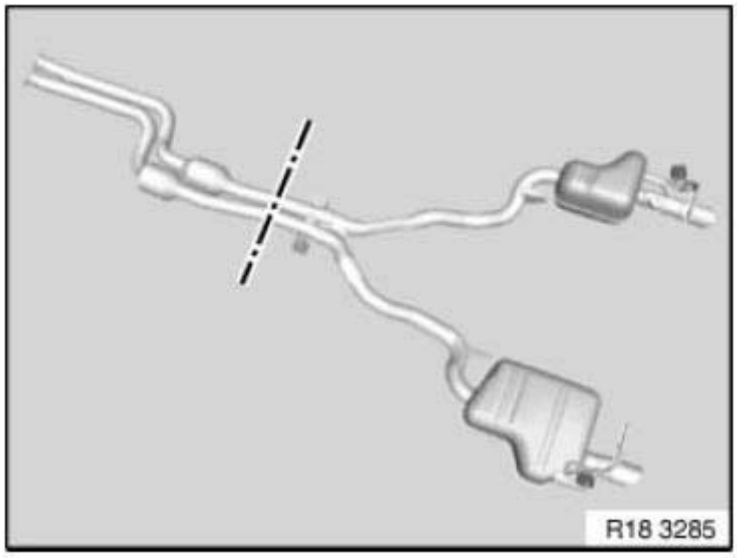


Fig. 29: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows the left side, the procedure for the right side is identical.

Release screw (1) on rubber mount.

Tightening torque **18 31 4AZ** .

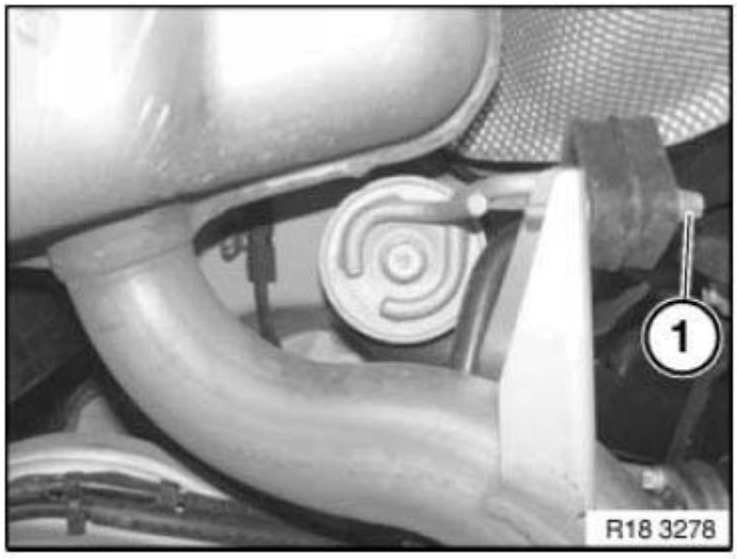


Fig. 30: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Tightening torque **18 31 5AZ** .

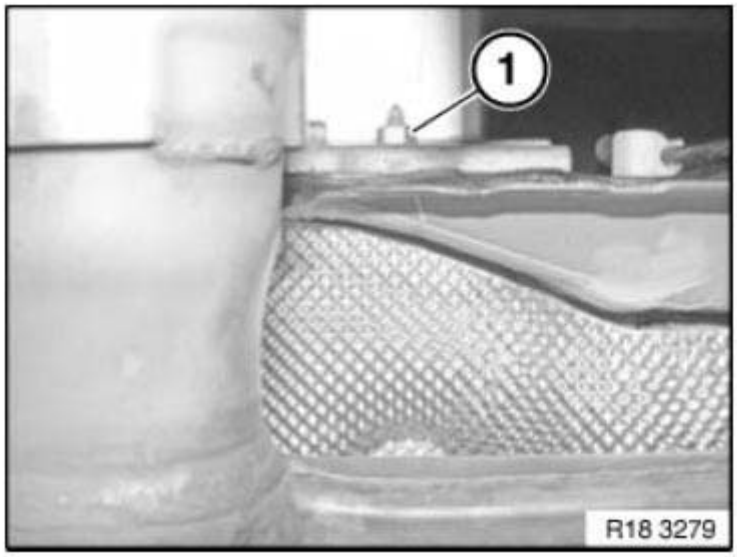


Fig. 31: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Pull off vacuum hose (1).

Slacken nut (2).

Tightening torque **18 31 5AZ** .

Lower and remove rear silencer with assistance of a second person.

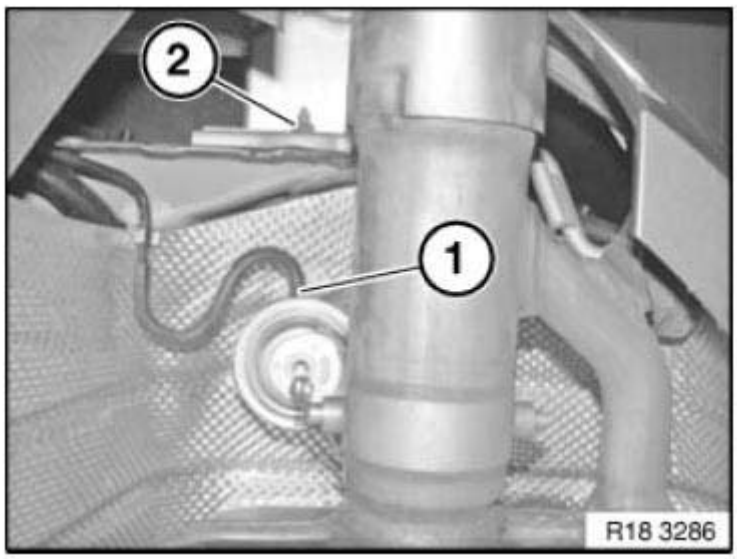


Fig. 32: Identifying Slacken Nut And Vacuum Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front pipes to rear silencers by means of clamps and align.

Centre clamps and tighten down.

Tightening torque **18 20 3AZ** .

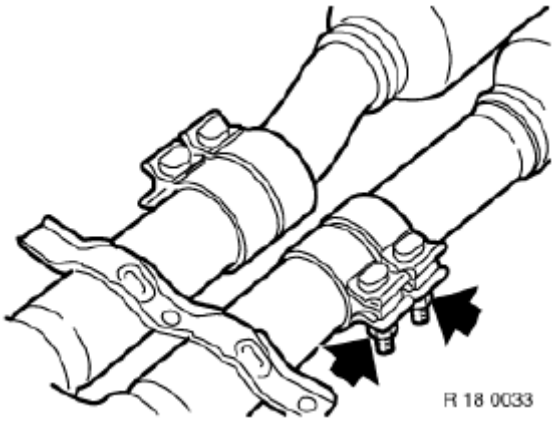


Fig. 33: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check exhaust system for leaks.

Check rubber mount for damage.

If necessary, replace damaged rubber mounts.

1831 EXHAUST PIPE WITH MOUNTING

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Remove **EXHAUST SYSTEM**
- Release right **TIE ROD** from steering gear

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 1 to 3.

Remove MONITOR SENSOR from cylinders 1 to 3.

Release screws (1).

Remove guard plate (2).

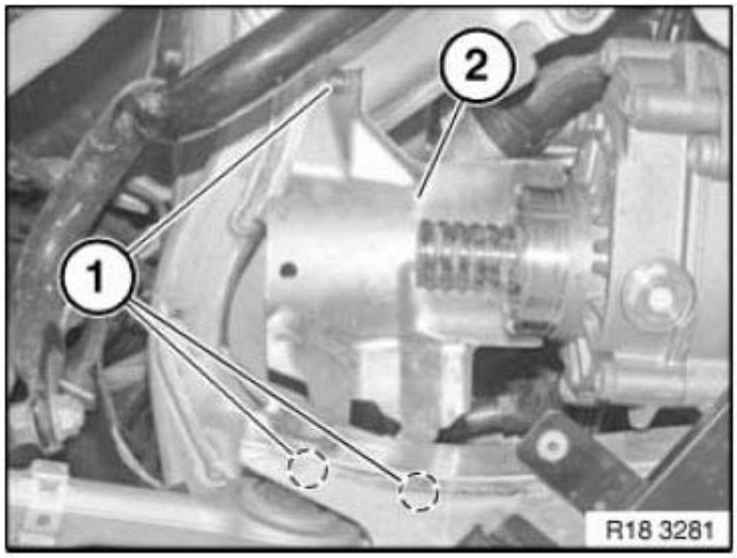


Fig. 34: Identifying Screws And Guard Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 20 2AZ** .

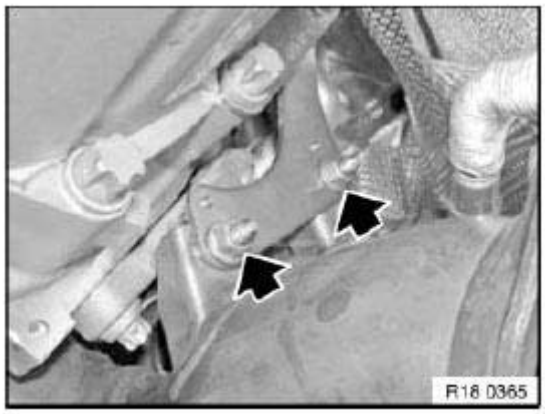


Fig. 35: Locating Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove holder (1).

Replace aluminium screws.

Tightening torque, automatic transmission 24 00 2AZ.

Tightening torque, manual gearbox **23 00 2AZ** .

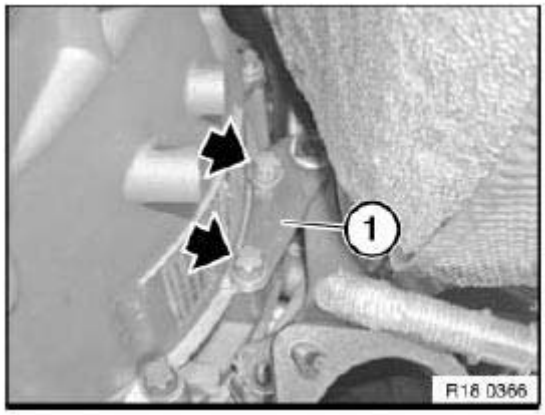


Fig. 36: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

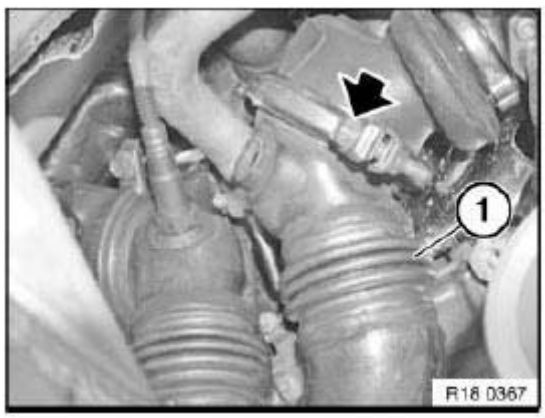


Fig. 37: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connecting piece and tighten down.

Add final details to vehicle.

Check exhaust system for leaks.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove **CATALYTIC CONVERTER** for cylinders 1-3

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 4 to 6.

Remove MONITOR SENSOR from cylinders 4 to 6.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

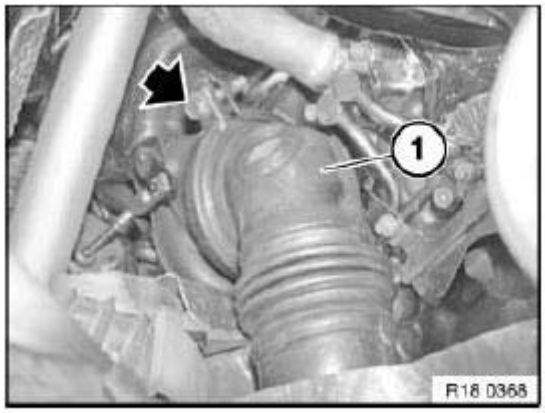


Fig. 38: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connection flange and tighten down.

Check exhaust system for leaks.

Add final details to vehicle.

1832 EXHAUST CATALYTIC CONVERTER

18 32 050 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 1-3 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**
- Remove rear **UNDERBODY PROTECTION**
- Remove **EXHAUST SYSTEM**
- Release right **TIE ROD** from steering gear

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 1 to 3.

Remove MONITOR SENSOR from cylinders 1 to 3.

Release screws (1).

Remove guard plate (2).

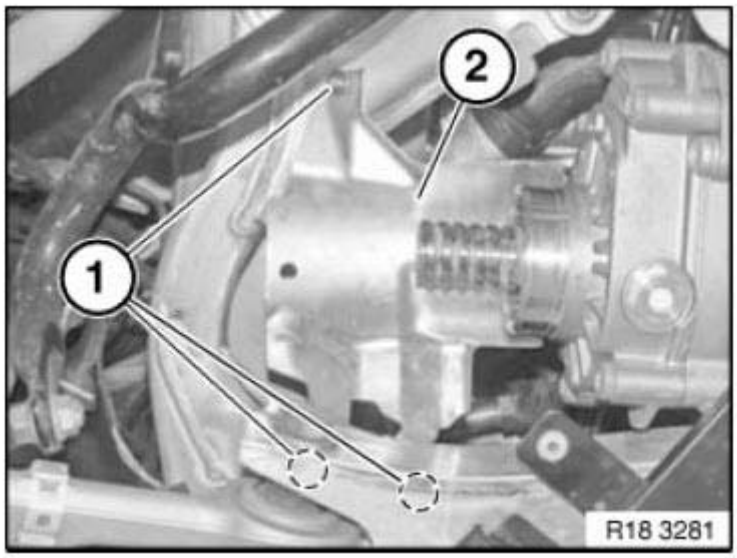


Fig. 39: Identifying Screws And Guard Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 20 2AZ** .

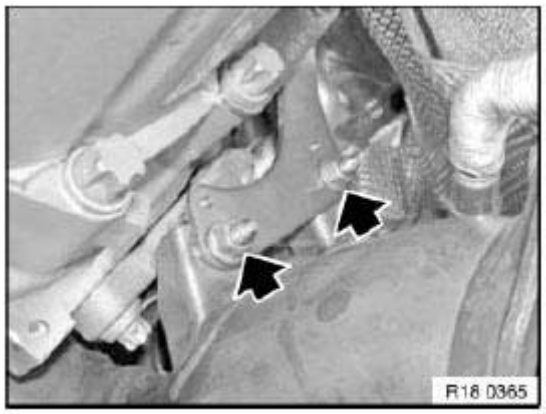


Fig. 40: Locating Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove holder (1).

Replace aluminium screws.

Tightening torque, manual gearbox **23 00 2AZ** .

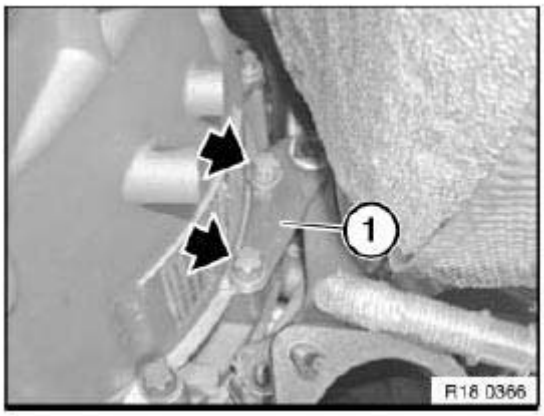


Fig. 41: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

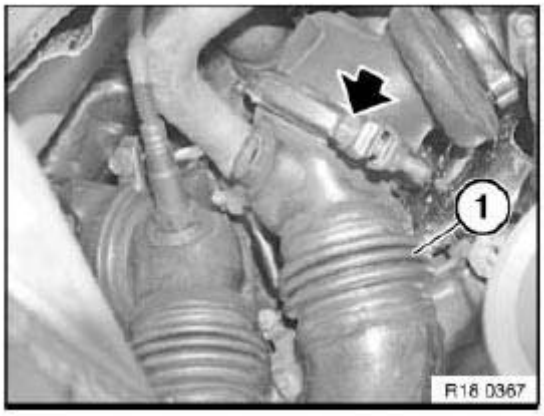


Fig. 42: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connecting piece and tighten down.

Add final details to vehicle.

Check exhaust system for leaks.

18 32 060 REMOVING AND INSTALLING/REPLACING CATALYTIC EXHAUST-GAS CONVERTER FOR CYLINDERS 4-6 (N54)

WARNING: Scalding hazard!

Only perform these tasks after exhaust system has cooled down.

Necessary preliminary tasks

- Remove **CATALYTIC CONVERTER** for cylinders 1-3

NOTE: The oxygen sensors are in danger of being damaged when the catalytic exhaust-gas converters are removed and installed.

Remove CONTROL SENSOR , cylinders 4 to 6.

Remove MONITOR SENSOR from cylinders 4 to 6.

Release clamp. Clamp must be replaced each time it is released.

Tightening torque **18 31 3AZ** .

In so doing, secure catalytic converter (1) against falling out.

Feed out catalytic converter (1) and remove.

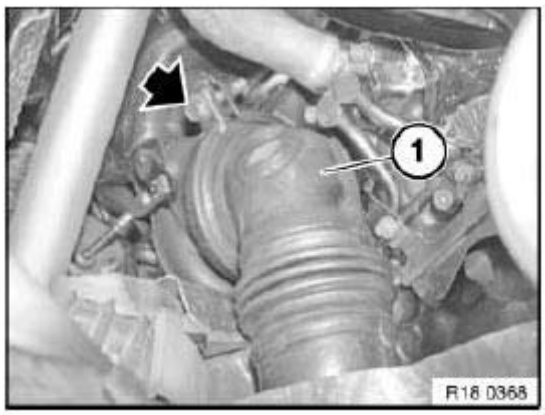


Fig. 43: Identifying Catalytic Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Clean sealing face. Replace seal and clamp.

Align catalytic converter to exhaust system connection flange and tighten down.

Check exhaust system for leaks.

Add final details to vehicle.

18 32 085 REPLACE BOTH EXHAUST PIPES WITH CATALYTIC CONVERTERS (N54)

WARNING: Scalding hazard!

Only perform these tasks on an engine that has cooled down.

Support front silencer with special tool 31 2 220 and secure against falling out.

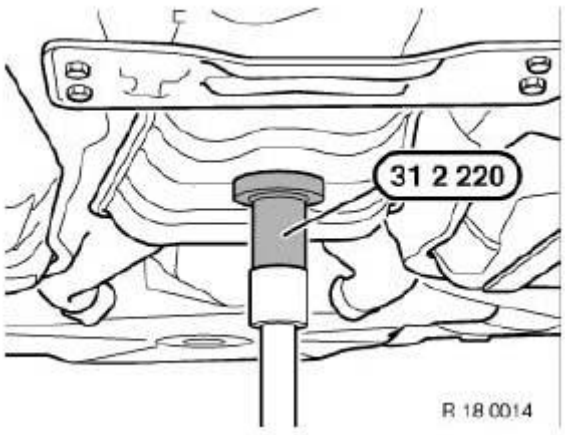


Fig. 44: Supporting Front Silencer Using Special Tool (31 2 220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the cutting line is not marked by a punch mark in the pipe, determine the cutting line by means of the pipe length on the new front silencer.

Carry over cutting line to faulty front silencer and mark.

Cut through exhaust pipes at marked point with a suitable tool.

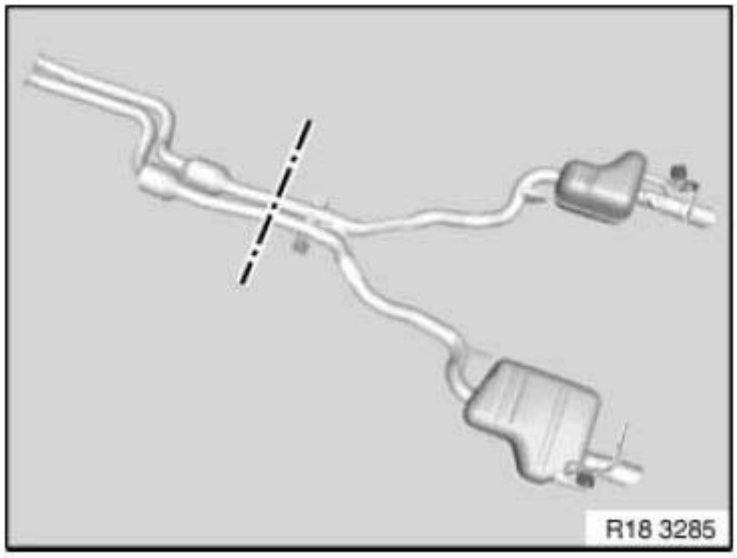


Fig. 45: Cutting Exhaust Pipes Through Marked Point Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Tightening torque **18 31 1AZ** .

Replace self-locking nuts.

Replace seals.

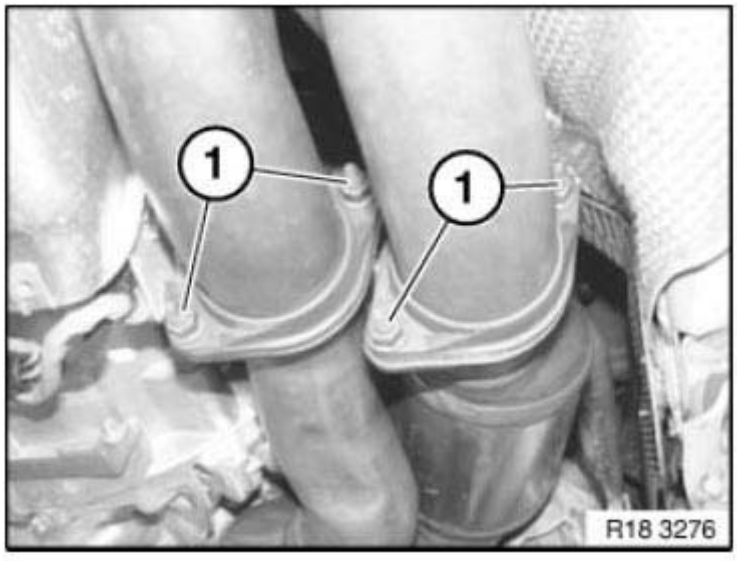


Fig. 46: Identifying Self Locking Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolt and remove bracket (1).

Tightening torque **18 31 2AZ** .

Lower and remove front silencer with assistance of a second person.

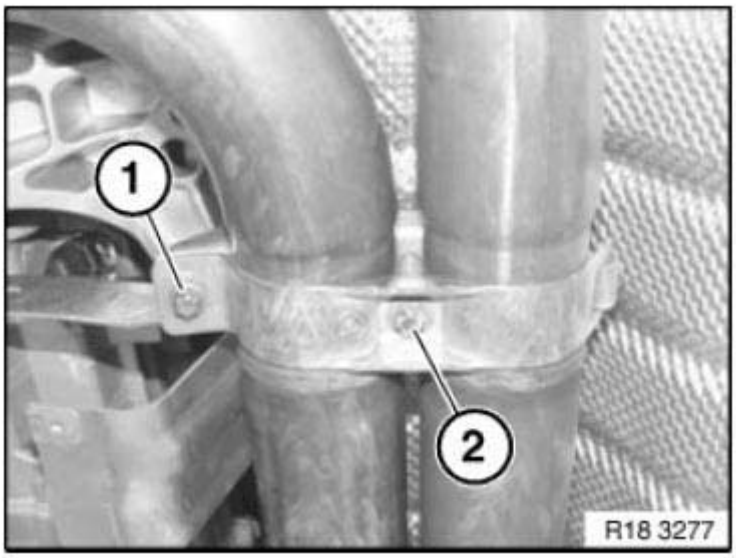


Fig. 47: Identifying Bracket With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Connect front silencer to rear silencer by means of clamp and align.

Centre clamp and tighten down.

Tightening torque **18 20 3AZ** .

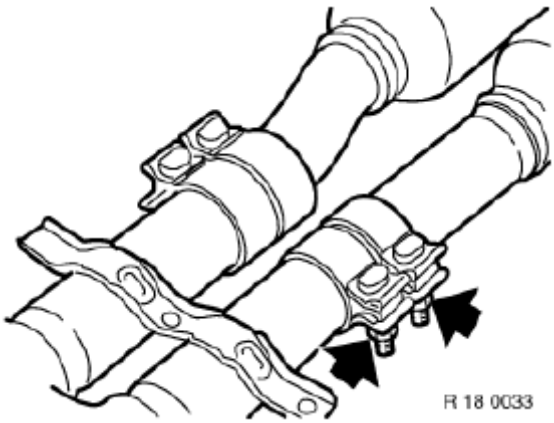


Fig. 48: Locating Clamps Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **Check exhaust system for leaks.**

18 EXHAUST SYSTEM

18-0110 GAUGE

Gauge MW

NOTE: For securing catalytic converter in installation position.

SI number

01 20 06 (299)

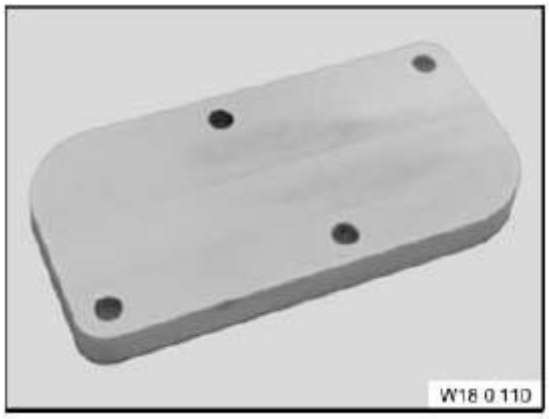


Fig. 1: Identifying Gauge (18-0110)
Courtesy of BMW OF NORTH AMERICA, INC.

18-0100 SOCKET WRENCH

Socket wrench MW

NOTE: (Socket wrench) Socket wrench set For removal and installation of the diesel particulate filter.

Storage Location

A20

SI number

01 27 05 (235)

Consisting of:

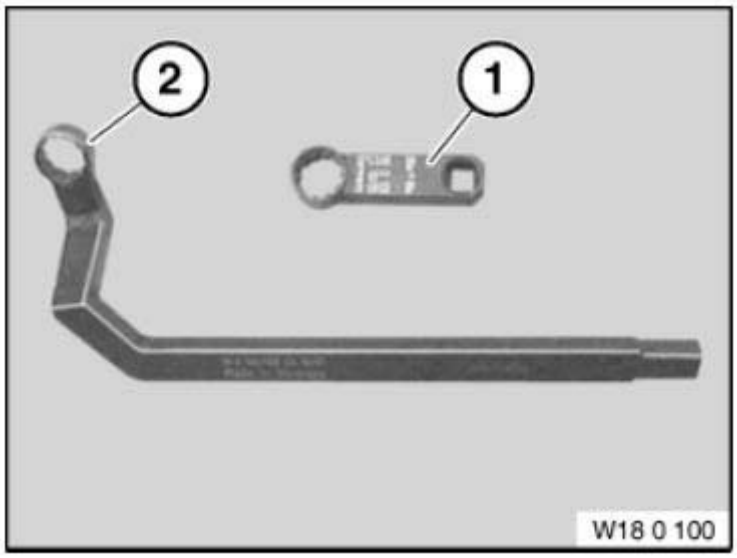


Fig. 2: Identifying Socket Wrench (18-0100)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495499 Socket wrench

NOTE: (Socket wrench) short version

2 = 0495500 Socket wrench

NOTE: (Socket wrench) offset version

Exhaust System - Tightening Torques - Z4

EXHAUST ASSEMBLY

18 00 EXHAUST ASSEMBLY

TIGHTENING TORQUE SPECIFICATION - EXHAUST ASSEMBLY

		Type	Thread	Tightening specification	Measure
1AZ	Primary catalytic converter to turbocharger/or jacket pipe to catalytic converter	M57/M57TU	M10		42 Nm
		M67			15 Nm
		M30/M70		Tighten down compression spring with nut uniformly to full extent, then slacken by 1.5 turns	10 Nm
		M51		Preload compression springs with nut to 27± 1 mm	
		S50	M10		30 Nm
		S54/ECE	M10		27 Nm
		S54/US	M10		24 Nm
2AZ	Exhaust pipe to flow section	E23			25 Nm
3AZ	Clamp for final muffler	All	M8		15 Nm
4AZ	Catalytic converter on silencer	E36/M42/M43/M44		Version with compression spring: Evenly preload compression springs with nuts to 30 mm	
5AZ	Connection of positive and negative leads to E catalytic converter	M73			5 Nm
6AZ	Rear muffler to intermediate	E53	M8		30 Nm

	muffler				
7AZ	Vacuum tank to retaining plate	E46/M54	M8		10 Nm
8AZ	Exhaust system to exhaust manifold	M40/M42/M43/M44	M10		45 Nm
9AZ	Primary cat. to exhaust system	M57TU/E65			55 Nm

EXHAUST MANIFOLD

18 40 EXHAUST MANIFOLD

TIGHTENING TORQUE SPECIFICATION - EXHAUST MANIFOLD

		Type	Thread	Tightening specification	Measure
1AZ	Exhaust manifold to cylinder head	N52K	M7 nut		20 Nm

EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

18 31 EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

TIGHTENING TORQUE SPECIFICATION - EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

		Type	Thread	Tightening specification	Measure
1AZ	Exhaust system to front pipe with exhaust manifold	N52K	M10		45 Nm
2AZ	Exhaust system to bracket, transmission	N52K	M8		21 Nm
3AZ	Exhaust system to rear differential	N52K	M8		21 Nm
4AZ	Rear silencer to body	N52K	M8		21 Nm
5AZ	Clamp to exhaust system	N52K	M10		45 Nm

OIL COOLER PIPES

17 22 OIL COOLER PIPES

TIGHTENING TORQUE SPECIFICATION - OIL COOLER PIPES

		Type	Thread	Tightening specification	Measure
1AZ	Transmission oil cooler line to transmission	N52K	M8x28		20 Nm
2AZ	Transmission oil cooler line to oil sump	N52K	M6		10 Nm
3AZ	Transmission oil cooler line to transmission sump	N52K	M6x35		8 Nm
4AZ	Transmission oil cooler line to transmission oil-water heat exchanger	N52K	M6x35		8 Nm

5AZ	Engine oil cooler lines to oil module/engine oil cooler	N52K	M8		20 Nm

Exhaust System - Tightening Torques - Z4

EXHAUST ASSEMBLY

18 00 EXHAUST ASSEMBLY

TIGHTENING TORQUE SPECIFICATION - EXHAUST ASSEMBLY

	Type	Thread	Tightening specification	Measure
1AZ Primary catalytic converter to turbocharger/or jacket pipe to catalytic converter	M57/M57TU	M10		42 Nm
	M67			15 Nm
	M30/M70		Tighten down compression spring with nut uniformly to full extent, then slacken by 1.5 turns	10 Nm
	M51		Preload compression springs with nut to 27±1 mm	
	S50	M10		30 Nm
	S54/ECE	M10		27 Nm
	S54/US	M10		24 Nm
2AZ Exhaust pipe to flow section	E23			25 Nm
3AZ Clamp for final muffler	All	M8		15 Nm
4AZ Catalytic converter on silencer	E36/M42/M43/M44		Version with compression spring: Evenly preload compression springs with nuts to 30 mm	
5AZ Connection of positive and negative leads to E catalytic converter	M73			5 Nm
6AZ Rear muffler to intermediate muffler	E53	M8		30 Nm
7AZ Vacuum tank to retaining plate	E46/M54	M8		10 Nm
8AZ Exhaust system to exhaust manifold	M40/M42/M43/M44	M10		45 Nm
9AZ Primary cat. to exhaust system	M57TU/E65			55 Nm

EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

18 31 EXHAUST PIPE WITH CATALYTIC CONVERTER/COMPLETE SYSTEM

TIGHTENING TORQUE SPECIFICATION - EXHAUST PIPE WITH CATALYTIC

CONVERTER/COMPLETE SYSTEM

	Type	Thread	Tightening specification	Measure
1AZ Exhaust system to front pipe with catalytic converter	N54	M8		21 Nm
2AZ Exhaust system to bracket, transmission	N54	M8		19 Nm
3AZ Catalytic converter to exhaust turbocharger	N54	M8	Replace profile clamp and screw	13 Nm
4AZ Exhaust system to rear differential	N54	M8		19 Nm
5AZ Rear muffler to body	N54	M8		19 Nm

EXHAUST SYSTEM SUSPENSION

18 20 EXHAUST SYSTEM SUSPENSION

TIGHTENING TORQUE SPECIFICATION - EXHAUST SYSTEM SUSPENSION

	Type	Thread	Tightening specification	Measure
1AZ Clamp to front pipe holder	N54	M8		19 Nm
2AZ Bracket, primary cat., to primary cat.	N54	M8		19 Nm
3AZ Clamp to exhaust system	N54	M10		45 Nm

1600 DRAWING OFF OF FUEL, SYSTEM CLEANING

16 00 100 CHECKING FUEL TANK AND TANK VENTILATION SYSTEM FOR LEAKS

Necessary preliminary tasks

- Remove cover for carbon canister

The following procedure is only applicable to vehicles **without** the tank leak diagnosis module.

Comply with the following conditions in order to obtain plausible test results:

- Content of fuel tank:
  1. Maximum 90 %
  2. Minimum 13 % (reserve telltale must not light up).
- Park the car in the workshop at least 2 hours before the test so that the fuel temperature is approximately that of the workshop temperature (ideal fuel temperature approx. 10 ... 20 °C).

Disconnect line to evaporation strainer (1) from carbon canister.

IMPORTANT: Risk of breakage!
Carefully remove evaporation strainer from carbon canister.

Using special tool 16 1 070, seal opening (2) for evaporation strainer on carbon canister.

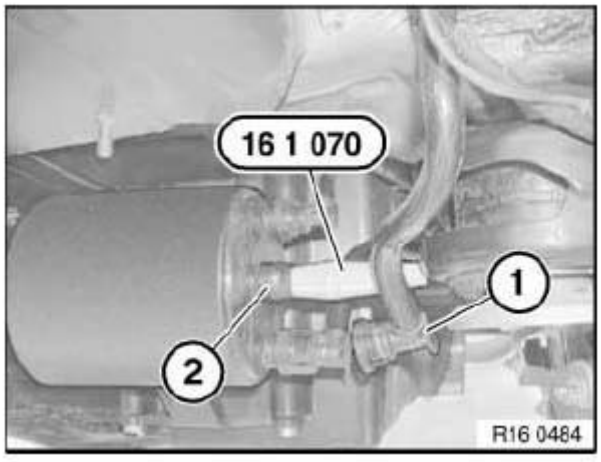


Fig. 1: Identifying Evaporation Strainer And Seal Opening With Special Tool (16 1 070)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove fuel filler cap and connect special tool 16 1 174 to fuel filler neck.

Clamp special tool 16 1 174 on fuel filler neck with adjusting wheel (1).

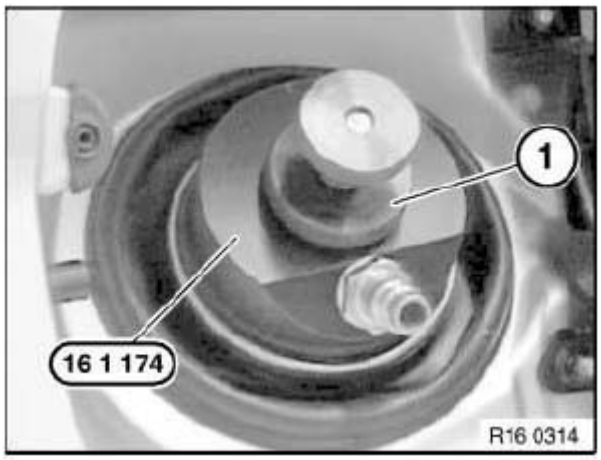


Fig. 2: Clamping Special Tool (16 1 174) On Fuel Filler Neck Adjusting Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Turn pressure regulator on special tool 16 1 171 counterclockwise up to stop.

Connect special tool 16 1 171 using compressed air line (1) to garage compressed air system (8 ... 10 bar).

Connect pressure sensor (2) from Diagnosis and Information System with a measuring range of 0 ... 25 bar.

IMPORTANT: Do not yet connect fast-release coupling (3) of special tool 16 1 171.

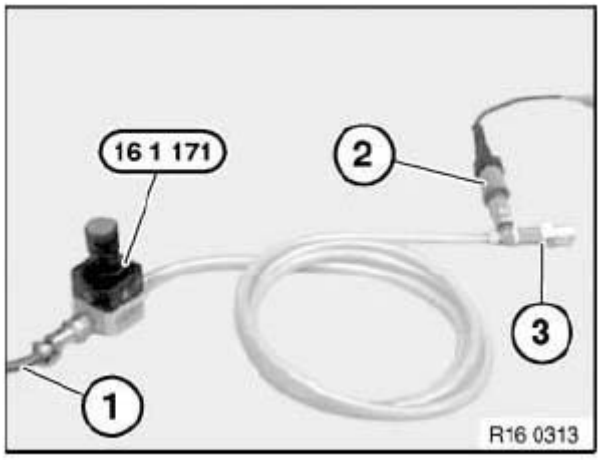


Fig. 3: Connecting Special Tool (16 1 171) To Garage Compressed Air System Using Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

1. Select "Measurement" function on Diagnosis and Information System (DIS).
2. Using pressure regulator on special tool 16 1 171, increase pressure by 0.20 bar.
3. Connect special tool 16 1 174 to fast-release coupling of special tool 16 1 171.
4. Wait until the value at the Diagnosis and Information System has levelled out.
5. Using pressure regulator on special tool 16 1 171, reset gauge pressure in fuel tank to 0.20 bar.

IMPORTANT: Do not under any circumstances increase pressure by more than 0.30 bar as this would result in damage to the fuel tank and venting system.

Using special tool 13 3 010 , disconnect delivery line from special tool 16 1 171 to fuel filler neck.

Allow a rest period of approx. 20 sec.

Read off and note down starting pressure value.

Wait approx. 120 sec.

Read off final pressure value and compare with starting pressure value.

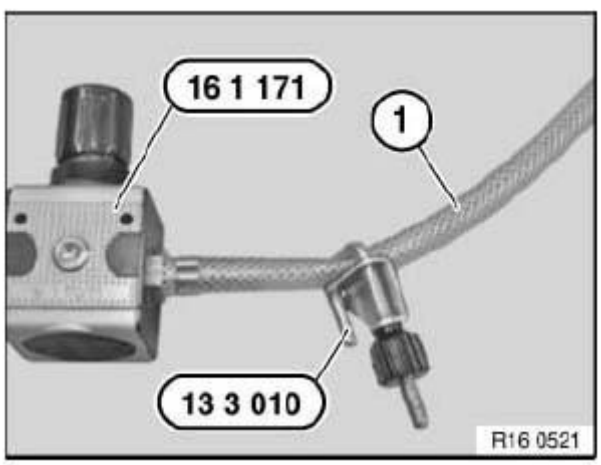


Fig. 4: Disconnecting Delivery Line From Fuel Filler Neck Using Special Tool (16 1 171)
Courtesy of BMW OF NORTH AMERICA, INC.

Measurement evaluation

- Pressure drop up to 0.01 bar:

  System OK

- Pressure drop over 0.02 bar:

  System leaking beyond permitted levels

If the system is leaking, a leak test must be carried out and the defective components replaced.

16 00 510 CONDUCTING LEAK TEST ON FUEL TANK AND TANK VENTING SYSTEM

Pressurize fuel tank and tank venting system.

NOTE: When leak-testing with a leak tester device, follow the operation instructions of the device manufacturer.

IMPORTANT: Emerging fuel vapors!
These tasks should only be performed in well ventilated rooms or with a suitable extractor facility provided.
Observe country-specific accident prevention and occupational safety regulations.

The leak test can be carried out with a leak detector.

Possible causes may be:

- **FUEL FILLER CAP LEAKING**
- Tank vent line leaking (fuel tank - carbon canister).
- Tank vent line leaking (engine compartment).
- Locking ring on fuel filter leaking
- Carbon canister - shut-off valve leaking

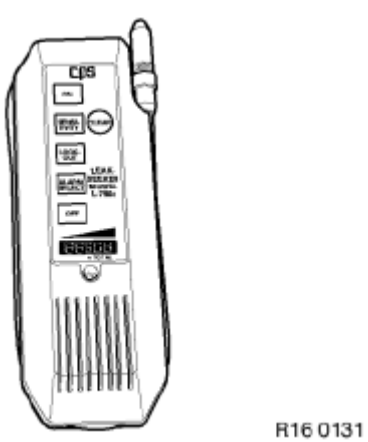


Fig. 5: Identifying Fuel Tank And Tank Venting System
Courtesy of BMW OF NORTH AMERICA, INC.

16 00 005 DRAINING AND FILLING FUEL TANK

IMPORTANT: Observe country-specific safety regulations.
Ensure adequate ventilation in the place of work!

Connect the exhaust and extraction systems to the exhaust tailpipe.
The electric fuel pump must not operate without fuel! After completing repairs but before starting the engine for the first time, fill the fuel tank with min. 5 l fuel through the fuel filler pipe.
Do not damage non-return flap when pulling out extraction hose.

Drawing off fuel

Start engine and allow to run.

The electric fuel pump runs.

In this way, the fuel is repumped through the suction jet pump from the left to the right side of the fuel tank.

NOTE: Fuel can be drawn out of left and right sides of tank through filler neck, leaving only a small residue. The residual amount is drawn off via the service opening.

Insert special tool 16 1 080 into fuel filler neck.

Special tool 16 1 080 has two different diameters for petrol/gasoline and diesel vehicles!

Slide extraction hose of extractor unit, refer to BMW Service Workshop Equipment and Planning Documentation, through special tool 16 1 080 into the fuel filler pipe, turning in the process if necessary.

Insertion length approx. 118 cm.

Draw off fuel with suction unit (refer to BMW Service Workshop Equipment) as far as possible.

Follow drawing off of fuel on fuel gauge in instrument cluster.

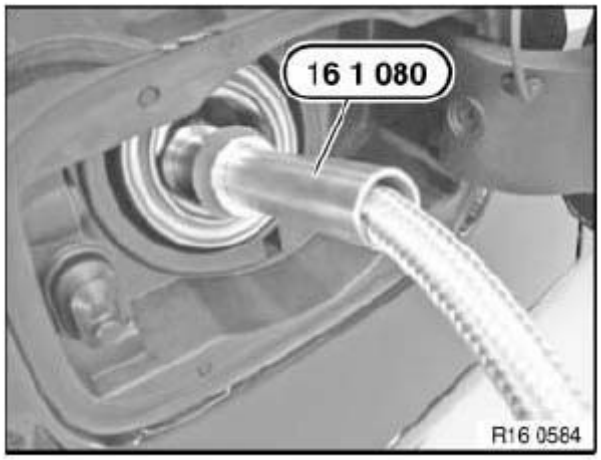


Fig. 6: Identifying Special Tool (16 1 080)
Courtesy of BMW OF NORTH AMERICA, INC.

Drawing off residual fuel amount

Drawing off residual fuel amount is not included in the time value of this operation.

Remove **FUEL FILTER** .

Drawing off residual fuel amount, right side:

Draw off residual fuel amount in right tank half through service opening (A).

Drawing off residual fuel amount, left side:

Feed extraction hose through service opening above saddle into left tank half (B).

Residual fuel amount can be drawn off.

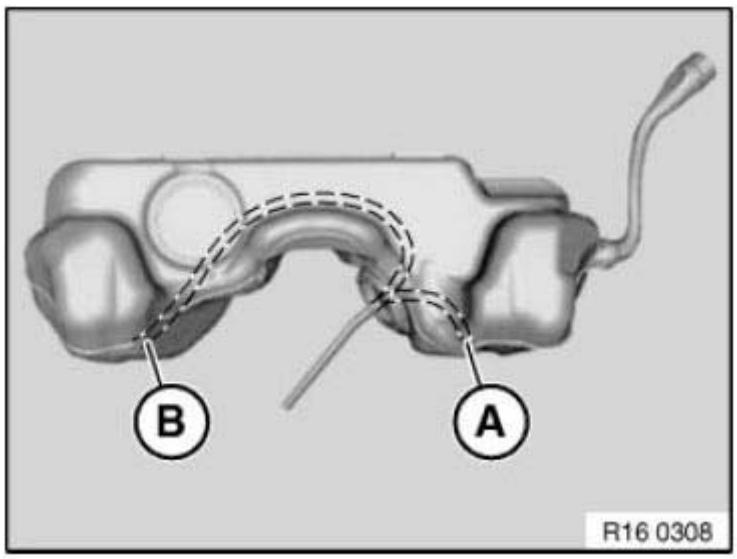


Fig. 7: Identifying Fuel Tank Service Openings
Courtesy of BMW OF NORTH AMERICA, INC.

Extracting fuel after a defect in the suction jet pump or fuel pump

Draw off right half of tank completely through fuel filler pipe.

Remove **FUEL FILTER** .

Insert extraction hose through service opening in tank, fuel (also residual quantity) can be drawn off.

Fuel filling

Insert special tool 16 1 080 into fuel filler neck.

Special tool 16 1 080 has two different diameters for petrol/gasoline and diesel vehicles!

Slide extraction hose of extractor unit, refer to BMW Service Workshop Equipment, approx. 40 cm into fuel filler pipe.

Fill fuel from suction extractor unit.

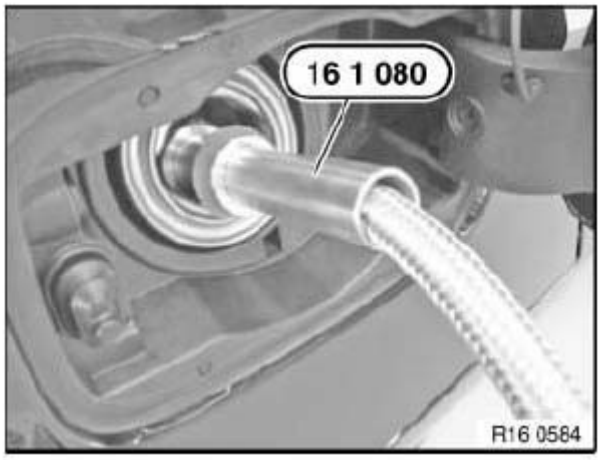


Fig. 8: Identifying Special Tool (16 1 080)
Courtesy of BMW OF NORTH AMERICA, INC.

16 00 510 LEAK TEST ON FUEL TANK AND TANK VENTILATION SYSTEM (DMTL)

IMPORTANT: On vehicles with tank leak diagnosis modules (DMTL), do not work with external pressurization as the tank ventilation system will leak under this condition.
On account of the escaping fuel vapors, these tasks should only be carried out in well ventilated rooms or with a suitable extractor facility provided.
Observe country-specific accident prevention and occupational safety regulations.

In the Diagnosis and Information System (DIS), go to the "Function and component selection" page.

By selecting:

- Service functions
- Drive
- Digital Motor Electronics
- Activation DMTL pump

Adopt test module in test schedule.

Switch to the test schedule and implement the "Activation DMTL pump" test module.

Leak diagnosis pump pressurizes fuel tank and tank ventilation system.

Carry out leak test.

Terminate test module after completing leak test.

NOTE: Leak diagnosis pump is automatically shut down after approx. 15 minutes due to risk of overheating. Allow pump to cool down for at least 15 minutes. Then continue procedure.

The leak test can be carried out with a leak detector. Follow manufacturer's operating instructions in doing so.

Possible causes of leaks are:

- **FUEL FILLER CAP LEAKING**
- Tank vent line leaking (fuel tank - carbon canister).
- Tank vent line leaking (engine compartment).
- Locking ring on fuel filter leaking

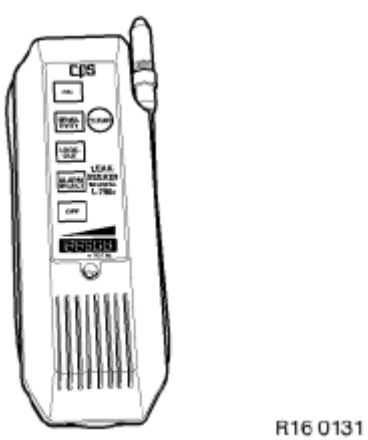


Fig. 9: Identifying Fuel Tank And Tank Venting System
Courtesy of BMW OF NORTH AMERICA, INC.

1611 FUEL TANK WITH MOUNTING

16 11 130 CHECKING FILLER CAP PRESSURE RELIEF VALVE

Set pressure regulator on special tool 16 1 171 fully in "-" direction.

Connect special tool 16 1 171 via compressed air line (1) to workshop/garage compressed air system (8...10 bar).

Connect pressure sensor (2) from Diagnosis and Information System.

Connect special tool 16 1 172 to quick-connect coupling (3).

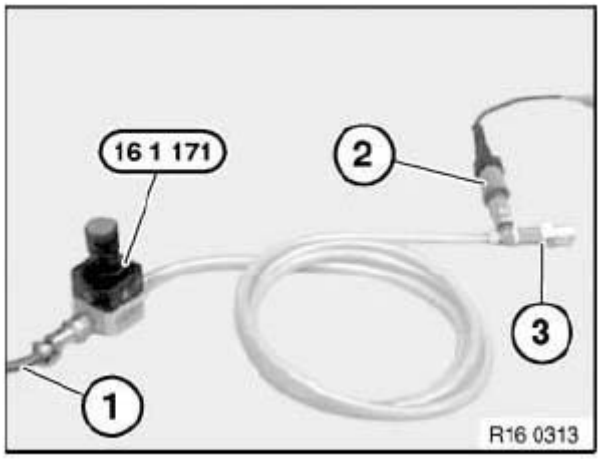


Fig. 10: Connecting Special Tool (16 1 171) To Garage Compressed Air System Using Compressed Air Line
Courtesy of BMW OF NORTH AMERICA, INC.

Install tank cap on special tool 16 1 172.

Fig. 11: Identifying Fuel Filler Cap With Special Tool (16 1 172) And (16 1 173)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Only the absolute pressure is indicated in the display of the Diagnosis and Information System (DIS). The current ambient air pressure is already displayed without additional pressurization.

Check testing equipment for leaks

Select "Measurement/Pressure" function on Diagnosis and Information System (DIS).

Increase pressure by 0.2 bar with pressure regulator on special tool 16 1 171.

Using special tool 13 3 010 , clamp off supply line from special tool 16 1 171.

Read off and note down pressure.

Wait 60 seconds.

Read off pressure again and compare with starting pressure value.

Measurement evaluation:

PRESSURE MEASUREMENT CHART

Pressure drop > 0.012 bar	Test equipment leaking. Check connection points for leaks.

Check filler cap pressure relief!

Select "Measurement/Pressure" function on Diagnosis and Information System (DIS).

Increase pressure by 0.3 bar with pressure regulator on special tool 16 1 171.

Using special tool 13 3 010 , clamp off supply line from special tool 16 1 171.

Read off and note down pressure.

Wait 60 seconds.

Read off pressure value again and compare with starting pressure value.

Measurement evaluation:

PRESSURE MEASUREMENT CHART

Pressure drop > 0.012 bar	Filler cap pressure relief valve faulty. Replace filler cap.

16 11 030 REMOVING AND INSTALLING FUEL TANK

IMPORTANT: After installing fuel tank (before initial engine starting):

- **Check ground connection at fuel filler neck to body for continuity.**

  If necessary, clean contact surface between body and fuel filler pipe screw connection.

- **Fill fuel tank with min. 5 l fuel.**

After installation:

Carry out wheel alignment check.

Necessary preliminary tasks

- Draw off **FUEL FROM FUEL TANK**
- Remove **FUEL FILLER CAP WITH COVER HOUSING**
- Remove **REAR AXLE**
- Remove tunnel thermal insulation

Detach cable ties (1) on rotary catch.

Disconnect plug (2) from fuel filter.

Press lock (3) towards fuel filter and detach feed line (4).

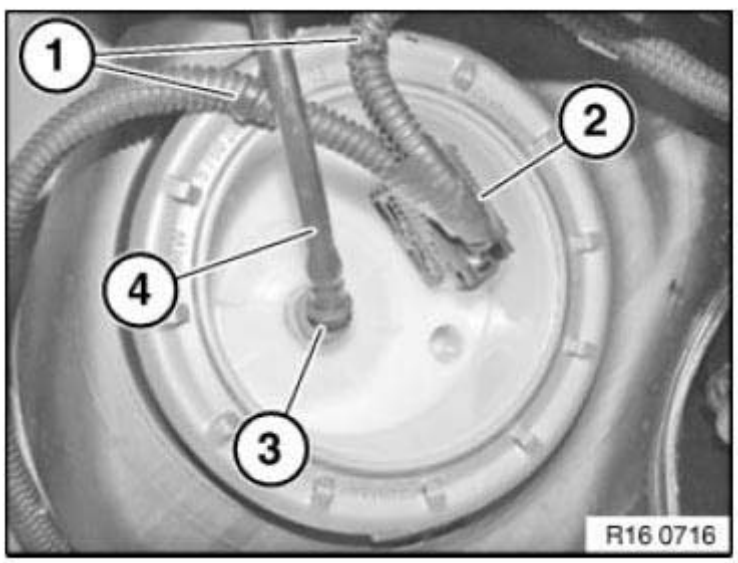


Fig. 12: Identifying Cable Ties, Plug And Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Tightening torque **16 11 1AZ** .

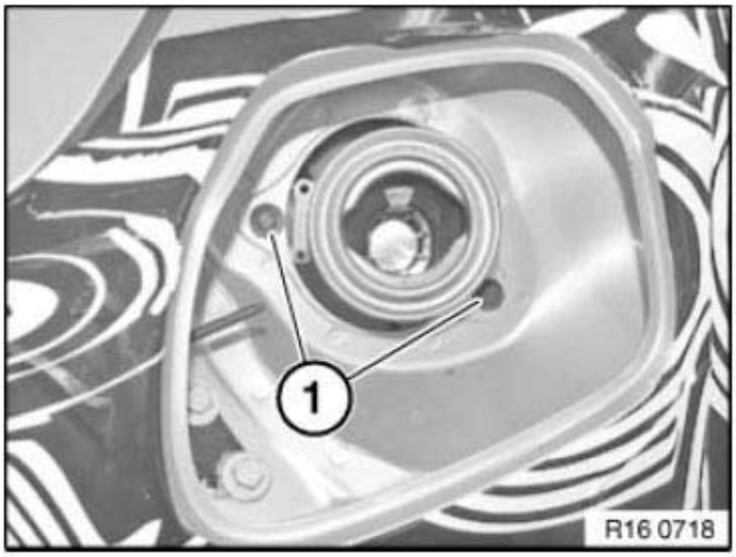


Fig. 13: Identifying Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Installation:

Tightening torque **16 11 3AZ** .

Detach grounding strap (2) from stud.

Disconnect service vent lines (3) and unclip from holder.

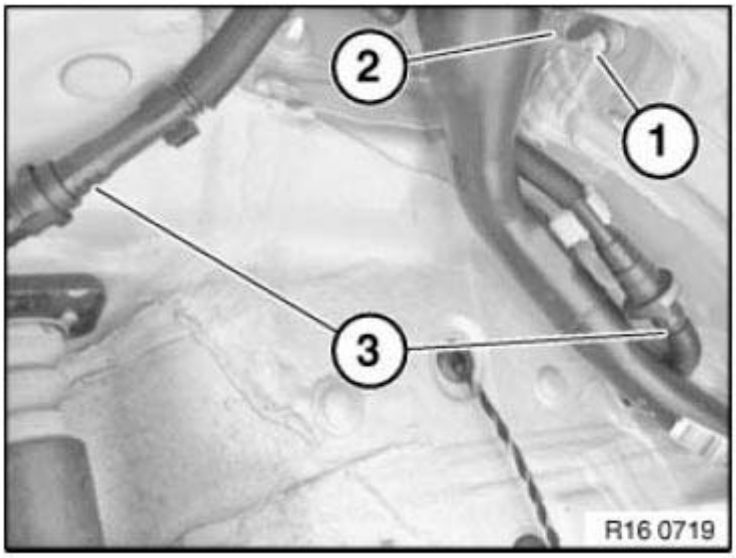


Fig. 14: Identifying Slacken Nut, Grounding Strap And Vent Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip line (1) from fuel tank (2).

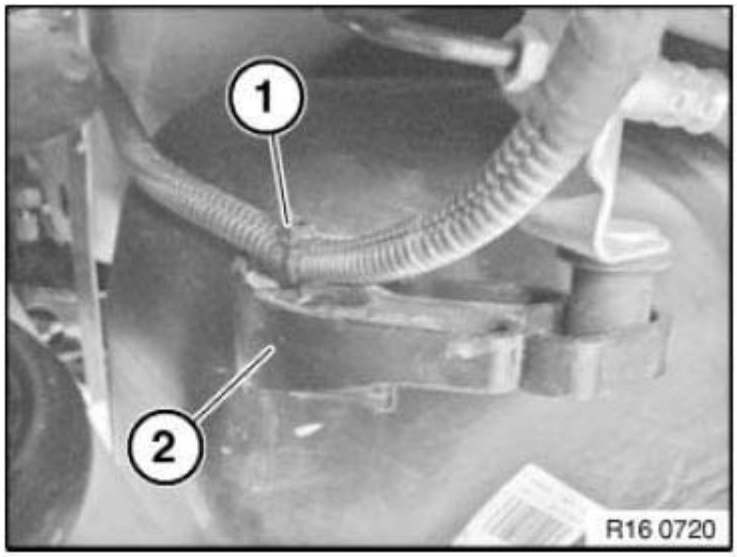


Fig. 15: Unclipping Line From Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1) and unclip line (2).

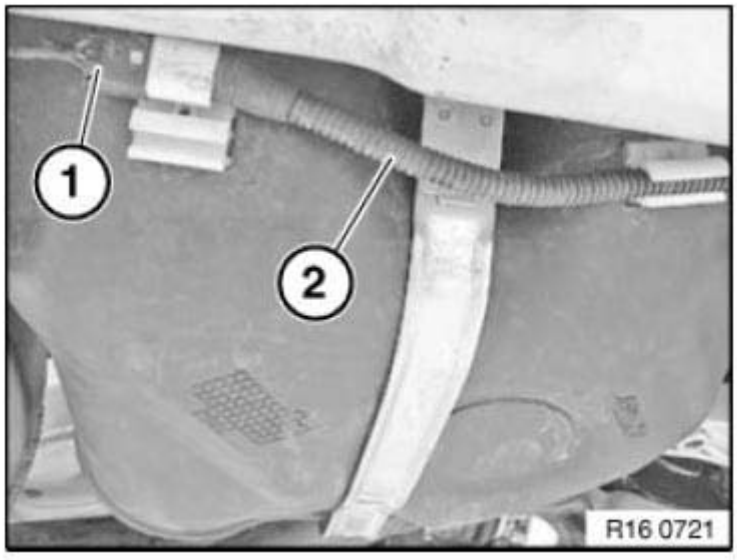


Fig. 16: Identifying Plug Connection And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Detach fuel feed line from holder (1).

Heavily support the fuel tank.

Unscrew nuts (3).

Installation:

Tightening torque **16 11 2AZ** .

Swing clamping bands (2) downwards and disengage.

Lower fuel tank downwards.

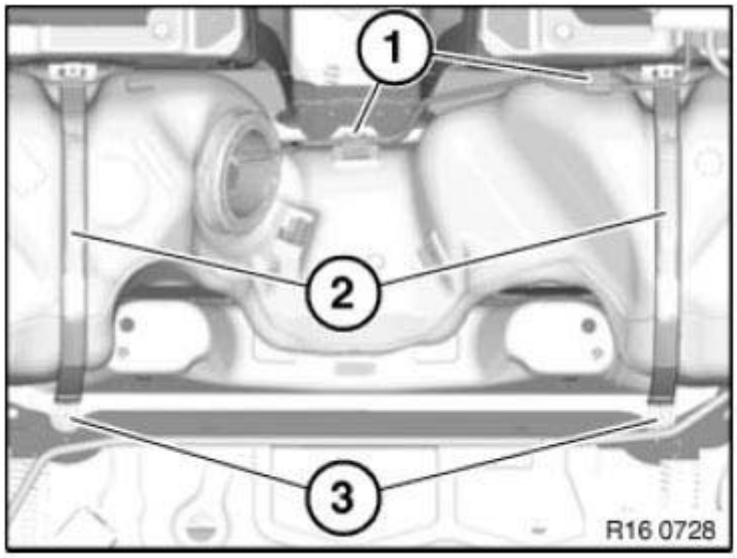


Fig. 17: Identifying Fuel Feed Line Holder, Clamping Bands And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Before engaging clamping bands (1), make sure rubber damper (2) is correctly seated.

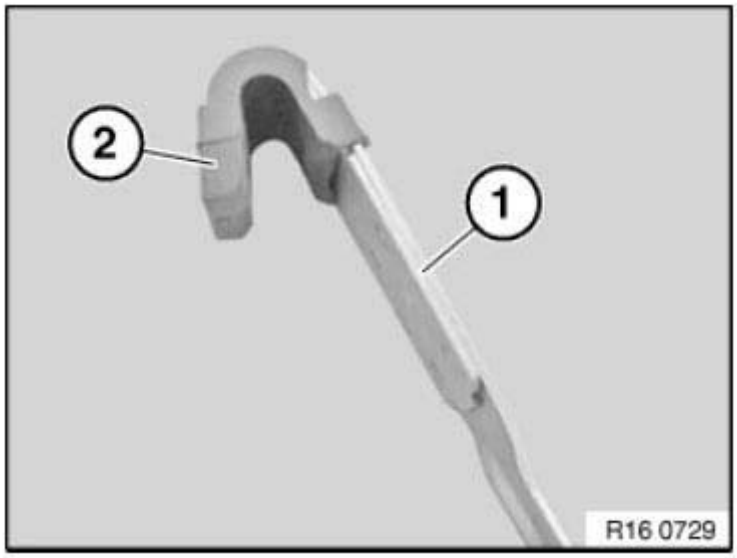


Fig. 18: Identifying Clamping Bands And Rubber Damper
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pay attention to top vent line (1) when installing fuel tank.

Feed vent line (1) through opening (2) into wheel arch.

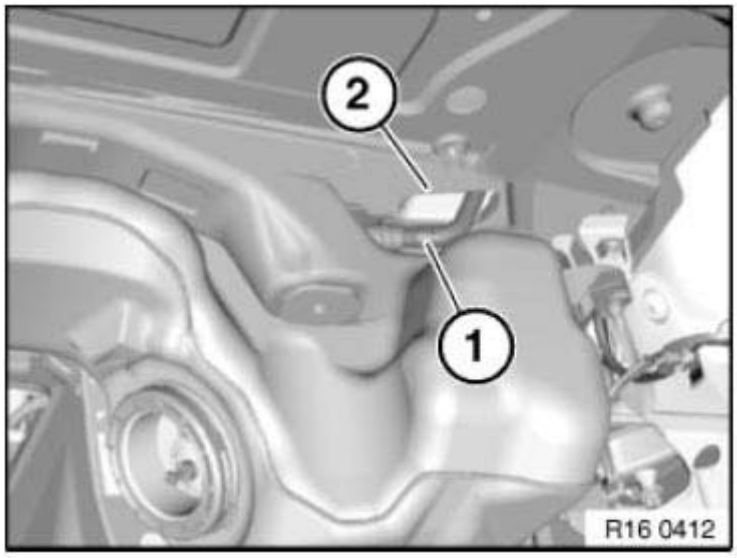


Fig. 19: Identifying Vent Line In Wheel Arch
Courtesy of BMW OF NORTH AMERICA, INC.

When replacing fuel tank:

- Modify **FUEL PUMP** .
- Modify **FUEL FILTER** .

16 11 048 REMOVING AND INSTALLING/REPLACING FUEL FILTER WITH PRESSURE REGULATOR

Recycling

Fuel escapes when fuel lines are detached. Have a collecting container ready.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

IMPORTANT: Ensure adequate ventilation in the place of work!
Avoid skin contact (wear gloves and protective goggles).

Ensure absolute cleanliness when working on the open fuel system. Contaminants in the fuel tank can impair driving operation or may even result in vehicle breakdown!

Necessary preliminary tasks:

- Draw off **FUEL FROM FUEL TANK** .
- Remove **EXHAUST SYSTEM (N52K)** or **1800 EXHAUST SYSTEM (N54)** .
- Remove tunnel thermal insulation.

Detach cable ties (1) on rotary catch.

Disconnect plug (2) from fuel filter.

Press lock (3) towards fuel filter and detach feed line (4).

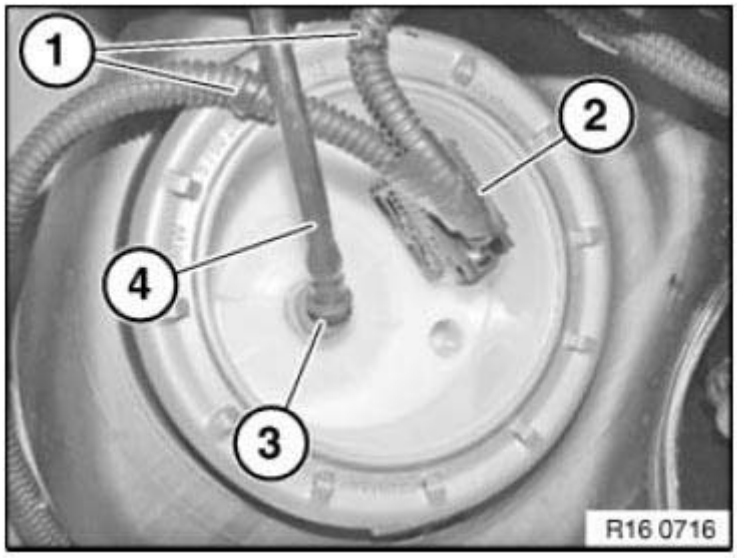


Fig. 20: Identifying Cable Ties, Plug And Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw cap with special tool 16 1 020.

Installation:

Tightening torque 16 14 2AZ.

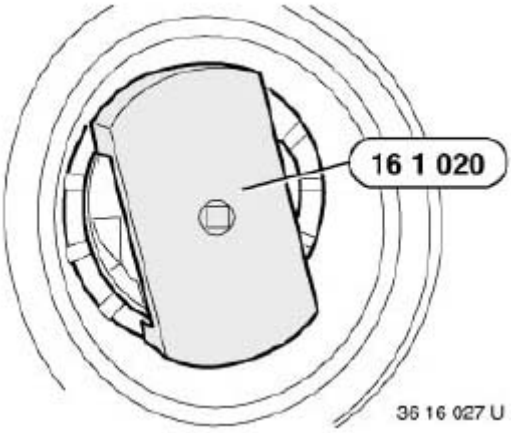


Fig. 21: Removing Screw Cap Using Special Tool (16 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

After tightening to specified torque, make sure the notch (2) on the rotary catch is located between the two markings (1) on the fuel tank.

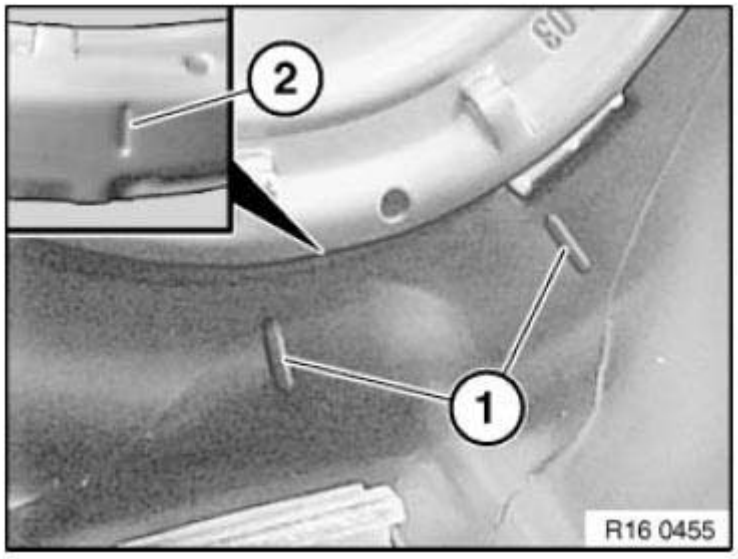


Fig. 22: Identifying Notch On Rotary Catch With Markings On Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The fuel filter can only be installed in one position.

When installing, make sure lug (1) of fuel filter engages in corresponding opening (2) on fuel tank.

Always replace seal (3).

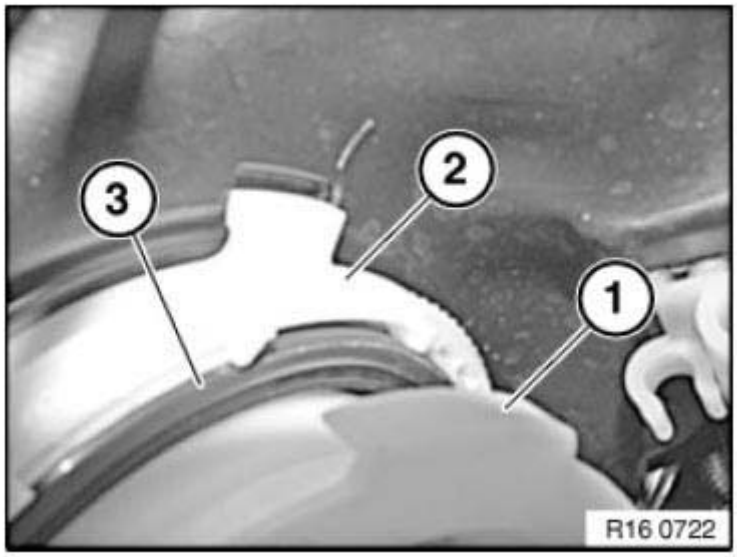


Fig. 23: Identifying Lug, Fuel Tank Opening And Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1).

Disconnect lines (2) and (3) from fuel filter.

NOTE: Lines (2) and (3) must not be switched round as they have different diameters. Fuel filter and pressure regulator together form a single unit and can only be replaced as such.

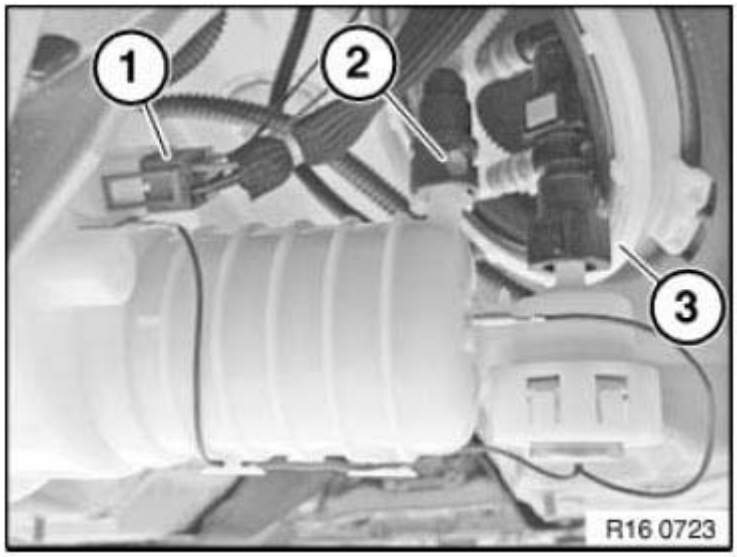


Fig. 24: Identifying Plug Connection And Fuel Filter Lines
Courtesy of BMW OF NORTH AMERICA, INC.

1612 FUEL DELIVERY, SENSOR FOR DISPLAY

16 12 010 REMOVING AND INSTALLING OR REPLACING CARBON CANISTER

Necessary preliminary tasks

- Remove cover for carbon canister

Unlock quick-release fasteners (1) and disconnect vent lines.

Release screws (2) and swing out carbon canister (3).

Installation:

Tightening torque **16 13 1AZ** .

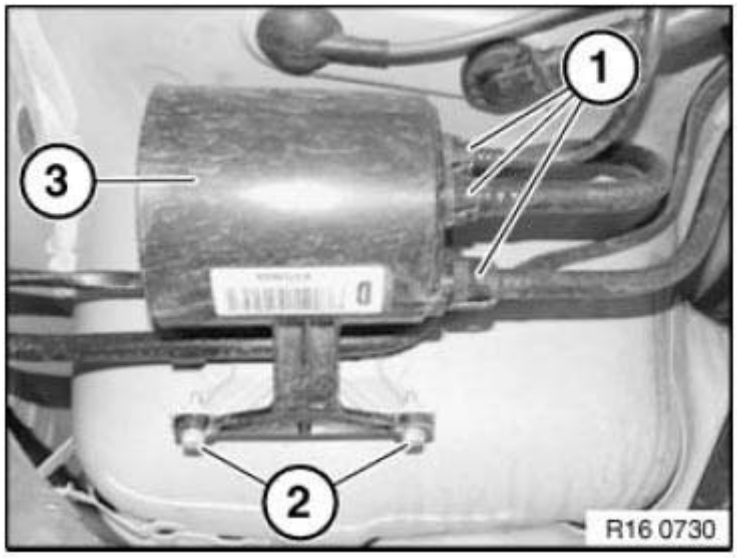


Fig. 25: Identifying Quick-Release Fasteners, Screws And Carbon Canister
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 010 REMOVING AND INSTALLING/REPLACING CARBON CANISTER (US VERSION)

Necessary preliminary tasks

- Remove cover for carbon canister

Disconnect plug connection (1).

Unlock quick-release fasteners (2) and disconnect vent lines.

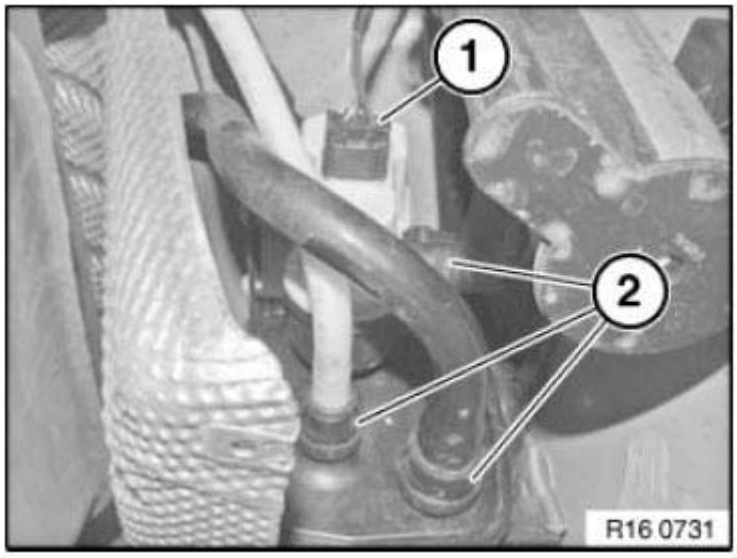


Fig. 26: Identifying Plug Connection And Quick-Release Fasteners
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and swing out carbon canister (2).

Installation:

Tightening torque **16 13 1AZ** .

The following components must be modified when the carbon canister is replaced:

- **DIAGNOSIS MODULE**

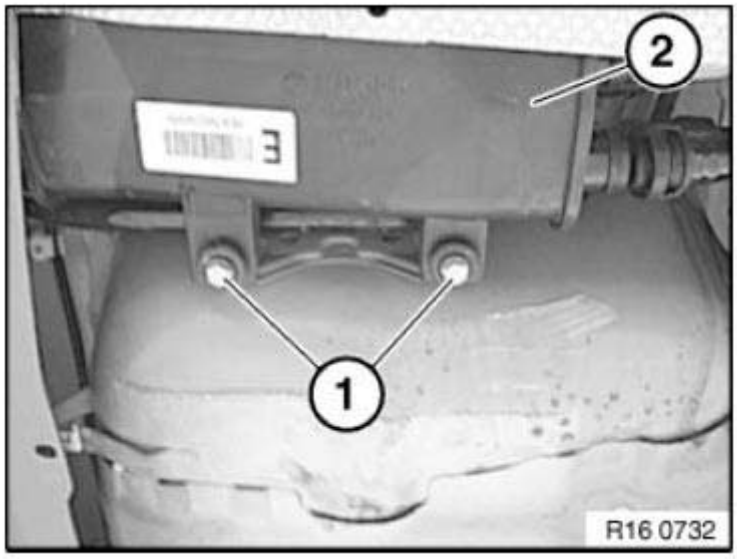


Fig. 27: Identifying Carbon Canister Screws
Courtesy of BMW OF NORTH AMERICA, INC.

16 12 000 REMOVING AND INSTALLING/REPLACING SENSOR FOR FUEL GAUGE

Necessary preliminary tasks:

- Remove **FUEL PUMP WITH FUEL LEVEL SENSOR**

Press plug connection (1) in direction of fuel pump.

Unlock lug (2) with a screwdriver and detach plug connection (1).

Installation:

Check locking of plug connection by pulling.

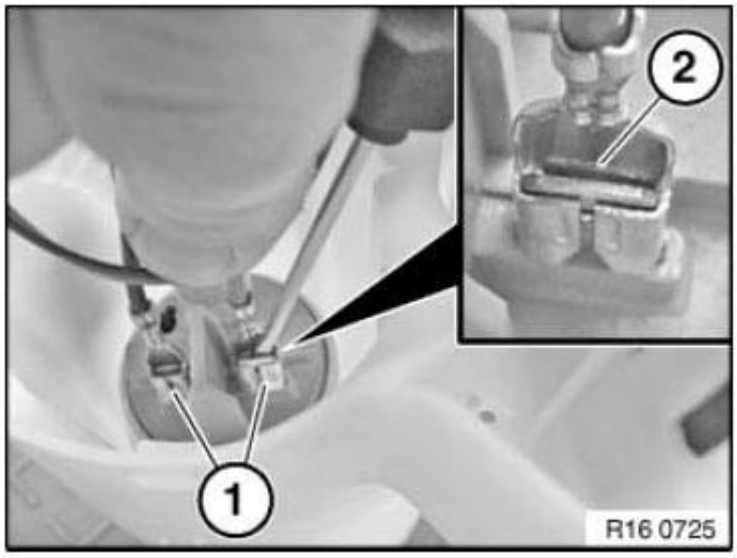


Fig. 28: Identifying Plug Connection And Lug
Courtesy of BMW OF NORTH AMERICA, INC.

Release lugs (1) in direction of arrow.

Lift out tank fill level sensor (2).

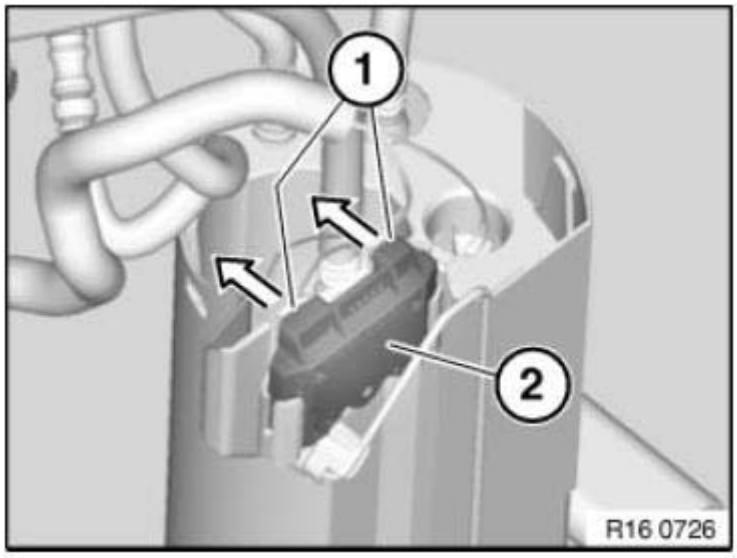


Fig. 29: Lifting Out Tank Fill Level Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

1613 FUEL DEAERATION

16 13 015 REMOVING AND INSTALLING/REPLACING TANK LEAK DIAGNOSIS MODULE (PETROL/GASOLINE CARS WITH US DMTL VERSION)

Necessary preliminary tasks

- Remove **CARBON CANISTER**

Release screws (1).

Disconnect tank leak diagnosis module (2) from carbon canister in direction of arrow.

Installation:

Replace sealing ring.

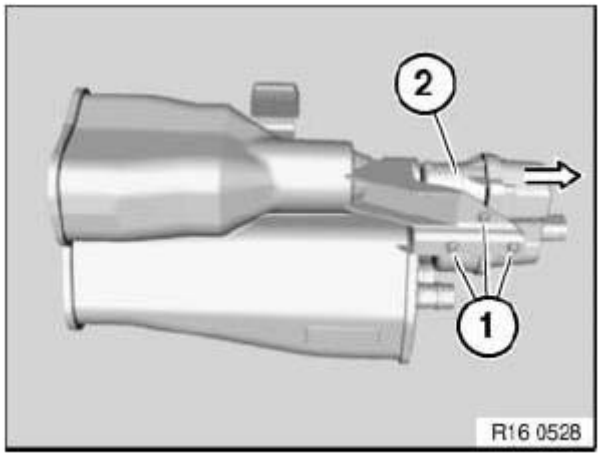


Fig. 30: Identifying Tank Leak Diagnosis Module With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

1614 FUEL PUMP

16 14 500 REMOVING AND INSTALLING OR REPLACING CONTROL UNIT FOR ELECTRIC FUEL PUMP

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD protection).

Necessary preliminary tasks

- Remove right luggage compartment **WHEEL ARCH TRIM**

Disconnect plug connection (1).

Unscrew nuts (2).

Installation:

Tightening torque **16 14 1AZ** .

Remove control unit (3).

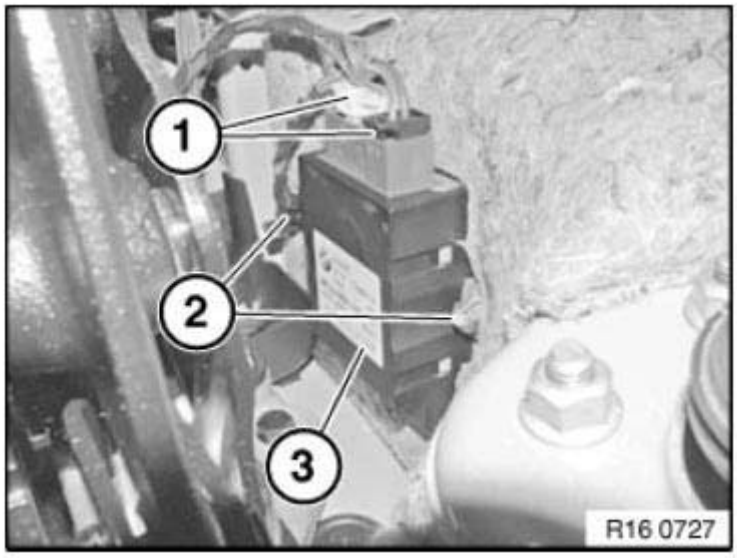


Fig. 31: Identifying Plug Connection, Nuts And Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/coding

16 14 060 REMOVING AND INSTALLING/REPLACING DUST FILTER FOR TANK LEAKAGE DIAGNOSIS MODULE

Necessary preliminary tasks

- Remove cover for carbon canister

Unlock quick-connect coupling (1) and detach vent lines.

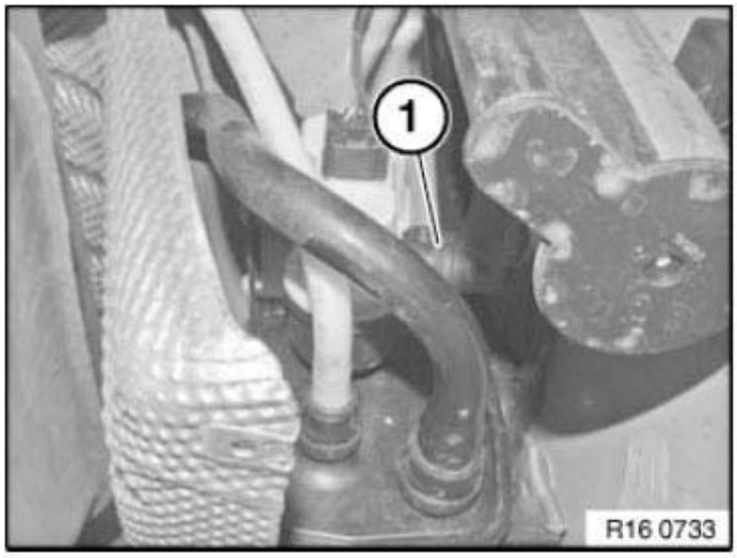


Fig. 32: Identifying Quick-Connect Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock quick-connect coupling (1) and detach vent lines (2) from dust filter.

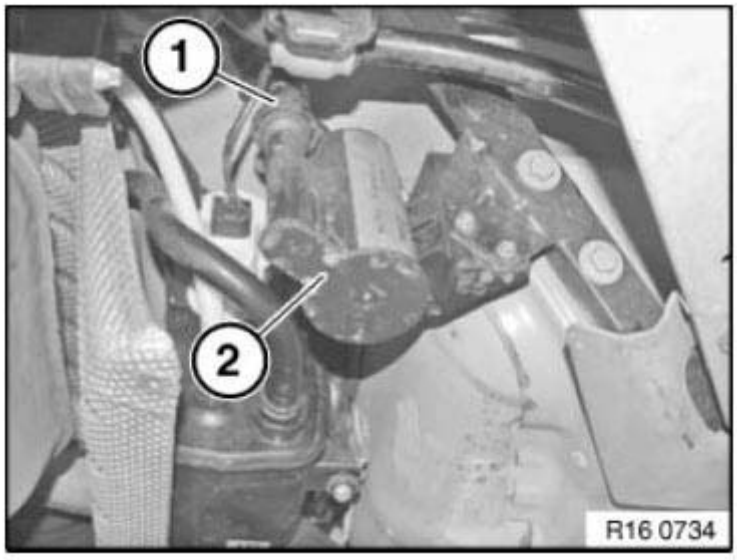


Fig. 33: Identifying Quick-Connect Coupling And Vent Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Slide dust filter (2) in direction of arrow from holder.

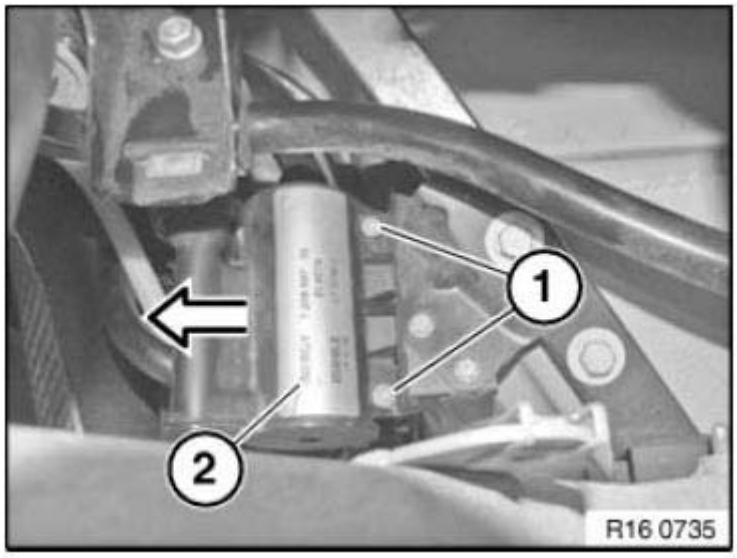


Fig. 34: Sliding Dust Filter From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

16 14 015 REMOVING AND INSTALLING/REPLACING FUEL PUMP WITH FUEL LEVEL SENSOR

Necessary preliminary tasks

- Remove **FUEL FILTER** .

Disconnect fuel line (1).

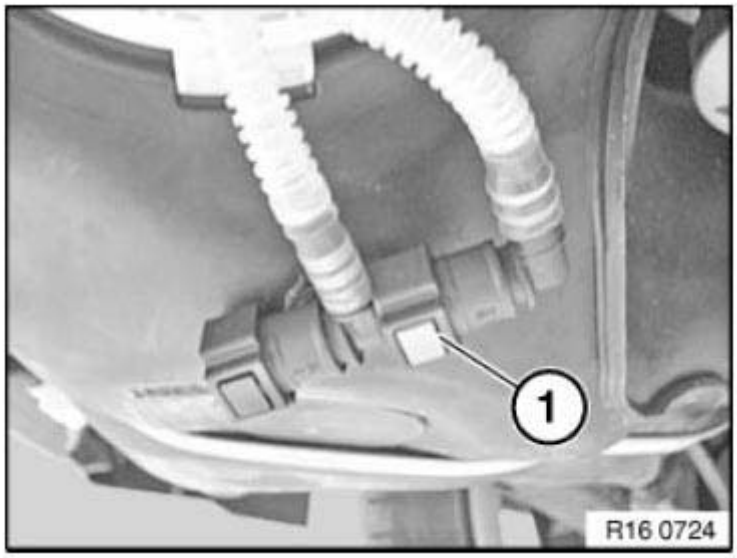


Fig. 35: Identifying Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug.

To do so, bend lug (1) on both sides outwards and pull plug apart.

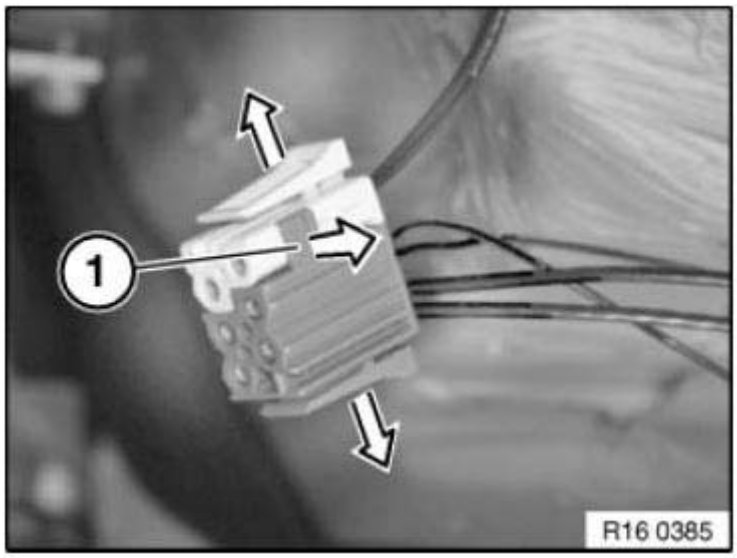


Fig. 36: Pulling Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect line (2) from fuel pump.

Unlock fuel pump by pressing lug (1).

Release fuel pump upwards from catch.

Remove fuel pump with sensor through service aperture.

Installation:

When installed, fuel pump must clearly be heard to snap into place.

Do not bend sensor arm during installation.

Line (2) must not be kinked!

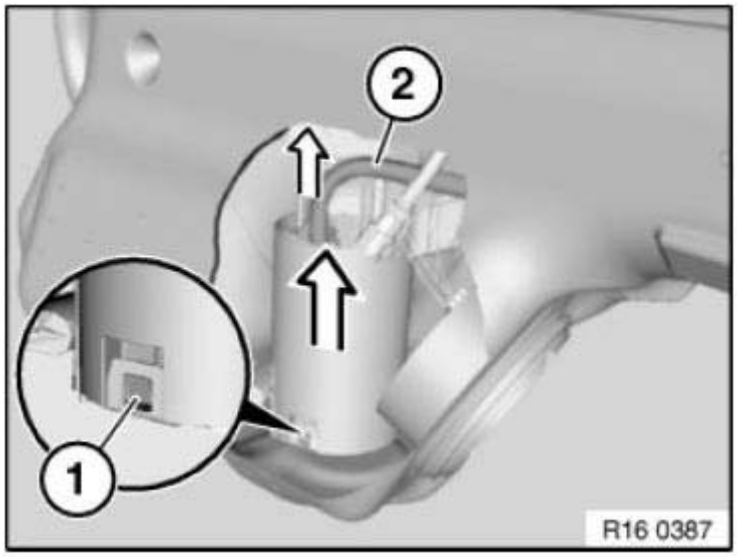


Fig. 37: Removing Fuel Pump From Catch And Service Aperture
Courtesy of BMW OF NORTH AMERICA, INC.

16 FUEL SUPPLY

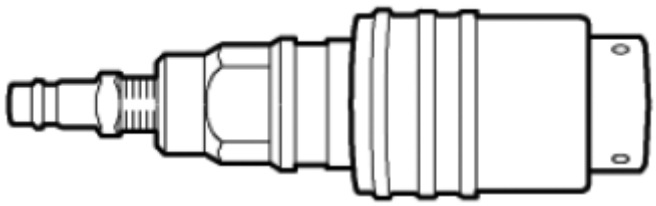
16-8010 ADAPTER

Adapter MW

NOTE: For connecting the workshop compressed air supply to the CNG system via the CNG filling connection.

SI number

01 14 95 (014)



W16 8 010

Fig. 1: Identifying Adapter (16-8010)
Courtesy of BMW OF NORTH AMERICA, INC.

16-1080 HOSE

Hose Minimum set: Mechanical tools MW

NOTE: (Hose guide) For unlocking new fuel tank flap systems with safety lock (incorrect fuelling, diesel/petrol/gasoline)

Storage Location

B19

SI number

01 16 06 (282)

Fig. 2: Identifying Hose (16-1080)
Courtesy of BMW OF NORTH AMERICA, INC.

16-8020 LIFTING GEAR

Lifting gear MW

NOTE: (Lifting beam) For removing and installing the gas tank

SI number

01 14 95 (014)

W16 8 020

Fig. 3: Identifying Lifting Gear (16-8020)
Courtesy of BMW OF NORTH AMERICA, INC.

FUEL TANK AND MOUNTING PARTS E89

16 11 FUEL TANK AND MOUNTING PARTS E89

FUEL TANK AND MOUNTING PARTS SPECIFICATIONS

Tank volume/reserve	ltr.	55/8
Venting: via integrated compensation volume in tank, by carbon canister to intake area.		

Fuel Supply System - Tightening Torques - Z4

FUEL PUMP

16 14 FUEL PUMP

TIGHTENING TORQUE SPECIFICATION - FUEL PUMP

	Type	Thread	Tightening specification	Measure
1AZ El. fuel pump ECU to body	E89	M6		5 Nm

FUEL TANK AND MOUNTING PARTS

16 11 FUEL TANK AND MOUNTING PARTS

TIGHTENING TORQUE SPECIFICATION - FUEL TANK AND MOUNTING PARTS

	Type	Thread	Tightening specification	Measure
1AZ Fuel filler pipe to body	E89	M5		8 Nm
2AZ Clamping band to body	E89	M8		19 Nm
3AZ Grounding strap to body	E89			8 Nm

TANK VENTILATION

16 13 TANK VENTILATION

TIGHTENING TORQUE SPECIFICATION - TANK VENTILATION

	Type	Thread	Tightening specification	Measure
1AZ Carbon canister to body	E89	M6		8 Nm

1.0 FUELS FOR GASOLINE ENGINES

Use only unleaded gasoline in vehicles equipped with a catalytic converter.

Fuels containing up to and including 10% of ethanol or other oxygenates with up to 2.8% oxygen by weight, that is, 15% MTBE (methyl tertiary butyl ether) or 3% methanol plus an equivalent amount of co-solvent, will not void the applicable warranties with respect to defects in materials or workmanship.

Although, usage of such alcohol fuel blends may result in driveability, starting, and stalling problems due to reduced volatility and lower energy content of the fuel. Those driveability problems may be especially evident under certain environmental conditions, such as: high or low ambient temperatures and high altitude.

Only specially adapted vehicles (FFV-Flexible Fuel Vehicles) can run on high alcohol fuel blends. BMW, for the various technical and environmental reasons explained below, does not offer FFV models.

Usage of E85, or any other high alcohol content blend (e.g. E30) in BMW vehicles, will cause various driveability complaints (cold start problems, stalling, reduced performance, poor fuel economy, etc.), may cause excessive emissions, and may cause irreversible damage to engine, emission control and fuel delivery systems due to incompatibility of materials with alcohols.

General Notes Regarding E85 Fuel.

E85 fuel contains 85% (by volume) of ethanol and 15% of gasoline. Ethanol can be produced chemically from ethylene or biologically from grains, agricultural wastes, or any organic material containing starch or sugar. In the US, ethanol is mainly produced from corn and is classified as a renewable fuel.

Similar to gasoline, ethanol contains hydrogen and carbon; with additional oxygen molecules build into its chemical chain. This chemical structure makes ethanol's burning process slightly cleaner compared to the gasoline (lower tailpipe emissions).

On the other hand, due to lower carbon content, ethanol provides 27% less energy (for identical volume) then gasoline, resulting in the reduced fuel economy of E85 vehicles (approximately 22% higher consumption). Increased fuel consumption requires the appropriately enlarged fuel tank capacities (usually 30% increase), and the specific DME calibrations for the E85 lower Stoichiometric air/fuel ratio (10 compared to 14.7 for gasoline engines).

E85 fuel volatility is typically lower then gasoline (RVP 6-10 psi, compared to 8-15 psi for gasoline). Lower fuel volatility will reduce vehicle evaporative emissions, but it may cause cold starting problems especially with lower ambient temperatures.

Under certain environmental conditions, mainly lower ambient temperatures, ethanol separates from gasoline/alcohol mixture and absorbs water. The ethanol absorbed water molecules are heavier then gasoline or ethanol, they remain at the bottom of fuel tank and when introduced into combustion process they tend to form

an extremely lean mixture resulting in misfire, rough idle and cold starting problems.

Certain materials, commonly used with gasoline are totally incompatible with alcohols. When these materials come in contact with ethanol, they may dissolve in the fuel, which may damage engine components and may result in poor vehicle driveability.

Some metals (e.g. zinc, brass, lead, aluminum) become degraded by long exposure to ethanol fuel blends. Also, some nonmetallic materials used in automotive industry such as: natural rubber, polyurethane, cork gasket material, leather, polyvinyl chloride (PVC), polyamides, methyl-methacrylate plastics, and certain thermo & thermoset plastics degrade when in contact with fuel ethanol.

In order to safely and effectively operate a motor vehicle running on E85, the vehicle must be compatible with alcohol use. Some manufacturers have developed vehicles called FFV (Flexible Fuel Vehicle) that can operate on any blend of ethanol and gasoline (from 0% ethanol and 100% gasoline, up to 85% ethanol and 15% gasoline). Ethanol FFVs are similar to gasoline vehicles, with main differences in materials used in fuel management and delivery systems, and DME control module calibrations. In some cases, also E85 vehicles require special lubricating oils.

Aftermarket conversions of gasoline-powered vehicles to ethanol-fueled vehicles, although possible, are not recommended due to internal materials and DME software incompatibility, as well, as the high costs of conversion.

TOP TIER DETERGENT GASOLINE

Deposit-control additives have been required by the EPA in all gasoline from 1995, however, since the introduction of the lowest additive concentration (LAC) most gasoline manufacturers have actually reduced the concentration level of detergent additives by up to 50%.

Low content of cleaning additives results in an excessive accumulation of deposits on fuel injectors, the intake valves, the exhaust manifold or inside the combustion chamber. Due to deposits build-up, customers may experience various driveability problems (e.g. cold start problems, rough idle), increased emissions with Service Engine Soon light illumination, reduced engine performance and poor fuel economy.

In order to increase the level of detergent additives in gasoline, the TOP TIER Detergent Gasoline requirements were approved by four automotive companies (BMW, GM, Honda and Toyota).

Usage of the TOP TIER Gasoline will help keep engines cleaner, and will reduce deposits-related concerns.

A number of gasoline retailers have already met the TOP TIER Detergent Gasoline requirements and are offering this product in all octane grades in all of their respective marketing areas. The current TOP TIER Gasoline retailers are: QuickTrip®, ChevronTexaco®; ConocoPhillips®; 76®; Shell®; Entec Stations®; MFA Oil Company®; Kwik Trip®/Kwik Star®; The Somerset Refinery, Inc.®; Aloha Petroleum®; Jiffy Mart®; Mahalo®; Trip-Par Oil Company®. All gasoline outlets carrying the brand of the approved retailer must conform to TOP TIER requirements on products advertised as such.

BMW recommends using TOP TIER Detergent Gasoline of minimum octane rating of AKI 91 and with alcohol content of less then 10% by volume (or any other oxygenates with up to 2.8% of oxygen by weight). Only the exclusive usage of TOP TIER Gasoline provides the full benefit of reducing deposits build-up.

ALCOHOL DETECTION PROCEDURE

Fuel Blends containing a high percentage (10% and above) of alcohol, mainly ethanol, are becoming more commercially available. Usage of E85, or any other high alcohol content blend (e.g. E30) in BMW vehicles, will cause various driveability complaints (cold start problems, stalling, reduced performance, poor fuel economy, etc.), may cause excessive emissions, and may cause irreversible damage to engine, emission control and fuel delivery systems due to incompatibility of materials with alcohols.

In order to correctly diagnose various driveability complaints caused by fuel blends with a high level of ethanol content, BMW is providing you with an alcohol detection test tool.

Distribution of the following tool will be through the Automatic Tool Shipment Program. Additional tools may be purchased through your PDC. All prices on this bulletin are introductory prices and are only valid during the Automatic Tool Shipment.

Procedure

Safety Precautions:

Gasoline is highly flammable; observe normal precautions for working with flammable liquids. Perform all tests away from any source of ignition. A class B fire extinguisher must be available. Wear protective eye protection with side shields and Nitrile rubber gloves for handling syringe. Please adhere to any applicable OSHA regulations when handling Gasoline. Dispose of the mixture according to local, state and federal regulations.

Fill a clean container with gasoline drawn from the fuel system of the affected vehicle then fill another container with water. Only a small amount of fuel is needed to perform the test (5 ounces of each fluid).

Slowly draw 3cc of water into the syringe. Note: To remove air, draw at least 5cc to 6cc of water, invert the syringe and squirt the water out until the top rim of the rubber plunger is at the 3cc mark.

Slowly draw gasoline into the syringe until the fluid reaches the 12cc mark. Place your finger over the tip of the syringe, vigorously shake the syringe for one minute. Relieve built-up pressure by occasionally removing your finger.

Place the syringe on a flat surface with the nozzle pointing up, allow the syringe to stand for one minute.

If alcohol is present in the fuel, it will separate from the gasoline and dissolve in the water.

Empty the syringe and rinse thoroughly with water, allow drying and apply a silicone lubricant to the rubber plunger before storing.

ALCOHOL PERCENTAGE REFERENCE

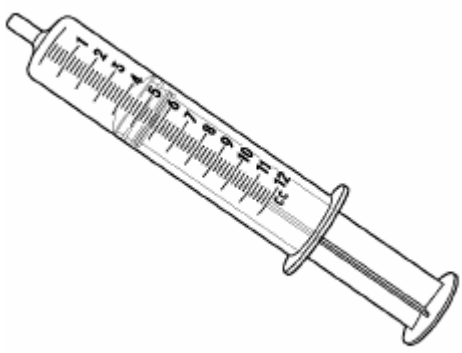
Boundary Line	% Alcohol	Boundary Line	% Alcohol
9.0cc	0%	5.0cc	45%
8.6cc	5%	4.5cc	55%
8.1cc	10%	4.1cc	60%
7.7cc	15%	3.6cc	65%

7.2cc	20%	3.2cc	70%
6.8cc	25%	2.7cc	75%
6.3cc	30%	2.3cc	80%
5.9cc	35%	1.8cc	85%
5.4cc	40%	1.4cc	90%

WARRANTY INFORMATION

Components damage/malfunctions, or any driveability problems caused by use of fuels containing more then 10% ethanol (or other oxygenates with more then 2.8% oxygen by weight) will not be covered under BMW warranties with respect to defects in materials or workmanship. Please document the results found on the vehicle repair order whenever performing this test

Alcohol Detection Test Tool
Order PN 83 30 0 420 667



S13 06 U01

Fig. 1: Identifying Alcohol Detection Test Tool
Courtesy of BMW OF NORTH AMERICA, INC.

ANTI-KNOCK PROPERTIES

The anti-knock value is the quality rating for gasoline and is a requirement for controlled combustion. Anti-knock value is expressed with an octane number. A higher number indicates better anti-knock properties of a gasoline. Internationally approved methods are used to determine the Research Octane Number (RON) and the Motor Octane Number (MON). In the United States the Anti-Knock Index (AKI) is displayed at the gas pumps.

$$AKI = \frac{RON + MON}{2}$$

Fig. 2: Identifying Formula
Courtesy of BMW OF NORTH AMERICA, INC.

BOILING RANGE AND VAPOR PRESSURE

Gasolines must be highly volatile. The boiling range and vapor pressure values are used for evaluation. Gasolines do not have a boiling "point", but rather a boiling "line", since they are produced from a mixture of various hydrocarbon components.

The boiling line (boiling range) and therefore vapor pressure have influence on, for example,

- vapor lock
- starting behavior
- evaporation loss
- transition and driving behavior
- engine oil dilution
- perfect combustion

The boiling range is different for summer and winter gasolines. The vapor pressure test is another means of determining the behavior of a gasoline.

SPECIFIC GRAVITY

The specific gravity is determined by gasoline components. The volume changes with the temperature. Due to the different compositions there are different values for premium grade and regular grade gasolines.

CALORIFIC VALUE

The calorific value expresses the power content of a gasoline. The calorific value of a combustible fuel/air mixture is of prime importance for the power output of engines.

PURITY, COMBUSTION DEPOSITS

Gasolines must be free of contamination. Pumps, jets, injectors, valves and lines must not be clogged or plugged up. Residue and deposits in the intake system and combustion chamber will impair engine operation. The solid residue from evaporation of gasoline provides information on the degree of contamination.

SULFUR CONTENT

The sulfur content of all gasolines should be as low as possible. In this manner there will be less sulfuric acids or sulfur acids in the combustion residue, which would lead to corrosion and sulfuric emissions on an engine running without reaching operating temperature.

1.1 MINIMUM OCTANE AND AKI RATINGS FOR GASOLINE ENGINES

Up to 2005 model year

MINIMUM OCTANE AND AKI RATINGS FOR GASOLINE ENGINES

	Leaded Gasoline	
	Premium Grade	**Regular Grade**
RON (Research Octane No.)		at least 91.0
MON (Motor Octane No.)		at least 82.7

AKI*		at least 93.0	at least 87.0
		Unleaded Gasoline	
	Premium Grade	**Mid-Range**	**Grade Regular Grade**
RON	at least 98.0	at least 95.0	at least 91.0
MON	at least 88.0	at least 85.0	at least 82.5
AKI*	at least 93.0	at least 90.0	at least 87.0

*Anti-Knock Index $AKI = \frac{RON + MON}{2}$

Fig. 3: Identifying Formula
Courtesy of BMW OF NORTH AMERICA, INC.

1.2 SUMMARY OF FUEL GRADE REQUIREMENTS

SUMMARY OF FUEL GRADE REQUIREMENTS

Engine	Vehicle	Model	Model Year	Unleaded Gasoline Regular (AKI at least 87.0)	Unleaded Gasoline Premium (AKI at least 93.0)
M10	E30	318i	'84-'85	X	
M20	E30	25e/es	'85-'88	X	
	E30	325i/iX	thru '91	X	
	E30	325iC	thru '93	X	
	E28	528e	thru '88	X	
	E34	525i	'89-'90	X	
M30	E28	535i	'85-'88	X	
	E34	535i	thru '93	X	
	E24	635CSi, L6	thru '89	X	
	E23	735i/iL, L7	thru '87	X	
	E32	735i/iL	thru '92	X	
M42	E30	318i/is/iC	'91-'92		X
	E36	318i/is/iC/ti	thru '95		X
M44	E36	318i, Z3	'96-'98		X
	E36	318is/iC	'96-'97		X
	E36	318ti	'96-'99		X
M50	E36	325i/is	'92		X
	E34	525i/iT	'91-'92		X
M50TU	E36	325i/is	'93-'95		X
	E36	325iC	'94-'95		X
	E34	525i/iT	'93-'95		X
M52	E36	323is/iC	'98-'99		X
	E36	328i	'96-'98		X
	E36	328is/iC	'96-'99		X

	E36	Z3	'97-'98	X
	E39	528i	'97-'98	X
M52TU	E46	323i, 328i	'99-'00	X
	E46	323Ci, 328Ci	'00	X
	E36	Z3 2.3/2.8	'99-'00	X
	E39	528i/iT	'99-'00	X
N52	E60	525i, 530i	'05-present	X
	E61	525xiT, 530xiT	'05-present	X
	E90	325i, 330i	'05-present	X
M54	E36	Z3	'01-'03	X
	E46	325i/Ci/CiCiT	'01-present	X
	E46	325xi/xiT	'01-present	X
	E46	330i/Ci/CiC	'01-present	X
	E46	330xi	'01-present	X
	E39	525i/iT	'01-present	X
	E39	530i	'01-present	X
	E53	X5 3.0i	'01-present	X
	E60	525i, 530i	'03-present	X
	E83	X3	'04-present	X
	E85	Z4	'03-present	X
M60	E34	530i/iT, 540i	'94-'95	X
	E32	740i/iL	'93-'94	X
	E38	740i/iL	'95	X
	E31	840Ci	'94-'95	X
M62	E39	540i	'97-'03	X
	E39	540iT	'99-'03	X
	E38	740i/iL	'96-'01	X
	E31	840Ci	'96-'97	X
	E53	X5	'00-'03	X
N62	E53	X5	'04-'05	X
	E60	545i	'03-'05	X
	E63	645Ci	'04-'05	X
	E64	645CiC	'04-'05	X
	E65	745i	'02-'05	X
	E66	745Li	'02-'05	X
N62TU	E53	X5	'05-present	X
	E60	550i	'03-present	X
	E63	650Ci	'04-present	X
	E65	750i	'05-present	X
	E66	750Li	'05-present	X
M70	E32	750iL	'88-'94	X
	E31	850i/Ci	'91-'94	X
M73	E38	750iL	'95-'01	X

	E31	850Ci	'95-'97	X
N73	E66	760Li	'04-present	X
S14	E30	M3	'88-'91	X
S38	E24	M6	'87-'88	X
	E28	M5	'88	X
	E34	M5	'91-'93	X
S50	E36	M3	'95	X
S52	E36	M3	'96-'99	X
	E36	MZ3	'98-'00	X
S54	E36	MZ3	'01-'02	X
	E46	M3	'01-'02	X
S62	E39	M5	'00-'03	X
	E52	Z8	'00-present	X
S70	E31	850CSi	'94-'95	X

2.0 FUEL SYSTEM CLEANER PLUS

Recent field experiences have shown a significant increase in various driveability complaints due to excessive carbon deposits in engine's combustion chambers, on the intake valves and fuel injectors.

The overall rise in carbon deposits accumulation is generally attributed to poor gasoline quality, namely, low level of cleaning additives and fuel contamination.

TECHNICAL BACKGROUND

Combustion chamber deposit formation is a by-product of the gasoline burning process. Fuel injector and intake valve deposits may become less troublesome with the recently introduced Top Tier Detergent Gasoline deposit control standards, which are exceeding the detergent requirements imposed by the EPA since 1995.

However, vehicles that do not exclusively use a Top Tier Detergent Gasoline, or are regularly driven in severe service conditions, such as stop-and-go traffic, high ambient temperatures, and high altitude can experience performance problems caused by intake system and combustion chamber deposits.

The most common customer complaints may include:

FUEL INJECTORS

Deposits at the injector's tip can impact fuel flow, upsetting the air/fuel mixture ratio.

Symptoms: Hesitation or stumble during acceleration, even loss of power. Poor fuel efficiency. Increased emissions of HC and CO. "Service Engine Soon" light illumination due to intermittent misfire faults, or lean mixture adaptation values

INTAKE VALVES:

Deposits at the valves and on the intake manifold ports can absorb fuel during the warm-up phase, leaning out

the air/fuel mixture ratio. Carbon build-up may disturb mixture flow at low throttle conditions/idle speeds.

Symptoms: Poor driveability, loss of power, unstable/rough idle, increased emissions of HC, CO and NOx. "Service Engine Soon" light illumination due to intermittent misfire faults.

COMBUSTION CHAMBER:

Combustion Chamber Deposit Interference, or CCDI, occurs when there is a contact between carbon deposits on the piston crown and cylinder head. The noise can be confused or misdiagnosed as ping, knock or other noises that could indicate a mechanical failure. CCDI occurs first as a cold start noise that can fade as the engine warms to operating temperature. The noise will reoccur at the next cold start. As deposits build, there is an increase in compression temperature that may cause pre-ignition detonations.

Symptoms: Knocking, pinging, run-on, poor acceleration, octane requirement increase, increased emissions of NOx, engine idle speed surges.

Depending on the manufacturer, fuels may contain various additives such as: oxidation and corrosion inhibitors, metal deactivators, emulsifiers, anti-icing agents & dyes, plus they are required to include some form of an intake system deposit control package. Unfortunately, not all fuels are created equal, and some additive packages are not effective enough to maintain integrity of the intake systems in high performance engines, or engines operating in severe environmental conditions. Even worse, the intake system deposit control additives in some fuels may actually contribute to the combustion chamber deposits accumulation, and to the problems associated with those deposits: knock, run-on and increased emissions of oxides of nitrogen.

RECOMMENDATION

BMW recommends using TOP TIER Detergent Gasoline of minimum octane rating of AKI 91 and with alcohol content of less then 10% by volume (or any other oxygenates with up to 2.8% of oxygen by weight). Only the exclusive usage of TOP TIER Detergent Gasoline provides the full benefit of reducing deposits formation.

If the TOP TIER Detergent Gasoline is unavailable, we recommend BMW Group Fuel System Cleaner Plus (PN 82 14 0 413 341) be added to the gas tank. For optimum cleaning and deposits control, add a 20 fl. oz. bottle every 3,000 miles when refueling.

Regular use of BMW Group Fuel System Cleaner Plus can help address carbon deposits related symptoms listed above. By removing these deposits, an engine may experience restored power, performance and fuel efficiency, a smoother idle running, lower emissions, and reduced octane requirement.

BMW Group Fuel System Cleaner Plus uses polyether amine TECHRON® based technology developed and patented by Chevron. BMW Group Fuel System Cleaner Plus has proven to clean up deposits in fuel injectors, ports & intake valves and reduces the harmful effects of combustion chamber deposits. It helps restore performance lost due to deposit buildup.

Chevron and BMW have run an extensive "no harm" tests with polyether amine technology. When used as directed, it will not harm catalytic converters, oxygen sensors, or any other mechanical components of the engine, or fuel delivery system.

The effectiveness of the additive depends on its presence in the gasoline in large concentrations for short

periods of time. One treatment is usually sufficient, but a second treatment (one 20 oz bottle per each, consecutive full tank of gas) may give additional benefits. To keep your fuel intake system clean, we recommend usage at every 3000 miles.

Additionally, vehicle's fuel sending units equipped with silver plated resistor card/contacts are especially vulnerable to attacks by elemental sulfur and/or hydrogen sulfide found in fuels. Adding BMW Group Fuel System Cleaner Plus immediately upon noticing erratic fuel gauge behavior may, in many cases, restore proper performance due to the additive's ability to remove the harmful sulfur compounds from the sending unit's contact surface. Additionally, BMW Group Fuel System Cleaner Plus can help protect the fuel gauge from future malfunctioning by coating all metal surfaces of the fuel system.

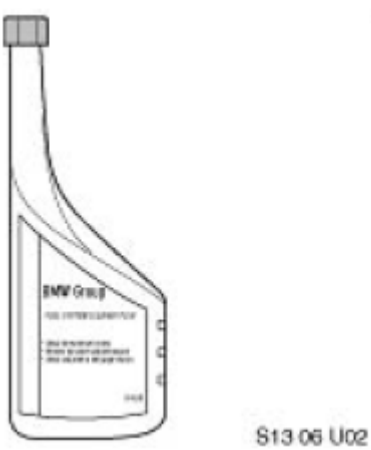


Fig. 4: Identifying BMW Group Fuel System Cleaner Plus
Courtesy of BMW OF NORTH AMERICA, INC.

WARRANTY INFORMATION

Because carbon deposit build-up is related to fuel quality, it cannot be considered as a defect in vehicle's materials or workmanship. Consequently, usage of BMW Group Fuel System Cleaner Plus is not covered under the terms of the BMW New Vehicle Limited Warranty or maintenance plan.

1300 CHECKING SETTING ENGINE EMISSION

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output.

The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles.

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated

by:

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

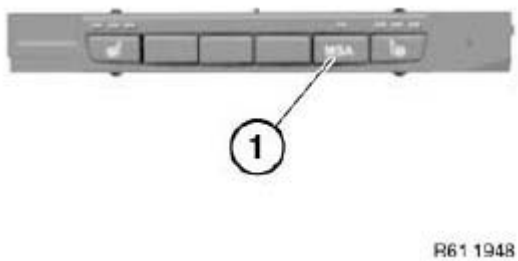


Fig. 1: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

B = 7 mm

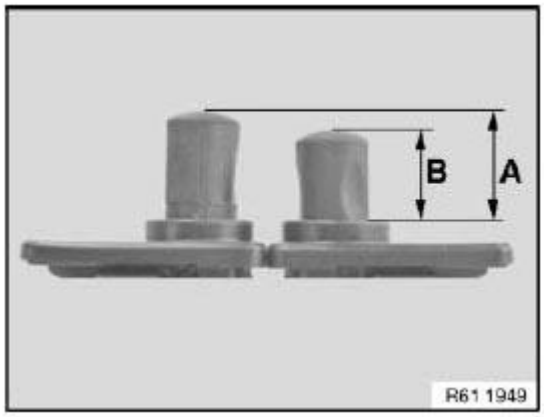


Fig. 2: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

When working with diagnosis tools

- Observe instructions in diagnosis tool

1331 FUEL PUMP WITH DRIVE AND LINE

13 31 032 CHECK FUEL PRESSURE

Necessary preliminary work

- Connect BMW diagnosis system.

IMPORTANT: Lines are under pressure!

Wear protective goggles and gloves.

Fuel can emerge spontaneously at high velocity when the fuel line is released!

Recycling

Catch and dispose of escaping fuel with auxiliary materials.

Observe country-specific waste disposal regulations.

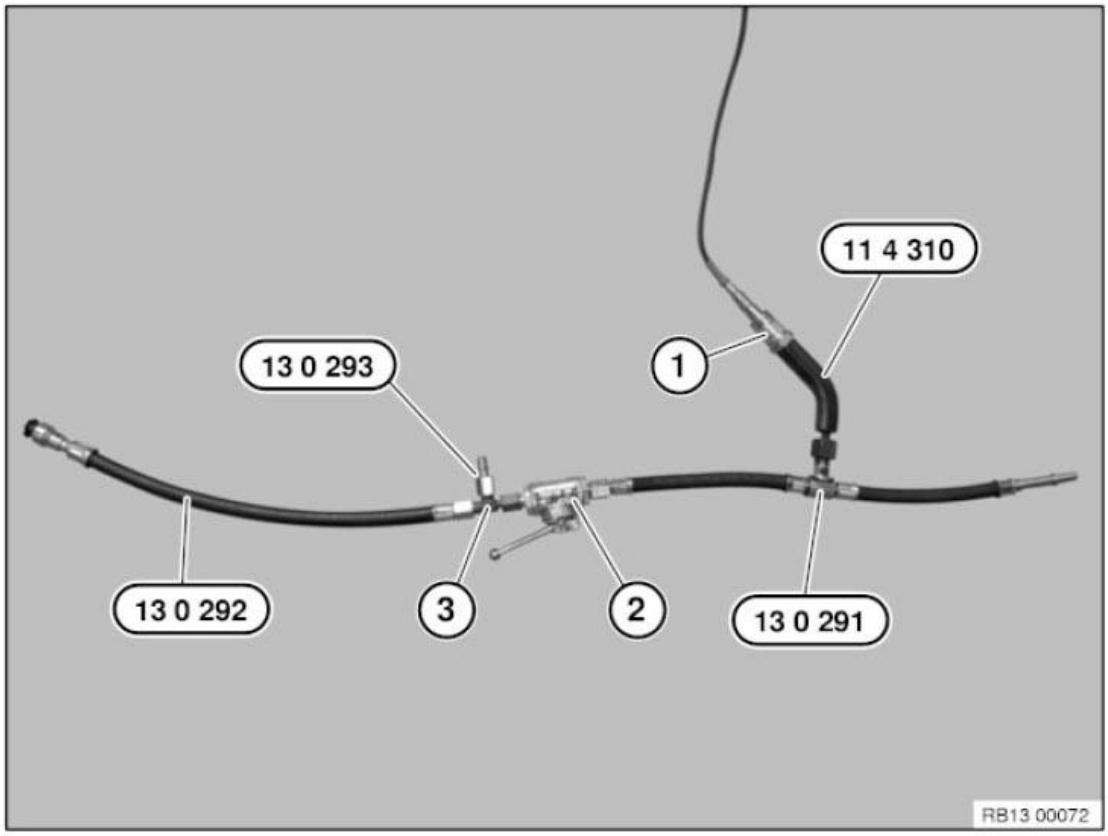


Fig. 3: Checking Fuel Delivery Pressure Using Pressure Sensor, Special Tools And Adapters
Courtesy of BMW OF NORTH AMERICA, INC.

Check fuel delivery pressure

To check the fuel delivery pressure, special tool **13 0 290** must be assembled as follows.

Screw adapter 11 4 310 onto line 13 0 291.

Screw the IMIB 100 bar pressure sensor (1) onto adapter 11 4 310.

Alternatively, the pressure gauge from the set of special tools **13 3 060** can be screwed onto line 13 0 291.

Between lines 13 0 291 and 13 0 292, mount a shutoff tap (2) and a T-piece (3) from the set of special tools **13 3 060** .

Close up T-piece (3) from the set of special tools with the cap 13 0 293.

NOTE: The graphic shows F07 The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

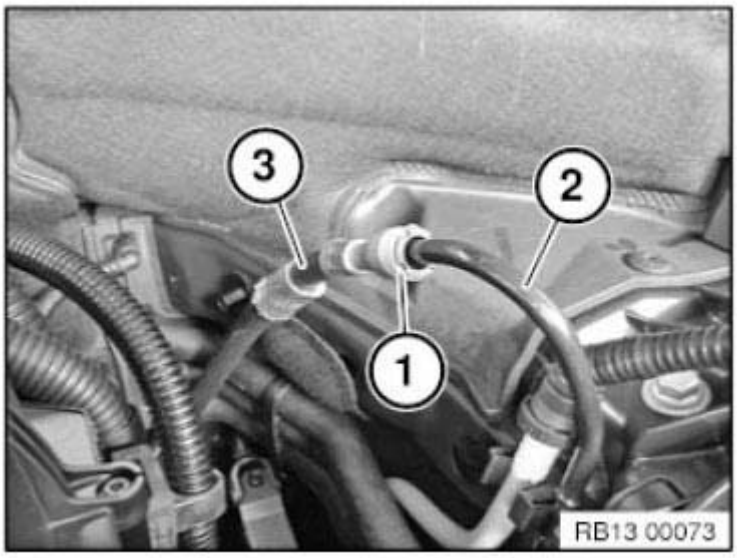


Fig. 4: Identifying Circlip, Fuel Line And Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool (1) **13 0 290** into detached fuel line with IMIB fuel pressure sensor (100 bar).

Connect IMIB with fuel pressure sensor.

Establish fuel delivery pressure. Read off fuel delivery pressure on IMIB and compare with values in diagnosis system.

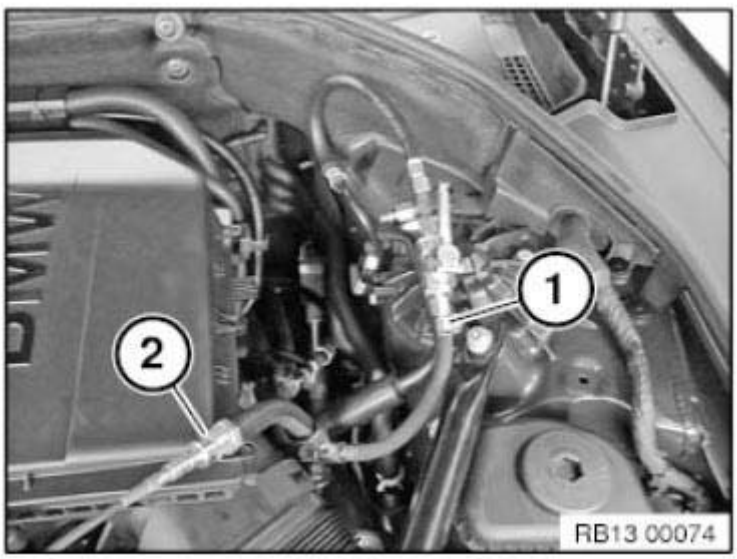


Fig. 5: Installing Special Tool (13 0 290) With Fuel Pressure Sensor To Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

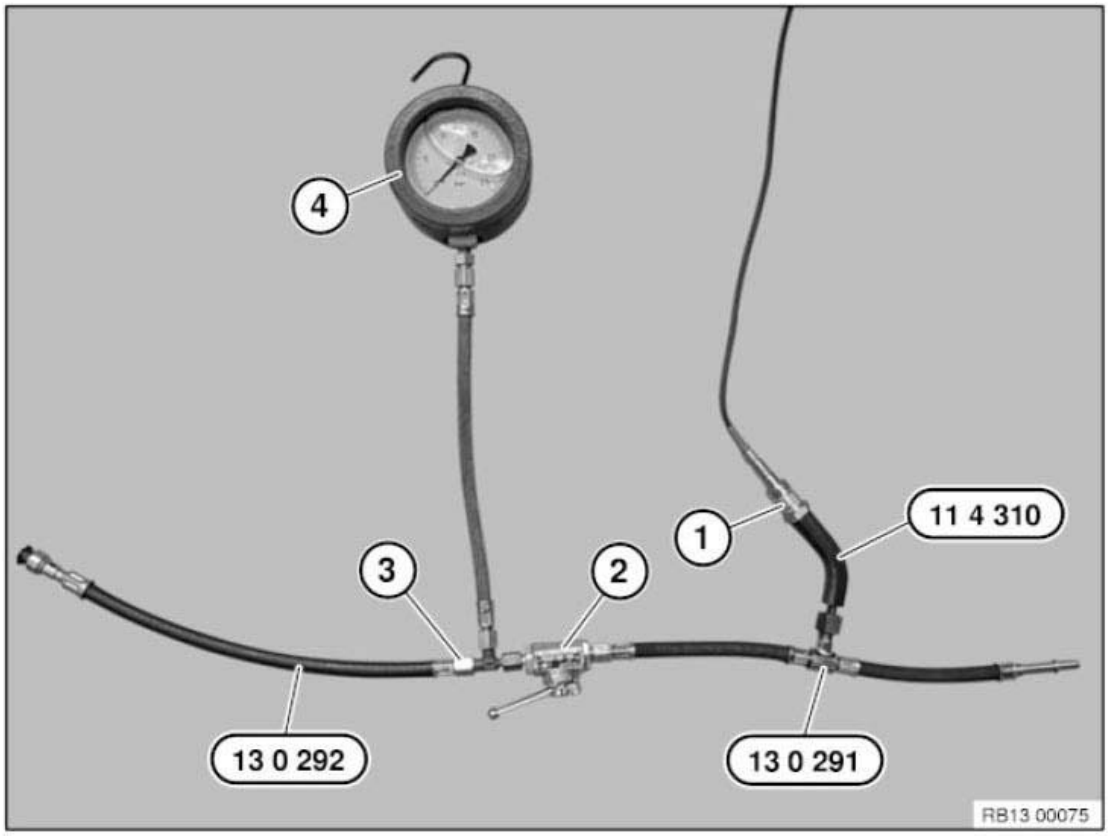


Fig. 6: Checking Fuel Delivery Pressure Using Pressure Sensor, Special Tools And Adapters
Courtesy of BMW OF NORTH AMERICA, INC.

Check fuel holding pressure

To check the fuel holding pressure, special tool **13 0 290** must be assembled as follows.

Screw adapter 11 4 310 onto line 13 0 291.

Screw the IMIB 100 bar pressure sensor (1) onto adapter 11 4 310.

Alternatively, the pressure gauge from the set of special tools **13 3 060** can be screwed onto line 13 0 291.

Between lines 13 0 291 and 13 0 292, mount a shutoff tap (2) and a T-piece (3) from the set of special tools **13 3 060** .

Mount pressure gauge (4) from special tool set **13 3 060** onto T-piece (3) from special tool set **13 3 060** .

NOTE: The graphic shows F07 The procedure is identical for other vehicles.

Remove circlip (1).

Unlock and detach fuel line (2) to fuel tank from fuel line (2) to high pressure pump.

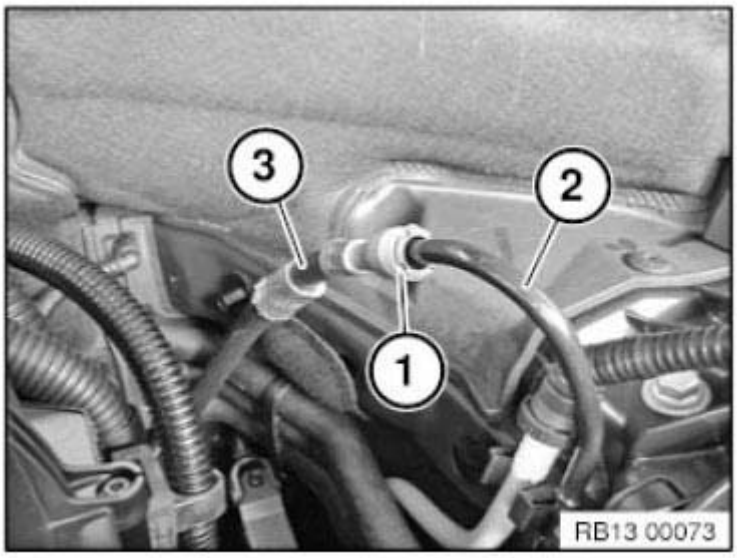


Fig. 7: Identifying Circlip, Fuel Line And Fuel Tank
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool (1) **13 0 290** with pressure gauge (2) and IMIB 100 bar fuel pressure sensor (3) into the detached fuel line.

Establish fuel delivery pressure.

Close shutoff tap (4) and switch off the engine.

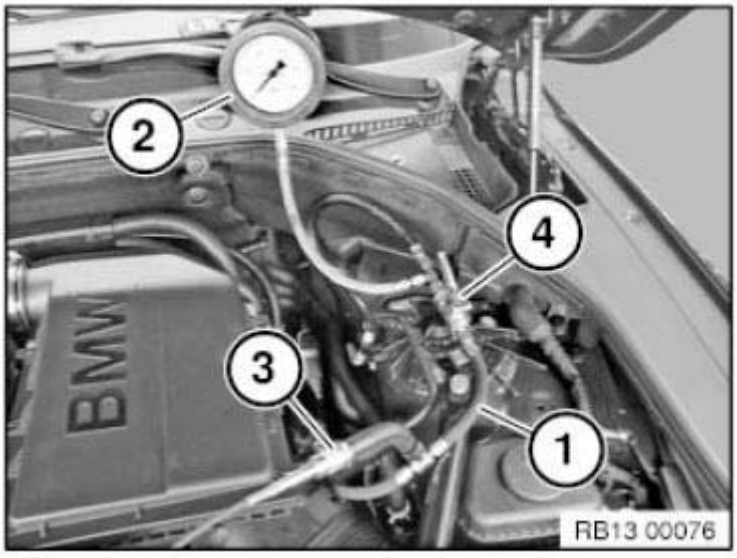


Fig. 8: Installing Special Tool (13 0 290) With Pressure Gauge And Fuel Pressure Sensor To Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Read off fuel holding pressure of high pressure pump from IMIB tester and compare with values in diagnosis system.

Read off fuel holding pressure to fuel tank on pressure gauge (2) and compare with values in diagnosis system.

Assemble engine.

Check fuel system for leak tightness.

13 31 ... NOTES ON FUEL PRESSURE CHECK (REFERENCE PRESSURE: ENVIRONMENT)

Feature of this version with ambient pressure:

The connection for the vacuum hose of the fuel pressure regulator is located between the throttle and the air cleaner or on the air cleaner.

Test precondition:

The correct fuel pressure regulator is fitted.

- Using the EPC, check whether the fuel pressure regulator suitable for the car is fitted:

  Connect test adapter.

Description of operation :

The control function of the fuel pressure regulator must be guaranteed under all operating conditions. The fuel pump must always be able to generate a higher fuel pressure than the pressure regulated by the pressure regulator.

The injection rate is adjusted by means of the injection time; the injection time is controlled by the DME.

Description of operation: fuel return line

When the engine is at a standstill and the ignition key is in position 0, the fuel return line after the pressure regulator is at zero pressure.

Description of operation: pressure retaining function

The pressure regulator closes when the engine is at a standstill and the ignition key is in position 0. The fuel pressure in the delivery line is retained over an extended period. A non-return valve closes in the fuel pump. These measures help to retain the fuel pressure in the fuel system. Extended starting times are thus avoided.

Complaint: drive characteristic faults, lack of power

- Run engine at idle speed and measure fuel pressure.

If the measured value is less than the nominal value - 0.2 bar:

- Line cross-sections in fuel feed are constricted or fuel filter is clogged, or

- Fuel pump voltage supply is not O.K.: e.g. as a result of high contact resistance (corrosion) in plug connection between wiring harness and fuel pump.

If the measured value is greater than the nominal value + 0.2 bar:

- Turn off engine stop and then observe measured value.
- If measured value drops to nominal value, then line cross-sections in fuel return are constricted or clogged.
- Check the fuel lines for kinks.

If no kinks are visible:

- Replace return lines

If measured value remains too high, then pressure regulator is in all probability faulty.

IMPORTANT: With less likelihood, the return line may be completely blocked. When the pressure regulator is removed, fuel could escape under pressure!

- Have a cleaning cloth ready and catch and dispose of escaping fuel.
- Replace the return line but not the pressure regulator.

Complaint: starting problems

- Run engine briefly at idle speed and switch off.
- Note down measured value while engine is stopped.
- Read off measured value again after approx. 20 to 30 minutes while engine is stopped.

Special tool 13 3 010 (hose clamp) is required for the following test.

If the measured value has dropped by more than 0.5 bar:

- Start engine and wait briefly for a stable pressure increase.
- Switch off the engine and immediately pinch off the delivery line just before the pressure gauge with the special tool 13 3 010.
- Note down measured value
- Read off measured value again after approx. 20 to 30 minutes while engine is stopped

If the measured value has now dropped by less than 0.5 bar, the following faults can be present:

- Fault in delivery lines
- Fault in in-tank delivery hose
- Faulty pressure-holding non-return valve in fuel pump

Check components. Replace faulty components.

If the measured value has dropped by more than 0.5 bar again:

- Replace pressure regulator

NOTE:

- **All the fuel hoses and hose clips which were detached within the framework of the checks must be replaced.**
- **Interrogate fault memory of DME control unit. Check stored fault messages. Rectify faults. Now clear the fault memory.**

1351 INJECTION PUMP, REGULATOR, MIXTURE REGULATOR

13 53 192 REMOVING AND INSTALLING/REPLACING A PRESSURE LINE (N54)

WARNING: Observe warning on cylinder head cover.

Clamp off BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!

NOTE: The following description applies to all pressure lines.

First release rail pressure lines to reduce existing fuel pressure if necessary. Fuel must not get into the spark plug slot. Then release pressure line on injector.

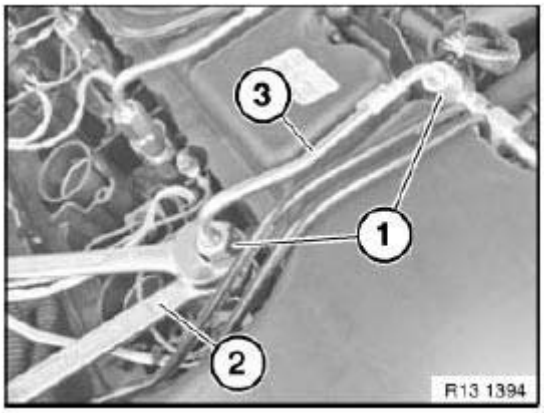


Fig. 9: Identifying Pressure Line, Wrench And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1), gripping the injector with a wrench (2) in so doing.

Disconnect pressure line (3).

IMPORTANT: If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).

Mark pressure lines.

Close off injector with protective cap (1).

Protective caps are available from BMW Parts Service.

Seal rail with a matching plug from special tool kit **32-1270 PLUG** .

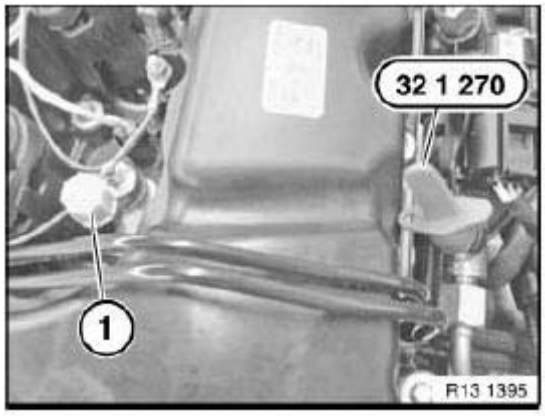


Fig. 10: Identifying Seal High-Pressure Rail With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Seal pressure line (1) with a matching plug from special tool kit **32-1270 PLUG** .

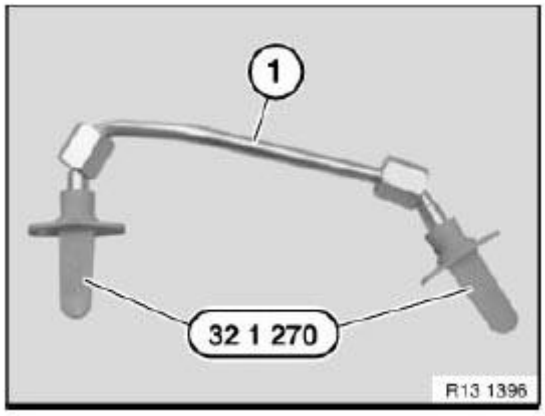


Fig. 11: Identifying Seal Pressure Line With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing pressure line

Installation of pressure rail is described separately from removal.

Same procedure for all pressure lines.

Copper seals that may be fitted (1) are no longer needed and must be removed.

If using the pressure line, apply a light coating of gear oil to the thread. New pressure lines are already coated.

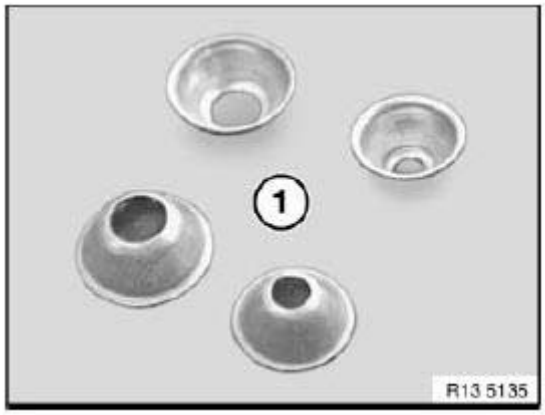


Fig. 12: Identifying Copper Seals
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

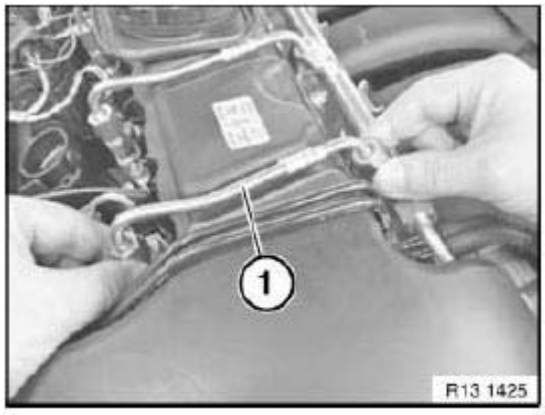


Fig. 13: Identifying Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

If the nuts cannot be easily screwed on by hand, the **injector must be turned into the installation position!**

NOTE: Description of "Turning injector into installation position" in the following two work steps.

Only if injector has to be turned into installation position

- Release bolt a few turns until holding-down element (1) is slackened.
- Turn injector (2) in direction of arrow until nuts on pressure line can be easily screwed on by hand.

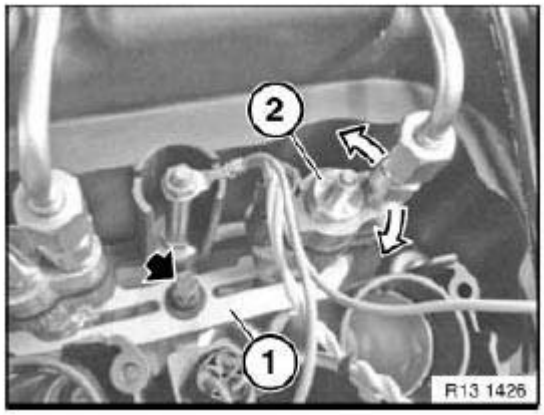


Fig. 14: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

- To do so, engage wrench on hexagon head of injector if necessary.
- Tighten nuts on pressure line hand-tight.

IMPORTANT: Do not under any circumstances pull injector out of bore!

If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced! Replacing PTFE sealing ring, refer to 13 53 310 .

Tighten down screw for holding-down element (1).

Tightening torque **13 53 5AZ** .

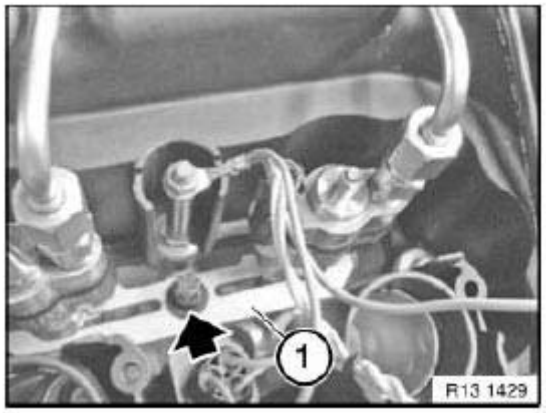


Fig. 15: Identifying Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** .

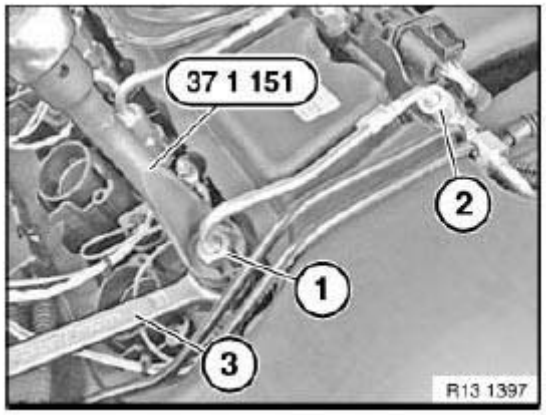


Fig. 16: Identifying Down Nut On Injector And Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 332 REMOVING AND INSTALLING/REPLACING FEED LINE (N54)

WARNING: Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

Wear protective goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be fouled by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.

Necessary preliminary tasks

- Remove **INTAKE AIR MANIFOLD**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock and detach fuel line (1).

Catch and dispose of escaping fuel.

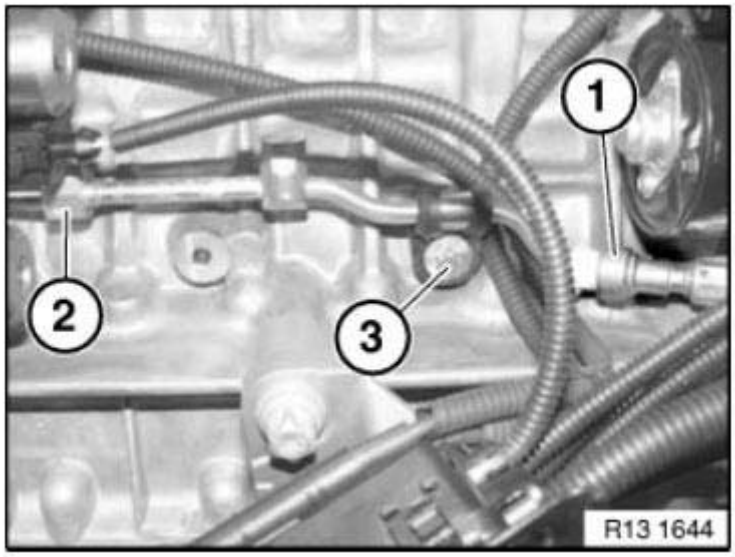


Fig. 17: Identifying Fuel Line, Slacken Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel lines with special tools (1) 13 5 161 and (2) 13 5 162.

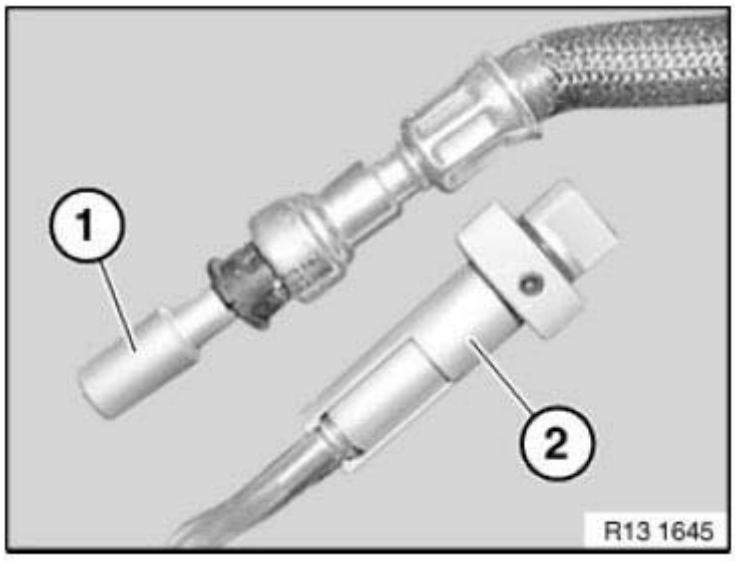


Fig. 18: Identifying Seal Fuel Lines With Special Tools (13 5 161) And (13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (2).

Release screw (3).

Remove feed line.

Close off feed line and high-pressure pump with a matching plug from special tool kit **32-1270 PLUG** .

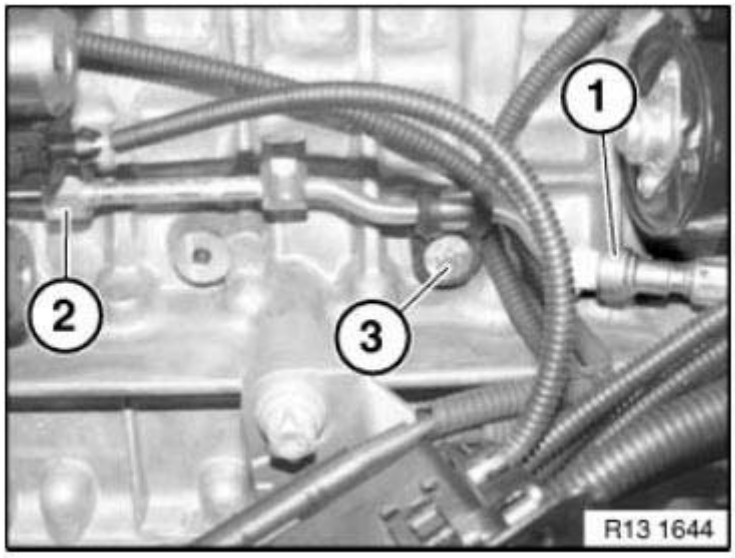


Fig. 19: Identifying Fuel Line, Slacken Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Follow sequence of screw connections:

1. Tighten down nut (2) with special tool **13 5 020** .

   Tightening torque **13 53 6AZ** .

2. Replace aluminum screw (3).

   Tighten down screw (3).

   Tightening torque **13 53 9AZ** .

3. Connect fuel line (3).

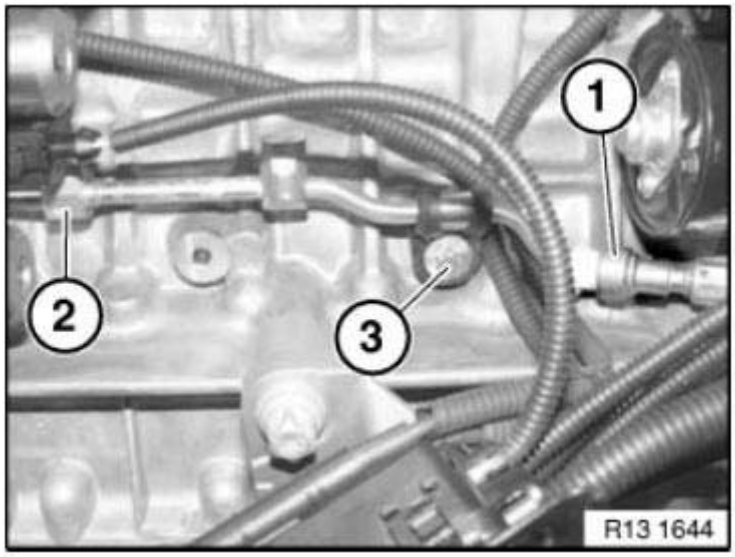


Fig. 20: Tightening Down Nut And Screw Using Special Tool (13 5 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 51 017 REMOVING AND INSTALLING/REPLACING HIGH-PRESSURE FUEL PUMP (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short circuit on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high speed when the high pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced dirt contamination can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt contamination before removing lines or separate components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be contaminated by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.

Necessary preliminary work

- Remove **THROTTLE BODY**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste disposal regulations.

Apply silicone-free multifunction spray (part number 83 23 0 418 567) on to supports (1) of base well bracket (2).

Unplug connector (3) and (4) from base well.

Slide base well (2) in direction of arrow.

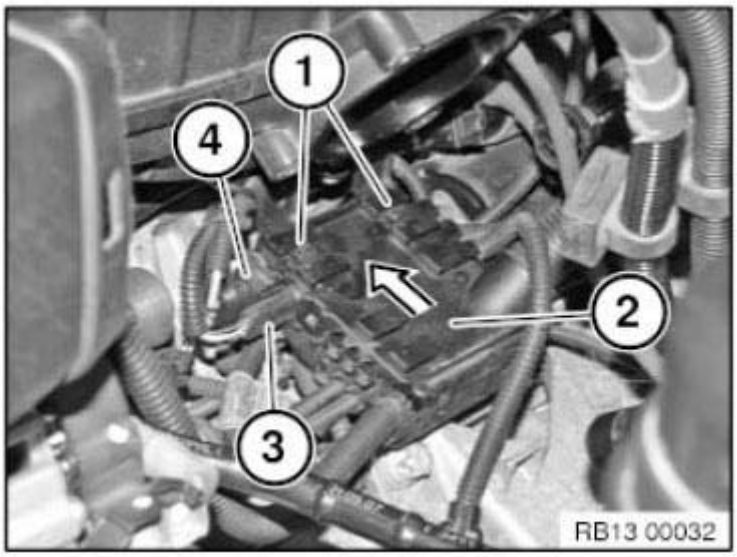


Fig. 21: Applying Silicone-Free Multifunction Spray On Base Well Bracket Supports
Courtesy of BMW OF NORTH AMERICA, INC.

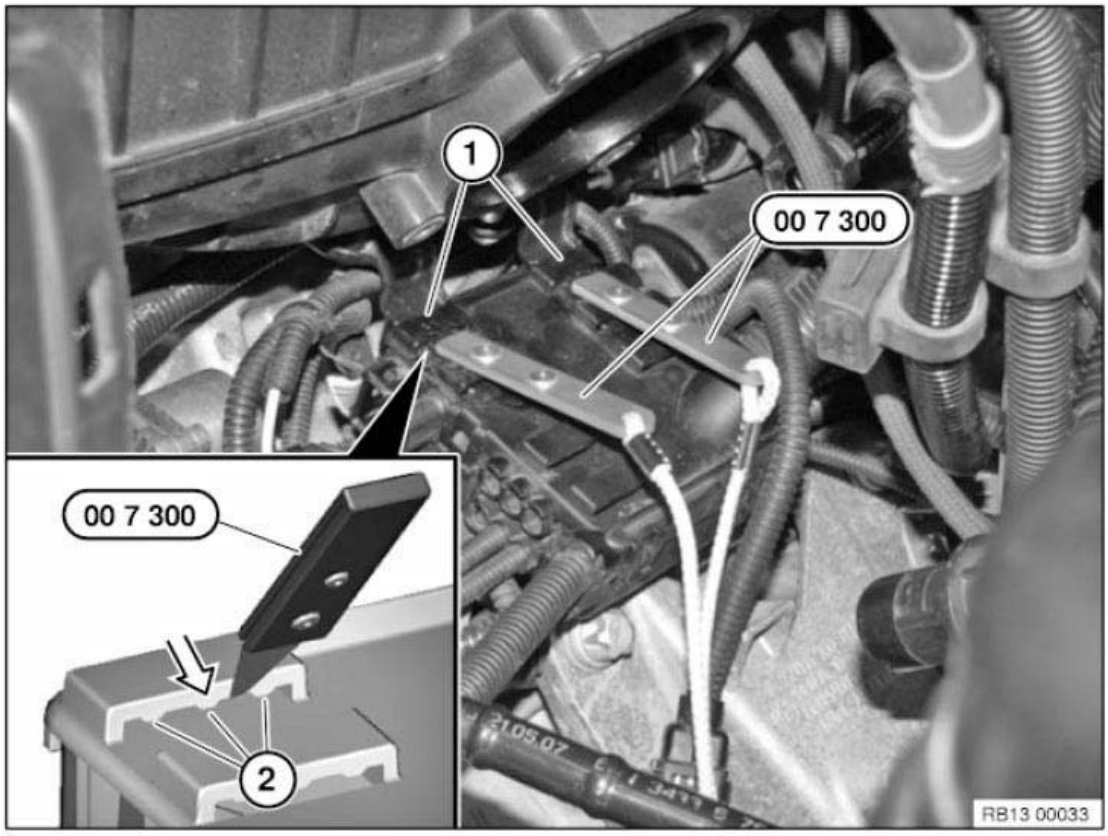


Fig. 22: Inserting Special Tools (00 7 300) In Base Well Mounting Points
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **00 7 300** in mounting points (1) on base well.

NOTE: Place tips of special tool 00 7 300 between retainers (2) and then centre (arrow).

Detach base well (1) from bracket (2) with special tool **00 7 300** .

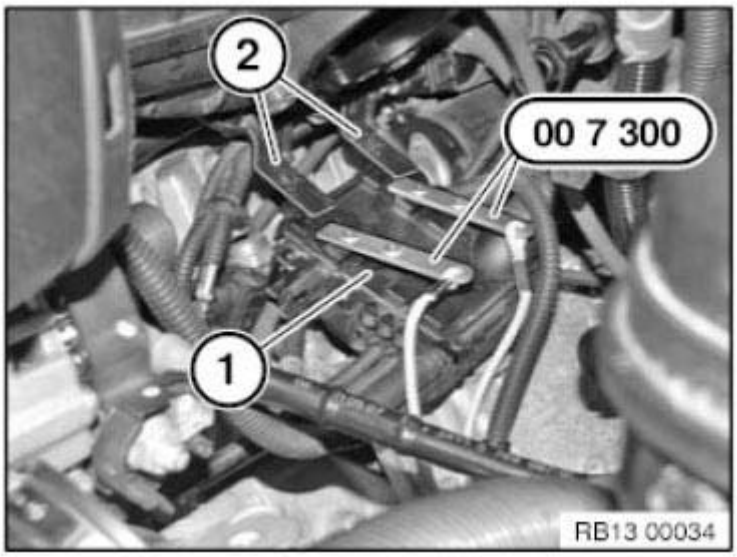


Fig. 23: Removing Base Well From Bracket Using Special Tool (00 7 300)
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) and remove.

Unlock and detach fuel line (2).

Catch and dispose of escaping fuel.

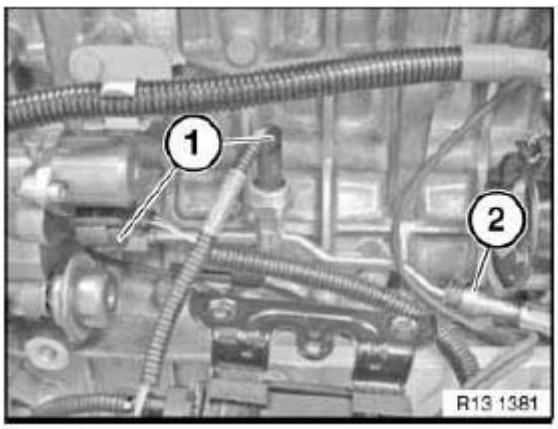


Fig. 24: Identifying Connector And Fuel Line
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel lines with special tools 13 5 281 and 13 5 282.

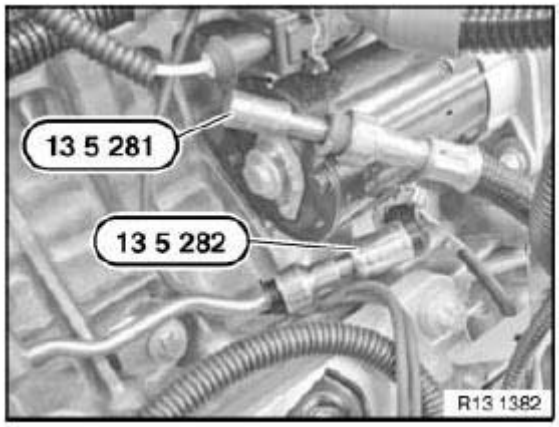


Fig. 25: Identifying Seal Fuel Lines With Special Tools (13 5 281) And (13 5 282)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Release screw (2).

Installation note:

- Replace aluminum screw (2).

Remove feed line (3).

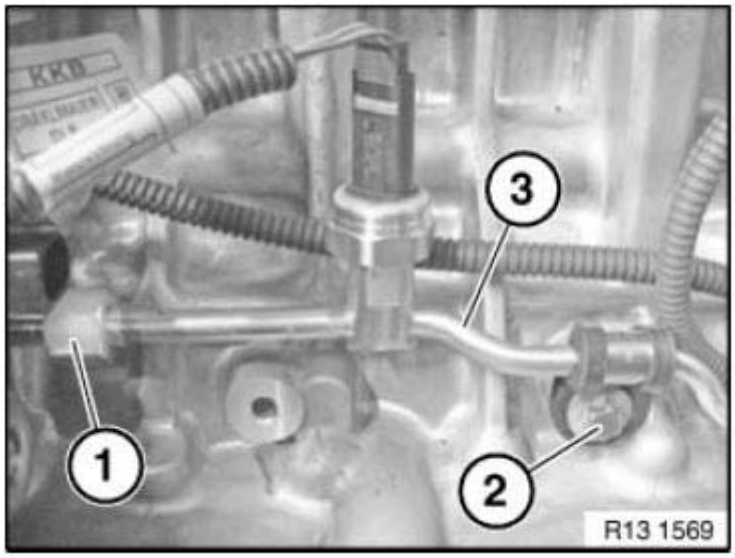


Fig. 26: Identifying Slacken Nut, Screw And Feed Line
Courtesy of BMW OF NORTH AMERICA, INC.

Seal feed line with matching plug from set of special tools **32-1270 PLUG** .

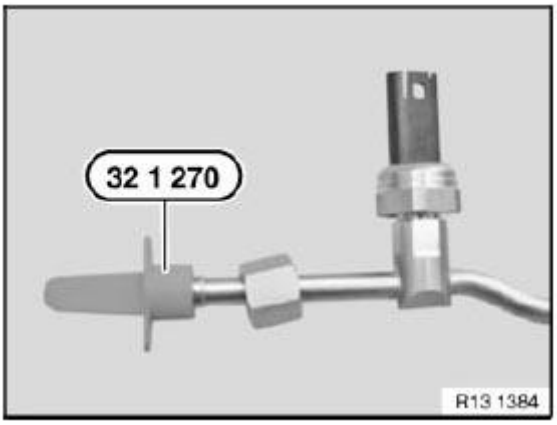


Fig. 27: Identifying Seal Feed Line With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

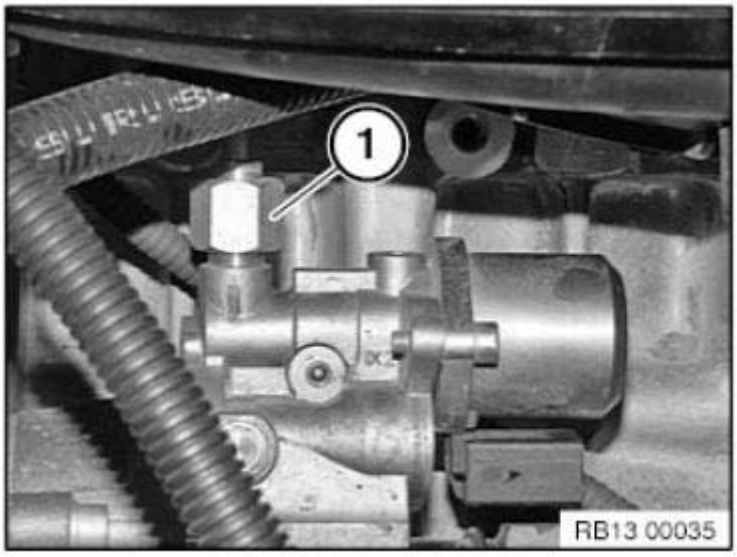


Fig. 28: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Undo screws (1) and raise acoustic cover (2) in front area.

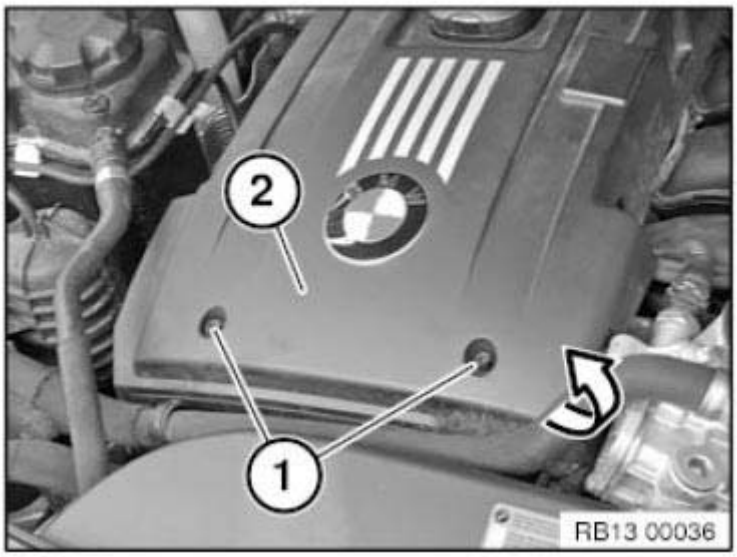


Fig. 29: Raising Acoustic Cover In Front Area
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

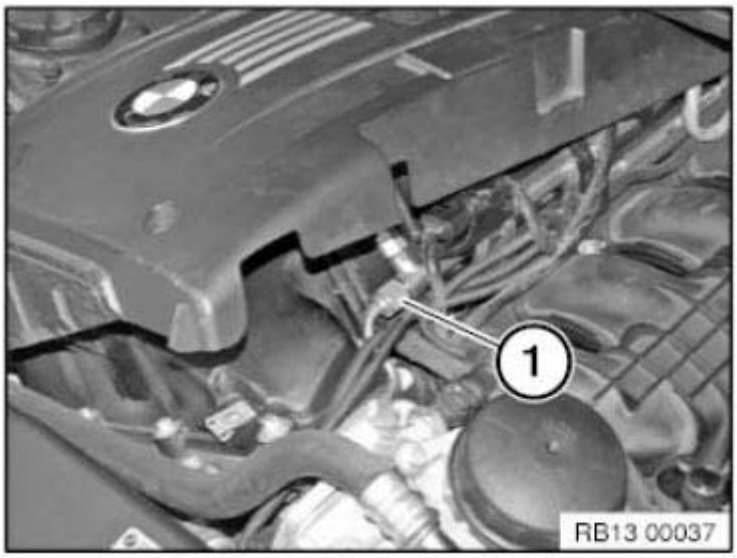


Fig. 30: Identifying Slacken Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel line connections of high pressure pump (1) with matching plugs from set of special tools **32-1270 PLUG** .

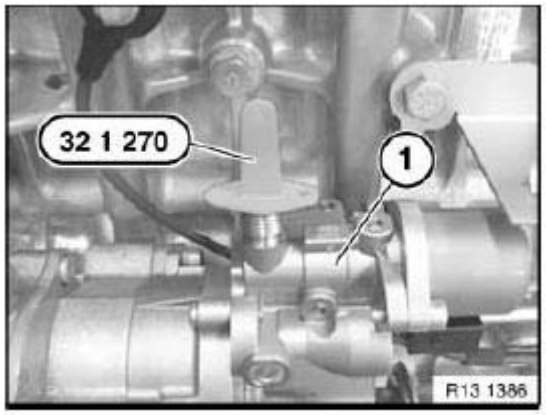


Fig. 31: Identifying Seal Fuel Line Connections Of High-Pressure Pump With Matching Plugs From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts with special tool **11 8 610** .

Detach high pressure pump (1) and remove.

Engine oil can escape when pump is detached; have a cleaning cloth ready.

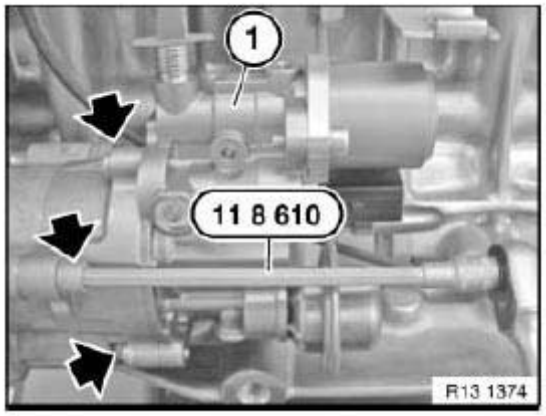


Fig. 32: Removing High-Pressure Pump Using Special Tool (11 8 610)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing high pressure pump

Installation of high pressure pump is described separately from removal.

Replace sealing ring (1).

Clean contact surfaces.

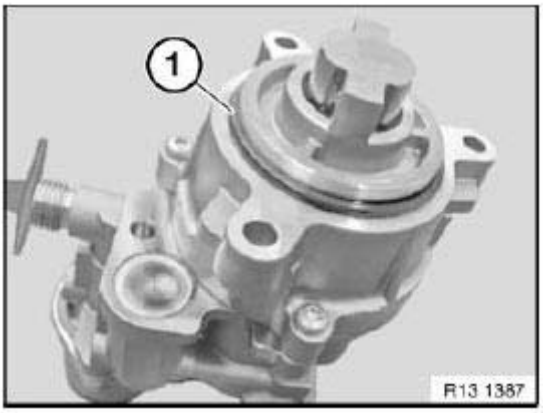


Fig. 33: Identifying Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

When installing, turn high pressure pump (1) if necessary in direction of arrow until bore holes for screws are flush.

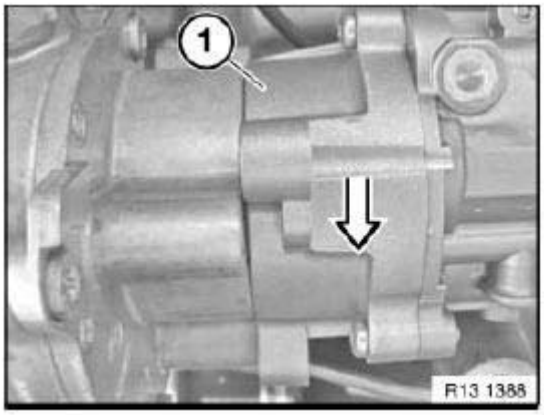


Fig. 34: Identifying High-Pressure Pump
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only hand-tighten screws (1) of high pressure pump (2) with special tool 11 8 610 .

This helps ensure that no strain is produced when the high pressure line is tightened.

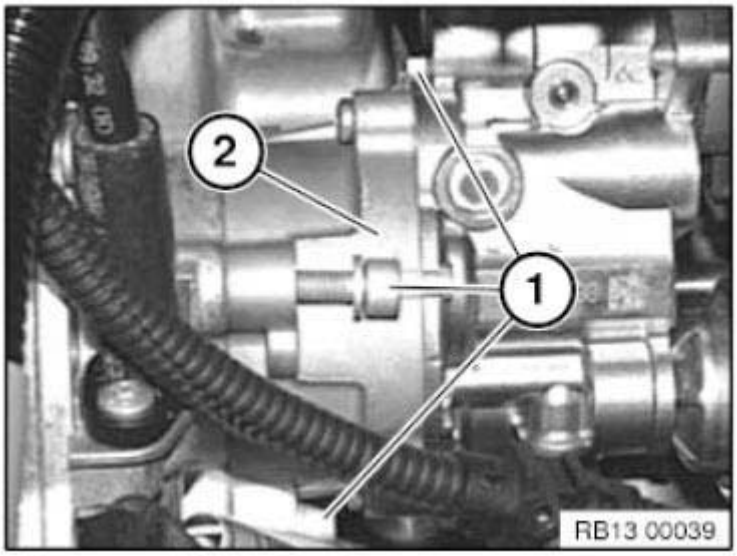


Fig. 35: Identifying High Pressure Pump With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Copper seals that may be fitted on the high pressure line are no longer needed and must be removed.

If reusing pressure line, lightly grease threads of pressure connections.

Threads of new pressure lines are already coated.

Only hand-tighten nut (1).

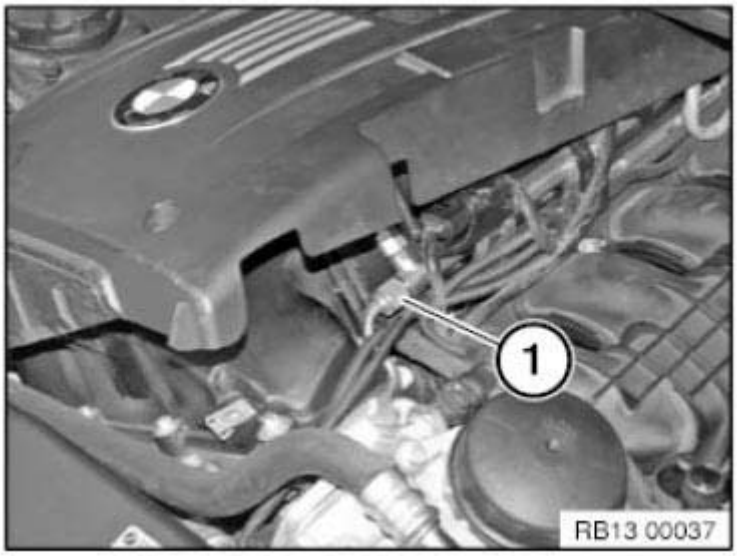


Fig. 36: Identifying Hand-Tightened Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Only hand-tighten nut (1).

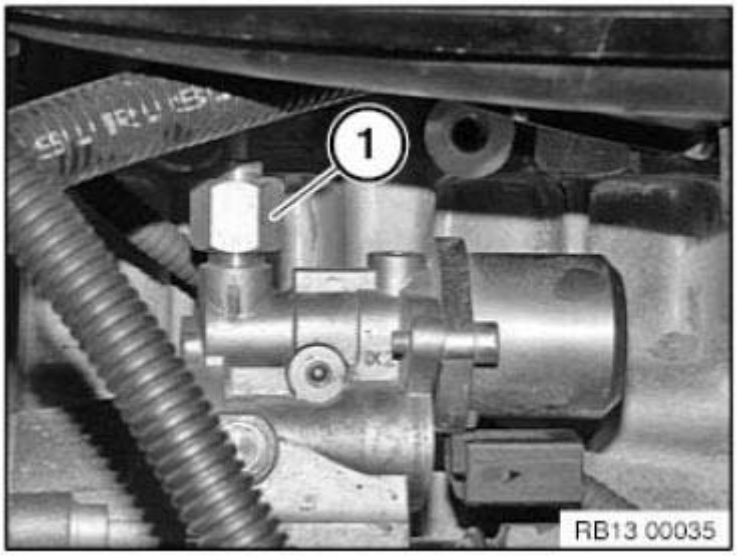


Fig. 37: Identifying Hand-Tightened Nut
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Feed lines with a soldered bracket must be replaced by the new version with elastomer clamp holder. Observe installation position of fuel low-pressure sensor. Lines for solenoid switches are laid behind fuel line.

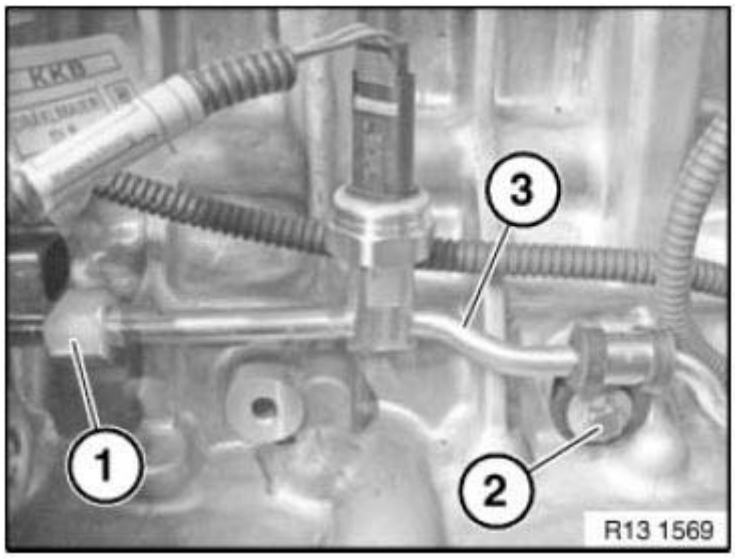


Fig. 38: Identifying Feed Line, Hand-Tighten Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Install feed line (3).

Only **hand-tighten** nut (1).

Tighten screw (2). Replace aluminum screw.

Tightening torque **13 53 9AZ.**

Tighten down screws with special tool **11 8 610** .

Tightening torque **13 51 1AZ.**

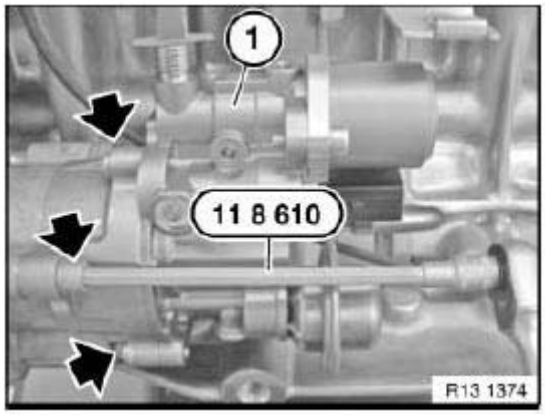


Fig. 39: Installing High-Pressure Pump Using Special Tool (11 8 610)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten nut (1).

Tightening torque **13 53 7AZ.**

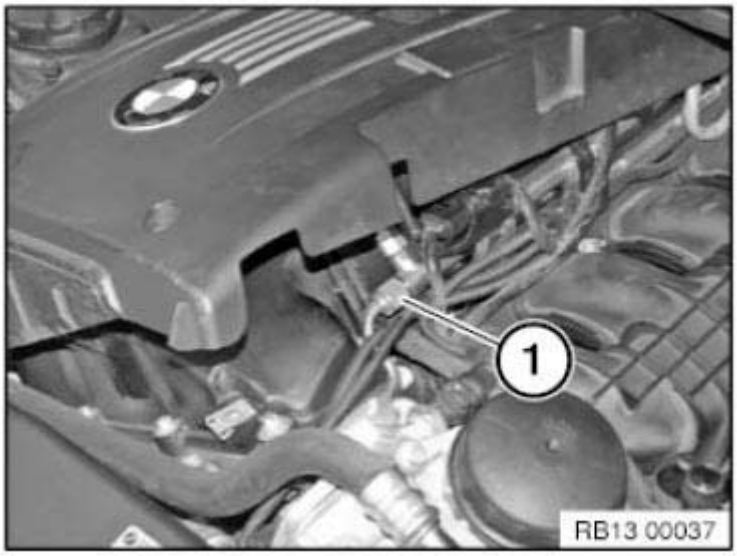


Fig. 40: Identifying Nut

Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down nut (1) with special tool **13 5 020** .

Tightening torque **13 53 7AZ.**

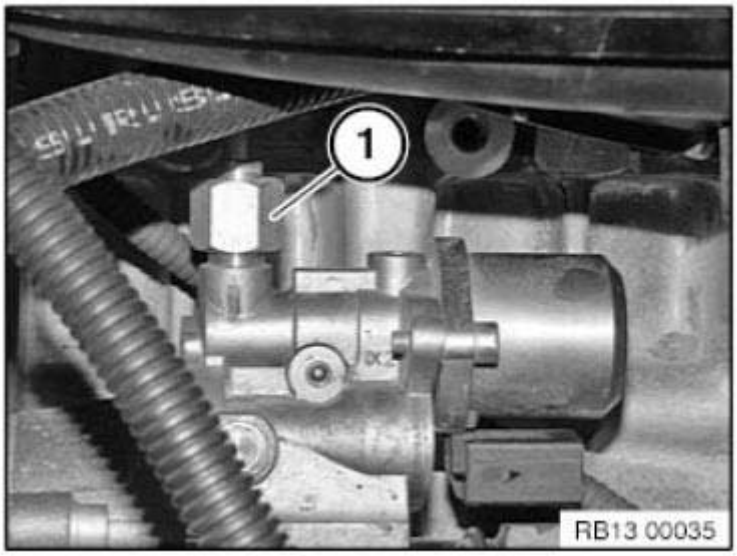


Fig. 41: Identifying Nut And Special Tool (13 5 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down nut (1) with special tool **13 5 020** .

Tightening torque **13 53 6AZ.**

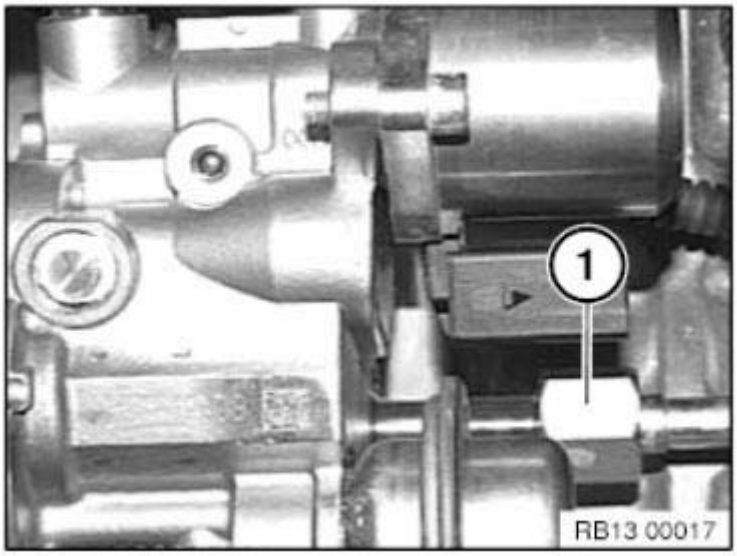


Fig. 42: Tightening Down Nut Using Special Tool (13 5 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Install and lock connector (1).

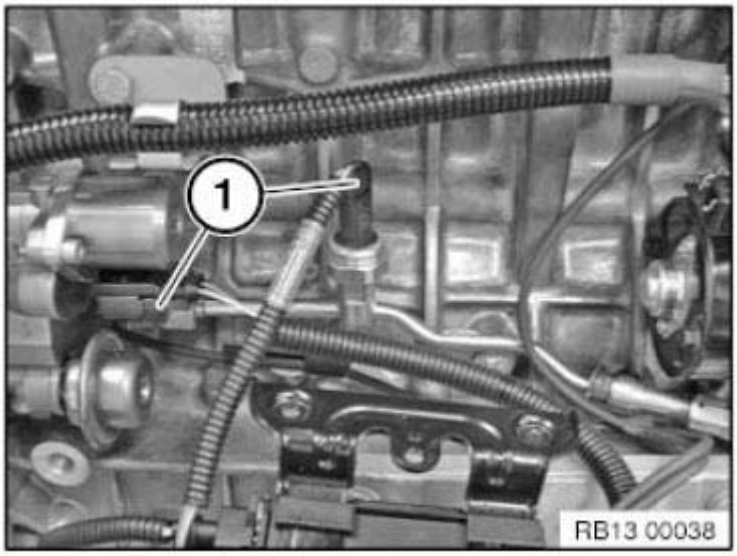


Fig. 43: Identifying Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Slide base well (2) on to bracket (1) as far as it will go.

Install and lock connector (3) and (4).

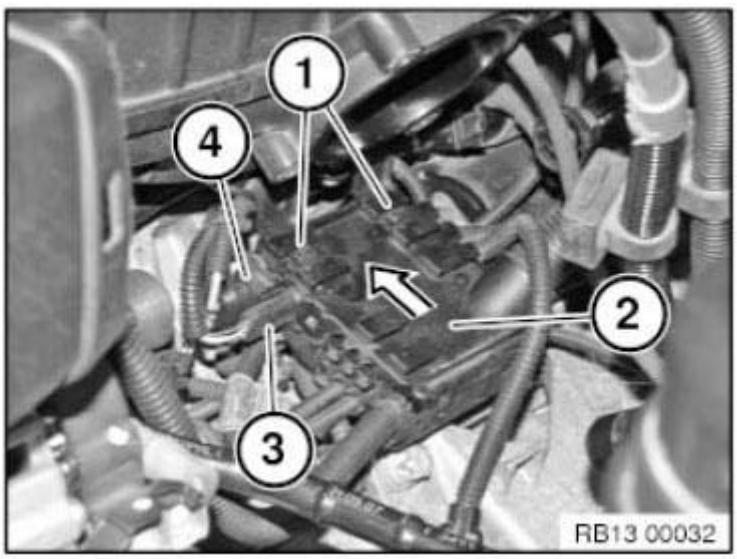


Fig. 44: Identifying Bracket, Connector And Slide Base Well
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leak tightness.

Check function of DME.

13 53 158 REMOVING AND INSTALLING/REPLACING HIGH-PRESSURE RAIL (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: When working on the oil, coolant or fuel circuit, you must protect the alternator against contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary tasks

- Remove **PRESSURE LINES**
- Remove **INTAKE FILTER HOUSING**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Pull connector holder off high-pressure rail.

Remove all holders for wiring harness from high-pressure rail.

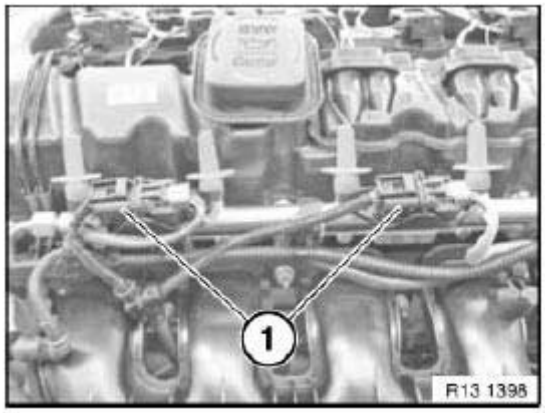


Fig. 45: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Unlock and disconnect plug (2) on high-pressure sensor.

Release screws (3) and remove high-pressure rail (4).

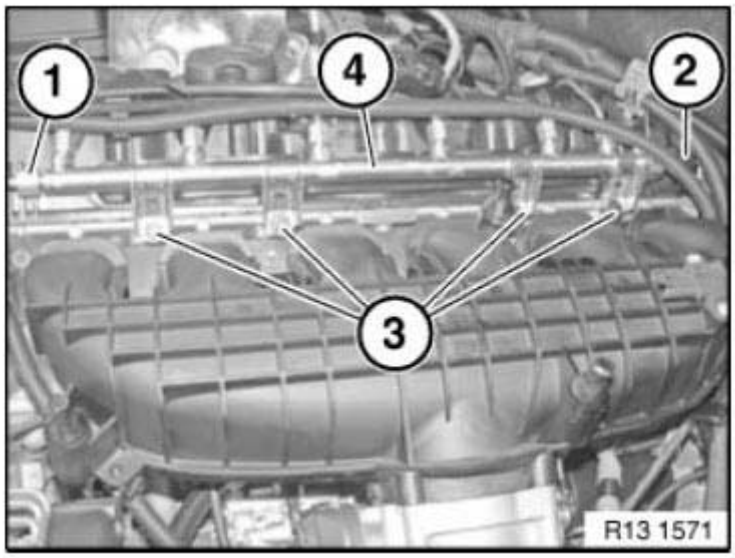


Fig. 46: Identifying Nut, Plug, High-Pressure Rail And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installing high-pressure rail

Installation of high-pressure rail is described separately from removal.

Install high-pressure rail (4); in so doing, tighten screws (3) and nut (1) hand-tight only.

NOTE:

- **It must still be possible for the high-pressure rail to slide on the cylinder head.**
- **Nut (2) must be able to be screwed on easily by hand.**

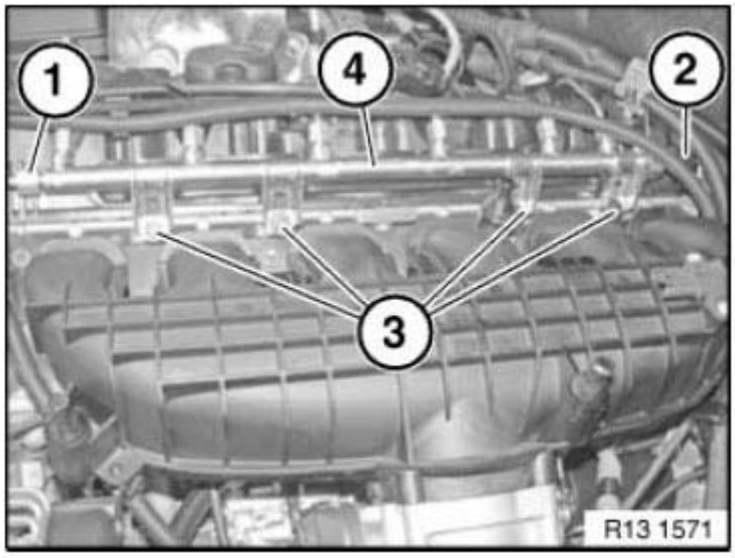


Fig. 47: Identifying Nut, Screws And High Pressure Rail
Courtesy of BMW OF NORTH AMERICA, INC.

Push on plug for high-pressure sensor (2).

Fitting pressure lines

(Same procedure for all pressure lines)

Connect pressure line (1). Tightening nuts hand-tight only.

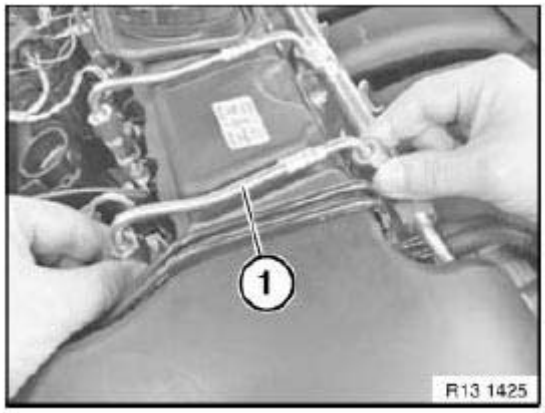


Fig. 48: Identifying Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be easily screwed on by hand, the injector must be turned into the installation position.

NOTE: Description of "Turning injector into installation location" in the following work step.

Only if one injector has to be turned into installation position

- Release bolt a few turns until holding-down element (1) is slackened.
- Turn injector (2) in direction of arrow until nuts on pressure line can be easily screwed on by hand.
- To do so, engage wrench on hexagon head of injector (2) if necessary.

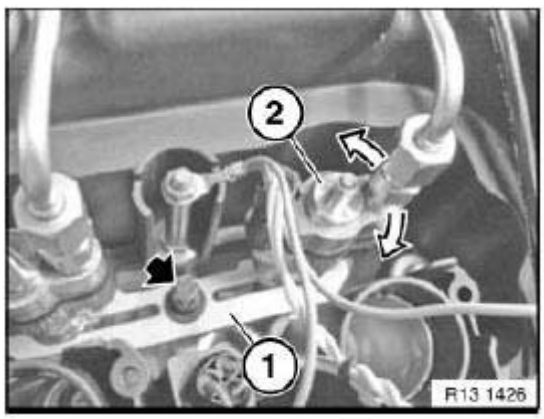


Fig. 49: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

- Tighten nuts on pressure line hand-tight.

IMPORTANT: Do not under any circumstances pull injector out of bore!

If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced!

Replacing PTFE sealing ring, refer to 13 53 310 .

Tighten down screws (1).

Tightening torque

13 53 1AZ .

Tighten nut (2).

Tightening torque

13 53 7AZ .

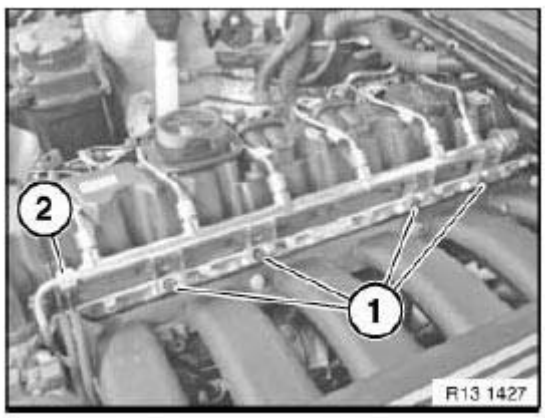


Fig. 50: Identifying Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screw for holding-down element (1).

Tightening torque **13 53 5AZ** .

NOTE: This work step is only necessary if one of the holding-down elements has been slackened beforehand.

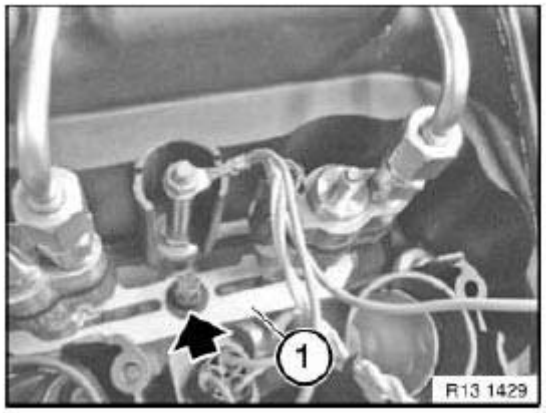


Fig. 51: Identifying Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on high-pressure rail.

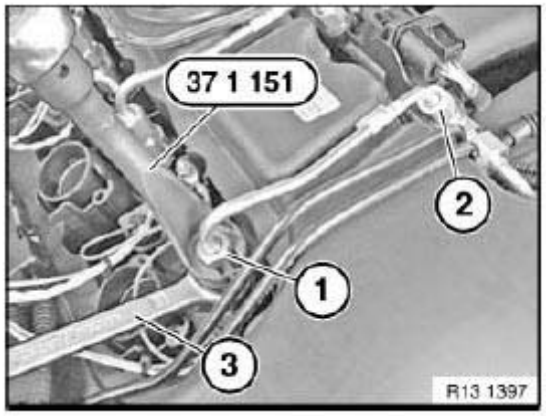


Fig. 52: Identifying Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** .

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 596 REPLACING HIGH-PRESSURE FUEL SENSOR (N54)

WARNING: Observe warning on cylinder head cover.

Clamp off BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks

- Remove **ACOUSTIC COVER** .

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Release high-pressure sensor (2) and remove.

Tightening torque **13 53 3AZ** with special tool 32 2 100.

Seal rail (3) if necessary with a matching plug from special tool kit **32-1270 PLUG** .

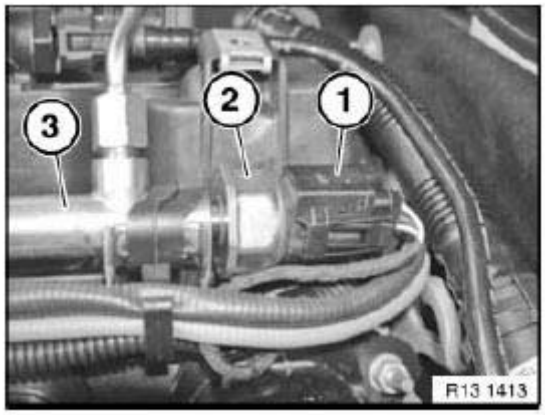


Fig. 53: Identifying Plug, High Pressure Sensor And Seal Rail
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If reusing:

The high-pressure sensor may only be screwed back in 3 times!

Therefore mark the sensor with a blue dot each time it is screwed back in.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1353 INJECTION NOZZLE AND LINES

13 53 192 REMOVING AND INSTALLING/REPLACING A PRESSURE LINE (N54)

WARNING: Observe warning on cylinder head cover.

Clamp off BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!

NOTE: **The following description applies to all pressure lines.**

First release rail pressure lines to reduce existing fuel pressure if necessary. Fuel must not get into the spark plug slot. Then release pressure line on injector.

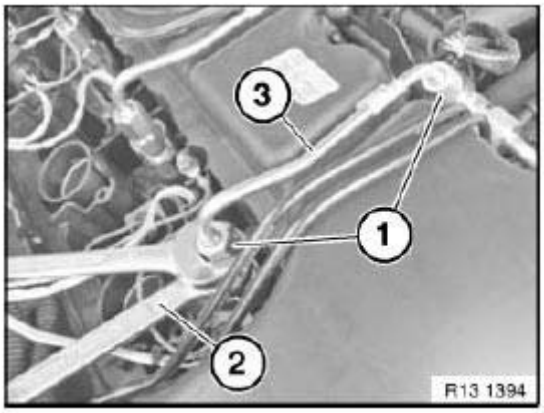


Fig. 54: Identifying Pressure Line, Wrench And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1), gripping the injector with a wrench (2) in so doing.

Disconnect pressure line (3).

IMPORTANT: If several pressure lines are removed, ensure that each pressure line is reinstalled in its original location (cylinder).

Mark pressure lines.

Close off injector with protective cap (1).

Protective caps are available from BMW Parts Service.

Seal rail with a matching plug from special tool kit **32-1270 PLUG** .

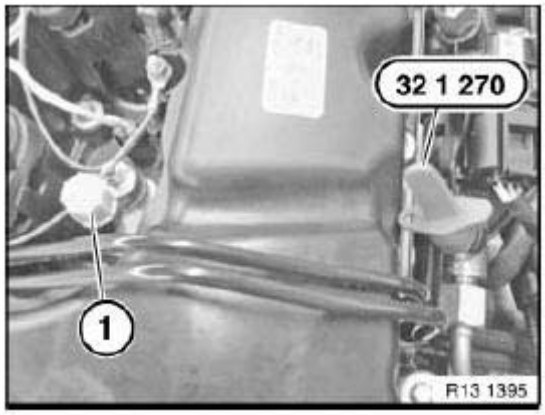


Fig. 55: Sealing High-Pressure Rail With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Seal pressure line (1) with a matching plug from special tool kit **32-1270 PLUG** .

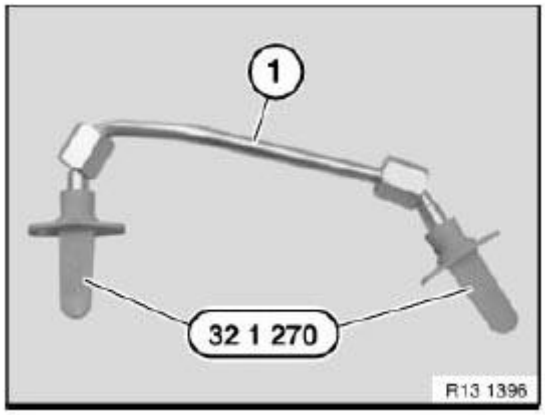


Fig. 56: Seal Pressure Line With Matching Plug From Special Tool Kit (32 1 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing pressure line

Installation of pressure rail is described separately from removal.

Same procedure for all pressure lines.

Copper seals that may be fitted (1) are no longer needed and must be removed.

If using the pressure line, apply a light coating of gear oil to the thread. New pressure lines are already coated.

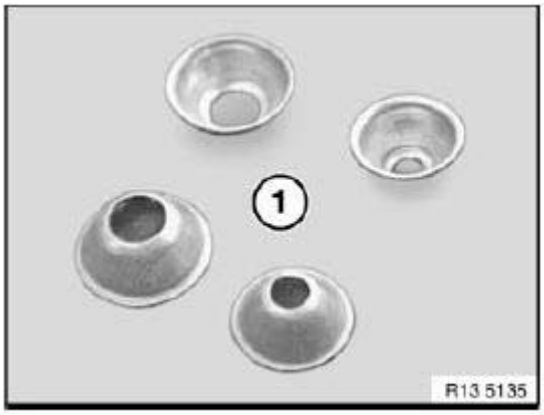


Fig. 57: Identifying Copper Seals
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be easily screwed on by hand, the injector must be turned into the installation position!

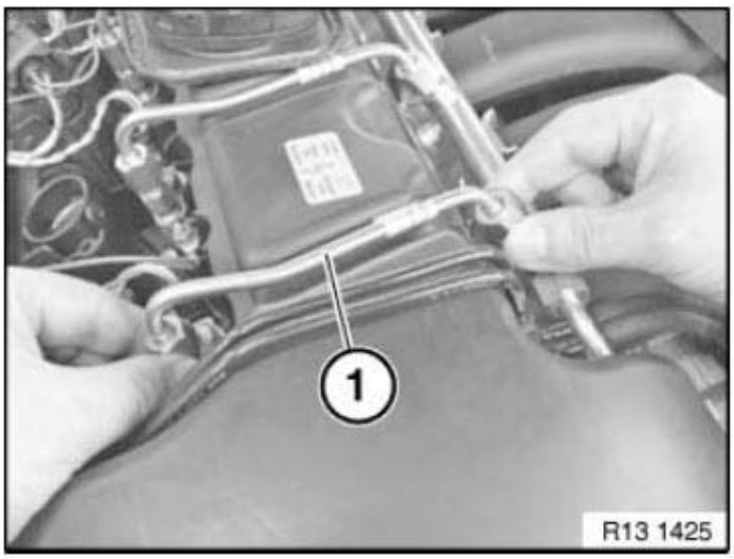


Fig. 58: Connecting Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Description of "Turning injector into installation position" in the following two work steps.

Only if injector has to be turned into installation position

- Release bolt a few turns until holding-down element (1) is slackened.
- Turn injector (2) in direction of arrow until nuts on pressure line can be easily screwed on by hand.

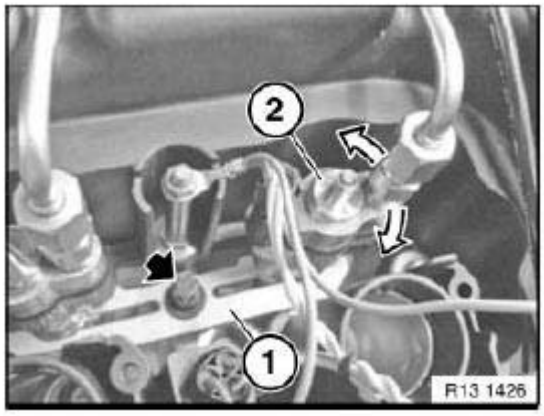


Fig. 59: Turning Injector Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

- To do so, engage wrench on hexagon head of injector if necessary.
- Tighten nuts on pressure line hand-tight.

IMPORTANT: Do not under any circumstances pull injector out of bore!

If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced! Replacing PTFE sealing ring, refer to 13 53 310 .

Tighten down screw for holding-down element (1).

Tightening torque **13 53 5AZ** .

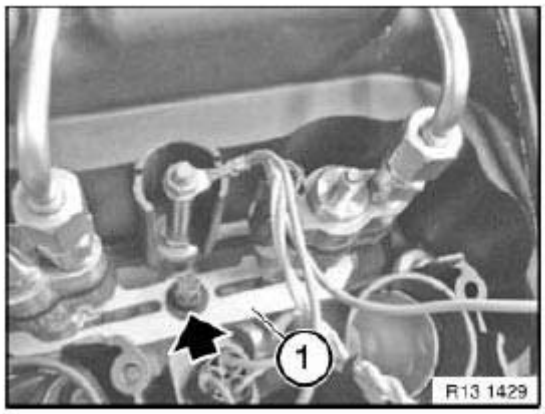


Fig. 60: Identifying Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

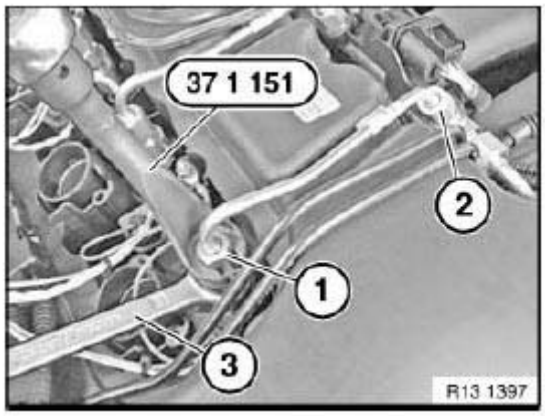


Fig. 61: Identifying Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque **13 53 8AZ** .

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 310 REMOVING AND INSTALLING/REPLACING AN INJECTOR (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!

IMPORTANT: When assembling, it is essential to adhere to screwing sequences and tightening torques!

Failure to comply with this requirement may result in leaks!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

IMPORTANT: Injectors are not waterproof!

Carry out engine cleaning/washing only with ignition coil cover fitted.

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail! Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**
- **Remove PRESSURE LINE of corresponding cylinder**

NOTE: The following description applies to all injectors.

Unlock plug (1) and remove.

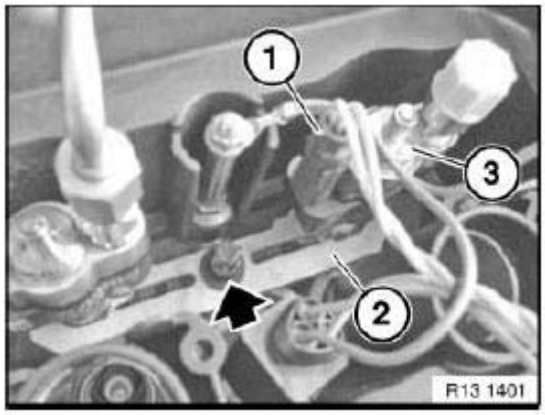


Fig. 62: Identifying Holding-Down Device, Plug And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw and remove hold-down device (2).

Remove injector (3).

NOTE: If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).

Mark injectors.

Procedure in event of stuck injector

Mount special tool 13 0 180 on injector (1).

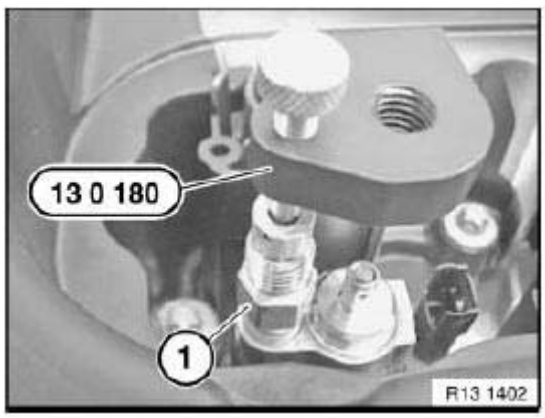


Fig. 63: Identifying Special Tool (13 0 180) On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool **13 5 250** .

Carefully knock out injector (1) with special tools **13 0 180** and **13 5 250** .

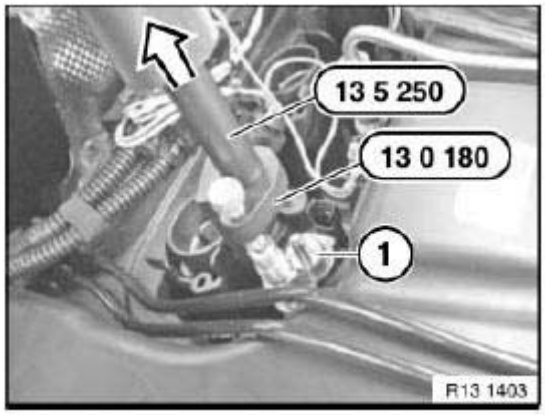


Fig. 64: Knock Out Injector With Special Tools (13 0 180) And (13 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

After removing, fit protective caps (1 and 3) to injector tip and fuel line connection.

Protective caps are available from BMW Parts Department.

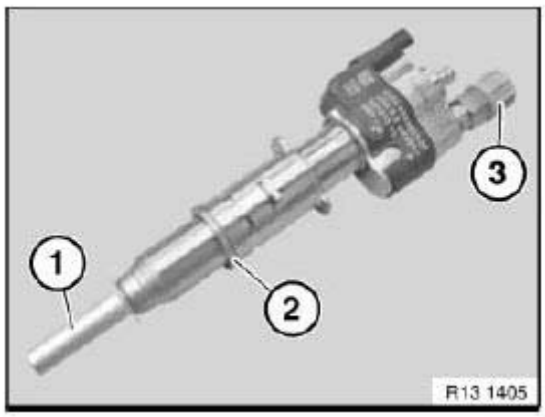


Fig. 65: Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When installing a new injector:

- Replace uncoupling element (2).
- Remove protective cap (1) from injector tip max. 10 min. before installation (PTFE sealing ring swells up).

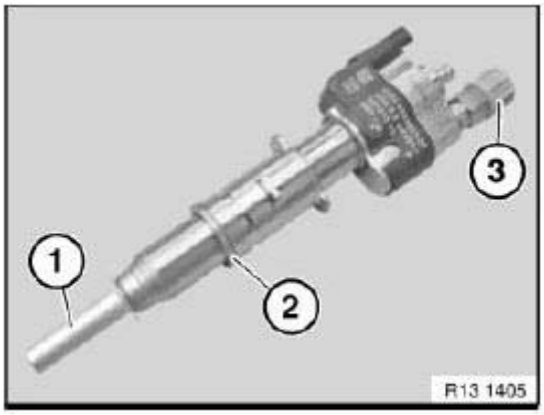


Fig. 66: Identifying Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When reusing fuel injector:

- Replace uncoupling element (2).
- Replace PTFE sealing ring (1).

A PTFE seal which has been heated once by engine operation must be replaced before the fuel injector is reinstalled.

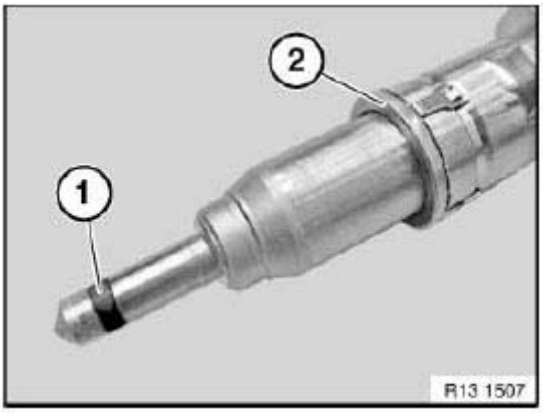


Fig. 67: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing PTFE sealing ring

Before replacing PTFE sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

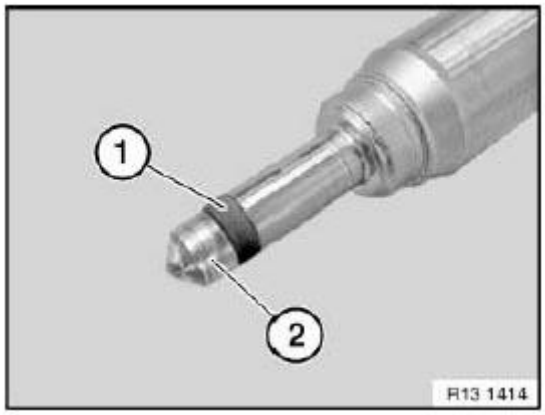


Fig. 68: Identifying PTFE Sealing Ring And Injector Tip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove PTFE sealing ring (1) with special tool 13 0 191 from injector (2).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

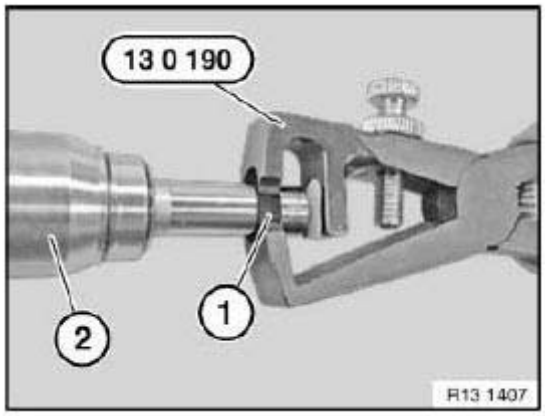


Fig. 69: Removing PTFE Sealing Ring From Injector Using Special Tool (13 0 191)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide new PTFE sealing ring (1) onto mounting taper 13 0 195.

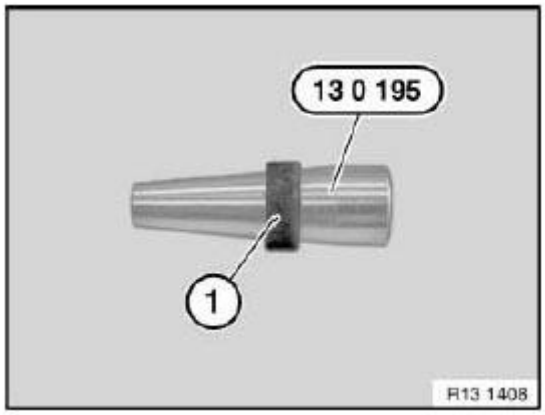


Fig. 70: Identifying PTFE Sealing Ring Onto Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

User fingers and mounting taper 13 0 195 to slide PTFE sealing ring (1) onto injector (2).

NOTE:

- **Do not use fingernails to slide PTFE sealing ring on.**
- **Do not use any lubricating agents.**
- **The sealing ring is expanded when slid on.**

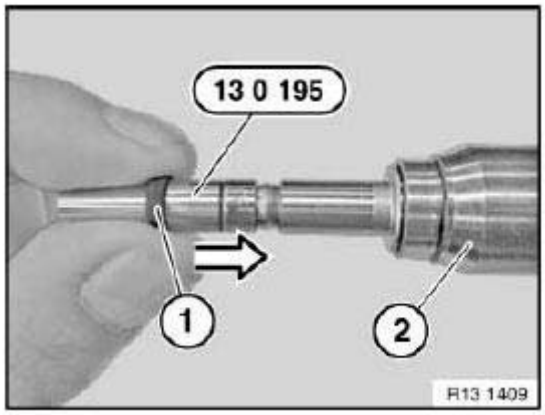


Fig. 71: Sliding PTFE Sealing Ring Onto Injector Using Fingers And Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

To bring the expanded PTFE sealing ring to its installation dimension, slide three assembly sleeves with decreasing diameters onto the injector.

Slide assembly sleeve (1) with large opening first onto injector (1).

Do not use any lubricating agents.

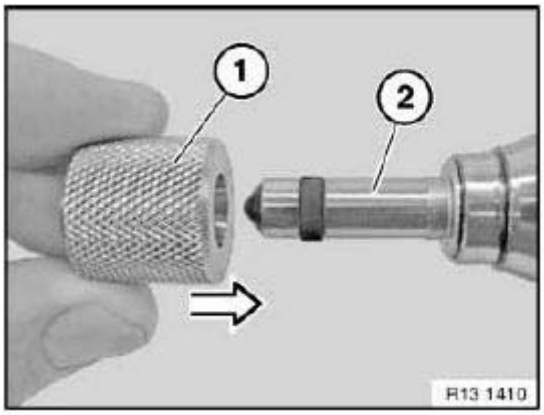


Fig. 72: Sliding Mounting Sleeve Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

First slide assembly sleeve 13 0 192 (large diameter) onto injector (1).

Then slide assembly sleeve 13 0 193 (medium diameter) onto injector (1).

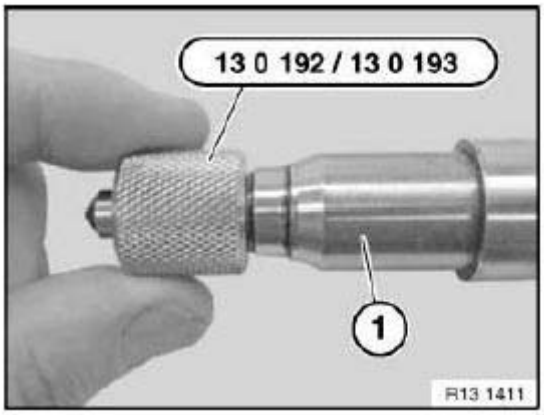


Fig. 73: Sliding Mounting Sleeve (13 0 192) Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Finally, press injector (1) into assembly sleeve 13 0 194 (small diameter).

Installation:

Install injector within 10 minutes or slide on protective cap (**Fig. 115**) (PTFE sealing ring swells up).

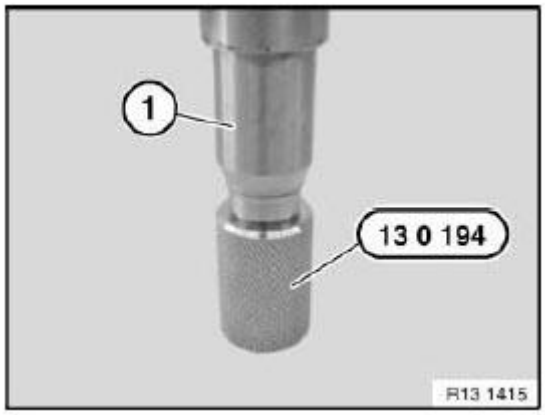


Fig. 74: Installing Injector Into Mounting Sleeve (13 0 194)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation of injector is described separately from removal.

Before installing injector in engines that have been run

- Check injector bore for dirt.

  Clean **only dirty** injector bores.

  Important - do not damage injector!

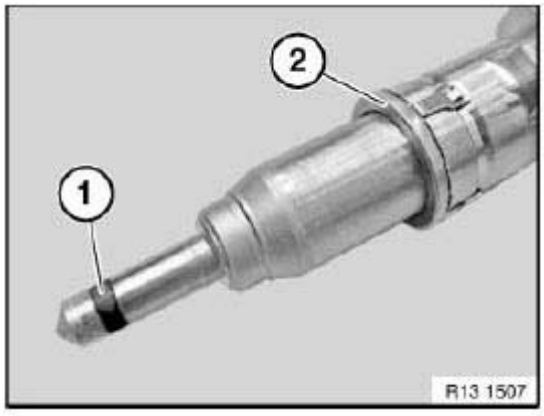


Fig. 75: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

- Clean injector bore: To do so, preferably slide injector without uncoupling element (2) but with new PTFE sealing ring (1) in and out of injector bores several times.

  The PTFE sealing ring must then be replaced.

- Clean contact surfaces of uncoupling elements (2) in cylinder head.
- Replace uncoupling element (2).

IMPORTANT: Injector adjustment!

An injector adjustment must be carried out if an injector is replaced or changed on the cylinder side.

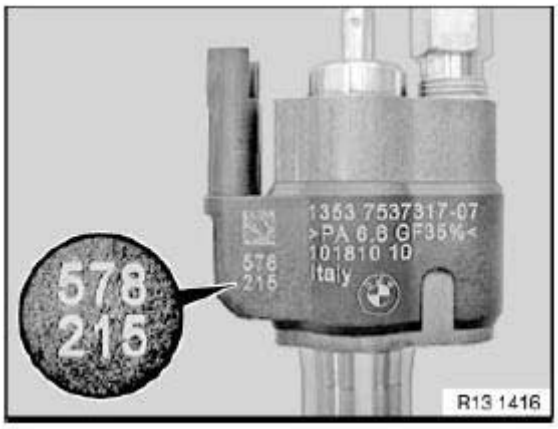


Fig. 76: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Injector adjustment is carried out with the aid of a so-called adjustment value.

The adjustment value is printed in two blocks of three digits on the injector.

The adjustment value must be read off **before** installation!

Enter the adjustment value according to the installation position (cylinder) of the injector.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Description of injector adjustment at end of instruction.

Fig. 77: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation:

Install hold-down device (1) with curvature facing upwards.

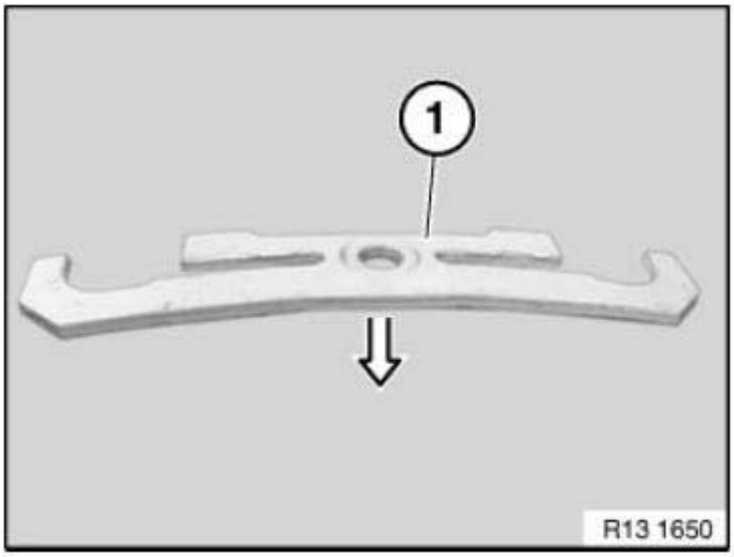


Fig. 78: Installing Hold-Down Device With Curvature
Courtesy of BMW OF NORTH AMERICA, INC.

Install injector (3).

Install hold-down device (2).

IMPORTANT: Tighten screw hand-tight only so that hold-down device (2) is slack and if necessary injector can still be turned.

Connect contact plug (1).

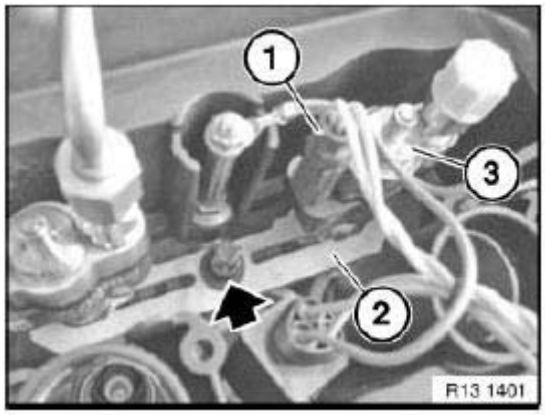


Fig. 79: Identifying Plug, Holding-Down Element And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Make sure hold-down device (1) is correctly seated.

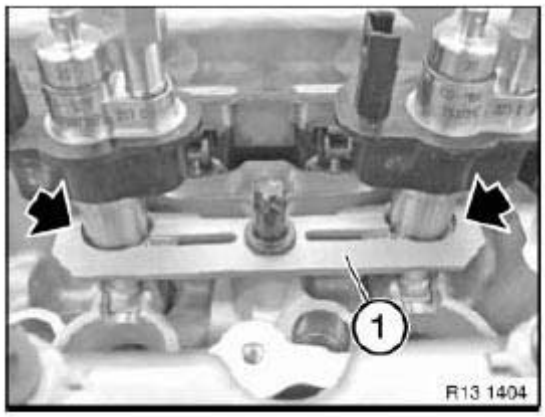


Fig. 80: Locating Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Copper seals (1) that may be fitted on the pressure lines are no longer needed and must be removed.

If using the pressure line, apply a light coating of gear oil to the thread. New lines are already pretreated.

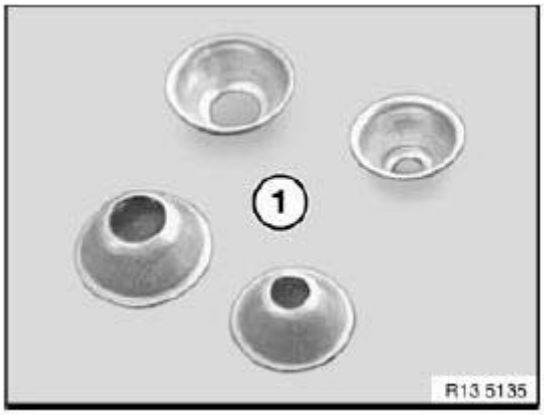


Fig. 81: Identifying Copper Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Connect pressure line (1), tightening nuts hand-tight only in the process.

IMPORTANT: Connect pressure line (1) without tension only.

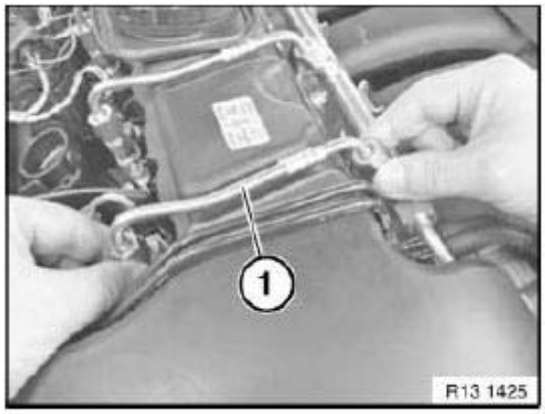


Fig. 82: Connecting Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be screwed on easily by hand, the injector must if necessary be turned a little.

Turn injector (2) if necessary in direction of arrow until nuts on pressure line can be easily screwed on by hand.

Tighten nuts on pressure line hand-tight.

Then tighten down bolt for hold-down device (1).

Tightening torque **13 53 5AZ** .

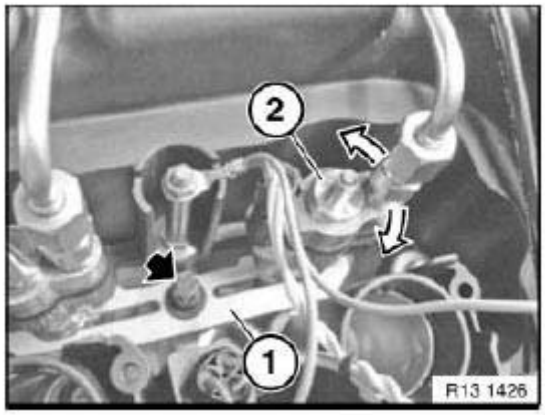


Fig. 83: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** .

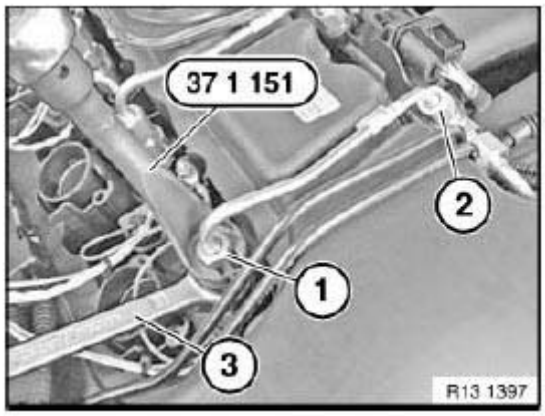


Fig. 84: Tightening Down Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Carrying out injector adjustment

- Connect DIS Tester

- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"
- Select "Adjustment programs"
- Select "Adjust injectors"
- Change "Test schedule"
- For each replaced injector, the adjustment value must be entered according to the installation position (cylinder).

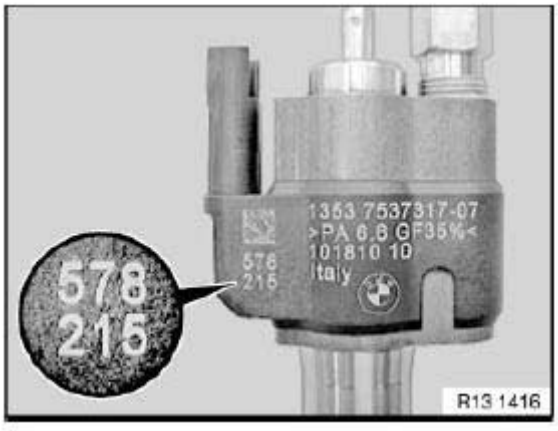


Fig. 85: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Clean spark plug slot.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 332 REMOVING AND INSTALLING/REPLACING FEED LINE (N54)

WARNING: Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

Wear protective goggles.

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: Ignition coils must not be fouled by fuel.

The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

Cover ignition coil with suitable means.

Necessary preliminary tasks

- Remove **INTAKE AIR MANIFOLD**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock and detach fuel line (1).

Catch and dispose of escaping fuel.

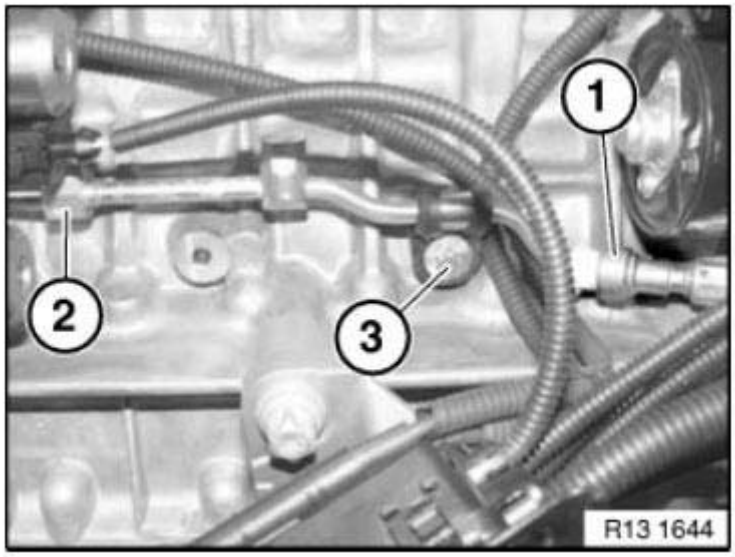


Fig. 86: Identifying Fuel Line, Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Seal fuel lines with special tools (1) 13 5 161 and (2) 13 5 162.

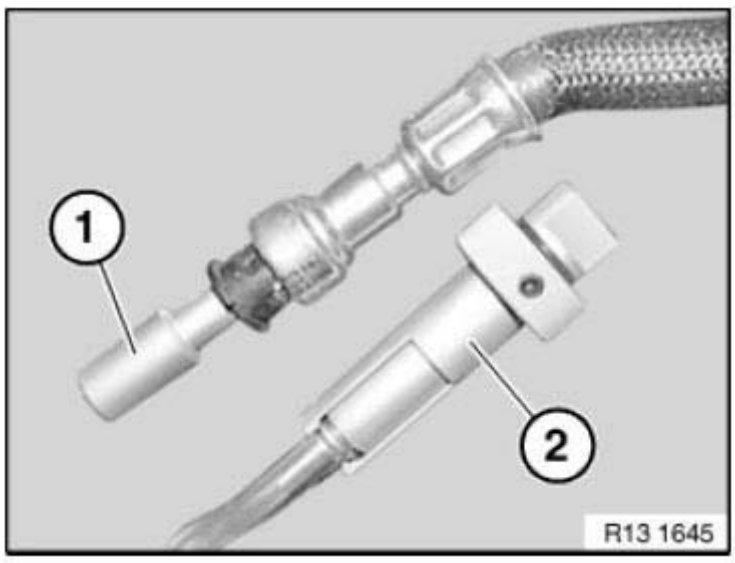


Fig. 87: Seal Fuel Lines With Special Tools (13 5 161) And (13 5 162)
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (2).

Release screw (3).

Remove feed line.

Close off feed line and high-pressure pump with a matching plug from special tool kit **32-1270 PLUG** .

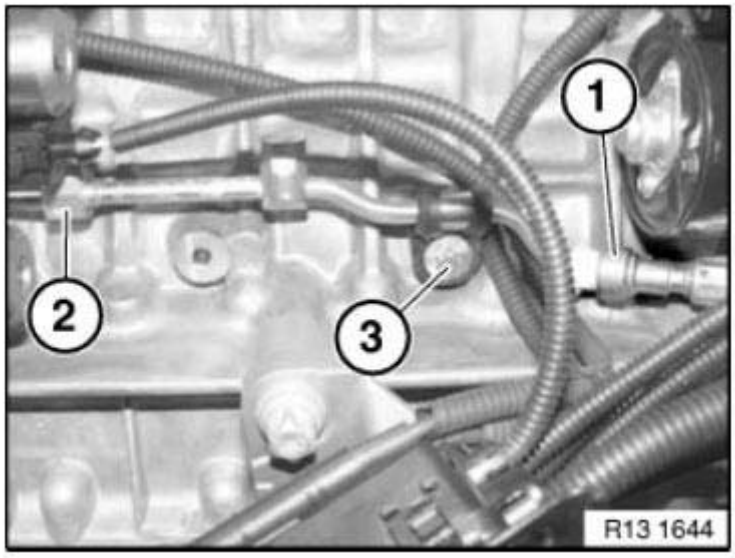


Fig. 88: Identifying Fuel Line, Nut And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Follow sequence of screw connections:

1. Tighten down nut (2) with special tool **13 5 020** .

   Tightening torque **13 53 6AZ** .

2. Replace aluminum screw (3).

   Tighten down screw (3).

   Tightening torque **13 53 9AZ** .

3. Connect fuel line (3).

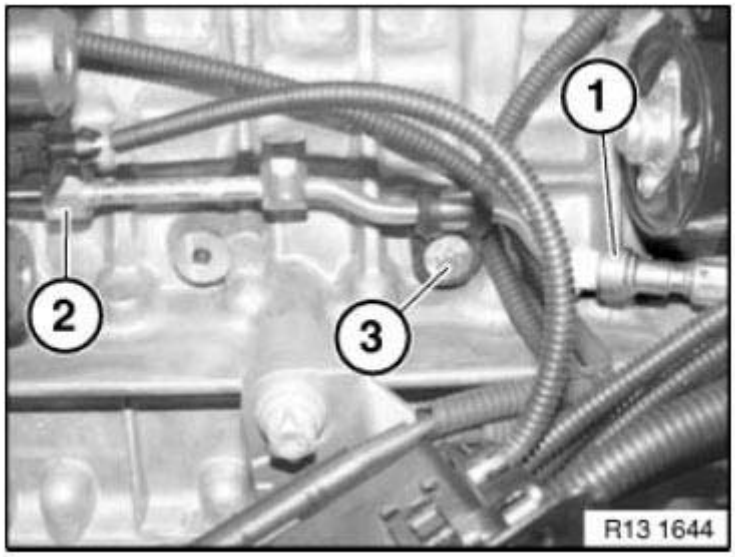


Fig. 89: Identifying Nut, Fuel Line And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 158 REMOVING AND INSTALLING/REPLACING HIGH-PRESSURE RAIL (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

IMPORTANT: When working on the oil, coolant or fuel circuit, you must protect the alternator against contamination.

Cover alternator with suitable materials.

Failure to comply with this procedure may result in an alternator malfunction.

Necessary preliminary tasks

- Remove **PRESSURE LINES**
- Remove **INTAKE FILTER HOUSING**

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Pull connector holder off high-pressure rail.

Remove all holders for wiring harness from high-pressure rail.

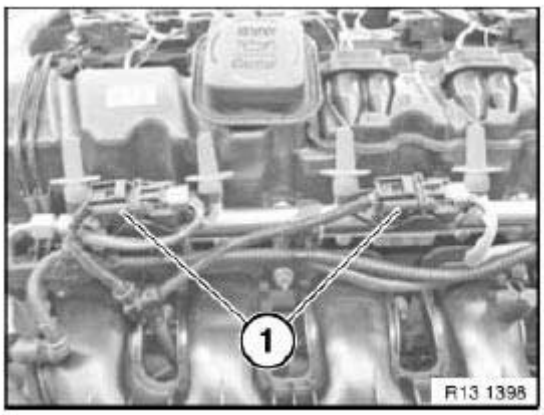


Fig. 90: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Unlock and disconnect plug (2) on high-pressure sensor.

Release screws (3) and remove high-pressure rail (4).

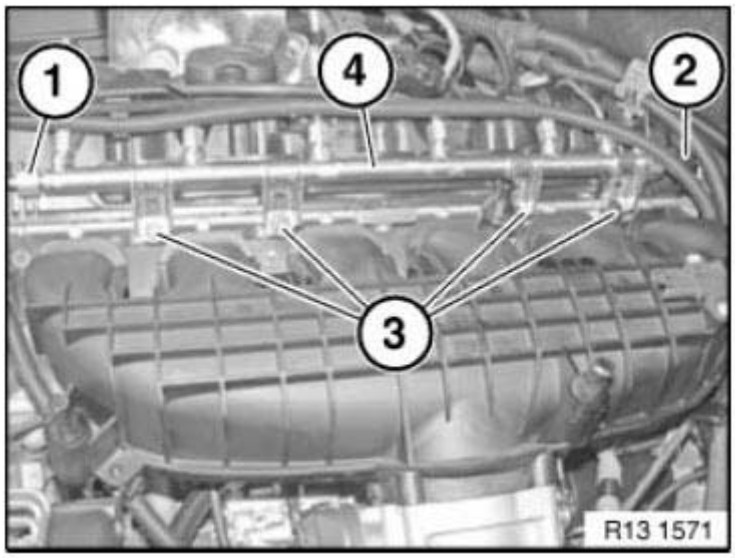


Fig. 91: Identifying Fuel Line, Nut, High-Pressure Rail And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installing high-pressure rail

Installation of high-pressure rail is described separately from removal.

Install high-pressure rail (4); in so doing, tighten screws (3) and nut (1) hand-tight only.

NOTE:

- **It must still be possible for the high-pressure rail to slide on the cylinder head.**
- **Nut (2) must be able to be screwed on easily by hand.**

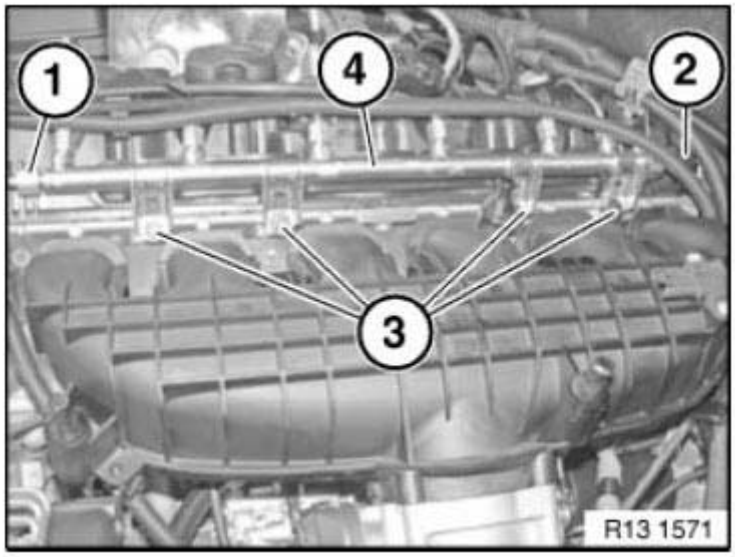


Fig. 92: Identifying High Pressure Rail, Nut And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Push on plug for high-pressure sensor (2).

Fitting pressure lines

(Same procedure for all pressure lines)

Connect pressure line (1). Tightening nuts hand-tight only.

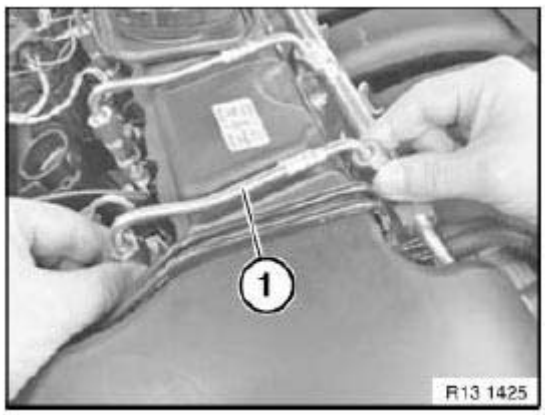


Fig. 93: Connecting Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily

by hand!

If the nuts cannot be easily screwed on by hand, the injector must be turned into the installation position.

NOTE: Description of "Turning injector into installation location" in the following work step.

Only if one injector has to be turned into installation position

- Release bolt a few turns until holding-down element (1) is slackened.
- Turn injector (2) in direction of arrow until nuts on pressure line can be easily screwed on by hand.
- To do so, engage wrench on hexagon head of injector (2) if necessary.
- Tighten nuts on pressure line hand-tight.

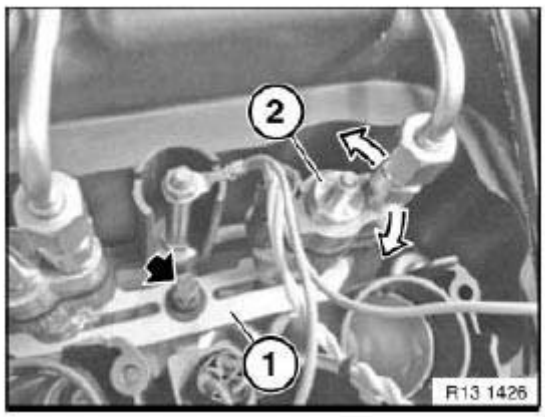


Fig. 94: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not under any circumstances pull injector out of bore!

If the injector is pulled out of the bore hole, the PTFE sealing ring must be replaced!

Replacing PTFE sealing ring, refer to 13 53 310 .

Tighten down screws (1).

Tightening torque

13 53 1AZ .

Tighten nut (2).

Tightening torque

13 53 7AZ .

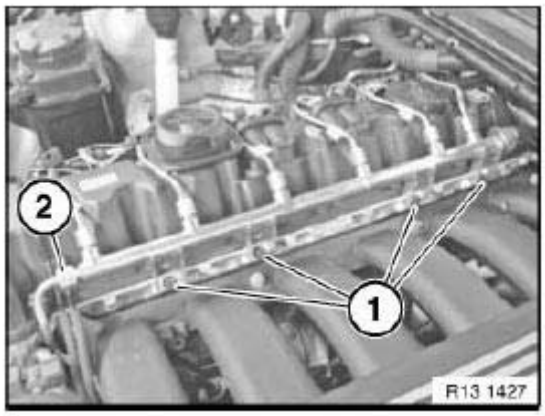


Fig. 95: Identifying Down Screws And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Tighten down screw for holding-down element (1).

Tightening torque **13 53 5AZ** .

NOTE: This work step is only necessary if one of the holding-down elements has been slackened beforehand.

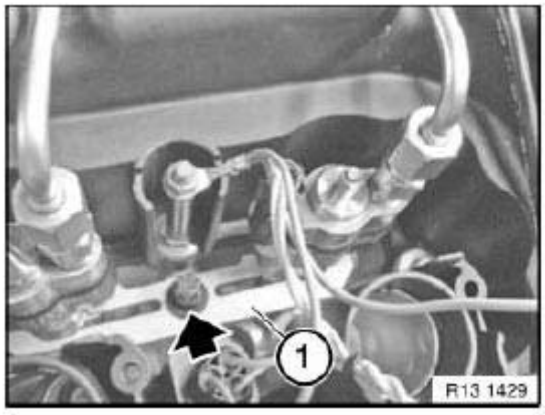


Fig. 96: Identifying Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on high-pressure rail.

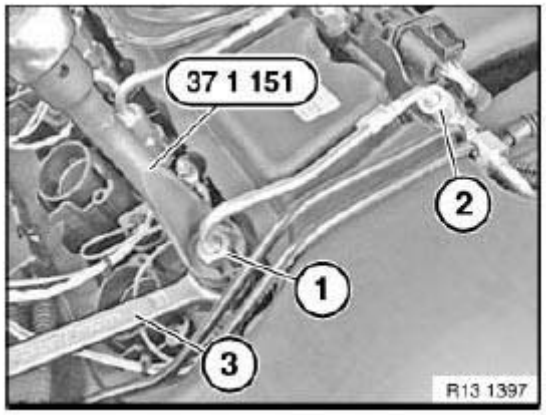


Fig. 97: Identifying Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** , see **13 53 FUEL INJECTION NOZZLES AND PIPES** .

Assemble engine.

Check fuel system for leaks.

Check function of DME.

13 53 596 REPLACING HIGH-PRESSURE FUEL SENSOR (N54)

WARNING: Observe warning on cylinder head cover.

Clamp off BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

IMPORTANT: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity when the high-pressure line is released!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**

Necessary preliminary tasks

- Remove **ACOUSTIC COVER** .

Recycling

Fuel escapes when fuel lines are detached.

Catch and dispose of escaping fuel in a suitable container.

Observe country-specific waste-disposal regulations.

Unlock plug (1) and remove.

Release high-pressure sensor (2) and remove.

Tightening torque **13 53 3AZ** with special tool 32 2 100.

Seal rail (3) if necessary with a matching plug from special tool kit **32-1270 PLUG** .

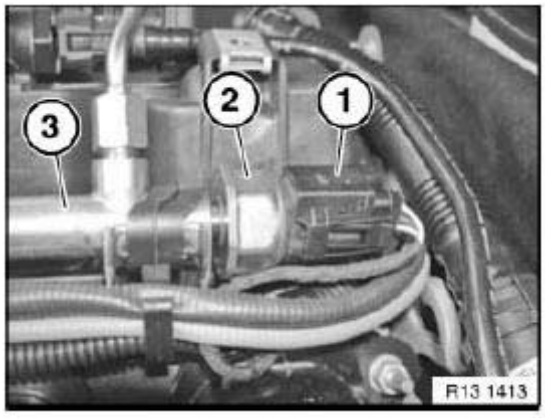


Fig. 98: Identifying Plug, High-Pressure Sensor And Seal Rail
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: If reusing:

The high-pressure sensor may only be screwed back in 3 times!

Therefore mark the sensor with a blue dot each time it is screwed back in.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1354 THROTTLE AND OPERATION

11 61 365 REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR DUCT (N54, N54T)

Necessary preliminary tasks

- Remove **FAN COWL**
- Remove front **UNDERBODY PROTECTION**
- Remove **INTAKE SILENCER HOUSING**

IMPORTANT: Coat sealing rings of snap fasteners with lubricant.

Pressure pipes with quick-connect couplings cannot be fitted without antiseize agent.

Unlock quick-connect coupling.

Detach charge air duct (1) from charge air cooler (2).

Installation note:

- Coat sealing rings of snap fasteners with lubricant.
- Pressure pipes must audibly snap into place.

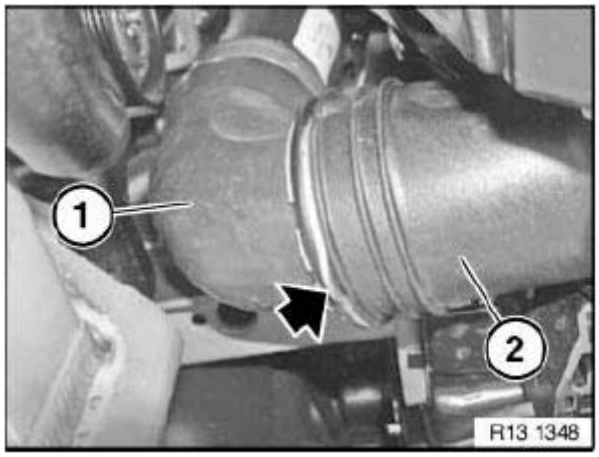


Fig. 99: Removing Charge-Air Duct From Intercooler
Courtesy of BMW OF NORTH AMERICA, INC.

Release quick-connect couplings (1) by turning lock through 90°.

Detach recirculated-air hoses (2) and lay to one side.

Disconnect plug connection (3).

Unlock quick-connect coupling (5) and detach charge air duct (6) from throttle valve actuator.

Pull charge air duct (6) out of rubber grommet (4) and remove towards top.

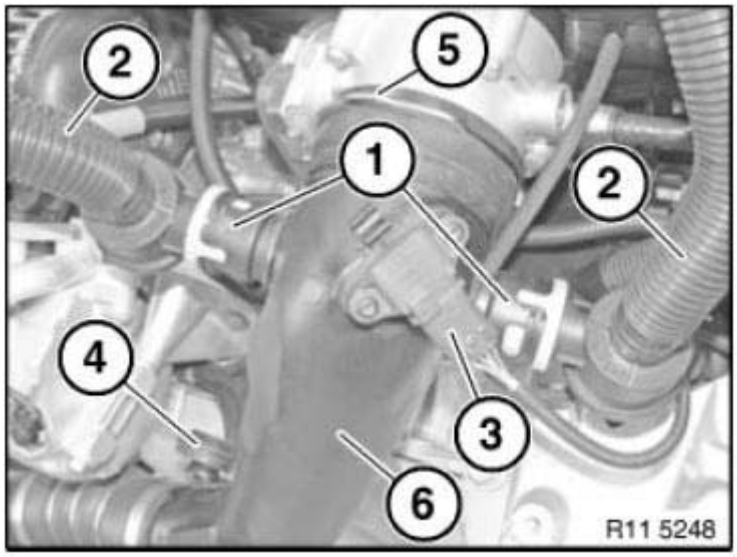


Fig. 100: Identifying Quick-Connect Couplings, Plug Connection, Charge Air Duct And Rubber Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Bring lock (1) back 90° into installation position.

Pay attention to markings.

Recirculated-air hoses must snap audibly into place.

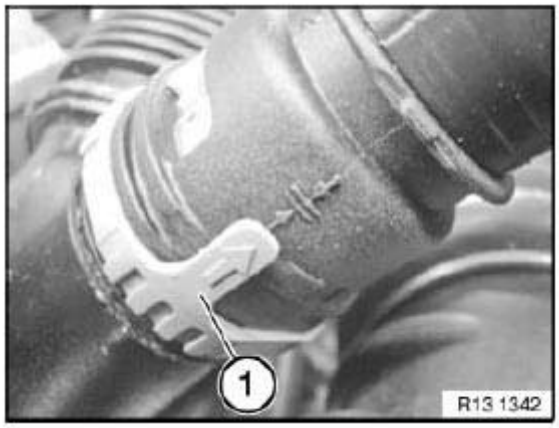


Fig. 101: Identifying Bring Lock
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to sealing rings.

Special tool 11 8 670 is mandatory.

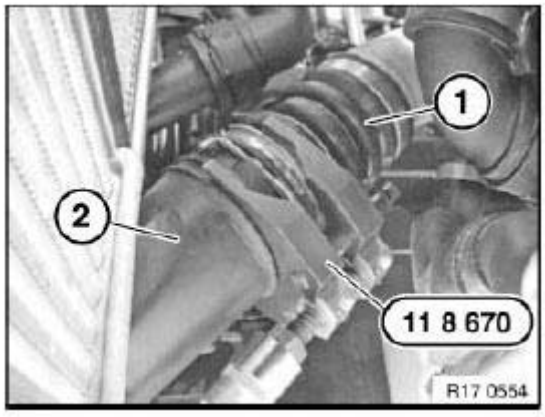


Fig. 102: Identifying Charge-Air Duct With Special Tool (11 8 670)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach charge air duct (1) with special tool **11 8 670** to charge air cooler (2).

Installation note:

Texts refer to and illustrations show the right side.

The procedure is identical for the left side.

IMPORTANT: Charge air hoses with clamp fastenings must be installed dry and free from grease!

If charge air hoses with clamp fastenings are not installed dry and free from grease, this may result in turbocharger failure!

11 61 362 REMOVING AND INSTALLING/REPLACING RIGHT CHARGE AIR DUCT (N54, N54T)

Necessary preliminary tasks

- Remove **COOLANT EXPANSION TANK**
- Remove **UNDERBODY PROTECTION**
- Remove right **TENSION STRUT**

IMPORTANT: Coat sealing rings of snap fasteners with lubricant.

Pressure pipes cannot be fitted without lubricant.

Mark vacuum hoses (1) and detach.

Mark vacuum hose (2) and detach.

Unscrew nuts (3).

Release screw (4).

Tightening torque, screw **11 65 6AZ** .

Raise bracket slightly.

Mark vacuum hose (5) on underside of pressure accumulator.

Remove vacuum accumulator with bracket.

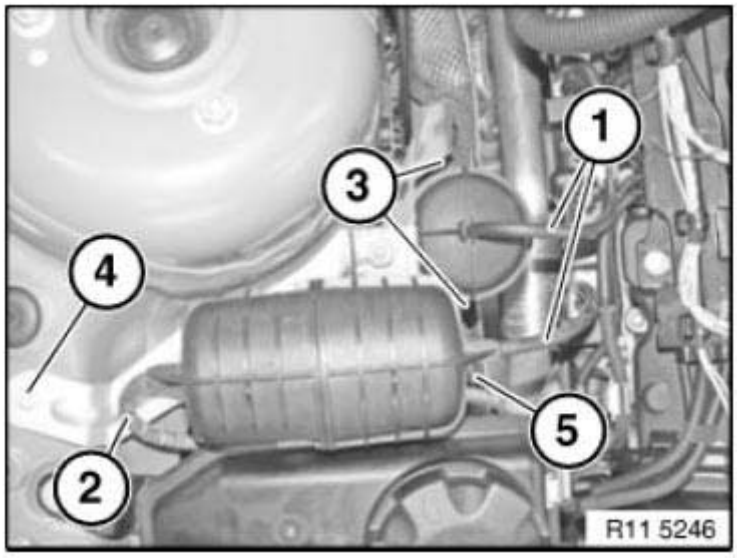


Fig. 103: Identifying Vacuum Hose, Nuts And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts (1) and screws (2), remove heat shield (3).

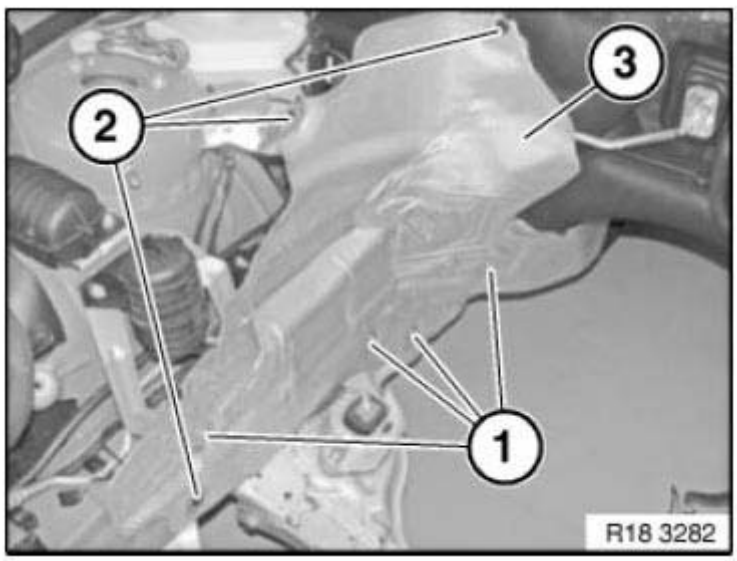


Fig. 104: Identifying Nuts, Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamps (1, 2), detach charge air duct (3).

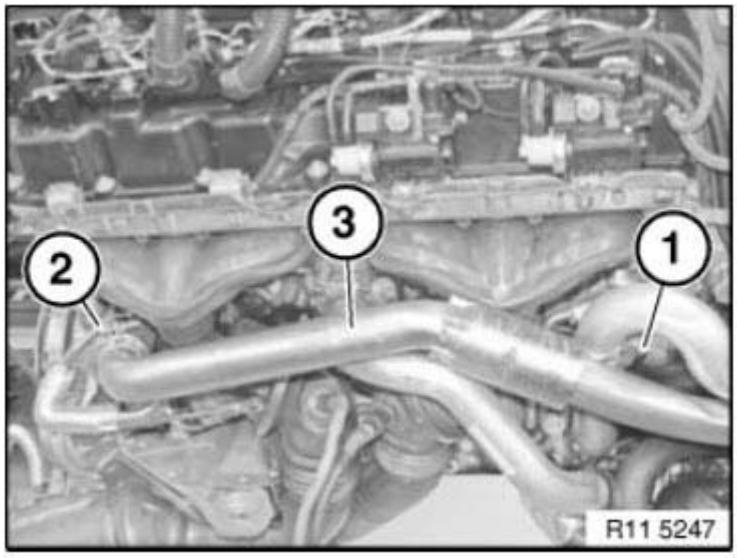


Fig. 105: Identifying Clamps And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Faulty O-rings must be replaced.

Prior to fitting, coat O-ring with suitable antiseize agent.

Fig. 106: Locating O-Rings
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and detach coolant hose (1).

Unlock quick-connect coupling.

Detach charge air duct (2) from charge air cooler (3) and remove towards top.

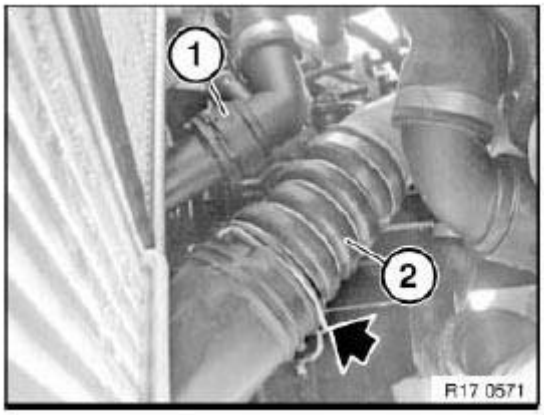


Fig. 107: Identifying Coolant Hose And Charge-Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage! to sealing rings!

Special tool 11 8 670 is mandatory.

Attach charge air duct (1) with special tool **11 8 670** to charge air cooler.

Installation note:

- Coat sealing rings of quick-connect couplings with antiseize agent.
- Pressure pipes must audibly snap into place

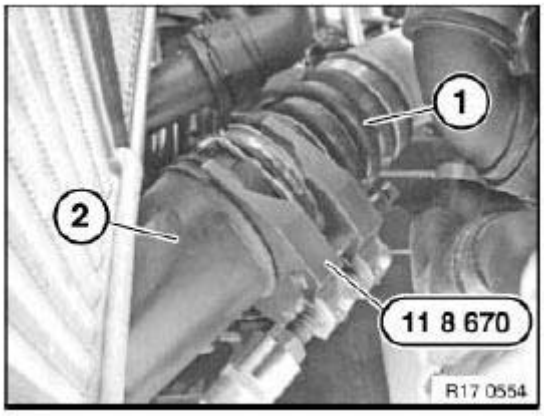


Fig. 108: Identifying Charge-Air Duct Using Special Tool (11 8 670)
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check DME (turbocharger) for correct operation.

13 54 030 REMOVING AND INSTALLING/SEALING THROTTLE VALVE ASSEMBLY (N54)

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Switch off ignition
- Remove left **CHARGE-AIR DUCT**

Unlock and disconnect line (1).

Unlock connector (2) and remove.

Release screws.

Tightening torque **13 54 1AZ** .

Remove throttle assembly (3).

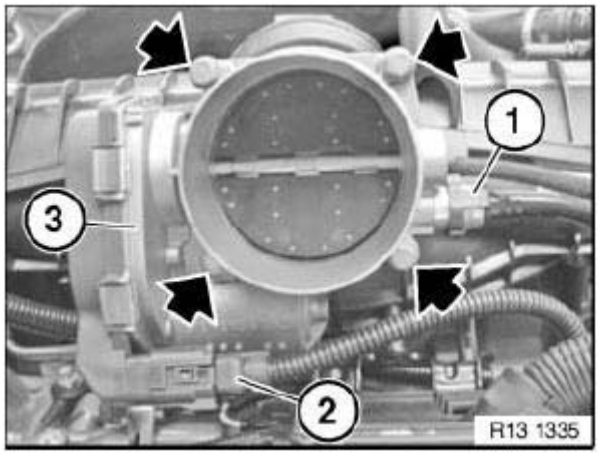


Fig. 109: Locating Throttle Assembly And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Replace sealing ring (1) of throttle assembly (2).

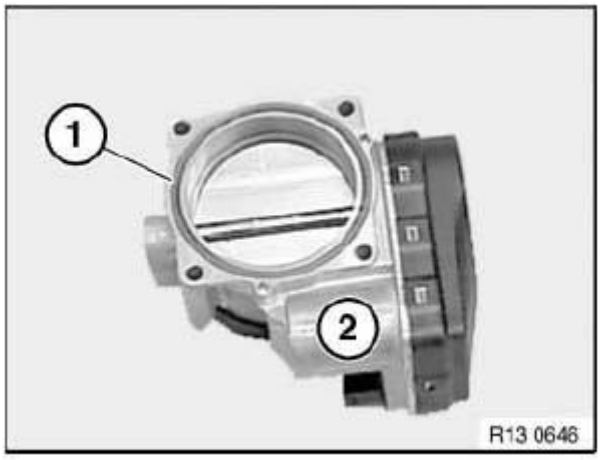


Fig. 110: Identifying Sealing Ring Of Throttle Assembly
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check stored fault messages.

Now clear the fault memory.

1362 SENSOR FOR CONTROL UNIT

13 62 531 REPLACING COOLANT TEMPERATURE SENSOR (N54)

WARNING: Danger of scalding!

Only perform these tasks on an engine that has cooled down.

Recycling

Catch and dispose of escaping coolant.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

- Read out fault memory of DME control unit
- Switch off ignition
- Remove **ACOUSTIC COVER**

NOTE: Coolant temperature sensor is mounted on cylinder head at front.

Unlock plug (1) and remove.

Release temperature sensor (2).

Installation:

Tightening torque **13 62 1AZ** .

.

Check **COOLING SYSTEM** for leaks.

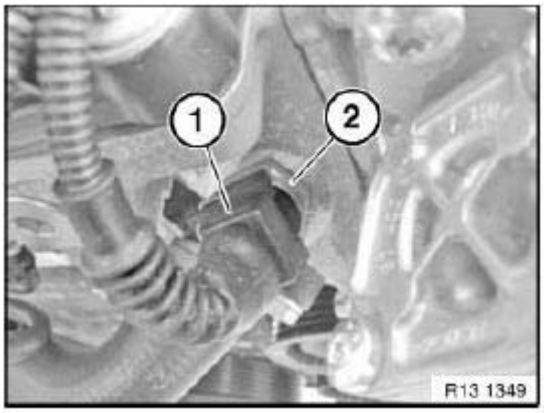


Fig. 111: Identifying Plug And Temperature Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check stored fault messages.

Now clear the fault memory.

1364 START VALVES

13 53 310 REMOVING AND INSTALLING/REPLACING AN INJECTOR (N54)

WARNING: Observe warning on cylinder head cover.

Disconnect BATTERY NEGATIVE LEAD (risk of fire due to short-circuiting on removal).

Electric fuel pump starts up automatically when door is opened!

Carry out installation work on fuel system only with coolant temperature below 40°C.

WARNING: Wear full face guard and protective gloves.

Fuel can emerge spontaneously at high velocity from the fuel injectors!

To reduce the fuel pressure, place rag over fuel injector and carefully tap against the fuel injector with a spanner.

There is a risk of injury if the fuel pressure is not reduced!

IMPORTANT: When assembling, it is essential to adhere to screwing sequences and tightening torques!

Failure to comply with this requirement may result in leaks!

IMPORTANT: Adhere to conditions of absolute cleanliness when working on the high-pressure fuel system.

Introduced contaminants can cause malfunctions in the system!

- **Do not allow any dirt particles or foreign bodies to get into the system.**
- **Remove all traces of dirt before removing pipes or individual components.**
- **Use only fluff-free cloths.**
- **Seal all fuel system openings with protective caps or plugs.**
- **High-pressure lines may be rescrewed a maximum of 10 times.**

IMPORTANT: Injectors are not waterproof!

Carry out engine cleaning/washing only with ignition coil cover fitted.

Necessary preliminary tasks

- Remove **IGNITION COIL** of corresponding cylinder

NOTE:

- **Ignition coils must not be fouled by fuel!**

  The resistance of the silicone material is reduced significantly by contact with fuel, which may cause the ignition coil to fail!

  Cloths/rags must therefore be used to prevent fuel from getting into the spark plug slots!

- **Before installing ignition coils, clean spark plug slots with compressed air.**
- **Make sure the spark plug slot is absolutely clean.**
- **Remove PRESSURE LINE of corresponding cylinder**

NOTE: The following description applies to all injectors.

Unlock plug (1) and remove.

Release screw and remove hold-down device (2).

Remove injector (3).

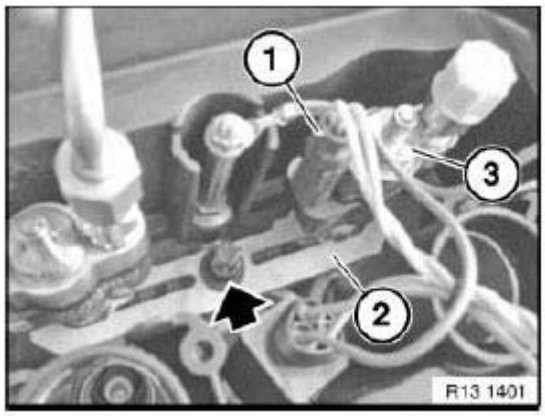


Fig. 112: Identifying Holding-Down Element And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If several injectors are removed, ensure that each injector is reinstalled in its original location (cylinder).

Mark injectors.

Procedure in event of stuck injector

Mount special tool 13 0 180 on injector (1).

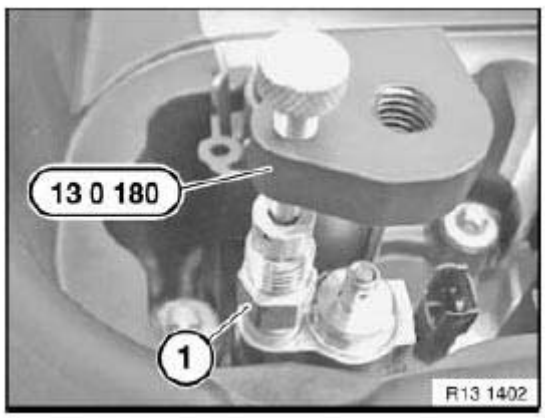


Fig. 113: Identifying Special Tool (13 0 180) On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Mount special tool **13 5 250** .

Carefully knock out injector (1) with special tools **13 0 180** and **13 5 250** .

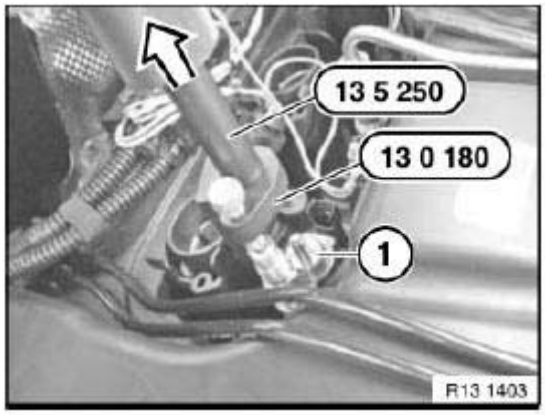


Fig. 114: Knock Out Injector With Special Tools (13 0 180) And (13 5 250)
Courtesy of BMW OF NORTH AMERICA, INC.

After removing, fit protective caps (1 and 3) to injector tip and fuel line connection.

Protective caps are available from BMW Parts Department.

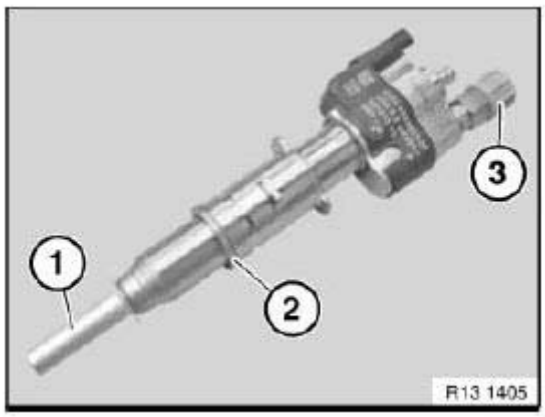


Fig. 115: Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When installing a new injector:

- Replace uncoupling element (2).
- Remove protective cap (1) from injector tip max. 10 min. before installation (PTFE sealing ring swells up).

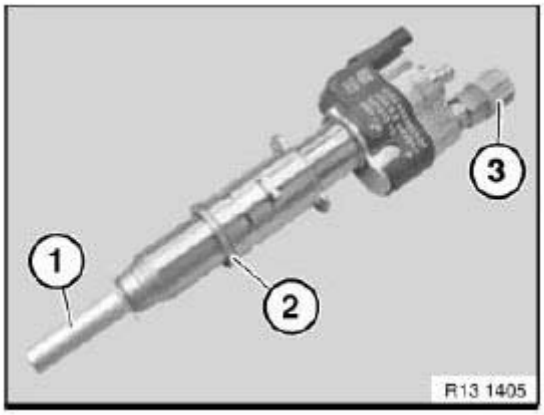


Fig. 116: Fit Protective Caps
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

When reusing fuel injector:

- Replace uncoupling element (2).
- Replace PTFE sealing ring (1).

A PTFE seal which has been heated once by engine operation must be replaced before the fuel injector is reinstalled.

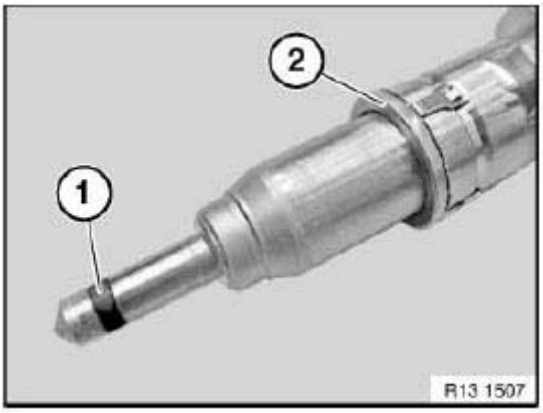


Fig. 117: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

Replacing PTFE sealing ring

Before replacing PTFE sealing ring (1), make sure hands and work surface are clean and free of oil.

Avoid mechanical contact with injector tip (2).

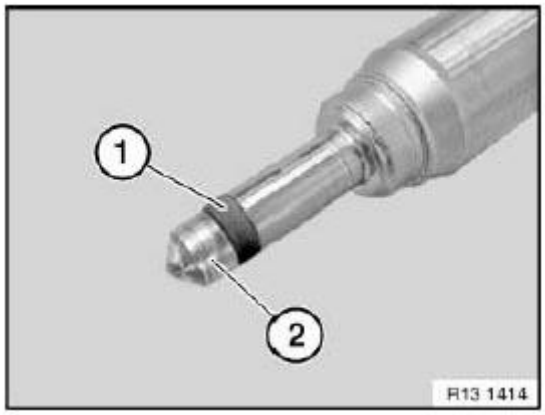


Fig. 118: Identifying PTFE Sealing Ring And Injector Tip
Courtesy of BMW OF NORTH AMERICA, INC.

Remove PTFE sealing ring (1) with special tool 13 0 191 from injector (2).

Use a fluff-free cloth only to remove combustion residues from cylindrical part of injector tip (do not use ultrasound or other tools/agents).

Do not clean injector tip.

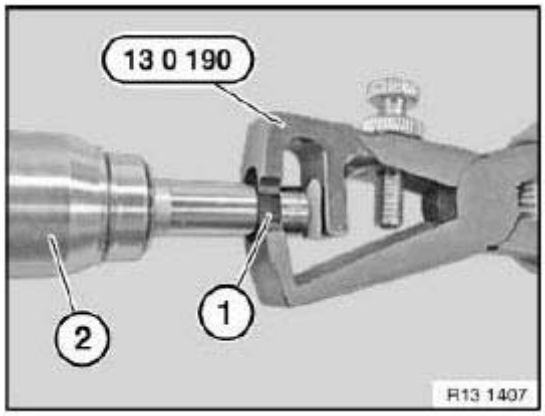


Fig. 119: Removing PTFE Sealing Ring From Injector Using Special Tool (13 0 191)
Courtesy of BMW OF NORTH AMERICA, INC.

Slide new PTFE sealing ring (1) onto mounting taper 13 0 195.

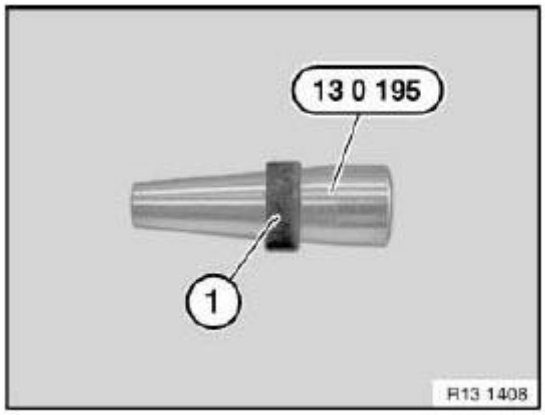


Fig. 120: Identifying PTFE Sealing Ring Onto Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

User fingers and mounting taper 13 0 195 to slide PTFE sealing ring (1) onto injector (2).

NOTE:

- **Do not use fingernails to slide PTFE sealing ring on.**
- **Do not use any lubricating agents.**
- **The sealing ring is expanded when slid on.**

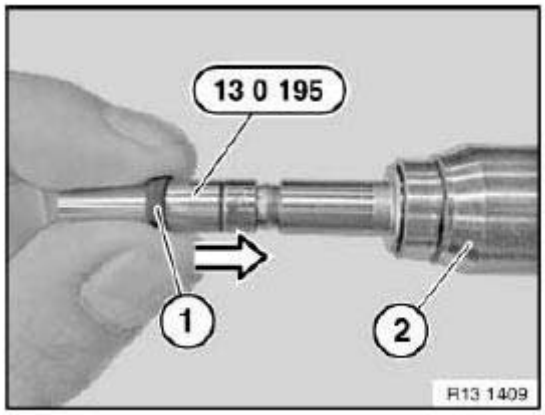


Fig. 121: Sliding PTFE Sealing Ring Onto Injector Using Fingers And Mounting Taper (13 0 195)
Courtesy of BMW OF NORTH AMERICA, INC.

To bring the expanded PTFE sealing ring to its installation dimension, slide three assembly sleeves with decreasing diameters onto the injector.

Slide assembly sleeve (1) with large opening first onto injector (1).

Do not use any lubricating agents.

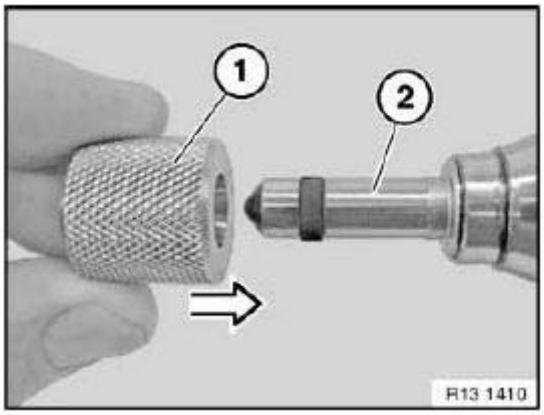


Fig. 122: Sliding Mounting Sleeve Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

First slide assembly sleeve 13 0 192 (large diameter) onto injector (1).

Then slide assembly sleeve 13 0 193 (medium diameter) onto injector (1).

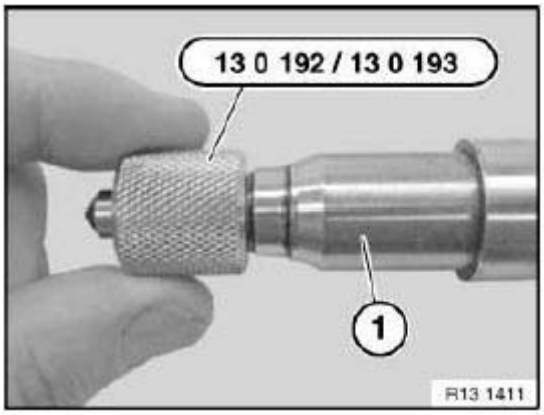


Fig. 123: Sliding Assembly Sleeve (13 0 192) Onto Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Finally, press injector (1) into assembly sleeve 13 0 194 (small diameter).

Installation:

Install injector within 10 minutes or slide on protective cap (**Fig. 116**) (PTFE sealing ring swells up).

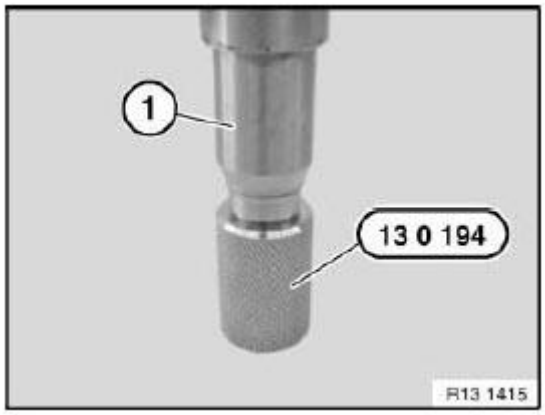


Fig. 124: Identifying Injector Into Assembly Sleeve (13 0 194)
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation of injector is described separately from removal.

Before installing injector in engines that have been run

- Check injector bore for dirt.

  Clean **only dirty** injector bores.

  Important - do not damage injector!

- Clean injector bore: To do so, preferably slide injector without uncoupling element (2) but with new PTFE sealing ring (1) in and out of injector bores several times.

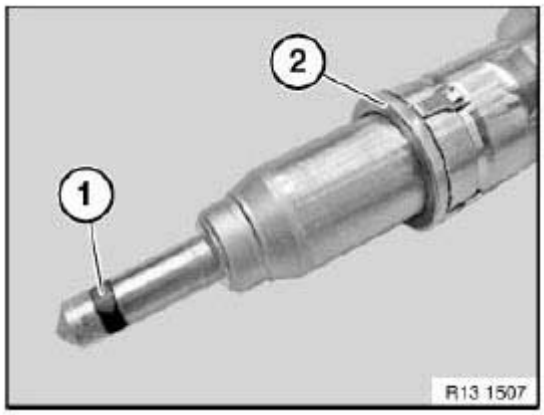


Fig. 125: Identifying PTFE Sealing Ring And Uncoupling Element
Courtesy of BMW OF NORTH AMERICA, INC.

The PTFE sealing ring must then be replaced.

- Clean contact surfaces of uncoupling elements (2) in cylinder head.
- Replace uncoupling element (2).

IMPORTANT: Injector adjustment!

An injector adjustment must be carried out if an injector is replaced or changed on the cylinder side.

Injector adjustment is carried out with the aid of a so-called adjustment value.

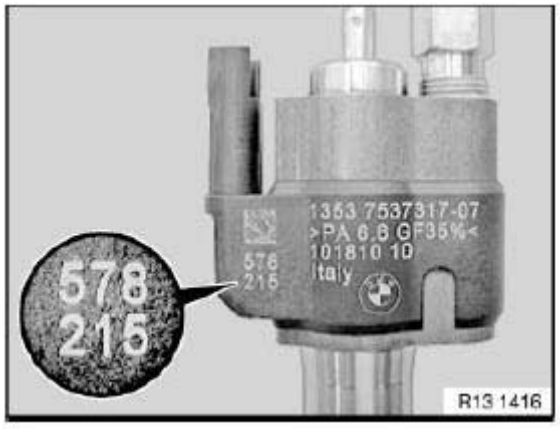


Fig. 126: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

The adjustment value is printed in two blocks of three digits on the injector.

The adjustment value must be read off **before** installation!

Enter the adjustment value according to the installation position (cylinder) of the injector.

If injector adjustment is not carried out, the engine may run roughly or fail to start.

Description of injector adjustment at end of instruction.

Fig. 127: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Installing injector

Installation:

Install hold-down device (1) with curvature facing upwards.

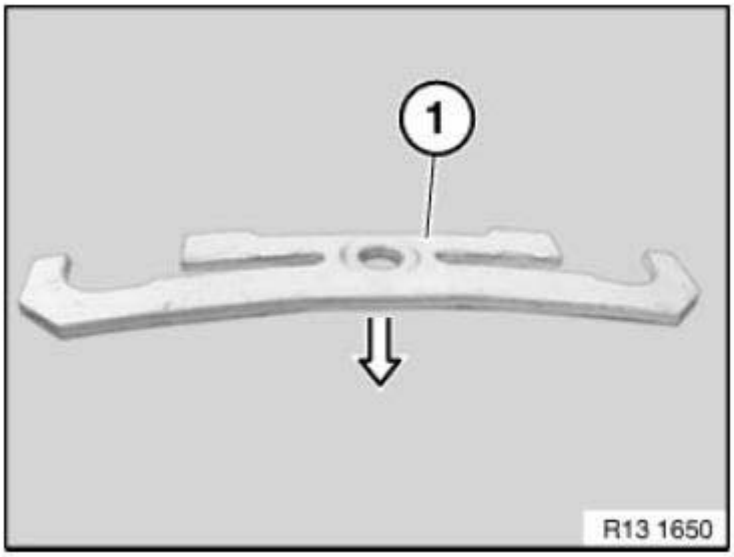


Fig. 128: Identifying Hold-Down Device With Curvature
Courtesy of BMW OF NORTH AMERICA, INC.

Install injector (3).

Install hold-down device (2).

IMPORTANT: Tighten screw hand-tight only so that hold-down device (2) is slack and if necessary injector can still be turned.

Connect contact plug (1).

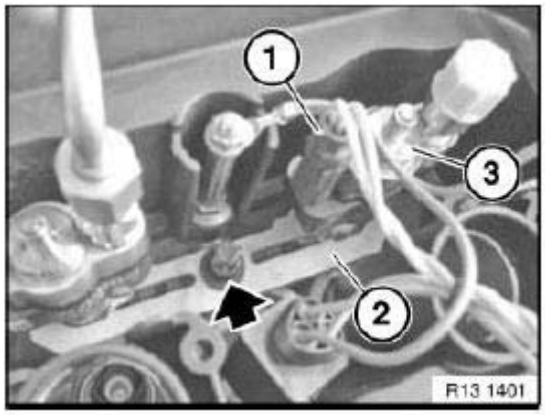


Fig. 129: Identifying Holding-Down Element, Plug And Injector
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Make sure hold-down device (1) is correctly seated.

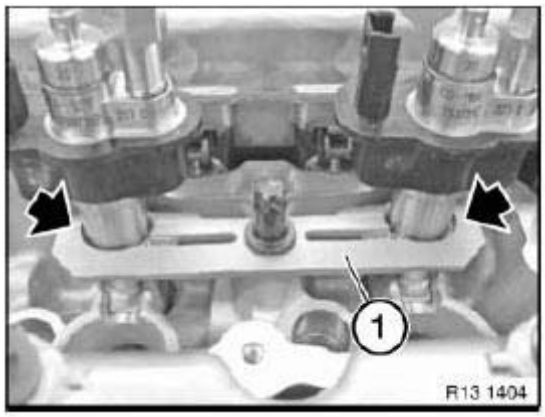


Fig. 130: Locating Holding-Down Element
Courtesy of BMW OF NORTH AMERICA, INC.

Copper seals (1) that may be fitted on the pressure lines are no longer needed and must be removed.

If using the pressure line, apply a light coating of gear oil to the thread. New lines are already pretreated.

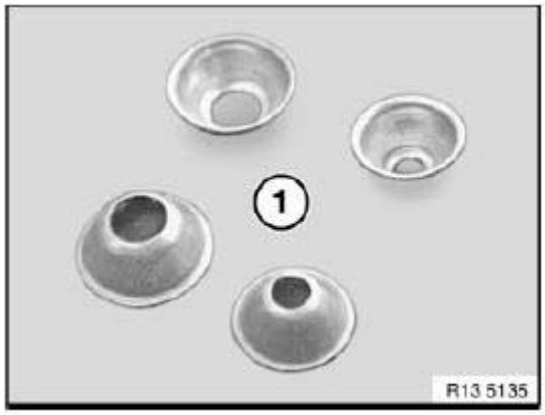


Fig. 131: Identifying Copper Seals
Courtesy of BMW OF NORTH AMERICA, INC.

Connect pressure line (1), tightening nuts hand-tight only in the process.

IMPORTANT: Connect pressure line (1) without tension only.

To ensure distortion-free installation of the pressure line and to avoid damaging the thread, it must be possible for both nuts to be screwed on easily by hand!

If the nuts cannot be screwed on easily by hand, the injector must if necessary be turned a little.

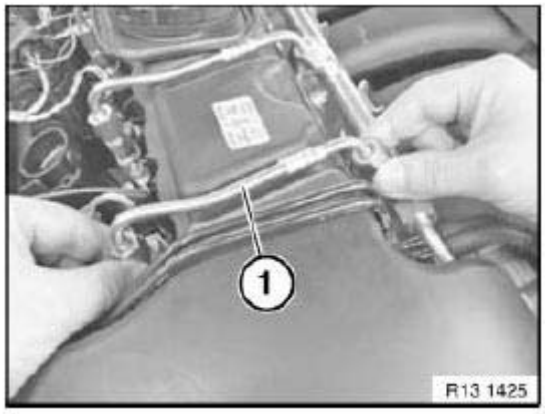


Fig. 132: Connecting Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Turn injector (2) if necessary in direction of arrow until nuts on pressure line can be easily screwed on by hand.

Tighten nuts on pressure line hand-tight.

Then tighten down bolt for hold-down device (1).

Tightening torque **13 53 5AZ** .

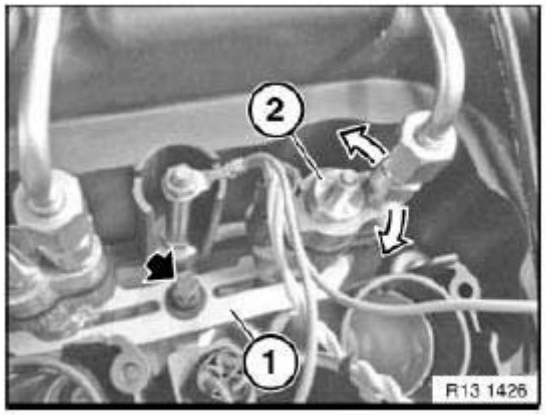


Fig. 133: Turning Injector With Nuts On Pressure Line
Courtesy of BMW OF NORTH AMERICA, INC.

Adhere to tightening sequence

- First tighten down nut (1) on injector.
- Then tighten down nut (2) on rail.

When tightening nut (1) on injector, grip hexagon head of injector with wrench (3).

Tighten down nuts with special tool 37 1 151.

Tightening torque **13 53 8AZ** .

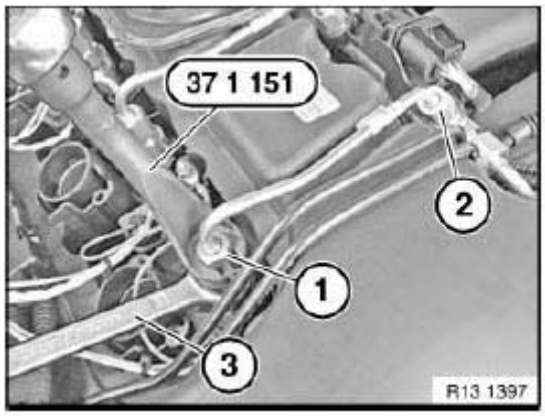


Fig. 134: Identifying Nut On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

Carrying out injector adjustment

- Connect DIS Tester

- Identify car
- Select "Function selection"
- Select "Service functions"
- Select "Engine electronics"

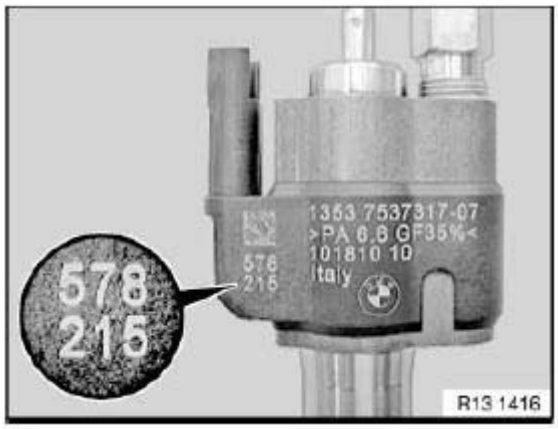


Fig. 135: Identifying Adjustment Value Printed In Blocks Of Digits On Injector
Courtesy of BMW OF NORTH AMERICA, INC.

- Select "Adjustment programs"
- Select "Adjust injectors"
- Change "Test schedule"
- For each replaced injector, the adjustment value must be entered according to the installation position (cylinder).

Clean spark plug slot.

Assemble engine.

Check fuel system for leaks.

Check function of DME.

1371 INTAKE SILENCER

13 71 170 AIR DUCT, REAR (N54)

IMPORTANT: Risk of damage through lever action at the top on the air duct!

Air duct may break!

Necessary preliminary tasks

- Remove left **TENSION STRUT**
- Remove front **UNDERBODY PROTECTION**

NOTE: For purposes of clarity, the pictures show the engine removed.

Release sheet metal nuts (1).

Unfasten screws (2).

Remove heat shield (3).

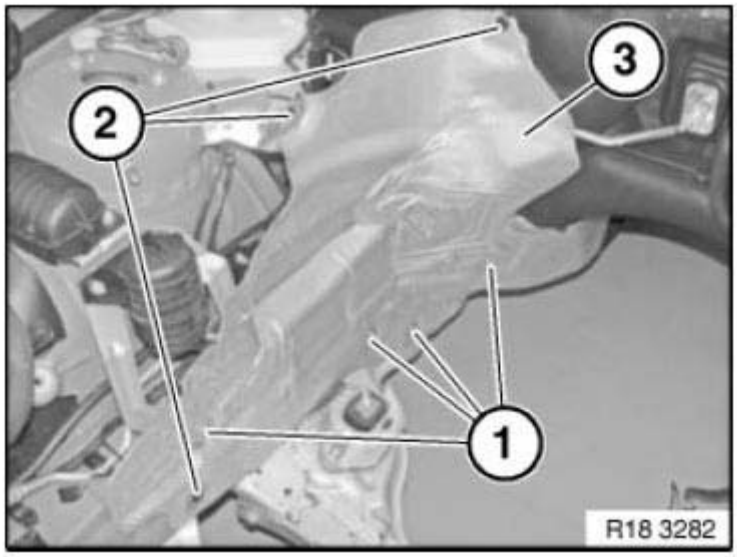


Fig. 136: Identifying Sheet Metal Nuts, Screws And Heat Shield
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock and disconnect line (1).

Unlock connector (2) and remove.

Unlock and disconnect quick-connect coupling (3).

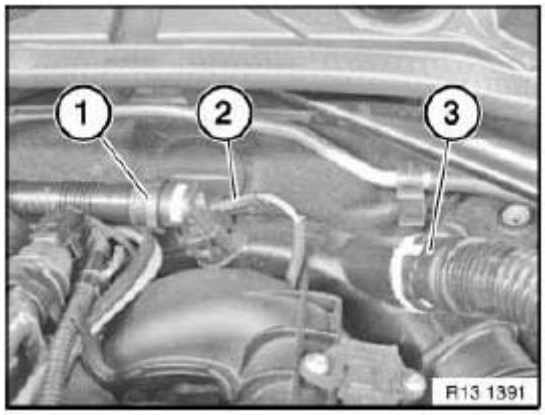


Fig. 137: Identifying Quick-Connect Coupling And Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Turn lock (1) until arrow markings are flush.

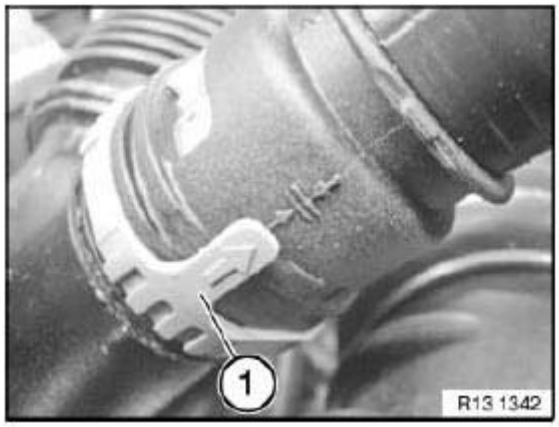


Fig. 138: Turn Lock (1) Until Arrow Markings Are Flush
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not detach air duct in upward direction.

Risk of damage!

Air duct may break!

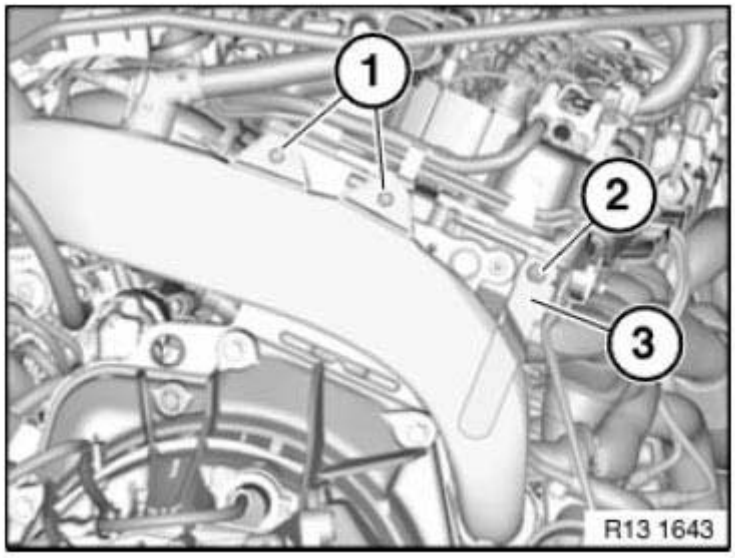


Fig. 139: Identifying Screw And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **13 71 8AZ** .

Release screw (2) and remove bracket (3).

Tightening torque **13 71 12AZ** .

NOTE: Illustration with engine removed.

Pull off air duct (1) from turbocharger, feed out and remove.

NOTE: Illustration with engine removed.

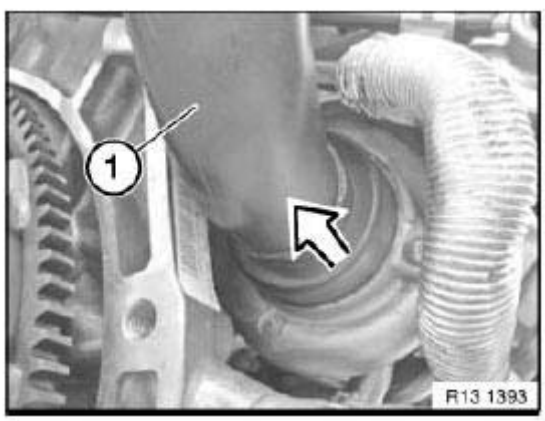


Fig. 140: Removing Air Duct From Turbocharger

Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check sealing ring (1) for damage.

Replace damaged sealing ring.

Make sure sealing ring (1) is correctly seated in air duct (2).

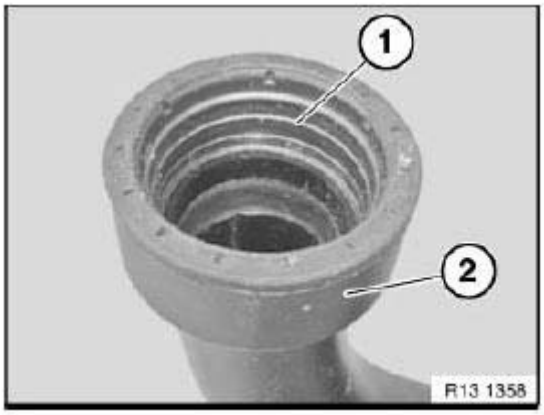


Fig. 141: Identifying Sealing Ring And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Assemble engine.

Check air duct for leaks.

13 71 160 REMOVING AND INSTALLING/REPLACING FRONT AIR DUCT (N54)

IMPORTANT: Risk of damage through lever action at the top on the air duct!

Air duct may break!

Necessary preliminary tasks

- Remove **FAN COWL**
- Draining **COOLANT**

Unlock and remove coolant hose (1).

Release quick-connect coupling (2) by turning lock and detach.

Release hose clamp and detach air duct (3).

Tightening torque **13 71 5AZ** .

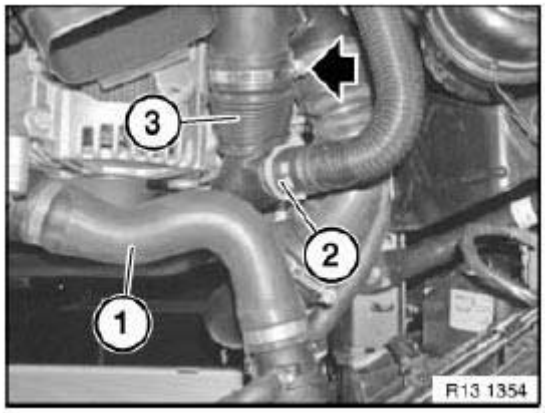


Fig. 142: Locating Hose Clamp And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Turn lock (1) back until arrow markings are flush.

Push air hose onto air duct.

Air hose must audibly snap into place.

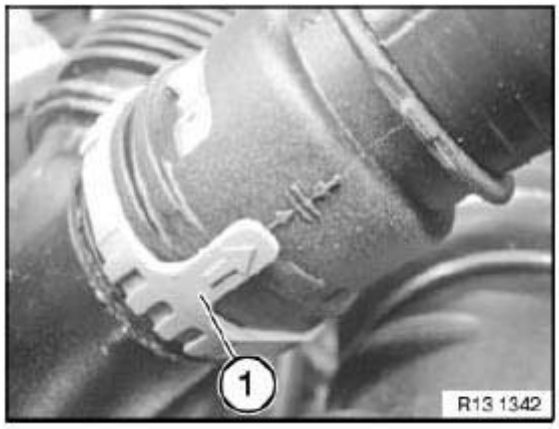


Fig. 143: Turn Lock (1) Back Until Arrow Markings Are Flush
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts and detach coolant hose (1).

Tightening torque **11 53 6AZ** .

Installation:

Check sealing ring.

Replace damaged sealing ring.

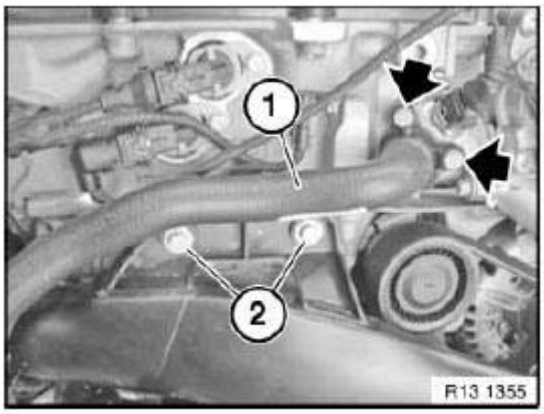


Fig. 144: Locating Bolts And Coolant Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (2).

Tightening torque **13 71 6AZ** .

Unclip A/C line (1) from holder.

Unlock and detach coolant hose (2) from coolant thermostat and release from holder (4).

Release coolant hose (3) from holder (4) and lay downwards to one side.

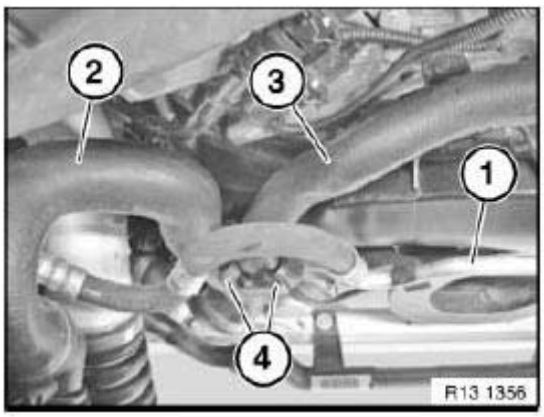


Fig. 145: Identifying Coolant Hose From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Detach air duct from turbocharger.

Risk of damage through lever action at the top on the air duct!

Air duct may break!

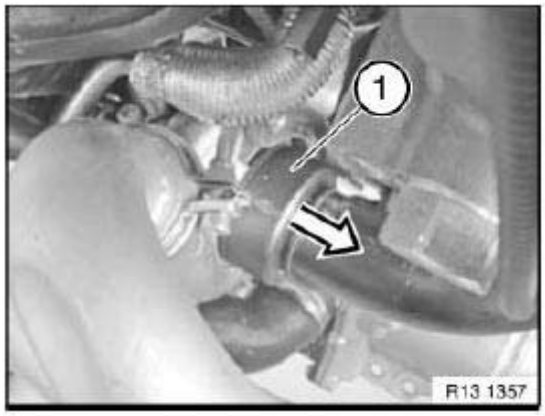


Fig. 146: Detaching Air Duct From Turbocharger
Courtesy of BMW OF NORTH AMERICA, INC.

Detach air duct (1) in direction of arrow.

NOTE: Illustration with engine removed.

Installation

Check sealing ring (1) for damage.

Replace damaged sealing ring.

Make sure sealing ring (1) is correctly seated in air duct (2).

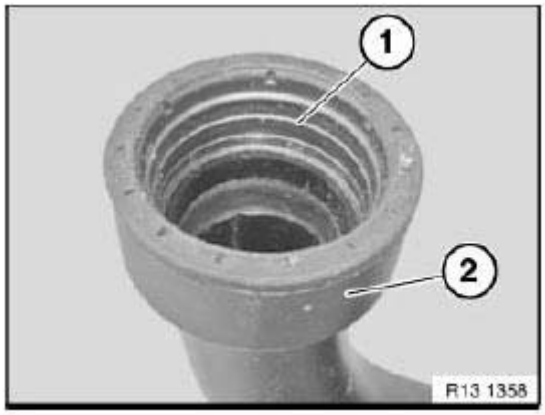


Fig. 147: Identifying Sealing Ring And Air Duct
Courtesy of BMW OF NORTH AMERICA, INC.

13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)

Necessary preliminary tasks

- Remove intake duct

Unlock and disconnect line (1).

Unclip line (1) from intake filter housing.

Release clamp and detach air intake hose.

Tightening torque **13 71 5AZ** .

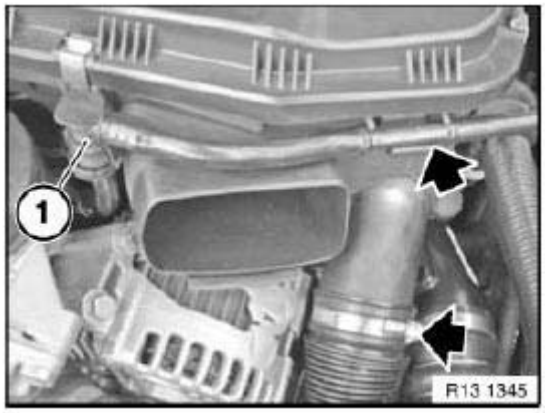


Fig. 148: Locating Clamp And Air Intake Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamp and detach air duct.

Tightening torque **13 71 5AZ** .

Pull off wiring harness holders (1) in upward direction.

Detach intake filter housing (2) from bearing journal and remove.

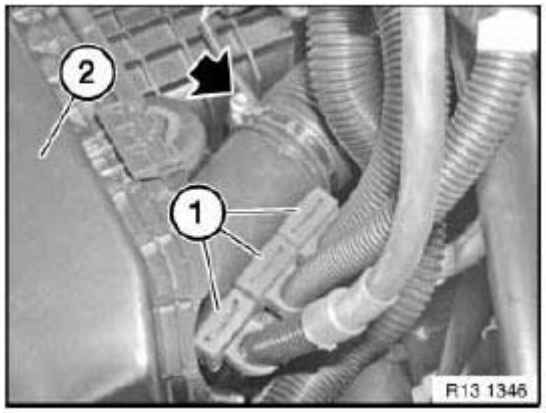


Fig. 149: Identifying Wiring Harness Holders And Intake Filter Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure intake filter housing is correctly seated on bearing journal.

NOTE: Assemble engine.

1390 CARBON CANISTER VENTILATION

13 90 500 REPLACING TANK VENT VALVE (N54)

Necessary preliminary tasks

- Check stored fault messages
- Switch off ignition
- Remove **INTAKE FILTER HOUSING**

Installation location

The tank vent valve is located at the rear below the intake air manifold.

Unlock plug (1) and remove.

Unlock hose (2) and detach.

Unlock hose (3) on throttle valve assembly and disconnect.

Detach tank vent valve (4) from holder and remove.

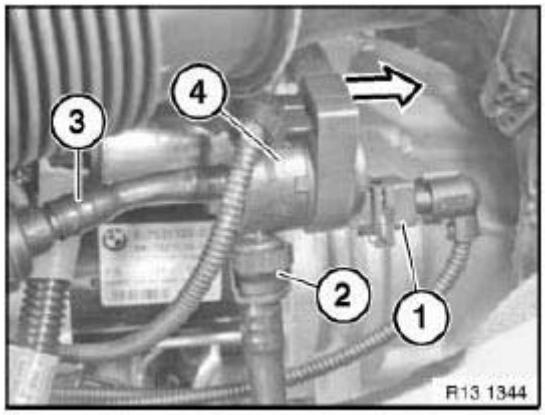


Fig. 150: Detaching Tank Vent Valve From Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Read out fault memory of DME control unit.

Now clear the fault memory.

13 FUEL SYSTEM

13-5270 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter hose with coupling connector) For the DIS pressure sensor or pressure gauge 13 3 061 for measuring the fuel feed pressure

Storage Location

C3

A3

B3

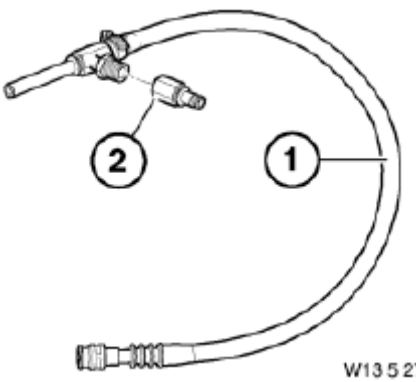


Fig. 1: Identifying Adapter (13-5270)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 18 96 (163)

Consisting of:

1 = 0491311 Adapter

NOTE: (Adapter hose)

2 = 0491312 Adapter

NOTE: (Adapter) For connecting the DIS pressure sensor

13-0100 ADAPTER

Adapter MW

Replaced by: 0491221

NOTE: Replaced by 13 0 094 (0 491 221)

Storage Location

B15

13-6050 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter set for BMW DIS) For measuring oil and fuel pressures

Storage Location

A3

A4

SI number

01 12 94 (859)

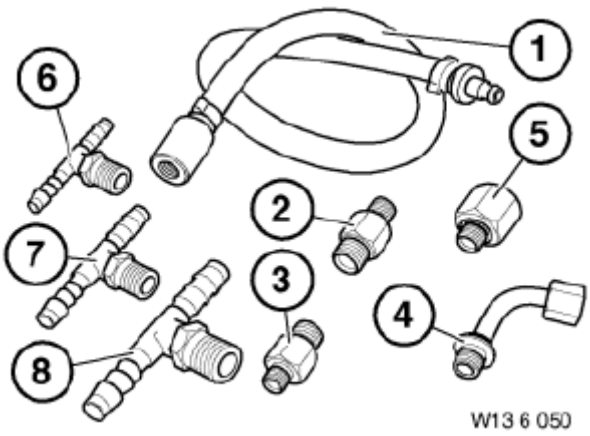


Fig. 2: Identifying Adapter (13-6050)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

4 = 0495067 T-piece

NOTE: (T-piece) T-piece for line dia. 12 mm

1 = 0491341 Hose

NOTE: (Connecting hose) For connecting reducers 13 6 052, 13 6 053, 13 6 55 and adapters 11 4 050, 11 4 160, 11 4 170, 13 5 131 to BMW DIS

2 = 0491342 Adapter

NOTE: (Adapter) For pipe bends 24 0 023, 24 0 024, 24 0 140

3 = 0491343 Adapter

NOTE: (Adapter) Reducer for adapter 16 1 300

4 = 0491344 Adapter

NOTE: (Adapter)

= 0491345

5 = 0491345 T-piece

NOTE: (T-piece) Reducer for T-pieces 13 6 056 and 13 6 057

6 = 0491346 T-piece

NOTE: (T-piece) T-piece for line dia. 6 mm

7 = 0491347 T-piece

NOTE: (T-piece) T-piece for line dia. 8 mm

13-8010 ADAPTER

Adapter MW

NOTE: For activating the diagnostic function of the CNG control unit (indicator light in the instrument panel), and for actuating the high pressure shut-off valve

Storage Location

W 2..

SI number

01 14 95 (014)

Fig. 3: Identifying Adapter (13-8010)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0132 ADAPTER

Adapter

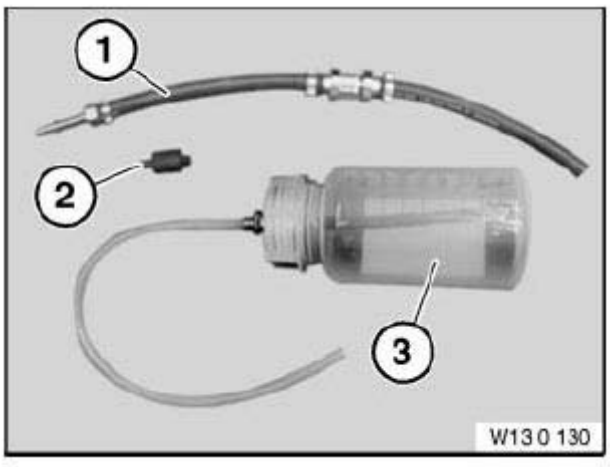


Fig. 4: Identifying Adapter (13-0132)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0131 COMPRESSED AIR HOSE WITH FILTER

Compressed air hose with filter

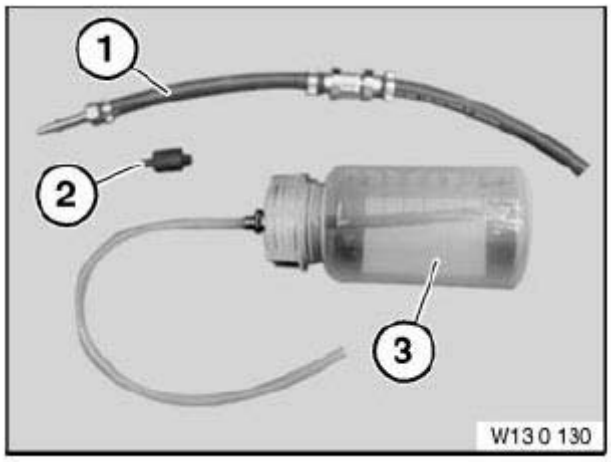


Fig. 5: Identifying Compressed Air Hose With Filter (13-0131)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0133 CONTAINER

Container

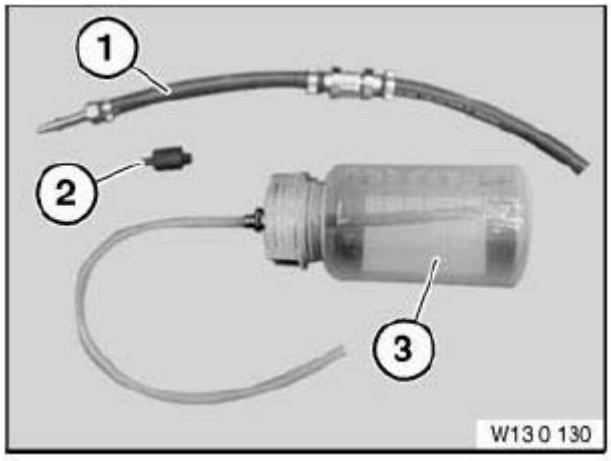


Fig. 6: Identifying Container (13-0133)
Courtesy of BMW OF NORTH AMERICA, INC.

13-5110 DEVICE

Device MW

Replaced by: 0491020

NOTE: (Centring device) For oil pump - Replaced by 11 4 100 (0 491 020)

13-3060 DEVICE

Device MW

NOTE: For checking fuel pressure and oil pressure

Consisting of:

1 = 0491260 Pressure gauge

NOTE: (Pressure gauge 0...25 bar)

2 = 0491261 Valve

NOTE: (Valve) 2-way valve, engine: all except S50, S54, N73

3 = 0491262 Lines

NOTE: (Connection lines (2 x)) For check of fuel and oil pressure

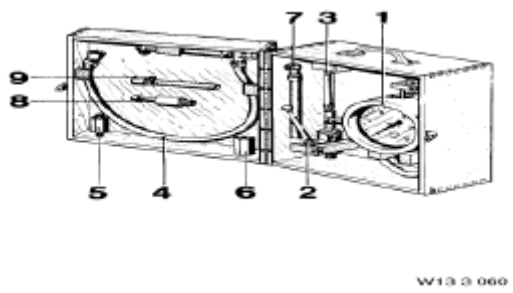


Fig. 7: Identifying Device (13-3060)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0491263 Lines

NOTE: (Connection line) With T-piece for L-Jetronic, all except N73

5 = 0491264 Connection piece

NOTE: (Connection piece, distributor)

All except N73

6 = 0491265 Connection piece

NOTE: (Connection piece warm-up sensor) All except N73

7 = 0491266 Hose

NOTE: (Connecting hose) For checking fuel pump fuel delivery rate, all except N73

= 0491267

8 = 0491267 Connection piece

NOTE: (Connection piece, distributor) All except N73

9 = 0491268 Connection piece

NOTE: For warm-up sensor with hose, all except N73

13-0190 FITTING AID

Fitting aid Minimum set: Mechanical tools MW

NOTE: (Installation set) For removing and installing the Teflon rings on the injector.

SI number

01 20 06 (299)

Consisting of:

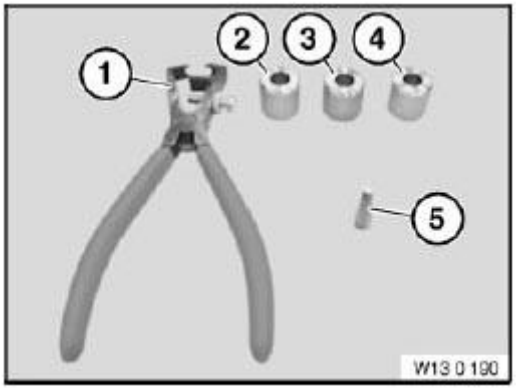


Fig. 8: Identifying Fitting Aid (13-0190)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0495757 Pliers

2 = 0495758 Sleeve

NOTE: (Assembly sleeve 1)

3 = 0495759 Sleeve

NOTE: (Assembly sleeve 2)

4 = 0495760 Sleeve

NOTE: (Assembly sleeve 3)

5 = 0495761 Fitting aid

NOTE: (Mounting cone)

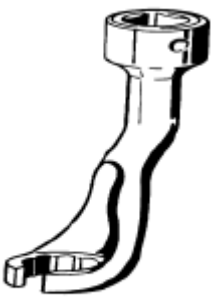
13-5020 KEY

Key Minimum set: Mechanical tools MW

NOTE: (Ignition key) SW17 For releasing and tightening the fuel injection lines

Storage Location

A9



W13 5 020

Fig. 9: Identifying Key (13-5020)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0290 LINES

Lines Minimum set: Mechanical tools MW

NOTE: Two fuel lines. Auxiliary lines for 13 3 060. For fuel pressure check in all direct injectors in comb. with IMIB and 100 bar sensor.

SI number

01 27 09 (598)

Consisting of:

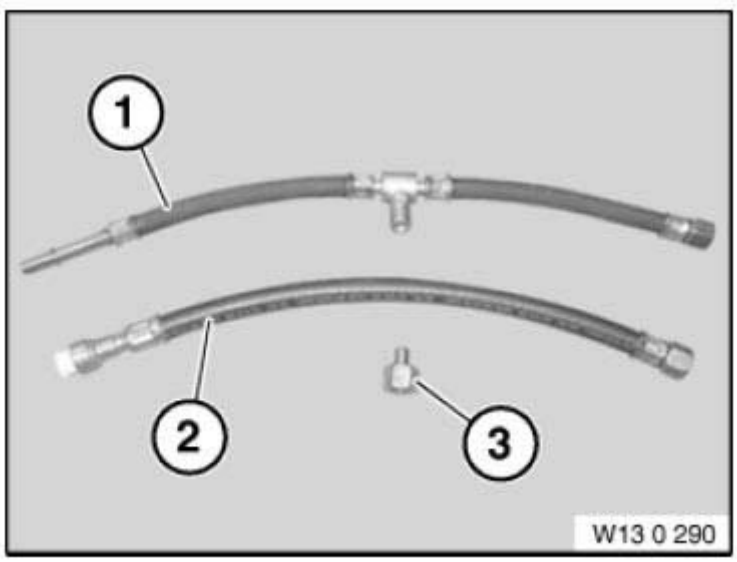


Fig. 10: Identifying Lines (13-0290)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496824 Lines

NOTE: With connection for 13 3 060 or 11 4 310.

2 = 0496825 Lines

3 = 0496826 Fastener

13-8020 MEASURING DEVICE

Measuring device MW

NOTE: (measuring device) With connection parts for checking and adjusting low pressure regulator

SI number

01 14 95 (014)

Consisting of:

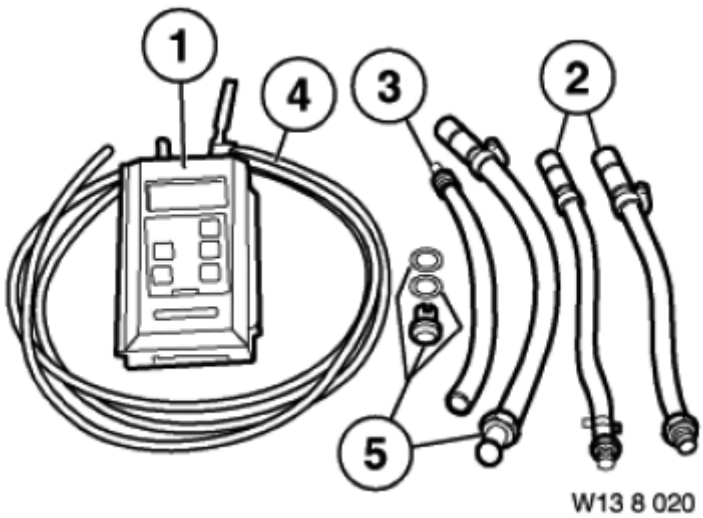


Fig. 11: Identifying Measuring Device (13-8020)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0491362 Measuring device

NOTE: (measuring device) Without adapter hoses

2 = 0491363 Adapter

NOTE: (adapter hose (2 pieces)) With M6 connecting nipple and quick-release coupling

3 = 0491364 Adapter

NOTE: (adapter hose) With counter piece for quick-release coupling

4 = 0491365 Adapter

NOTE: (adapter hoses) With T-piece for intake pressure connection

5 = 0491366 Adapter

NOTE: (adapter hose) With quick-release coupling and ring connection with banjo bolt for testing the output pressure at the metering unit

13-0070 PROBE

Probe MW

Replaced by: 0491217

NOTE: **(Exhaust gas probe) For vehicles with catalytic converter - Other: only Japan and USA Replaced by 13 0 090 (0 491 217)**

13-5250 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: **For removing injector nozzles or injectors from cylinder head**

Storage Location

A11

B11

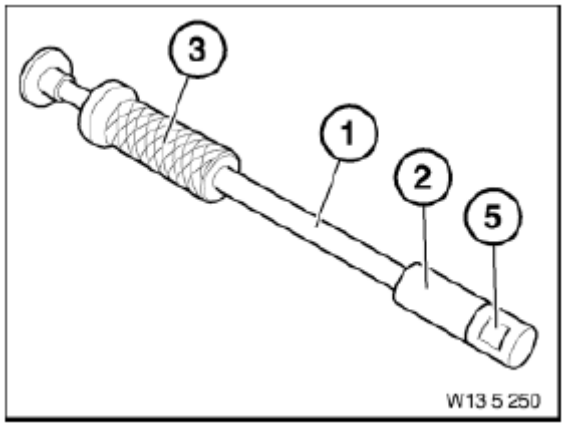


Fig. 12: Identifying Puller (13-5250)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 06 98 (306)

Consisting of:

5 = 0495579 Adapter

NOTE: **For removing steering shaft on E85. Refer to SI 01 11 06 (265)**

1 = 0493338 Rod

NOTE: **(Guide rod)**

2 = 0493339 Bush

NOTE: **(Threaded bush)**

3 = 0493340 Weight

NOTE: **(Weight)**

4 = 0493379 Claw

NOTE: **(Clamping claw) For dismantling injector nozzles/engine: M57**

13-5160 SEAL

Seal Minimum set: Mechanical tools MW

NOTE: **(Caps (2 pieces)) To close off the fuel lines when removing and installing the engine.**

Storage Location

A26

SI number

01 22 08 (498)

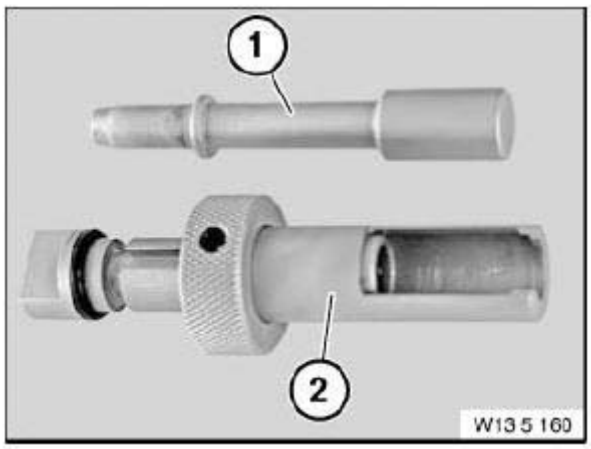


Fig. 13: Identifying Seal (13-5160)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0496567 Seal

NOTE: **(Cap (2 pieces)) To close off the quick connectors**

2 = 0496568 Seal

NOTE: (Cap (2 pieces)) To close off the fuel lines.

13-5280 SEAL

Seal MW

Replaced by: 0496565

NOTE: (Caps) To close off the fuel lines when removing and installing the engine. 13 5 280 discontinued from 10/2008. Replaced by 13 5 160 (0 496 565)

Storage Location

B3

C3

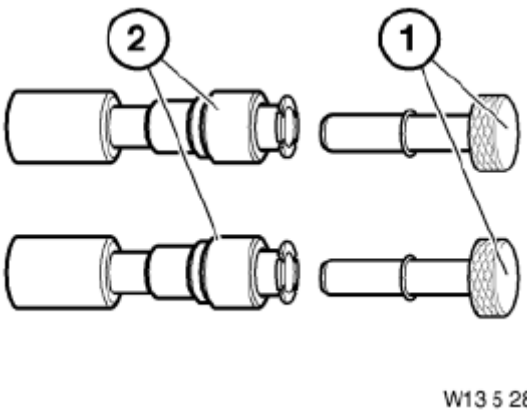


Fig. 14: Identifying Seal (13-5280)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 18 96 (163)

Consisting of:

1 = 0491314 Seal

NOTE: (Cap) 2 pieces, for closing off the quick connectors

2 = 0491315 Seal

NOTE: **(Cap) 2 pieces, for closing off the fuel lines**

13-6058 T-PIECE FOR 12 MM DIA. LINE

T-piece for 12 mm dia. line

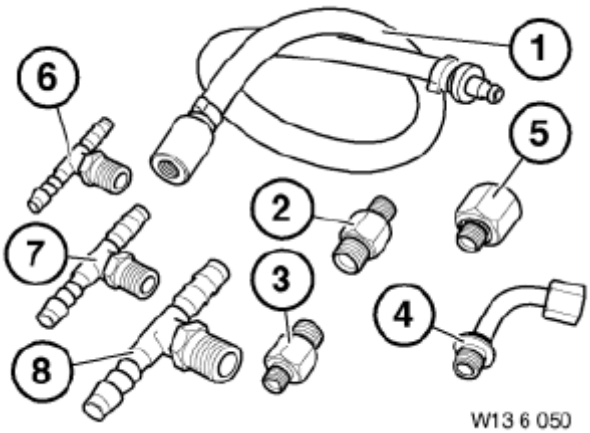


Fig. 15: Identifying T-Piece For 12 mm Dia. Line (13-6058)
Courtesy of BMW OF NORTH AMERICA, INC.

Z13-3010 TERMINAL

Terminal Minimum set: Mechanical tools MW

NOTE: **(Hose clip) For removing a hose during repair work**

Fig. 16: Identifying Terminal (13-3010)
Courtesy of BMW OF NORTH AMERICA, INC.

13-0180 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: **(Drive-out tool) For striking out seized injectors.**

Storage Location

A19

SI number

01 20 06 (299)

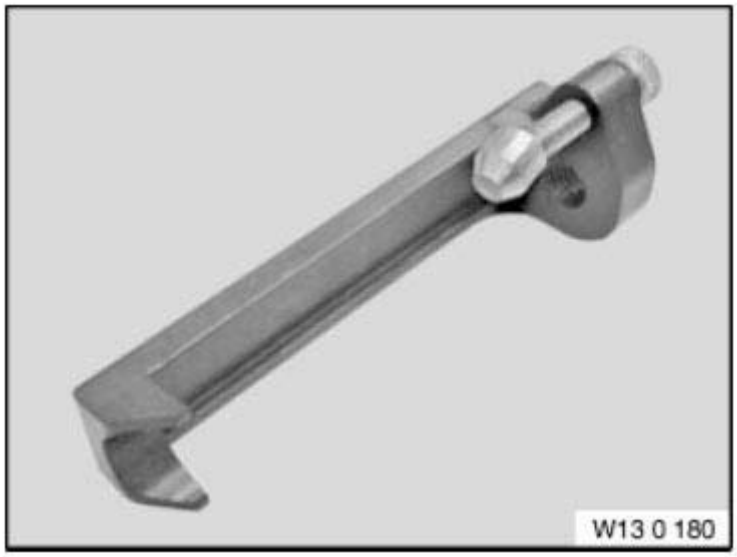


Fig. 17: Identifying Tool (13-0180)
Courtesy of BMW OF NORTH AMERICA, INC.

INJECTORS AND LINES, FUEL PRESSURE REGULATOR N53, N54

13 53 INJECTORS AND LINES, FUEL PRESSURE REGULATOR N53/N54

INJECTORS AND LINES, FUEL PRESSURE REGULATOR SPECIFICATIONS

Testing pressure	bar ± 0.2	5

AIR INTAKE SILENCER

13 71 AIR INTAKE SILENCER

TIGHTENING TORQUE SPECIFICATION - AIR INTAKE SILENCER

	Type	Thread	Tightening specification	Measure
1AZ Clean-air gaiter to throttle valve	N52K	Hose clamp		3 Nm
2AZ Gaiter to intake muffler	N52K	Hose clamp		3 Nm
3AZ Intake silencer to body	N52K	M6		8 Nm
4AZ Intake duct to front wall	N52K/N54	self-tapping screw		2 Nm
5AZ Air duct to air silencer	N54	Hose clamp		3 Nm
6AZ Air duct to crankcase	N54	M6		9 Nm
7AZ Charge-air duct to bracket	N54	M6		9 Nm
8AZ Air duct, compressor to basic engine	N54	M6		9 Nm
9AZ Pressure sensor to charge-air duct	N54	M6		2 Nm
10AZ Engine sound system to charge-air duct	N54	Hose clamp		3 Nm
11AZ Engine sound line to sound system	N54	Hose clamp		3 Nm
12AZ Holder for air duct to cylinder head	N54	M6		9 Nm
13AZ Air intake hose to throttle valve assembly	N52K	Hose clamp		3 Nm

CARBURETOR

13 11 CARBURETOR

TIGHTENING TORQUE SPECIFICATION - CARBURETOR

	Type	thread	tightening specification	Measure
1AZ Carburetor to intake manifold	M10/M20/M30			10 Nm
2AZ Carburetor to insulating flange	M10/M20/M30			10 Nm
3AZ Insulating flange to intake manifold	M10/M20/M30			10 Nm
4AZ Idling shut off valve; max.	M10/M20/M30			5 Nm
5AZ Flow valve; max.	M10/M20/M30			28 Nm
6AZ Throttle valve assembly to float housing; max.	M10/M20/M30			9 Nm
8AZ Throttle valve control to carburetor; max.	2BE			3 Nm

9AZ Warm-up regulator to engine	M10/M20/M30			23 Nm

FUEL FILTER

13 32 FUEL FILTER

TIGHTENING TORQUE SPECIFICATION - FUEL FILTER

	Type	Thread	Tightening specification	Measure
1AZ Fuel line to filter housing and injection pump				
Coupling nut	M21/M51/M41	M14 x 1.5		14 Nm
Adapter	M21/M51/M41	M12 x 1.5		9 Nm
Hollow bolt	M21/M51/M41	M14 x 1.5		14 Nm
2AZ Fuel filter to holder	M51/M41	M8		22 Nm
3AZ Air duct to fuel cooler	M47			5.7 Nm
	M57			2 Nm
4AZ Fuel filter cover	M47			25 Nm
5AZ Fuel filter with holder to body	N42			8.8 Nm

FUEL INJECTION NOZZLES AND PIPES

13 53 FUEL INJECTION NOZZLES AND PIPES

TIGHTENING TORQUE SPECIFICATION - FUEL INJECTION NOZZLES AND PIPES

	Type	Thread	Tightening specification	Measure
1AZ Rail, high-pressure side, to cylinder head	N54	M7 x 16		13 ± 2 Nm
2AZ High-pressure line to cylinder head	N54	M7 x 16		13 ± 2 Nm
3AZ High-pressure fuel sensor	N54	M10		30 Nm
4AZ Low pressure fuel sensor	N54	M10		20 Nm
5AZ Hold-down device to cylinder head	N54	M7 x 20		13 ± 2 Nm
6AZ Feed line to high-pressure pump	N54	M14	Coat screw connection with transmission oil	30 Nm
7AZ High-pressure line to rail and high-pressure pump	N54	M14	Coat screw connection with transmission oil	30 ± 3 Nm
8AZ High-pressure lines to rail and injector	N54	M12	Coat screw connection with transmission oil	23±3 Nm

9AZ Fuel delivery line	N54	M8 x 17	Replace screw	
			1. Tightening	10 Nm
			2. Angle-of-rotation tightening	90° ± 15°
10AZ Bracket, fuel line, to engine support frame	N54	M6 x 12		8 Nm

FUEL INJECTORS

13 64 FUEL INJECTORS

TIGHTENING TORQUE SPECIFICATION - FUEL INJECTORS

	Type	Thread	Tightening specification	Measure
1AZ Fuel injector to intake manifold	All	M6		10 Nm
2AZ Coupling nut on fuel injector	All/with K-Jetr.			25 Nm

FUEL PUMP WITH DRIVE AND PIPES

13 31 FUEL PUMP WITH DRIVE AND PIPES

TIGHTENING TORQUE SPECIFICATION - FUEL PUMP WITH DRIVE AND PIPES

	Type	thread	tightening specification	Measure
1AZ Fuel pump to engine	All			12 Nm
2AZ Fuel pipe coupling bolt	All/with K-Jetr.	M8		9 Nm
3AZ Fuel pipe coupling bolt	All/with K-Jetr.	M12		20 Nm
4AZ Fuel pipe to pressure regulator	All/with L-Jetr.			30 Nm
5AZ Return pipe connector to pressure regulator	All/with L-Jetr.			27 Nm

INJECTION PUMP, CONTROL RECEPTACLE

13 51 INJECTION PUMP, CONTROL RECEPTACLE

TIGHTENING TORQUE SPECIFICATION - INJECTION PUMP, CONTROL RECEPTACLE

	Type	Thread	Tightening specification	Measure
1AZ Plug for high pressure section of injection pump	M21/M51/M41			25 Nm
2AZ Distributor injection pump to holder	M21/M51/M41			25 Nm
3AZ Electric shutoff to injection pump	M21/M51/M41			20 ± 5 Nm

4AZ Electric cold start valve to injection pump	M21			20 Nm
5AZ Coupling bolt (OUT) to injection pump (fuel return)	M21/M51/M41			25 Nm
6AZ Pressure valve holder to injection pump	M21/M51			45 Nm
7AZ Expansion element housing (temperature dependent idling speed boost) to injection pump	M21			18 Nm
8AZ Distributor injection pump to flange and console	M21/M51/M41			22 Nm
9AZ Electr. line on fuel cutout device	M51/M41			2.5 Nm
10AZ Fuel feed line to injection pump (VP44)	M47			30 Nm
11AZ Fuel return line to injection pump (VP44)	M47			25 Nm
12AZ Plug for static basic adjustment (injection pump VP44)	M47			13 Nm
13AZ Blocking screw for injection pump shaft without spacer plate (injection pump VP44)	M47			31 Nm
14AZ Blocking screw for injection pump shaft with spacer plate (injection pump VP44)	M47			13 Nm
15AZ Injection line (union nut) to injection pump (VP44)	M47			30 Nm

INJECTION PUMP, CONTROL

13 51 INJECTION PUMP, CONTROL

TIGHTENING TORQUE SPECIFICATION - INJECTION PUMP, CONTROL

	Type	Thread	Tightening specification	Measure
1AZ High-pressure fuel pump to vacuum pump	N54, N53	M6x25		9 Nm

SENDERS FOR CONTROL UNIT

13 62 SENDERS FOR CONTROL UNIT

TIGHTENING TORQUE SPECIFICATION - SENDERS FOR CONTROL UNIT

	Type	Thread	Tightening specification	Measure
1AZ Coolant temperature sensor	N54	M12x1.5		13.5 Nm
2AZ Intake pressure sensor	N54	K50x16		3.75 Nm
3AZ Camshaft sensor to cylinder head	N54	M6x16		8 Nm
4AZ Crankshaft sensor to crankcase	N54	M6x16		8 Nm
5AZ Knock sensor to crankcase	N54	M8x30		21.5 Nm

SENDERS FOR CONTROL UNIT

13 62 SENDERS FOR CONTROL UNIT

TIGHTENING TORQUE SPECIFICATION - SENDERS FOR CONTROL UNIT

	Type	Thread	Tightening specification	Measure
1AZ Temperature time switch	M21/M51			18 Nm
2AZ Temperature sensor, water	M60/1/M60/2/M21/M51			18 Nm
	all others			13 Nm
3AZ Temperature switch	All			28 Nm
4AZ Temperature sensor, air	All			13 Nm
5AZ Charge-air pressure sensor to bracket	M51/M41			4 Nm
Charge-air pressure sensor to intake manifold	M47			5 Nm
6AZ Dual temperature sensor (4-pin plug connection)	M41/M43/M44/S50/S52/M52/M57/M67/M62/M73			13 Nm
7AZ Air-mass sensor on lower section of intake filter housing	M51			3.5 Nm
Air-mass flow sensor to cylinder head cover	M47/M47TU/M57/M57TU/M57T2			4.5 Nm
8AZ Pulse generator, camshaft to cylinder head cover	M57			4.5 Nm
	M47TU/M57TU			3.5 Nm
	M57T2			2.3 Nm
9AZ Intake neck on air-mass flow sensor	M47			9 Nm

THROTTLE AND ACTUATOR

13 54 THROTTLE AND ACTUATOR

TIGHTENING TORQUE SPECIFICATION - THROTTLE AND ACTUATOR

	Type	Thread	Tightening specification	Measure
1AZ Throttle-valve assembly to intake manifold	N54	M6 x 50		8 Nm

EMISSION APPLICATIONS

Z4

Engine & Fuel System	**(1) Emission Control Systems & Devices**
2010	
3.0L (183") 6-Cyl. SFI	**PCV, EVAP, TWC, FR, SPK, (2) HO2S, CEC, MIL,** EVAP-CPCS, EVAP-LDP, EVAP-VC, SPK-CC

(1) Major emission control systems and devices are listed in bold type; components and other related devices are listed in light type.

(2) Equipped with 4.

ABBREVIATIONS

AP

Air Pump Injection System

CEC

Computerized Engine Controls

EVAP

Fuel Evaporative System

EVAP-CPCS

EVAP Canister Purge Control Solenoid

EVAP-LDP

EVAP Leak Detection Pump

EVAP-VC

EVAP Vapor Canister

FR

Fill Pipe Restrictor

HO2S

Heated Oxygen Sensor

MIL

Malfunction Indicator Light

PCV

Positive Crankcase Ventilation

SFI

Sequential Fuel Injection

SPK

Spark Controls

SPK-CC

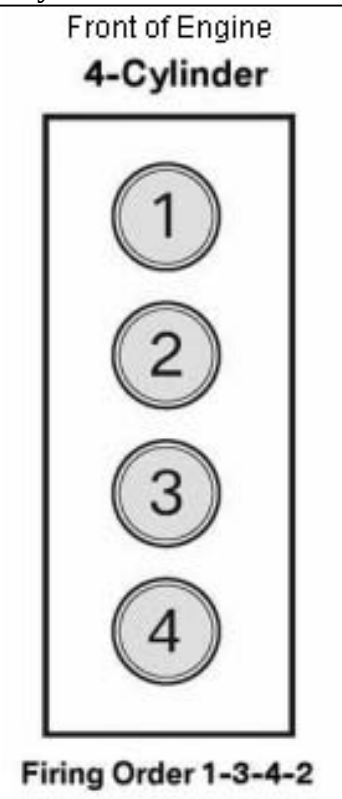
SPK Computer Controlled

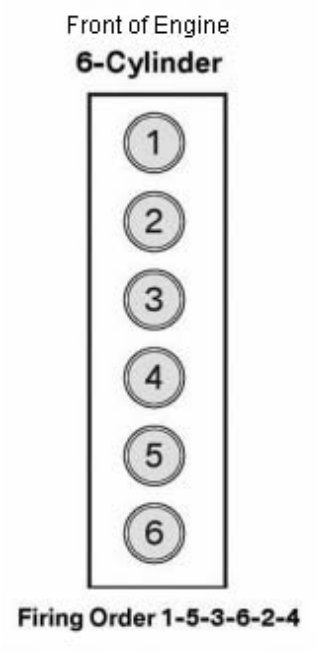
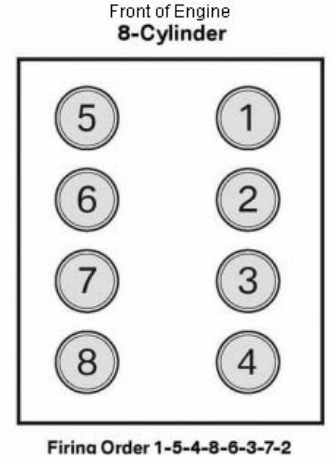
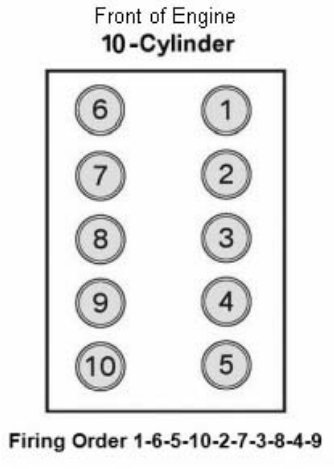
TWC

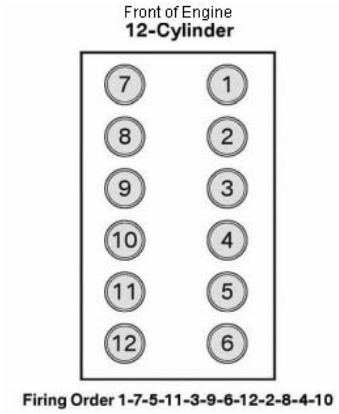
Three-Way Catalytic Converter

FIRING ORDER & CYLINDER IDENTIFICATION

NOTE: **This information is intended as a quick reference for firing order and cylinder identification only. The information provided covers many vehicles and may include some information that does not apply to the vehicle you have currently selected.**

Engine Configuation	Firing Order	Cylinder Identification
In-Line 4	1-3-4-2	 Firing Order 1-3-4-2
In-Line 6	1-5-3-6-2-4	

		
V8	1-5-4-8-6-3-7-2	
V10	1-6-5-10-2-7-3-8-4-9	

V12	1-7-5-11-3-9-6-12-2-8-4-10	

1.0 AIR CONDITIONER REFRIGERANT

FREON®

The refrigerant Freon® R12 is used in most BMW automobiles with an air conditioner up through the 1992 model year. It has a boiling point of - 29.8°C (sea level), at which the refrigerant is transformed from a liquid into a gaseous state. This boiling point, however, is not constant. It is displaced in the direction of higher temperatures as pressure increases.

Freon® R12 complies with the requirements expected of a safety refrigerant. Freon® is not combustible and does not turn into an explosive mixture with air. It is also odorless and non-toxic. Conformance with certain safety regulations is essential to the handling of refrigeration systems.

There are currently no BMW-approved alternative refrigerants to R12.

SAFETY WARNING

64 Avoid any contact with liquid refrigerant, since this could cause frostbite. Protect eyes with safety goggles and hands with gloves. Contact a doctor without delay in case of an accident.

64 Freon® R12 is heavier than air, so this refrigerant must not be discharged in closed rooms. There is danger of asphyxiation in a sunken work area (pit). Do not store bottles of refrigerant at temperatures above 113°F/45° C or heat them.

64 Never weld on or near a system filled with refrigerant. Heat could cause excessive pressure and an explosion. In addition, Freon® R12 will decompose at high temperature or when subjected to an open flame. The resulting decomposition products would be hazardous to health.

64 Make sure you read the container label instructions completely prior to use.

64 Obtain and use the correct type of refrigerant recovery/recycling machine. Follow the directions included in the machine's instruction manual.

HFC-134A

The refrigerant HFC-134a (also known as R-134a) is used as of the following models with an air conditioner:

64 1992 E32/M30 from March 1992 production

64 1993 E34, E36, 325iC. E31, E32 from August 1992 production

This environmentally friendly refrigerant performs similar functions as Freon® R12, but the refrigerants Freon® R12 and R-134a must NEVER be mixed or combined in any way under any circumstances.

SAFETY WARNING

64 Always wear eye protection and gloves while handling refrigerant or servicing air conditioning systems.

64 Avoid breathing R-134a and lubricant vapor or mist. Exposure may irritate eyes, nose, throat, and lungs. Use only approved service equipment to discharge A/C systems. If accidental system discharge occurs, ventilate work area before resuming service.

64 If refrigerant or compressor oil contacts the skin or eyes, large quantities of cool water should be used to flush the affected area.

64 Never heat a refrigerant container with an open flame. Keep all refrigerants away from open flames, since burning refrigerant can produce poisonous gas.

64 Under no circumstances should R-134a service equipment or vehicle A/C systems be pressure tested with air/R 134a mixtures. Some mixtures of air and R-134a have been shown to be combustible at elevated pressures.

The use of compressed air (shop air) for leak detection in R-134a systems could result in fire or explosion causing injury or property damage. In addition, introducing compressed air into A/C systems or components contaminates the system and/or refrigerant with moisture.

64 Obtain and use the correct type of refrigerant recovery/recycling machine. Follow the directions included in the machine's instruction manual.

2.0 REFRIGERATION OIL

OIL USED IN FREON®-CHARGED SYSTEMS

A mineral-based oil is used. The oil level in the compressor must be checked before filling an air conditioner with refrigerant. It can be checked only if the system is without refrigerant.

Always check the oil level each time a new system is filled with Freon® R12 or after repairs. The oil level is very important for the entire air conditioning system. Part of the oil (approx. 25% depending on amount of refrigerant) is mixed with the refrigerant and is continuously circulated in the system. This oil lubricates the moving parts of the system, such as the expansion valve and compressor.

Oil Used in R-134a-Charged Systems:

A synthetic oil is used, which is totally different than the mineral-based oils used in Freon® R12 systems.

R-134a systems require Polyalkylene Glycol lubricants, often referred to as "PAG" oil. Use of R-12 compressor oil in R-134a systems will cause the compressor to seize and fail. The R-12 mineral oil does not stay in solution in R-134a. In addition, R-134a compressor should not be used in an R-12 system. Long term damage and corrosion will result.

The **GREEN** R-134a system labels, usually located near the top side of the fan shroud in the engine

compartment, will display the refrigerant requirement for R-134a systems. An example is illustrated.

R-12 systems will have a **BLACK** label in a similar location.

Fig. 1: Identifying R-12 Systems - Black Label
Courtesy of BMW OF NORTH AMERICA, INC.

PAG oil should only be stored in its original container, and sealed as tightly as possible. PAG oil is totally devoid of moisture when packaged, and will absorb moisture readily (hygroscopic) if exposed to the atmosphere, rendering it useless. Dispose of all extracted lubricants from A/C systems. Never reuse old compressor oil. Contaminated PAG oil should never be added to the air-conditioning system, and old PAG oil is typically contaminated with moisture. R-134a is even more sensitive to moisture contamination than R-12 systems.

PAG oil may be obtained from BMW of North America.

BMW Part No. 82 11 1 468 042.

3.0 AIR CONDITIONING UNIT DISINFECTANTS

A musty odor may be detected in the vehicle, particularly when the air conditioner is first switched on.

This is caused by microorganisms growing on the evaporator from moisture condensation.

A disinfectant can be applied to the air conditioning system:

"Airguard" by J. J. Products, Inc.; "Airsept" by The Auto Doctor or Air Conditioning and Heating System Treatment by Wurth USA, Inc.

Such disinfectants are not available from BMW of North America.

4.0 AIR CONDITIONER REFRIGERATION/OIL FILL CAPACITIES

Note that some 1993 Model Year early production R-134a equipped vehicles have under-hood labels that

specify higher charge values than those specified in the chart. Testing has confirmed that the values given are the optimum fill capacities. Consult the chart before refilling. Labels with the lower refrigerant charge amount specified on the chart have been phased into production as of 11/92.

When performing repairs to the A/C system that require recharging, only the specifications given in this chart should be used, as well as the label part numbers, as appropriate. However, inadvertent refrigerant charging up to the fill capacity given on an "original" ('93 MY production prior to 11/92) under-hood label will not cause any problems.

See appropriate HVAC article for oil refill capacity for specifications not indicated in **A/C LABEL BMW P/N REFERENCE** table.

Refrigerant, Special Features, Production Range, Fill Capacity g (lbs), Fill Capacity ml (oz), BMW P/N

A/C LABEL BMW P/N REFERENCE

Series/Body, Refrigerant	Model or Type Special Features	Production Range	Fill Capacity g (lbs)	Refrigerant Oil Total Fill Capacity ml (oz)	A/C Label BMW P/N
1/E82, R-134a	N52K, N54	All	590 ± 10 (1.30 ± 0.02)		64 50 6 985 512
1/E88, R-134a	N52K, N54	All	590 ± 10 (1.30 ± 0.02)		64 50 6 985 512
3/E30, R-12	M3	All up to 9/92	875 ± 25 (1.93 ± 0.05)	200 ± 20 (6.8 ± 0.7)	64 50 1 381 958
3/E30, R-12	All Others	All up to 9/92	975 ± 25 (2.15 ± 0.05)	200 ± 20 (6.8 ± 0.7)	64 50 1 380 981
3/E30, R-134a	Convertible	All from 9/92	900 ± 25 (1.76 ±	.05) 100 ± 20 (3.4 ± 0.7) 5	64 50 8 391 0264
3/E36, R-12	Modine Condenser1	9/91 - 3/921	1000 ± 25 (2.20 ± 0.05)	167 ± 20 (5.6 ± 0.7)	90 00 1 000 006
3/E36, R-12	Original Condenser	All up to 9/92	1200 ± 25 (2.65 ± 0.05)	200 ± 20 (6.8 ± 0.7)	71 21 2 122 023
3/E36, R-134a	All	9/92 - 11/923	1000 ± 25 (2.20 ± 0.05)	120 ± 20 (4.1 ± 0.7) 5	64 50 8 391 5244
3/E36, R-134a	Z3 except M coupe and M roadster	All	900 ± 25 (1.98 ± 0.05)	120 ± 20 (4.1 ± 0.7) [5,6] 150 ± 10 (5.1 ± 0.3) [5,7]	64 50 8 391 026
3/E36, R-134a	M coupe and M roadster	All	950 ± 26 (2.09 ± 0.05)		64 50 8 391 525
3/E36, R-134a	All	All from 11/92	825 ± 25 (1.82 ± 0.05)	120 ± 20 (4.1 ± 0.7) [5,6] 150 ± 10 (5.1 ± 0.3) [5,7]	64 50 8 367 947

3/E46, R-134a	All	All	740 ± 25 (1.63 ± 0.05)	160 ±10 (5.4 ± 0.3) [5,6]	64 50 8 380 053
3/E90/E91, R134a	N52	All	500 ± 15 (1.10 ± 0.03)		64 50 6 952 937
3/E90/E91/E92/E93, R134a	N52KP, N54	All	590 ± 10 (1.30 ± 0.02)		64 50 6 985 512
3/E90/E92/E92, R134a	S65	All	590 ± 10 (1.30 ± 0.02)		64 50 6 985 512
5/E28, R-12	524, 535, M5	All	975 ± 25 (2.15 ± 0.05)	170 ± 20 (5.7 ± 0.7)	64 50 1 380 981
5/E28, R-12	528e, 533	All	1275 ± 25 (2.81 ± 0.05)	170 ± 20 (5.7 ± 0.7)	64 50 1 380 984
5/E34, R-12	525i, 535i, 525iT	All up to 9/92	1925 ± 25 (4.24 ± 0.05)	200 ± 20 (6.8 ± 0.7)	64 53 1 382 614
5/E34, R-12	M5	All up to 9/92	1500 ± 25 (3.31 ± 0.05)	200 ± 20 (6.8 ± 0.7)	64 53 1 378 247
5/E34, R-134a	M5	From 9/92[2]	1450 ± 25 (3.19 ± 0.05)	160 ± 20 (5.4 ± 0.7) [5]	64 50 8 391 751[4]
5/E34, R-134a	All Others	All from 9/92	1550 ± 25 3.42 ± 0.05)	160 ± 20 (5.4 ± 0.7) [5]	64 50 8 391 523[4]
5/E39, R-134a	All	Up to 9/98	1210 ± 25 (2.67 ± 0.05)	160 ± 15 (5.4 ± 0.5) [5,6] 180 ± 20 (6.1 ± 0.7) [5,7]	64 50 8 362 434
5/E39, R-134a	All	From 9/98	750 ± 25 (1.65 ± 0.05)	160 ± 15 (5.4 ± 0.5) [5,6] 180 ± 20 (6.1 ± 0.7) [5,7]	64 50 8 387 412
5/E60, R-134a	All (Includes M5)	From 8/03	810 ± 10 (1.78 ± 0.02)		64 50 6 920 708
5/E61, R134a	All	All	810 ± 10 (1.78 ± 0.02)		64 50 6 920 708
6/E24, R-12	Rear Air Conditioner	All	1800 ± 25 (3.97 ± 0.05)	170 ± 20 (5.7 ± 0.7)	653 1 380 728
6/E24, R-12	All Others	All	1100 ± 25 (2.43 ± 0.05)	170 ± 20 (5.7 ± 0.7)	64 50 1 380 982
6/E63/E64, R-134a	All	From 8/03	810 ± 10 (1.78 ± 0.02)		64 50 6 920 708
7/E23, R-12	733, 735	All up to 9/85	1275 ± 25 (2.81 ± 0.05)	170 ± 20 (5.7 ± 0.7)	64 50 1 380 984
7/E23, R-12	735	All from 9/85	1175 ± 25 (2.59 ± 0.05)	170 ± 20 (5.7 ± 0.7)	64 50 1 380 983
7/E32, R-12	750iL	All up to	1925 ± 25	200 ± 20 (6.8 ±	64 53 1 382

		11/92[2]	(4.24 ± 0.05)	0.7)	614
7/E32, R-12	735i, 735iL	All up to 3/92	1925 ± 25 (4.24 ± 0.05)	200 ± 20 (6.8 ± 0.7) [5]	64 53 1 382 614
7/E32, R-134a	735i, 735iL	From 3/92[3]	1550 ± 25 (3.42 ± 0.05)	160 ± 20 (5.4 ± 0.7) [5]	64 50 8 391 523
7/E32, R-134a	740i, 740iL, 750iL	From 9/922	1550 ± 25 (3.42 ± 0.05)	160 ± 20 (5.4 ± 0.7) [5]	64 50 8 391 5234
7/E38, R-134a	All	All up to 11/97	1210 ± 25 (2.67 ± 0.05)	180 ± 30 (6.1 ± 1.0) [5,6]	64 50 8 362 434
	All	All from 11/97	680 ± 25 (1.50 ± 0.05)	180 ± 20 (6.1 ± 0.7) [5,7]	64 50 8 381 241
7/E65, R-134a	745i, 750i	All	810 ± 25 (1.78 ± 0.05)		64 50 6 920 708
7/E66, R-134a	745Li, 750Li	All	810 ± 25 (1.78 ± 0.05)		64 50 6 920 708
7/E66, R-134a	760Li	All	1120 ± 25 (2.46 ± 0.05)		64 50 6 924 568
8/E31, R-12	All	All up to 9/92	1925 ± 25 (4.24 ± 0.05)	200 ± 20 (6.8 ± 0.7)	64 53 1 382 614
8/E31, R-134a	All	All from 9/92	1550 ± 25 (3.42 ± 0.05)	Nippon Denso 160 ± 30 (5.4 ± 1.0) Seiko Seiki 180 ± 20 (6.0 ± 0.7)	64 50 8 391 523
Z4/E85, R-134a	M54, N52, N52KP, S54	All	740 ± 10 (1.63 ± 0.05)		64 50 6 920 364
Z8/E52, R-134a	All	All	710 ± 25 (1.56 ± 0.05)		64 50 8 384 651
X5/E53, R-134a	3.0, 4.4i, 4.6i, 4.8iS	All	440 ± 10 (0.970 ± 0.02)		64 50 8 385 985
X5/E70, R-134a	3.0i, 4.8i	All	700 ± 10 (1.540 ± 0.02)		64 50 6 917 364
X6/xDrive35i	All	All	700 ± 10 (1.540 ± 0.02)		64 50 6 917 364
X3/E83, R134a	2.5, 3.0	All	740 ± 25g (1.63 ± 0.05)		64 50 8 385 985
X3/E83, R134a	3.0Si	All	740 ± 25g (1.63 ± 0.05)		64 50 8 380 053

NOTE:

1. **The Modine condenser was used in many E36 vehicles over the production range 9/91-3/92. This condenser has a smaller volume, and the A/C system must be charged accordingly.**

2. **Production start of 1993 MY E34/S38 (M5) 9/92; E32/M70 (750iL) 11/92.**
3. **R-134a, the environmentally friendly air conditioning refrigerant, was introduced to the U.S. market beginning with 3/92 production E32/M30 (735i/iL) vehicles.**
4. **Labels reflecting the proper charging volumes given on this chart are available form BMW Parts. These may be used in place of the original equipment labels on '93 model year vehicles produced before 11/92.**
5. **All vehicles equipped with R-134a refrigerant require special PAG lubricant.**
6. **Nippon Denso**
7. **Seiko Seiki**

6400 GENERAL

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid:

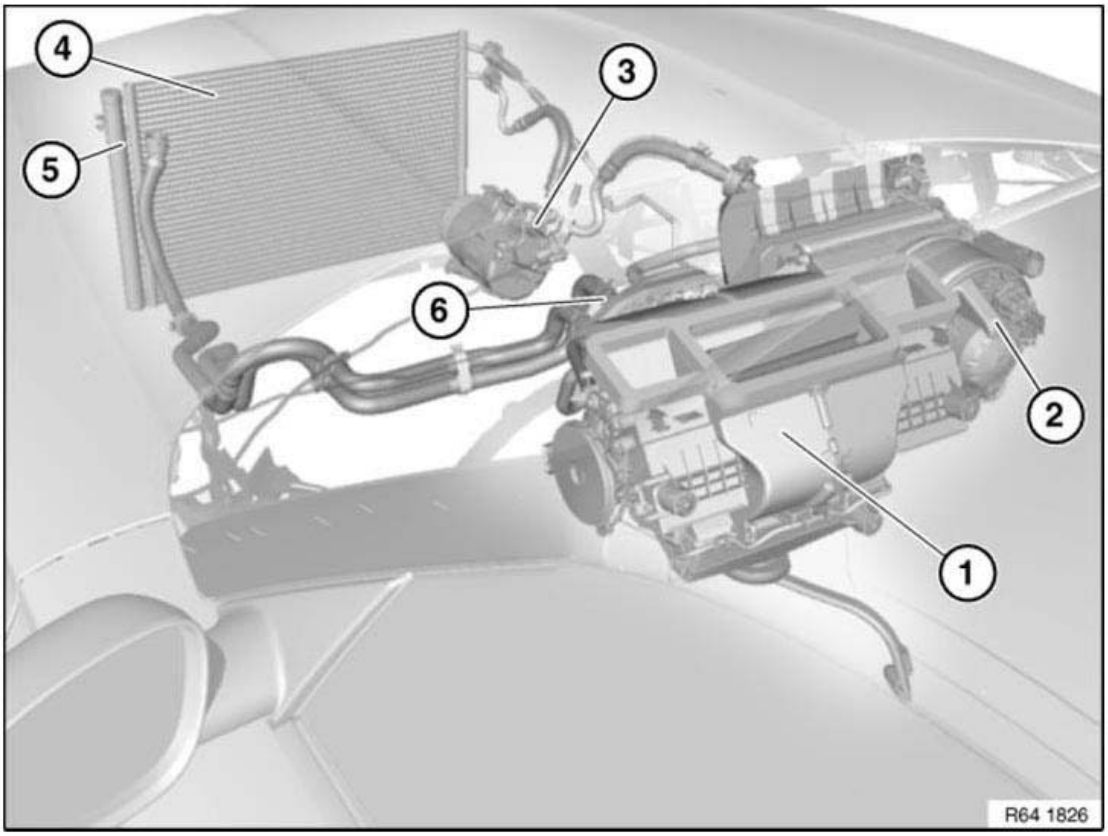
- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

64 00 .. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Heater/air conditioner with add-on parts
2 Remove fan for heater - A/C system
3 Compressor for A/C system
4 Fan for heater - A/C system
5 Desiccant bottle for A/C system
6 Expansion valve

Fig. 1: Identifying Heater - A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

1. Heater/air conditioner with add-on parts
2. Remove fan for heater - A/C system
3. Compressor for A/C system
4. Fan for heater - A/C system
5. Desiccant bottle for A/C system
6. Expansion valve

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

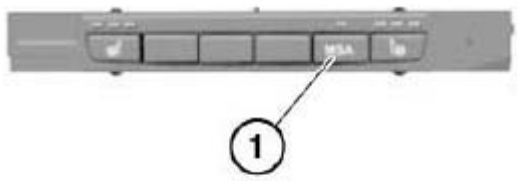


Fig. 2: Identifying Automatic Engine Start/Stop Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

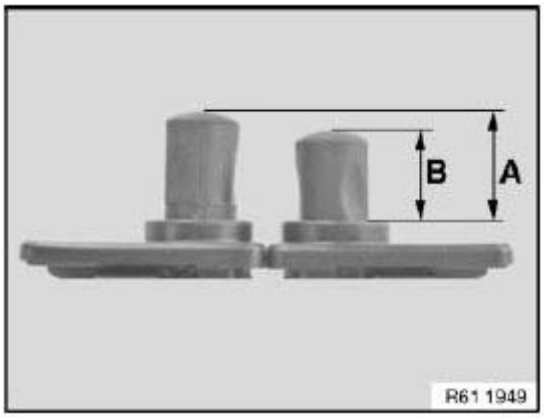


Fig. 3: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode

Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

6411 HEATER WITH OPERATION

64 11 ... INSTALLING SERVODRIVE

Installation:

If necessary, align shaft of flap(s) to be actuated to position of servodrive to be installed.

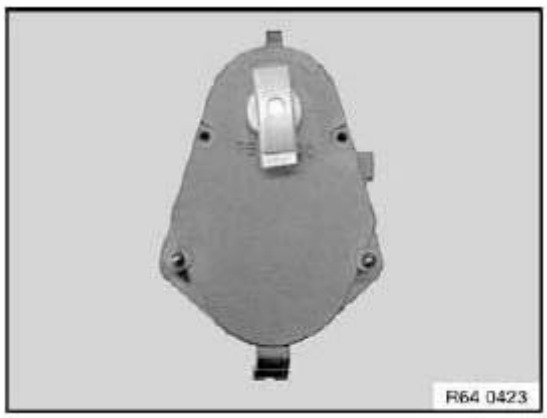
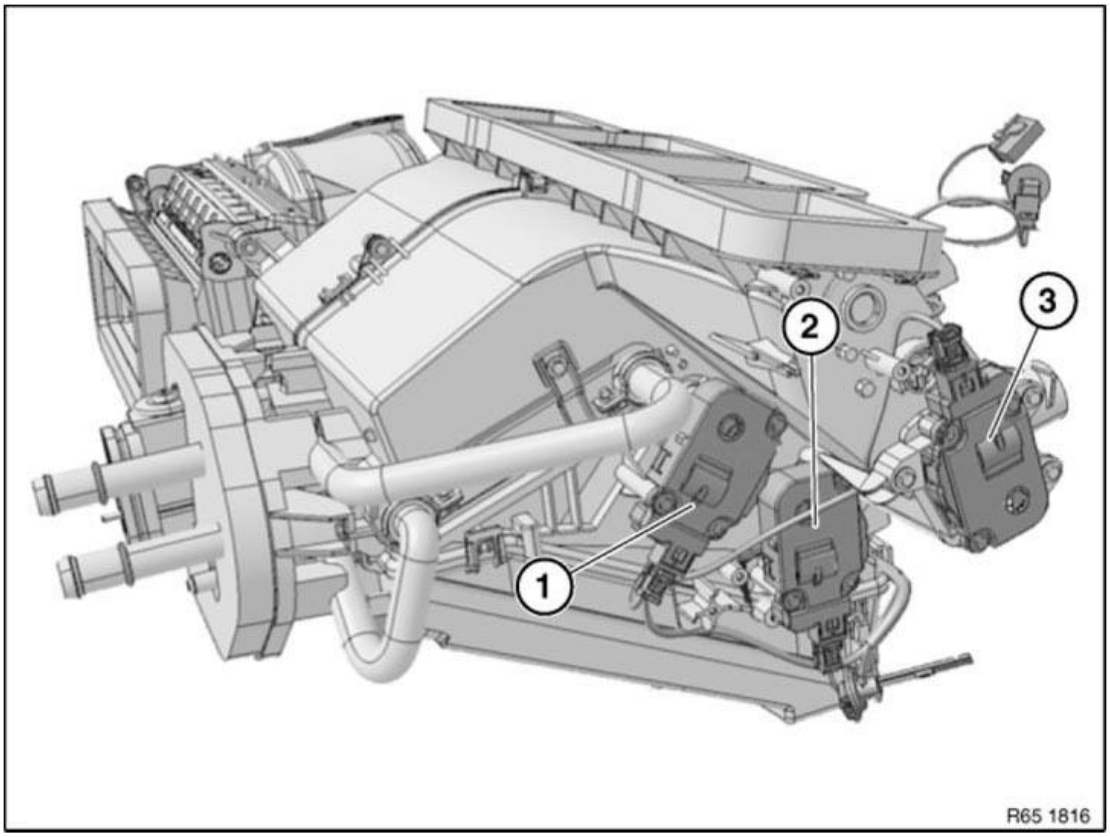


Fig. 4: Identifying Servodrive
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 .. OVERVIEW OF ACTUATOR DRIVES ON HEATER/AIR CONDITIONER



1 Actuator drive, blending flap (automatic A/C)

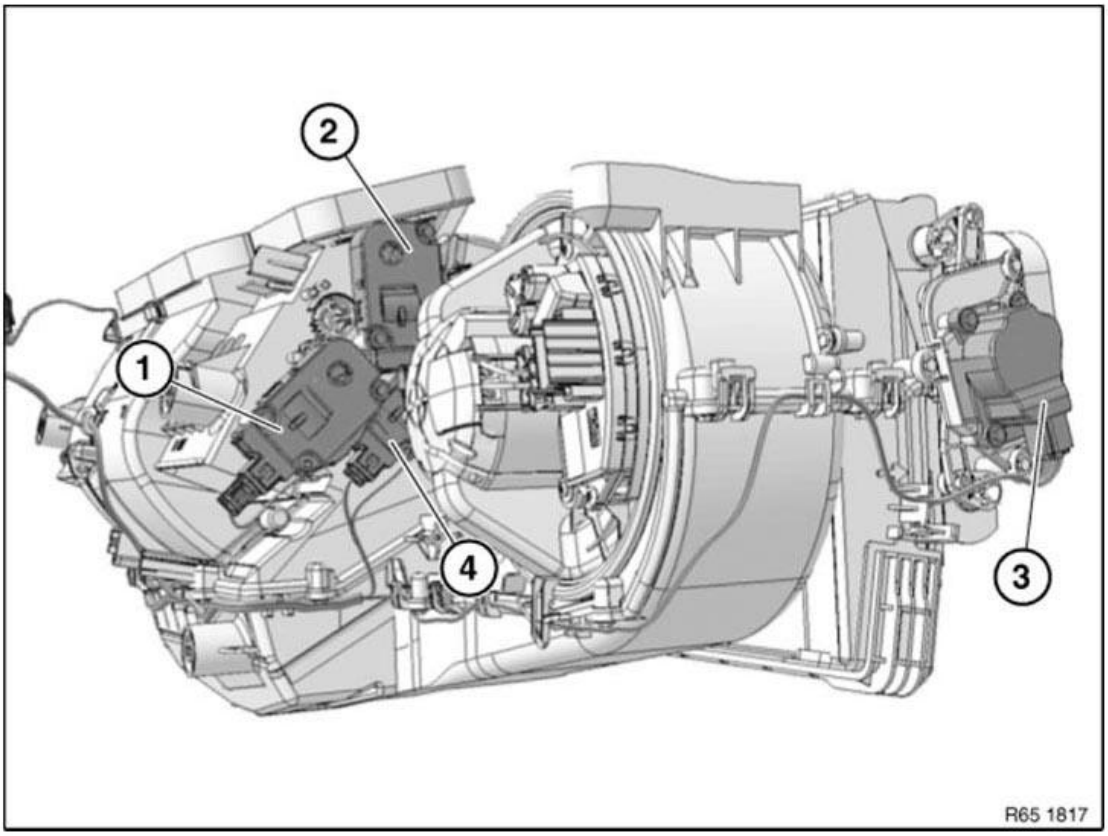
2 Actuator drive, air mixing flap (left, automatic air A/C)

3 Actuator drive, footwell flap (automatic A/C)

Fig. 5: Overview Of Actuator Drives On Heater/Air Conditioner
Courtesy of BMW OF NORTH AMERICA, INC.

1. Actuator drive, blending flap (automatic A/C)
2. Actuator drive, air mixing flap (left, automatic air A/C)
3. Actuator drive, footwell flap (automatic A/C)

NOTE: The High equipment specification heater/air conditioner is pictured!



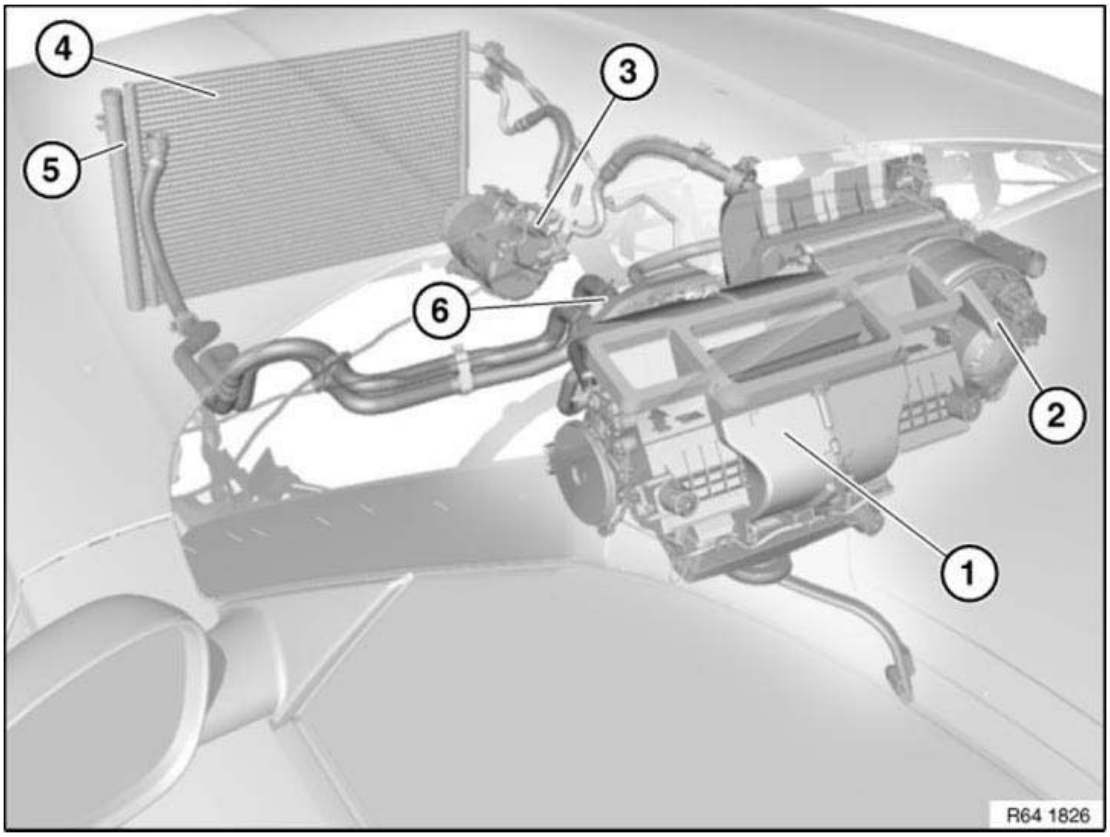
1 Actuator drive, defrosting flap (automatic A/C)
2 Actuator drive, ventilation flap (automatic A/C)
3 Actuator drive, fresh-air/recirculated-air flap
4 Actuator drive, air mixing flap (right, automatic air A/C)

Fig. 6: Overview Of Actuator Drives On Heater/Air Conditioner
Courtesy of BMW OF NORTH AMERICA, INC.

1. Actuator drive, defrosting flap (automatic A/C)
2. Actuator drive, ventilation flap (automatic A/C)
3. Actuator drive, fresh-air/recirculated-air flap
4. Actuator drive, air mixing flap (right, automatic air A/C)

NOTE: The High equipment specification heater/air conditioner is pictured!

64 00 .. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Heater/air conditioner with add-on parts
2 Remove fan for heater - A/C system
3 Compressor for A/C system
4 Fan for heater - A/C system
5 Desiccant bottle for A/C system
6 Expansion valve

Fig. 7: Overview Of Heater - A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 377 REMOVING AND INSTALLING (REPLACING) CONTROL PANEL FOR HEATING AND AIR CONDITIONING SYSTEM

Necessary preliminary tasks:

- Remove **RIGHT INSTRUMENT PANEL TRIM**

Replacement

Release screws (1).

Remove air conditioning control panel (2) from instrument panel trim (3).

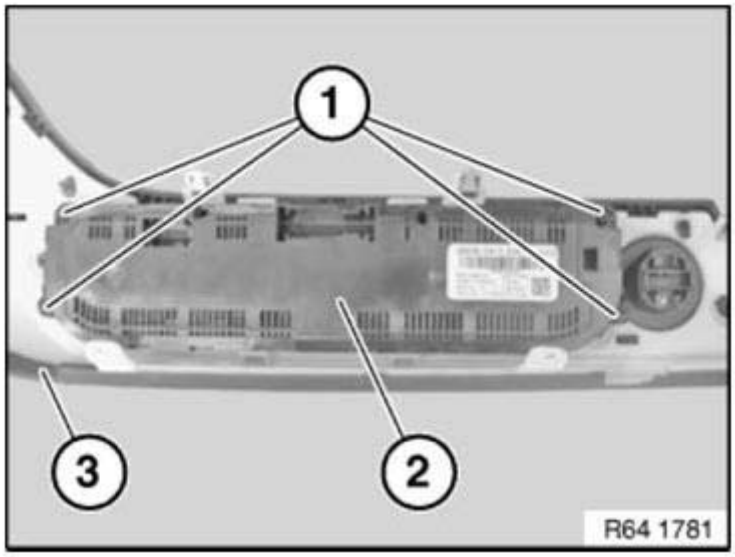


Fig. 8: Identifying Air Conditioning Control Panel On Instrument Panel Trim With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Carry out vehicle programming/coding .

64 11 992 REMOVING AND INSTALLING OR REPLACING SOLAR SENSOR

Unclip trim (1) with special tool from catches and remove towards top.

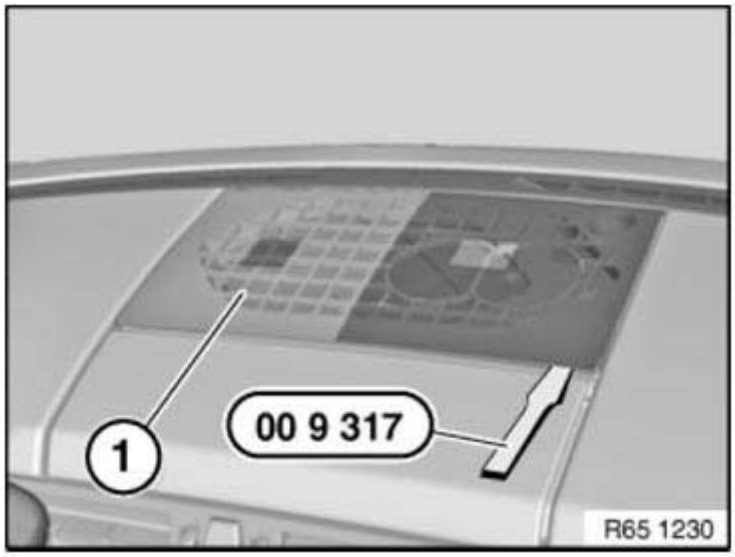


Fig. 9: Opening Trim With Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retainers (1) on speaker trim (2) must be correctly seated on associated lugs and must not be damaged.

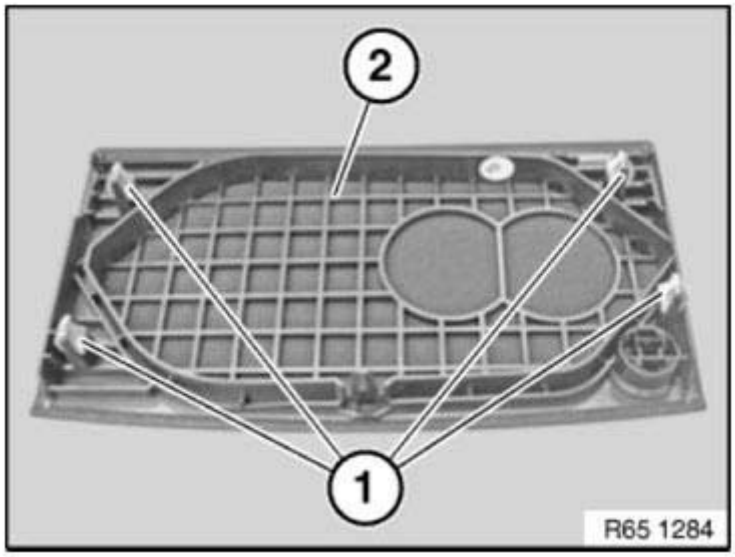


Fig. 10: Identifying Retainers On Speaker Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cover (1).

Remove speaker trim (2).

Unclip solar sensor (3) downwards from speaker trim (2).

Installation:

Retaining lugs on cover (1) and solar sensor (3) must not be damaged.

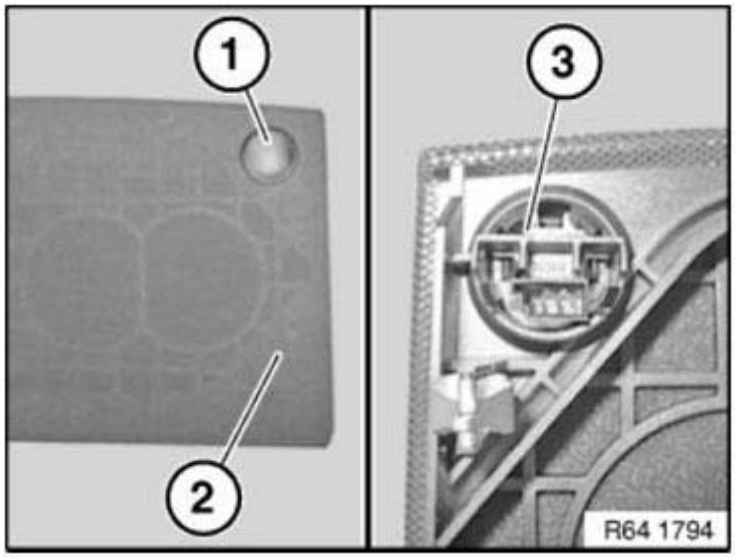


Fig. 11: Identifying Speaker Trim And Solar Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 872 REMOVING AND INSTALLING/REPLACING ACTUATOR DRIVE FOR BLENDING FLAP (LEFT, AUTOMATIC AIR CONDITIONING)

Necessary preliminary work:

- Remove **TRIM FOR INSTRUMENT PANEL AT BOTTOM LEFT**

Release screws (1).

Pull out actuator drive for blending flap (2).

Unlock plug connection (3) and disconnect.

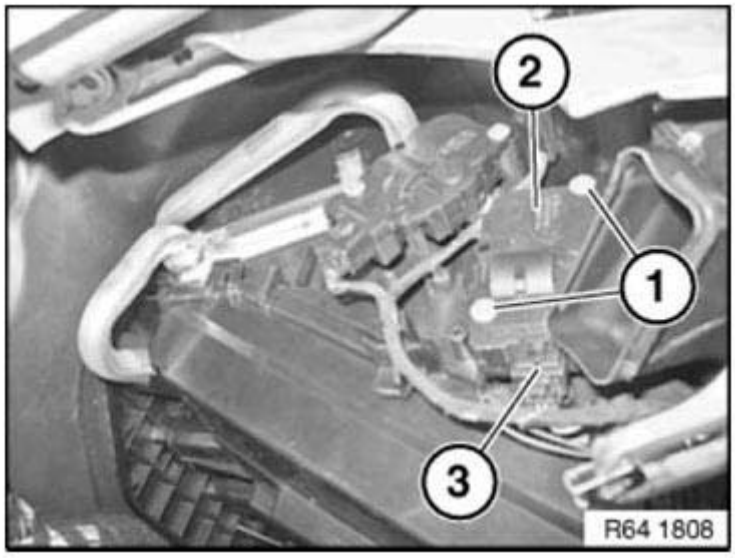


Fig. 12: Identifying Actuator Drive For Blending Flap
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors

- Re-address flap motors

64 11 875 REMOVING AND INSTALLING/REPLACING ACTUATOR DRIVE FOR DEFROSTING FLAP (AUTOMATIC A/C)

Necessary preliminary work:

- Remove **HEATER/AIR CONDITIONER FAN**

Release screws (1).

Pull out actuator drive for defroster flap (2).

Unlock plug connection (3) and disconnect.

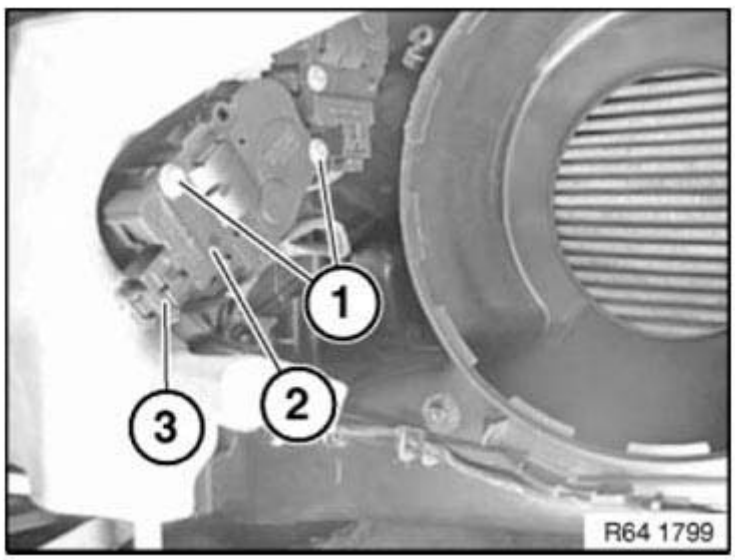


Fig. 13: Identifying Actuator Drive For Defroster Flap
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Re-address flap motors

64 11 806 REMOVING AND INSTALLING/REPLACING ACTUATOR DRIVE FOR FRESH-/RECIRCULATED AIR FLAP

Necessary preliminary work:

- Remove **RIGHT GLOVE BOX WITH HOUSING** .

Release screw (1).

Fold down passenger compartment power distribution box (2).

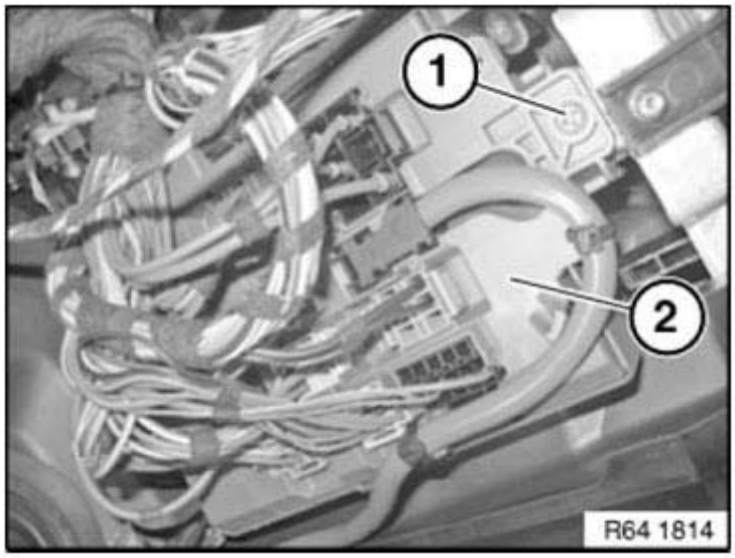


Fig. 14: Identifying Passenger Compartment Power Distribution Box With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unfasten plug connection (2) and disconnect.

Remove actuator drive for fresh-air/recirculated air flap (3).

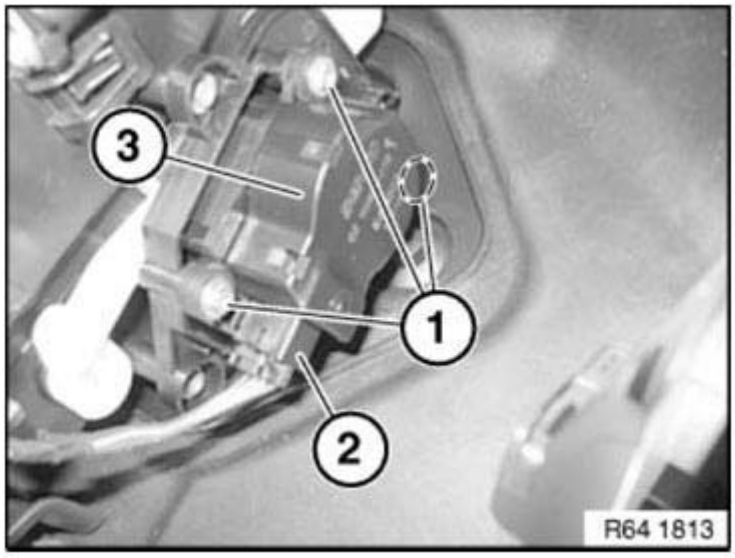


Fig. 15: Identifying Actuator Drive For Fresh-Air/Recirculated Air Flap With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Re-address flap motors

64 11 869 REMOVING AND INSTALLING/REPLACING ACTUATOR DRIVE FOR VENTILATION/STRATIFICATION FLAP (AUTOMATIC AIR CONDITIONING)

Necessary preliminary work:

- Remove **INSTRUMENT PANEL TRIM AT BOTTOM LEFT**

Release screws (1).

Pull out actuator drive for defroster flap (2).

Unlock plug connection (3) and disconnect.

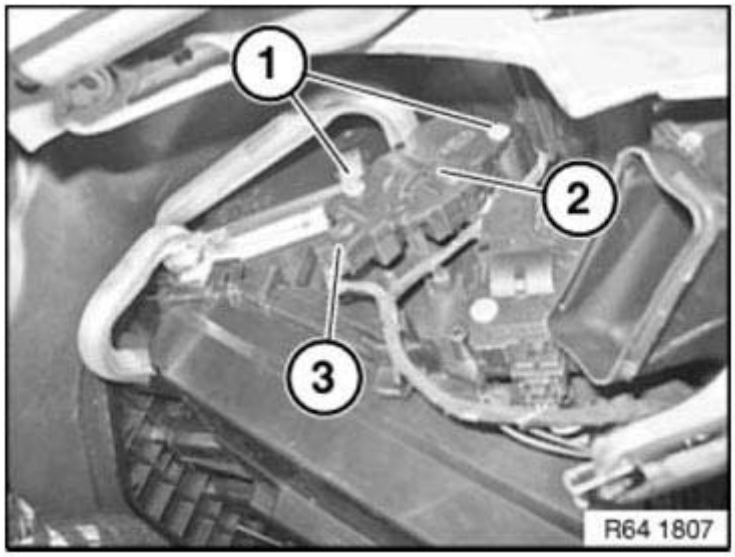


Fig. 16: Identifying Actuator Drive For Defroster With Plug Connection And Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be re-addressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Re-address flap motors

64 11 909 REMOVING AND INSTALLING/REPLACING FOOTWELL TEMPERATURE SENSOR

Necessary preliminary tasks

- Remove **TRIM FOR INSTRUMENT PANEL AT BOTTOM LEFT**

Remove footwell duct (1).

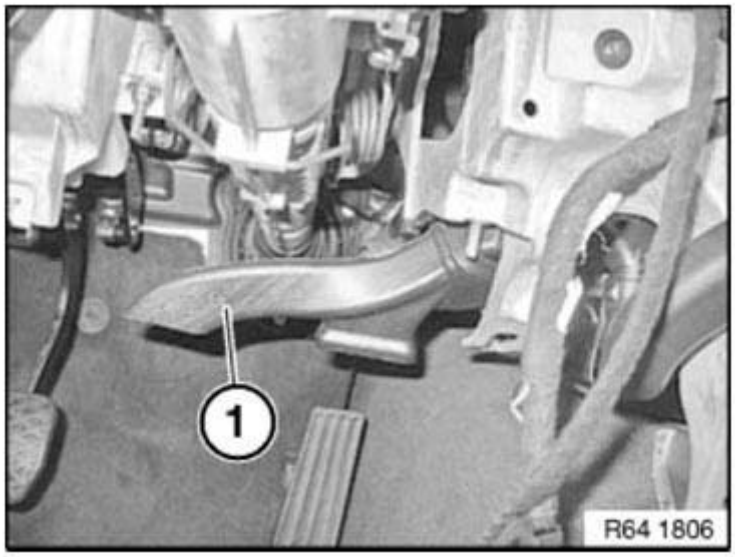


Fig. 17: Identifying Footwell Duct
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Turn temperature sensor (2) at plug socket as far as it will go.

Feed temperature sensor (2) out of footwell duct.

Installation:

Make sure temperature sensor (2) is correctly engaged in footwell duct.

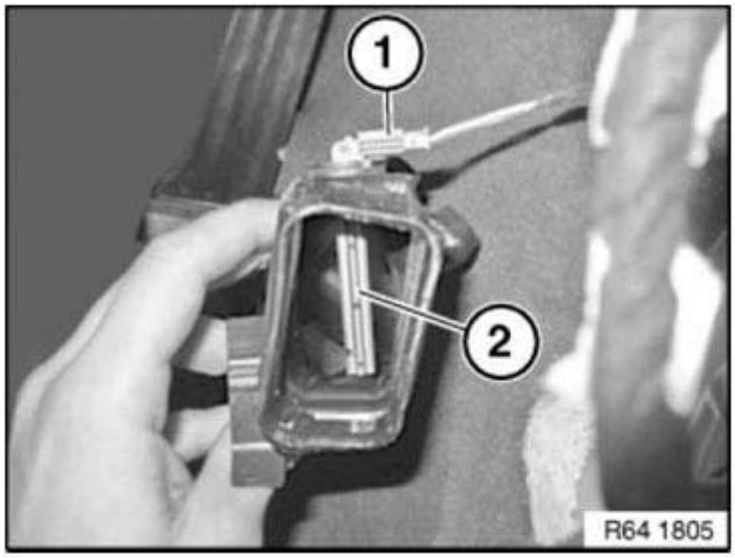


Fig. 18: Identifying Temperature Sensor With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 213 REMOVING AND INSTALLING/REPLACING HEATER/AIR CONDITIONER FAN

Necessary preliminary tasks:

- Remove **RIGHT GLOVEBOX WITH HOUSING**

Remove air duct (1).

Unfasten plug connection (2) and disconnect.

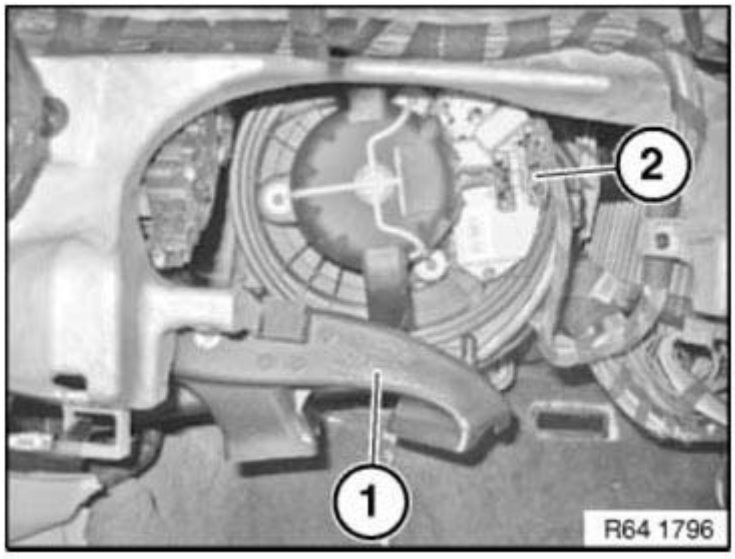


Fig. 19: Identifying Air Duct With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Raise lug (1).

Release fan motor (2) in direction of arrow.

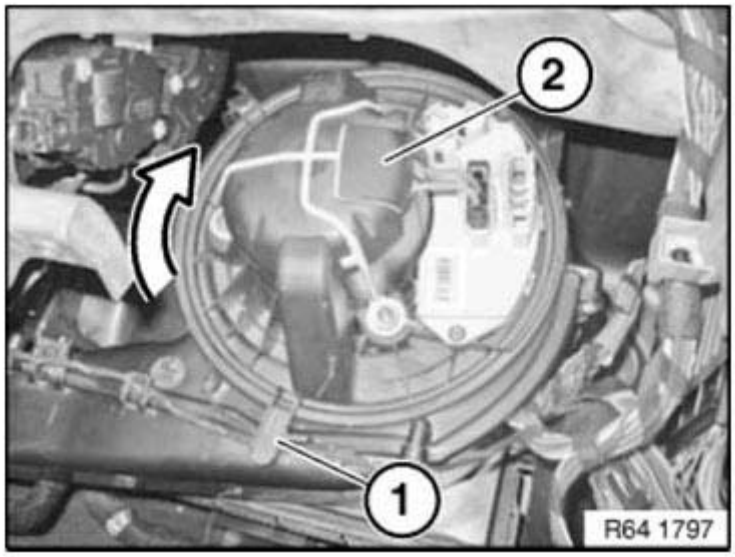


Fig. 20: Removing Fan Motor
Courtesy of BMW OF NORTH AMERICA, INC.

Pull fan motor (1) forwards a little and then turn until controller (2) points downwards.

Feed out fan motor (2).

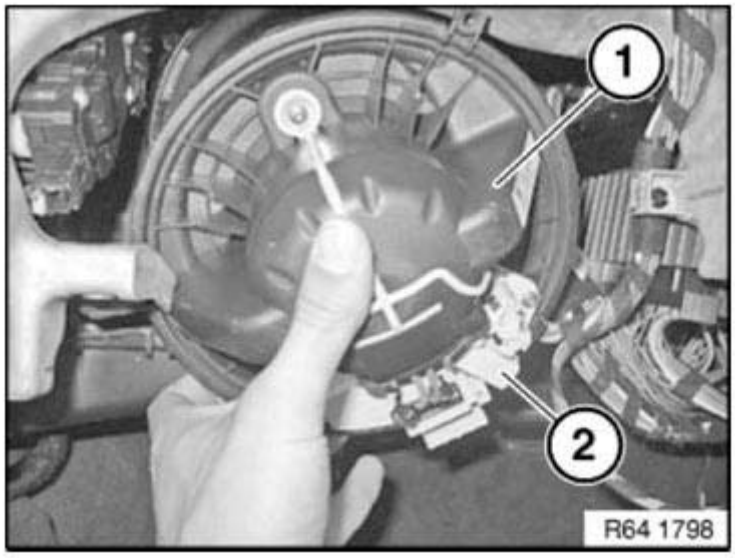


Fig. 21: Removing Fan Motor
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 205 REMOVING AND INSTALLING/REPLACING HEATING UNIT (N52K)

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!

Follow safety instructions for handling R 134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A.
Avoid contact with refrigerant and refrigerant oil.
Follow safety instructions for handling REFRIGERANT OIL .
Follow INSTRUCTIONS FOR WORKING ON COOLING SYSTEM .

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours: Replace DESICCANT INSERT FOR A/C SYSTEM .

Necessary preliminary tasks:

- **DRAW OFF REFRIGERANT FROM A/C SYSTEM**
- **REMOVE CARRIER FOR INSTRUMENT PANEL**

Recycling

Coolant emerges when coolant lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping coolant.

Observe country-specific waste-disposal regulations.

IMPORTANT: Carefully blow through aluminum twin pipe (on heat exchanger) to remove remaining coolant from heater element.

Release screw (1) on bulkhead (2).

Pull holder (3) out of rubber.

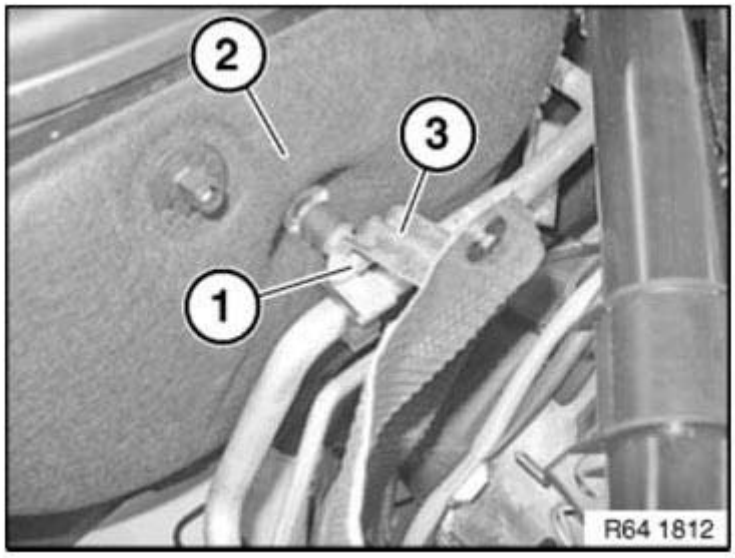


Fig. 22: Identifying Screw On Bulkhead And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release hose clamps (1) and detach coolant hoses (2).

Release screws (3) and detach refrigerant lines (4) in direction of arrow.

Tightening torque **64 53 2AZ** .

Installation:

Replace sealing rings.

Use special tool 00 9 030 Keil to mount sealing rings without damaging them.

Installation:

Make sure bulkhead grommet is correctly seated.

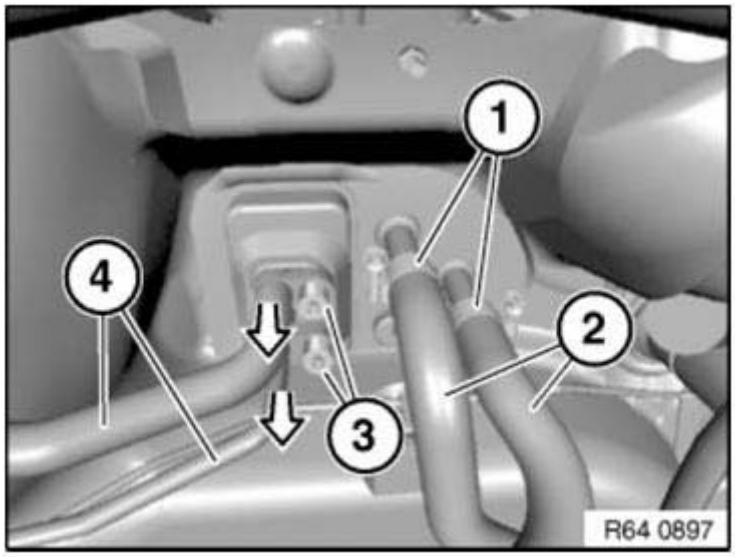


Fig. 23: Disconnecting Refrigerant Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Remove heating unit (1) in direction of arrow.

Installation:

If necessary, replace seal (2) and seals between heater (1) and bulkhead.

Make sure condensate drain grommet (3) is correctly seated in mounting.

Make sure heater (1) is correctly seated in condensate drain grommet (3).

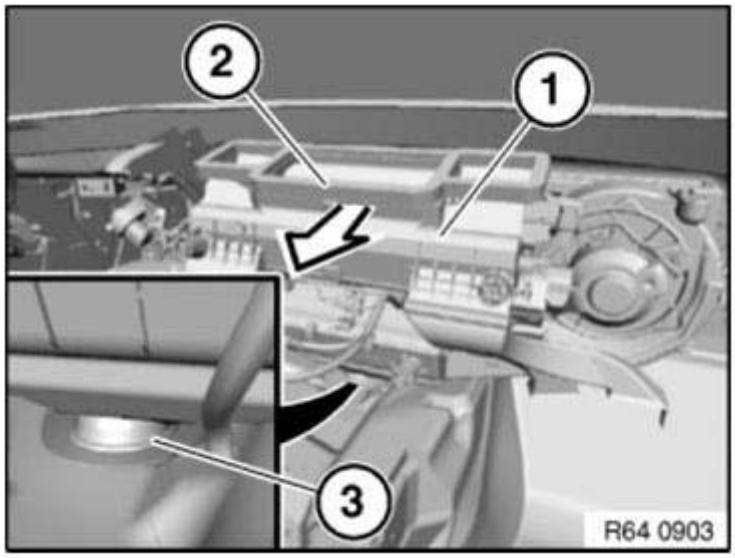


Fig. 24: Removing Heating Unit
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL A/C SYSTEM** .
- Vent cooling system and check for water leaks See **1700039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT** or **1700009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)** .

64 11 205 REMOVING AND INSTALLING/REPLACING HEATING UNIT (N54)

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Follow safety instructions for handling R 134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A.
Avoid contact with refrigerant and refrigerant oil.
Follow safety instructions for handling REFRIGERANT OIL .
Follow INSTRUCTIONS FOR WORKING ON COOLING SYSTEM .

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours: Replace DESICCANT INSERT FOR A/C SYSTEM .

Necessary preliminary tasks:

- **DRAW OFF REFRIGERANT FROM A/C SYSTEM**
- **REMOVE CARRIER FOR INSTRUMENT PANEL**

Recycling

Coolant emerges when coolant lines are detached. Have a suitable collecting container ready.

Catch and dispose of escaping coolant.

Observe country-specific waste-disposal regulations.

IMPORTANT: Carefully blow through aluminum twin pipe (on heat exchanger) to remove remaining coolant from heater element.

Release hose clamps (1) and detach coolant hoses (2). Release screws (3) and detach refrigerant lines (4) in direction of arrow.

Tightening torque, see 64 53 2AZ in **64 53 REFRIGERANT LINES AND EXPANSION VALVE** .

Installation: Replace sealing rings. Use special tool 00 9 030 to mount sealing rings without damaging them.

Installation: Make sure bulkhead grommet is correctly seated.

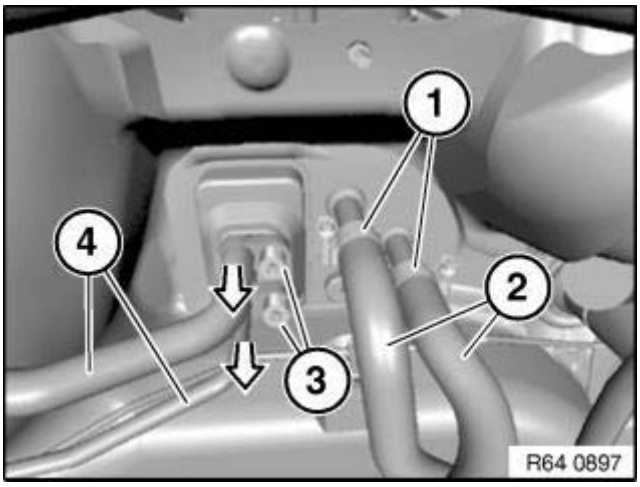


Fig. 25: Removing Refrigerant Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Remove heating unit (1) in direction of arrow.

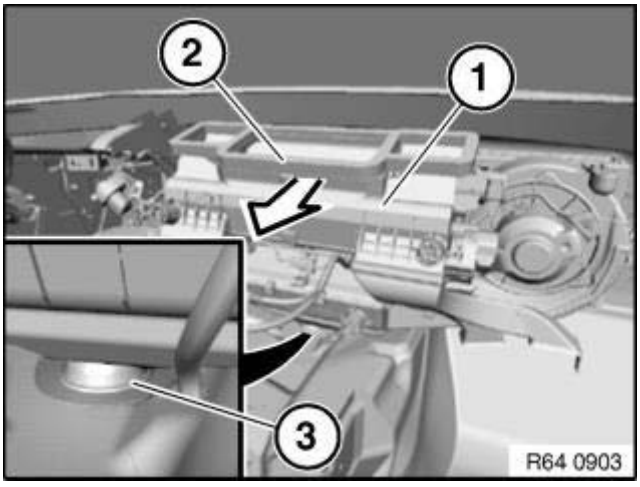


Fig. 26: Removing Heating Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Installation: If necessary, replace seal (2) and seals between heater (1) and bulkhead. Make sure condensate drain grommet (3) is correctly seated in mounting. Make sure heater (1) is correctly seated in condensate drain grommet (3).

After installation

- **EVACUATE AND FILL A/C SYSTEM** .
- Vent cooling system and check for water leaks . See **1700039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT** or **1700009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)** .

64 11 991 REMOVING AND INSTALLING/REPLACING SENSOR FOR AUTOMATIC RECIRCULATED AIR CONTROL (AUC SENSOR)

Lever out plastic slips (1) on cowl panel (3) at marked points.

Lever out plastic clip (2).

Raise cowl panel (3) until AUC sensor is accessible.

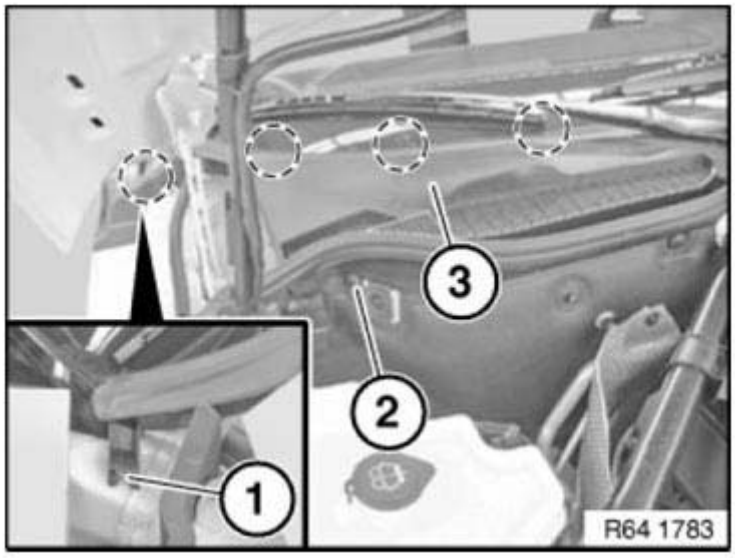


Fig. 27: Identifying Plastic Slips On Cowl Panel
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock AUC sensor (1) in direction of arrow and remove.

Unfasten plug connection (2) and disconnect.

Installation:

Make sure AUC sensor (1) is correctly seated.

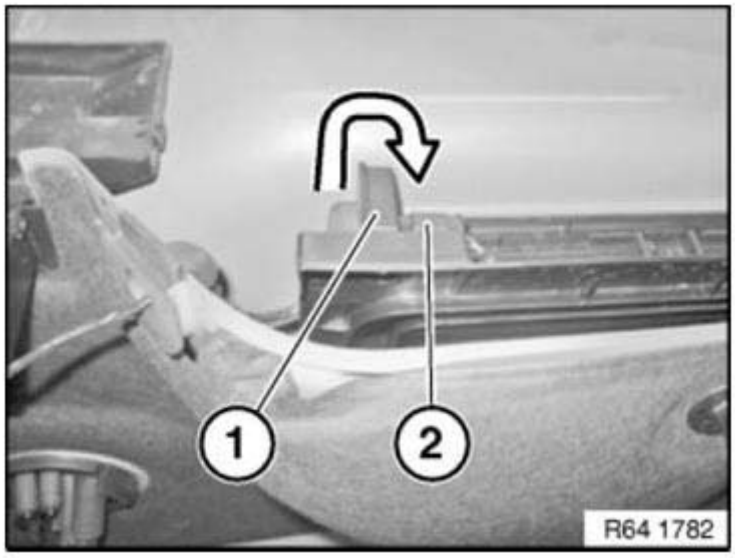


Fig. 28: Removing AUC Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 871 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR BLENDING FLAP (RIGHT, AUTOMATIC AIR CONDITIONING)

Necessary preliminary tasks:

- Remove **HEATER/AIR CONDITIONER FAN**

Release screws (1).

Pull out servodrive for blending flap (2).

Unlock plug connection (3) and disconnect.

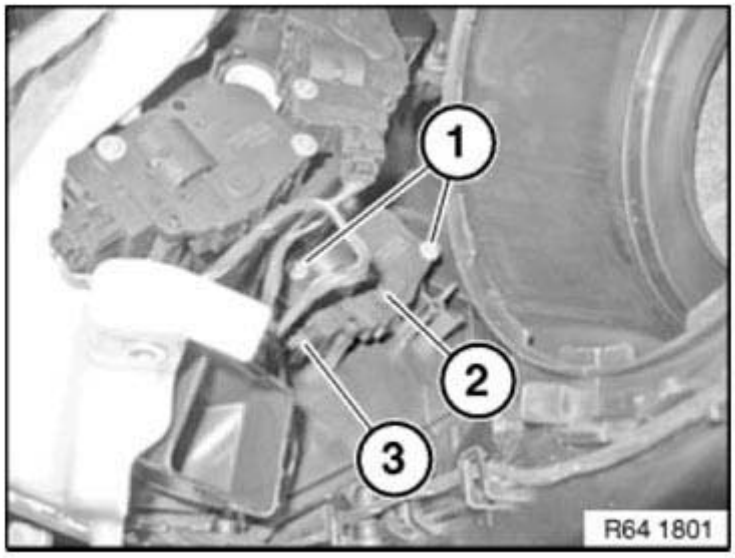


Fig. 29: Identifying Servodrive For Blending Flap With Screws And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be readdressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Readdress flap motors

64 11 839 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR FOOTWELL FLAP (AUTOMATIC AIR CONDITIONING)

Necessary preliminary tasks:

- Remove **TRIM FOR INSTRUMENT PANEL AT BOTTOM LEFT**

Release screws (1).

Pull out servodrive (3).

Unfasten plug connection (2) and disconnect.

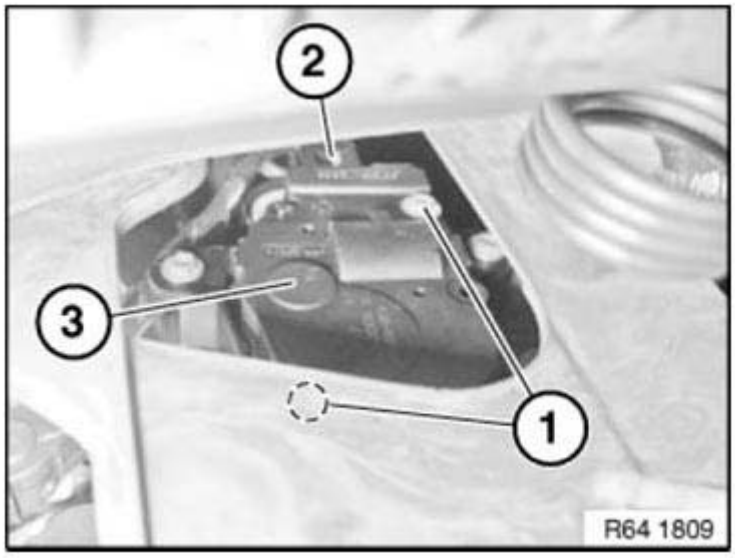


Fig. 30: Identifying Servodrive With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be readdressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Readdress flap motors

64 11 829 REMOVING AND INSTALLING/REPLACING SERVODRIVE FOR VENTILATION FLAPS (AUTOMATIC AIR CONDITIONING)

Necessary preliminary tasks:

- Remove **HEATER/AIR CONDITIONER FAN**

Release screws (1).

Pull out servodrive for ventilation flaps (2).

Unlock plug connection (3) and disconnect.

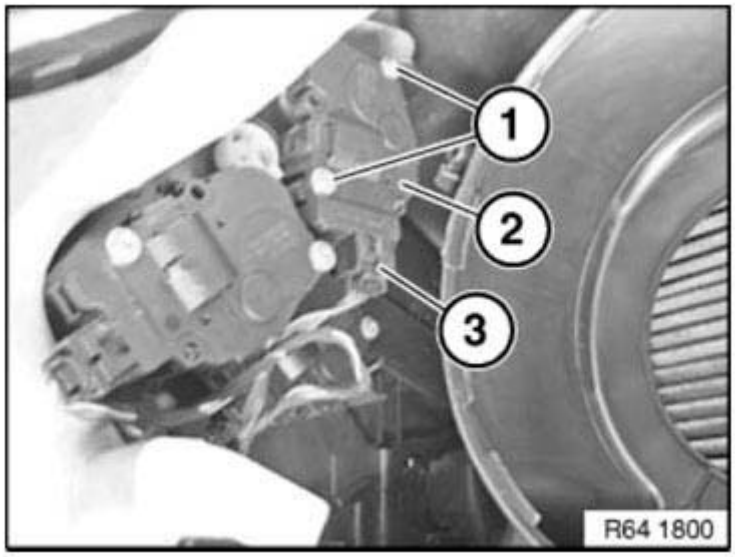


Fig. 31: Identifying Servodrive For Ventilation Flaps With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Servomotors must be readdressed in the event of replacement!

Addressing can only be carried out with the BMW diagnosis system.

Service functions:

- Body
- Heating and air conditioning function
- Flap motors
- Readdress flap motors

64 11 906 REMOVING AND INSTALLING/REPLACING VENTILATION TEMPERATURE SENSOR (MIDDLE FRESH-AIR GRILLE)

Necessary preliminary tasks

- Remove **CENTRE FRESH AIR GRILLE**

Turn temperature sensor (1) on plug socket in direction of arrow as far as it will go.

Feed temperature sensor (1) out of fresh-air duct (2).

Disconnect associated plug connection.

Installation:

Make sure temperature sensor (1) is correctly engaged in fresh-air duct (2).

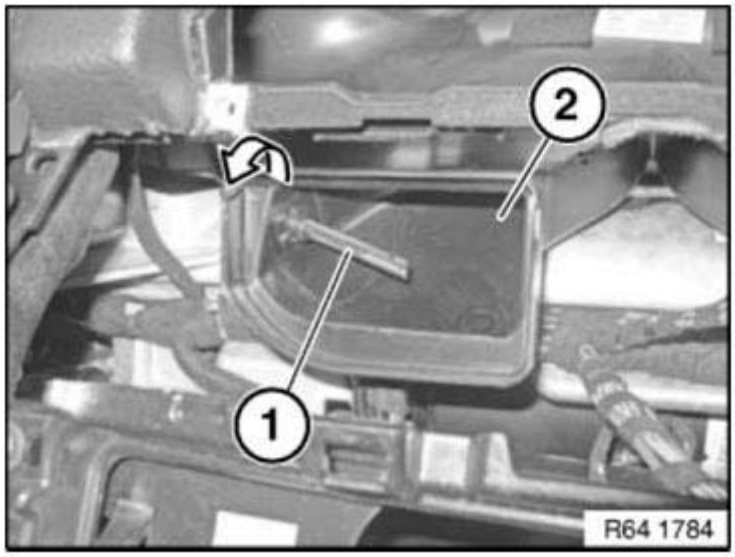


Fig. 32: Turning Temperature Sensor On Plug Socket
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 225 REPLACING CONTROLLER FOR HEATING AND A/C SYSTEM FAN

Necessary preliminary tasks:

- Remove **HEATER/AIR CONDITIONER FAN**

Release screws (1).

Tightening torque **64 11 3AZ** .

Unfasten plug connection (2) and disconnect.

Remove controller (3) from fan motor housing (4).

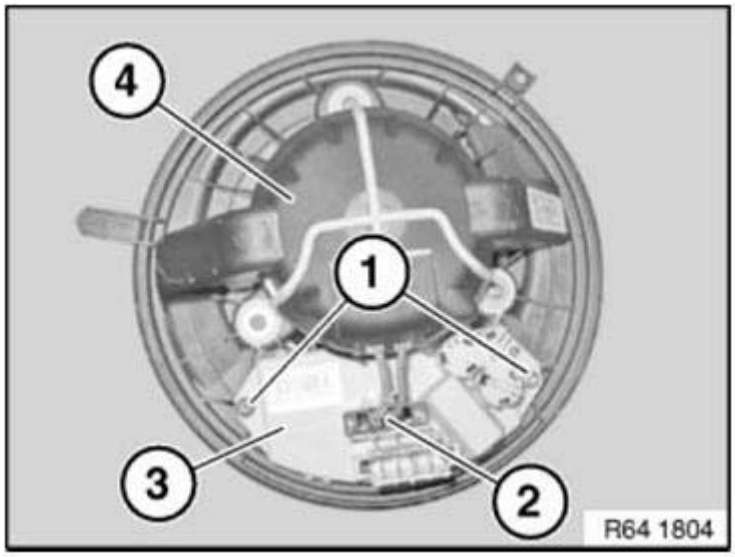


Fig. 33: Identifying Fan Motor Housing, Controller And Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 943 REPLACING EVAPORATOR TEMPERATURE SENSOR

Necessary preliminary tasks:

- Partially remove **EVAPORATOR**

Lever evaporator temperature sensor (1) out of corresponding guides on evaporator (2).

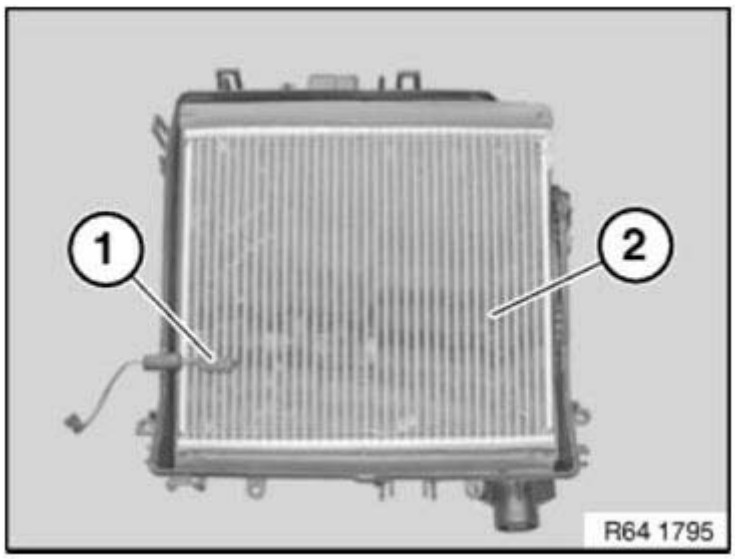


Fig. 34: Identifying Evaporator Temperature Sensor On Evaporator
Courtesy of BMW OF NORTH AMERICA, INC.

64 11 970 REPLACING FOGGING SENSOR

WARNING: Make sure rooms are well ventilated when working with adhesive remover indoors.

IMPORTANT: Do not under any circumstances use paint thinner to clean the bonding surface.

Expand two-part mirror base cover (1) by pressing from below and detach.

Feed out two-part mirror base cover (1) and remove.

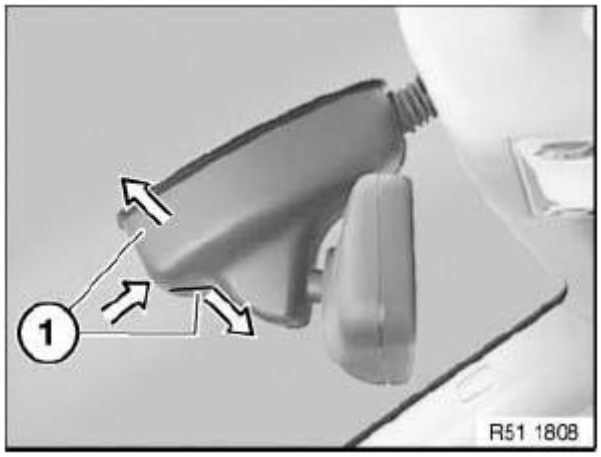


Fig. 35: Disconnecting Two-Part Mirror Base Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

NOTE: If necessary, carefully heat fogging sensor (2) with a hot air blower to approx. 40-60 °C.

Lift off fogging sensor (2) with special tool 00 9 317 and slowly pull off from windshield.

Installation:

Bonding surface must be dry and free of dust and grease.

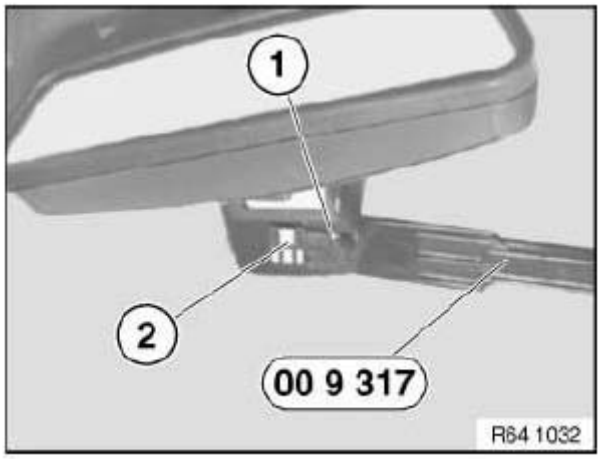


Fig. 36: Lifting Fogging Sensor Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Clean bonding surface with adhesive remover (sourcing reference: BMW Parts Service).

After cleaning, do not touch bonding surface with bare hands.

Pull off protective film completely from fogging sensor (3).

Place mounting template (1) as pictured on rain sensor (2).

Press fogging sensor (3) in direction of arrow with a contact pressure of > or =15 N/cm^2 onto inside of windshield.

NOTE: **Firm thumb pressure attains approx. 30 N/cm^2 .**

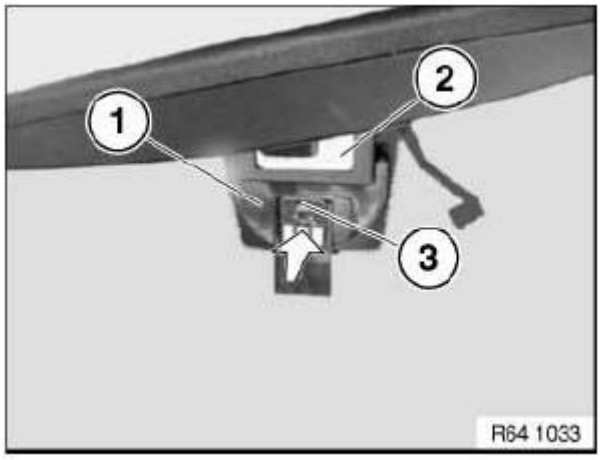


Fig. 37: Pressing Fogging Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Remove mounting template (1) carefully from fogging sensor (3).

L1- 009317 Keil

64 11 208 REPLACING HEATER CORE

Necessary preliminary tasks:

- **REMOVE HEATER**

Release screw (1).

Tightening torque **64 53 3AZ** .

Remove adapter plate (2).

Release screws (4).

Tightening torque **64 11 1AZ** .

Remove bulkhead adapter (3).

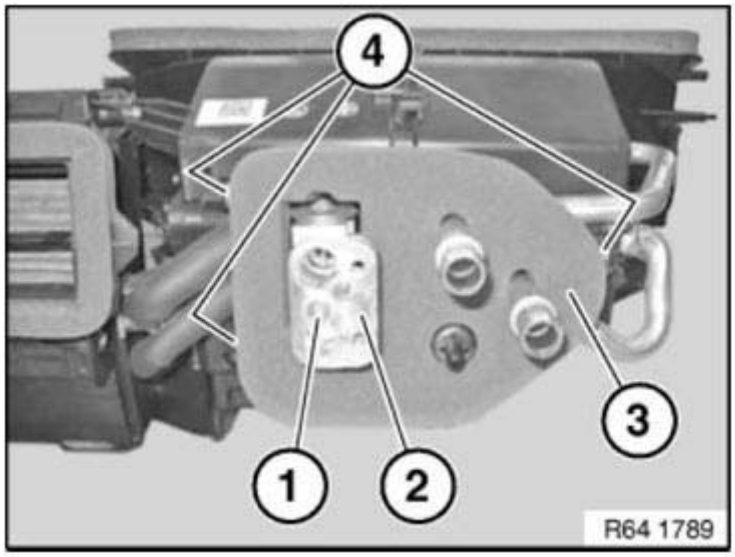


Fig. 38: Identifying Bulkhead Adapter With Adapter Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Remove retaining plate (2).

Pull out heater element (3) in direction of arrow.

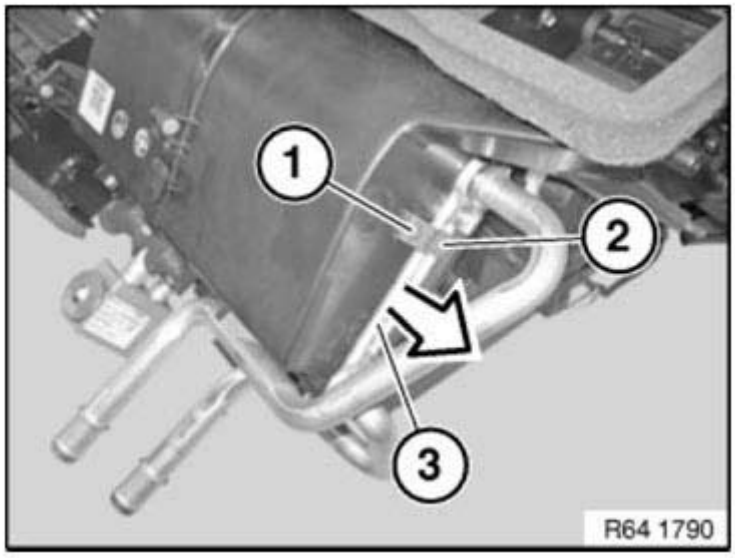
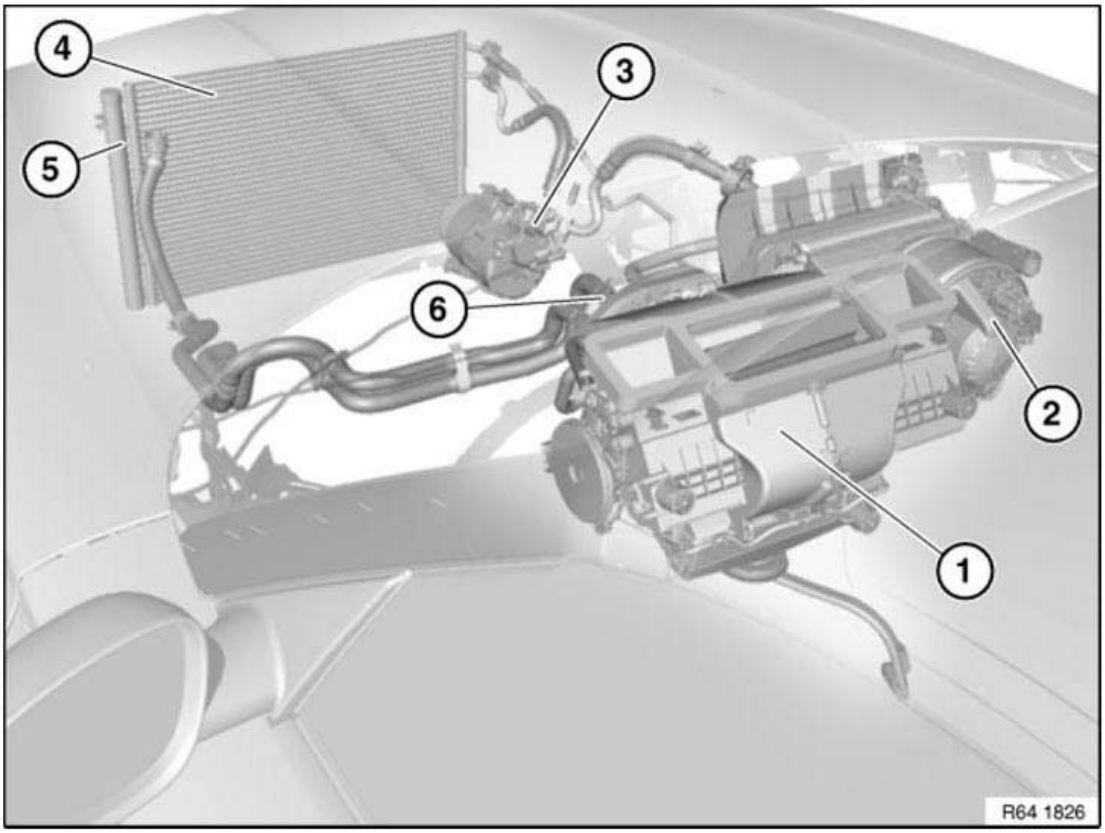


Fig. 39: Identifying Heater Element With Retaining Plate And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

6422 NOZZLES AND OUTLETS

64 00 .. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Heater/air conditioner with add-on parts
2 Remove fan for heater - A/C system
3 Compressor for A/C system
4 Fan for heater - A/C system
5 Desiccant bottle for A/C system
6 Expansion valve

Fig. 40: Overview Of Heater - A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 22 137 REMOVING AND INSTALLING OR REPLACING LEFT FRESH-AIR GRILLE

Necessary preliminary tasks

- Remove **TRIM ON INSTRUMENT PANEL ON LEFT**

Release screws (1).

Snap out fresh-air grille (2) in direction of arrow.

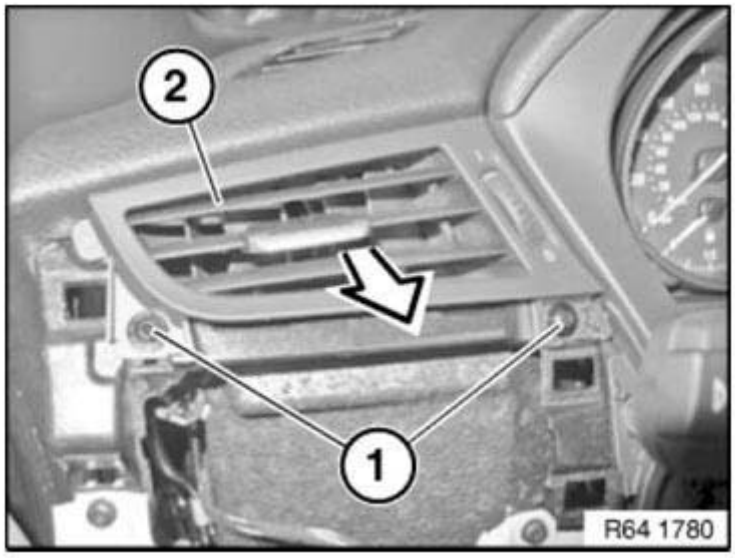


Fig. 41: Identifying Fresh-Air Grille
Courtesy of BMW OF NORTH AMERICA, INC.

64 22 165 REMOVING AND INSTALLING OR REPLACING MIDDLE FRESH-AIR GRILLE

Necessary preliminary tasks

- Remove **RIGHT INSTRUMENT PANEL TRIM**

Gently fold in

Central Information Display (1) manually.

Unfasten screws (2).

Pull out fresh-air grille (3) towards front.

Disconnect associated plug connections for hazard warning flashers and central locking.

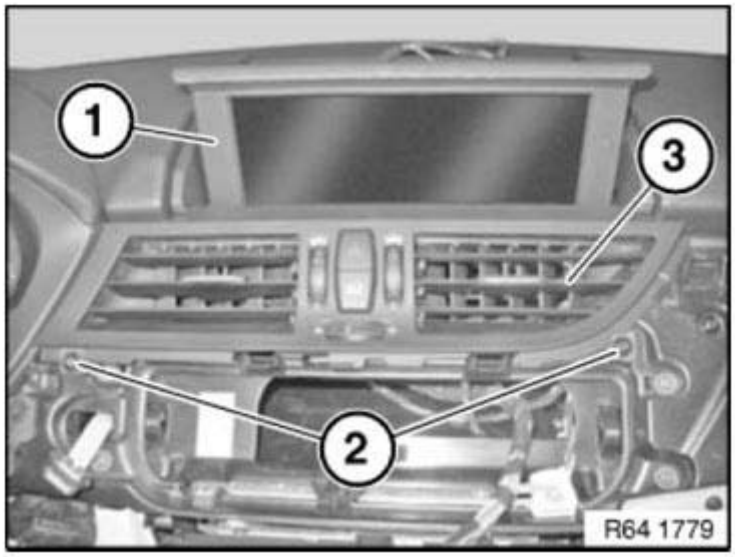


Fig. 42: Identifying Central Information Display And Fresh Air Grille
Courtesy of BMW OF NORTH AMERICA, INC.

64 22 139 REMOVING AND INSTALLING/REPLACING RIGHT FRESH-AIR GRILLE

Unclip decorative trim (1) as shown with special tool 00 9 317 on left and remove.

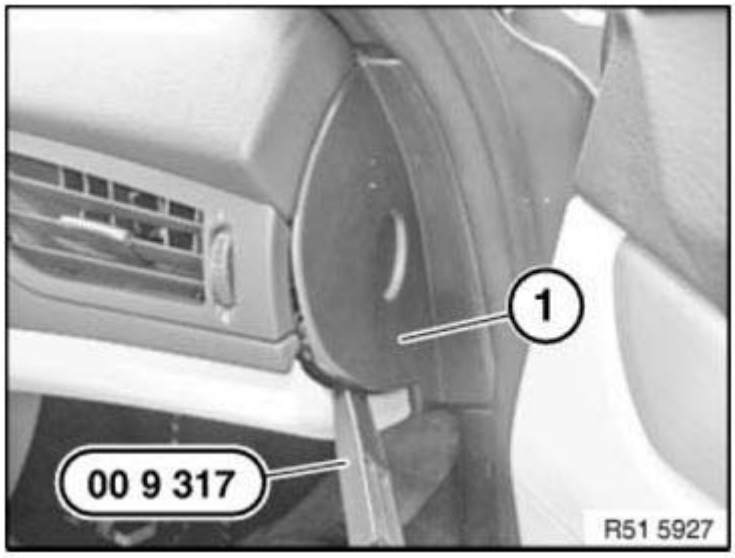


Fig. 43: Opening Decorative Trim Using Special Tool (00 9 317)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on fresh-air grille (2).

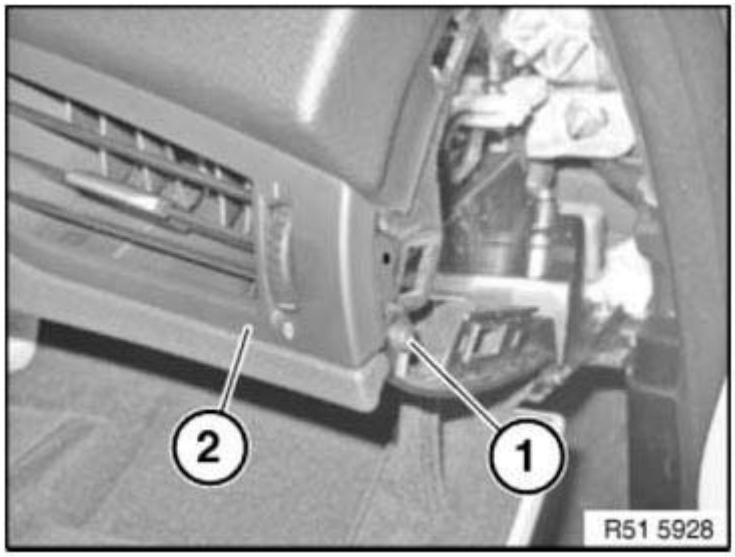


Fig. 44: Identifying Fresh Air-Grille With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Open glove compartment (1).

Release screws (2) at marked points.

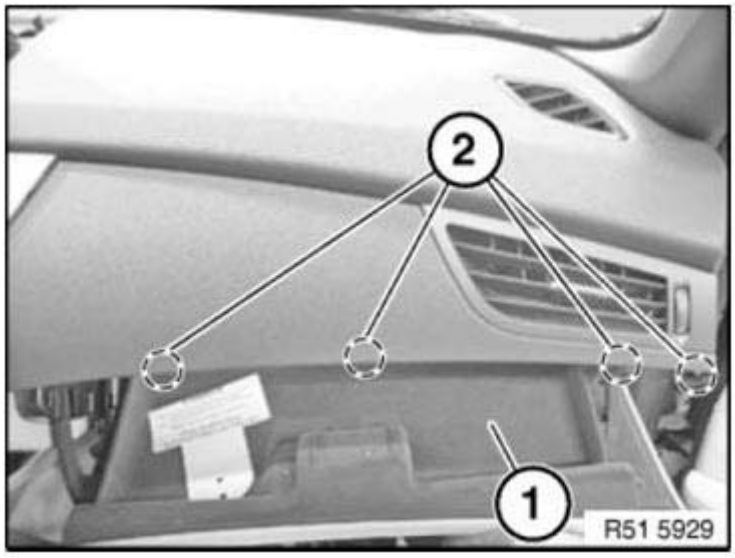


Fig. 45: Identifying Glove Compartment With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip trim (1) as shown in area of fresh-air grille (2) and pull forwards slightly.

Snap out fresh-air grille (2) towards front and remove.

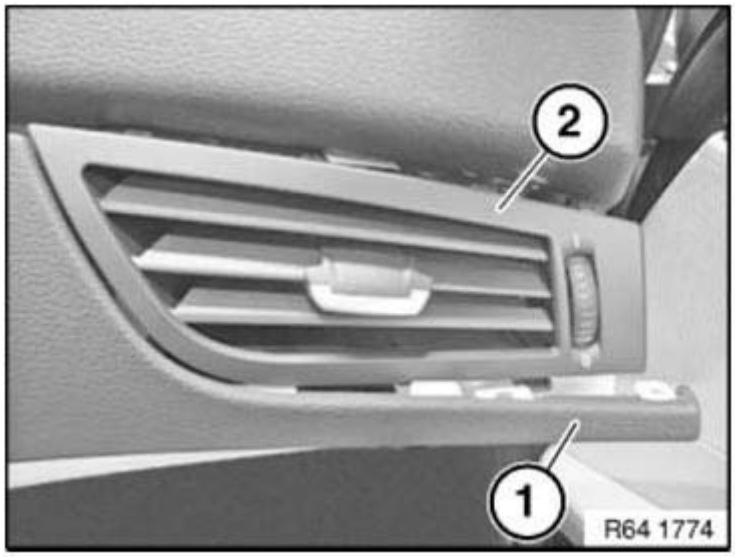


Fig. 46: Identifying Fresh Air Grille And Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Retaining clips (1) on fresh-air grille (2) must be correctly seated on associated lugs.

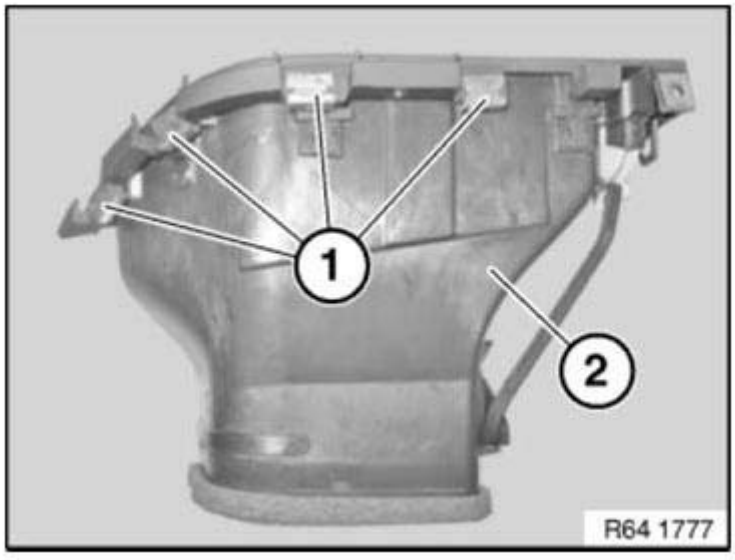
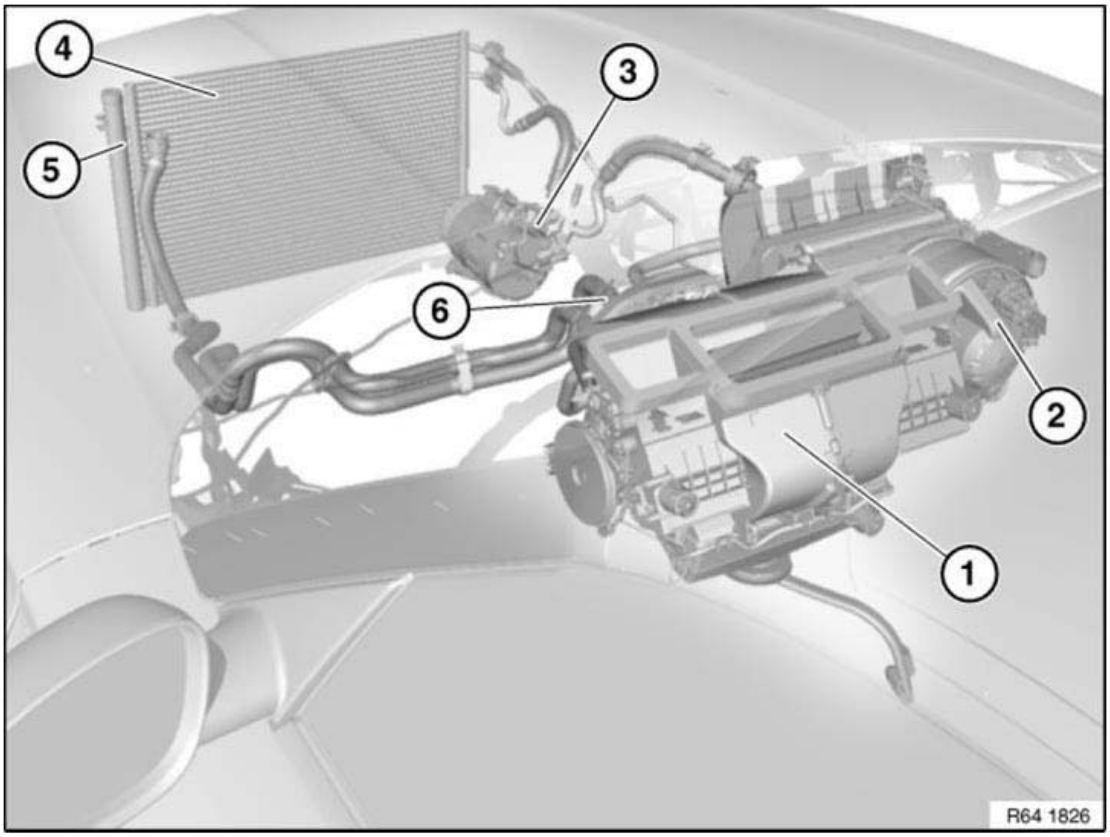


Fig. 47: Identifying Retaining Clips On Fresh-Air Grille
Courtesy of BMW OF NORTH AMERICA, INC.

6431 MICROFILTER

64 00 .. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Heater/air conditioner with add-on parts
2 Remove fan for heater - A/C system
3 Compressor for A/C system
4 Fan for heater - A/C system
5 Desiccant bottle for A/C system
6 Expansion valve

Fig. 48: Overview Of Heater - A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 31 010 REPLACING MICROFILTER FOR INTERIOR VENTILATION

IMPORTANT: Risk of damage!
A/C system must not be operated without the prescribed filter element.

Note on cleaning:

Spray microfilter housing from inside with BMW pollen filter housing cleaner.

COMPLY with notes and instructions on handling cleaning agents!

Wipe away excess liquid.

This kills off germs, bacteria and fungi that cause smells.

The smell that results on the plastic parts of the microfilter housing is eliminated.

Necessary preliminary work:

- Remove **TRIM FOR INSTRUMENT PANEL AT BOTTOM RIGHT**

Unlock cover (1), slide in direction of arrow and remove towards bottom.

Installation note:

Make sure guides (2) are correctly seated in rails (3).

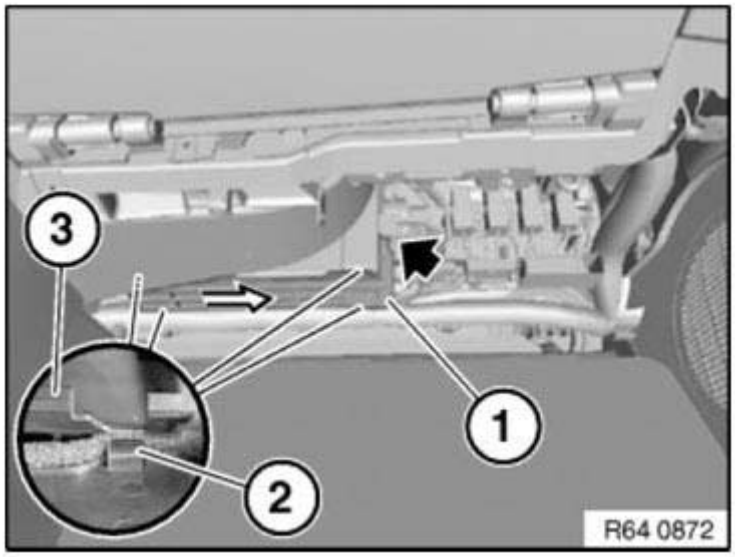


Fig. 49: Opening Microfilter Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Pull out microfilter for interior ventilation (1) in direction of arrow.

Installation note:

Make sure microfilter for interior ventilation (1) is in correct installation position (flow direction).

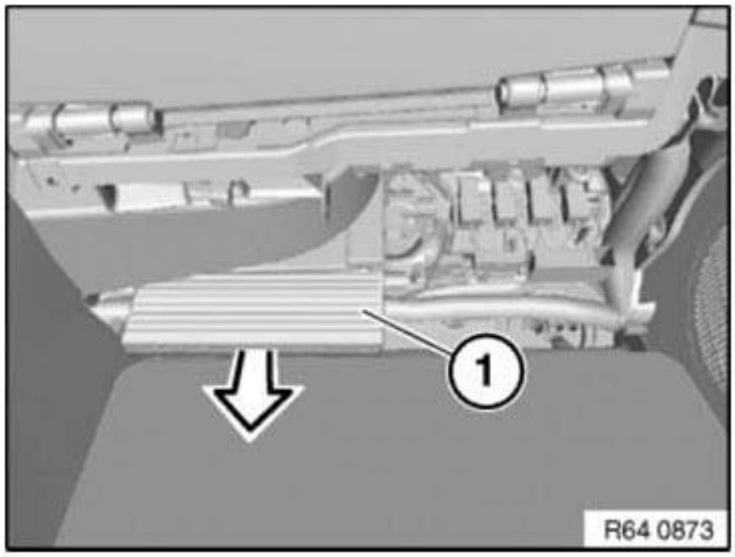


Fig. 50: Removing Microfilter For Interior Ventilation
Courtesy of BMW OF NORTH AMERICA, INC.

6450 AIR CONDITIONING SYSTEM

64 50 ... A/C PERFORMANCE TEST (TETRAFLUORETHANE)

Observe the following conditions prior to the A/C performance test

1. Provide a vehicle diagnostic system or. Safeguard electrical system integrity by checking the fault memory (no faults in the fault memory).
2. Provide a thermometer with separate gauge.
3. Perform the test in a suitable work bay with an ambient temperature between 20 °C and 30 °C.

Re 1:

Connect diagnosis system to vehicle and display evaporator temperature.

Re 2:

Position a thermometer with a separate gauge approx. 5 cm below the roof liner at the height of the B-pillar. Lay gauge outwards out of vehicle interior.

Re 3:

Heat vehicle interior:

- "A/C button" is not activated during the heating process
- Close all windows and doors.
- Set recirculated air mode.

- In A/C menu (MMI) in Air distribution index tab: select 100 % footwell for driver and front passenger and 100 % defrosting for driver (this applies here to driver and front passenger)
- Maximum temperature setting (28 °C)
- Maximum fan speed (adjust 9 pixels from 9 possible on front A/C control panel)
- Run engine at approx. 2000 RPM until operating temperature is reached, then idle speed.

Air-conditioning efficiency measurement

Turn on A/C compressor via "A/C button" at a vehicle interior temperature of 50 °C.

Vehicles with MAX AC button ("MAX"):

- Activation of MAX AC (= maximum chilling capacity)

Vehicles without MAX AC button ("MAX"):

- Set maximum chilling capacity by means of following steps:
  - Temperature setting = 16 °C
  - Fan setting 9 pixels from 9 possible
  - Stratification maximum cold (4 blue bars)

Evaporator sensor temperature must be < or = 15 °C after 3-4 minutes at approx. 2000 RPM.

DRAW OFF A/C SYSTEM if this temperature is not reached. Measure amount of refrigerant drawn off.

If drawn-off quantity does not correspond to **SPECIFIED FILL QUANTITY** : supplement refrigerant and repeat test.

If fill quantity is correct, continue troubleshooting by pressure measurement.

64 50 010 DRAWING OFF, EVACUATING AND FILLING HEATING AND AIR CONDITIONING SYSTEM (R 134A)

WARNING: Only persons in possession of a professional certificate of competence for the maintenance and repair of heating and air conditioning systems are authorized to carry out repair work on the refrigerant circuit. This certificate must be presented by 04/07/2010 at the latest. (applies only to EU countries; follow country-specific regulations in non-EU countries) Refrigerant circuit is under high pressure!

- **If the protective caps on the filling valves are difficult to open, there is a danger of injury from leaking valve inserts.**

Repair work may only be carried out on a depressurized refrigerant circuit!

- **Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station.**

Avoid contact with refrigerant and refrigerant fluid.

- **Follow safety information for handling R 134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A.**
- **Follow safety information for HANDLING REFRIGERANT FLUID .**

IMPORTANT: Risk of damage!
Only BMW-approved tetrafluorethane R134a refrigerant may be used.
Restart engine only when air conditioning system has been correctly filled.

IMPORTANT: Risk of damage!
Carefully move the climate control service station!
Observe the operating instructions and maintenance intervals of the service station!
Highly sensitive components, such as scales, are installed in the climate control service station. These will be damaged by improper handling, such as fast driving over bumps. This will result in a significant reduction of the measuring accuracy when drawing off and filling.

IMPORTANT: The vehicle must be parked on the ground during the entire drawing off, evacuation and filling procedure!
Filling a raised vehicle will result in filling shortage.

NOTE: In case of complaints, carry out a heating and air conditioning performance test!
If the system fails the test, draw off, evacuate and fill the heating and air conditioning system in accordance with the operating instructions of the relevant service station.
It is essential to adhere to the service station service intervals.

Notes for drawing off heating and air conditioning system:

To help separation of refrigerant and refrigerant fluid, run engine at low speed (800-1200 RPM) and with heating and air conditioning system turned on for a few minutes.

The limits the entrainment of refrigerant fluid while it is drawn off.

Drawn-off refrigerant fluid must be changed and reintroduced via the A/C service station.

Recycling:

Dispose of drawn-off refrigerant fluid as hazardous waste.

Observe country-specific waste disposal regulations.

Notes for evacuating off heating and air conditioning system:

Before each filling, evacuate the refrigerant system.

Observe an evacuation time of **at least 30 minutes** .

The evacuation procedure removes all traces of ambient air, water vapor and any other gases present from the heating and air conditioning system. This enables subsequent system filling with refrigerant.

If the vacuum does not remain stable when the system is off, run the procedure for leaks in the refrigerant circuit.

Notes for filling heating and air conditioning system:

Before filling with refrigerant, replace the refrigerant fluid entrained during drawing off.

Also top up any lost fluid as indicated in the table:

Loss of R134a refrigerant

Table 1 indicates the approved coolant loss after a certain period of time. This is no leak. Refrigerant fluid may not be topped up.

Table 2 indicates how much refrigerant fluid must be topped up after an unapproved coolant loss due to a leak after a specified period of time.

Different cases:

a. Loss of refrigerant per **Table 1 is not exceeded**
   - Top up lost R134a refrigerant
   - It is **not permitted** to top up the refrigerant fluid

b. Loss of refrigerant per **Table 1** is exceeded
   - Top up lost R134a refrigerant
   - Refrigerant fluid must be topped up **additionally** per **Table 2**

COOLANT LOSS REFERENCE CHART

Table 1: **Number of years since last filling**	0 - 1	1 - 2	2 - 3	3 - 4	4 - 5
Permissible loss [g] --> no need to top up refrigerant fluid	< or = 30	< or = 60	< or = 90	< or = 120	< or = 150

REFRIGERANT FLUID TOP UP REFERENCE CHART

Table 2: Number of years since last filling	R134a Coolant loss [g]	Top up quantity refrigerant fluid
0 - 1	- <120	0
	120 - 150	10
	>150	20
1 - 2	- <180	0
	180 - 210	10
	>210	20
2 - 3	- <240	0
	240 - 270	10
	>270	20
3 - 4	- <300	0
	300 - 330	10
	>330	20
4 - 5	- <360	10
	>360	20

Follow **NOTES FOR OPENING AND REPLACING PARTS** in refrigerant circuit.

Depending on the type of component replaced on the heating and air conditioning system, it may be necessary to top up the refrigerant fluid, even if no measurable losses have occurred during drawing off. Follow the notes provided by the heating and air conditioning system manufacturer, taking account of the tolerances (and inaccuracies) indicated in the operating instructions of the relevant service station.

Information on the required refrigerant capacity for the entire heating and air conditioning system is contained on the type plate (1) in the engine compartment.

If necessary, refer to Technical Data for **CAPACITY** .

Fig. 51: Identifying Engine Compartment Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Reseal refrigerant filler necks on vehicle with sealing caps.

64 50 ... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A

Work on the refrigerant circuit may only be carried out by experts!

Installation

After each refill of an A/C system, check that the protective caps of the filler valves are hand-tight. They serve as additional seals.

Avoid all contact with liquid or gaseous R 134a. Wear protective goggles and gloves when working on the refrigerant circuit.

- Follow **SAFETY INSTRUCTIONS** for handling R134a refrigerant.

> **WARNING: Although R 134a at normal temperature is non-toxic, non-flammable and not explosive in air in any mixture ratio, it is still essential to follow various safety precautions.**

As a gas, R 134a is colorless, odorless and heavier than air. If it enters the atmosphere, this may result in an imperceptible danger of asphyxiation or in cardiac palpitations, especially in workshop pits. Ventilate rooms adequately; if necessary, turn on installed extractor systems.

Store charged refrigerant pressure flasks in a place where they are not exposed to direct sunlight or any other heat source (max. 45 °C). Also avoid exposing them to mechanical stress (e.g. by dropping).

Do not weld or solder on to filled A/C systems or in rooms into which R 134a may have leaked. Exposure to flames or high temperatures (> or = 50 °C) may give rise to toxic decomposition products (fluorine gas). For this reason, do not smoke either.

In the event of fire, carbon dioxide (CO2), extinguishing powder and a sprayed water jet are deemed to be suitable extinguishing agents. Cool reservoirs at risk with a sprayed water jet (risk of bursting!).

If the protective caps on the filler valves are difficult to open, there is a risk of injury from leaking valve inserts (high pressure).

The filled refrigerant circuit of the A/C system is subject to gauge pressure. Before carrying out repairs on the A/C system, it is absolutely essential to draw off the refrigerant.

- Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service station.

R 134a must be drawn off, cleaned and returned to the A/C system using an A/C service station following the relevant operating instructions.

For a properly functioning A/C system, it is essential to have the greatest possible levels of cleanliness when working on the A/C system and the longest possible evacuation (at least 30 minutes dehumidification from refrigerant circuit) before each filling of the A/C system.

R 134a absorbs moisture very easily. Therefore, seal off opened pipes, condenser, evaporator, compressor and drier bottle immediately with plugs.

- If an air conditioning system has been emptied completely because of a leak, accident or in the course of a repair, the **DESICCANT INSERT** and

COMPLETE CONDENSER must be replaced, since too much moisture may penetrate the inside

With replacement parts, the plugs may only be removed immediately before the lines are connected. In the event of warranty claims, the old parts must be provided with plugs to be able to determine the cause of the damage.

64 52 ... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- **Avoid contact with refrigerant and refrigerant fluid**
- **Follow safety information for handling R134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A**
- **Follow safety information for HANDLING REFRIGERANT FLUID**

IMPORTANT:

- **Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)**

  They must not be coated.

  Use special tool 00 90 30 Keil to install sealing rings without damaging them.

- **Open the refrigerant circuit for as short of a period as possible.**
- **Close all components and lines in the refrigerant circuit and return parts immediately following the removals at openings with special tool 32 1 270 to prevent penetration of moisture or foreign objects.**
- **If the refrigerant circuit was closed at the openings with special tool 32 1 270 but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.**

I. Part replacement as preliminary work fur further repair work and part replacement based on gradual leakage

(minor leak, e.g. hairline crack)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 10 ml
  - Capacitor: 20 ml
  - Desiccant insert/dryer flask: 20 ml
  - Each replaced refrigerant line: 10 ml
  - Capacitor with integrated dryer: 40 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

II. Part replacement due to sudden leak

(major leak, e.g. pipe break due to accident)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 35 ml
  - Capacitor: 35 ml
  - Desiccant insert/dryer flask: 55 ml
  - Each replaced refrigerant line: 35 ml
  - Capacitor with integrated dryer: 55 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

64 50 ... LEAK DETECTION WITH ULTRAVIOLET ADDITIVES (UV ADDITIVES) (BMW LEAK-TESTING CASE)

IMPORTANT: UV leak detection is prohibited in EU countries.
In all other countries, follow the country-specific regulations.

IMPORTANT: It is absolutely essential to read and comply with the equipment manufacturer's operating instructions use provided in the equipment case!
Read and comply with the instructions for use provided with the special tool

particularly with regard to accident prevention, health protection and environmental protection.
Use only BMW-approved UV additives (e.g. TRACER).
Only the basic procedure is described in the following!

WARNING: **Avoid contact with refrigerant.**
Follow safety precautions when handling refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A.

IMPORTANT: **Ultraviolet lamp gets very hot in the radiation area!**
Do not use the ultraviolet lamp without the filter glass.
Eyes and skin will suffer damage if the ultraviolet lamp is used without the filter glass.
When using the UV lamp, wear the safety goggles provided in the case.

NOTE:

- **Fill the hose system of the hand pump completely with UV additive PRIOR to use**
- **Use the UV additive exclusively for BMW-approved refrigerant fluids**
- **Do not operate the air conditioning system while the hand pump is connected or in use**
- **The air conditioning system must always be filled with an adequate amount of refrigerant to enable the leak-detecting agent to be properly distributed**

Necessary preliminary work

Before actually testing for leaks, check the entire refrigerant circuit using the UV leak detection lamp to ensure that no UV additive is already in the area of the refrigerant circuit.

If already illuminated areas are found, carefully clean the area in question with the cleaning agent contained in the case.

On initial use:

Connect hand pump (1) to additive cartridge (2) and hose piece (3).

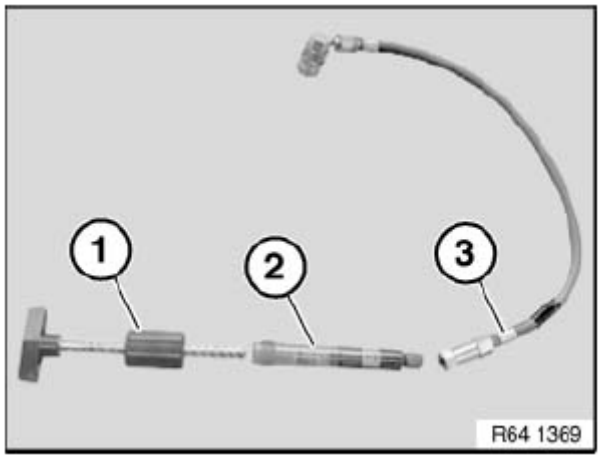


Fig. 52: Identifying Hand Pump, Additive Cartridge And Hose Piece
Courtesy of BMW OF NORTH AMERICA, INC.

On initial use:

Attach vent valve (1) to quick-release coupling (2).

Turn handle (3) on hand pump to advance the plunger until a small amount of UV additive emerges. This vents the hose system.

IMPORTANT: The entire hand pump with hose system must not be disassembled again once the filling work has been completed.

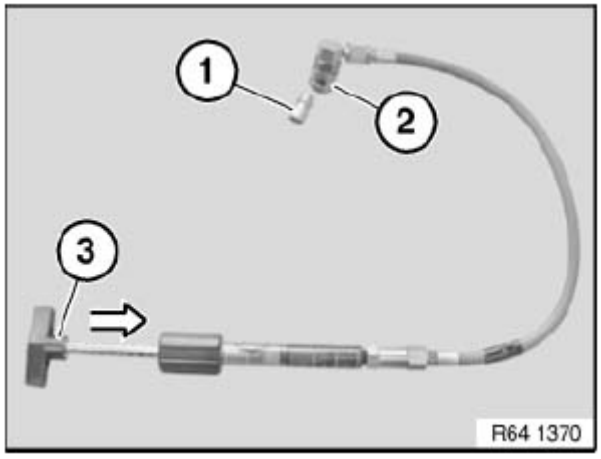


Fig. 53: Attaching Vent Valve To Quick-Release Coupling
Courtesy of BMW OF NORTH AMERICA, INC.

Attach quick-release coupling (1) to low-pressure connection (2) of air conditioning system.

Turn handle on hand pump (3) until the required amount of UV additive is added.

The quantity of UV additive to be added is dependent on the **AMOUNT OF REFRIGERANT IN THE REFRIGERANT CIRCUIT** :

- Air conditioning systems with refrigerant filling up to 900 g: one graduation mark (4) on additive cartridge
- Air conditioning systems with refrigerant filling in excess of 900 g: two graduation marks (4) on additive cartridge

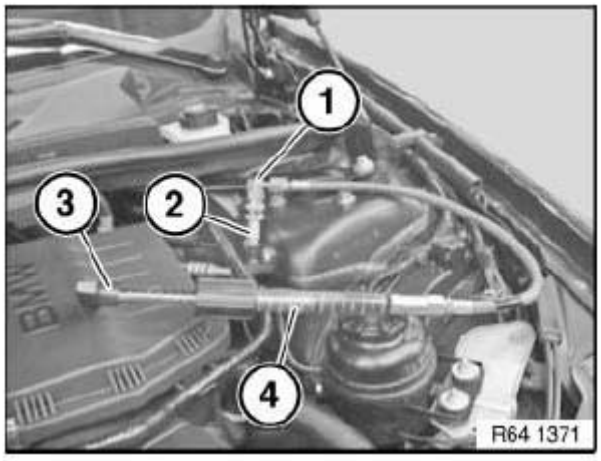


Fig. 54: Identifying Quick-Release Coupling, Low-Pressure Connection And Hand Pump
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: After filling, remove quick-release coupling (1) and if necessary use the cleaning agent contained in the special tool case to clean up the UV additive.

Further tasks:

- Start engine
- Run air conditioning system at highest setting for 5 - 10 minutes in order to ensure adequate distribution of dye in the system
- Turn off engine.
- Check all air conditioning system components for possible leaks
- Possible leaks show up in luminous green

Complete accompanying information label (1) with the relevant data and attach in an easily visible position next to the filling capacity information label (2).

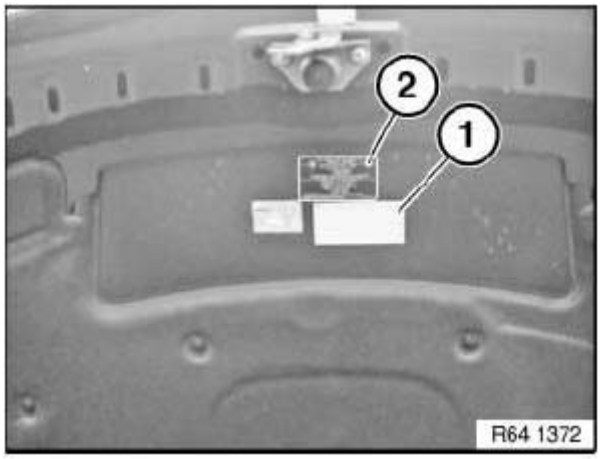
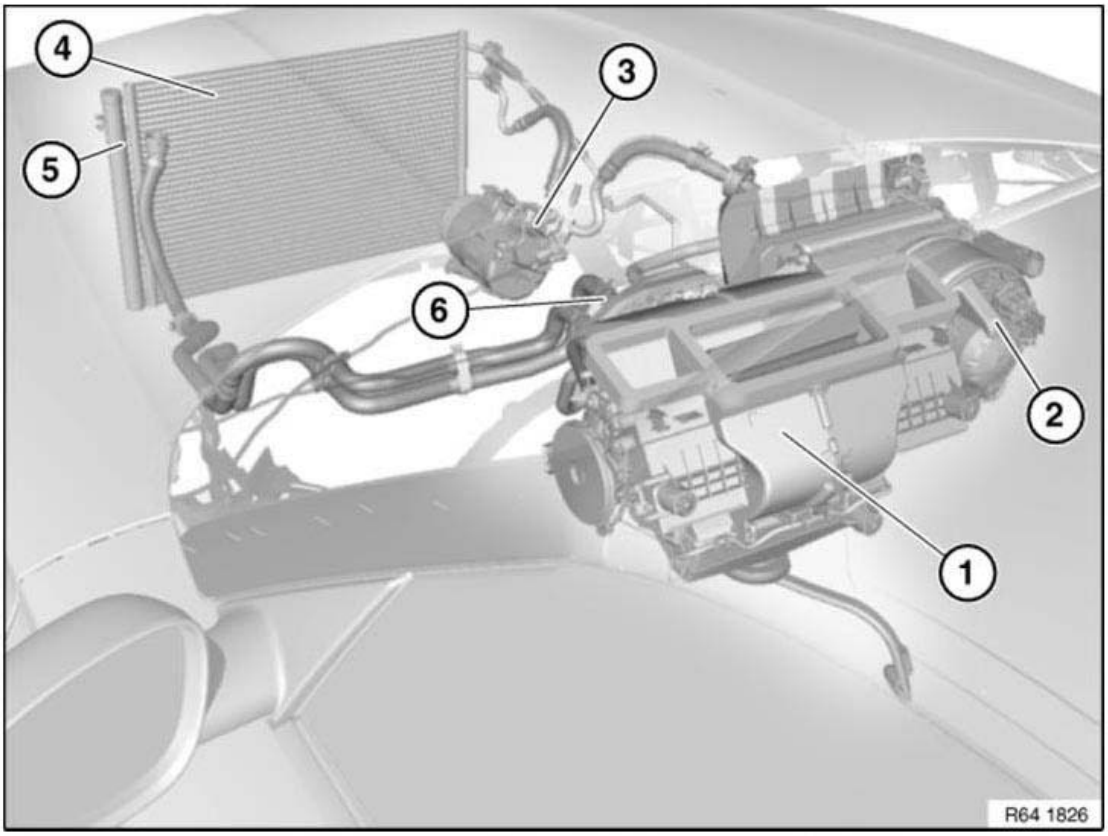


Fig. 55: Identifying Accompanying Information Label And Filling Capacity Information Label
Courtesy of BMW OF NORTH AMERICA, INC.

64 00 .. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Heater/air conditioner with add-on parts
2 Remove fan for heater - A/C system
3 Compressor for A/C system
4 Fan for heater - A/C system
5 Desiccant bottle for A/C system
6 Expansion valve

Fig. 56: Overview Of Heater - A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 50 ... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A

WARNING: Risk of injury!
Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts!
Draw off refrigerant without fail BEFORE all repair work on the refrigerant circuit.
The refrigerant circuit is depressurized AFTER drawing off.

- **The pressure gauge on the A/C service unit must be checked for the actual pressure drop prior to repair work.**

It is absolutely essential to read and observe the relevant operating instructions for the A/C service unit used!

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

First aid measures

- **Eye contact:** In the event of contact with the eyes, rinse immediately with plenty of running water and consult an opthalmologist.
- **Skin contact:** In the event of contact with skin, remove affected clothing immediately and rinse with plenty of water.
- **After inhalation:** If refrigerant vapors are inhaled in greater concentrations, remove the person affected to an area of fresh air and keep them under supervision. Call for a doctor. If breathing problems are experienced, breathe additional oxygen. If the person affected is breathing with difficulty or has stopped breathing, incline the person's head at the neck and administer the kiss of life.

64 50 ... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT OIL

WARNING: Risk of injury!
Refrigerant circuit is under high pressure! Work on the refrigerant circuit may only be carried out by experts !
Draw off refrigerant without fail BEFORE all repair work on the refrigerant circuit.
The refrigerant circuit is depressurized AFTER drawing off!

- **Before conducting repairs, check the actual pressure drop on the pressure gauge of the A/C service unit.**

Read and comply with the relevant operating instructions for the A/C service unit used.

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Do not smoke!
- Observe country-specific safety regulations.

First aid measures

- **If swallowed:** Do NOT induce vomiting, unless expressly instructed to do so by medical personnel. Do not administer anything to an unconscious person through their mouth. Consult a doctor immediately if larger quantities of this substance are swallowed. Loosen tight-fitting items of clothing (e.g. collar, tie, belt or similar).
- **Eye contact:** Remove contact lenses if worn. In the event of eye contact, rinse eyes for at least 15 minutes with plenty of water. **It is essential to use WARM WATER. Consult a doctor.**
- **Skin contact:** In the event of skin contact, rinse immediately with plenty of water. Remove contaminated clothes and shoes. Wash affected clothes before wearing again. Clean shoes thoroughly before reusing. **Call for a doctor.**
- **After inhalation:** If inhaled, take the person affected outside into fresh air immediately and keep them under supervision. **Call for a doctor.** If breathing difficulties are experienced, administer additional oxygen. If the person affected stops breathing, administer the kiss of life.

IMPORTANT: Refrigerant is hygroscopic and must therefore be stored in suitable containers that are sealed airtight!
Refrigerant oil is non-combustible and non-explosive at normal temperatures. Nevertheless, the following points must be observed:

- **Do not store in the vicinity of flames, heat sources or strongly oxidizing materials**
- **Suitable extinguishants are carbon dioxide (CO_2) extinguishant and foam**

Recycling

Catch and dispose of emerging refrigerant oil.

Observe country-specific waste-disposal regulations.

Absorb escaping refrigerant oil with fluid-binding material.

Notify the relevant authorities if larger amounts of refrigerant oil are discharged into above-ground water supplies, drainage systems or subsoil.

6451 AC HOUSING/EVAPORATOR, SWITCHING ELEMENTS

64 52 ... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- **Avoid contact with refrigerant and refrigerant fluid**
- **Follow safety information for handling R134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A**
- **Follow safety information for HANDLING REFRIGERANT FLUID**

IMPORTANT:

- **Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)**

  They must not be coated.

  Use special tool 009030 Keil to install sealing rings without damaging them.

- **Open the refrigerant circuit for as short of a period as possible.**
- **Close all components and lines in the refrigerant circuit and return parts immediately following the removals at openings with special tool 32 1 270 Stopfen to prevent penetration of moisture or foreign objects.**
- **If the refrigerant circuit was closed at the openings with special tool 32 1 270 Stopfen but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.**

I. Part replacement as preliminary work fur further repair work and part replacement based on gradual leakage

(minor leak, e.g. hairline crack)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 10 ml
  - Capacitor: 20 ml
  - Desiccant insert/dryer flask: 20 ml
  - Each replaced refrigerant line: 10 ml
  - Capacitor with integrated dryer: 40 ml
  - Safety pressure switch and seals: no additional refrigerant fluid

- **EVACUATE AND FILL** A/C system

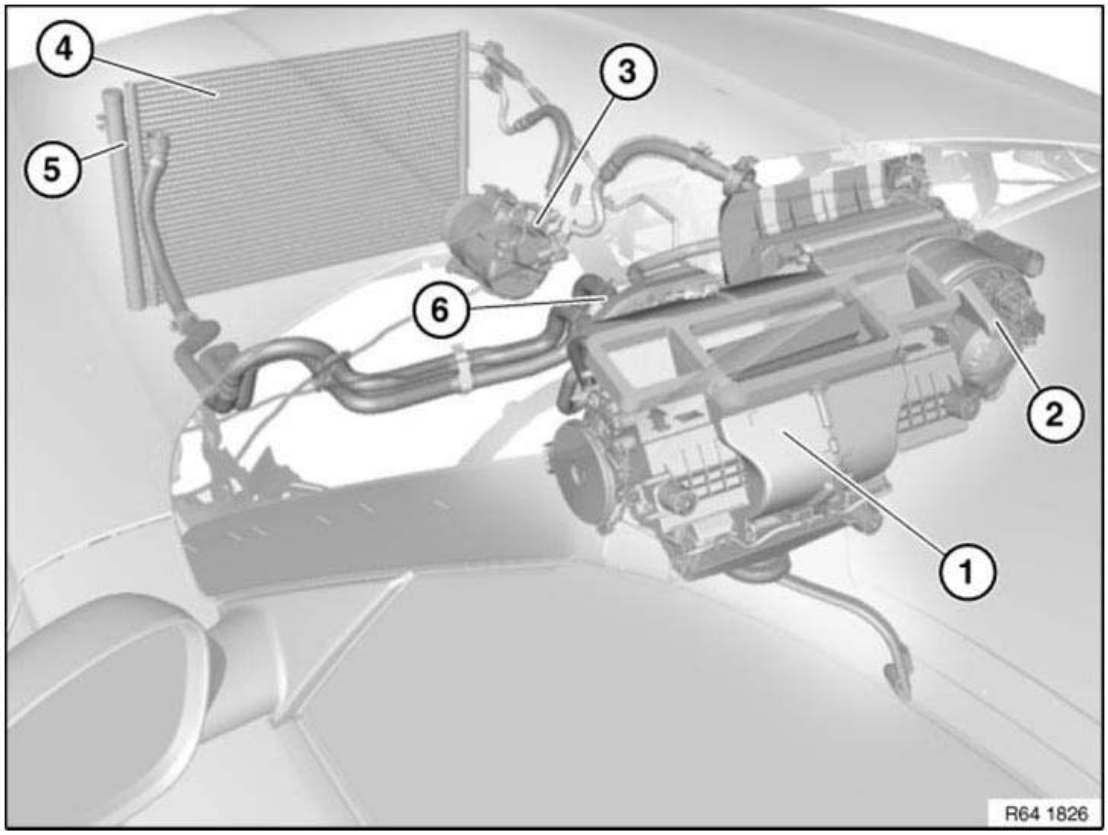
II. Part replacement due to sudden leak

(major leak, e.g. pipe break due to accident)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 35 ml
  - Capacitor: 35 ml
  - Desiccant insert/dryer flask: 55 ml
  - Each replaced refrigerant line: 35 ml
  - Capacitor with integrated dryer: 55 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

64 00 .. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Heater/air conditioner with add-on parts
2 Remove fan for heater - A/C system
3 Compressor for A/C system
4 Fan for heater - A/C system
5 Desiccant bottle for A/C system
6 Expansion valve

Fig. 57: Overview Of Heater - A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 51 591 REMOVING AND INSTALLING/RENEWING EVAPORATOR

Necessary preliminary tasks:

- **REMOVE HEATING UNIT**

Release screw (1).

Tightening torque **64 53 3AZ** .

Remove adapter plate (2).

Release screws (4).

Tightening torque **64 11 1AZ** .

Remove bulkhead adapter (3).

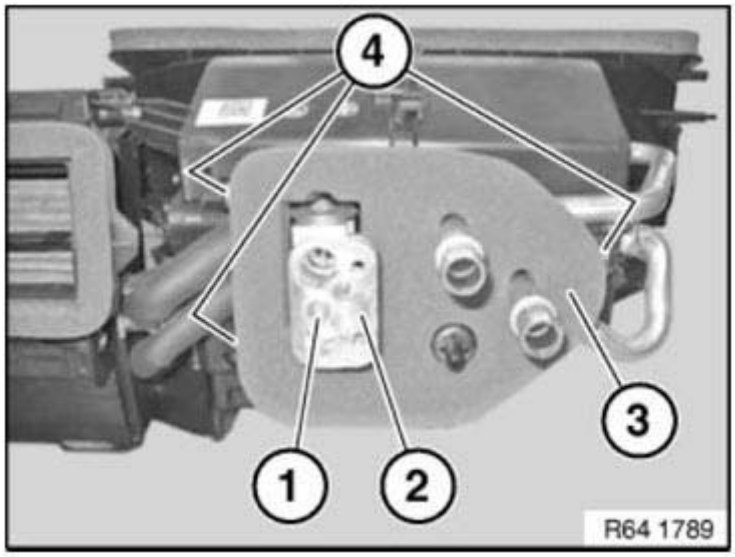


Fig. 58: Identifying Bulkhead Adapter With Adapter Plate And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Replacement

Release screws (2) on expansion valve (3).

Tightening torque **64 53 9AZ** .

Remove expansion valve (3).

Installation:

Replace sealing rings.

Use special tool 009310 Keil to mount sealing rings without damaging them.

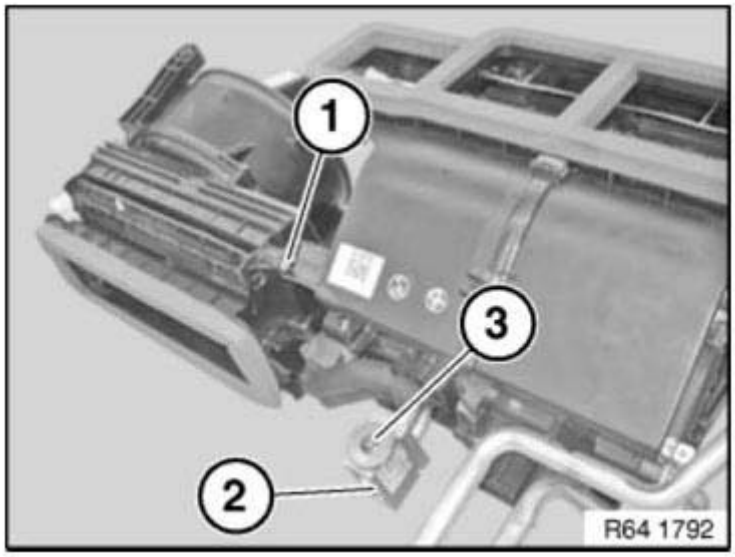


Fig. 59: Identifying Expansion Valve With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Unclip associated retaining lugs on lower housing section (2).

Remove lower housing section (2) and place to one side.

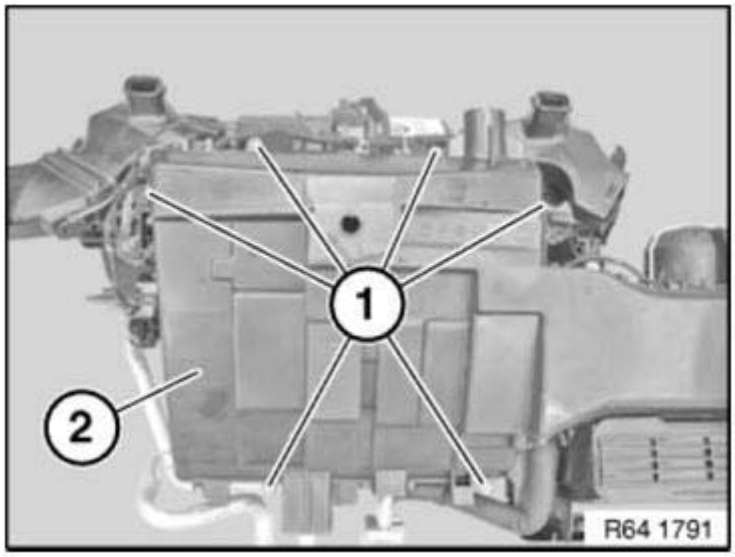


Fig. 60: Identifying Lower Housing Section With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Pull evaporator (1) in direction of arrow out of upper housing section (2).

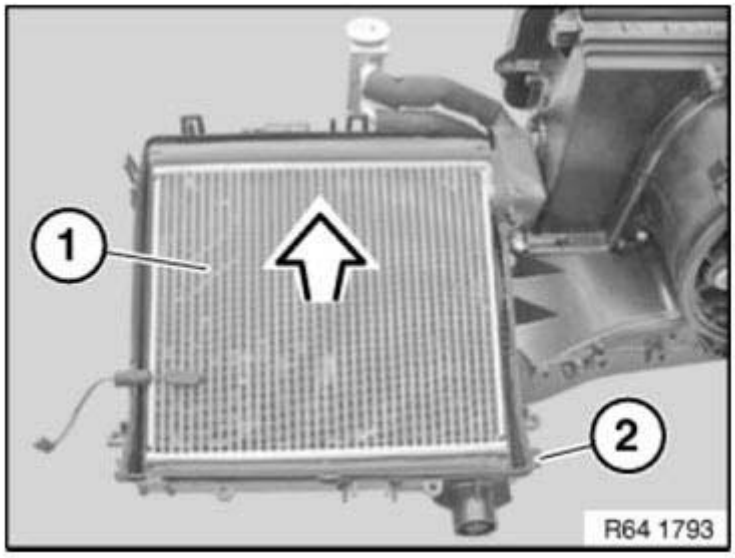


Fig. 61: Removing Evaporator From Upper Housing Section
Courtesy of BMW OF NORTH AMERICA, INC.

64 51 525 REMOVING AND INSTALLING/REPLACING EXPANSION VALVE (N52K)

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Follow safety instructions for handling R 134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A.
Avoid contact with refrigerant and refrigerant oil.
Follow safety instructions for handling REFRIGERANT OIL .

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours:
Replace DESICCANT INSERT for A/C system.

Necessary preliminary tasks:

- **DRAIN OFF AIR CONDITIONING SYSTEM**

Lever out expansion rivets (1).

Unclip cable holder (2) on tension struts (3) towards top.

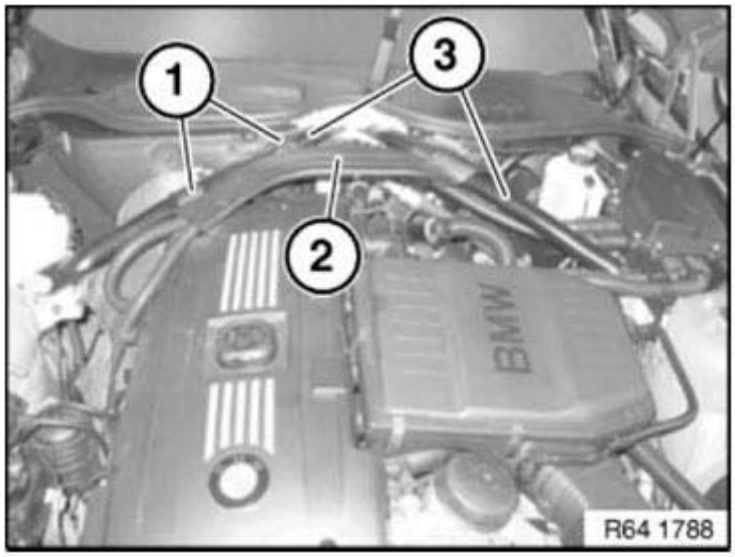


Fig. 62: Identifying Tension Struts, Cable Holder And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1) on bulkhead (2).

Pull holder (3) out of rubber.

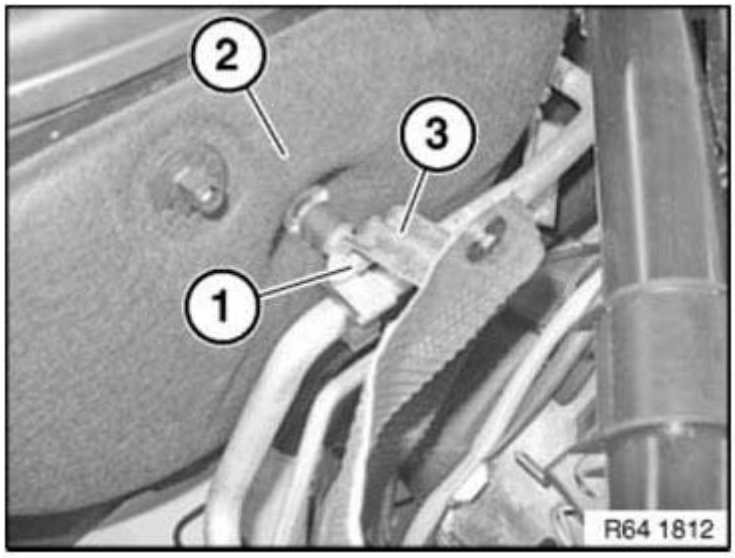


Fig. 63: Identifying Screw On Bulkhead And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Depiction may vary, depending on engine variant.

Release screws (1).

Tightening torque **64 53 2AZ** .

Detach refrigerant lines (2) in direction of arrow and press slightly to one side.

Installation:

Replace sealing rings.

Use special tool 00 9 030 Keil to mount sealing rings without damaging them.

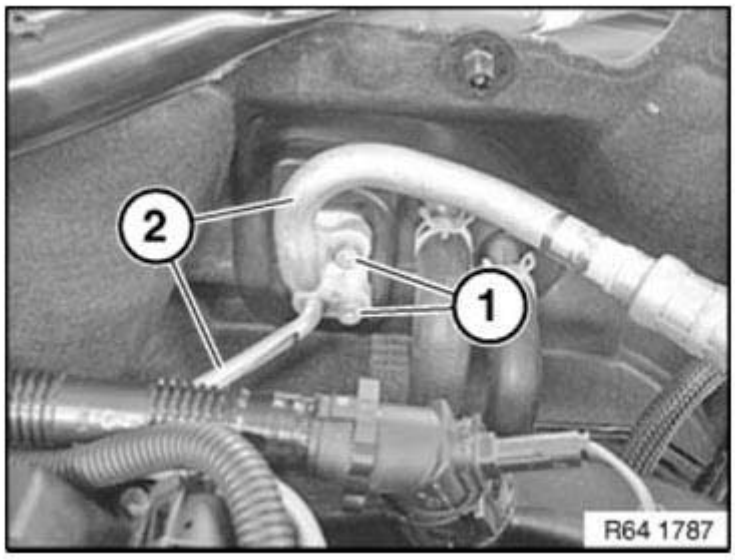


Fig. 64: Identifying Refrigerant Lines With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Detach adapter plate (2) in direction of arrow.

Installation:

Tightening torque **64 53 3AZ** .

Make sure bulkhead grommet (3) is correctly seated in all-round groove of adapter plate (2).

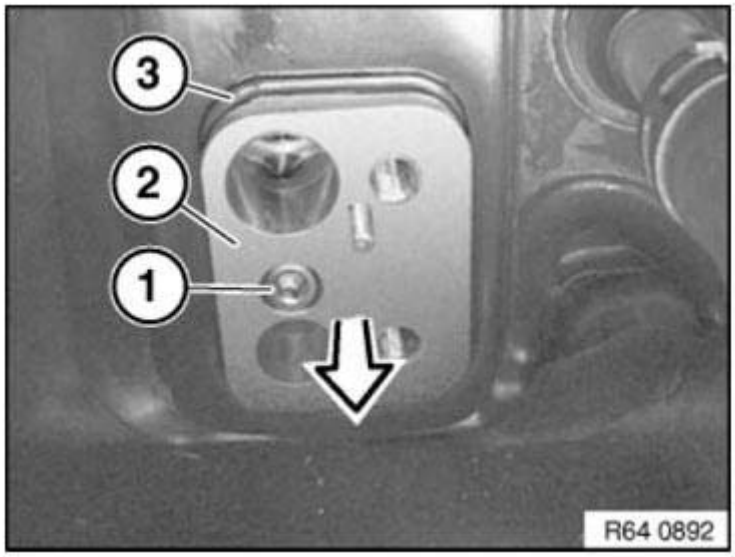


Fig. 65: Removing Adapter Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Tightening torque **64 53 4AZ** .

Carefully detach bulkhead grommet (2) from bulkhead and fold down in direction of arrow.

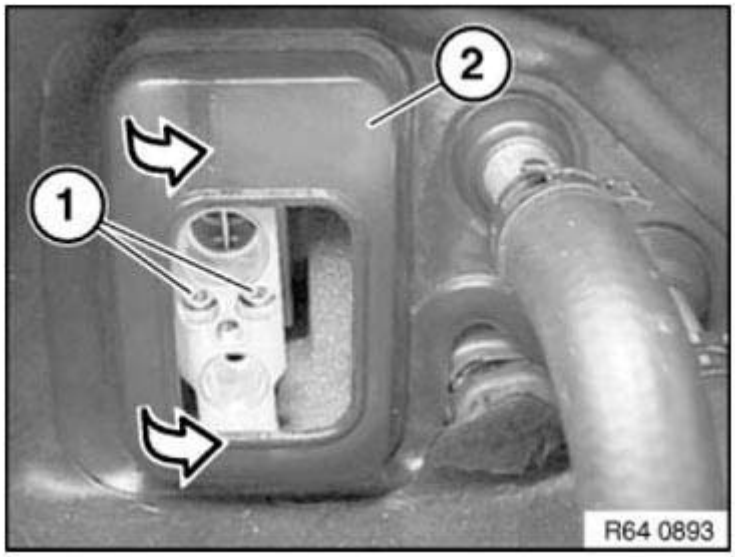


Fig. 66: Disconnecting Bulkhead Grommet
Courtesy of BMW OF NORTH AMERICA, INC.

Detach expansion valve (1) in direction of arrow.

Installation:

Replace sealing rings.

Use special tool 00 9 030 Keil to mount sealing rings without damaging them.

Unclip frame (2) from bulkhead and insert in groove (3) of bulkhead grommet (4).

Make sure bulkhead grommet (4) is correctly seated.

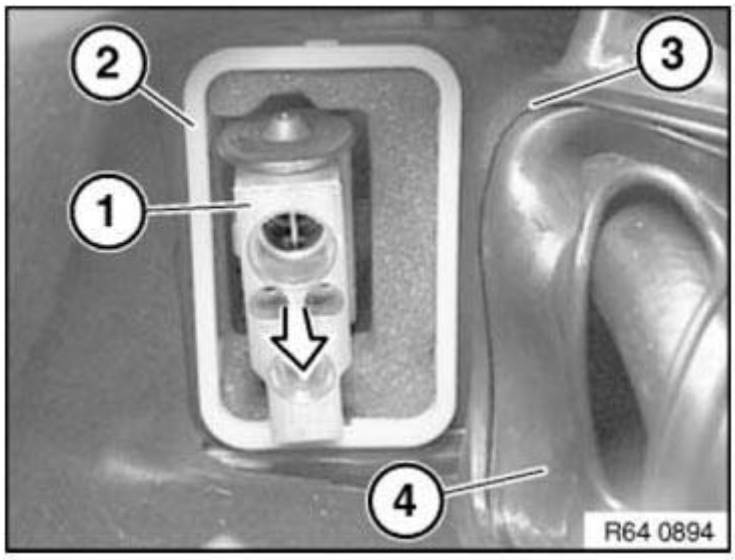


Fig. 67: Removing Expansion Valve
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL A/C SYSTEM**

64 51 525 REMOVING AND INSTALLING/REPLACING EXPANSION VALVE (N54)

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Follow safety instructions for handling R 134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A.
Avoid contact with refrigerant and refrigerant oil.
Follow safety instructions for handling REFRIGERANT OIL .

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.

If A/C system is opened for more than 24 hours:
Replace DESICCANT INSERT for A/C system.

Necessary preliminary tasks:

- **DRAIN OFF AIR CONDITIONING SYSTEM**

Lever out expansion rivets (1).

Unclip cable holder (2) on tension struts (3) towards top.

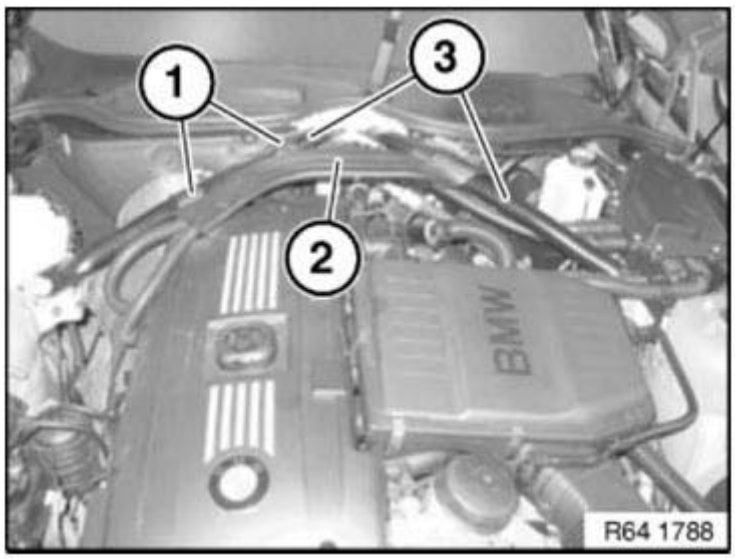


Fig. 68: Identifying Tension Struts, Cable Holder And Rivets
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1). Tightening torque, see 64 53 2AZ in **64 53 REFRIGERANT LINES AND EXPANSION VALVE** . Detach refrigerant lines (2) and press slightly to one side. Installation: Replace sealing rings. Use special tool 00 9 030 to mount sealing rings without damaging them.

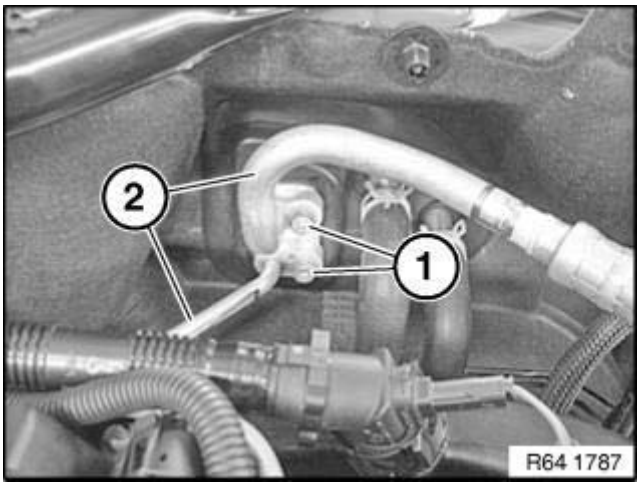


Fig. 69: Detach Refrigerant Lines (2) And Press Slightly To One Side
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1). Detach adapter plate (2) in direction of arrow. Installation: Tightening torque, see 64 53 3AZ in **64 53 REFRIGERANT LINES AND EXPANSION VALVE** . Make sure bulkhead grommet (3) is correctly seated in all-round groove of adapter plate (2).

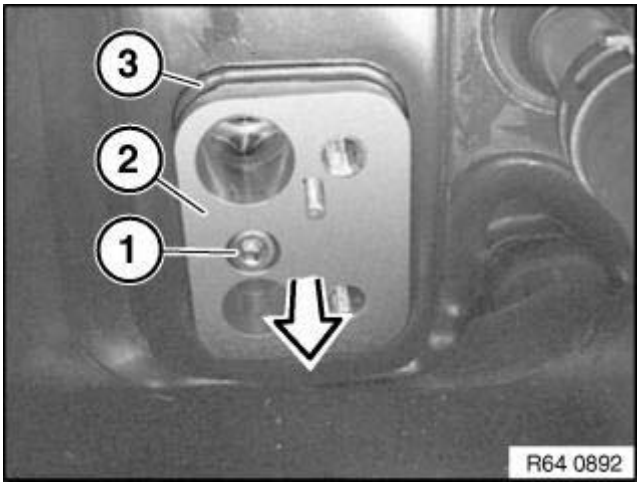


Fig. 70: Detach Adapter Plate In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1). Installation: Tightening torque, see 64 53 4AZ in **64 53 REFRIGERANT LINES AND EXPANSION VALVE** . Carefully detach bulkhead grommet (2) from bulkhead and fold down in direction of arrow.

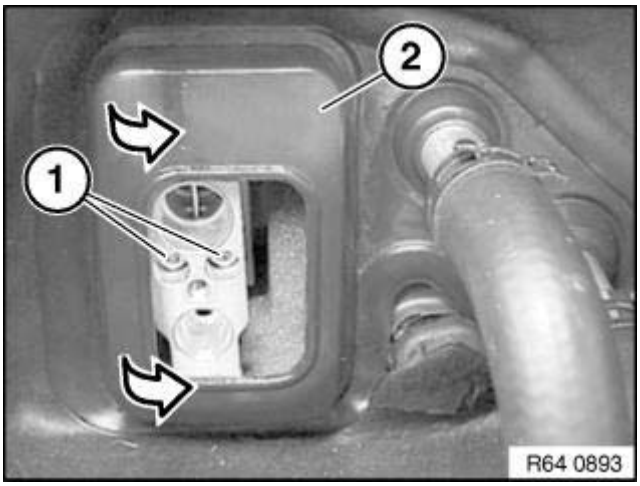


Fig. 71: Carefully Detach Bulkhead Grommet From Bulkhead
Courtesy of BMW OF NORTH AMERICA, INC.

Detach expansion valve (1) in direction of arrow. Installation: Replace sealing rings. Use special tool 00 9 030 to mount sealing rings without damaging them. Unclip frame (2) from bulkhead and insert in groove (3) of bulkhead grommet (4). Make sure bulkhead grommet (4) is correctly seated.

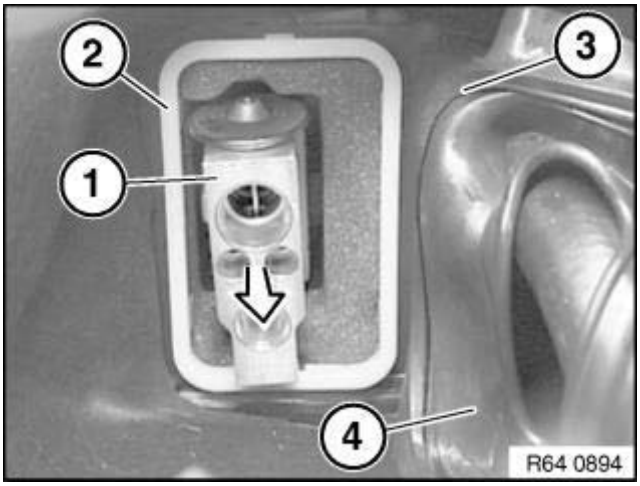


Fig. 72: Detach Expansion Valve In Direction Of Arrow
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL A/C SYSTEM**

6452 COMPRESSOR

64 52 ... INSTRUCTIONS FOR COMPRESSOR REPLACEMENT

IMPORTANT: Compressors with plastic belt pulleys:

- **Avoid impacts/knocks to plastic belt pulley (caused by tools, contact with base).**
- **Return faulty compressors in their original packaging only.**

In the event of mechanical compressor failure and the resulting ingress of chips into the refrigerant circuit, replace DESICCANT INSERT or CONDENSER !

IMPORTANT: When starting up a new compressor for the first time, it is absolutely essential to carry out the following breaking-in procedure:

- **Switch on A/C system**
- **Set all air vents in instrument cluster to "OPEN"**
- **Start engine and let it stabilize at idle speed**
- **Set blower output to min. 75 % of max. blower output**
- **Switch on A/C system and run for at least 2 minutes at idle speed (risk of damage at increased engine speed!)**

When evacuating the air-conditioning system, refrigerant oil is also extracted and collected in the oil separator of the A/C service station.

After evacuation, the refrigerant must be filtered in the A/C service station as the oil separator could still contain a liquid refrigerant/oil mixture. The filtering process gasifies the refrigerant completely and only the previously bound refrigerant oil remains in the oil separator. Measure and note down this quantity of refrigerant oil.

- **REFER TO DRAWING OFF A/C SYSTEM**

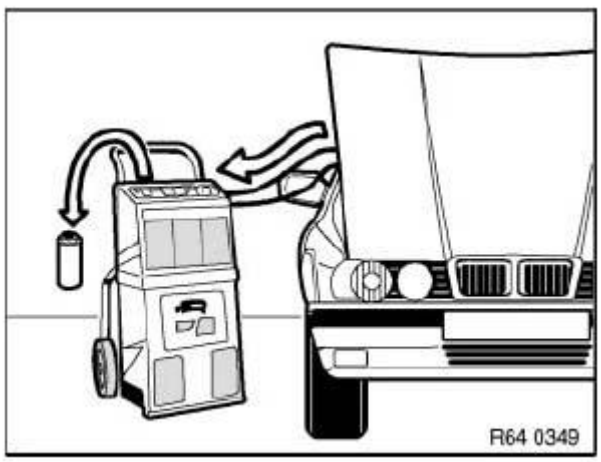


Fig. 73: Drawing Off Air Conditioning System Refrigerant Oil
Courtesy of BMW OF NORTH AMERICA, INC.

Transfer the refrigerant oil remaining in the previous compressor via the filler plug completely into a measuring container.

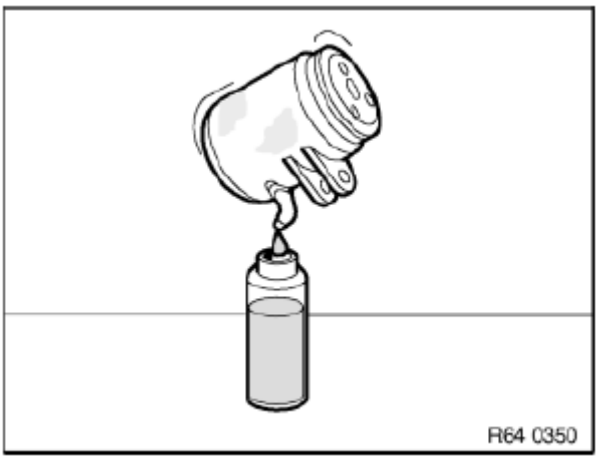


Fig. 74: Transferring Remaining Refrigerant Into Measuring Container
Courtesy of BMW OF NORTH AMERICA, INC.

Measure the amount of refrigerant oil collected from the previous compressor.

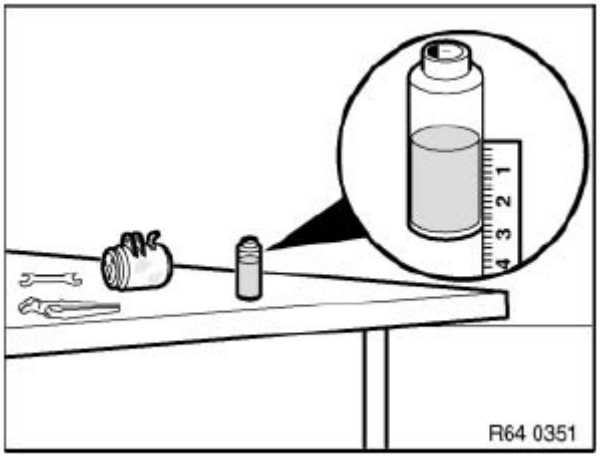


Fig. 75: Measuring Amount Of Refrigerant Fluid Collected From Compressor
Courtesy of BMW OF NORTH AMERICA, INC.

The new compressor is filled at the factory with refrigerant oil. Open filler plug and pour entire contents of compressor into a clean container.

Installation:

Replace sealing ring and moisten with refrigerant oil.

Tightening torque **64 52 2AZ** .

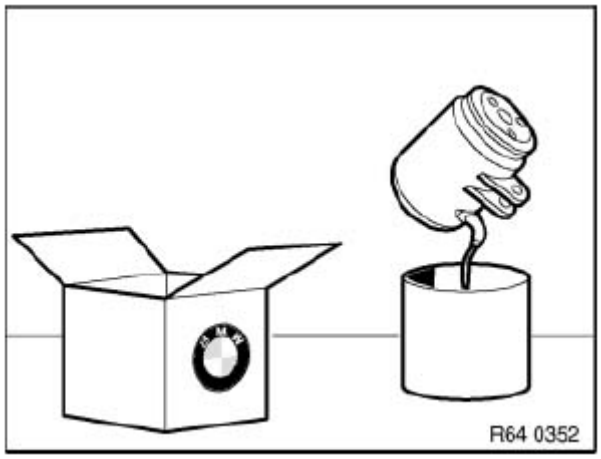


Fig. 76: Pouring Out Compressor Contents In Clean Container
Courtesy of BMW OF NORTH AMERICA, INC.

From the new compressor, pour the same amount of refrigerant oil (as drained from the previous compressor) + 10 g extra into a clean measuring container and pour again into the new compressor.

Remaining refrigerant oil can be poured into service station tank.

- **REFER TO EVACUATING A/C SYSTEM** .

Otherwise the excess refrigerant oil must be disposed of correctly.

On account of its hygroscopic properties, refrigerant oil must not be stored in open containers.

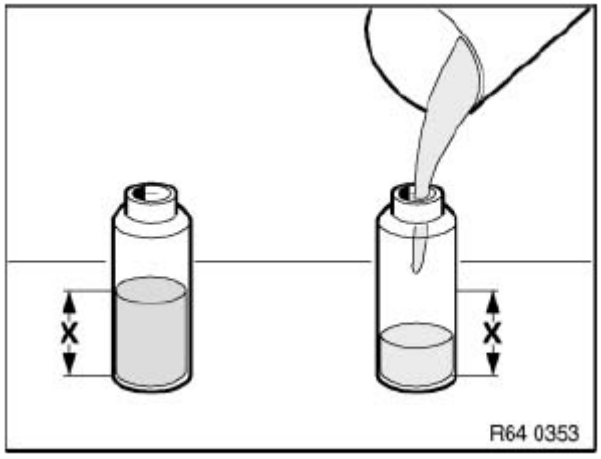


Fig. 77: Taking Out Refrigerant Oil From Compressor Into Measuring Container
Courtesy of BMW OF NORTH AMERICA, INC.

The refrigerant oil drawn off from the oil separator of the A/C service station and from the previous compressor must not be reused and must be correctly disposed of.

Observe country-specific waste-disposal regulations.

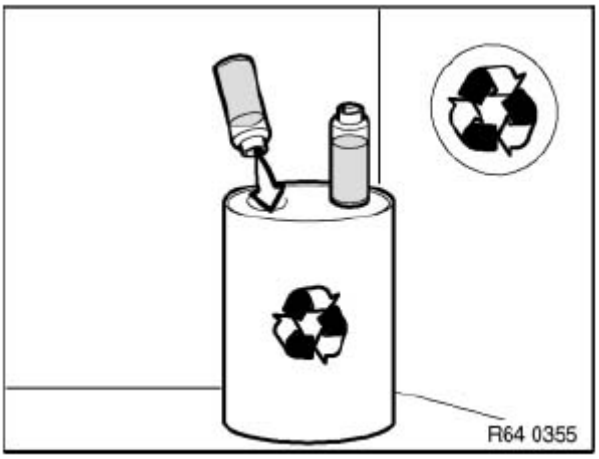


Fig. 78: Disposing Refrigerant Fluid
Courtesy of BMW OF NORTH AMERICA, INC.

After installing the new compressor, it is essential before filling the A/C system to pour the same amount of the previously drawn off refrigerant oil into the system again,

- **REFER TO FILLING A/C SYSTEM**

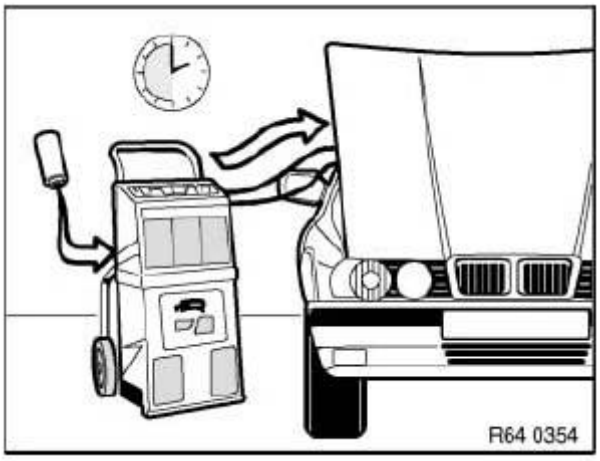


Fig. 79: Pouring Refrigerant Oil Into Air Conditioning System
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

If A/C system is opened for more than 24 hours:

- Replace **DESICCANT INSERT**
- or **CONDENSER**

64 52 ... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- **Avoid contact with refrigerant and refrigerant fluid**
- **Follow safety information for handling R134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A**
- **Follow safety information for HANDLING REFRIGERANT FLUID**

IMPORTANT:

- **Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)**

  They must not be coated.

  Use special tool 00 9 030 Keil to install sealing rings without damaging them.

- **Open the refrigerant circuit for as short of a period as possible.**
- **Close all components and lines in the refrigerant circuit and return parts immediately following the removals at openings with special tool 321270 Stopfen to prevent penetration of moisture or foreign objects.**
- **If the refrigerant circuit was closed at the openings with special tool 32 1 270 Stopfen but it remains open for more than 24 hours, the dryer insert for the air conditioning must be replaced.**

I. Part replacement as preliminary work fur further repair work and part replacement based on gradual leakage

(minor leak, e.g. hairline crack)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 10 ml
  - Capacitor: 20 ml
  - Desiccant insert/dryer flask: 20 ml
  - Each replaced refrigerant line: 10 ml
  - Capacitor with integrated dryer: 40 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

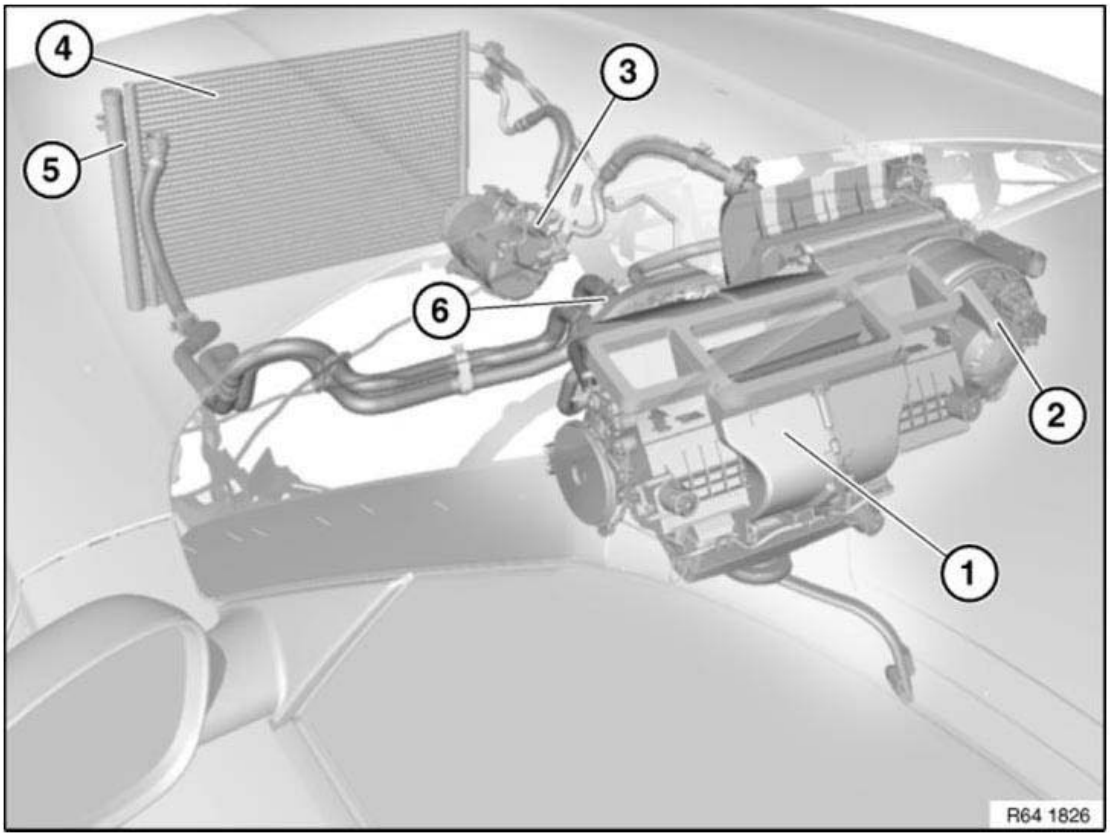
II. Part replacement due to sudden leak

(major leak, e.g. pipe break due to accident)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 35 ml
  - Capacitor: 35 ml
  - Desiccant insert/dryer flask: 55 ml
  - Each replaced refrigerant line: 35 ml
  - Capacitor with integrated dryer: 55 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

64 00 .. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Heater/air conditioner with add-on parts
2 Remove fan for heater - A/C system
3 Compressor for A/C system
4 Fan for heater - A/C system
5 Desiccant bottle for A/C system
6 Expansion valve

Fig. 80: Overview Of Heater - A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

64 52 521 REPLACING A/C SYSTEM COMPRESSOR (N52K)

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Work on the cooling system may only be carried out when it has cooled down.

Follow safety instructions for handling refrigerant See **6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A** or **6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A**.

Follow safety instructions for handling **REFRIGERANT OIL** .

Avoid contact with refrigerant and refrigerant oil.

IMPORTANT: Aluminum magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail **(risk of damage) !**

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
READ AND COMPLY WITH NOTES ON REPLACING COMPRESSOR.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours:
REPLACE DESICCANT INSERT FOR A/C SYSTEM

Necessary preliminary tasks

- **DRAWING OFF, EVACUATING AND FILLING THE A/C SYSTEM** are not included in the time value given for this work operation
- Release expansion tank and place to one side
- Remove alternator **DRIVE BELT**
- Remove **COOLANT THERMOSTAT**

Release screws (1).

Tightening torque **64 52 1AZ** .

Remove suction line (2) and pressure line (3).

Installation:

Replace sealing rings.

Use special tool 00 9 030 Keil to mount sealing rings without damaging them.

Disconnect associated plug connection on compressor

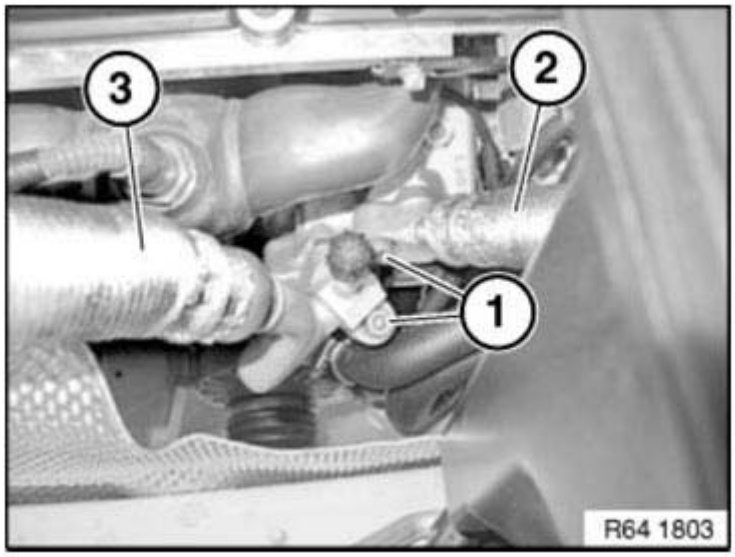


Fig. 81: Identifying Suction Line, Pressure Line With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Close openings or line to compressor with special tool 32 1 270 Stopfen , to avoid media leak and dirt contamination.

NOTE: Secure compressor (3) against falling out.

Release screw (1).

Unfasten screws (2).

Tightening torque **64 52 2AZ** .

Remove compressor towards front.

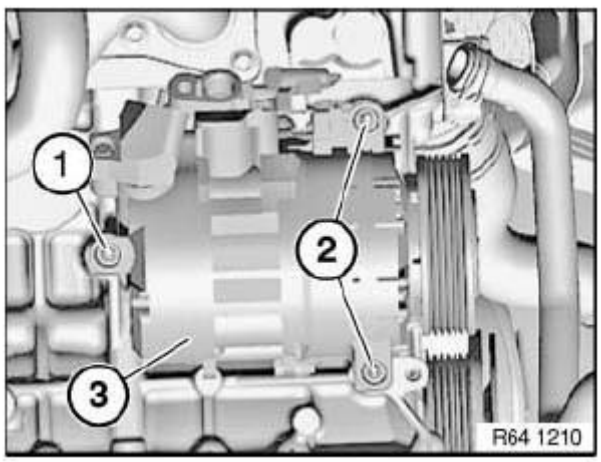


Fig. 82: Identifying Compressor With Mounting Screws

Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL A/C SYSTEM**
- Fill cooling system . See **1700039 VENTING AND FILLING COOLING SYSTEM WITH VACUUM FILLING UNIT** or **1700009 CHECKING COOLING SYSTEM FOR LEAKS (N54, N52K)** , vent and check for leaks.

64 52 521 REPLACING AIR CONDITIONING COMPRESSOR (N54)

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Work on the cooling system may only be carried out when it has cooled down.

Follow safety instructions for handling refrigerant See **6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A** or **6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A**.

Follow safety instructions for handling **REFRIGERANT OIL** .

Avoid contact with refrigerant and refrigerant oil.

IMPORTANT: Aluminum magnesium materials.

No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

The end faces of aluminum screws/bolts are painted blue for the purposes of reliable identification.

Jointing torque and angle of rotation must be observed without fail **(risk of damage) !**

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
READ AND COMPLY WITH NOTES ON REPLACING COMPRESSOR.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours:
REPLACE DESICCANT INSERT FOR A/C SYSTEM

Necessary preliminary tasks

- **DRAWING OFF, EVACUATING AND FILLING THE A/C SYSTEM** are not included in the time

value given for this work operation.

- Remove air conditioning compressor drive belt. See **11 28 010 REPLACING DRIVE BELT FOR ALTERNATOR (N54, N54T)** .
- Remove suction filter housing. See **13 71 000 REMOVING AND INSTALLING/REPLACING INTAKE FILTER HOUSING (N54)** .
- Remove left charge-air duct. See **11 61 365 REMOVING AND INSTALLING/REPLACING LEFT CHARGE AIR DUCT (N54, N54T)** .

Release screws (1) and remove refrigerant lines. Tightening torque, see 64 52 1AZ in **64 52 A/C COMPRESSOR** . Installation: Replace sealing rings. Use special tool 00 9 030 to mount sealing rings without damaging them. Unfasten plug connection (2) and disconnect.

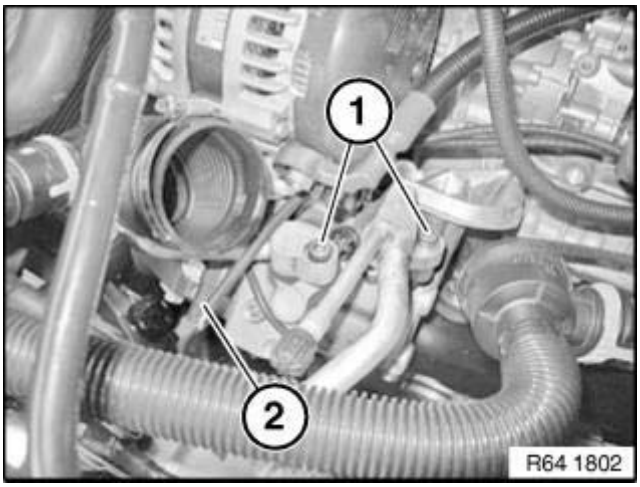


Fig. 83: Release Screws (1) And Remove Refrigerant Lines
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1). Tightening torque, see 64 52 2AZ in **64 52 A/C COMPRESSOR** .

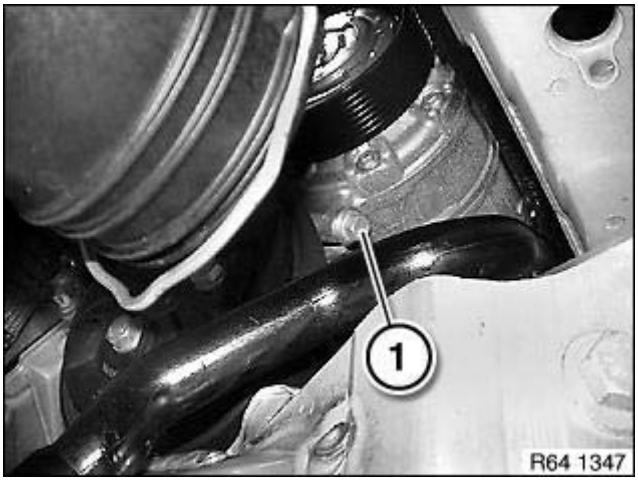


Fig. 84: Release Screw (1) As Shown (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1). Tightening torque, see 64 52 2AZ in **64 52 A/C COMPRESSOR** .

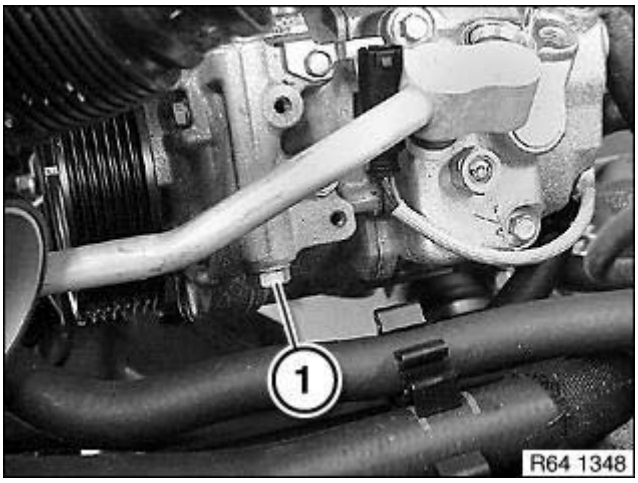


Fig. 85: Release Screw (1) As Shown (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Close openings or line to compressor with special tool 32 1 270 , to avoid media leak and dirt contamination.

NOTE: Secure compressor (2) against falling off/down

Release bolt (1) and lift out compressor (2). Tightening torque, see 64 52 2AZ in **64 52 A/C COMPRESSOR** .

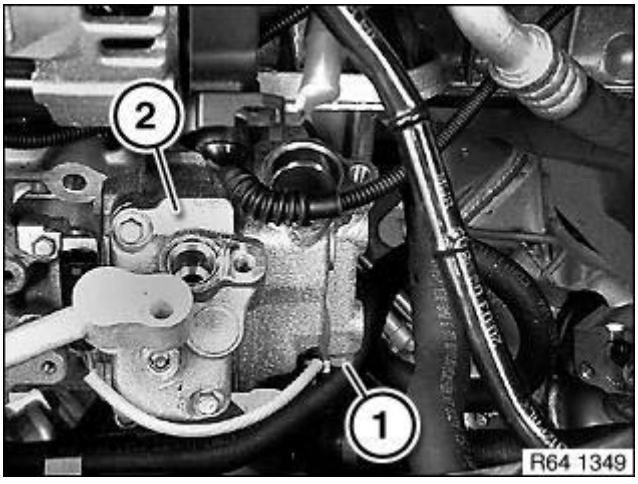


Fig. 86: Release Bolt (1) And Lift Out Compressor (2)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation: Adapter sleeves (1) must not be damaged. Replace damaged adapter sleeves.

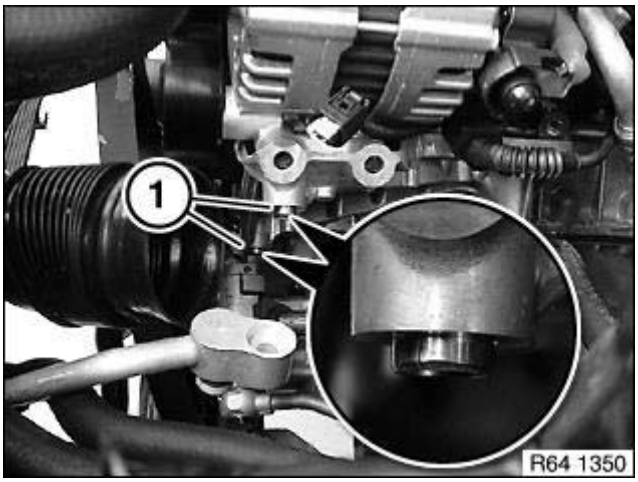


Fig. 87: Adapter Sleeves (1) Must Not Be Damaged
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL A/C SYSTEM**

6453 CONDENSER AND DRYER WITH LINES

64 52 ... INSTRUCTIONS FOR OPENING AND REPLACING PARTS IN REFRIGERANT CIRCUIT

WARNING:

- **Avoid contact with refrigerant and refrigerant fluid**
- **Follow safety information for handling R134a refrigerant See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A**
- **Follow safety information for HANDLING REFRIGERANT FLUID**

IMPORTANT:

- **Always use new O-rings each time A/C connections are opened (refer to Electronic Parts Catalogue)**

  They must not be coated.

  Use special tool 00 9 030 Keil to install sealing rings without damaging them.

- **Open the refrigerant circuit for as short of a period as possible.**
- **Close all components and lines in the refrigerant circuit and return parts immediately following the removals at openings with special tool 32 1 270 Stopfen to prevent penetration of moisture or foreign objects.**
- **If the refrigerant circuit was closed at the openings with special tool 32 1 270 Stopfen but it remains open for more than 24 hours, the dryer insert**

for the air conditioning must be replaced.

I. Part replacement as preliminary work fur further repair work and part replacement based on gradual leakage

(minor leak, e.g. hairline crack)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 10 ml
  - Capacitor: 20 ml
  - Desiccant insert/dryer flask: 20 ml
  - Each replaced refrigerant line: 10 ml
  - Capacitor with integrated dryer: 40 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

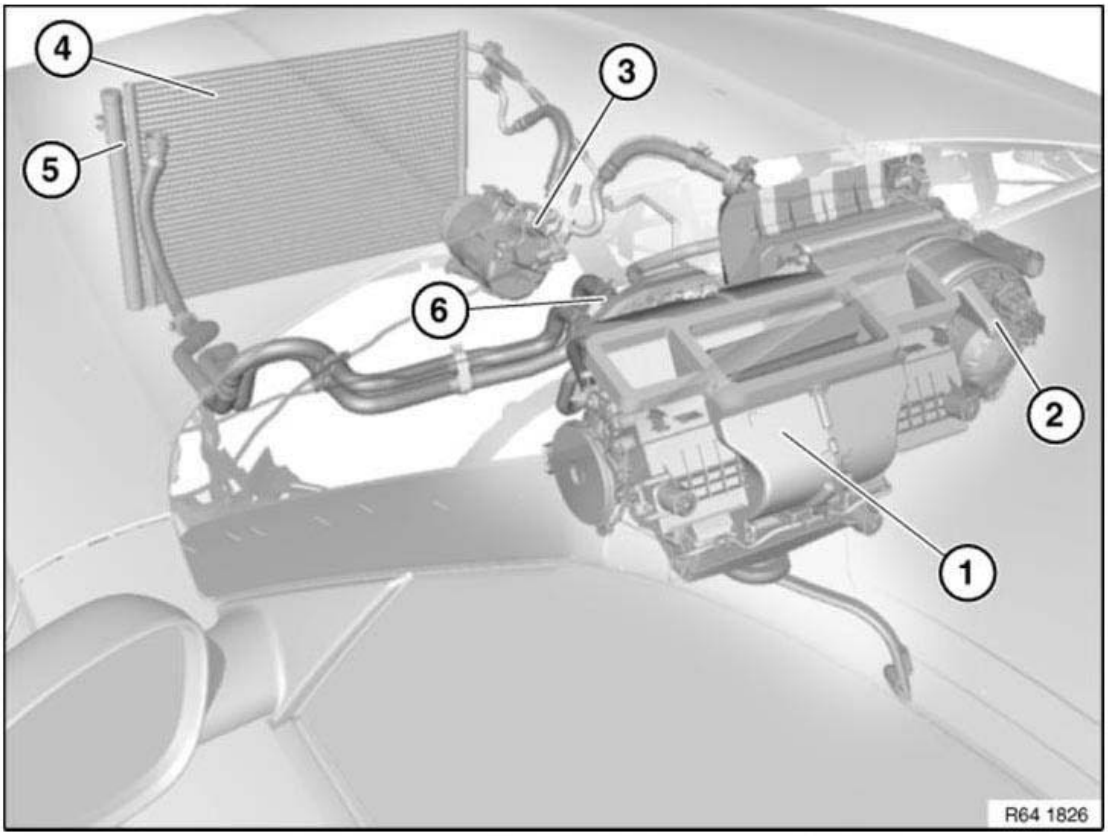
II. Part replacement due to sudden leak

(major leak, e.g. pipe break due to accident)

Procedure:

- **DRAW OFF** A/C system, then determine drawn-off refrigerant oil quantity
- Carry out part replacement
- Replace removed refrigerant fluid and additionally top up with new refrigerant fluid according to components replaced:
  - Compressor: refer to **NOTES ON REPLACING COMPRESSOR**
  - Evaporator: 35 ml
  - Capacitor: 35 ml
  - Desiccant insert/dryer flask: 55 ml
  - Each replaced refrigerant line: 35 ml
  - Capacitor with integrated dryer: 55 ml
  - Safety pressure switch and seals: no additional refrigerant fluid
- **EVACUATE AND FILL** A/C system

64 00 .. OVERVIEW OF HEATER - A/C SYSTEM COMPONENTS



1 Heater/air conditioner with add-on parts
2 Remove fan for heater - A/C system
3 Compressor for A/C system
4 Fan for heater - A/C system
5 Desiccant bottle for A/C system
6 Expansion valve

Fig. 88: Overview Of Heater - A/C System Components
Courtesy of BMW OF NORTH AMERICA, INC.

1. Heater/air conditioner with add-on parts
2. Remove fan for heater - A/C system
3. Compressor for A/C system
4. Fan for heater - A/C system
5. Desiccant bottle for A/C system
6. Expansion valve

64 53 551 REMOVING AND INSTALLING OR REPLACING CAPACITOR FOR HEATING AND AIR CONDITIONING SYSTEM

The repair work described is identical to:

Remove right **MODULE CARRIER** .

64 53 517 REMOVING AND INSTALLING/REPLACING DESICCANT INSERT FOR HEATING AND AIR CONDITIONING SYSTEM

WARNING: Danger of injury!
Refrigerant circuit is under high pressure!
Follow safety information for handling R 134a tetrafluorethane refrigerant.
Avoid contact with refrigerant and refrigerant fluid.
Follow safety information for handling refrigerant fluid.

IMPORTANT: Risk of damage!
Restart engine only when air conditioning system has been correctly filled.
Follow notes for replacing desiccant cartridge.

NOTE: Follow notes for opening and replacing parts in refrigerant circuit.
If air conditioning system is opened for more than 24 hours:
Replace desiccant insert for heating and air conditioning system.

IMPORTANT: The desiccant insert can only be replaced in vehicles with production dates up to 12/08!
In vehicles after 12/08, the heating and air conditioning system capacitor must be replaced!

Necessary preliminary work:

- **DRAIN OFF AIR CONDITIONING SYSTEM**
- Remove **CROSS CONNECTION UPPER PART**

Release screws (1).

Tightening torque **17 10 2AZ** .

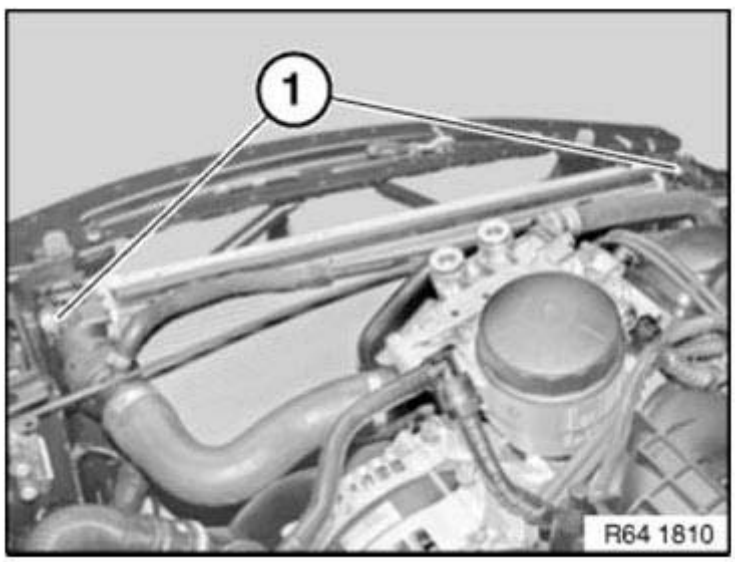


Fig. 89: Identifying Screws

Courtesy of BMW OF NORTH AMERICA, INC.

Carefully pull capacitor (1) with dryer flask (2) forward out of left module carrier (3).

For further operation, protect cooling fins between capacitor and radiator, for example with a cloth (2).

Cloth (2) simultaneously serves as a fixture.

If necessary, pierce label on dryer flask.

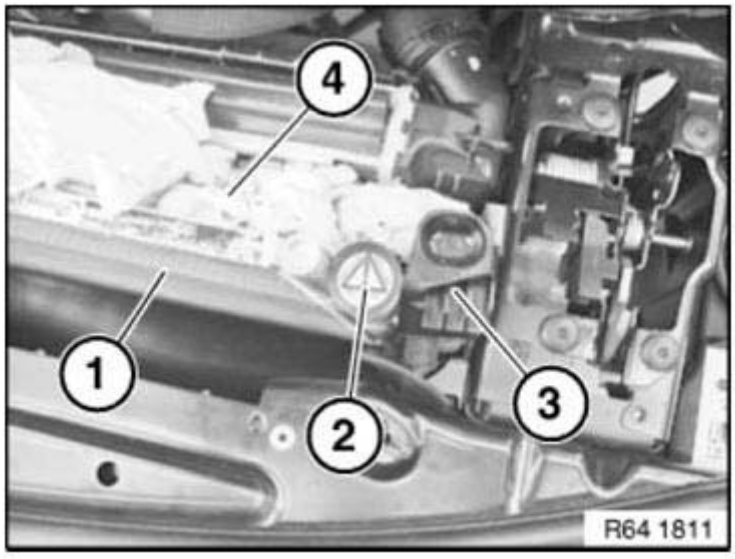


Fig. 90: Identifying Capacitor With Dryer Flask And Left Module Carrier
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: For purpose of clarity capacitor shown removed in following work steps.

Remove protective cap (1) from capacitor for the heating and air conditioning system (2).

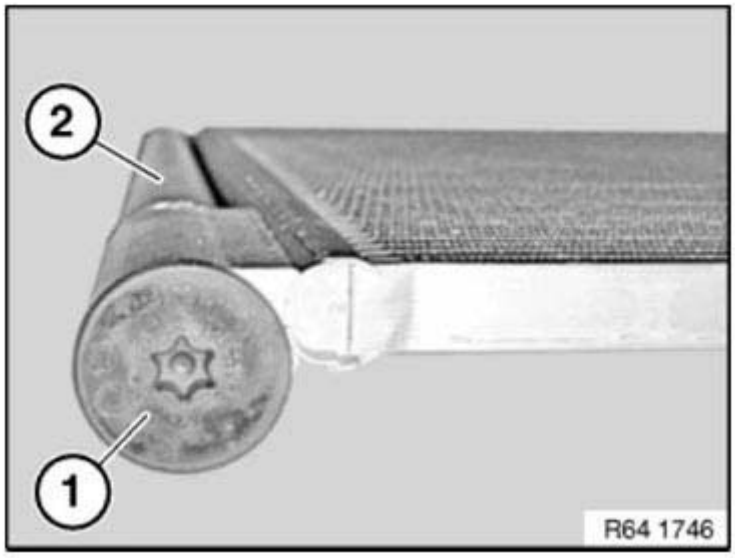


Fig. 91: Identifying Air Conditioning System And Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Press sealing cap (1) inwards and remove circlip (2).

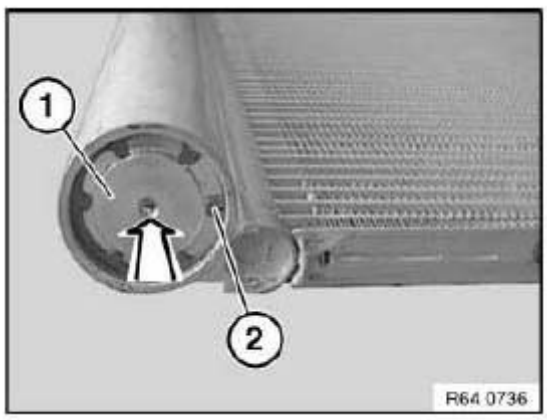


Fig. 92: Pressing Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Remove the sealing cap (2) from capacitor of the heating and air conditioning system (3) with an inserted screw (1).

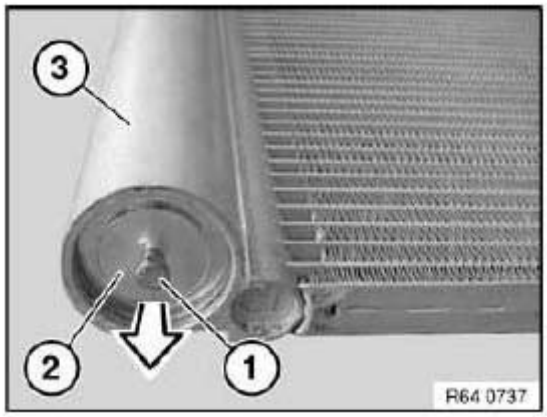


Fig. 93: Removing Sealing Cap From Heating And Air Conditioning System Capacitor
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Renew sealing rings (1) of sealing cap (2).

Use special tool 00 9 030 Keil to install sealing rings without damaging them.

Fig. 94: Installing Sealing Rings Using Special Tool (00 9 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove desiccant insert for heating and air conditioning system (1) in direction of arrow from capacitor of the heating and air conditioning system (2).

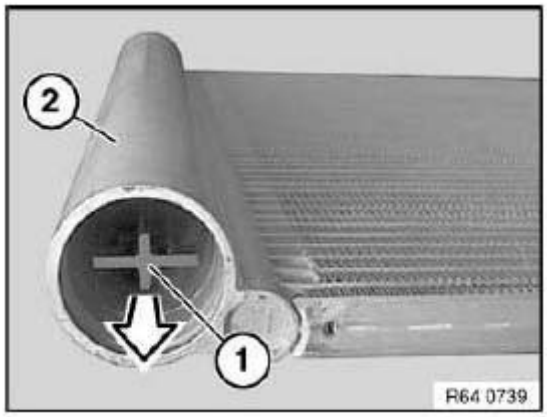


Fig. 95: Removing Desiccant Insert For Heating And Air Conditioning System
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: If the heating and air conditioning system remains open for longer than one hour, the refrigerant lines must be sealed off with seal plugs.
In event of warranty application, seal pipe aperture with seal plugs of new dryer flask.

After installation

- **EVACUATE AND FILL HEATING AND AIR CONDITIONING SYSTEM**

64 53 521 REPLACING SAFETY PRESSURE SWITCH

WARNING: Risk of injury!
Refrigerant circuit is under high pressure!
Follow safety instructions See 6450... INSTRUCTIONS FOR HANDLING REFRIGERANT R 134A or 6450... SAFETY INSTRUCTIONS FOR HANDLING REFRIGERANT R134A handling R 134a refrigerant.
Avoid contact with refrigerant and refrigerant oil.
Follow SAFETY INSTRUCTIONS for handling refrigerant oil.

IMPORTANT: Risk of damage!
Restart engine only when A/C system has been correctly filled.
Follow INSTRUCTIONS for opening and replacing parts in refrigerant circuit.
If A/C system is opened for more than 24 hours: Replace DESICCANT INSERT FOR A/C SYSTEM .

Necessary preliminary tasks:

- **DRAWING OFF, EVACUATING AND FILLING THE A/C SYSTEM** are not included in the time value given for this work operation

Disconnect plug connection (1).

Release safety pressure switch (2).

Installation:

Tightening torque **64 53 14AZ** .

Replace sealing ring.

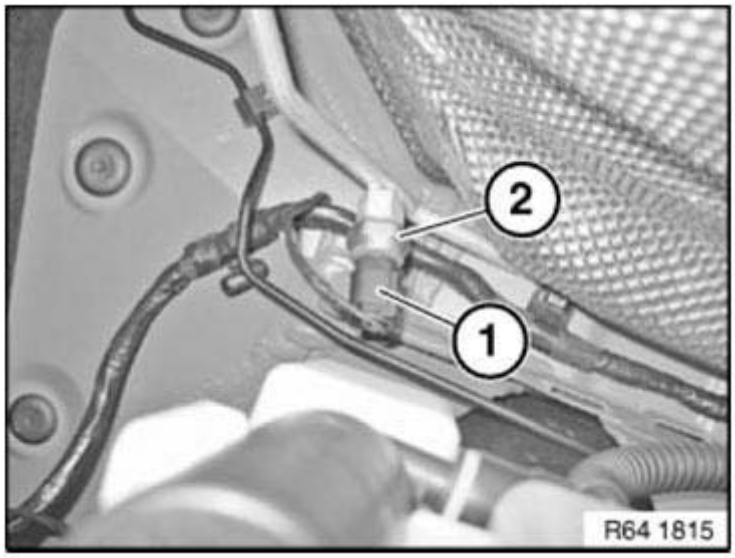


Fig. 96: Identifying Safety Pressure Switch With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **EVACUATE AND FILL A/C SYSTEM**

64 HEATING AND AIR CONDITIONING

64-5102 ADAPTER

0493318 645102 Adapter MW

NOTE: (Seal adapter) For closing off the intake pipe

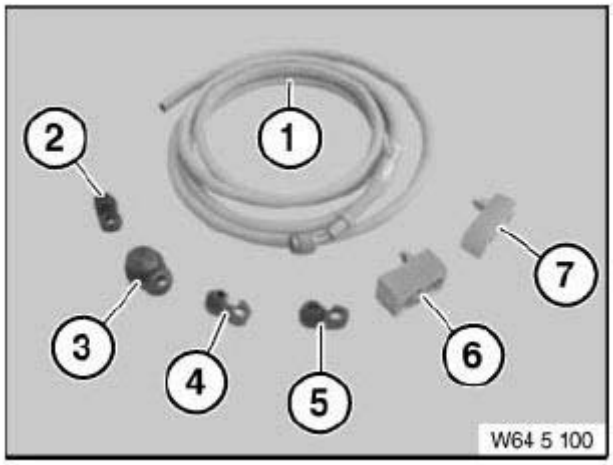


Fig. 1: Identifing Adapter (645102)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5127 ADAPTER

0496300 645127 Adapter MW

NOTE: (Evaporator test adapter) E85, E86

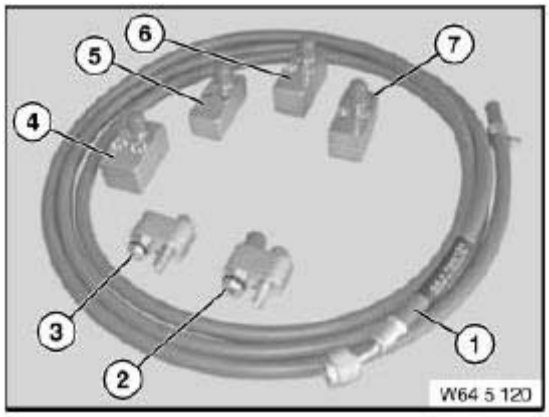


Fig. 2: Identifing Adapter (645127)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5126 ADAPTER

0496299 645126 Adapter MW

NOTE: (Evaporator test adapter) E60, E61, E63, E64

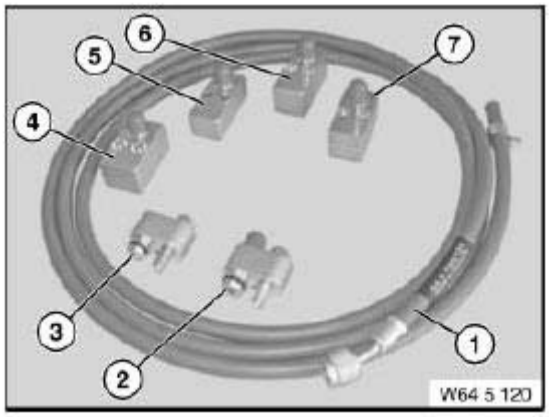


Fig. 3: Identifing Adapter (645126)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5107 ADAPTER

0496087 645107 Adapter MW

NOTE: (Sealing adapter) For closing off the line for the leakage test for E81, E87, E90, E91, E92, E93 (included in delivery from 02/2007)

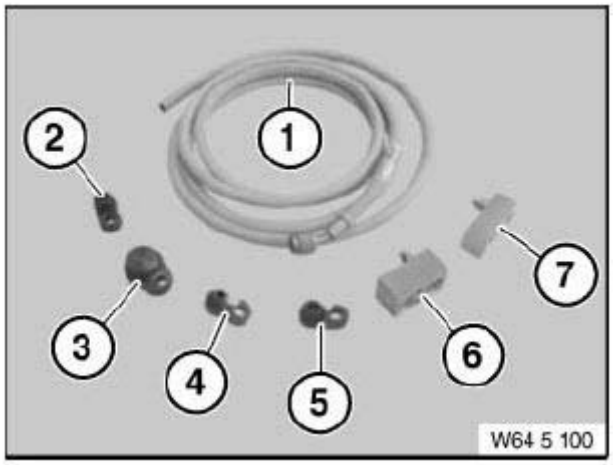


Fig. 4: Identifing Adapter (645107)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5125 ADAPTER

0496260 645125 Adapter MW

NOTE: (Evaporator test adapter) E46, E83, E70, R55, R56 (formerly 64 5 108)

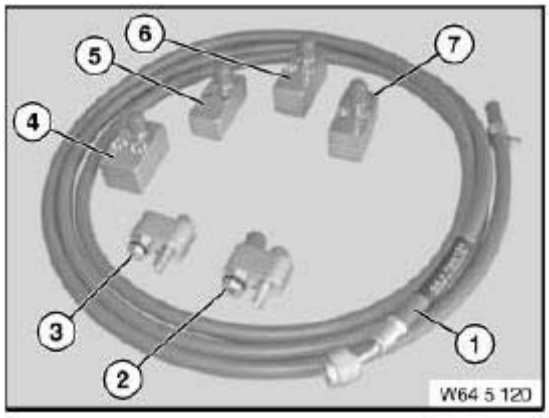


Fig. 5: Identifing Adapter (645125)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5124 ADAPTER

0496259 645124 Adapter MW

NOTE: (Evaporator test adapter) PL2, formerly 64 5 107

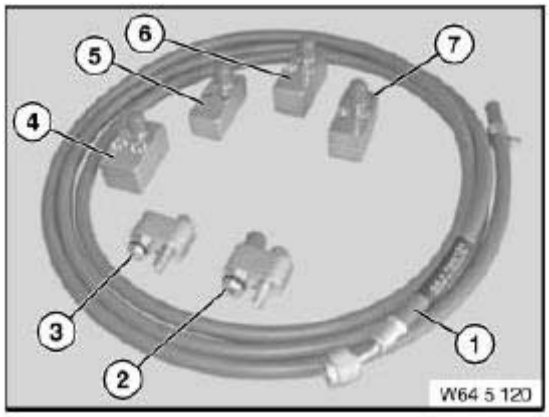


Fig. 6: Identifing Adapter (645124)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5101 ADAPTER

0493317 645101 Adapter MW

Replaced by: 0495257

NOTE: (Filling adapter) is replaced by 64 5 105 (from 01/2005) Replaced by 64 5 105 (0 495 257)

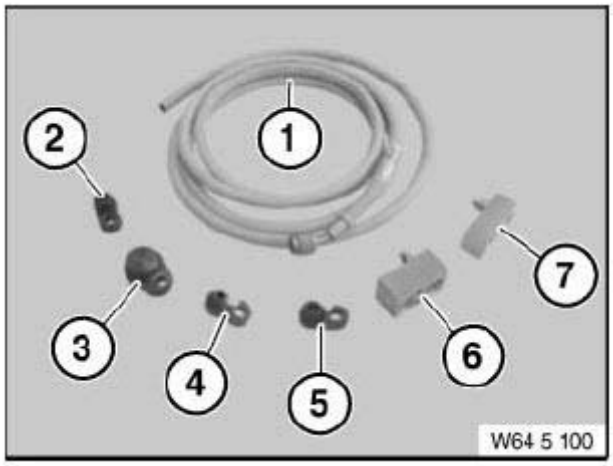


Fig. 7: Identifing Adapter (645101)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5108 ADAPTER

0496182 645108 Adapter MW

NOTE: (leak-tight adapter) For sealing the line during the evaporator leakage test in the E70 (included in the delivery specification from 02/2007)

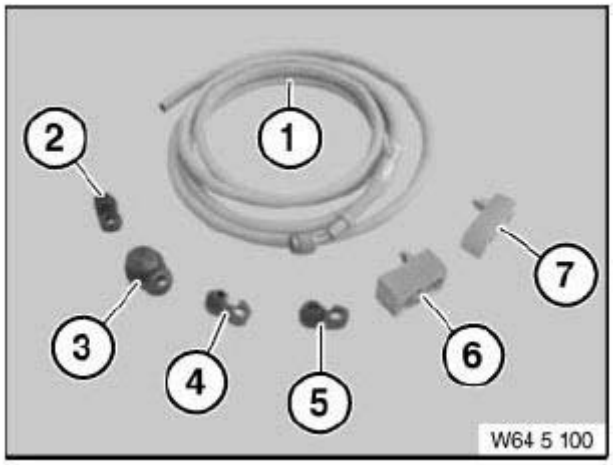


Fig. 8: Identifing Adapter (645108)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5106 ADAPTER

0495258 645106 Adapter MW

NOTE: (Sealing adapter) Sealing adapter for closing off the line for the leakage test (included in delivery from 01/2005)

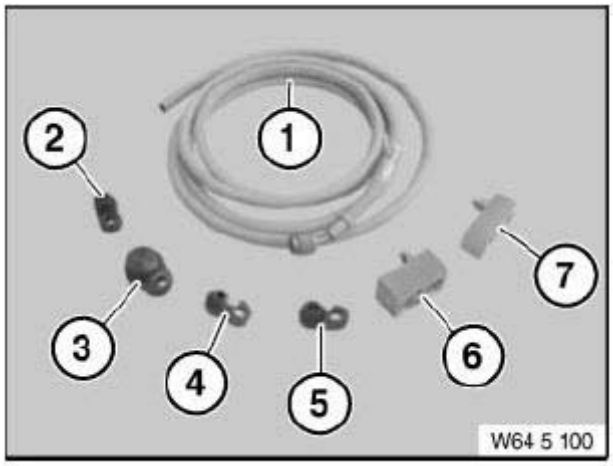


Fig. 9: Identifing Adapter (645106)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5105 ADAPTER

0495257 645105 Adapter MW

NOTE: (Filler adapter) For sealing pressure line and connection to connecting hose (replaces special tool 64 5 101 from 01/2005)

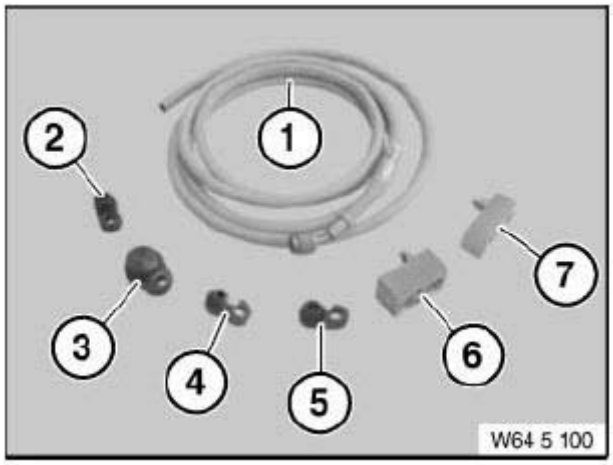


Fig. 10: Identifing Adapter (645105)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5122 ADAPTER

0496224 645122 Adapter MW

NOTE: (Climate condenser test adapter)

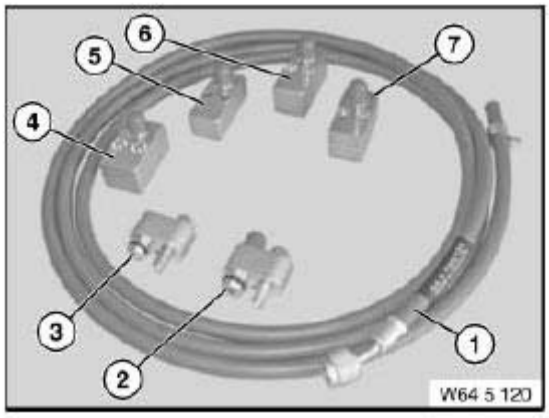


Fig. 11: Identifing Adapter (645122)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5103 ADAPTER

0493319 645103 Adapter MW

NOTE: (Sealing adapter) For sealing suction connection on compressor

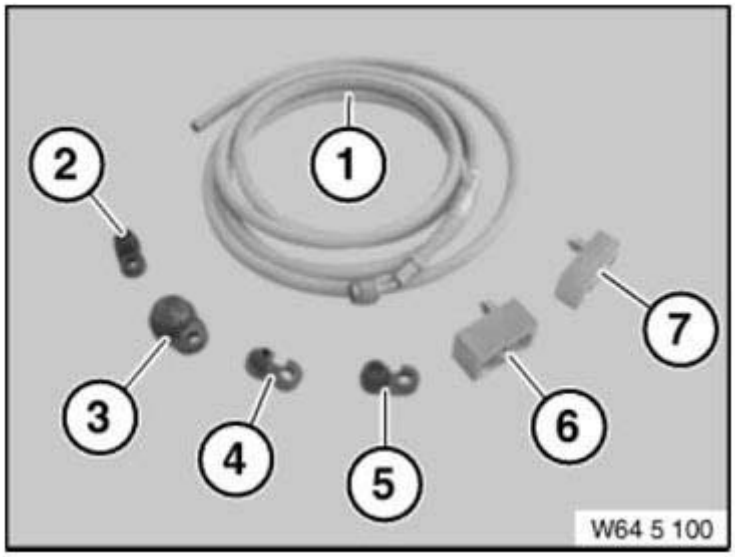


Fig. 12: Identifing Adapter (645103)
Courtesy of BMW OF NORTH AMERICA, INC.

64-1252 GUIDE

64 1 252 Guide

In conjunction with: Lance 64 1 251

NOTE: Guide from spray apparatus set 64 1 250

SI number

1 26 03 (044)

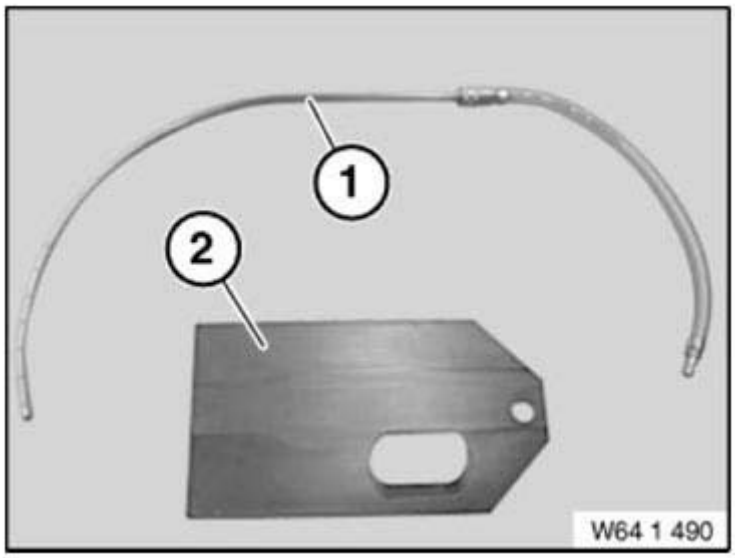


Fig. 13: Identifing Guide (641252)
Courtesy of BMW OF NORTH AMERICA, INC.

64-1492 GUIDE FOR SPRAY LANCE (LHD VEHICLES)

64 1 492 Guide for spray lance (LHD vehicles)

In conjunction with: Spray lance 64 1 491 for evaporator cleaning

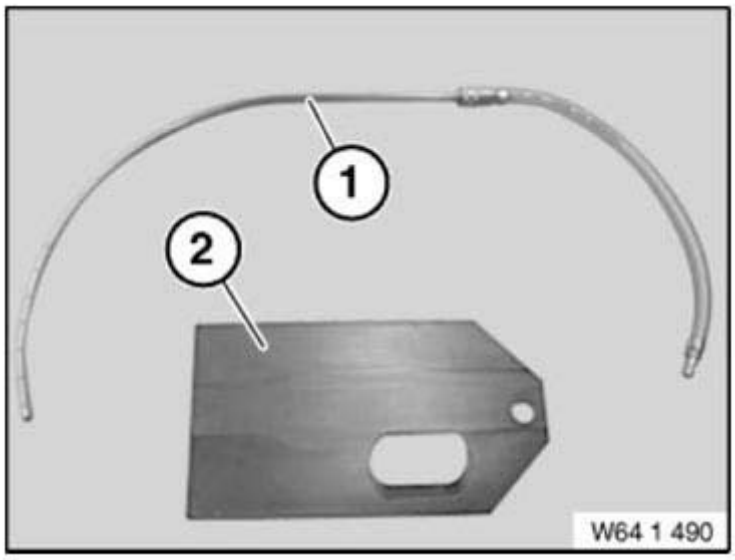


Fig. 14: Identifing Guide For Spray Lance (LHD Vehicles) (641492)
Courtesy of BMW OF NORTH AMERICA, INC.

64-1030 HOOK

0494190 641030 Hook Minimum set: Mechanical tools MW

NOTE: (Release hook) For removal of fresh air grille (delivery 2 pieces)

Storage Location

B46

SI number

01 14 01 (766)

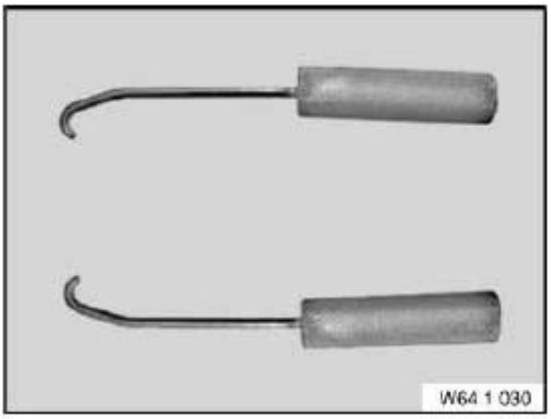


Fig. 15: Identifing Hook (641030)
Courtesy of BMW OF NORTH AMERICA, INC.

64-1020 HOOK

0493681 641020 Hook Minimum set: Mechanical tools MW

NOTE: (release hook) For releasing and removing fresh air grille. For removing various trims.

Storage Location

A3

B3

SI number

01 15 99 (483)

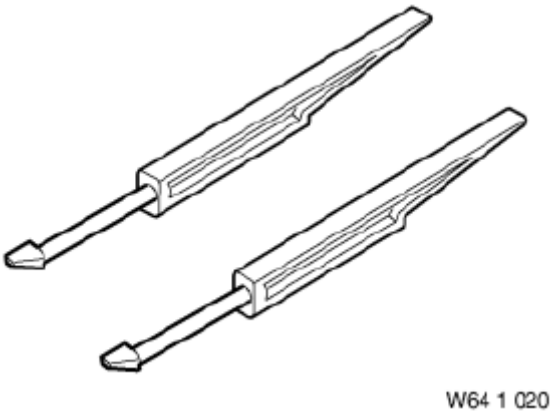


Fig. 16: Identifing Hook (641020)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5104 HOSE

0493320 645104 Hose MW

NOTE: (connecting hose) For connecting the pressure cylinder to the filler adapter

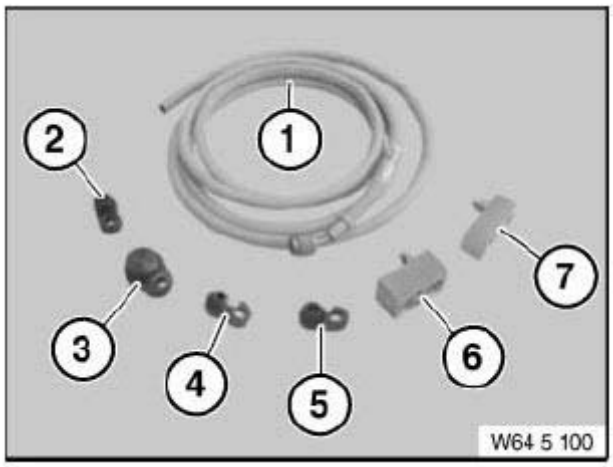


Fig. 17: Identifing Hose (645104)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5121 HOSE

0496223 645121 Hose MW

NOTE: (Connection hose with clamp)

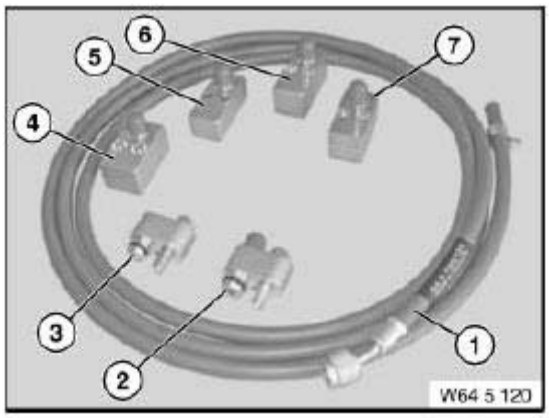


Fig. 18: Identifing Hose (645121)
Courtesy of BMW OF NORTH AMERICA, INC.

64-5123 PLUG

0496258 645123 Plug MW

NOTE: **(Climate condenser seal plug)**

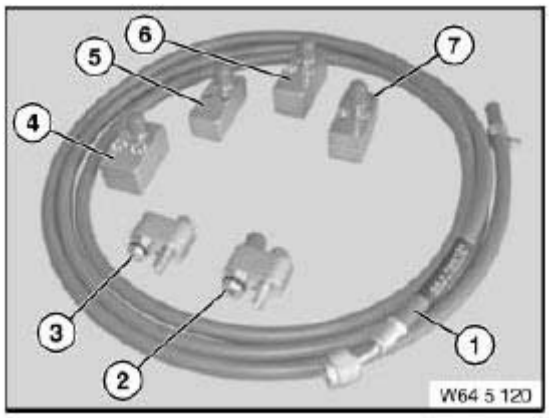


Fig. 19: Identifing Plug (645123)
Courtesy of BMW OF NORTH AMERICA, INC.

64-1491 SPRAY LANCE (LHD VEHICLES)

64 1 491 Spray lance (LHD vehicles)

In conjunction with: Guide 64 1 492

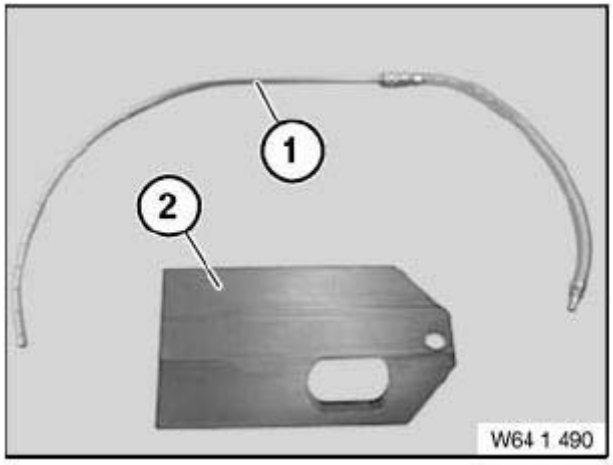


Fig. 20: Identifing Spray Lance (LHD Vehicles) (641491)
Courtesy of BMW OF NORTH AMERICA, INC.

64-1251 SPRAY LANCE, RHD VEHICLES

64 1 251 Spray lance, RHD vehicles

In conjunction with: Guide 64 1 252

NOTE: **from spray apparatus set 64 1 250 (RHD vehicles)**

SI number

1 26 03 (044)

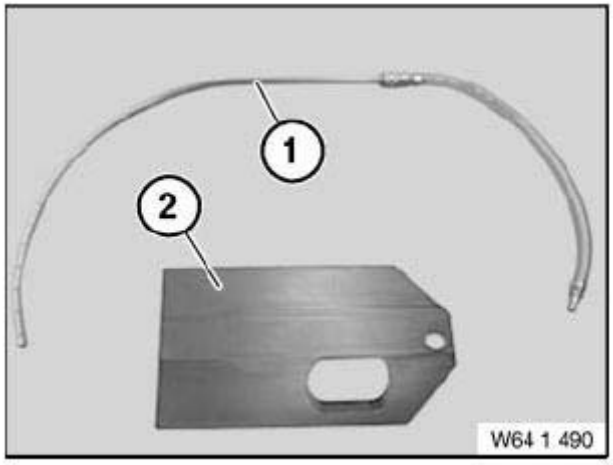


Fig. 21: Identifing Spray Lance, RHD Vehicles (641251)
Courtesy of BMW OF NORTH AMERICA, INC.

AIR CONDITIONING SYSTEM, AMOUNT OF REFRIGERANT

64 50 AIR CONDITIONING SYSTEM, AMOUNT OF REFRIGERANT E89

AIR CONDITIONING SYSTEM, AMOUNT OF REFRIGERANT SPECIFICATION

Refrigerant capacity R 134a (The data on the nameplate in the engine compartment are definitive) Sourcing reference for refrigerant in Electronic Parts Catalogue	g	550±10

HEATING AND AIR-CONDITIONING UNIT (EVAPORATOR), SWITCHING ELEMENTS

64 51 HEATING AND AIR-CONDITIONING UNIT (EVAPORATOR), SWITCHING ELEMENTS

HEATING AND AIR-CONDITIONING UNIT (EVAPORATOR), SWITCHING ELEMENTS SPECIFICATION

Resistance as a function of temperature	° C/kohms	-5/11.4 ... 11.9 0/8.8 ... 9.2 5/6.8 ... 7.2 10/5.3 ... 5.6 15/4.2 ... 4.5 20/3.3 ... 3.6 25/2.6 ... 2.9 30/2.1 ... 2.3 35/1.7 ... 1.9

HEATING AND AIR-CONDITIONING UNIT (EXPANSION VALVE), SWITCHING ELEMENTS

64 51 HEATING AND AIR-CONDITIONING UNIT (EXPANSION VALVE), SWITCHING ELEMENTS

HEATING AND AIR-CONDITIONING UNIT (EXPANSION VALVE), SWITCHING ELEMENTS SPECIFICATION

Inlet pressure (excess pressure)	bar	14
Outlet pressure (excess pressure)	bar	1.8
Leak test with detector at excess pressure	bar	1 ... 2

Heating and Air Conditioning - Tightening Torques - Z4

A/C COMPRESSOR

64 52 A/C COMPRESSOR

TIGHTENING TORQUE SPECIFICATION - A/C COMPRESSOR

		Type	Thread	Tightening specification	Measure
1AZ	Refrigerant lines to compressor	E84, E89	M8		18.5 Nm
2AZ	Compressor to bracket	E84, E89	M8		21 Nm
3AZ	Bearing block, compressor, to crankcase	N43/N47/N54, E84, E89	M8		19 Nm
		N52K, E84, E89	M8	Replace screws Angle of rotation:	10±1.5 Nm 180 °

HOUSING, HEATER/AIR CONDITIONER

64 11 HOUSING, HEATER/AIR CONDITIONER

TIGHTENING TORQUE SPECIFICATION - HOUSING, HEATER/AIR CONDITIONER

		Type	Thread	Tightening specifications	Dimension
1AZ	Bulkhead adapter	E85, E86, E89			1.0 ± 0.3 Nm
2AZ	Blower for heater/air conditioner	E85, E86			1.5 ± 0.3 Nm
3AZ	Controller for heating and air conditioning system blower	E84, E85, E86, E89			1.0 ± 0.3 Nm
4AZ	Air conditioner to bulkhead	E60, E61, E63, E64, E83, E81, E82, E87, E88, E90, E91, E92, E93			6 Nm
		E70, E71, E72			6.5 Nm
5AZ	Cooler box to luggage compartment partition wall	E65, E66, E67			4.5 Nm
6AZ	Air conditioner to support tube	E81, E82, E84, E87, E88, E90, E91, E92, E93			9 Nm
7AZ	Mounting, positive/negative lead, to electric auxiliary heater	E83			8.8 Nm

HOUSING, HEATER/AIR CONDITIONER

64 11 HOUSING, HEATER/AIR CONDITIONER

TIGHTENING TORQUE SPECIFICATION - HOUSING, HEATER/AIR CONDITIONER

		Type	Thread	Tightening specification	Measure
1AZ	Bulkhead adapter	E85, E86, E89			1.0 ± 0.3 Nm
2AZ	Fan for heater/air conditioner	E85, E86			1.5 ± 0.3 Nm
3AZ	Controller for heater - A/C system fan	E84, E85, E86, E89			1.0 ± 0.3 Nm
4AZ	Air conditioner to bulkhead	E60, E61, E63, E64, E83, E81, E82, E87, E88, E90, E91, E92, E93			6 Nm
		E70, E71, E72			6.5 Nm
5AZ	Cooler box to luggage compartment partition wall	E65, E66, E67			4.5 Nm
6AZ	Air conditioner to support tube	E81, E82, E84, E87, E88, E90, E91, E92, E93			9 Nm
7AZ	Mounting, positive/negative lead, to electric auxiliary heater	E83			8.8 Nm

REFRIGERANT LINES AND EXPANSION VALVE

64 53 REFRIGERANT LINES AND EXPANSION VALVE

TIGHTENING TORQUE SPECIFICATION - REFRIGERANT LINES AND EXPANSION VALVE

		Type	Thread	Tightening specifications	Dimension
1AZ	Refrigerant lines to dryer flask	E83, E85, E86	M8		20 Nm
2AZ	Refrigerant lines to expansion valve/double pipe	E46, E83, E85, E86, E81, E82, E87, E88, E89, E90, E91, E92, E93	M8		20 Nm
		E53	M8		18 Nm
		E84	M8		18.5 NM
3AZ	Adapter plate to expansion valve	E85, E86, E89	M6		10 ± 2 Nm
4AZ	Expansion valve to heater - A/C	E85, E86, E89	M5		5.5 Nm
5AZ	Refrigerant line to heater end panel	E85, E86	M6		8.6 Nm

6AZ	Refrigerant lines to capacitor	E60, E61, E63, E64, E81, E82, E83, E85, E86, E87, E88, E89, E90, E91, E92, E93	M8		20 Nm
		E84	M8		18.5 Nm
7AZ	Refrigerant lines to expansion valve	E60, E61, E63, E64	M6		8.8 Nm
8AZ	Refrigerant line to assembly compartment partition reinforcement	E60, E61, E63, E64	M6		7.6 Nm
9AZ	Expansion valve to heater - A/C	E46, E60, E61, E63, E64, E83	M5		5.5 Nm
10AZ	Refrigerant line to body	E46, E83	M6		5.5 Nm
11AZ	Double pipe to expansion valve	E46, E83	M6		8.0 Nm
12AZ	Screw plug to capacitor	E53, E81, E82/E84, E87, E88, E90, E91, E92			3.0 ± 0.5 Nm
13AZ	Expansion valve to retaining clip	E81, E82, E84, E87, E88, E90, E91, E92, E93	M6		5.5 Nm
14AZ	Pressure sensor in refrigerant line	E53, E60, E61, E63, E64, E65, E66, E81, E82, E83, E84, E85, E86, E87, E88, E89, E90, E91, E92, E93			10 Nm
15AZ	Refrigerant line to adapter lead	E60/N53, E61/N53, E63/N53, E64/N53, E60/N54, E61/N54			18 Nm

6310 LAMP SETTINGS

63 10 004 ADJUSTING HEADLIGHTS

COMPLY WITH TEST PRECONDITIONS FOR HEADLIGHT ADJUSTMENT .

IMPORTANT: Do not damage adjusting screws when adjusting headlights.

Carry out headlight adjustment at adjusting screws below openings (1) and (2).

1. Adjustment screw primarily for vertical adjustment
2. Adjustment screw primarily for lateral adjustment

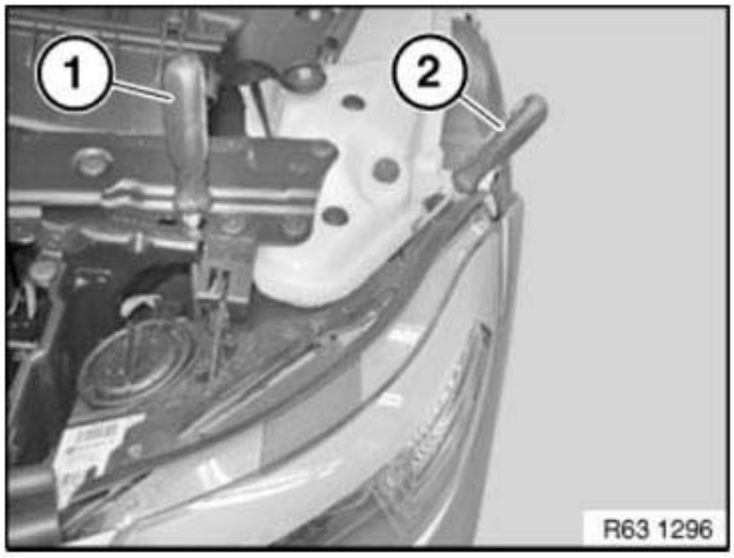


Fig. 1: Carrying Out Headlight Vertical And Lateral Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

63 10 ... TEST REQUIREMENTS FOR HEADLIGHTS VERTICAL AIM ADJUSTMENT

- Car parked on level ground.
- Replace faulty glass and mirrors and blackened light bulbs.
- Check tyre pressure and correct if necessary.
- Apply load equivalent to one person on driver's seat (approx. 75 kg).
- Vehicle with full fuel tank or appropriate additional weight in luggage compartment.
- Correct adjustment of headlights in relation to engine hood (gap dimensions).

- Manual headlight vertical aim control: Turn handwheel to 0 position.
- Automatic headlight vertical aim control: Wait approx. 30 seconds after switching on lights.
- Version with xenon headlights: Wait 80 seconds after switching on lights. During this time, do not move the vehicle and avoid vibrations.
- Align headlight aimer with vehicle longitudinal axis and parallel to parking surface. Set marking line (M) on aimer to distance (e). Scale graduations on aimer are equal to a gradient in cm at a distance of 10 meters.

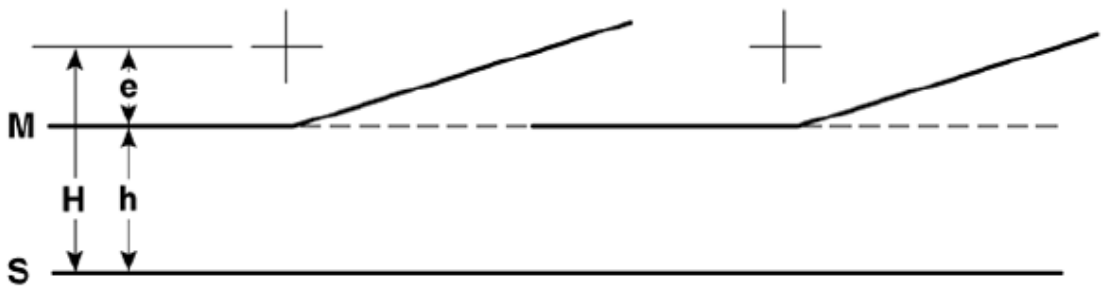


Fig. 2: Identifying Headlight Vertical Aim Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Light/dark limit of headlights in headlight aimer

e Adjustment dimension, headlights:

- as per type plate on headlight housing in % (e.g.: 1.0 % = 10 cm/10 m = 10 on headlight aimer).

Adjustment dimension, fog lights:

- all vehicles 2.0 % = 20 cm/10 m = 20 on headlight aimer.

H Height of centre of headlight above parking surface.

h H - e = height of marking line above parking surface

\+ Central mark = centre point of high-beam headlight.

M Marking line of headlamp aimer

S Parking surface of vehicle and headlight aimer

6312 HEADLIGHTS

63 99 ... NOTES FOR REPLACING THE PROTECTIVE CAP OF THE HEADLIGHT

IMPORTANT: Risk of damage!
Damaged seals on the protective caps will lead to moisture penetration into the headlight.
This will in turn cause porous cable insulations and malfunctioning of the headlight.

When working on the headlight system, check the protective cap seals.

Replace the protective cap in the event of damage!

Example: screwed protective cap

Seal (1) on protective cap (2).

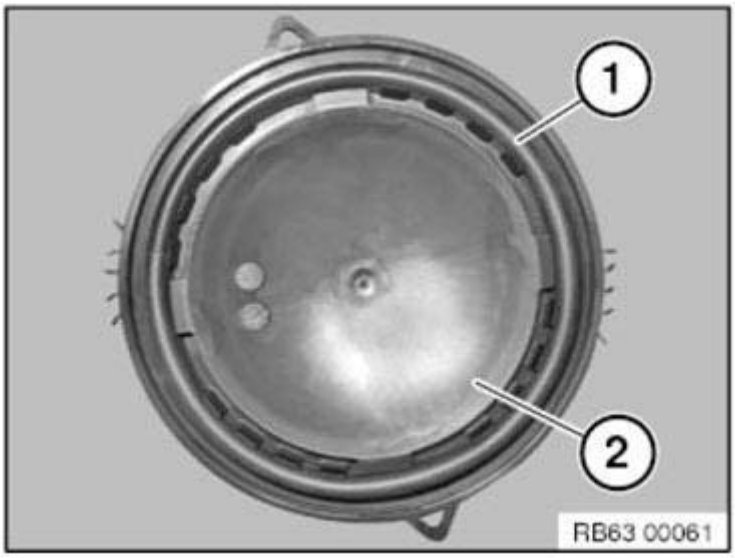


Fig. 3: Identifying Seal On Protective Cap (Screwed Protective Cap)
Courtesy of BMW OF NORTH AMERICA, INC.

Example: latchable protective cap

Seal (1) on protective cap (2).

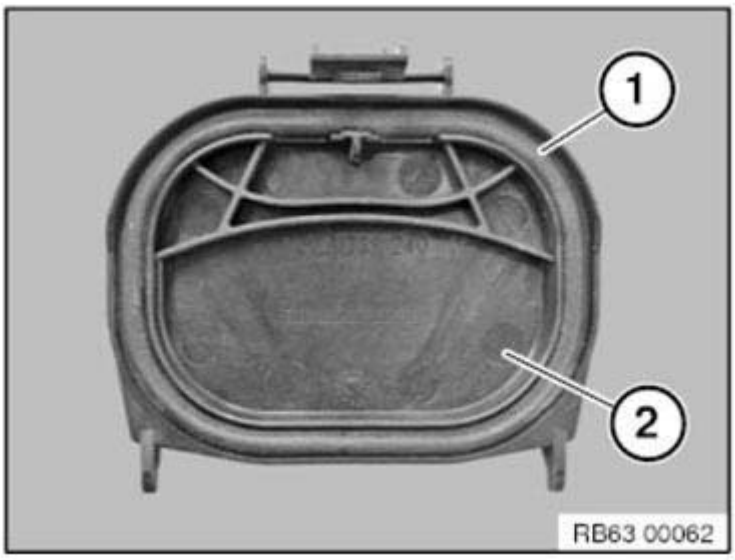


Fig. 4: Identifying Seal On Protective Cap (Latchable Protective Cap)
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 015 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT (ADAPTIVE HEADLIGHT)

Operation is described in:

Remove **LEFT HEADLIGHT**

63 12 010 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT (XENON HEADLIGHT)

> **WARNING: Xenon headlights: Danger to life due to high voltage! Therefore disconnect xenon headlights from voltage supply.**
> **Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.**

Necessary preliminary tasks:

- Remove **FRONT BUMPER TRIM**

Unfasten plug connection (1) and disconnect.

Unfasten screws (2).

Tightening torque 61 12 1AZ.

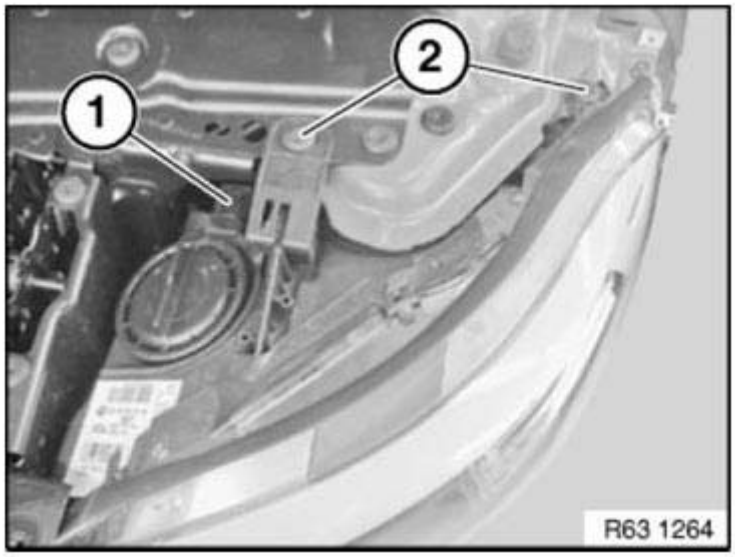


Fig. 5: Identifying Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Left headlight only:

Unlock plug connections (1) and disconnect.

Unfasten screws (2).

Remove fanfare horn (3).

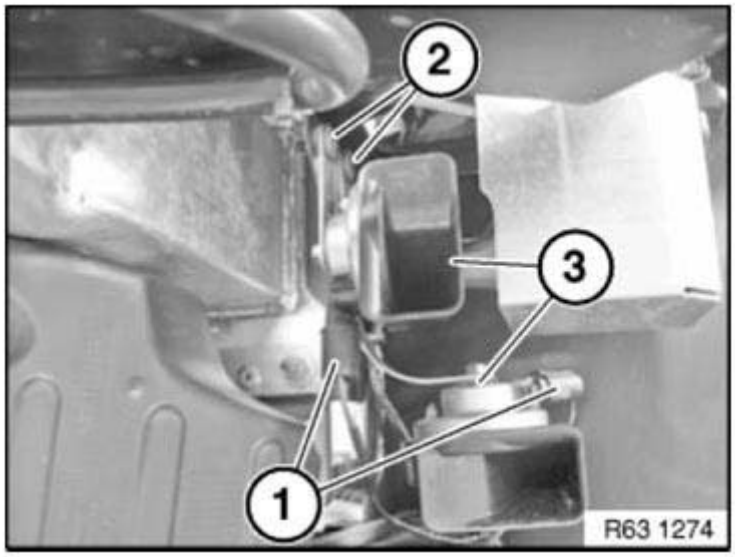


Fig. 6: Identifying Fanfare Horn With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque 61 12 1AZ.

Remove headlight (2).

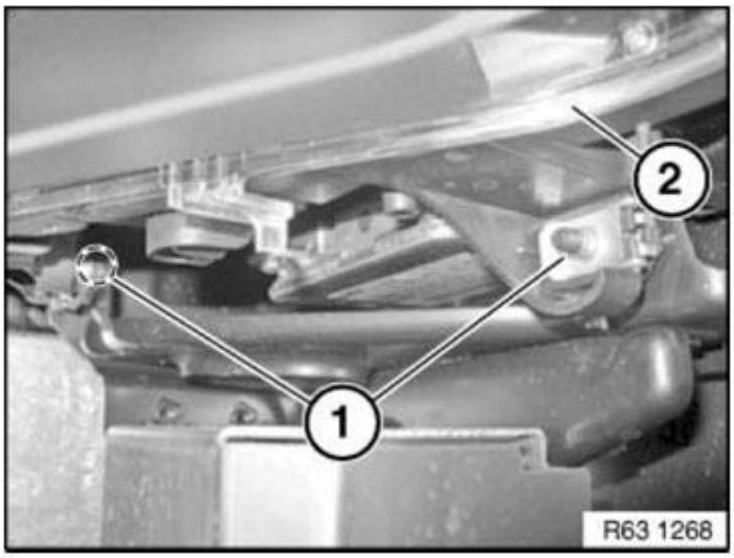


Fig. 7: Identifying Headlight With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Replacement

- Remove **CONTROL UNIT** for xenon headlights
- Remove **IGNITION UNIT** for left xenon headlight
- If necessary, remove **DRIVE/ELECTRONICS BOX FOR ADAPTIVE HEADLIGHT**

Installation:

ADJUST headlight.

- If necessary, remove bulbs - note type of bulb

67 16 011 REMOVING AND INSTALLING/REPLACING LEFT HEADLIGHT VERTICAL AIM ADJUSTER

WARNING: Xenon headlights: Danger to life due to high voltage! Therefore disconnect xenon headlights from the power supply.
Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

- Remove **WHEEL ARCH COVER AT FRONT**
- Remove ignition unit for xenon headlight See **6312871 REPLACING IGNITION UNIT FOR RIGHT XENON HEADLIGHT (WITH XENON BULB)** or **6312870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT (WITH XENON BULB)**

Specification with adaptive headlights:

Unlock plug connection (1) on sensor system (2) and disconnect.

This produces additional space for removing the headlight vertical aim adjuster.

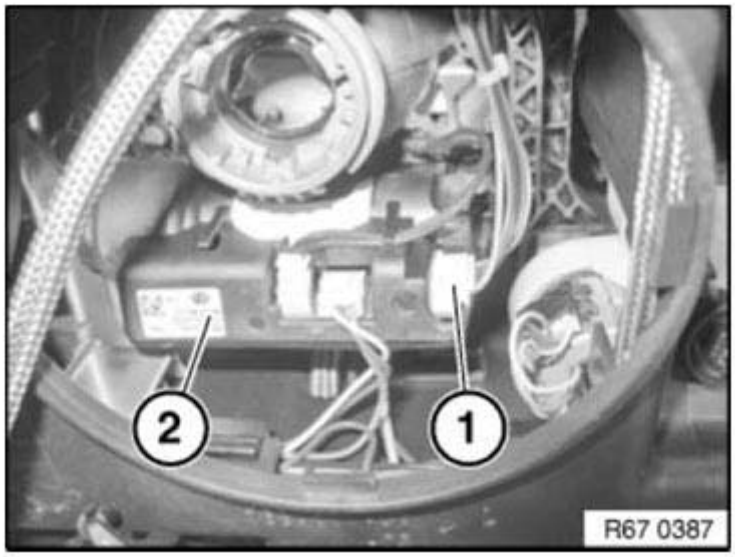


Fig. 8: Identifying Plug Connection On Sensor System
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
Carry out following operation carefully.
Turn screws only until an increase in torque is detected.

Move adjusting screw for horizontal adjustment (1) to end position by turning clockwise.

Move adjusting screw for vertical adjustment (2) to end position by turning counterclockwise.

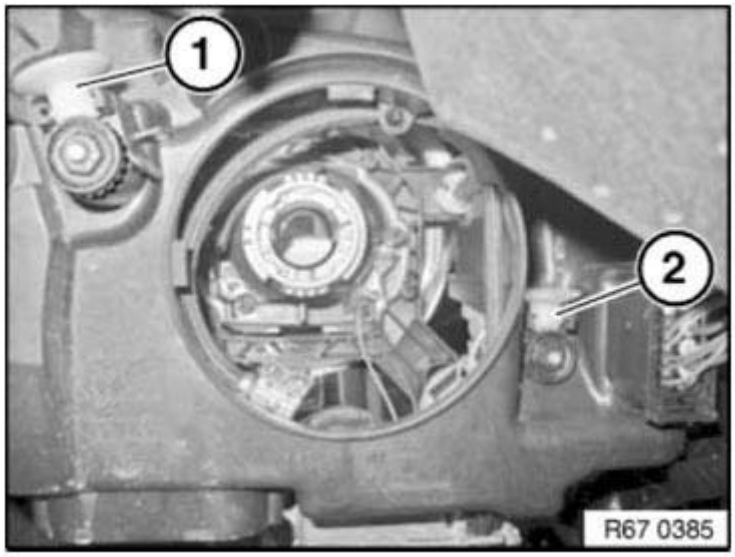


Fig. 9: Identifying Vertical And Horizontal Aim Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Turn headlight vertical aim adjuster (1) by turning counterclockwise (45°) out of carriage bayonet.

Turn adjusting screw for vertical adjustment (2) clockwise until an increase in torque is detected.

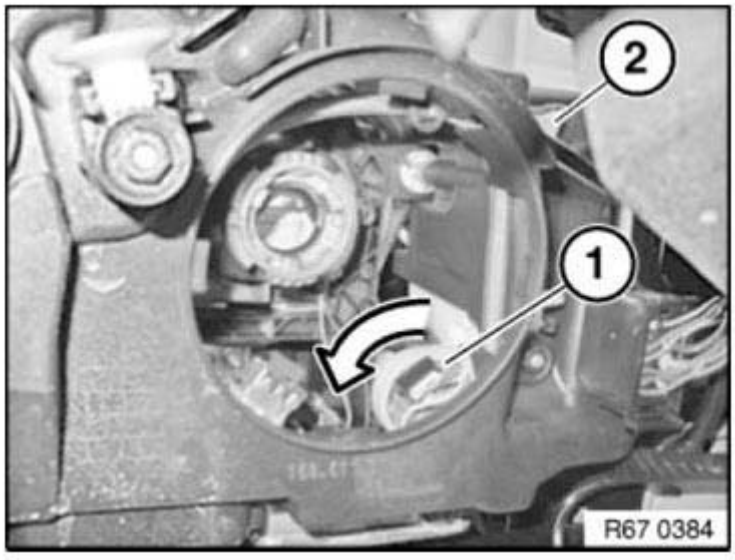


Fig. 10: Turn Adjusting Screw For Vertical Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

Disengage headlight vertical aim adjuster (1) with a swinging movement in direction of arrow from ball socket.

Feed out headlight vertical aim adjuster (1).

Unlock associated plug connection and disconnect.

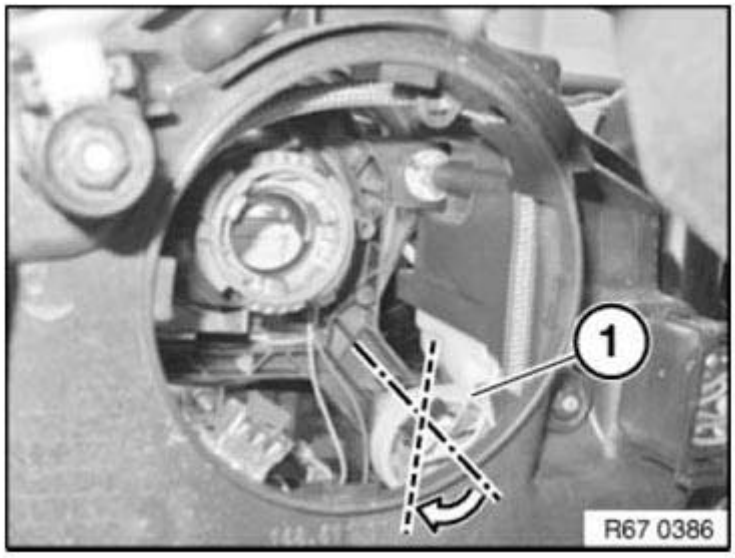


Fig. 11: Disconnecting Headlight Vertical Aim Adjuster
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull adjustment mechanism (1) forwards to enable headlight vertical aim adjuster (2) to be engaged in ball socket.

Make sure ball head on headlight vertical aim adjuster (2) is exactly seated in mounting.

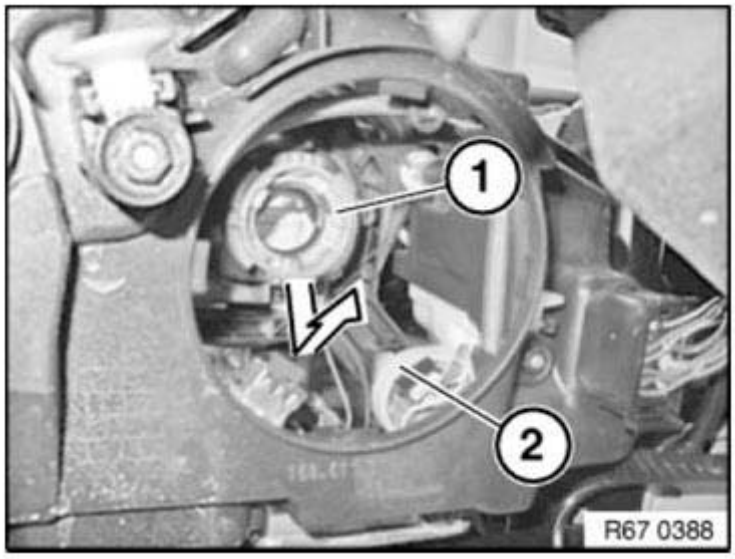


Fig. 12: Pull Adjustment Mechanism Forwards
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- **ADJUST** headlight

63 12 017 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT (ADAPTIVE HEADLIGHT)

Operation is described in:

Remove **LEFT HEADLIGHT**

63 12 012 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT (XENON HEADLIGHT)

Operation is described in:

Remove **LEFT HEADLIGHT**

67 16 016 REMOVING AND INSTALLING/REPLACING RIGHT HEADLIGHT VERTICAL AIM ADJUSTER

Operation is described in:

REMOVING AND INSTALLING LEFT HEADLIGHT VERTICAL AIM ADJUSTER

63 12 860 REPLACING CONTROL UNIT FOR LEFT XENON HEADLIGHT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal. Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks

- Remove left **HEADLIGHT**

Release screws (1).

Remove control unit for xenon headlight (2) upwards from headlight (3).

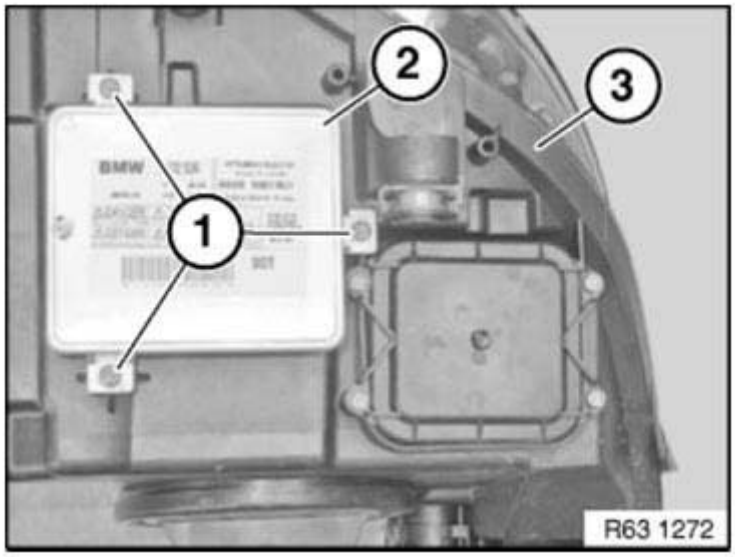


Fig. 13: Identifying Xenon Headlight Control Unit With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing, make sure sealing sleeve (1) is correctly seated.

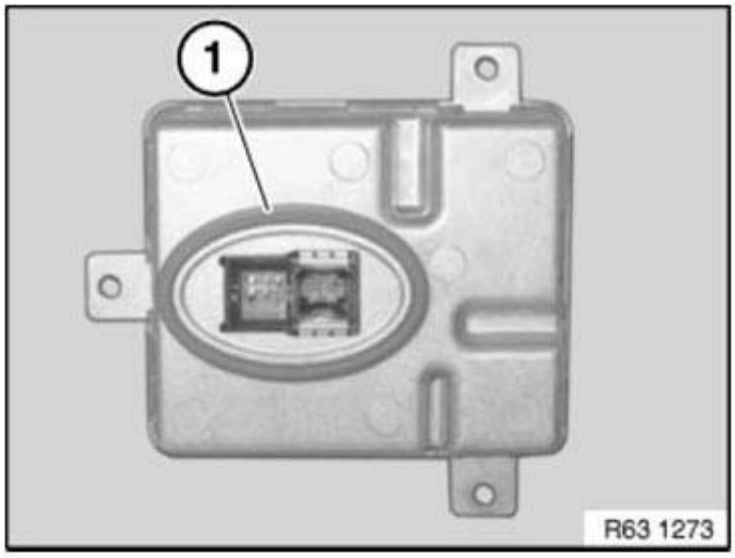


Fig. 14: Identifying Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 861 REPLACING CONTROL UNIT FOR RIGHT XENON HEADLIGHT

Operation is described in:

- **REMOVE CONTROL UNIT FOR LEFT XENON HEADLIGHT**

63 12 895 REPLACING DRIVE/ELECTRONICS BOX FOR LEFT ADAPTIVE HEADLIGHT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore disconnect all components from voltage supply before removal. Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

Necessary preliminary tasks:

- Remove wheel arch cover at front

NOTE: For purposes of clarity, picture shows component removed.

Release screws (1).

Remove drive/electronics box for adaptive headlight (2) from headlight (3).

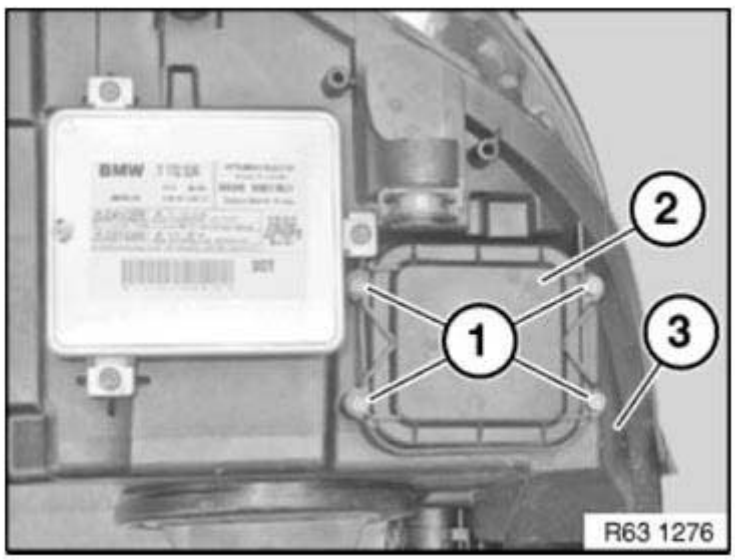


Fig. 15: Identifying Adaptive Headlight Drive/Electronic Box With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing, make sure sealing sleeve (1) is correctly seated.

Make sure pin housing (2) is exactly seated.

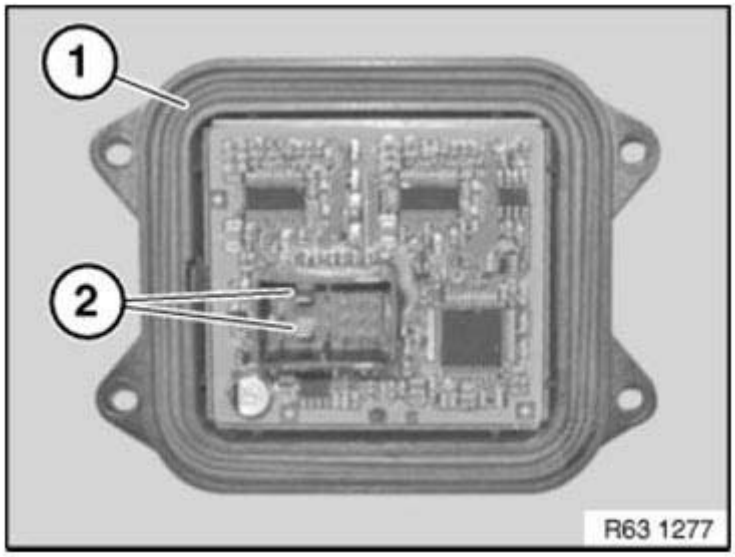


Fig. 16: Identifying Sealing Sleeve And Pin Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Carry out vehicle programming/coding.

63 12 896 REPLACING DRIVE/ELECTRONICS BOX FOR RIGHT ADAPTIVE HEADLIGHT

Operation is described in:

- Removing **DRIVE/ELECTRONICS BOX FOR LEFT ADAPTIVE HEADLIGHT**

63 12 870 REPLACING IGNITION UNIT FOR LEFT XENON HEADLIGHT (WITH XENON BULB)

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore, before removing, disconnect all components from the voltage supply (lighting system and ignition off). Work on the entire xenon lighting system (ignition device, control unit and bulb) may only be carried out by qualified personnel.

NOTE: Front wheel removed for purposes of clarity.

Unlock fasteners (1) by turning counterclockwise through 180° and remove cover (2).

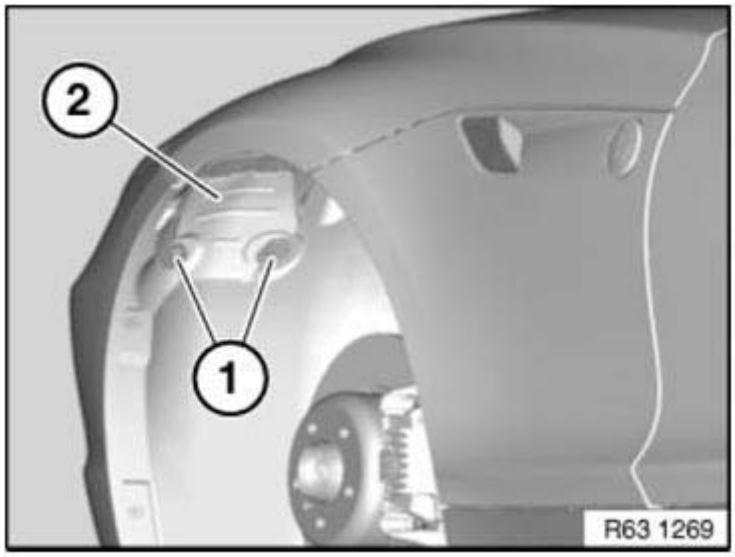


Fig. 17: Identifying Xenon Headlight Ignition Unit Cover With Fasteners
Courtesy of BMW OF NORTH AMERICA, INC.

Turn protective cap (1) in the direction of the arrow and remove.

Installation note:

Protective cap (2) must be correctly engaged.

Check seal.

Replace protective cap (2) if necessary.

Comply with **INSTRUCTIONS FOR REPLACING THE PROTECTIVE CAP** .

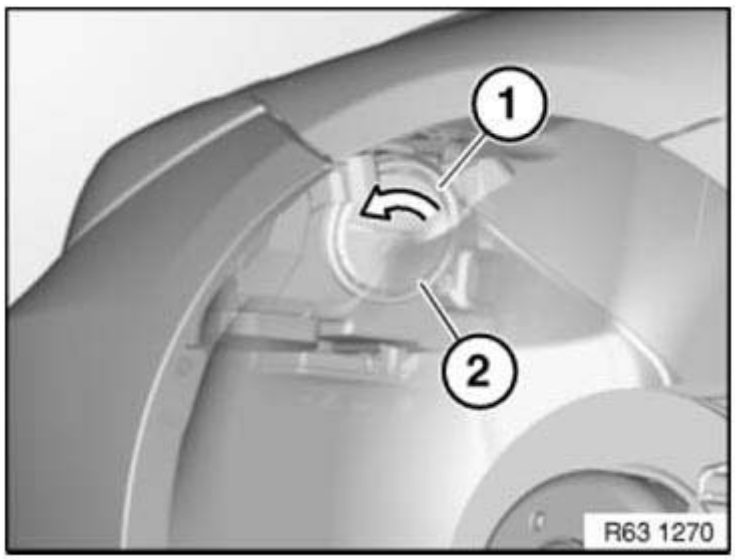


Fig. 18: Removing Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

Turn ignition unit for xenon headlight (2) approx. 30° counterclockwise and detach from headlight (3).

Installation note:

Make sure inner ring is correctly positioned in ignition unit for xenon headlight (2).

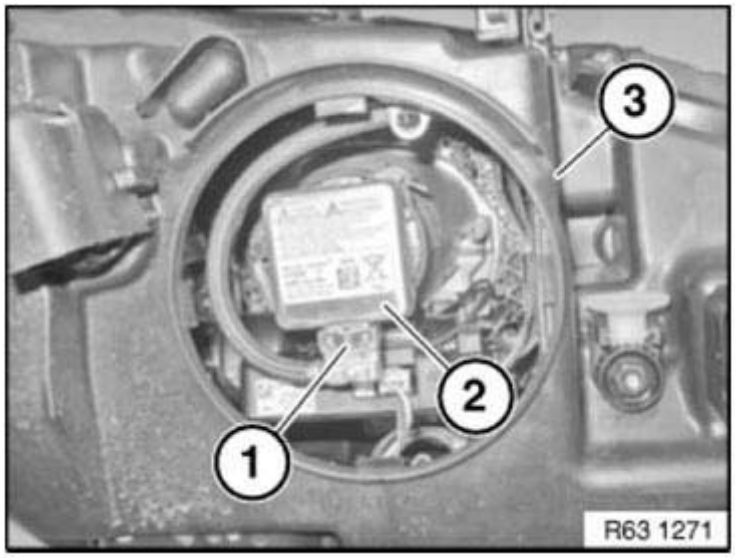


Fig. 19: Identifying Xenon Headlight Ignition Unit With Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

63 12 871 REPLACING IGNITION UNIT FOR RIGHT XENON HEADLIGHT (WITH XENON BULB)

Operation is described in:

- Remove **IGNITION UNIT FOR LEFT XENON HEADLIGHT**

6313 TURN SIGNAL INDICATOR LIGHTS

63 13 200 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT AUXILIARY DIRECTION INDICATOR

Necessary preliminary tasks:

- Swing engine hood/bonnet upwards

Release front auxiliary direction indicator in area (1) with a suitable tool and press outwards.

Remove front auxiliary direction indicator (2) in direction of arrow.

Unlock plug connection behind and disconnect.

Remove front auxiliary turn signal lamp (2).

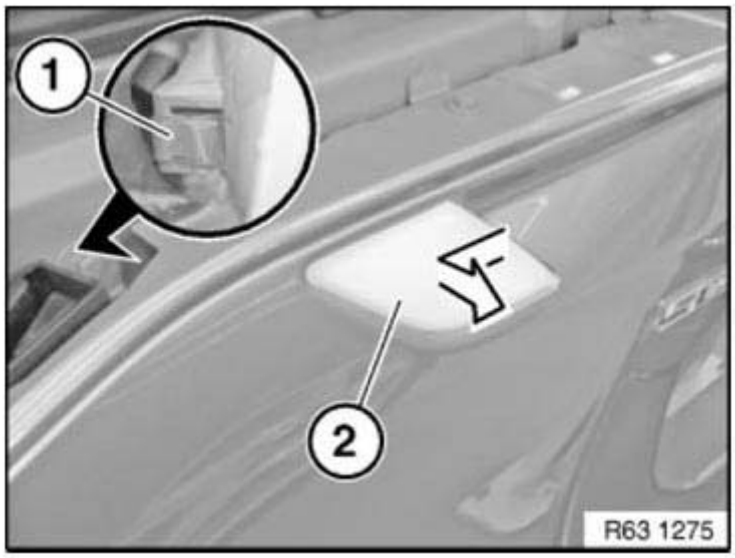


Fig. 20: Removing Front Auxiliary Direction Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

6314 CLEARANCE AND SIDE MARKER LAMPS

63 14 060 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT SIDE MARKER

Necessary preliminary tasks

- Remove front **WHEEL ARCH COVER FRONT SECTION**

NOTE: Minimum object temperature of side marker and side panel > or = 18 °C. If this temperature is not achieved, the components must be preheated.

Removing side marker

Carefully heat side marker (1) in area (A) with hot air blower and detach with special tool 00 9 323 from side panel (2).

NOTE: Side marker (1) cannot be reused.

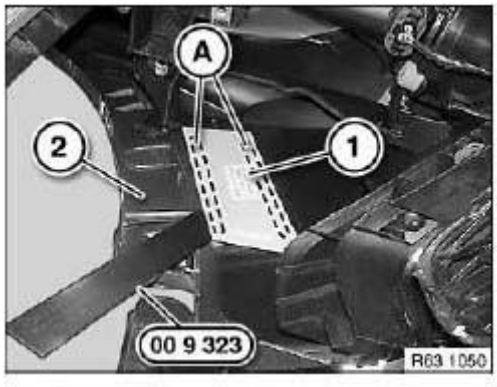


Fig. 21: Removing Side Marker From Side Panel Using Special Tool (00 9 323)
Courtesy of BMW OF NORTH AMERICA, INC.

Cleaning side panel

For cleaning, use a fluff-free disposable cloth or a clean cleaning cloth.

Clean adhesive area of side panel with spirit.

Air drying time at least 1 minute.

Do not grip bonding surface.

Fitting side marker

Pull off liner* (1) and gently press side marker (2) onto side panel.

Check position and if necessary realign.

Minimum application pressure is achieved by applying firm thumb pressure in stages over the entire joining surface (hold time approx. 1 second).

Firm thumb pressure approx. 35 N/cm^2 .

* Liner is the protective film on a new side marker.

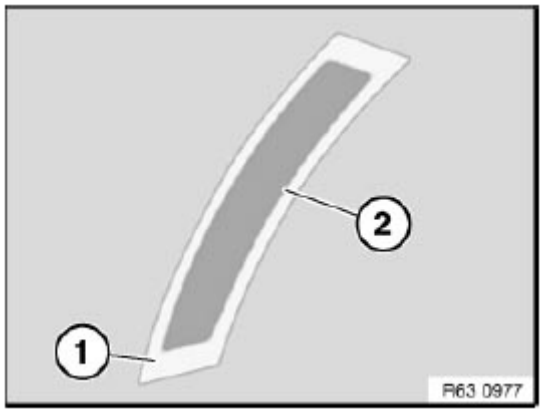


Fig. 22: Identifying Side Marker With Liner
Courtesy of BMW OF NORTH AMERICA, INC.

63 14 120 REMOVING AND INSTALLING/REPLACING REAR REFLECTOR (ON REAR BUMPER)

Unclip reflector (1) from bumper trim (2) in area (3).

Pull reflector (1) out of guide and detach towards rear from bumper trim (2).

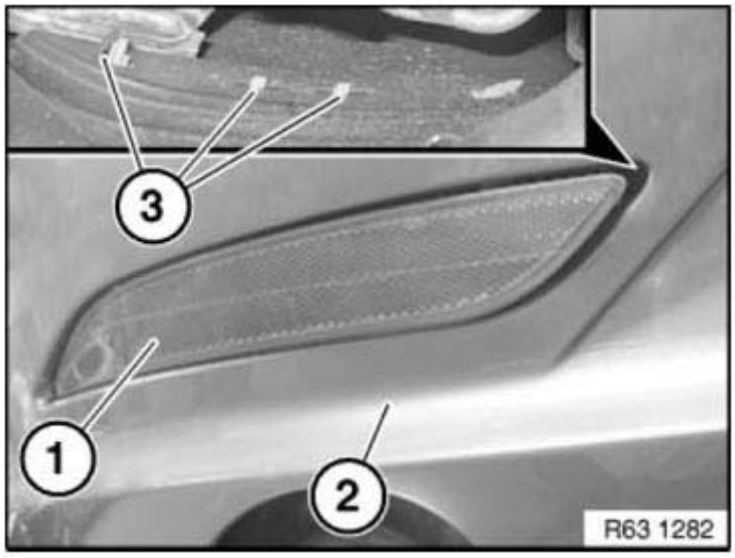


Fig. 23: Identifying Reflector And Bumper Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Catches (1) and guide (2) on rear reflector must not be damaged.

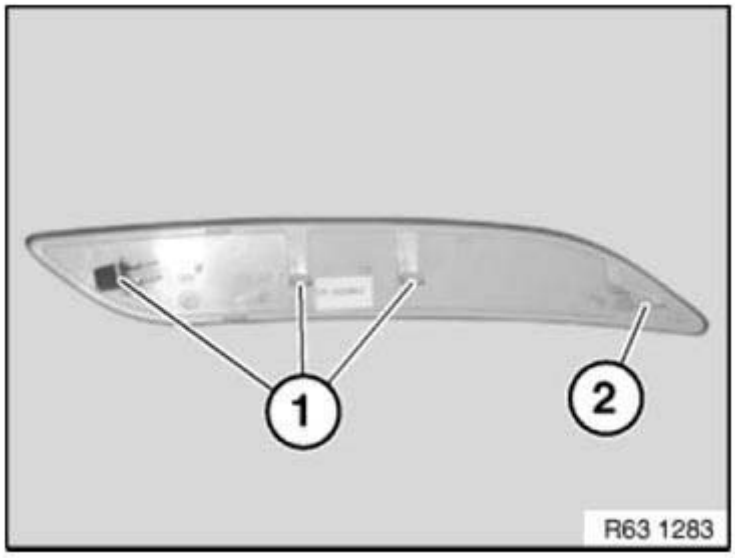


Fig. 24: Identifying Catches And Guide On Rear Reflector
Courtesy of BMW OF NORTH AMERICA, INC.

6321 REAR LIGHT CLUSTER

63 21 170 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT TAIL LIGHT

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD PROTECTION) .

Necessary preliminary tasks:

- Remove **LEFT LOADING SILL END COVER**

Unfasten plug connection (1) and disconnect.

Unscrew nuts (2).

Tightening torque **63 21 1AZ** .

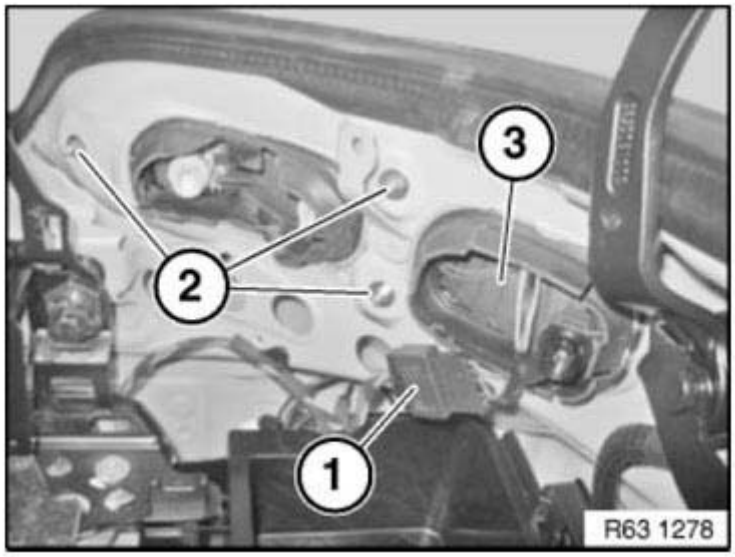


Fig. 25: Identifying Tail Light Plug Connections And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove rear light (1) in direction of arrow.

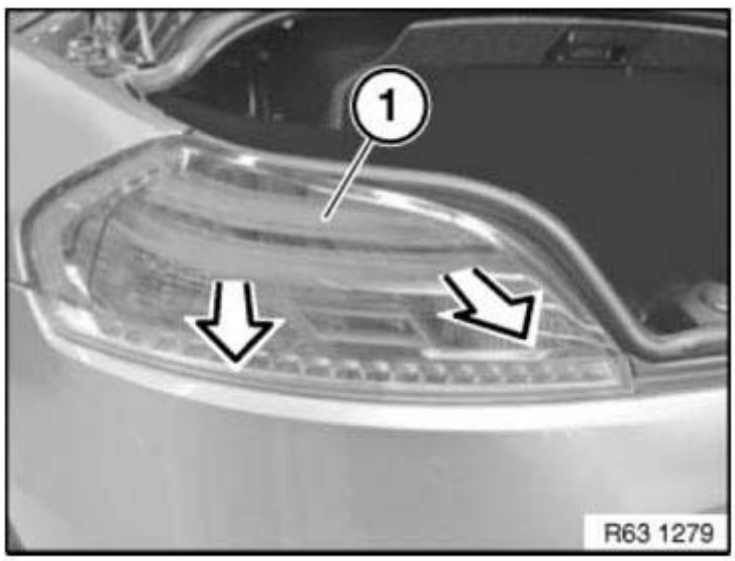


Fig. 26: Removing Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Make sure sealing frame (1) is exactly seated.

Make sure guides (2) of rear light (3) are correctly seated in associated mountings.

Make sure (outer) gap of rear light (3) is uniform all round.

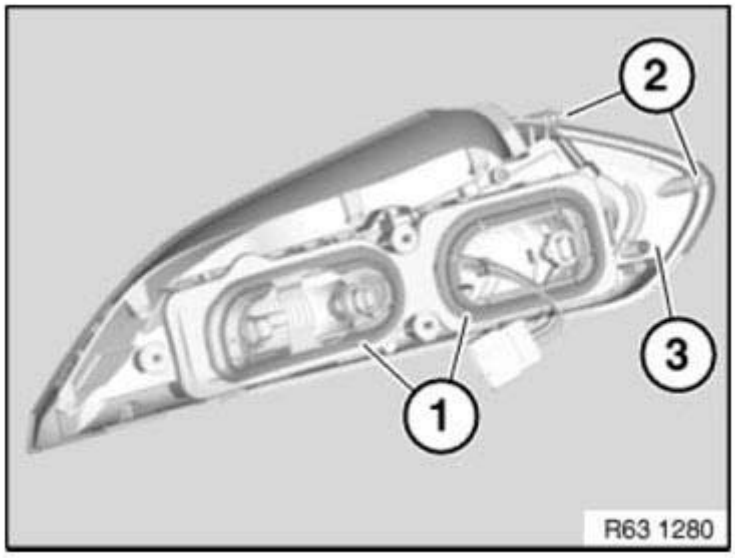


Fig. 27: Identifying Rear Light Guides, Sealing Frame And Outer Gap
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- Replace **SEALING FRAME FOR REAR LIGHT**
- Remove **A SOCKET HOUSING FOR REAR LIGHT**

63 21 055 REPLACING A SOCKET HOUSING FOR LEFT OR RIGHT REAR LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Release side cover trim (1) and remove in direction of arrow.

Remove side cover trim (2) in direction of arrow.

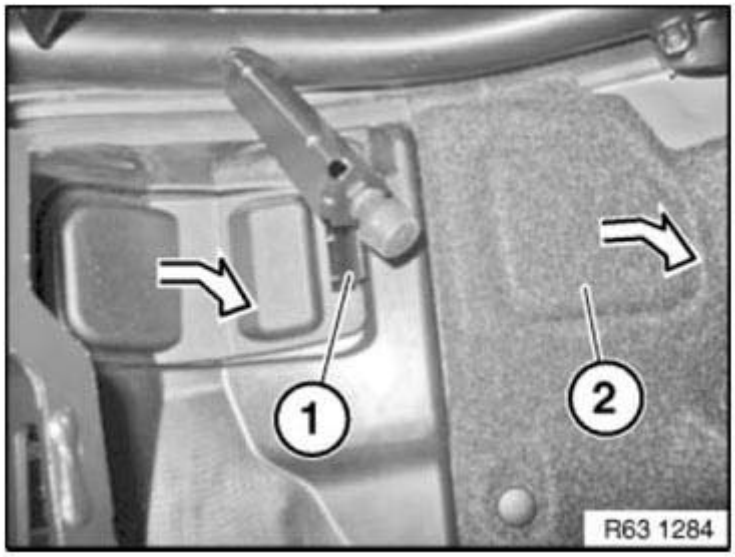


Fig. 28: Removing Side Cover Trim
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw socket housings (1-3) from rear light (4).

NOTE:

1. **Socket housing for brake light**
2. **Socket housing for reversing light**
3. **Socket housing for brake light/rear fog light**

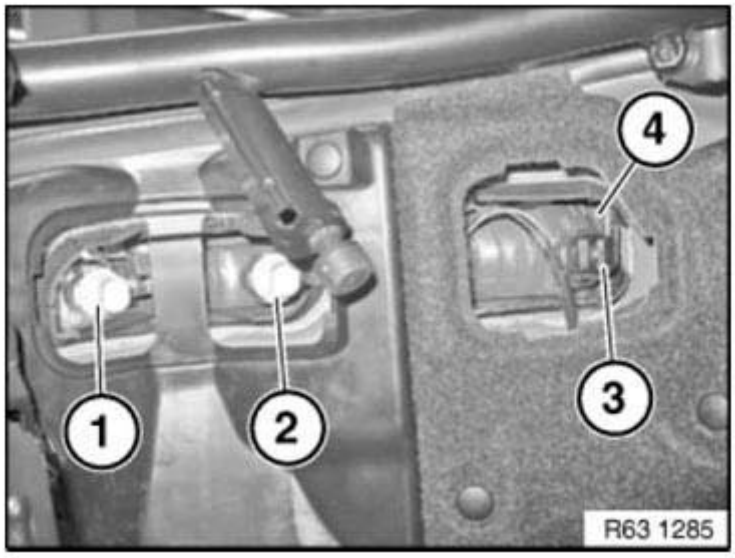


Fig. 29: Identifying Rear Light Socket Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

Convert **BULBS** , replace if necessary

63 21 101 REPLACING SEALING FRAME FOR LEFT OR RIGHT REAR LIGHT

Necessary preliminary tasks

- Remove **REAR LIGHT**

Detach sealing frame (1) from rear light (2).

Installation:

Make sure sealing frame (1) is correctly bonded all round on rear light (2).

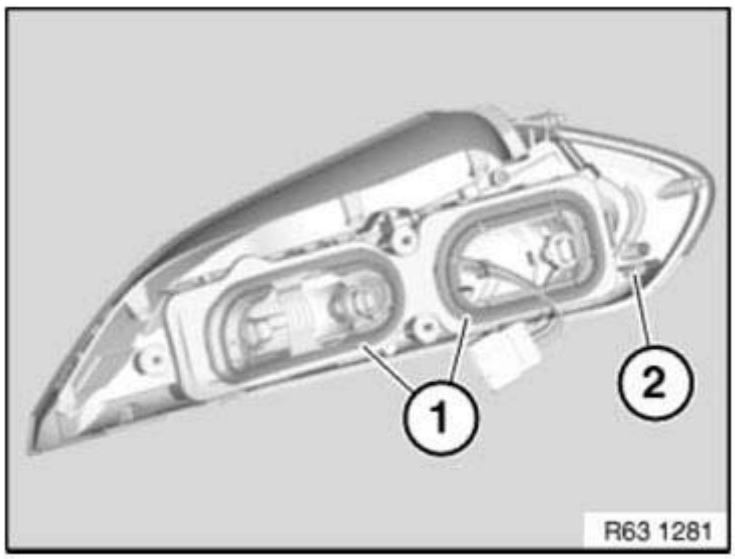


Fig. 30: Identifying Sealing Frame On Rear Light
Courtesy of BMW OF NORTH AMERICA, INC.

6325 BRAKE LIGHTS

63 25 000 REMOVING AND INSTALLING/REPLACING AUXILIARY BRAKE LIGHT

Necessary preliminary tasks:

- Remove **AUXILIARY BRAKE LIGHT REAR LID COVER**

Lever out clips (1).

Remove auxiliary brake light (2) from rear lid cover (3).

Installation:

- If necessary, replace clips (1).
- If necessary, replace auxiliary brake light seal.

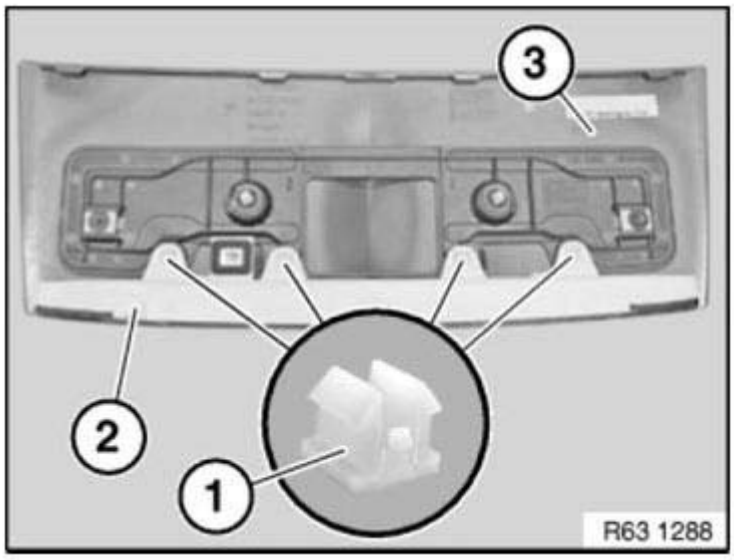


Fig. 31: Identifying Auxiliary Brake Light With Rear Lid Cover And Clips
Courtesy of BMW OF NORTH AMERICA, INC.

6326 LICENCE PLATE LIGHTS

63 26 000 REMOVING AND INSTALLING/REPLACING LEFT OR RIGHT NUMBER/LICENSE PLATE LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Lever out number/license plate light (1) with special tool 64 1 020 as illustrated.

Disconnect associated plug connection and remove number/license plate light (1).

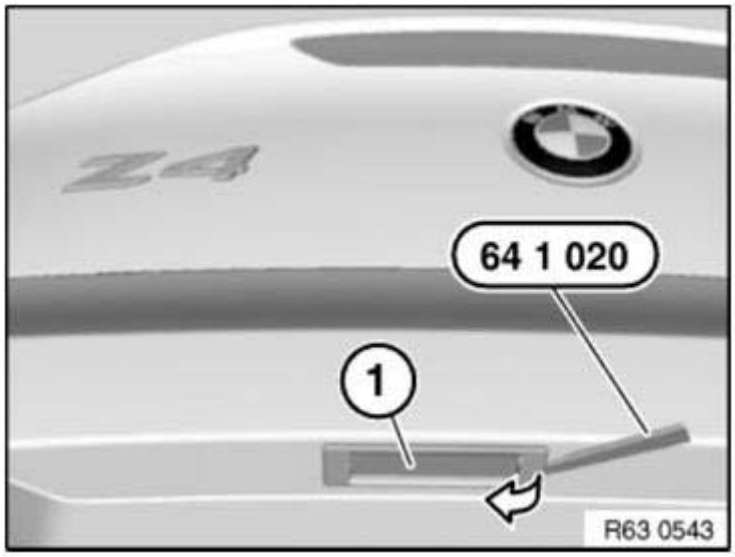


Fig. 32: Removing Number/License Plate Light Using Special Tool (64 1 020)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

REPLACE NUMBER/LICENSE PLATE LIGHT

6331 INTERIOR LIGHTS

63 31 000 REMOVING AND INSTALLING/REPLACING COMPLETE CEILING LIGHT

IMPORTANT: Follow instructions for handling light bulbs (interior lights).

NOTE: Secure complete ceiling light against falling out.

Unclip complete ceiling light (1) with plastic wedge in direction of arrow from cowl panel insert (2).

Unlock associated plug connections and disconnect.

Remove complete ceiling light (1).

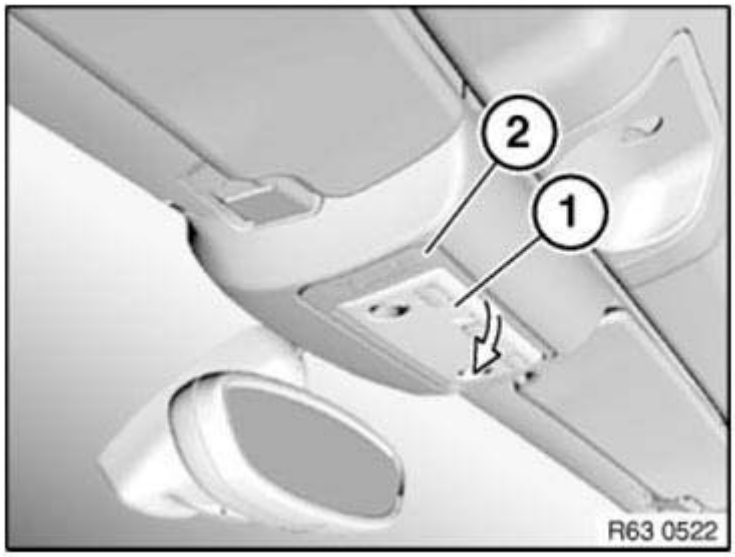


Fig. 33: Opening Complete Ceiling Light
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove **BULBS** .

63 31 020 REMOVING AND INSTALLING/REPLACING FOOTWELL LIGHT

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Driver's side:

Unclip footwell light (1) in direction of arrow from panel for pedals (2), disconnect associated plug connection and remove footwell light (1).

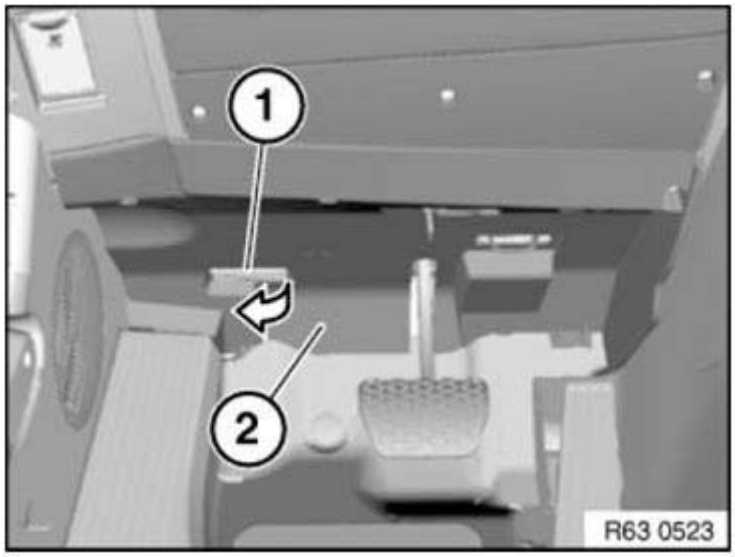


Fig. 34: Opening Footwell Light (Diver's Side)
Courtesy of BMW OF NORTH AMERICA, INC.

Passenger side:

Unclip footwell light (1) in direction of arrow from bottom right instrument panel trim (2), disconnect associated plug connection and remove footwell light (1).

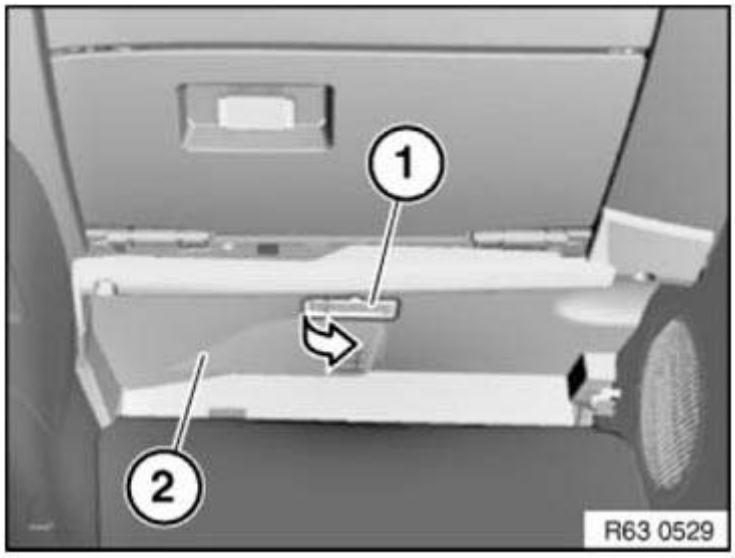


Fig. 35: Opening Footwell Light (Passenger's Side)
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

- If necessary, remove **BULB** .

63 31 020 REMOVING AND INSTALLING/REPLACING FOOTWELL LIGHT (DOOR)

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Lever footwell light (1) in direction of arrow out of door trim (2).

Disconnect associated plug connection and remove footwell light (1).

Replacement

- If necessary, remove **BULB** .
- Note **BULB TYPE**

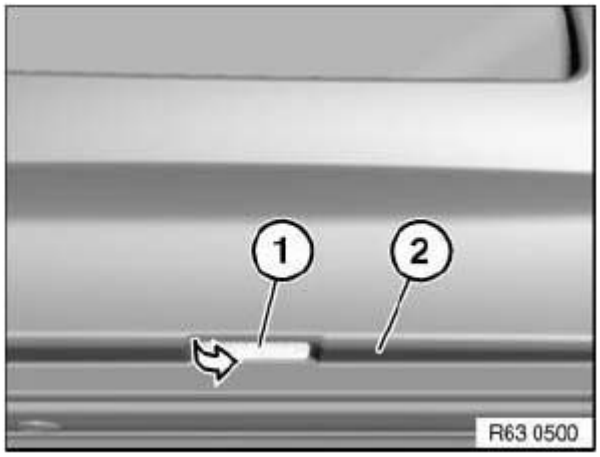


Fig. 36: Removing Footwell Light From Door Trim
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 150 REMOVING AND INSTALLING/REPLACING GLOVE BOX LIGHT

IMPORTANT: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

NOTE: Open glove box.

Lever out glove box light (1) in direction of arrow.

Disconnect plug connection and remove glove box light (1).

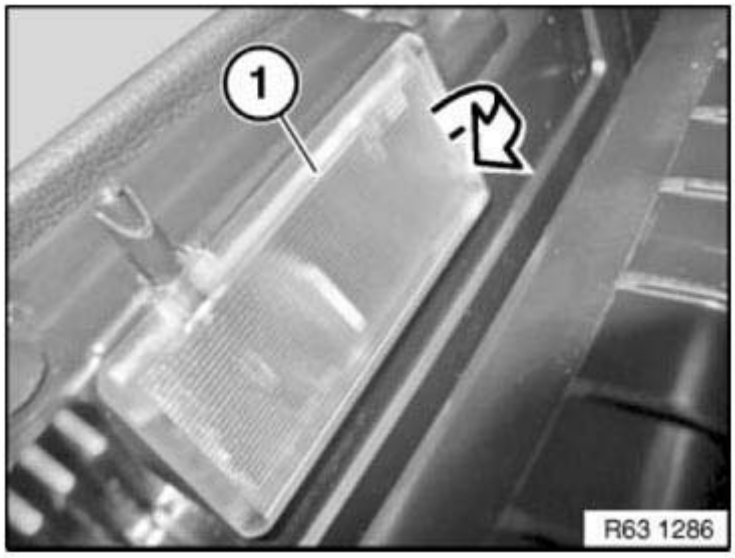


Fig. 37: Removing Glove Box Light
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- If necessary, remove **BULB** .
- Note **BULB TYPE**

63 31 080 REMOVING AND INSTALLING/REPLACING LUGGAGE COMPARTMENT LIGHT

IMPORTANT: Follow instructions for handling light bulbs (interior lights).

Lever out luggage compartment light (1) in direction of arrow.

Disconnect associated plug connection and remove luggage compartment light (1).

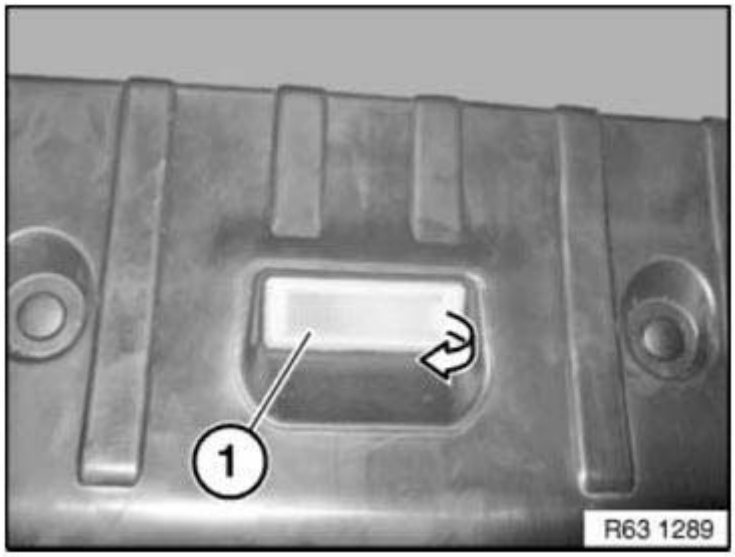


Fig. 38: Removing Luggage Compartment Light
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement:

If necessary, remove **BULB** .

63 31 180 REPLACING LED FOR FRONT DOOR TRIM PANEL LIGHT (LEFT OR RIGHT)

Necessary preliminary tasks

- Remove **FRONT LEFT DOOR TRIM PANEL**

Unlock LED for door opener (1) and remove towards top.

Unlock LED for storage compartment (2) and remove in direction of arrow.

Unlock bushing (3).

Disconnect plug connection (4).

Detach adhesive tape (5) and remove LED (1/2).

Installation:

Make sure LED (1/2) is correctly seated.

Replace adhesive tape (5).

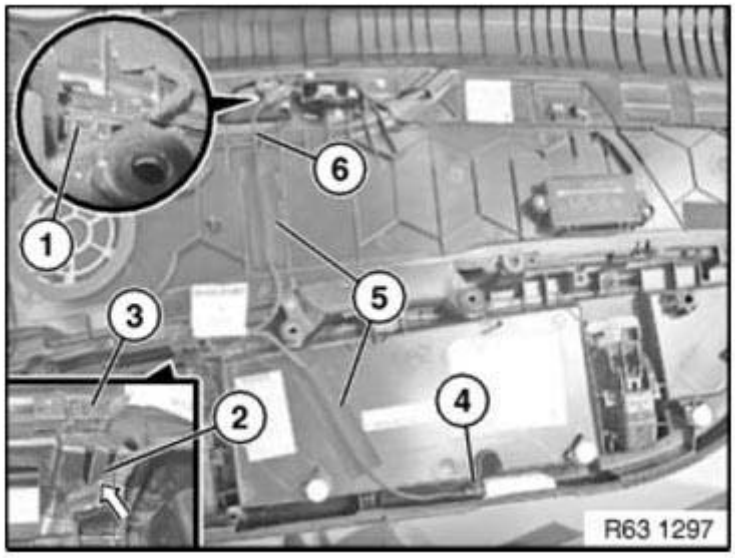


Fig. 39: Identifying Door Opener/Storage Compartment LED With Adhesive Tapes And Bushing
Courtesy of BMW OF NORTH AMERICA, INC.

63 31 185 REPLACING LED FOR SIDE TRIM PANEL LIGHT

Necessary preliminary tasks

- Remove **REAR LEFT SIDE TRIM PANEL**

Feed out cable (1).

Detach both LEDs for side trim panel light (2) in direction of arrow from side trim panel (3).

Installation:

LED for side trim panel light (2) must be felt to snap into place in side trim panel (3).

Make sure cable (1) correctly laid.

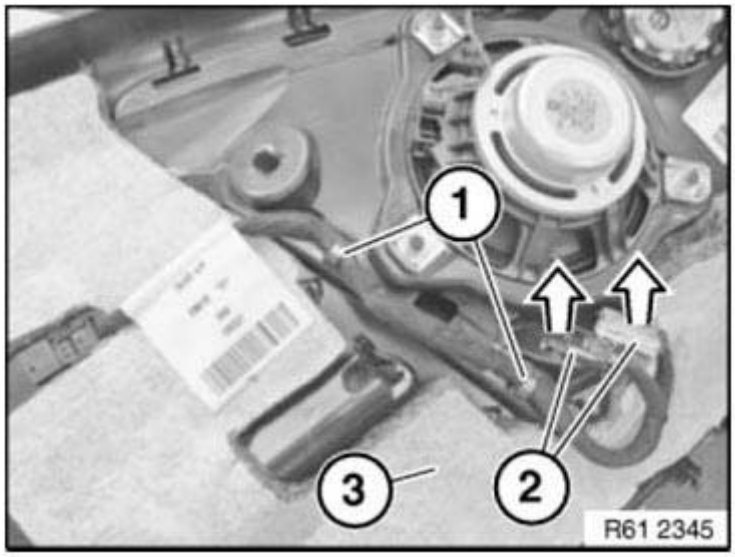


Fig. 40: Removing Side Trim Panel LED's
Courtesy of BMW OF NORTH AMERICA, INC.

6399 LIGHT BULBS

63 99 ... INSTRUCTIONS FOR HANDLING LIGHT BULBS (EXTERIOR LIGHTS)

WARNING: Xenon headlights: Danger to life due to high voltage!
Work on the entire xenon lighting system (ignition unit, control unit and lamp) may only be carried out by specialist personnel.

WARNING: Halogen lamps are under pressure:
To avoid injury, wear protective goggles and gloves.

IMPORTANT: To avoid short circuits, disconnect bulbs from the power supply before replacing them (lighting system and ignition off).

Do not touch the glass bulbs in new light bulbs as even the smallest amount of dirt will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99 ... INSTRUCTIONS FOR REPLACING LIGHT BULBS (INTERIOR LIGHTS)

IMPORTANT: To avoid short circuits, disconnect bulbs from the power supply before replacing them (lighting system and ignition off).

Do not touch the glass bulbs in new lights bulbs as even the slightest contamination will burn in and reduce bulb service life.

Only touch light bulbs with clean gloves or a clean cloth.

Do not expose light bulbs to mechanical vibrations.

Use only recommended light bulbs.

Follow the light bulb manufacturer's instructions without fail.

63 99 ... NOTES FOR REPLACING THE PROTECTIVE CAP OF THE HEADLIGHT

IMPORTANT: Risk of damage!
Damaged seals on the protective caps will lead to moisture penetration into the headlight.
This will in turn cause porous cable insulations and malfunctioning of the headlight.

When working on the headlight system, check the protective cap seals.

Replace the protective cap in the event of damage!

Example: screwed protective cap

Seal (1) on protective cap (2).

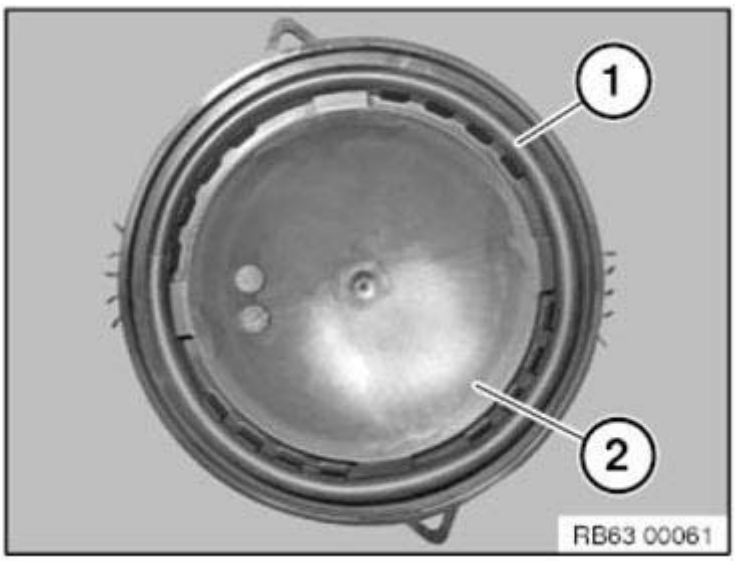


Fig. 41: Identifying Seal On Protective Cap (Screwed Protective Cap)
Courtesy of BMW OF NORTH AMERICA, INC.

Example: latchable protective cap

Seal (1) on protective cap (2).

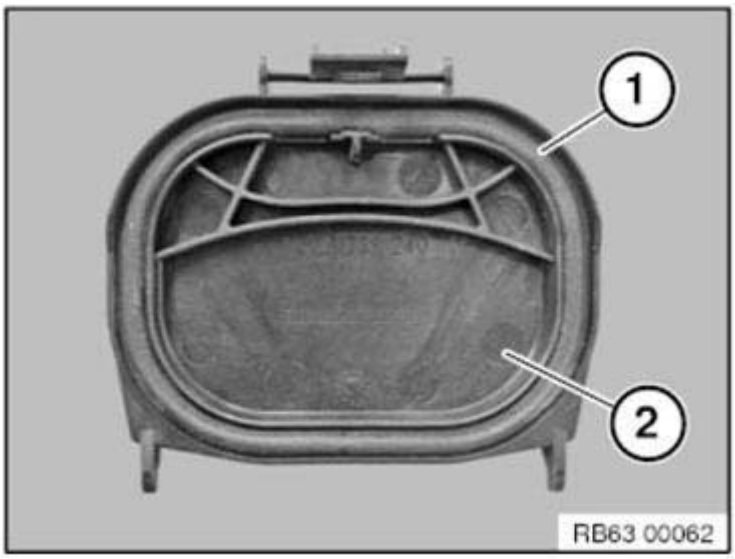


Fig. 42: Identifying Seal On Protective Cap (Latchable Protective Cap)
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 431 REPLACING BULB FOR FRONT CEILING LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Necessary preliminary tasks

- Remove **FRONT CEILING LIGHT**

Turn bulbs (1) in direction of arrow and pull out of ceiling light (2).

Installation:

Note **BULB TYPE** .

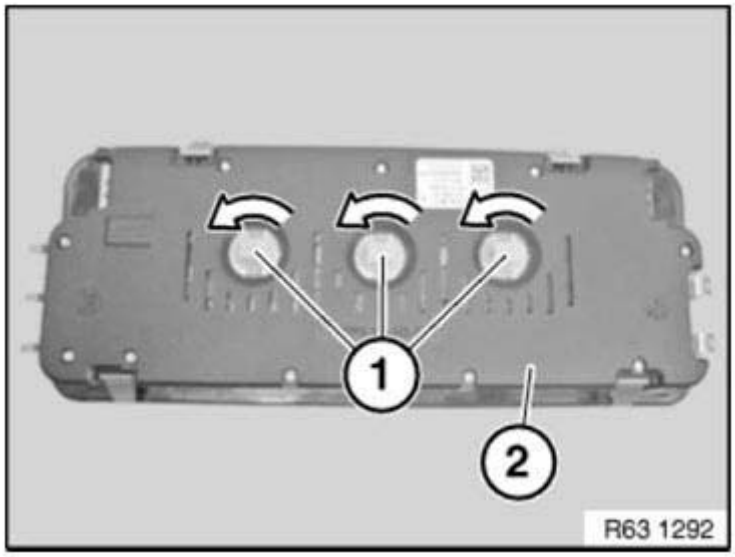


Fig. 43: Tuning Bulbs On Ceiling Light
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 140 REPLACING BULB FOR FRONT LEFT (OR RIGHT) SIDE LIGHTS (XENON HEADLIGHT)

WARNING: Version with xenon headlights: Danger to life due to high voltage!
Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off).
Work on the entire xenon lighting system (control unit, ignition unit with lamp) may only be carried out by specialist personnel.
Follow instructions for handling light bulbs (exterior lights).

Turn housing (1) in direction of arrow and remove.

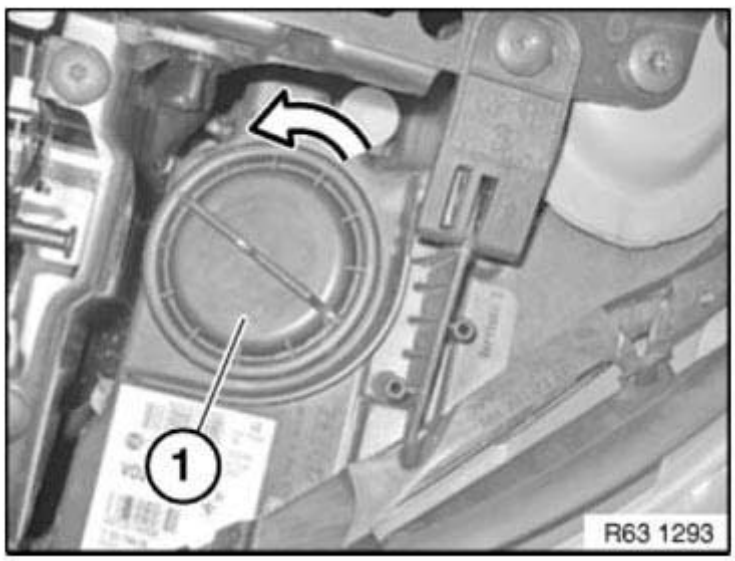


Fig. 44: Removing Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

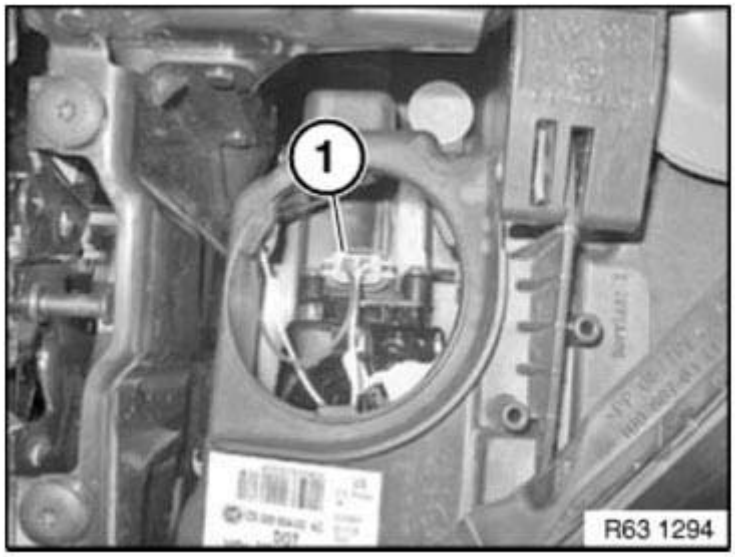


Fig. 45: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb holder (1) in direction of arrow and pull out of headlight (2).

Installation:

Note type of bulb.

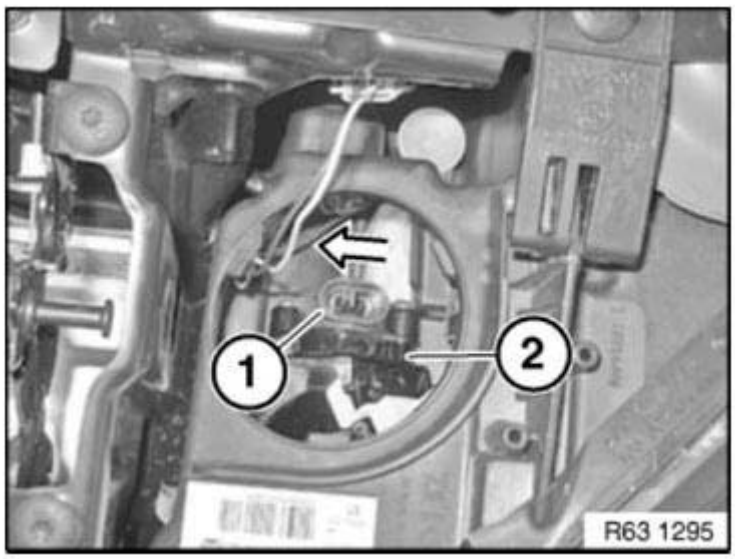


Fig. 46: Turning Bulb Holder

Courtesy of BMW OF NORTH AMERICA, INC.

63 99 275 REPLACING BULB FOR FRONT RIGHT DIRECTION INDICATOR

Operation is described in:

Replacing **BULB FOR FRONT LEFT TURN INDICATOR**

63 99 461 REPLACING BULB FOR GLOVEBOX LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Necessary preliminary tasks

- Remove **GLOVEBOX LIGHT**

Press springs of glovebox light (1) in direction of arrow.

Remove bulb (2).

Installation:

Note **BULB TYPE** .

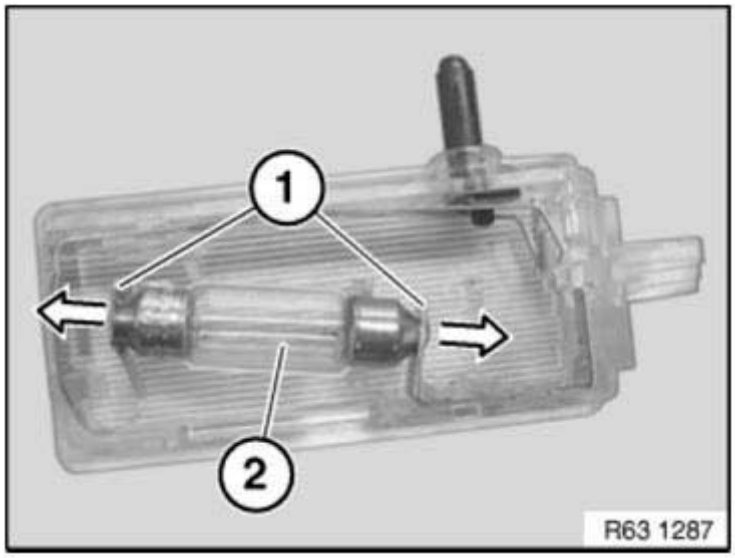


Fig. 47: Press Glovebox Light Springs
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 273 REPLACING BULB FOR LEFT (OR RIGHT) FRONT TURN INDICATOR

WARNING: Version with xenon headlights: Danger to life due to high voltage! Therefore, before removing, disconnect all components from the power supply (lighting system and ignition off).
Work on the entire xenon lighting system (control unit, ignition unit with bulb) may only be carried out by specialist personnel.
Follow instructions for handling light bulbs (EXTERIOR LIGHTS) .

NOTE: Front wheel removed for purposes of clarity.

Unlock fasteners (1) by turning counterclockwise through 180° and fold up cover (2) in direction of arrow.

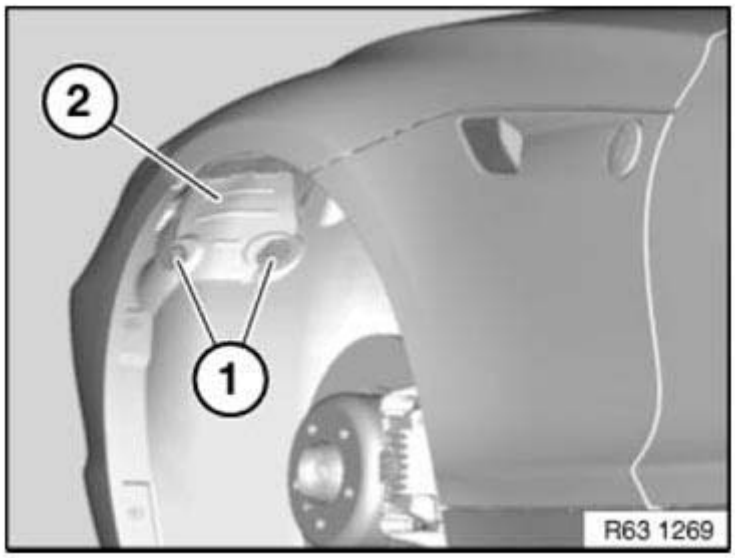


Fig. 48: Identifying Turn Indicator Unit Cover With Fasteners
Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb holder (1) approx. 30° counterclockwise and remove from headlight (2).

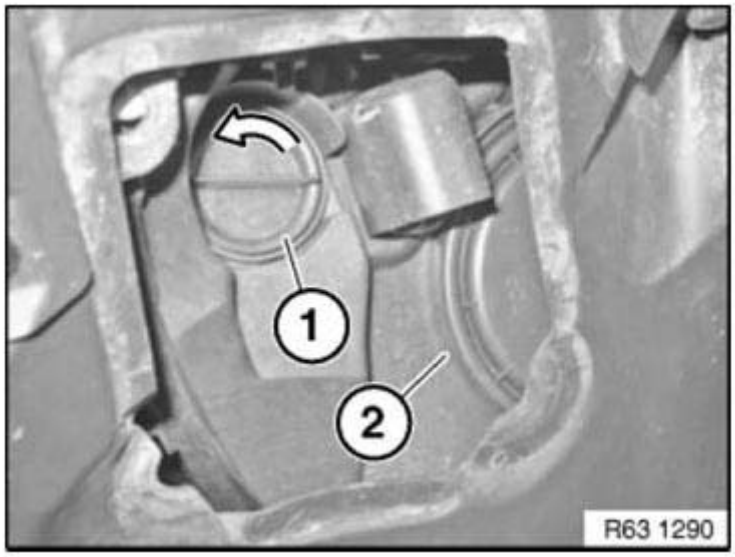


Fig. 49: Turning Bulb Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Turn bulb (1) in direction of arrow out and remove from bulb holder (2) in upward direction.

Installation:

Note **BULB TYPE** .

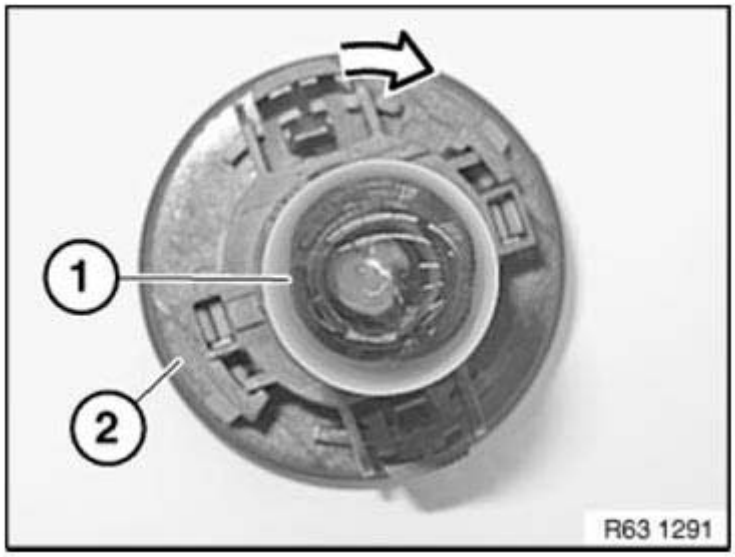


Fig. 50: Removing Bulb Holder
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 076 REPLACING BULB FOR LEFT (OR RIGHT) XENON HEADLIGHT

Operation is described in:

- Removing **IGNITION UNIT FOR XENON HEADLIGHT**

63 99 077 REPLACING BULB FOR RIGHT XENON HEADLIGHT

Operation is described in:

Replacing **IGNITION UNIT FOR RIGHT XENON HEADLIGHT**

63 12 871 REPLACING IGNITION UNIT FOR RIGHT XENON HEADLIGHT (WITH XENON BULB)

Operation is described in:

- Remove **IGNITION UNIT FOR LEFT XENON HEADLIGHT**

63 99 437 REPLACING LIGHT BULB FOR FOOTWELL LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Necessary preliminary tasks

- Remove **FOOTWELL LIGHT**

Turn bulb holder (1) in direction of arrow and pull out of footwell light (2).

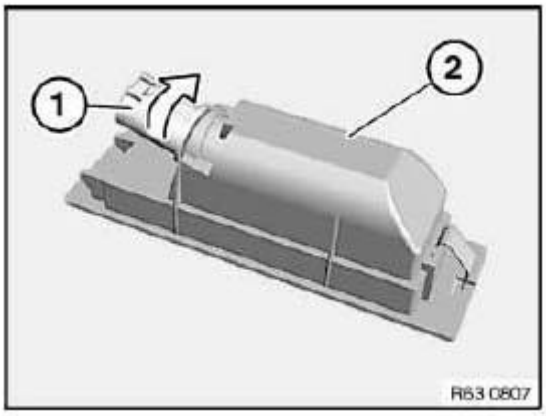


Fig. 51: Turning Bulb Holder To Remove Footwell Light
Courtesy of BMW OF NORTH AMERICA, INC.

Detach bulb (1) in direction of arrow.

Installation:

Note **BULB TYPE** .

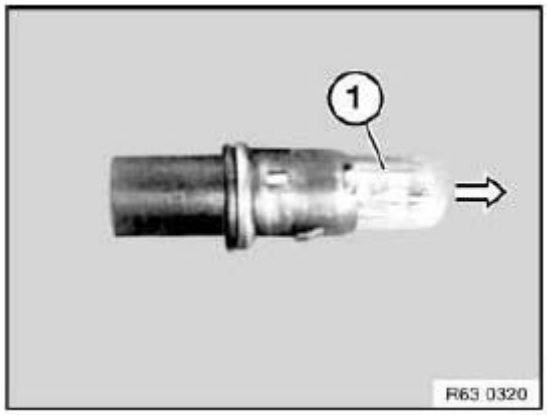


Fig. 52: Disconnecting Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 452 REPLACING LIGHT BULB FOR LUGGAGE COMPARTMENT LIGHTING

WARNING: Follow instructions for HANDLING LIGHT BULBS (INTERIOR LIGHTS) .

Necessary preliminary tasks

- Remove **LUGGAGE COMPARTMENT LIGHT**

Turn bulb holder (1) in direction of arrow and withdraw from license plate light (2).

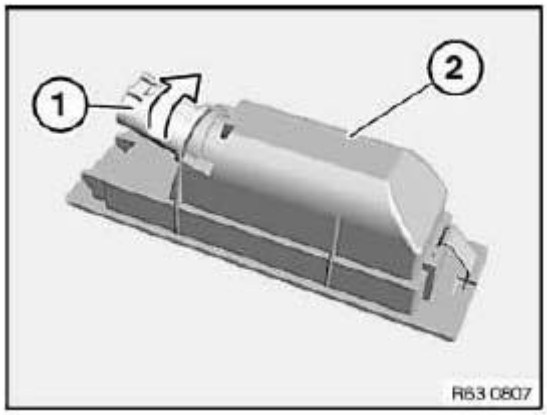


Fig. 53: Removing Bulb Holder From License Plate Light
Courtesy of BMW OF NORTH AMERICA, INC.

Detach bulb (1) in direction of arrow.

Installation:

Note **BULB TYPE** .

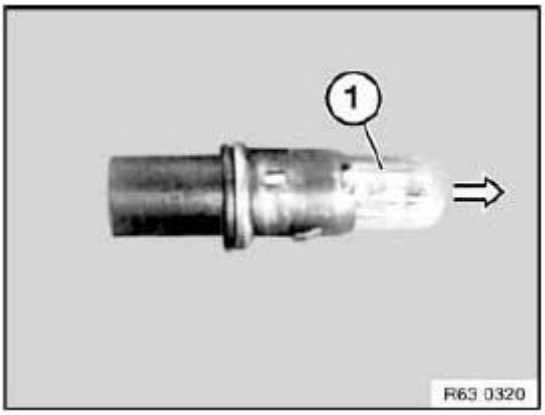


Fig. 54: Disconnecting Bulb
Courtesy of BMW OF NORTH AMERICA, INC.

63 99 315 REPLACING LIGHT BULB(S) FOR LEFT OR RIGHT REAR LIGHT

WARNING: Follow instructions for HANDLING LIGHT BULBS (EXTERIOR LIGHTS) .

Necessary preliminary tasks

- Remove **SOCKET HOUSING FOR REAR LIGHT**

Brake light:

Pull faulty bulb (1) in direction of arrow out of socket housing (2).

Installation:

Note **BULB TYPE** .

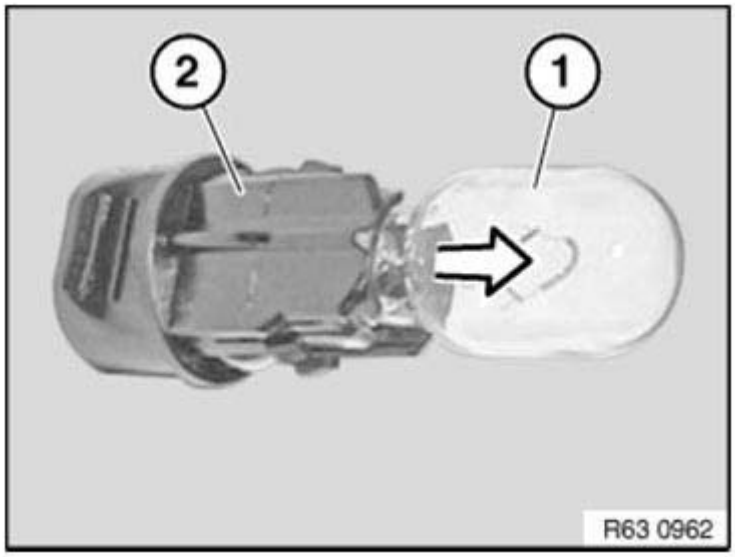


Fig. 55: Removing Bulb From Socket Housing (Brake Light)
Courtesy of BMW OF NORTH AMERICA, INC.

Reversing light:

Pull faulty bulb (1) in direction of arrow out of socket housing (2).

Installation:

Note **TYPE OF BULB** .

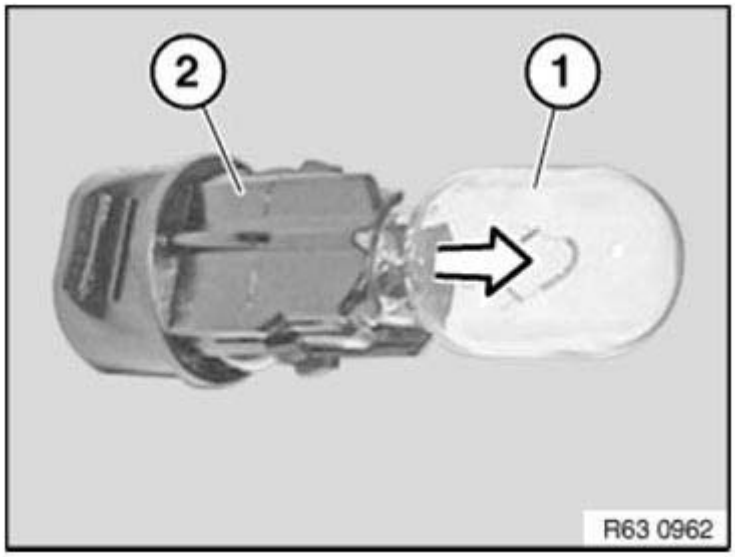


Fig. 56: Removing Bulb From Socket Housing (Reversing Light)
Courtesy of BMW OF NORTH AMERICA, INC.

Brake light/rear fog light:

Turn faulty bulb (1) in direction of arrow and pull out of socket housing (2).

Installation:

Note **TYPE OF BULB** .

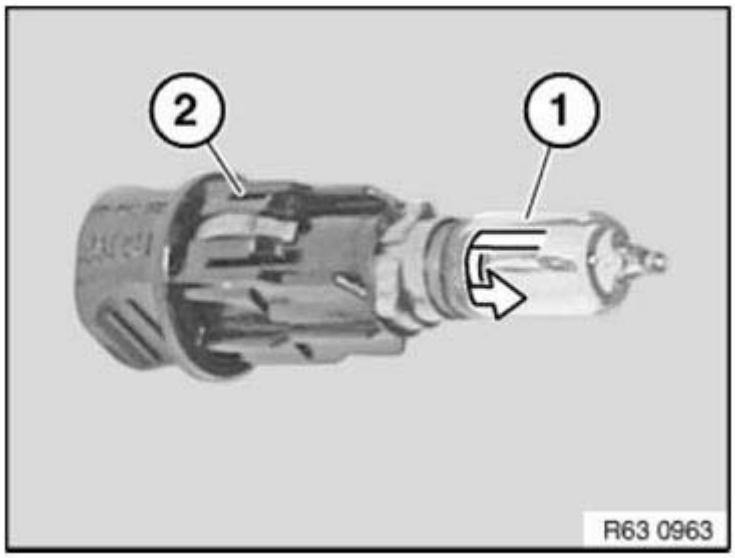


Fig. 57: Removing Bulb From Socket Housing (Brake Light/Rear Fog Light)
Courtesy of BMW OF NORTH AMERICA, INC.

INTERIOR LIGHTS

63 31 INTERIOR LIGHTS E89

INTERIOR LIGHTS SPECIFICATION

Reading light, front	Type	W6W xenon 12V 6W				
Trunk light	Type	W5W 12V 5W				
Glovebox light	Type	C5W festoon 12V 5W				
Footwell light trim	Type	W5W 12V 5W				
Footwell light door	Type	W5W 12V 5W				
Make-up mirror light, front	Type		C10W festoon 12V 10W	T5 12V 2.3W	C10W festoon 12V 10W	T5 12V 2.3W

LICENSE PLATE LIGHTS

63 26 LICENSE PLATE LIGHTS E89

LICENSE PLATE LIGHTS SPECIFICATION

Type	LED

REAR LIGHT UNIT

63 21 REAR LIGHT UNIT E89

REAR LIGHT UNIT SPECIFICATION

Light bulb - brake light	Type	12V 16W
Bulb - brake light/rear fog light	Type	12V 21W
Light bulb - backup light	Type	12V 16W
Light bulb - turn signal	Type	18 LEDs
Light bulb - 3rd brake light	Type	20 LEDs

TURN SIGNALS

63 13 TURN SIGNALS E89

TURN SIGNALS SPECIFICATION

Light bulb - turn signal, front EUR	Type	PSY24WSV 12V 24W
Light bulb - turn signal, front US	Type	PSY24WSV 12V 24W
Light bulb - turn signal, rear EUR	Type	LED
Light bulb - turn signal, rear US	Type	LED
Light bulb - auxiliary turn signal	Type	LED

ADAPTIVE HEADLIGHTS E60, E61, E63, E64, E65, E66, E70, E81, E87, E90, E91, E92, E93

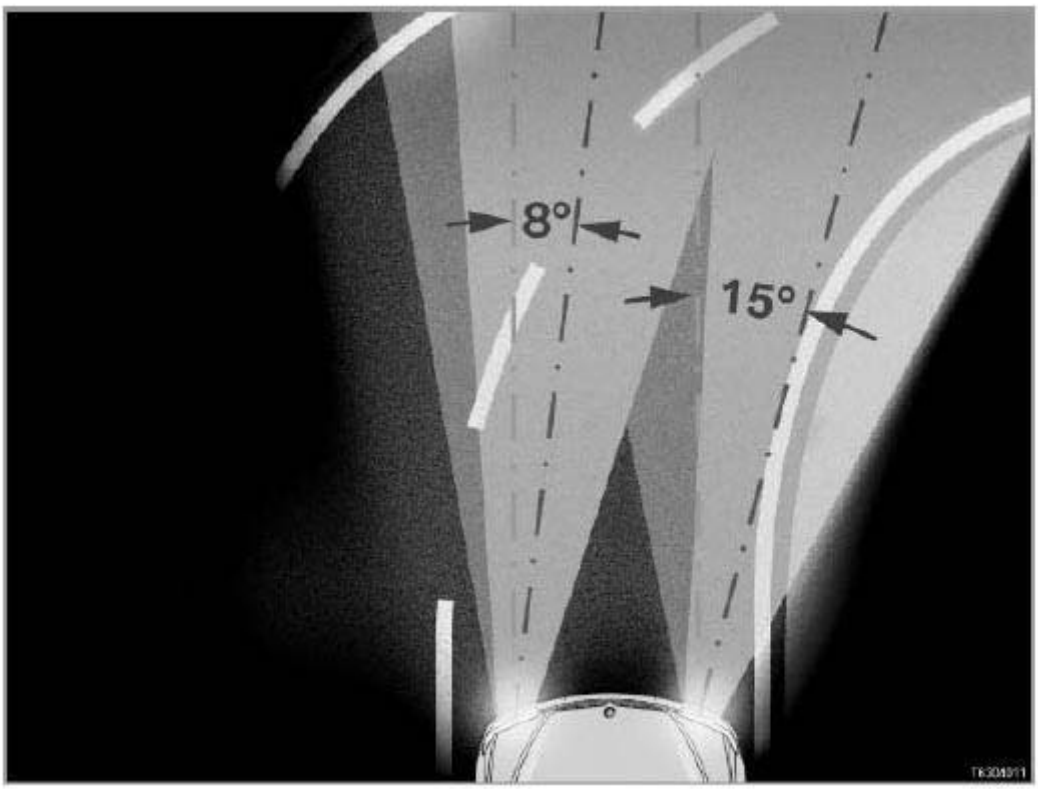


Fig. 1: Identifying Headlights Focusing Angle
Courtesy of BMW OF NORTH AMERICA, INC.

INTRODUCTION

Adaptive headlights turns the bi-xenon headlights towards the inside of a bend when cornering. This improves illumination of the curve of the road. Visibility is therefore improved.

When cornering, the driver is not looking into a "black hole" - instead, the adaptive headlights allow the driver to see the curve of the road.

This service information describes the adaptive headlights for the following model series:

> E60, E61, E63, E64 up to 03/2005:

See **SYSTEM OVERVIEW OF ADAPTIVE HEADLIGHTS (E60, E61, E63, E64, E65, E66 UP TO 03/2005)**

The system overview applies accordingly for the E65 and E66 up to 03/2005.

> E60, E61, E63, E64 from 03/2005 until 09/2005

See **SYSTEM OVERVIEW OF ADAPTIVE HEADLIGHTS (E60, E61, E63, E64, E65, E66 FROM 03/2005)**

The system overview applies accordingly for the E65 and E66 from 03/2005.

NOTE: ***AHL control unit discontinued from 03/2005.***

From 03/2005, the AHL control unit software is integrated into the light module on the E60, E61, E63, E64, E65 and E66. The AHL control unit is no longer fitted.

> E60, E61, E63, E64 from 09/2005

The vehicle electrical system was changed from 09/2005.

As a result of the change, several control units were discontinued and some control unit functions were integrated into new control units.

> E70

The turning lights function is new on the E70 from the start of series production.

The turning lights give the area next to the carriage way additional illumination when you are turning or cornering (driving in tight bends). They are also active when you park the vehicle.

Depending on the country concerned, the turning lights are activated when cornering.

> E81, E87, E90, E91, E92, E93

For the E81, E92, E93 from start of series production and for the E87 from 03/2007, the turning light function is new.

NOTE: ***Turning lights on E70, E81, E87, E92, E93 only in conjunction with option 524***

Turning lights are a subfunction of option 524 "Adaptive headlights".

Bi-xenon headlights are standard equipment on the E92, E93.

Option 524 is standard on the US version.

NOTE: ***AHL components on E46, E53 and E83***

There is a separate system description for the adaptive headlights on the E46,

E53, E83.

NOTE: ***AHL components on the E63, E64***

- **The E63, E64 has a zero-position sensor.**
- **Otherwise, the E63 and E64 are the same as the other 5-Series models.**

NOTE: ***Components for adaptive headlight on E70, E81, E87, E90, E91, E92, E93***

On the E81, E87, E90, E91, E92, E93, the adaptive headlights largely correspond to those on the E60, E61, E63, E64, E65 and E66:

- **E70, E81, E87, E90, E91, E92, E93 vehicles are equipped with a zero-position sensor.**
- **On the E70, E81, E87, E90, E91, E92, E93, the FRM (footwell module) acts as control unit for exterior lighting. The footwell module contains the functions of the light module, AHL control unit and the general module (or body general module).**

BRIEF DESCRIPTION OF COMPONENTS

The following components and control units provide signals for the adaptive headlight system:

CAS: Car Access System

The Car Access System supplies signals for the terminal management (e.g. terminal 15 ON).

The adaptive headlights control unit is activated when terminal 15 is switched ON.

Light Switch

The rotary switch for the side lights and dipped headlights differs depending on the vehicle equipment level (adaptive headlights, automatic driving lights control, automatic or manual headlight-range adjustment). For the adaptive headlights function to operate, the light switch must be set to position "A" ("A" = "automatic driving lights control" and "adaptive headlights").

See **LIGHT SWITCH**

Turn-Signal/Main-Beam Switch

The main-beam headlights are switched on and off with the turn-signal/main-beam switch (by pressing or pulling the switch). The adaptive headlights function operates with both dipped and main-beam headlights.

See **DIRECTION INDICATOR/MAIN-BEAM SWITCH**

SZL: Steering Column Switch

The SZL control unit forwards the signals from the turn-signal/main-beam switch to the adaptive headlights control unit.

E60, E61, E63, E64, E65 and E66

See **SZL: STEERING COLUMN SWITCH CLUSTER**

E70, E81, E87, E90, E91, E92, E93

The steering column switch cluster forwards the signals from the turn-signal/main-beam switch to the footwell module (FRM).

Ride-Height Sensors

If the special equipment "Adaptive headlights" is fitted, the adaptive headlights control unit evaluates the signals from the ride-height sensors. This is because: the adaptive headlights control unit also controls the automatic headlight-range adjustment.

The automatic headlight - range adjustment feature adjusts the vertical aim of the headlights to compensate for variations in the vehicle tilt angle (e.g. when the vehicle is laden, and under braking and acceleration in dynamic driving situations).

See **E60, E61, E63, E64, E65, E66, E90 - RIDE-HEIGHT SENSORS**

Brake Light Switch

If the special equipment "Adaptive headlights" is fitted, the signals from the brake light switch are read by the adaptive headlights control unit.

In addition, the brake light switch signal is also a signal for automatic headlight-range adjustment, see **RIDE-HEIGHT SENSORS** above.

Position Sensor

E60, E61
E65, E66

Hella headlights have a position sensor.

The position sensor in the positioner module for the bi-xenon headlights supplies a signal for the horizontal movement of the headlights.

See **POSITION SENSOR**

Zero-Position Sensor

> E63, E64

> E70, E81, E87, E90, E91, E92, E93

Automotive Lighting headlights, previously Bosch, have a zero-position sensor.

The zero-position sensor registers the horizontal movement of the headlight.

See **ZERO-POSITION SENSOR**

EGS Control Unit or Reversing Light Switch

When reverse gear is engaged, the headlights are moved to the straight - ahead position.

- On vehicles with automatic transmission, the EGS control unit provides the "Reverse gear engaged" signal. (EGS: electronic transmission control).
- On vehicles with manual transmission, the signal is supplied by the reversing light switch.

Rain-Light Sensor For Automatic Driving Lights Control

The rain - light sensor measures the ambient brightness outside the vehicle.

- In twilight conditions, the rain - light sensor transmits the message "Twilight" so that the automatic headlight - range adjustment can activate dipped headlights. The headlights are tilted up and down as required, but they are not yet moved towards the bend in the road.
- In darkness, the rain-light sensor sends the message "Darkness". The adaptive headlights are then activated when the vehicle is cornering. The headlights are moved to the left or right:

See **RAIN-LIGHT SENSOR FOR AUTOMATIC DRIVING LIGHTS CONTROL**

Steering-Angle Sensor and DSC Sensor

The steering angle sensor and DSC sensor (DSC = Dynamic Stability Control) supply signals for the adaptive headlights to the adaptive headlights control unit. These signals are evaluated as follows, depending on the vehicle's speed:

- Vehicle speeds up to **30 km/h:**

  The adaptive headlights function is controlled using the information from the steering angle sensor (in the steering column switch cluster).

- Vehicle speeds between **30 km/h and 50 km/h:**

  In the 30 to 50 km/h speed range, there is a continuous transition in signal evaluation: from the evaluation of signals sent by the steering angle sensor to evaluation of the signals sent by the yaw-rate sensor (in the DSC sensor).

- **In extreme dynamic driving situations** , e.g. if the vehicle starts to skid or fishtail, even at speeds less than **50 km/h** , the signals from the yaw-rate-sensor are considered.

If the vehicle starts to skid or fishtail, the headlights will move to the straight - ahead position. The headlights are not moved until the vehicle has stabilized.

- Vehicle speeds over **50 km/h:**

  At speeds upwards of 50 km/h, the signals from the **yaw-rate sensor** (in the DSC sensor) form the primary basis for control of the adaptive headlights function.

  Reason: For a constant cornering radius, the steering angle required increases disproportionately with speed. In addition, the steering angle required also depends on the coefficient of friction of the road surface.

  Yaw rate is directly proportional to speed. For this reason, the yaw rate is always the most suitable measure for controlling the adaptive headlights at high speeds.

  Even at high speeds, however, the steering angle sensor signal is used to detect (predict) the driver's commands **in advance.** This prediction is important: The yaw rate signal is not supplied until the vehicle has **responded** to the steering wheel movement.

  The steering-angle sensor signal is disabled so that rapid, momentary steering adjustments do not affect the adaptive headlights function.

A number of control units are involved in the adaptive headlights system (see above: **CAS: CAR ACCESS SYSTEM**, **EGS CONTROL UNIT OR REVERSING LIGHT SWITCH** and **SZL: STEERING COLUMN SWITCH**). Depending on the model series and model version concerned, the adaptive headlights are actuated by the following control units:

AHL: Adaptive Headlights

> E60, E61, E63, E64, E65, E66 up to 03/2005

The AHL control unit actuates the adaptive headlights.

For safety reasons, the AHL control unit is also responsible for the automatic headlight-range adjustment. This is because: Oncoming traffic must not be dazzled by the adaptive headlights. If a headlight sticks in an unfavorable position, the AHL control unit will attempt to move this headlight down (using the stepper motors in the automatic headlight-range adjustment).

The AHL control unit is connected to the PT-CAN.

See **AHL: ADAPTIVE HEADLIGHTS**

LM: Light Module

E60, E61, E63, E64, E65, E66 from 03/2005

From 03/2005, the AHL control unit is integrated in the light module.

The light module (LM) controls and monitors all vehicle lights. Information is transmitted and received via the K-CAN data bus.

The light module actuates the indicator light for the adaptive headlights (on the light switch).

See **E60, E61, E63, E64 FROM 03/2005** and/or **E65, E66 (FROM 03/2005)**

FRM: Footwell Module

> E70, E81, E87, E90, E91, E92, E93

The footwell module controls the exterior lighting and the adaptive headlights.

The footwell module thus takes the place of the light module and the AHL control unit.

The footwell module actuates the indicator light for the adaptive headlights (on the light switch).

See **FRM: FOOTWELL MODULE**

The footwell module has its own system description.

SMC: Stepper Motor Controllers

The stepper motor controllers control the stepper motors in the headlights (for the automatic headlight - range adjustment and for the adaptive headlights). The stepper motor controllers are not capable of self - diagnosis. The stepper motor controllers are diagnosed and encoded via the control unit for adaptive headlights.

See **SMC: STEPPER MOTOR CONTROLLERS**

SGM: Safety and Gateway Module

E60, E61, E63, E64 until 09/2005 and E65, E66

The safety and gateway module (SGM) is the interface between the two data buses K-CAN and PT-CAN. Thus, all information exchanged between the light module and the AHL control unit passes through the SGM. Information from the yaw-rate sensor (in the DSC sensor) is also fed through the SGM to the AHL control unit.

KGM: Body Gateway Module

E60, E61, E63, E64 from 09/2005

The vehicle electrical system was changed from 09/2005.

As a result of the change, several control units were discontinued and some control unit functions were integrated into new control units.

The new body gateway module (KGM) supersedes the safety and gateway module (SGM) previously fitted, the door modules and the micro - power module.

Xenon-Headlight Control Unit

The xenon-headlight control unit actuates the bulb in the bi-xenon headlights.

The xenon-headlight control unit is not capable of self-diagnosis. The xenon control unit is monitored by the light module (E70, E81, E87, E90, E91, E92, E93: footwell module).

See **E60, E61, E63, E64, E65, E66, E90 - BI-XENON HEADLIGHTS**

Headlights

Option 524 "Adaptive headlights" is only available in conjunction with option 522 "Xenon dipped and main-beam headlights". This means that bi-xenon headlights are employed.

See **E60, E61, E63, E64, E65, E66, E90 - BI-XENON HEADLIGHTS**

Stepper Motors For the Adaptive Headlights

The stepper motors turn the positioner modules in the bi-xenon headlights.

The stepper motors move the headlights vertically and horizontally (vertically = up and down for automatic headlight range adjustment;

horizontally = left and right for the adaptive headlights function).

The positioner modules execute the movement.

See **POSITIONER MODULES**

Indicator Light On the Light Switch

The indicator light (green LED) next to the "A" (= "automatic driving lights control" and "adaptive headlights") has 2 display functions:

- The indicator light **lights up permanently** when the automatic driving lights control or adaptive headlights function is switched on (= light switch in position "A").
- The indicator light **flashes** if a fault develops in the adaptive headlight system.

  E60, E61, E63, E64, E65 and E66:

  The indicator light is actuated by the light module.

  E70, E81, E87, E90, E91, E92, E93:

  The indicator light is actuated by the footwell module.

SYSTEM FUNCTIONS

The adaptive headlights system moves headlights horizontal (i.e. from left to right) in order to illuminate the inside of a bend when cornering.

The following functions of the adaptive headlights system are described below:

- System activation and automatic calibration
- Activation of stepper motor controllers
- Speed-dependent analysis of signals
- Adjustment of headlight horizontal aim
- Deactivation of adaptive headlights function under extreme handling conditions
- Deactivation of adaptive headlights function in response to system faults
- Setting headlights to parked position
- Automatic headlight-range adjustment
- Adaptive headlights for automatic driving lights control
- Turning light

NOTE: ***Different control units for adaptive headlights.***

E60, E61, E63, E64, E65, E66 up to 03/2005: The adaptive headlights are actuated by the AHL control unit.

E60, E61, E63, E64, E65, E66 from 03/2005: The adaptive headlights are actuated by the light module (LM).

E70, E81, E87, E90, E91, E92, E93: The adaptive headlights are actuated by the footwell module (FRM).

System Activation and Automatic Calibration

When terminal 15 is switched ON, the headlights always perform a calibration sequence, even if the dipped headlights are not switched on. The control unit for adaptive headlights sends the "perform calibration sequence" request to the stepper motor controllers (SMCs, control units for the headlight stepper motors). The stepper motor controllers actuate the stepper motors in the headlights. The calibration sequence is performed. In the calibration sequence, the headlights move as follows:

1. The headlights move to the right and left (= calibration sequence for adaptive headlights).
2. The headlights move up and down (= calibration sequence for automatic headlight - range adjustment).
3. At the end of the calibration sequence, the headlights are in the straight-ahead position.

Following the calibration sequence, the system is ready for operation.

When reverse gear is engaged, the headlights are moved to the straight-ahead position.

NOTE: ***The calibration sequence is performed only after terminal 15 has been switched OFF for at least 15 seconds.***

> E66, E61, E63, E64, E65, E66 until 09/2006

> E87, E90, E91, E92, E93 until 03/2007

If terminal 15 is repeatedly switched on and off (e.g. for demonstration purposes), the calibration sequence will not be executed every time terminal 15 is switched on.

Terminal 15 must have been switched off for at least 15 seconds before it is switched on again. Only then is a calibration sequence performed when terminal 15 is switched on.

NOTE: ***Calibration sequence always after terminal 15 ON and dipped - beam headlights ON.***

> E66, E61, E63, E64, E65, E66 from 09/2006

> E70 from start of series production

> E81, E87, E90, E91, E92, E93 from 03/2007

If terminal 15 is repeatedly switched on and off (e.g. for demonstration purposes), the calibration sequence will not be executed every time terminal 15 and the dipped-bead headlights are switched ON.

NOTE: ***Calibration sequence with enlarged range of movement.***

> not E65, E66

From 09/2007, starting with the E60, E61, E63, E64, a calibration sequence with larger range of movement will be introduced.

The calibration sequence with larger range of movement will then gradually be introduced on other model series.

Activation of Stepper Motor Controllers

The control unit for adaptive headlights sends the stepper motor controllers (SMC) the nominal values for the positioner modules (position of positioner modules and speed of movement).

The control unit for adaptive headlights calculates the nominal values using the following signals:

- Vehicle road speed
- Steering angle (at speeds up to 50 km/h, dependent on encoding)
- Yaw rate (50 km/h upwards, see **STEERING-ANGLE SENSOR AND DSC SENSOR** above)

Speed-Dependent Analysis of Signals

Depending on the road speed, the adaptive headlights are controlled using the following signals: Signals from the steering angle sensor and signals from yaw - rate sensor (in the DSC sensor).

The encoding (at the end of the production line) determines the priority assigned to sensor signals above which speed threshold.

Adjustment of Headlight Horizontal Aim

The stepper motor controllers move the headlights to the right or left when the vehicle corners.

Horizontal range of movement of headlights:

- Inwards, i.e. towards center of vehicle: up to max. 8°
- Outwards: up to max. 15°

Example: Right - hand bend:

The right-hand headlight turns by up to 15° (the right-hand headlight is the "inside" headlight on a right-hand bend).

Viewed from the vehicle, the right-hand headlight moves "outwards".

The left-hand headlight moves up to 8° (the left-hand headlight moves towards the middle of the vehicle, i.e. "inwards" as viewed from the vehicle).

The headlight on the outside of the bend has to reach its end position at the same time as the headlight on the inside of the bend so that the carriage way remains smoothly and evenly illuminated.

On a right-hand bend, the left-hand headlight is on the outside of the bend. The right-hand headlight is on the inside of the bend.

Deactivation of Adaptive Headlights Function Under Extreme Handling Conditions

If the vehicle drifts, skids and loses sideways grip, the adaptive headlights function is deactivated as follows:

- The headlights are returned to the straight-ahead position. The headlights are no longer turned.
- The dipped headlights remain on.

Deactivation of Adaptive Headlights Function In Response To System Faults

Until 09/2007, a system fault will be indicated by the indicator lamp on the light switch flashing.

From 09/2007 system fault will be indicated by a Check-Control message in the instrument cluster.

Dazzling of oncoming traffic must be prevented in the event of a system fault.

For this reason, the adaptive headlights function is deactivated as follows:

- If the stepper motors are still functional, the headlights are returned to the straight-ahead position. The headlights are no longer moved towards bends in the road.
- If it is no longer possible for a headlight to be moved back to the straight-ahead position, the headlight is tilted downwards (by the stepped motors for automatic headlight-range adjustment). This prevents dazzling of oncoming traffic.
- Vehicles **up to 09/2007**

  If the headlight cannot be tilted downwards, the bi-xenon bulb in this headlight is disabled as follows:

  When the vehicle is parked up, the control unit registers sleep mode for the adaptive headlights, as follows: Vehicle standstill and terminal R OFF for several minutes.

  The next time the vehicle is restarted, the bi-xenon light of the defective headlight is not switched on.

  The front foglights are switched on in order to ensure a minimum level of illumination.

  The dipped beam headlights are **not** switched off while the vehicle is in motion.

NOTE: ***From 09/2007, the dipped - beam headlights will not be switched off in the event of a system fault.***

If a system fault develops in the adaptive headlights, the dipped-beam headlights for the affected headlight will *not* be switched off.

Setting Headlights To Parked Position

When terminal R is switched off, the headlights move to the parked position. The parked position is important for the headlights' next calibration sequence: From the parked position, the headlights are run through a calibration sequence in the pre-drive-check. During each calibration sequence, the control unit for adaptive headlights relearns the straight - ahead position for the headlights.

When the headlights have reached the parked position, the stepper motor controllers SMCs inform the control unit for adaptive headlights ("verification").

The control unit for adaptive headlights deactivates the stepper motor controllers.

The run-down period lasts approx. 10 seconds.

Automatic Headlight-Range Adjustment

If the special equipment "Adaptive headlights" is fitted, the control unit for adaptive headlights also controls the automatic headlight-range adjustment.

The automatic headlight - range adjustment adapts the headlight range for different operating conditions. Variations in the vehicle tilt angle are produced by vehicle loads and braking or acceleration in extreme driving situations. The automatic headlight-range adjustment moves the headlights up and down as required.

The control unit for adaptive headlights also controls the automatic headlight-range adjustment as follows:

1. The ride-height sensors and the brake light switch supply the signals for the automatic headlight-range adjustment.
2. The control unit for adaptive headlights computes the vehicle inclination (longitudinally to the roadway) from the signals.
3. The stepper motors for the automatic headlight-range adjustment automatically and dynamically control the headlight range.

   The headlight range is adjusted so that the actual headlight range conforms to the legally required headlight range as follows:

   - If vehicle rear is lower than front:

     The actual headlight range will be longer than the legally stipulated range. The headlight beam height is lowered to reduce the headlight range to match the legal requirement.

   - If the vehicle is horizontal:

     The actual headlight range will be the same as the legally stipulated range.

   - If vehicle front is lower than rear:

     The actual headlight range will be shorter than the legally stipulated range. The headlight beam height is raised to increase the headlight range to match the legal requirement.

Adaptive Headlights For Automatic Driving Lights Control

The automatic driving lights control feature (option in conjunction with the rain-light sensor) automatically switches the side lights and dipped headlights on or off.

Switch-on conditions:

- The automatic driving lights control must be encoded (in the light module on the E60, E61, E63, E64, E65, E66, in the footwell module on the E70, E81, E87, E90, E91, E92, E93).
- The light switch must be in position "A" ("A" for automatic driving lights control and adaptive headlights).
- The rain-light sensor must be installed and operational.

  The rain-light sensor detects the brightness of the ambient light.

  The rain-light sensor sends the following prompts to the light module (on the E70, E81, E87, E90, E91, E92, E93: footwell module):

  - Ambient brightness low: In twilight, darkness, in an underground garage or tunnel.

"Switch on dipped headlights" request

- Ambient brightness sufficient.

  "Switch off dipped headlights" request

If only the side lights are to be switched on, the light switch must be set to side lights (switch position 1).

When the light switch is set to position "A", the control unit for adaptive headlights is also activated:

- When the automatic driving lights control function switches on the dipped headlights (e.g. at dawn/dusk), the adaptive headlights function is notified at the same time.

  The control unit for adaptive headlights thus assumes control of the automatic headlight - range adjustment.

- In addition, signals from the rain - light sensor are evaluated (E60, E61, E63, E64, E65, E66: by the light module; E90, E91, E92, E93: by the footwell module).

  The headlights are not turned when the vehicle is cornering until total darkness sets in.

The message "dipped headlights on" is given individually for each headlight.

If a headlight fails, the adaptive headlights are switched off.

The front foglights are switched on in order to ensure a minimum level of illumination.

Turning Lights

The turning lights are coupled to the adaptive headlights (option 524).

The footwell module (FRM) uses the following signals to adjust the turning lights:

- Steering angle
- Yaw rate
- Status of reverse gear

  > E81, E92, E93 with start of series production and E87 from 03/2007

  Instead of the main-beam headlight (H7), the main headlight with turning light has a fixed additional reflector with an H3 bulb. The special shape of the lens prevents dazzle to the front.

The **Fig. 2** shows the main headlight with turning light on the E81, E87, E92, E93

1. Bi-xenon light
2. H8 bulb for side lights and daytime driving lights

3. H3 bulb for turning lights
4. Reflector for turning lights

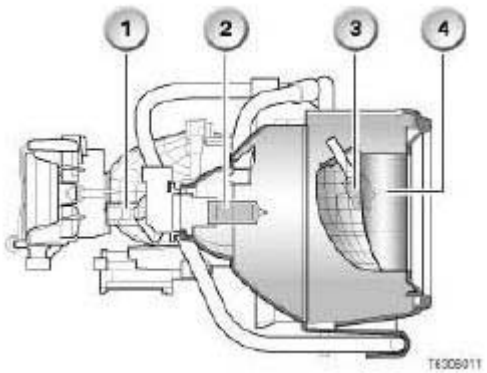


Fig. 2: Identifying Headlight Reflector For Turning Lights
Courtesy of BMW OF NORTH AMERICA, INC.

The **Fig. 3** shows the turning light on the E81, E87, E92, E93

1. Left turn
2. Right turn

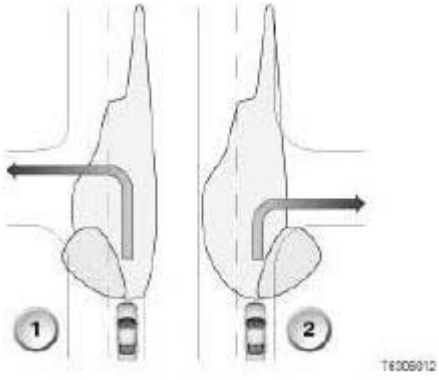


Fig. 3: Identifying Turning Light Turn
Courtesy of BMW OF NORTH AMERICA, INC.

The following conditions must be satisfied for the turning lights to be switched on:

- Terminal 15 ON
- Light switch in position "A" ("A" stands for automatic driving lights control)
- Rain-light sensor detects twilight or darkness (threshold exceeded)

The turning lights are not activated at speeds greater than 70 km/h.

> Europe version:

For legal reasons, the turning lights on the Europe version can only be activated via the turn signal indicator at speeds up to 40 km/h.

When reversing, the footwell module (FRM) activates the turning lights as follows in the speed range 0 km/h to 35 km/h:

- US version: both sides
- Other countries: outside of turn only

When the turn signal indicator is switched on:

If the vehicle is stationary, the turning lights will automatically be deactivated after approx. 4 seconds, e.g. when waiting at traffic lights. However, the turning lights can be activated again with the turn-signal/mainbeam switch (up to 3 times) until the reflector has reached a certain temperature.

A temperature model protects the headlights from excessive thermal stress.

The switching-off conditions for the turning light depend on the country concerned.

NOTE: ***Temperature monitoring by temperature model***

A temperature model in the footwell module calculates the temperature of the reflector. The temperature of the reflector must not exceed a certain value. If a critical temperature is reached, the footwell module (FRM) will deactivate the turning lights. The turning lights can be activated again after a cooling-off phase.

> E70 with start of series production

The turning lights are realized using the front foglights. (Reason: The installation location of the headlights is too high for the turning lights. This prevents legal stipulations from being adhered to.)

Depending on actuation, the right - hand and/or left-hand front foglight is switched on. The turning lights are actuated by the light module (LM).

The front foglights have an additional reflector to illuminate the areas to the sides better.

When turning, the front foglight on the inside of the turn is automatically activated. The additional reflector for the turning light reflects the light beam towards the turning area.

The turning light are not switched on suddenly but rather faded according to special time parameters.

Depending on the country concerned, the turning lights are switched on when cornering.

The **Fig. 4** shows the front foglight on the E70

1. Additional reflector for the turning light

2. Reflector for the front foglights
3. Bulb

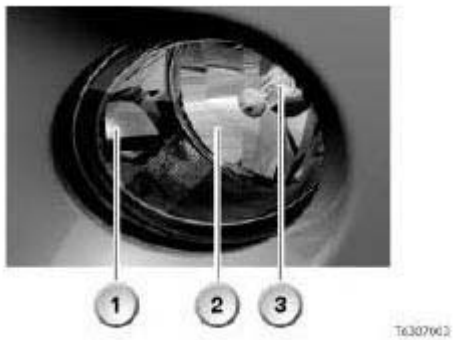


Fig. 4: Identifying Turning Light Reflector
Courtesy of BMW OF NORTH AMERICA, INC.

The following conditions must be satisfied for the turning lights to be **switched on:**

- Terminal 15 ON
- Light switch in position "A" ("A" stands for automatic driving lights control)
- Rain-light sensor detects twilight or darkness (threshold exceeded)

and

- Turn signal indicator ON (not one-touch turn signal)
- Speed range (forwards):
  - Europe and Japan version from 0 km/h to 35 km/h
  - US version from 0 km/h to 65 km/h
- Swivel angle (theoretical):
  - when stationary > or = 77°
  - when driving > or = 10°

Alternatively

- Speed range (reverse):
  - 0 km/h to 35 km/h
- Swivel angle (theoretical):
  - when stationary or driving > or = 70°

If the vehicle is stationary, the turning lights will automatically be deactivated after a certain time, e.g. when waiting at traffic lights. However, the turning lights can be activated again with the turn-signal/main-beam switch.

The following conditions must be satisfied for the turning lights to be **switched off:**

- Light switch not in position "A" ("A" stands for automatic driving lights control)
- Rain-light sensor does not detect twilight or darkness (lower threshold exceeded)

Alternatively

- Turn signal indicator OFF
- Speed range (forwards):
  - Europe and Japan versions > or = 40 km/h
  - US version > or = 70 km/h
- Swivel angle (theoretical):
  - when stationary 77°
  - when driving 10°

Alternatively

- Speed range (reverse): > or = 40 km/h
- Swivel angle (theoretical): when stationary and when driving below a certain value

Alternatively

- Vehicle skids and swings out.

Alternatively

- Front foglights are switched on with the front foglights switch.

PRECONDITIONS FOR ACTIVATION

The control unit for adaptive headlights is "awake" from terminal 15 ON.

The movement of the lights is subject to the following conditions:

- Reverse gear must **not** be engaged.
- The system is free of faults (indicator lamp **not** flashing and no Check-Control message)
- The bulbs for the bi-xenon lights are OK in both headlights.
- The vehicle must not be skidding or fishtailing.
- The rain - light sensor must detect darkness.
- Additional precondition for activation: automatic driving lights control is active (light switch in position "A", see above).

Notes for service staff

CAUTION: ***Exercise caution when working on bi-xenon headlights***

Whenever inspecting or working on the headlights, always observe the safety precautions and accident prevention rules. The headlight system has dangerously high voltage.

- General note: See **E60, E61, E63, E64, E65, E66, E90 - ADAPTIVE HEADLIGHTS, GENERAL INFORMATION FOR SERVICE STAFF**
- Diagnosis: See **E60, E61, E63, E64, E65, E66, E90 - ADAPTIVE HEADLIGHTS DIAGNOSIS**
- Encoding/programming: See **E60, E61, E63, E64, E65, E66, E90 - ENCODING/PROGRAMMING ADAPTIVE HEADLIGHTS**
- Car and Key Memory:

  > E60, E61, E63, E64, E65, E66

  The sensitivity of the driving light sensor can be set to one of 2 settings with the Car and Key Memory.

  > E70, E81, E87, E90, E91, E92, E93

  All Car and Key Memory functions are programmed inside the vehicle itself.

  (Please refer to the "Personal profile" section of the Owner's Handbook: Personal settings for a maximum of 3 remote control units via the display in the instrument cluster or via the Central Information Display.)

NATIONAL VERSIONS

The options "Daytime driving lights" and "Manual headlight - range adjustment" are available in certain countries. Vehicles with manual headlight-range adjustment do not have adaptive headlights. This is because vehicles with manual headlight - range adjustment have halogen dipped headlights. Adaptive headlights (option 524) are only available in conjunction with option 522 "Xenon dipped and main - beam headlights".

Switching on adaptive headlights in conjunction with daytime driving lights function

The "Daytime lights" option (Northern Europe and Canada) means that dipped-beam headlights and side lights (E70, E92, E93: daytime driving lights) are always switched on:

- Light switch in position "2"
- Terminal 15 ON

The automatic headlight - range adjustment is active (actuated by the control unit for adaptive headlights).

If terminal 15 is switched off, the dipped headlights and the side lights are automatically switched off as well.

The light switch must also be set to position "A" with the "Daytime driving lights" option. The control unit for adaptive headlights is then in standby.

System functions for "Daytime lights" option when the light switch is set to position "A":

- If the vehicle is encoded with the "Daytime driving lights" option (end of production line), the light switch can remain in position "A" at all times.

  When terminal R is switched on, the side lights, parking lights and licence plate lighting are switched on.

  As soon as terminal 15 is switched on, the dipped headlights are also switched on.

- When the dipped headlights are switched on, the control unit for adaptive headlights is activated (for automatic headlight-range adjustment).
- The indicator lamp on the light switch lights up and indicates that the system is functional.
- The adaptive headlights turn when the vehicle is stationary if the steering wheel is turned (to the right only).
- The headlights are moved when the vehicle corners if the rain - light sensor registers darkness.

The switch-on conditions for the adaptive headlights in conjunction with special equipment "Daytime driving lights" are as follows:

- The vehicle must be encoded with the "Daytime driving lights" option (end of production line)
- The light switch must be in position "A"
- Terminal 15 must be switched on and reverse gear must not be engaged
- Rain-light sensor must detect darkness

Subject to change.

MAIN-BEAM ASSISTANT E60, E61, E63, E64, E65, E66, E70, E90, E91, E92, E93

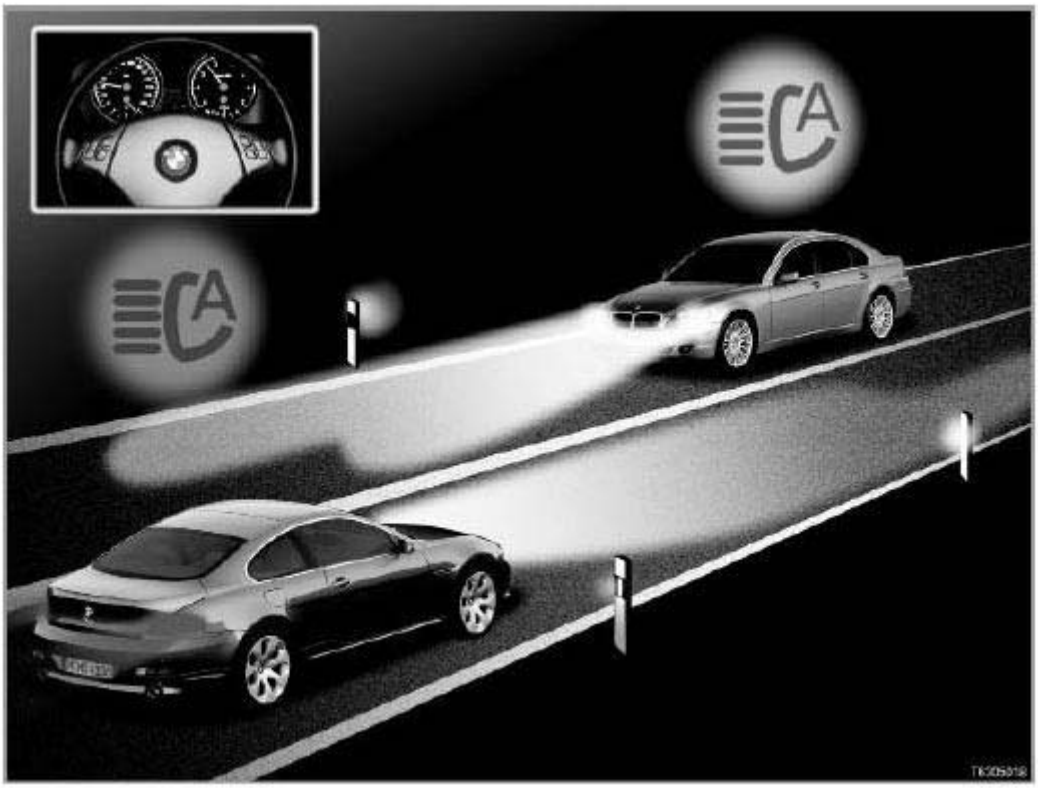


Fig. 5: Identifying Main-Beam Assistant
Courtesy of BMW OF NORTH AMERICA, INC.

INTRODUCTION

The main-beam assistant assists the driver to operate the main-beam headlights. The main-beam assistant automatically switches the main-beam headlights on and off as the traffic situation changes.

The main-beam assistant detects vehicles travelling ahead of the car and oncoming traffic, and it also detects lighted stretches of roadway. By automatically switching off the main-beam headlights in good time, the main - beam assistant ensures that the occupants of oncoming vehicles, for example, are not dazzled by the headlights.

Advantages:

Drivers do not have to concern themselves with the job of operating the main - beam headlights. This enhances the level of convenience for drivers. The main - beam headlights are switched on more frequently by the main-beam assistant than is the case with manually operated main-beam headlights. The driver's field of vision is optimally illuminated. Driving in the dark, therefore, is rendered safer.

IMPORTANT: ***The driver retains full responsibility for all his/her actions, despite the assistance of the main - beam assistant.***

The main-beam assistant merely assists the driver in the task of operating the main-beam headlights.

Responsibility for switching the main-beam headlights on and off in accordance with the dictates of the traffic situation rests with the drivers.

The main-beam assistant can be deactivated at any time with the turn-signal/main-beam switch.

Option 5AC "Main-beam assistant" is available for the BMW 3, 5, 6 and 7-Series.

> E60, E61, E63, E64, E65, E66 - See **SYSTEM OVERVIEW FOR THE MAIN-BEAM ASSISTANT: E60, E61, E63, E64, E65, E66**

NOTE: ***Only the main beam of the bi-xenon headlights are switched on.***

If a main-beam assistant is fitted, only the main beam of the bi-xenon headlights are switched on.

The halogen headlights are switched on only when the headlight flasher is actuated. In countries in which daytime driving lights are required by law, the halogen headlights are used for the daytime driving lights.

BRIEF DESCRIPTION OF COMPONENTS

The following components and control units provide input signals for the main - beam assistant:

- **Light switch**

  The main-beam assistant can be activated only when the light switch is in position "A".

  "A" stands for "automatic headlight control".

- **Turn-signal/main-beam switch**

  The main-beam assistant is activated and deactivated by mans of the turn-signal/main-beam switch.

  See the section entitled **OPERATION** below.

- **Rain-light sensor**

  The rain - light sensor measures the brightness of the ambient light. The light module switches the dipped headlights on when daylight fails.

  The main-beam assistant can be activated only when the dipped headlights are on. The precondition is that the light switch must be in the "A" position.

- **Wheel-speed sensors**

Each of the wheel-speed sensors measures the circumferential speed of an individual wheel. The DSC control unit (DSC: Dynamic Stability Control) uses these input signals to calculate the car's road speed.

The main-beam headlights are switched on when the car's road speed is above 50 km/h.

The main-beam headlights are switched off when the car's road speed is below 38 km/h.

- **DSC sensor**

  The DSC sensor registers lateral acceleration and calculates the yaw rate.

  ("Yaw" is the movement of the vehicle about the vertical axis, e.g. when the car is cornering).

  The main-beam assistant uses the yaw rate to improve evaluation when the car corners. The DSC sensor is underneath the driver's seat. For safety reasons, cars with active front steering have a second DSC sensor underneath the front passenger's seat.

- **Image sensor**

  The image sensor is a special camera for detecting light sources.

  The image sensor transmits images to the control unit for the main - beam assistant.

  The images are carried by an LVDS data line (LVDS: Low Voltage Differential Signalling).

  The control unit for the main-beam assistant analyses the images.

  The image sensor and the control unit are installed in a **common** housing and can only be supplied as a unit.

  See **IMAGE SENSOR FOR THE MAIN-BEAM ASSISTANT: E60, E61, E63, E64, E65, E66**

- **Reverse gear switch**

  The main-beam headlights are **not** switched on if reverse gear is engaged.

  In a manual-shift car, the reverse gear switch supplies the "reverse gear engaged" information.

  The reverse gear switch sends this information to the light module.

- **Selector lever position switch**

  The main-beam headlights are **not** switched on if reverse gear is engaged.

  In a car fitted with electronic transmission control (EGS), the selector lever position switch supplies the "reverse gear engaged" information. The selector lever position switch sends this information to the EGS control unit.

The EGS control unit sends this information to the light module or footwell module.

- **Selector angle sensor and shift travel sensor**

  > E60, E61, E63, E64, E65, E66

  The main-beam headlights are **not** switched on if reverse gear is engaged.

  In a car fitted with sequential manual transmission (SMG), the selector angle sensor and the shift travel sensor supply the "reverse gear engaged" information. The selector angle sensor and the shift travel sensor send the information to the SMG control unit. The SMG control unit sends the information to the light module.

The following control units are involved in the main-beam assistant system:

- **FLA: Main-beam assistant**

  The FLA control unit analyses the images from the image sensor. The FLA control unit receives information on road speed and yaw rate from the DSC control unit.

  The FLA control unit sends a switch-on recommendation or a switch-off recommendation for the main-beam headlights to the light module. The recommendation depends on the traffic situation, the ambient light, and the car's road speed.

  The FLA control unit is connected to the K-CAN.

  See **FLA CONTROL UNIT FOR THE MAIN-BEAM ASSISTANT: E60, E61, E63, E64, E65, E66**

- **LM: Light module**

  > E60, E61, E63, E64, E65, E66

  The light module receives various input variables for the main-beam headlights:

  - Switch-on or switch-off recommendation from the FLA control unit
  - Switch position of the light switch
  - Switch position of the direction indicator/mean - beam switch
  - Information from the reverse gear switch or the selector lever position switch or the selection angle and shift travel sensor
  - Information from the rain-light sensor, as to whether the dipped headlights have to be switched on

  On the basis of the input variables, the light module decides whether the main-beam headlights should be switched on or off.

  - The light module actuates the bi-xenon headlights.
  - The light module actuates the FLA indicator light in the instrument cluster.

A Check-Control symbol appears if the main - beam assistant fails.

The light module is connected to the K-CAN.

- **FRM: Footwell module**

  > E90, E91, E92, E93, E70

  The footwell module receives various input variables for the main - beam headlights:

  - Switch-on or switch-off recommendation from the FLA control unit
  - Switch position of the light switch
  - Switch position of the direction indicator/mean-beam switch
  - Information from the reverse gear switch or selector lever position switch
  - Information from the rain-light sensor, as to whether the dipped headlights have to be switched on

  On the basis of the input variables, the footwell module decides whether the main-beam headlights should be switched on or off.

  - The footwell module actuates the bi-xenon headlights.
  - The footwell module actuates the FLA indicator light in the instrument cluster.

    A Check-Control symbol appears if the main-beam assistant fails.

  The footwell module is connected to the K-CAN.

- **DSC: Dynamic Stability Control**

  The DSC control unit calculates the car's road speed using the signals from the wheel-speed sensors. The DSC control unit sends the information on road speed to the main - beam assistant.

  The DSC control unit also sends the information from the yaw-rate sensor in the DSC sensor to the main-beam assistant.

- **EGS or SMG: Electronic gearbox control or sequential manual transmission**

  The EGS control unit receives the "Reverse gear engaged" information from the selector lever position switch.

  The EGS control unit is connected to the PT-CAN.

  The SMG control unit receives the "Reverse gear engaged" information from the selector angle sensor and the shift travel sensor. The SMG control unit is connected to the PT-CAN.

- **SZL: Steering Column Switch**

  The switch signals from the turn - signal/main-beam switch are picked up and evaluated by the SZL

control unit.

The SZL control unit sends the position of the turn-signal/main-beam switch to the light module (E60, E61, E63, E64, E65, E66) or footwell module (E90, E91, E92, E93, E70)

The following components are controlled:

- **Bi-xenon headlights**

  The bi-xenon headlights are actuated by the light module.

NOTE: ***Only the main beam of the bi-xenon headlights are switched on.***

If a main-beam assistant is fitted, only the main beam of the bi-xenon headlights are switched on. The halogen headlights are switched on only when the headlight flasher is actuated. In countries in which daytime driving lights are required by law, the halogen headlights are used for the daytime driving lights.

- **Instrument cluster**

  The indicators in the instrument cluster are as follows:

  - Main-beam indicator lamp (legally stipulated, blue)
  - FLA indicator light
    - Orange on BMW 3, 5 and 6-Series and on X5
    - Blue on BMW 7-Series
  - Check-Control symbol for failure of the main-beam assistant (yellow)

  See the section entitled **SYSTEM FUNCTIONS** below.

The following components provide the power supply for the main - beam assistant:

- **PM: Power module**
  > E65, E66

  In the BMW 7-Series, the power module supplies power to the main - beam assistant.

- **Rear power distributor**
  > E60, E61, E63, E64

  In the BMW 5-Series and 6-Series, the rear power distributor supplies power to the main-beam assistant.

- **Power distributor in junction box**
  > E90, E91, E92, E93

On the BMW 3-Series, the power distributor in the junction box supplies voltage to the main - beam assistant.

- **Rear power distributor**

  > E70

  On the BMW X5, the rear power distributor provides power to the main - beam assistant.

SYSTEM FUNCTIONS

In accordance with the traffic situation, the FLA control unit sends a switch - on recommendation or a switch - off recommendation for the main - beam headlights to the light module or footwell module. On the basis of this recommendation and various other the input variables, the light module or footwell module decides whether the main-beam headlights should be switched on or off.

The following system functions of the main - beam assistant are described:

- Automatic main-beam headlight switch - off when oncoming traffic is detected
- Automatic main-beam headlight switch - off when vehicle detected ahead of the car
- Automatic main-beam headlight switch - off when adequate ambient lighting is detected
- Automatic main-beam headlight switch - on
- Indicators in the instrument cluster
- Function limitations of the main - beam assistant
- Automatic alignment of the main - beam assistant

Automatic Main - Beam Headlight Switch-Off When Oncoming Traffic Is Detected

The light cone of the main - beam headlights has a range of about 400 m. The image sensor can detect other light sources within a range of about 1000 m. This ensures that the image sensor detects oncoming vehicles before their drivers can be dazzled by the light cone of the main - beam headlights.

When the image sensor detects an oncoming vehicle, the FLA control unit sends a switch - off recommendation to the light module or footwell module. The light module or footwell module switches the main - beam headlights off.

Automatic Main - Beam Headlight Switch-Off When Vehicle Detected Ahead Of The Car

When the image sensor detects a vehicle ahead, the FLA control unit sends a switch - off recommendation to the light module or footwell module. The light module or footwell module switches the main - beam headlights off.

Automatic Main - Beam Headlight Switch-Off When Adequate Ambient Lighting Is Detected

When the image sensor detects an environment in which ambient lighting is adequate, the FLA control unit sends a switch-off recommendation to the light module or footwell module. The light module or footwell module switches the main-beam headlights off.

Adequate ambient lighting means:

- Daylight
- Twilight
- Street lighting (e. g. in illuminated towns)

Automatic Main-Beam Headlight Switch-On

If there is no reason for the lights to be dipped, the light module or footwell module switches the main-beam headlights on. The bi-xenon headlights are switched to full beam.

Displays In The Instrument Cluster

The FLA indicator light lights up in the instrument cluster as soon as the main-beam assistant is activated (blue on the BMW 7-Series, orange on the BMW 3, 5, and 6-Series and on the X5).

The main-beam indicator light also lights up (blue) in the usual way as soon as the main-beam headlights are switched on.

A Check-Control symbol appears (yellow) if the FLA control unit detects a system failure.

See **INDICATORS FOR THE MAIN-BEAM ASSISTANT AND THE MAIN-BEAM HEADLIGHTS: E60, E61, E63, E64, E65, E66**

Function Limitations Of The Main-Beam Assistant

The main-beam assistant can be subject to function limitations under the following circumstances:

- Inclement weather conditions (e.g. fog)
- Poorly lighted road users (e.g. cyclists, pedestrians)
- Certain road signs (e.g. the warning sign for a tight bend): Reflections from traffic signs may be incorrectly interpreted by the main - beam assistant as a vehicle driving ahead or as oncoming traffic.

  See **FUNCTION LIMITATIONS OF THE MAIN-BEAM ASSISTANT**

- Driving over crests and through dips

  See **FUNCTION LIMITATIONS OF THE MAIN-BEAM ASSISTANT**

- Certain traffic situations (e.g. tight bends, vehicles approaching from the side)
- Image sensor's field of view obstructed (e.g. by snow)

Automatic Alignment Of The Main-Beam Assistant

In order to operate correctly, the image sensor must be aligned parallel with the vehicle's centerline. When the car is driven at night, the main - beam assistant can automatically correct alignment up to 3° to the left or 3° to

the right. This correction compensates for minor deviations from the centerline.

Driving conditions for automatic directional orientation of the main - beam assistant are:

- Straight ahead for a distance of approx. 50 km: A relatively straight stretch accelerates the directional orientation.
- Road marking must be clearly visible.

See **IMAGE SENSOR FOR THE MAIN-BEAM ASSISTANT: E60, E61, E63, E64, E65, E66**

OPERATION

Operation of the main-beam assistant is described in a separate section.

The following controls of the main - beam assistant are described:

- Switching on automatic headlight control
- Activating the main - beam assistant
- Deactivating the main-beam assistant
- Reactivating the main-beam assistant
- Switching on the headlight flasher

See **OPERATION**

PRECONDITIONS FOR ACTIVATION

For technical reasons, distinctions are drawn between the following conditions required for switch - on:

- Conditions required for switch-on for the FLA control unit
- Conditions required for switch-on for the main-beam assistant
- Conditions required for switch-on for the main-beam headlights

Conditions Required For Switch - On For The FLA Control Unit

The FLA control unit is active as of terminal 15 ON.

Conditions Required For Switch - On For The Main-Beam Assistant

- Light switch set to position "A"
- Dipped headlights switched on.

  When the switch is in position "A", the dipped headlights are switched on by the automatic headlight control.

- Turn-signal/main-beam switch pressed forward (in forward direction of travel).

Conditions Required For Switch - On For The Main-Beam Headlights

- Road speed greater than 50 km/h.
- Reverse gear must **not** be engaged.
- Image sensor does **not** detect an oncoming vehicle or a vehicle ahead.
- Image sensor detects adequate darkness.

Notes for service staff

The following information is available for service staff:

- General note: See **MAIN-BEAM ASSISTANT, GENERAL INFORMATION FOR SERVICE STAFF: E60, E61, E63, E64, E65, E66**
- Diagnosis: See **MAIN-BEAM ASSISTANT DIAGNOSIS: E60, E61, E63, E64, E65, E66**
- Encoding/programming: -

Maintenance and General Information - Operating Fluids

1.0 INTRODUCTION

These operating fluids specifications describe the standards which are necessary for approval and application for BMW automobiles. Operating fluids are arranged in vehicle group category and are approved for all assemblies. Before applying operating fluids, it is important to make sure that the specifications and manufacturing codes on the container conform with those on the enclosed specification list.

BMW of North America has also approved various fluids for use which are not available through the Parts Department, but may be obtained locally.

2.0 CORROSION PROTECTION FOR VEHICLE IN LONG-TERM STORAGE

Location-inside of a building whenever possible or covered parking lot (especially convertibles).

Replace engine oil and filter after engine reaches operating temperature. Run engine several minutes after replacing oil. Engine oil must be replaced every 12 months. Factory engine oil (in new cars) can remain in the engine up to 12 months.

Check/correct electrolyte level in battery cells.

Disconnect battery ground lead to avoid discharging battery through current draw of electrical equipment. Or, switch off battery main disconnect switch (if equipped).

Recharge battery.

Inspect undercoating for damage and repair as necessary.

Inspect wax coating in engine compartment, on engine, underbody and axles. Repair as necessary.

Operate air conditioner monthly for 10 minutes in order to lubricate the seals and the expansion valve. Note: The air conditioner will only work at temperatures above 37°F/3°C.

PRE-DELIVERY CARS

Replace brake fluid if car has been parked outdoors longer than six (6) months.

Fill the vehicle fuel tank with fresh fuel in order to prevent condensation inside the tank (applies only to metal fuel tanks).

Check, and if needed, correct the coolant level and concentration of long-term antifreeze and corrosion inhibitor.

Apply brakes to dry the brake discs of any moisture and spray them with a corrosion inhibitor. Spray the

complete brake assemblies after parking the car at its final storage location.

Do not apply the parking brake. Brake linings could seize when the parking brake is applied for an extended period of time. Rather, engage first gear (manual transmissions) or "park" position (automatic transmissions) to hold vehicle stationary.

Increase inflation pressure on all road tires to 50 psi.

Thoroughly clean the entire car, including underside, engine and engine compartment.

3.0 CONVERSION TABLE

CONVERSION TABLE

Liters	US Gallons	US Pints	Liters	US Gallons	US Pints
0.5	0.132	1.055	8.0	2.112	16.904
1.0	0.264	2.113	9.0	2.376	19.017
2.0	0.538	4.226	10.0	2.640	21.130
3.0	0.792	6.339	11.0	2.904	23.243
4.0	1.056	8.452	12.0	3.168	25.356
5.0	1.320	10.565	13.0	3.432	27.469
6.0	1.584	12.678	14.0	3.696	29.582
7.0	1.848	14.791	15.0	3.960	31.695

Conversion Factors:

Liters in US Gallons x 0.264

US Gallons in Liters x 3.785

Liters in US Pints x 2.113

US Pints in Liters x 0.473

4.0 ALTERNATE UNIVERSAL LUBRICANTS AND WORKSHOP SUPPLIES

ALTERNATE UNIVERSAL LUBRICANTS AND WORKSHOP SUPPLIES REFERENCE

BMW P/N	Description/Application	3M P/N	Wurth P/N	Loctite P/N
81 22 9 400 208(1)	**Lubricant/Contact Cleaner Spray** Stops electrical and mechanical faults due to water, moisture, rust, dirt and friction. Colorless, neutral, free of grease and silicone, suitable for		89360/1	24379

	all applications. Examples: Stops moisture on distributor, generator, ignition coil, starter, spark plugs, coils, relays, contacts, etc. Prevents metal parts from corroding. Stops rubber and plastic parts from aging prematurely. Applications: from-50oC to +150oC.			
81 22 9 400 229(1)	**Hand Cleaner** Removes stubborn stains and grit without attacking skin. Contains special skin protectant. Does not clog pipes.		893900	25108
81 22 9 400 720(1)	**Molybdenum Disulfide (MOS2) Spray** Loosens rust, eliminates squeaking and similar noises, prevent rust seizure. Displaces water on ignition components to allow quick starting. Insulates electrical systems against moisture and stops corrosion.	8876		24378
81 22 9 407 138(1)	**Stain Remover** Removes tar, oil and grease stains from seat covers, leather upholstery and painted plastic components.		89024	
81 22 9 407 174(1)	**Bearing Grease** A water repellent high-pressure grease for lubricating flywheel gear rings, starter motor pinions, etc., and also as an acid-proof grease for battery terminal posts.		893530	
81 22 9 407 301(1)	**Loctite 574** Anaerobic, silicone sealant for aluminum flange surfaces. Provides		893574	24018

	instant sealing when flanges are assembled.			
81 22 9 407 388[1]	**Adhesive Remover** Removes all residual or excess adhesive, sealing and coating compounds, wax, grease or oil films from painted and plastic surfaces, i.e. before installing front or rear spoilers and decor strips.	8984		
81 22 9 407 394[1]	**Loctite 380** Black cyanacrylate adhesive for joining metals, rubber, PVC.	8155	893 4103	38050
81 22 9 407 524[1]	**Contact Cement** Powerful adhesive for leather and leatherette, rubber moldings, seats, rubber mats, noise-absorbent materials, etc. Has good heat resistance and does not attack paint. See and .	1357HP		
81 22 9 407 629[1]	**High-Adhesion Lubricant** Long-life high-adhesion lubricant for clutch and brake linkages, spring struts, stabilizers, idler levers and pivots.	8878		20029
81 22 9 407 711[1]	**Universal Lube Spray** Colorless lubricant with high lubricant content. Eliminates squeaks and grating noises from spring seat bases. Lubricates door stops and locks, seat adjustment mechanism, etc. Resistant to temperatures between-50°C and 120°C.	8878	893106	20029

(1) *These items are no longer available through BMW NA Parts Department.

The above alternate suppliers can be contacted below:

ALTERNATE SUPPLIERS REFERENCE

3M 19460 Victor Parkway Livonia, MI 48152 (800) 521-8180	Wurth USA, Inc. 93 Grant Street Ramsey, NJ 07446 (800) 526-5228	Kem Krest, Inc. (Loctite) 1919 Superior Street Elkhart, IN 46515 (800) 285-5917

5.0 APPROVED OPERATING FLUIDS SOURCES

APPROVED OPERATING FLUIDS SOURCES REFERENCE

Group	Description, S.I. Bulletin	Product Name, Source	Telephone
11	Engine Oil, SAE 5W-50	"Syntec FSX" Castrol Inc., Piscataway, NJ	732-980-9100
11	Oxygen Sensor Lubricant	Bostik "Never-Seez" NSBT-16 Bostik Findley, Middleton, MA	888-603-8558
11	Intake & Vacuum System Leak Detector S.I. Bulletin B 11 03 92 (3500)	"LiquiMoly (Lubro Moly) Motor Lecksucher" 2021 W.A.W.D.	800-477-9293
11	Cold Weld Epoxy	"J-B Weld" J-B Weld Company, Sulphur Springs, TX	903-885-7696
13	Loctite 290 Throttle Housing Fasteners S.I. Bulletin B 13 06 91 (3440)	"Loctite 290" Kem Krest, Inc., Elkhart, IN	800-285-5917
18	Copper Paste Exhaust System Joints S.I. Bulletin B 18 03 89 (1954)	"8945" 3M Automotive Trades Division, Livonia, MI	800-521-8180
23	Synthetic Transmission Fluid	"Mobil SHC 630" Mobil Oil Corporation	800-582-3645
34	Brake Component Lubricant S.I. Bulletins B 34 02 94 & B 34 05 98	Bostik "Never-Seez" NSBT-16 Bostik Findley, Middleton, MA	888-603-8558
36	Loctite 638 (green) Affix wheel hub covers	"Loctite 680" Kem Krest, Inc., Elkhart, IN	800-285-5917
36	Loctite Cleaner 755 Loctite 242 M5 Wheel Covers S.I. Bulletin B 36 03 90 (3182)	"Loctite Cleaning Solvent 755" "Loctite 242" Kem Krest, Inc., Elkhart, IN	800-285-5917
41	Structural Adhesive S.I. Bulletin B 41 01 95 (4150)	"DP420 Epoxy Adhesive with 3M EPX Applicator" 3M Industrial Tapes and Specialties Division, Livonia, MI	800-521-8180
54	Renax GL1	"Poliplex #1" Fuchs	800-323-7755

		Lubricants Corp., Harvey, IL	
61	Rubberized Super Glue	"893 4103" Wurth USA, Inc., Ramsey, NJ	800-526-5228
62	Contact Cleaner Spray IC Acoustic Transmitter S.I. Bulletin B 62 04 92 (3539)	"CRC QD Contact Cleaner Spray 5101" CRC Industries, Warminster, PA	800-272-8963
63	Silicone Gasket Material Turn Signals S.I. Bulletin B 63 05 91 (3313)	"Permatex Form-A-Gasket 6B-80627" Kem Krest, Inc., Elkhart, IN	800-285-5917
64	AC System Disinfectant S.I. Bulletin B 64 08 91 (3373)	"Airguard" J.J. Products, Inc., East Orange, NJ	800-654-2356
		"Airsept" The Auto Doctor, Tucker, GA	404-662-6778
64	AC System Treatment	"893540-U" Wurth USA, Inc., Ramsey, NJ	800-526-5228
97	Brushable Seam Sealer Seals spot-welded, riveted, or bolted seams and joints. Brushable consistency remains flexible. Retains brush marks appearance.	"8901021" Wurth USA, Inc., Ramsey, NJ	800-526-5228
97	Body Seal, Beige Underbody Seal, Black Permanent, flexible protection against stone chipping damage. Fast drying and paintable.	"0892091 U" "0893075 U" Wurth USA, Inc., Ramsey, NJ	800-526-5228
97	Seam Sealer, Grey Fast drying, paintable, silicone-free sealant for special spray gun application.	"0893228 U" Wurth USA, Inc., Ramsey, NJ	800-526-5228
99	Paint Cleaner	"Machine Cleaner 1" and "Hi-Tech Cleaner 2" Meguiar's Inc., Irvine, CA	800-854-8073
99	Machine Glaze	"Mirror Glaze 3" Meguiar's Inc., Irvine, CA	800-854-8073
99	Paint Sealer	"Sealer and Reseal Glaze 7" Meguiar's Inc., Irvine, CA	800-854-8073
99	Paint Swirl Remover	"Hi-Tech Swirl Remover 9" Meguiar's Inc., Irvine, CA	800-854-8073

99	Paint Carnauba Paste Wax	"Hi-Tech Yellow Wax 26" Meguiar's Inc., Irvine, CA	800-854-8073

00 MAINTENANCE AND GENERAL INFORMATION

00 00 ... BATTERY: CHECKING DISPLAY. IF NECESSARY, RECHARGING BATTERY

IMPORTANT: Observe SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY .

Vehicles with low-maintenance battery

Check acid level, top up with distilled water if necessary

If level drops below Max. marking, top up distilled water to Max. marking.

00 00 ... BODY: CHECK FOR CORROSION (EXCEPT CAVITIES)

- Visually inspect underbody and attachment parts (brake lines, exhaust system branch, sills) for corrosion and check for damage.
- Check wheel arches for corrosion.
- Open doors and check A-, B- and C-pillars for corrosion, especially door hinges.
- Check door frame for corrosion, folding back door seal slightly if necessary.
- Check outer body for stone impacts, scratches or damage to paintwork and associated corrosion.

IMPORTANT: If damage to the underbody is identified:
Rectify identified faults after consulting with customer and issue a separate invoice.
If damage to the underbody is identified:

- **If necessary, remove panels from underbody.**
- **Check mountings and fixtures and brake and fuel lines for damage, corrosion and correct installation position.**

Rectify identified faults after consulting with customer and issue a separate invoice.

00 00 ... BRAKE LINES AND CONNECTIONS: VISUAL INSPECTION FOR LEAKS, DAMAGE AND CORRECT POSITION

Check brake lines and connections

- Visual inspection in visible area for:
  - Check brake fluid level in expansion tank
  - leaks

- traces of fluid
- damage
- crushing/flattening
- correct routing of brake lines
- correct seating of brake lines in holders

NOTE: Detected faults must urgently be repaired after consultation with the customer!

00 00 ... CBS RESET

IMPORTANT: It is always recommended to reset the CBS jobs via the BMW diagnosis system. The CBS service jobs can be reset in the car with the on-board computer button on the direction indicator/main-beam switch. It is only possible to encode the statutory intervals specific to individual countries with the BMW diagnosis system.

CBS reset with the BMW diagnosis system

IMPORTANT: To be able to check and/or correct the vehicle's on-board date properly, the BMW diagnosis system requires the correctly set tester system date!
The jobs may only be reset after the service measure has been completed.
The brake pads can only be reset with a new brake pad wear sensor.

The CBS jobs can be reset via the BMW diagnosis system on the following path:= => Perform vehicle test => Service functions => Maintenance => CBS reset

CBS reset in the vehicle

On the vehicle, maintenance operations can be reset at the instrument cluster. Here, the availability of a service job is reset to 100 % (corresponding to new component). The availability is an internal computing value (not visible to the operator).

NOTE: A reset is only possible in the car if there is no Check Control message and if the availability of the service job is below 80 %.
On-board date must be correctly set.
Resetting the scope of maintenance work service job must always be carried out after a maintenance measure has been completed.
The resetting process is interrupted it the time is exceeded or if a terminal is changed.

Switch the ignition on.

Press and hold the trip distance recorder reset button for 10 seconds until the 1st scope of maintenance work appears in the LCD display.

The upper display in the speedometer is illuminated by a service symbol (e.g.: an oilm can denotes an oil change).

The lower display in the speedometer indicates the time or distance remaining until the next service (e.g.: 25000).

Set desired maintenance scope with the rocker switch on the direction indicator/main-beam switch.

Fig. 1: Identifying Speedometer/Odometer Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

To reset, press the on-board computer button on the turn-signal/main-beam switch until the word "RESET" appears.

Resetting is confirmed by pressing the onboard computer button for a slightly longer period.

Fig. 2: Display - RESET
Courtesy of BMW OF NORTH AMERICA, INC.

A clock is displayed during resetting.

A check/tick is displayed after "RESET" on successful resetting.

Repeat the procedure for each additional service which is to be reset.

Fig. 3: Display - RESET On Successful Resetting
Courtesy of BMW OF NORTH AMERICA, INC.

The month and year are displayed in order to reset the statutory vehicle inspection.

Press on-board computer button.

Change month with rocker switch on direction indicator/main-beam switch.

Press on-board computer button to confirm.

Change year with rocker switch on direction indicator/main-beam switch.

Press on-board computer button to confirm.

Fig. 4: Display - Month And Year
Courtesy of BMW OF NORTH AMERICA, INC.

00 00 ... CHECK WINDSCREEN WASH/WIPE SYSTEM

- Check wipe pattern for smearing; if necessary, replace **WIPER BLADES** after consulting with customer
- The spray jet must emerge uniformly from the spray nozzle, replace **NOZZLE** if necessary and issue a separate invoice

00 00 ... CHECKING COOLANT LEVEL AND CONCENTRATION, CORRECTING IF NECESSARY

- Check connections, hose clamps and hoses for coolant residues and damage such as e.g. cracks.
- Check coolant level in expansion tank. Coolant level must be between Min. and Max. markings. If necessary, top up coolant to max. fill level. If there is no coolant, also identify the cause and notify the customer.
- In event of topping up: Check concentration with antifreeze tester (special tool) in coolant expansion tank.

  If necessary, drain off the difference quantity at the coolant drain plug and top up with recommended coolant (issue a separate invoice).

00 00 ... CHECKING HORN, HEADLIGHT FLASHERS AND HAZARD WARNING FLASHERS

Horn

Check function.

NOTE: In the case of twin-tone fanfares, make sure that both fanfares are working properly.

Headlamp flasher

Activate headlight flashers, check high-beam headlights and blue indicator lamp in instrument cluster for correct operation.

Hazard-warning system

Check function.

NOTE: After consultation with the customer, rectify faults and issue a separate invoice.

00 00 ... CHECKING INSTRUMENT AND INDICATION FIELD LIGHTING, HEATER BLOWER

Instrument lighting

Check function of instrument and indicator/warning lamps.

Indication field lighting

Check function of light switches; dimmer; controls; heater/air conditioning; rear window demister; radio; (depending on equipment) on-board computer; power windows; electric sunroof; fog lamp.

Heating

Check function of all blower stages, air distribution and air outlet.

NOTE: After consultation with the customer, rectify faults and issue a separate invoice.

00 00 ... CHECKING LIGHTING SYSTEM

- Check lighting system for correct operation:
  - Check headlights, rear lights and associated telltale/indicator lamps
  - Check headlight adjustment
  - Check side lights, parking lights, dipped-beam and main-beam headlights for correct operation
  - Check headlight flasher for correct operation
  - Check signal horn
  - Check left/right direction indicators and hazard warning system for correct operation
  - Check brake lights for correct operation
  - Check reversing lights and license plate lights for correct operation
  - Check front and rear fog lights for correct operation
  - Check interior lights (assembly: interior lights, footwell lights, luggage compartment lights, glovebox light) for correct operation
  - Check instrument and indication field lighting

00 00 ... CHECKING ROADWORTHINESS (TEST DRIVE)

Checking roadworthiness

- Take vehicle for a test drive, checking service and parking brakes in the process
- For vehicles with rear disc brakes, **BRAKE IN PARKING BRAKE AS INSTRUCTED**
- **CHECK FUNCTION OF PARKING BRAKE**
- Check steering for play, ease of movement and directional stability
- Check clutch for problem-free disengagement and non-spasmodic driving off at normal operating temperature
- Visually inspect shock absorbers for leaks
- Check indicator/warning lamps and Check Control system for correct operation
- Check due date for statutory roadworthiness and exhaust emission tests and advise customer of test dates

00 11 237 CHECKING/TOPPING UP FLUID LEVEL IN AUTOMATIC TRANSMISSION (GA6HP19Z)

IMPORTANT: Use only the approved AUTOMATIC TRANSMISSION - OPERATING FLUIDS . Failure to comply with this requirement will result in serious damage to the automatic transmission!

Installation:

Tighten down filler plug using

1. Hexagon wrench 8 A/F
2. Torque wrench
3. Socket 8 A/F

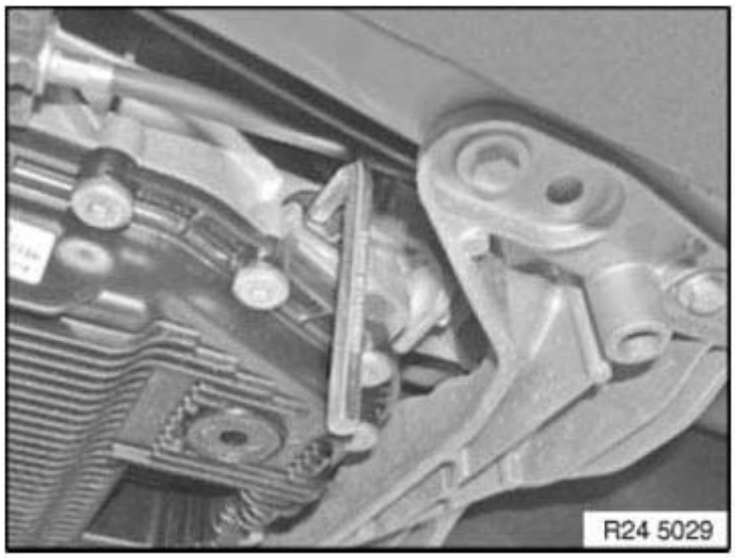


Fig. 5: Tightening Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Topping up transmission fluid after a repair

Stand vehicle on a level surface and secure against rolling off.

Undo filler plug (1).

Installation:

Replace sealing ring.

Top up transmission fluid until it emerges from filling orifice.

Start engine.

Replenish transmission fluid until it emerges from filling orifice.

Screw in filler plug (1).

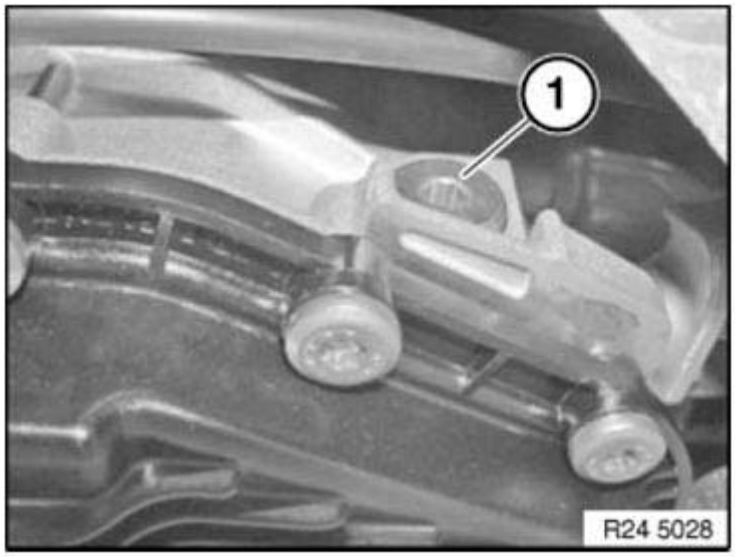


Fig. 6: Identifying Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Tightening torque: **24 11 7AZ** .

Press brake pedal to floor and shift through gears 1 to 6 several times at idle speed. Then shift selector lever to "P" position (Park).

Then check fluid level.

Checking fluid level

- Connect BMW Diagnosis and Information System (DIS) or BMW MoDiC to car.
- Call up Service functions (drive).
- Carry out fluid level check in accordance with instructions.

00 11 ... CHECKING/TOPPING UP OIL LEVEL IN REAR DIFFERENTIAL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Risk of damage!
To avoid serious damage to the rear differential, it is essential to use REAR AXLE - OPERATING FLUIDS in the rear differential.

Undo oil filler plug (1).

Tightening torque **33 11 2AZ** .

Check oil level.

If necessary, pour in rear differential oil up to lower edge of opening for oil filler plug (1).

Installation:

Replace oil filler plug (1) with O-ring.

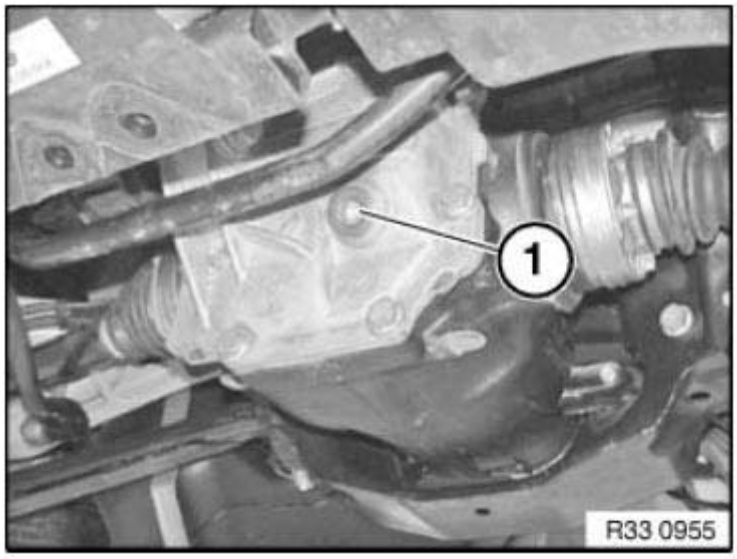


Fig. 7: Identifying Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

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  If the person affected is unconscious, do not administer anything by mouth, place the person in the

recovery position and seek immediate medical attention.

00 00 ... DIAGNOSTIC BRIEF TEST

Connect diagnostic system to OBD socket.

Switch on ignition.

Carry out vehicle identification.

Click on Brief test.

The brief test is carried out.

NOTE: **For motor vehicle diagnostics, the brief test is essential for evaluating possible stored diagnostic trouble codes. In the brief test, the control units are physically identified in succession and their fault memories read out.**
If the fault memory has been read out, the faults appear in the "Fault pattern selection" mask in the "Fault memory contents" field.
Check identified faults and if necessary rectify these faults after consulting with customer.

00 11.. ... DRAINING/TOPPING UP GEAR OIL IN MANUAL TRANSMISSION

NOTE: **Gearbox must be at normal operating temperature.**
Gear oil:

- **Refer to BMW Service Operating Fluids.**

Filling capacities:

- **Refer to Technical Data. See TED-TED-TDMUC2300-01B1S3 TRANSMISSION FILLING CAPACITIES or TED-TED-TDMUC2300-01B1S1 TRANSMISSION FILLING CAPACITIES .**

Draining gear oil:

- Release oil drain plug (1) and filler plug (2).
- Clean oil drain plug (1) and screw in.

Tightening torque **23 00 4AZ** .

Fill transmission with ATF.

- Pour in gear oil until overflowing.

- Tighten in filler screw (2).

Tightening torque: **23 00 4AZ** .

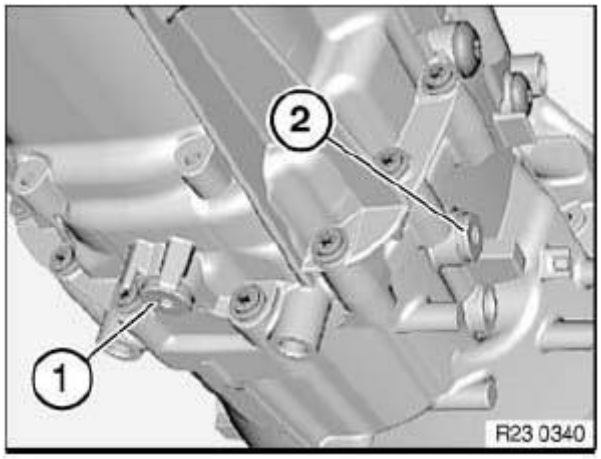


Fig. 8: Identifying Gear Oil Drain Plug And Filler Screw
Courtesy of BMW OF NORTH AMERICA, INC.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**

- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

36 00 ... INFORMATION/RECOMMENDATIONS AND REPAIR METHODS FOR ALUMINUM WHEELS

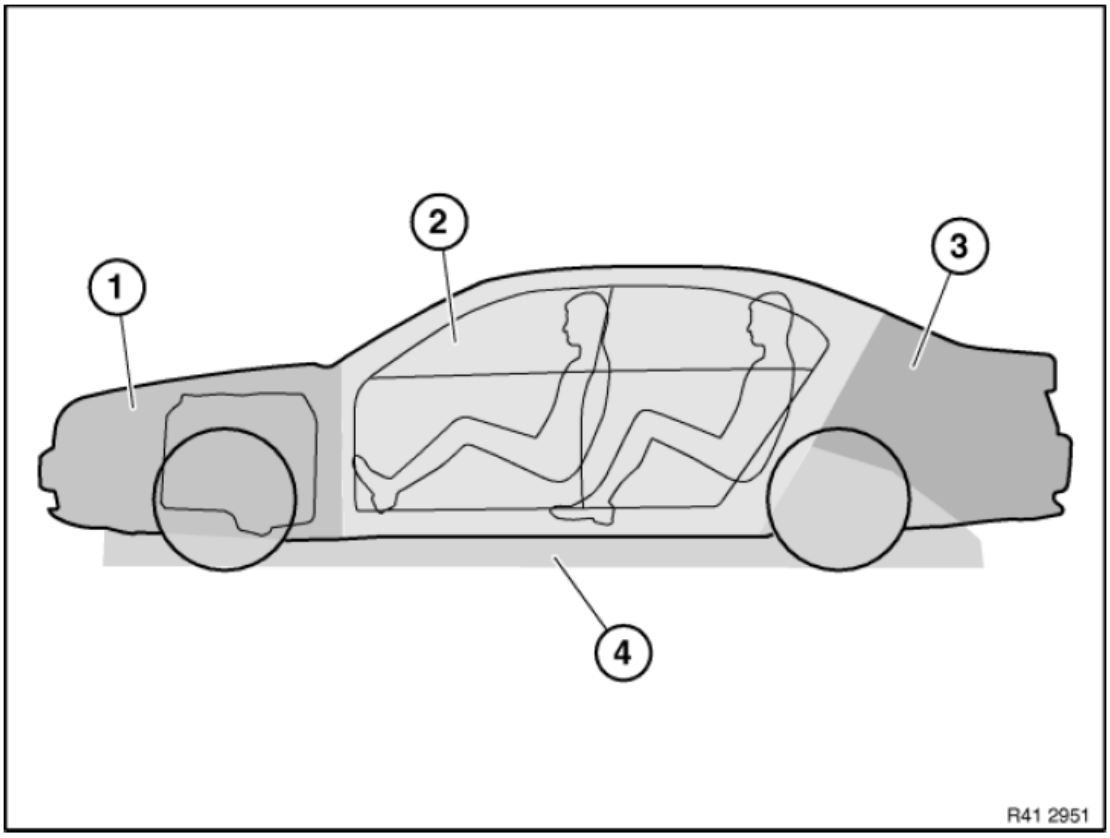
Cosmetic repairs of aluminum wheels using Color System

Recommendations and repair methods for aluminum wheels are described in the ASAP system under the following link:

- Aftersales Assistance Portal
  - Service/Technology
    - Color System

- Repair recommendations for aluminum wheels

00 00 ... INFORMATION/WARNING LABELS



1	Engine compartment	3	Rear end
2	Interior	4	Underfloor

Fig. 9: Identifying Engine Compartment, Interior, Rear End And Underfloor
Courtesy of BMW OF NORTH AMERICA, INC.

Location: Information/warning label: Country

VARIOUS COMPONENTS CHART

Various components	Replacement identification - spare parts -	US, CDN
Various components	Anti-theft protection	US, CDN

ENGINE COMPARTMENT REFERENCE CHART

Engine compartment (1):		
Battery	Battery sticker	Gulf States
Electronics box cover	High-voltage identification	Worldwide
Headlights/engine compartment	Mercury (xenon headlights)	Worldwide
Engine compartment/raw air snorkel	Aluminium screws/bolts	Worldwide
Cylinder head cover	Ignition coil	Worldwide
Engine compartment/end panel	BMW High Performance Oil	US, not CDN
Engine compartment/end panel	Premair	US
Engine compartment	ICES CDN	CDN
Engine compartment/hood/bonnet	Refrigerant	Worldwide
Engine compartment/hood/bonnet	Production date	Australia, Great Britain
Engine compartment/hood/bonnet	Exhaust gas	Australia, US, CDN
Engine compartment/brake booster	Brake fluid	CDN
Engine compartment/hood/bonnet	Exterior paint	Worldwide
Engine compartment/hood/bonnet	BMW genuine spare parts	Worldwide

INTERIOR REFERENCE CHART

Interior (2):		
Windscreen, top right	Airbag - windscreen	Europe
Windscreen	CCC	China
Windscreen	Vehicle identification number	US, CDN, Gulf States, Great Britain&South Africa
I Drive	A/C menu	US, CDN
Passenger compartment/instrument panel	Airbag, instrument panel	US, CDN
Interior/sun visor	Airbag - sun visor	US, CDN
Steering wheel/speedometer	Top speed - 210 km/h - Only with optional equipment and for car rental	Germany

BODY AND COMPLETE VEHICLE REFERENCE CHART

Complete vehicle, bodyshell:		
B-pillar	Airbag symbol (front passenger)	Worldwide (not US and CDN)
B-pillar	Vehicle identification number	Brazil
B-pillar	Manufacturer's certificate	US, CDN, Gulf States
B-pillar	Tyre inflation pressure	Europe, US, CDN, Australia
B-pillar	Runflat indicator	Worldwide
B-pillar	Side airbag	Worldwide
B-pillar	Nameplate	China
B-pillar	EC type plate with model designation, vehicle identification number, colour code	Worldwide, not US, CDN, Japan, Australia, Gulf States
Door, driver's side	Towing	Worldwide

REAR END REFERENCE CHART

Rear end (3):		
Fuel cap/hood/bonnet	Independent heating	Europe
Filling area	Refuelling	US, CDN, Europe
Filling area, instrument cluster (plug)	OBD system	US, CDN
Trim, striker	Nose weight (only with optional equipment)	Worldwide
Trim, cross-member (through-loading)	Lock, through-loading (only with optional equipment)	Worldwide
Luggage compartment cover	Retractable hardtop	Worldwide
Luggage compartment trim panel on side panel	Retractable hardtop	Worldwide
Tool box lid (E60)	HWS fluid	US
Rear lid trim (E61)	HWS fluid	US

UNDERFLOOR REFERENCE CHART

Underfloor (4):		
Vehicle jack	Vehicle jack	Australia
Front axle support	Airbag (basic setting)	Worldwide
Tension strut with hydro-mount	Do not lash down	Worldwide

Key:

US = United States

CDN = Canada

CCC = Car Communication Computer

OBD = On-Board Diagnosis

00 ... ... LIFTING VEHICLE WITH A LIFTING PLATFORM

WARNING: Danger to life!
Read and follow operating instructions for lifting platform.
Do not exceed carrying capacity of lifting platform.

NOTE: The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions.

IMPORTANT: Risk of damage!
Before driving onto a lifting platform, make sure there is sufficient ground clearance between the lifting platform and the car.
The vehicle may only be raised with the lifting platform at the four jacking

points.

IMPORTANT: Risk of damage!
Align support plates (2) of lifting platform arms to jacking points (1) in such a way that no adjoining components are touched and thereby damaged.

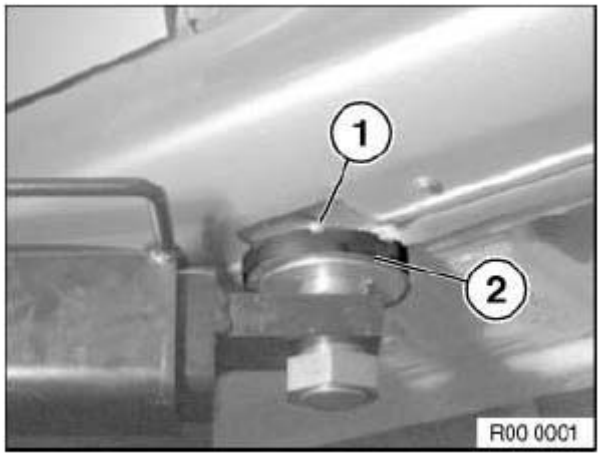


Fig. 10: Identifying Jacking Points And Support Plates
Courtesy of BMW OF NORTH AMERICA, INC.

00 .. ... LIFTING VEHICLE WITH A LIFTING PLATFORM

WARNING: Danger to life!
Read and follow operating instructions for lifting platform.
Do not exceed carrying capacity of lifting platform.

NOTE: The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions.

IMPORTANT: Risk of damage!
Before driving onto a lifting platform, make sure there is sufficient ground clearance between the lifting platform and the car.
The vehicle may only be raised with the lifting platform at the four jacking points.

IMPORTANT: Risk of damage!
Align support plates (2) of lifting platform arms to jacking points (1) in such a way that no adjoining components are touched and thereby damaged.

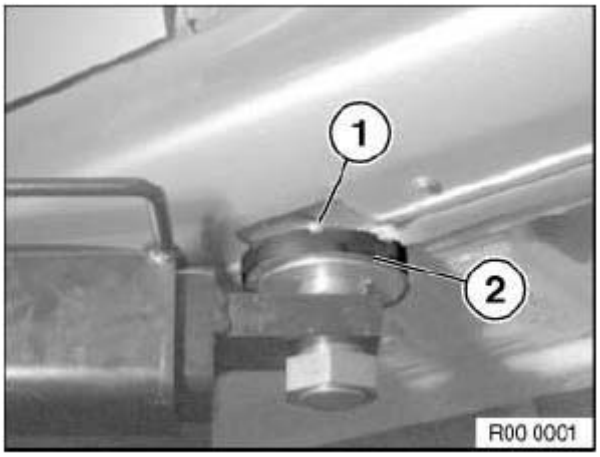


Fig. 11: Identifying Jacking Points And Support Plates
Courtesy of BMW OF NORTH AMERICA, INC.

00 00 ... MICROENCAPSULATED SCREWS

Screw locking is a means to preventing a screwed connection from being loosened by external influences.

After the screw has been coated with the adhesive, the adhesive remains inactive until it is activated by capsule breakage when the screw is inserted and then cures at room temperature.

Installation:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must **not** be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

00 ... ... NOTES ON USING REPAIR INSTRUCTIONS, TECHNICAL DATA, TIGHTENING TORQUES

If there are no cross-references to tightening torques in the repair instructions, the excerpts from the company standard BMW N 600 02.0 See **EXCERPT FROM COMPANY STANDARD BMW GS 90003-2** ; **MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M16 AND M16X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M14 AND M14X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M12 AND M12X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M10 AND M10 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M8 AND M8 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M6 AND M7 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** or **M4 AND M5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** must be observed.

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are colored differently as follows:

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**
- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange=repair fibre-optic cables**

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat > or = 85 °**

Treating cables and fibre-optic cables See **6113... CUTTING OFF, STRIPPING INSULATION AND CUTTING OPTICAL FIBRES TO LENGTH** or **6113... CRIMPING OPTICAL FIBRES**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

Airbag lines:

REPAIRING AIRBAG CABLES

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools.

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: **Optical fibre cables are colored differently as follows:**

- **Green = MOST (M edia O riented S ystems T ransport) optical fibre**

- **Yellow = ISIS (I ntelligent S afety I ntegration S ystem) optical fibre**
- **Orange = repair optical fibre cables**

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat > or = 85 °**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

00 11 259 OIL CHANGE IN REAR DIFFERENTIAL INCL. USED OIL DISPOSAL

NOTE: Observe following instructions and torques.

- **Replace screw plug with O-ring after releasing.**

Tightening torque with O-ring 33 11 2AZ.

WARNING: Risk of burning if exhaust system is touched!
DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Risk of damage!
To avoid serious damage to the rear axle differential, it is essential to use only REAR AXLE - OPERATING FLUIDS in the rear axle differential.

NOTE: The oil does not need to be changed in rear differentials carrying the "Life-

Time-Oil" sticker.
Only change oil when rear differential is at normal operating temperature.

Recycling

Catch and dispose of emerging differential oil.

Observe country-specific waste-disposal regulations

Open plug (1).

Drain and dispose of differential oil.

Add rear differential oil up to lower edge of opening for screw plug (1); if necessary, refer to Technical Data See **REAR AXLE FINAL DRIVE** or **REAR AXLE FINAL DRIVE** for necessary fill quantity.

Replace screw plug.

Tightening torque **33 11 2AZ** (with O-ring).

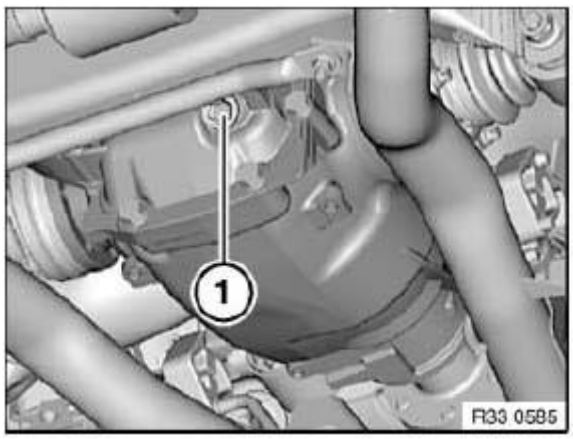


Fig. 12: Identifying Rear Differential Oil Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... POSITIONING OF MULTITRAILER HOOD FOR MAINTENANCE AND REPAIR WORK

IMPORTANT: At least two persons are needed to install and remove the hood from the platform.
Before installing and removing the hood, secure the BMW multitrailer and the entire combination against rolling. For this purpose, use the parking brake and the chocks of the BMW multitrailer.
The hood can also be set up and lowered with the aid of the universal lift available from BMW in conjunction with the roof racks and the hood adapter.
Under no circumstances should work of any kind be carried out below the suspended hood.

For maintenance and repair work, raise the hood using a lifting platform. Twin-column lifting platforms, body lifting platforms and twin-stamp underfloor platforms are suitable. The seating plates and areas of the lifting platform must be adjustable according to the dimensions of **Fig. 13**.

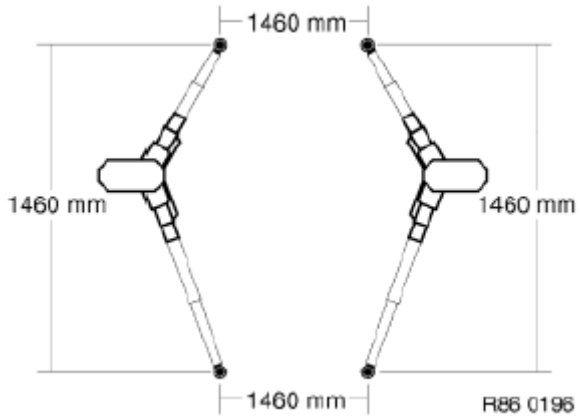


Fig. 13: Identifying Adjustable Dimension Of Seating Plates And Lifting Platform Areas
Courtesy of BMW OF NORTH AMERICA, INC.

The lifting platform must conform to the relevant legal provisions of the accident prevention regulations and be serviced as specified. Comply with the lifting platform operating instructions, in particular the safety instructions and the carrying capacity.

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Please comply with the following instructions before raising the hood:

- Raise only when it is unloaded;
- Ensure sufficient clearance between the seating plates/seating areas and the GFP edge of the hood;
- The hood must always be positioned in the middle of the lifting platform.

IMPORTANT: The hood may only be raised at the pin (1). Under no circumstances may the hood be raised at the GFP edge of the hood (2). See Fig. 14. Exclusively for removal of pin (1), raise the hood in the GFP area.

Also refer to:

86 21 ... REMOVING CENTERING PIN FROM MOUNTING BRACKET .

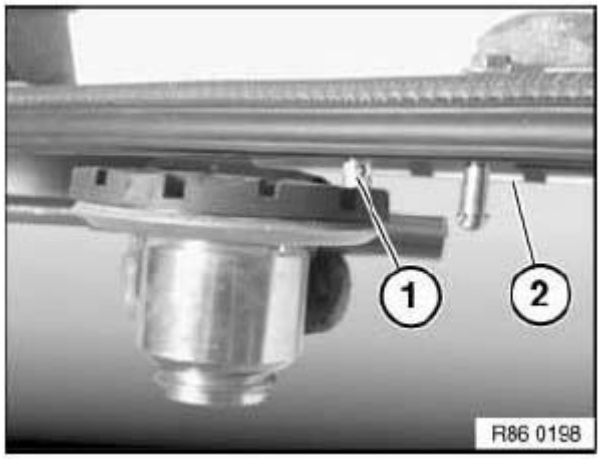


Fig. 14: Identifying Centering Pin Of Mounting Bracket And Hood
Courtesy of BMW OF NORTH AMERICA, INC.

00 .. . PRE-DELIVERY CHECK

Quality assurance by BMW Service

Model:
Vehicle identification number:

(Please tick where appropriate)

If necessary Quick Reference Guide:	Discussed and handed over
Included with the vehicle:	Owner's Handbook(s) Service Record Booklet Master key/remote control If necessary - spare key
The vehicle document case is left in the vehicle:	Glove box Storage box Luggage compartment

I hereby confirm that I have received the vehicle in perfect condition.

....

Place and date Signature of vehicle owner

Fig. 15: Pre-Delivery Check Sheet
Courtesy of BMW OF NORTH AMERICA, INC.

Pre-delivery check by BMW Service

Scopes of inspection: To be kept with the workshop documents

The following work must be carried out on the vehicle by BMW Service prior to delivery.

*** Denotes optional extra or national-market version. Observe possible changes in this regard.**

Model:
Vehicle identification number:

Battery master switch*	Not OK	OK
Removal and connection, carry out following scopes if necessary	O	O
Power windows regulator*: Initialise system	O	O
Glass sunroof*: Initialise system	O	O

Accessory items	Not OK	OK
Install	O	O

Fig. 16: Pre-Delivery Check Sheet (1 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.

With BMW Group diagnosis system	Not OK	OK
Carry out "CBS pre-delivery check" in the Service Function path under Maintenance	O	O
Deactivate transportation mode	O	O
Reset average mileage/kilometres driven	O	O
Enter first registration	O	O
Set on-board date	O	O
Set statutory inspection dates*	O	O
Enter service telephone numbers	O	O
Check battery, observe notes in tester, charge battery if necessary	O	O
Delete fault memory	O	O
Carry out vehicle test, eliminate faults if necessary	O	O

Engine compartment	Not OK	OK
Check for cleanliness	O	O

Washer fluid reservoir	Not OK	OK
Check fluid level and top up if necessary, where required with antifreeze additive	O	O

Fig. 17: Pre-Delivery Check Sheet (2 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.

Labels	Not OK	OK
Attach label for BMW Group Mobile Service	O	O

Body, interior equipment, underbody	Not OK	OK
Check for transportation damage	O	O

Spring blocker*	Not OK	OK
Remove	O	O

Tyres	Not OK	OK
Check inflation pressures; if provided, also compact or spare wheel	O	O
Initialise Run Flat Indicator	O	O

Winter tyres*	Not OK	OK
Attach V - max. sticker	O	O

Service Record Booklet	Not OK	OK
Stamp pre-delivery check / enter vehicle identification number	O	O

Include documents (glove box / storage box / luggage compartment)	Not OK	OK

Fig. 18: Pre-Delivery Check Sheet (3 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.

Owner's Handbook	O	O
Service Record Booklet	O	O
Contact booklet	O	O
BMW Group Mobile Service booklet	O	O
Include BMW key or remote control (make note of number)	O	O

Indicator/warning lights and Check Control	Not OK	OK
Check for incorrect display and eliminate faults if necessary	O	O

Navigation	Not OK	OK
If necessary, install navigation road map(s)	O	O

BMW TeleServices	Not OK	OK
Activated Yes / No	O	O

Service and parking brake	Not OK	OK
Transport and immobilisation periods of 3-6 weeks		
Check for correct operation	O	O

In event of transportation and immobilisation periods of more than 6 weeks

Fig. 19: Pre-Delivery Check Sheet (4 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.

Brake in	O	O
Interior mirror with digital compass*	Not OK	OK
Calibrate system	O	O
Optional equipment	Not OK	OK
Check for completeness and correction function	O	O
Preservation, cleaning	Not OK	OK
Remove transportation lock	O	O
Dewax and clean vehicle as prescribed	O	O

Date ..... Mechanic ..... Workshop Supervisor .....

Fig. 20: Pre-Delivery Check Sheet (5 Of 5)
Courtesy of BMW OF NORTH AMERICA, INC.

00 00 612 PRELIMINARY CHECK PRIOR TO ROADWORTHINESS TEST

- Preliminary check prior to roadworthiness test:
  - Check headlight adjustment
  - Visually inspect steering system
  - Visually inspect axles, suspension, springs, anti-roll bar, vibration damper, axle damping, if necessary air suspension
  - Visually inspect silencers

00 00 ... RAISING BMW MULTI-TRAILER

CAUTION: Twin-strut underfloor platforms and twin-pillar lifting platforms are

suitable for raising the BMW multi-trailer.
Lifting platforms with drive-on surfaces are not suitable for raising in order to carry out maintenance and repair work.

The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions. It is essential to follow the lifting platform operating instructions, in particular the safety instructions and carrying capacity!

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Before raising the BMW multi-trailer, please observe the following points:

- Raise the trailer only when it is unloaded
- Remove a supplied loading ramp from the loading ramp frame so that all chassis areas of the BMW multi-trailer are freely accessible
- There must be sufficient clearance between the carrier arms/flat girder bridges and the GFK aprons or the front guard of the BMW multi-trailer
- The BMW multi-trailer must always be positioned in the middle of the lifting platform.

CAUTION: You will need special additional supports for the lifting platform in order to bridge the difference in height between longitudinal member and lower edge of GFK side apron or front guard of the BMW multi-trailer. The minimum height of the additional supports is 145 mm. Use only the additional supports approved by the platform manufacturer or specified in these repair instructions.
You will find appropriate examples in the repair instructions for the majority of lifting platforms present in BMW workshops. For lifting platforms that are not named, the relevant manufacturers will offer you appropriate additional supports. Please contact directly the manufacturer of the lifting platform used in your dealership.

CAUTION: The BMW multi-trailer may only be raised by its longitudinal members. Do not under any circumstances raise the BMW multi-trailer by the GFK aprons. Make sure the additional supports bear the longitudinal members over their entire width and no attachments or wiring harnesses are touched or jammed. Check the securing equipment of the additional supports for correct seating. Under no circumstances should any work be carried out underneath the BMW multi-trailer if it is not adequately secured against slipping off the lifting platform.

The areas (2) on the longitudinal members (1) marked in the adjacent diagram are the best areas for attaching the additional supports.

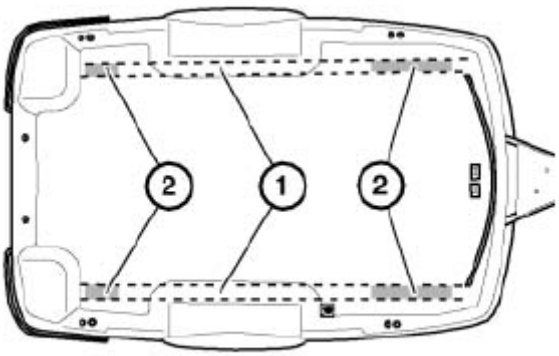


Fig. 21: Identifying Additional Support Areas On Longitudinal Members
Courtesy of BMW OF NORTH AMERICA, INC.

General notes on using twin-pillar lifting platforms

For the twin-pillar lifting platforms described, the BMW multi-trailer is positioned in the direction of travel on the platform. For lifting platforms which do not create sufficient clearance between disk wheel and carrier arms, move the BMW multi-trailer against the direction of travel onto the platform.

Becker & Sohne twin-strut underfloor platform

The BMW multi-trailer can only be raised if it is supported at right angles to the direction of travel. For raising, use the high additional supports (1) of Becker&Sohne.

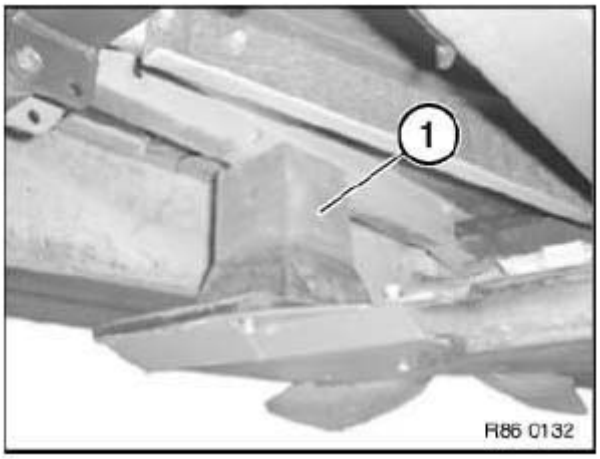


Fig. 22: Identifying Additional Supports
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Also lash the BMW multi-trailer to the flat girder bridges of the lifting platform. Flag the protruding tow hitch and the drawbar member of the BMW multi-trailer conspicuously so as to prevent injury, e.g. with a red cloth.

MAHA twin-pillar lifting platform

The BMW multi-trailer can only be raised if you use the support plate attachment sleeves for transporters (1). Position the axle of the BMW multi-trailer in the direction of travel in front of the pillars of the platform in order to obtain the specified lifting ranges and to establish sufficient clearance between disk wheel and carrier arms. The long carrier arms raise the front and the short carrier arms raise the rear of the BMW multi-trailer.

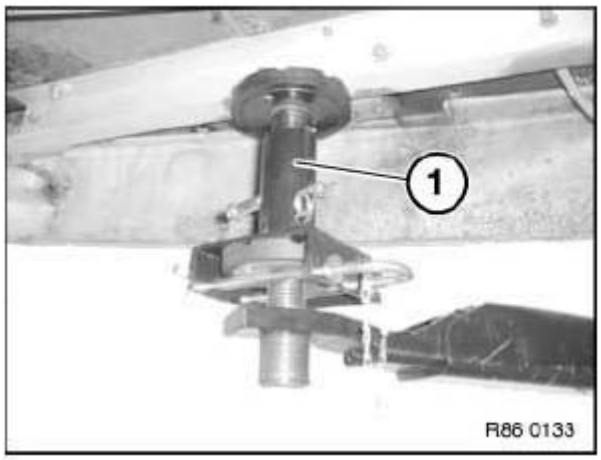


Fig. 23: Identifying MAHA Twin-Pillar Lifting Platform
Courtesy of BMW OF NORTH AMERICA, INC.

Romaico-Lift twin-pillar lifting platform

The BMW multi-trailer can only be raised if you use the 146 mm high attachments (1). Position the axle of the BMW multi-trailer in the direction of travel in front of the pillars of the platform in order to obtain the specified lifting ranges and to establish sufficient clearance between disk wheel and carrier arms. The long carrier arms raise the front and the short carrier arms raise the rear of the BMW multi-trailer.

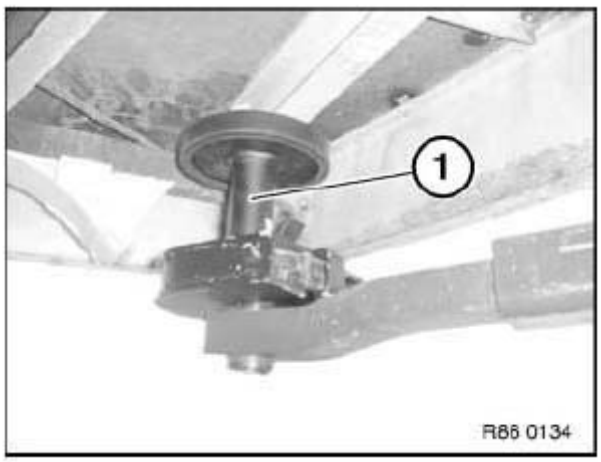


Fig. 24: Identifying High Attachment
Courtesy of BMW OF NORTH AMERICA, INC.

Working pit

The BMW multi-trailer can be serviced or repaired in conjunction with a working pit if the following measures are taken into consideration. The BMW multi-trailer must be secured against slipping/tilting sideways. The drawbar jockey wheel must be firmly secured against rolling.

00 ... ... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. **Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.**
2. **Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!**
3. **Check the rubber plate on the trolley jack prior to each use, replacing if necessary.**

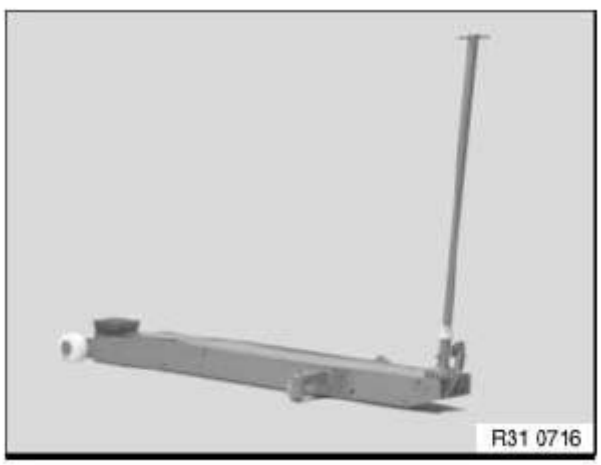


Fig. 25: Identifying Trolley Jack With Rubber Plate
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Car jacking point
2. Side car jacking points
3. Rear differential (**REMOVE HEAT SHIELD**)

   Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

4. Bolting point for rear axle tension struts

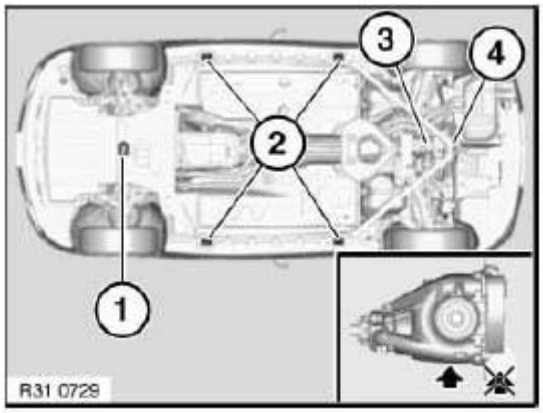


Fig. 26: Identifying Rear Differential With Car Jacking Points
Courtesy of BMW OF NORTH AMERICA, INC.

11 00 REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N52K)

Release screws (1).

Raise acoustic cover slightly and remove towards front.

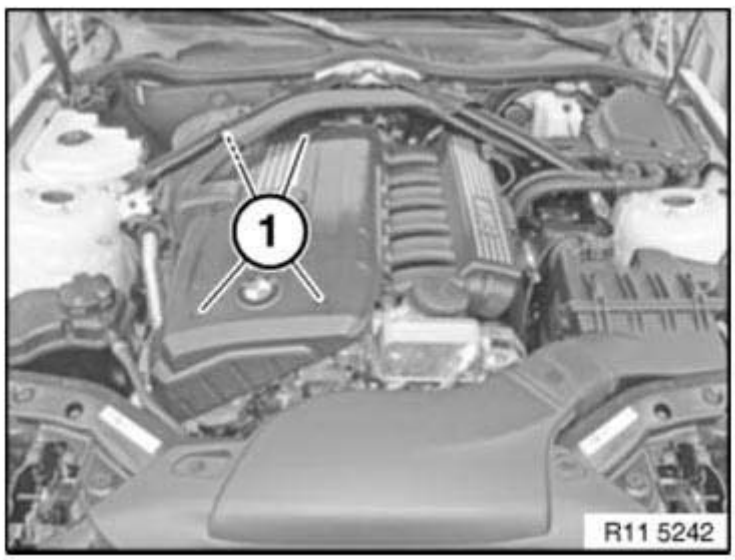


Fig. 27: Identifying Acoustic Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Risk of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

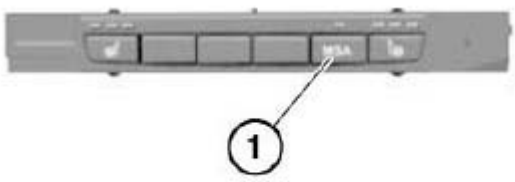
WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 28: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

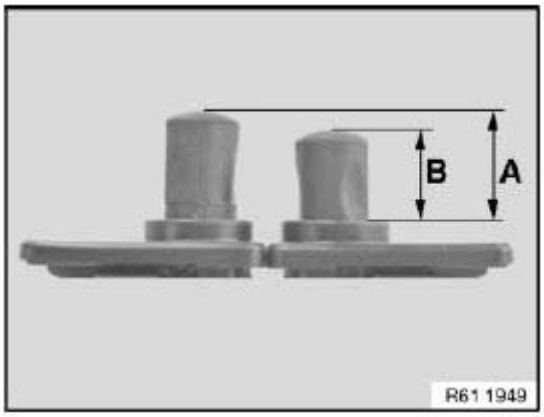


Fig. 29: Identifying Engine Hood/Bonnet Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

NOTE: For further information on automatic engine start - stop function (MSA):

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00 00 ... SEAT BELTS: CHECKING CONDITION OF BELT STRAP, FUNCTION OF INERTIA REEL MECHANISM, LOCKING REEL, BELT BUCKLE

Belt strap, retractor mechanism, belt interlock

Pull out strap and make sure it emerges without jerking.

Belt strapj:

- folding
- unravelling
- pinches
- cracks and tears
- traces of melting
- Check retaining button on tongue of belt strap

for damage and proper installation.

Retract belt strap; here the inertia reel mechanism must retract the strap automatically and without squeaking noises, the last section of the strap may have to be fed in.

Pull out belt strap in short tugs - locking reel must lock.

Belt buckle

The tongue on the belt strap must easily snap into place with an audible click.

When the "Press" button is pressed, the tongue must be ejected from the buckle under spring pressure.

NOTE: If the seat belt is damaged, you must replace the seat belt completely after consulting the customer; issue a separate invoice for this work. Instructions on how to proceed, refer to CHECKING AUTOMATIC SEAT BELT .

00 00 618 SERVICE - BRAKE FLUID

Service - brake fluid

- **CHANGING BRAKE FLUID**
- Reset CBS display See or **0000... CBS RESET** according to factory specification

IMPORTANT: Read and comply with GENERAL NOTES AND INFORMATION on brakes

00 00 618 SERVICE - BRAKE FLUID

Service - brake fluid

- **CHANGING BRAKE FLUID**
- Replace **MICROFILTER** for interior blower.
- Reset CBS display See or **0000... CBS RESET** according to factory specification

IMPORTANT: Read and comply with GENERAL NOTES AND INFORMATION on brakes

00 00 610 SERVICE - ENGINE OIL (PETROL VEHICLES FROM 03/2009)

Service - engine oil

- Change **ENGINE OIL AND OIL FILTER**
- **PARKING BRAKE**
  - Brake in and check for correct function
- A/C system or automatic A/C:
  - Change **MICROFILTER**
- At every 2nd engine oil change
  - Replace **SPARK PLUGS**
  - Intake silencer: change **AIR FILTER ELEMENT** . Shorten intervals accordingly for vehicles operated in dusty regions.
- Reset CBS display See or **0000... CBS RESET** according to factory specification

00 00 612 SERVICE - FRONT BRAKES

Service - front brakes

- **CHANGE BRAKE PADS** , clean brake air ducts
- **BRAKE DISCS**
  - Check surface and thickness
  - If necessary: Replace
- Reset CBS display See or **0000... CBS RESET** according to factory specification

NOTE:

- **Clean brake air ducts.**
- **Replace brake discs if they are below the MINIMUM BRAKE DISC THICKNESS and if scoring, heat cracks or thickness difference are detected.**
- **Apply a thin coat of grease to wheel centering on light alloy wheels.**
- **Issue a separate invoice for replacing the brake discs.**

00 00 602 SERVICE - INTAKE MUFFLER

- Change air cleaner element in accordance with **Replacing air cleaner element (N52K)** .
- Reset CBS display See or **0000... CBS RESET** according to factory specification

00 00 616 SERVICE - MICROFILTER

Service - microfilter

- **HEATING/AIR CONDITIONING: CHANGE MICROFILTER/CARBON CANISTER**
- Reset CBS display See or **0000... CBS RESET** according to factory specification

00 00 614 SERVICE - REAR BRAKES

Service - rear brakes

- **CHANGE BRAKE PADS** , clean brake air ducts
- **BRAKE DISCS**
  - Check surfaces and thickness.
  - If necessary: Replace
- **HANDBRAKE**
  - Check operation
- Reset **0000... CBS RESET** according to factory specification

NOTE:

- **Clean brake air ducts.**
- **Replace brake disks if they drop below MINIMUM THICKNESS (refer to Technical Data) and in event of scoring, heat cracks or thickness difference.**
- **Apply a thin coat of grease to wheel centering on light alloy wheels, refer to Service Information Operating Fluids.**
- **Issue a separate invoice for replacing the brake discs and handbrake shoes.**

00 00 622 SERVICE - SPARK PLUGS

Service - spark plugs

- **REPLACE SPARK PLUGS**
- Reset CBS display See or **0000... CBS RESET** according to factory specification

00 00 624 SERVICE - VEHICLE CHECK

Service - vehicle check

- Check **HORN, HEADLIGHT FLASHERS AND HAZARD WARNING FLASHERS**
- Check **INSTRUMENT AND INSCRIPTION LIGHTING AND BLOWER**
- Check **LIGHTING SYSTEM**
- **SEAT BELTS:** Check condition of seat belt strap, function of automatic reel, seat belt locking reel and seat belt buckle
- Check **WINDSCREEN WASH/WIPE SYSTEM**
- Convertible only:

Trigger rollover protection system (Convertible) via diagnostic interface. Warning: open soft top first

- If available: (M) Mobility System: Check expiry date on sealant bottle, replace sealant bottle if necessary
- **TYRES:** Check tread depth, tread wear pattern, external condition and tire pressure and correct if necessary (spare wheel as well)
- Initialize Run Flat Indicator
- Check **BATTERY** (magic eye), if necessary recharge battery (issuing a separate invoice for this work)
  - Check display (magic eye)
  - If necessary: Charge battery
- Steering fluid reservoir: Check oil level.
- Checking **COOLANT LEVEL AND CONCENTRATION** , topping up if necessary
- **WINDSCREEN WASHER SYSTEM:** Check fluid level, top up if necessary
- **BRAKE LINES AND CONNECTIONS:** Check for tightness, damage and correct position
- **UNDERBODY INCL. ALL VISIBLE COMPONENTS:** Check for damage, tightness, corrosion
- **STEERING COMPONENTS:** Check for play, tightness, damage and wear
- **CHECK ROAD SAFETY** (test drive):
  - Brakes
  - Steering
  - Shock Absorbers
  - Transmission
- Reset **CBS DISPLAY** according to factory specification

00 00 105 STANDARD SCOPE OF SERVICE

Standard scope of service

- Check Check Control messages
- Check indicator and warning lights
- Reset CBS display See or **0000... CBS RESET**

00 00 ... STEERING COMPONENTS: CHECKING FOR ZERO CLEARANCE, LEAKS, DAMAGE AND WEAR

Checking play

- For hydraulically assisted steering systems, the engine must be running
- For electrically assisted steering systems, the ignition must be on
- Steering wheel: Move steering wheel back and forth and check for play
- Tie rod joint: There must be no play between the track-rod arm (2) and track rod joint (1)

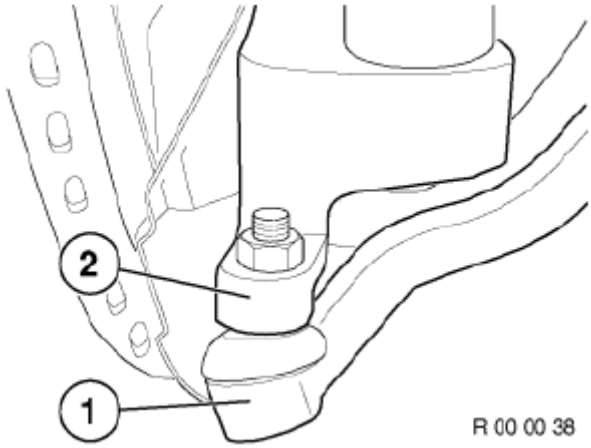
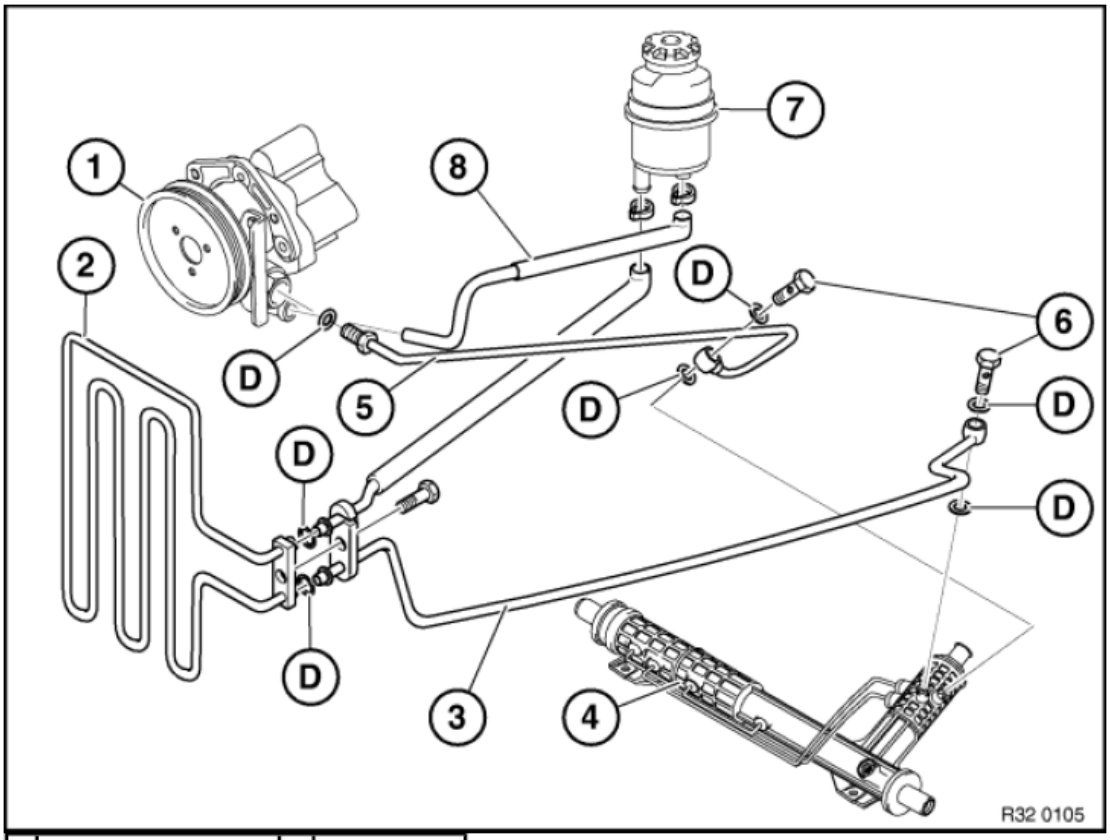


Fig. 30: Identifying Track-Rod Arm And Track Rod Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Checking for leaks

The following illustration shows the arrangement of the power steering components and lines.



1	Pump	6	Hollow bolt
2	Power steering cooler	7	Container
3	Return line	8	Suction hose
4	Steering gear	D	Sealing ring
5	Pressure line		

Fig. 31: Identifying Power Steering Components
Courtesy of BMW OF NORTH AMERICA, INC.

Check all visible connections, hoses, lines and steering gear for traces of fluid.

Checking for damage and wear

Check gaiters, flexible disc and axle and tie rod sleeves for damage (e.g. cracks, holes), for leaks or missing clamping bands on gaiters.

00 .. ... SYMBOLS USED AND INFORMATION IN REPAIR INSTRUCTIONS

WARNING: Precautionary rules and measures which protect mechanics and other personnel against injury (including life-threatening injuries).

For example:

WARNING: Risk of scalding!

Only perform this work after engine has cooled down.

IMPORTANT: Specific instructions and precautionary measures which prevent damage to the vehicle or to vehicle parts. Failure to comply with the above will invalidate any warranty claims.
The caution symbol is used in all repair instructions.
However, use of the warning word "Caution!" is not binding in every case.
The notes, instructions and precautionary measures mentioned above retain their validity.

WARNING: High-voltage system - danger to life!
Before beginning work, follow the applicable safety rules and perform the necessary preliminary work.

NOTE: High-voltage symbol for hybrid cars (electrically powered vehicles) E72 and MINI E.

WARNING: High-voltage system - danger to life!
Before beginning work, follow the applicable safety rules and perform the necessary preliminary work.

NOTE: High-voltage symbol for hybrid car (electrically powered vehicle) from F04.

NOTE: Particular information on improved procedures for operation, testing, adjustment and upkeep.
Also indicates the end of a repair section.

Recycling

Observe country-specific waste disposal regulations

General information:

Refers to other instructions: such as e.g.:

Necessary preliminary tasks;

Further instructions: refer to operating instructions for balancing machine.

Replacement:

Carry out programming/encoding.

NOTE: Many electronic control units must be programmed/coded (e.g. when replaced).

Note (previous symbol):

- Connect BMW diagnosis system

Note (symbol for new diagnosis system ISID):

- Connect BMW diagnosis system

IMPORTANT: Read and comply with notes on protection against damage from electrostatic damage (ESD protection).

NOTE: Electronic control units and other electronic components - if handled incorrectly - can be damaged or destroyed by electrostatic discharge.

Special tools required

NOTE: List of special tools needed in these repair instructions.

WARNING: Laser beam!

For example:

Laser beam at adjustment unit. Do not look into the beam!

Note on laser class.

IMPORTANT: Use eye protection for the following operations.

For example:

Fuel can emerge spontaneously at high speed when the fuel delivery line is released!

IMPORTANT: Use eye protection and ear protection for the following operations.

IMPORTANT: Use face protection for the following operations.

IMPORTANT: Use protective gloves for the following operations.
Avoid skin contact.

IMPORTANT: Use eye protection and protective gloves for the following operations.

Avoid eye contact and skin contact.

WARNING: Danger of explosion!

First aid measures

Note on first aid measures that need to be administered immediately.

00 00 ... TYRES: CHECKING INFLATION PRESSURE, CORRECTING IF NECESSARY (INCL. SPARE WHEEL), CHECKING EXTERNAL CONDITION, TREAD DEPTH, PATTERN

Checking tire inflation pressure

- Check tire inflation pressure in accordance with information plate on B-pillar
- The inflation pressure in the spare wheel must be 0.5 bar higher than the maximum specified value on the information plate
- Initialize **RUN FLAT INDICATOR**

Check tire condition

- Check tread depth of all tires with tire tread gauge
- Check tire tread surfaces and side walls for incisions and foreign particles such as nails or screws
- Check tire tread pattern for localized flattening and wear on one side; if necessary, carry out wheel/chassis alignment after consulting with customer and issue a separate invoice for this work

NOTE:

- **For details of approved wheel-tyre combinations, refer to KSD CD**
- **For reasons of driving safety, only use tires of the same type and tread pattern on a single vehicle**
- **Inform customer of any incorrect or worn tires**

00 00 ... UNDERBODY INCL. ALL VISIBLE COMPONENTS: CHECKING FOR DAMAGE, LEAKS, CORROSION

- Visually inspect underbody:
  - For leaks (transmission, fuel system, brake components, steering)
  - For correct routing of electrical leads (brake pad sensor, pulse generator)
  - For leaks (shock absorber) and mounting (springs) - rebound
  - Damage to underbody
  - Corrosion on underbody

IMPORTANT: If damage to the underbody is identified:

- **If necessary, remove panels from underbody.**

- **Check mountings and fixtures and brake and fuel lines for damage and correct installation position.**

Rectify identified faults after consulting with customer and issue a separate invoice.

00 00 ... UPKEEP MEASURES FOR STORED VEHICLES (NEW AND USED CARS) AND VEHICLES TO BE LAID UP AT CUSTOMER'S PREMISES

IMPLEMENTATION REFERENCE CHART

Measure	Vehicles	Implementation
Renew outer skin preservation (new cars must always be stored in preserved condition; preservation/depreservation instructions, refer to Component Group 97)	New cars	every 6 months; Tropical countries every 4 months
Release parking brake	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Engage gear or selector lever position "P" for automatic	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Check covering of interior equipment	New cars	in general
Increase tire inflation pressure to 3.5 bar	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
If battery master switch is fitted, switch off	New cars	in general
Charge battery		every 6 weeks batteries disconnected from vehicle

	New cars	electrical system every 12 weeks in general before handover to customer
	Used cars	every 6 weeks batteries disconnected from vehicle electrical system every 12 weeks
	Customer cars to be laid up (instructions to customer)	every 6 weeks batteries disconnected from vehicle electrical system every 12 weeks
Change brake fluid and reset service interval indicator (clock symbol only)	New cars	lay-up periods > 6 months, change before handover of vehicle to customer
	Used cars	lay-up periods > 6 months, change before handover of vehicle to customer
Check convertible top for possible damage	New cars	in general before handover to customer
	Used cars	in general before handover to customer
Park convertibles, if possible, under a roof	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Check for damage to paintwork and exterior/interior equipment	New cars	in general before handover to customer
	Used cars	in general before handover to customer
Change engine oil and oil filter when engine is at normal operating temperature	New cars	from 12 months lay-up period before handover of vehicle to customer
	Used cars	from 12 months lay-up period before handover of vehicle to customer
	Customer cars to be laid up (instructions to customer)	from 12 months lay-up period before handover of vehicle to customer

Check coolant concentrate	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Apply hand and foot brakes when dry	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Perform surface protection: Vehicle washing with inside cleaning and subsequent preservation of paintwork and chrome. Clean rubber seals on hoods/bonnets, rear lids and doors and apply talc or glycerine. Perform cleaning, preservation and subsequent treatment of engine, engine compartment, underbody, axles and assemblies with BMW-approved materials.	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Switch on A/C system once a month for 10 minutes	Used cars	necessary in order to retain full operational capability of gaskets and expansion valve (omitted in case of R134a refrigerant, identified by rating plate in engine compartment)
	Customer cars to be laid up (instructions to customer)	necessary in order to retain full operational capability of gaskets and expansion valve (omitted in case of R134a refrigerant, identified by rating plate in engine compartment)

00 00 ... VEHICLE DIAGNOSTIC TEST

Connect BMW diagnostic system (ISID) to diagnostic socket.

Switch the ignition on.

Carry out vehicle identification.

Start vehicle test.

The vehicle test is carried out.

NOTE: **The vehicle test is a prerequisite for vehicle diagnosis, since it allows any stored fault codes to be read and a test schedule to be prepared. In the vehicle test, the control units are physically identified in succession and their fault memories read out.**
Once the fault memory has been read, all fault memories are displayed in a fault memory list.
Check identified faults and if necessary rectify these faults after consulting with customer.

00 00 ... WINDSCREEN WASHER SYSTEM: CHECKING FLUID LEVEL, TOPPING UP IF NECESSARY

- Top up windscreen washer fluid reservoir, if necessary rear window washer fluid reservoir and (depending on equipment specification) intensive cleaning reservoir up to edge or mark.

IMPORTANT: A pH-neutral BMW window cleaning agent (antifreeze in winter) must always be added to the water.

00 MAINTENANCE AND GENERAL INFORMATION

00 00 ... BATTERY: CHECKING DISPLAY. IF NECESSARY, RECHARGING BATTERY

IMPORTANT: Observe 61 00 ... SAFETY INSTRUCTIONS FOR HANDLING VEHICLE BATTERY .

Vehicles with low-maintenance battery

Check acid level, top up with distilled water if necessary

If level drops below Max. marking, top up distilled water to Max. marking.

Vehicles with maintenance-free battery

IMPORTANT: For information on how to proceed, refer to Battery charging.

Issue a separate invoice if the battery is recharged.

00 00 ... BODY: CHECK FOR CORROSION (EXCEPT CAVITIES)

- Visually inspect underbody and attachment parts (brake lines, exhaust system branch, sills) for corrosion and check for damage.
- Check wheel arches for corrosion.
- Open doors and check A-, B- and C-pillars for corrosion, especially door hinges.
- Check door frame for corrosion, folding back door seal slightly if necessary.
- Check outer body for stone impacts, scratches or damage to paintwork and associated corrosion.

IMPORTANT: If damage to the underbody is identified:

- **If necessary, remove panels from underbody.**
- **Check mountings and fixtures and brake and fuel lines for damage, corrosion and correct installation position.**

Rectify identified faults after consulting with customer and issue a separate invoice.

00 00 ... BRAKE LINES AND CONNECTIONS: VISUAL INSPECTION FOR LEAKS, DAMAGE AND CORRECT POSITION

Check brake lines and connections

- Visual inspection in visible area for:
  - Check brake fluid level in expansion tank
  - leaks
  - traces of fluid
  - damage
  - crushing/flattening
  - correct routing of brake lines
  - correct seating of brake lines in holders

NOTE: Detected faults must urgently be repaired after consultation with the customer!

00 00 ... CBS RESET

IMPORTANT: It is always recommended to reset the CBS jobs via the BMW diagnosis system. The CBS service jobs can be reset in the car with the on-board computer button on the direction indicator/main-beam switch. It is only possible to encode the statutory intervals specific to individual countries with the BMW diagnosis system.

CBS reset with the BMW diagnosis system

IMPORTANT: To be able to check and/or correct the vehicle's on-board date properly, the BMW diagnosis system requires the correctly set tester system date!

The jobs may only be reset after the service measure has been completed.

The brake pads can only be reset with a new brake pad wear sensor.

The CBS jobs can be reset via the BMW diagnosis system on the following path:=

=> Perform vehicle test => Service functions => Maintenance => CBS reset

CBS reset in the vehicle

On the vehicle, maintenance operations can be reset at the instrument cluster. Here, the availability of a service job is reset to 100 % (corresponding to new component). The availability is an internal computing value (not visible to the operator).

NOTE: A reset is only possible in the car if there is no Check Control message and if the availability of the service job is below 80 %.

On-board date must be correctly set.

Resetting the scope of maintenance work service job must always be carried

out after a maintenance measure has been completed.

The resetting process is interrupted it the time is exceeded or if a terminal is changed.

Switch the ignition on.

Press and hold the trip distance recorder reset button for 10 seconds until the 1st scope of maintenance work appears in the LCD display.

The upper display in the speedometer is illuminated by a service symbol (e.g.: an oil can denotes an oil change).

The lower display in the speedometer indicates the time or distance remaining until the next service (e.g.: 25000).

Set desired maintenance scope with the rocker switch on the direction indicator/main-beam switch.

Fig. 1: Identifying Speedometer And Odometer
Courtesy of BMW OF NORTH AMERICA, INC.

To reset, press the on-board computer button on the turn-signal/main-beam switch until the word "RESET" appears.

Resetting is confirmed by pressing the onboard computer button for a slightly longer period.

Fig. 2: Display Message - RESET
Courtesy of BMW OF NORTH AMERICA, INC.

A clock is displayed during resetting.

A check/tick is displayed after "RESET" on successful resetting.

Repeat the procedure for each additional service which is to be reset.

Fig. 3: Display - Clock During Resetting
Courtesy of BMW OF NORTH AMERICA, INC.

The month and year are displayed in order to reset the statutory vehicle inspection.

Press on-board computer button.

Change month with rocker switch on direction indicator/main-beam switch.

Press on-board computer button to confirm.

Change year with rocker switch on direction indicator/main-beam switch.

Press on-board computer button to confirm.

Fig. 4: Display - Month And Year
Courtesy of BMW OF NORTH AMERICA, INC.

00 00 ... CHECK WINDSCREEN WASH/WIPE SYSTEM

- Check wipe pattern for smearing; if necessary, replace wiper blades See **61 61 ... ADJUSTING LEFT OR RIGHT WINDSCREEN WIPER** or **61 61 041 REPLACING BOTH WINDSCREEN WIPER BLADES** after consulting with customer
- The spray jet must emerge uniformly from the spray nozzle, replace nozzle. See **61 71 015 REMOVING AND INSTALLING/REPLACING A JET NOZZLE IN WINDSCREEN WASHER SYSTEM** . If necessary and issue a separate invoice

00 00 ... Checking coolant level and concentration, correcting if necessary

- Check connections, hose clamps and hoses for coolant residues and damage such as e.g. cracks.
- Check coolant level in expansion tank. Coolant level must be between Min. and Max. markings. If necessary, top up coolant to max. fill level. If there is no coolant, also identify the cause and notify the customer.
- In event of topping up: Check concentration with antifreeze tester (special tool) in coolant expansion tank.

If necessary, drain off the difference quantity at the coolant drain plug and top up with recommended coolant (issue a separate invoice).

00 00 ... CHECKING HORN, HEADLIGHT FLASHERS AND HAZARD WARNING FLASHERS

Horn

Check function.

NOTE: In the case of twin-tone fanfares, make sure that both fanfares are working properly.

Headlamp flasher

Activate headlight flashers, check high-beam headlights and blue indicator lamp in instrument cluster for correct operation.

Hazard-warning system

Check function.

NOTE: After consultation with the customer, rectify faults and issue a separate invoice.

00 00 ... CHECKING INSTRUMENT AND INDICATION FIELD LIGHTING, HEATER BLOWER

Instrument lighting

Check function of instrument and indicator/warning lamps.

Indication field lighting

Check function of light switches; dimmer; controls; heater/air conditioning; rear window demister; radio; (depending on equipment) on-board computer; power windows; electric sunroof; fog lamp.

Heating

Check function of all blower stages, air distribution and air outlet.

NOTE: After consultation with the customer, rectify faults and issue a separate invoice.

00 00 ... CHECKING LIGHTING SYSTEM

- Check lighting system for correct operation:
  - Check headlights, rear lights and associated telltale/indicator lamps
  - Check headlight adjustment
  - Check side lights, parking lights, dipped-beam and main-beam headlights for correct operation
  - Check headlight flasher for correct operation
  - Check signal horn
  - Check left/right direction indicators and hazard warning system for correct operation
  - Check brake lights for correct operation
  - Check reversing lights and license plate lights for correct operation
  - Check front and rear fog lights for correct operation
  - Check interior lights (assembly: interior lights, footwell lights, luggage compartment lights, glovebox light) for correct operation
  - Check instrument and indication field lighting

00 00 ... CHECKING ROADWORTHINESS (TEST DRIVE)

Checking roadworthiness

- Take vehicle for a test drive, checking service and parking brakes in the process
- For vehicles with rear disc brakes, see **34 00 ... GENERAL INFORMATION ON BRAKING IN NEW BRAKE DISCS/BRAKE PADS**
- **CHECK BRAKES ON TEST STAND**
- Check steering for play, ease of movement and directional stability
- Check clutch for problem-free disengagement and non-spasmodic driving off at normal operating temperature
- Visually inspect shock absorbers for leaks
- Check indicator/warning lamps and Check Control system for correct operation
- Check due date for statutory roadworthiness and exhaust emission tests and advise customer of test dates

00 11 ... CHECKING/TOPPING UP OIL LEVEL IN REAR DIFFERENTIAL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: Risk of damage!

To avoid serious damage to the rear differential, it is essential to use only REAR AXLE - OPERATING FLUIDS in the rear differential.

Undo oil filler plug (1).

Tightening torque 33 11 2AZ, see **REAR DIFFERENTIAL CASE WITH COVER** .

Check oil level.

If necessary, pour in rear differential oil up to lower edge of opening for oil filler plug (1).

Installation:

Replace oil filler plug (1) with O-ring.

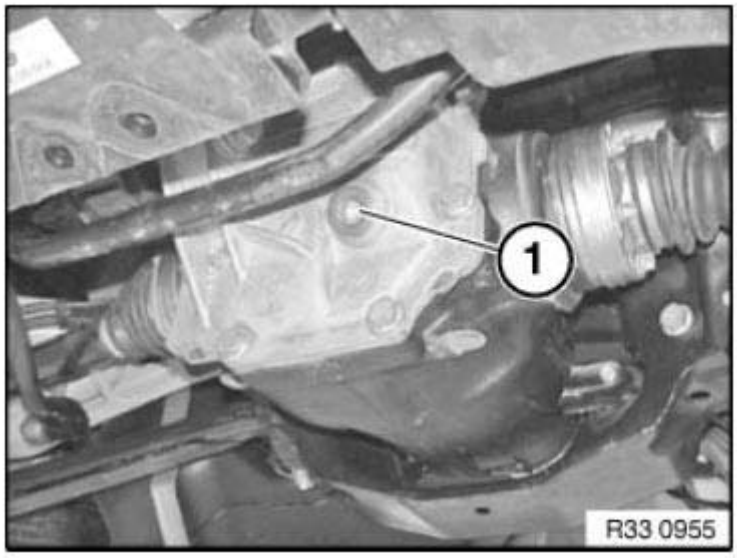


Fig. 5: Identifying Oil Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

28 00 ... CHECKING/TOPPING UP OIL LEVEL IN TWIN-CLUTCH GEARBOX (GS7D36SG)

Checking oil level

- Call up Service functions (Drive) in BMW diagnosis system
- Carry out oil level check in accordance with instructions

IMPORTANT: On the twin-clutch gearbox a run-in check fluid change is not required at 2000 km.

Use only the approved gear oil for dual clutch transmission GS7D36SG .

Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: The testing and filling procedure must be completed before the transmission oil temperature of 40°C is reached.

If a temperature in excess of 40°C is reached and no oil has emerged, insert the fluid adjusting screw and repeat the testing and filling procedure when it has cooled down.

Installation note:

Tighten down filler plug using

1. Hexagon wrench 8 A/F

2. Torque wrench
3. Socket 8 A/F

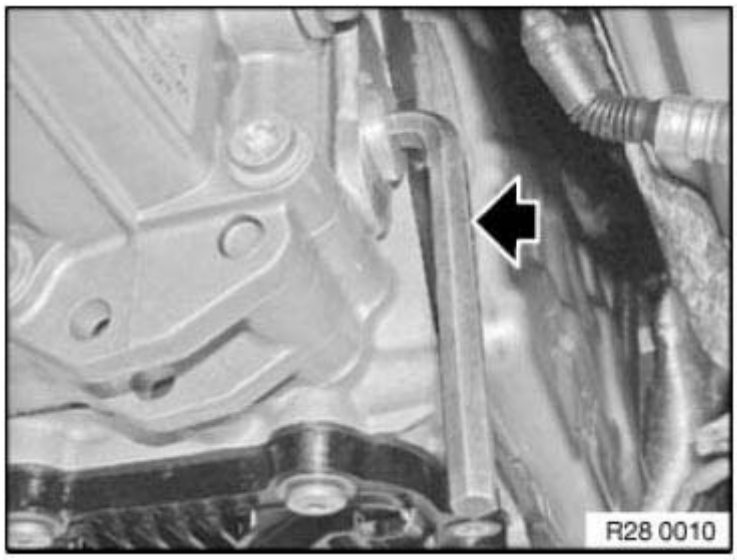


Fig. 6: Tightening Filler Plug Using Hexagon Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

Topping up transmission oil after a repair

Stand vehicle on a level surface and secure against rolling off.

- Open fluid adjusting screw (1). If oil emerges, close screw again immediately

  If no oil emerges, top up until oil emerges and close oil adjusting screw (1) again

  NOTE: If oil has been replenished here, a further refill must be carried out during the actual oil adjustment.

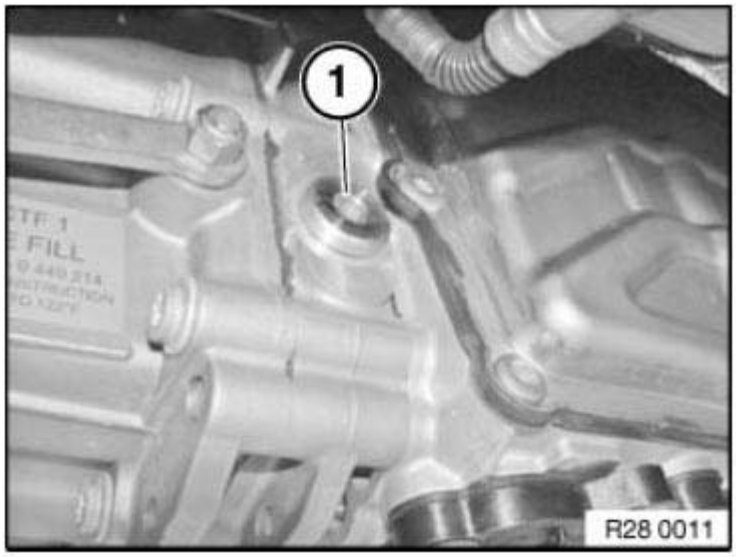


Fig. 7: Identifying Fluid Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

- Connect diagnosis system and start service functions (drive).
- Start engine (drive position N or P)
- Record transmission temperature using Tester.
- (Drive position P)
- Permissible starting temperature < or = 32°C
- Idle speed: maintain at approx. 2000 rpm for 1 minute.
- Open the oil adjusting screw (1)
- Fill until oil emerges.

  Max. transmission oil temperature 40 degrees Celsius

- Insert screw.

Installation note:

Replace screw.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches

- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
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  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 00 ... DIAGNOSTIC BRIEF TEST

Connect diagnostic system to OBD socket.

Switch on ignition.

Carry out vehicle identification.

Click on Brief test.

The brief test is carried out.

NOTE: **For motor vehicle diagnostics, the brief test is essential for evaluating possible stored diagnostic trouble codes. In the brief test, the control units are physically identified in succession and their fault memories read out.**

If the fault memory has been read out, the faults appear in the "Fault pattern selection" mask in the "Fault memory contents" field.

Check identified faults and if necessary rectify these faults after consulting with customer.

00 11.. ... DRAINING/TOPPING UP GEAR OIL IN MANUAL TRANSMISSION

NOTE: **Gearbox must be at normal operating temperature.**

Gear oil:

- **Refer to BMW Service Operating Fluids.**

Filling capacities:

- **See TRANSMISSION FILLING CAPACITIES or TRANSMISSION FILLING CAPACITIES**

Draining gear oil

- Release oil drain plug (1) and filler plug (2).
- Clean oil drain plug (1) and screw in.

  Tightening torque **23 00 4AZ** .

Fill transmission with ATF.

- Pour in gear oil until overflowing.
- Tighten in filler screw (2).

  Tightening torque: **23 00 4AZ** .

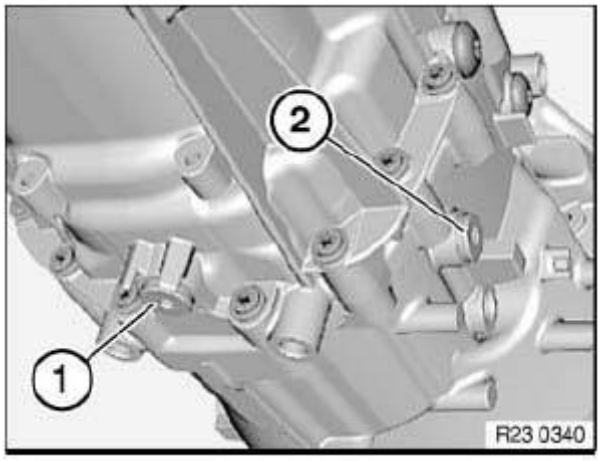


Fig. 8: Identifying Gear Oil Drain Plug And Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!

Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct**

sunlight.

- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

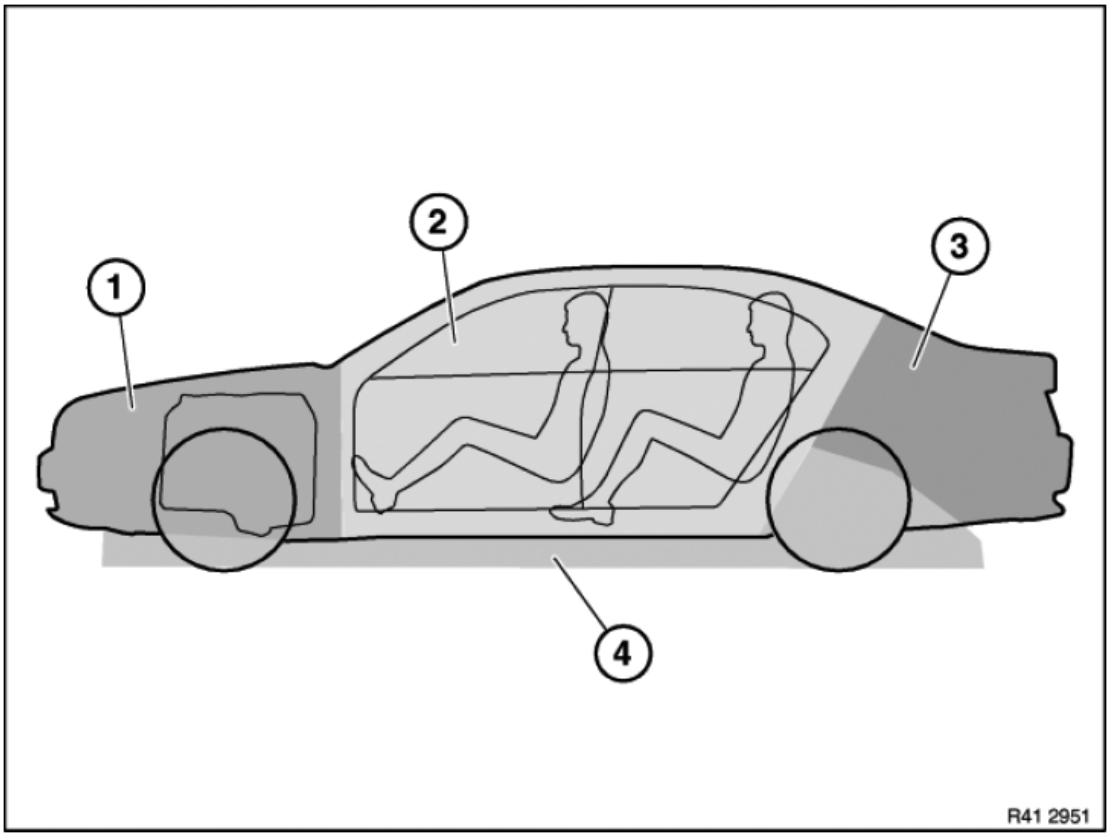
36 00 ... INFORMATION/RECOMMENDATIONS AND REPAIR METHODS FOR ALUMINIUM WHEELS

Cosmetic repairs of aluminium wheels using ColorSystem

Recommendations and repair methods for aluminium wheels are described in the ASAP system under the following link:

- Aftersales Assistance Portal
  - Service/Technology
    - ColorSystem
      - Repair recommendations for aluminium wheels

00 00 ... INFORMATION/WARNING LABELS



1	Engine compartment	3	Rear end
2	Interior	4	Underfloor

Fig. 9: Identifying Engine Compartment, Vehicle Interior, Rear End And Underfloor
Courtesy of BMW OF NORTH AMERICA, INC.

Location: Information/warning label: Country

INFORMATION/WARNING LABEL - COUNTRY

Various components	**Replacement identification - spare parts-**	**US, CDN**
Various components	Anti-theft protection	US, CDN

COUNTRY WISE INFORMATION/WARNING LABELS - ENGINE COMPARTMENT

Engine compartment (1):		
Battery	Battery sticker	Gulf States
Electronics box cover	High-voltage identification	Worldwide
Headlights/engine compartment	Mercury (xenon headlights)	Worldwide
Engine compartment/raw air snorkel	Aluminium screws/bolts	Worldwide
Cylinder head cover	Ignition coil	Worldwide
Engine compartment/end panel	BMW High Performance Oil	US, not CDN
Engine compartment/end panel	Premair	US
Engine compartment	ICES CDN	CDN
Engine compartment/hood/bonnet	Refrigerant	Worldwide
Engine compartment/hood/bonnet	Production date	Australia, Great Britain
Engine compartment/hood/bonnet	Exhaust gas	Australia, US, CDN
Engine compartment/brake booster	Brake fluid	CDN
Engine compartment/hood/bonnet	Exterior paint	Worldwide
Engine compartment/hood/bonnet	BMW genuine spare parts	Worldwide

COUNTRY WISE INFORMATION/WARNING LABELS - INTERIOR

Interior (2):		
Windscreen, top right	Airbag - windscreen	Europe
Windscreen	CCC	China
Windscreen	Vehicle identification number	US, CDN, Gulf States, Great Britain&South Africa
I Drive	A/C menu	US, CDN
Passenger compartment/instrument panel	Airbag, instrument panel	US, CDN
Interior/sun visor	Airbag - sun visor	US, CDN
Steering wheel/speedometer	Top speed -210 km/h - Only with optional equipment and for car rental	Germany

COUNTRY WISE INFORMATION/WARNING LABELS - COMPLETE VEHICLE

Complete vehicle, bodyshell:		
B-pillar	Airbag symbol (front passenger)	Worldwide (not US and CDN)
B-pillar	Vehicle identification number	Brazil
B-pillar	Manufacturer's certificate	US, CDN, Gulf States
B-pillar	Tyre inflation pressure	Europe, US, CDN, Australia

B-pillar	Runflat indicator	Worldwide
B-pillar	Side airbag	Worldwide
B-pillar	Nameplate	China
B-pillar	EC type plate with model designation, vehicle identification number, colour code	Worldwide, not US, CDN, Japan, Australia, Gulf States
Door, driver's side	Towing	Worldwide

COUNTRY WISE INFORMATION/WARNING LABELS - REAR END

Rear end (3):		
Fuel cap/hood/bonnet	Independent heating	Europe
Filling area	Refuelling	US, CDN, Europe
Filling area, instrument cluster (plug)	OBD system	US, CDN
Trim, striker	Nose weight (only with optional equipment)	Worldwide
Trim, cross-member (through-loading)	Lock, through-loading (only with optional equipment)	Worldwide
Luggage compartment cover	Retractable hardtop	Worldwide
Luggage compartment trim panel on side panel	Retractable hardtop	Worldwide
Tool box lid (E60)	HWS fluid	US
Rear lid trim (E61)	HWS fluid	US

COUNTRY WISE INFORMATION/WARNING LABELS - UNDERFLOOR

Underfloor (4):		
Vehicle jack	Vehicle jack	Australia
Front axle support	Airbag (basic setting)	Worldwide
Tension strut with hydro-mount	Do not lash down	Worldwide

Key:

US = United States

CDN = Canada

CCC = Car Communication Computer

OBD = On-Board Diagnosis

00 .. ... INSTRUCTIONS FOR PERFORMING SERVICE FUNCTIONS ON THE TWIN-CLUTCH GEARBOX (GS7D36SG)

NOTE: The service functions must be carried out in the relevant order!

TWIN CLUTCH GEARBOX SERVICING INSTRUCTION

Replacement of clutch and after all work on opened transmission	1. Carry out fluid adjustment 2. Teach in valve characteristic curves 3. Teach in kiss point 4. Parking lock hook test
Replacement of oil pump	1. Carry out fluid adjustment 2. Teach in valve characteristic curves 3. Teach in kiss point 4. Parking lock hook test
Replacement of transmission (complete)	1. Read out transmission data before replacement 2. Parking lock hook test 3. Write transmission data 4. Carry out fluid adjustment
Replacement/repair of parking lock cable, selector lever with parking lock unit	1. Parking lock hook test
Replacement of combination sensor	1. Carry out fluid adjustment 2. Teach in valve characteristic curves 3. Teach in kiss point 4. Parking lock hook test
Opening/replacement of fluid adjustment screw, repair/replacement of transmission fluid cooler, oil cooler lines, thermostat, water/oil heat exchanger (M3) and seals	1. Carry out fluid adjustment

00 ... ... LIFTING VEHICLE WITH A LIFTING PLATFORM

WARNING: Danger to life!

Read and follow operating instructions for lifting platform.

Do not exceed carrying capacity of lifting platform.

NOTE: The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions.

IMPORTANT: Risk of damage!

Before driving onto a lifting platform, make sure there is sufficient ground clearance between the lifting platform and the car.

The vehicle may only be raised with the lifting platform at the four jacking points.

IMPORTANT: Risk of damage!

Align support plates (2) of lifting platform arms to jacking points (1) in such a way that no adjoining components are touched and thereby damaged.

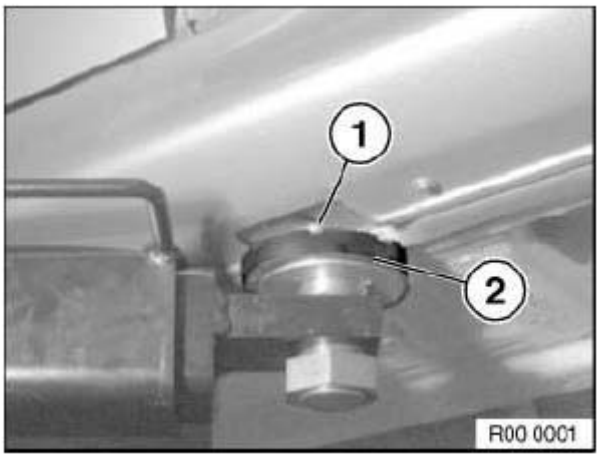


Fig. 10: Identifying Lifting Platform Arms Jacking Points And Support Plate
Courtesy of BMW OF NORTH AMERICA, INC.

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WARNING: Danger to life!

Read and follow operating instructions for lifting platform.

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The vehicle may only be raised with the lifting platform at the four jacking points.

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Align support plates (2) of lifting platform arms to jacking points (1) in such a way that no adjoining components are touched and thereby damaged.

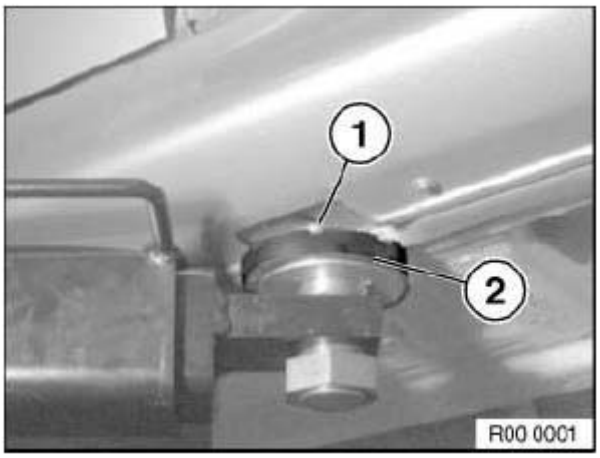


Fig. 11: Identifying Lifting Platform Arms Jacking Points And Support Plate
Courtesy of BMW OF NORTH AMERICA, INC.

00 00 ... MICROENCAPSULATED SCREWS

Screw locking is a means to preventing a screwed connection from being loosened by external influences.

After the screw has been coated with the adhesive, the adhesive remains inactive until it is activated by capsule breakage when the screw is inserted and then cures at room temperature.

Installation

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 mins. (start of curing)
- Microencapsulated screws must **not** be retightened
- Thread of nut must be cleaned beforehand in event of repeated use

00 ... ... NOTES ON USING REPAIR INSTRUCTIONS, TECHNICAL DATA, TIGHTENING TORQUES

These repair instructions are intended to help expertly carry out maintenance and repair work.

If there are no cross-references to tightening torques in the repair instructions, the excerpts from the company standard BMW : **EXCERPT FROM COMPANY STANDARD BMW GS 90003-2** ; **M18 AND M18X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M16 AND M16X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M14 AND M14X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M12 AND M12X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M10 AND M10 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M8 AND M8 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** ; **M6 AND M7 - MAXIMUM TIGHTENING**

TORQUES ACC. TO BMW GS 90003-2 ; or **M4 AND M5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** must be observed.

Cross-references to other flat rate units are intended as an aid and can refer to a complete work operation or merely to individual work steps contained therein.

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general:

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- To ensure professional repairs, perform repair work only with BMW-approved or recommended special tools and spare parts
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body parts; use edge protection if necessary
- Secure additionally laid cables/leads with cable ties

The following additionally applies

Shielded lines (coaxial lines):

IMPORTANT: Shielded lines may not be repaired!

- **This may lead to indifferences in noise radiation and interference immunity at contact points in the shield**
- **To satisfy the requirements of the type approval, it is essential to replace shielded cables completely**

Fibre-optic cable:

NOTE: Fibre-optic cables are coloured differently as follows:

- Green = **MOST** (**M** edia **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (**I** ntelligent **S** afety **I** ntegration **S** ystem) optical fibre
- Orange=repair fibre-optic cables

IMPORTANT:

- **Optical fibres may only reveal one separation point (bridge); renew optical fibre if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid effects of heat < or = 85°**

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional **BUTT CONNECTORS AND HEAT-SHRINK HOSES** .

NOTE:

- **FlexRay lines may only reveal one separation point (bride); renew complete line if necessary**
- **The cable is a twisted cable. If possible, maintain twisted cable after repair**

61 00 ... NOTES ON HANDLING WIRING HARNESSES AND CABLES

The following applies in general

To avoid damage, observe the following instructions:

- Avoid compressive and tensile loads
- Make sure cables are laid without kinks or abrasions
- Ensure non-contacting routing at sharp-edged body components; use edge protection if necessary
- Secure additionally laid cables/lines with cable straps

The following additionally applies

Shielded lines

Contact points in the shield can cause problems with regard to noise radiation and interference immunity. Consequently, distinctions have to be drawn between the following types:

Coaxial line

- Shielded RTK031 coaxial lines may only be repaired with special crimping tools .

CVBS lines

- CVBS lines may not be repaired.
- CVBS lines must be replaced in their entirety.

HSD lines

- HSD lines may not be repaired.
- HSD lines must be replaced in their entirety.

Optical fibre cable:

NOTE: **Optical fibre cables are coloured differently as follows:**

- Green = **MOST** (**M** edia **O** riented **S** ystems **T** ransport) optical fibre
- Yellow = **ISIS** (**I** ntelligent **S** afety **I** ntegration **S** ystem) optical fibre

- Orange = repair optical fibre cables

IMPORTANT:

- **Optical fibre cables are permitted to show only one separation point (bridge), replace optical fibre cables if necessary**
- **Smallest permissible bending radius is 25 mm**
- **Avoid influence of heat > or = 85°**

Treating cables and optical fibre cables

FlexRay:

It is possible to repair the FlexRay. In the event of damage, the cables can be joined with conventional butt connectors.

NOTE:

- **The line is a twisted cable. If possible, maintain twist in line after repair.**

Airbag lines:

Repairing airbag cables

Ribbon cables:

Repairing ribbon cables Z

00 11 259 OIL CHANGE IN REAR DIFFERENTIAL INCL. USED OIL DISPOSAL

NOTE: **Observe following instructions and torques.**

- **Replace screw plug with O-ring after releasing.**

Tightening torque with O-ring, see 33 11 2AZ in 33 11 REAR DIFFERENTIAL CASE WITH COVER

WARNING: **Risk of burning if exhaust system is touched!**

DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

IMPORTANT: **Risk of damage!**

To avoid serious damage to the rear axle differential, it is essential to use only approved transmission oils. See REAR AXLE - OPERATING FLUIDS .

NOTE: **The oil does not need to be changed in rear differentials carrying the "Life-Time-Oil" sticker.**

Only change oil when rear differential is at normal operating temperature.

Recycling

Catch and dispose of emerging differential oil.

Observe country-specific waste-disposal regulations

Open plug (1).

Drain and dispose of differential oil.

Add rear differential oil up to lower edge of opening for screw plug (1).

Replace screw plug.

Tightening torque 33 11 2AZ in **33 11 REAR DIFFERENTIAL CASE WITH COVER** .

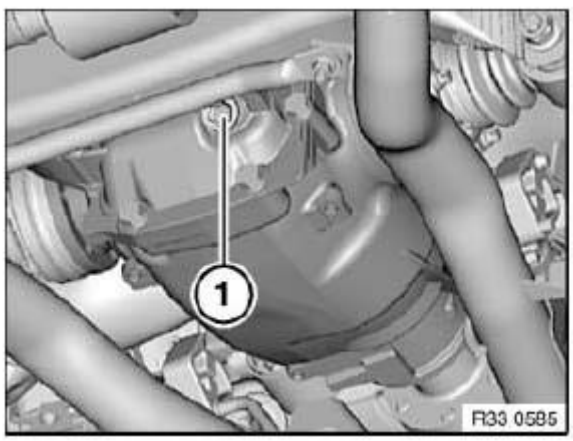


Fig. 12: Identifying Screw Plug
Courtesy of BMW OF NORTH AMERICA, INC.

86 10 ... POSITIONING OF MULTITRAILER HOOD FOR MAINTENANCE AND REPAIR WORK

IMPORTANT: **At least two persons are needed to install and remove the hood from the platform.**

Before installing and removing the hood, secure the BMW multitrailer and the entire combination against rolling. For this purpose, use the parking brake and the chocks of the BMW multitrailer.

The hood can also be set up and lowered with the aid of the universal lift

available from BMW in conjunction with the roof racks and the hood adapter. Under no circumstances should work of any kind be carried out below the suspended hood.

For maintenance and repair work, raise the hood using a lifting platform. Twin-column lifting platforms, body lifting platforms and twin-stamp underfloor platforms are suitable. The seating plates and areas of the lifting platform must be adjustable according to the dimensions of **Fig. 13**.

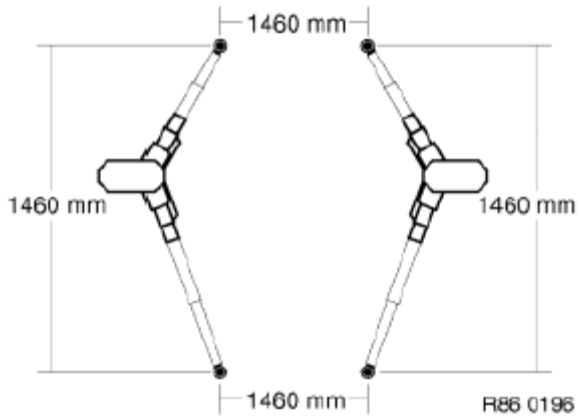


Fig. 13: Identifying Seating Plates And Lifting Platform Areas Adjustable Dimensions
Courtesy of BMW OF NORTH AMERICA, INC.

The lifting platform must conform to the relevant legal provisions of the accident prevention regulations and be serviced as specified. Comply with the lifting platform operating instructions, in particular the safety instructions and the carrying capacity.

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Please comply with the following instructions before raising the hood:

- Raise only when it is unloaded;
- Ensure sufficient clearance between the seating plates/seating areas and the GFP edge of the hood;
- The hood must always be positioned in the middle of the lifting platform.

IMPORTANT: The hood may only be raised at the pin (1). Under no circumstances may the hood be raised at the GFP edge of the hood (2). See Fig. 14. Exclusively for removal of pin (1), raise the hood in the GFP area.

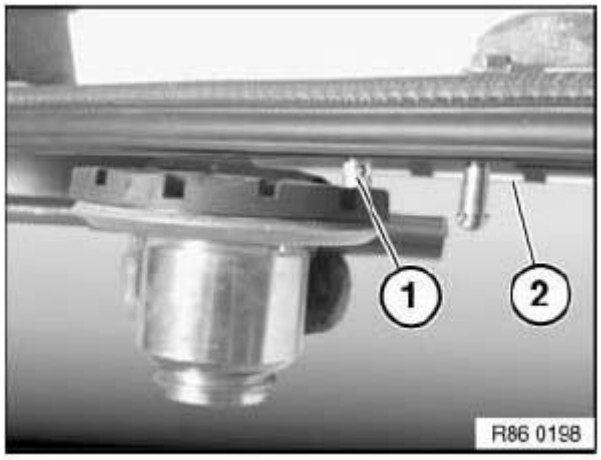


Fig. 14: Identifying Multitrailer Hood And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

00 .. . PRE-DELIVERY CHECK

Quality assurance by BMW Service

Model:

Vehicle identification number:

VEHICLE IDENTIFICATION NUMBER

(Please tick where appropriate) **If necessary Quick Reference Guide:**	**Discussed and handed over**
Included with the vehicle:	Owner's Handbook(s) Service Record Booklet Master key/remote control If necessary - spare key
The vehicle document case is left in the vehicle:	Glove box Storage box Luggage compartment

I hereby confirm that I have received the vehicle in perfect condition.

Place and date

Signature of vehicle owner

Pre-delivery check by BMW Service

Scopes of inspection: To be kept with the workshop documents

The following work must be carried out on the vehicle by BMW Service prior to delivery.

*** Denotes optional extra or national-market version. Observe possible changes in this regard.**

Model:

Vehicle identification number:

BATTERY MASTER SWITCH OPERATION REFERENCE CHART

Battery master switch*	**Not OK**	**OK**
Removal and connection, carry out following scopes if necessary	O	O
Power windows regulator*: Initialise system	O	O
Glass sunroof*: Initialise system	O	O

ACCESSORY ITEMS INSPECTION CHART

Accessory items	**Not OK**	**OK**
Install	O	O

BMW GROUP DIAGNOSIS SYSTEM INSPECTION CHART

With BMW Group diagnosis system	**Not OK**	**OK**
Carry out "CBS pre-delivery check" in the Service Function path under Maintenance	O	O
Deactivate transportation mode	O	O
Reset average mileage/kilometres driven	O	O
Enter first registration	O	O
Set on-board date	O	O
Set statutory inspection dates*	O	O
Enter service telephone numbers	O	O
Check battery, observe notes in tester, charge battery if necessary	O	O
Delete fault memory	O	O
Carry out vehicle test, eliminate faults if necessary	O	O

ENGINE COMPARTMENT INSPECTION CHART

Engine compartment	**Not OK**	**OK**
Check for cleanliness	O	O

WASHER FLUID RESERVOIR INSPECTION CHART

Washer fluid reservoir	**Not OK**	**OK**
Check fluid level and top up if necessary, where required with antifreeze additive	O	O

LABELS INSPECTION CHART

Labels	Not OK	OK
Attach label for BMW Group Mobile Service	O	O

BODY INTERIOR EQUIPMENT INSPECTION CHART

Body, interior equipment, underbody	Not OK	OK
Check for transportation damage	O	O

SPRING BLOCKER INSPECTION CHART

Spring blocker*	Not OK	OK
Remove	O	O

TYRES INSPECTION CHART

Tyres	Not OK	OK
Check inflation pressures; if provided, also compact or spare wheel	O	O
Initialise Run Flat Indicator	O	O

WINTER TYRES INSPECTION CHART

Winter tyres*	Not OK	OK
Attach V-max. sticker	O	O

SERVICE BOOKLET INSPECTION CHART

Service Record Booklet	Not OK	OK
Stamp pre-delivery check/enter vehicle identification number	O	O

DOCUMENTS INSPECTION CHART

Include documents (glove box/storage box/luggage compartment)	Not OK	OK
Owner's Handbook	O	O
Service Record Booklet	O	O
Contact booklet	O	O
BMW Group Mobile Service booklet	O	O
Include BMW key or remote control (make note of number)	O	O

INDICATOR/WARNING LAMPS AND CHECK CONTROL INSPECTION CHART

Indicator/warning lights and Check Control	Not OK	OK
Check for incorrect display and eliminate faults if necessary	O	O

NAVIGATION INSPECTION CHART

Navigation	Not OK	OK
If necessary, install navigation road map(s)	O	O

BMW TELESERVICES INSPECTION CHART

BMW TeleServices	Not OK	OK
Activated Yes/No	O	O

SERVICE AND PARKING BRAKE INSPECTION CHART

Service and parking brake	Not OK	OK
Transport and immobilisation periods of 3-6 weeks Check for correct operation	O	O
In event of transportation and immobilisation periods of more than 6 weeks Brake in	O	O

INTERIOR MIRROR WITH DIGITAL COMPASS INSPECTION CHART

Interior mirror with digital compass*	Not OK	OK
Calibrate system	O	O

OPTIONAL EQUIPMENT INSPECTION CHART

Optional equipment	Not OK	OK
Check for completeness and correction function	O	O

PRESERVATION/CLEANING INSPECTION CHART

Preservation, cleaning	Not OK	OK
Remove transportation lock	O	O
Dewax and clean vehicle as prescribed	O	O

Date

Mechanic

Workshop Supervisor

00 00 612 PRELIMINARY CHECK PRIOR TO ROADWORTHINESS TEST

- Preliminary check prior to roadworthiness test:
  - Check headlight adjustment
  - Visually inspect steering system
  - Visually inspect axles, suspension, springs, anti-roll bar, vibration damper, axle damping, if necessary air suspension
  - Visually inspect silencers

00 00 ... RAISING BMW MULTI-TRAILER

CAUTION: Twin-strut underfloor platforms and twin-pillar lifting platforms are suitable for raising the BMW multi-trailer.

Lifting platforms with drive-on surfaces are not suitable for raising in order to carry out maintenance and repair work.

The lifting platform must comply with the relevant statutory accident prevention regulations and be serviced according to the manufacturer's instructions. It is essential to follow the lifting platform operating instructions, in particular the safety instructions and carrying capacity!

Make sure you adhere to the BMW-recommended work area of 5 x 7 m and to an escape route of 0.6 m between two lifting platforms.

Before raising the BMW multi-trailer, please observe the following points:

- Raise the trailer only when it is unloaded
- Remove a supplied loading ramp from the loading ramp frame so that all chassis areas of the BMW multi-trailer are freely accessible
- There must be sufficient clearance between the carrier arms/flat girder bridges and the GFK aprons or the front guard of the BMW multi-trailer
- The BMW multi-trailer must always be positioned in the middle of the lifting platform.

CAUTION: You will need special additional supports for the lifting platform in order to bridge the difference in height between longitudinal member and lower edge of GFK side apron or front guard of the BMW multi-trailer. The minimum height of the additional supports is 145 mm. Use only the additional supports approved by the platform manufacturer or specified in these repair instructions.

You will find appropriate examples in the repair instructions for the majority of lifting platforms present in BMW workshops. For lifting platforms that are not named, the relevant manufacturers will offer you appropriate additional supports. Please contact directly the manufacturer of the lifting platform used in your dealership.

CAUTION: The BMW multi-trailer may only be raised by its longitudinal members. Do not under any circumstances raise the BMW multi-trailer by the GFK aprons. Make sure the additional supports bear the longitudinal members over their entire width and no attachments or wiring harnesses are touched or jammed. Check the securing equipment of the additional supports for correct seating. Under no circumstances should any work be carried out underneath the BMW multi-trailer if it is not adequately secured against slipping off the lifting platform.

The areas (2) on the longitudinal members (1) marked in the adjacent diagram are the best areas for attaching the additional supports.

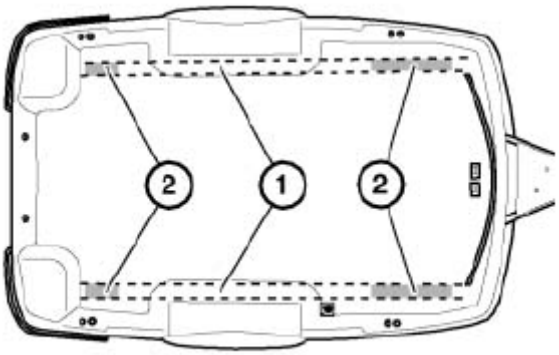


Fig. 15: Identifying Additional Support Areas On Longitudinal Members
Courtesy of BMW OF NORTH AMERICA, INC.

General notes on using twin-pillar lifting platforms

For the twin-pillar lifting platforms described, the BMW multi-trailer is positioned in the direction of travel on the platform. For lifting platforms which do not create sufficient clearance between disk wheel and carrier arms, move the BMW multi-trailer against the direction of travel onto the platform.

Becker & Sohne twin-strut underfloor platform

The BMW multi-trailer can only be raised if it is supported at right angles to the direction of travel. For raising, use the high additional supports (1) of Becker&Sohne.

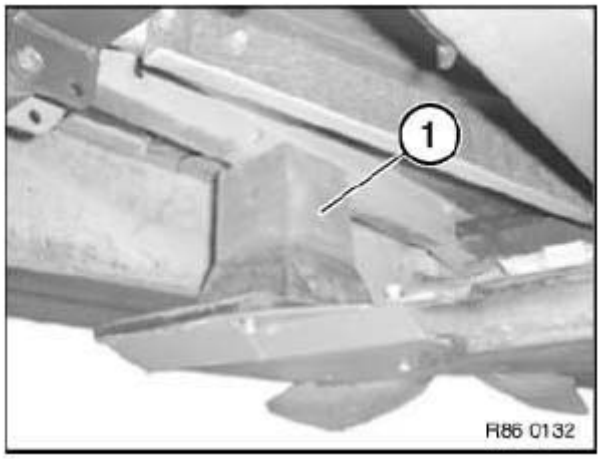


Fig. 16: Identifying Twin-Strut Underfloor Platform With Additional Support
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Also lash the BMW multi-trailer to the flat girder bridges of the lifting platform. Flag the protruding tow hitch and the drawbar member of the BMW multi-trailer conspicuously so as to prevent injury, e.g. with a red cloth.

MAHA twin-pillar lifting platform

The BMW multi-trailer can only be raised if you use the support plate attachment sleeves for transporters (1). Position the axle of the BMW multi-trailer in the direction of travel in front of the pillars of the platform in order to obtain the specified lifting ranges and to establish sufficient clearance between disk wheel and carrier arms. The long carrier arms raise the front and the short carrier arms raise the rear of the BMW multi-trailer.

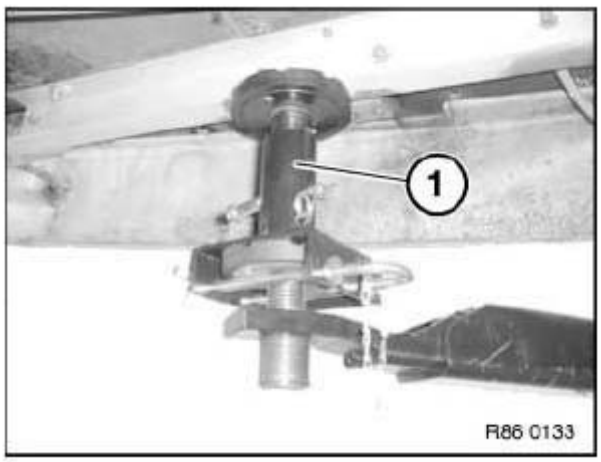


Fig. 17: Identifying MAHA Twin-Pillar Lifting Platform
Courtesy of BMW OF NORTH AMERICA, INC.

Romaico-Lift twin-pillar lifting platform

The BMW multi-trailer can only be raised if you use the 146 mm high attachments (1).

Position the axle of the BMW multi-trailer in the direction of travel in front of the pillars of the platform in order to obtain the specified lifting ranges and to establish sufficient clearance between disk wheel and carrier arms. The long carrier arms raise the front and the short carrier arms raise the rear of the BMW multi-trailer.

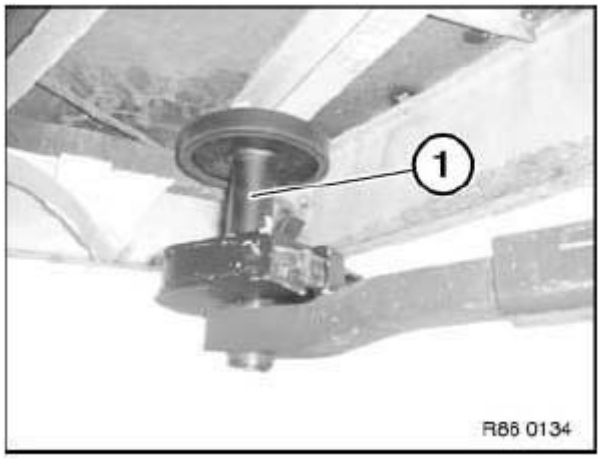


Fig. 18: Identifying Romaico-Lift Twin-Pillar Lifting Platform
Courtesy of BMW OF NORTH AMERICA, INC.

Working pit

The BMW multi-trailer can be serviced or repaired in conjunction with a working pit if the following measures are taken into consideration. The BMW multi-trailer must be secured against slipping/tilting sideways. The drawbar jockey wheel must be firmly secured against rolling.

00 ... ... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. **Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.**
2. **Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!**
3. **Check the rubber plate on the trolley jack prior to each use, replacing if necessary.**

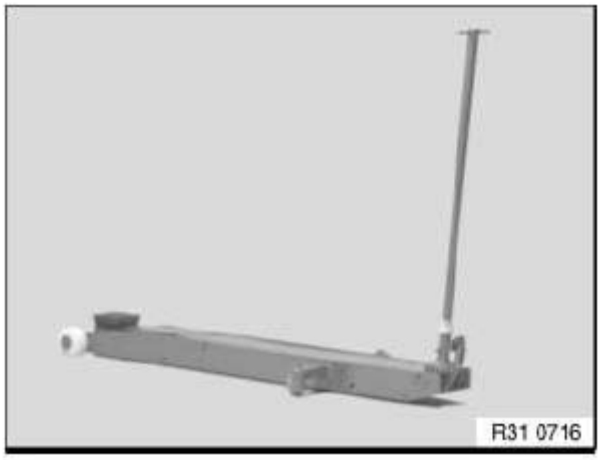


Fig. 19: Identifying Trolley Jack
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Car jacking point
2. Side car jacking points
3. Rear differential (remove heat shield: see **51 71 390 REMOVING AND INSTALLING/REPLACING REINFORCEMENT PLATE ON REAR AXLE**)

   Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

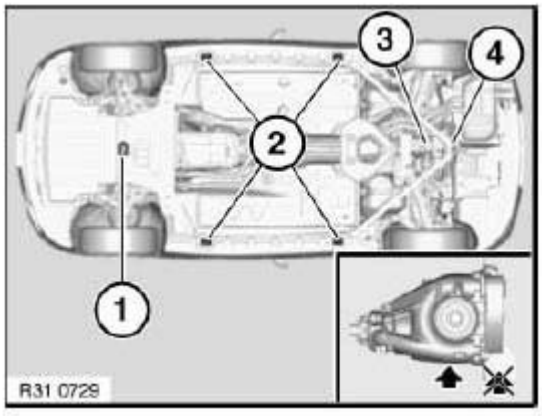


Fig. 20: Identifying Vehicle Jacking Points
Courtesy of BMW OF NORTH AMERICA, INC.

4. Bolting point for rear axle tension struts

11 .. ... REMOVING AND INSTALLING/REPLACING ACOUSTIC COVER (N54, N54T)

Release screws (1).

Raise acoustic cover slightly and remove towards front.

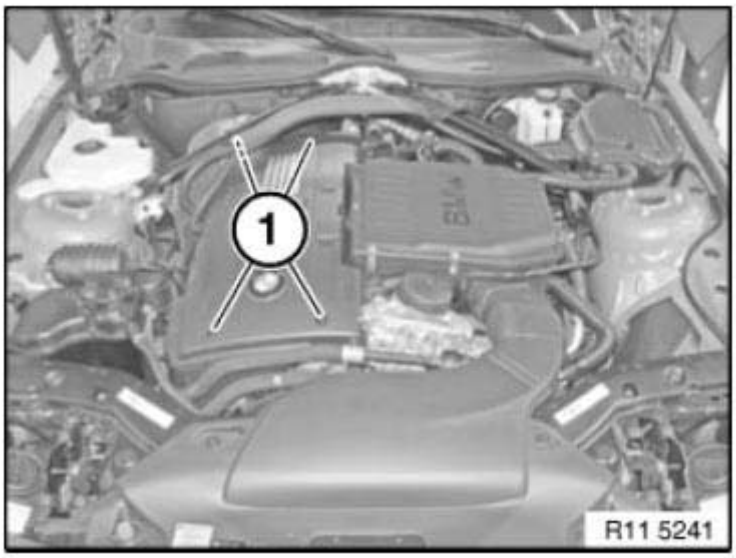


Fig. 21: Identifying Acoustic Cover Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Risk of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.

- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.

An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

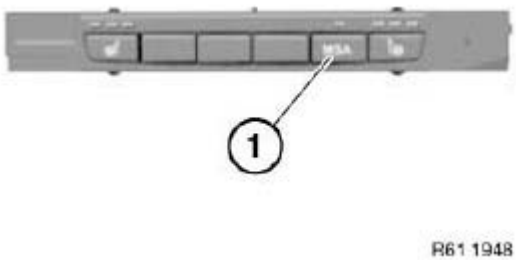


Fig. 22: Identifying MSA Switch In Passenger Compartment
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

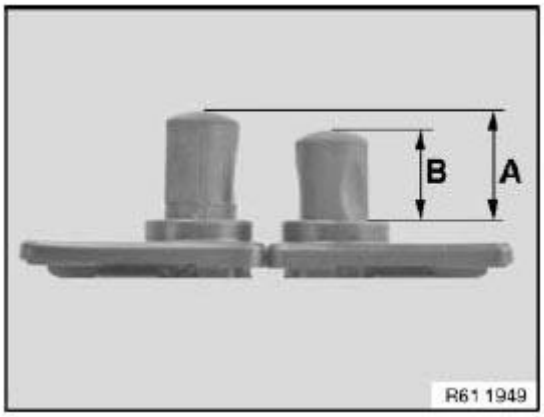


Fig. 23: Identifying Engine Hood/Bonnet Basic Setting And Workshop Mode
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

00 00 ... SEAT BELTS: CHECKING CONDITION OF BELT STRAP, FUNCTION OF INERTIA REEL MECHANISM, LOCKING REEL, BELT BUCKLE

Belt strap, retractor mechanism, belt interlock

Pull out strap and make sure it emerges without jerking.

Belt strap:

- folding
- unraveling
- pinches
- cracks and tears
- traces of melting
- Check retaining button on tongue of belt strap

for damage and proper installation.

Retract belt strap; here the inertia reel mechanism must retract the strap automatically and without squeaking noises, the last section of the strap may have to be fed in.

Pull out belt strap in short tugs - locking reel must lock.

Belt buckle

The tongue on the belt strap must easily snap into place with an audible click.

When the "Press" button is pressed, the tongue must be ejected from the buckle under spring pressure.

NOTE: If the seat belt is damaged, you must replace the seat belt completely after consulting the customer; issue a separate invoice for this work.

Instructions on how to proceed, refer to 72 11 ... CHECKING AUTOMATIC SAFETY BELT .

00 00 618 SERVICE - BRAKE FLUID

Service - brake fluid

- **BLEEDING BRAKE SYSTEM WITH DSC**
- Reset **CBS** according to factory specification.

00 00 618 SERVICE - BRAKE FLUID

Service - brake fluid

- **REPLACING FLUID IN BRAKE SYSTEM**
- Replace **MICROFILTER** for interior blower.
- Reset **CBS** according to factory specification

IMPORTANT: Read and comply with GENERAL INFORMATION on brakes

00 00 610 SERVICE - ENGINE OIL (PETROL VEHICLES FROM 03/2009)

Service - engine oil

- Change **ENGINE OIL AND OIL FILTER**
- **PARKING BRAKE FUNCTION CHECK**
  - Brake in and check for correct function
- A/C system or automatic A/C:
  - Change **MICROFILTER**
- At every 2nd engine oil change
  - Replace **SPARK PLUGS**
  - Intake silencer: change air filter element. Shorten intervals accordingly for vehicles operated in dusty regions.
- Reset **CBS** according to factory specification.

00 00 612 SERVICE - FRONT BRAKES

Service - front brakes

- Change **BRAKE PADS** , clean brake air ducts
- **BRAKE DISCS**
  - Check surface and thickness
  - If necessary: Replace
- Reset **CBS** according to factory specification

NOTE:

- **Clean brake air ducts.**
- **Replace brake discs if they are below the minimum brake disc thickness. See FRONT BRAKE E89 and if scoring, heat cracks or thickness difference are detected.**
- **Apply a thin coat of grease to wheel centering on light alloy wheels, refer to Service Information Operating Fluids.**
- **Issue a separate invoice for replacing the brake discs.**

00 00 602 SERVICE - INTAKE MUFFLER

- Change air cleaner element
- Reset **CBS** according to factory specification

00 00 616 SERVICE - MICROFILTER

Service - microfilter

- **REPLACING MICROFILTER**
- Reset **CBS** according to factory specification.

00 00 614 SERVICE - REAR BRAKES

Service - rear brakes

- Change brake pads. See **BRAKE PADS ON BOTH REAR DISC BRAKES**
- **REMOVING AND INSTALLING OR REPLACING BOTH REAR BRAKE DISCS**
  - Check surfaces and thickness.
  - If necessary: Replace
- **PARKING BRAKE FUNCTION CHECK**
  - Check operation
- Reset **CBS DISPLAY** according to factory specification

NOTE:

- **Clean brake air ducts.**
- **Replace brake disks if they drop below minimum thickness. See E89 REAR**

BRAKE .

- **Apply a thin coat of grease to wheel centering on light alloy wheels, refer to Service Information Operating Fluids.**
- **Issue a separate invoice for replacing the brake discs and handbrake shoes.**

00 00 622 SERVICE - SPARK PLUGS

Service - spark plugs

- **REPLACE SPARK PLUGS**
- Reset **CBS** according to factory specification.

00 00 624 SERVICE - VEHICLE CHECK

Service - vehicle check

- Check **HORN, HEADLIGHT FLASHERS AND HAZARD WARNING FLASHERS**
- Check **INSTRUMENT AND INSCRIPTION LIGHTING AND BLOWER**
- Check **LIGHTING SYSTEM**
- **SEAT BELTS:** Check condition of seat belt strap, function of automatic reel, seat belt locking reel and seat belt buckle
- Check **WINDSCREEN WASH/WIPE SYSTEM**
- Convertible only:

  Trigger rollover protection system (Convertible) via diagnostic interface. Warning: open soft top first

- If available: (M) Mobility System: Check expiry date on sealant bottle, replace sealant bottle if necessary
- **TYRES:** Check tread depth, tread wear pattern, external condition and tyre pressure and correct if necessary (spare wheel as well)
- Initialize Run Flat Indicator
- Check **BATTERY** (magic eye), if necessary recharge battery (issuing a separate invoice for this work)
  - Check display (magic eye)
  - If necessary: Charge battery
- Steering fluid reservoir: Check oil level.
- Checking **COOLANT LEVEL AND CONCENTRATION** , topping up if necessary
- **WINDSCREEN WASHER SYSTEM:** Check fluid level, top up if necessary
- **BRAKE LINES AND CONNECTIONS:** Check for tightness, damage and correct position
- **UNDERBODY INCL. ALL VISIBLE COMPONENTS:** Check for damage, tightness, corrosion
- **STEERING COMPONENTS:** Check for play, tightness, damage and wear
- **CHECK ROAD SAFETY** (test drive):
  - Brakes

    - Steering
    - Shock Absorbers
    - Transmission
- Reset **CBS** according to factory specification

00 00 105 STANDARD SCOPE OF SERVICE

Standard scope of service

- Check Check Control messages
- Check indicator and warning lights
- Reset **CBS**

00 00 ... STEERING COMPONENTS: CHECKING FOR ZERO CLEARANCE, LEAKS, DAMAGE AND WEAR

Checking play

- For hydraulically assisted steering systems, the engine must be running
- For electrically assisted steering systems, the ignition must be on
- Steering wheel: Move steering wheel back and forth and check for play
- Tie rod joint: There must be no play between the track-rod arm (2) and track rod joint (1)

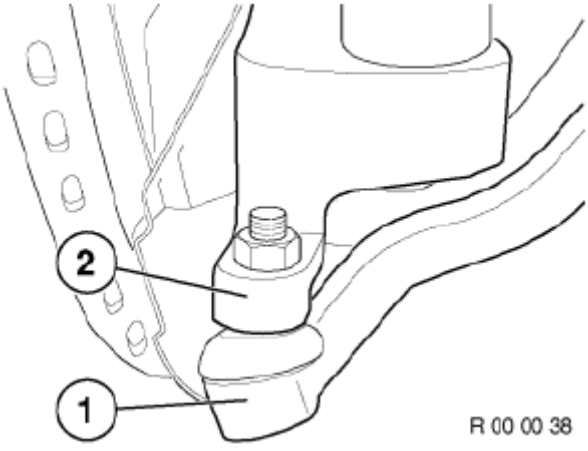
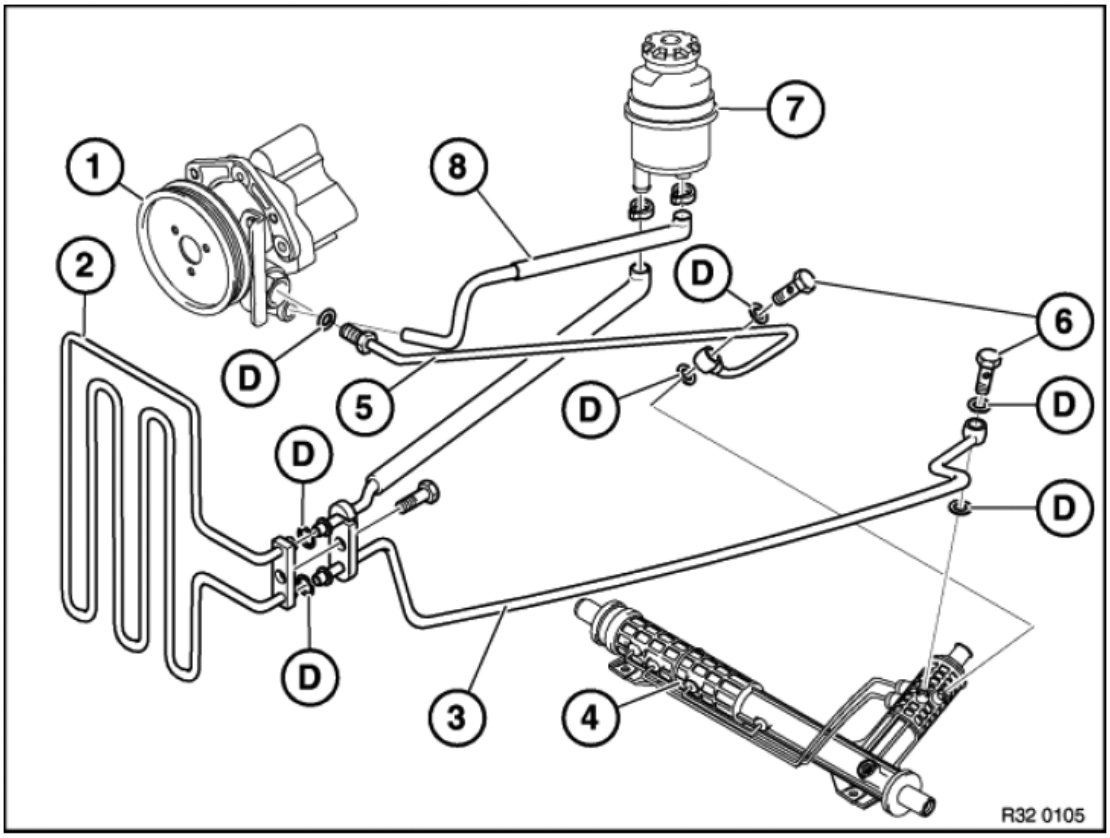


Fig. 24: Identifying Track Rod Joint And Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Checking for leaks

The following illustration shows the arrangement of the power steering components and lines.



1	Pump	6	Hollow bolt
2	Power steering cooler	7	Container
3	Return line	8	Suction hose
4	Steering gear	D	Sealing ring
5	Pressure line		

Fig. 25: Identifying Power Steering Components
Courtesy of BMW OF NORTH AMERICA, INC.

Check all visible connections, hoses, lines and steering gear for traces of fluid.

Checking for damage and wear

Check gaiters, flexible disc and axle and tie rod sleeves for damage (e.g. cracks, holes), for leaks or missing clamping bands on gaiters.

00 .. ... SYMBOLS USED AND INFORMATION IN REPAIR INSTRUCTIONS

WARNING: Precautionary rules and measures which protect mechanics and other personnel against injury (including life-threatening injuries).

For example:

WARNING: **Risk of scalding!**

Only perform this work after engine has cooled down.

IMPORTANT: **Specific instructions and precautionary measures which prevent damage to the vehicle or to vehicle parts. Failure to comply with the above will invalidate any warranty claims.**

The caution symbol is used in all repair instructions.

However, use of the warning word "Caution!" is not binding in every case.

The notes, instructions and precautionary measures mentioned above retain their validity.

WARNING: **High-voltage system - danger to life!**

Before beginning work, follow the applicable safety rules and perform the necessary preliminary work.

NOTE: **High-voltage symbol for hybrid cars (electrically powered vehicles) E72 and MINI E.**

WARNING: **High-voltage system - danger to life!**

Before beginning work, follow the applicable safety rules and perform the necessary preliminary work.

NOTE: **High-voltage symbol for hybrid car (electrically powered vehicle) from F04.**

NOTE: **Particular information on improved procedures for operation, testing, adjustment and upkeep.**

Also indicates the end of a repair section.

Recycling

Observe country-specific waste disposal regulations

General information:

Refers to other instructions: such as e.g.:

Necessary preliminary tasks;

Further instructions: refer to operating instructions for balancing machine.

Replacement:

Carry out programming/encoding.

NOTE: Many electronic control units must be programmed/coded (e.g. when replaced).

Note (previous symbol):

- **Connect BMW diagnosis system**

Note (symbol for new diagnosis system ISID):

- Connect BMW diagnosis system

IMPORTANT: Read and comply with notes on protection against damage from electrostatic damage (ESD protection).

NOTE: Electronic control units and other electronic components - if handled incorrectly - can be damaged or destroyed by electrostatic discharge.

Special tools required

NOTE: List of special tools needed in these repair instructions.

WARNING: Laser beam!

For example:

Laser beam at adjustment unit. Do not look into the beam!

Note on laser class.

IMPORTANT: Use eye protection for the following operations.

For example:

Fuel can emerge spontaneously at high speed when the fuel delivery line is released!

IMPORTANT: Use eye protection and ear protection for the following operations.

IMPORTANT: Use face protection for the following operations.

IMPORTANT: Use protective gloves for the following operations.

Avoid skin contact.

IMPORTANT: Use eye protection and protective gloves for the following operations.

Avoid eye contact and skin contact.

WARNING: Danger of explosion!

First aid measures

Note on first aid measures that need to be administered immediately.

00 00 ... TYRES: CHECKING INFLATION PRESSURE, CORRECTING IF NECESSARY (INCL. SPARE WHEEL), CHECKING EXTERNAL CONDITION, TREAD DEPTH, PATTERN

Checking tyre inflation pressure

- Check tyre inflation pressure in accordance with information plate on B-pillar
- The inflation pressure in the spare wheel must be 0.5 bar higher than the maximum specified value on the information plate
- Initialize **RUN FLAT INDICATOR (RPA)**

Check tyre condition

- Check tread depth of all tyres with tyre tread gauge
- Check tyre tread surfaces and side walls for incisions and foreign particles such as nails or screws
- Check tyre tread pattern for localized flattening and wear on one side; if necessary, carry out wheel/chassis alignment after consulting with customer and issue a separate invoice for this work

NOTE:

- **For details of approved wheel-tyre combinations, refer to KSD CD**
- **For reasons of driving safety, only use tyres of the same type and tread pattern on a single vehicle**
- **Inform customer of any incorrect or worn tyres**

00 00 ... UNDERBODY INCL. ALL VISIBLE COMPONENTS: CHECKING FOR DAMAGE, LEAKS, CORROSION

- Visually inspect underbody:
  - For leaks (transmission, fuel system, brake components, steering)
  - For correct routing of electrical leads (brake pad sensor, pulse generator)

- For leaks (shock absorber) and mounting (springs) - rebound
- Damage to underbody
- Corrosion on underbody

IMPORTANT: If damage to the underbody is identified:

- **If necessary, remove panels from underbody.**
- **Check mountings and fixtures and brake and fuel lines for damage and correct installation position.**

Rectify identified faults after consulting with customer and issue a separate invoice.

00 00 ... UPKEEP MEASURES FOR STORED VEHICLES (NEW AND USED CARS) AND VEHICLES TO BE LAID UP AT CUSTOMER'S PREMISES

STORED VEHICLE UPKEEP MEASURES

Measure	Vehicles	Implementation
Renew outer skin preservation (new cars must always be stored in preserved condition; preservation/depreservation instructions, refer to Component Group 97)	New cars	every 6 months; Tropical countries every 4 months
Release parking brake	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Engage gear or selector lever position "P" for automatic	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Check covering of interior equipment	New cars	in general
Increase tire inflation pressure to 3.5 bar	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
If battery master switch is fitted, switch off	New cars	in general
Charge battery	New cars	every 6 weeks batteries disconnected from vehicle electrical system every 12 weeks in general before handover to customer
	Used cars	every 6 weeks batteries

		disconnected from vehicle electrical system every 12 weeks
	Customer cars to be laid up (instructions to customer)	every 6 weeks batteries disconnected from vehicle electrical system every 12 weeks
Change brake fluid and reset service interval indicator (clock symbol only)	New cars	lay-up periods > 6 months, change before handover of vehicle to customer
	Used cars	lay-up periods > 6 months, change before handover of vehicle to customer
Check convertible top for possible damage	New cars	in general before handover to customer
	Used cars	in general before handover to customer
Park convertibles, if possible, under a roof	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Check for damage to paintwork and exterior/interior equipment	New cars	in general before handover to customer
	Used cars	in general before handover to customer
Change engine oil and oil filter when engine is at normal operating temperature	New cars	from 12 months lay-up period before handover of vehicle to customer
	Used cars	from 12 months lay-up period before handover of vehicle to customer
	Customer cars to be laid up (instructions to customer)	from 12 months lay-up period before handover of vehicle to customer
Check coolant concentrate	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Apply hand and foot brakes when dry	New cars	in general
	Used cars	in general
	Customer cars to be laid up (instructions to customer)	in general
Perform surface protection: Vehicle washing with inside cleaning and subsequent preservation of paintwork and chrome. Clean rubber seals on	Used cars	in general

hoods/bonnets, rear lids and doors and apply talc or glycerine. Perform cleaning, preservation and subsequent treatment of engine, engine compartment, underbody, axles and assemblies with BMW-approved materials.	Customer cars to be laid up (instructions to customer)	in general
Switch on A/C system once a month for 10 minutes	Used cars	necessary in order to retain full operational capability of gaskets and expansion valve (omitted in case of R134a refrigerant, identified by rating plate in engine compartment)
	Customer cars to be laid up (instructions to customer)	necessary in order to retain full operational capability of gaskets and expansion valve (omitted in case of R134a refrigerant, identified by rating plate in engine compartment)

00 00 ... VEHICLE DIAGNOSTIC TEST

Connect BMW diagnostic system (ISID) to diagnostic socket.

Switch the ignition on.

Carry out vehicle identification.

Start vehicle test.

The vehicle test is carried out.

NOTE: **The vehicle test is a prerequisite for vehicle diagnosis, since it allows any stored fault codes to be read and a test schedule to be prepared. In the vehicle test, the control units are physically identified in succession and their fault memories read out.**

Once the fault memory has been read, all fault memories are displayed in a fault memory list.

Check identified faults and if necessary rectify these faults after consulting with customer.

00 00 ... WINDSCREEN WASHER SYSTEM: CHECKING FLUID LEVEL, TOPPING UP IF NECESSARY

- Top up windscreen washer fluid reservoir, if necessary rear window washer fluid reservoir and (depending on equipment specification) intensive cleaning reservoir up to edge or mark.

IMPORTANT: A pH-neutral BMW window cleaning agent (antifreeze in winter) must always be added to the water.

00 MAINTENANCE AND GENERAL INFORMATION

00-2261 ADAPTER (2 X)

Adapter (2 x)

SI number

01 22 06 (307)

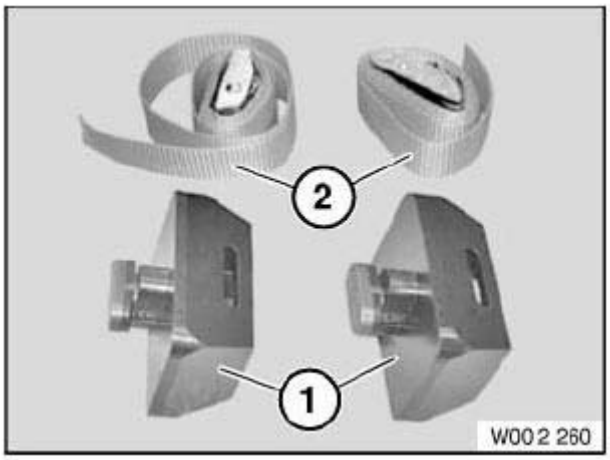


Fig. 1: Identifying Adapter (2 X) (00-2261)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2300 ASSEMBLY STAND

Assembly stand MW

NOTE: (Assembly stand with universal flange) For mounting engines from S85

SI number

01 25 04 (155)

Consisting of:

1 = 0495188 Assembly stand

2 = 0495189 Tool

NOTE: (Universal flange)

3 = 0495200 Crank

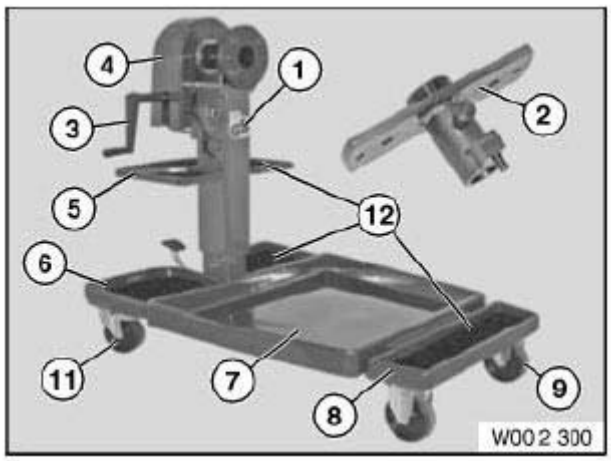


Fig. 2: Identifying Assembly Stand (00-2300)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0495201 Cover

NOTE: (Protective hood)

5 = 0495202 Oddments tray

NOTE: (Oddments tray for small parts)

6 = 0495203 Shaped element

NOTE: (Rear shaped pan)

7 = 0495204 Collection pan

NOTE: (Oil collection pan)

8 = 0495205 Shaped element

NOTE: (Front shaped pan)

9 = 0495206 Wheel

NOTE: (Front wheel (without stop))

10 = 0495207 Wheel

NOTE: **(Rear wheel (with stop))**

11 = 0495208 Mat

NOTE: **(Checker mat set)**

00-1490 ASSEMBLY STAND

Assembly stand MW

Replaced by: 0495187

NOTE: **For accommodating engine, transmission and rear axle, replaced by 00 1 450 (passenger car) Release for motorcycle only! Replaced by 00 2 300 (0 495 187)**

Consisting of:

1 = 0490119 Frame

NOTE: **(tube frame) Release for motorcycle only!**

2 = 0490120 Fixture

NOTE: **(Mounting head without mounting flange)**

3 = 0490121 Fixture

NOTE: **(Mounting flange (2 pieces required)) Release for motorcycle only!**

4 = 0490122 Fuse

5 = 0490123 Fitting aid

NOTE: **(Locking of mounting flange)**

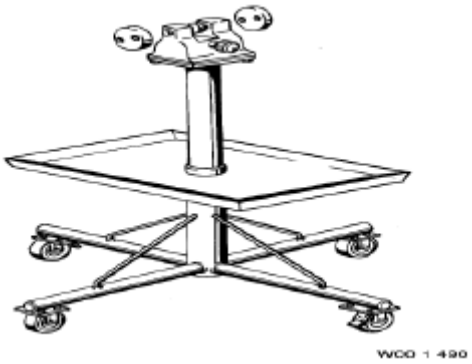


Fig. 3: Identifying Assembly Stand (00-1490)
Courtesy of BMW OF NORTH AMERICA, INC.

6 = 0490124 Lever

NOTE: (release lever)

7 = 0490125 Wheel

NOTE: (wheel without brake) Release for motorcycle only!

8 = 0490126 Wheel

NOTE: (wheel with brake) Release for motorcycle only!

9 = 0490127 Oddments tray

NOTE: (storage plate)

00-3070 AWL

Awl MW

NOTE: Diameter 3 mm

Storage Location

A21

SI number

01 28 06 (331)

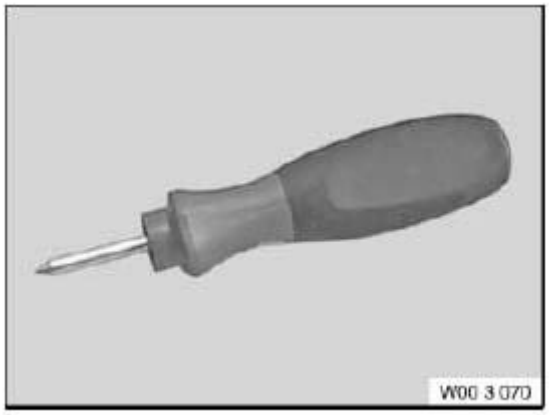


Fig. 4: Identifying Awl (00-3070)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1290 BASE FRAME

Base frame MW

NOTE: 4 m special tool cabinet. USA version

00-0151 BASIC FRAME

Basic frame MW

NOTE: Length 4040 mm/height 2150 mm/depth 680 mm Replaced by 00 1 000 (0 494 897) See Service Information (bulletin) 01 10 04 (092)

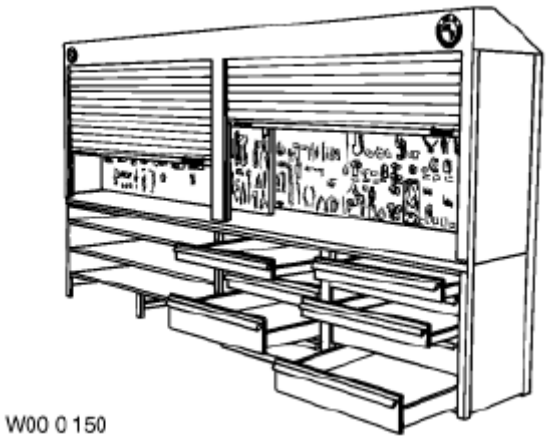


Fig. 5: Identifying Basic Frame (00-0151)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0100 BASIC FRAME

Basic frame MW

NOTE: (Base frame) Frame for special tool board. Replaced by 00 0 220 (0 493 777), 00 0 221 (0 493 778), 00 0 224 (0 493 781)

00-0180 CABLE CABINET

Cable cabinet MW

NOTE: (Cable cabinet II, complete) For extended accommodation of adapter cables, measuring equipment and testers

SI number

00 02 99 (399)

Consisting of:

4 = 0494120 Drawer block

NOTE: For cable cabinet II only

5 = 0494121 Holder

NOTE: (holder) Holder set for test adapters. For cable cabinet II only

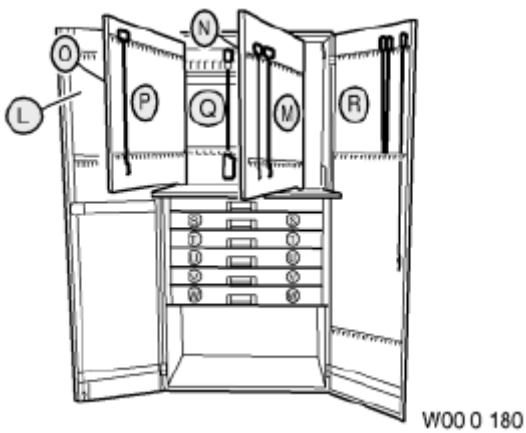


Fig. 6: Identifying Cable Cabinet (00-0180)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0493522 Film

NOTE: (Film set II) For identifying storage locations in cable cabinet II - valid status in each case

2 = 0493523 Holder

NOTE: **(Cable holder set - H -) For cable cabinet II only 16 guide rails with 15 holding straps as fixture for adapter cables - valid status in each case**

3 = 0493524 CD holder

NOTE: **For holding two program CDs with cover - Can be installed in cable cabinets I and II**

6 = 0493527 Holder

NOTE: **(Holder) Holding strap set (optional) 20 holding straps for cable clips - H - For extension to cable hanging in cable cabinets I and II**

00-0190 CABLE CABINET

Cable cabinet MW

NOTE: **(Cable cabinet I, complete) With foil set and accessories - For storing the adapter cables and measuring devices and testers**

SI number

00 02 99 (399)

Consisting of:

1 = 0494122 Cable cabinet

NOTE: **Without content and without accessories Base for cable cabinet I and II**

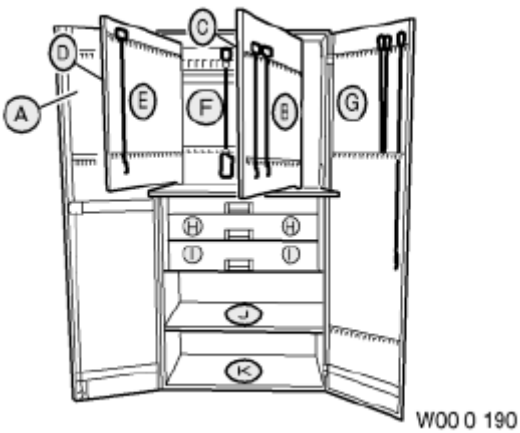


Fig. 7: Identifying Cable Cabinet (00-0190)

Courtesy of BMW OF NORTH AMERICA, INC.

6 = 0494123 Frame

NOTE: (Frame) Swivel panel frame support of the cable suspensions in the cable cabinet I and II

9 = 0494124 Floor

NOTE: (Floor) For cable cabinet I only

2 = 0490072 Foil

NOTE: (Foil set I) For identification of the storage locations in the cable cabinet I - valid status in each case

3 = 0490073 Holder

NOTE: (Cable holder set - H -) For cable cabinet I only 24 guide rails with 15 holding straps each for accommodating the adapter cables

= 0490074

4 = 0490074 Cable holder

NOTE: (Cable holder) Cable holder - B - For mounting the engine test cable For extending the cable suspensions in cable cabinet I and II

7 = 0493529 Drawer block

NOTE: For cable cabinet I only

8 = 0493530 Magnet

NOTE: (Magnet) Magnet with roller. For better fixation and spacing of the swivel panels - Only for retrofittings in cable cabinets I and II

10 = 0493532 Register

NOTE: For locating the BMW special tools for the vehicle electrical system in cable cabinet I and II

00-0120 CARDBOARD BOX

Cardboard box Minimum set: Mechanical tools MW

NOTE: **(Cardboard box) Cardboard box (set) for cable cabinet. For adapter cable storage (cable cabinet modification) 2 cardboard boxes are delivered at this time: 00 0 121 = storage location Y1 00 0 122 = storage location Y2**

SI number

00 04 04 (104)

Consisting of:

0494948

0494949

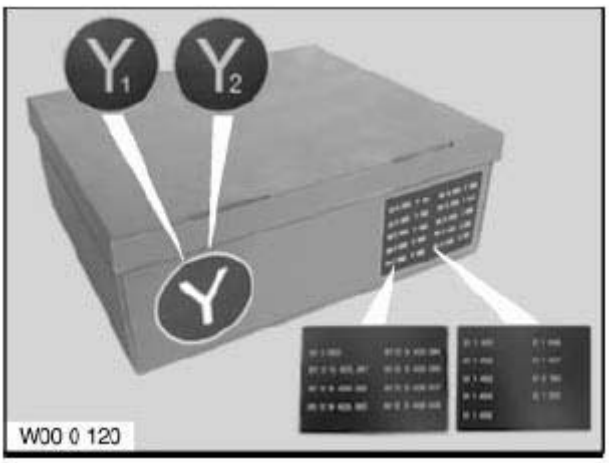


Fig. 8: Identifying Cardboard Box (00-0120)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0122 CARDBOARD BOX

Cardboard box MW

NOTE: **(Cardboard box) Cardboard box Y2 = storage location for adapter cable**

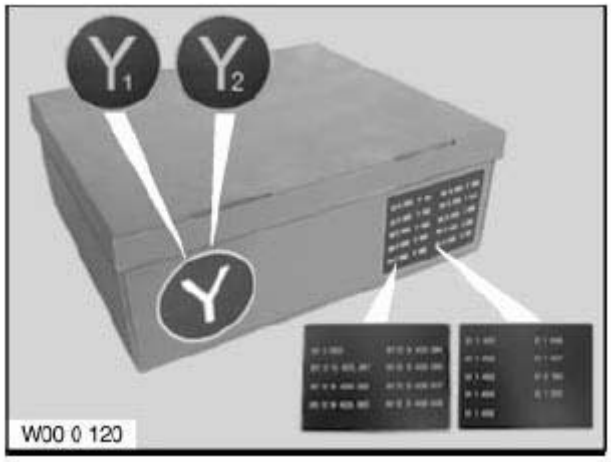


Fig. 9: Identifying Cardboard Box (00-0122)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0121 CARDBOARD BOX

Cardboard box MW

NOTE: (Cardboard box) Cardboard box Y1 = storage location for adapter cable

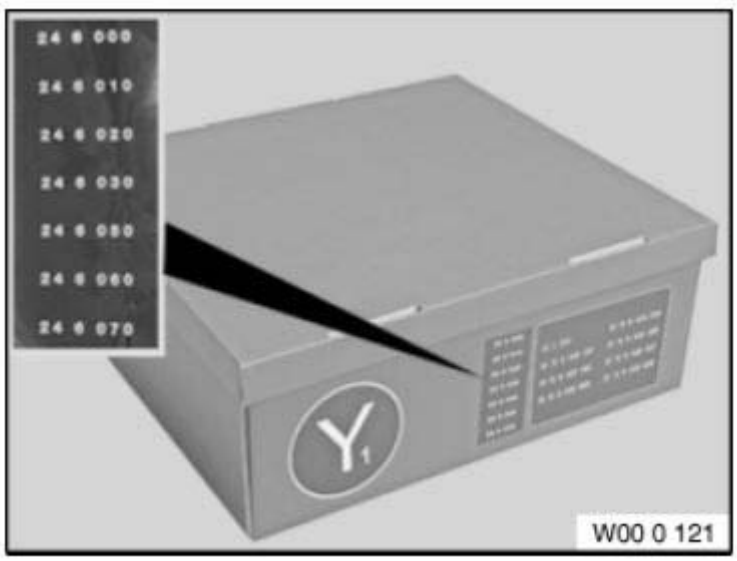


Fig. 10: Identifying Cardboard Box (00-0121)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9329 CASE

Case MW

NOTE: **(Case) with insert not incl. panel wedges**

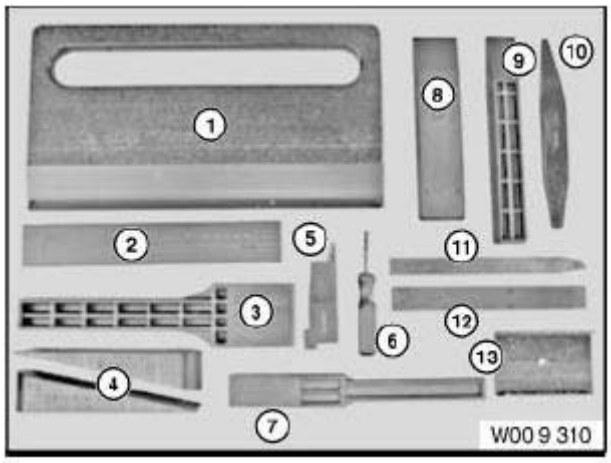


Fig. 11: Identifying Case (00-9329)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0450 DECADE NUMBER

Decade number

NOTE: **Reserved for consecutive sub-no. Cross-member 00 0 200. Replaced by: 00 6 040**

SI number

1 10 02 (907)

00-0200 DEVICE

Device MW

NOTE: **(Cross-member) To hold the engine when removing and installing the front axle support, the oil sump and transmission. Replaced by: 00 6 000, 00 6 010, 00 6 020, 00 6 030**

Storage Location

Individual

SI number

01 14 01 (766)

Consisting of:

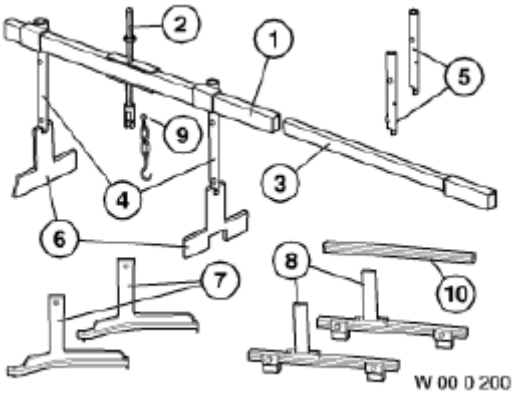


Fig. 12: Identifying Device (00-0200)
Courtesy of BMW OF NORTH AMERICA, INC.

8 = 0490083 Support

NOTE: **(Support foot (2 pieces) with pads (4 pieces)) Series: E38, E39, E46, E60, E65. Replaced by 00 6 030 (0 496 422)**

1 = 0490076 Bridge

NOTE: **(Support bridge) Replaced by 00 6 001**

2 = 0490077 Spindle

NOTE: **(Spindle with hook) Replaced by 00 6 002**

3 = 0490078 Extension

NOTE: **For extending the support bridge 00 0 201 Series: E65 Replaced by 00 6 003**

4 = 0490079 Adapter

NOTE: **(Adapter leg (1 piece)) Replaced by 00 6 004**

5 = 0490080 Extension

NOTE: **Series: R50, R53 Replaced by 00 6 005**

6 = 0490081 Support

NOTE: **(Support foot (2 pieces)) Series: E30, E31, E32, E34, E36, Z3 Only 6-cylinder engines. Replaced by 00 6 010**

7 = 0490082 Support

NOTE: (Support foot (2 pieces)) Model: Z3/Only 4-cylinder engines. Replaced by 00 6 020

9 = 0493123 Chain

NOTE: (Chain) Chain with hook. Version similar to 11 0 003. Replaced by 00 6 006

00-2030 DEVICE

Device MW

NOTE: (Universal hydraulic lifter base unit) Chassis and hydraulic lifter - For removing and installing rear axle supports and transmissions. Also for soft top mounts.

SI number

01 05 90 (207)

Consisting of:

1 = 0490134 Adapter

NOTE: (Adapter for gearbox holder) Series: E30, E31, E32, E34, E36

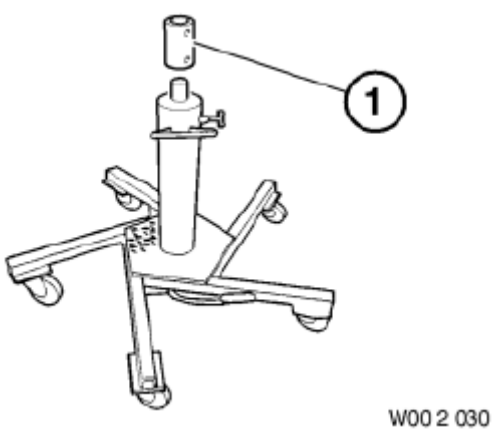


Fig. 13: Identifying Device (00-2030)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0154 DRAWER BLOCK

Drawer block MW

NOTE: **(Drawer unit) With 5 drawers, lockable**

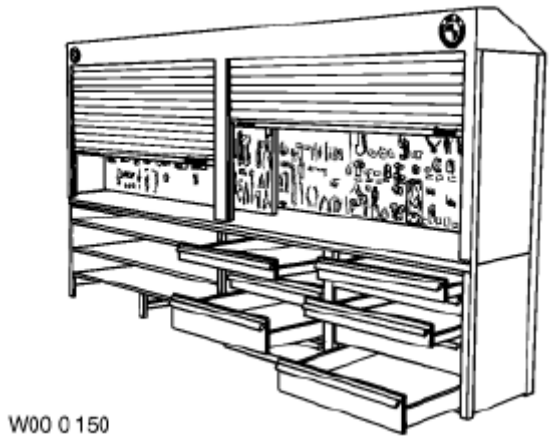


Fig. 14: Identifying Drawer Block (00-0154)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2327 ENGINE SUPPORT PLATES

Engine support plates

NOTE: **Engine: S62 Replaced by 11 5 420**

Fig. 15: Identifying Engine Support Plates (00-2327)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2220 EXHAUST CUTTER

Exhaust cutter MW

NOTE: **(Exhaust pipe cutter) For cutting V2a pipes on exhaust system.**

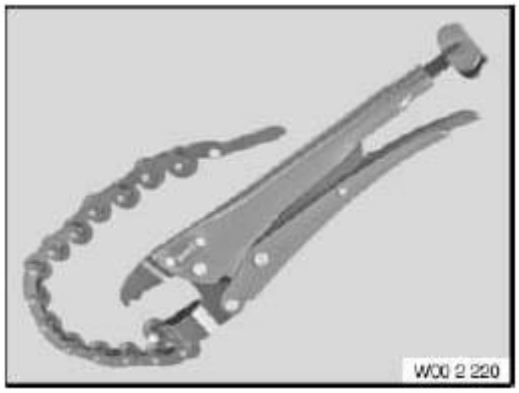


Fig. 16: Identifying Exhaust Cutter (00-2220)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2511 EXTENSION

Extension MW

Fig. 17: Identifying Extension (00-2511)
Courtesy of BMW OF NORTH AMERICA, INC.

00-7500 EXTRACTOR

Extractor MW

NOTE: (Universal extractor Kukko 17/K) For pulling bearing inner race from drive flange on wheel bearing, rear

Consisting of:

1 = 0490483 Spindle

NOTE: (Pressure spindle with bridge)

2 = 0490484 Spindle

NOTE: (Adjusting spindle (2 pieces) with knurled nuts (4 pieces))

3 = 0490485 Spindle

NOTE: (Pressure spindle, side)

4 = 0490486 Retaining bracket

NOTE: (Adjusting jaws (2 pieces))

5 = 0490487 Bolt

NOTE: (Adjusting screws (2 pieces) with nut) For adjusting jaw (2 pieces)

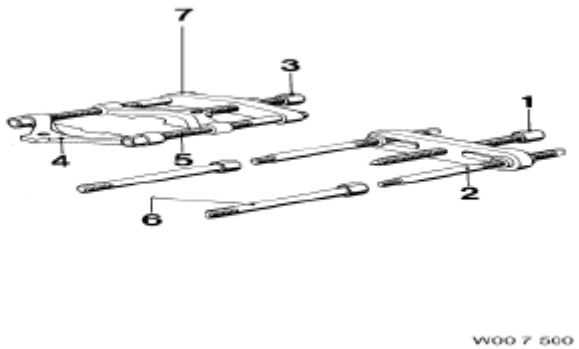


Fig. 18: Identifying Extractor (00-7500)
Courtesy of BMW OF NORTH AMERICA, INC.

6 = 0490488 Extension

NOTE: (Extension (2 pieces))

7 = 0490489 Bridge

00-0051 FILM

Film MW

NOTE: (Film, German)

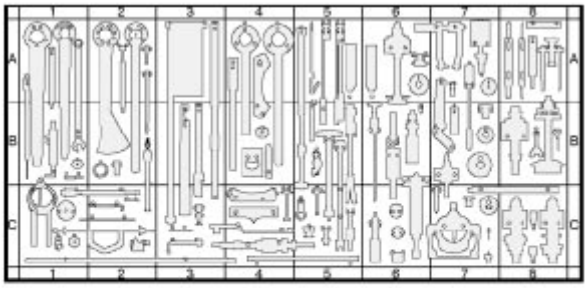
W00 0 050

Fig. 19: Identifying Film (00-0051)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0012 FILM

Film MW

NOTE: (Set of films for special tool board I)



W00 0 010

Fig. 20: Identifying Film (00-0012)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1331 FILM

Film MW

NOTE: (Film number 10 USA version)

00-0054 FILM

0490032 000054 Film MW

NOTE: (Film, Dutch)

W00 0 050

Fig. 21: Identifying Film (00-0054)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0365 FILM/HOOK

0496468 000365 Film/hook MW

NOTE: (Supplementary films/hook set for N63/E83/E88/E92)

00-0361 FILM/HOOK

0496220 000361 Film/hook MW

NOTE: (Additional films/hooks for N43, N47)

00-1171 FILM S85

00 1 171 Film S85

00-1161 FILM S85

00 1 161 Film S85

00-1323 FOIL

0495080 001323 Foil MW

NOTE: (Film no. 3 USA version)

00-1327 FOIL

0495084 001327 Foil MW

NOTE: (Film no. 7 USA version)

00-5103 FOIL

0495975 005103 Foil MW

NOTE: (Foil 3, panel I)

SI number

01 19 06 (298)

00-5107 FOIL

0495979 005107 Foil MW

NOTE: (Foil 7, panel III)

SI number

01 19 06 (298)

00-1322 FOIL

0495079 001322 Foil MW

NOTE: (Film no. 2 USA version)

00-5453 FOIL

0495985 005453 Foil MW

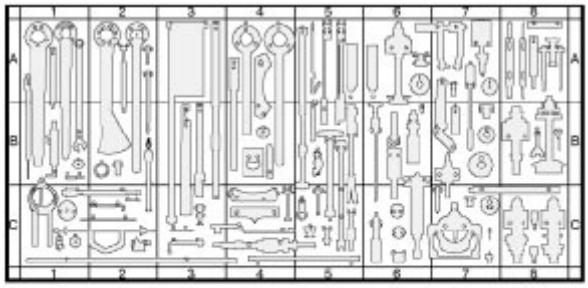
NOTE: (Stock issue film 3)

SI number

01 19 06 (298)

00-5115 FOIL

0496802 005115 Foil MW



W00 0 010

Fig. 22: Identifying Foil (00-5115)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1335 FOIL

0496560 001335 Foil MW

NOTE: (Foil 14 USA (A/B/C 35/36))

00-1328 FOIL

0495085 001328 Foil MW

NOTE: (Foil no. 8 USA version)

00-1334 FOIL

0496559 001334 Foil MW

NOTE: (Foil 13 USA (A/B/C 33/34))

00-5106 FOIL

0495978 005106 Foil MW

NOTE: (Foil 6, panel II)

SI number

01 19 06 (298)

00-5101 FOIL

0495973 005101 Foil MW

NOTE: (Foil 1, panel I)

SI number

01 19 06 (298)

00-0418 FOIL

0495513 000418 Foil MW

NOTE: (Foil set cable cabinet 2)

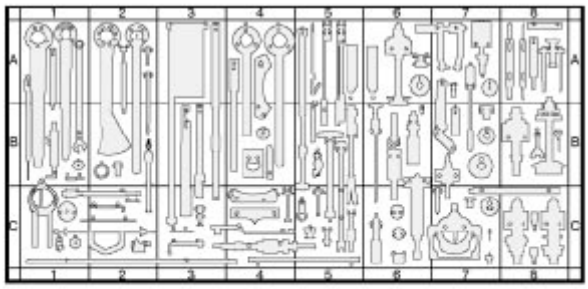
00-5113 FOIL

0496214 005113 Foil MW

NOTE: (Foil 12 (A/B/C 23/24)) GM6 and RHT

00-0368 FOIL

0496800 000368 Foil MW



W00 0 010

Fig. 23: Identifying Foil (00-0368)
Courtesy of BMW OF NORTH AMERICA, INC.

00-5114 FOIL

0496556 005114 Foil MW

NOTE: (Foil 13 (A/B/C 25/26)) F01

00-5111 FOIL

0495867 005111 Foil MW

NOTE: (Foil 10 (A/B/C 19/20)) Engine: N54

00-5452 FOIL

0495984 005452 Foil MW

NOTE: (Stock issue film 2)

SI number

01 19 06 (298)

00-5108 FOIL

0495980 005108 Foil MW

NOTE: (Foil 8, panel III)

SI number

01 19 06 (298)

00-0416 FOIL

0495282 000416 Foil MW

NOTE: (Foil set cable cabinet 1 for E90)

00-5102 FOIL

0495974 005102 Foil MW

NOTE: (Foil 2, panel I)

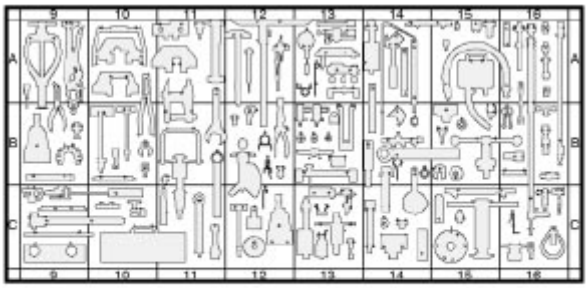
SI number

01 19 06 (298)

00-0022 FOIL

0490009 000022 Foil MW

NOTE: (Foil set for special tool board II)



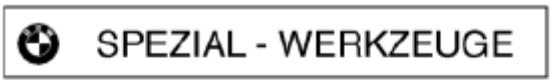
W00 0 020

Fig. 24: Identifying Foil (00-0022)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0053 FOIL

0490031 000053 Foil MW

NOTE: (foil, French



W00 0 050

Fig. 25: Identifying Foil (00-0053)
Courtesy of BMW OF NORTH AMERICA, INC.

00-5109 FOIL

0495981 005109 Foil MW

NOTE: (Foil 9, panel 3)

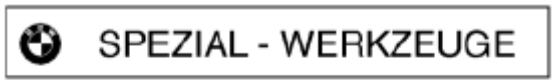
SI number

01 19 06 (298)

00-0056 FOIL

0490034 000056 Foil MW

NOTE: (foil, Spanish)



W00 0 050

Fig. 26: Identifying Foil (00-0056)
Courtesy of BMW OF NORTH AMERICA, INC.

00-5454 FOIL

0495986 005454 Foil MW

NOTE: (Stock issue film 4)

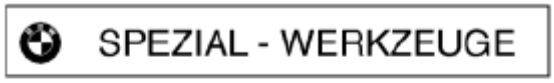
SI number

01 19 06 (298)

00-0055 FOIL

0490033 000055 Foil MW

NOTE: (Foil, Italien)



W00 0 050

Fig. 27: Identifying Foil (00-0055)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0032 FOIL

0490016 000032 Foil MW

NOTE: (set of foils for special tool board III)

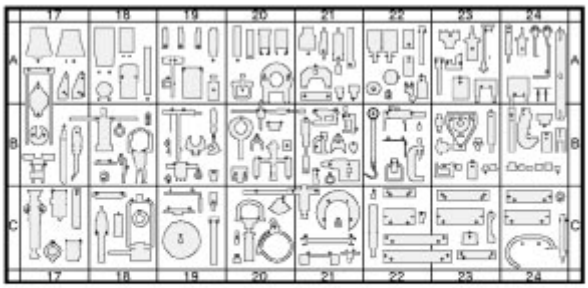


Fig. 28: Identifying Foil (00-0032)
Courtesy of BMW OF NORTH AMERICA, INC.

00-5104 FOIL

0495976 005104 Foil MW

NOTE: (Foil 4, panel II)

SI number

01 19 06 (298)

00-0415 FOIL

0495281 000415 Foil MW

NOTE: (Foil set 1 + 2 for E87)

00-5112 FOIL

0496096 005112 Foil MW

NOTE: (Film 11 (A/B/C 21/22)) Model series: E70

00-1329 FOIL

0495086 001329 Foil MW

NOTE: (Film no. 9 USA version)

00-5451 FOIL

0495983 005451 Foil MW

NOTE: (Stock issue film 1)

SI number

01 19 06 (298)

00-1333 FOIL

0496252 001333 Foil MW

NOTE: (Foil no. 12 USA version)

00-1325 FOIL

0495082 001325 Foil MW

NOTE: (Film no. 5 USA version)

00-0052 FOIL

0490030 000052 Foil MW

NOTE: (Film sheet, English)

W00 0 050

Fig. 29: Identifying Foil (00-0052)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1332 FOIL

0496251 001332 Foil MW

NOTE: (Foil no. 11 USA version)

00-1320 FOIL

0495077 001320 Foil MW

NOTE: (Foil set, complete, USA version)

00-1336 FOIL

0496561 001336 Foil MW

NOTE: (Foil 15 USA (A/B/C 37/38))

00-5105 FOIL

0495977 005105 Foil MW

NOTE: (Foil 5, panel II)

SI number

01 19 06 (298)

00-5455 FOIL

0495987 005455 Foil MW

NOTE: (Relocation template 5)

SI number

01 19 06 (298)

00-1321 FOIL

0495078 001321 Foil MW

NOTE: (Film no. 1 USA version)

00-1326 FOIL

0495083 001326 Foil MW

NOTE: (Film no. 6 USA version)

00-1324 FOIL

0495081 001324 Foil MW

NOTE: (Foil no. 4 USA version)

00-0353 FOIL

0495363 000353 Foil MW

NOTE: (Additional foil for E60 all-wheel drive/E90/M57 T2/M67 TU)

00-0366 FOIL/HOOK

0496558 000366 Foil/hook MW

NOTE: (Supplementary foil/hook set USA - update)

00-1120 FOIL/HOOK

0494388 001120 Foil/hook MW

NOTE: (Film and hook set)

Consisting of:

1 = 0494389 Foil

2 = 0494390 Hook

NOTE: (Hook set)

00-0355 FOIL/HOOK

0495556 000355 Foil/hook MW

NOTE: (Film and hook set) 61 6 100, 61 6 110

00-0356 FOIL/HOOK

0495566 000356 Foil/hook MW

NOTE: (Film and hook set) 23 0 320

00-1160 FOIL/HOOK

0495414 001160 Foil/hook MW

NOTE: (Foil and hook set for S85) (for special offer tool)

SI number

01 12 05 (196)

Consisting of:

4 = 0495608 Foil

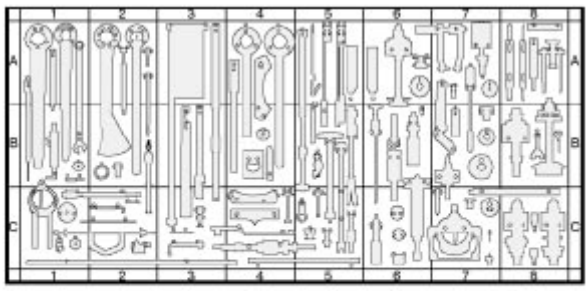
NOTE: (Foil S85)

4 = 0495609 Hook

NOTE: (Hook set S85)

00-5215 FOIL/HOOK

0496803 005215 Foil/hook MW



W00 0 010

Fig. 30: Identifying Foil/Hook (00-5215)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0363 FOIL/HOOK

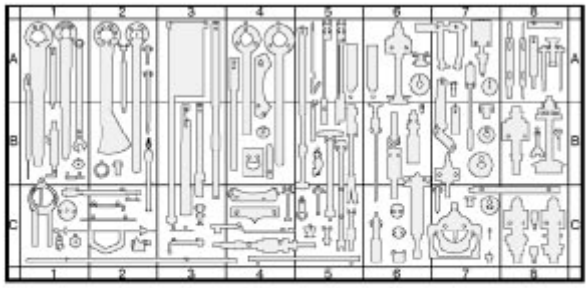
0496313 000363 Foil/hook MW

NOTE: (Supplementary film/hook set for N43)

99-5000 FOIL/HOOK

0496688 995000 Foil/hook MW

NOTE: Complete set for BMW



W00 0 010

Fig. 31: Identifying Foil/Hook (99-5000)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0362 FOIL/HOOK

0496301 000362 Foil/hook MW

NOTE: (additional foils/set of hooks for S65)

00-1170 FOIL/HOOK

0495415 001170 Foil/hook MW

NOTE: (Foil and hook set for S85) (for store tool)

SI number

01 12 05 (196)

Consisting of:

4 = 0495610 Foil

NOTE: (Foil S85)

4 = 0495611 Hook

NOTE: (Hook set S85)

00-1140 FOIL/HOOK

0495292 001140 Foil/hook MW

NOTE: (E87 Foil and hook set) E87

Consisting of:

1 = 0495296 Foil

2 = 0495297 Hook

NOTE: (Hook set)

00-1100 FOIL/HOOK

0494205 001100 Foil/hook MW

NOTE: (Foil and hook set)

Consisting of:

1 = 0494206 Foil

2 = 0494207 Hook

NOTE: (Hook set)

00-0354 FOIL/HOOK

0495504 000354 Foil/hook MW

NOTE: (Foils/hook set E90)

00-1150 FOIL/HOOK

0495293 001150 Foil/hook MW

NOTE: (N 52 foil and hook set) N52

Consisting of:

1 = 0495294 Foil

2 = 0495295 Hook

NOTE: (Hook set)

00-0358 FOIL/HOOK

0496255 000358 Foil/hook MW

NOTE: (Foil/hook set)

00-0369 FOIL/HOOK

0496801 000369 Foil/hook MW

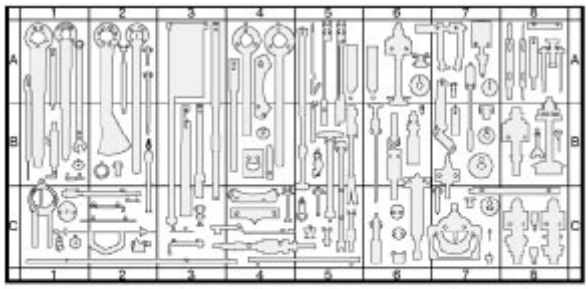


Fig. 32: Identifying Foil/Hook (00-0369)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0359 FOIL/HOOK

0496217 000359 Foil/hook MW

NOTE: (Supplementary foils + hooks for 24 2 354 and 24 4 166)

00-0357 FOIL/HOOK

0495804 000357 Foil/hook MW

NOTE: (Film and hook set) For 33 4 285

00-9321 FOLDING STICK

0490538 009321 Folding stick MW

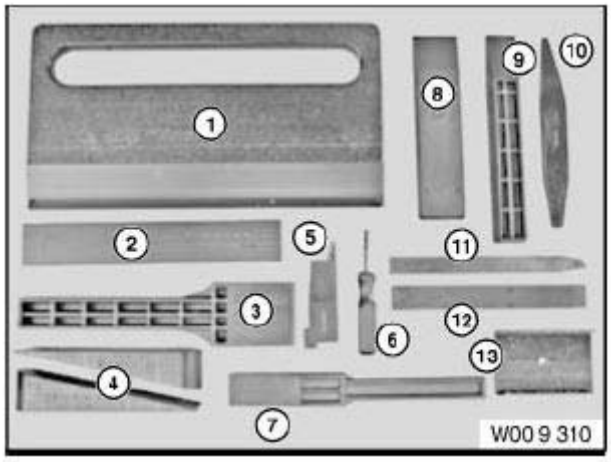


Fig. 33: Identifying Folding Stick (00-9321)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0159 FRAME

0490067 000159 Frame MW

NOTE: (Carrier housing with roller) Consisting of: Carrier housing (3 pieces)/roller (3 pieces)/roller, bottom (6 pieces) Replaced by 00 1 000 (0 494 897) See Service Information (bulletin) 01 10 04 (092)

00-9470 GAUGE

0496076 009470 Gauge MW

NOTE: (Gap gauge) From 1 to 5 mm (1; 1.5; 2; 2.5 ...). For checking body gap dimensions.

Storage Location

A23

SI number

01 03 07 (337)

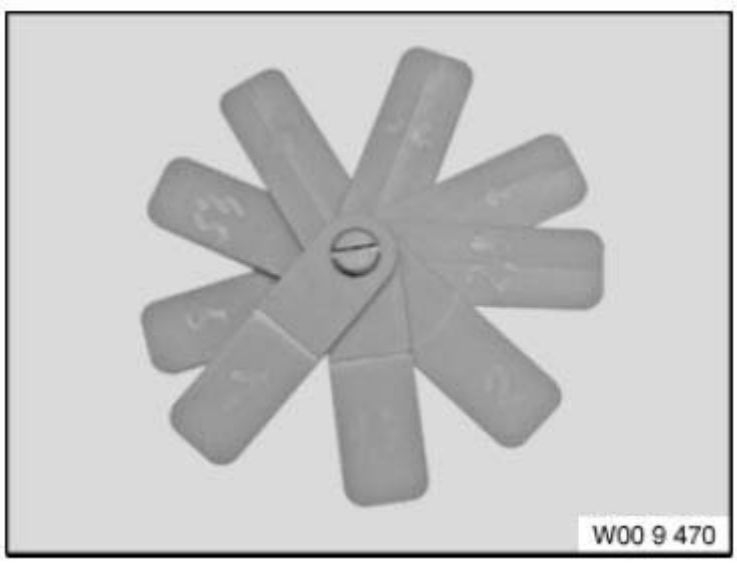


Fig. 34: Identifying Gauge (00-9470)
Courtesy of BMW OF NORTH AMERICA, INC.

00-5208 HOOK

0496004 005208 Hook MW

NOTE: (Hook set) for foil 8

00-1345 HOOK

0495093 001345 Hook MW

NOTE: (Hook set for foil no. 5 USA version)

00-5213 HOOK

0496215 005213 Hook MW

NOTE: (Hook set) Hook set for foil 12

00-1351 HOOK

0496253 001351 Hook MW

NOTE: (Hook set for film no. 10 USA version)

00-5205 HOOK

0496001 005205 Hook MW

NOTE: (Hook set) for film 5

00-5201 HOOK

0495997 005201 Hook MW

NOTE: (Hook set) for film 1

00-1354 HOOK

0496562 001354 Hook MW

NOTE: (Hook set for foil 13 USA)

00-5499 HOOK

0495982 005499 Hook MW

NOTE: (Supplementary set of hooks for foil 1-9)

SI number

01 19 06 (298)

00-1346 HOOK

0495094 001346 Hook MW

NOTE: (Hook set for film no. 6 USA version)

00-5214 HOOK

0496557 005214 Hook MW

NOTE: (Set of hooks) Set of hooks for film 13 F01

00-5207 HOOK

0496003 005207 Hook MW

NOTE: (Hook set) for film 7

00-1340 HOOK

0495088 001340 Hook MW

NOTE: (Hook set, complete, for 00 1 300, USA version)

00-1349 HOOK

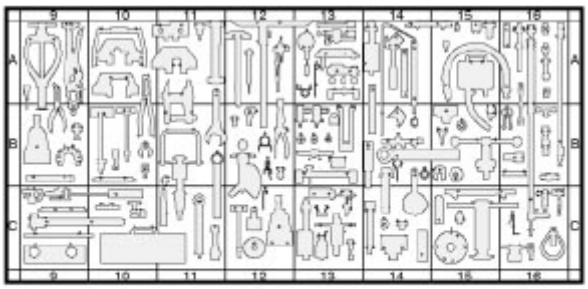
0495097 001349 Hook MW

NOTE: (Hook set for film no. 9 USA version)

00-0023 HOOK

0490010 000023 Hook MW

NOTE: (Hook set for foil 4, 5 and 6)



W00 0 020

Fig. 35: Identifying Hook (00-0023)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1356 HOOK

0496564 001356 Hook MW

NOTE: (Hook set for foil 15 USA)

00-1348 HOOK

0495096 001348 Hook MW

NOTE: (Hook set for film no. 8 USA version)

00-1344 HOOK

0495092 001344 Hook MW

NOTE: (Hook set for film no. 4 USA version)

00-5211 HOOK

0495868 005211 Hook MW

NOTE: (Hook set for film 10) Engine: N54

00-1342 HOOK

0495090 001342 Hook MW

NOTE: (Hook set for foil no. 2 USA version)

00-5202 HOOK

0495998 005202 Hook MW

NOTE: (Hook set) for foil 2

00-5204 HOOK

0496000 005204 Hook MW

NOTE: (Hook set) for foil 4

00-1352 HOOK

0496254 001352 Hook MW

NOTE: (Hook set for film no. 11 USA version)

00-0033 HOOK

0490017 000033 Hook MW

NOTE: (Hook set for foils 7, 8 and 9)

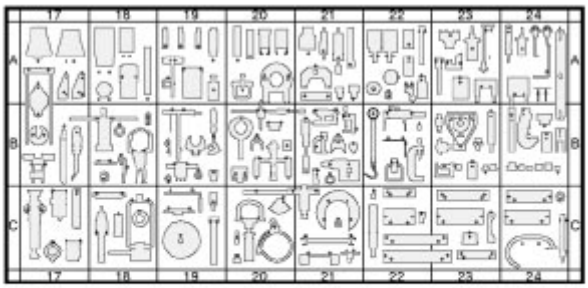


Fig. 36: Identifying Hook (00-0033)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1343 HOOK

0495091 001343 Hook MW

NOTE: (Hook set for film no. 3 USA version)

00-5203 HOOK

0495999 005203 Hook MW

NOTE: (Hook set) for film 3

00-1355 HOOK

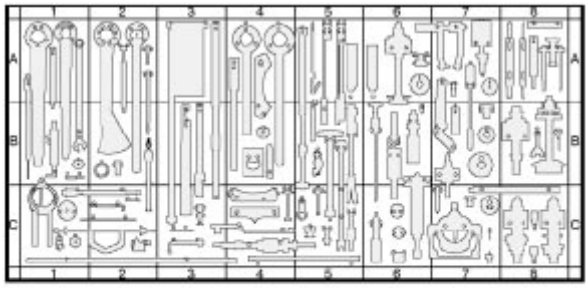
0496563 001355 Hook MW

NOTE: (Hook set for film 14 USA)

00-0013 HOOK

0490003 000013 Hook MW

NOTE: (Hook set for the foils 1, 2 and 3)



W00 0 010

Fig. 37: Identifying Hook (00-0013)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1347 HOOK

0495095 001347 Hook MW

NOTE: (Hook set for film no. 7 USA version)

00-5212 HOOK

0496097 005212 Hook MW

NOTE: (Hook set) Hook set for foil 11

00-5209 HOOK

0496005 005209 Hook MW

NOTE: (Hook set) for film 9

00-5206 HOOK

0496002 005206 Hook MW

NOTE: (Hook set) for foil 6

00-1341 HOOK

0495089 001341 Hook MW

NOTE: (Hook set for film no. 1 USA version)

00-5471 HOOK SET

0495988 005471 Hook set MW

NOTE: (Hook set for stock issue film 1)

SI number

01 19 06 (298)

00-5472 HOOK SET

0495989 005472 Hook set MW

NOTE: (Hook set for relocation template 2)

SI number

01 19 06 (298)

00-5473 HOOK SET

0495990 005473 Hook set MW

NOTE: (Hook set for relocation template 3)

SI number

01 19 06 (298)

00-8600 HOOK SET

00 8 600 Hook set

For reorganization and mounting of existing special tools on tool boards-

NOTE: The following individual tools cannot be ordered in the set!

Series: All models

Consisting of:

1 = 00 8 601 Hook No. 1

10 = 00 8 612 Hook No. 12

11 = 00 8 613 Hook No. 13

12 = 00 8 614 Hook No. 14

13 = 00 8 615 Hook No. 15

14 = 00 8 616 Hook No. 16

15 = 00 8 617 Hook No. 17

16 = 00 8 620 Hook No. 20

17 = 00 8 621 Hook No. 21

18 = 00 8 622 Hook No. 22

19 = 00 8 625 Hook No. 25

2 = 00 8 602 Hook No. 2

20 = 00 8 626 Hook No. 26

21 = 00 8 628 Hook No. 28

22 = 00 8 629 Hook No. 29

23 = 00 8 630 Hook No. 30

3 = 00 8 603 Hook No. 3

4 = 00 8 604 Hook No. 4

5 = 00 8 606 Hook No. 6

6 = 00 8 608 Hook No. 8

7 = 00 8 609 Hook No. 9

8 = 00 8 610 Hook No. 10

9 = 00 8 611 Hook No. 11

00-5474 HOOK SET

0495991 005474 Hook set MW

NOTE: (Hook set for stock issue film 4)

SI number

01 19 06 (298)

00-5475 HOOK SET

0495992 005475 Hook set MW

NOTE: (Hook set for stock issue film 5)

SI number

01 19 06 (298)

00-1162 HOOK SET S85

00 1 162 Hook set S85

00-1172 HOOK SET S85

00 1 172 Hook set S85

00-0059 LABELLING BOARD

0490035 000059 Labelling board MW

NOTE: (Labelling board) Without film

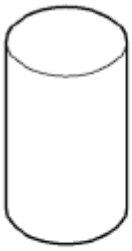
00-8660 MAGNET

0493217 008660 Magnet MW

NOTE: For tool cabinet

Storage Location

Tool cabinet



W00 8 660

Fig. 38: Identifying Magnet (00-8660)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9130 MAGNET

0495108 009130 Magnet Minimum set: Mechanical tools MW

NOTE: (Magnet with 1/2" connection) For securing torque angle dial 00 9 120 to body.

Storage Location

A52

SI number

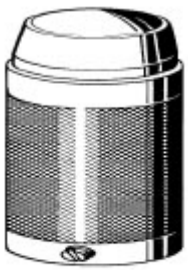
01 17 04 (130)

Fig. 39: Identifying Magnet (00-9130)
Courtesy of BMW OF NORTH AMERICA, INC.

00-5500 MANDREL

0490475 005500 Mandrel Minimum set: Mechanical tools MW

NOTE: (Handle for drifts)



W00 5 500

Fig. 40: Identifying Mandrel (00-5500)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0153 MAT

0490063 000153 Mat MW

NOTE: (mat) Wide-groove mat (2 mats)

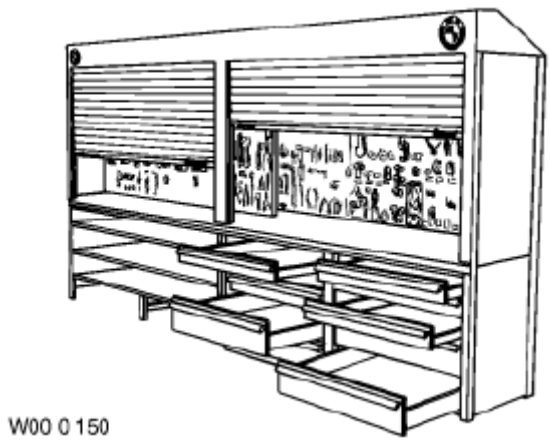


Fig. 41: Identifying Mat (00-0153)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2550 MEASUREMENT AID

0490189 002550 Measurement aid MW

NOTE: (Depth gauge) E.g. for determining side clearance of transmission shaft and basic adjustment dimension for installing bevel pinion in rear axle final drives

Storage Location

B5

A5

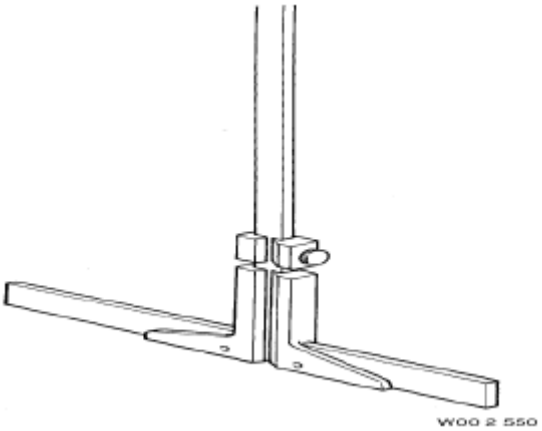


Fig. 42: Identifying Measurement Aid (00-2550)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2590 MEASUREMENT AID

0490190 002590 Measurement aid MW

NOTE: (Plastigage (5 x)) For checking bearing clearance on crankshaft and connecting rod bearings

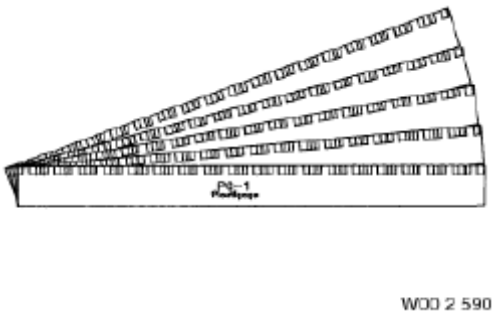


Fig. 43: Identifying Measurement Aid (00-2590)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2010 MEASUREMENT AID

0490130 002010 Measurement aid MW

NOTE: (Coefficient of friction meter) For adjusting the steering box (measurement possible in both directions) and for checking and adjusting the bevel pinion and crown wheel bearing in all final drives

Storage Location

X9

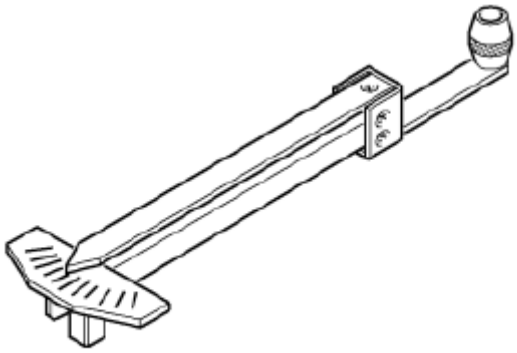


Fig. 44: Identifying Measurement Aid (00-2010)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2510 MEASURING DEVICE

0490180 002510 Measuring device MW

NOTE: (Dial gauge with gauging pin) Dial can be turned to the pointer zero position using the outer ring

Storage Location

A5

Consisting of:

1 = 2208442 Extension

Fig. 45: Identifying Measuring Device (00-2510)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1310 PANEL

0495076 001310 Panel MW

NOTE: (Tool boards, complete, USA version) Comprising: - 3 large tool boards, covered with film - including hook set - including wall mounting

00-9324 PANEL WEDGE

0495484 009324 Panel wedge MW

NOTE: (Panel wedge (panel)) For removing cavity strips from E60

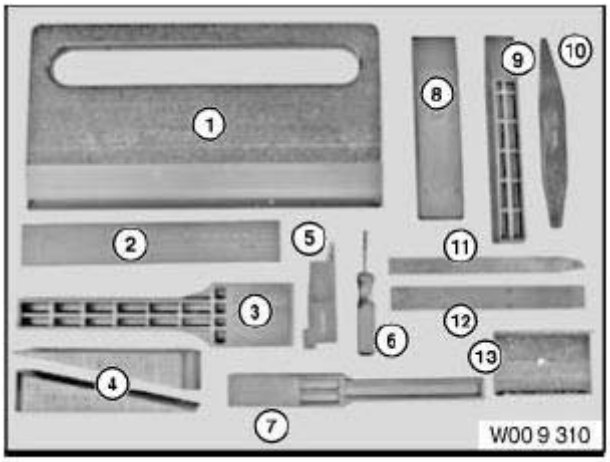


Fig. 46: Identifying Panel Wedge (00-9324)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9311 PANEL WEDGE

0490528 009311 Panel wedge MW

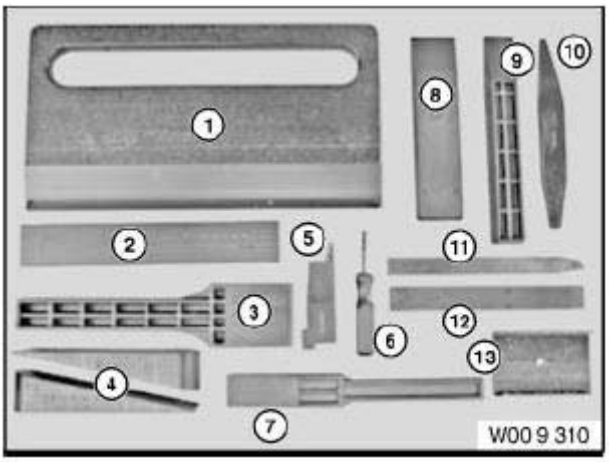


Fig. 47: Identifying Panel Wedge (00-9311)
Courtesy of BMW OF NORTH AMERICA, INC.

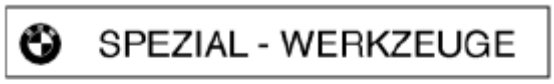
00-0050 PANEL WITH LETTERING

0490028 000050 Panel with lettering MW

NOTE: (Panel with lettering) Panel with lettering: "SPECIAL TOOLS" With foil in the required language - size 2000 mm x 215 mm

Storage Location

Tool cabinet



W00 0 050

Fig. 48: Identifying Panel With Lettering (00-0050)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9290 PLIERS

0494313 009290 Pliers MW

Replaced by: 0496521

NOTE: (Rivet pliers) Replaced by 00 2 240! Replaced by 00 2 230 (0 496 521)

00-5030 PLIERS

0490473 005030 Pliers MW

Replaced by: 0490474

NOTE: (Special pliers for seat belt limiter) Replaced by 00 5 040 (0 490 474)

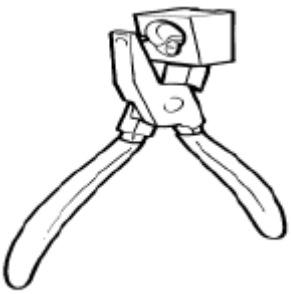


Fig. 49: Identifying Pliers (00-5030)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2250 PLIERS

0494959 002250 Pliers MW

NOTE: (Special pliers for cabling rearrangement) With market introduction of engines (N46, N52 and S85), cable 12 7 420/421 can be used for diagnostics after completion

SI number

02 03 04 (106)

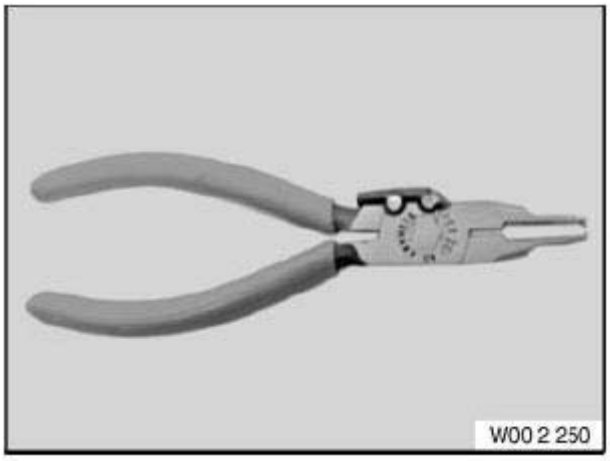


Fig. 50: Identifying Pliers (00-2250)
Courtesy of BMW OF NORTH AMERICA, INC.

00-5010 PULLER

0490466 005010 Puller Minimum set: Mechanical tools MW

NOTE: (universal puller) For removing radial shaft seals 00 5 011 for E90

Storage Location

A14

Consisting of:

1 = 0490467 Claw

NOTE: (extractor claw (3 pieces required))

2 = 0490468 Spindle

NOTE: (guide spindle)

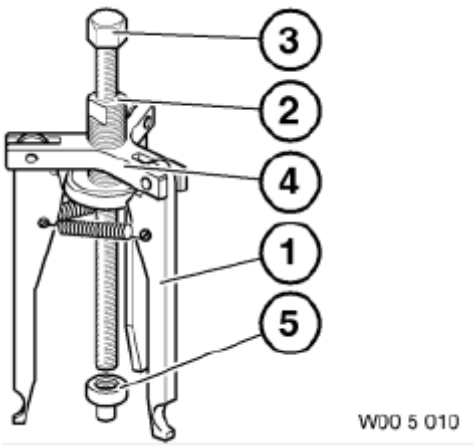


Fig. 51: Identifying Puller (00-5010)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0490469 Spindle

NOTE: (Pressure spindle)

4 = 0490470 Fixture

NOTE: (Locating star) For accommodating extractor claws

5 = 0490471 Synchronizing key

00-2080 PUMP

0493337 002080 Pump MW

NOTE: (Hand pump) For lifetime oil filling

SI number

01 01 98 (294)

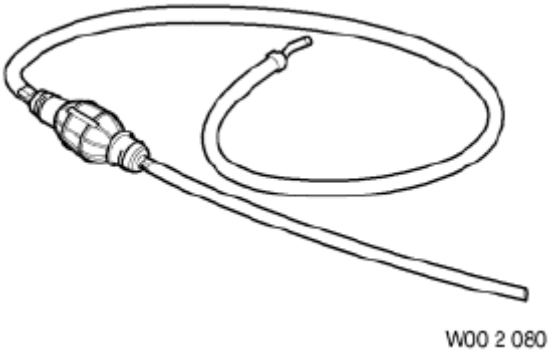


Fig. 52: Identifying Pump (00-2080)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9313 PUNCH ELEMENT

0490530 009313 Punch element MW

NOTE: (striking wedge, large)

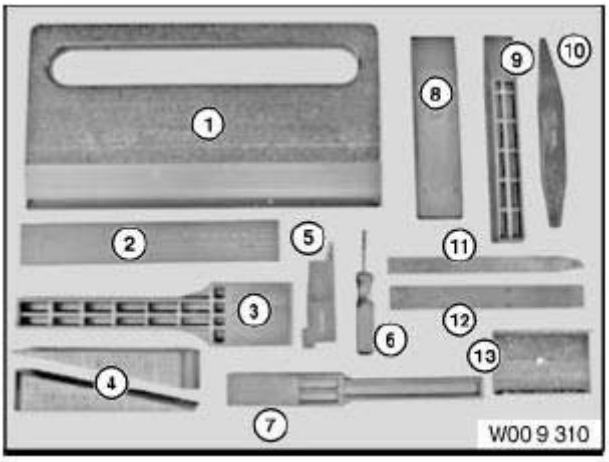


Fig. 53: Identifying Punch Element (00-9313)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9319 PUNCH ELEMENT

0490536 009319 Punch element MW

NOTE: (striking wedge, small)

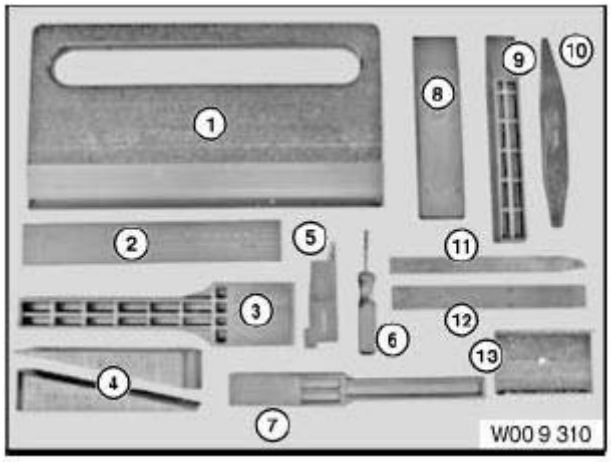


Fig. 54: Identifying Punch Element (00-9319)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9312 PUNCH ELEMENT

0490529 009312 Punch element MW

NOTE: (striking wedge, square)

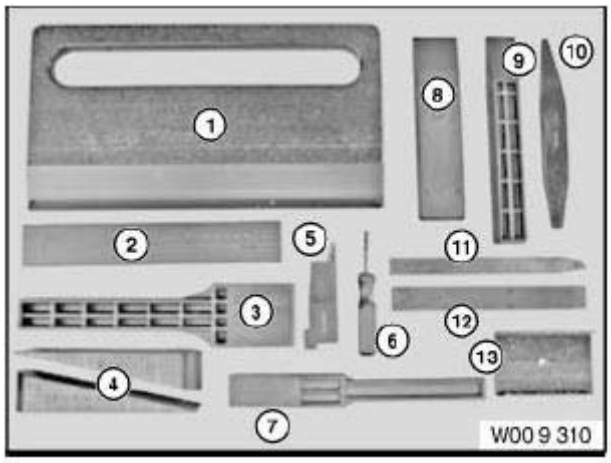


Fig. 55: Identifying Punch Element (00-9312)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0155 REAR PANEL

0490065 000155 Rear panel MW

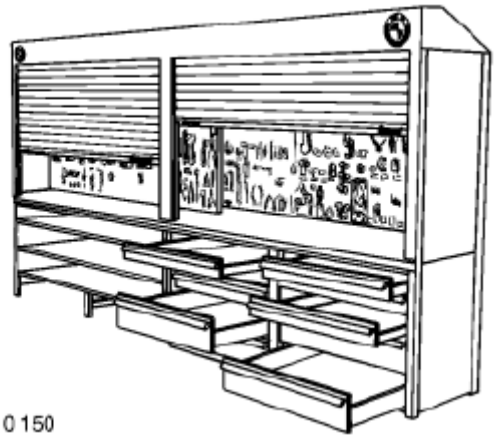


Fig. 56: Identifying Rear Panel (00-0155)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0270 REAR PANEL

0493785 000270 Rear panel MW

NOTE: (rear panel (2 pieces)) For closing the rear panel (2 m high by 1 m wide) when setting up a free-standing special tool cabinet.

SI number

00 01 00 (549)

00-9340 REMOVAL AID

0493687 009340 Removal aid Minimum set: Mechanical tools MW

NOTE: (Removal aid (2 x)) For levering out switch block on driver's door.

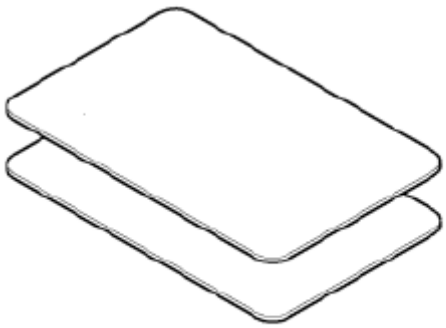
SI number

01 15 99 (483)

Consisting of:

1 = 0496289 Removal aid

NOTE: Only available as a set (2 pieces) under 00 9 340, thus separate component blocked.



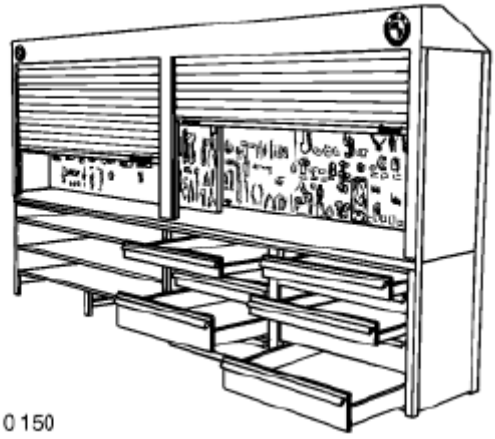
W00 9 340

Fig. 57: Identifying Removal Aid (00-9340)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0158 ROLLER SUNBLIND

0490066 000158 Roller sunblind MW

NOTE: (Roller sunblind) Lockable (2 pieces)



W00 0 150

Fig. 58: Identifying Roller Sunblind (00-0158)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9323 SCRAPER

0490540 009323 Scraper MW

Replaced by: 0496571

NOTE: (Cleaning wedge (scraper)) Replaced by special tool 00 9 327 from 11/2008 (quality improvement due to new material) Replaced by 00 9 327 (0 496 571)

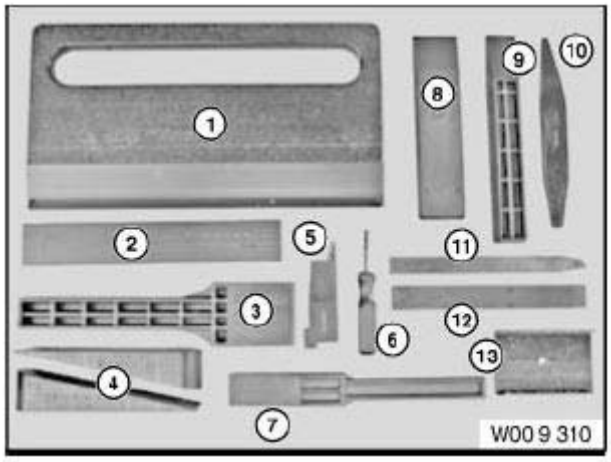


Fig. 59: Identifying Scraper (00-9323)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9010 SOCKET

0494938 009010 Socket Minimum set: Mechanical tools MW

NOTE: (Socket Torx E18) For releasing and tightening down transmission screw connections on engine (aluminium screws).

Storage Location

A51

SI number

01 17 04 (130)

Fig. 60: Identifying Socket (00-9010)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0230 SPECIAL TOOL BOARD

0493786 000230 Special tool board MW

NOTE: (large board (2x1 m) with set of rollers) For retrofitting to a large special tool board for use in a special tool cabinet with a minimum length of 4 m.

Consisting of:

1 = 0493787 Special tool board

NOTE: (large special tool board without foils)

2 = 0493788 Roller

NOTE: (upper rollers for large board)

3 = 0494125 Roller

NOTE: (lower rollers for large board)

00-0131 SPECIAL TOOL BOARD

0490056 000131 Special tool board MW

NOTE: (special tool board VI without foils) Replaced by 00 0 224

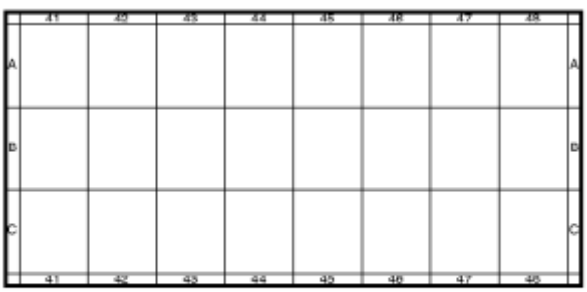


Fig. 61: Identifying Special Tool Board (00-0131)
Courtesy of BMW OF NORTH AMERICA, INC.

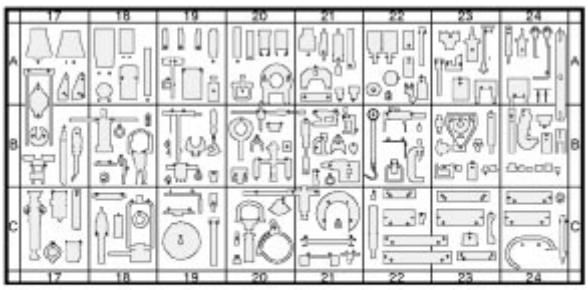
00-0030 SPECIAL TOOL BOARD

0490014 000030 Special tool board MW

NOTE: (Special tool board III complete) Size 2 m x 1 m

Storage Location

Tool cabinet



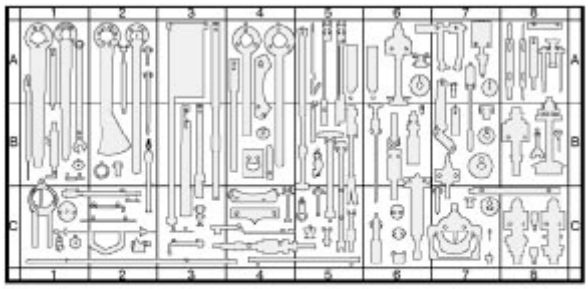
W00 0 030

Fig. 62: Identifying Special Tool Board (00-0030)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0011 SPECIAL TOOL BOARD

0490001 000011 Special tool board MW

NOTE: (special tool board I with bracket without foils) Replaced by 00 0 224



W00 0 010

Fig. 63: Identifying Special Tool Board (00-0011)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0020 SPECIAL TOOL BOARD

0490007 000020 Special tool board MW

NOTE: (Special tool board II, complete) Size 2 m x 1 m

Storage Location

Tool cabinet

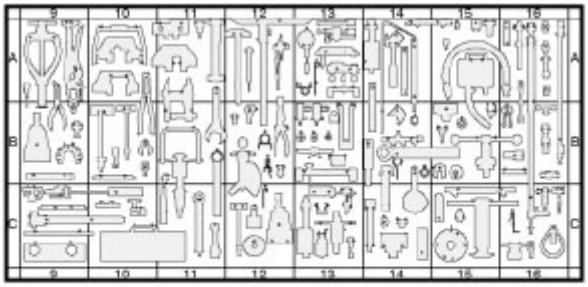


Fig. 64: Identifying Special Tool Board (00-0020)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0010 SPECIAL TOOL BOARD

0496243 000010 Special tool board MW

NOTE: (Special tool board I)

00-0041 SPECIAL TOOL BOARD

0490022 000041 Special tool board MW

Replaced by: 0493781

NOTE: (Special tool board IV with bracket without foils) Replaced by 00 0 224 (0 493 781)

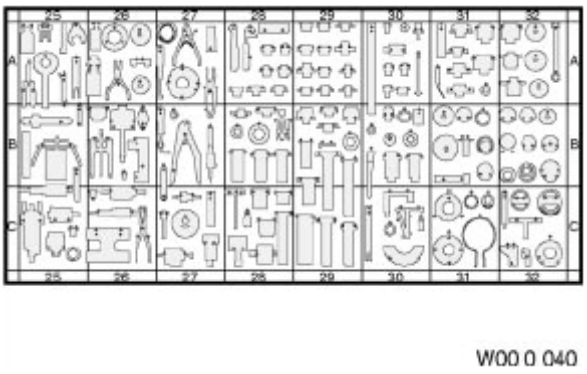


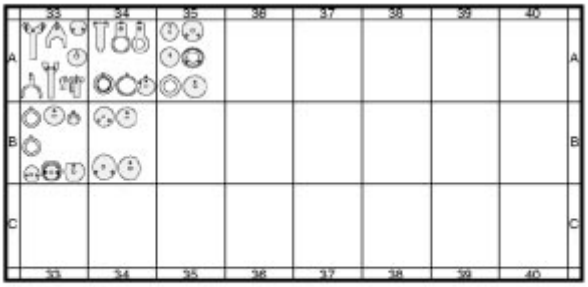
Fig. 65: Identifying Special Tool Board (00-0041)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0061 SPECIAL TOOL BOARD

0490037 000061 Special tool board MW

Replaced by: 0493781

NOTE: (Special tool board V with bracket without foils) Replaced by 00 0 224 (0 493 781)



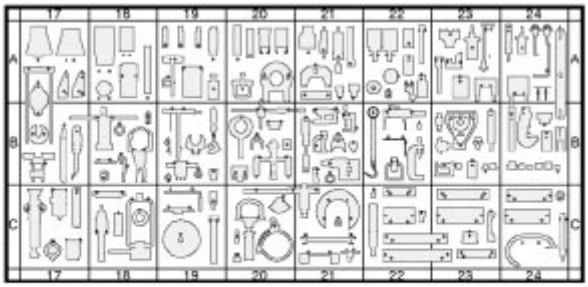
W00 0 060

Fig. 66: Identifying Special Tool Board (00-0061)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0031 SPECIAL TOOL BOARD

0490015 000031 Special tool board MW

NOTE: (special tool board III with bracket without foils) Replaced by 00 0 224



W00 0 030

Fig. 67: Identifying Special Tool Board (00-0031)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0021 SPECIAL TOOL BOARD

0490008 000021 Special tool board MW

NOTE: **(special tool board II with bracket without foils) Replaced by 00 0 224**

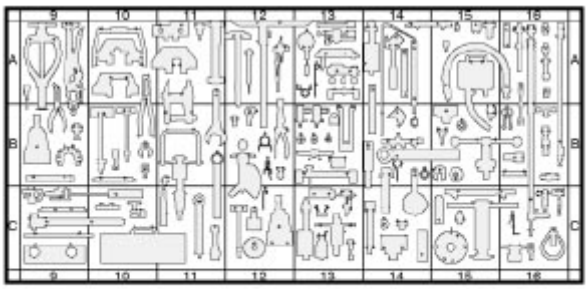


Fig. 68: Identifying Special Tool Board (00-0021)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0240 SPECIAL TOOL BOARD

0493789 000240 Special tool board MW

NOTE: **(small movable special tool board without foils) For retrofitting a special tool cabinet from 2 m in length.**

SI number

00 01 02 (810)

Consisting of:

1 = 0493790 Tool

NOTE: **(small special tool board 0.65 m x 1 m)**

2 = 0493791 Roller

NOTE: **(upper rollers) For moving a small special tool board**

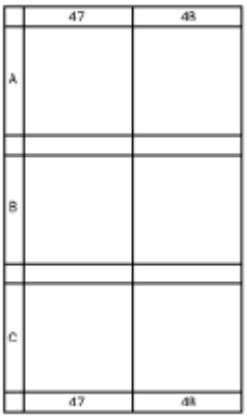


Fig. 69: Identifying Special Tool Board (00-0240)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0494119 Roller

NOTE: (lower rollers) For moving a small special tool board

00-1010 SPECIAL TOOL CABINET

0494899 001010 Special tool cabinet MW

NOTE: (Special tool cabinet, length 4 m and 2m, complete current range of equipment) Consisting of tool cabinet 4 m and 2 m. All boards covered with foil, hook set and folding index with list. Accessories such as storage shelves (00 0 250), drawer blocks (00 0 260) and rear panels (00 0 270) must be ordered separately.

00-1300 SPECIAL TOOL CABINET

0495073 001300 Special tool cabinet MW

NOTE: (Tool cabinet, USA version, complete) Comprising: - Tool cabinet 4 m - All boards covered with film, USA version - including hook set - including lighting

Consisting of:

0495074

0495075

00-1301 SPECIAL TOOL CABINET

0495074 001301 Special tool cabinet MW

NOTE: **(2 m tool cabinet USA basic version) Comprising: - Tool cabinet 2 m - Large bright-finish board - including lighting**

00-0220 SPECIAL TOOL CABINET

0493777 000220 Special tool cabinet MW

Fig. 70: Identifying Special Tool Cabinet (00-0220)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: **(Special tool cabinet, length 2 m) Dimensions: (LxHxD) 2.05 m x 2.10 m x 0.65 m For extended accommodation of special tools.**

PLEASE NOTE: To construct a complete 6 m long special tool cabinet, use the ordering code 00 1 000.

SI number

Consisting of:

00 01 00 (549)

1 = 0493778 Basic frame

NOTE: **(Basic frame) Basic frame with rollerblind for constructing a separate 2 m long tool cabinet.**

NOTE: **For an individual order as an attachment frame, the complete delivery specification must already be present under ordering code 00 0 220. Overall length with a mounting frame: 4 m**

2 = 0493779 Side wall

NOTE: **(side wall) Left side wall. Only required once for constructing the basic frame**

3 = 0493780 Side wall

NOTE: **(side wall) Right side wall. Only required once for constructing the basic frame**

4 = 0493781 Special tool board

NOTE: **(large special tool board 2 m x 1 m) This special tool board is used as the rear panel of basic and attachment frames and is the basis for large fixed or movable special tool boards.**

5 = 0493782 Roller-blind

NOTE: **(roller-blind) Lockable Is included in the 00 0 221 delivery specification. This order number is for reordering purposes only.**

6 = 0494126 Frame

NOTE: **(side frame) Only required once for constructing the basic frame**

00-1302 SPECIAL TOOL CABINET

0495075 001302 Special tool cabinet MW

NOTE: **(2 m tool cabinet USA mounting version) Comprising: - Tool cabinet 2 m - Large bright-finish board - including lighting**

00-0150 SPECIAL TOOL CABINET

0490060 000150 Special tool cabinet MW

NOTE: **To accommodate 5 special tool boards. Replaced by 1x 00 0 220 complete plus 1x 00 0 221 and 1x 00 0 224**

Consisting of:

0490061

0490062

0490063

0490064

0490065

0490066

0490067

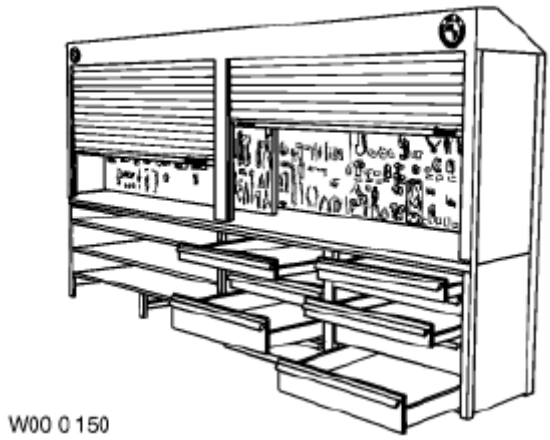


Fig. 71: Identifying Special Tool Cabinet (00-0150)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0070 SPECIAL TOOL CABINET

0490043 000070 Special tool cabinet MW

NOTE: (Special tool cabinet, length 6 m) For storing large and small transportable special tool boards (not included in scope of delivery) for the entire current special tool range. Consisting of: 1x 00 0 220 complete plus 2x 00 0 221 and 2x 00 0 224

00-0152 STORAGE

0490062 000152 Storage MW

NOTE: (Storage shelf)

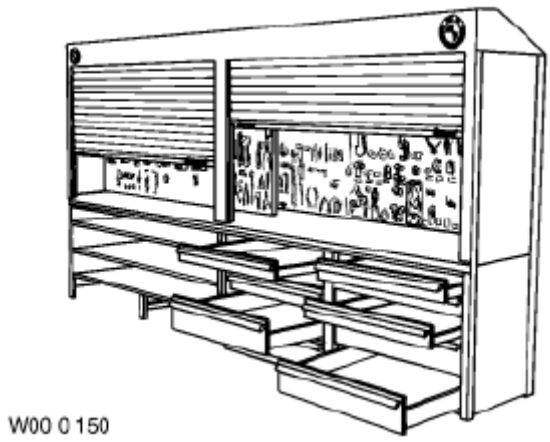


Fig. 72: Identifying Storage (00-0152)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0250 STORAGE

0493783 000250 Storage MW

NOTE: (Storage shelf) With mounting material.

SI number

00 01 00 (549)

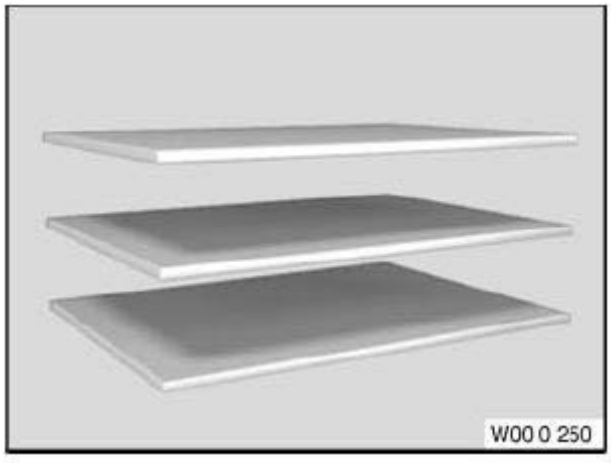


Fig. 73: Identifying Storage (00-0250)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0260 SUPPLEMENT

0493784 000260 Supplement MW

NOTE: (Set of drawers) With 5 lockable drawers

SI number

00 01 00 (549)

Fig. 74: Identifying Supplement (00-0260)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2262 TENSIONING STRAP (2 X)

00 2 262 Tensioning strap (2 x)

SI number

01 22 06 (307)

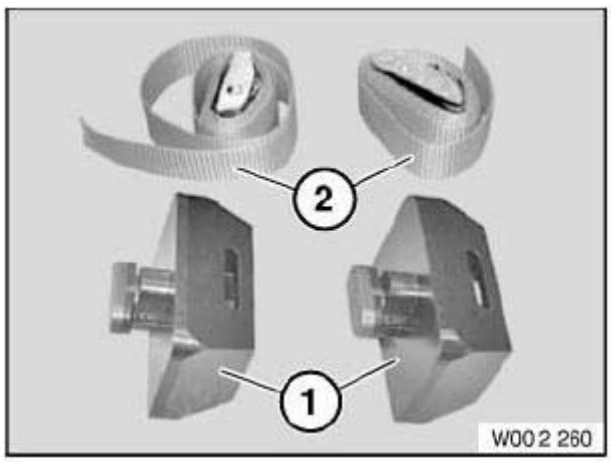


Fig. 75: Identifying Tensioning Strap (2 X) (00-2262)
Courtesy of BMW OF NORTH AMERICA, INC.

00-1210 TESTER

0495430 001210 Tester MW

NOTE: (Exhaust-gas test universal adjustment unit) Disturbance air valves in case

00-5040 TOOL

0490474 005040 Tool MW

NOTE: (riveting tool) For riveting the seat belt limiters

Storage Location

C3

SI number

01 05 95 (932)

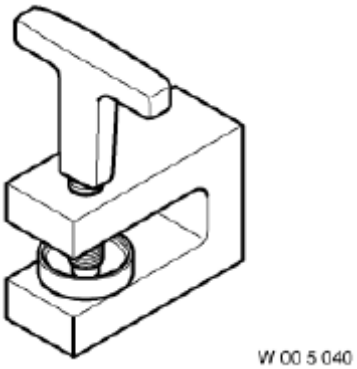


Fig. 76: Identifying Tool (00-5040)
Courtesy of BMW OF NORTH AMERICA, INC.

00-0080 TOOL REGISTER

0490044 000080 Tool register MW

NOTE: (tool register) Overview of tool positioning/storage locations

Storage Location

Tool cabinet

SI number

01 12 97 (202)

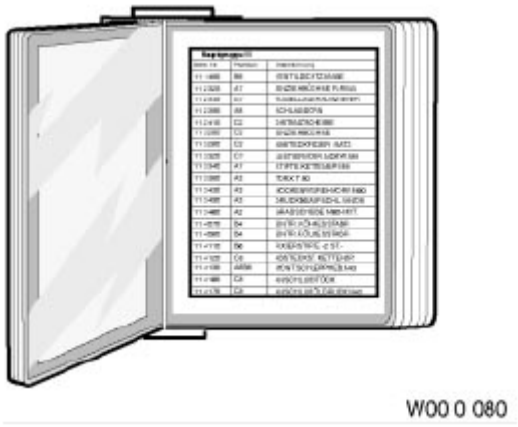


Fig. 77: Identifying Tool Register (00-0080)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9450 TORQUE WRENCH

0496055 009450 Torque wrench Minimum set: Mechanical tools MW

NOTE: Infinitely adjustable from 0.05 Nm to 0.6 Nm (5 cNm to 60 cNm). 1/4" external square bit connection. For information on adjustment, see Special Tool Service Information (bulletin) 1 03 07 337 Annex 3.

SI number

01 03 07 (337)

Fig. 78: Identifying Torque Wrench (00-9450)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9460 TORQUE WRENCH

0496778 009460 Torque wrench Minimum set: Mechanical tools MW

NOTE: **Measuring range 0.40 to 3.00 Nm (accuracy +/-3%). Set 00 9 460 consists of 00 9 461 = torque wrench and 00 9 462 extension. Replaces special tool 00 9 250 from KW41/2009.**

SI number

01 24 09 (590)

Consisting of:

2 = 0496782 Extension

NOTE: **Flexible shaft (Replaces special tool 00 9 552 from KW41/2009)**

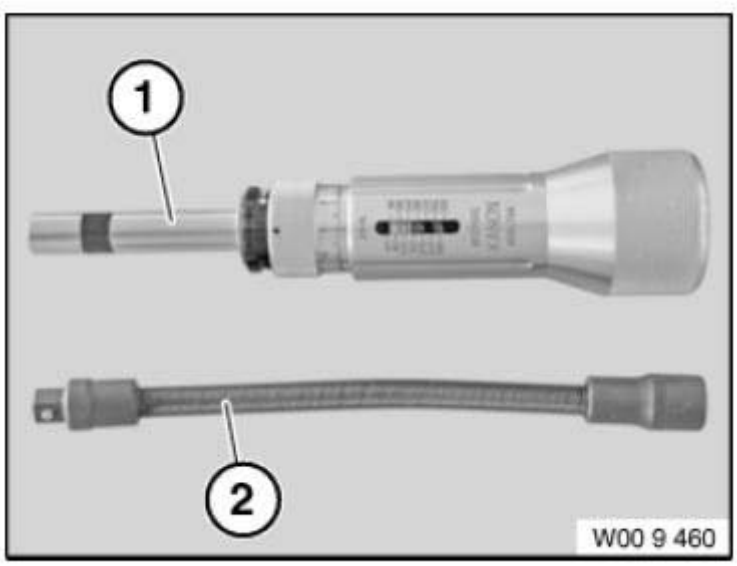


Fig. 79: Identifying Torque Wrench (00-9460)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0496781 Torque wrench

NOTE: **N30LTDK (0.4 - 3.0 Nm accuracy 3%) (replaces special tool 00 9 251 from KW41/2009**

00-9140 TORSION ANGLE GAUGE

0495605 009140 Torsion angle gauge MW

NOTE: **(Angle of rotation measuring disc 3/4" connection) For torsion angle adjustment of the central bolt up to 600 Nm.**

Storage Location

B19

A19

SI number

01 20 06 (299)

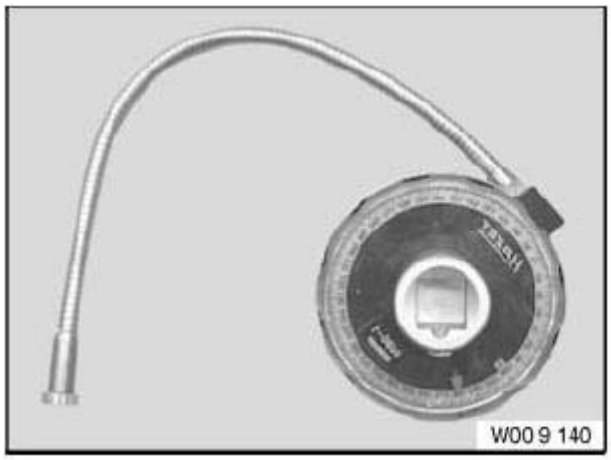


Fig. 80: Identifying Torsion Angle Gauge (00-9140)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9120 TORSION ANGLE GAUGE

0490504 009120 Torsion angle gauge Minimum set: Mechanical tools MW

NOTE: For torsion angle adjustment of cylinder head bolts (all engines) And reinforcement plate front axle support E46

Storage Location

A5

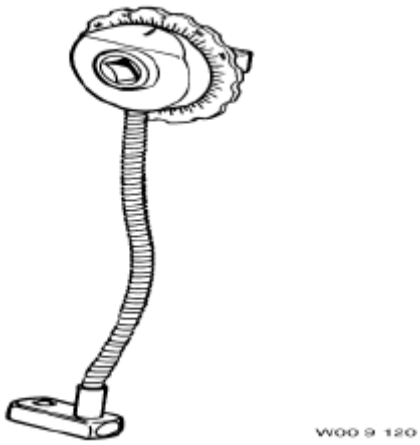


Fig. 81: Identifying Torsion Angle Gauge (00-9120)
Courtesy of BMW OF NORTH AMERICA, INC.

00-2520 TORX

0490181 002520 Torx MW

NOTE: (Torx sockets E10, E12, E14) Replaced by Torx tool set (see Workshop Equipment - Planning Documentation, Group 9)

Consisting of:

1 = 0490182 Torx socket

NOTE: (Torx socket E10) see Workshop Equipment Catalogue

2 = 0490183 Torx socket

NOTE: (Torx socket E12) see Workshop Equipment Catalogue

3 = 0490184 Torx socket

NOTE: (Torx socket E14) see Workshop Equipment Catalogue

00-2470 TRIPOD

0493724 002470 Tripod MW

Replaced by: 0493577

NOTE: (Measuring tripod with magnetic retainer) Replaced by 00 2 480 (0 493 577)

Consisting of:

1 = 0493725 Holder

NOTE: (Magnetic retainer) Replaced by 00 2 480 (0 493 577)

2 = 0493726 Rod

NOTE: Replaced by 00 2 480 (0 493 577)

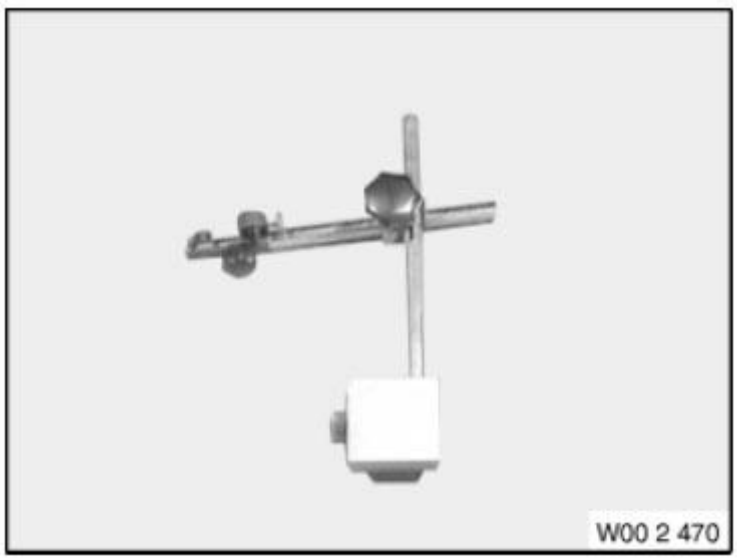


Fig. 82: Identifying Tripod (00-2470)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0493727 Bolt

NOTE: (Clamping bolt) Replaced by 00 2 480 (0 493 577)

4 = 0493728 Rod

NOTE: (Rod with dial gauge holder) Replaced by 00 2 480 (0 493 577)

00-2480 TRIPOD

0493577 002480 Tripod MW

NOTE: (Measurement stand with clamping bracket)

SI number

01 18 99 (489)

Consisting of:

1 = 0493720 Terminal

NOTE: (Clamping base)

2 = 0493721 Terminal

NOTE: (Clamping piece)

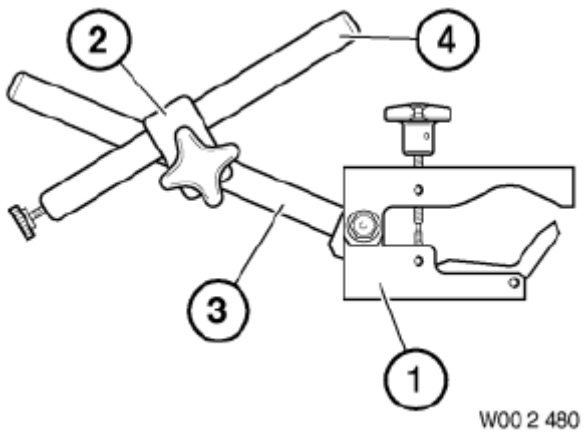


Fig. 83: Identifying Tripod (00-2480)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0493722 Shaft

4 = 0493723 Shaft

00-8690 WASHERS AND SCREWS

00 8 690 Washers and screws

Consisting of:

1 = 00 8 691 Washers, 100 x

2 = 00 8 692 Screws, 100 x

3 = 00 8 693 Screws, 100 x

NOTE: For USA

4 = 00 8 694 Box 40 mm

5 = 00 8 695 Box 100 mm

6 = 00 8 696 Box 150 mm

00-9317 WEDGE

0490534 009317 Wedge MW

Replaced by: 0496569

NOTE: (Trim wedge) Replaced by special tool 00 9 325 from 11/2008 (quality improvement due to new material) Replaced by 00 9 325 (0 496 569)

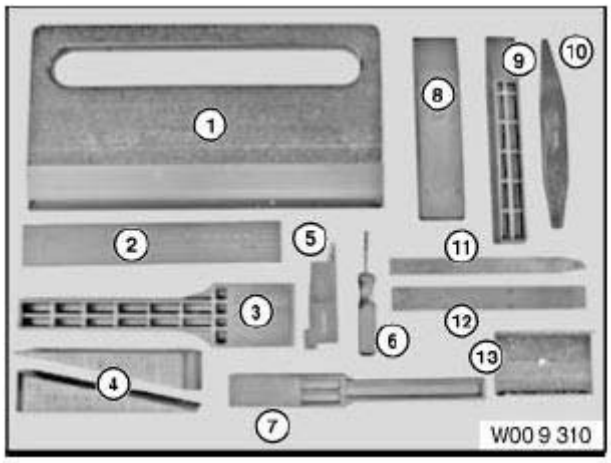


Fig. 84: Identifying Wedge (00-9317)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9030 WEDGE

0496714 009030 Wedge Minimum set: Mechanical tools MW

NOTE: For dismantling O-rings, gaskets and trim panels. This special tool is in future to replace special tool 00 9 316.

SI number

01 20 09 (581)

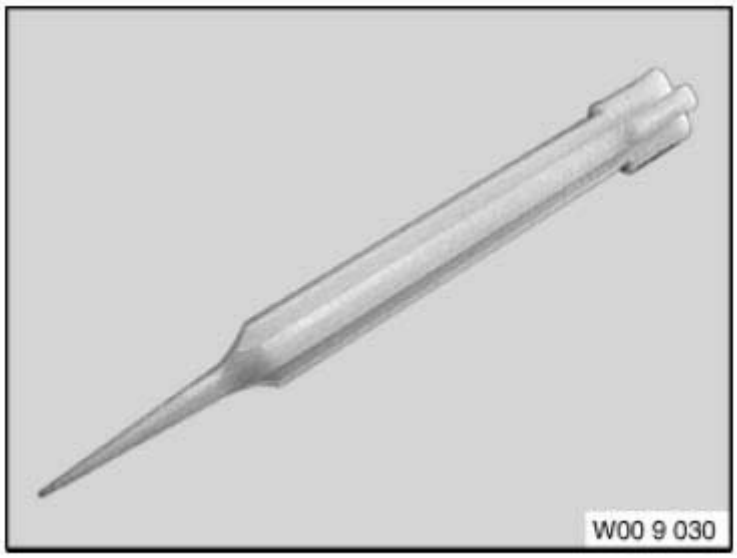


Fig. 85: Identifying Wedge (00-9030)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9322 WEDGE

0490539 009322 Wedge MW

NOTE: (Panel wedge)

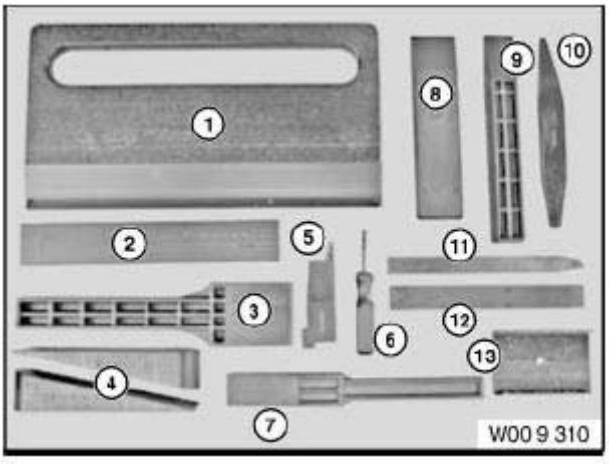


Fig. 86: Identifying Wedge (00-9322)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9318 WEDGE

0490535 009318 Wedge MW

Replaced by: 0496570

NOTE: **(Universal wedge) Replaced by special tool 00 9 326 from 11/2008 (quality improvement due to new material) Replaced by 00 9 326 (0 496 570)**

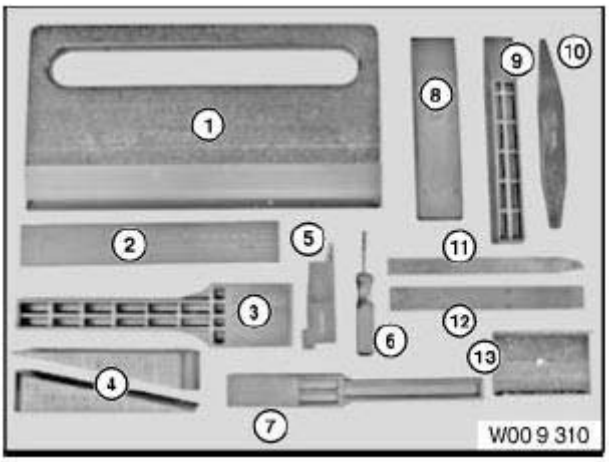


Fig. 87: Identifying Wedge (00-9318)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9326 WEDGE

0496570 009326 Wedge MW

NOTE: **(Universal wedge) From 11/2008 this special tool replaces panel wedge 00 9 318 (different material)**

00-9325 WEDGE

0496569 009325 Wedge MW

NOTE: **(Panel wedge) From 11/2008 this special tool replaces panel wedge 00 9 317 (different material)**

00-9316 WEDGE

0490533 009316 Wedge MW

NOTE: **(Sealing lip wedge)**

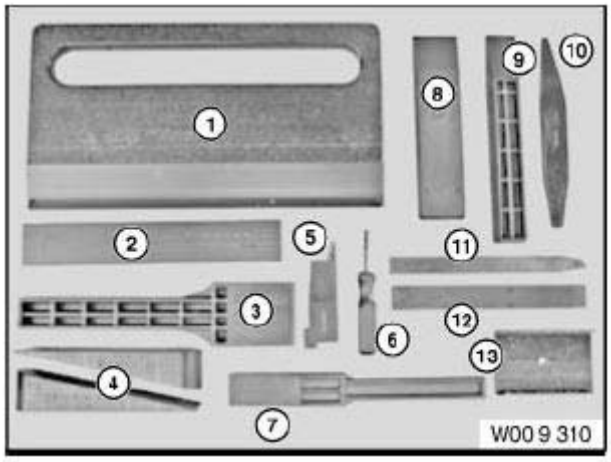


Fig. 88: Identifying Wedge (00-9316)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9310 WEDGE

0490527 009310 Wedge Minimum set: Mechanical tools MW

NOTE: (Panel wedges (set in plastic case)) For straightening and installation work on vehicle, e.g. feeding in trim panels, removing window cavity strips, removing minor dents, removing adhesive residues, measuring gap widths, levering out trim panels --> 13-piece

SI number

01 25 05 (230)

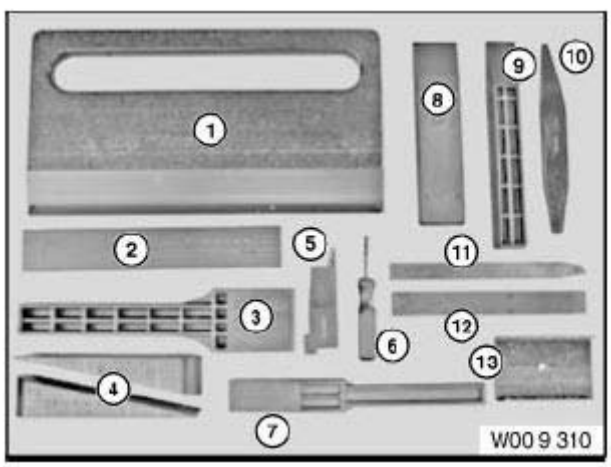


Fig. 89: Identifying Wedge (00-9310)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

0495484

0496569

0496570

0496571

0490528

0490529

0490530

0490531

0490532

0490533

0490534

0490535

0490536

0490538

0490539

0490540

0493752

00-9327 WEDGE

0496571 009327 Wedge MW

NOTE: (Cleaning wedge) From 11/2008 this special tool replaces panel wedge 00 9 323 (different material)

00-9315 WEDGE

0490532 009315 Wedge MW

NOTE: (gap dimension wedge)

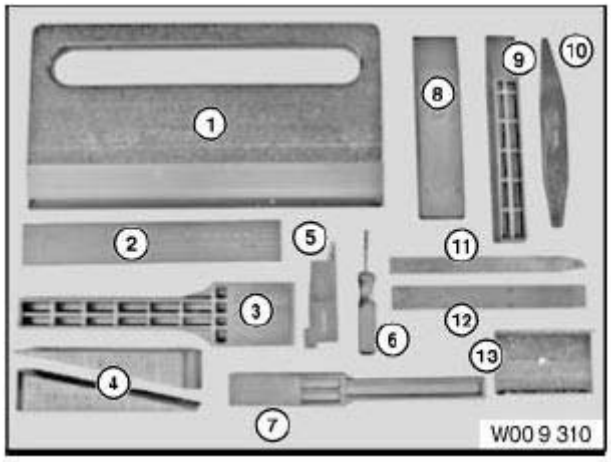


Fig. 90: Identifying Wedge (00-9315)
Courtesy of BMW OF NORTH AMERICA, INC.

00-9314 WEDGE

0490531 009314 Wedge MW

NOTE: (adjusting wedges (2 x))

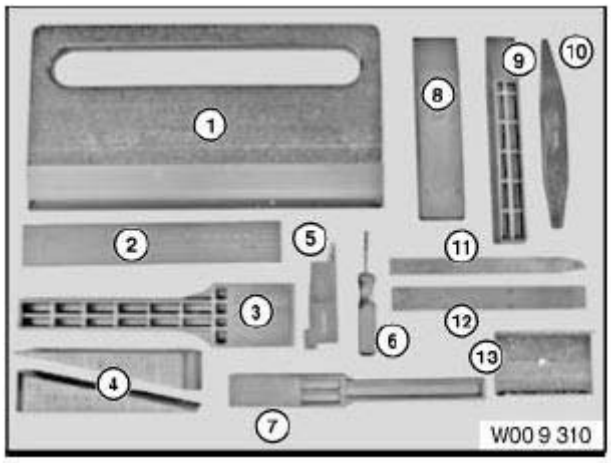


Fig. 91: Identifying Wedge (00-9314)
Courtesy of BMW OF NORTH AMERICA, INC.

EXCERPT FROM COMPANY STANDARD BMW GS 90003-2

00 00 EXCERPT FROM COMPANY STANDARD BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - EXCERPT FROM COMPANY STANDARD BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
If there are no cross-references to tightening torques in the repair instructions, the excerpts from the company standard BMW GS 90003-2; **AZD-AZD-AZD00-08 M16 AND M16X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2**; **AZD-AZD-AZD00-07 M14 AND M14X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2**; **AZD-AZD-AZD00-06 M12 AND M12X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2**; **AZD-AZD-AZD00-05 M10 AND M10 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2**; **AZD-AZD-AZD00-04 M8 AND M8 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2**; **AZD-AZD-AZD00-03 M6 AND M7 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2**; or **AZD-AZD-AZD00-02 M4 AND M5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2** must be observed.				
There are different screws/nuts with surface color/(surface coating) - yellow (ZN) and silver (ZNS) The maximum tightening torques are: Surface color yellow (ZN): Applicable only to shank screws with metric coarse- and fine-pitch threads according to DIN 13-28 and nuts with nut height 0.8 x d according to DIN 934 and exclusively for a μ tot = 0.125 (screws phosphatized, nuts without subsequent treatment or galvanized. Lubrication condition: unlubricated and also oiled).				
Surface color silver (ZNS): Applicable only to shank screws with metric coarse- and fine-pitch threads according to DIN 13-28 and nuts with nut height 0.8 x d according to DIN 934 and exclusively for a spread of μ = 0.09 to 0.15 (screws cadmium-plated, nuts without subsequent treatment or galvanized. Lubrication condition: unlubricated and also oiled). The values specified in this table apply to all screw connections conforming to the aforementioned conditions. Not applicable when using a different surface or lubricant condition on the thread, or if the height of the nut differs.				
Not applicable to necked-down bolts, self-tapping screw connections or to connections between parts made of different materials. Attention! To be able to carry out competent repairs, it is essential to comply with the specified tightening torques. This presupposes that the required torque wrenches are subjected to regular testing. Permitted tolerance of torque wrenches ± 2 % of scale value.				

M10 AND M10 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS

90003-2

00 00 M10 AND M10 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - M10 AND M10 X 1 - ACC. TO BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
Scope of applicability of tightening torques, refer to excerpt from **COMPANY STANDARD BMW GS 90003-2**	Surface colour/ (surface coating)			
M10 thread	yellow (ZN)	M10 8.8		47 Nm
	silver (ZNS)	M10 8.8		38 Nm
	yellow (ZN)	M10 10.9		66 Nm
	silver (ZNS)	M10 10.9		56 Nm
	yellow (ZN)	M10 12.9		79 Nm
	silver (ZNS)	M10 12.9		62 Nm
M10x1 thread	yellow (ZN)	M10 x 1 8.8		54 Nm
	silver (ZNS)	M10 x 1 8.8		41 Nm
	yellow (ZN)	M10 x 1 10.9		75 Nm
	silver (ZNS)	M10 x 1 10.9		60 Nm
	yellow (ZN)	M10 x 1 12.9		91 Nm
	silver (ZNS)	M10 x 1 12.9		67 Nm

M12 AND M12X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

00 00 M12 AND M12X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - M12 AND M12X1.5 - ACC. TO BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
Scope of applicability of tightening torques, refer to excerpt from **COMPANY STANDARD BMW GS 90003-2**	Surface colour/ (surface coating)			
M12 thread	yellow (ZN)	M12 8.8		82 Nm
	silver (ZNS)	M12 8.8		66 Nm

	yellow (ZN)	M12 10.9		115 Nm
	silver (ZNS)	M12 10.9		98 Nm
	yellow (ZN)	M12 12.9		140 Nm
	silver (ZNS)	M12 12.9		108 Nm
M12x1.5 thread	yellow (ZN)	M12 x 1.5 8.8		87 Nm
	silver (ZNS)	M12 x 1.5 8.8		68 Nm
	yellow (ZN)	M12 x 1.5 10.9		123 Nm
	silver (ZNS)	M12 x 1.5 10.9		100 Nm
	yellow (ZN)	M12 x 1.5 12.9		147 Nm
	silver (ZNS)	M12 x 1.5 12.9		110 Nm

M14 AND M14X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

00 00 M14 AND M14X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - M14 AND M14X1.5 - ACC. TO BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
Scope of applicability of tightening torques, refer to excerpt from **COMPANY STANDARD BMW GS 90003-2**	Surface colour/ (surface coating)			
M14 thread	yellow (ZN)	M14 8.8		130 Nm
	silver (ZNS)	M14 8.8		104 Nm
	yellow (ZN)	M14 10.9		180 Nm
	silver (ZNS)	M14 10.9		155 Nm
	yellow (ZN)	M14 12.9		220 Nm
	silver (ZNS)	M14 12.9		170 Nm
M14x1.5 thread	yellow (ZN)	M14 x 1.5 8.8		143 Nm
	silver (ZNS)	M14 x 1.5 8.8		110 Nm
	yellow (ZN)	M14 x 1.5 10.9		200 Nm
	silver (ZNS)	M14 x 1.5 10.9		165 Nm
	yellow (ZN)	M14 x 1.5 12.9		240 Nm
	silver (ZNS)	M14 x 1.5 12.9		180 Nm

M16 AND M16X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

00 00 M16 AND M16X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - M16 AND M16X1.5 - ACC. TO BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
Scope of applicability of tightening torques, refer to excerpt from **COMPANY STANDARD BMW GS 90003-2**	Surface colour/ (surface coating)			
M16 thread	yellow (ZN)	M16 8.8		200 Nm
	silver (ZNS)	M16 8.8		160 Nm
	yellow (ZN)	M16 10.9		280 Nm
	silver (ZNS)	M16 10.9		235 Nm
	yellow (ZN)	M16 12.9		340 Nm
	silver (ZNS)	M16 12.9		260 Nm
M16x1.5 thread	yellow (ZN)	M16 x 1.5 8.8		216 Nm
	silver (ZNS)	M16 x 1.5 8.8		170 Nm
	yellow (ZN)	M16 x 1.5 10.9		303 Nm
	silver (ZNS)	M16 x 1.5 10.9		250 Nm
	yellow (ZN)	M16 x 1.5 12.9		364 Nm
	silver (ZNS)	M16 x 1.5 12.9		275 Nm

M18 AND M18X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

00 00 M18 AND M18X1.5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - M18 AND M18X1.5 - ACC. TO BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
Scope of applicability of tightening torques, refer to excerpt from **COMPANY STANDARD BMW GS 90003-2**	Surface colour/ (surface coating)			
M18 thread	yellow (ZN)	M18 8.8		280 Nm
	silver (ZNS)	M18 8.8		225 Nm
	yellow (ZN)	M18 10.9		390 Nm
	silver (ZNS)	M18 10.9		330 Nm
	yellow (ZN)	M18 12.9		470 Nm
	silver (ZNS)	M18 12.9		365 Nm

M18x1.5 thread	yellow (ZN)	M18 x 1.5 8.8		313 Nm
	silver (ZNS)	M18 x 1.5 8.8		245 Nm
	yellow (ZN)	M18 x 1.5 10.9		440 Nm
	silver (ZNS)	M18 x 1.5 10.9		360 Nm
	yellow (ZN)	M18 x 1.5 12.9		527 Nm
	silver (ZNS)	M18 x 1.5 12.9		400 Nm

M4 AND M5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

00 00 M4 AND M5 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - M4 AND M5 - ACC. TO BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
Scope of applicability of tightening torques, refer to excerpt from **COMPANY STANDARD BMW GS 90003-2**	Surface colour/ (surface coating)			
M4 thread	yellow (ZN)	M4 8.8		3 Nm
	silver (ZNS)	M4 8.8		2 Nm
	yellow (ZN)	M4 10.9		4 Nm
	silver (ZNS)	M4 10.9		3 Nm
	yellow (ZN)	M4 12.9		5 Nm
M5 thread	yellow (ZN)	M5 8.8		6 Nm
	silver (ZNS)	M5 8.8		5 Nm
	yellow (ZN)	M5 10.9		8 Nm
	silver (ZNS)	M5 10.9		7 Nm
	yellow (ZN)	M5 12.9		10 Nm
	silver (ZNS)	M5 12.9		8 Nm

M6 AND M7 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

00 00 M6 AND M7 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - M6 AND M7 - ACC. TO BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
Scope of applicability of tightening torques,	Surface colour/ (surface coating)			

refer to excerpt from **COMPANY STANDARD BMW GS 90003-2**				
M6 thread	yellow (ZN)	M6 8.8		10 Nm
	silver (ZNS)	M6 8.8		8 Nm
	yellow (ZN)	M6 10.9		14 Nm
	silver (ZNS)	M6 10.9		12 Nm
	yellow (ZN)	M6 12.9		17 Nm
	silver (ZNS)	M6 12.9		13 Nm
M7 thread	yellow (ZN)	M7 8.8		15 Nm
	silver (ZNS)	M7 8.8		13 Nm
	yellow (ZN)	M7 10.9		21 Nm
	silver (ZNS)	M7 10.9		19 Nm
	yellow (ZN)	M7 12.9		26 Nm
	silver (ZNS)	M7 12.9		21 Nm

M8 AND M8 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

00 00 M8 AND M8 X 1 - MAXIMUM TIGHTENING TORQUES ACC. TO BMW GS 90003-2

TIGHTENING TORQUE SPECIFICATION - M8 AND M8 X 1 - ACC. TO BMW GS 90003-2

	Type	Thread	Tightening specification	Measure
Scope of applicability of tightening torques, refer to excerpt from **COMPANY STANDARD BMW GS 90003-2**	Surface colour/ (surface coating)			
M8 thread	yellow (ZN)	M8 8.8		24 Nm
	silver (ZNS)	M8 8.8		19 Nm
	yellow (ZN)	M8 10.9		34 Nm
	silver (ZNS)	M8 10.9		28 Nm
	yellow (ZN)	M8 12.9		40 Nm
	silver (ZNS)	M8 12.9		32 Nm
M8x1 thread	yellow (ZN)	M8 x 1 8.8		26 Nm
	silver (ZNS)	M8 x 1 8.8		21 Nm
	yellow (ZN)	M8 x 1 10.9		36 Nm
	silver (ZNS)	M8 x 1 10.9		30 Nm
	yellow (ZN)	M8 x 1 12.9		44 Nm

	silver (ZNS)	M8 x 1 12.9		33 Nm

BRAKE PAD WARNING LIGHT

NOTE: **Most vehicles are equipped with a Malfunction Indicator Light (MIL) or check engine light. If light comes on and remains on while driving, the vehicle requires some type of repair. See appropriate service and repair information. After repairing fault(s) and clearing fault code(s), the Malfunction Indicator Light (MIL) or check engine light should go out. Some models may use a dual-function indicator light, which is also used to indicate emission component service is due. After performing required service, reset indicator light.**

NOTE: **Brake pad warning light should go out after replacement of brake pad thickness sensor. If warning light does not go out, turn ignition on, engine off, for 30-45 seconds. Warning light should go out. If the above procedure is not successful, connect vehicle to DIS tester, access Instrument Cluster/IKE, then "clear fault memory".**

NOTE: **The base instrument cluster OIL SERVICE INSPECTION display is located on the bottom of the cluster, to the right of center. The base cluster is also equipped with a graphic display of the car that shows if a door or the trunk lid is open. The high instrument cluster OIL SERVICE INSPECTION display is located on the bottom of the cluster, to the left of center.**

NOTE: **To determine the appropriate reset procedure, refer to BRAKE PAD WARNING LIGHT RESET INDEX. Only vehicles listed in this index have a specific brake pad warning light reset procedure. For other vehicles, perform PROCEDURE 1 first. If light does not reset, perform PROCEDURE 2. If the above procedures are not successful, connect vehicle to DIS tester, access Instrument Cluster/IKE, then "clear fault memory".**

BRAKE PAD WARNING LIGHT RESET INDEX

Model & Year	Reset Procedure
5-Series	
1997-00 (w/High Instrument Cluster)	Brake Pad Warning Light Reset - Procedure 1
1997-00 (w/Base Instrument Cluster)	Brake Pad Warning Light Reset - Procedure 2
7-Series	
1997-00	Brake Pad Warning Light Reset - Procedure 1

BRAKE PAD WARNING LIGHT RESET - PROCEDURE 1

To reset light after replacing brake pads, turn ignition on with engine off. Wait 30 seconds. Brake pad warning indicator light will switch off.

BRAKE PAD WARNING LIGHT RESET - PROCEDURE 2

Start engine. Brake pad warning indicator will switch off.

OXYGEN SENSOR WARNING LIGHT

NOTE: To determine the appropriate reset procedure, refer to OXYGEN SENSOR WARNING LIGHT RESET INDEX. Only vehicles listed in this index have an oxygen sensor warning light.

OXYGEN SENSOR WARNING LIGHT RESET INDEX

Model & Year	Reset Procedure
All Models	
1983 & Earlier	Oxygen Sensor Warning Light Reset - Procedure 1
1984 & Later	Oxygen Sensor Warning Light Reset - Procedure 2

OXYGEN SENSOR WARNING LIGHT RESET - PROCEDURE 1

1. Every 30,000 miles (25,000 miles on 528i) the OXYGEN light in dash will come on as a reminder to replace the oxygen sensor.

   NOTE: On 528e models, pull the protective metal plate off before removing oxygen sensor.

2. On 528e models, no interval reset switch is provided. After replacing sensor, remove instrument panel. Remove and discard bulb for OXYGEN sensor light.
3. On all other models, trace speedometer cable to interval switch (in-line with cable, mounted on frame rail left of transmission). Press White reset button. See **Fig. 1**. Ensure warning light is out.

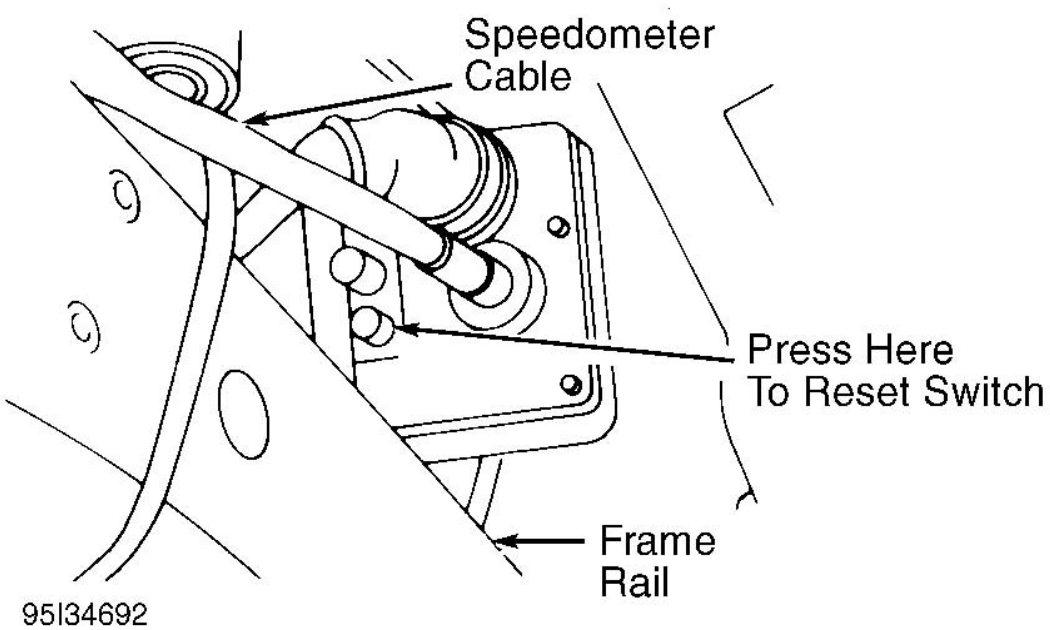


Fig. 1: Locating Oxygen Sensor Warning Light Reset Switch (All BMW Models Before 1983)
Courtesy of BMW OF NORTH AMERICA, INC.

OXYGEN SENSOR WARNING LIGHT RESET - PROCEDURE 2

NOTE: Some late production (February 1985 and later) BMW models have a reset button on rear of the light control assembly located near pedal assembly. Press button to reset light after servicing oxygen sensor.

No reset switch is provided. When oxygen sensor light comes on, service oxygen sensor. Remove and discard bulb from indicator.

SERVICE INTERVAL REMINDER LIGHTS

NOTE: This is sometimes referred to as the "Oil Change Light" or "Oil Service Light".

NOTE: On models that still use the round diagnostic connector in engine compartment, use SIA reset tool to reset service lights. See SERVICE INTERVAL LIGHT RESET - PROCEDURE 1. On models without the round diagnostic connector in the engine compartment, the use of the SIA reset tool is not possible. See SERVICE INTERVAL LIGHT RESET - PROCEDURE 2. The service indicator can only be reset using the reset mode in the instrument cluster or by using BMW hardware. This procedure applies to 3-Series from production date 9/99, and 5-Series and 7-Series from production date 9/00 (except 2002-05 7-Series and

2004-05 5-Series) without an engine compartment diagnostic connector. For 2002-up models with condition based service (CBS) interval system reset procedure, see SERVICE INTERVAL LIGHT RESET - PROCEDURE 3.

NOTE: To determine the appropriate reset procedure, refer to SERVICE INTERVAL REMINDER LIGHT RESET INDEX. Only vehicles listed in this index have a service interval reminder.

SERVICE INTERVAL REMINDER LIGHT RESET INDEX

Model & Year	Reset Procedure
Models With Engine Compartment Diagnostic Connector	
1983-05	Service Interval Light Reset - Procedure 1
Models Without Engine Compartment Diagnostic Connector	
2001-05	Service Interval Light Reset - Procedure 2
Models With Condition Based Service (CBS) Interval System	
2002 & Newer	Service Interval Light Reset - Procedure 3
Models Without Condition Based Service (CBS) Interval System	
2004-05	Service Interval Light Reset - Procedure 4

DESCRIPTION & OPERATION

Starting in 1983 and ending on some models in 1999, service indicator on instrument panel consists of 5 Green, 3 Red and one Yellow Light Emitting Diodes (LED) and the inscriptions OIL SERVICE and INSPECTION. When ignition is on, as many as 5 Green LEDs will light up. The Green LEDs go out when the engine is started. If the Yellow LED glows and one of the inscriptions comes on and remains on when the engine is started, maintenance service is due immediately. When maintenance interval has been exceeded (after approximately 1000 miles) the Red LED's will come on in addition to the Yellow LED as a reminder for servicing.

Beginning on some models in 1999, a new method for displaying the service interval is used. Colored LEDs are no longer used to display the amount of time until the next service or inspection is due. The actual mileage remaining until the next service will be displayed for five seconds when the ignition is first switched on. The text OIL SERVICE or INSPECTION will also illuminate to show which service is due. A minus symbol (-) before the mileage display indicates that a service is past due.

The 2002-05 models with condition based service (CBS) interval system uses an entirely different service interval system. See **SERVICE INTERVAL LIGHT RESET - PROCEDURE 3**.

SERVICE INTERVAL LIGHT RESET - PROCEDURE 1

1. To reset instrument cluster SIA OIL SERVICE indicator, turn ignition switch to ON position. Connect Service Indicator Resetter (62 1 110) to diagnosis connector in engine compartment. See **Fig. 2**.
2. Press Yellow OIL SERVICE button. Green LED will illuminate. Wait until Yellow LED illuminates and then goes out again. Ensure that OIL SERVICE indicator has been reset.
3. To reset SERVICE INTERVAL indicator, press Red INSPECTION service button for inspection. Green LED illuminates. Wait until Red LED illuminates and then goes out again. Turn ignition switch to OFF

position, wait 20 seconds and repeat procedure in order to adapt interval of annual inspection to inspection. Ensure that SERVICE INTERVAL indicator has been reset.

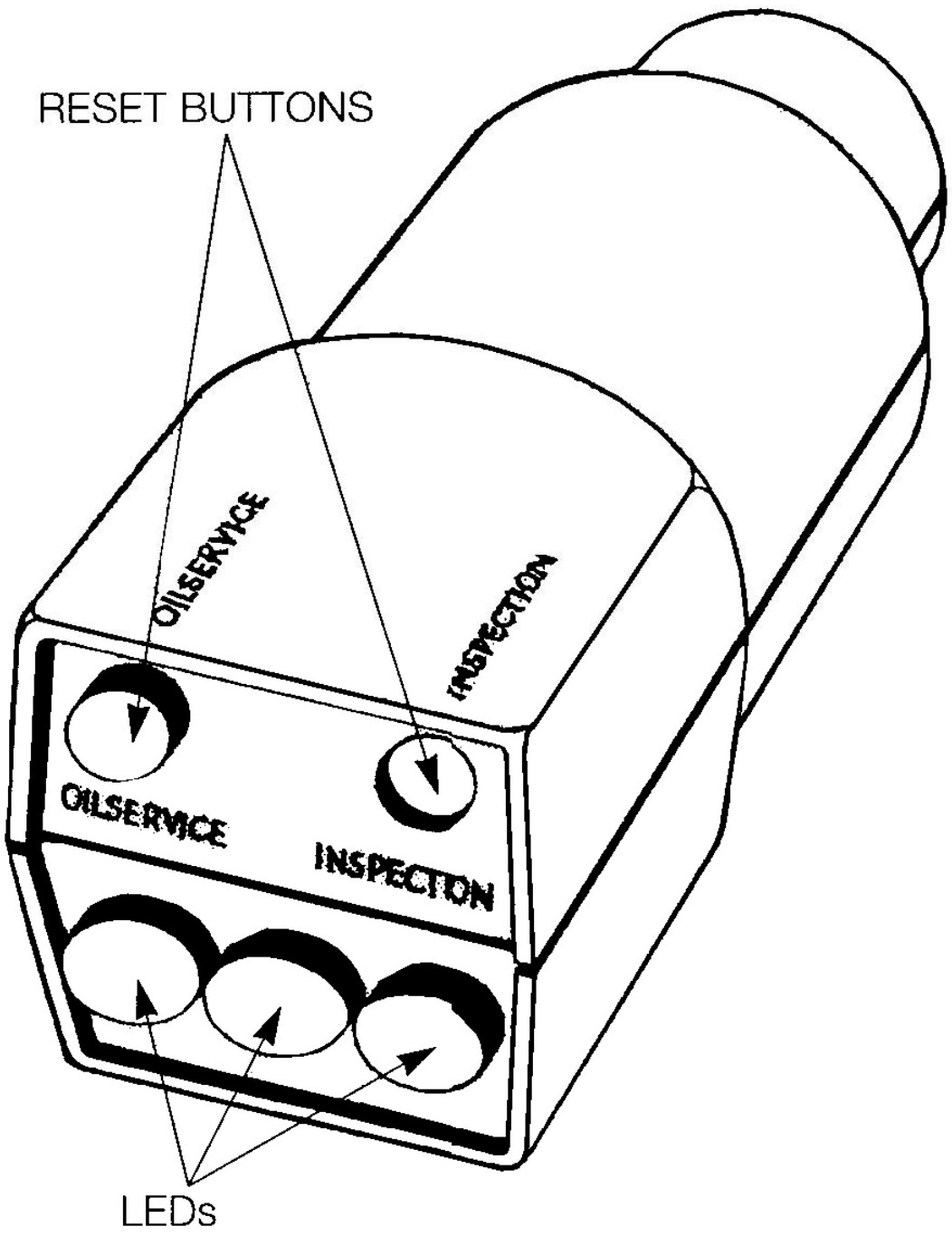


Fig. 2: Identifying BMW Service Interval Reset Tool

Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INTERVAL LIGHT RESET - PROCEDURE 2

Reset service light by performing the following:

1. Ignition key must be in OFF position.
2. Press and hold trip odometer reset button in the instrument cluster (left button), and turn ignition key to first position.
3. Keep the button pressed for approximately 5 seconds until one of the following words appear in the display: "OIL SERVICE", or "INSPECTION", with "RESET".
4. Release reset button and press it again until "RESET" begins to flash in the display. See **Fig. 3** and **Fig. 4** .
5. Service due is shown with "RESET" if coded minimum consumption limit has been reached and resetting is possible. If "RESET" is not shown, minimum limit has not been reached and resetting is not possible.
6. While "RESET" is flashing, press left button briefly to reset service interval. After display has shown new interval, following will appear: "END SIA".
7. System can only be reset again after 2.5 gallons of fuel have been consumed.

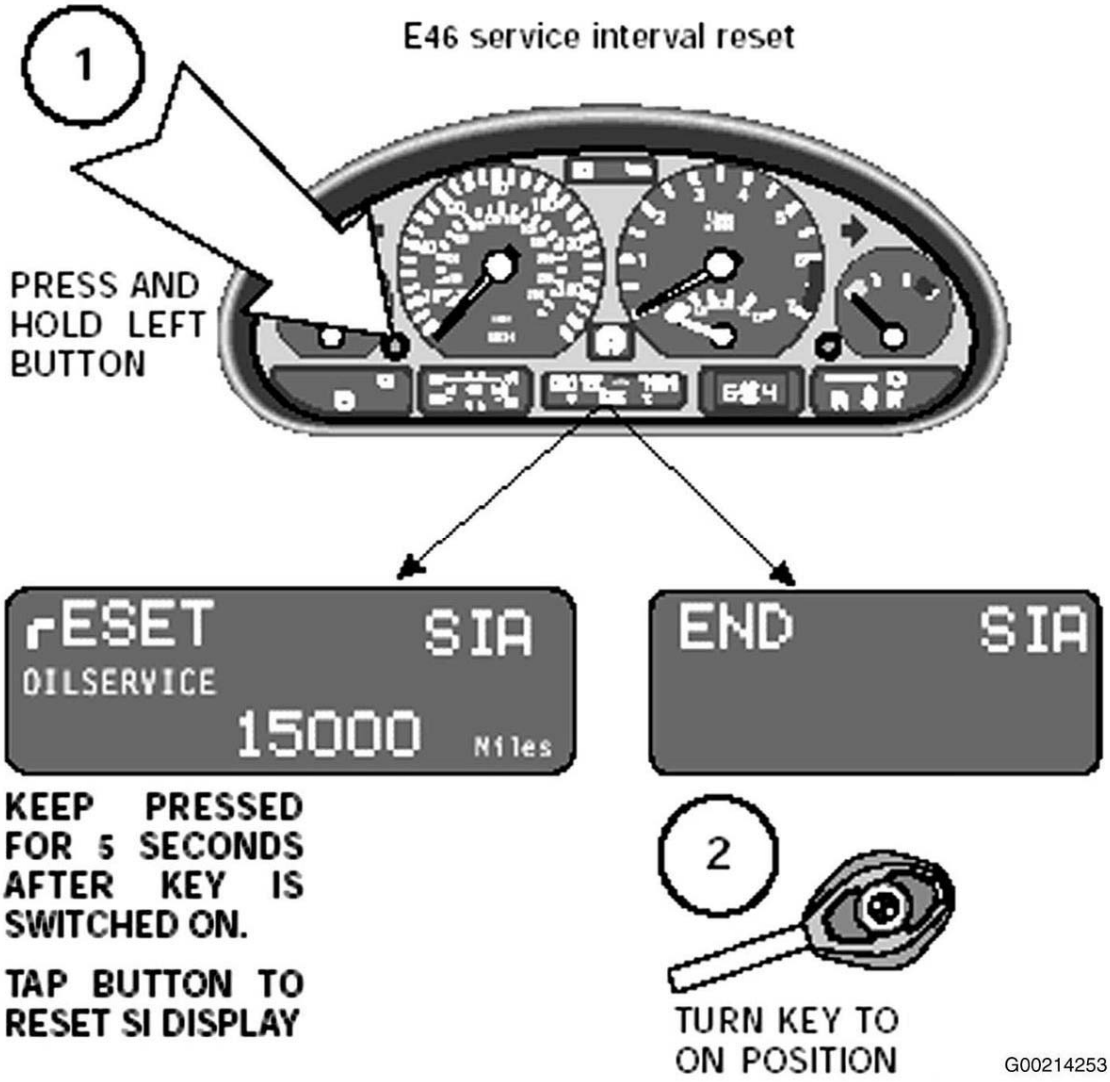


Fig. 3: Resetting Service Interval Light (E46)
Courtesy of BMW OF NORTH AMERICA, INC.

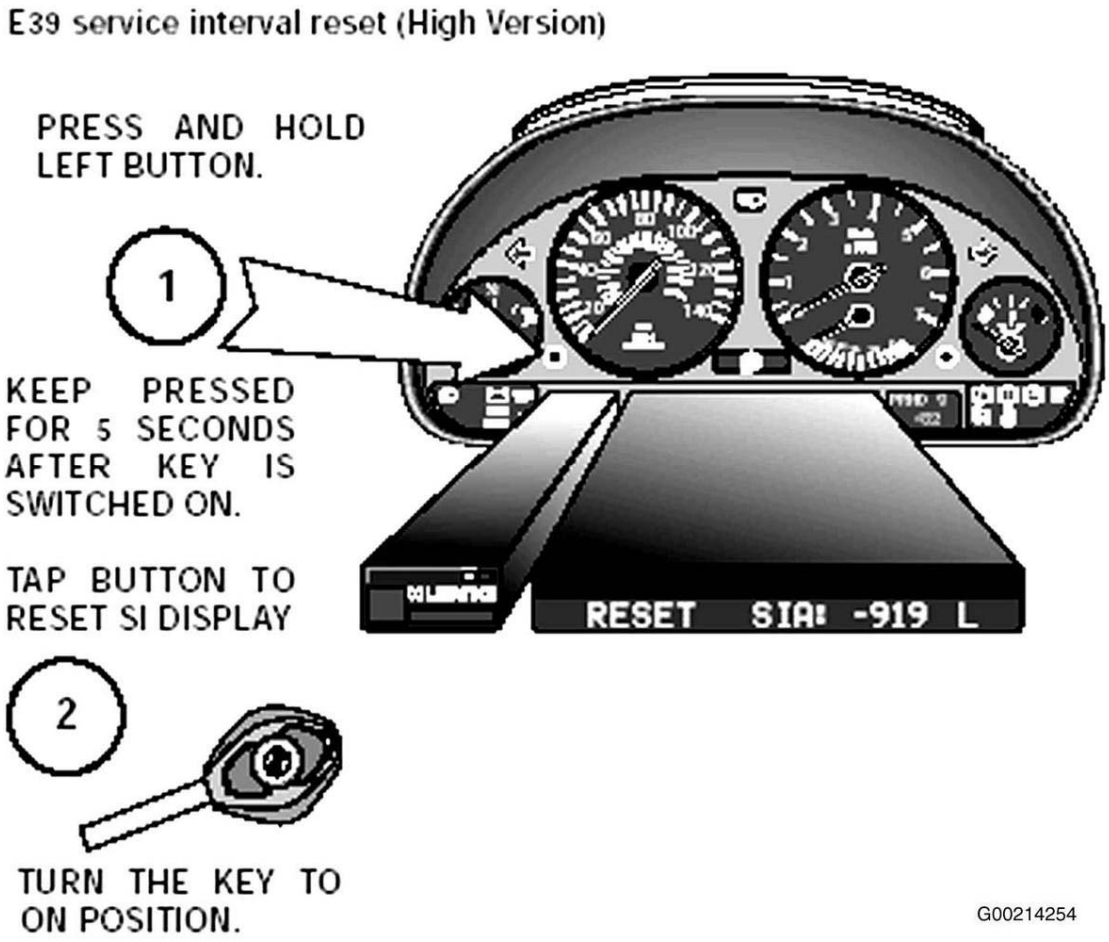


Fig. 4: Resetting Service Interval Light (E39)
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INTERVAL LIGHT RESET - PROCEDURE 3

Models use a Condition Based Service (CBS) service interval system, which displays a Service Need Display (SND). When ignition is on, Service Need Display appears under the speedometer in the instrument cluster for 10 seconds in the place where the fuel tank level is normally displayed. The first line corresponds to the mileage dependent service items. It specifies the mileage when the next service is due.

If the mileage is exceeded (service overdue), it appears with a minus sign. The second line corresponds to the time dependent service items and is displayed by a clock symbol. It specifies the weeks/months/years when the next service is due. If the service is overdue, it appears with a minus sign. The actual service item (with additional information) can be viewed in the control display.

NOTE: On some models an appropriate scan tool may be used to reset CBS service schedules. By using suitable diagnostic equipment connected to the vehicle diagnostic connector it is possible to reset CBS service schedules at any time. By selecting the `CBS' option, the diagnostic equipment will gather information regarding the current state of CBS items from their relevant modules on the CAN network.

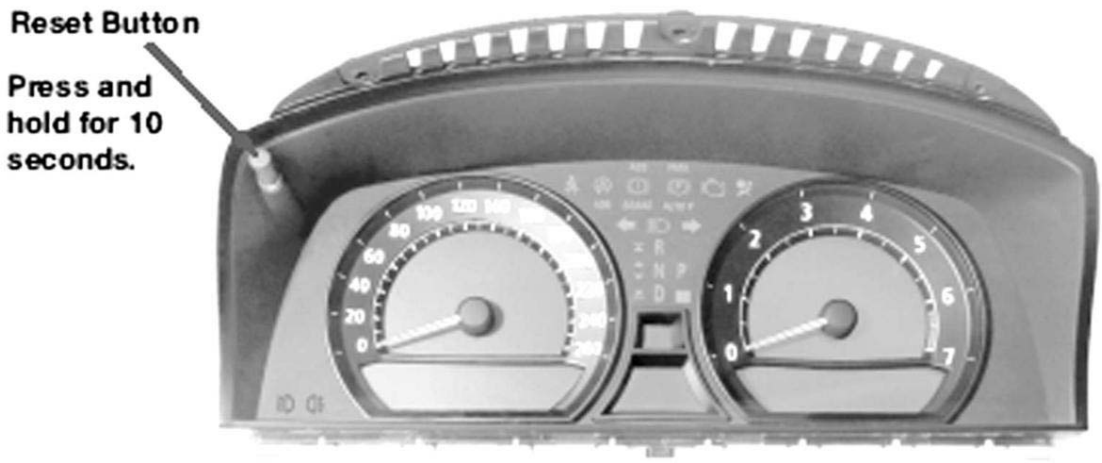
Service reset is accomplished using instrument cluster:

1. Insert key into ignition.
2. Press start/stop button without depressing the clutch or brake, and wait for the service reminder to dissapear.
3. Immediately after the service reminder indicator goes out, press and hold the odometer reset button. After 3 secs a warning triangle will appear, keep the odometer button pressed and after another 2-3 secs an oil can will appear.

NOTE: If the odometer button is pressed too long (10 secs in total), German writing will appear (giving the software level/ can bus etc. of the vehicle). This indicates that you've overshot the reset procedure and you need to re-start from the beginning.

4. The service menu should now be displayed. Use the toggle switch on indicator stalk (twisting the stalk) to scroll up/down through the various service items.
5. When the item to be reset is showing, press the BC button on end of indicator stalk. "Reset" should now appear in the display. Press in and hold the BC button for 2-3 secs and a whirling clock icon will be displayed. The reset procedure for the selected service item is done.
6. Scroll up/down to select another item (as in step 4), or press the start/stop button to exit.

NOTE: Residual wear or remaining time are specified (possibly with a minus sign). The "1" symbol means that you can reset service operation (early production vehicles may show an "F"), while a "0" indicates it is not resettable (the first 20 percent of the service interval is also protected against accidental reset). For additional information about Condition Based Service (CBS), see RESETTING AND CORRECTING CONDITION BASED SERVICE under PROGRAMMING in SELF-DIAGNOSIS - 7-SERIES article.



G00214255

Fig. 5: Identifying Condition Based Service (CBS) Instrument Panel Controls (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

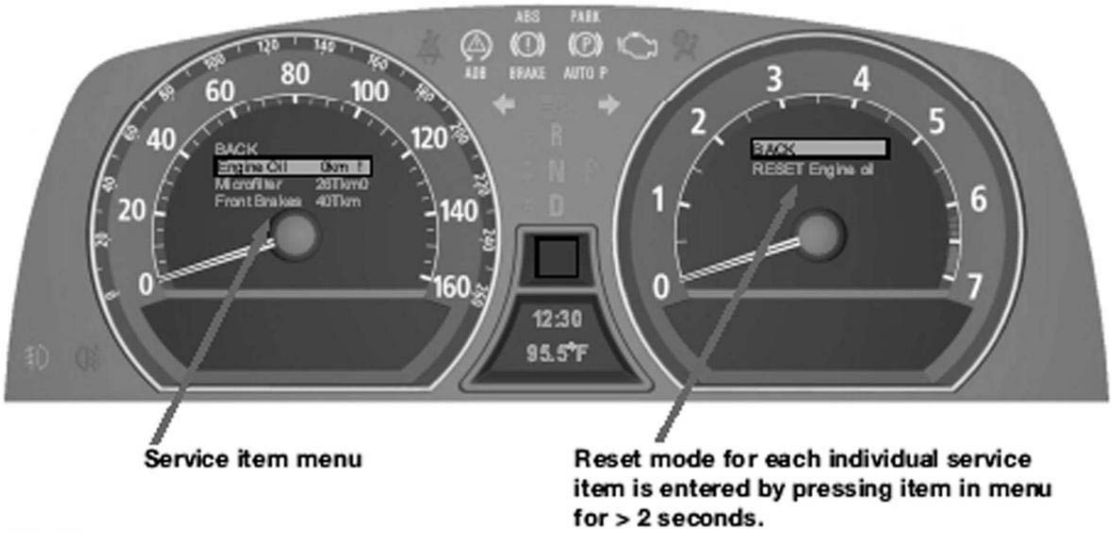


Fig. 6: Identifying Condition Based Service (CBS) Instrument Panel Controls (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

SERVICE INTERVAL LIGHT RESET - PROCEDURE 4

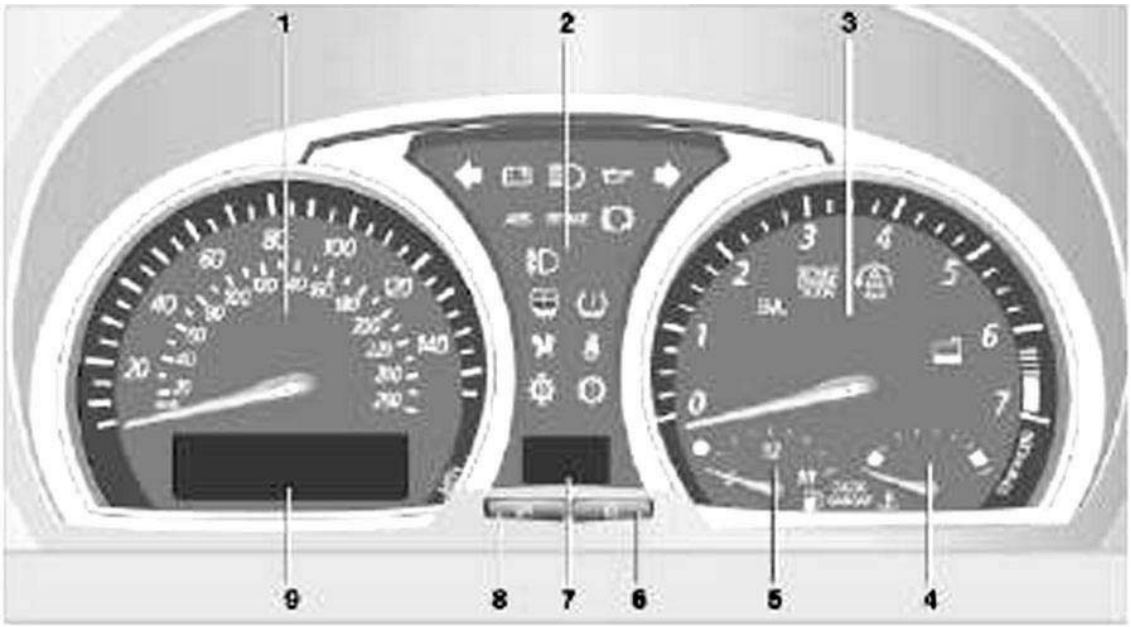
The BMW maintenance system SIA IV (service interval indicator) is used on X3 models (E83). The service interval indicator is a system subject to constant development which in its development stages has been integrated in various model series such as E85 (Z4) and E46 (3 and M3-Series).

The service indicator appears in the LC display in the instrument cluster's speedometer. The indicator is shown for 5 seconds in the LC display after terminal R is "ON". See **Fig. 7**.

Fig. 7: Identifying Service Interval Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

Resetting Service Interval Indicator

Resetting the service interval indicator for the oil service and inspection procedures can only be done by pressing the left button in the instrument cluster. See **Fig. 8**.



1. Speedometer
2. Indicator Warning Lamps
3. Tachometer
4. Coolant Temperature Guage
5. Fuel Guage
6. Button for display of Time and Service Interval
7. Display for Selector lever and program display
8. Button for reset of Trip Odometer and Time
9. Display for Time, Service Interval, OBC

G00313208

Fig. 8: Identifying Service Interval Indicator Reset Button
Courtesy of BMW OF NORTH AMERICA, INC.

TIRE PRESSURE MONITOR SYSTEM (TPMS)

NOTE: If a tire pressure has been adjusted, or a wheel or tire has been changed or replaced, or repairs have been made to air spring suspension, the TPM system must be reinitialized. System must be reinitialized both before and after pulling a trailer.

CAUTION: When driving with snow chains or a space-saver spare tire, DO NOT initialize the system.

NOTE: To determine the appropriate reset procedure, refer to TPMS RESET INDEX. Only vehicles listed in this index have a TPMS reset.

TPMS RESET INDEX

Model & Year	Reset Procedure
1-Series (128i & 135i)	
2008	**TPMS Reset - Procedure 8**
2009-11	**TPMS Reset - Procedure 9**
3-Series	
2001-08	**TPMS Reset - Procedure 1**
2009-11	**TPMS Reset - Procedure 9**
5-Series	
2001-03	**TPMS Reset - Procedure 1**
2004-09	**TPMS Reset - Procedure 8**
2010-11	**TPMS Reset - Procedure 9**
6-Series	
2004-09	**TPMS Reset - Procedure 8**
2010-11	**TPMS Reset - Procedure 9**
7-Series	
2002-05	**TPMS Reset - Procedure 2**
2006-11	**TPMS Reset - Procedure 9**
Alpina	
2007-08	**TPMS Reset - Procedure 5**
2011	**TPMS Reset - Procedure 9**
M3	
2001-06	**TPMS Reset - Procedure 1**
2008	**TPMS Reset - Procedure 8**
2009-11	**TPMS Reset - Procedure 9**
M5	
2002-03	**TPMS Reset - Procedure 3**
2006-08	**TPMS Reset - Procedure 8**
2009-10	**TPMS Reset - Procedure 9**
M6	
2006-07	**TPMS Reset - Procedure 8**
2008-10	**TPMS Reset - Procedure 9**
M-Coupe & M-Roadster	
2006-08	**TPMS Reset - Procedure 6**
X3	
2004-10	**TPMS Reset - Procedure 6**
2011	**TPMS Reset - Procedure 9**
X5 & X5 M	
2001-05	**TPMS Reset - Procedure 1**
2006	**TPMS Reset - Procedure 6**
2007-11	**TPMS Reset - Procedure 9**
X6 & X6 M	
2008-11	

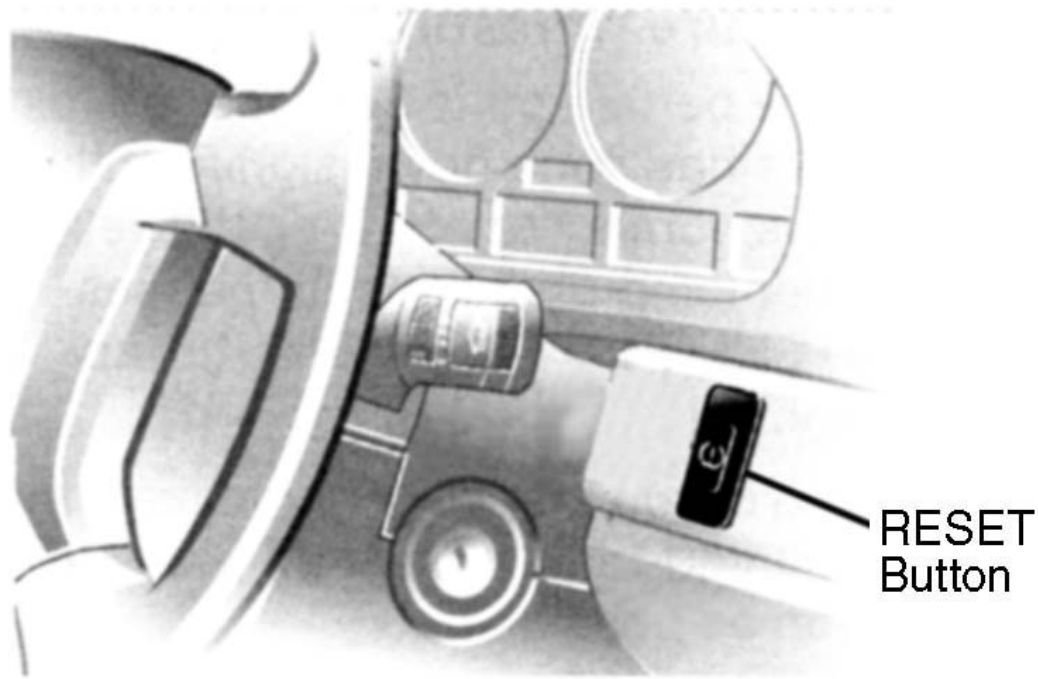
	TPMS Reset - Procedure 9
Z3	
2001-02	**TPMS Reset - Procedure 1**
Z4	
2003-06	**TPMS Reset - Procedure 1**
2007-08	**TPMS Reset - Procedure 6**
2009-11	**TPMS Reset - Procedure 9**
Z8	
2001-03	**TPMS Reset - Procedure 1**

TPMS RESET - PROCEDURE 1

1. Set the tire pressure on all wheels to specification.
2. Turn ignition switch to ON position, with engine off.
3. Press reset button (for no longer than 10 seconds) until tire pressure warning light illuminates Yellow for a few seconds. See **Fig. 9**, **Fig. 10**, **Fig. 11** or **Fig. 12** .

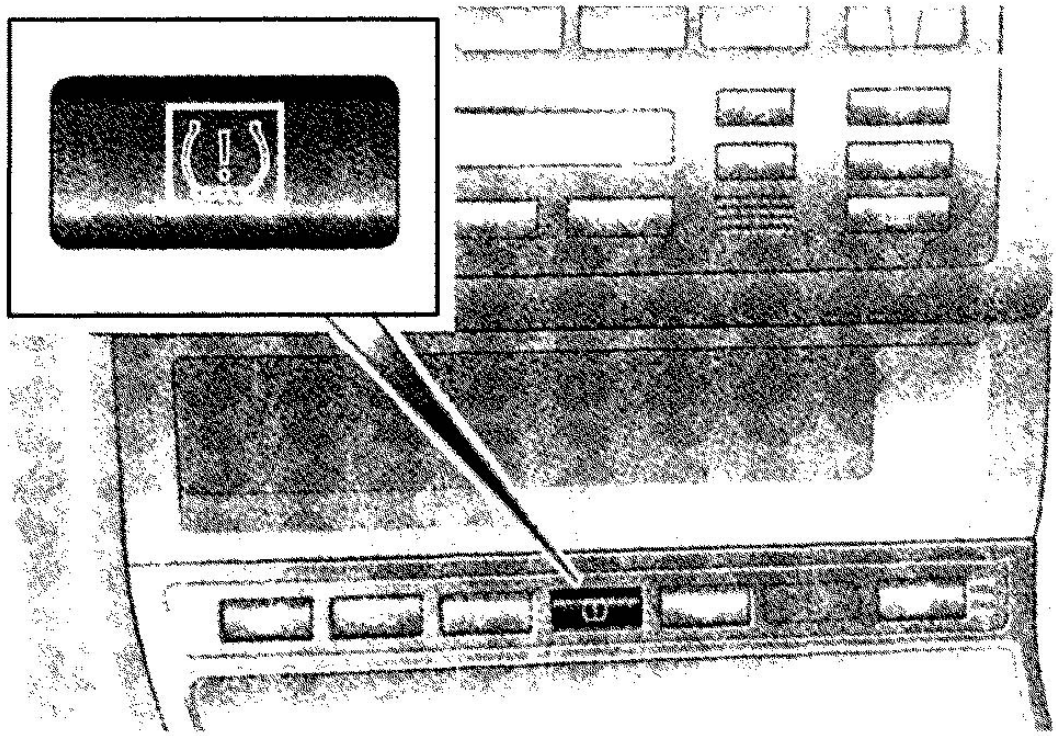
NOTE: On some X5 models, the reset button is marked "RDC".

4. Drive vehicle. Initialization is automatically completed during the drive, without any feedback issued.



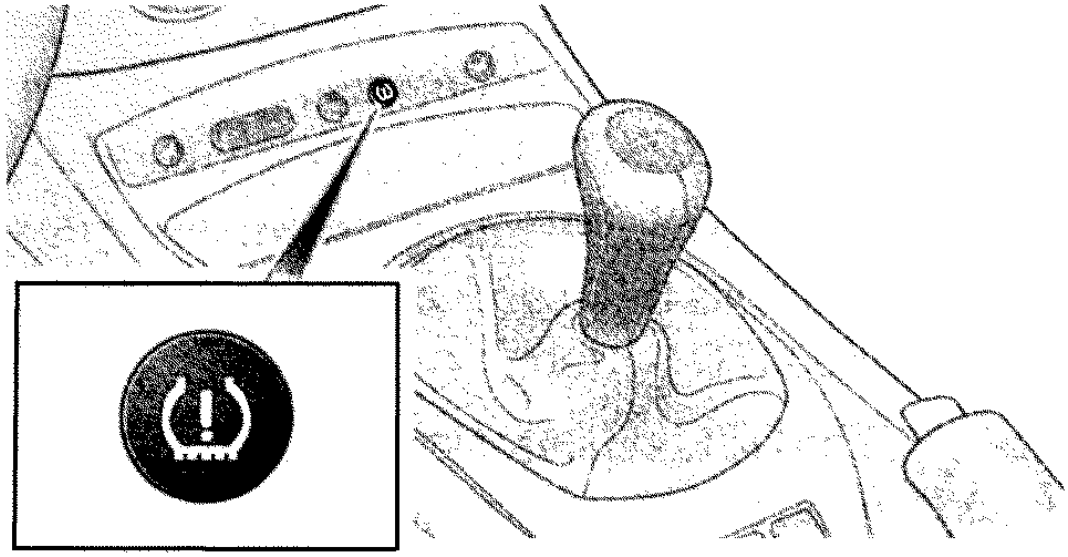
G00251683

Fig. 9: Locating TPM System Reset Button (5-Series)
Courtesy of BMW OF NORTH AMERICA, INC.



G00225522

Fig. 10: Locating TPM System Reset Button (3-Series & X5 - Typical)
Courtesy of BMW OF NORTH AMERICA, INC.



G00225521

Fig. 11: Locating TPM System Reset Button (Z4)
Courtesy of BMW OF NORTH AMERICA, INC.

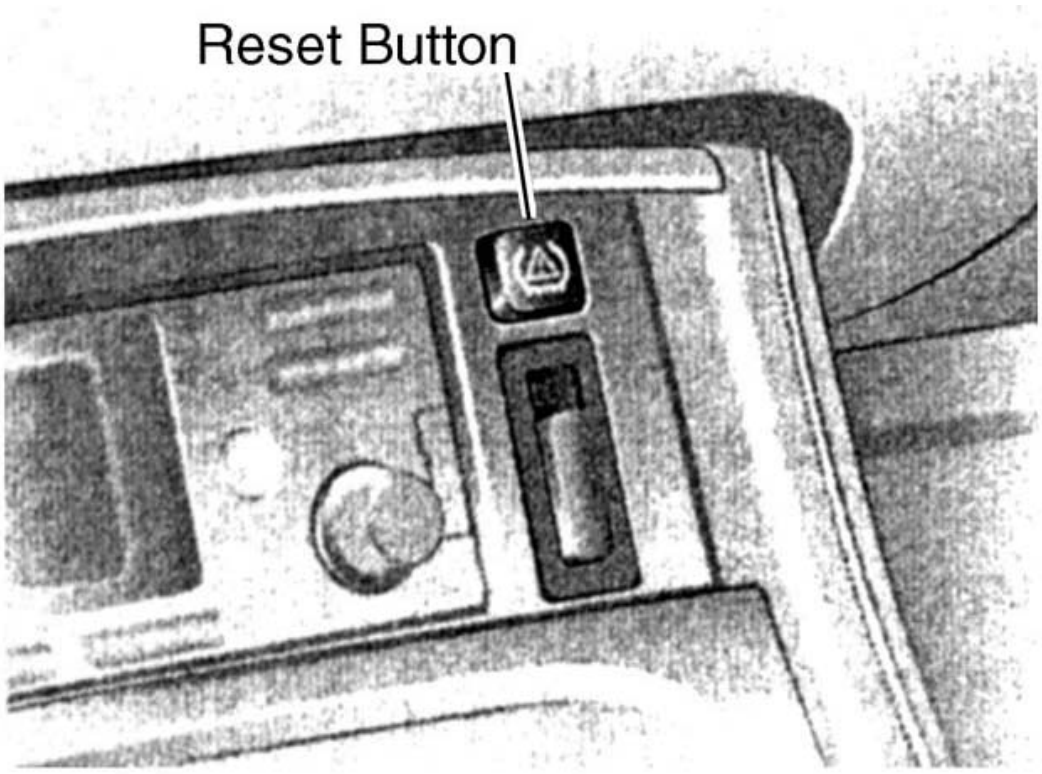


Fig. 12: Locating TPM System Reset Button (Z28)
Courtesy of BMW OF NORTH AMERICA, INC.

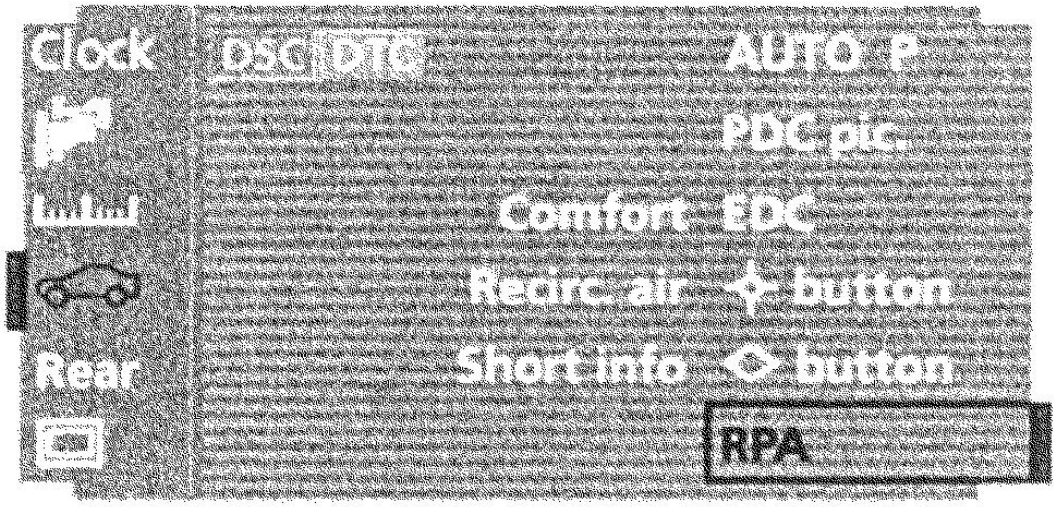
TPMS RESET - PROCEDURE 2

NOTE: The initialization finishes during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.

1. Set the tire pressure of all wheels to specification.
2. Start engine, but do not start driving.
3. On Control Center, select "RPA" from the "SETTINGS" menu and confirm selection. The initialization menu will appear. See **Fig. 13**.
4. Select "SET" and confirm selection.
5. Drive vehicle. The message "FTM IS BEING INITIALIZED" will be displayed. See **Fig. 14**.

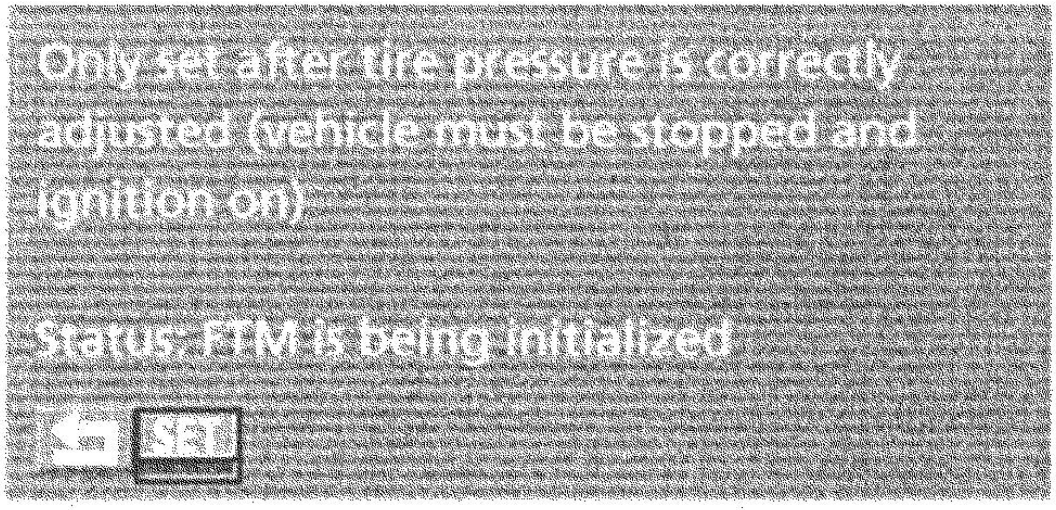
NOTE: It takes at least 10 minutes before the TPM system can detect and report a flat tire.

6. Select counterclockwise left arrow button and confirm to exit from menu.



G00225474

Fig. 13: Identifying TPM System Reinitialization Messages (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.



G00225475

Fig. 14: Identifying TPM System Reinitialization Messages (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 3

NOTE: The initialization finishes during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.

1. Set the tire pressure of all wheels to specification.
2. Start the engine.
3. Press iDrive knob down once to enter Vehicle Info.
4. Select Settings.
5. Select Vehicle Tires.
6. Select TPM.
7. Select Reset.
8. Scroll to Yes.
9. Select "YES" and press the controller.
10. After selecting Yes, drive vehicle until tires on iDrive screen turn green.

TPMS RESET - PROCEDURE 4

Resetting TPM With iDrive Controller

When the color of the tire indicator is Green, tire pressure is within the established target value. When the indicator color is Yellow in one of the wheel, check for a flat tire or substantial loss of pressure in the indicated tire. A message also appears in Control Display.

If indicator color is Yellow in all wheels, check for flat tire or substantial loss of tire pressure in several tires. A message will also appear in Control Display.

If indicator color is Gray, system cannot detect a puncture. Check for TPM being reset, temporary malfunction caused by systems or devices using the same radio frequency or a system malfunction.

1. Press MENU button. The Start menu is called up.
2. Press the controller to open the i-menu.
3. Select "Vehicle Settings" and press the controller.
4. Select "TPM" and press controller.
5. Drive vehicle for a few minutes. The set inflation pressures in the tires are accepted as target values to be monitored. The system reset is completed during the drive, but can be interrupted any time. When driving resumes, reset is continued automatically.
6. The Control Display will show Green indicators and "Status: TPM active" is shown in Control Display
7. If a flat tire is detected while system is resetting and determining inflation pressures, all tires on Control Indicator will appear in Yellow and message "Tire Low" is shown.

Resetting TPM Without iDrive Controller

1. Start engine, but do not drive vehicle.
2. Lightly push button the top button on turn indicator lever up or down repeatedly until the tire symbol

appears in the display accompanied by the word "RESET".

3. Press the side button on turn indicator to confirm your choice of the Tire Pressure Monitor.
4. Press and hold the side button for about 5 seconds, until "RESET" is displayed.
5. Drive vehicle. The set inflation pressures in the tires are accepted as target values to be monitored. The system reset is completed during the drive, but can be interrupted any time. When driving resumes, reset is continued automatically.

TPMS RESET - PROCEDURE 5

NOTE: The initialization finishes during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.

1. Set the tire pressure of all wheels to specification.
2. Press "MENU" button to open start menu.
3. Open the i-menu of the Control Center.
4. Select "SETTINGS" and press the controller.
5. Select "VEHICLE" and press the controller. See **Fig. 15**.
6. Select "TIRES: TPM" and press controller.
7. Start engine, but do not start driving.
8. Select "RESET" and press the controller.
9. Select "YES" and press the controller.
10. Drive vehicle. The message "RESETTING TPM...." will be displayed. Initialization is automatically completed during the drive. When initialization is complete, "STATUS: TPM ACTIVE" message will be displayed.

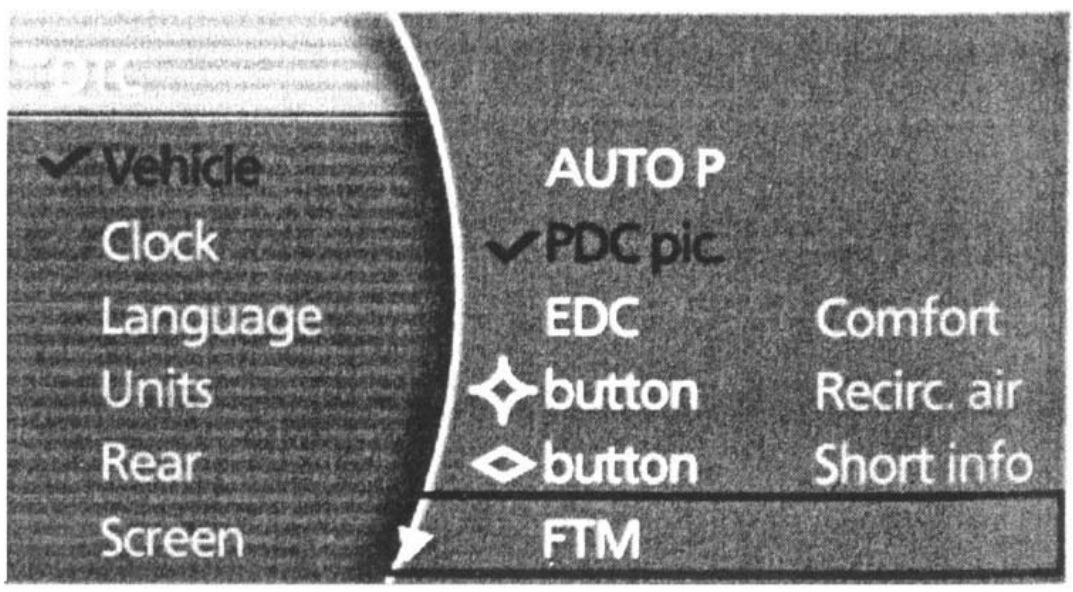


Fig. 15: Identifying TPM System Reinitialization Messages

Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 6

CAUTION: When driving with snow chains or a space-saver spare tire, DO NOT initialize the system.

1. Set the tire pressure of all wheels to specification.
2. Start engine, but do not start driving.
3. Press reset button (for no longer than 10 seconds) until tire pressure warning light illuminates Yellow for a few seconds. See **Fig. 16**, **Fig. 17**, **Fig. 18** or **Fig. 19** .
4. Drive vehicle. Initialization is automatically completed during the drive, without any feedback issued.

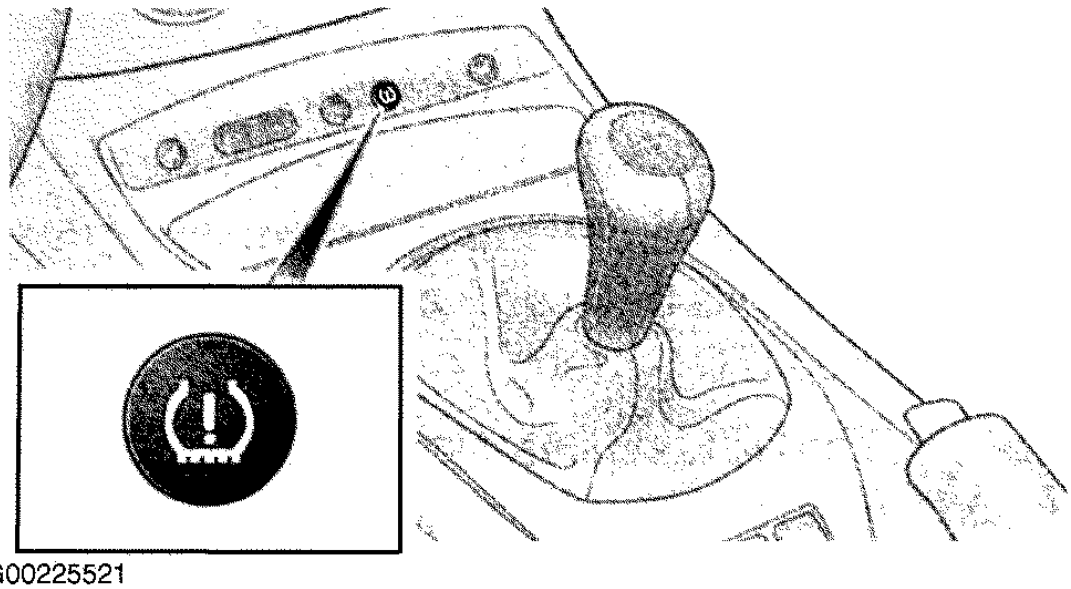
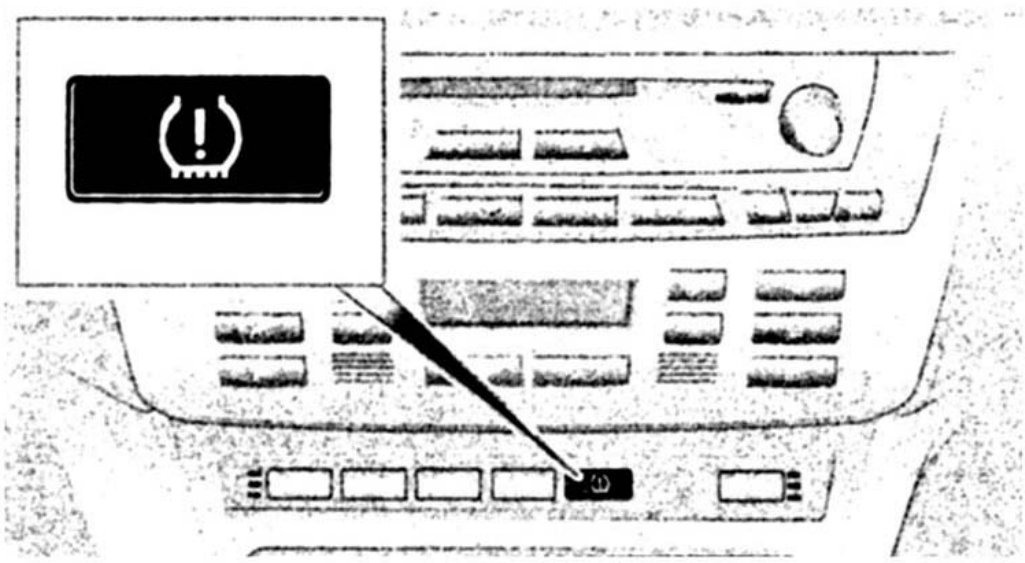
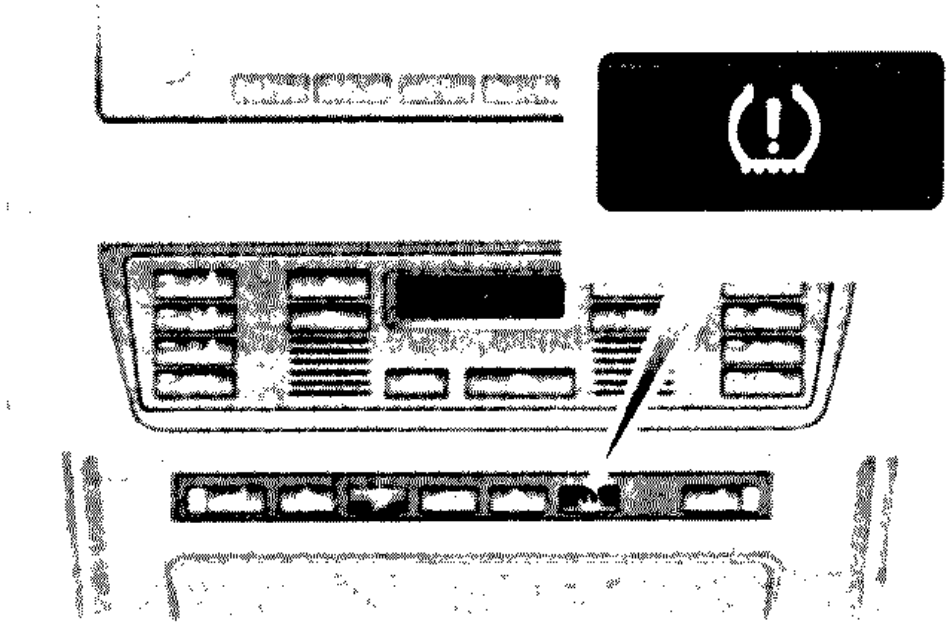


Fig. 16: Locating TPM System Reset Button (M-Coupe & Roadster)
Courtesy of BMW OF NORTH AMERICA, INC.



G00251685

Fig. 17: Locating TPM System Reset Button (X3)
Courtesy of BMW OF NORTH AMERICA, INC.



G00251688

Fig. 18: Locating TPM System Reset Button (X5)
Courtesy of BMW OF NORTH AMERICA, INC.

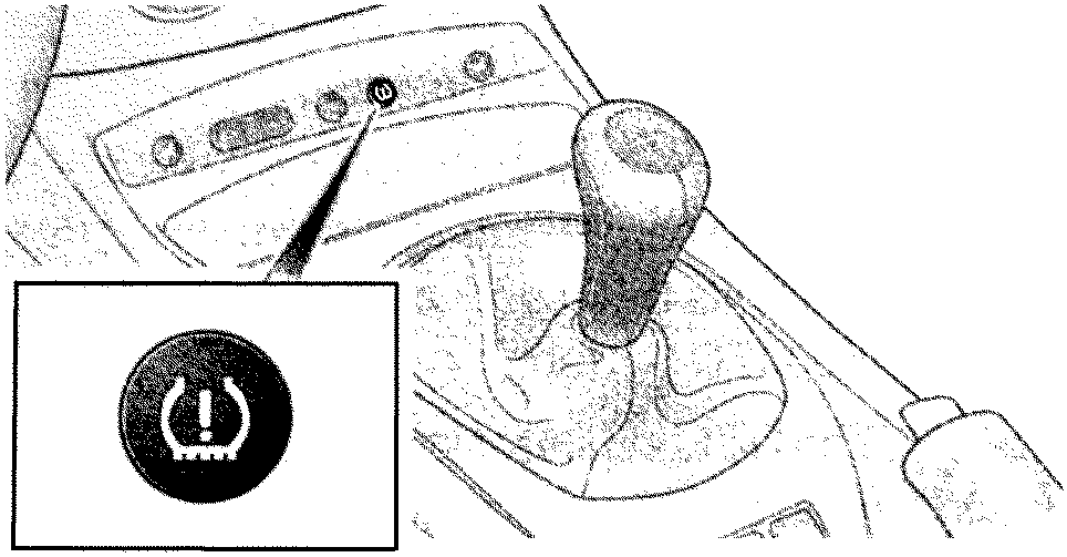


Fig. 19: Locating TPM System Reset Button (Z4)
Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 7

1. Set the tire pressure of all wheels to specification.
2. Press "MENU" button.
3. Open the "i" menu of the Control Center.
4. Select "SETTINGS" and press the controller.
5. Select "VEHICLE/TIRES" and press the controller.
6. Change to upper field if necessary. Turn controller until "TPM" is selected and press the controller.
7. Start engine, but do not start driving.
8. Select "RESET" and press the controller.
9. Select "YES" and press the controller.
10. Drive vehicle. The message "RESETTING TPM...." will be displayed. Initialization is automatically completed during the drive. When initialization is complete, "STATUS: TPM ACTIVE" message will be displayed.

TPMS RESET - PROCEDURE 8

Resetting TPM With iDrive

1. Set the tire pressure of all wheels to specification.
2. Turn ignition switch ON.
3. Press controller to call up I menu. See **Fig. 20**.
4. Select SETTINGS and press controller.
5. Select CAR/TIRES and press controller.

6. If necessary, switch to top field and select TIRES/RDC and press controller.
7. Start engine.
8. Select CONFIRM TIRE PRESSURE and press controller.
9. Drive vehicle. Initialization is automatically completed during the drive, without any feedback issued.

Fig. 20: Locating TPM System Reset Button (With iDrive)
Courtesy of BMW OF NORTH AMERICA, INC.

Resetting TPM Without iDrive

1. Set the tire pressure of all wheels to specification.
2. Start engine.
3. Move turn signal lever up or down until TPM warning symbol and RESET appears. See **Fig. 21**.
4. Press BC button on end of turn signal lever to confirm selection.
5. Press and hold BC button for approximately 5 seconds until a CHECK/TICK appears after RESET.
6. Drive vehicle. Initialization is automatically completed during the drive, without any feedback issued.

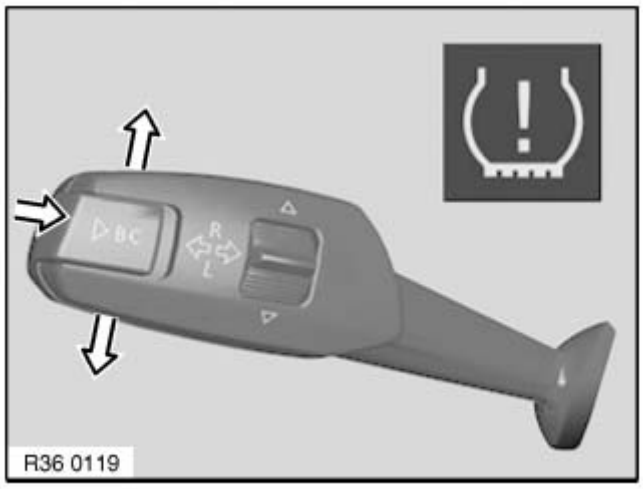


Fig. 21: Locating TPM System Reset Button (Without iDrive)
Courtesy of BMW OF NORTH AMERICA, INC.

TPMS RESET - PROCEDURE 9

With iDrive

Indirect System (Flat Tire Monitor)

CAUTION: Do not initialize the system while snow chains are attached.

NOTE: Each time a tire inflation pressure has been corrected or a wheel or tire has been changed, reset the system.

Initialization: :

1. Using the iDrive MENU button, choose:
2. "Vehicle Info"
3. "Vehicle status"
4. "Reset"
5. Start the engine.
6. Start the initialization using "Reset". See **Fig. 22**.
7. Start to drive.

The initialization is completed during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.

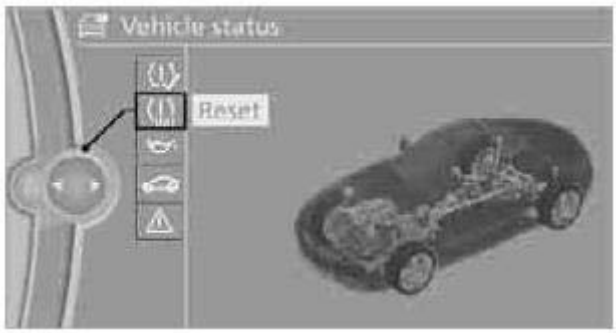


Fig. 22: iDrive Showing Tire Monitor "Reset"
Courtesy of BMW OF NORTH AMERICA, INC.

Checking FTM Status:

1. Using the iDrive MENU button, choose:
2. "Vehicle Info"
3. "Vehicle status"
4. "Flat Tire Monitor"
5. The status will be diplayed. See **Fig. 23**.

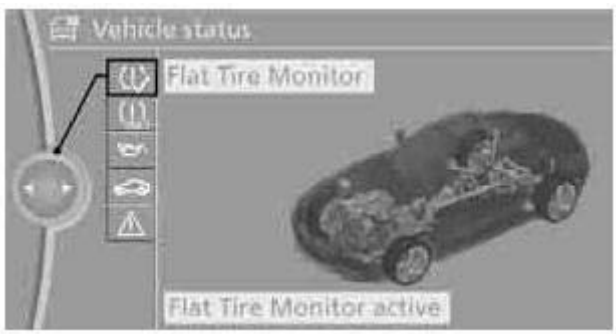


Fig. 23: iDrive Showing Tire Monitor Status
Courtesy of BMW OF NORTH AMERICA, INC.

Direct System (Tire Pressure Monitor)

NOTE: Each time a tire inflation pressure has been corrected or a wheel or tire has been changed, reset the system.

TPMS Status indicator on the Control Display:

The color of the tires represents the status of the tires and the system. TPM takes into account that tire pressures change while the vehicle is being driven. The tire pressures do not need to be corrected unless the TPM instructs you to do so by means of color indicators.

- **Green:** The tire inflation pressure corresponds to the established target value. "TPM active" appears on the Control Display.

- **One Wheel Yellow:** There is a flat tire or substantial loss of tire pressure in the indicated tire. A message appears on the Control Display.
- **All Wheels Yellow:** There is a flat tire or substantial loss of tire pressure in several tires. A message appears on the Control Display.
- **Gray:** The system cannot detect a puncture. Possible reasons for this:
  - TPM is being reset.
  - Temporary malfunction caused by systems or devices using the same radio frequency.
  - Malfunction.

Initialization (Reset): :

1. Using the iDrive MENU button, choose:
2. "Vehicle Info"
3. "Vehicle status"
4. "Reset"
5. Start the engine.
6. Start the initialization using "Reset". See **Fig. 22**.
7. Start to drive.
8. The tires are shown in gray and "Resetting TPM..." is displayed.

After driving a few minutes, the set inflation pressures in the tires are accepted as the target values to be monitored. The system reset is completed during your drive, and can be interrupted at any time. When driving resumes, the reset is continued automatically. On the Control Display, the tires are shown in green and "TPM active" is displayed again.

IMPORTANT: If a flat tire is detected while the system is resetting and determining the inflation pressures, all tires on the Control Display are displayed in yellow. The message "Low tire!" is shown.

System Reset Failure:

- **Message For Unsuccessful System Reset:** The warning lamp lights up yellow. A message will appear on the Control Display. Check the tire inflation pressure and reset the system.
- **Malfunction:** The small warning lamp flashes in yellow and then lights up continuously; the larger warning lamp comes on in yellow. On the Control Display, the tires are shown in gray and a message appears. No punctures can be detected. This type of message is shown in the following situations:
  - If there is a malfunction. Have the system checked.
  - If a wheel without TPM electronics has been mounted.
  - If TPM is temporarily malfunctioning due to other systems or devices using the same radio frequency.

Without iDrive

Indirect System (Flat Tire Monitor)

CAUTION: Do not initialize the system while snow chains are attached.

NOTE: Each time a tire inflation pressure has been corrected or a wheel or tire has been changed, reset the system.

Reset: :

1. Start the engine.
2. Lightly push button 1 on the turn indicator. See **Fig. 24**.
3. Lever the turn indicator up or down repeatedly until the tire monitor symbol appears in the display, accompanied by the word "RESET". See **Fig. 24**.
4. Press button 2 to confirm your choice of the Flat Tire Monitor.
5. Press button 2 for approx. 5 seconds until the a check mark is shown next to the "RESET" display.
6. Drive the vehicle.

The initialization is completed during driving, which can be interrupted at any time. When driving resumes, the initialization is continued automatically.

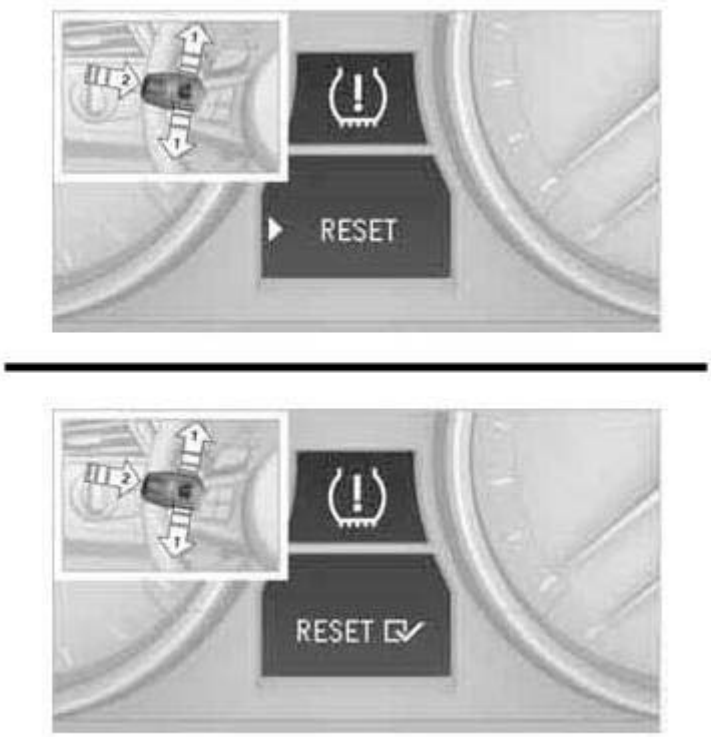


Fig. 24: Flat Tire Monitor Status Display
Courtesy of BMW OF NORTH AMERICA, INC.

CAUTION: Do not initialize the system while snow chains are attached.

NOTE: Each time a tire inflation pressure has been corrected or a wheel or tire has been changed, reset the system.

IMPORTANT: The system does not work correctly if it has not been reset; for example, a flat tire may be indicated even though the tire inflation pressures are correct. The system is inactive and cannot indicate a flat tire if a wheel without TPM electronics, such as a compact spare wheel, has been mounted, or if TPM is temporarily malfunctioning due to other systems or devices using the same radio frequency.

Reset: :

1. Start the engine.
2. Lightly push button 1 on the turn indicator. See **Fig. 25**.
3. Lever the turn indicator up or down repeatedly until the tire monitor symbol appears in the display, accompanied by the word "RESET". See **Fig. 25**.
4. Press button 2 to confirm your choice of the Tire Pressure Monitor. In the display, "ACTIVE" will appear above "RESET". See **Fig. 25**.
5. Press button 2 for approx. 5 seconds. In the display, "RESETTING" will now appear above "RESET". See **Fig. 25**.
6. Drive the vehicle.

After driving a few minutes, the set inflation pressures in the tires are accepted as the target values to be monitored. The system reset is completed during your drive, and can be interrupted at any time. When driving resumes, the reset is continued automatically. The indicator lamp goes out after the system reset is completed.

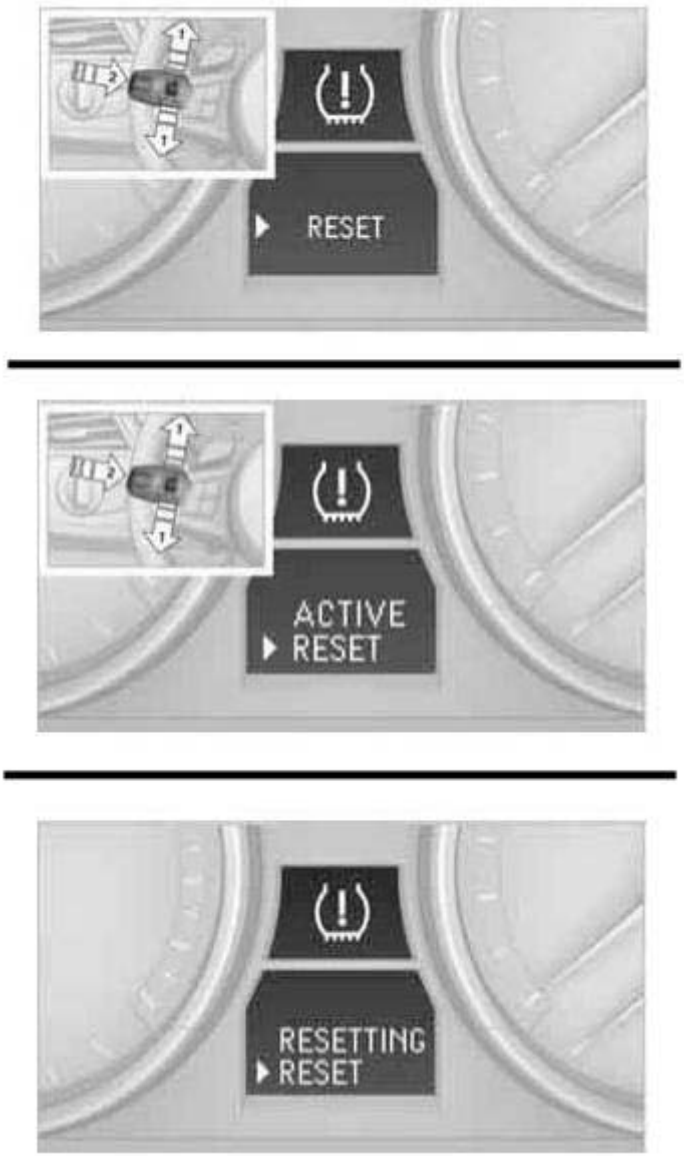


Fig. 25: Tire Pressure Monitor Status Display
Courtesy of BMW OF NORTH AMERICA, INC.

System Reset Failure:

- **Message For Unsuccessful System Reset:** The warning lamp lights up yellow. The system was not reset. Check the tire inflation pressure and reset the system.
- **Malfunction:** The small warning lamp flashes in yellow and then lights up continuously; the larger warning lamp comes on in yellow. On the Control Display, the tires are shown in gray and a message appears. No punctures can be detected. This type of message is shown in the following situations:
    - If there is a malfunction. Have the system checked.
    - If a wheel without TPM electronics has been mounted.
    - If TPM is temporarily malfunctioning due to other systems or devices using the same radio

frequency.

AIRBAG MODULES

72 12 AIRBAG MODULES

TIGHTENING TORQUE SPECIFICATION - AIRBAG MODULES

		Type	Thread	Tightening specification	Measure
1AZ	Passenger airbag module to instrument panel	E89		Hexagon nut with flange, self-locking	8 Nm
2AZ	Knee airbag module - to support tube	E89			8 Nm
3AZ	Side airbag to backrest frame	E89			6.5 Nm

SEAT BELTS

72 11 SEAT BELTS

TIGHTENING TORQUE SPECIFICATION - SEAT BELTS

		Type	Thread	Tightening specification	Measure
Seat belt, front:					
1AZ	Retractor mechanism - to body	E89		Replace microencapsulated screws	36 Nm
2AZ	Anchor fitting, belt - to front seat	E89		Replace microencapsulated screws	44 Nm
3AZ	Belt deflection fitting - to B-pillar, top	E89		Replace microencapsulated screws	90 Nm
4AZ	Belt strap deflector - to body	E89			4 Nm
5AZ	Belt tensioner - to front seat	E89		Replace microencapsulated screws	38 Nm

SEAT BELTS

72 11 SEAT BELTS

TIGHTENING TORQUE SPECIFICATION - SEAT BELTS

			Tightening	

		Type	Thread	specification	Measure
1AZ	Seat belt, Automatic reel, Lower strap, Anchor fitting, Belt tensioner to body	E36/E31/E38/E39/E46/E52/E53/E83		Replace screws	31 Nm
Seat belt on B-pillar		All, except E53		Replace screws	31 Nm
Seat belt/belt tensioner to seat, on Touring also to rear seat backrest		All, except E52/E53		Replace screws	48 Nm
2AZ	Screws for seatbelt height adjustment on body	All		Replace screws	22 Nm
3AZ	Seat belt to seat Install bolt with bolt cement.	E31		Replace screws	47 Nm
4AZ	Seat belt to backrest	E31		Replace screws	24 Nm
5AZ	Headrest to backrest	E31			24 Nm
6AZ	Seat belt at belt height adjustment (reversing clip)	All		Replace screws	31 Nm
7AZ	Tension relief between roller sun blind bracket and backrest lock bracket	E39/2			24 Nm
8AZ	Retaining angle, belt tensioner to seat rail	E46/E83		Replace screws	24 Nm
9AZ	Slide bar to body	E46		Replace screws	44 Nm
10AZ	Counter-support plate to body, B- and C-pillars	E53			39 Nm
11AZ	Seat belt to seat (end fitting)	All		Replace screws	45 Nm
12AZ	Screw of seatbelt height adjuster to counter-support plate	E53		Replace screws	31 Nm
13AZ	Belt tensioner to seat	E83		Replace screws	45 Nm
		E52/E53		Replace screws	31 Nm

14AZ	Inertial reel unit to body/B-pillar	E53/E83		Replace screws	31 Nm
15AZ	Automatic reel on rear seat backrest	E53		Replace screws	45 Nm
		E83		Replace screws	35 Nm
16AZ	Belt guide to front seat (sash guide to head restraint clip)	E46 Convertible		Replace screws	8 Nm
17AZ	Automatic reel to front seat backrest	E46 Convertible		Replace screws	39 Nm
18AZ	Coupling gearing to centering pin	E46 Convertible			2.5 Nm
19AZ	Corner hoop to side panel, inner (B-pillar)	E53/E83			$3^{\pm 0.5}$ Nm
20AZ	Upper belt loop to body	E83		Replace screws	31 Nm
21AZ	Automatic reel to body	E83		Replace screws	31 Nm

INTRODUCTION TO PASSIVE SAFETY

Model: All with Passive Safety Systems

Production: All

INTRODUCTION

History of BMW Safety Systems

BMW has a long history of being at the forefront of passenger safety technology. Before the introduction of airbag systems, seatbelts provided the primary restraint for protection of the occupants during an impact. Three point seatbelts provided the greatest level of occupant safety at that time.

Many other safety innovations were already is use before airbag systems were introduced. Energy absorbing body structures with "crumple zones" uphold the integrity of the passenger safety cell. Some of the other features are "breakaway" engine and transmission mountings, collapsible steering column, door mounted impact beams and a hood that is designed to fold on impact rather than penetrate the windshield.

There are many other safety innovations which are transparent to the driver, but are crucial to providing a safe environment for the vehicle occupants.

Fig. 1: Identifying History Of BMW Safety Systems
Courtesy of BMW OF NORTH AMERICA, INC.

Since 1986, when BMW first introduced the Supplementary Restraint System (SRS) to their US model line, BMW has continuously improved the level of occupant protection.

The driver's side airbag was standard on all US production models from 1986. Later, the passenger side airbag became standard on the 1992 models.

These first systems were made by Cipro and Siemens and consisted of mechanical crash sensors located on the inner fenders. An airbag was mounted on the steering wheel and a control unit containing a mechanical safing sensor was located in the passenger compartment. The vehicle wiring harness was modified to accommodate these systems.

Later versions included a standard passenger side airbag from 9/91 production. These system were designated Siemens 2C. These systems were replaced by ZAE.

Beginning with the 1994 model year, the ZAE system was introduced on US models. The E31, E34, E36 and E38 all used the ZAE I system. ZAE I used crash sensors which were integral to the control unit and eliminated the mechanical fender mounted sensors on previous models. Also the passenger seat occupancy detection system (SBE) was introduced at this time. ZAE 2 was introduced later and now included the detection of rear impacts.

The Multiple Restraint System (MRS) addressed the need for side impact protection. Starting with the E39, door mounted side airbags were added on the front driver and passenger side. The MRS system also utilized side impact sensors which were externally mounted near the b-pillar. In combination with the MRS control unit, the side impact sensors allowed the MRS system to differentiate between front, rear and side impacts.

Fig. 2: Identifying Multiple Restraint (MRS) System
Courtesy of BMW OF NORTH AMERICA, INC.

Subsequent versions of MRS introduced new technology and enhancements to MRS I. MRSII utilized the new head protection system (HPS) and also the new Safety Battery Terminal.

MRS III has new features including the 2-stage airbag and the rear head protection system. Also, the MRS III control unit was now connected to the K-bus for diagnosis, improved crash signalling and for the fuel pump cut-off feature.

The only changes to MRS IV were improved software and triggering algorithms. It was introduced in 4/01 production on the E46 and E53 and later phased into E38 and E39.

The latest version of MRS is the MRS4RD system. The "RD" designation indicates a redesign over the previous MRSIV system. Numerous modifications include additional crash sensors mounted in the front of the vehicle and pressure sensors mounted in the front doors. Also, the new passenger seat occupancy detection system (OC-3) which is capable of determining the approximate size of the occupant based on weight distribution. To accommodate these changes, the MRS control unit was increased to 75 pins from the previous 50 pin control

unit.

Fig. 3: Identifying Latest Version Of MRS MRS4RD System
Courtesy of BMW OF NORTH AMERICA, INC.

The introduction of the E65 brought about a new era in passive safety technology.

The new passive safety system on the E65 was a departure from the MRS philosophy. Instead of having the triggering electronics located centrally in the MRS module. The new method was to decentralize the triggering electronics by locating the trigger circuits in the satellite sensors which are closer to potential impact points.

The new system is referred to as the Intelligent Safety and Information System (ISIS). ISIS consists of a series of satellites connected by an optical bus network called ***byte-flight.*** The ***byteflight*** network was specifically designed a high speed network for use on safety related systems.

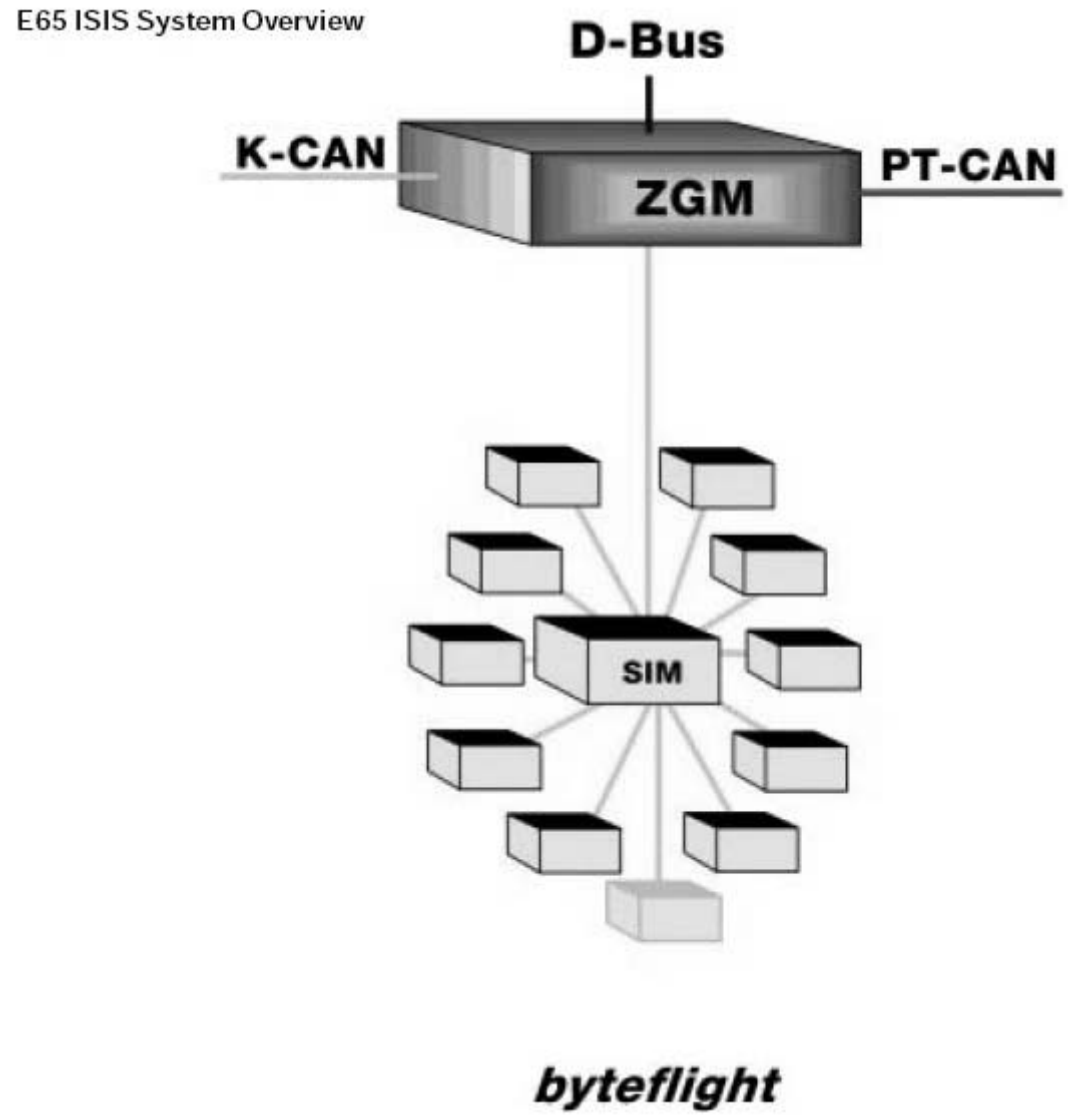
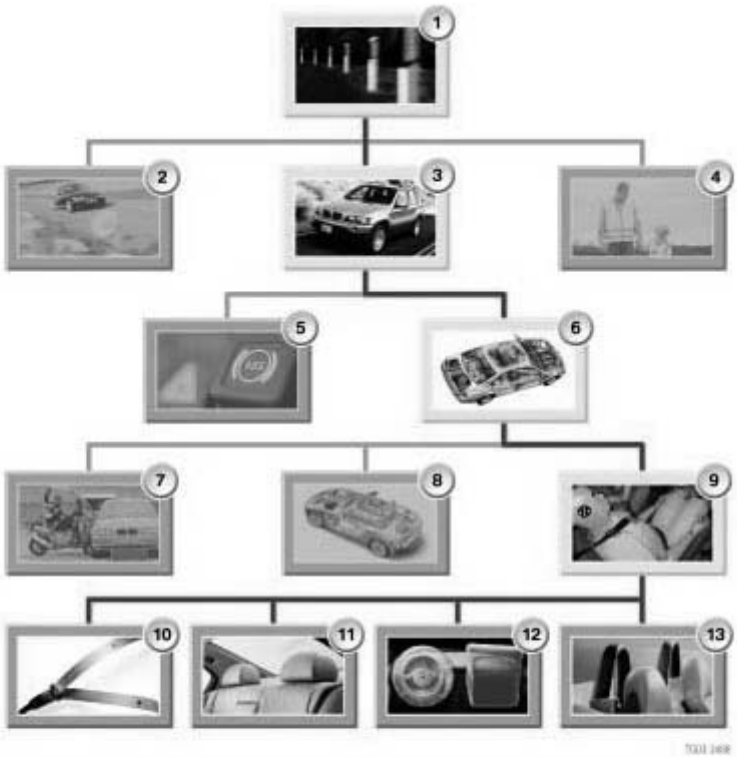


Fig. 4: Identifying E65 (ISIS) System Overview
Courtesy of BMW OF NORTH AMERICA, INC.

The ISIS concept was also adopted on the new Advanced Safety Electronic (ASE) systems which was introduced on the E85. The ASE system is also used on the new E60, E63 and E64 vehicles. ASE is similar in design to ISIS, and uses the byteflight fiber optic network. However the total number of satellites is reduced as compared to ISIS.

Fully Integrated Road Safety Technology (F.I.R.S.T.)

The BMW FIRST safety concept incorporates the environmental considerations (traffic, road conditions), the vehicle (active and passive safety), and the people involved. During the design process, all of these things are taken into to consideration to create a safe environment for the passengers as well as considering the durability of the vehicle during an impact to comply with federal law and insurance regulations.



Index	Explanation	Index	Explanation
1	Traffic Conditions	8	Vehicle Protection
2	Environment	9	Occupant Protection
3	Vehicle	10	Seat Belt
4	People	11	Head Restraints
5	Active Safety	12	Airbag
6	Passive Safety	13	Rollover Protection
7	Partner Protection		

Fig. 5: Identifying Fully Integrated Road Safety Technology (F.I.R.S.T.) System
Courtesy of BMW OF NORTH AMERICA, INC.

F.I.R.S.T. is the cornerstone behind BMW's safety philosophy. This technology consists of *active* and *passive* safety features designed to help the driver avoid accidents as well as protect the occupants in the event of an unavoidable accident.

Fig. 6: Identifying F.I.R.S.T. Cornerstone Behind BMW'S Safety Philosophy
Courtesy of BMW OF NORTH AMERICA, INC.

Active Safety features are designed to help the driver avoid accidents. In other words these features allow the driver to actively avoid potentially dangerous situations. These features consist of consist of a responsive engine, stable suspension, precise steering and excellent all around vision. Systems such as Dynamic Stability Control (DSC) and ABS also help the driver retain precise control of the vehicle.

Traffic and adverse environmental conditions can be offset by systems such as RLS (rain sensing wiper control), X-Drive, climate control with mist sensor and driving lights etc.

Other features which are "transparent" to the driver include the multi-function steering wheel which allows the driver to control the cruise control and audio systems while still focusing on the road. The seating position and location of switches and controls are also taken into consideration during the design process. The new HUD also allows the driver to access important driving information while maintaining concentration.

Passive Safety features provide vehicle occupant protection when an accident cannot be avoided. Today's BMW Passive Safety systems consist of the following features:

- Energy absorbing body structures
- Seatbelts with Automatic tensioners and force limiters
- Dual front airbags with 2-stage deployment
- Head Protection Systems (front as well as rear on some models)
- Side Impact Airbags (standard) and Rear Side Airbags (optional
- Active Knee Protection Airbags (On some models)
- Battery Safety Terminal
- Active Head Restraints (on some models)
- Rollover Protection on Convertibles (E36, E46 and E64) and fixed rollover bars on the Z3 and Z8 and Z4.

Energy Absorbing Body Structures

One of the first considerations in designing a safe vehicle is the body and chassis design. It is vital to protect the passenger in the event of an impact. This is accomplished by maintaining the integrity of the "passenger cell" during an accident.

The main consideration during an impact is to avoid transferring crash energy to the vehicle occupants. By adding energy absorbing crash elements to the vehicle, this energy transfer is reduced considerably.

Passenger Safety Cell E60

Fig. 7: Identifying Passenger Safety Cell E60 And Energy Absorbing Body Structures System
Courtesy of BMW OF NORTH AMERICA, INC.

In addition to having energy absorbing structures in the front and rear of the vehicle, there are also side impact protection structures in the doors. These structures not only help prevent impact intrusion into the safety cell, but also allow the door to be opened after most impacts.

Engine Support Arm showing "Crumple Zone"

Fig. 8: Identifying Engine Support Arm System (1 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

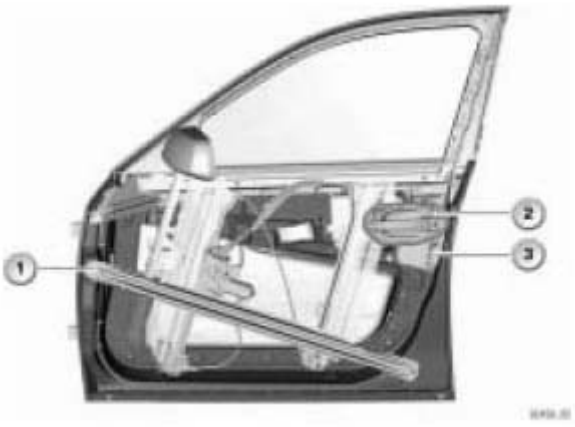


Fig. 9: Identifying Engine Support Arm System (2 Of 2)
Courtesy of BMW OF NORTH AMERICA, INC.

SMART Airbags

Front driver and passenger airbags have been in use with single stage activation since 1986. Once an impact is detected, the airbags are triggered with one specific level of deployment force.

From 1999, BMW developed the SMART airbag which is designed to deploy in 2 stages.

There are 4 triggering thresholds which are dependent upon the severity of impact detected, the status of the seatbelts and whether the passenger seat is occupied.

Driver's side SMART Airbag (Rear view)

Fig. 10: Identifying Driver Side SMART Airbag System
Courtesy of BMW OF NORTH AMERICA, INC.

Passenger side SMART Airbag (Rear view)

Fig. 11: Identifying Passenger Side SMART Airbag System
Courtesy of BMW OF NORTH AMERICA, INC.

The two stage airbags are used for both the front driver and front passenger which allows for a softer cushioning effect when the bags are triggered at lighter impacts.

The 2-stage airbags also employ the "cold-gas" inflation method which differs from the previous single stage airbags. The gas generators contain an inert gas mixture which is released when the airbags are triggered.

Also, the cold gas inflation method was incorporated into the side airbags and the ITS assemblies.

Side Airbags

Since the introduction of MRS, side airbags have been standard equipment. Rear airbags on some vehicles are part of an option package.

Side airbags are designed to prevent injury to the thorax (chest) region of the occupants.

Side Airbag with Inert Gas Inflation (Rear view)

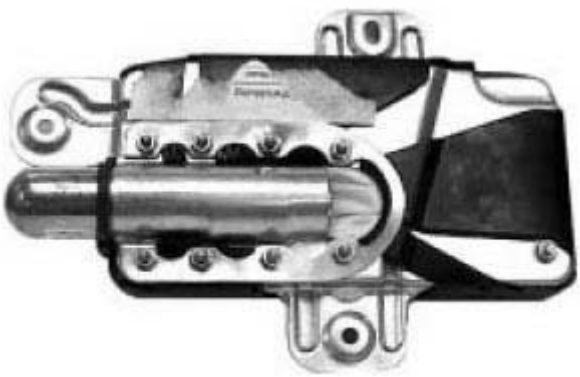


Fig. 12: Identifying Side Airbag With Inert Gas Inflation System
Courtesy of BMW OF NORTH AMERICA, INC.

Seatbelts

Of all of the safety innovations brought forth by the automotive industry, the safety belt is universally recognized as the single most effective safety device. Specifically, the 3-point safety belt provides passengers

with safety as well as comfort.

The effectiveness of the 3-point seat belt depends upon the correct positioning of the safety belt on the body.

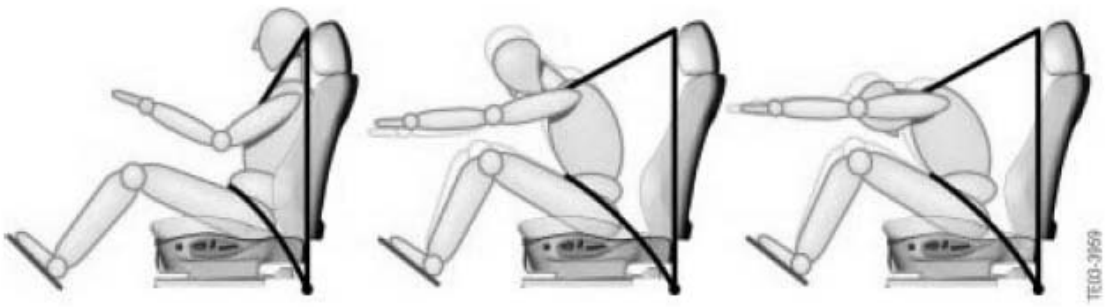


Fig. 13: Identifying Seat Belt Depends Correct Position Of Safety Belt On Body
Courtesy of BMW OF NORTH AMERICA, INC.

BMW safety belt systems use an upper anchor point which is height adjustable. In addition, the tensioning mechanisms allow the belt to remain relatively slack to increase comfort while driving.

The seat belt tensioning device is designed to remove slack in the seatbelt during an impact. This increases the effectiveness of the seatbelt and reduces the bio-mechanical load on the passenger.

There are 4 different belt tensioning systems which have been in use on BMW vehicles.

The 4 systems are as follows:

- Pyrotechnic automatic tensioners/end fitting tensioners
- Mechanical seat belt tensioners
- Pyrotechnic seat belt tensioners
- SGS (Seat Integrated Belt System)

More information on the seat belt tensioning systems will be covered in the forthcoming training modules.

Fig. 14: Identifying Mechanical Seat Belt Tensioners
Courtesy of BMW OF NORTH AMERICA, INC.

Battery Safety Terminal

The Battery Safety Terminal (BST) is designed to minimize the risk of short circuits in severe accidents. The BST protects the B+ cable from the battery to the starter and generator by disconnecting the main connections via a pyrotechnic device.

The rest of the power distribution circuits are protected by various fuses etc. This allows those circuits to remain available for SOS calls, power window and lock operation.

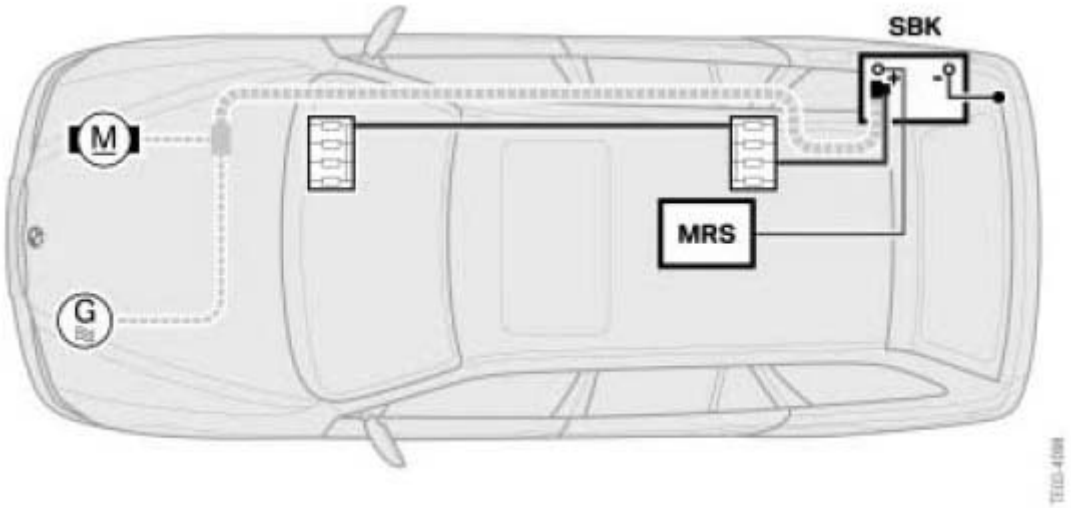


Fig. 15: Identifying Battery Safety Terminal
Courtesy of BMW OF NORTH AMERICA, INC.

The BST assembly is bolted to the positive battery terminal. It consists of a conventional battery terminal and a contact sleeve attached to the surface of the terminal. The sleeve houses an igniter pellet which contains a small amount of solid propellant.

Upon impact, the propellant is ignited which separates the battery cable from the positive terminal of the battery.

Fig. 16: Identifying BST - Not Deployed
Courtesy of BMW OF NORTH AMERICA, INC.

Once the BST is deployed, it must be replaced. Depending upon application, the entire B+ cable must be replaced or there are repair kits available on some models.

Head Protection System

Head injuries account for a large portion of overall accident statistics. To address this statistic BMW added the Head Protection System to complement the side airbags already in use. HPS was developed by BMW to offer increased occupant protection during a side impact and lower the instance of head injuries.

The original HPS, introduced on the E38, consisted of an Inflatable Tubular Structure (ITS) which was mounted in the headliner between the A and B pillars.

The ITS assembly consists of a woven fabric tube containing an inner tube of polyurethane. A gas generator is used to inflate the ITS assembly. When deployed, the ITS increases in diameter and overall length decreases by approximately 100mm. This causes the ITS assembly to emerge from the headliner trim.

Fig. 17: Identifying Head Protection System
Courtesy of BMW OF NORTH AMERICA, INC.

The ITS is designed as a sealed unit, unlike an airbag which deflates immediately. The ITS assembly deflates as the gas cools over a period of time, which allows the ITS to remain inflated in the event of secondary impacts.

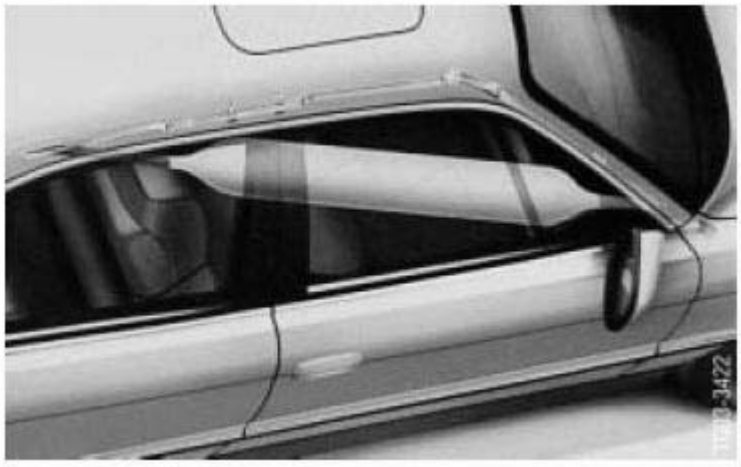


Fig. 18: Identifying ITS Assembly Deflates Gas Cools
Courtesy of BMW OF NORTH AMERICA, INC.

Rear HPS was introduced later as part of a special rear side airbag option on the E38 and E39. The rear HPS does not use a conventional ITS assembly, but rather an "cushion" type airbag located in the C-pillar. A vehicle with rear HPS can be identified by observing "HPS" in the C-pillar cover.

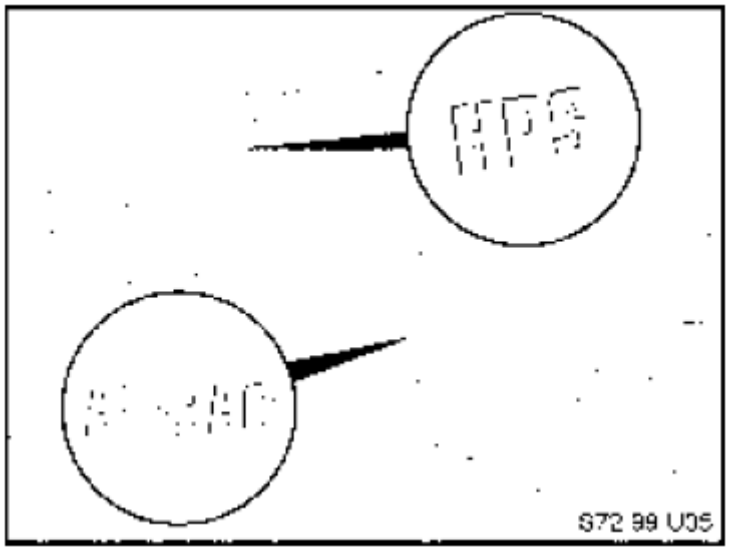


Fig. 19: Identifying Vehicle With Rear HPS Identified By Observing In C-Pillar Cover
Courtesy of BMW OF NORTH AMERICA, INC.

The Head Protection System was further developed to increase the level of occupant protection. The Advanced Head Protection System was introduced on the E65. It consists of a modified ITS which is now extended by a curtain. There are 2 versions of AHPS available. The first, AHPS I, extends from the A-pillar to the B-pillar and protects the front passengers.

The second version, AHPS II, is part of an option for rear passenger head protection. The AHPS II extends for the A-pillar to the C-pillar to protect front and rear passengers simultaneously. The advantages of AHPS include protection from glass splinters and protruding objects as well as optimized coverage for occupants of all sizes.

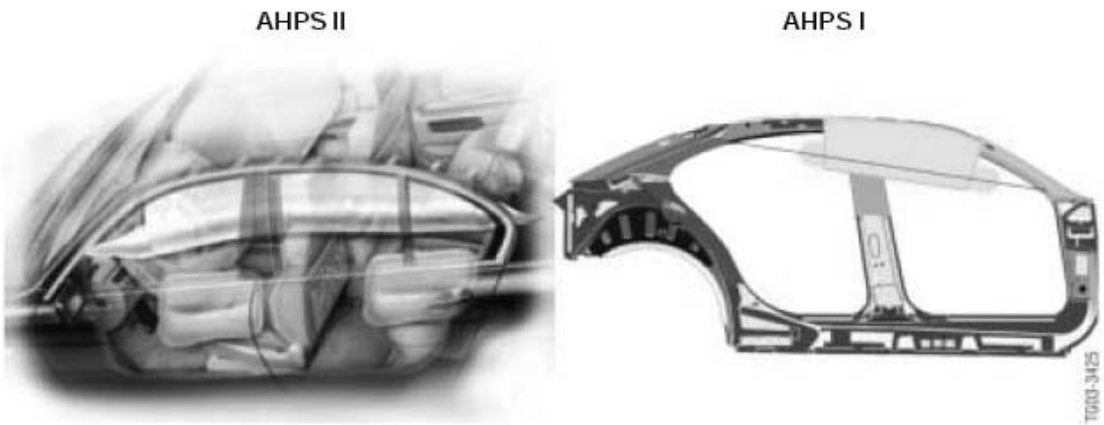


Fig. 20: Identifying AHPS II And AHPS I Part
Courtesy of BMW OF NORTH AMERICA, INC.

Active Knee Protection

The Active Knee Protection consists of a knee airbag located on the front driver and passenger sides of the vehicle. The knee airbag prevent the driver from sliding under the seat belt during an impact. This effect is

known as "submarining". This effect is counteracted by the knee airbag and initiates a controlled forward shift of the upper body.

This increases the effect of the seatbelt and the airbag.

The knee airbag is available on the E65, E85 and E63/64.

E65 Driver's Side Knee Airbag

Fig. 21: Identifying E65 Driver Side Knee Airbag System
Courtesy of BMW OF NORTH AMERICA, INC.

E65 Passenger Side Knee Airbag

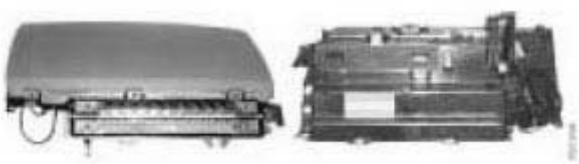


Fig. 22: Identifying E65 Passenger Side Knee Airbag System
Courtesy of BMW OF NORTH AMERICA, INC.

Active Head Restraint System (AKS)

In a rear end collision, the risk for cervical vertebrae injuries (whiplash) is high. To prevent this, the objective would be to position the head as close as possible to the headrest. This prevents excessive rearward motion.

On the E65/E66 and E60, the basic seat option only allows for a fixed position between the backrest and head and eliminates the need for the AKS. However, on vehicles equipped with the multi-function seat option, the adjustability of the headrest and backrest allows for the possibility of a large gap between the headrest and the occupants head.

For this reason AKS was developed. The AKS is located in the backrest of the multifunction seat. It is deployed by a pyrotechnic device, similar to an airbag.

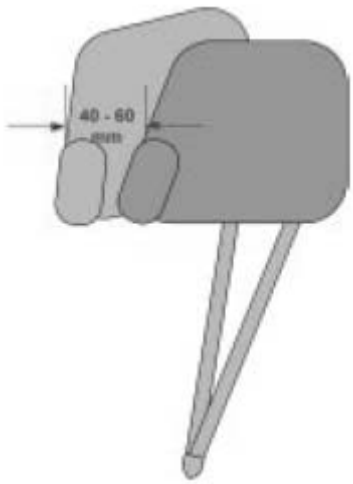


Fig. 23: Identifying Active Head Restraint (AKS) System
Courtesy of BMW OF NORTH AMERICA, INC.

Rollover Protection Systems

In order to protect the passengers of a convertible in the event of a rollover, BMW has developed the Rollover Protections System (RPS). Convertible models with RPS include the E36, E46 and E64. BMW roadsters use fixed steel rollover bars, these vehicle include the E52 (Z8), E36/7 (Z3), and the E85 (Z4).

The RPS consists of a set of automatically deployable rollbars which are triggered when the vehicle exceeds certain criteria. This criteria is based on the amount of tilt which is monitored by a rollover sensor.

When an impending rollover is detected, the rollover bars lock into place to provide the necessary head clearance to protect the occupants.

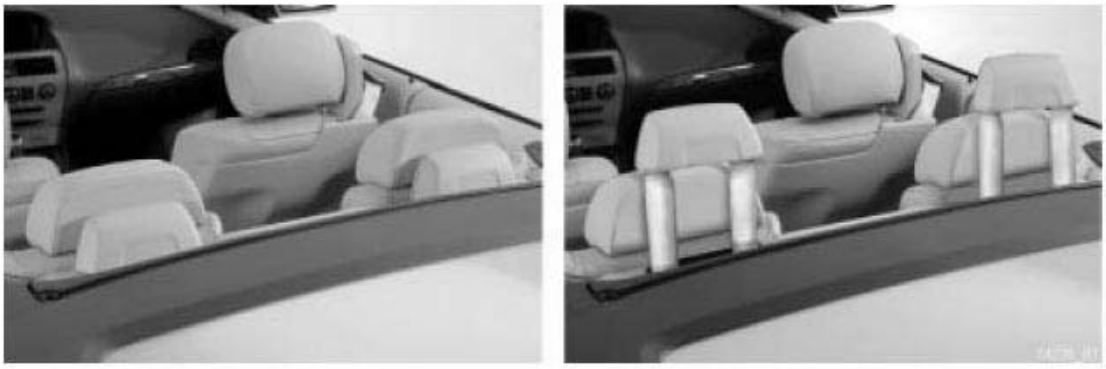


Fig. 24: Identifying Rollover Protection (RPS) Systems
Courtesy of BMW OF NORTH AMERICA, INC.

Also, the rollover bars can be deployed by the diagnostic equipment for testing. There is also a reset procedure for each model which is done manually. This allows the bars to be reset in the event of an erroneous deployment.

Fig. 25: Identifying Rollover Bars
Courtesy of BMW OF NORTH AMERICA, INC.

Summary of BMW Passive Safety Systems

	3 Series				Z4	5 Series				7 Series				6 Series		8 Series		SAV AWD	
	E30	E36	E46	E90/91	E85	E28	E34	E39	E60/E61	E23	E32	E38	E65/66	E24	E63/E64	E31	E52	E53	E83
Cipro	x					x				x				x					
Siemens 2A	x													x					
Siemens 2B		x					x				x					x			
Siemens 2C		x 9/93					x				x					x			
ZAE		x					x					x				x			
ZAE II		x					x					x				x			
MRS		x						x 3/96				x 3/96							
MRSII			x					x 9/97				x 5/97							
MRSIII			x 3/99					x 3/99				x 3/99					x	x	
MRSIV			x 4/01					x 8/01				x 8/01						x 4/01	
MRS 4RD																			x
MRS 5				x															
ISIS													x						
ASE					x				x						x				

Fig. 26: Identifying Summary Of BMW Passive Safety Systems
Courtesy of BMW OF NORTH AMERICA, INC.

GENERAL

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid:

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

72 12 ... PROCEDURE AFTER AIRBAG TRIGGERING AS RESULT OF AN ACCIDENT

Check and/or replace following components after airbag triggering:

Satellites (control unit + sensor)

- Components
  - Satellite, A-/B-pillar, left/right
  - Satellite, front door
  - Satellite, rear seat
  - Satellite, driver's/front passenger seat
  - Satellite, vehicle center
- Procedure
  - Inspect visually for mechanical damage
  - Read fault memory
  - Disconnect battery and observe waiting period
  - Rectify faults
  - Connect battery and observe waiting period (at least 10 seconds)
  - Delete fault memory
  - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. inside lights, radio, etc.)
  - Switch on ignition (wait at least 10 seconds)
  - Clear fault memory and if necessary rectify faults

Cables and plugs

- Components and procedure
  - Check cables and plugs for damage, replace if necessary.

    (e. g. corrosion, correct engagement, bent pin)

Belt system

- Components
  - Retractor mechanism
  - Belt buckle tensioner
  - Seatbelt height adjustment
  - Anchor fitting tensioner

- Procedure
  - Check components, replace if necessary

Seats

- Components
  - Seat
  - Airbag module
  - Active head restraint

- Procedure
  - Check seats (function check of seat mechanism), replace if necessary
  - Check seat screw/bolt connections
  - Replace gas generator, active head restraint system

    If the severity of the impact has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

    External feature: The triggered head restraint is folded forwards and engaged.

    The repair work can be carried out in the car with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

    The gas generator can be replaced up to 5 times.

  - Replace airbag module and, if necessary, seat cover with padding

Driver's airbag

- Components
  - Airbag module
  - Steering Wheel
  - Steering column (if damaged)
- Procedure
  - Replace faulty components
  - Replace steering wheel

Front-passenger airbag

- Components
  - Airbag module
  - Trim, instrument panel
  - Supporting tube (if damaged)
- Procedure

- Check components; replace if necessary

Side airbag, front/rear

- Components
  - Airbag module
  - Door panel
  - Door in white
  - Seat
- Procedure
  - Check components; replace if necessary

Head airbag

- Components
  - Airbag module
  - Trim, A-pillar
  - Roofliner
  - Trim, B-pillar (if damaged)
  - Trim, C-pillar (if damaged)
  - Connection/mounting (on side frame)
- Procedure

- Check components; replace if necessary

Knee airbag

- Components
  - Panel (driver's side)
  - Lower section of glovebox
  - Active knee protector (driver's and passenger sides)
- Procedure
  - Replace faulty components

Passive knee protector

- Components
  - Trim panels (driver's side)
  - Glovebox incl. knee protector (passenger side)
- Procedure
  - Replace faulty components
  - Check fastening elements

72 SAFETY PRECAUTIONS AND GENERAL INFORMATION

Notes on safety

- **SAFETY REGULATIONS** for handling airbag modules, airbag components and pyrotechnical seat belt tensioners
- **NOTES ON SCRAPPING** vehicles with gas generators
- **DEACTIVATION/ACTIVATION PYROTECHNICAL COMPONENTS**

Handling electrical and electronic equipment

- **UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS**
- Repairing airbag lines
- Handling optical fibres

Check

- **CHECK SEAT BELT**
- **CHECK LIST FOR SEAT BELT**

Airbag system

- Functional description and checking, refer to Diagnosis system
- **DEACTIVATING AIRBAGS**
- **PROCEDURE AFTER AIRBAG DEPLOYMENT** .

72 00 ... SAFETY REGULATIONS FOR HANDLING COMPONENTS WITH GAS GENERATORS

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

IMPORTANT: Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1.

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of

qualification, i.e. specific training, is not required for the person responsible.

2. Disassembly and assembly

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
  - 30 minutes for vehicles up to 9/93;
  - 1 minute for vehicles from 9/93
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75 °C.
- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Before installing, subject components such as housing, connector pins etc. (including electronic diagnostic components) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing upwards. Otherwise the generator will be thrown upwards if it is fired.
- Do not point the firing pellet of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
  - Disconnect battery
  - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

SEAT BELTS

72 11 ... CHECKING AUTOMATIC SAFETY BELT

General considerations when checking seat belts:

The seat belts must be checked after an accident.

For the check, you should start by trying to get information on which seats in the car involved in the accident were occupied. If this is not possible, check all the seat belts in the car and replace them if necessary.

In the event of deformations on the car, you must subject the components of the restraint system affected in this area such as e.g.

- Seat Belts
- Anchor fitting tensioner
- Seatbelt height adjustment
- Belt buckle tensioner
- Triggering sensors
- etc.

to a function check and a visual inspection.

If you are in any doubt as to the unimpaired functional capability of restraint system components, these components must be replaced in the interests of safety!

If a seat belt has to be replaced following an accident (e.g. in the event of a frontal and/or side impact with permanently deformed impact dampers/deformation elements or crossmembers), the complete seat belt must be replaced! The complete seat belt comprises:

- Top belt
- Lower strap
- Anchor fitting tensioner
- Seat belt buckle (buckle tensioner)
- Seatbelt height adjustment
- Retaining screws of all components

The following must also be checked and if necessary replaced:

- Seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners
- Seat structure (frame, etc.)

Alignment tests on the seat and the seat runners are not permitted!

The following explanations and the **CHECKLIST** for the automatic safety belt can provide help.

An unusable seat belt or a seat belt worn in a serious accident should be destroyed immediately after removal to guarantee that it can not be used again.

Checking automatic reel and seat belt strap:

The automatic reel has two independent activation systems for seat-belt locking.

The first activation system locks the automatic reel when driving quickly around curves, driving in tight curves, on extreme inclinations (vehicle rolls over) and during sharp braking or impact.

To check, the seat backrest must be placed in the upright position and both hands held in a supporting position close to the steering wheel. The brakes are then applied fully while driving on a dry surface and at a road speed equal to twice that of walking speed.

The seat belt must lock.

The second activation system provides additional safety and is controlled by inertia mass.

If the reel locks when the strap is pulled out suddenly, this system is also OK.

In addition, the automatic electric reel (EMA) must eliminate belt slack.

Check whether an attempt was made to eliminate belt slack:

- Enter, close doors and latch seat belt buckle contact
- EMA eliminates belt slack

If belt slack was not eliminated, the procedure described below must be followed:

- Allow vehicle to assume complete sleep mode and repeat the function test.
- All doors must be closed!
- EMA, left, must be installed and connected correctly.
- Work through all fault memory entries before the function test is carried out again.

Replace defective or actuated automatic electric reels.

Automatic reel does not require servicing and must not be opened.

Precondition for complete, problem-free retraction of straps:

- the straps must not be twisted!
- the straps must not be damaged!

When placed to one side, the straps of the front seats must retract fully.

With the straps in the rear seat bench, a small remaining loop is acceptable due to increased friction between the strap and the rear seat bench cover if:

- this remaining loop is fully retracted when the strap is reguided.

Belt straps should only be cleaned with a lukewarm soap solution or a commercial laundry detergent.

Belt straps must never be cleaned chemically or dyed.

The automatic reel and strap must be replaced in the event of:

1. creases
2. unravelling
3. pinches
4. cracks and tears
5. traces of melting
6. traces of wear on casing of seat belt tongue or on reversing clip.

Checking lower strap (belt buckle tensioner):

To fasten a seat belt, the tongue should insert easily and with a loud click in the lock.

When the "Red button" is pressed, the tongue must be ejected from the lock under spring pressure.

If the lock cover is missing or damaged, the lower strap must be replaced.

Replace the triggered belt buckle tensioner including the complete seat belt with seatbelt height adjustment and retaining screws and check the

- Seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners
- Seat structure

Criteria for a triggered mechanical belt buckle tensioner:

- very low position of seatbelt buckle (comparisons with new part).

Criteria for a triggered pyrotechnical belt buckle tensioner:

- very low position of seatbelt buckle (comparisons with new part).
- Airbag warning lamp permanently lit: read out airbag system fault memory.

The belt buckle tensioners can be triggered under certain circumstances even when the seat is not occupied. If it is definite that the belt system was not used (seat was not occupied), there is no need to replace the

- upper strap
- attachment parts (belt height adjustment, screws)
- seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners

after a check.

Checking anchor fitting tensioner:

Replace the triggered anchor fitting tensioner including the complete seat belt with seatbelt height adjustment, lower strap and retaining screws and check the

- Seatbelt mountings on the car body
- Seatbelt mountings on the seat
- Seat runners
- Seat structure

Criteria for a triggered anchor fitting tensioner:

- A triggered anchor fitting tensioner can be recognized from the wrapped belt strap around the shaft.
- Airbag warning lamp permanently lit: read out airbag system fault memory.

72 11 ... INSPECTION LIST FOR AUTOMATIC SEAT BELT

AUTOMATIC SEAT BELT INSPECTION LIST

Was the automatic seat belt with lower strap replaced after an accident, e.g. frontal and/or oblique impact in which the impact absorbers/deformation elements were permanently deformed? (only while seat belt was fastened)	**No**	**Replace complete automatic seat belt The following must also be checked and replaced, if necessary: seatbelt mountings on the car body seatbelt mountings on the seat seat runners.**
Yes		
Does seat belt lock when pulled out suddenly?	No	Replace automatic seat belt (upper strap).
Yes		
Does the automatic electric reel eliminate the belt slack?	No	Replace automatic seat belt (upper strap).
Yes		
		Automatic reel is loose -

Can the strap be pulled out without jamming?	No	tighten reel. If fault persists: Return spring broken - replace automatic seat belt (upper strap).
Yes		
Does the strap on the front seat belts retract automatically? Does the strap on the rear seat belts retract automatically, a small remaining loop is acceptable if this remaining loop is fully retracted when the strap is readjusted.	No	Automatic reel is loose - tighten reel. Excessive friction in belt guides - replace automatic seat belt (upper strap). Return spring broken - replace automatic seat belt (upper strap).
Yes		
Does automatic reel make a squeaking noise when belt is fastened or unfastened?	Yes	Excessive friction in belt guides - replace automatic seat belt (upper strap). Reel is loose - tighten reel. Return spring broken - replace automatic seat belt (upper strap).
No		

AUTOMATIC SEAT BELT INSPECTION LIST

Is the plastic casing on the latch free from damage in the area of the belt opening?	**No**	**Replace complete automatic seat belt**
Yes		
Is the fully extended strap free from pinches, burn marks, tears and cuts, folding and unravelling?	No	Replace complete automatic seat belt
Yes		
When the belt is fastened, is the belt tongue ejected by spring force from the buckle when the "red button" is pressed?	No	Replace complete automatic seat belt
Yes		
Does fastened seat belt lock when stopping vehicle quickly on a dry road at a road speed twice as fast as walking speed?	No	Replace complete automatic seat belt
Yes		
Is fully pulled-out belt free of serious dirt and other marks?	No	If dirt and marks cannot be removed with commercially available mild-action detergent, the

		automatic seat belt (upper strap) must be replaced.
Yes		
In the case of seat-integrated seat belts, is front tongue of reclining mechanism or seat rail free of deformation?	No	Replace both damaged parts and complete automatic-reel seat belt. The following must also be checked and replaced, if necessary: seatbelt mountings on the car body seatbelt mountings on the seat seat runners.
Yes		
The automatic seat belt is O.K.!		

72 11 041 REMOVING AND INSTALLING OR REPLACING FRONT LEFT OR RIGHT LOWER BELT FITTING (SEAT BELT PRETENSIONER)

Necessary preliminary tasks

- Remove **FRONT SEAT**

WARNING: **Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt pretensioners.**
Improper handling can lead to triggering of the pyrotechnical seat belt pretensioner or side airbag, resulting in injuries.

Switch off ignition!

Installation:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must not be retightened
- Clean thread of nut beforehand in event of repeated use

Unfasten plug connection (1) and disconnect.

Unlock plug connection (3) and pull all plugs out of plug housing (2).

Disconnect all cable ties.

Removing wiring harness.

Installation:

- Replace cable tie.
- Wires must not be under tension

- Plugs are coded and must be reinstalled in the correct sequence in the plug housing

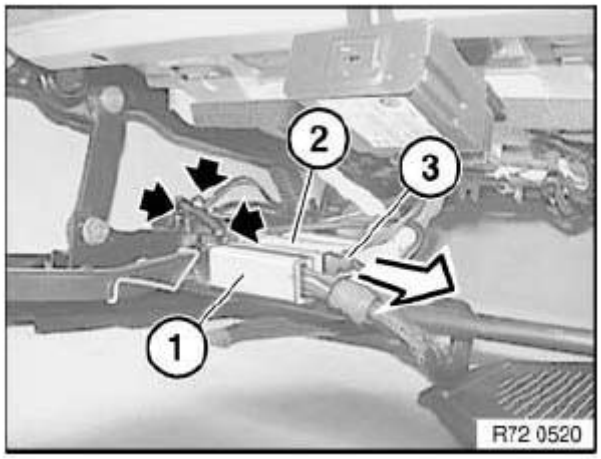


Fig. 1: Identifying Plug Connection And Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 5AZ** .

Remove belt pretensioner (3).

Installation:

Replace screw (1).

Belt tensioner (3) is secured through recess (2) to retaining bracket.

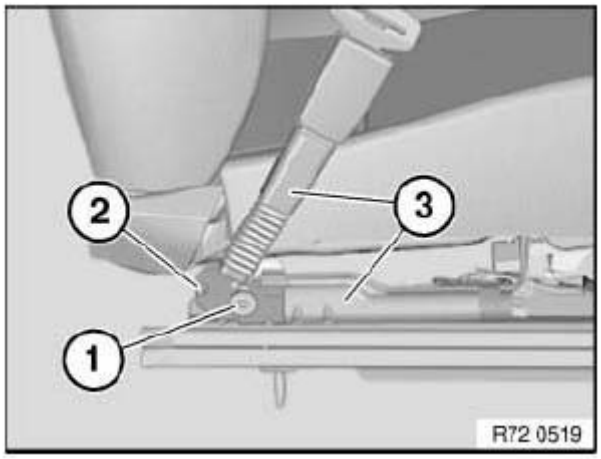


Fig. 2: Identifying Belt Tensioner On Recess And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

72 11 033 REMOVING AND INSTALLING/REPLACING FRONT LEFT OR RIGHT SEAT BELT

Necessary preliminary tasks

- Remove **REAR SIDE TRIM PANEL**

Installation:

- Microencapsulated screws (Loctite) must be replaced and may **not** be reused
- Screw connection must be completed within 20 minutes (start of curing)
- Microencapsulated screws must **not** be retightened
- Clean thread of nut beforehand in event of repeated use

Move seat fully upwards.

Unlock release tab (2) for belt anchor fitting trim (1) with plastic wedge.

Simultaneously unclip trim (1) in direction of arrow.

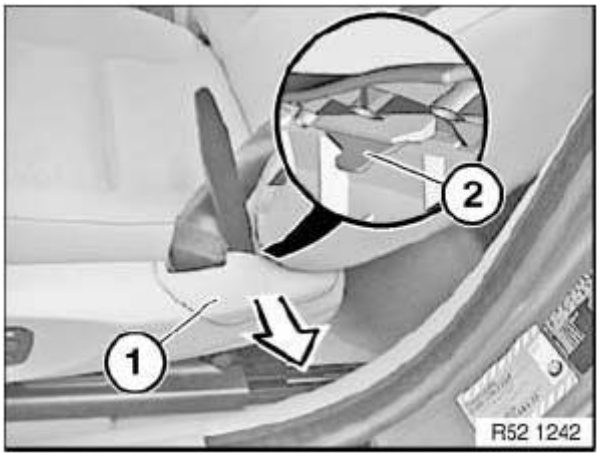


Fig. 3: Removing Belt Anchor Fitting Trim Release Tab Using Plastic Wedge
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 02AZ** .

Remove hook (2) for lower belt guide.

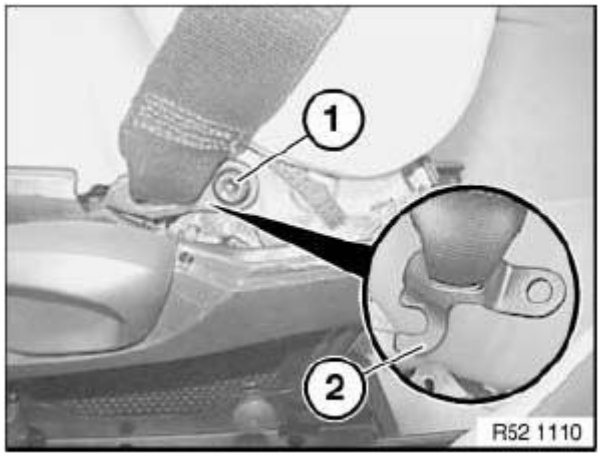


Fig. 4: Identifying Lower Belt Guide Hook And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 11 03AZ** .

Remove deflection fitting (2).

Installation:

Deflection fitting (2) is coded against incorrect installation.

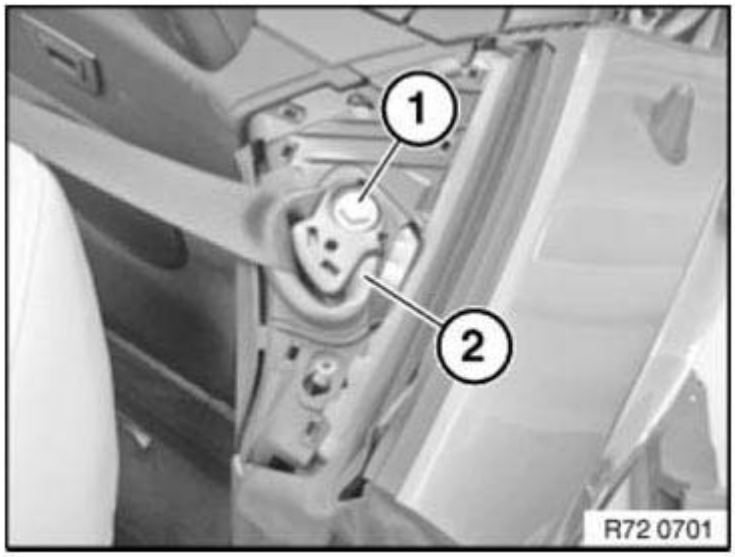


Fig. 5: Identifying Deflection Fitting With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque **72 12 01AZ** .

US only:

Unlock plug connection (3) and disconnect.

Remove inertia reel unit (2).

Installation:

Inertia reel unit (2) is coded against incorrect installation.

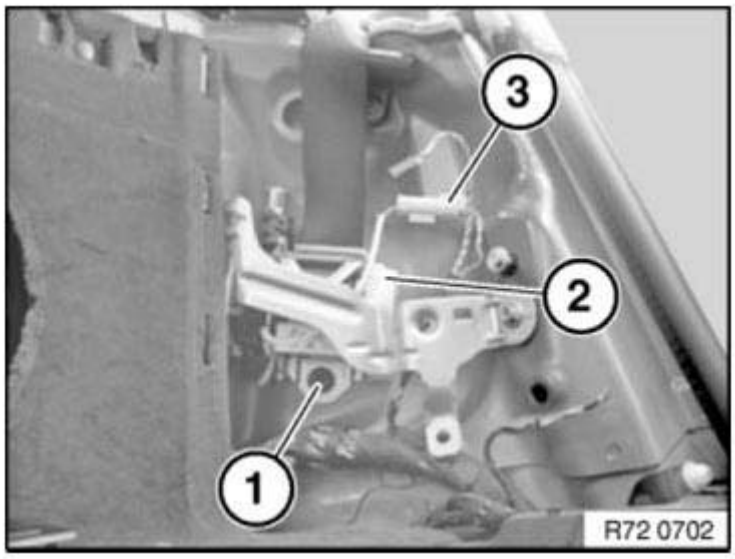


Fig. 6: Identifying Inertia Reel Unit With Plug Connection And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

72 SAFETY PRECAUTIONS AND GENERAL INFORMATION

Notes on safety

- **SAFETY REGULATIONS** for handling airbag modules, airbag components and pyrotechnical seat belt tensioners
- **NOTES ON SCRAPPING** vehicles with gas generators
- **DEACTIVATION/ACTIVATION PYROTECHNICAL COMPONENTS**

Handling electrical and electronic equipment

- **UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS**
- Repairing airbag lines
- Handling optical fibres

Check

- **CHECK SEAT BELT**
- **CHECK LIST FOR SEAT BELT**

Airbag system

- Functional description and checking, refer to Diagnosis system
- **DEACTIVATING AIRBAGS**
- **PROCEDURE AFTER AIRBAG DEPLOYMENT** .

7212 AIRBAG GENERATOR/AIRBAG UNIT FOR PASS

72 12 ... DEACTIVATING FRONT PASSENGER AIRBAGS WITH KEY-OPERATED SWITCH

> **WARNING: The responsibility for deactivation/activation rests with the customer. Depending on the occupation of the front passenger seat, the front passenger and side airbags must be (de-)activated in accordance with the Owner's Handbook.**

The passenger airbag can only be deactivated in accordance with the following instructions if the vehicle is equipped with a suitable key-operated switch!

The key-operated switch can be retrofitted if it is missing and has been ordered as an optional extra.

Key-operated switch:

- Optional extra SA 5DA for MINI
- Optional extra SA 470 for BMW

E83 up to 09/2004 only:

see Deactivation of airbags

E83 from 09/2004 only:

Deactivation via key-operated switch, see following work steps

R50/R53 up to 04/2004 only:

see Deactivation of airbags

R50/R53 from 04/2004 only:

Deactivation via key-operated switch, see following work steps

The following airbags are deactivated simultaneously with the key-operated switch (1):

- Passenger airbag
- Side airbag (passenger side)
- If necessary, knee airbag in US models (passenger side)

The airbags can only be deactivated/reactivated while the vehicle is stationary and with the door open.

IMPORTANT: The head airbag remains active.

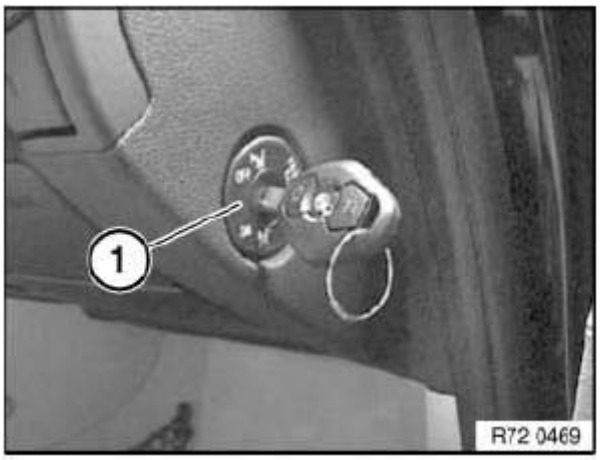


Fig. 7: Identifying Key-Operated Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Deactivation

1. Turn key-operated switch with ignition key to "OFF" position.

Deactivatable airbags on passenger side out of operation.

Head airbag on passenger side remains active.

All airbags on driver side remain active.

Activation

2 Turn key-operated switch with ignition key to "ON" position.

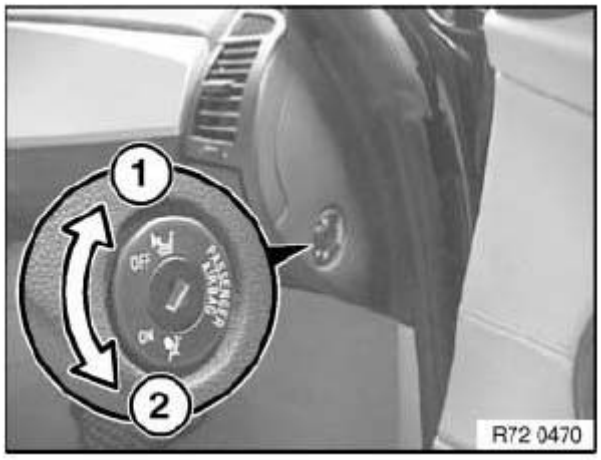


Fig. 8: Identifying Key-Operated Switch ON And OFF Position
Courtesy of BMW OF NORTH AMERICA, INC.

All the airbags in the vehicle are activated and are triggered in appropriate situations.

Warning lamp

When the ignition key is turned in the ignition lock, the function of the airbag system is checked and the warning lamp in the center console lights up for several seconds.

1. The warning lamp is permanently lit when the passenger airbags are **deactivated**
2. The warning lamp goes out after a few seconds when the passenger airbags are **activated**

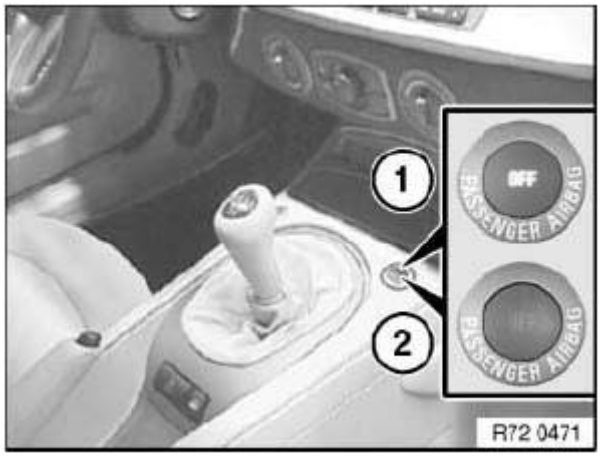


Fig. 9: Identifying Warning Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 ... NOTES ON SCRAPPING VEHICLES WITH GAS GENERATORS (AIRBAG SYSTEM)

The gas generator is a pyrotechnical component and is for the most part permanently mounted on the following components:

- Airbag module
  - Driver's/passenger airbag
  - Side airbag
  - Head airbag
  - Knee airbag
- Automatic electric reel
- Belt end fitting tensioner
- Belt buckle tensioner
- Safety battery terminal
- Active head restraint

In accordance with accident prevention regulations and specific national regulations, gas generators must be rendered unusable before they are scrapped. This is necessary because pyrotechnical objects can cause injury if improperly activated (e.g. scrapping with flame cutters).

With vehicles which are scheduled for scrapping, it is always essential prior to draining and further stripping work to ensure that all the gas generators **in the vehicle** are fired. The fired gas generators can then be scrapped together with the vehicle.

Gas generators that have not fired constitute a hazard (also to the environment)!

Firing failure:

If correct firing is not possible, the relevant components must be removed and disposed of by special waste disposal companies!

Comply with **SAFETY REGULATIONS for handling airbag system components.**

If a triggering operation has failed:

- Disconnect the triggering device from the battery and
- Wait a few minutes before approaching the vehicle

The components of an airbag system must always be disposed of. Such components must not be sold on as used parts.

Firing:

Triggering of the gas generators may only be carried out by expert personnel and under the supervision of a responsible person. Other standard accident prevention regulations (safety goggles, ear defenders etc.) must also be observed.

The gas generators must be fired from the outside in this vehicle which has been earmarked for scrapping. In this process

- the doors must be closed
- the rear lid must be open
- the side windows must be open and
- the sunroof must be open

To fire the gas generators, use the firing device with the appropriate cables (follow instructions).

WARNING: Once gas generators have been fired, observe a ventilation period of 10 minutes with the doors opened. Only then is it permitted to continue work inside the vehicle.
Wear protective goggles and protective gloves when handling a fired gas generator!
The burning of solid fuel will heat up the airbag unit - danger of burning hands!

Wash skin with water after contact with fired gas generators!

72 12 ... PROCEDURE AFTER AIRBAG TRIGGERING AS RESULT OF AN ACCIDENT

Check and/or replace following components after airbag triggering:

Satellites (control unit + sensor)

- Components
  - Satellite, A-/B-pillar, left/right
  - Satellite, front door
  - Satellite, rear seat
  - Satellite, driver's/front passenger seat
  - Satellite, vehicle center
- Procedure
  - Inspect visually for mechanical damage
  - Read fault memory
  - Disconnect battery and observe waiting period
  - Rectify faults
  - Connect battery and observe waiting period (at least 10 seconds)
  - Delete fault memory
  - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. inside lights, radio, etc.)
  - Switch on ignition (wait at least 10 seconds)
  - Clear fault memory and if necessary rectify faults

Cables and plugs

- Components and procedure
  - Check cables and plugs for damage, replace if necessary.

    (e. g. corrosion, correct engagement, bent pin)

Belt system

- Components
  - Retractor mechanism
  - Belt buckle tensioner
  - Seatbelt height adjustment
  - Anchor fitting tensioner
- Procedure
  - Check components, replace if necessary

Seats

- Components
  - Seat
  - Airbag module
  - Active head restraint
- Procedure
  - Check seats (function check of seat mechanism), replace if necessary

- Check seat screw/bolt connections
- Replace gas generator, active head restraint system

  If the severity of the impact has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

  External feature: The triggered head restraint is folded forwards and engaged.

  The repair work can be carried out in the car with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

  The gas generator can be replaced up to 5 times.

- Replace airbag module and, if necessary, seat cover with padding

Driver's airbag

- Components
  - Airbag module

        - Steering Wheel
        - Steering column (if damaged)
    - Procedure
        - Replace faulty components
        - Replace steering wheel

Front-passenger airbag

- Components
    - Airbag module
    - Trim, instrument panel
    - Supporting tube (if damaged)
- Procedure
    - Check components; replace if necessary

Side airbag, front/rear

- Components
    - Airbag module
    - Door panel
    - Door in white
    - Seat
- Procedure
    - Check components; replace if necessary

Head airbag

- Components
    - Airbag module
    - Trim, A-pillar
    - Roofliner
    - Trim, B-pillar (if damaged)
    - Trim, C-pillar (if damaged)
    - Connection/mounting (on side frame)
- Procedure
    - Check components; replace if necessary

Knee airbag

- Components

- Panel (driver's side)
- Lower section of glovebox
- Active knee protector (driver's and passenger sides)

- Procedure
  - Replace faulty components

Passive knee protector

- Components
  - Trim panels (driver's side)
  - Glovebox incl. knee protector (passenger side)
- Procedure
  - Replace faulty components
  - Check fastening elements

72 12 050 REMOVE AND INSTALL SIDE AIRBAG

WARNING: Observe SAFETY REGULATIONS for handling airbag modules and pyrotechnical seat belt pretensioners.
Follow instructions for UNLOCKING AND LOCKING AIRBAG PLUG CONNECTIONS .
Incorrect handling can cause airbags to trigger, resulting in serious injuries.

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.
Improper, unauthorized operations may result in serious dangers.
Unauthorized persons are strictly prohibited from performing any operations on this system.

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove rear panel on front seat
- Remove front seat

IMPORTANT: Make sure airbag wiring harness is exactly routed when installed.

Detach cable tie.

Release airbag wiring harness (2) from cable holders on seat mechanism.

Raise release clip (3) and pull plug (4) out of plug housing (1).

NOTE: If necessary, release yellow plug housing (1) from holder on seat mechanism.

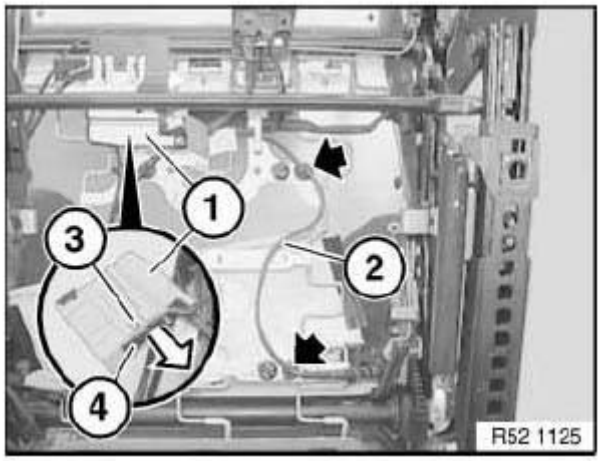


Fig. 10: Pulling Plug From Plug Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable tie (1) from seat mechanism.

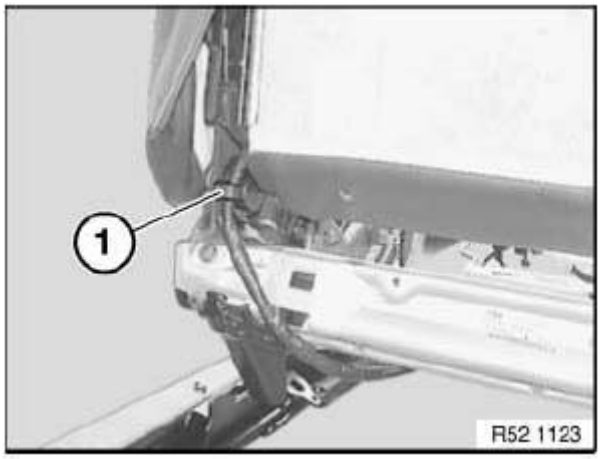


Fig. 11: Identifying Seat Mechanism Cable Tie
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Installation:

Replace nuts.

Tightening torques **72 12 03AZ** .

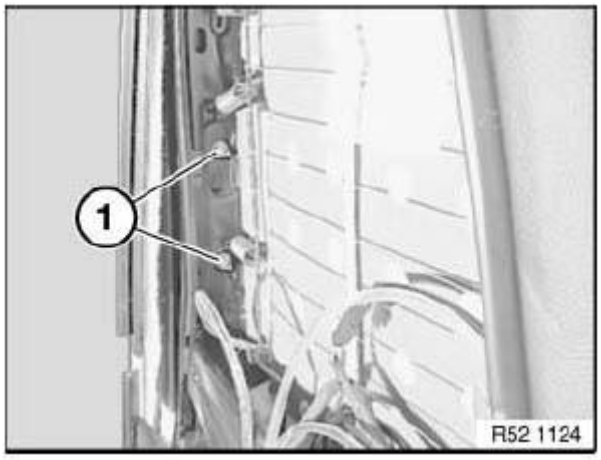


Fig. 12: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Feed the wiring harness carefully through the seat and backrest mechanism as the edges of the frame can be sharp.

Installation:

Make sure wiring harness is correctly laid.

Pull airbag module (2) with threaded pins out of backrest frame.

Feed out airbag module (2) between padding (1) and inner bag (3).

Installation:

Pull inner bag (3) fully over airbag module (2) and threaded pins.

Insert threaded pins into backrest frame and secure with new nuts.

No inner bag material is permitted to project through the hole in the inner frame.

Install nuts and tighten down.

Tightening torques **72 12 03AZ** .

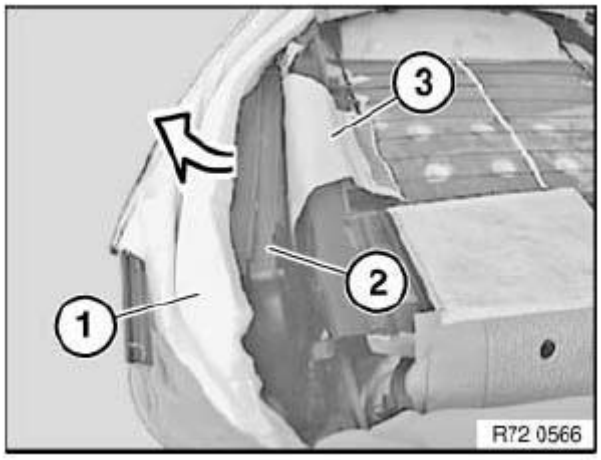


Fig. 13: Removing Airbag Module Between Padding And Inner Bag
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Feed out wiring harness (2) of airbag module (1) through seat and backrest mechanism (3) carefully on account of sharp edges.

Installation:

Make sure wiring harness is correctly laid.

Engage backrest cover (3) in backrest frame and **ASSEMBLE** front seat.

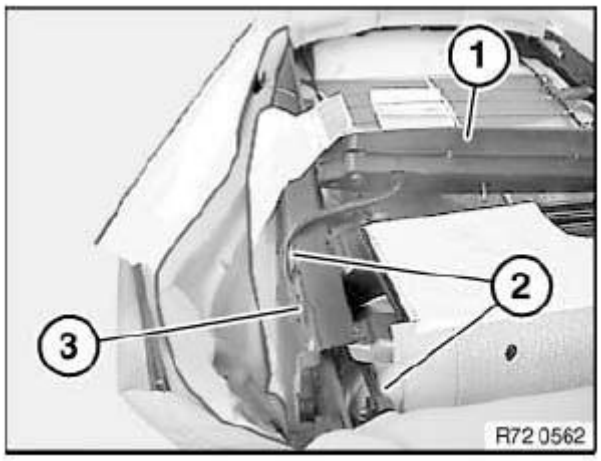


Fig. 14: Identifying Airbag Module With Wiring Harness And Backrest Mechanism
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 000 REMOVING AND INSTALLING OR REPLACING AIRBAG MODULE ON PASSENGER SIDE

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag

modules and pyrotechnical belt pretensioners.
Incorrect handling can activate airbag and cause injury.

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.
Improper, unauthorized operations may result in serious dangers.
Unauthorized persons are strictly prohibited from performing any operations on this system.

Necessary preliminary tasks

- Clamp off **BATTERY NEGATIVE LEAD**
- Remove **RIGHT GLOVEBOX WITH HOUSING**

Disconnect plug connection (1).

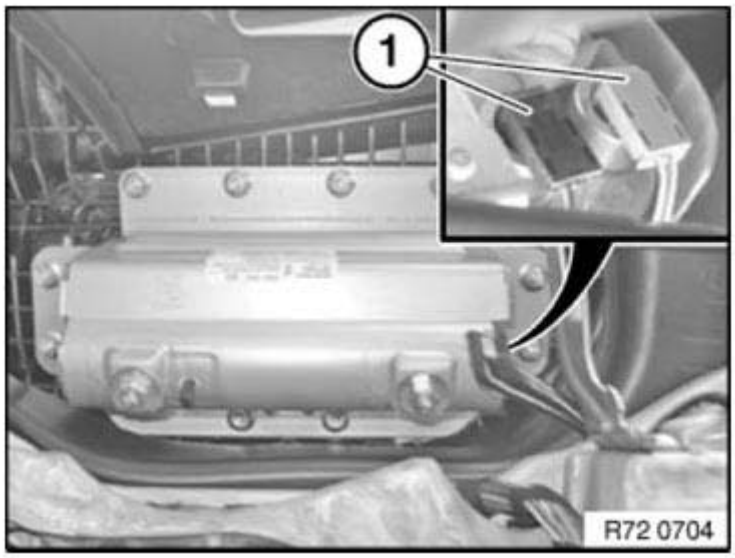


Fig. 15: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Secure airbag module (1) on passenger side against falling out.

Release nuts in marked area.

Installation:

Replace self-locking nuts.

Tightening torque **72 12 01AZ** .

Remove airbag module (1) on passenger side towards bottom.

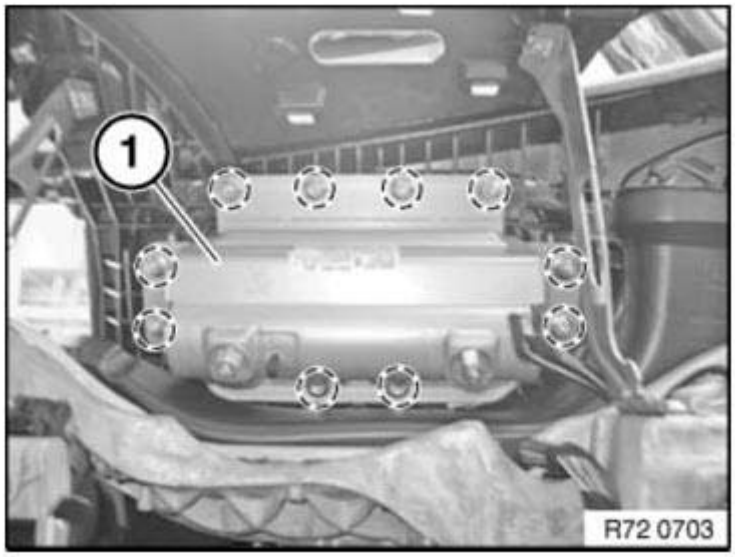


Fig. 16: Identifying Airbag Module
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 004 REMOVING AND INSTALLING/REPLACING AIRBAG MODULE FOR DRIVER'S KNEE PROTECTION

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt pretensioners.
Follow instructions for UNLOCKING AND LOCKING AIRBAG PLUG CONNECTIONS .
Incorrect handling can activate airbag and cause injury.

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.
Improper, unauthorized operations may result in serious dangers.
Unauthorized persons are strictly prohibited from performing any operations on this system.

Necessary preliminary tasks

- Remove **TRIM PANEL FOR PEDAL ASSEMBLY**

IMPORTANT: Secure airbag module against falling out.

Unscrew nuts (1).

Tightening torque **72 06 02AZ** .

Feed airbag module out of instrument panel trim and unlock and disconnect **PLUG CONNECTION** behind.

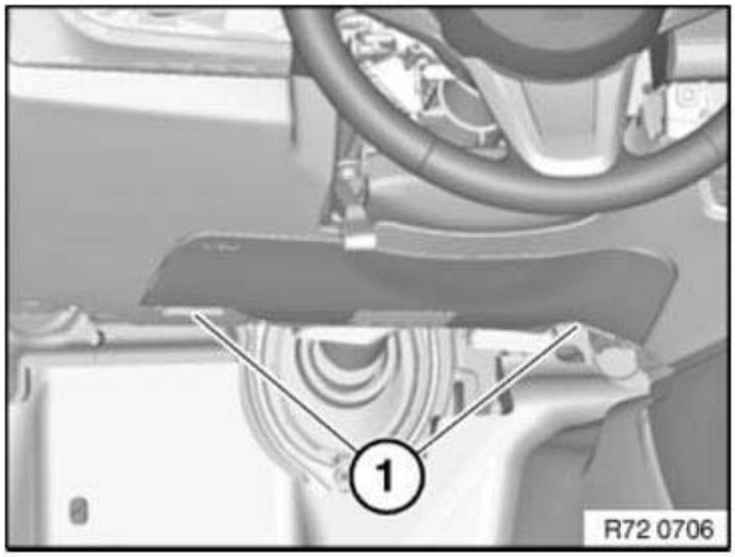


Fig. 17: Identifying Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure airbag module (1) is correctly seated in instrument panel trim.

Make sure lugs are correctly seated on threaded bolts.

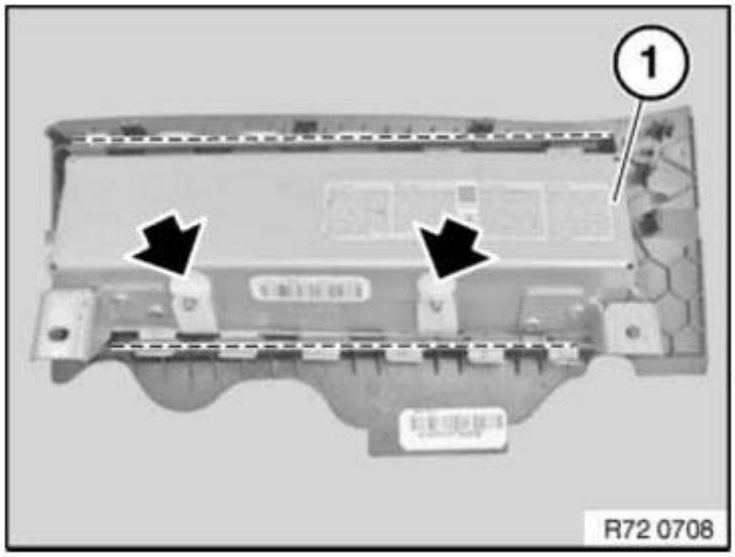


Fig. 18: Identifying Airbag Module With Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

72 12 006 REMOVING AND INSTALLING/REPLACING AIRBAG MODULE FOR PASSENGER'S KNEE PROTECTION

WARNING: Read and comply with SAFETY REGULATIONS for handling airbag modules and pyrotechnical belt pretensioners.
Follow instructions for UNLOCKING AND LOCKING AIRBAG PLUG CONNECTIONS .
Incorrect handling can activate airbag and cause injury.

IMPORTANT: Operations on pyrotechnical devices may only be carried out by authorized experts.
Improper, unauthorized operations may result in serious dangers.
Unauthorized persons are strictly prohibited from performing any operations on this system.

Necessary preliminary tasks

- Remove **TRIM FOR INSTRUMENT PANEL** , bottom right

IMPORTANT: Secure airbag module against falling out.

Unscrew nuts (1).

Tightening torque **72 06 02AZ** .

Feed airbag module out of instrument panel trim and unlock and disconnect **PLUG CONNECTION** behind.

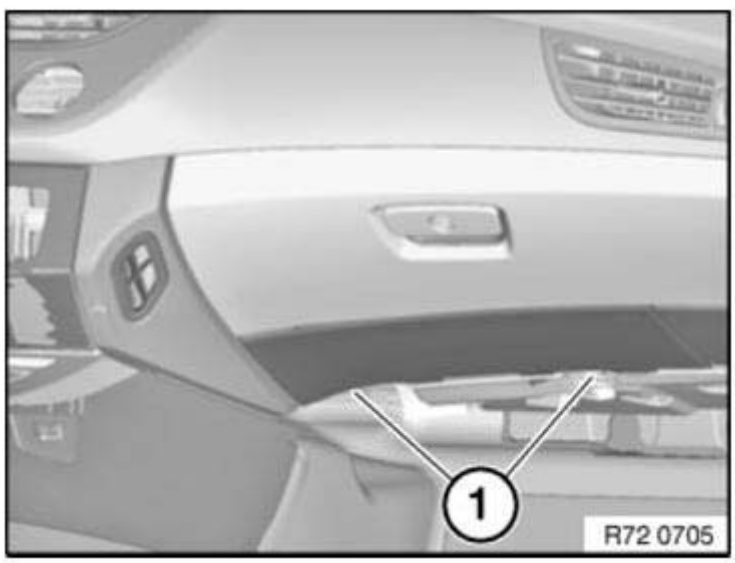


Fig. 19: Identifying Instrument Panel Trim Mounting Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Make sure airbag module (1) is correctly seated in instrument panel trim.

Make sure lugs are correctly seated on threaded bolts.

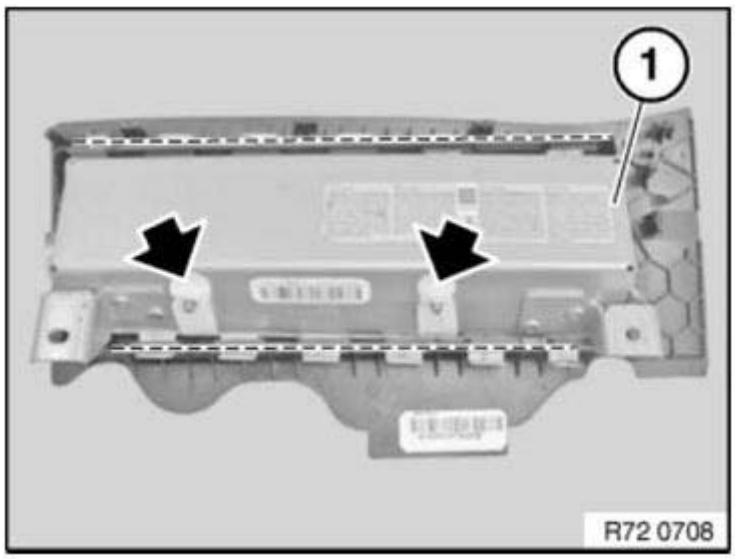


Fig. 20: Identifying Airbag Module With Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

61 00 ... REPAIRING AIRBAG CABLES

IMPORTANT: Only repair those cables which show visible signs of damage. In the event of visible damage, make sure there is only one cable repair in effect after the repair work. If no visible damage can be identified, the entire cable must be replaced. When carrying out repairs to the airbag wiring harness, you must use the spare parts offered in the Electronic Parts Catalogue (EPC).

Safety regulations

Safety regulations for handling components of airbag system.

INSTRUCTIONS FOR DISCONNECTING AND CONNECTING BATTERY .

Procedure for cable repair

In event of visible damage

Expose cable at damaged areas. Cut through one cable after the other at an appropriate position and insulate cables no longer required in wiring harness with insulating tape, do not under any circumstances cut through both cables at the same time. Now, depending on the scope of work, unpin contacts either on airbag control unit/airbag module or on adapter plug. Cut off unpinned cables. Insulate cables remaining in wiring harness with insulating tape. Now pin in contacts of repair cable, assignment of repair cables is relevant. Lay repair lead in car parallel to existing airbag lead up to cutting point. Cut off excess length of repair lead. Twist open cables. Connect cables with connectors and shrink-fit hoses in Electronic Parts Catalogue (EPC), assignment of repair cables is relevant. Twist cables again, open length (twist) must not exceed 40 mm. Secure interface (shrink-fit

hoses) with insulating tape to prevent cables from twisting open.

Instructions for cutting off, insulating, crimping cables, installing and removing contacts:

CUTTING OFF AND INSULATING CABLES .

REPAIRING A PLUG CONNECTION USING CONNECTORS .

INSTALLING AND REMOVING CONTACTS .

72 SAFETY PRECAUTIONS AND GENERAL INFORMATION

Notes on safety

- **SAFETY REGULATIONS** for handling airbag modules, airbag components and pyrotechnical seat belt tensioners
- **NOTES ON SCRAPPING** vehicles with gas generators
- **DEACTIVATION/ACTIVATION PYROTECHNICAL COMPONENTS**

Handling electrical and electronic equipment

- **UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS**
- Repairing airbag lines
- Handling optical fibres

Check

- **CHECK SEAT BELT**
- **CHECK LIST FOR SEAT BELT**

Airbag system

- Functional description and checking, refer to Diagnosis system
- **DEACTIVATING AIRBAGS**
- **PROCEDURE AFTER AIRBAG DEPLOYMENT** .

72 00 ... SAFETY REGULATIONS FOR HANDLING COMPONENTS WITH GAS GENERATORS

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

IMPORTANT: Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint
- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1.

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act" (law relating to the use of explosives dated 13/09/1976).

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Disassembly and assembly

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
  - 30 minutes for vehicles up to 9/93;
  - 1 minute for vehicles from 9/93
- In the event of breaks in work, a component with a gas generator that has been removed must be secured

against access by other persons.

- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75 °C.
- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Before installing, subject components such as housing, connector pins etc. (including electronic diagnostic components) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing *upwards* . Otherwise the generator will be thrown upwards if it is fired.
- Do not point the firing pellet of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
  - Disconnect battery
  - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

72 12 ... UNLOCKING/LOCKING AIRBAG PLUG CONNECTIONS

WARNING: READ AND COMPLY WITH safety regulations for handling airbag modules and pyrotechnical belt tensioners.

IMPORTANT: An airbag plug connection must be replaced if it is damaged. Sourcing reference for airbag repair instructions (with plug connection), refer to BMW Parts Service.

Following versions of plug connections on airbag module/gas generator are possible:

- Airbag plug connection on gas generator/airbag module is offset by 90°
- Airbag plug connection on gas generator/airbag module is straight (3 versions)

Airbag plug connection on gas generator/airbag module offset by 90°

There are two ways of unlocking this airbag plug connection on the gas generator/airbag module:

Method 1:

Simultaneously pull cover (1) upwards at lugs on left and right (2).

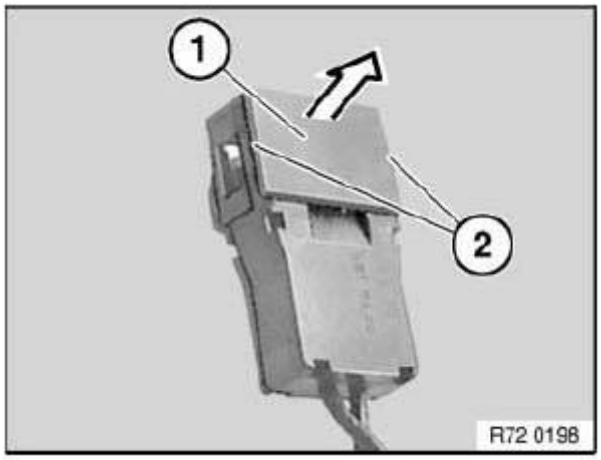


Fig. 21: Pulling Air Bag Plug Connection Cover Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Method 2:

Insert a narrow screwdriver into recess (1) in housing (2).

Carefully pry cover (3) off (4).

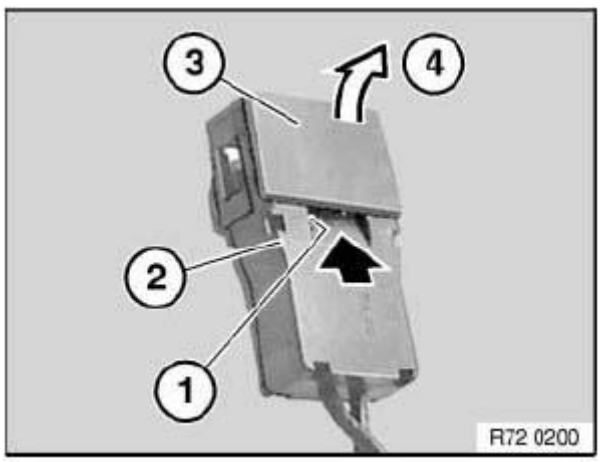


Fig. 22: Removing Air Bag Plug Connection Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Cover (1) is not positioned higher than housing (2).

The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.

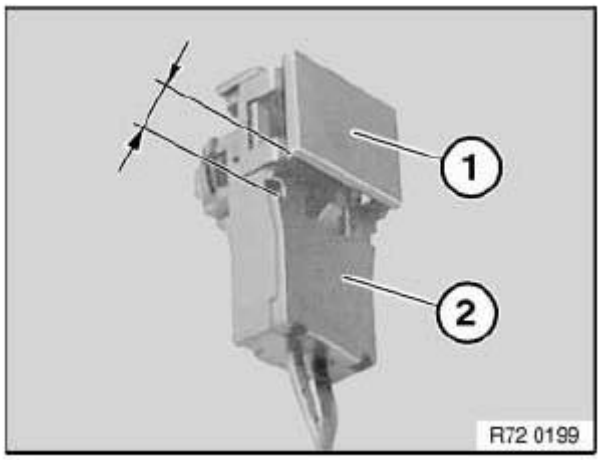


Fig. 23: Identifying Air Bag Plug Connection Cover And Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

After attaching airbag plug connection to gas generator/airbag module, press cover (1) downwards until it rests flat on housing.

Check that it catches properly.

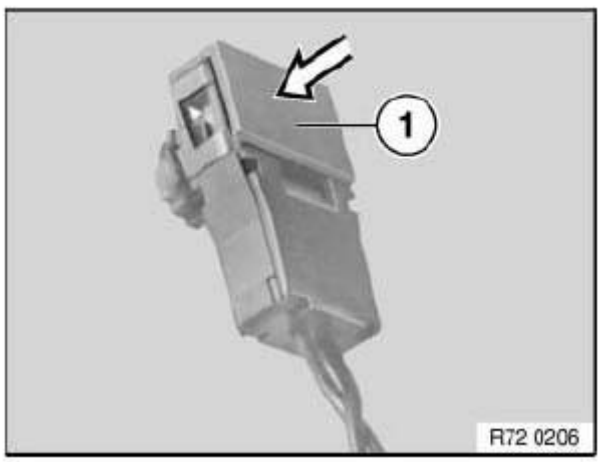


Fig. 24: Pressing Cover Downwards
Courtesy of BMW OF NORTH AMERICA, INC.

Airbag plug connection on gas generator/airbag module is straight (2 versions)

Version 1:

Press locking/unlocking plate (1) at edge (4).

Locking/unlocking plate (1) snaps upwards at opposite edge (3) and releases detent lug (2).

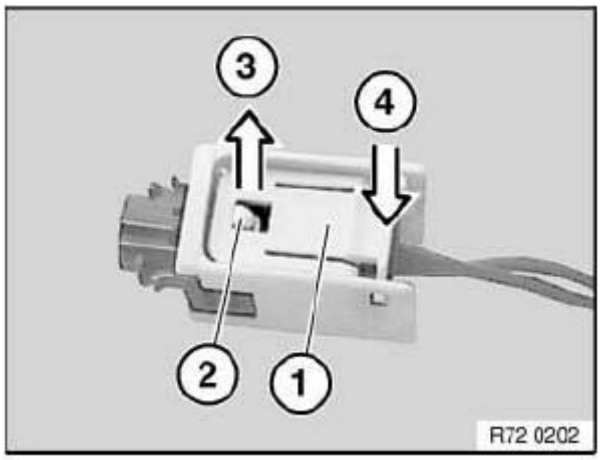


Fig. 25: Pressing Locking/Unlocking Plate At Edge
Courtesy of BMW OF NORTH AMERICA, INC.

The airbag plug connection is unlocked and can now be detached from the gas generator/airbag module.

Fig. 26: Identifying Airbag Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

After attaching airbag plug connection to gas generator/airbag module, check whether detent lug (2) is visible in opening of locking/unlocking plate (1).

Only if the detent lug (2) is visible will the airbag plug connection gas generator/airbag module be correctly engaged.

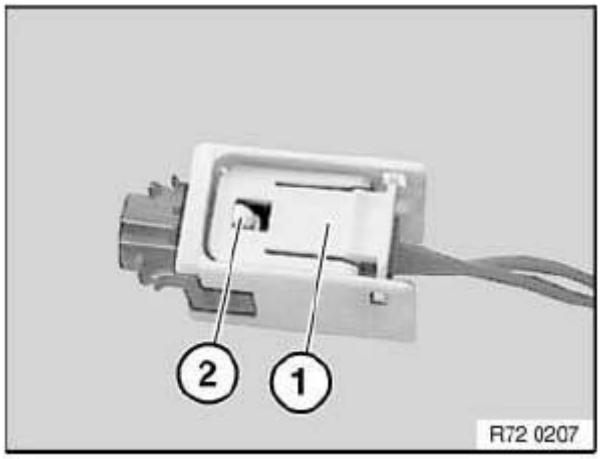


Fig. 27: Identifying Detent Lug And Locking/Unlocking Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2:

Press locking/unlocking plate (1) on edge (3) and pull plug (2) out of plug housing (4).

Installation:

Only if the detent lug is visible in opening (5) will the gas generator/airbag module plug connection be correctly engaged.

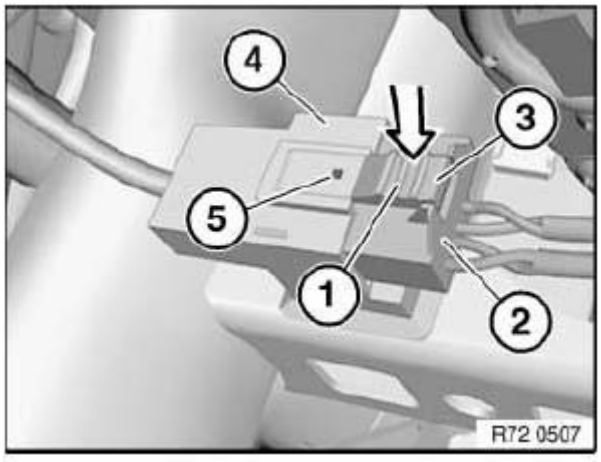


Fig. 28: Pressing Locking/Unlocking Plate On Edge
Courtesy of BMW OF NORTH AMERICA, INC.

Version 3:

Press lock button (1) and pull out plug (2) up to initial engagement position.

Detach plug (2) from firing pellet.

Installation:

Insert plug connection in initial engagement position in gas generator/airbag module and engage in final engagement position.

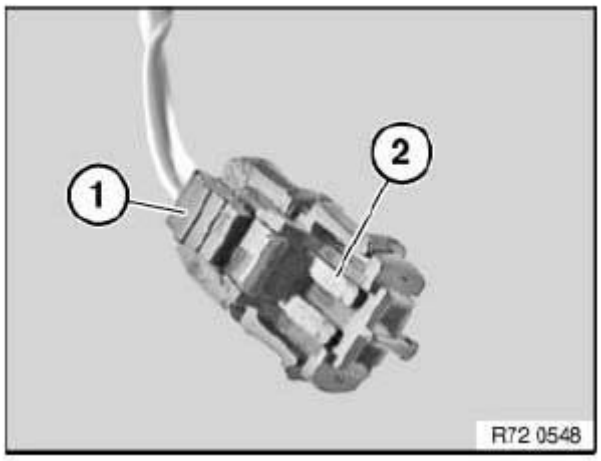


Fig. 29: Identifying Lock Button And Detent Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Illustration of version 3 with gas generator:

A. Initial engagement position
B. Final engagement position

1. Lock button
2. Gas generator

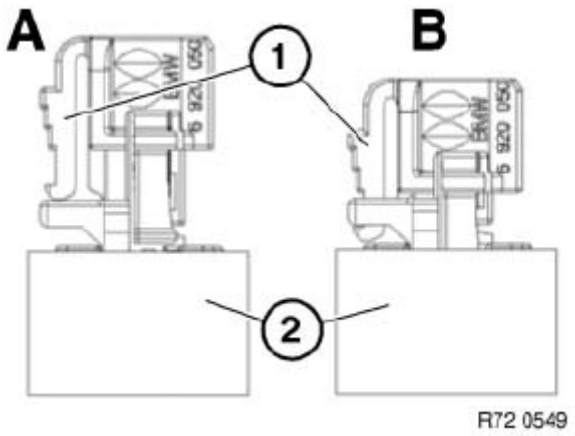


Fig. 30: Identifying Gas Generator With Lock Button
Courtesy of BMW OF NORTH AMERICA, INC.

Version 4 - Crash-active head restraint:

Press locking clip at edge and disconnect plug (1).

Installation:

Check for correct engagement.

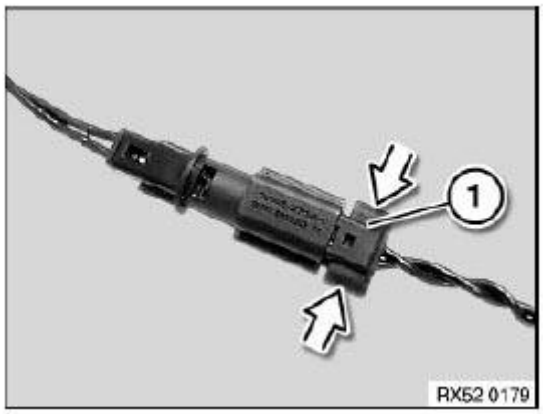


Fig. 31: Pressing Locking Clip At Edge
Courtesy of BMW OF NORTH AMERICA, INC.

ELECTRIC POWER STEERING (EPS)

The main difference between hydraulic and electric power steering systems is in the method of generating the power assistance force that reduces the amount of force that the driver has to apply to the steering wheel.

Hydraulic power steering systems feature a pump that is driven either by a belt running off the engine or by an electric motor. The pump is part of a hydraulic system which generates the fluid pressure/flow that is used to produce the power assistance for steering.

Electric power steering systems produce the power assistance force directly by means of an electric motor that transmits its torque either to the steering column or the steering gear. Therefore, such systems generally require extra gearing to connect the electric motor to the existing steering system components.

Otherwise, the basic design of the steering system is the same (e.g. rack-and-pinion steering gear for both hydraulic and electric power steering systems).

The steering characteristics, e.g. amount of steering force required, progression of steering force, feedback from the roadwheels, are subject to strict development specifications that have resulted in continual optimization of the hydraulic power steering systems so far used. The new electric power steering systems have to match up to the outstanding steering characteristics of BMW vehicles BMW owners have come to experience.

VERSIONS OF ELECTRIC POWER STEERING

The table below categorizes EPS systems on the basis of the mounting position of the servo unit consisting of electric motor and reduction gearing. With the advent of EPS, the method of generating the power assistance for steering changes from hydraulic to electrical means.

INDEX EXPLANATION REFERENCE CHART

Index	EPS with APA	C-EPS
Vehicles	Z4 (E89)	Z4 (E85, E86)
Manufacturer	ZF	ZF
Type of Motor	Brushless Motor	Brushless Asynchronous Motor
Location of Motor and Reduction Mechanism	Parallel to Steering Rack	Upper Part of Steering Column Inside Passenger Compartment
Design of Reduction Mechanism	Belt and Ball Screw Drive	Worm Shaft and Gear

DISTINCTION FROM ACTIVE STEERING

The electric motor of an EPS system is capable of superimposing additional force in addition to the force applied by the driver. The EPS is able to determine the level and timing of that force independently of such factors as the engine speed.

The rigid link between the steering wheel and the front wheels remains unchanged with electric power steering. The gear ratio of the rack is fixed, so the position of the steering wheel is always directly related to the position of the front wheels.

The electric motor in an active steering system, by contrast, is capable of superimposing a steering angle (which changes the ratio between steering wheel and front wheels) but not a steering force.

The steering train of an active steering system is split by a double planetary gear. This enables the active steering to alter the steering angle of the roadwheels without it being felt by the driver through the steering wheel.

In order for the wheels to adopt the total steering angle produced by the steering wheel position plus the superimposed adjustment, a bracing force is required: the driver has to hold the steering wheel firmly. A pump unit is also required. This can only be of the hydraulic type on active steering systems. Only hydraulic pump units are currently capable of providing the combination of high positioning force and positioning speed.

FEATURES

The use of electric power steering provides many advantages for the BMW customer, the environment and the BMW Group.

Interacting with the well-proven suspension concepts, a unique combination of driving comfort and dynamics is achieved. The steering properties (e.g. the level of steering torque assistance and damping) can be finely tuned by correspondingly programming the electrical system while ensuring optimum adaptation to the different vehicle philosophies.

Thus, despite the use of identical mechanical components, the system will be capable of perfect adaptation to future BMW models.

Where more precise steering and better handling characteristics are desired for a more sports-style model, it can be achieved by reducing the amount of power assistance.

Although the driver then has to apply slightly more force to the steering wheel, the feedback from the roadwheels gives the more "direct" feel desired.

By contrast, a greater degree of power assistance can be programmed for models whose steering characteristics are to be more comfort-orientated.

With the disappearance of the hydraulic system (consisting of pump, hoses, cooler, fluid, etc.), assembly of the steering on the production line is more efficient for the manufacturer. The EPS steering system is supplied as a pre-assembled unit and fitted to the vehicle as such. In addition, the EPS also eliminates the environmental hazard of hydraulic fluid leakage.

Because the electric motor is activated only when required (when steering but not when driving straight ahead) fuel consumption is reduced and the effective power output of the combustion engine increased when compared to a conventional hydraulic power steering system.

The example figures below illustrate the difference in power consumption between the two steering systems.

POWER CONSUMPTION REFERENCE CHART

Power Consumption	Electric Power Steering	Hydraulic Power Steering
Minimum Demand	10 Watts	300 - 400
Maximum Demand	1,000 Watts	2,000

FEATURES OF ELECTRIC POWER STEERING

Improved Handling Dynamics

- Steering characteristics perfectly adapted to vehicle model
- Active return to center
- Linear dynamics benefits of up to 2 kW

Greater Driving Comfort

- Steering train isolated from suspension vibration while still transmitting the important road feedback (different road surface conditions) to the driver
- Improved isolation of interference from the road surface (less steering judder)
- Electronically controlled, speed-dependent power-assistance (e.g. greater when parking)

Greater Driving Safety

- Servotronic function: EPS assists the driver to hold the correct line, particularly at high speeds, by providing a lower level of power assistance than at low speeds.
- Steering wheel backlash is reduced by active speed-dependent damping. This function also reduces the vehicle's tendency to slew in response to abrupt steering wheel movements made by the driver.

Better Environmental Credentials

- Fuel saving of approx. 0.2 l per 100 km
- No possibility of leakage from the hydraulic system

PRINCIPLES OF OPERATION

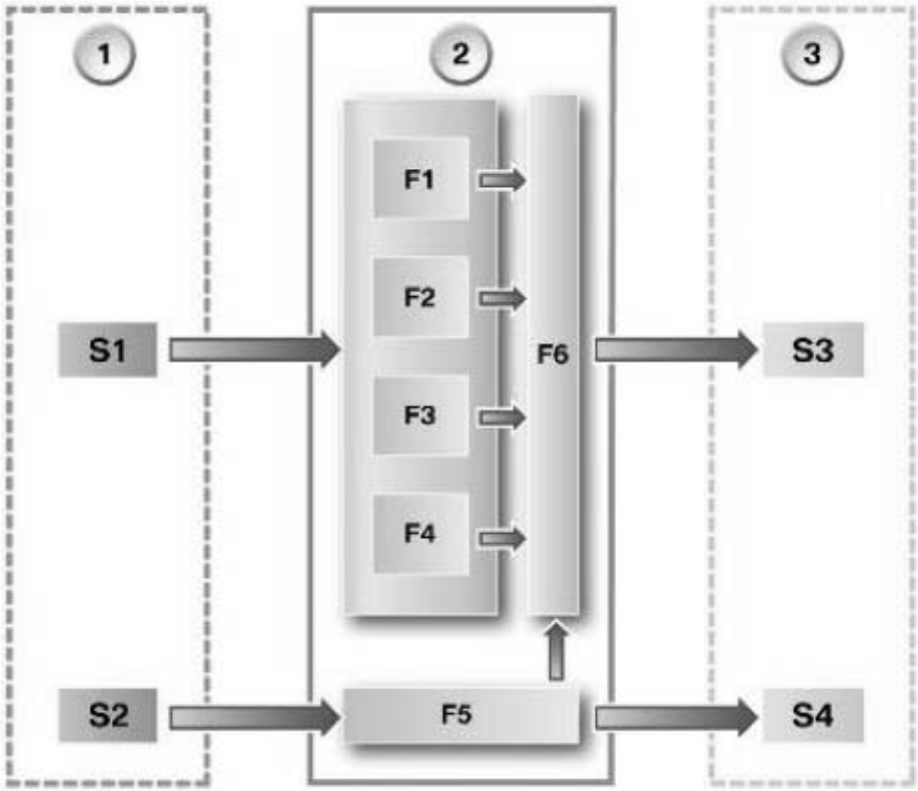


Fig. 1: Overview Of EPS Functions
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Input
2	EPS control unit
3	Output
S1	Input signals for EPS control and modulation functions o Steering force applied by driver o Road speed and other variables that describe the driving situation o Steering angle, steering angle rate of change
S2	Input signals for EPS status control o Terminal 15 on/off

	o Engine running/not running
F1	"Speed-dependent power steering assistance" function
F2	"Active steering wheel return" function
F3	"Active damping" function
F4	"Active roadwheel feedback" function
F5	"Status control" function
F6	"Co-ordination of specified settings" function
S3	Output signal of EPS control and modulation functions: control of electric motor
S4	Output signal of EPS status control: o Demand for higher cooling capacity o Control of warning and indicator lamps

EPS INPUT VARIABLES

EPS INPUT VARIABLES REFERENCE CHART

Steering Column Switch Cluster (SZL)	
Transmitter	Steering column switch cluster with steering-angle sensor
Signal	Steering angle set by driver
Transmitted via	PT-CAN
Receiver	EPS control unit
Function	Active steering-wheel return

DYNAMIC STABILITY CONTROL REFERENCE CHART

Dynamic Stability Control (DSC)	
Transmitter	Dynamic stability control with DSC sensor
Signal	Road speed and other variables that describe the driving situation
Transmitted via	PT-CAN
Receiver	EPS control unit
Function	Steering power assistance, active roadwheel feedback

DIGITAL MOTOR ELECTRONICS REFERENCE CHART

Digital Motor Electronics (DME)	
Transmitter	Digital motor electronics
Signal	Engine running
Transmitted via	PT-CAN
Receiver	EPS control unit
Function	Status control

CAR ACCESS SYSTEM REFERENCE CHART

Car Access System (CAS)	
Transmitter	Car Access System

Signal	Terminal 15 status
Transmitted via	PT-CAN
Receiver	EPS control unit
Function	Status control

EPS OUTPUT VARIABLES

DIGITAL MOTOR ELECTRONICS REFERENCE CHART

Digital Motor Electronics (DME)	
Transmitter	EPS control unit
Signal	Demand for greater cooling capacity
Transmitted via	PT-CAN
Receiver	Digital motor electronics
Function	Control of electric fan

INSTRUMENT CLUSTER REFERENCE CHART

Instrument Cluster (Kombi)	
Transmitter	EPS control unit
Signal	Request for failure message
Transmitted via	PT-CAN
Receiver	Instrument cluster
Function	Control of warning and indicator lamps

DME FUNCTIONS USED BY EPS

Intelligent Alternator Control

With the advent of "intelligent alternator control" (IGR) on the DME as an additional means of CO2 reduction, the alternator voltage is adjusted according to the driving situation and battery charge level. Therefore, there will be periods in which the electrical system voltage is at the level that has been normal up to now (approximately 13.8 V). However, there will also be situations in which the voltage drops to around or just below 12 V.

The EPS components, and in particular the electric motor, are rated for a power supply of 12 V. At that level, the requirements in terms of maximum steering power assistance and speed are satisfied.

If the maximum EPS output were demanded at an alternator voltage of 12 V, the high current draw by the electric motor would produce a voltage drop on the EPS power supply line. The consequence would be an EPS input voltage of substantially below 12 V and, therefore, a reduced level of steering power assistance.

In order to prevent such an undesirable situation occurring, there is an additional IGR function for the EPS that is implemented without additional exchange of signals with the EPS and comprises the following features:

- Observation of whether an operating status exists in which high EPS output is required.

- The bus signals indicating steering angle rate of change and road speed are monitored for that purpose. A high level of EPS output is identified when the steering angle rate of change is high at the same time as the road speed is low.

- Action: Increase of alternator output and temporary increase of electrical system voltage when high EPS output is detected.

This function ensures that the power supply at the EPS input terminals always provides at least the rated voltage of 12 V regardless, to a great extent, of other variables.

NOTE: **Detecting statuses involving high EPS output and raising the electrical system voltage constitute a control cycle that is completed within 2 seconds at most. As it is also an infrequent situation, it is unlikely that it will be the subject of customer complaints. If a particularly observant customer complains of momentarily reduced power steering assistance, this control cycle may possibly be the cause. If there are repeated complaints, performing a diagnosis on the power supply is advisable.**

Speed-dependent Power Steering Assistance

The Servotronic function that is only achievable by means of additional system complexity on hydraulic steering systems is implemented in the form of software on the electric power steering system and is therefore available with EPS.

The customer expects the lightest and smoothest steering movement possible when maneuvering or parking into spaces. Less sensitive steering setup is required when driving at high speed so that the vehicle can be kept on course more effectively.

Based on the sensor signals indicating the vehicle's road speed and the steering torque applied by the driver, the EPS provides a high level of power steering assistance at low speeds and when stationary (maximum convenience).

At high speeds on the other hand, the EPS demands greater steering force from the driver by reducing the level of power steering assistance. This helps the driver to hold a constant line.

As can be seen from the graph, the level of power assistance is computed on the basis not only of vehicle speed but also of the steering torque applied by the driver. If the driver applies a small amount of turning force to the steering wheel, the assistance from the EPS also initially remains at a relatively low level. This produces excellent self-centering characteristics, i.e. the steering does not react over-sensitively from the straight-ahead position.

If the driver applies greater force to the steering wheel, there is a smooth transition to a steeper curve gradient. As a result, the driver obtains the expected high degree of assistance when making abrupt steering movements or tight maneuvers.

The characteristics described here have been adopted by the EPS from the familiar hydraulic steering systems.

The transition between the curves is not abrupt but progressive. The EPS calculates appropriate transitional

levels where necessary.

The steering characteristics of the EPS is influenced by the driver as in other vehicles by pressing the driving dynamics button.

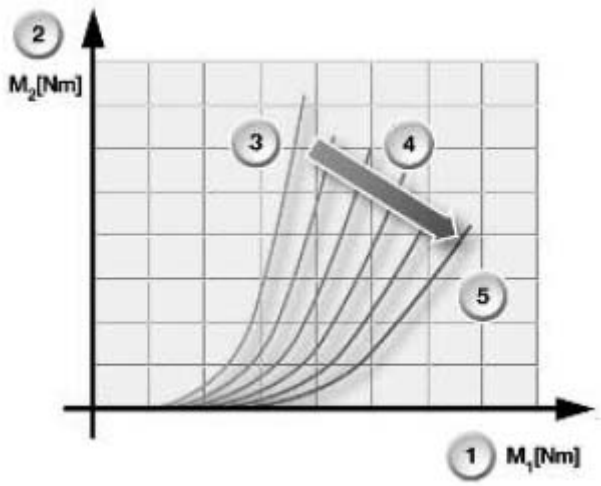


Fig. 2: EPS Speed-Dependent Power Steering Assistance Graph
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Steering torque applied by driver
2	Power assistance torque provided by EPS
3	Vehicle road speed equal to zero
4	Vehicle road speed increases
5	Vehicle road speed at maximum

Active Steering-wheel Return

In addition to the natural self-centering characteristics inherent in the steering and suspension systems, this function assists steering-wheel return by appropriate operation of the electric motor.

The following signals are required for this purpose:

- Road speed
- Steering torque applied by driver
- Steering angle and
- Steering angle rate of change

However, the steering angle signal is only required for calibration with the electric-motor position sensor in order to determine the target position for steering-wheel return (steering angle equal to zero). Thereafter, the active steering-wheel return function uses the electric-motor position sensor signal as it has a higher resolution

than the steering angle sensor signal and thus enables more precise control.

If the steering-angle sensor signal is not available, e.g. due to a fault on the SZL, the active steering-wheel return function cannot operate. The other EPS functions remain active. Customers may possibly describe the resulting vehicle behavior as "pulling to one side" because the steering wheel does not return to the straight-ahead position as precisely as usual.

The necessity for activation of the active steering-wheel return function arises when, for example, the driver allows the steering wheel to slip when exiting a corner. The signal values reflecting that situation which the EPS uses to detect the situation are:

- Steering angle clearly not equal to zero and
- Steering torque applied by driver approximately equal to zero

The electric motor is then operated by the EPS so as to generate a return force that produces smooth return of the steering wheel to a position close to the straight-ahead position.

NOTE: **If a customer complains of the car "pulling to one side" the possible causes to be considered include not only a mechanical problem with the suspension/steering but also a signal or communication fault between the EPS and the steering column switch cluster/steering-angle sensor. In such a situation, the EPS is unable to provide the active steering wheel return function and this may be perceived by the customer as the vehicle "pulling to one side". Therefore, before checking the wheel alignment, the EPS fault memory should be checked and, if necessary, the stored testing sequence followed in order to make certain the signal from the steering-angle sensor is present.**

The clearly perceptible improvement compared with the self-centering characteristics of hydraulic power steering systems is evident from the graph below.

The electric power steering returns to the center position more dynamically and precisely. This applies to all electric power steering systems used by BMW because they all incorporate the active steering-wheel return function.

The self-centering characteristics of an EPS system without active steering wheel return shown on the graph are for comparison purposes only. They reveal themselves to be inferior to those of a hydraulic power steering system. This is due to the greater inertia of the electric motor and reduction gearing.

However, all EPS systems used by BMW incorporate active steering-wheel return and therefore offer the benefits described above.

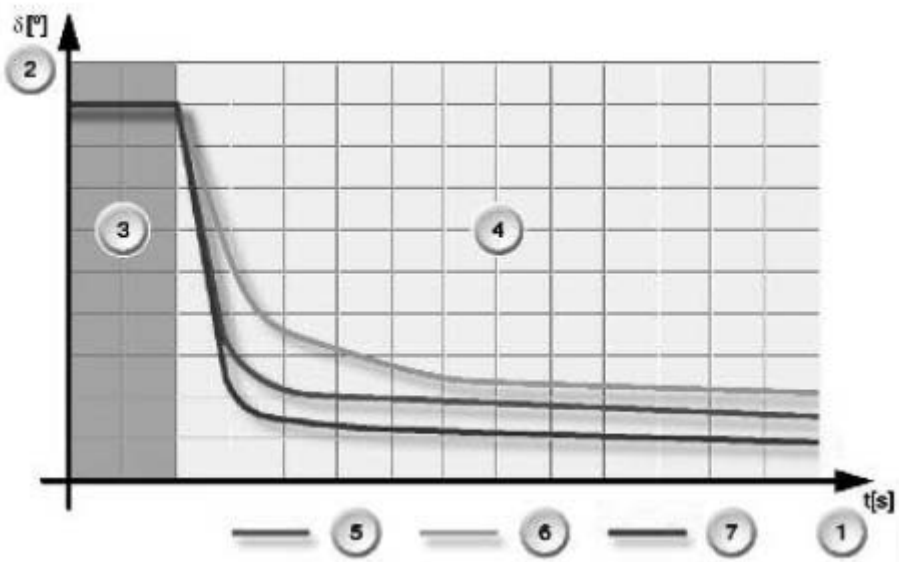


Fig. 3: Self-Centering Characteristics Of Steering Systems
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Time
2	Steering wheel angle
3	Driver holds steering at a constant lock (cornering)
4	Driver lets steering wheel slip (exiting corner)
5	Self-centering characteristics of a hydraulic power steering system
6	Theoretical self-centering characteristics of EPS without active steering-wheel return
7	Self-centering characteristics of EPS with active steering-wheel return

Active Damping

The undesirable steering-wheel movements to be damped can be produced either by inadvertent steering input by the driver or feedback from the road/roadwheels.

Damping Roadwheel Feedback

The design of the front suspension (double link Macpherson strut suspension) on its own ensures that vertical wheel movements produce very little lateral force on the track rods.

Due to the low ratio of the reduction gear by which the electric motor is connected to the steering rack, the inertia of the electric motor also has a damping effect on the forces and movements transmitted from the roadwheels to the steering wheel. Those mechanical damping effects are supplemented by an electronic damping function on the part of the EPS. It analyses the movements of the steering rack (using the signals from the electric-motor position sensor) and operates the electric motor accordingly in response.

This means that feedback from external forces is transmitted in controlled amounts to the steering wheel so that,

on the one hand, the driver obtains sufficient information about the nature of the road surface, but on the other, undesirably extreme steering wheel backlash is prevented.

Damping Steering Input from Driver

Particularly at high speeds, unintentional jerky movements of the steering wheel by the driver have a negative effect on vehicle handling stability. So-called "snatching" of the steering wheel can, under certain circumstances, cause the vehicle to start rocking, which can lead to snaking and the driver ultimately losing control of the vehicle if corrective action is not taken quickly enough.

The EPS detects such steering input and operates the electric motor so as to substantially damp the movements, particularly at high speeds. As a result, vehicle rocking is prevented.

Damping of Steering Input by EPS

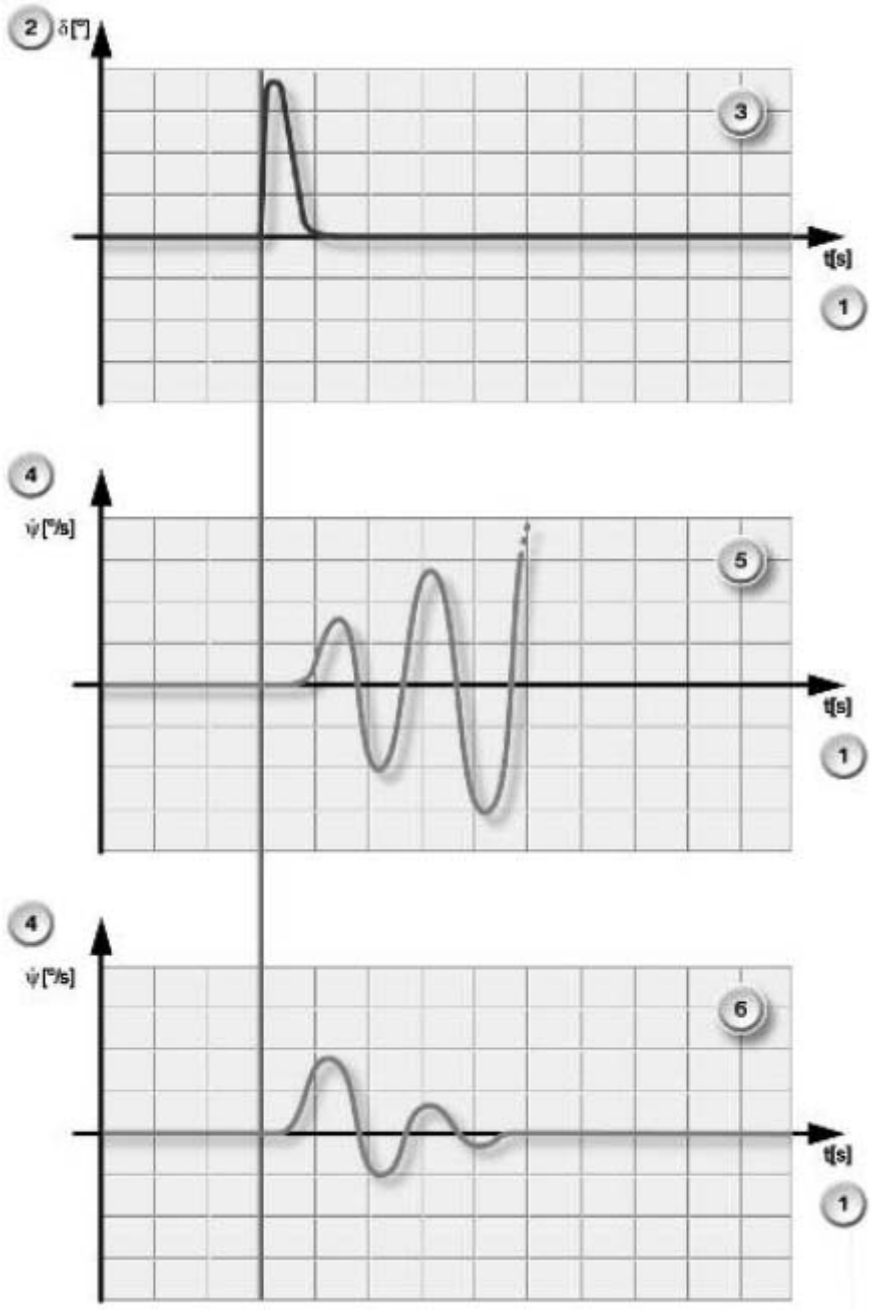


Fig. 4: Damping Of Steering Input By EPS
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Time
2	Steering wheel angle
3	Steering angle progression (steering input by driver, "snatching" the steering wheel)
4	Yaw rate

5	Theoretical vehicle response without active damping: the turning action following the steering input is progressively amplified at high vehicle speed.
6	Desirable vehicle response with active damping: the turning action is heavily damped even at high vehicle speeds.

Active Roadwheel Feedback

Partly due to the damping effect of the inertia of the electric motor, an EPS system can inherently not provide as direct feedback about the nature of the road surface as a hydraulic power steering system.

In order to obtain virtually identical roadwheel feedback characteristics on vehicles with EPS, the EPS analyses information that describes the vehicle's dynamic handling situation. From that information, the EPS computes additional "EPS road surface data". As a result, the driver obtains better roadwheel feedback characteristics which are very similar to those of a hydraulic power steering system.

Control

The EPS status control function makes the overriding decision as to whether operation of the electric motor is permissible or not. It produces a clearance signal that is sent to the EPS function that is co-ordinating the subordinate specified settings of the control and modulation functions.

The conditions for allowing operation are the following:

- Ignition must be switched on
- Engine must be running
- There must be no EPS input signal faults or EPS internal faults present

The response to detected faults described below represents an exception.

Status Shutdown in the Event of Faults

A primary aim in the development of the EPS was to ensure that vehicle response in the event of faults would remain manageable by the driver. Therefore, under no circumstances must a sudden high steering force in either direction be allowed to occur. For that reason, the EPS has numerous monitoring functions for detecting faults on the sensors, actuators and associated systems that are involved in EPS operation.

All fault statuses in which reliable and correct control of the electric motor is not possible result in the disabling of motor operation and, therefore, shutdown of the EPS functions.

The consequence of that is that the driver no longer benefits from the convenience of power-assisted steering. More importantly, however, incorrect control of the electric motor is prevented.

NOTE: The loss of power steering assistance in the event of faults constitutes an intended system response on the part of the EPS.
Although such a response may be slightly unnerving for the driver, the vehicle remains fully steerable with greater physical effort.

Loss of power steering assistance in the event of faults occurs both with electric and hydraulic power steering. The two systems thus also behave in a similar manner in response to faults.

In such a fault situation, a yellow warning lamp lights up on the instrument cluster. The driver is also notified of the fact that power steering assistance from the EPS is no longer available by display of the appropriate Check Control symbol together with the explanatory message on the Central Information Display.

Fig. 5: Identifying Warning Lamp Of Power Steering Fault
Courtesy of BMW OF NORTH AMERICA, INC.

Co-ordination of Specified Settings

The specified settings for the control and modulation functions for operating the electric motor are co-ordinated at a central point by the EPS software. If a clearance signal from the status control function is present, the individual specified settings are normally added together and signalled as a total value.

In certain transitional situations the specified settings are filtered before they are signalled.

The following are examples of such cases:

- The EPS goes into operation after the engine is started. The power assistance torque is increased progressively until the desired level is reached.
- The EPS reduces the power steering assistance for function-related reasons (see also the section "**SUPPLEMENTARY FUNCTIONS**").

In the event of a fault the control signal for the electric motor is abruptly cancelled instead of being filtered in order to prevent incorrect operation as quickly as possible.

Supplementary Functions

The functions described below are encountered only rarely in special operating situations. The information given here can help to distinguish those special operating statuses, which do not require repairs, from genuine faults when handling complaints from customers.

Protection Against Overload

The EPS reduces the degree of power steering assistance if the temperature of EPS components becomes too high. By limiting motor operation, the amount of heat generated by the EPS itself is also limited, thereby protecting the components against excessive thermal stress.

This action starts to come into effect from a temperature of approximately 100°C and escalates to the point where power steering assistance is reduced to zero at a temperature of 115°C.

Upwards of a certain degree of function restriction, the warning light on the instrument cluster is switched on (see the section "**SHUTDOWN IN THE EVENT OF FAULTS**") and a fault registered in the fault memory.

In addition to reducing power steering assistance, the EPS also requests higher electric fan output from the DME in order to produce a greater cooling effect.

This type of overload can occur at high ambient temperatures combined with simultaneous high degrees of steering activity, especially when stationary.

Another overload situation can occur if an attempt is made to turn the front wheels against a solid obstacle (e.g. a kerbstone). If this situation occurs repeatedly at short intervals, the degree of power steering assistance is similarly reduced. This firstly protects the EPS components against excessive mechanical stresses, and secondly signals to the driver that there is a solid object preventing the wheels turning.

The EPS detects such situations by comparing the control signals to the electric motor with the motion of the motor.

NOTE: The EPS reduces the power steering assistance in overload situations. If customer complaints are received, the customer should be questioned as to the situation in which the symptoms occurred before commencing any repair work. If necessary enlighten the customer as to the way in which these protective functions operate.

End Stop as Software Function

Although the EPS steering gear also incorporates mechanical end stops, there is a function that steeply reduces the level of power assistance shortly before the mechanical end stops are reached. Although the driver will perceive this as increased steering resistance, it makes turning the wheels to full lock much smoother overall.

In addition, this function reduces the stresses on mechanical and electrical components of the steering system and thus contributes to the achievement of long service life combined with reliable operation.

SERVICE INFORMATION

BRAKES

For safety reasons, the parking brake cannot be activated for as long as the EMF control unit is in installation mode. If the EMF button is pulled, the EMF indicator lamp in the instrument cluster will flash yellow.

The exact procedure for bedding-in the service brakes is described in the Repair Instructions. The instructions must be followed exactly.

ADAPTIVE M CHASSIS AND SUSPENSION

For standardization reasons, the continuous electronic damper control on the E89 is simply referred to as EDC.

A detailed functional description of the EDC van be found in Background Material E65 Dynamic Driving Systems from April 2001.

DYNAMIC DRIVING SYSTEMS

Cruise control with brake function is described in detail in the Participant's Manual E90 Dynamic Driving Systems.

Dynamic driving switch

The yellow DSC indicator and warning lamp and the DTC button have new symbols. Beginning with the F01/F02, these new DSC symbols will replace those previously used.

REPLACING AN EPS SYSTEM

The EPS components consisting of steering torque sensor, EPS control module unit, electric motor with position sensor, reduction gear and steering rack form a single unit (often referred to as "EPS steering rack assembly") that can only be replaced as a complete unit. To do so, the unit has to be disconnected from the track rods and the lower end of the steering column.

After a new EPS steering rack is fitted, a front wheel and tracking alignment check is required. The commissioning sequence involves coding the EPS to match the vehicle model and the diagnosis function for learning the end-stop positions.

INTELLIGENT ALTERNATOR CONTROL AND EPS

Detecting statuses involving high EPS output and raising the electrical system voltage constitute a control cycle that is completed within 2 seconds at most. As it is also an infrequent situation, it is unlikely that it will be the subject of customer complaints.

If a particularly observant customer complains of momentarily reduced power steering assistance, this control cycle may possibly be the cause. If there are repeated complaints, performing a diagnosis on the power supply is advisable.

ACTIVE STEERING WHEEL RESET

If a customer complains of the car "pulling to one side" the possible causes to be considered include not only a mechanical problem with the suspension/steering but also a signal or communication fault between the EPS and the steering column switch cluster/steering-angle sensor. In such a situation, the EPS is unable to provide the active steering wheel return function and this may be perceived by the customer as the vehicle "pulling to one side".

Therefore, before checking the wheel alignment, the EPS fault memory should be checked and, if necessary, the stored testing sequence followed in order to make certain the signal from the steering-angle sensor is present.

PROTECTION AGAINST OVERLOAD

The EPS reduces the power steering assistance in overload situations. If customer complaints are received, the customer should be questioned as to the situation in which the symptoms occurred before commencing any repair work.

If necessary enlighten the customer as to the way in which these protective functions operate.

SHUTDOWN IN THE EVENT OF FAULTS

The loss of power steering assistance in the event of faults constitutes an intended system response on the part of the EPS.

Although such a response may be slightly unnerving for the driver, the vehicle remains fully steerable with greater physical effort.

ELECTRICAL CONNECTIONS

If the EPS steering rack assembly has to be replaced, only the power supply and bus connection have to be disconnected and not the connection for the steering torque sensor.

If a customer complains of inadequate power steering assistance, it can be due to a voltage drop across the power supply connection.

Therefore, in such cases the power supply connection should be checked for corrosion.

STEP-DOWN GEAR

If a defective gaiter is discovered, it should be replaced so as to prevent water entering the steering gear. At the same time as replacing the gaiter, the water drain valve at the lowest point of the reduction gear should also be replaced and is included in the repair kit.

Corrosion on the moving parts of the steering gear does not normally result in heavy steering. Instead, corrosion is frequently a cause of noises from the steering mechanism.

If customers complain of loud steering noises and if they are definitely attributable to the EPS steering rack, the complete EPS steering rack assembly must be replaced.

1.0 ZF GEMMER STEERING

The ZF Gemmer steering is permanently filled with oil. There is no drain plug.

2.0 ZF RACK AND PINION STEERING WITHOUT POWER ASSIST

The ZF rack and pinion steering is lubricated for its service life and therefore does not require servicing.

In case of repair, steering components on E21 vehicles are to be lubricated with a sodium-based grease, with a temperature range of -30°C to +75°C.

BMW PART NUMBER SPECIFICATION

Calypsol D 4024	BMW Part No. 32 11 1 116 929

3.0 BALL AND NUT OR RACK AND PINION POWER STEERING

Only reputable brand Automatic Transmission Fluid (ATF) of Dexron® III formulation may be used for the power steering and power steering pump.

In case of brief hydraulic noise after starting at low outside temperatures, we recommend replacing the red ATF with green CHF or LHM oil (see below).

4.0 ZF Ball and Nut Power Steering with H31 System

The approved oils for BMW models with power steering and the H31 brake booster system are identical with those oils approved for power steering without the H31 system except for the following:

E32 models with self-leveling rear suspension and mutual oil supply tank in the engine compartment.

Countries with very low outside temperatures (e.g. Canada) had their power steering systems filled at the factory with Pentosin CHF 7.1 since 9/87 through 9/91. This is also to be used on vehicles built before 9/87.

Since 9/91, vehicles now use Pentosin CHF 11S instead of CHF 7.1.

BMW PART NUMBER SPECIFICATION

Pentosin CHF 7.1	BMW Part No. 81 22 1 468 879
Pentosin CHF 11S	BMW Part No. 82 11 1 468 041

These cars are marked with a pertinent label located close to the oil tank.

LHM oils (green color) of the following manufacturers may also be used instead of Pentosin (CHF 7.1):

Shell LHM

Castrol LHM

Exxon LHM

The mixing of CHF, LHM oils and ATF is not permitted.

Pentosin CHF 4548 was used on vehicles built before 9/87 but is no longer available. However, mixing of Pentosin CHF 7.1 with residual quantities of Pentosin CHF 4548 are permitted in these earlier vehicles. Mixing of these two oils is not permitted for E32 / E38 vehicles.

The hydraulic system for power steering and power-assisted brakes must be drained as completely as possible when changing from one type of oil to the other.

All oil supply reservoirs are marked with the type of oil being used - ATF or CHF.

5.0 OIL CHANGE FOR POWER STEERING

Regular oil changing is not necessary. However, it is recommended to replace the oil after completion of repairs (unit or line replacement). Use ATF of Dexron® III formulation.

6.0 HORN SLIP RINGS

Approved grease is a copper paste (former BMW Part No. 81 22 9 400 794).

BMW PART NUMBER SPECIFICATION

3M	Part No. 8945
CRC	Part No. 3046 010

3200 ELECTRONIC CHASSIS ALIGNMENT

32 00 620 ADJUSTING REAR AXLE

NOTE: A camber change always means a toe change as well. The camber must therefore be adjusted first.

Adjusting camber

Replace nut (2) and tighten to 5 Nm.

Turn eccentric bolt (1) to adjust camber to setpoint value.

Tighten nut (2).

Tightening torque **33 32 3AZ** .

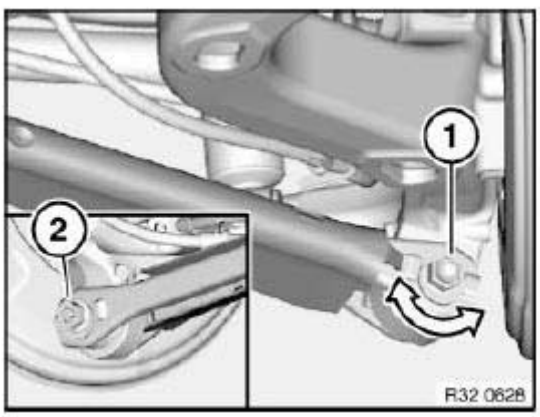


Fig. 1: Turning Eccentric Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting toe

Slacken bolts of bearing block by approx. 1 to 1.5 turns.

Attach special tool 32 3 030 to bolt head and pin (1).

Turn special tool 32 3 030 to adjust toe to specified value.

Tighten down screws.

Tightening torque **33 32 2AZ** .

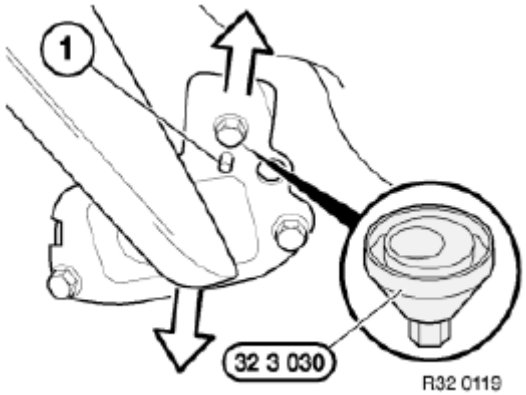


Fig. 2: Attaching Special Tool (32 3 030) To Bolt Head And Pin
Courtesy of BMW OF NORTH AMERICA, INC.

32 00 610 ADJUSTING TOE-IN AND CAMBER ON FRONT AXLE

IMPORTANT: Changes in axle geometry caused by accidents must under no circumstances be rectified by camber adjustment!

NOTE: Camber and toe-in influence each other. Adjust the toe-in first in order to simplify the adjustment procedure.
The centering pin may only be driven or twisted out if the camber is outside the specified tolerance after toe adjustment.

Adjust toe-in

Move steering into straight-ahead position by means of markings on cap (1) and steering gear (2).

Align steering wheel centrally and secure with steering wheel arrester.

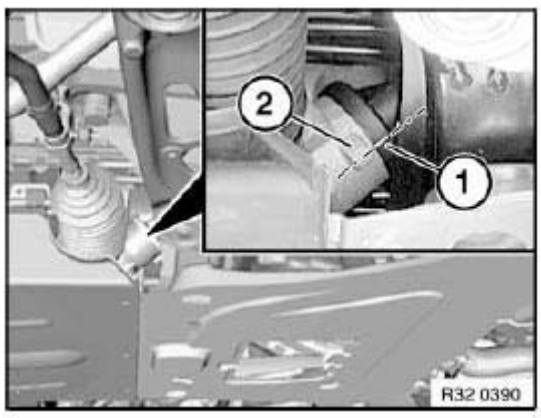


Fig. 3: Identifying Markings On Cap And Steering Gear

Courtesy of BMW OF NORTH AMERICA, INC.

Clean thread on tie rod.

Loosen screw (2).

Turn tie rod (3) and if necessary grip tie rod end (1) to adjust toe-in to setpoint value.

Tighten down clamping nut (2).

Tightening torque **32 21 3AZ** .

If necessary, correct installation position of gaiter.

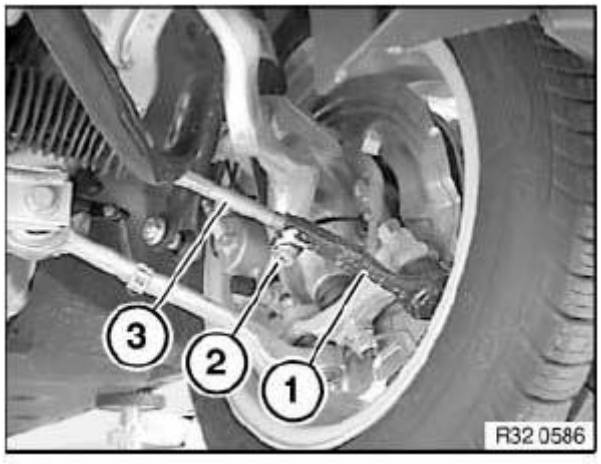


Fig. 4: Identifying Tie Rod With Tie Rod End And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Adjusting camber

Disassemble adjustment tool 32 3 140, recondition and fit with spindle 32 3 146.

A. Previous version (consisting of 32 3 144 and 32 3 145)
B. New version (consisting of 32 3 145, 32 3 146 and 32 3 147)

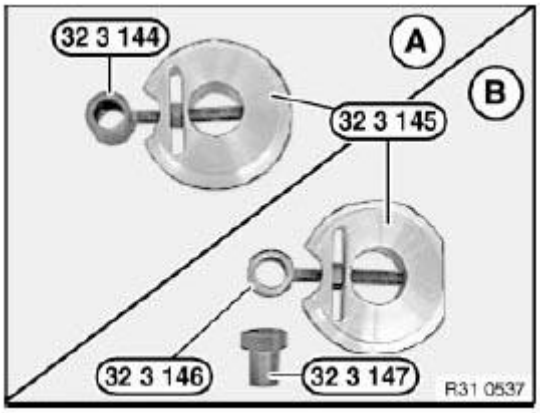


Fig. 5: Identifying Adjustment Tools With Spindles
Courtesy of BMW OF NORTH AMERICA, INC.

Remove protective cap.

Twist/drive out centering pin (1).

Clean wheel arch from below in area of support bearing with compressed air.

Slacken nut (2).

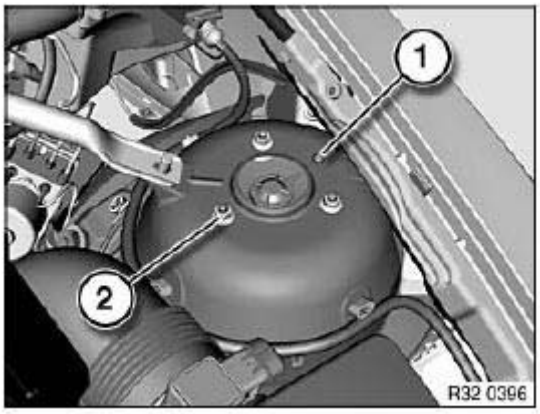


Fig. 6: Identifying Centering Pin And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 32 3 140 into opening in wheel arch.

NOTE: The spindle 32 3 146 must be aligned in such a way that the short end of the guide sleeve (3) points upwards.

Screw knurled nut 32 3 147 onto stud.

Replace nuts (1) and screw on but do not tighten down fully.

Turn nut (2) of special tool 32 3 140 to adjust camber to setpoint value.

Tighten down nuts (1).

Tightening torque **31 31 1AZ** .

Remove special tool 32 3 140.

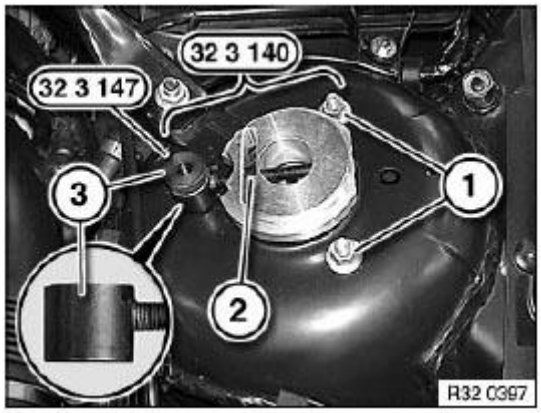


Fig. 7: Identifying Guide Sleeve With Nuts And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Replace nut (1) and tighten down.

Tightening torque **31 31 1AZ** .

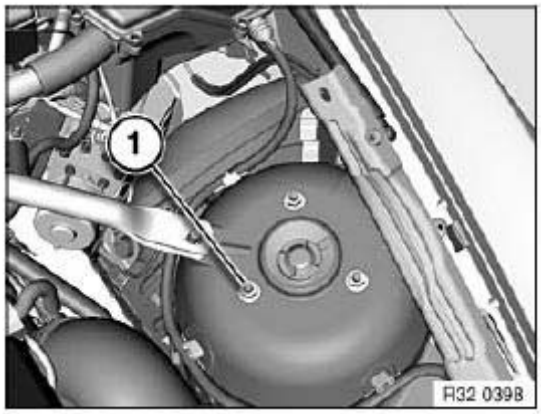


Fig. 8: Identifying Protective Cap Nut
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check directional stability of vehicle, check steering wheel position; if necessary repeat toe-in adjustment

61 31 996 CARRYING OUT STEERING ANGLE SENSOR ADJUSTMENT

NOTE: Steering angle sensor adjustment must be carried out:

- **after adjustment work on the front axle/steering**
- **after all mechanical work on the steering system**
- **after disconnection of battery**
- **after replacement/coding/programming of the following components:**
  - **Fixture for switches of steering column/switch cluster/steering angle sensor**
  - **Dynamic Stability Control (DSC) control unit**

Connect vehicle to BMW diagnosis system.

Select and carry out steering angle sensor adjustment under Service functions.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

  If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

  If the person affected is unconscious, do not administer anything by mouth, place the person in the

recovery position and seek immediate medical attention.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

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31 00 ... FRONT AXLE + STEERING: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

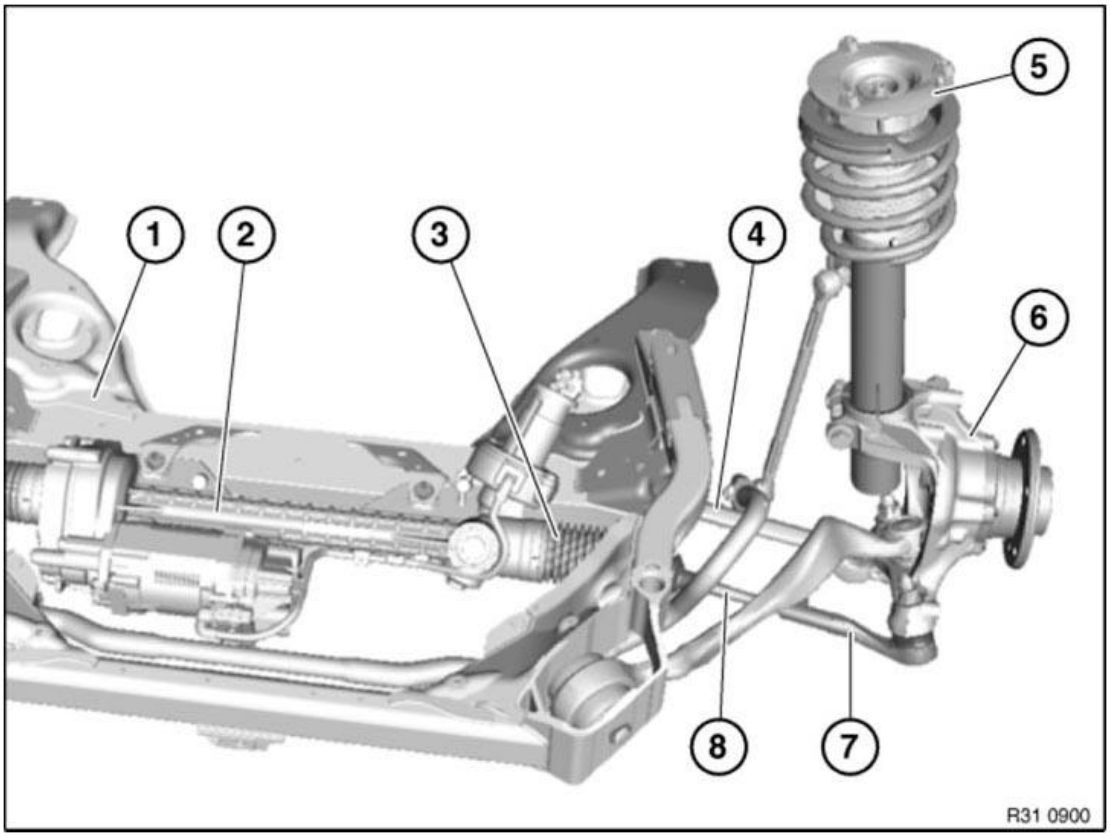
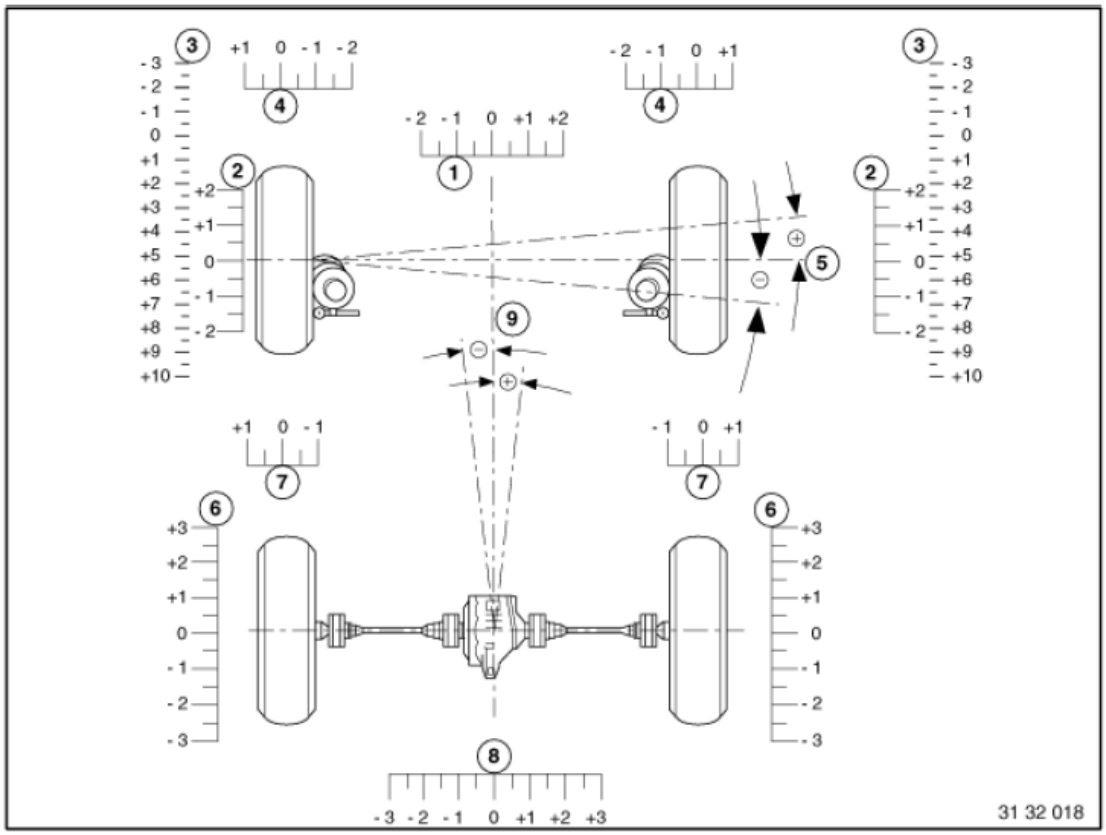


Fig. 9: Identifying Front Axle + Steering Components
Courtesy of BMW OF NORTH AMERICA, INC.

A **WHEEL/CHASSIS ALIGNMENT CHECK** must be carried out after the following work:

- **Release of following screw/bolt connections:**
  - Steering gear to front axle carrier
  - Control arm to front axle carrier
  - Support bearing to body (if centering pin is missing)
  - Tie rod end to tie rod
- **Replacement of following parts:**
  1. Front axle carrier
  2. Steering gear
  3. Gaiter (if the tie rod end has to be screwed off)
  4. Control arm
  5. Support bearing (only if centering pin is missing)
  6. Swivel bearing
  7. Tie rod end
  8. Tie rod



1. Toe
2. Camber
3. Caster (with 10° or 20° wheel lock)
4. Toe angle difference (with 20° wheel lock)
5. Wheel misalignment
6. Camber
7. Rear-wheel position
8. Toe
9. Geometrical driving axis

Fig. 10: Chassis And Suspension Angles Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

1. Toe
2. Camber
3. Caster (with 10° or 20° wheel lock)
4. Toe angle difference (with 20° wheel lock)
5. Wheel misalignment
6. Camber

7. Rear-wheel position
8. Toe
9. Geometrical driving axis

32 00 ... GENERAL INFORMATION AND DEFINITIONS

Toe angle difference

a Toe difference angle

D Centre point of operating circle

The toe angle difference is the angle adjustment of the inner cornering wheel relative to the outer cornering wheel when negotiating a curve. Steering is designed in such a way that angular position of wheels changes as steering lock progresses.

A correctly adjusted toe angle difference produces equal values for left and right lock with consideration of factory tolerances.

Toe angle difference provides information on corresponding operation of steering trapezoid for left or right steering lock from center position.

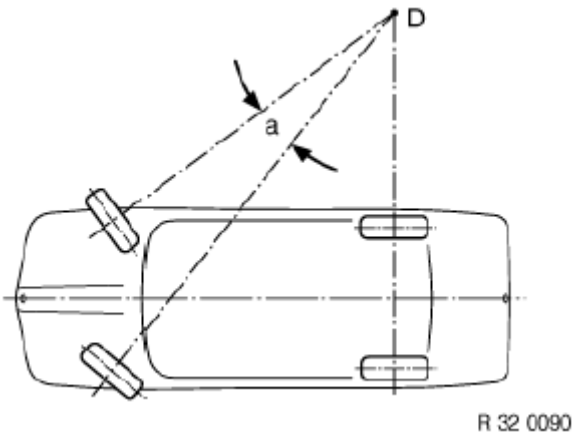


Fig. 11: Identifying Toe Difference Angle From Centre Point Of Operating Circle
Courtesy of BMW OF NORTH AMERICA, INC.

Camber

Inclination of the wheel from the perpendicular.

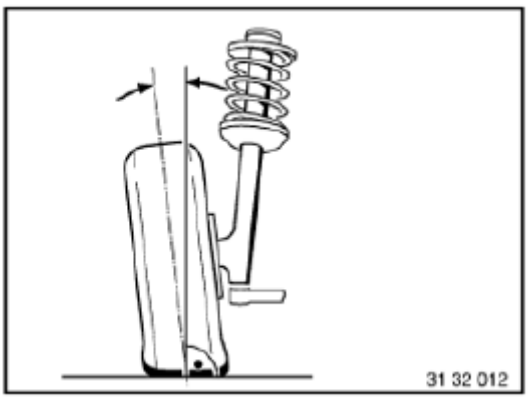


Fig. 12: Identifying Camber (Inclination Of Wheel From Perpendicular)
Courtesy of BMW OF NORTH AMERICA, INC.

Toe

Reduction in distance of front of front wheels to rear of front wheels. The toe-in prevents the wheels from moving apart during driving and thus:

- the wheels from vibrating and grinding
- excessive tire wear
- excessive strain on the steering linkage and its links/joints
- heavy vehicle steering

Measurement is performed in "straight-ahead mode".

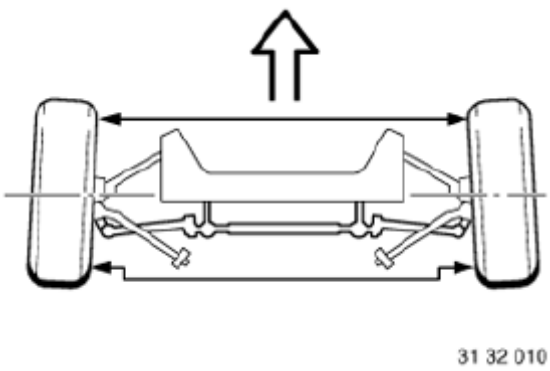


Fig. 13: Identifying Toe-In
Courtesy of BMW OF NORTH AMERICA, INC.

Castor

Is the inclination of the kingpin in the direction of travel viewed from the side. The line through the center point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

Thanks to caster, wheels are pulled and not pushed. In a similar manner to king pin inclination, when driving in curves or around corners, returning forces are reproduced to help return wheels to straight-ahead position.

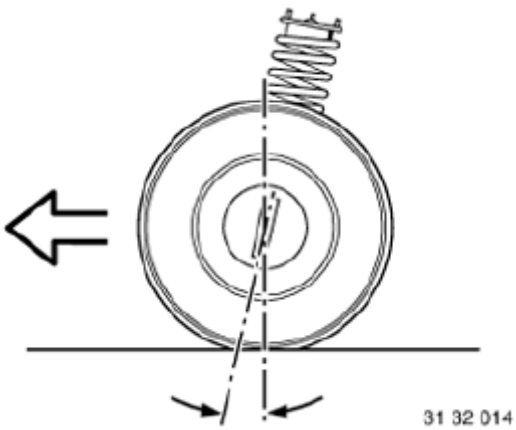


Fig. 14: Identifying Caster
Courtesy of BMW OF NORTH AMERICA, INC.

Geometrical driving axis 1

Is the angle bisector from the total rear-wheel toe.

Front-wheel measurements are taken in reference to this axis.

Symmetrical axis 2

Centre line running through front and rear axles.

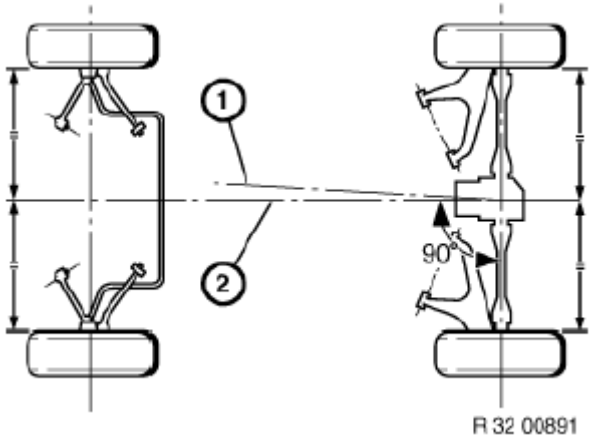


Fig. 15: Identifying Geometrical Driving Axis And Symmetrical Axis
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel misalignment

Angle by which one front wheel is displaced more towards front or rear than the other front wheel. The wheel offset angle is positive when the right wheel is displaced towards the front and negative when it is displaced towards the rear.

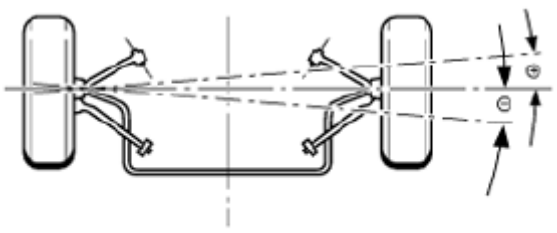


Fig. 16: Identifying Positive And Negative Wheel Alignments
Courtesy of BMW OF NORTH AMERICA, INC.

Kingpin offset/scrub radius

Is the distance from the center of the wheel contact face to the intersection point of the kingpin extension. The line through the center point of the spring strut support bearing and the control arm ball joint corresponds to the "kingpin".

The scrub radius is influenced by camber, kingpin angle and wheel offset of the wheel rim.

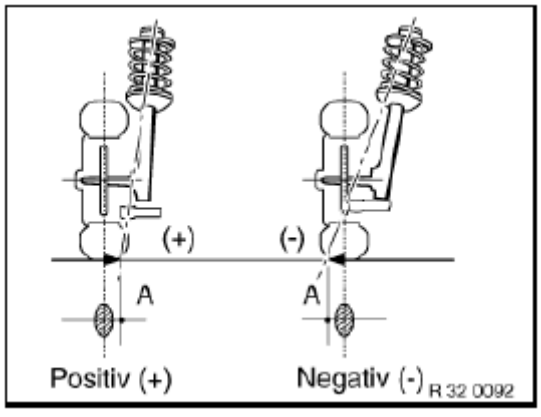


Fig. 17: Identifying Positive And Negative Kingpin Offset
Courtesy of BMW OF NORTH AMERICA, INC.

32 00 ... INFORMATION ON REPLACING STEERING GEAR AFTER ACCIDENT DAMAGE

Situation

In the event of accidents or driving conditions similar to accidents, shocklike loads can cause different types of damage to steering gears. When a steering gear is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering gear and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure

The steering gear must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering gear
   - Version with electric steering gear (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic/electrical assistance)

C. Permissible tolerances exceeded during axle/wheel alignment (include alignment record with invoice/report if necessary)

D. Fire damage

E. Damage, permanent deformation or fractures to:
   - Wheel rims in the event of a negative result from the wheel/axle alignment check
   - Spring struts, steering knuckles, wheel carriers
   - Control arms
   - struts or diagonal members or stabilizers with this function
   - Body-side screwing/bolting points for wheel guide/control components
   - Front axle support
   - Pitman arms
   - Tie rods
   - Steering gear fixtures
   - Steering Column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE: **If the steering gear replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.**

IMPORTANT: The vehicle's type approval will be invalidated whenever the function of any of its safety components is compromised!

32 00 155 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD

NOTE:

- **Read and comply with GENERAL INFORMATION AND DEFINITIONS .**

- **Read and comply with GENERAL CHASSIS DEFINITION .**
- **Check compliance with TEST CONDITIONS , repair vehicle if necessary.**

- If necessary, prepare vehicle hoist.
- Drive vehicle onto vehicle hoist.

NOTE: The front and rear wheels must be positioned centrally on the rotary and sliding plates.

- Remove locking pins from both rotary and sliding plates.

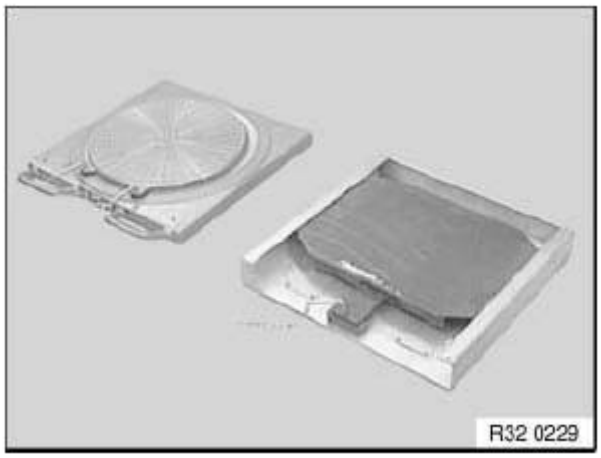


Fig. 18: Identifying Rotary And Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Only use quick-clamping holders with polycontrol pins (1). Other quick-clamping holders are not permitted because of the inaccuracy of measurement!

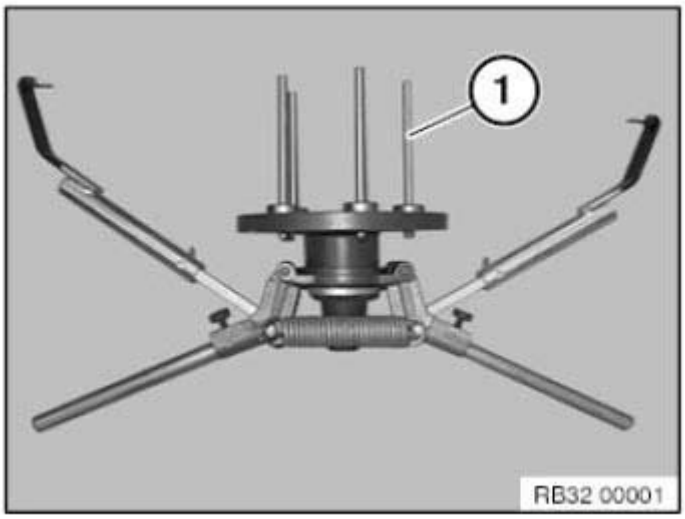


Fig. 19: Identifying Quick-Clamping Holders With Poly Control Arm Pins
Courtesy of BMW OF NORTH AMERICA, INC.

- Attach quick-clamping holder to vehicle and remove clamping levers in area of front wheels
- Attach pickup to quick-clamping holder, align using bubble level and connect to turntables

Fig. 20: Attaching Quick-Clamping Holder To Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, attach spoiler adapter.

Fig. 21: Identifying Spoiler Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, switch on chassis alignment system.
- Enter customer and vehicle data
- Identify chassis and suspension version (standard/VDC suspension) and select vehicle
- Enter tire inflation pressure and tread depth
- Measure and enter **VEHICLE RIDE HEIGHT**
- Install brake tensioner.

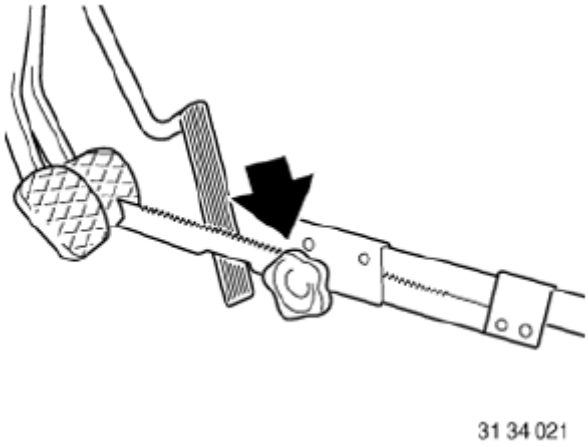


Fig. 22: Locating Brake Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
In order to avoid damaging the front side panel during the "Max. steering angle" drive-in routine, make sure the pickups are removed from the quick-clamping holders/quick-clamping units during output and input alignment. In the process do not detach the connecting cable from the pickups or the rotary plates.

NOTE: **After the drive-in routine, reconnect the pickups to the quick-clamping holders/quick-clamping units, align using the bubble levels and secure in place.**

- Perform input measurement in accordance with equipment manufacturer's instructions.
- Compare nominal values See **WHEEL ALIGNMENT** or **WHEEL ALIGNMENT** with actual values.

Only in event of customer complaint (e.g. poor driving performance):

IMPORTANT: Do not remove screws/bolts (front axle support to engine support or body)!

Slacken all screws/bolts (front axle support to engine support or body) and then retighten to specified torque.

Refer to **LOWERING FRONT AXLE SUPPORT** .

If necessary, adjust front axle and rear axle See **3200620 ADJUSTING REAR AXLE** or **3200610 ADJUSTING TOE-IN AND CAMBER ON FRONT AXLE**

- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system
- Drive vehicle off vehicle hoist

32 00 150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION

NOTE:

- **Read and comply with GENERAL INFORMATION AND DEFINITIONS .**
- **Read and comply with GENERAL CHASSIS DEFINITION .**

- If necessary, prepare vehicle hoist.
- Drive vehicle onto vehicle hoist.

NOTE: **The front and rear wheels must be positioned centrally on the rotary and sliding plates.**

- Remove locking pins from both rotary and sliding plates.

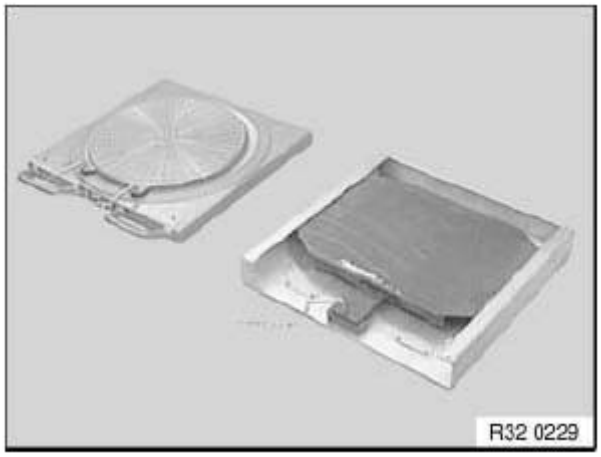


Fig. 23: Identifying Rotary And Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Use quick-clamping holders with poly control arm bushings (1) only. Due to excessive measuring inaccuracy, other quick-clamping units without poly control arm bushings are not permitted!

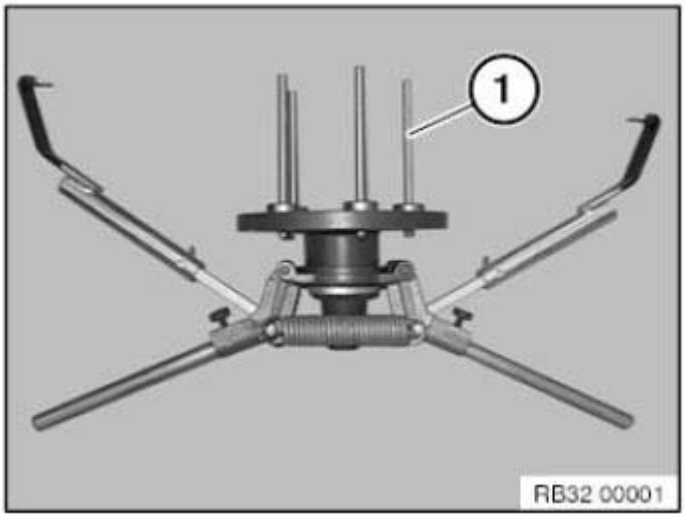


Fig. 24: Identifying Quick-Clamping Holders With Poly Control Arm Pins
Courtesy of BMW OF NORTH AMERICA, INC.

- Attach quick-clamping holder to vehicle and remove clamping levers in area of front wheels
- Attach pickup to quick-clamping holder, align using bubble level and connect to turntables

Fig. 25: Attaching Quick-Clamping Holder To Vehicle
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, attach spoiler adapter.

Fig. 26: Identifying Spoiler Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

- If necessary, switch on chassis alignment system.
- Enter customer and vehicle data
- Identify chassis/suspension version (standard suspension/VDC suspension) and select vehicle
- Enter tire inflation pressure and tread depth
- Move **VEHICLE INTO DESIGN POSITION**
- Install brake tensioner.

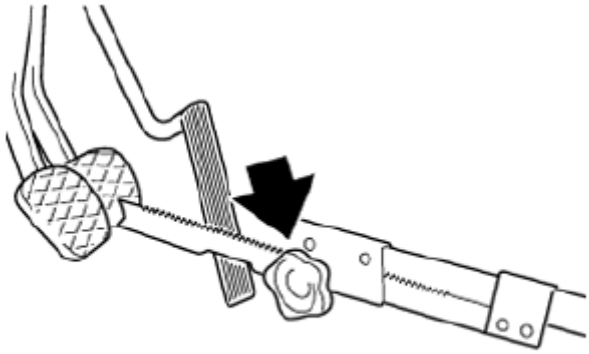


Fig. 27: Locating Brake Tensioner
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Risk of damage!
In order to avoid damaging the front side panel during the "Max. steering angle" drive-in routine, make sure the pickups are removed from the quick-clamping holders/quick-clamping units during output and input alignment. In the process do not detach the connecting cable from the pickups or the rotary plates.

NOTE: After the drive-in routine, reconnect the pickups to the quick-clamping holders/quick-clamping units, align using the bubble levels and secure in place.

- Perform input measurement in accordance with equipment manufacturer's instructions.
- Compare nominal values See **WHEEL ALIGNMENT** or **WHEEL ALIGNMENT** with actual values.

Only in event of customer complaint (e.g. poor driveability):

IMPORTANT: Do not remove screws/bolts (front axle support to engine support or body)!

Slacken all screws/bolts (front axle support to engine support or body) and then retighten to specified torque.

Refer to **LOWERING FRONT AXLE SUPPORT** .

If necessary, adjust front axle and rear axle See **3200620 ADJUSTING REAR AXLE** or **3200610 ADJUSTING TOE-IN AND CAMBER ON FRONT AXLE**

- Perform output measurement in accordance with equipment manufacturer's instructions.
- Save and print out test record.
- Insert locking pins into both rotary and sliding plates
- Remove chassis/wheel alignment system
- Drive vehicle off vehicle hoist

32 00 ... MOVING VEHICLE INTO DESIGN POSITION

Necessary preliminary tasks

- Move **VEHICLE INTO NORMAL POSITION**

- Add/distribute weights in area of spring struts until the vehicle ride height is within the tolerance (refer to Technical Data See **REAR AXLE - RIDE HEIGHT E89** or **FRONT AXLE - RIDE HEIGHT E89**).

  Measure ride-level height of vehicle See **3353... MEASURING RIDE HEIGHT OF VEHICLE (REAR AXLE)** or **3133095 MEASURE VEHICLE RIDE HEIGHT, FRONT AXLE**

32 00 ... MOVING VEHICLE INTO NORMAL POSITION

Necessary preliminary tasks

- Check compliance with **TEST CONDITIONS** , bring vehicle to a stop if necessary.

- Check vehicle interior and luggage compartment (incl. luggage compartment recess) for load, unload vehicle if necessary
- Introduce DIN load (refer to **TECHNICAL DATA**) into vehicle

32 00 ... PERFORMING RIM RUNOUT COMPENSATION

NOTE: Rim runout compensation involves electronically recording the lateral runout of the rim and the possible clamping error of the quick-clamping unit for one wheel rotation and compensating the toe and camber for measurement/alignment.

Raise body.

Perform rim runout compensation in accordance with equipment manufacturer's instructions.

Compress/deflect car.

00 ... ... RAISING VEHICLE WITH TROLLEY JACK

IMPORTANT: Observe the following trolley-jack-related instructions:

1. **Use only BMW-distributed/approved trolley jacks which have rubber plate contact points.**
2. **Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!**
3. **Check the rubber plate on the trolley jack prior to each use, replacing if necessary.**

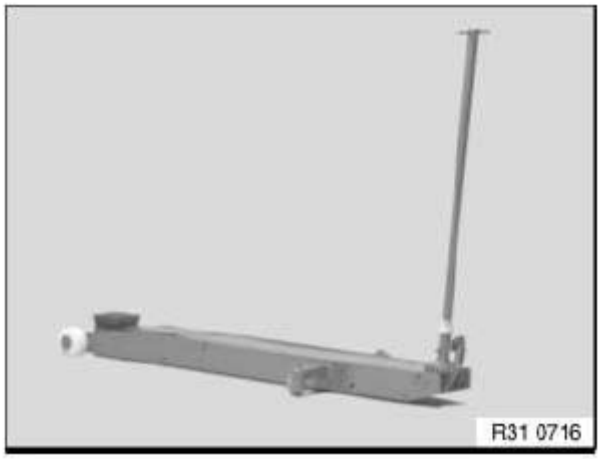


Fig. 28: Identifying Trolley Jack
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: The vehicle may be raised with a trolley jack only at the following jacking points!

1. Car jacking point
2. Side car jacking points
3. Rear differential (**REMOVE HEAT SHIELD**)

   Risk of damage: It is not permitted to raise the vehicle at the rear differential cover!

4. Bolting point for rear axle tension struts

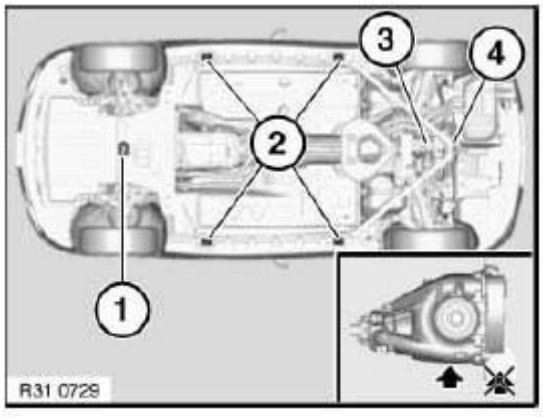


Fig. 29: Identifying Rear Differential With Car Jacking Points
Courtesy of BMW OF NORTH AMERICA, INC.

33 00 ... REAR AXLE: WHEEL/CHASSIS ALIGNMENT CHECK MUST BE CARRIED OUT AFTER THE FOLLOWING WORK

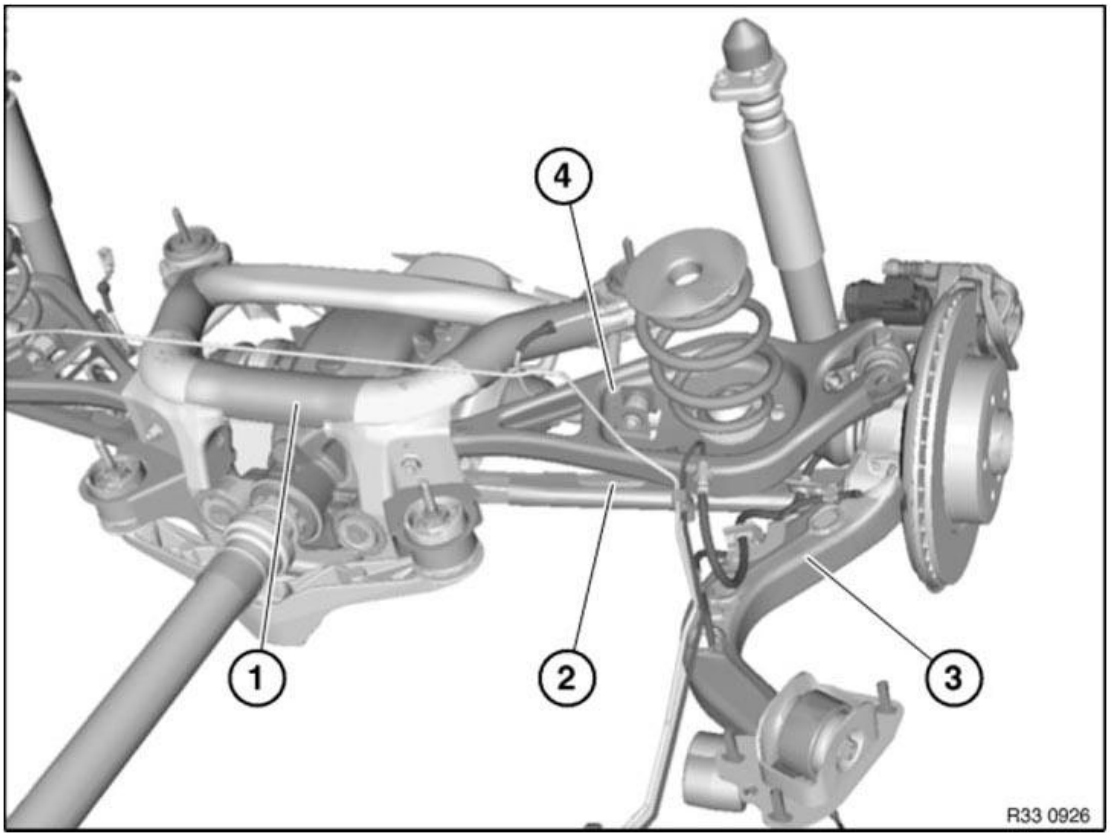


Fig. 30: Identifying Rear Axle + Steering Components
Courtesy of BMW OF NORTH AMERICA, INC.

A **WHEEL/CHASSIS ALIGNMENT CHECK** must be carried out after the following work:

- **Release of following screw/bolt connections:**
  - Bearing block to trailing arm/body
  - Upper control arm to trailing arm
  - Lower control arm to trailing arm
- **Replacement of following parts:**
  1. Rear axle carrier
  2. Lower control arm
  3. Trailing arm/rubber mount/bearing block
  4. Upper control arm

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

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- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door

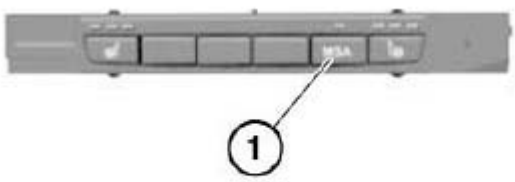


Fig. 31: Identifying MSA Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
- Workshop mode

  A = 10 mm

- Basic setting (engine hood/bonnet open)

  B = 7 mm

To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

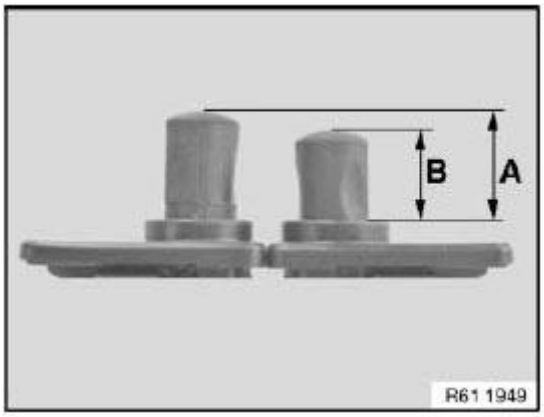


Fig. 32: Identifying Basic Setting For Engine Hood/Bonnet Open
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

32 00 ... TEST CONDITIONS FOR CHASSIS/WHEEL ALIGNMENT CHECK

Observe the following test conditions prior to the chassis/wheel alignment check:

1. Correct and identical rim and tire sizes.
2. Correct tread depth. The tread depth for each axle may differ from left to right by max. 1-2 mm.

3. Correct tire inflation pressure (see instruction plate on car).
4. Wheel bearing clearance OK
5. Steering backlash OK
6. Condition of suspension and shock absorbers OK: Visually inspect for breakage, etc.
7. Cars with ride level control: Pull fuse of air supply unit so that there is no controlling down or up.

3211 MECHANICAL STEERING GEAR

32 00 ... INFORMATION ON REPLACING STEERING GEAR AFTER ACCIDENT DAMAGE

Situation

In the event of accidents or driving conditions similar to accidents, shocklike loads can cause different types of damage to steering gears. When a steering gear is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering gear and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure

The steering gear must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering gear
   - Version with electric steering gear (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic/electrical assistance)

C. Permissible tolerances exceeded during axle/wheel alignment (include alignment record with invoice/report if necessary)

D. Fire damage

E. Damage, permanent deformation or fractures to:
   - Wheel rims in the event of a negative result from the wheel/axle alignment check
   - Spring struts, steering knuckles, wheel carriers
   - Control arms
   - struts or diagonal members or stabilizers with this function
   - Body-side screwing/bolting points for wheel guide/control components
   - Front axle support
   - Pitman arms
   - Tie rods

- Steering gear fixtures
- Steering Column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE: **If the steering gear replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.**

IMPORTANT: **The vehicle's type approval will be invalidated whenever the function of any of its safety components is compromised!**

32 11 100 REPLACING GAITER FOR STEERING GEAR ON LEFT OR RIGHT

IMPORTANT: **The power steering gear must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!**

Necessary preliminary tasks

- Remove front **UNDERBODY PROTECTION**

Release band clamp (1).

Mark screw-in depth of tie rod (2) or count thread turns.

Release screw (3).

Tightening torque **32 21 3AZ** .

Twist tie rod (2) out of tie rod end (4).

Installation:

Replace microencapsulated screw.

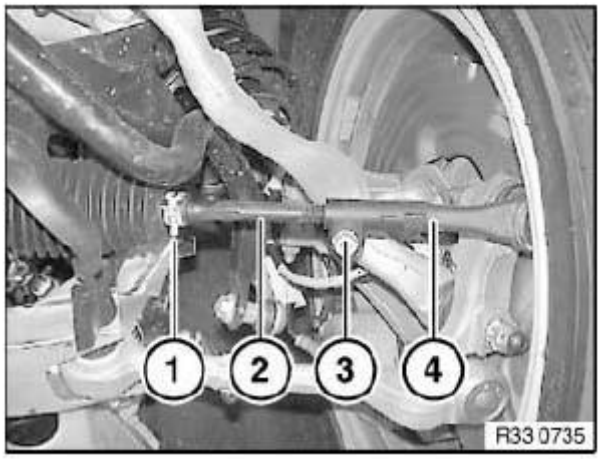


Fig. 33: Identifying Tie Rod With Band Clamp And Tie Rod End
Courtesy of BMW OF NORTH AMERICA, INC.

Release **EAR CLAMP** (1).

Detach gaiter (2) from tie rod (3).

Installation:

Clean rack and check surface for damage (e.g. by corrosion).

Grease rack (refer to **STEERING AND WHEEL ALIGNMENT - OPERATING FLUIDS**).

Clean tie rod and apply grease to taper. This ensures that the gaiter is not rotated when the tie rod is rotated.

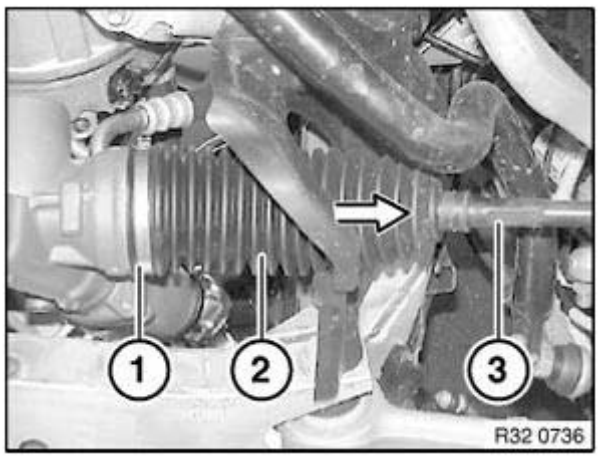


Fig. 34: Removing Gaiter From Tie Rod
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis alignment check See **3200150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **3200155 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

3213 STEERING GEAR WITH SERVO UNIT

32 00 ... INFORMATION ON REPLACING STEERING GEAR AFTER ACCIDENT DAMAGE

Situation

In the event of accidents or driving conditions similar to accidents, shocklike loads can cause different types of damage to steering gears. When a steering gear is externally undamaged, it is sometimes only possible to identify damage with great difficulty and with great effort. However, damage of this nature poses an unacceptable risk to the vehicle because it can result in failure of the steering system.

Because of the disproportionate amount of effort involved, it is generally not sensible to check thoroughly all the individual components of the steering gear and as an alternative it is necessary to take into account other components which can be checked more easily.

Procedure

The steering gear must be replaced if one or more of the following points apply:

A. Visible or noticeable damage to the steering gear
   - Version with electric steering gear (EPS): Examine in particular the control unit with all plug connections for damage and hairline cracks.

B. Unacceptable torque increase and jamming when the steering gear is turned from lock to lock (without hydraulic/electrical assistance)

C. Permissible tolerances exceeded during axle/wheel alignment (include alignment record with invoice/report if necessary)

D. Fire damage

E. Damage, permanent deformation or fractures to:
   - Wheel rims in the event of a negative result from the wheel/axle alignment check
   - Spring struts, steering knuckles, wheel carriers
   - Control arms
   - struts or diagonal members or stabilizers with this function
   - Body-side screwing/bolting points for wheel guide/control components
   - Front axle support
   - Pitman arms
   - Tie rods
   - Steering gear fixtures
   - Steering Column

This guideline is binding for all accident repairs to BMW and MINI vehicles.

NOTE: If the steering gear replacement work which is required for safety reasons is refused by the customer or an insurance company for cost reasons, a memorandum to that effect must be drawn up and countersigned by the party bearing the costs of the accident repair.

IMPORTANT: The vehicle's type approval will be invalidated whenever the function of any of its safety components is compromised!

32 13 070 REMOVING AND INSTALLING (REPLACING) ELECTRIC STEERING GEAR (EPS)

IMPORTANT: Steering gear:
Check connection of steering gear for corrosion, clean contacts if necessary. The steering gear must be replaced if the corrosion is too far advanced.
Connecting cable:
In the event of moisture/corrosion inside the two plug connections, check the insulation of the connecting cable. If the insulation reveals any noticeable/striking features, it will be necessary to replace the part. Otherwise it will be sufficient to replace the contacts or plug housing.

NOTE: In a warranty case, a fault memory printout must be included with the defective part.

Necessary preliminary tasks

- Disconnect **BATTERY NEGATIVE LEAD**

  NOTE: High-current-carrying lead laid with permanent positive connection (80 A fuse protection).

- Remove **FRONT UNDERBODY PROTECTION**
- Remove **V-STRUT ON LEFT AND RIGHT**
- Remove **LOWER SECTION OF STEERING SPINDLE FROM STEERING GEAR**
- Remove both **TIE ROD ENDS FROM SWIVEL BEARING**
- Replacement: Remove **BOTH TIE ROD ENDS FROM STEERING GEAR**

Release cable holder (1) on steering gear.

Unlock plug connections (2) and disconnect.

Installation:

Check plug connections for moisture and corrosion. To do so, read and follow notes/information at the start of the document.

Make sure wiring harnesses are laid correctly.

Plug connections must audibly snap into place.

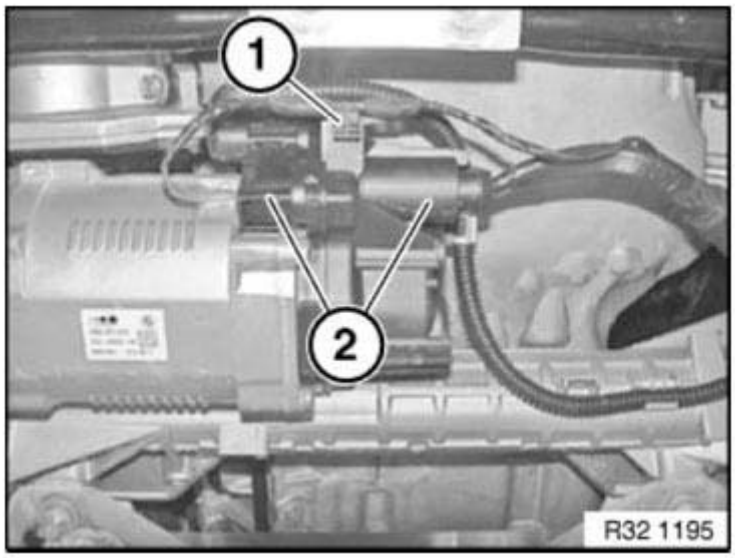


Fig. 35: Identifying Steering Gear Cable Holder And Plug Connections
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and remove screws (1) towards bottom.

Remove steering gear (2) towards front.

Installation:

Replace screws and nuts.

Tightening torque **32 00 1AZ** .

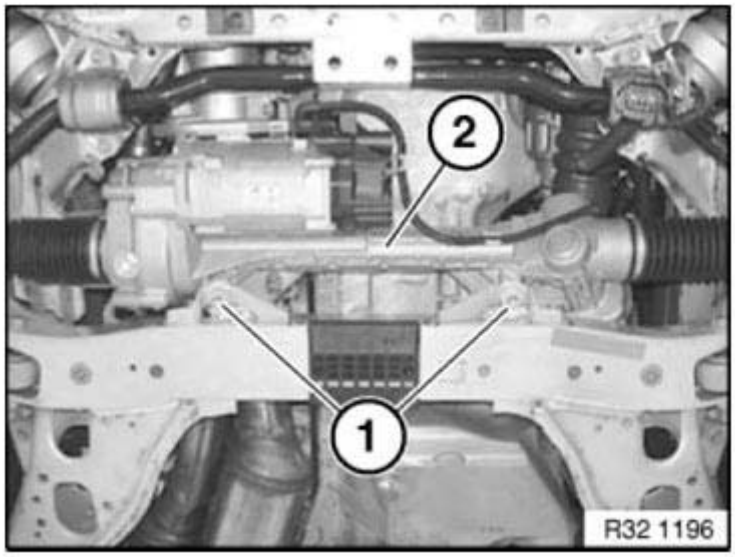


Fig. 36: Identifying Steering Gear With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Teach in **END STOP SOFTWARE**
- Perform chassis alignment check See **3200150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **3200155 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

32 10 ... TEACHING IN END STOP SOFTWARE FOR ELECTRIC STEERING GEAR (EPS)

NOTE: The end stop software must be taught in:

- **after the steering gear is replaced**
- **after programming/coding**

Connect vehicle to BMW diagnosis system.

Select and perform end stop under Service functions.

3221 STEERING ARMS, TIE RODS, STEERING DAMPER

32 41 ... INSTRUCTIONS FOR REMOVING AND INSTALLING EAR CLIPS

NOTE: The work steps are show on assorted components.
Ear clip must always be replaced.

To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

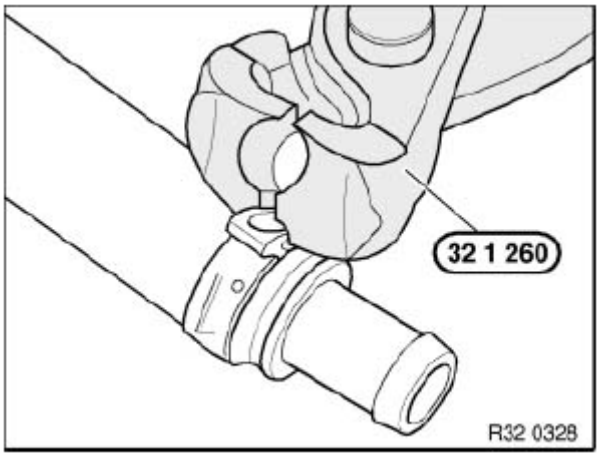


Fig. 37: Removing Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

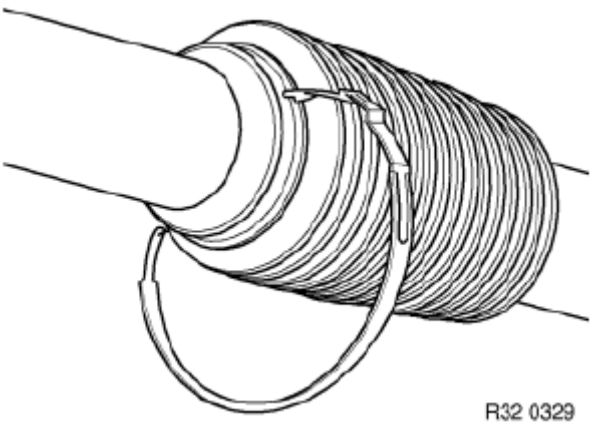


Fig. 38: Identifying Hook Fastener On Ear Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Attach hook fastener and press ear together with special tool 32 1 260.

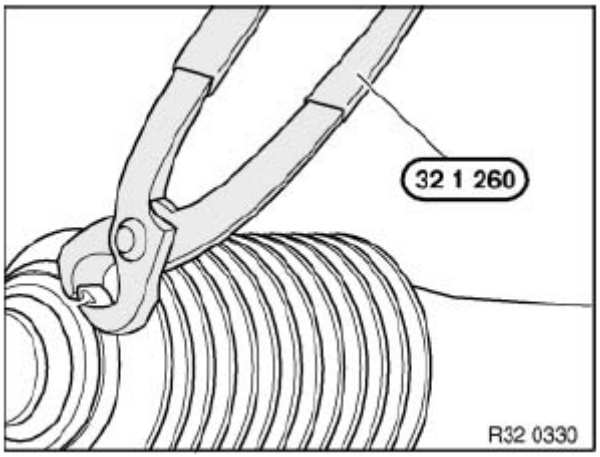


Fig. 39: Pressing Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

Side cutter of special tool 32 1 260 can be used in areas which are difficult to access.

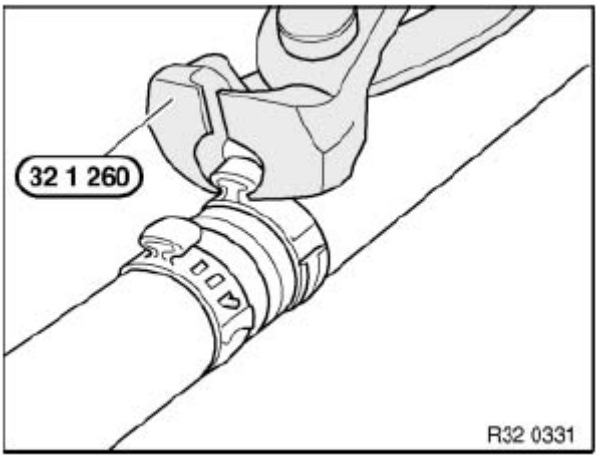


Fig. 40: Identifying Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Gap (A) max. 1 mm!

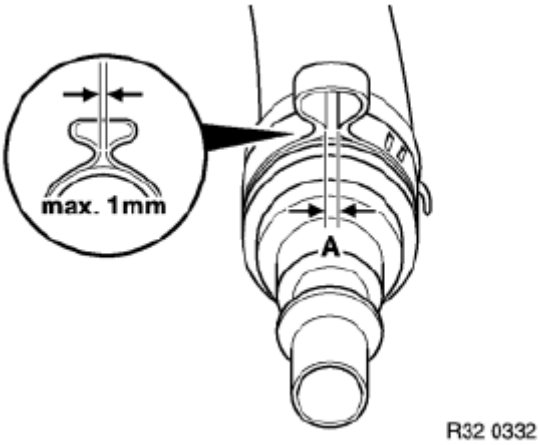


Fig. 41: Identifying Ear Clip Gap
Courtesy of BMW OF NORTH AMERICA, INC.

32 21 231 REPLACING (REMOVING AND INSTALLING) LEFT OR RIGHT TIE ROD

IMPORTANT: The steering gear must be replaced if the polished surface of the rack is damaged (e.g. by corrosion)!

Necessary preliminary tasks

- Remove **TIE ROD END FROM SWIVEL BEARING**
- Remove **GAITER FROM STEERING GEAR** and slide back

IMPORTANT: To avoid damage to rack and to suspension mounting, move rack in as far as possible.

Release joint (1) with special tool 32 3 160 on steering gear rack.

Tightening torque **32 21 1AZ** .

Installation:

Clean rack.

Check surface of rack for damage (e.g. corrosion).

Lightly grease rack (refer to **STEERING AND WHEEL ALIGNMENT - OPERATING FLUIDS**).

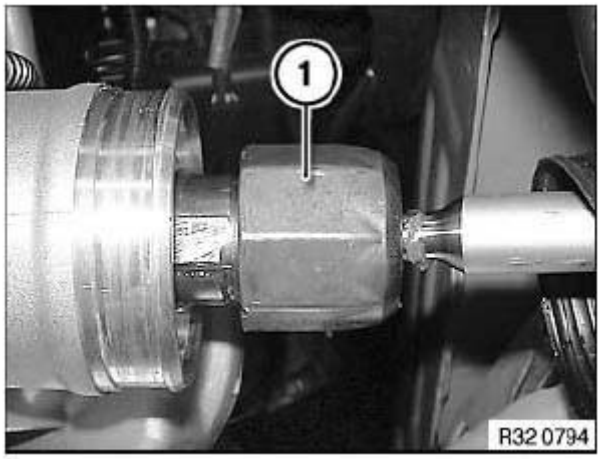


Fig. 42: Identifying Steering Gear Rack Joint
Courtesy of BMW OF NORTH AMERICA, INC.

On replacement, assemble new part with gaiter

- Determine measurement (A) to simplify following adjustment of front axle

Installation:

Slacken clamping screw (1) and screw off tie rod end.

Tightening torque **32 21 3AZ** .

Slide gaiter with ear clip and band clamp on tie rod.

Screw in tie rod end to measurement (A).

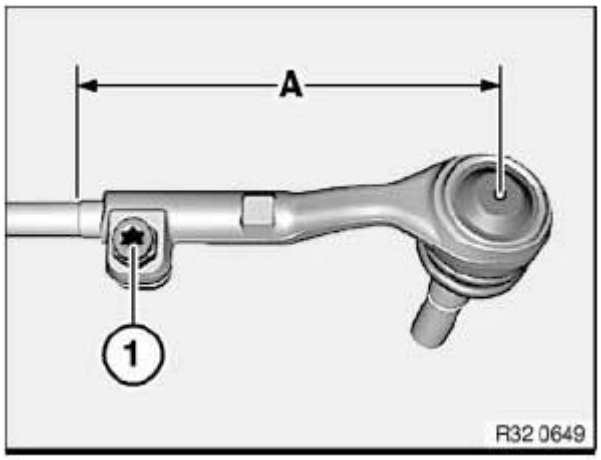


Fig. 43: Identifying Tie Rod With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Only if replacing/removing tie rod end: Perform chassis alignment check See **3200150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **3200155 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

32 21 151 REPLACING LEFT OR RIGHT TIE ROD

NOTE: If the tie rod end to tie rod screw/bolt connection is released, it is necessary after reinstallation to carry out a wheel/chassis alignment check.

Release nut (1); if necessary, grip at Torx socket.

Tightening torque **32 21 2AZ** .

Remove tie rod end (2) from swivel bearing.

Installation:

Keep tie rod end to swivel bearing connection clean and free from oil and grease.

Replace self-locking nut.

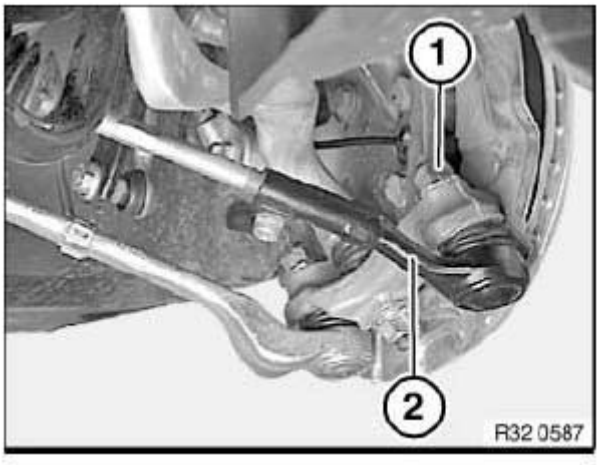


Fig. 44: Identifying Tie Rod End With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Determine measurement (A) to simplify following adjustment of front axle.

Release bolt (1).

Tightening torque **32 21 3AZ** .

Screw off tie rod end; if necessary, grip tie rod with open-end wrench.

Installation:

Check **GAITER** for damage, replace if necessary.

Screw tie rod end onto tie rod to measurement (A).

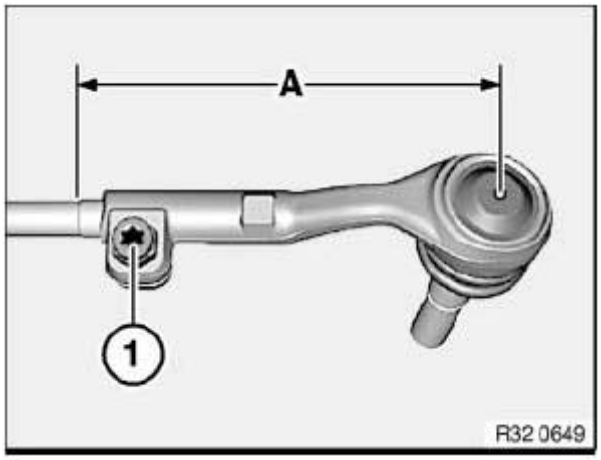


Fig. 45: Identifying Tie Rod With Mounting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform chassis alignment check See **3200150 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH VEHICLE LOAD UP TO DESIGN POSITION** or **3200155 KDS CHASSIS/WHEEL ALIGNMENT CHECK WITH RIDE HEIGHT MEASUREMENT WITHOUT VEHICLE LOAD**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

3231 STEERING COLUMN

32 31 020 REMOVING AND INSTALLING/REPLACING LOWER SECTION OF STEERING COLUMN TRIM

Necessary preliminary tasks

- Remove upper section of **STEERING COLUMN TRIM**

Press detent lugs outwards a little and unclip steering column trim downwards.

Installation:

Align steering column trim by means of detent lugs to steering column and press up as far as it will go.

Press steering column trim on both sides together a little and then press upwards completely until detent lugs snap into place.

Check installation position, correct if necessary.

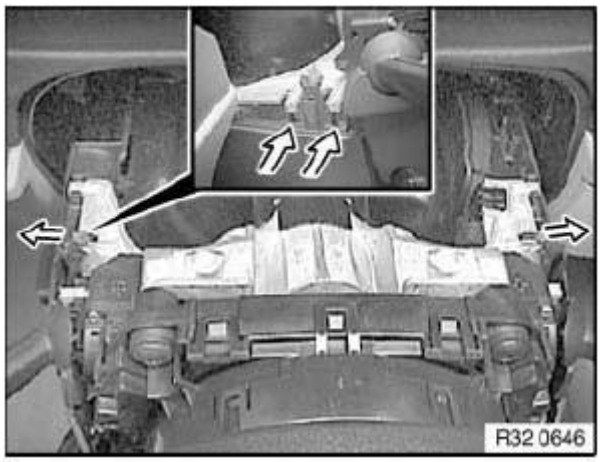


Fig. 46: Pressing Detent Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 070 REMOVING AND INSTALLING/REPLACING LOWER SECTION OF STEERING SPINDLE

Necessary preliminary tasks

N52K engine:

- Remove **INTAKE FILTER HOUSING**

IMPORTANT: If the lower section of the steering spindle is separated from the steering gear/steering column, the steering-column switch cluster may be damaged when the steering wheel is turned.

Release clamping screw (1).

Return steering to straight-ahead drive setting and remove ignition key.

Detach lower section of steering spindle from steering gear.

Installation:

Clean thread to remove all remnants of screw securing adhesive.

Replace clamping screw.

Lower section of steering spindle can only be attached in one position to the steering gear.

Tightening torque **32 31 1AZ** .

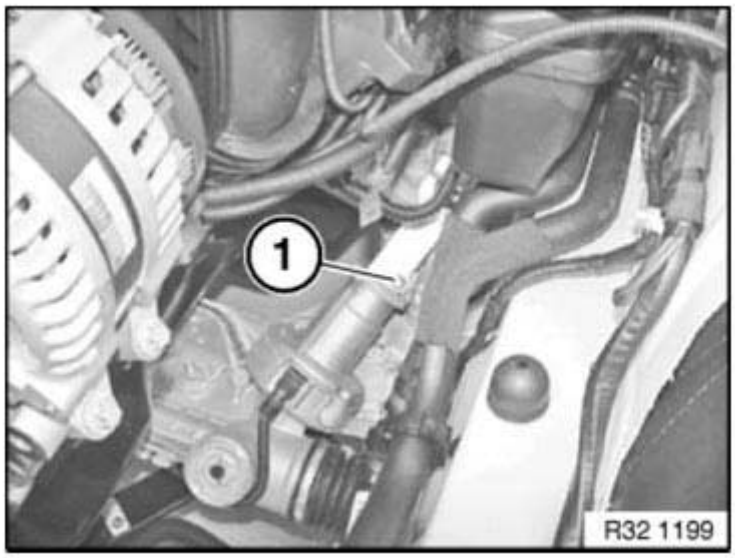


Fig. 47: Identifying Clamping Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release clamping screw (1).

Detach steering spindle upper section from steering column.

Installation:

Clean thread to remove all remnants of screw securing adhesive.

Replace clamping screw.

Clamping screw must rest in groove of steering column.

Tightening torque **32 31 2AZ** .

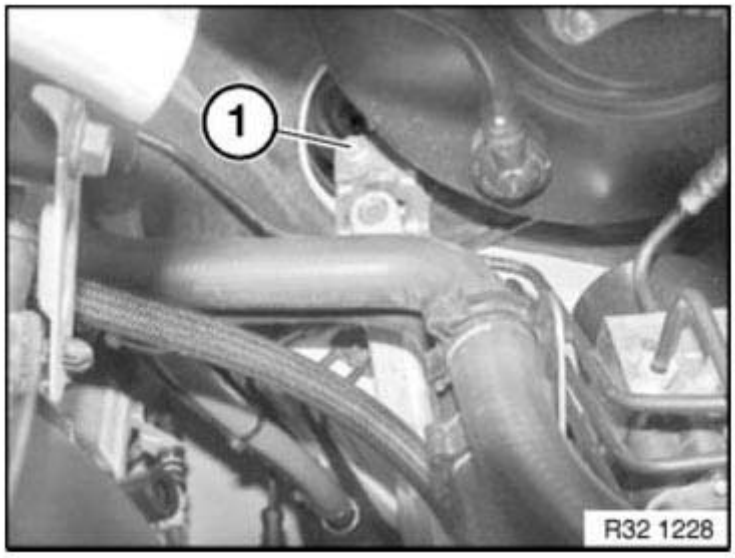


Fig. 48: Identifying Clamping Screw
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Turn steering wheel in both directions to full lock. The airbag warning lamp must not light up in the process.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**
- Check directional stability of car

32 31 082 REMOVING AND INSTALLING/REPLACING STEERING ANGLE SENSOR

NOTE: Steering angle sensor is integrated in STEERING-COLUMN SWITCH CLUSTER .

After installation

- Replacement only: Carry out programming/coding
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

32 31 090 REMOVING AND INSTALLING/REPLACING STEERING COLUMN

Necessary preliminary tasks:

- Remove **STEERING WHEEL**
- Remove steering column trims See **3231020 REMOVING AND INSTALLING/REPLACING LOWER SECTION OF STEERING COLUMN TRIM** or **3231003 REMOVING AND INSTALLING/REPLACING UPPER SECTION OF STEERING COLUMN TRIM**
- Remove **PANEL** for pedal assembly
- Release **STEERING SPINDLE** from steering column (in engine compartment)

- Disconnect plug connection on electric steering column lock
- Remove wiring harnesses from steering column

Secure steering column against falling out.

Release screws (1).

Tightening torque **32 31 3AZ** .

Remove steering column towards rear.

Installation:

Check steering column sleeve.

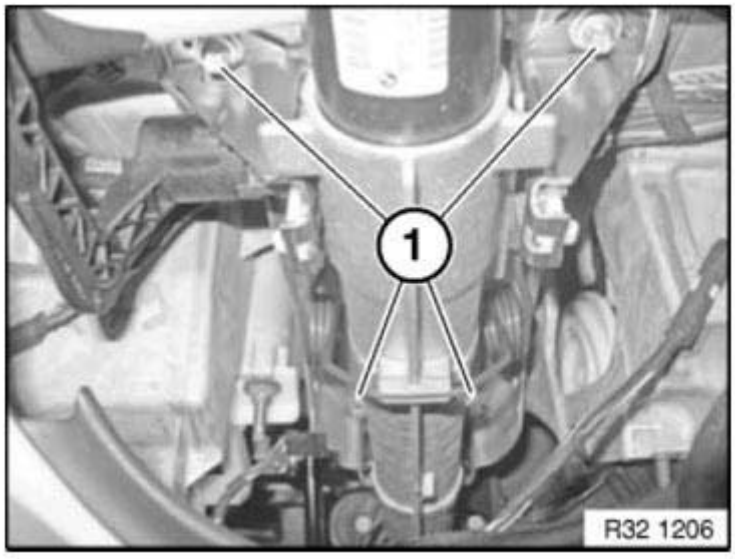


Fig. 49: Identifying Steering Column Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Modify **STEERING-COLUMN SWITCH CLUSTER**

After installation

- Replacement: Lock and unlock electric steering column lock and clear fault memory in Car Access System (CAS)
- Replacement: Turn steering wheel in both directions to full lock. The airbag warning lamp must not light up in the process.
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

32 31 003 REMOVING AND INSTALLING/REPLACING UPPER SECTION OF STEERING COLUMN TRIM

Move steering column into "lower" and "extended" position.

Lever out upper section of steering column trim (1) with special tool 51 1 110 in direction of arrow towards top.

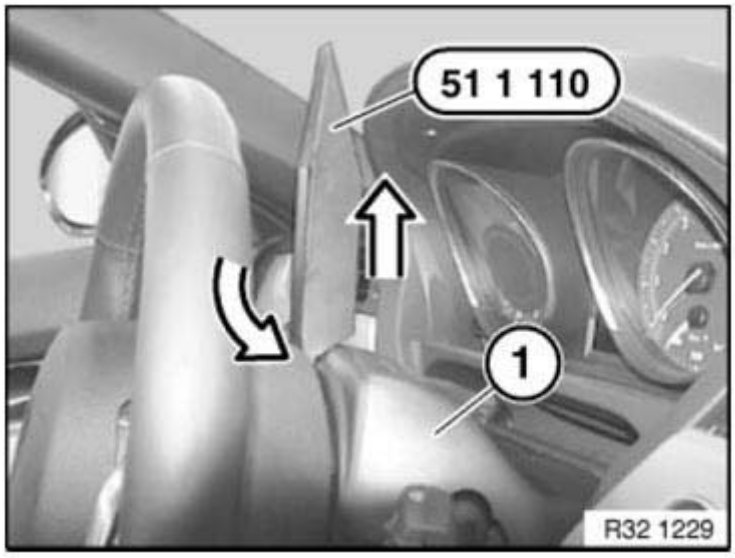


Fig. 50: Removing Upper Section Of Steering Column Trim Using Special Tool (51 1 110)
Courtesy of BMW OF NORTH AMERICA, INC.

Tilt steering column trim (1) towards front.

Unclip steering column gap cover (2) from steering column trim.

Installation:

Tilt steering column trim towards rear, align by way of lock to lower section (of steering column trim) and press down.

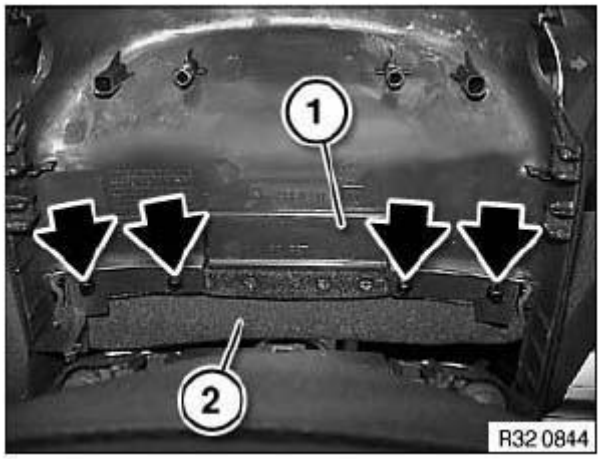


Fig. 51: Identifying Steering Column Trim And Gap Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Tilt steering column trim forwards.

Unclip gap cover from steering column trim.

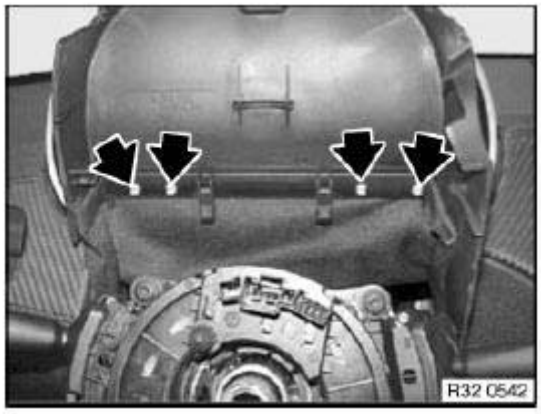


Fig. 52: Locating Steering Column Trim Screws
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 241 REPLACING ADJUSTING LEVER FOR STEERING COLUMN

Necessary preliminary tasks

- Remove **STEERING COLUMN**

If necessary, remove cable duct from steering column.

Unclip adjusting lever.

Installation:

Align adjusting lever to steering column and attach straight to prevent the locks from being damaged.

Check locks after attachment, replace adjusting lever if necessary.

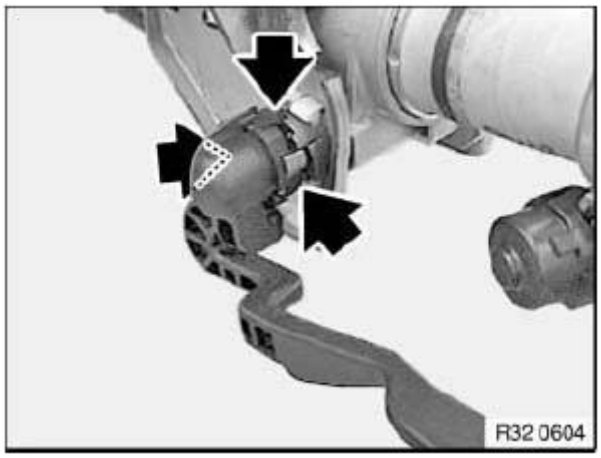


Fig. 53: Locating Adjusting Lever Of Steering Column
Courtesy of BMW OF NORTH AMERICA, INC.

32 31 102 REPLACING STEERING SPINDLE SLEEVE

Necessary preliminary tasks

- Release **STEERING SPINDLE** from steering column (in engine compartment)
- Move steering column into "upper" and "extended" position
- Remove **PANEL FOR PEDAL ASSEMBLY**

Press release (1) downwards and remove sleeve.

Installation:

First feed sleeve at top into guide and clip into place at bottom.

Sleeve must snap audibly into place!

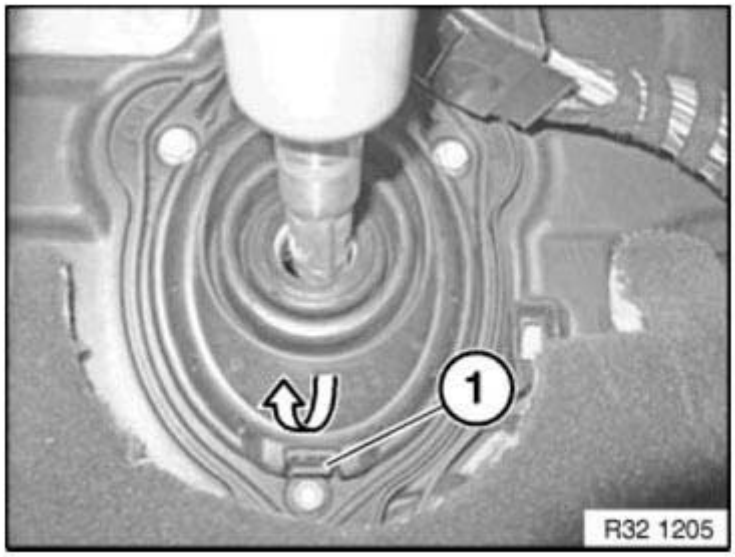


Fig. 54: Pressing Release
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

3233 STEERING WHEEL

32 33 010 REMOVING AND INSTALLING/REPLACING SPORT STEERING WHEEL

NOTE: Wheel/chassis alignment is not necessary after the steering wheel has been removed and installed or replaced.

Necessary preliminary tasks

- Remove **AIRBAG UNIT**

Move wheels/steering wheel into straight-ahead position.

Unlock plug connections (1) and (2) and disconnect.

Release screw (3) and remove steering wheel.

Installation:

Make sure connecting lead(s) is/are correctly laid.

Tightening torque **32 33 1AZ** .

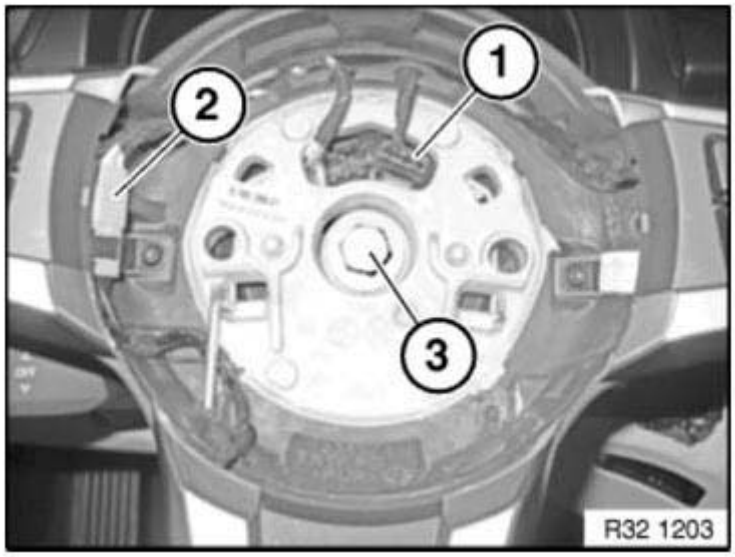


Fig. 55: Identifying Plug Connections And Screws On Steering Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Align steering wheel using markings (arrows) to steering column and attach.

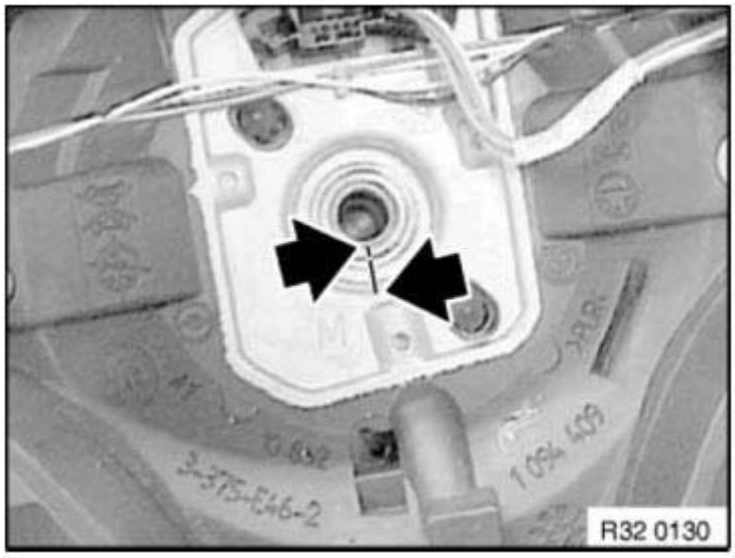


Fig. 56: Locating Steering Wheel Aligning Marking
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- If necessary, modify **SHIFT PADDLES**
- If necessary, modify **MULTIFUNCTION STEERING WHEEL SWITCH**

32 33 ... REPLACING SPOKE COVERS FOR STEERING WHEEL

Necessary preliminary tasks

- Remove **AIRBAG UNIT**

Release screws (1) and unclip spoke covers towards top.

Installation:

Make sure connecting cables are correctly routed.

Check installation position of spoke covers, correct if necessary.

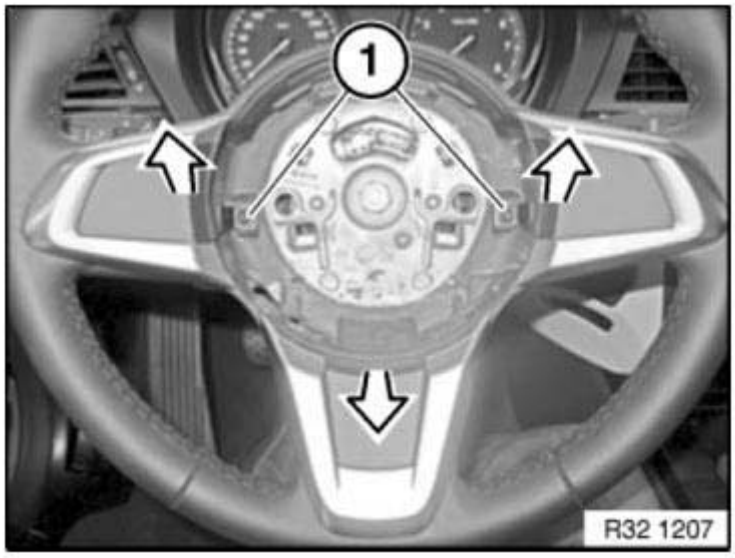


Fig. 57: Removing Spoke Cover
Courtesy of BMW OF NORTH AMERICA, INC.

3234 STEERING WHEEL FOR AIRBAG

72 12 ... PROCEDURE AFTER AIRBAG TRIGGERING AS RESULT OF AN ACCIDENT

Check and/or replace following components after airbag triggering:

Satellites (control unit + sensor)

- Components
  - Satellite, A-/B-pillar, left/right
  - Satellite, front door
  - Satellite, rear seat
  - Satellite, driver's/front passenger seat

        - Satellite, vehicle center
    - Procedure
        - Inspect visually for mechanical damage
        - Read fault memory
        - Disconnect battery and observe waiting period
        - Rectify faults
        - Connect battery and observe waiting period (at least 10 seconds)
        - Delete fault memory
        - Turn off ignition and wait at least 2 minutes (no consumers may be switched on during this period such as e.g. inside lights, radio, etc.)
        - Switch on ignition (wait at least 10 seconds)
        - Clear fault memory and if necessary rectify faults

Cables and plugs

- Components and procedure
    - Check cables and plugs for damage, replace if necessary.

      (e. g. corrosion, correct engagement, bent pin)

Belt system

- Components
    - Retractor mechanism
    - Belt buckle tensioner
    - Seatbelt height adjustment
    - Anchor fitting tensioner
- Procedure
    - Check components, replace if necessary

Seats

- Components
    - Seat
    - Airbag module
    - Active head restraint
- Procedure
    - Check seats (function check of seat mechanism), replace if necessary
    - Check seat screw/bolt connections
    - Replace gas generator, active head restraint system

If the severity of the impact has not caused any other damage to the seat, only the triggered gas generator needs to be replaced.

External feature: The triggered head restraint is folded forwards and engaged.

The repair work can be carried out in the car with the rear panel removed. The entire system can be pushed back into its original position and the new gas generator installed.

The gas generator can be replaced up to 5 times.

- Replace airbag module and, if necessary, seat cover with padding

Driver's airbag

- Components
  - Airbag module
  - Steering Wheel
  - Steering column (if damaged)
- Procedure
  - Replace faulty components
  - Replace steering wheel

Front-passenger airbag

- Components
  - Airbag module
  - Trim, instrument panel
  - Supporting tube (if damaged)
- Procedure
  - Check components; replace if necessary

Side airbag, front/rear

- Components
  - Airbag module
  - Door panel
  - Door in white
  - Seat
- Procedure
  - Check components; replace if necessary

Head airbag

- Components
  - Airbag module
  - Trim, A-pillar
  - Roofliner
  - Trim, B-pillar (if damaged)
  - Trim, C-pillar (if damaged)
  - Connection/mounting (on side frame)
- Procedure
  - Check components; replace if necessary

Knee airbag

- Components
  - Panel (driver's side)
  - Lower section of glovebox
  - Active knee protector (driver's and passenger sides)
- Procedure
  - Replace faulty components

Passive knee protector

- Components
  - Trim panels (driver's side)
  - Glovebox incl. knee protector (passenger side)
- Procedure
  - Replace faulty components
  - Check fastening elements

32 34 030 REMOVING AND INSTALLING/REPLACING AIRBAG UNIT

WARNING: Observe the following instructions to avoid any risk of injury by the airbag unit.

- **Comply with SAFETY REGULATIONS for handling components with gas generators.**
- **Do not exert any force on the airbag unit.**
- **Use only specified tools for releasing the airbag unit.**

NOTE: Incorrect handling may result in triggering of the airbag unit and thereby cause serious injury.

IMPORTANT: STEERING WHEEL must be replaced if airbag unit has been triggered!
Follow PROCEDURE AFTER AIRBAG TRIGGERING .

Necessary preliminary tasks

- Disconnect **BATTERY NEGATIVE LEAD**
- If necessary, remove **SHIFT PADDLES** (TCT/automatic transmission)

Slide T20 Torx screwdriver (1) from below vertically into concealed opening on reverse side of steering wheel up to stop (2).

Press Torx screwdriver in direction of arrow outwards in order to press spring clip (3) inwards and to release airbag unit.

Repeat procedure on other side.

Installation:

Make sure electrical leads are correctly positioned.

Snap airbag unit with uniform pressing force plane-parallel in direction of steering column shaft into steering wheel.

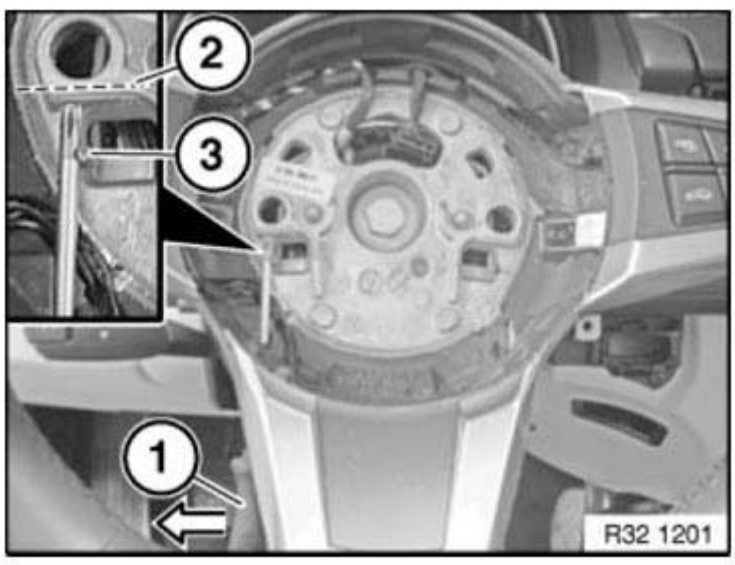


Fig. 58: Pressing Out Torx Screwdriver
Courtesy of BMW OF NORTH AMERICA, INC.

WARNING: Risk of injury!
Airbag unit may only be set down with the airbag itself facing upwards.

Tilt airbag unit forwards.

Disconnect plug connection (1) and remove airbag unit.

Installation:

Connect plugs to connections of same colour on airbag unit.

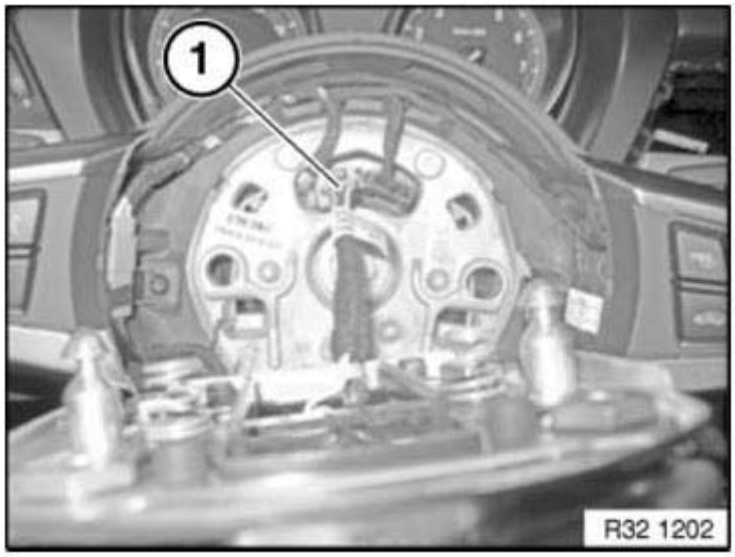


Fig. 59: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

72 00 ... SAFETY REGULATIONS FOR HANDLING COMPONENTS WITH GAS GENERATORS

It is essential to comply with the regulations as specified in the law relating to the use of explosives when working on airbag units and seat belt tensioners.

Airbags, seat belt tensioners etc. are pyrotechnical objects. Pyrotechnical objects are assigned to different danger classes on the basis of the quantity of propellant that they contain. The assignment can be ascertained from the identification marking on the product:

IMPORTANT: Failure to comply with the warning notices and repair instructions for gas generator components can cause accidental deployment and result in injury and vehicle damage!

This applies in particular to the following components:

- Airbag modules (driver's/front passenger airbags, side airbags)
- Buckle/belt tensioner
- Head airbag
- Active knee protection
- Active head restraint

- Safety battery terminal

1. Regulations

The regulations quoted in the following refer to the Federal Republic of Germany.

In all other countries, the relevant legislation and regulations must be observed in each case. Country-specific legal regulations that go beyond this information or court decisions based thereon must be followed in each case or given precedence over these regulations.

The following components used by BMW:

- Pyrotechnical restraint systems are subject to danger class PT1
- Gas generators are pyrotechnical objects belonging to danger class T1.

Handling, transporting and storing non-fired gas generators are subject to the "Explosive Materials Act".

The relevant trade supervisory authority must be notified at least 2 weeks before pyrotechnical objects are handled for the first time. Here the relevant authority must be notified in writing of the person responsible (e.g. dealership owner, holder of general power of attorney or if necessary workshop supervisor). A certificate of qualification, i.e. specific training, is not required for the person responsible.

2. Disassembly and assembly

- Inspection, testing and installation work may only be carried out by expert trained personnel in BMW Service.
- Work on components of the airbag system should only ever be carried out with the battery disconnected, the negative terminal post covered and the plug connection of the cable leading to the gas generator disconnected. If only the battery is disconnected, the following prescribed waiting period must be observed without fail:
  - 30 minutes for vehicles up to 9/93;
  - 1 minute for vehicles from 9/93
- In the event of breaks in work, a component with a gas generator that has been removed must be secured against access by other persons.
- Individual components must never be repaired. Instead, always replace them.
- Do not treat airbag system components with cleaning agents or grease.
- Components of the airbag system must not be exposed to temperatures in excess of 75 °C.
- Airbag system components, including electronic diagnostic components, which have been dropped from heights in excess of 0.5 m must not be reinstalled in the vehicles.
- Before installing, subject components such as housing, connector pins etc. (including electronic diagnostic components) to a visual inspection for damage and replace if necessary.
- Airbag system components may only be electrically tested while they are installed and only with the BMW ISTA.
- **Danger of injury:** The airbag module may only be set down with the airbag itself facing upwards.

Otherwise the generator will be thrown upwards if it is fired.

- Do not point the firing pellet of a gas generator at other persons.
- Components with gas generators must not be fired while they are removed. They must be disposed of by special disposal companies or returned to BMW in the packaging of the new components.
- When carrying out straightening and welding work with an electric welder:
  - Disconnect battery
  - Cover negative terminal (post)
- Avoid all contact with the skin when removing a fired airbag module - wear gloves. Wash with water after contact with the skin.

3. Transport

- Components with gas generators must be sent off in the packaging of the new components.

4. Storage

- Observe the regulations of the relevant trade supervisory authority and the applicable national regulations.

3241 PUMP AND OIL SUPPLY

32 41 ... INSTRUCTIONS FOR REMOVING AND INSTALLING EAR CLIPS

NOTE: The work steps are shown on assorted components.
Ear clip must always be replaced.

To remove an ear clip, place special tool 32 1 260 at right angles to ear and cut ear open.

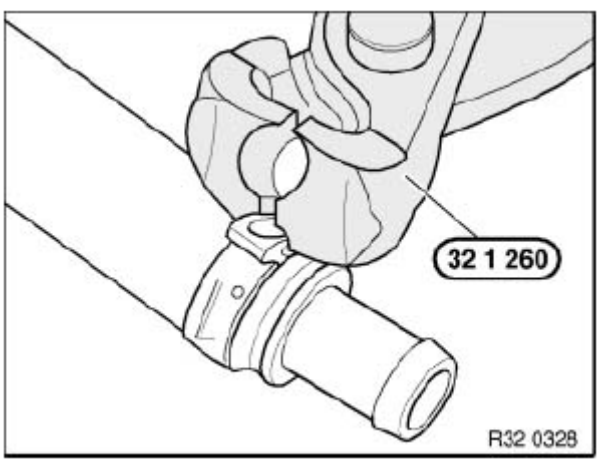


Fig. 60: Removing Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

The ear clip can be fitted not only axially but also radially after the hook fastener has been opened.

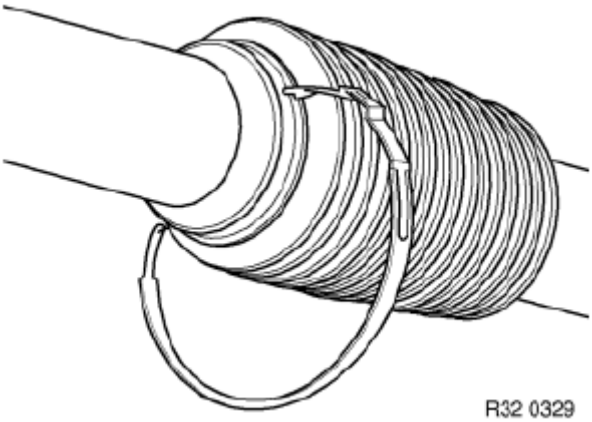


Fig. 61: Identifying Hook Fastener On Ear Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Attach hook fastener and press ear together with special tool 32 1 260.

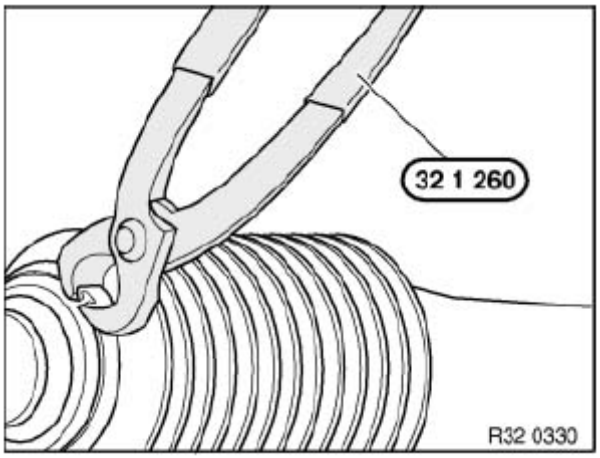


Fig. 62: Pressing Ear Clip Using Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

Side cutter of special tool 32 1 260 can be used in areas which are difficult to access.

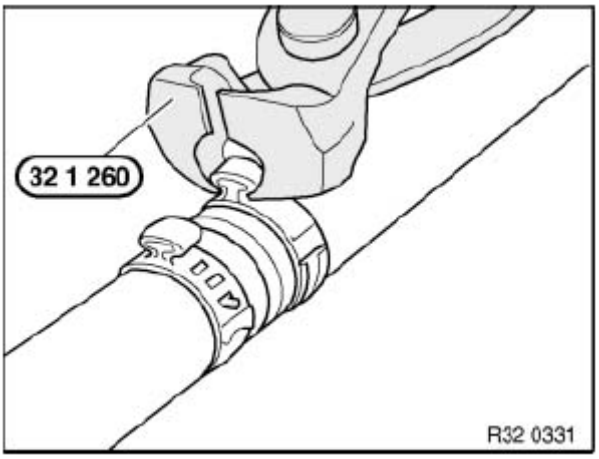


Fig. 63: Identifying Special Tool (32 1 260)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Gap (A) max. 1 mm!

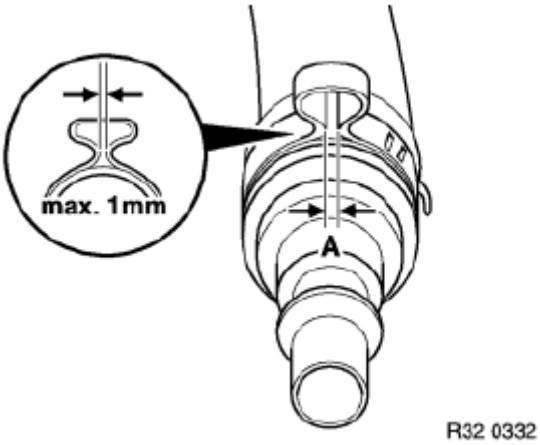


Fig. 64: Identifying Ear Clip Gap
Courtesy of BMW OF NORTH AMERICA, INC.

32 STEERING AND WHEEL ALIGNMENT

32-0000 GAUGE

Gauge MW

NOTE: For vertical adjustment of the front axle

SI number

01 09 09 (532)

Consisting of:

1 = 0496677 Gauge

NOTE: Left

2 = 0496678 Gauge

NOTE: Right

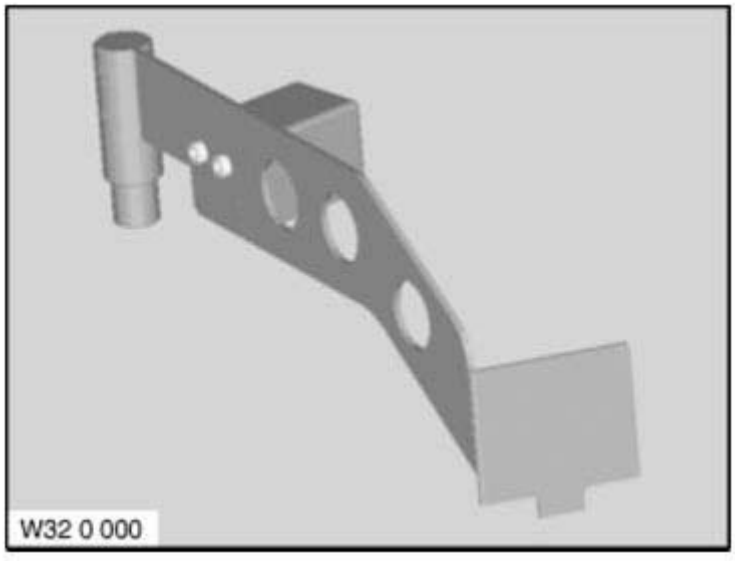


Fig. 1: Identifying Gauge (32-0000)
Courtesy of BMW OF NORTH AMERICA, INC.

32-2120 GAUGE

Gauge MW

Replaced by: 0492036

NOTE: (Test gauge) For measuring the drop arm - Replaced by 32 2 140.(0 492 036)

Consisting of:

1 = 0492030 Spindle

NOTE: Discontinuation and replaced by 32 2 140.(0 492 036)

2 = 0492031 Shaped part

NOTE: (Shaped part) Discontinuation and replaced by 32 2 140.(0 492 036)

3 = 0492032 Bolt

NOTE: (Measuring bolt) Discontinuation and replaced by 32 2 140.(0 492 036)

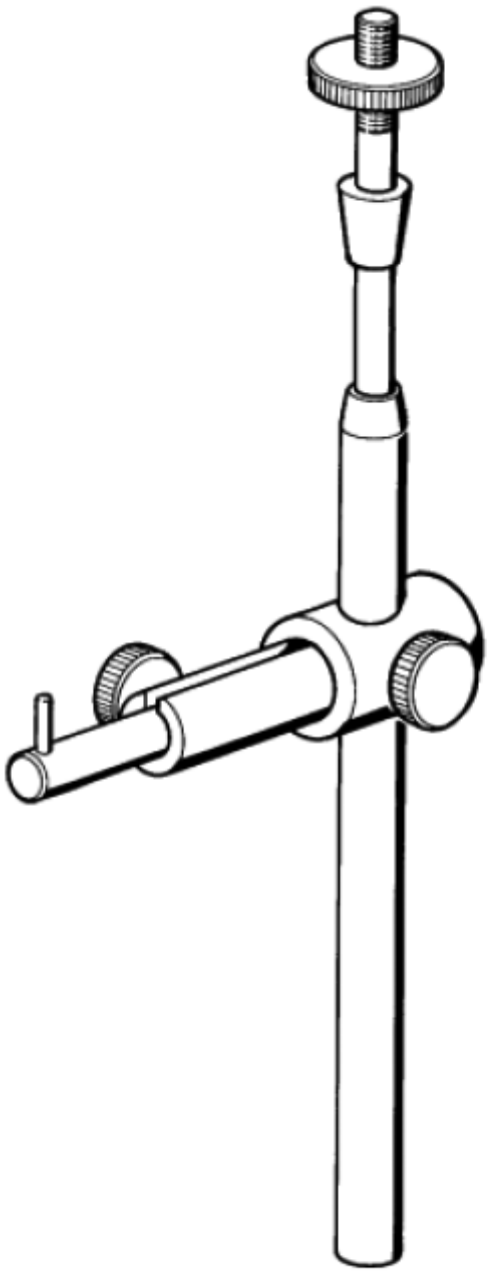


Fig. 2: Identifying Gauge (32-2120)
Courtesy of BMW OF NORTH AMERICA, INC.

32-3200 OPEN-END WRENCH INSERT

Open-end wrench insert MW

NOTE: **(Open-end wrench insert) SW34 For releasing and tightening down track rod connection to steering gear (rack)**

Storage Location

A84

SI number

01 01 04 (065)

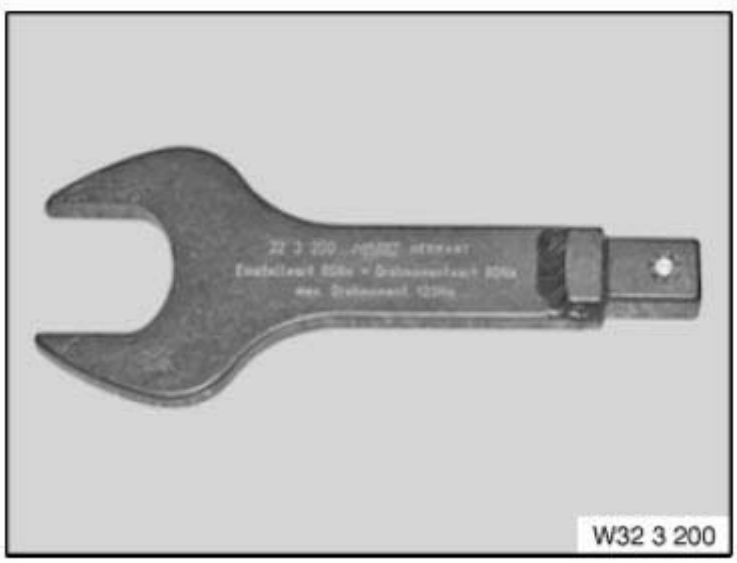


Fig. 3: Identifying Open-End Wrench Insert (32-3200)
Courtesy of BMW OF NORTH AMERICA, INC.

32-1270 PLUG

Plug Minimum set: Mechanical tools MW

NOTE: **(Plugs (set)) 27-piece, 3x per size - For sealing off hydraulic lines for brakes, steering etc.**

SI number

01 14 01 (766)

Fig. 4: Identifying Plug (32-1270)
Courtesy of BMW OF NORTH AMERICA, INC.

32-3140 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (Adjustment tool) For adjusting the front camber.

Storage Location

B8

SI number

01 15 05 (200)

Consisting of:

5 = 0493765 Spindle

NOTE: Replaced by 32 3 146 (0 495 355)

3 = 0494384 Ring

NOTE: (Support ring) Replaced by 32 3 145 (0 494 181)

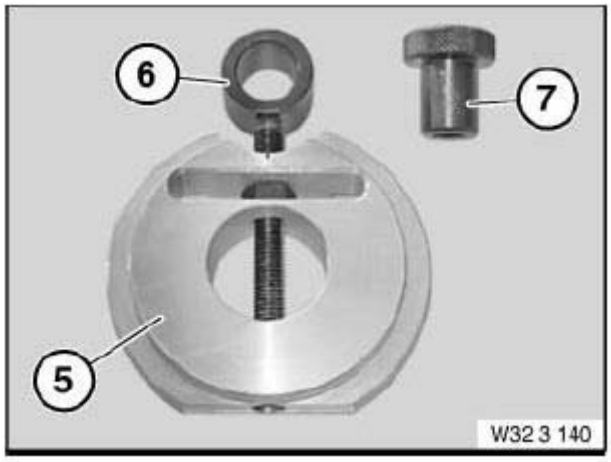


Fig. 5: Identifying Tool (32-3140)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0493558 Ring

NOTE: (Support ring) Replaced by 32 3 145 (0 494 181)

2 = 0493559 Holder

NOTE: Replaced by 32 3 146 (0 495 355)

5 = 0494181 Washer

NOTE: For adjusting the camber on the front axle.

6 = 0495355 Spindle

7 = 0495356 Bolt

NOTE: (Knurled screw)

32-3030 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (adjusting tool) For setting toe-in on rear axle - rear axle with KDS

Storage Location

B5

SI number

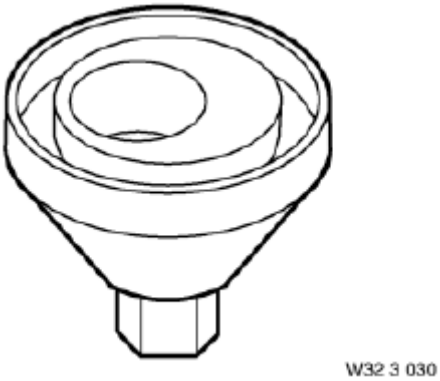


Fig. 6: Identifying Tool (32-3030)
Courtesy of BMW OF NORTH AMERICA, INC.

CHASSIS/WHEEL ALIGNMENT - NORMAL POSITION E89

32 00 CHASSIS/WHEEL ALIGNMENT - NORMAL POSITION E89

CHASSIS/WHEEL ALIGNMENT - NORMAL POSITION SPECIFICATION

Car loaded down to normal position	Vehicle with complete equipment for normal operation with: 2 x 68 kg on front seats (seats in central position); 1 x 14 kg in luggage compartment (centre) and full fuel tank.

WHEEL ALIGNMENT

32 00 WHEEL ALIGNMENT E89

WHEEL ALIGNMENT SPECIFICATION

OBSERVE TEST CONDITIONS!		
Front axle:		
Total toe-in		0° 14' ± 12'
Adjustment(1) total toe		0° 14' ± 4'
Toe difference(2) single wheel between left/right		max. 12'
Camber (difference between left/right max. 30')		- 23' ± 30'
Adjustment(1) camber		- 23' ± 25'
Toe angle difference with 20° lock on inside wheel		(difference between left/right max. 30')
with 20° lock on inside wheel		-2° 04' ± 30'
Castor		(difference between left/right max. 30')
Front wheel offset		0° ± 15'
Maximum wheel lock		
Inner cornering wheel	approx. °	37° 39'
Outer cornering wheel	approx. °	31° 10'
Rear axle:		
Total toe-in		0° 18' ± 12'
Adjustment(1) total toe		0° 18' ± 4'
Camber (difference between left/right max. 30')		-2° 20' ± 25'
Adjustment(1) camber		-2° 20' ± 5'
Geometrical driving axis		0° ± 12'
(1) To minimize adjusting errors (measuring inaccuracies), use a narrower tolerance for adjusting toe/camber.		

(2) Toe difference front axle = criterion for steering wheel inclination		

WHEEL ALIGNMENT

32 00 WHEEL ALIGNMENT E89 VDC FAHRWERK

WHEEL ALIGNMENT SPECIFICATION

OBSERVE TEST CONDITIONS!		
Front axle:		
Total toe-in		0° 14' ± 12'
Adjustment(1) total toe		0° 14' ± 4'
Toe difference(2) single wheel between left/right		max. 12'
Camber (difference between left/right max. 30')		- 33' ± 30'
Adjustment(1) camber		- 33' ± 25'
Toe angle difference with 20° lock on inside wheel		(difference between left/right max. 30')
_ with 20° lock on inside wheel		-2° 08' ± 30'
Castor		(difference between left/right max. 30')
Front wheel offset		0° ± 15'
Maximum wheel lock		
Inner cornering wheel	approx. °	37° 25'
Outer cornering wheel	approx. °	31° 55'
Rear axle:		
Total toe-in		0° 18' ± 12'
Adjustment(1) total toe		0° 18' ± 4'
Camber (difference between left/right max. 30')		-2° 20' ± 25'
Adjustment(1) camber		-2° 20' ± 5'
Geometrical driving axis		0° ± 12'
(1) To minimize adjusting errors (measuring inaccuracies), use a narrower tolerance for adjusting toe/camber. (2) Toe difference front axle = criterion for steering wheel inclination		

Steering and Wheel Alignment - Tightening Torques - Z4

DROP ARM

32 21 DROP ARM

TIGHTENING TORQUE SPECIFICATION - DROP ARM

		Type	Thread	Tightening specifications	Dimension
1AZ	Track rod/axial joint to rack	E89			100 +10 Nm
2AZ	Track rod to swivel bearing	E89	M14	Replace nut.	165 Nm
3AZ	Clamping bolt, track rod	E89	M10	Replace screw.	40 Nm

STEERING

32 00 STEERING

TIGHTENING TORQUE SPECIFICATION - STEERING

		Type	Thread	Tightening specification	Measure
1AZ	Steering gear to front axle carrier	E89	M10	Replace screws & nuts Jointing torque Torque angle	 56 Nm 90 °
2AZ	Heat shield to steering gear	E89	M6		4.5 Nm

STEERING COLUMN

32 31 STEERING COLUMN

TIGHTENING TORQUE SPECIFICATION - STEERING COLUMN

		Type	Thread	Tightening specification	Measure
1AZ	Steering spindle to steering column	E89		Replace clamping screw Clean thread	21 Nm
2AZ	Steering spindle to steering gear	E89		Replace clamping screw Clean thread	21 Nm

3AZ	Steering column to support tube	E89	M8		21 Nm

STEERING WHEEL

32 33 STEERING WHEEL

TIGHTENING TORQUE SPECIFICATION - STEERING WHEEL

		Type	Thread	Tightening specification	Measure
1AZ	Steering wheel to steering column	E89,			62.5 Nm

SYSTEM COMPONENTS

The main components of the EPS system are the:

- Steering torque sensor
- EPS control unit
- Electric motor with position sensor
- Reduction gear
- Steering rack

STEERING TORQUE SENSOR

The steering torque sensor provides the EPS control unit with information about the steering torque applied by the driver in the form of an input signal. The EPS control unit uses that signal and other input signals to calculate the power assistance torque and operates the electric motor accordingly. The torque produced by the electric motor is added by way of the reduction gear to the steering torque applied by the driver. The total torque is converted by the steering rack into steering force at the front wheels.

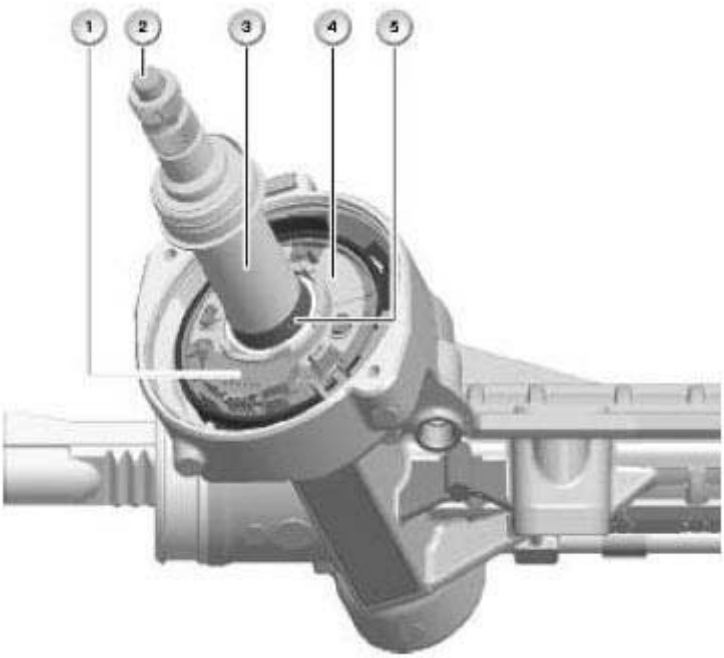


Fig. 1: Identifying Steering Torque Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation

1	Sensor unit with analyzer circuitry
2	Torsion bar (top end) 5 Ring magnet
3	Input shaft
4	Coil spring
5	Ring magnet

Rotation of the input shaft (3) and ring magnet (5) is detected and electronically analysed by the sensor unit (1). The fundamental sensing principle applied is called the Hall effect.

As the rigidity of the torsion bar (2) inside the input shaft is known, the electronic circuitry can calculate the amount of torque applied from the degree of twist.

The steering torque is then digitally transmitted to the EPS control unit via a direct cable connection.

The sensor signal is provided with redundant back-up (a second identical sensor) so that system availability in the event of sensor failure is improved. If an unacceptable degree of divergence between the two sensors is detected during operation, the system continues to operate on the basis of the more plausible of the two signals and full EPS functionality is maintained.

If the fault status remains present at the end of the driving cycle, a fault memory entry is generated and the EPS does not operate when the next driving cycle starts.

EPS CONTROL UNIT

As well as the control circuitry, the EPS control unit also contains the power electronics for operating the electric motor.

The power electronics includes a multiple output relay that turns off the power supply to the motor windings in the event of a fault. Breaking the circuit allows the motor shaft to rotate freely. Fault conditions in which the motor would electrically lock up are avoided.

There is a temperature sensor integrated in the control unit that is required for detecting overload situations.

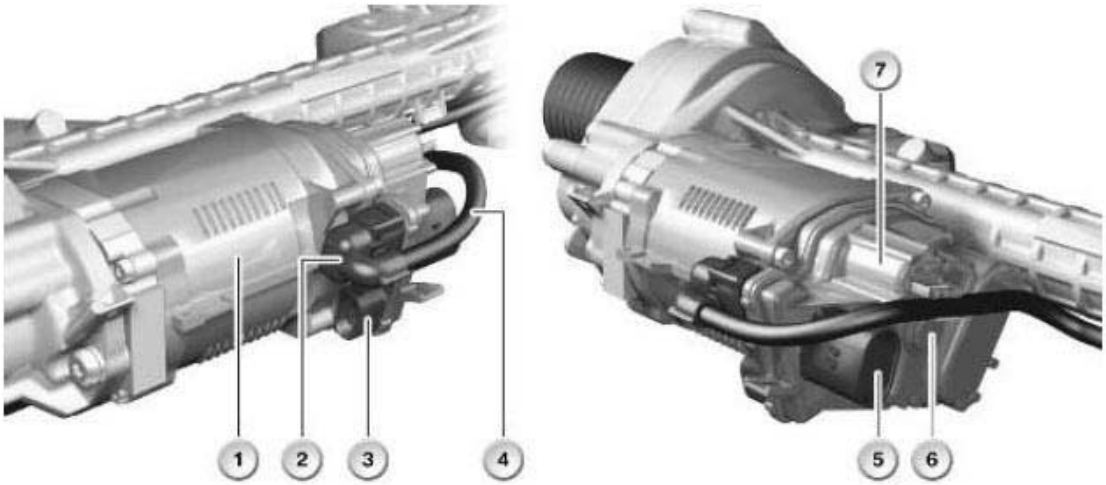


Fig. 2: Identifying EPS Control Unit And Electric Motor Housing Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Electric motor housing
2	Steering torque sensor lead connection
3	Bus connection
4	Cable to steering torque sensor
5	Power supply connection
6	Diaphragm made of Goretex
7	EPS control unit housing

The housing of the EPS control unit (and the electric motor) is located in a position exposed to large temperature fluctuations and high external moisture levels. Therefore, there is a diaphragm made of Goretex on the housing that equalizes the pressure difference between the inside and outside of the housing but still prevents moisture intrusion at that point.

On the EPS control unit and electric motor housing there are also the following EPS electrical connections:

- Power supply for the EPS
- Bus connection (PT-CAN inc. wake-up line)
- Power supply and signal line for steering torque sensor

ELECTRIC MOTOR WITH POSITION SENSOR

The essential function of the electric motor is to generate the required torque calculated by the EPS control unit.

The type of electric motor used is a brushless DC motor (made by Siemens).

Although it is powered by direct current, its method of operation is based on that of an AC synchronous motor.

The power electronics in the EPS control unit convert the power supply voltage (DC voltage) into phase voltages so as to produce a rotating field at the phase windings.

Only this type of motor combines the following characteristics that are decisive for use in an EPS system:

- High efficiency
- Long service life
- Small external dimensions
- Low wear
- High thermal load capacity
- Constantly high torque over a wide speed range

The electric motor is almost exclusively operated in the speed range throughout which its torque is constant. Only in rare cases involving extremely high rates of steering angle change applied by the driver does the speed briefly reach the point at which the torque curve falls away with increasing motor speed. Very aware drivers may perceive this as reduction of power steering assistance. In contrast with hydraulic power steering, where the drop is noticeable as an abrupt stiffening, the change is progressive with EPS, which is generally perceived as more pleasant.

The maximum power consumption (transient) is 85 A so that at a rated voltage of 12 V a peak output of approximately 1 kW results. The fuse in the trunk that protects the power circuit against shorting has an appropriately high rating for that high current draw.

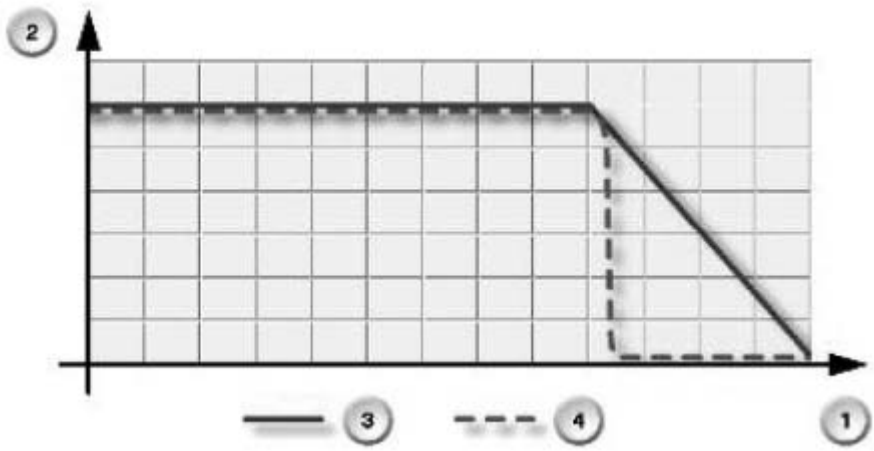


Fig. 3: Torque Versus Rate Of Change Of Steering Angle Graph (EPS Vs. Hydraulic Power Steering)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Speed of electric motor, equates to rate of change of steering angle
2	Torque
3	EPS electric motor - relationship of torque to motor speed
4	Hydraulic power steering pump - relationship of torque to steering angle rate of change

In contrast with the peak output, the average output required for delivery of EPS functions is very low. It is only between approx. 20 W and 40 W (depending on driving profile) because the electric motor is only supplied with power on demand, e.g. when cornering but not when travelling in a straight line (without having to use the steering).

Demand-based operation of the electric motor is the main reason why the fuel consumption of vehicles with EPS is around 0.2 l/100 km less than that of vehicles with hydraulic power steering. And on the other hand, the power that would otherwise be required to constantly drive the power steering pump is now almost entirely available as additional motive power for the vehicle. Depending on the situation, there can be a linear dynamics gain of up to 2 kW.

A second important component is actually on the circuit board of the EPS control unit but is located directly adjacent to the electric motor shaft: the motor position sensor. In that way the motor position sensor can directly signal the electric motor's rotor position to the EPS control unit. As the electric motor is rigidly connected to the steering rack by means of the reduction gearing, the EPS control unit can deduce the position of the roadwheels and the steering angle from the rotor position.

After first calibrating the straight-ahead position with the aid of the signal from the steering angle sensor, the motor position sensor signal is subsequently used for the EPS functions (e.g. "active steering-wheel return"). The reason for this is the higher resolution of the motor position sensor signal.

The sensing principle applied by the motor position sensor is identical with that used by the steering torque sensor. Both consist of Hall-effect sensor units adjacent to which there is a rotating magnet. The steering torque sensor is designed to detect small degrees of twist, while the motor position sensor must detect large amounts of rotation (a complete revolution must be measurable). The motor position sensor is also duplicated, though in this case the duplicate unit has a different resolution in order to be able to pick up both fast and slow movements effectively.

REDUCTION GEAR

The reduction gearing transmits the torque generated by the electric motor to the steering rack, thereby applying steering force to the front wheels.

The overall transmission ratio is approximately 20 revolutions of the electric motor to one revolution of the steering wheel. That low gearing ratio combined with the high torque of the electric motor makes it possible to generate the required steering rack forces.

The low ratio combined with the rotating mass of the electric motor also has a damping effect on feedback from the road and roadwheels (as described in the section "Active damping").

The reduction gearing consists of the belt drive and reciprocating ball (screw) drive.

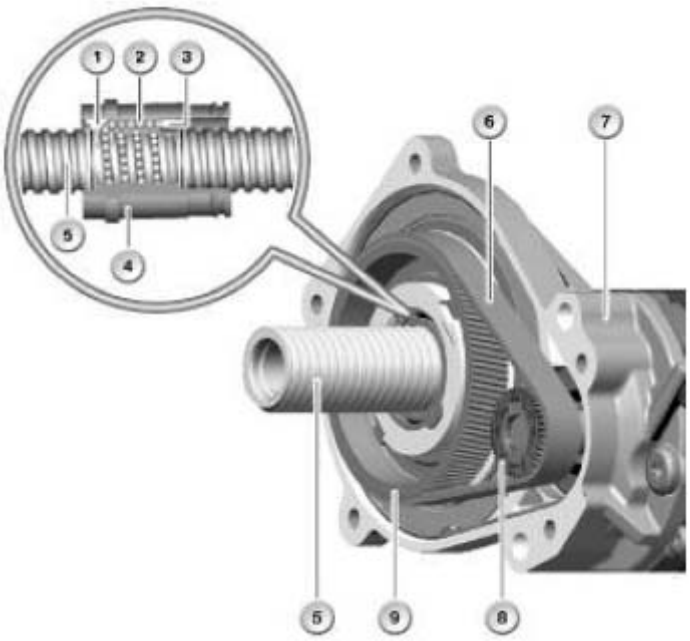


Fig. 4: Identifying Reduction Gearing For EPS With APA
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Ball bearing outfeed mechanism
2	Ball bearing return channel
3	Ball bearing infeed mechanism
4	Nut of ball screw drive
5	Ball screw thread on steering rack
6	Toothed drive belt
7	Reduction-gear housing
8	Small gear wheel
9	Large gear wheel

The electric motor shaft drives the small gear wheel (8) of the belt drive directly. Via the toothed drive belt (6) and the large gear wheel (9), the nut (4) of the ball screw drive is made to rotate.

That nut contains a return channel (2) and mechanisms at either end of the bearing race for feeding the ball bearings into (3) and out of (1) the ball screw thread of the steering rack (5). Thus, the ball bearings circulate within a "closed system".

As the nut cannot move along the steering rack, the ball bearings moving along the ball screw thread exert an axial force on the steering rack.

The reduction gearing is inseparably attached to the electric motor. Repairs or adjustments to it as a separate component are not possible.

The reduction gearing and its components (including the drive belt) are designed to last for the life of the vehicle.

If the gaiter at the end of the steering rack is damaged, water can get into the reduction gear housing and therefore into the steering gear as well. That water will cause corrosion and, over time, loud noises when steering.

Nevertheless, power steering assistance from the EPS continues to be provided even in such cases.

In order that large amounts of water do not remain in the steering gear (e.g. after driving through deep water), a water drain valve has been fitted at the lowest point of the reduction gear.

NOTE: **If a defective bellows (boot) is discovered, it should be replaced so as to prevent water entering the steering gear. At the same time as replacing the gaiter, the water drain valve at the lowest point of the reduction gear should also be replaced and is included in the repair kit.**

STEERING RACK

The steering rack of the EPS system has the same function as that of a hydraulic power steering system.

It converts the steering force applied by the driver combined with the power steering assistance provided by the EPS into a force applied to the track rods. Ultimately, that results in steering movements by the front wheels.

The design and dimensions of the steering rack are such that the design of the other vehicle components only required marginal adjustments in order to enable the use of electric power steering.

In particular, the points of attachment to the wheels by way of the track rods and with the steering column are absolutely identical with those used up to now with the hydraulic power steering.

The track rod also has the same gearing ratio.

Accordingly, the gearing ratio of the steering system as a whole is identical regardless of the power assistance method used.

As with hydraulic power steering systems, there is a thrust piece at the point where the pinion engages in the rack. It guides the rack and also serves as a means of adjusting the entire unit at the factory.

The thrust piece in this EPS system acts purely as a spring mechanism without a hydraulic bearing.

NOTE: **Adjustment of the steering rack and pinion using the thrust piece is a once-only operation carried out during production. That adjustment cannot and must not be performed at a dealership!**

SYSTEM OVERVIEW

MECHANICAL DESIGN

The electric power steering is an absolutely identical fit with the previously used hydraulic power steering as far as the connections between it and the vehicle are concerned.

For comparison, a hydraulic power steering system and the new EPS with parallel mounted motor are illustrated below.

Fig. 1: Identifying Hydraulic Power Steering Components (Typical Installation Configuration)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Hydraulic-fluid reservoir
2	Steering column
3	Torsion bar and valve actuator
4	Track rod
5	Hydraulic power steering pump
6	Steering rack

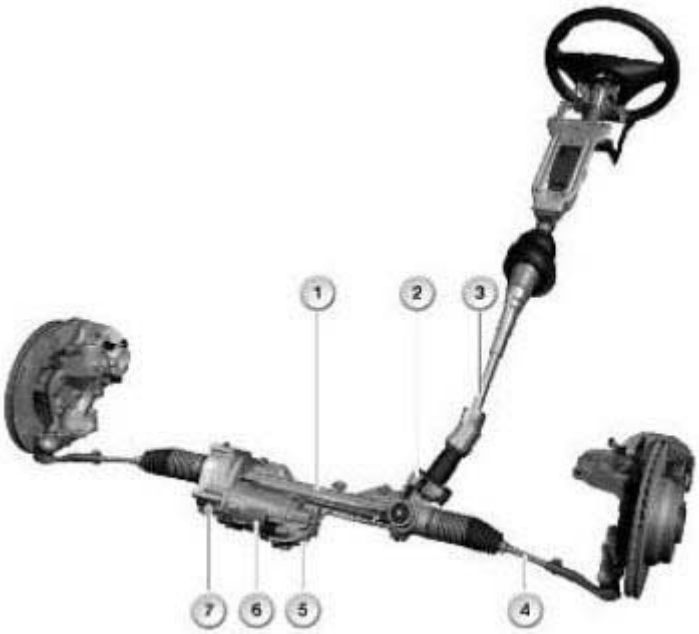


Fig. 2: Identifying Electric Power Steering Components With Parallel-Mounted Motor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Steering rack
2	Steering torque sensor
3	Steering column
4	Track rod
5	EPS control unit
6	Electric motor with position sensor
7	Reduction gear

The EPS system essentially consists of the following components:

- Steering torque sensor
- EPS control unit
- Electric motor with position sensor
- Reduction gear
- Steering rack

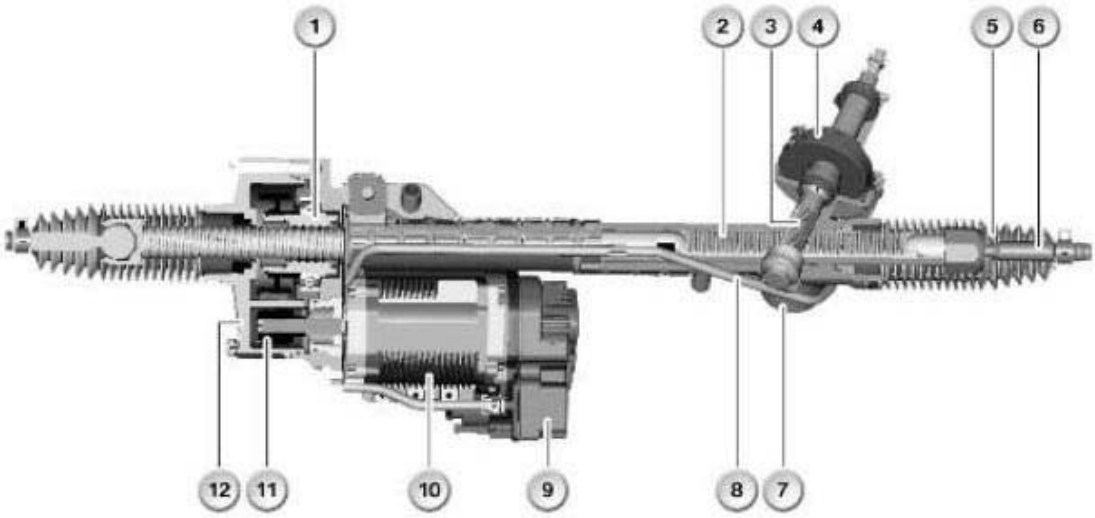


Fig. 3: Identifying EPS Rack-And-Pinion Steering Box Components With Parallel-Mounted Electric Motor
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Ball-screw drive (part of reduction gearing)
2	Rack
3	Pinion
4	Steering torque sensor
5	Gaiter
6	Track rod
7	Thrust piece
8	Signal and power lead for steering torque sensor
9	EPS control unit
10	Electric motor
11	Toothed-belt drive (part of reduction gearing)
12	Reduction-gear housing

NOTE: These components form a preassembled unit (often referred to as "EPS steering rack assembly") that can only be replaced as a complete unit. To do so, the unit has to be disconnected from the tie rods and the lower end of the steering column.

EPS SYSTEM CIRCUIT DIAGRAM

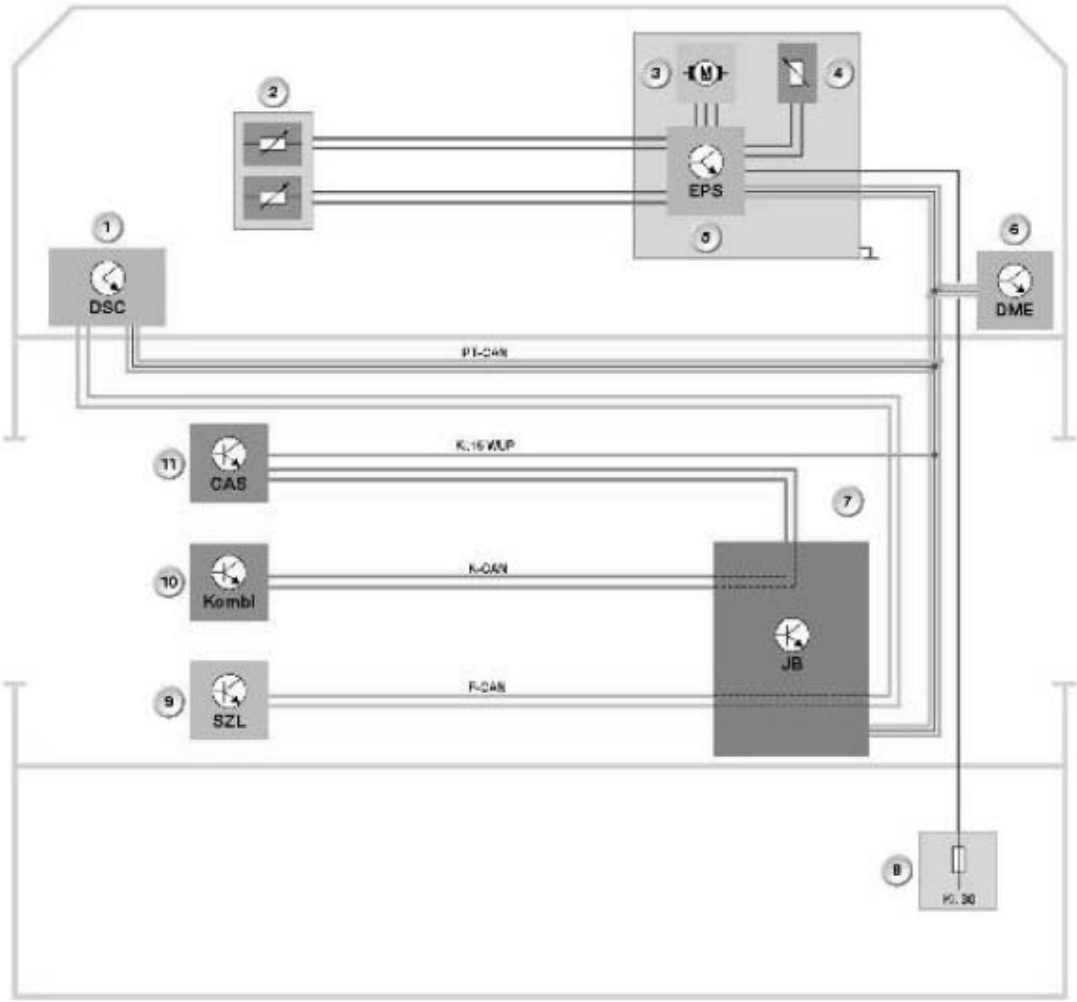


Fig. 4: EPS System Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	DSC control module
2	Steering torque sensor with redundant back-up
3	Electric motor
4	Motor position sensor
5	EPS control unit
6	DME control unit
7	Junction box
8	Fuse in boot (power supply for EPS)
9	Steering column switch cluster with steering-angle sensor
10	Instrument cluster
11	CAS control unit

E89 CHASSIS AND SUSPENSION

The handling and agility of the E89 are outstanding in this vehicle class. This is achieved by the rear wheel drive, an optimum steering response and outstanding traction in all load situations. It has been possible to optimally match the front axle kinematics and steering as no allowances had to be made for drive influences. An axle load distribution between 50:50 and 44:56 has been achieved in all load situations.

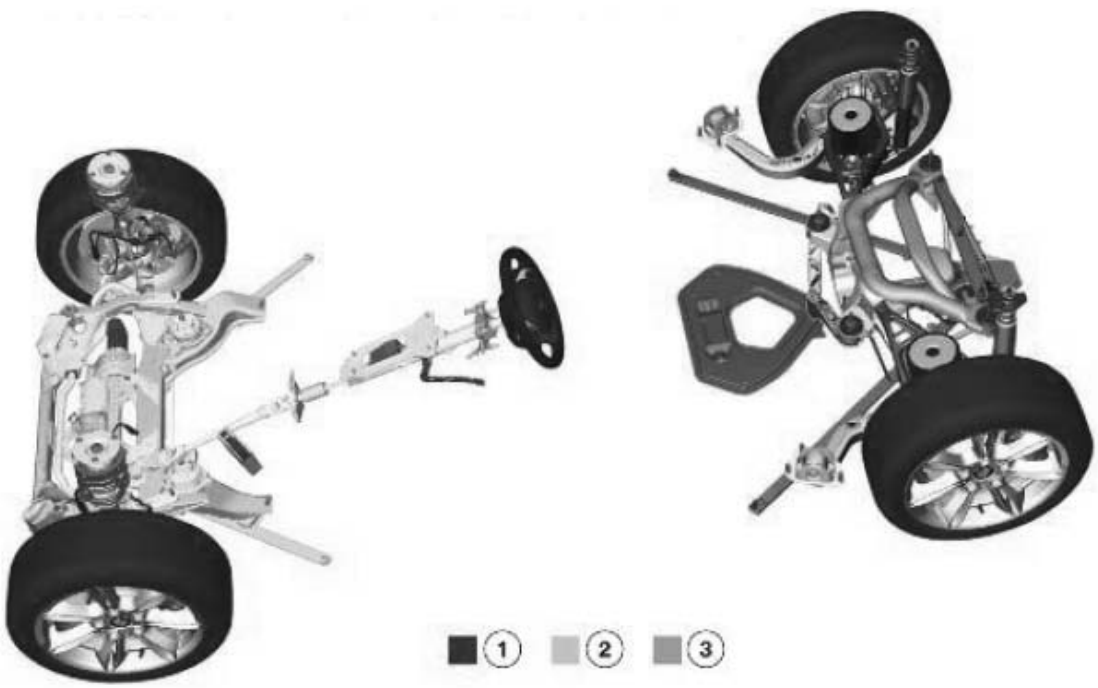


Fig. 1: Identifying E89 Chassis And Suspension
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	New components (newly developed)
2	Modified components (developed with minimum expenditure)
3	Common parts E87 and E90

DOUBLE-JOINT SPRING STRUT FRONT AXLE

A modified version of the double-joint spring strut front axle known from the E8x and E9x series vehicles is used in the E89. Adaptations were necessary due to the available space and the modified suspension geometry.

The graphic uses colors to show an overview of the common parts, modified components and new components

in the E89 compared to the E85 and compared to the E9x and E8x models for the front axle.

Some components have been fully adopted, others have been adapted and optimized to the changed conditions while other components are a complete new development. In the same way as the E8x and E9x models, the E89 is based on the well-known principle of the double-joint spring strut front axle. The well-proven principle of the central link rear axle from the E85 is retained for the rear axle.

Dynamic Driving Systems

Differentiation

The dynamic driving systems are differentiated in three directions of action and are assigned to the individual dynamic systems corresponding to their main direction of action:

- Longitudinal dynamics systems
  - Dynamic stability control (DSC)
  - Electromechanical parking brake (EMF)
- Transverse dynamics systems
  - Electromechanical power steering (electronic power steering EPS)
- Vertical dynamics systems
  - Adaptive M chassis and suspension

Changes and New Features

The parking brake on the E89 is designed as an electromechanical parking brake EMF. The EMF on the E89 differs from the known EMF systems in that it is integrated in the brake calliper. Competitors are already using this system in series production.

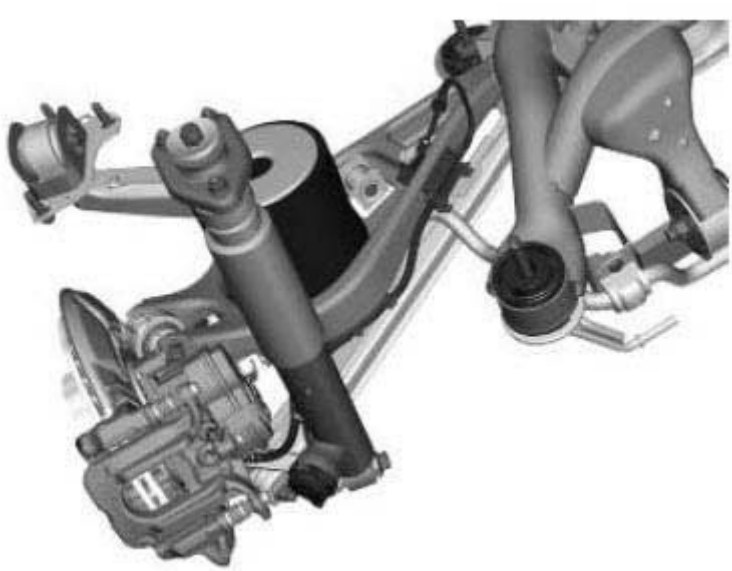


Fig. 2: Identifying E89 Brake Calliper With EMF Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

E89 FRONT AXLE

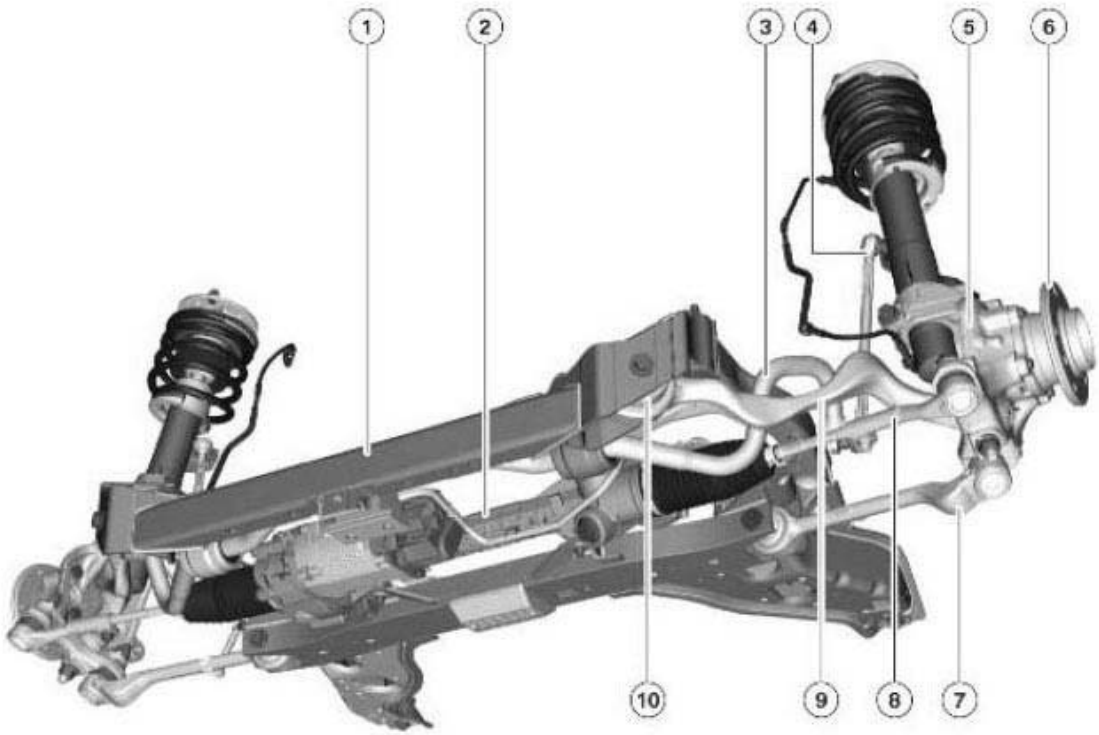


Fig. 3: Identifying E89 Front Axle Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Front axle carrier
2	Electromechanical power steering
3	Stabilizer bar
4	Stabilizer link
5	Spindle
6	Wheel hub
7	Control arm
8	Tie rod
9	Tension strut
10	Hydraulic mount/Bushing

The E85 was equipped with a single-joint spring strut front axle. To optimize the suspension properties, the E89 is equipped with a double-joint spring strut front axle. The reasons are explained in the following.

Kingpin Offset

The kingpin offset (scrub radius) of the E89 is greater compared to that of the E85. The reason for this is that

the front axle has been adopted from production line 2 (1 Series and 3 Series).

On the single-joint spring strut front axle of the E85 the position of the wheel control joint largely determines the size of the kingpin offset. Since the kingpin offset should be as small as possible, the wheel control joint must be located as far towards the outside as possible. This however results in problems concerning the package space for the brake disc and brake calliper. On the double-joint spring strut front axle the position of the control arm and tension strut with respect to each other determines the size of the kingpin offset.

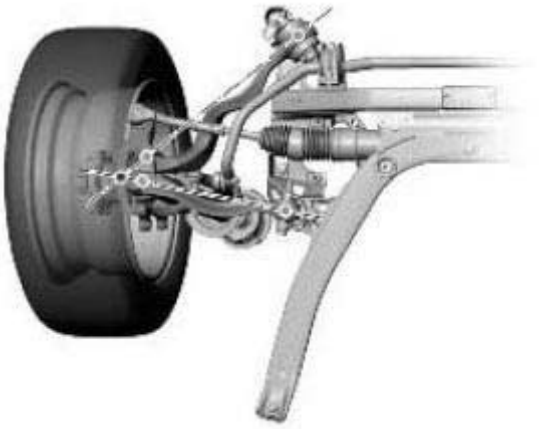


Fig. 4: Identifying Lower Pivot Point
Courtesy of BMW OF NORTH AMERICA, INC.

The pivot points of the control arm or wishbone and tension strut at the swivel bearing can therefore be selected such that no space problems are encountered for the brake system.

While these aspects still retain their validity, a larger kingpin offset than on the single-joint spring strut front axle is now used. The reason for this is that common parts from production line 2 are used as far as possible but the track width has increased compared to the 1 Series and 3 Series. Among other measures, this was achieved by changing the rim offset, thus, of course, also increasing the kingpin offset.

The effects of increased susceptibility to interference caused by a larger kingpin offset were eliminated by an optimized and modified elastokinematics system and tuned to such an extent that an improvement was achieved compared to the E85. As a result, the response of the E89 to steering movements is slightly more indirect at high speeds and very direct at speeds up to 100 km/h. The vehicle handling is very balanced up to the limit range and therefore has outstanding control properties.

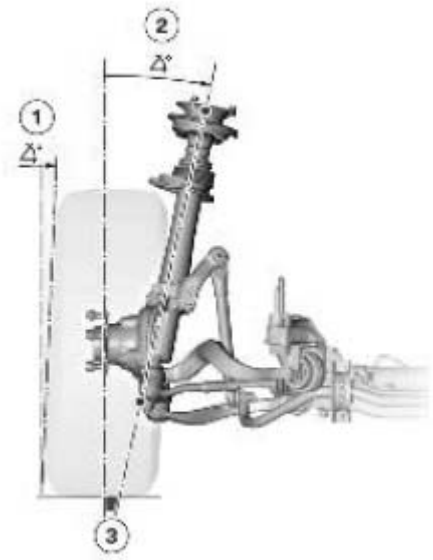


Fig. 5: Identifying Positive Kingpin Offset
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Camber
2	Kingpin inclination
3	Kingpin offset

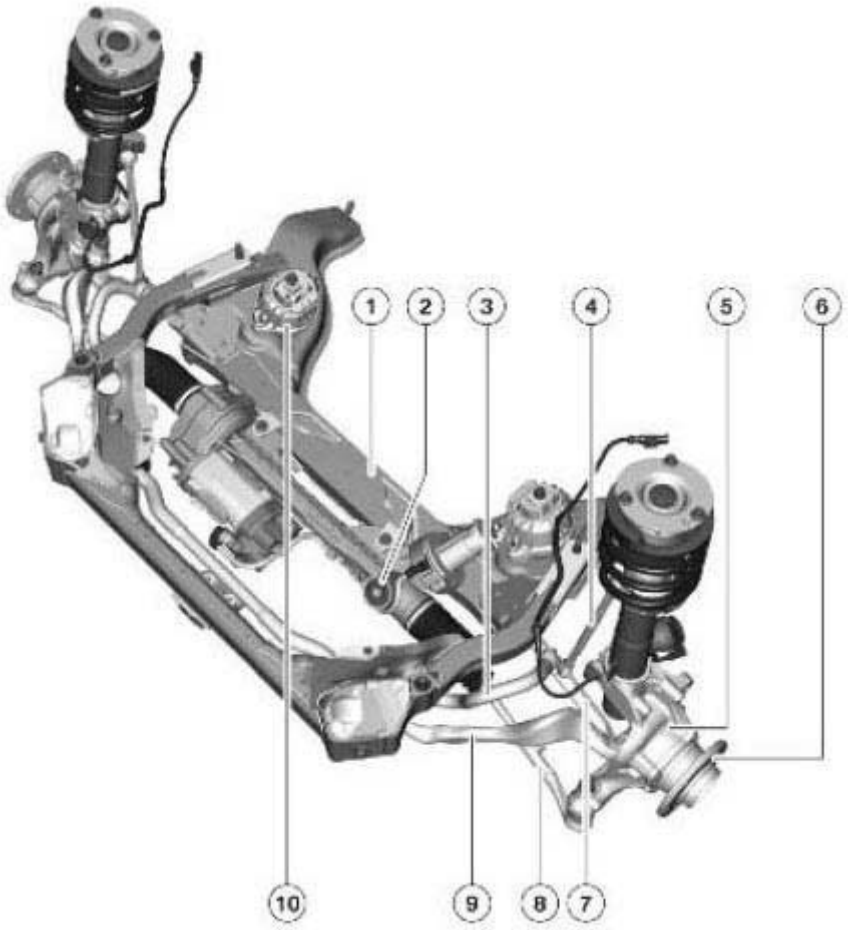


Fig. 6: Identifying E89 Front Axle Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Front axle carrier
2	Electromechanical power steering
3	Stabilizer bar
4	Stabilizer link
5	Swivel bearing
6	Wheel hub
7	Control arm
8	Track rod
9	Tension strut
10	Engine mount

Both tension struts are mounted with hydraulic bushings on the front axle carrier. In addition, the distance of the tension strut and control arm pivot points at the swivel bearing largely determines the vertical force lever arm. The further the joints of the tension strut and control arm are from each other at the swivel bearing, the greater

the recovery force initiated by the vehicle weight.

On the single-joint spring strut front axle, the distance is zero as the two joints of this axle have merged to form one. The resulting advantage of the double-joint spring strut front axle is improved directional stability in the high speed range and a lower tendency to steering instability in the lower speed range (less susceptible to torsional vibration in the steering wheel).

Compared to that of the control arm, the ball joint (guide joint) of the tension strut is raised at the swivel bearing, thus providing effective anti-dive control. A further advantage of this arrangement is that this tension strut mount on the axle carrier can be arranged at approximately the same level with respect to the mounting at the swivel bearing and does not have to be lowered. This is of particular benefit to a large overhang angle. In addition, it is possible to lower the control arm mount on the axle carrier side, thus enabling a lower roll center.

The single-joint axle features only one type of cross brace as the axle carrier. The double-joint spring strut front axle on the other hand features a frame which additionally provides significant stiffening of the front end.

TECHNICAL DATA

Description	**E85**	**E89**
Total toe-in	14.4'	14.0'
Track width	1473.3 mm	1511.1 mm
Camber	-34.8'	-23.3'
Kingpin inclination	15.7	14.3
Castor angle	5.9	7.2
Castor offset	17.7 mm	20.7 mm
Kingpin offset	4.7 mm	9.6 mm
Steering angle, inner	43.1	37.7
Steering angle, outer	35.3	31.2
Rim offset ET/IS	47 mm	29 mm
Tire size	225/50 R16 225/45 R17 225/40 R18	225/45 R17 225/40 R18 225/35 R19

Central-link Rear Axle

An adapted version of the rear axle known from the E85 with the development designation HA 3 is fitted in the E89.

The central link rear axle is an intricately constructed, weight and space saving, multi-link rear axle. The wheels are controlled by two control arms and one semi-trailing arm that is mounted at the central point on the body. The precise interaction between the semi-trailing arm and control arm ensures that the wheels remain in the best possible position with respect to the road surface, thus providing outstanding directional stability. The flexible link bearings ensure exceptional driving stability while cornering, providing the vehicle with excellent rolling and acoustic comfort.

The designation HA 3 does not refer to the three links but rather is a continuation of the development designation at BMW. The central link rear axle optimizes the following properties:

- Directional stability
- Alternating load response
- Self-steering response
- Lane change stability
- Transition response from cornering to straight ahead
- Rolling comfort.

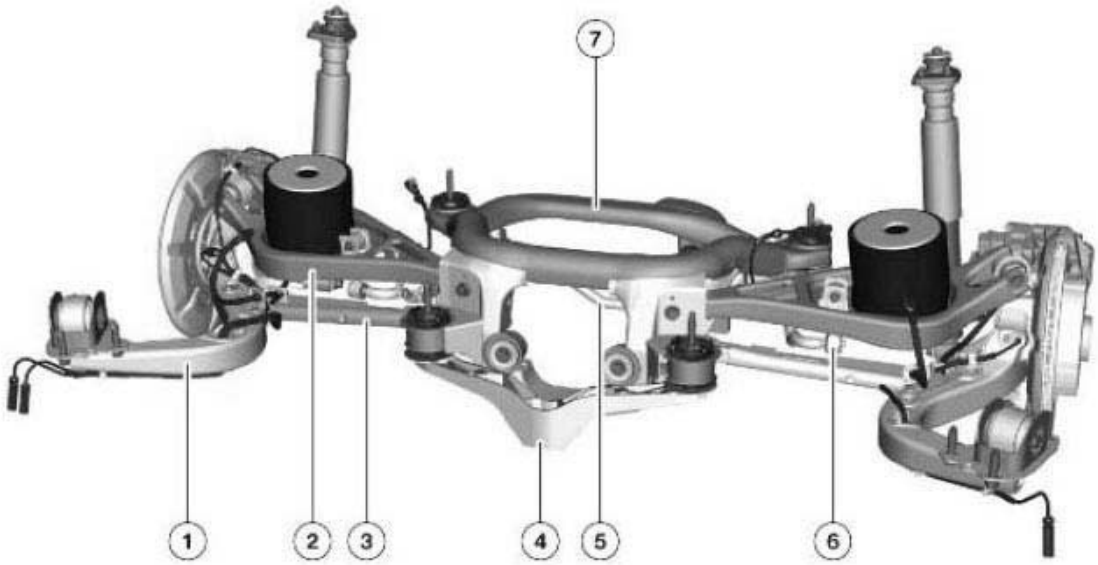


Fig. 7: Identifying E89 Central Link Rear Axle Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Semi-trailing arm
2	Transverse control arm, top
3	Transverse control arm, bottom
4	Thrust strut
5	Stabilizer bar
6	Stabilizer link
7	Rear axle carrier

TECHNICAL DATA

TECHNICAL DATA

Description	E85	E89
Total toe-in (angle)	22'	18'
Track width	1521 mm	1562 mm
Camber	-2 15'	-2 20'

Wheelbase	2495 mm	2496 mm
Rim offset ET/IS	47 mm (50 mm(1))	29 mm (40 mm(1))
Tire size	225/50 R16 225/45 R17 255/40 R17(1) 255/35 R18(1)	225/45 R17 255/40 R17(1) 255/35 R18(1) 255/30 R19(1)
(1) Mixed tires		

SUSPENSION REINFORCEMENT DEVICES

Support brackets are fitted on the front axle and rear axle as well as a thrust panel additionally on the rear axle to increase the body rigidity and to optimize the transfer of forces into the body. These components distribute the force input into the body over the largest possible area.

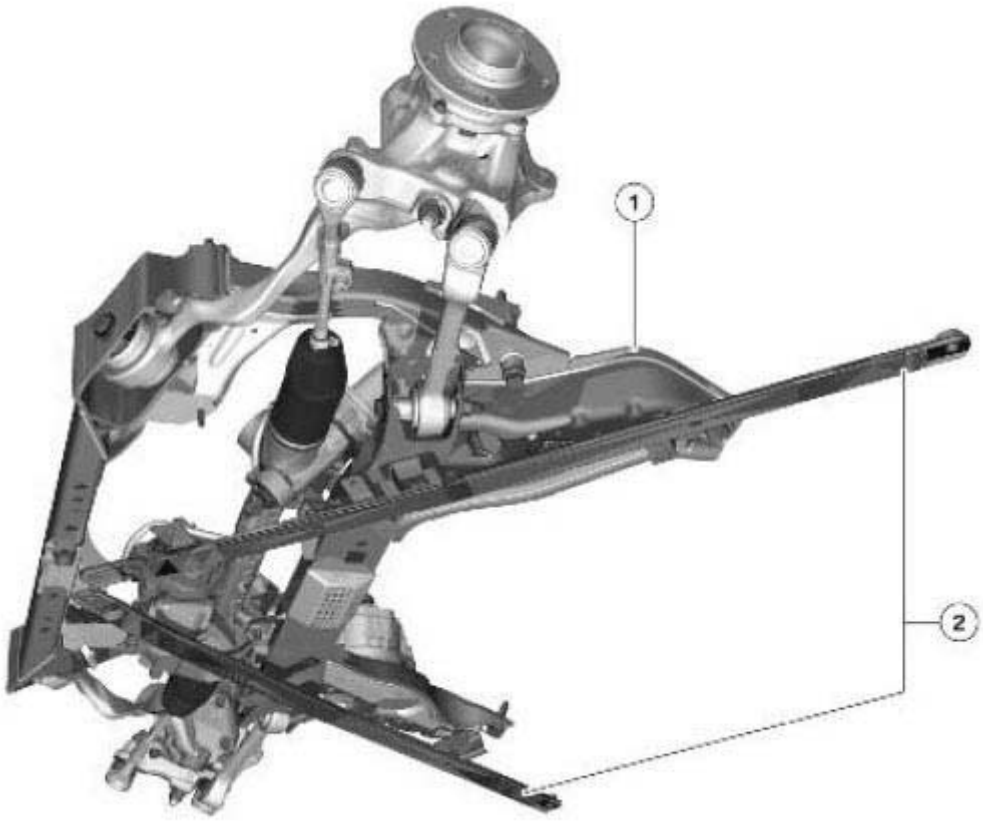


Fig. 8: Identifying Front Axle Carrier And Support Brackets
Courtesy of BMW OF NORTH AMERICA, INC.

E89 Front axle carrier with struts

INDEX EXPLANATION REFERENCE CHART

Index	Explanation

1	Front axle carrier
2	Support brackets

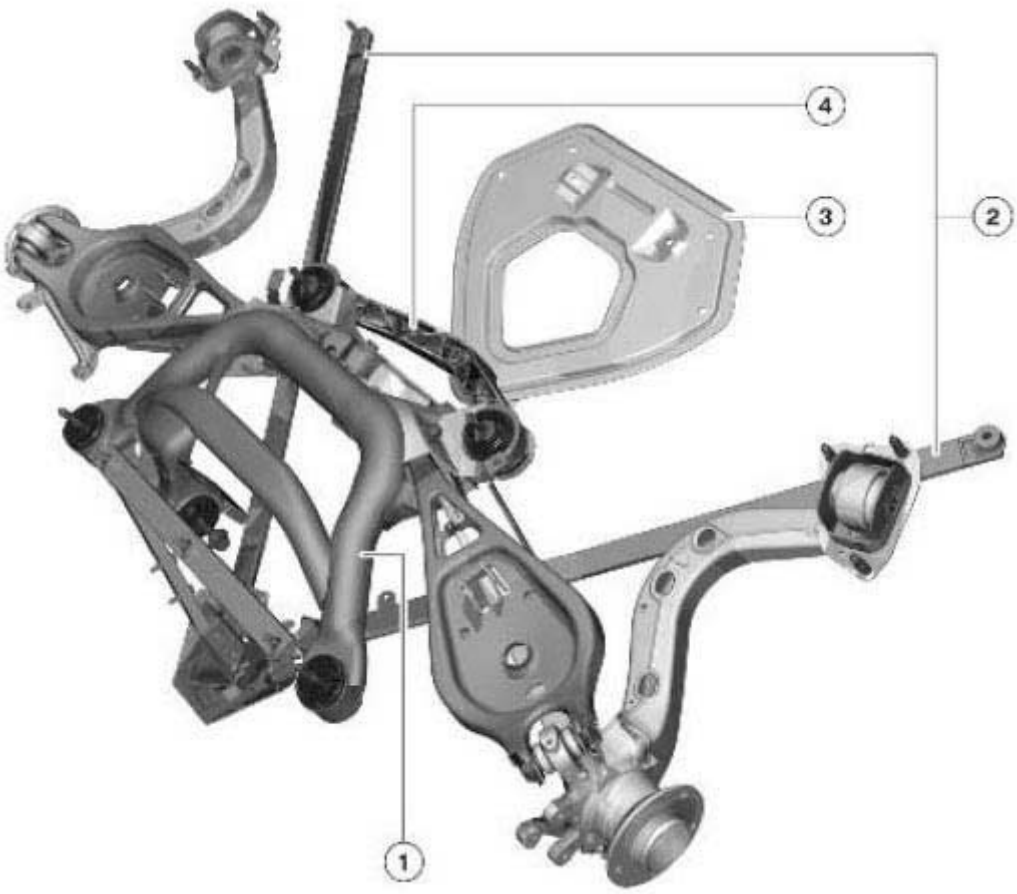


Fig. 9: Identifying Rear Axle Components
Courtesy of BMW OF NORTH AMERICA, INC.

E89 Rear axle carrier with tension struts and thrust panel

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Rear axle carrier
2	Tension support brackets (struts)
3	Thrust panel
4	Thrust strut

BRAKES

The function and weight of the service brake have been improved. Aluminum floating calliper brakes and aluminum frame calliper brakes are fitted on the front axle. Lightweight brake discs are used on the front axle of both top models. Outstanding stability was achieved by the corresponding dimensioning. The brake pad control

principle as well as the brake callipers and brake discs secure the long-term properties in terms of surface protection, corrosion protection and unsusceptibility to soiling.

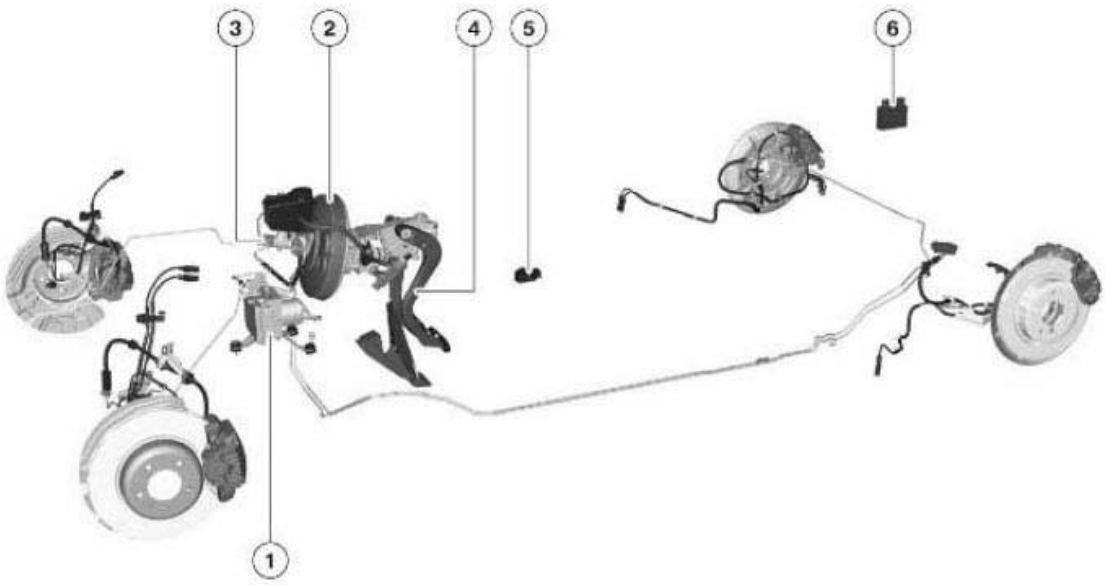


Fig. 10: Identifying E89 Service Brake Components
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	DSC unit
2	Brake booster
3	Master brake cylinder
4	Brake pedal
5	DSC sensor
6	EMF control unit

Technical Data

TECHNICAL DATA

Model	Type	Front brake disc in mm x thickness in mm	Rear brake disc in mm x thickness in mm
E85	Z4 2.5i	286 x 22 (1)	280 x 10
	Z4 3.0si	325 x 25 (1)	294 x 19 (1)
E89	Z4 sDrive30i	330 x 24 (1)	300 x 20 (1)
	Z4 sDrive35i	348 x 30 (1)	324 x 20 (1)
(1) Internally ventilated brake disc			

Parking Brake

For the first time at BMW, the E89 is equipped with an electromechanical parking brake integrated in the brake calliper. The use of the electromechanical parking brake offers the following advantages:

- Operation by means of a button ergonomically positioned in the center console
- Reliable application and release of the electromechanical parking brake (EMF) under all conditions
- Dynamic emergency braking function also at low friction ensured by the control systems (ABS)
- No parking brake lever means additional storage space in the area of the center console.

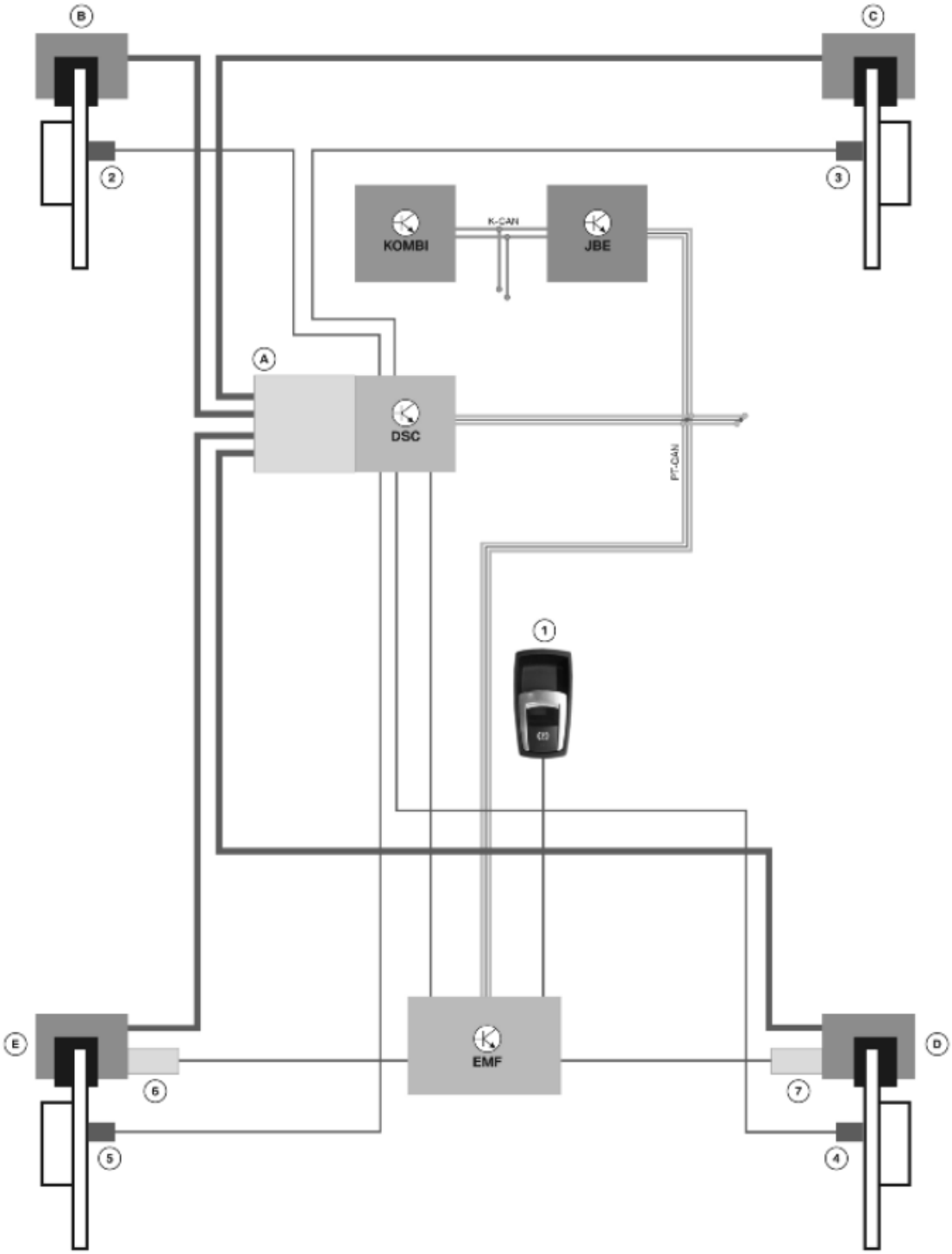


Fig. 11: System Overview - Electromechanical Parking Brake (EMF)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
A	DSC unit

B	Brake calliper, front left
C	Brake calliper, front right
D	Brake calliper, rear right
E	Brake calliper, rear left
1	EMF button
2	Wheel speed sensor, front left (not used for EMF)
3	Wheel speed sensor, front right (not used for EMF)
4	Wheel speed sensor, rear right
5	Wheel speed sensor, rear left
6	EMF actuator, rear left
7	EMF actuator, rear right
EMF	Electromechanical parking brake
DSC	Dynamic stability control
JBE	Junction box electronics
KOMBI	Instrument cluster
PT-CAN	Powertrain-Controller Area Network

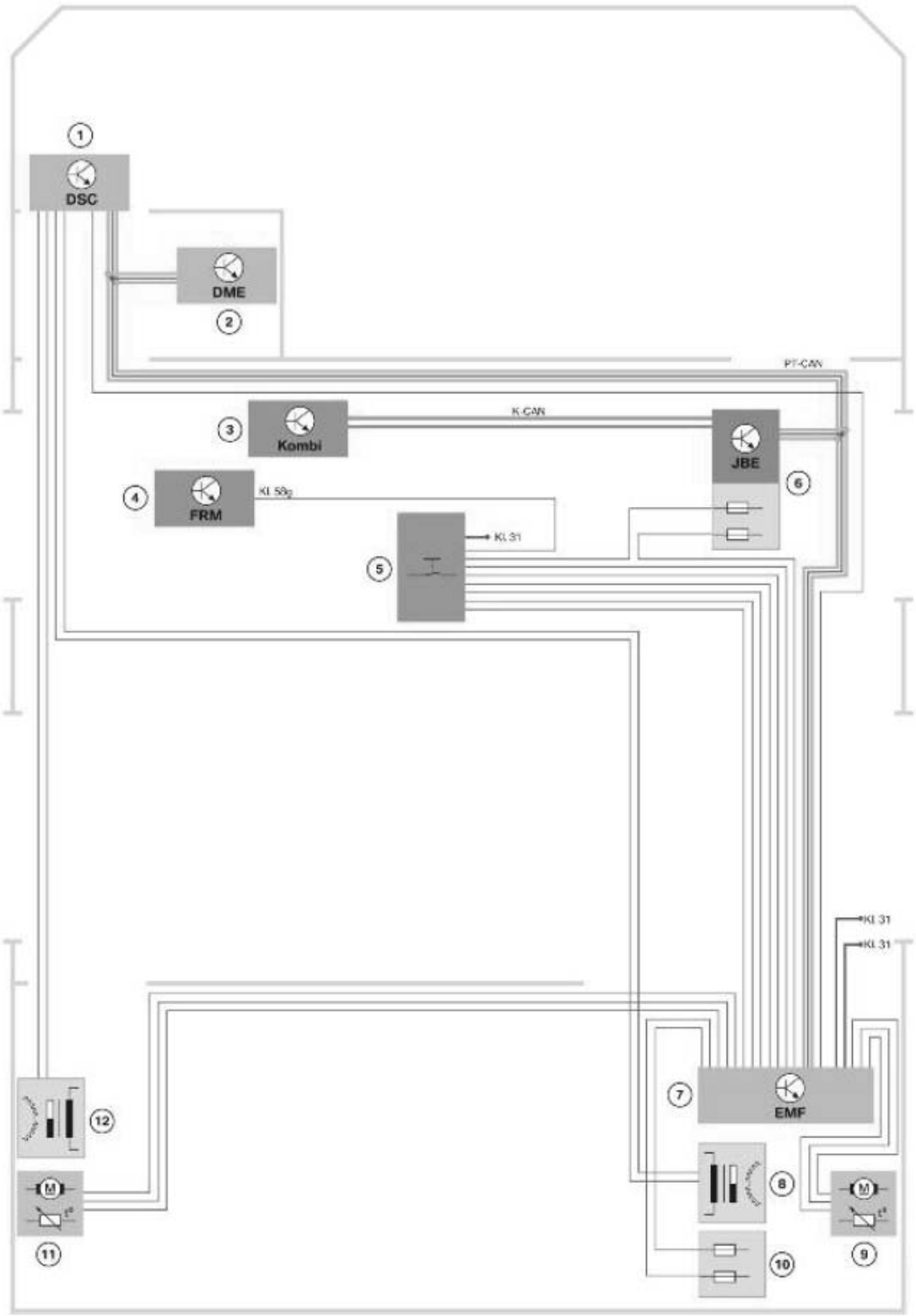


Fig. 12: System Circuit Diagram - Electromechanical Parking Brake (EMF)
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	DSC (Dynamic stability control)
2	DME (Digital motor electronics)
3	KOMBI (Instrument cluster)
4	FRM (Footwell module)
5	EMF button
6	JBE (Junction box electronics)
7	EMF (Electromechanical parking brake)
8	Wheel speed sensor, rear right
9	EMF actuator, rear right
10	Fuses
11	EMF actuator, rear left
12	Wheel speed sensor, rear left

PRINCIPLES OF OPERATION

The EMF control unit receives the driver's choice to apply the parking brake from the EMF button on the center console. The vehicle status is determined via the link to the electrical system and the bus systems and the control unit decides whether all conditions for applying the brake are met. If this is the case, the two EMF actuators on the rear brake callipers are actuated.

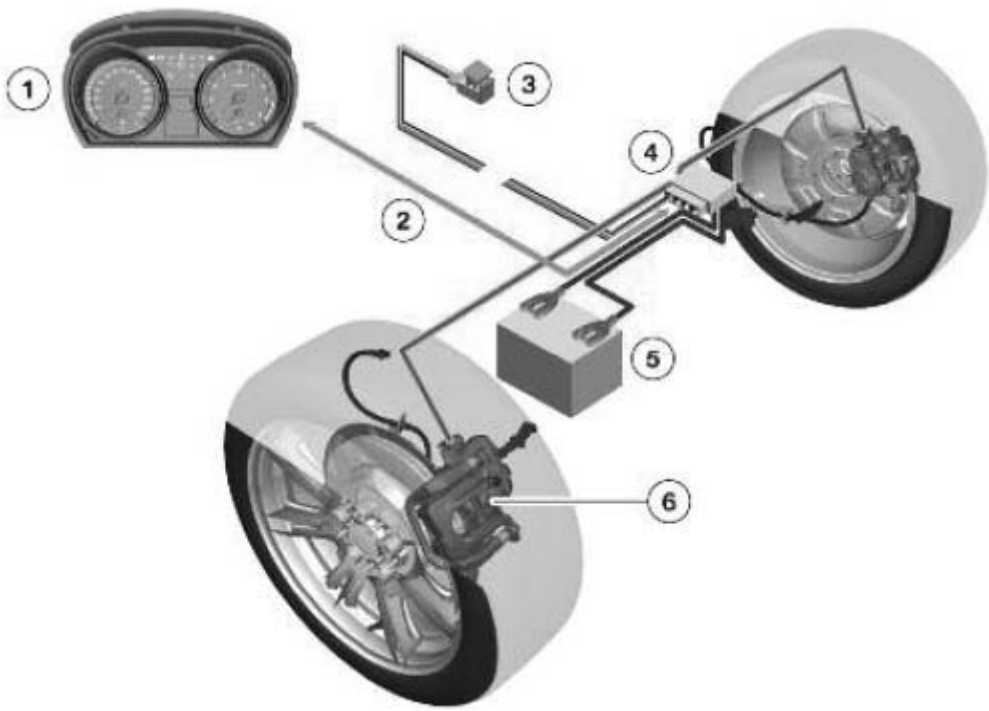


Fig. 13: E89 EMF System Overview
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Instrument cluster
2	Information flow
3	EMF button
4	EMF control unit
5	Battery
6	EMF actuator

Due to the self-locking characteristics of the spindle, the tension is retained even when no power is applied, thus firmly holding the vehicle. On reaching the required force, the applied brake status is indicated by a red indicator lamp in the instrument cluster and an additional red LED in the EMF button.

FUNCTION OF THE EMF ACTUATOR

The EMF actuator is mounted on the brake calliper and pushes directly on the back of the "normally" hydraulically operated brake piston.

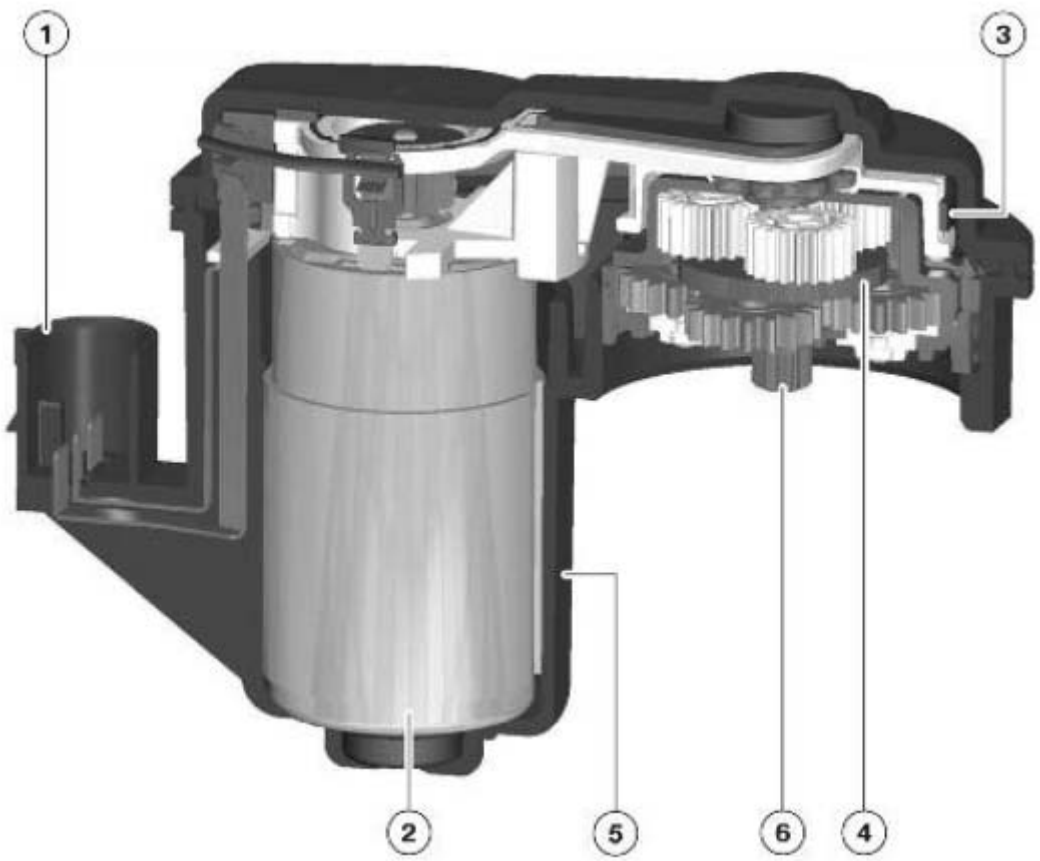


Fig. 14: Design Of EMF Actuator
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Plug connection
2	Electric motor
3	Drive belt
4	Planetary gear
5	Housing
6	Connection to spindle

The force is transmitted via electric motor (2) and drive belt (3) to a two-stage planetary gear train (4). Spindle (4) shown in the following graphic is driven by spindle connection (6). Spindle (4) in the spindle nut with anti-twist lock (2) in brake piston (3) provides the self-locking effect. The force is transmitted via the spindle and spindle nut with anti-twist lock to brake piston (3). As in hydraulically operated systems, the brake piston acts on the brake pads that are forced against the brake disc. Due to the self-locking effect of the spindle in the spindle nut with anti-twist lock, the tension is retained and the vehicle is held firmly even when no power is applied.

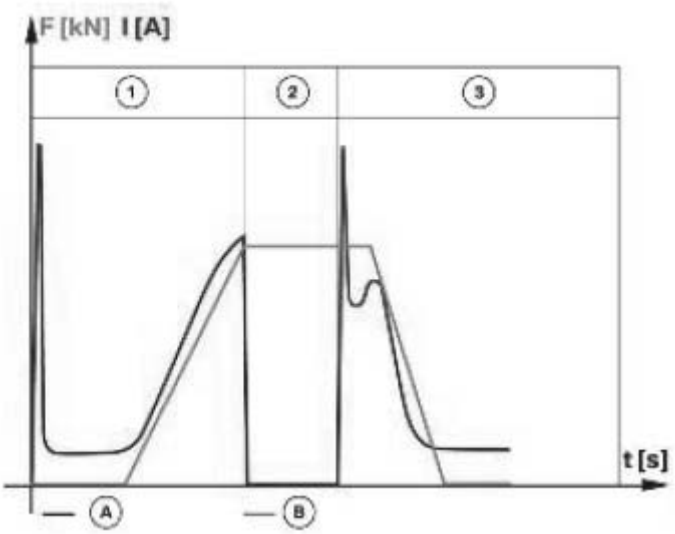


Fig. 15: E89 EMF Voltage And Force Curve
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
A	Force curve
B	Voltage curve
1	Applying EMF
2	EMF applied
3	Releasing EMF

BRAKE PISTON

The brake fluid can flow via grooves (1) past the spindle nut to ensure the brake system is completely bled. The screw-in travel is limited by spindle stop (5). This therefore prevents tightening and blocking when in open state.

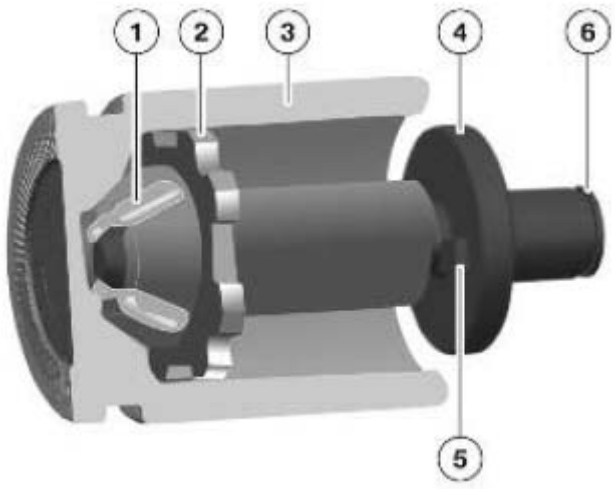


Fig. 16: Cutaway View Of Brake Piston
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Groove
2	Spindle nut with anti-twist lock
3	Brake piston
4	Spindle
5	Spindle stop
6	Connection to planetary gear

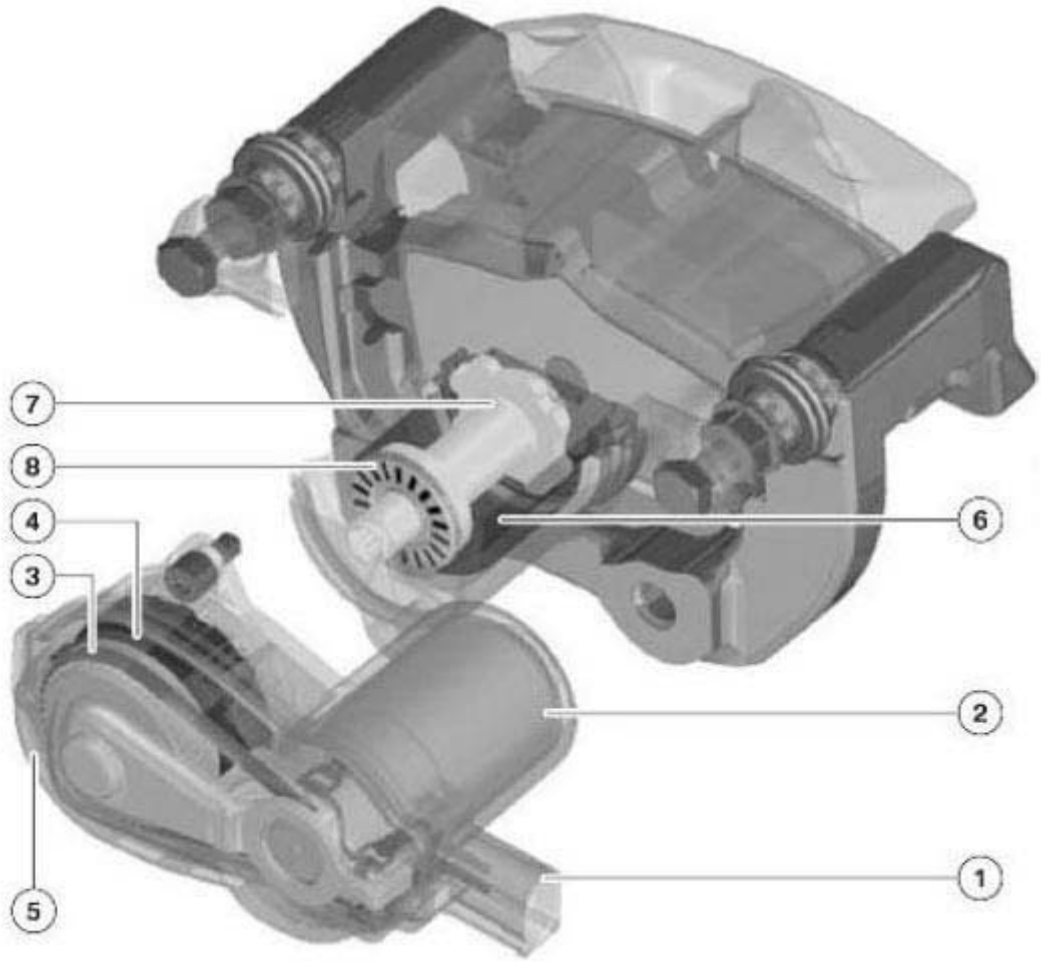


Fig. 17: Overview Of EMF Actuator With Brake Calliper
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Plug connection
2	Electric motor
3	Drive belt
4	Planetary gear
5	Housing
6	Brake piston
7	Spindle with spindle nut
8	Roller bearing

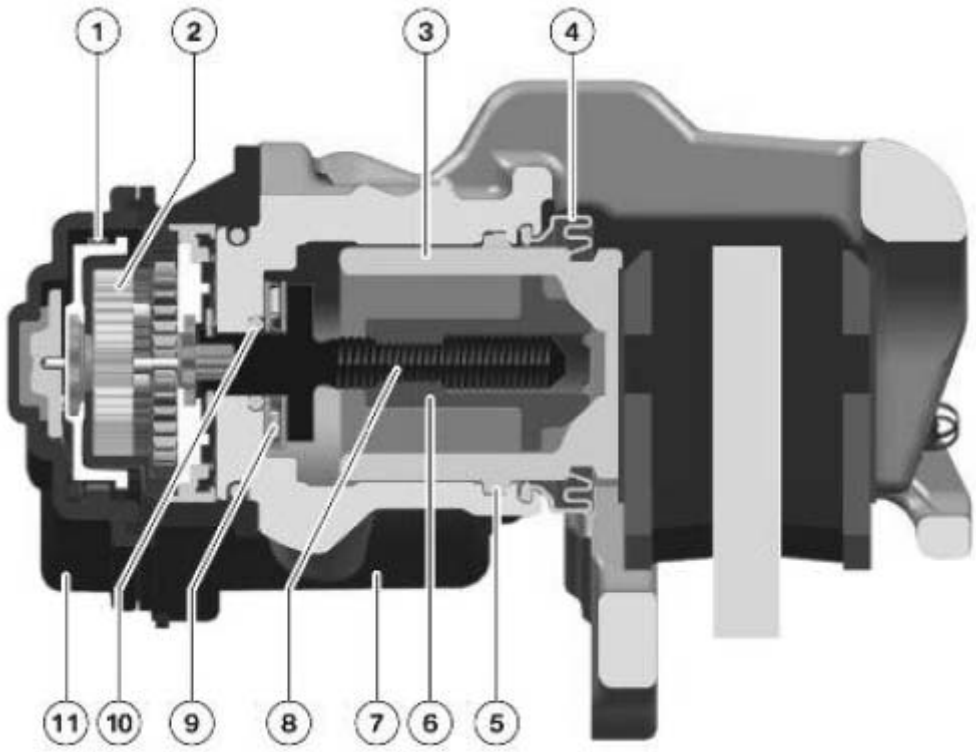


Fig. 18: Cutaway View Of E89 Parking Brake Applied With New Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Drive belt
2	Planetary gear
3	Brake piston
4	Dust sleeve
5	Seal
6	Spindle nut
7	Electric motor
8	Spindle
9	Roller bearing
10	Seal
11	Housing

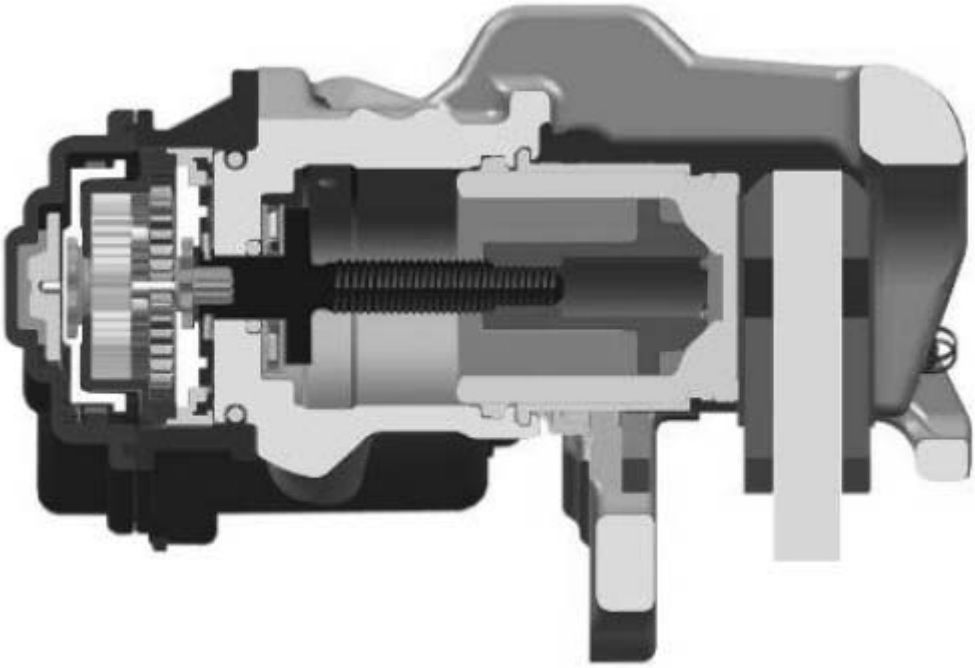


Fig. 19: Cutaway View Of E89 Parking Brake Applied With Worn Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

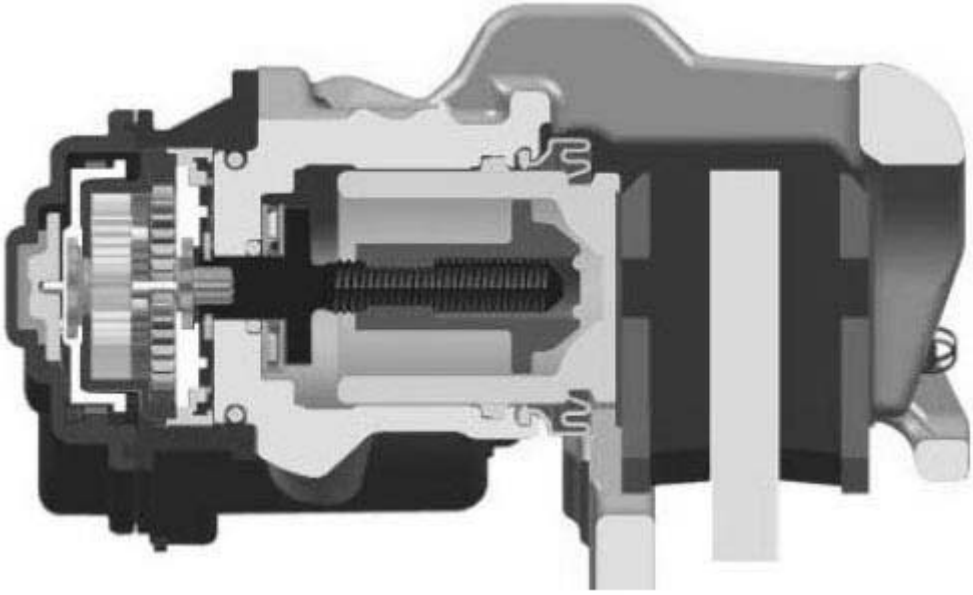


Fig. 20: Cutaway View Of E89 Parking Brake Released With New Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

Applying the Parking Brake

The driver can apply the parking brake by pulling the EMF button. The operating direction is the same as that of the mechanical handbrake lever.

The signal from the EMF button is read by the EMF control unit. The EMF control unit individually activates the EMF actuators at the wheel brake.

The parking brake can be applied in any logical terminal status. Applying the parking brake at terminal 0 is made possible by connecting terminal 30 to the EMF control unit. The EMF control unit is woken up when the driver operates the EMF button at terminal 0. In turn, the EMF control unit wakes the other control units in the vehicle. Only then does the EMF control unit receive the important information on the stationary status of the vehicle. In addition, the change status of the parking brake can be indicated after waking the control unit.

The parking brake applied status is indicated by a red LED in the EMF button and by the EMF indicator lamp in the instrument cluster. If the parking brake is already applied, pulling the EMF button again will have no effect.

Fig. 21: Identifying E89 Indicator Lamp, Parking Brake
Courtesy of BMW OF NORTH AMERICA, INC.

Rolling Monitor with Parking Brake Applied

This monitoring function is designed to prevent the vehicle from rolling with the parking brake applied. The rolling monitor is always activated when the status of the parking brake changes from released to applied and ends after a defined period of time after this status change.

The function ends:

- when a fault occurs that prevents mechanical retensioning
- when the vehicle assumes sleep mode, the control unit is switched off or reset.

The DSC uses a signal as the input variable for rolling detection. The tension at the EMF actuators is immediately increased as soon as this signal indicates that the vehicle is starting to roll during rolling monitoring. During the retensioning phase, the tensioning force is increased until the vehicle no longer rolls or a maximum tensioning force is reached.

Temperature Monitoring

The task of the temperature monitoring function is to compensate for the loss of force that occurs when the hot brake disc cools down. Temperature monitoring is activated when the temperature exceeds a defined value as the status of the parking brake changes from released to applied.

The DSC control unit calculates the brake disc temperature at the individual wheels and sends the corresponding value to the EMF control unit. During the status change, the higher temperature of the two brake discs is taken for the temperature monitoring function. A characteristic map contains the corresponding temperature ranges with the associated retensioning times.

The corresponding retensioning times in the characteristic map are activated depending on the temperature during the status change. The tension is increased once when the first retensioning time is reached. The tension is then increased again after the second retensioning time has elapsed and increased yet again after the third. The characteristic map may also contain the value 0 for one or several retensioning times. In these cases, the corresponding increase in tension does not take place. The function ends under following conditions:

- Occurrence of a fault that prevents retensioning
- The control unit is switched off or reset
- The last retensioning step has already been executed.

Releasing the Parking Brake

The EMF button is pushed down to release the parking brake. For the parking brake to actually release terminal 15 must additionally be on and at least one of the following conditions must apply:

- Brake pedal pressed or
- Parking lock of automatic gearbox engaged or clutch pedal pressed (only vehicle with manual gearbox).

This prevents the vehicle from inadvertently rolling if, for example, the EMF button is pressed by another occupant instead of the driver. The LED in the EMF button and the EMF indicator in the instrument cluster go out when the parking brake is released.

Activation of the EMF actuator causes the spindle to rotate. The rotation of the spindle causes the spindle nut to move a short defined distance from the brake piston.

Dynamic Emergency Braking

Two operating units for the brake are required by law. Besides the brake pedal, the second operating unit in the E89 is the EMF button in the center console. Pulling the EMF button while driving triggers dynamic emergency braking with a defined sequence via the DSC system. This function is intended for emergencies when the driver can no longer slow down the vehicle using the brake pedal. Other occupants can also stop the vehicle in this way should, for example, the driver suddenly become unconscious.

During dynamic emergency braking, hydraulic braking pressure is built up at all four wheel brakes. The DSC functions are fully active and the brake lights come on. This is an important advantage compared to a manual parking brake.

Dynamic emergency braking takes place only for as long as the driver is pulling the EMF button. The deceleration initiated by the DSC is increased in ramps. The EMF indicator lamp in the instrument cluster is activated during dynamic emergency braking. In addition, a check control message is given together with an acoustic signal in order to warn the driver of this adverse situation.

The DSC control unit prioritizes if the driver attempts to slow down the vehicle by simultaneously pressing the brake pedal and pulling the EMF button. The higher deceleration request is implemented. If dynamic emergency braking is continued until the vehicle comes to a stop, the parking brake will remain applied even after the EMF button is released. The EMF indicator lamp in the instrument cluster remains active. The driver can then release the parking brake (see **RELEASING THE PARKING BRAKE**).

Parking Brake Fault

The EMF indicator lamp in the instrument cluster lights yellow to indicate a fault in the parking brake. A check control message is also output.

Fig. 22: Identifying E89 Indicator Lamp, Parking Brake
Courtesy of BMW OF NORTH AMERICA, INC.

Emergency Release

No parking brake emergency release function is provided for the customer. The parking brake can be released using the BMW diagnosis system or the EMF actuators are removed and the spindle is turned back manually.

Changing Brake Pads

To change the brake pads, the EMF actuator must be in the fully opened position so that the brake piston can be pushed back. The BMW diagnosis system can be used to actuate the EMF actuators and assume the fully opened position. This position is necessary to change the brake pads. Installation mode is set automatically on reaching the installation position.

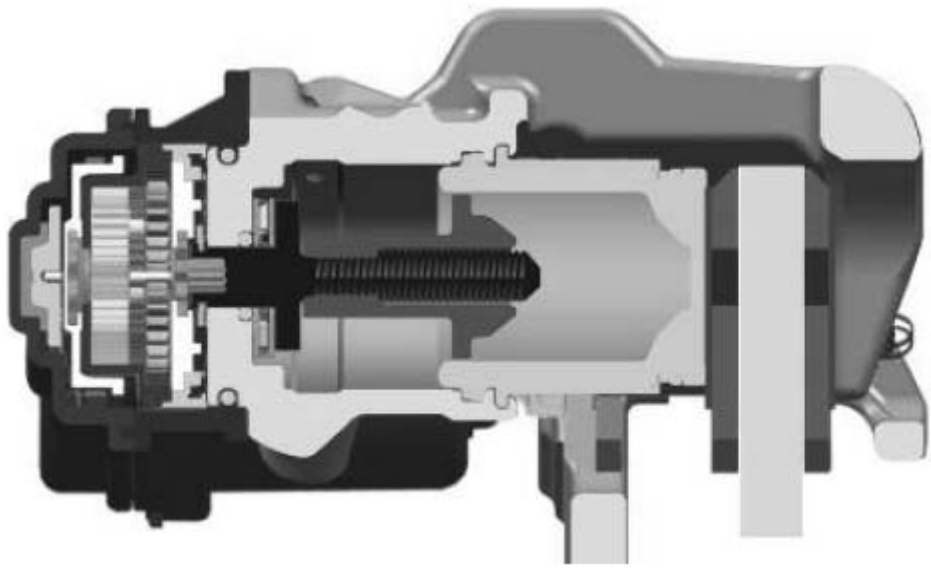


Fig. 23: Cutaway View Of E89 Parking Brake With Spindle Nut In Installation Position For Changing Brake Pads
Courtesy of BMW OF NORTH AMERICA, INC.

For safety reasons, the parking brake cannot be activated for as long as the EMF control unit is in

installation mode. If the EMF button is pulled, the EMF indicator lamp in the instrument cluster will flash yellow.

Installation mode can be cancelled in two ways:

- By carrying out the service function Reset Installation Mode with the aid of ISTA
- By driving the vehicle and exceeding a programmed minimum speed.

After being changed, the brake pads must be bedded-in. This is necessary to ensure the brake pad and brake disc pairing assumes the specified friction parameters. Only then will the required braking force be reached.

The exact procedure for bedding-in the service brakes is described in the Repair Instructions. The instructions must be followed exactly.

Brake Test Rig Recognition

The EMF control unit recognizes the brake test rig based on a plausibility check (wheel speed comparison) and assumes brake test rig mode. The following target positions are assumed in succession by pulling the EMF button several times:

- Brake pads applied
- Force 1 for brake test rig
- Force 2 for brake test rig
- Target force.

The EMF indicator lamp flashes slowly when brake test rig mode is activated and the EMF actuators are released.

The EMF indicator lamp begins to flash fast when brake test rig mode is activated and EMF actuators are partially applied.

The EMF indicator lamp lights permanently when brake test rig mode is activated and EMF actuators are fully applied.

The parking brake can be released on the brake test rig without pressing the brake pedal or clutch pedal.

Brake test rig mode is automatically cancelled on exiting the brake test rig. The mode is also deactivated by pressing the EMF button or if a fault occurs.

CHECK CONTROL MESSAGE REFERENCE CHART

Description	Check control message	Central information display	General brake indicator lamp	Parking brake indicator lamp	Check control symbol
For safety reasons,	Additionally press foot				

the parking brake can only be released with the service brake pedal depressed	brake Manual gearbox: Additionally press foot brake or clutch	-	-	-	
The driver must immediately be made aware of a fault in the EMF button	-	-	-		-
Parking brake applied mechanically	-	-	-		-
Redundant EMF button fault, workshop visit required as soon as possible	Parking brake fault!	Parking brake fault. Have checked by BMW Service dealer	-		
Mechanical application of parking brake no longer possible, dynamic emergency braking (emergency brake function) still available	Parking brake fault!	Parking brake fault. Not operative when vehicle stationary. Emergency braking function still possible. Have checked by nearest BMW Service dealer.	-		

CHECK CONTROL MESSAGE REFERENCE CHART

Description	Check control message	Central information display	General brake indicator lamp	Parking brake indicator lamp	Check control symbol
Dynamic emergency braking (emergency		Parking brake fault. No emergency braking function.			

brake function) no longer possible, mechanical brake application still possible	Parking brake fault!	Parking brake can be applied with vehicle stationary. Have checked by your BMW Service dealer.	-		
Parking brake completely failed, mechanical parking brake cannot be applied, no emergency braking function	Parking brake failed!	Parking brake failed. Secure vehicle to prevent it rolling away. Have checked by nearest BMW Service dealer.			
Warning when driving off - parking brake or dynamic emergency braking applied	Release parking brake	-	-		
Installation mode (only with EMF button operated)	-	-	-		-

Suspension and Damping

Basic Suspension Setup

The spring struts on the front axle are made of steel and are connected in a clamp arrangement to the aluminum wheel carrier. Two-tube gas-pressurized dampers are used.

The piston rods on the front axle are hollow. The piston in the shock absorbers are coated with PTFE (colloquially also known as Teflon).

The coil springs on the front and rear axle have been are optimized in terms of their tension and weight. To ensure a constant ride height is achieved depending on the engine and vehicle equipment, as on all BMW vehicles, different springs are used that are adapted to the specific vehicle weight.

Stabilizer bars are used on the front and rear axles. For weight reasons, the stabilizer bar on the front axle is of a tubular/hollow design.

Adaptive M Chassis and Suspension

The adaptive M suspension setup is lower by 10 mm. Four continuously adjustable shock absorbers in the optional Adaptive M chassis and suspension achieve variable damping forces to suit the driving situation by means of coupled tension/compression stage adjustment (continuous electronic damper control EDC-K). The shock absorbers are automatically set harder (more dynamic/sporty) or softer (more comfortable) corresponding to the driving situation.

In contrast to the E70/E71 and F01/F02 a bus system is not used in the E89 for data transfer. The VDM control unit is responsible for controlling the vertical movements. On the E89, the EDC-K function is integrated in the VDM control unit. The E89 does not feature any other vertical dynamics systems.

The EDC-K system on the E70/E71 and F01/F02 is known as vertical dynamics control. The designation was changed because the actuator units for the dampers are controlled by satellites on the shock absorbers and data transmission from the VDM control unit to the satellites takes place via FlexRay.

Also on the E89, the damper control can be influenced by means of the dynamic driving control switch on the center console. Two characteristic curves are used, which, in addition to a comfortable characteristic (normal) additionally enable another distinctly sports-orientated characteristic (sport).

HISTORY OF ELECTRONIC DAMPING

HISTORY OF ELECTRONIC DAMPING REFERENCE

	EDC M3	**EDCI**	**EDCII**	**EDCIII**	**EDC-K**	**VDCI**	**VDCII**	**EDC**
Model	E30	E32, E34	E24	E31, E32, E34, M5, E38, E39	E65, E66	E70, E71	F01, F02	E89
Introduction	1987	1987	1989	1990	2001	2006	2008	2009
Operation	Rotary switch	Rocker switch	Pushbutton	Rocker switch	Controller	Dynamic driving switch	Dynamic driving switch	Dynamic driving switch
Damper levels	Comfort, Normal, Sport	Comfort, Sport	Comfort, Sport	Comfort, Sport	Continuous	Continuous	Continuous	Continuous
Selection via control	Comfort, Normal, Sport	Comfort, Sport	Comfort, Sport	Comfort, Sport	Comfort, Sport	COMFORT, Sport	COMFORT, NORMAL, SPORT, SPORT+	NORMAL, SPORT, SPORT+
Additional sensors	None	None	1x Vertical (1), Steering angle	2x Vertical (1), 1x Longitudinal (1), 1x Steering angle	3x Vertical (1)	4x EDC satellites, x Ride-height sensors	4x EDC satellites, 4x Ride-height sensors	3x Vertical (1) 2x Ride height sensors
Gas								

pressurized shock absorber	Two-tube	Two-tube	Two-tube	Two-tube	Two-tube	Two-tube	Two-tube	Two-tube
Diagnostic capabilities	No	No	Yes	Yes	Yes	Yes	Yes	Yes
(1) Acceleration sensor								

NOTE: In order to simplify the description of the system, the continuous electronic damper control on the E89 is simply referred to as EDC.

Design

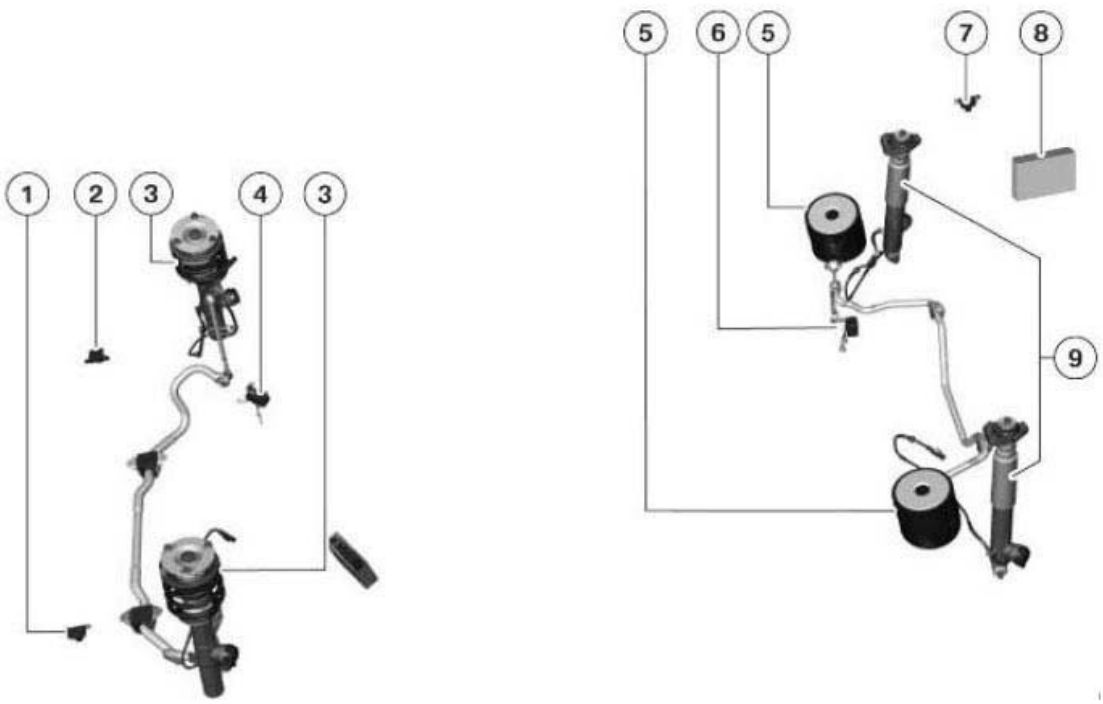


Fig. 24: Design Of E89 Adaptive M Chassis And Suspension
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	Acceleration sensor, front left
2	Acceleration sensor, front right
3	Spring strut, front
4	Ride-height sensor, front
5	Springs, rear
6	Ride-height sensor, rear
7	Acceleration sensor, rear right

8	VDM control unit
9	Shock absorber, rear

Function

The input parameters such as road condition, vehicle load and driving style are registered directly by the system and used to activate the corresponding characteristic map as required. This results in improved damping over a broad range with distinct comfort and safety advantages.

The aim of EDC is to clearly increase vibration comfort (vehicle movement) without compromising on driving characteristics (wheel-related movement) and safety. Three acceleration sensors register the driving dynamics of the vehicle and send the data each over a separate data line to the VDM control unit. Sensors register the following values:

- Vehicle speed
- Vertical acceleration
- Longitudinal acceleration and deceleration
- Steering angle
- Ride height.

The EDC valves are set to the hard position when no power is applied (failsafe position). The EDC valves are actuated by the VDM control unit and are set towards soft. The VDM control unit contains adaptive controllers with four output stages and converts the signals corresponding to a defined characteristic map. For this purpose, the four EDC valves on the shock absorbers are actuated independently (wheel-individual).

An EDC valve externally mounted on each shock absorber is responsible for controlling the oil flow in the tension and compression stages (damping). The shock absorbers are automatically set harder (increases dynamics) or softer (increased comfort) corresponding to the driving situation. In the event of the VDM control unit failing, the power supply to the EDC valves is disconnected and they are closed mechanically by springs, thus fixing the EDV valves in the hard position.

The dynamic driving switch makes it possible to additionally influence the control system.

Sensors

Additional sensors and information from existing systems are required to ensure the EDC operates correctly.

For instance, the EDC receives information on the vertical acceleration as the springs compress and recoil from the three additionally installed acceleration sensors. The acceleration sensors are fitted on the front left, front right and rear right. The acceleration sensors on the front and rear axles make it possible to register the movement of the vehicle body with respect to the road surface.

The steering column switch cluster makes available the rate of change in the steering angle in the form of a signal on the PT-CAN. The signal for the front left and front right wheel speed is also made available on the PT-CAN. The signal is provided by the DSC control unit.

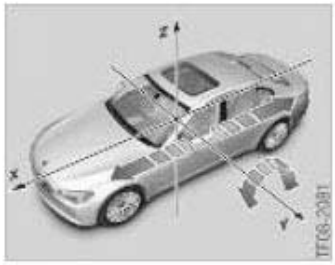
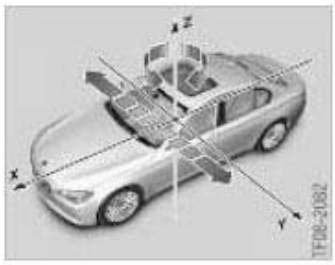
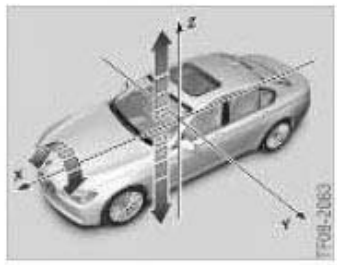
The DSC sensor makes available the longitudinal acceleration signal on the PT-CAN. The ride-height values are registered by a ride-height sensor on the front axle and on the rear axle and are also made available.

Dynamic Driving Systems

Overview

Fundamentally, the dynamic driving systems can be divided into three acceleration axes. The X-axis denotes the longitudinal dynamics, the Y-axis the transverse dynamics and the Z-axis the vertical dynamics. All dynamic driving systems act on one or several axes. The following overview shows the dynamic driving systems available for the E89 together with the effective axes.

DYNAMIC DRIVING SYSTEMS REFERENCE CHART

Effective direction			
DSC	sq. root	sq. root	
EPS		sq. root	
VDM			sq. root
DCC	sq. root		

Dynamic Stability Control DSC

The following table shows an overview of the subfunctions combined in the DSC.

DYNAMIC STABILITY CONTROL DSC FUNCTION CHART

Function	**Subfunction**	**Description**
ABS		Anti-lock brake system
	EBV	Electronic braking force distribution
	CBC	Cornering brake control (counteracts oversteer)
	DBC	Dynamic brake control
ASC		Automatic stability control
	MMR	Engine torque control
	MSR	Engine drag torque control
	BMR	Braking torque control
DSC		Dynamic stability control
	GMR	Yaw moment control
	SDR	Thrust differential control
	DTC	Dynamic traction control

Vertical Dynamics Management VDM

Electronic damper control EDC is used as the vertical dynamic system in the E89. The EDC function is integrated in the VDM control unit. The sales designation for the E89 is Adaptive M suspension.

Dynamic Cruise Control DCC

The option SA544 Cruise Control with Brake Function (also known as also known as Dynamic Cruise Control) is available for the E89.

Dynamic Driving Control in the E89

Compared to the E85/E86, the new dynamic control in the E89 has two new features:

- All dynamic driving systems available in the vehicle are influenced in full.
- Three levels are available. The status of the dynamic stability control is also taken into account thus making two further levels possible.

Dynamic Driving Switch

The E85/E86 was equipped with a SPORT button that influences several systems. The SPORT button switched the steering, automatic transmission and accelerator pedal between a standard mode and a sports mode. This made it possible to match these three systems more effectively in the two available modes. As a result, the customer experienced a vehicle trimmed to a sports driving style without compromise in sports mode.

Dynamic driving control is activated by a new dynamic driving switch and the DTC button arranged directly in front of it. Dynamic driving control combines the activation of many vehicle drive and dynamic driving functions.

The overall vehicle then assumes the characteristics that the driver expects in the selected drive range. With this bundling of functions, the vehicle characteristic can be set considerably more pronounced and less compromising. In response, the large number of, in part, unfeasible individual combinations is avoided (for example: sports steering and comfort-orientated damping).

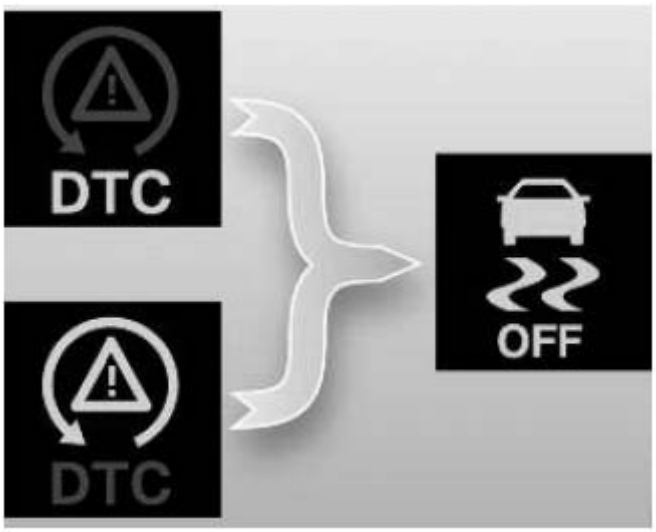


Fig. 25: Identifying DSC And DTC Symbols (With New Standardized Symbols)
Courtesy of BMW OF NORTH AMERICA, INC.

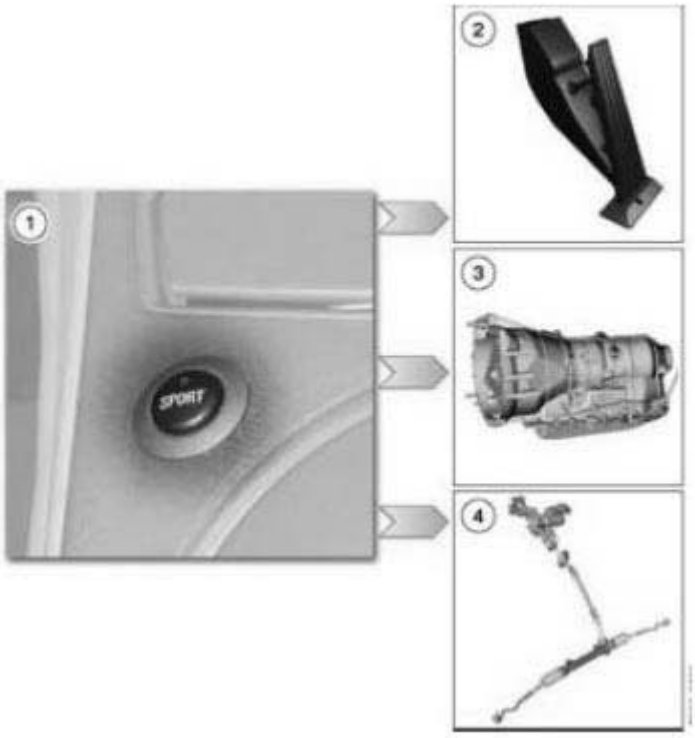


Fig. 26: Identifying SPORT Button In E85/E86
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	SPORT button
2	Accelerator pedal

3	Automatic gearbox
4	Steering

Fig. 27: Identifying DTC Button And Dynamic Driving Switch
Courtesy of BMW OF NORTH AMERICA, INC.

INDEX EXPLANATION REFERENCE CHART

Index	Explanation
1	DTC button
2	Dynamic driving switch

Central Information Display CID

In addition to the indicator in the instrument cluster, an assistance window also appears in the CID when the DTC button or dynamic driving switch is pressed. The newly selected mode is shown here and explained by an additional text.

Modes and Their Effects

The entire vehicle has a coherent response due to the fact that the individual systems are switched jointly and in a co-ordinated manner. This configuration avoids unfeasible combinations. For instance, this configuration rules out a sports accelerator pedal characteristic together with an extremely comfort-orientated shift program of the automatic transmission. The following table shows the possible combinations and the five available modes.

DYNAMIC DRIVING SWITCH SPECIFICATION CHART

	Dynamic driving switch			DTC button	

Mode	NORMAL			Sport			SPORT+			TRACTION			DSC OFF		
Vehicle setup	Comfort			Sport			Sport			Comfort			Comfort		
Drive systems															
Accelerator pedal characteristic	Comfort			Sport			Sport			Comfort			Comfort		
Mode, automatic gearbox	D	DS	M	D	DS	M	D	DS	M	D	DS	M	D	DS	M
Gearshift program, automatic gearbox (1)	XE	S	M	S	S	M	S	S	M	XE	S	M	XE	S	M
Gearshift speed, automatic gearbox (2)	N	S	S	S	S	S+	S	S	S+	N	S	S	N	S	S
Vehicle Chassis, suspension and dynamic driving systems															
Power steering	Basic			Sport			Sport			Basic			Basic		
DSC	DSC ON			DSC ON			DTC			DTC			DSC OFF		
Vertical dynamics management	Basic			Sport			Sport			Basic			Basic		

(1) 1XE = Extremely economical gearshift program; S = Sports gearshift program; M = Manual gearshift program

(2) 2N = Normal shift speed, S = Fast shift speed, S+ = Very fast shift speed

The modes (D, DS, M) of the automatic gearbox are selected via the selector switch and shift paddles.

As before, DS mode is engaged by shifting the selector lever to the left. The selector lever locks in this position. The sports program can only be engaged from D. The manual gearshift program M is selected by shifting the selector lever forward or back in the sports program. The manual gearshift program M is also selected by pressing the shift paddles in D or DS mode.

INTRODUCTION TO CHASSIS DYNAMICS

Model: All

Production: All

INTRODUCTION TO CHASSIS DYNAMICS

One of the trademark characteristics of a BMW is its ability to handle like a sports car and still provide a pleasing driver experience. To keep ahead of the competition, BMW has continually raised the bar from a performance standpoint. BMW engines are usually "Best in Class" in the premium segment. However, to remain a leader it is not only the engine which must outperform the rest of the pack. The chassis must allow for optimal comfort and safety as well as superior handing and braking.

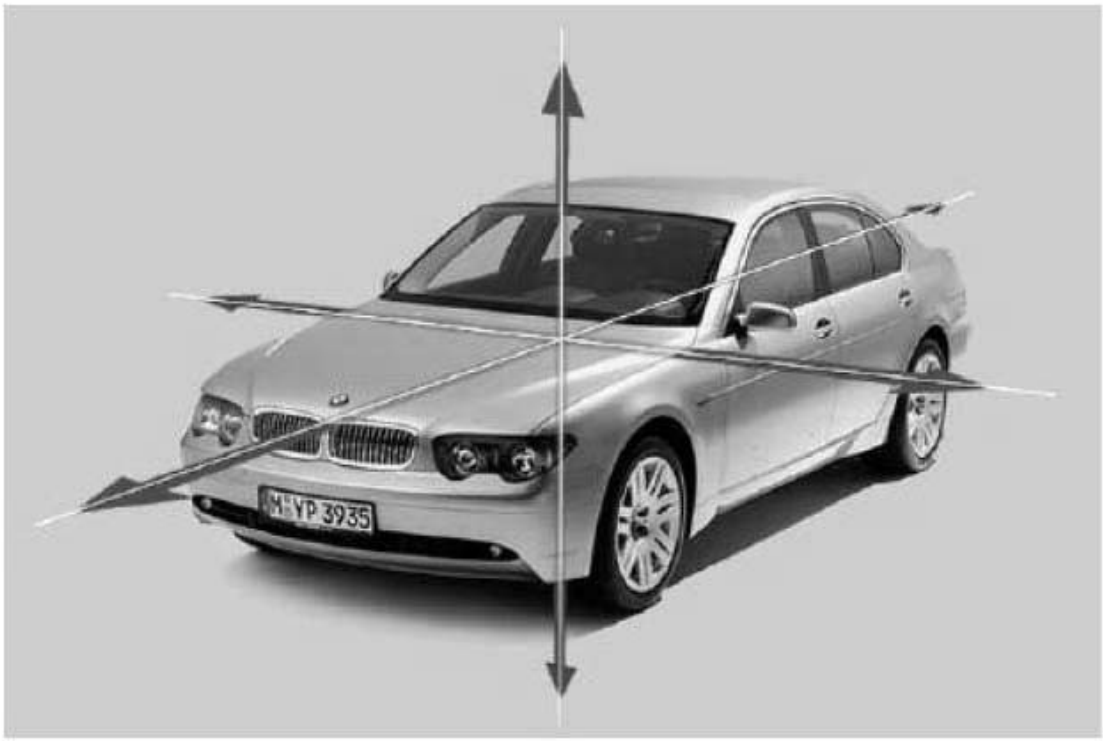


Fig. 1: Identifying Chassis Dynamics
Courtesy of BMW OF NORTH AMERICA, INC.

This training module will help the technician understand the basics of vehicle dynamics. Terminology, as it applies to BMW chassis systems, will also be explained in this section. A thorough understanding of current chassis technology is needed to diagnose and perform service procedures of these vehicles.

The information learned in this training module will provide fundamental knowledge needed to understand such

systems as Dynamic Stability Control, Active Steering and Active Roll Stabilization.

Vehicle Dynamics

A vehicle's cornering performance is also referred to as its self-steering properties. This handling performance is considerably influenced by the changing ratio of lateral force to wheel load on the front and rear axles. Lateral force increases as centrifugal force increases.

BMW vehicles are designed to have the best possible weight balance. A 50/50 weight ratio between the front and rear axles is always the intended design target.

The engineers at BMW always strive to achieve these goals during the design process. This effort can be seen by the use of lightweight components. New materials such as aluminum, magnesium and high-strength steel are used throughout various models. Even new materials, such as plastic, have been incorporated into the body.

For example, the E60 takes advantage of the lightweight front end technology (GRAV). On all modern BMW vehicles, the vehicle battery is installed in the rear of the vehicle for better weight balance.

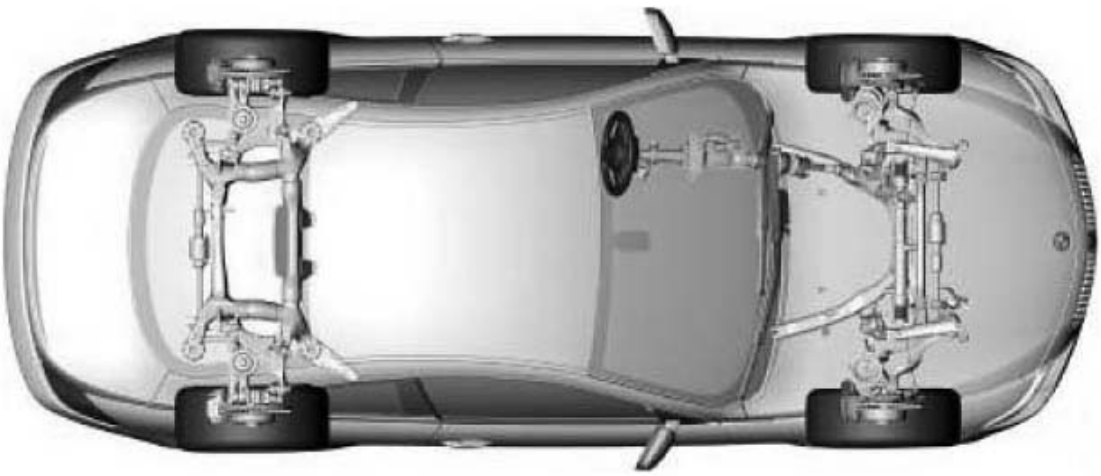


Fig. 2: BMW Vehicle Designed With Weight Balance
Courtesy of BMW OF NORTH AMERICA, INC.

Neutral Steer

The slip angles arising as a result of lateral force are the same on the front and rear axles. Neutral cornering facilitates the best use of lateral forces and thereby the highest limit cornering speeds. However, it also reduces the subjective feel for vehicle stability. In addition the breakaway cannot be calculated as it can occur via both the front and rear axles.

Understeer

The ratio of lateral force to wheel load is greater on the front axle than on the rear. The vehicle follows a larger cornering radius than that corresponding to the steering angle. It also slides to the outside of the turn via the front axle. When designing the chassis, this behavior is often the preferred option, because when the vehicle breaks away it can be returned to a straightline course which it is possible to calculate. Take, for example, a

vehicle which begins to break away via the front axle while being driven to the limits; if the steering angle is then reduced, the vehicle will recover to assume a straightline course.

BMW chassis are designed so that they have slight understeer characteristics.

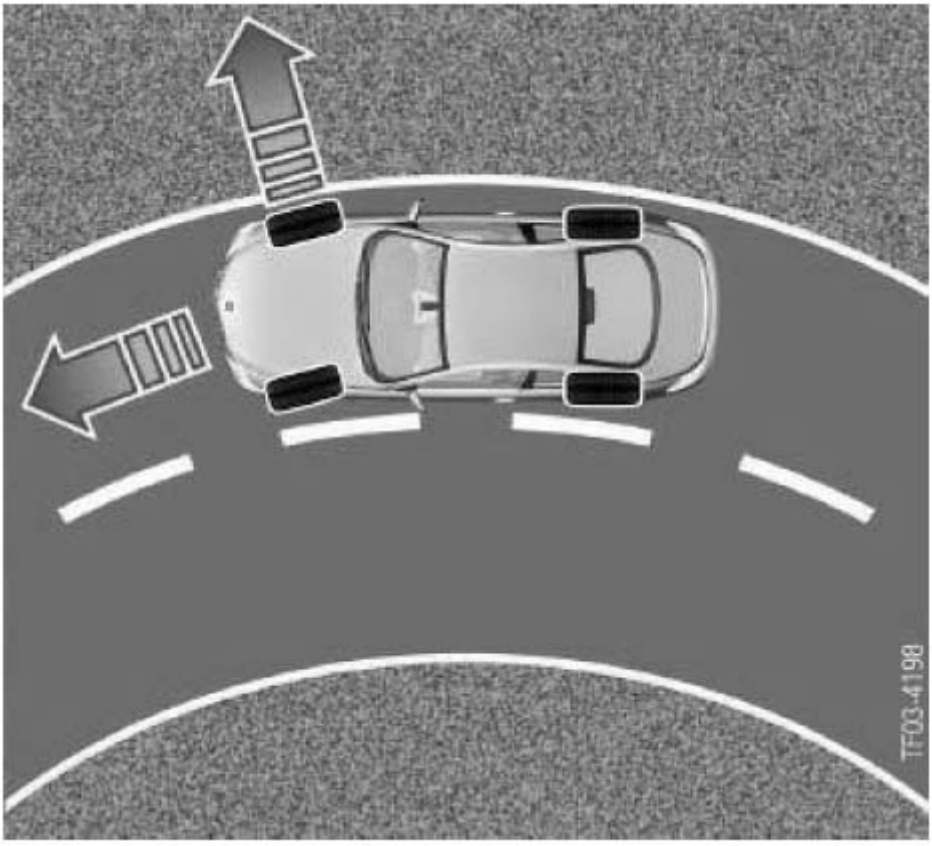


Fig. 3: Identifying Understeer
Courtesy of BMW OF NORTH AMERICA, INC.

Oversteer

The ratio of lateral force to wheel load is greater on the rear axle than on the front. The vehicle follows a smaller radius than that corresponding to the steering angle. The vehicle slides to the outside of the turn via the rear axle.

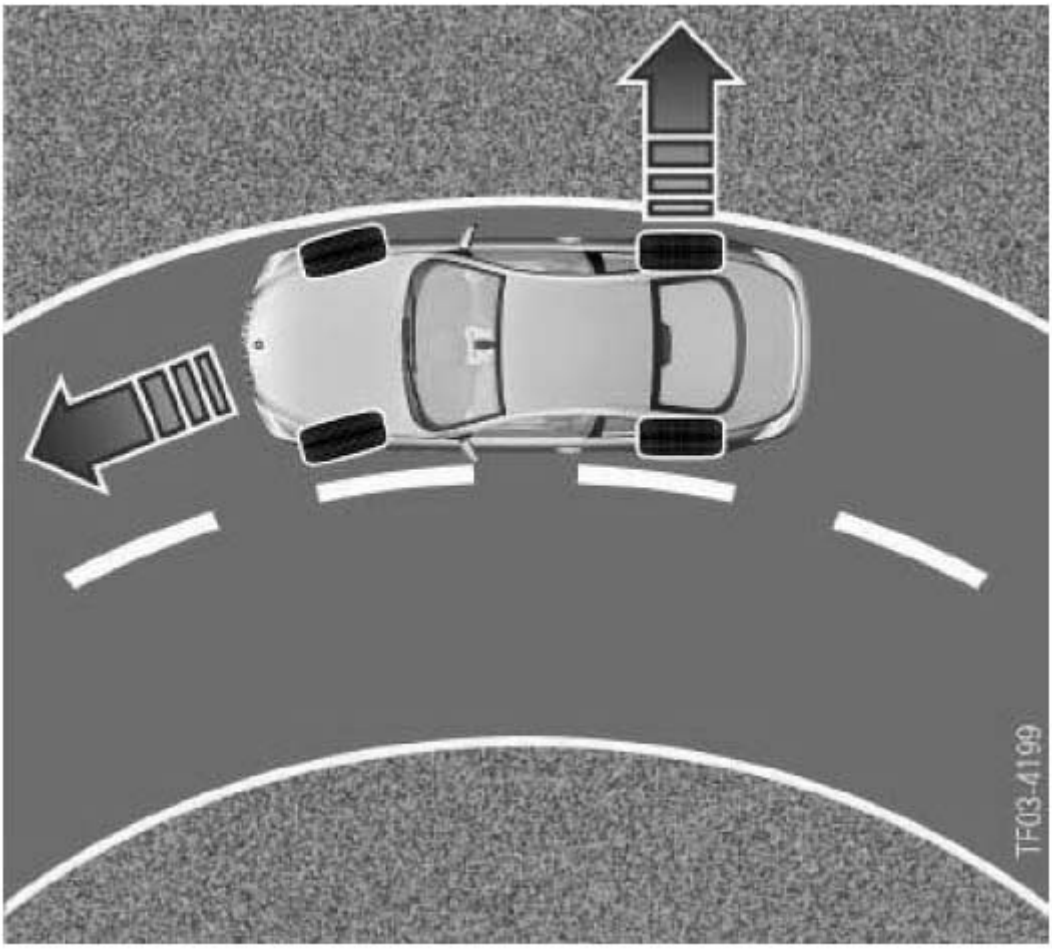


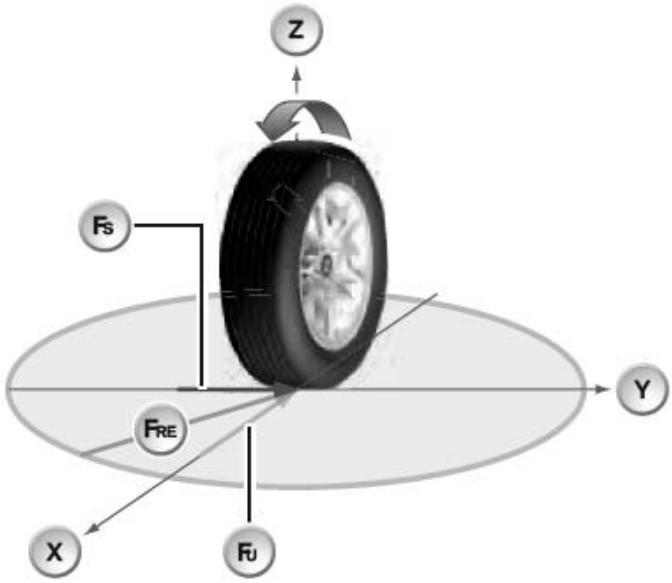
Fig. 4: Identifying Oversteer
Courtesy of BMW OF NORTH AMERICA, INC.

Chassis Forces

The chassis connects the vehicle with the road. Both force and drive torque are transferred to the road via the chassis. The chassis also has to absorb all cornering forces when the vehicle is cornering.

The chassis is therefore exposed to a huge number of forces and moments all of which act in different ways. It is essential that all these forces and moments can be transmitted in an optimum way via the tire contact areas.

As vehicles get more powerful and demands for ride comfort and driving safety rise, so the demands placed on the modern chassis increase considerably too.



Index	Explanation	Index	Explanation
Fv	Wheel contact force	Fre	Resulting force
Fu	Driving force	K	Maximum force
Fs	Cornering force	X,Y,Z	Coordinate axes

Fig. 5: Identifying Chassis Forces
Courtesy of BMW OF NORTH AMERICA, INC.

Kinematics

From a physics point of view, kinematics are the laws which give rise to sequences of movements.

Where chassis engineering is concerned, kinematics is the sequence of movements at the wheels and wheel-guiding components. Kinematics therefore have a direct effect on the position of the wheel for the respective load conditions.

Longitudinal Forces

Longitudinal forces act on the vehicle through the vehicle centerline. These forces are created by acceleration and braking. Also, any up or downhill movement will influence the longitudinal forces acting of the vehicle.

Fig. 6: Identifying Longitudinal Forces
Courtesy of BMW OF NORTH AMERICA, INC.

Lateral Forces

Lateral forces are also known as "transverse" forces. These forces are most prevalent during turns. Crosswinds also contribute to lateral force.

Fig. 7: Identifying Lateral Forces
Courtesy of BMW OF NORTH AMERICA, INC.

Rotational Forces

Rotational forces are more commonly known as "yaw". Yaw motion is the vehicle rotation around a vertical axis. These forces are also experienced during turns. The speed of this force indicates the degree of turning force.

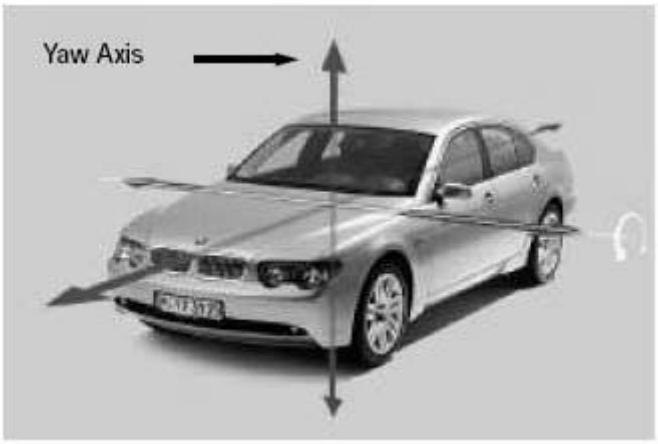


Fig. 8: Identifying Rotational Forces
Courtesy of BMW OF NORTH AMERICA, INC.

Tire contact area

The tire contact area is the area which is covered by the wheel standing on the road.

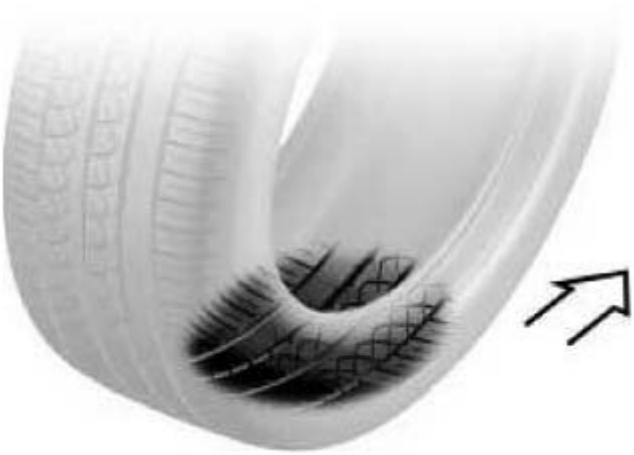


Fig. 9: Identifying Tire Contact Area
Courtesy of BMW OF NORTH AMERICA, INC.

Tire contact patch

The tire contact patch is the effective contact area of a tire in operation. It is therefore the tire contact area which is deformed by interfering forces (lateral forces, braking and acceleration forces) and by road surface quality.

The tire contact patch therefore describes the area of road which is touched by the tire when the vehicle is in operation.

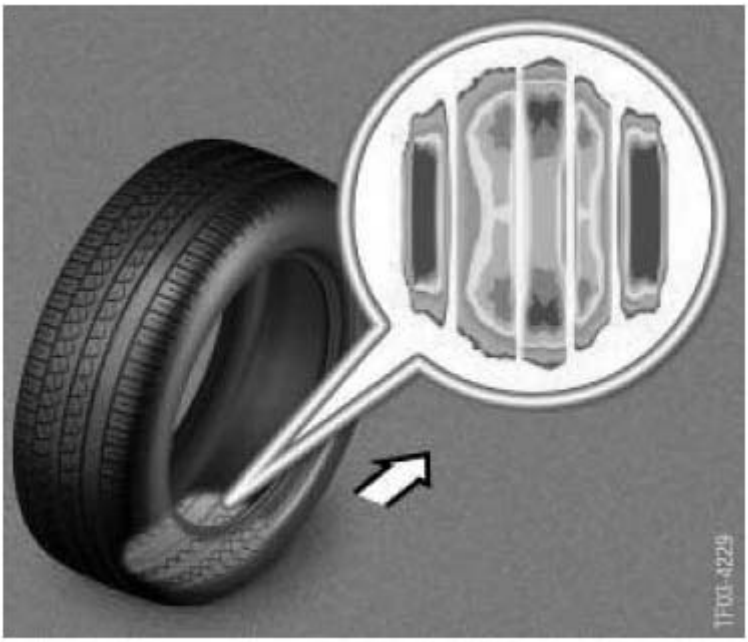


Fig. 10: Identifying Tire Contact Patch
Courtesy of BMW OF NORTH AMERICA, INC.

BMW suspension systems are designed to allow for the optimum contact patch when the vehicle is in operation. For example, the "double-pivot" suspension is designed to keep the outside front tire as close to a zero camber angle on turns.

Integrated Suspension Systems - Operating Fluids

1.0 GENERAL INFORMATION

LHM hydraulic fluid has a favorable viscosity range and permits problem-free operation of the self-leveling rear suspension at very low and very high temperatures. The solidification point is -78°F/-61°C.

2.0 APPROVED HYDRAULIC FLUIDS

E24, E28 produced prior to 9/87

Pentosin CHF 4548 was used for initial factory filling.

For filling up and replacement the following oil is to be used:

Pentosin CHF 7.1 BMW Part No. 81 22 1 468 879

Pentosin CHF 4548 and CHF 7.1 can be mixed in these cars.

For complete system oil replacement:

Reputable brand name LHM oils (green color) can also be used (Shell, Castrol, Exxon, etc.)

NOTE: Mixing of CHF and LHM oils is not permitted.

E24, E28 produced since 9/87

Pentosin CHF 7.1 is used for initial factory filling.

For filling up and replacement use only Pentosin CHF 7.1

BMW Part No. 81 22 1 468 879

For complete oil replacement:

Reputable brand name LHM oils (green color) can also be used.

NOTE: Mixing of CHF 7.1 and LHM oils is not permitted.

E32 produced prior to 9/91

Use only Pentosin CHF 7.1.

Mixing with other oils is not permitted.

E32, E34 produced since 9/91

Use only Pentosin CHF 11S

NOTE: All cars have a label indicating the respective type on the hydraulic fluid reservoir. Since both Pentosin CHF 11S and CHF 7.1 are green in color, the reservoir label must be carefully checked prior to adding fluid.

Mixing CHF 11S and CHF 7.1 is not permitted.

Pentosin CHF 11S BMW Part No. 82 11 1 468 041

E38 produced since 1/94

Use only Pentosin CHF 11S

NOTE: All cars have a label indicating the respective type on the hydraulic fluid reservoir. Since both Pentosin CHF 11S and CHF 7.1 are green in color, the reservoir label must be carefully checked prior to adding fluid.

Mixing CHF 11S and CHF 7.1 is not permitted.

Pentosin CHF 11S BMW Part No. 82 11 1 468 041

3.0 CHECKING HYDRAULIC FLUID LEVELS

The hydraulic fluid level must be checked on an unloaded car and at every Inspection I or, for cars without a Service Indicator, at 10,000 mi/15,000 km intervals.

NOTE: Not required as of 1993 model year vehicles.

Special checking instructions apply to the E32.

NOTE: Never fill above the "max" mark. There are no replacement intervals for hydraulic fluid.

3700 GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

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  If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**
- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid:

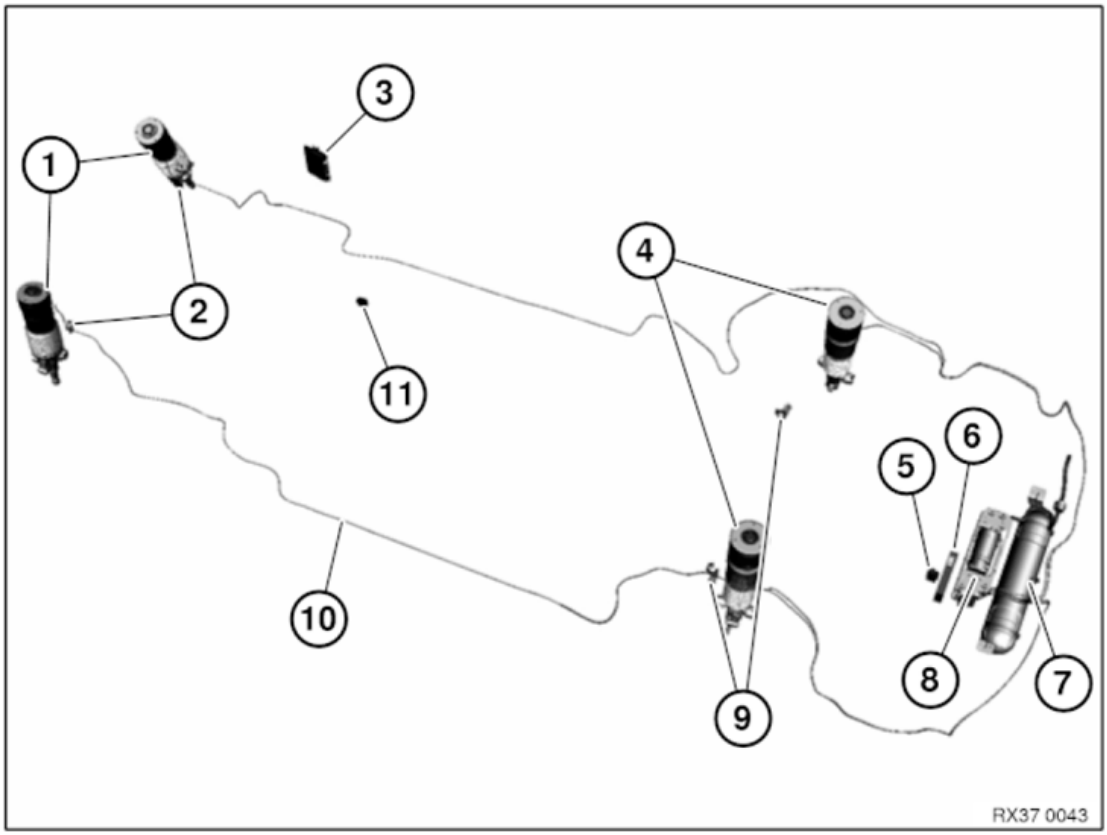
- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapours ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

37 .. . OVERVIEW OF 2- AXLE RIDE-HEIGHT CONTROL



1	Air suspension strut, front left and right	7	Pressure accumulator for air suspension
2	Ride height sensor, front left and right	8	Air supply system with solenoid valve manifold
3	Vertical Dynamics Management (VDM) control unit	9	Ride height sensor, rear left and right
4	Air suspension strut, rear left and right	10	Air lines
5	Relay, air supply unit	11	Ride-height control switch
6	Electronic ride-height control		

Fig. 1: Overview Of 2- Axle Ride-Height Control
Courtesy of BMW OF NORTH AMERICA, INC.

Safety instructions&general information Deactivate/activate air spring system

Bleed/fill pressure accumulator

Carry out ride height adjustment

- Air suspension strut, front left and right
- Ride height sensor, front left and right
- Vertical Dynamics Management (VDM) control unit

- Air suspension strut, rear left and right
- Relay, air supply unit
- Electronic ride-height control (EHC) control unit
- Pressure accumulator for air suspension
- Air supply system with solenoid valve manifold
- Ride height sensor, rear left and right
- Air lines
- Ride-height control switch

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Risk of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INFORMATION FOR WORKING ON VEHICLES WITH AUTOMATIC ENGINE START-STOP FUNCTION (MSA)

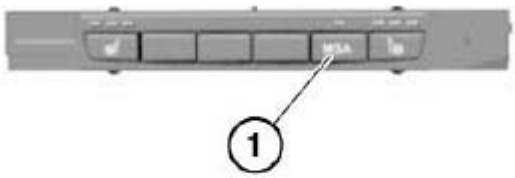
WARNING: If the engine hood/bonnet contact is pulled upwards (workshop mode), the information "switch closed" is output. The automatic engine start-stop function is active.
An automatic engine start is possible.

Observe safety precautions when working on MSA vehicles

Before carrying out practical work on the engine, always ensure that the MSA functionality is deactivated so as to prevent automatic engine starting while work is being carried out in the engine compartment.

MSA function is deactivated by

- Deactivate MSA by means of button (1) in passenger compartment
- Open seat belt buckle and driver's door



R61 1948

Fig. 2: Identifying Automatic Engine Start/Stop Button
Courtesy of BMW OF NORTH AMERICA, INC.

- Open engine bonnet/hood and ensure that engine hood/bonnet contact is not in workshop mode
  - Workshop mode

    A = 10 mm

  - Basic setting (engine hood/bonnet open)

    B = 7 mm

  To make sure that the engine hood/bonnet contact is at the basic setting, if necessary press the hood/bonnet contact up to the limit position before starting work and slowly release.

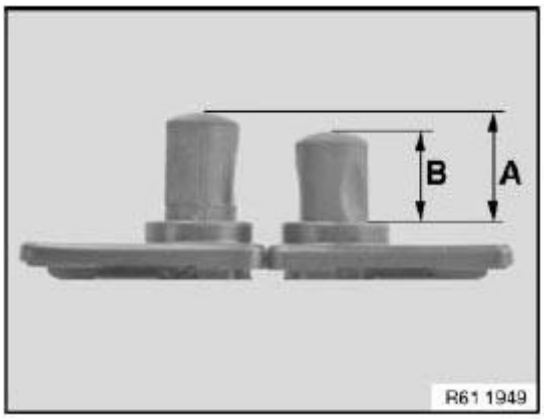


Fig. 3: Identifying Engine Hood/Bonnet Dimension
Courtesy of BMW OF NORTH AMERICA, INC.

When working with diagnosis tools

- Observe instructions in diagnosis tool

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin! RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work

area. Wear personal protective clothing/equipment.

- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

3711 FRONT CONTROL AND SUSPENSION ELEMENTS

37 11 030 REMOVING AND INSTALLING COMPLETE LEFT OR RIGHT SPRING STRUT SHOCK ABSORBER

IMPORTANT: If the centring pin is missing from the support bearing, the position of the studs to the wheel arch must be marked so that the original camber is approximately maintained.
Only one nut may ever be released for marking.

Necessary preliminary tasks

- Remove **FRONT WHEEL**
- Remove **STABILIZER LINK FROM SPRING STRUT**
- Disconnect plug connection and expose line up to holder on spring strut
- Unlock line from VDC damper in engine compartment and disconnect
- Remove front **PULSE GENERATOR** from swivel bearing
- Remove **FRONT BRAKE DISC**

Remove jointed rod of ride-height sensor from control arm.

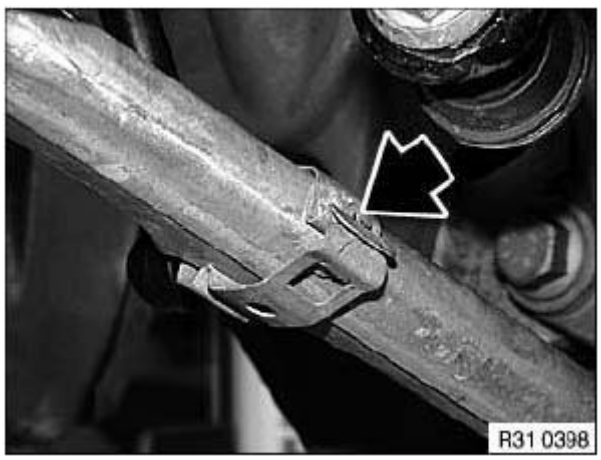


Fig. 4: Locating Jointed Rod Of Ride-Height Sensor
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken **CONTROL ARM BOLT CONNECTION ON FRONT AXLE CARRIER** in order to prevent control arm rubber mount from being damaged.

Remove **CONTROL ARM FROM SWIVEL BEARING** .

Remove **TIE ROD END FROM SWIVEL BEARING** .

Remove **TENSION STRUT FROM SWIVEL BEARING**

WARNING: Risk of injury!
Secure spring strut against falling out.

Release nuts (1) and remove spring strut with swivel bearing towards bottom.

Installation:

Clean contact surface in spring strut dome.

Align spring strut using centring pin to bore in wheel arch or studs to wheel arch and push upwards.

Replace self-locking nuts.

Tightening torque **31 31 1AZ** .

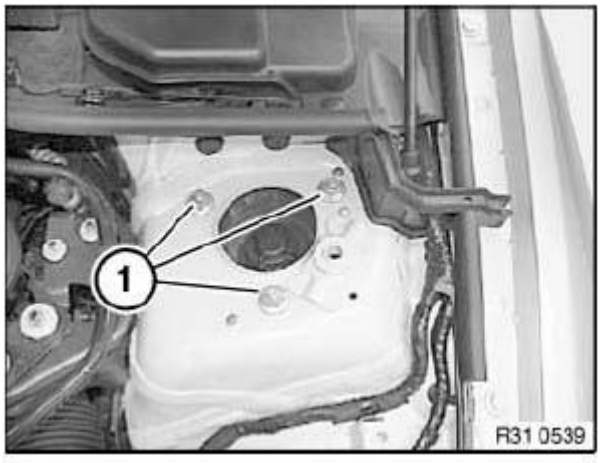


Fig. 5: Identifying Spring Strut Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Perform **CHASSIS ALIGNMENT CHECK**
- Carry out **STEERING ANGLE SENSOR ADJUSTMENT**

3712 REAR CONTROL AND SUSPENSION ELEMENTS

37 12 001 CHECKING FUNCTION OF SELF-LEVELLING SUSPENSION SYSTEM

Carry out error search with BMW diagnosis system; if necessary, refer to Troubleshooting on self-levelling suspension system.

37 12 131 REPLACING LEFT OR RIGHT REAR SHOCK ABSORBER (ADAPTIVE M SUSPENSION)

NOTE: Read and comply with INFORMATION ON REPLACING SHOCK ABSORBERS .

Necessary preliminary tasks

- Remove **REAR WHEEL**
- Remove **LUGGAGE COMPARTMENT WHEEL ARCH TRIM**
- Unlock and disconnect plug connection of VDC damper and expose line to shock absorber

WARNING: Danger of injury!
Failure to comply with the following instructions may result in the vehicle slipping off the lifting platform and critically injuring other persons.

When supporting components, make sure that

- the vehicle can no longer be raised or lowered
- the vehicle does not lift off the locating plates on the lifting platform

Support trailing arm with a workshop jack (1).

Release screw.

Tightening torque **33 52 3AZ** .

Installation:

Thrust washer (2) on rubber bearing must point to screw head.

Tighten bolt in **NORMAL POSITION** .

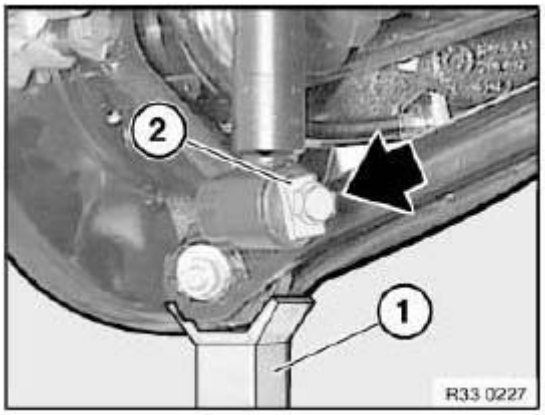


Fig. 6: Supporting Trailing Arm Using Workshop Jack
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew nuts (1).

Remove shock absorber with support bearing towards bottom.

Installation:

Replace flat seal (between support bearing and body).

Replace self-locking nuts.

Tightening torque **33 52 2AZ** .

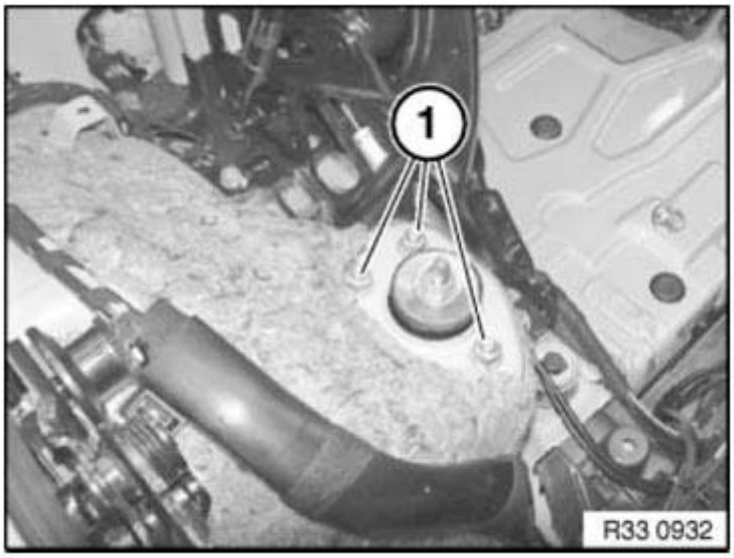


Fig. 7: Identifying Shock Absorbers Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

Remove **SUPPORT BEARING** .

Remove or detach plate (1), spacer, auxiliary damper (2) and protective tube (3) from shock absorber (4).

Installation:

Check auxiliary damper (2) and protective tube (3) for damage, replace if necessary.

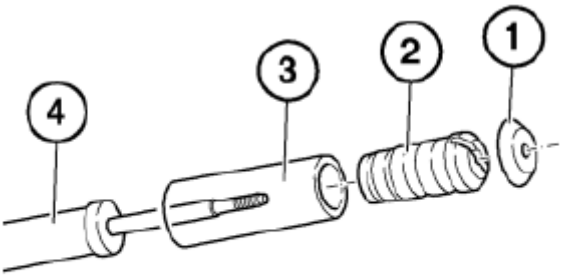


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Fig. 8: Identifying Rear Shock Absorber, Auxiliary Damper And Protective Tube
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Check that output shaft is correctly seated in rear differential.

3714 ELECTRICAL COMPONENTS

37 14 027 REMOVING AND INSTALLING/REPLACING REAR MOUNTED ACCELERATION SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove **RIGHT LUGGAGE COMPARTMENT TRIM PANEL**

Unfasten plug connection (1) and disconnect.

Release nuts (2) and remove mounted acceleration sensor (3).

Tightening torque **37 14 8AZ** .

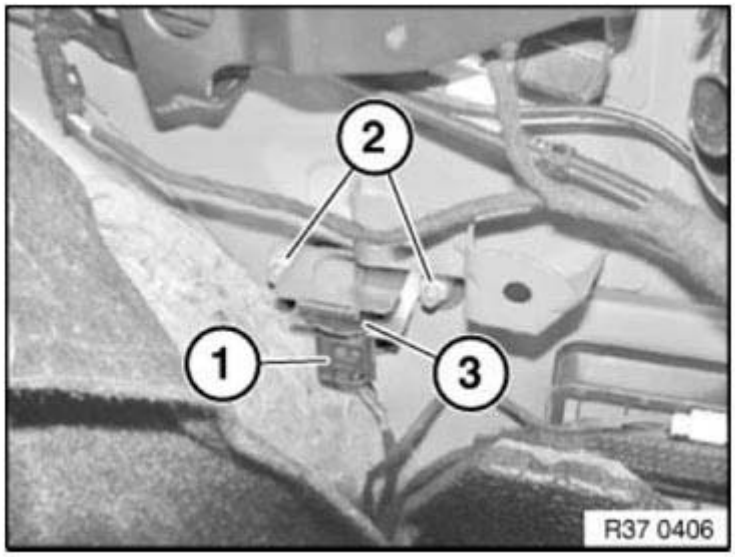


Fig. 9: Identifying Plug Connection And Acceleration Sensor With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

37 14 017 REMOVING AND INSTALLING/REPLACING FRONT MOUNTED ACCELERATION SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove **FRONT WHEEL ARCH TRIM**

Unfasten plug connection (1) and disconnect.

Release screws (2) and remove mounted acceleration sensor (3).

Tightening torque **37 14 8AZ** .

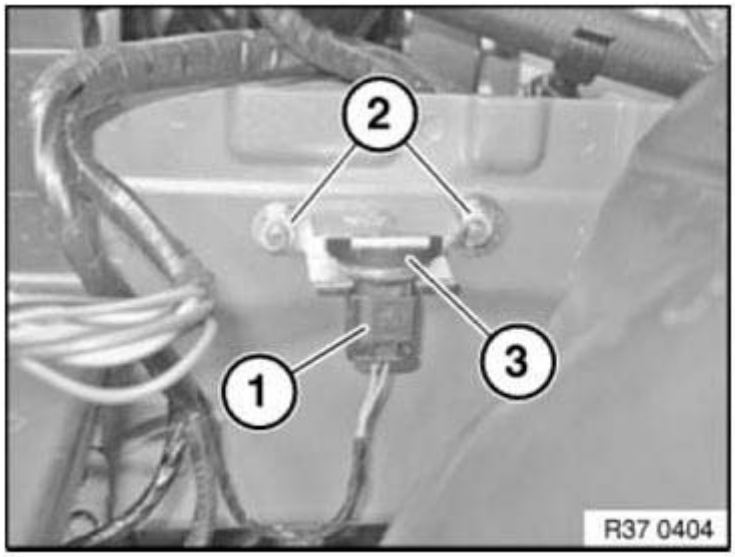


Fig. 10: Identifying Plug Connection And Acceleration Sensor With Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

37 14 511 REPLACING FRONT RIDE-HEIGHT SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Unfasten plug connection (2) and disconnect.

Release nut (1) and disconnect jointed rod.

Tightening torque **37 14 7AZ** .

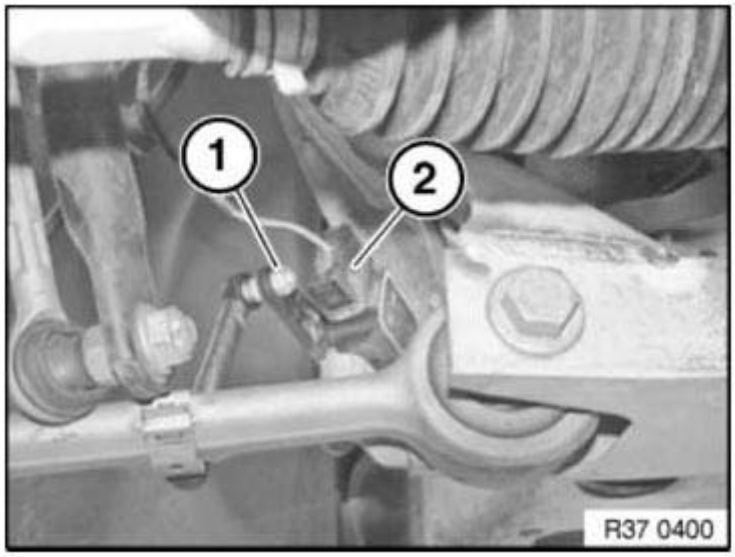


Fig. 11: Identifying Plug Connection And Jointed Rod Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and remove ride-height sensor.

Tightening torque **37 14 5AZ** .

Installation:

Sensor lever must point to front from ride-height sensor.

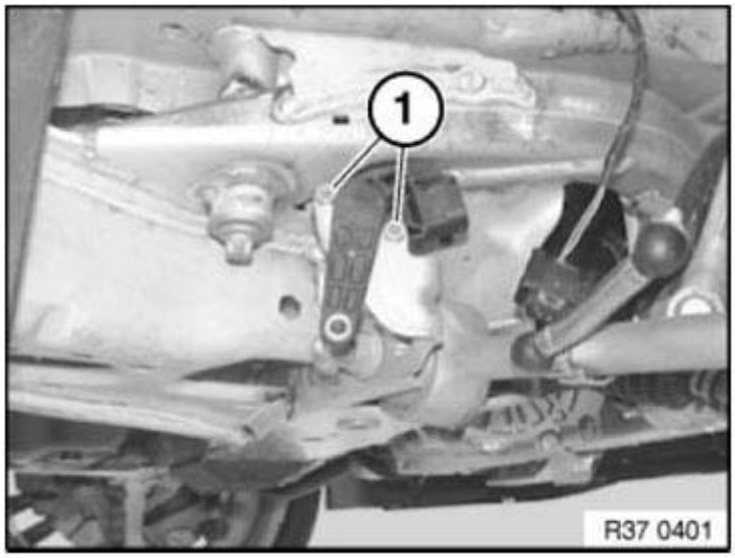


Fig. 12: Identifying Ride-Height Sensor Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

37 14 512 REPLACING REAR RIDE-HEIGHT SENSOR

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Release nut (1) and disengage jointed rod with lever extension (2).

Tightening torque **37 14 3AZ** .

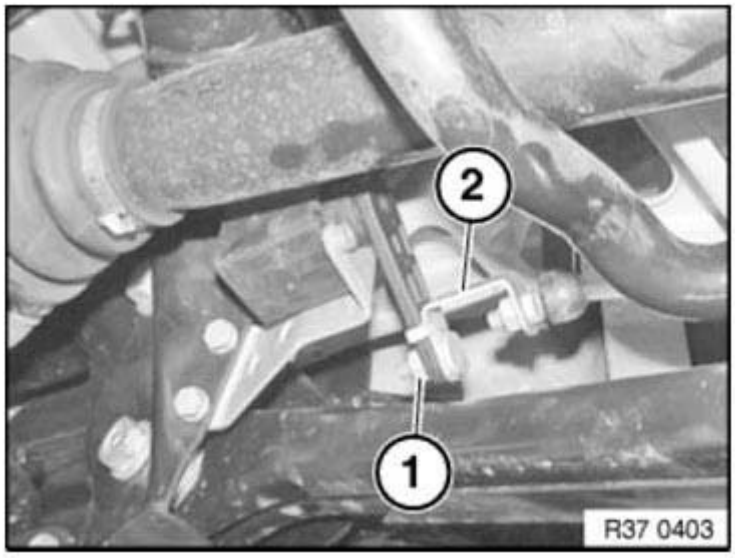


Fig. 13: Identifying Jointed Rod Nut With Lever Extension
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten plug connection (1) and disconnect.

Release screws (2) and remove ride-height sensor.

Tightening torque **37 14 1AZ** .

Installation:

Sensor lever (3) must point from ride-height sensor in direction opposite to direction of travel.

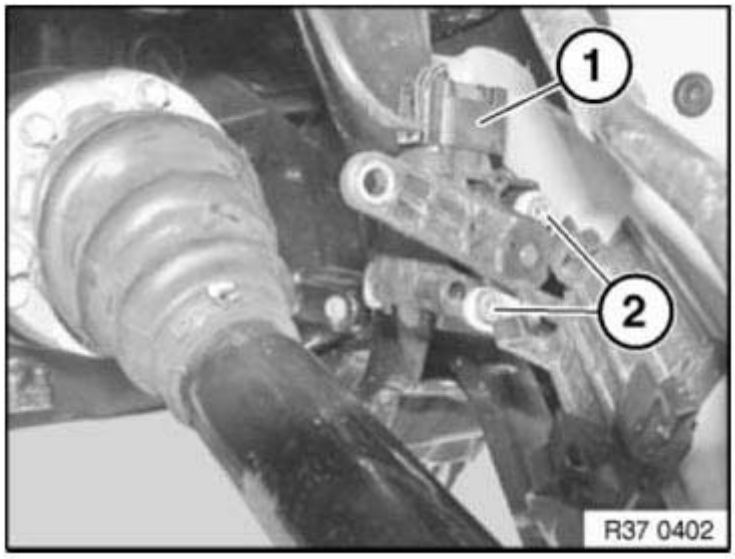


Fig. 14: Identifying Plug Connection And Ride-Height Sensor Screws
Courtesy of BMW OF NORTH AMERICA, INC.

3715 ELECTRONIC DAMPING FORCE ADJUSTMENT

37 15 055 REMOVING AND INSTALLING/REPLACING EDC CONTROL UNIT

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DAMAGE (ESD PROTECTION) .

Release screws (1).

Remove electronics box cover (2).

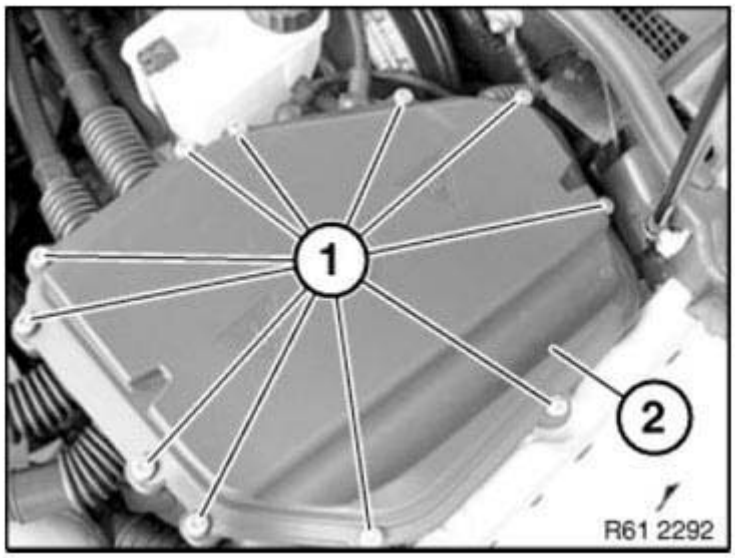


Fig. 15: Identifying Electronics Box Cover Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock plug connections (1) and disconnect.

Unlock control unit (2) and remove upwards from holder.

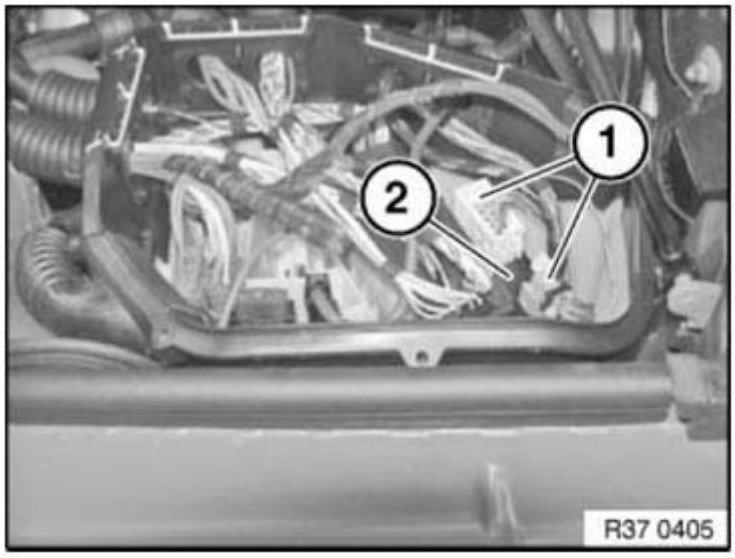


Fig. 16: Identifying Plug Connection And Control Unit Of Holder
Courtesy of BMW OF NORTH AMERICA, INC.

After installation

- Carry out programming/coding.

ELECTRIC COMPONENTS

37 14 ELECTRIC COMPONENTS

TIGHTENING TORQUE SPECIFICATION - ELECTRIC COMPONENTS

		Type	Thread	Tightening specification	Measure
1AZ	Ride-height sensor, rear, to holder	E89	M5		5 Nm
2AZ	Bracket ride level sensor to rear axle carrier	E89	M6		8 Nm
3AZ	Lever extension to ride-height sensor, rear	E89	M6		8 Nm
4AZ	Jointed rod to lever extension or to control arm, rear	E89	M6	Replace nut	8 Nm
5AZ	Ride-height sensor, front, to holder	E89	M5	Replace nut	5 Nm
6AZ	Holder, ride-height sensor, front, to front axle carrier	E89	M6		8 Nm
7AZ	Jointed rod to ride-height sensor, front	E89	M6	Replace nuts	8 Nm
8AZ	Acceleration sensor to end plate, rear, or engine carrier, front	E89	M6		8 Nm

BASIC SUSPENSION GEOMETRY

Model: All

INTRODUCTION

The safety, stability, handling and performance of a vehicle depends on many factors. One of the most important aspects of these characteristics is the design of suspension and steering systems. BMW vehicles are known for their superior handling and road holding performance.

The design of the BMW suspension systems is a key factor in achieving these goals. Suspension geometry is defined as: "The angular relationship between the suspension, the steering linkage and the wheels - relative to the road surface."

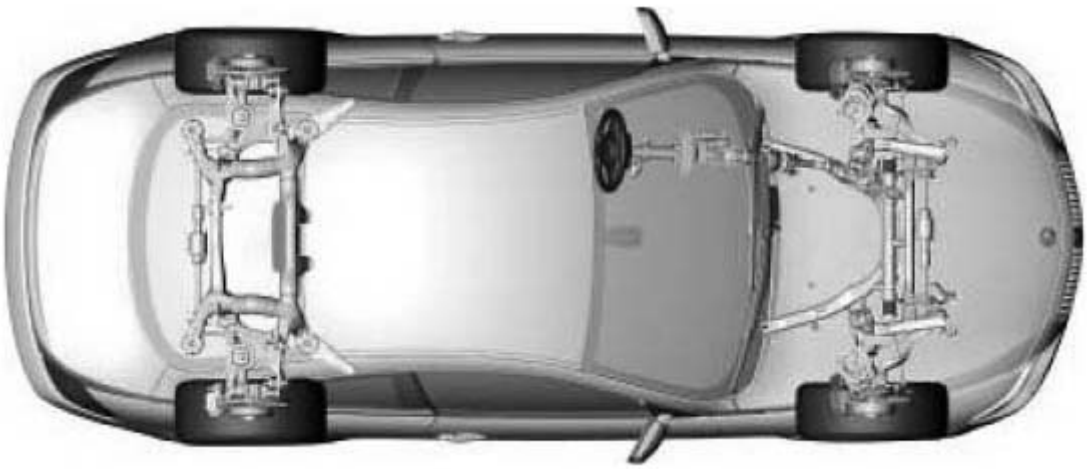


Fig. 1: Identifying Design Of BMW Suspension Systems
Courtesy of BMW OF NORTH AMERICA, INC.

There are several alignment geometry angles which relate to the suspension components and steering linkages including:

- Caster
- Camber
- Toe-In/Toe-Out
- Steering Roll Radius (steering offset)
- Steering Axis Inclination (SAI) and Included Angle (IA)
- Toe Out on Turns
- Thrust Line and Thrust Angle

All of these angles influence:

- The ease with which the vehicle can be steered
- The overall vehicle stability (handling, tracking and safety)
- Tire wear

The suspension geometry for any given vehicle is a result of the design engineers development of the vehicle and the design criteria for that particular vehicle.

ALIGNMENT ANGLES

Caster

Caster is the forward or rearward tilt of the steering axis centerline, as viewed from the side of the vehicle, and is measured in degrees. When the steering axis centerline is exactly perpendicular to the road surface, the Caster is considered to be at zero degrees.

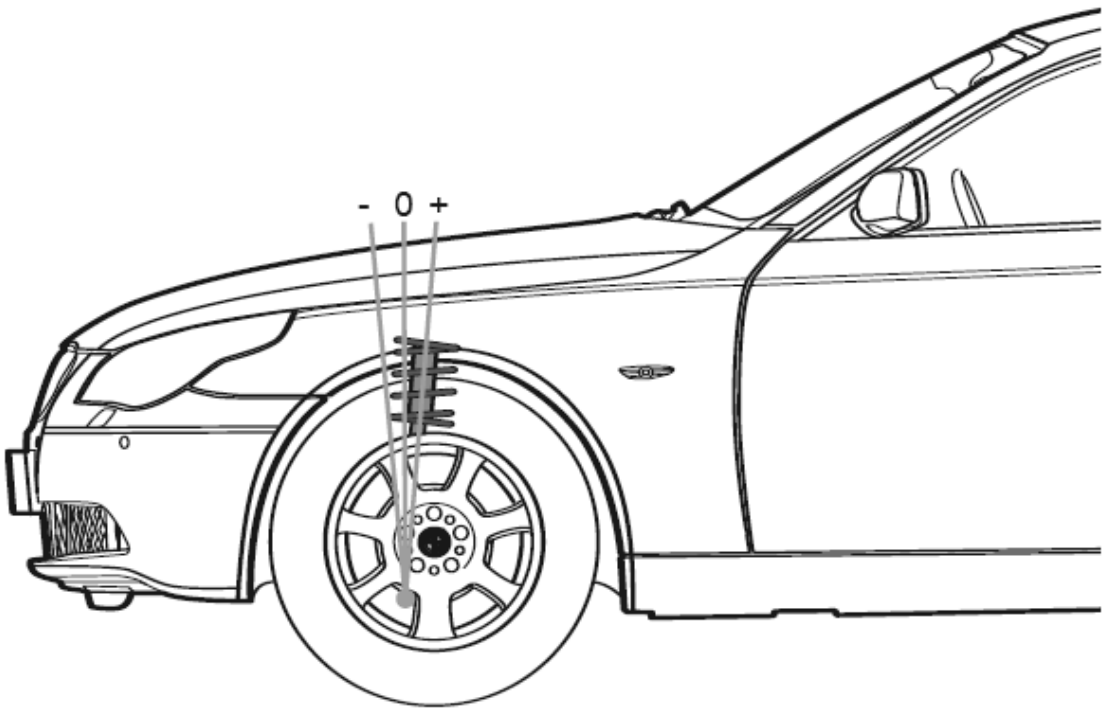


Fig. 2: Identifying Caster Angle
Courtesy of BMW OF NORTH AMERICA, INC.

When the top of the steering axis centerline is tilted rearward (toward the bulkhead), the caster is considered to be "positive". When the top of the steering axis centerline is tilted forwards, the caster is considered to be negative.

Most vehicles have a caster angle from zero degrees to a positive angle. Negative caster is not very desirable because is reduces the vehicle stability especially at high speeds. BMW vehicle always have a positive caster

angle. Positive caster promotes high speed stability and provides feedback to the driver.

Positive caster also promotes "steering return" which increases driver comfort and safety. Caster angles which are more negative (or not very positive) can increase the effect of wheel "shimmy", create sensitivity to high winds and creates poor steering return.

When the caster angle differs greatly from side to side, the vehicle may "pull" to the side which has the "least positive" caster.

One of the main characteristics of positive caster is the positive effect on high speed steering stability. However, low speed steering effort is increased. This characteristic is counteracted by the power steering system and in particular the Servotronic system. Servotronic will be discussed in later training modules.

Caster is not a directly measured angle. It can only be measured by sweeping the steering through an angle of 20 degrees in both directions. This is important to know during the alignment procedure.

On BMW vehicles, caster can only be measured, there is no adjustment. However, caster measurement can be used to detect and diagnose alignment concerns. Caster which is out of specification could indicate damaged or worn components.

Caster Offset

Caster offset is the distance between the centerline of the wheel contact point and the intersection point of the extended pivot axis. This greater the offset, the more effort required to turn a moving wheel. The negative effects of more increased offset are counter-acted by the BMW double pivot suspension system and the Servotronic steering system (if equipped).

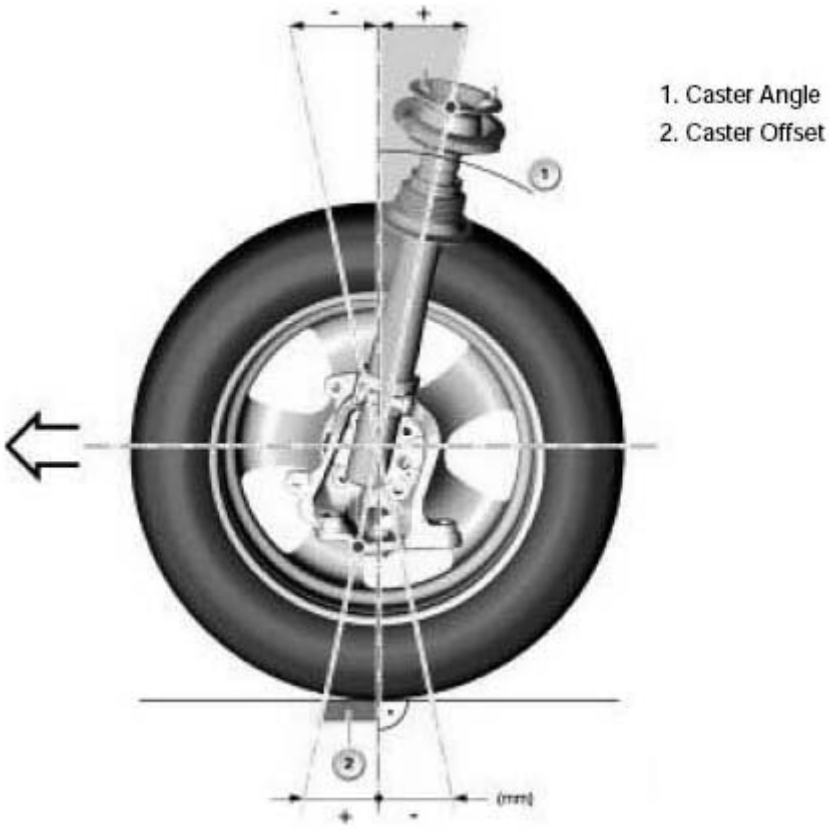


Fig. 3: Identifying Caster Offset Is Distance Between Centerline Of Wheel Contact Point
Courtesy of BMW OF NORTH AMERICA, INC.

Camber

Camber is the inward or outward tilt of the wheels when viewed from the front of the vehicle. The amount of tilt is measured in degrees from the vertical and is called the camber angle.

The camber angle is the angle between the wheel center point and a perpendicular line (in the wheel contact point) with respect to the road surface. Camber angle is considered positive (+) if the upper part of the wheel is angled outward from the wheel center point and negative (-) if it is angled inward.

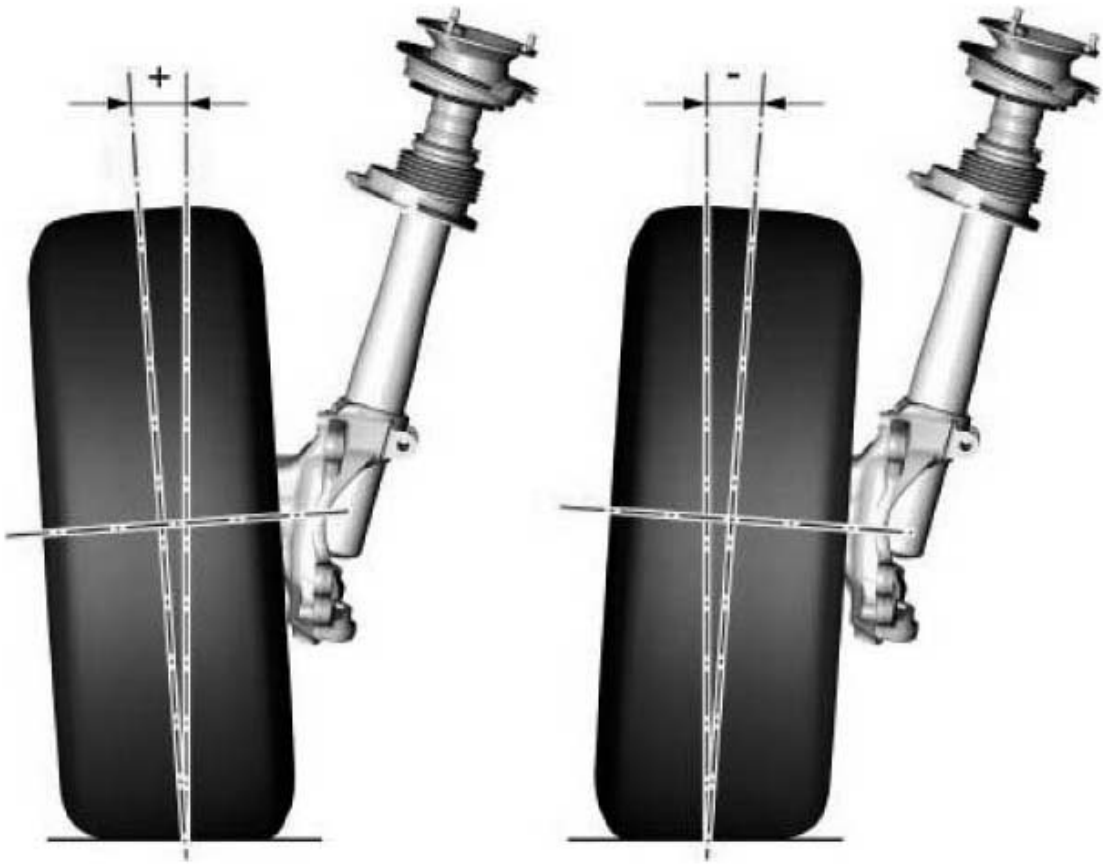


Fig. 4: Identifying Camber Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Wheels running at a camber want to follow a circular path, like an overturned cone. Therefore, vehicles which have excessive camber angles will tend to pull to one side. As a general rule, the vehicle will tend to pull to the side of the vehicle which has the most positive camber.

Front camber angle on most current BMW vehicles is set at a slightly negative value. This promotes good straight line stability. This is due to the fact that slight negative camber causes the wheels to "track inward". As long as the side-to-side camber is roughly equal, the vehicle will track in a straight line.

Camber angle also has an effect on component wear. For instance, the wheel bearings will perform well and last longer as long as the camber is within specification. Camber which is out of specification will cause undue load on the wheel bearings. Excessive camber angle also causes wear on the outer edges of the tire. The outside of the tire will wear if the camber is too positive and the reverse is true with excessive negative camber. The same holds true for the rear camber angle.

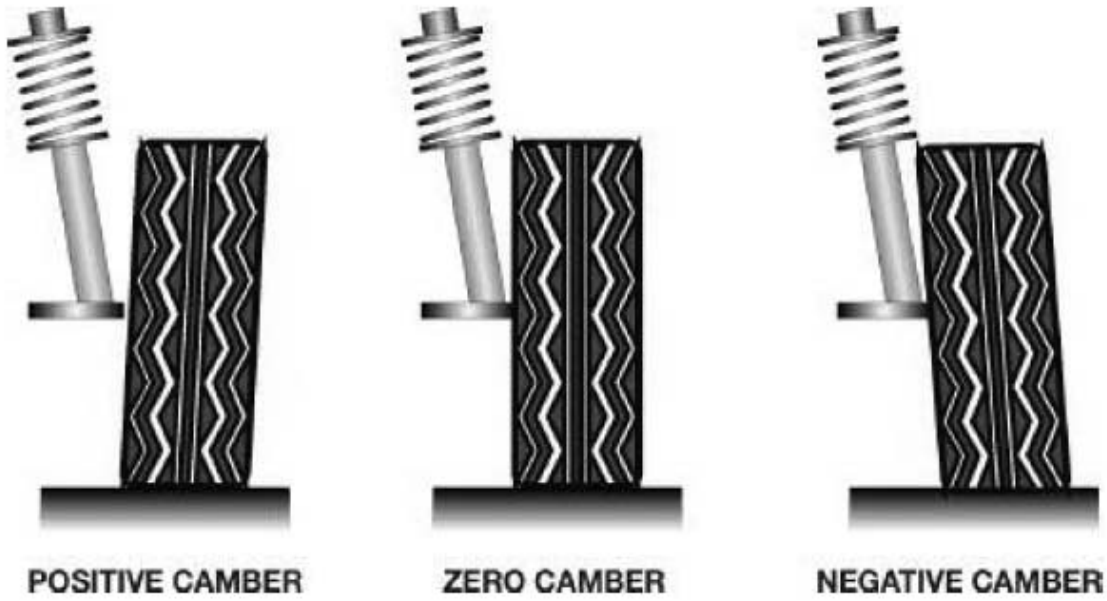


Fig. 5: Identifying Positive Camber, Zero Camber And Negative Camber
Courtesy of BMW OF NORTH AMERICA, INC.

Positive Camber

Older vehicles often had a positive camber on the front axle. The design made this necessary, as the tapered roller bearings would not withstand any other type of load. In a steering maneuver, the front axle wheel on the outside of the turn is shifted to the negative camber range by the caster angle and the spread. The desired cornering stability is achieved in this way. When cornering, no positive camber should arise at the outer wheel of the steered axle.

Negative Camber

On modern BMW chassis, it is possible to set a negative camber for the straight-ahead position on the front axle as well. This has been made possible by using two rows of ball bearings. The rear wheels on BMW vehicles have always had a negative camber.

This is a compromise. The wheels on the rear axle cannot be shifted to the negative camber range by steering movements. To improve cornering stability, a negative camber has to be pre-set.

Toe

The total toe of an axle is the difference in the distance between the front of the wheels and the rear of the wheels on the same axle.

Toe is measured at the center of the wheels from one wheel rim to the other. When the distance is greater at the rear of the wheels, it is called toe-in. When the distance is greater at the front of the wheels, it is called toe-out.

Rear wheel drive vehicles generally will have a small amount of toe-in at the front wheels. This will allow the wheels to toe out when rolling to achieve a zero running toe.

Toe is measured in Degrees when using BMW specifications. Front toe is adjustable on all BMW vehicles. Rear toe is only adjustable on some models.

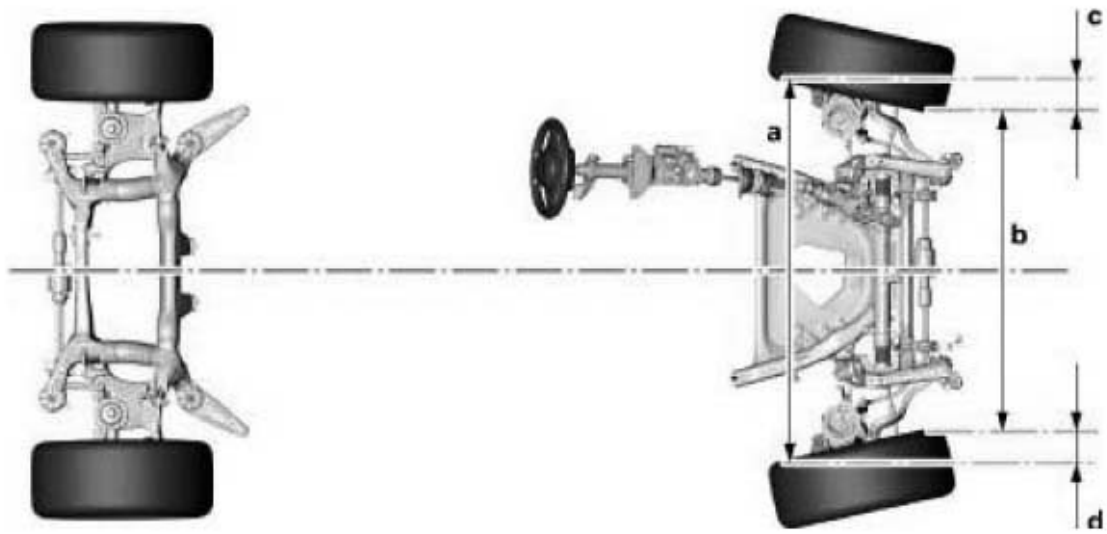


Fig. 6: Identifying Toe-In Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Toe has a major influence on vehicle handling, straight line stability and the position of the steering wheel. An incorrect toe setting will have a negative effect on tire wear. A toe angle which is out of specification will cause the tires to wear in a relatively short time.

Toe Out on Turns

Also referred to as "Turning Angle" or "Toe differential angle". Toe out on turns results from the different angles (arcs) taken by the front wheels when driving through a corner. When turning a corner, the outside wheel must travel a greater distance than the inside wheel. The additional toe angle is determined by the steering arm design.

Deviations from the specified value could indicate possible bent steering linkage. A typical complaint that would be associated with this condition would be excessive tire squeal or "scrubbing" on turns. When looking for this specification in TIS, look for the "Track Differential Angle" specification.

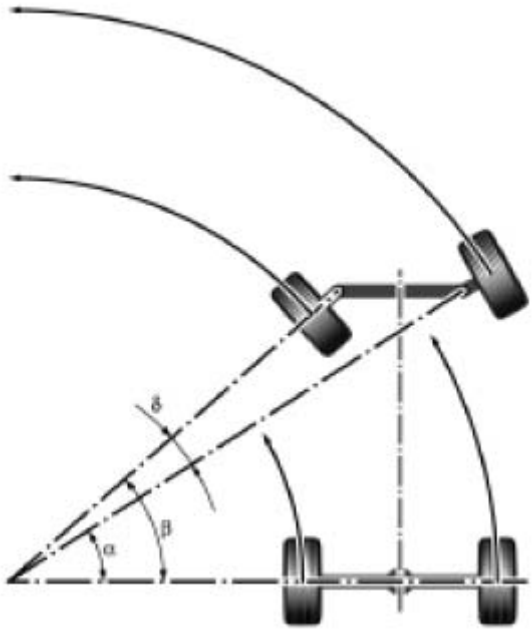


Fig. 7: Identifying Toe-In Angle And Turning Angle
Courtesy of BMW OF NORTH AMERICA, INC.

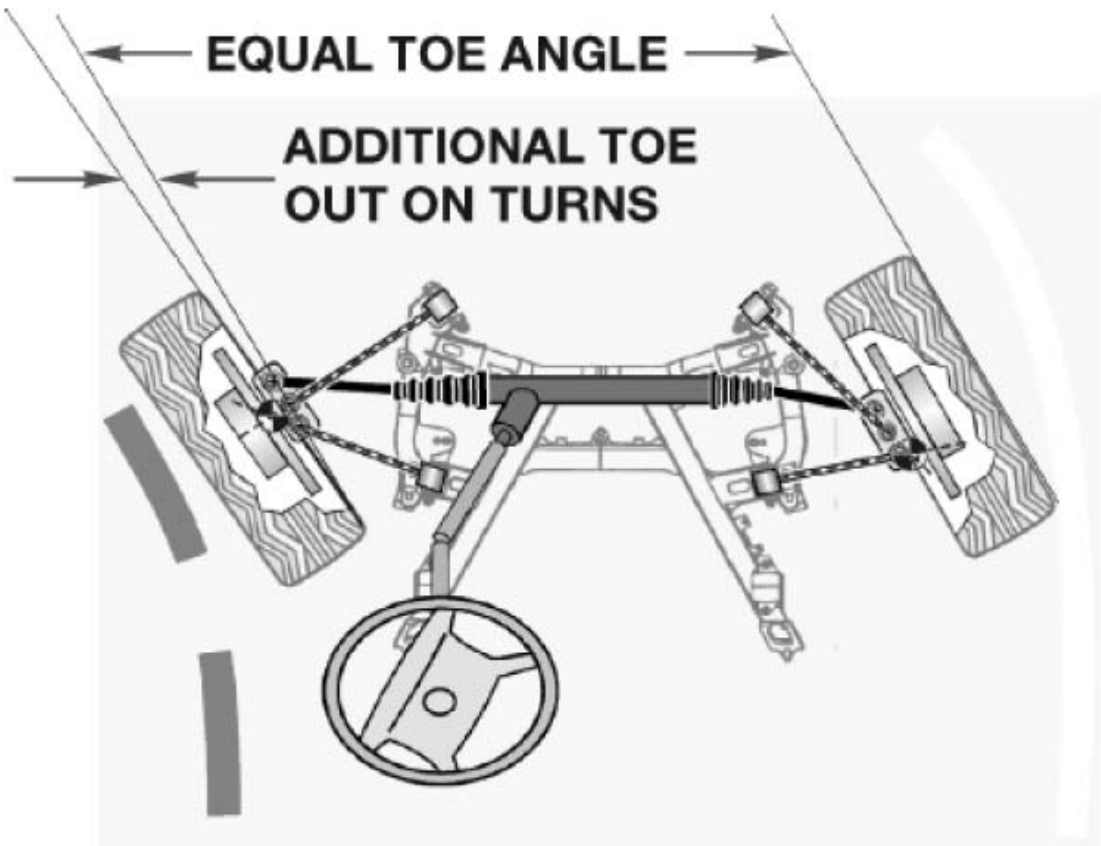


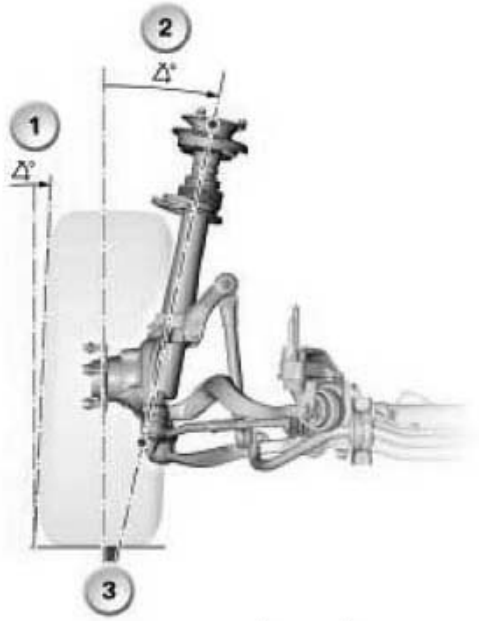
Fig. 8: Identifying Toe-Out Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Steering Roll Radius (Steering Offset)

The steering roll radius is the distance between the point of contact of the projected line drawn through the steering axis to the road surface and the center point of the tire contact area (foot print). The roll radius is the distance between these two lines.

The roll radius can be positive or negative:

- A positive roll radius exists when the steering axis line is inside the center line of the tire (in other words, the imaginary intersection of these two lines is below the road surface).
- A negative roll radius exists when the steering axis line is outside of the tire center line (in other words, the imaginary intersection of these two lines is above the road surface).



Index	Explanation	Index	Explanation
1	Camber	3	Steering Roll Radius
2	Steering Axis Inclination		

Fig. 9: Identifying Steering Axis Inclination
Courtesy of BMW OF NORTH AMERICA, INC.

The steering roll radius influences the steering by means of a "torque effect". During braking, uneven brake forces will influence the steering towards the side with the most braking force. This becomes more evident when the roll radius is excessively positive. A positive roll radius also provides more feedback to the driver regarding road surface conditions.

A steering roll radius which is excessively positive, reduces vehicle stability during braking. However, when roll radius is excessively negative, the directional stability is reduced (when not braking) and there is reduced feedback to the driver through the steering wheel. This is why BMW vehicles are designed with a steering roll radius which is slightly positive. This gives the driver a better "road feel" without compromising braking

stability.

Steering Roll Radius is not adjustable, but can be influenced by camber, SAI and rim offset. This can become evident by installing improper tire and wheel combinations. Wheels with incorrect offsets can compromise handling characteristics.

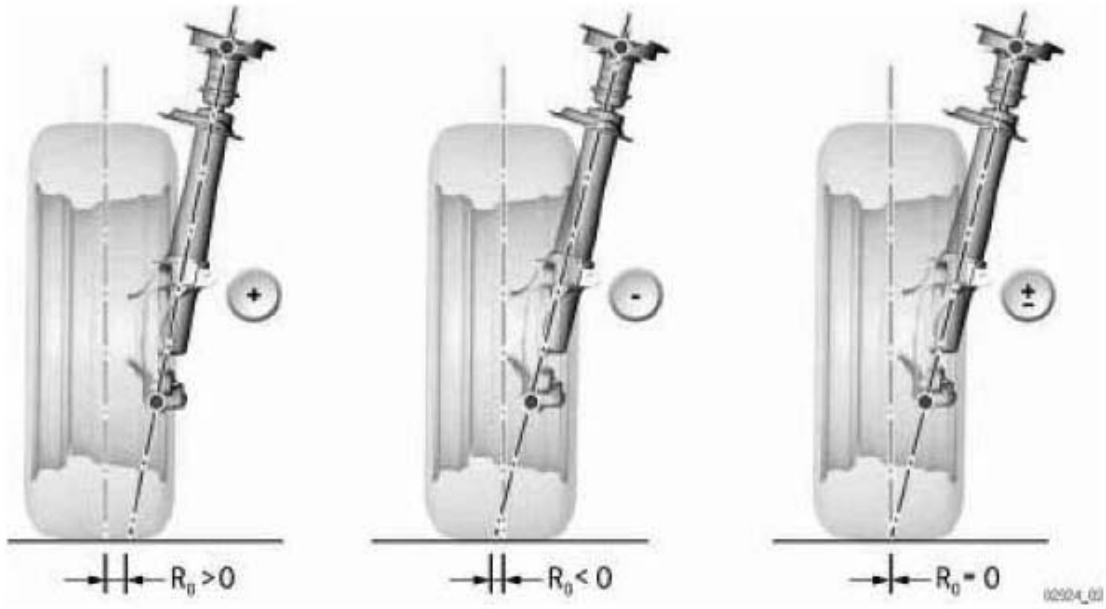


Fig. 10: Identifying Steering Roll Radius
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The term "Steering Roll Radius" is also known as Scrub Radius, Steering Offset or King Pin Offset.

Steering Axis Inclination (SAI)

Steering Axis Inclination is the inward tilt (angle) of the strut assembly with respect to a vertical line to the road surface. SAI raises the vehicle when the steering wheel is turned, which results in the self-correcting forces that cause the front wheels and steering wheel to return to a straight ahead position after cornering.

SAI is not adjustable, but is affected by damaged suspension components.

Most current alignment equipment can measure SAI and can aid in the diagnosis of damaged parts. Bent strut or spindle assemblies are common causes of incorrect SAI readings.

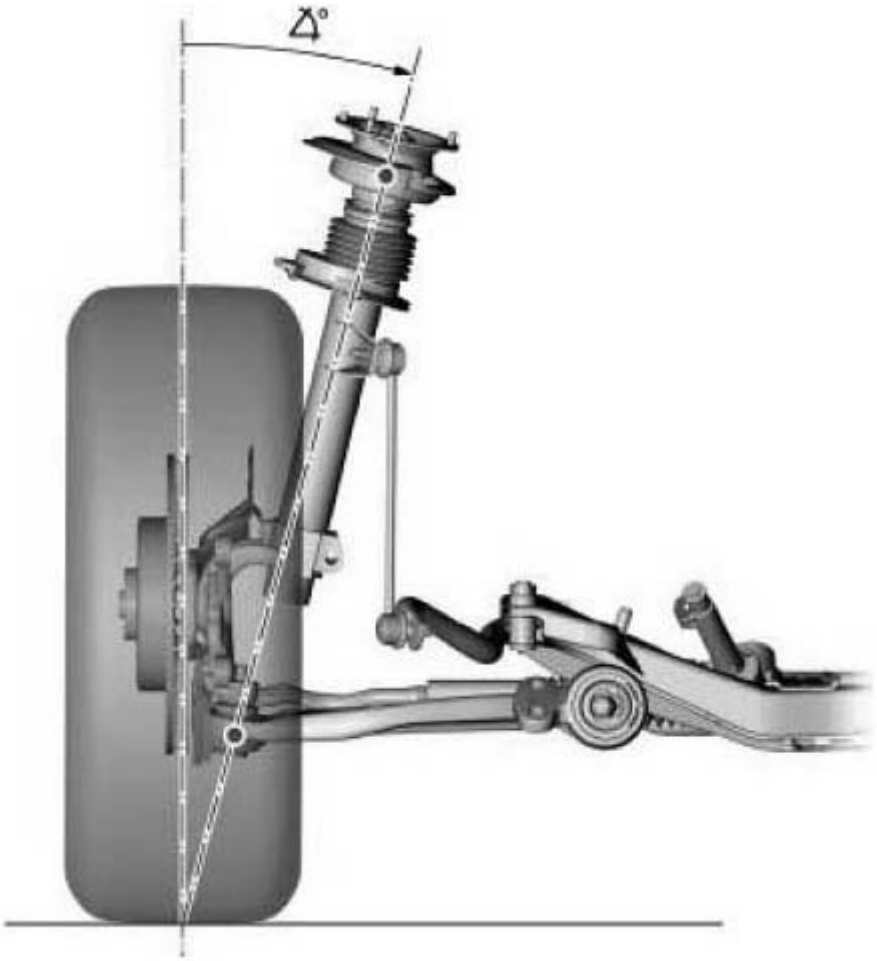


Fig. 11: Identifying Steering Axis Inclination (SAI)
Courtesy of BMW OF NORTH AMERICA, INC.

Included Angle (IA)

Included angle is the Camber angle and SAI combined. IA is also helpful when trying to diagnose bent suspension components. Knowing the IA and SAI is helpful when adjusting Camber. If the desired Camber angle cannot be achieved, then looking at SAI and IA could help determine the cause.

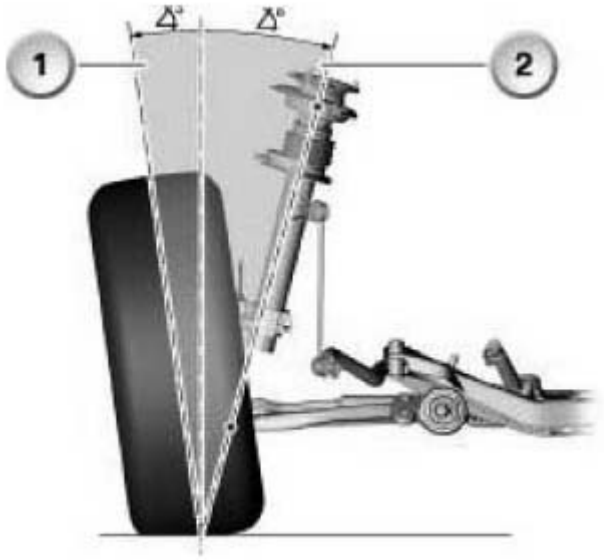


Fig. 12: Identifying Included Angle (IA)
Courtesy of BMW OF NORTH AMERICA, INC.

Depending on the type of alignment equipment used, S.A.I. and I.A. can be measured by raising the vehicle. Look for any excessive deviations from side to side. This could indicate possible chassis (frame) damage or bent components (strut/spindle).

Geometric Axis

The Geometric Axis (Centerline) is an imaginary line that is drawn between the midpoints of both front and rear wheels. The Axis is perpendicular to the axis of the front and rear axles at 90 degrees. This is an imaginary angle that is not adjustable.

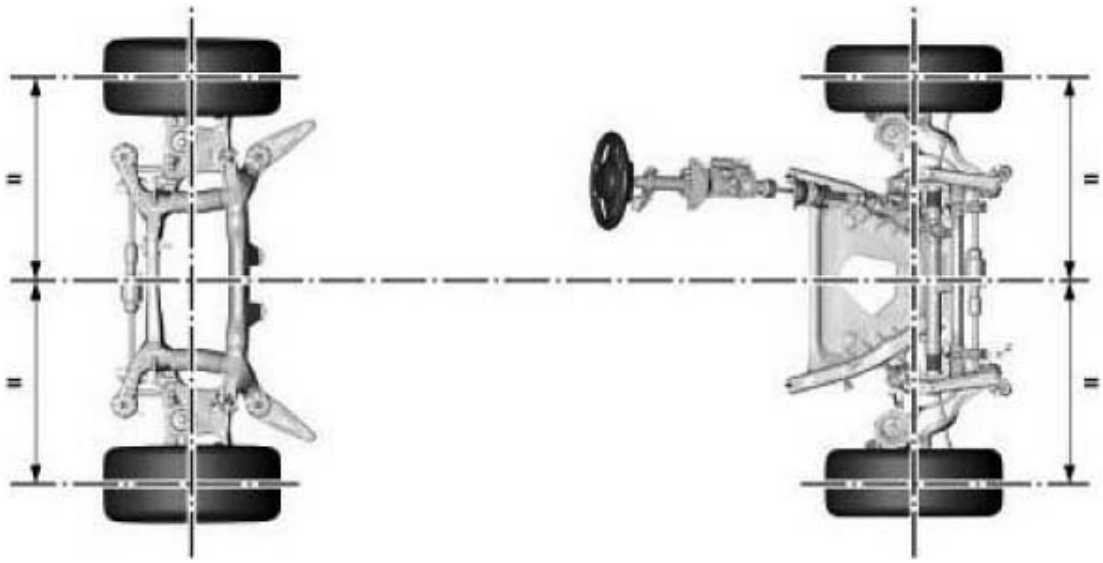


Fig. 13: Identifying Geometric Axis
Courtesy of BMW OF NORTH AMERICA, INC.

Thrust Line/Thrust Angle

The Thrust Line is represented by an imaginary line that bisects the rear toe angle. This angle represents the overall "direction" in which the rear wheels are pointing. The thrust angle is the difference between the Geometric Axis and the Thrust Line. The optimum Thrust Angle is Zero Degrees, any deviation from this will affect the position of the steering wheel.

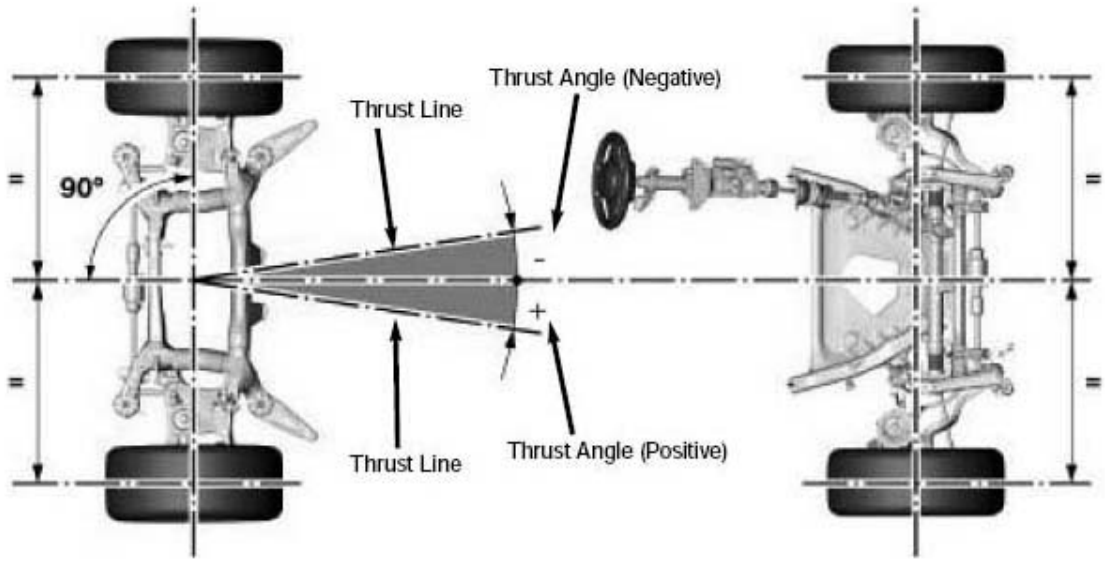


Fig. 14: Identifying Thrust Line/Thrust Angle
Courtesy of BMW OF NORTH AMERICA, INC.

Positive Thrust Angle

A positive thrust angle is formed when the thrust line is to the right of the Geometric Axis (Centerline). When this situation occurs, the steering wheel position will be off to the right as well. The rear of the vehicle will tend to move to the right which will cause the front of the vehicle to steer left, the driver will move the steering wheel to the right to compensate.

Negative Thrust Angle

A negative thrust angle is formed when the thrust line is to the left of the Geometric Axis (Centerline). When this situation occurs, the steering wheel position will be off to the left as well. The rear of the vehicle will tend to move to the left which will cause the front of the vehicle to steer right, the driver will steer the vehicle by moving the steering wheel to the left to compensate.

[] Alignment Procedures

When performing a wheel alignment, make sure that the thrust angle is as close to zero as possible. Failure to do so can result in a steering wheel that is not centered.

Wheelbase

Wheelbase (1) is the distance between the centerline of the two wheels on the same side of the vehicle. This is a

static measurement which will change when the suspension travels on a moving vehicle.

A vehicle with a long wheelbase is of course larger and more spacious. The ride comfort is improved due to less "pitching" motion. In contrast, a vehicle with a shorter wheelbase is capable of tighter "cornering".

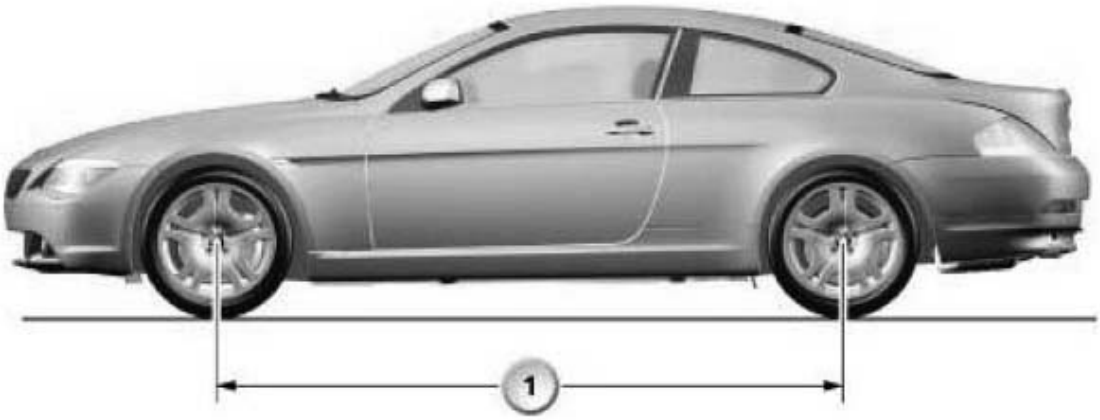


Fig. 15: Identifying Wheelbase
Courtesy of BMW OF NORTH AMERICA, INC.

Track Width

Track Width (1) is the distance between the centerline (wheel contact point) of two wheels on the same axle. This is also a static measurement which will change during vehicle movement.

A vehicle with an increased "track width" can corner at higher speeds.

Fig. 16: Identifying Track Width
Courtesy of BMW OF NORTH AMERICA, INC.

3610 WHEELS

36 00 ... CHECKING TIRE INFLATION PRESSURE

NOTE: Through natural air diffusion, a tire loses approx. 0.05 bar per month, which is about 0.03 bar inflation pressure after 6 months.
Driving with low pressure negatively impacts fuel consumption and tire wear, particularly the tendency of run-flat tires to wear unevenly and experience increased abrasion.
In addition, extremely low inflation pressure can adversely affect driving stability or cause tire damage and thus accidents.
Checking inflation pressure (at least twice a month and prior to long trips) as well as adjusting it to the load status of the vehicle is necessary.

Checking tire inflation pressure

The pressure information for the approved tire sizes are located on the driver's door post.

If the tires speed rating letter is not listed, the inflation pressure for the particular size, such as 255/45, applies.

When towing a trailer, the higher load inflation pressure listed in the pressure information applies.

The pressure information applies to tire sizes approved and makes recommended by BMW.

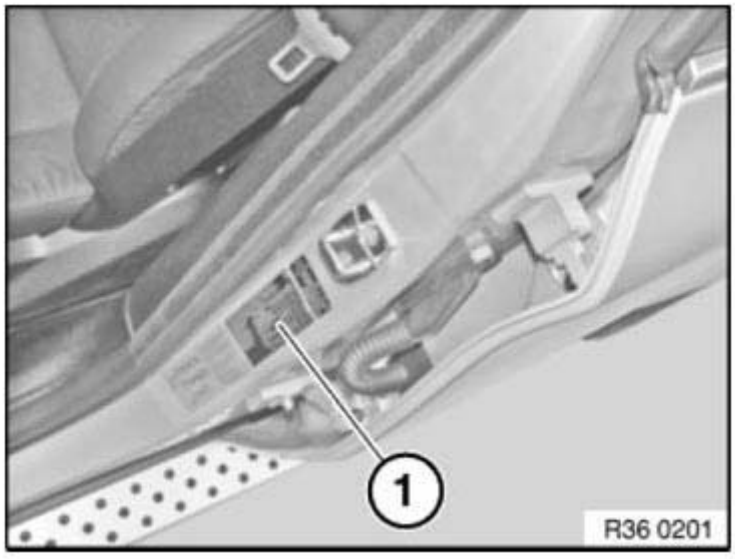


Fig. 1: Identifying Tyre Inflation Pressure Label
Courtesy of BMW OF NORTH AMERICA, INC.

For vehicles with a Run Flat Indicator, the indicator must be initialized after completing repair work.

36 10 300 REMOVING OR INSTALLING FRONT OR REAR WHEEL

IMPORTANT: Wheel was balanced electronically.

Observe the following in order to avoid positioning errors and imbalance:

- Loosen wheel bolts.
- Wheel positioned with valve facing down.
- If several wheels are simultaneously removed, mark installation location of wheels on tires (e.g. with a piece of chalk).
- Mark out wheel to wheel hub.
- Mark out lockable wheel bolt in relation to wheel.
- Release wheel bolts and remove wheel.

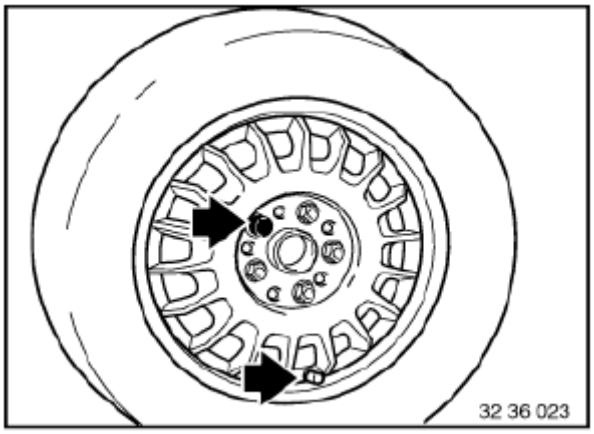


Fig. 2: Identifying Wheel Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: contact surfaces between brake disc and disc wheel and between brake disc and wheel hub must be free of grease.
Follow instructions on initializing Run Flat Indicator (RPA).
When fitting all four wheels (e.g. when changing from summer to winter wheels), check the tire inflation pressure.
To avoid tire damage, advise the customer to check the tire inflation pressures on a regular basis (see Owner's Handbook).

Remove dirt, grease residues and corrosion from contact surface (1) with a drill and special tool 36 1 250.

IMPORTANT: Do not operate special tool 36 1 250 with an impact screwdriver!

NOTE: Degrease contact face with universal cleaner, refer to BMW Parts Department.

NOTE: **If there are grease residues in the area of the wheel bolt bore, the brake disc must be removed See 3411220 REMOVING AND INSTALLING/REPLACING BOTH FRONT BRAKE DISCS or 3421320 REMOVING AND INSTALLING OR REPLACING BOTH REAR BRAKE DISCS and cleaned.**

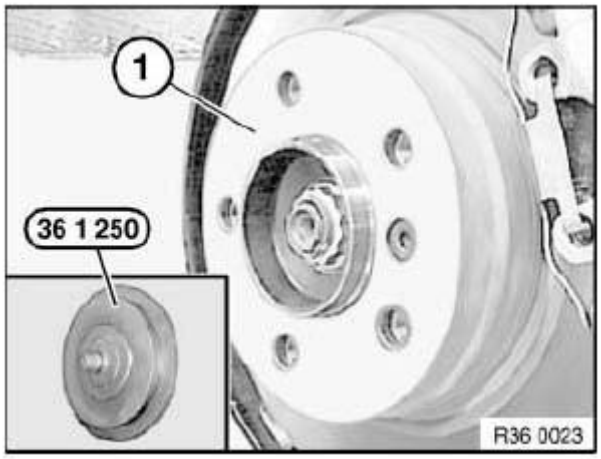


Fig. 3: Identifying Brake Disc And Disc Wheel Contact Surface With Special Tool (36 1 250)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove dirt, grease residues and corrosion from contact surface (1) with a drill and special tool 36 1 250.

IMPORTANT: Do not operate special tool 36 1 250 with an impact screwdriver!

NOTE: **Degrease contact face with universal cleaner, refer to BMW Parts Department.**

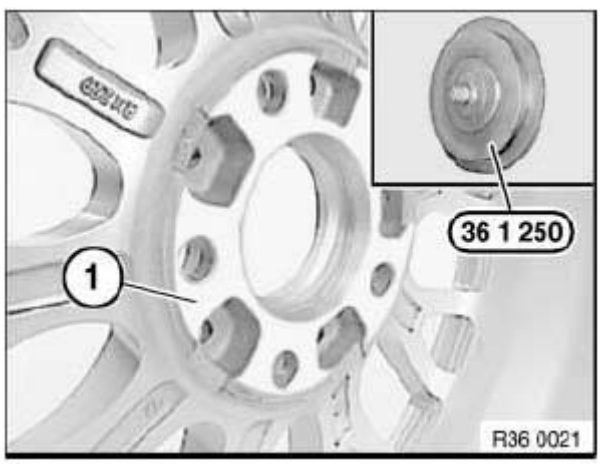


Fig. 4: Identifying Contact Surface With Special Tool 36 1 250
Courtesy of BMW OF NORTH AMERICA, INC.

Check brake disc retaining bolt (1) for secure seating.

IMPORTANT: Brake disc retaining bolt must under no circumstances protrude over contact surface (2) between brake disc and disc wheel.
Tightening torque, brake disc retaining screw,
Front axle, 34 11 1AZ .
Rear axle 34 21 1AZ .

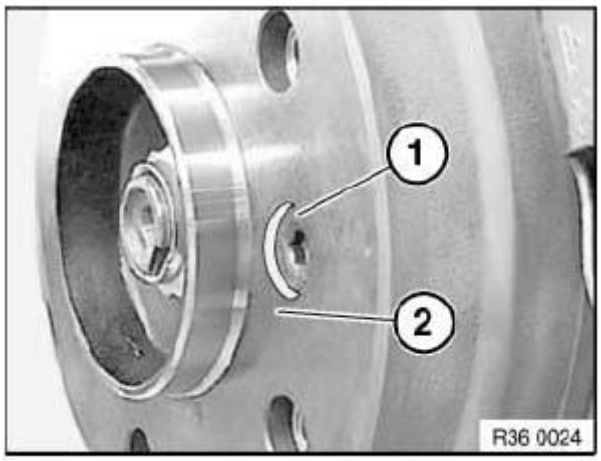


Fig. 5: Identifying Brake Disc Mounting Bolt Position With Brake Disc And Disc Wheel Contact Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Apply a thin coat of grease to wheel centering (1) in disc wheel.

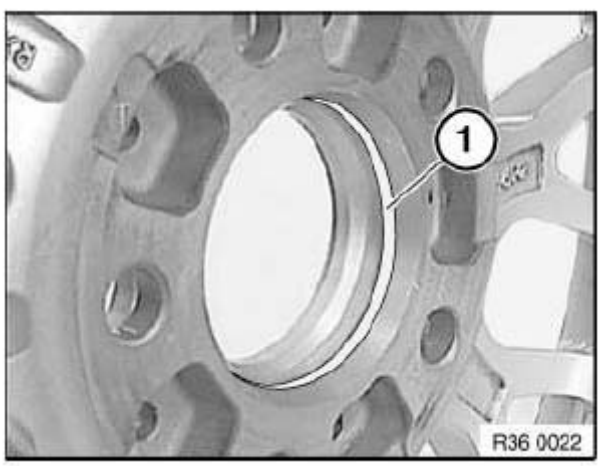


Fig. 6: Identifying Wheel Centering On Disc Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Wheel bolts with taper:

a. Wheel bolt - galvanized
b. Wheel bolt - black chrome plated
c. Wheel bolt - black chrome plated and lockable

d. Lockable wheel bolt with adapter, black chrome-plated

NOTE: To release and tighten down lockable wheel bolt, use a matching adapter from special tool 36 1 300 (wheel bolt adapter set).

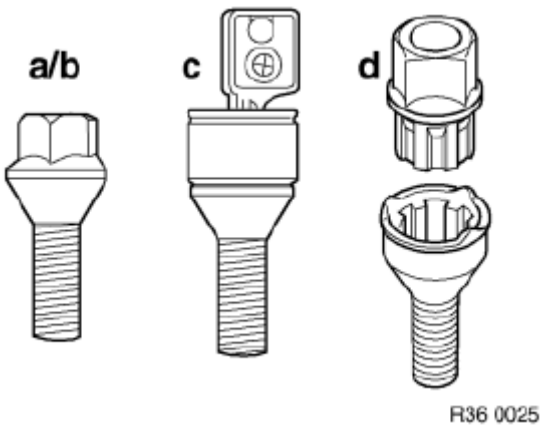


Fig. 7: Identifying Wheel Bolts With Taper
Courtesy of BMW OF NORTH AMERICA, INC.

Clean wheel bolts and check threads for damage, replace, if necessary.

Replace rusty wheel bolts.

IMPORTANT: Do not apply oil to wheel bolts.

IMPORTANT: Under no circumstances use pneumatic or power screwdrivers to install and tighten the wheel bolts.

IMPORTANT: Disc wheel must rest uniformly against brake disc.

In the case of non-original BMW wheel bolts/rims it may be necessary to retighten the wheel bolts on account of settling properties (refer to manufacturer's documents).

Screw in wheel bolts and, to center disc wheel, tighten down by hand diagonally and evenly.

Using torque wrench, firmly tighten wheel bolts in diagonal and even sequence.

Tightening torque **36 10 1AZ** .

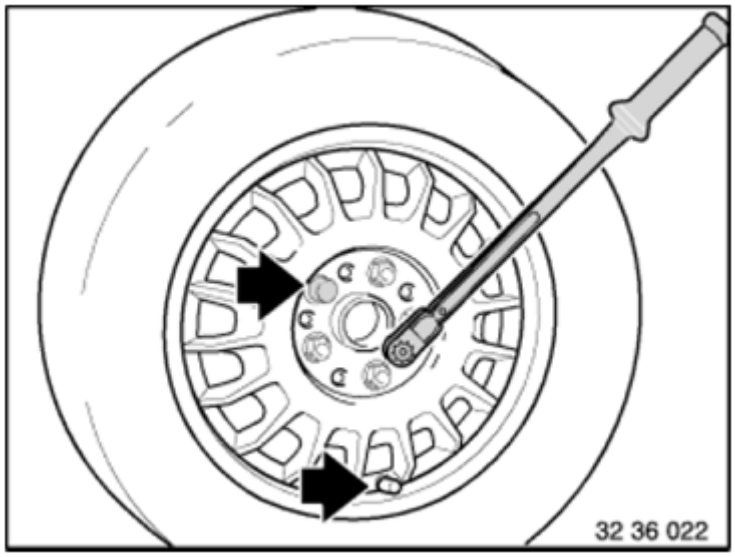


Fig. 8: Tightening Wheel Bolts Using Torque Wrench
Courtesy of BMW OF NORTH AMERICA, INC.

3611 DISC WHEELS (RIMS)

36 11 000 INITIALIZING RUN FLAT INDICATOR (RPA)

NOTE: Checking the tire pressure is based on monitoring the speeds of the wheels in relation to each other. A tire puncture is detected and signalled by way of a deviation in specific speed ratios.
The four tires mounted on the vehicle are monitored while the vehicle is moving.
Initialization must be carried out in each case immediately after tire pressures have been corrected, after tires/wheels have been replaced and after repairs to the air spring system.

IMPORTANT: The Run Flat Indicator does not function when the vehicle is driven with the compact spare wheel.

Version with iDrive:

- Press controller to call up **i** menu
- Select **Settings** and press controller
- Select **Car/Tires** and press controller
- If necessary, switch to the top field. Turn controller until Tires: RPA is selected and press controller
- Start engine but do not drive off
- Select **Confirm tire** pressure and press controller

Fig. 9: Control Display - CBS Menu
Courtesy of BMW OF NORTH AMERICA, INC.

- Drive off. Initialization is completed during the journey

Version without iDrive:

- Start engine but do not drive off
- Touch direction indicator lever up or down until the corresponding symbol and **RESET** appear
- Press PC button to confirm selection of Run Flat Indicator
- Press PC button for approx. 5 seconds until a check/tick appears after RESET
- Drive off. Initialization is completed during the journey

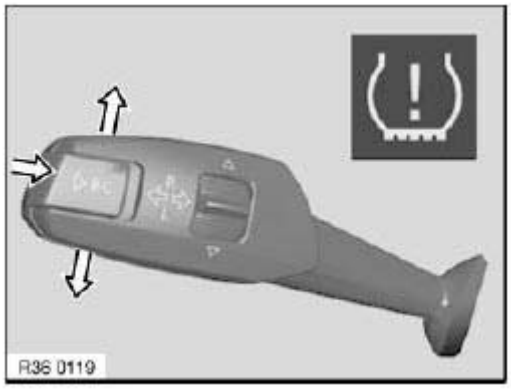


Fig. 10: Identifying RDC Menu (Without iDrive)
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 105 REMOVING AND INSTALLING RDC (TYRE PRESSURE CONTROL) CONTROL UNIT (LOW COST)

IMPORTANT: Read and comply with notes on protection against electrostatic damage (ESD protection).

Loosen the lower part of the bumper panel (1) and raise slightly.

Disconnect plug connection (2).

Push the retaining tabs (3) apart.

Pull the RDC control unit out.

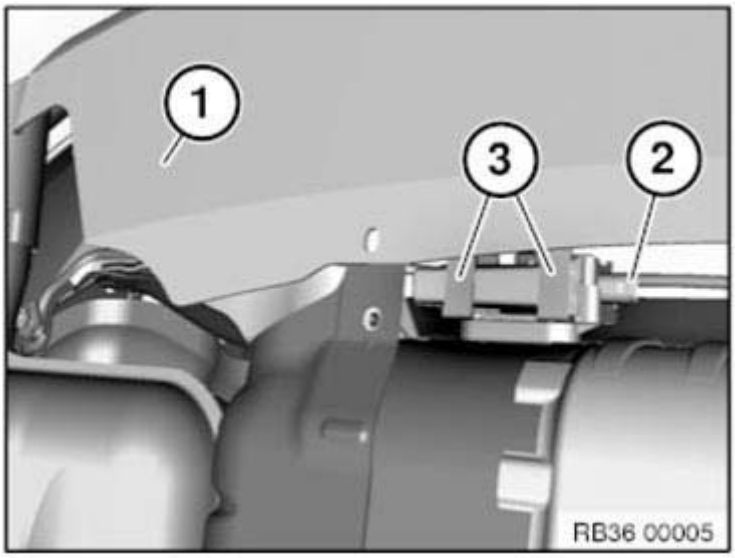


Fig. 11: Identifying Plug Connection, Retaining Tabs And RDC Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Replacement

- Carry out programming/encoding

36 11 105 REMOVING AND INSTALLING/REPLACING RDC (TYRE PRESSURE CONTROL) CONTROL UNIT

Necessary preliminary tasks

- Remove right luggage compartment **WHEEL ARCH PANEL**

Swing out RDC control unit (1).

Disconnect plug connection and remove RDC control unit.

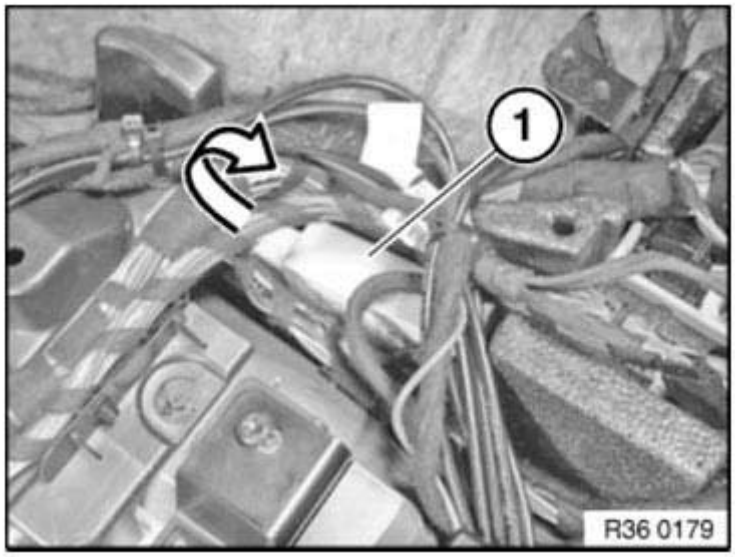


Fig. 12: Swinging RDC Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 115 REMOVING AND INSTALLING/REPLACING RDC RECEIVING AERIAL

Necessary preliminary tasks

- Remove front left underbody panelling

Disconnect plug connection (1).

Gently press retaining tabs apart in direction of arrow and remove RDC aerial (2).

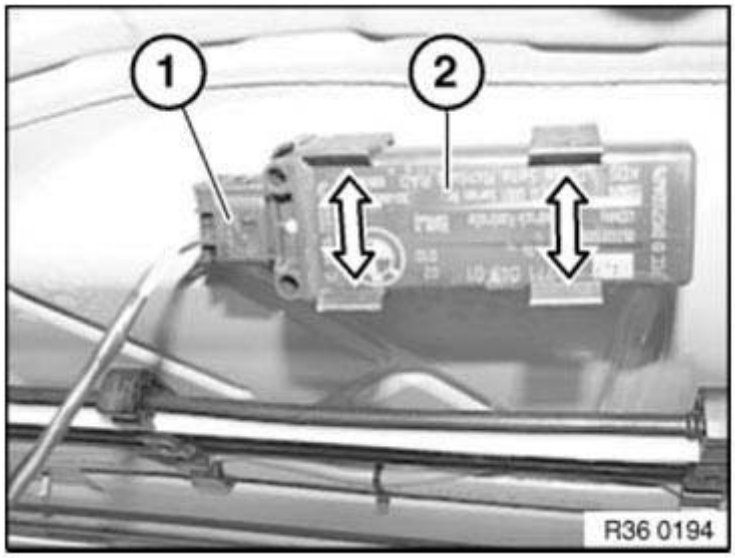


Fig. 13: Removing RDC Aerial
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 123 REMOVING AND INSTALLING/REPLACING AN RDC TRIGGER TRANSMITTER (REAR)

Necessary preliminary tasks

- Release rear **WHEEL ARCH PANEL**

Disconnect plug connection (1).

Press catch (2) together and swing out RDC transmitter (3).

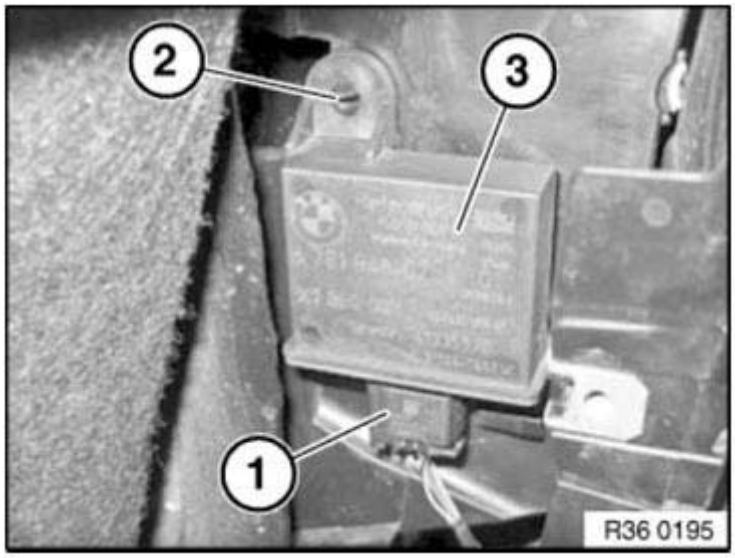


Fig. 14: Identifying Plug Connection, Catch And RDC Transmitter
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 130 REMOVING AND INSTALLING/REPLACING FRONT LEFT RDC TRIGGER TRANSMITTER

Necessary preliminary tasks

- Remove front left **WHEEL ARCH PANEL** .

Unclip RDC transmitter (1).

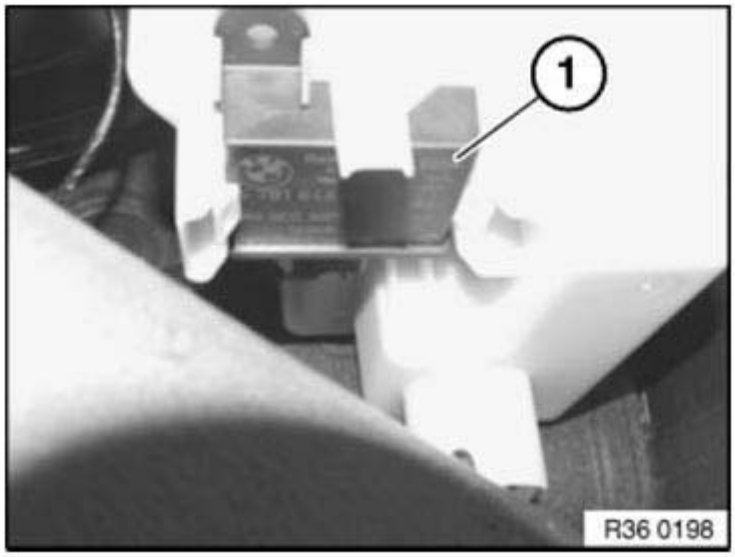


Fig. 15: Identifying RDC Transmitter
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connection (1).

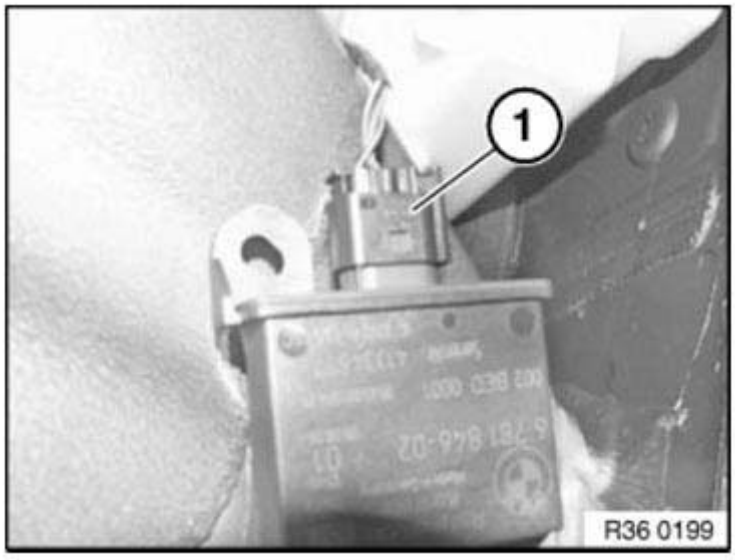


Fig. 16: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

36 11 131 REMOVING AND INSTALLING/REPLACING FRONT RIGHT RDC TRIGGER TRANSMITTER

Unclip line (1) from washer fluid reservoir (2).

Unlock washer fluid reservoir (2) (3) and swing out.

Disconnect plug connection of RDC transmitter.

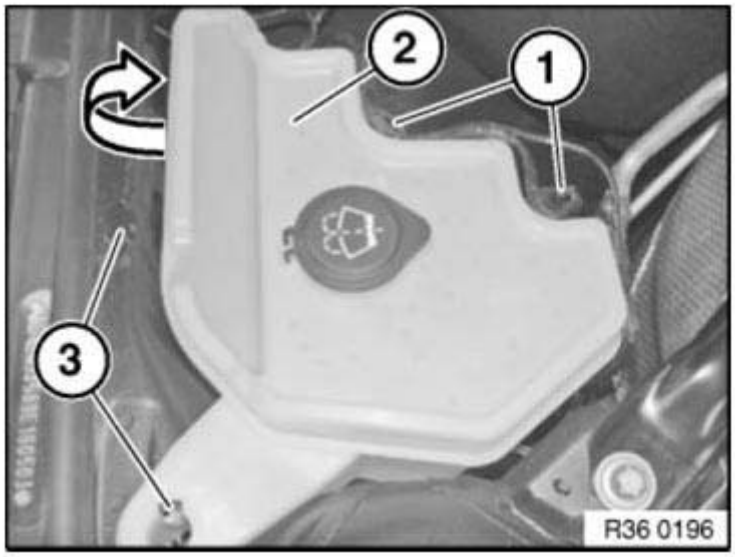


Fig. 17: Removing Line From Washer Fluid Reservoir
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Installation:

Tightening torque **36 11 3AZ** .

Remove RDC transmitter (2).

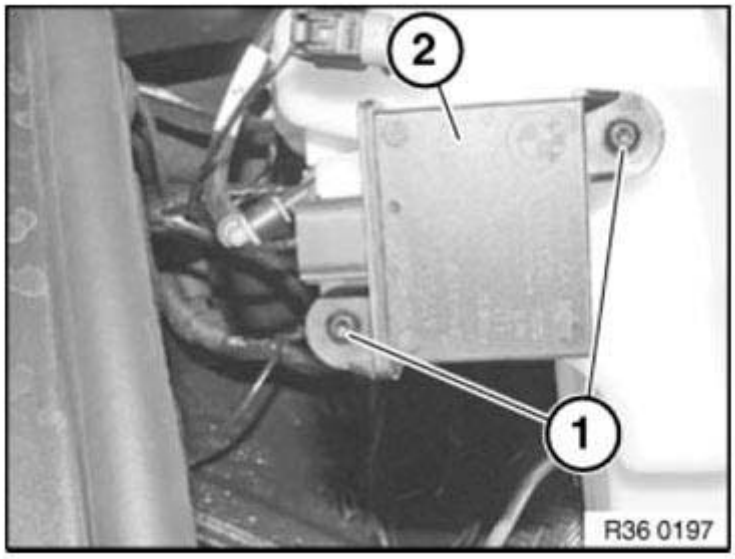


Fig. 18: Identifying RDC Transmitter With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

KINEMATIC DIAGNOSIS SYSTEM AND ENVIRONMENT

BMW KDS (Beissbarth)

Fig. 1: Identifying Kinematic Diagnosis System And Environment
Courtesy of BMW OF NORTH AMERICA, INC.

1. FOREWORD

1.1 Objectives

Wheel alignment has become an increasingly complex subject. The aim of this BMW Service Technology bulletin, therefore, is to achieve several objectives:

- Creation of guidelines for working with the BMW Kinematic Diagnosis System (KDS).
- Familiarization with wheel alignment technology for current vehicles and clarifying any questions which

arise in this connection.

- Transparency and clarification of different terms.
- Clarification of the causes of errors in the past, such that they can be avoided after reading this document.
- Creation of conditions for dealing safely with the BMW KDS.

1.2 Further development of the BMW Kinematic Diagnosis System

- The BMW Kinematic Diagnosis System is an integrated part of automotive system concepts. It ensures that work is carried out in a particularly rational manner which is appropriate for BMW requirements, such that you can also be certain of being prepared for future technological developments. As far as precision and performance in wheel alignment and tuning is concerned, BMW, together with leading manufacturers, has made the best of what is technically feasible: the BMW Kinematic Diagnosis System.
- The BMW Kinematic Diagnosis System manufactured by Beissbarth is more than just the further development of conventional wheel alignment equipment. It sets new standards in precision, performance, speed and handling. It is a guarantor for the perfection which BMW service customers rely on.
- Ride comfort, road safety and tyre wear depend to a large extent on the perfect interplay of the vehicle's kinematic functions. BMW is constantly launching new generations of chassis which are even better than their predecessors. This is why there are fewer kinematics system adjusting points and narrower tolerances when measuring and tuning the chassis.
- With the use of the multi-link rear suspension and the E36, the electronic wheel alignment devices are no longer suitable for BMW wheel alignment purposes. This applies to both the measuring procedure and measuring precision. The generation of equipment which was approved with the E36 series still fulfils all the requirements placed on a modern wheel alignment device, including the use of the latest computer technology.
- Only BMW Kinematic Diagnosis Systems manufactured by Beissarth and Bosch may be used for wheel alignment.

1.3 Technical Data

G03179503

Fig. 2: Technical Data Display
Courtesy of BMW OF NORTH AMERICA, INC.

BMW KINEMATIC DIAGNOSIS SYSTEM - TECHNICAL DATA SPECIFICATIONS

1)	Display	- 17" graphic screen with high-resolution graphics (640x480 pixels with 256 colours)
2)	On-screen text	- In the appropriate national language
3)	Wheel dimensions	- 12"...20"
4)	Vehicle memory locations	- Unlimited
5)	Rotating plates	- Load bearing capacity 1000 kg, angle of rotation +/- 360°, 450 x 450 x 50 mm (L x W x H), sliding range +/- 50 mm, weight 18 kg
6)	Sliding plates	- Loadbearing capacity 1000 kg, angle of rotation +/- 10°, 450x450 x 50mm (L x W x H)
7)	Electrical connection	- 100...115 V/220...240V 50/60 Hz, 0.5 kW (other connections on request)

1.4 Scope Of Delivery

1 - PC display device with graphic screen, graphical tablet, small or large equipment cabinet including automatic charging station, DIN A4 dot matrix printer

4 - Measuring sensors with CCD camera technology and infrared data transmission with built-in power supply

1 - Cable set (comprising 4 cables)

1 - Brake clamping device

1 - Steering lock device

2 - Electronic precision rotating plates with integrated sensor without access ramps

2 - Sliding plates without access ramps

4 - BMW quick-clamping units, comprising a P8-68 locating bell and P267 01 quick-acting clamp including coated holding claws

1 - Operating instructions for BMW KDS (8 languages)

1 BMW software and the BMW vehicle set-point data with setting screens as well as text for the measurement preparations

1.5 Accessories Required

2 Locating rods for positioning the vehicle

1 Set of sand bags for the prescribed loading

1.6 Accessories recommended

4 - Quick-clamping units

2 - Sets of access ramps

1 - Remote control display

1 - Trolley (for ballast bags, rotating and sliding plates and 4 quick-acting clamps)

2. MEASURING OPTIONS USING THE BMW KINEMATIC DIAGNOSIS SYSTEM

2.1 Front Axle

- Toe-in (single and total toe-in in relation to the geometrical drive axis)
- Camber (with steering wheel pointing straight ahead)
- Wheel displacement (in relation to the left-hand front wheel)
- Castor, kingpin inclination and toe-differential angle

2.2 Rear Axle

- Toe-in (single and total toe-in in relation to the longitudinal centre plane of the vehicle -> previously called symmetrical axis)
- Geometrical drive axis
- Camber

2.3 Other Measuring Options

- Rear Wheel Displacement
- Wheelbase Difference
- Lateral Displacement On Right
- Lateral Displacement On Left
- Track Difference
- Axial Displacement

3. SYSTEM DESCRIPTION

3.1 BMW Kinematic Diagnosis System 1, Based On The Beissbarth ML4000

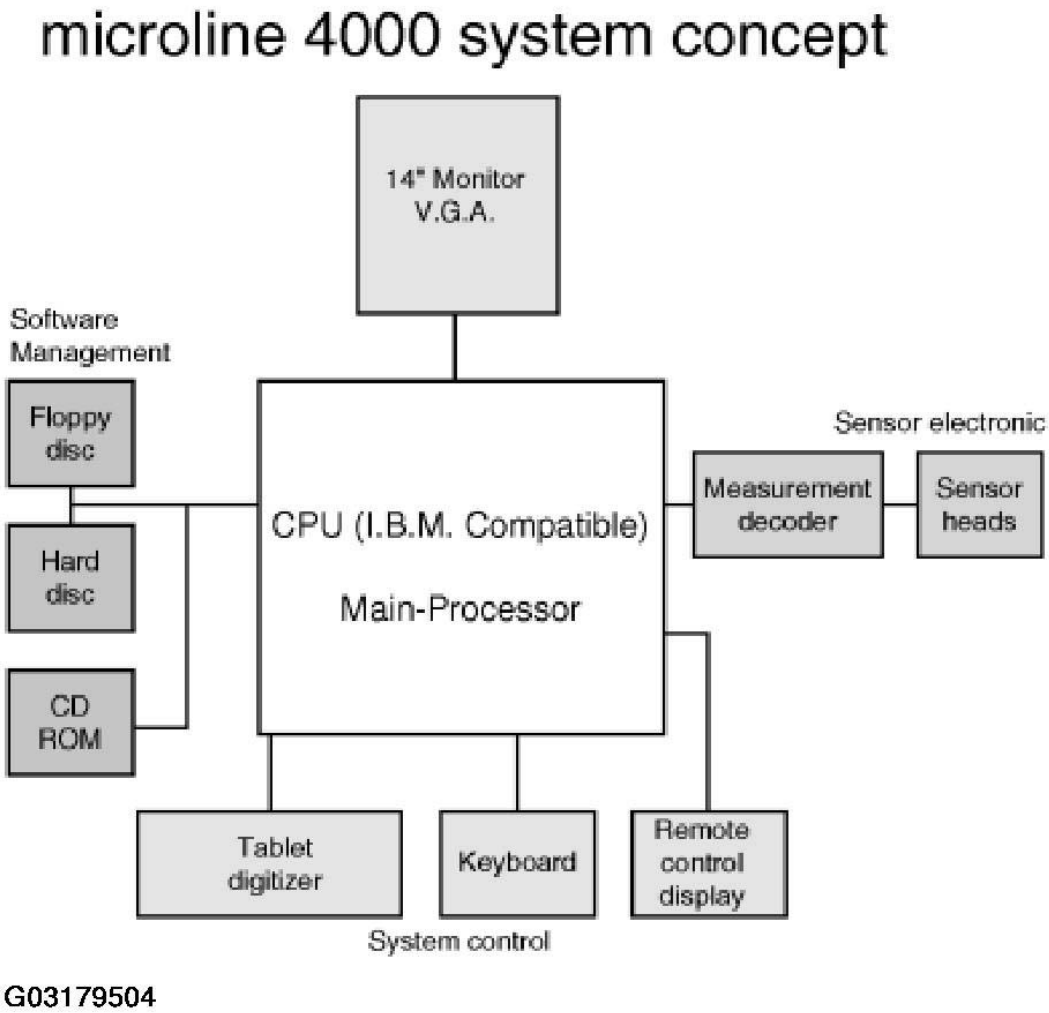


Fig. 3: BMW Kinematic Diagnosis System Concept Chart
Courtesy of BMW OF NORTH AMERICA, INC.

The KDS 1 is available in two different designs at no extra charge:

1. Mobile Workstation

G03179505

Fig. 4: Identifying Mobile Workstation
Courtesy of BMW OF NORTH AMERICA, INC.

2. Mobile Compact Cabinet

G03179506

Fig. 5: Identifying Mobile Compact Cabinet
Courtesy of BMW OF NORTH AMERICA, INC.

The larger workstation offers a small storage area for accessories, whilst the compact cabinet is mobile and ideal for restricted working areas. Both variants can be supplied as a cableless measuring system (infrared). From the point of view of measuring technology, there is only a difference in the handling and equipping of the system. For both designs, the four measuring sensors are stored in integrated inserts with rechargeable battery charging points. When automatically charged over night, the measuring sensor batteries provide enough power for 10 hours of continuous use.

3.2 Computer

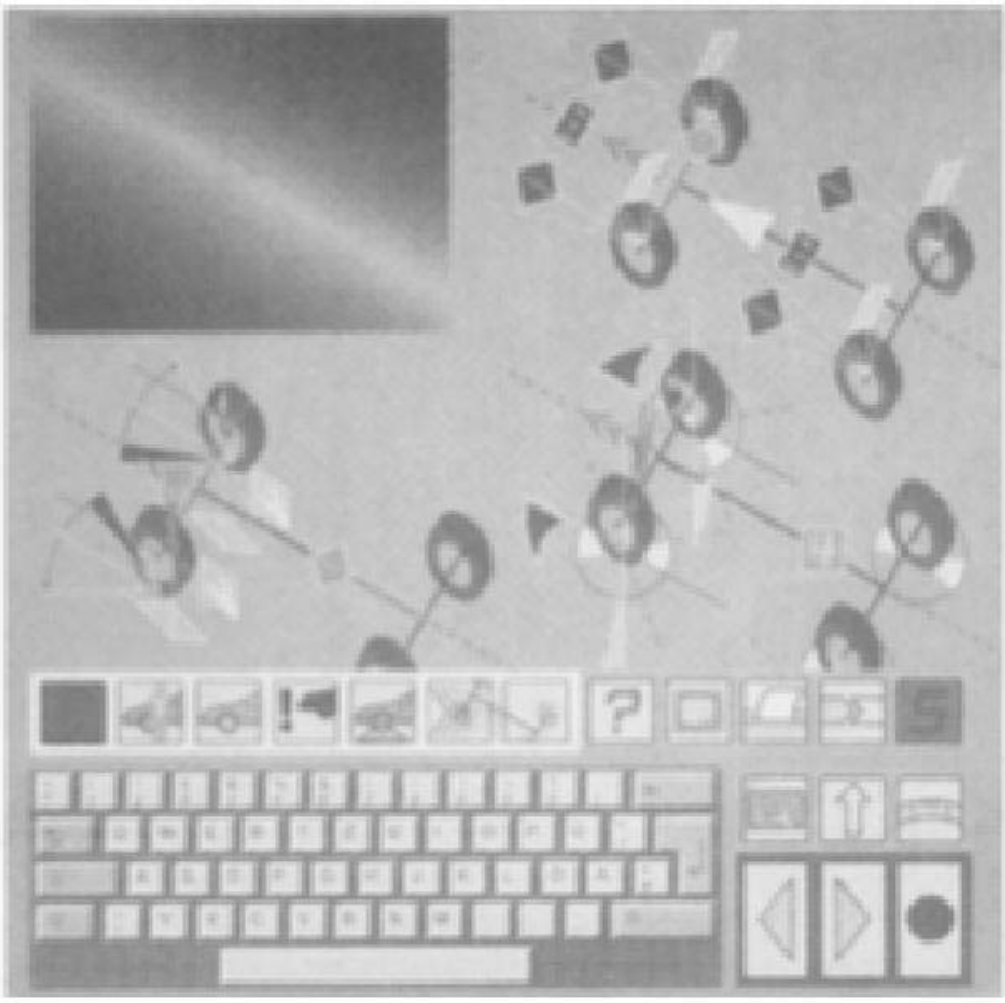
The KDS 1 system comprises tested and reliable industrial components. The computer is an IBM-compatible, 32-bit Intel processor with CD ROM drive to the industry standard.

G03179507

Fig. 6: Identifying System Comprises Tested And Reliable Industrial Components
Courtesy of BMW OF NORTH AMERICA, INC.

3.3 Graphical Tablet

All functions are shown in graphical form on a "pictogram" panel. The panel is protected by a plexiglass cover. It can easily be replaced if more extensive design modifications are necessary. The operator interface has no membrane and is thus protected against damage. The main functions are activated by clicking the icon with the digital pen.



G03179508

Fig. 7: Identifying Graphical Tablet
Courtesy of BMW OF NORTH AMERICA, INC.

3.4 Equipment Cabinet

The PC with graphic monitor and removable operating panel, supports for the measuring sensors, the remote control and the A4 printer are integrated into the workstation. The charging station is located in the cabinet and can also be connected to the measuring sensors and the remote control using the plug-in cables (operating while simultaneously charging the batteries).

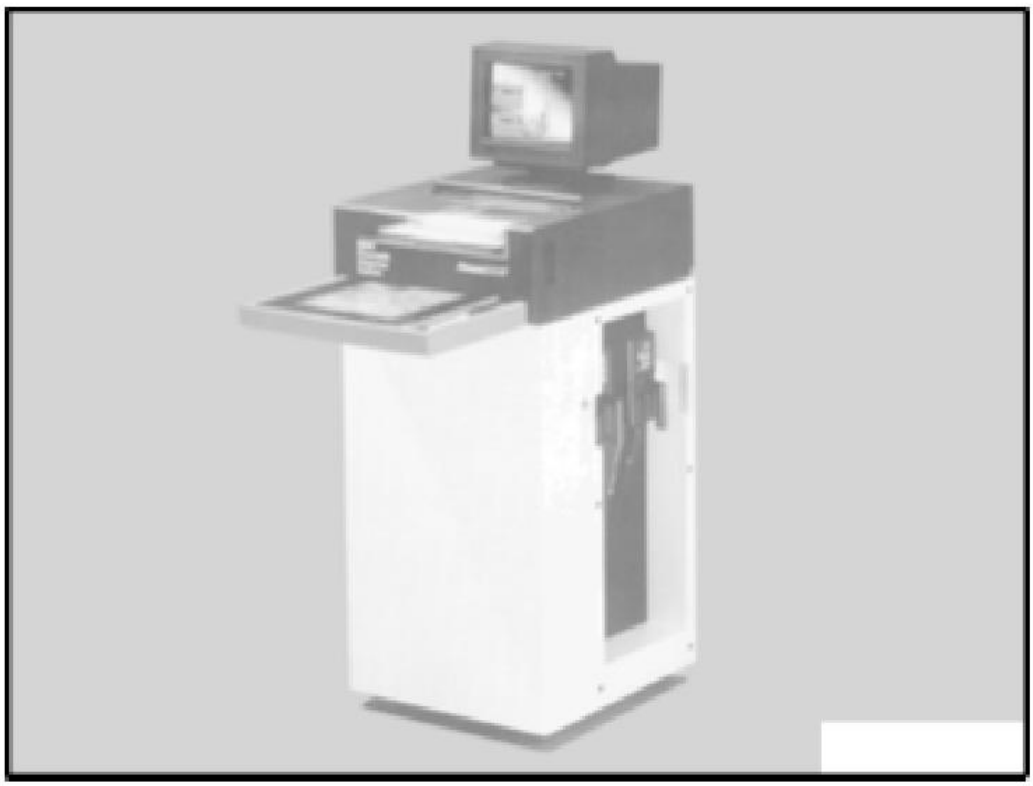


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Fig. 8: Identifying Equipment Cabinet
Courtesy of BMW OF NORTH AMERICA, INC.

3.5 Remote Display

A cableless remote display can be supplied on request. The remote control keys are only active during measuring and adjustment (not for customer data input, or if selecting a vehicle or editing the setpoint data etc.). The following displays are supported by the remote control:

- Measured value with setpoint/actual comparison and tolerance bar
- Steering graphics for steering routines
- Live overview of the track/camber values with a setpoint/actual comparison
- Rim run-out compensation

G03179510

Fig. 9: Identifying Remote Display
Courtesy of BMW OF NORTH AMERICA, INC.

3.6 Measuring Sensors With CCD Camera

The measuring sensors are each equipped for automatic measurement with two CCD cameras and their own processor for the cableless infrared transmission of data with integrated batteries. Benefits:

- No temperature deviation
- Very high measuring resolution (the track
- Single track range of more than +/- 9 degrees for the constant display of toe-in when changing the tie-rod ends
- Exact system accuracy, i.e. when carrying out measurements at the vehicle following rim run-out compensation, the toe-in and camber measurements are accurate to 2 angular minutes

G03179511

Fig. 10: Measuring Sensors With CCD Camera
Courtesy of BMW OF NORTH AMERICA, INC.

3.7 BMW Quick-Acting Clamp

BMW quick-acting clamp for holding the measuring sensors precisely in position and measuring without rim run-out compensation.

NOTE: Any existing quick-acting clamps, e.g. from older F1600s or ML-3000s, must not be used on the BMW KDS.

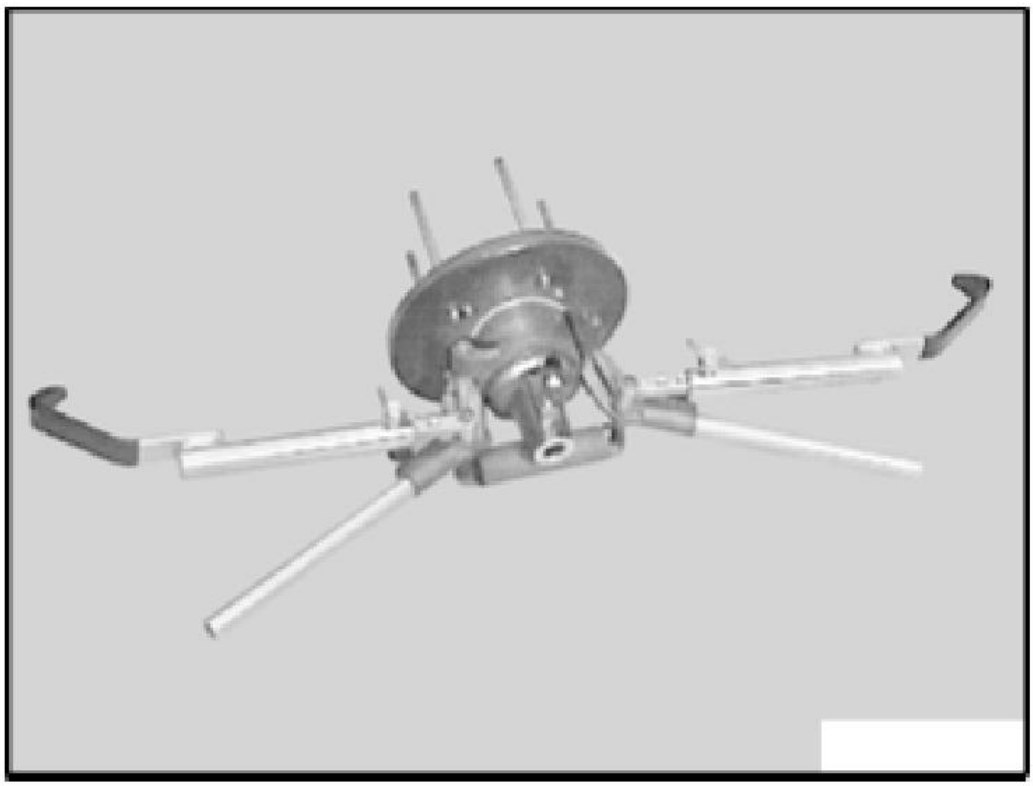

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Fig. 11: Measuring BMW Quick-Acting Clamp For Holding
Courtesy of BMW OF NORTH AMERICA, INC.

3.8 Rotating/Sliding Plates

- Electronic precision rotating plates for the front wheels with integrated sensor (360 degree measuring range)
- Stable sliding plates for the rear wheels with a swivelling/rotating top plate
- Accessories: Cover hood for aluminum rotating plates

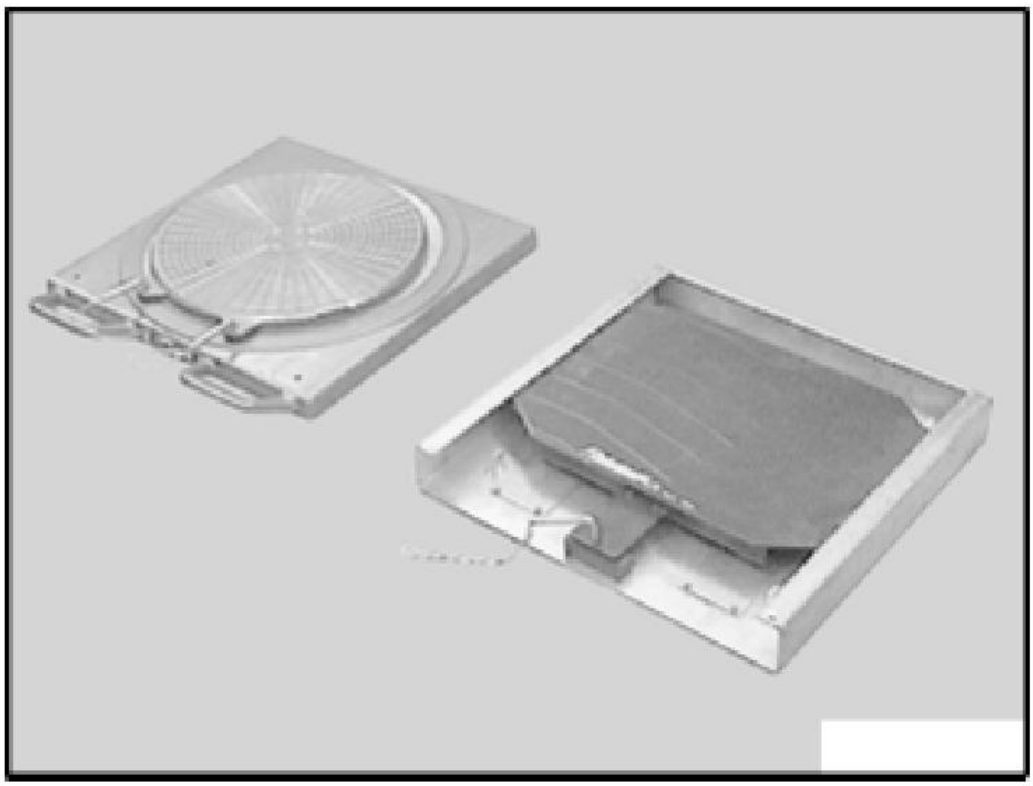

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Fig. 12: Identifying Rotating/Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

3.9 Sensor Pins

- A new BMW light alloy wheel (styling no. 18) has been available as optional equipment from April 1993. When measurements are being made on vehicles with these wheels, new sensor pins are required for the quick-acting clamps of the recommended wheel alignment equipment.
- The new sensor pins are included in the scope of supply for new deliveries of KDS 1 (order number: BS 90 19 11).

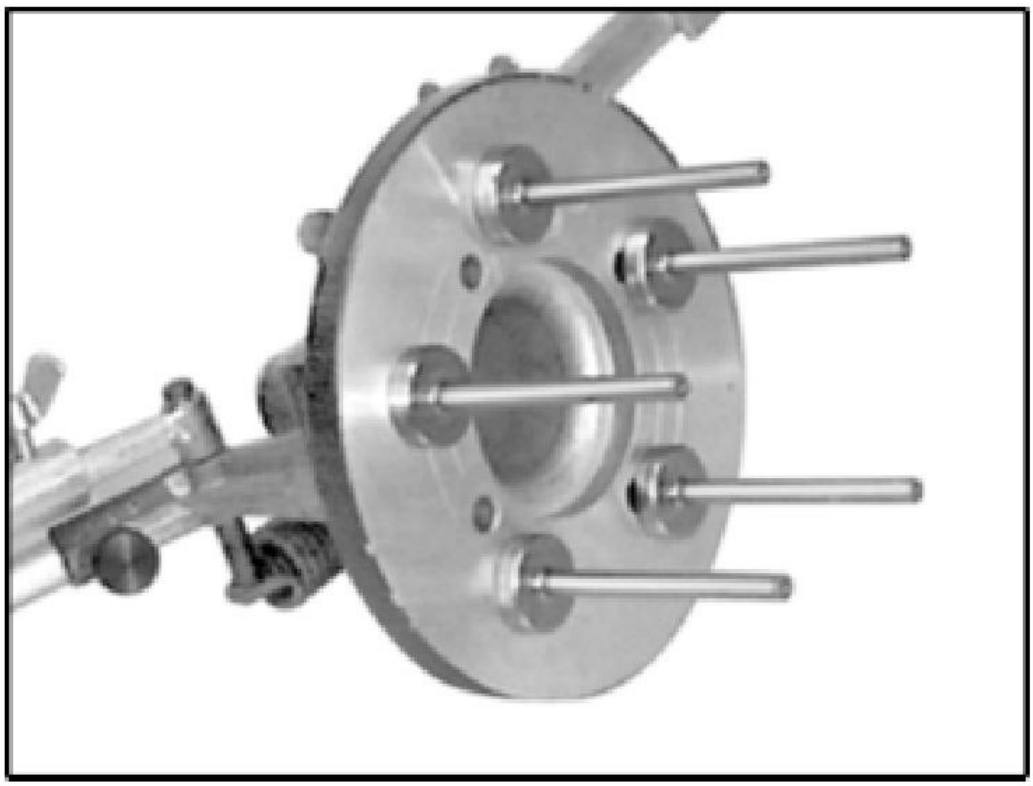

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Fig. 13: Identifying Sensor Pins
Courtesy of BMW OF NORTH AMERICA, INC.

3.10 Spoiler Adapter

- In the case of vehicles with very low spoilers, the sensor beam may be broken by the spoiler between the measuring sensors. This primarily occurs in front of the front axle.
- The spoiler adapter is used here as a connecting element between the measuring equipment clamp and the measuring sensor. Thanks to the adapter, the sensors are placed 50 mm lower, thus allowing the sensor beam to move freely below the spoiler.

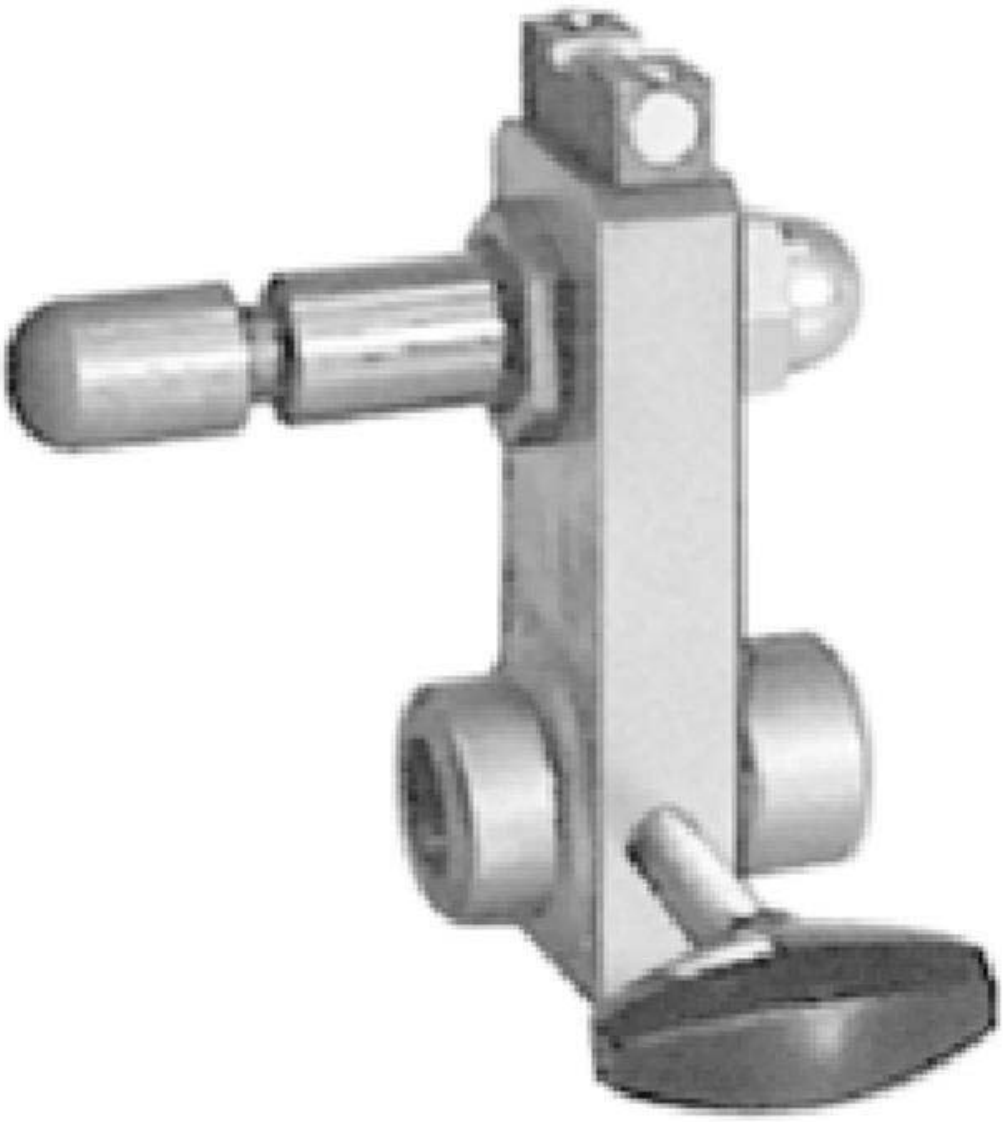

Fig. 14: Identifying Spoiler Adapter
Courtesy of BMW OF NORTH AMERICA, INC.

3.11 Quick-Clamping Units

- Quick-clamping units for wheel alignment on non-BMW vehicles with rim run-out compensation.
- Rims without sensors boreholes (rims for BMW vehicles from other manufacturers)

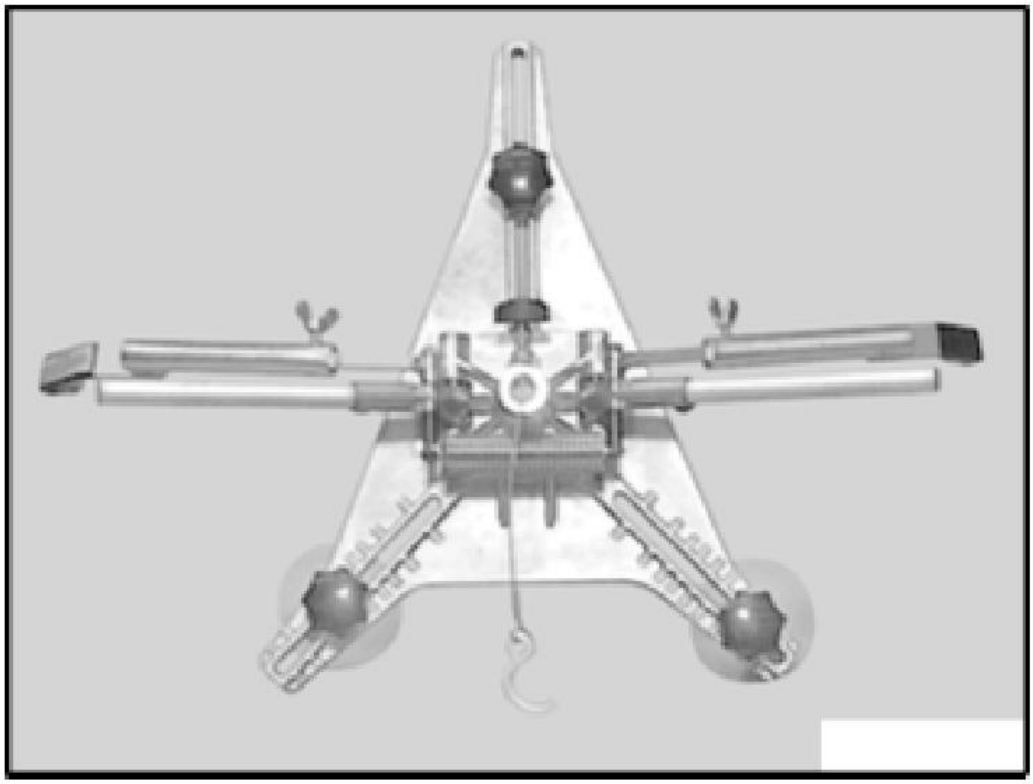

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Fig. 15: Identifying Quick-Clamping Units For Wheel Alignment Non-BMW
Courtesy of BMW OF NORTH AMERICA, INC.

3.12 Retainers

- The most varied clamping options for the measuring equipment are possible thanks to the versatile retainers and the rubber-coated thrust pieces, even on exotic light-alloy rims.

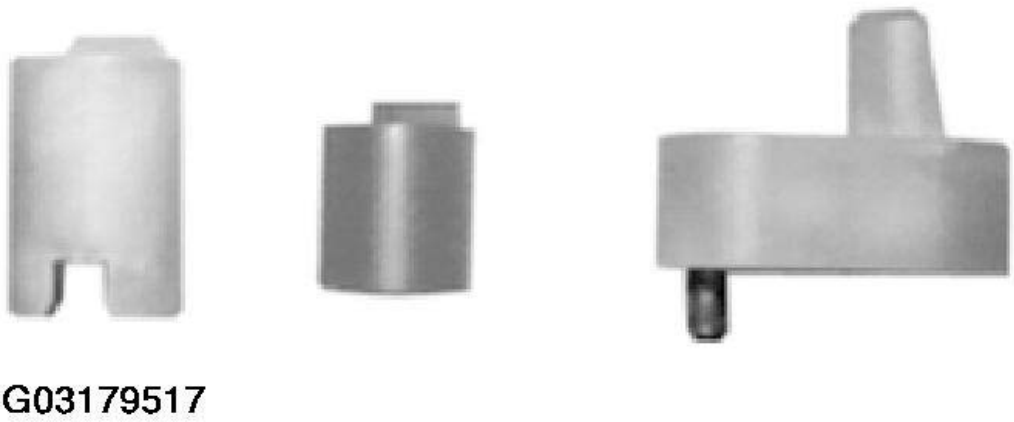


Fig. 16: Identifying Retainers
Courtesy of BMW OF NORTH AMERICA, INC.

4. WORKSTATION

4.1 Environment

All lifting platforms currently recommended by BMW (see Workshop Equipment Planning documentation, Issue 11) for wheel alignment meet the requirements for the BMW KDS.

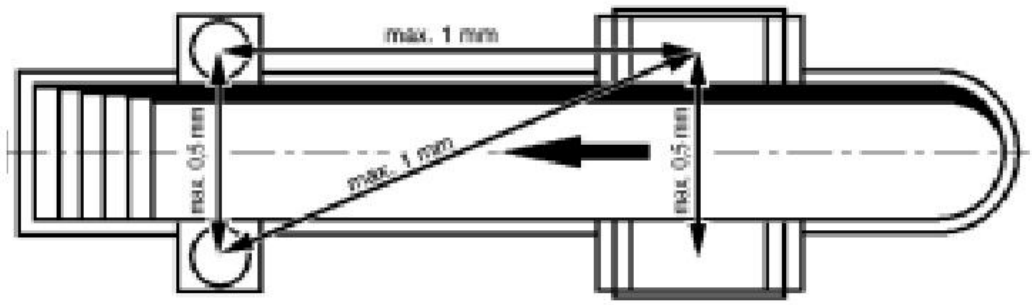
No particular requirements have to be met in respect of the location at which the BMW KDS is used. The measuring device can be installed over working pits or on lifting platforms.

Requirements:

- Wheel alignment pits
- Pillar-type lifts with set-down device
- 2 plunger-type lifting platforms with set-down device
- Repair stands with set-down device
- One measuring area (approx. 4.5 m x 7.0 m).
- The rotating plates must be pinned to the platform

The support surfaces for the rotating and sliding plates may only display the following maximum height difference:

- from left to right +/- 0.5 mm
- from front to back +/- 1.0 mm
- diagonally +/- 1.0 mm.



G03179518

Fig. 17: Cutaway View Of For Rotating And Sliding Plates
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: A difference in the height of the rotary plates of +/- 2 mm from left to right results in a measuring error of 4.8° in the camber.
As a comparison: The camber tolerance on the E36 is +/- 10'. The tyre tread difference or varying tyre pressure cause measuring errors of the same magnitude.

4.2 Preconditions For Alignment

When carrying out the wheel alignment, the front and rear wheels must be centred on the rotating and sliding plates in order that all wheel suspensions remain free of tension during the steering routine and adjustment work. As a result, the rotating and sliding plates for the relevant wheel bases and track widths of the vehicle to be aligned must be moved.

4.3 Measuring Tolerance

All measuring tolerances are system tolerances. This means that the sum of all individual tolerances gives the value shown in the example. Example of camber: Quick-acting clamp + measuring sensor + computer = 1' at a measuring range of +/- 3° (all BMW vehicles are within this measuring range).

4.4 Levelling The Measuring Station

The manufacturers of the BMW KDS (Beissbarth/Bosch) are able to measure the measuring area to the required accuracy using levelling devices. Any "normal" water level is not suitable for this. Lifting platforms must be levelled under load so that the uneven deflection in the travel rails is taken into account.

IMPORTANT: Adjustment work for the lifting platform concerned must be executed by a specialist (manufacturer's after-sales service).

5. CHASSIS-RELATED TERMS

5.1 Toe-Differential Angle

Description:

- The toe-differential angle (a) is the angular position of the internal wheel on the curve in relation to the external wheel on the curve when driving round bends. The steering is designed such that the angular position of the wheels in relation to each other changes as the steering angle increases.
- In ideal cases, the wheel axes meet at point D in any steering position (except for straight ahead).

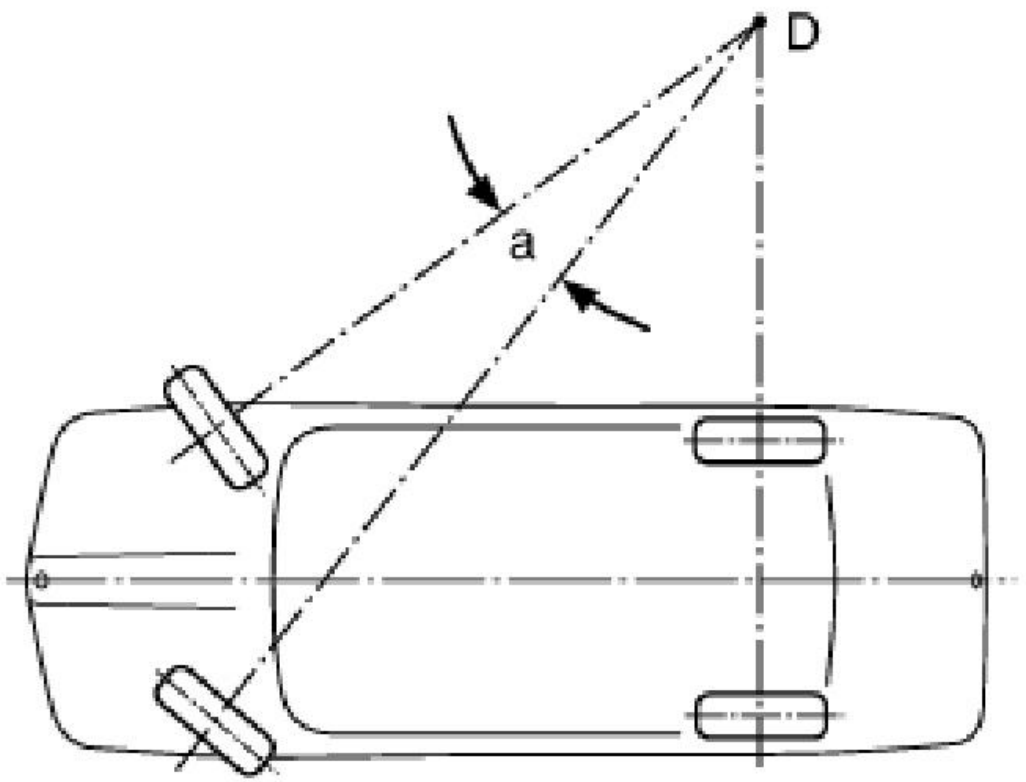


Fig. 18: Identifying Toe-Differential Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.2 Camber

- The camber is the angle of inclination of the wheel in relation to the vertical.

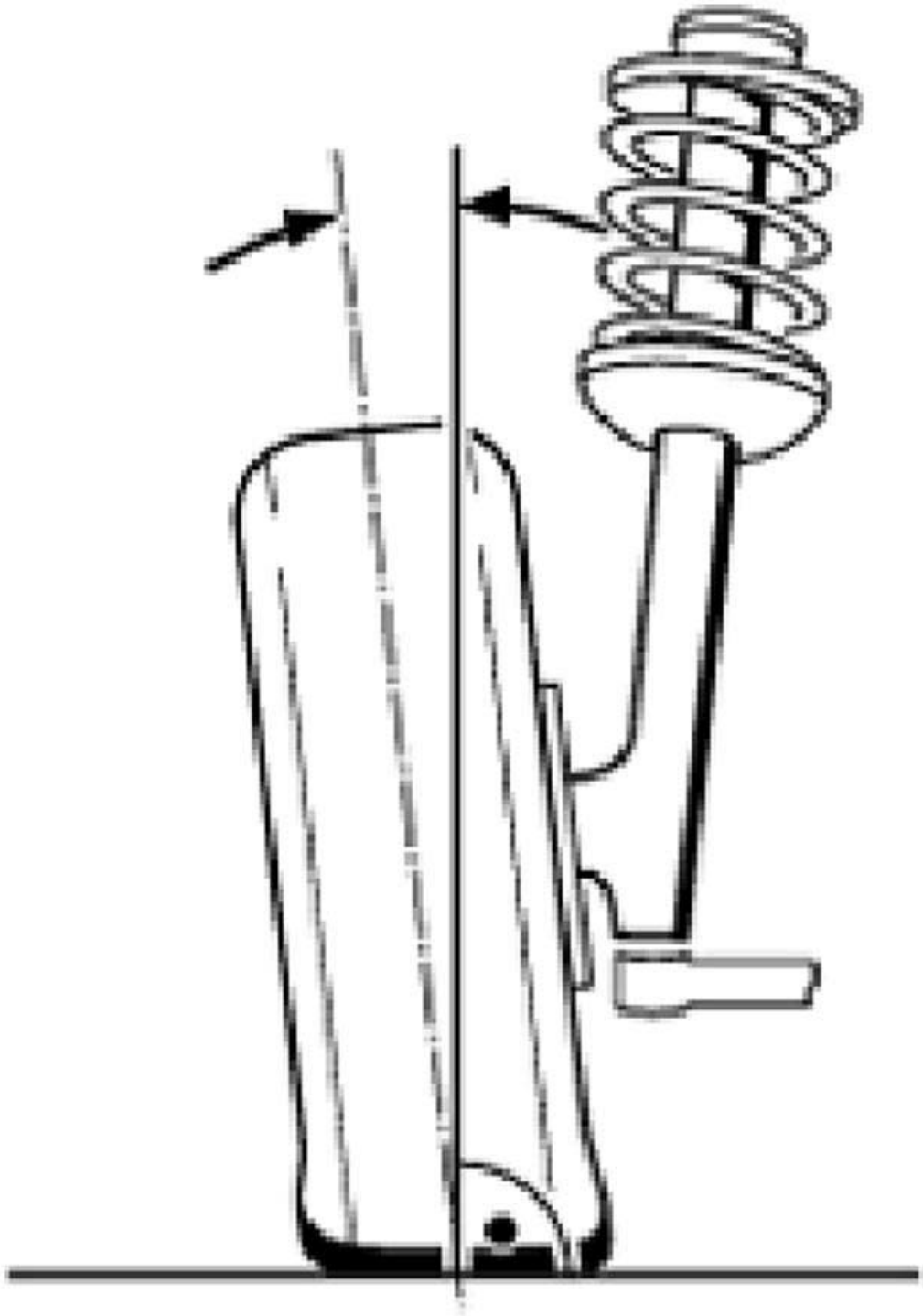


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Fig. 19: Identifying Camber Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.3 Toe-In

- The toe-in is the reduction in the distance between the front of the wheels and the rear. The toe-in prevents the wheels from moving apart whilst driving (wobbling and grinding).

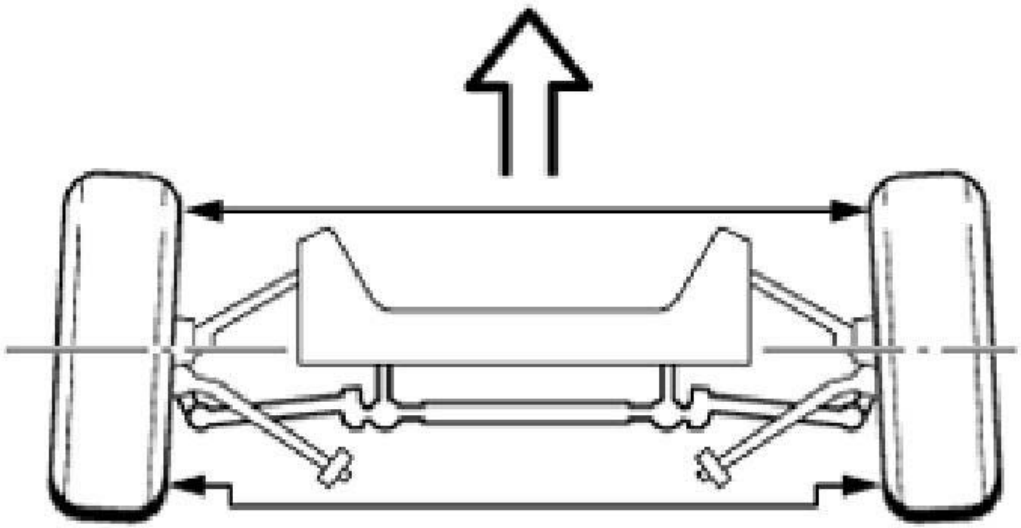

Fig. 20: Identifying Toe-In Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.4 Caster

- The castor is the kingpin angle seen from the side in the opposite direction of travel. The line through the centre of the spring strut mount and control arm ball joint corresponds to the kingpin.

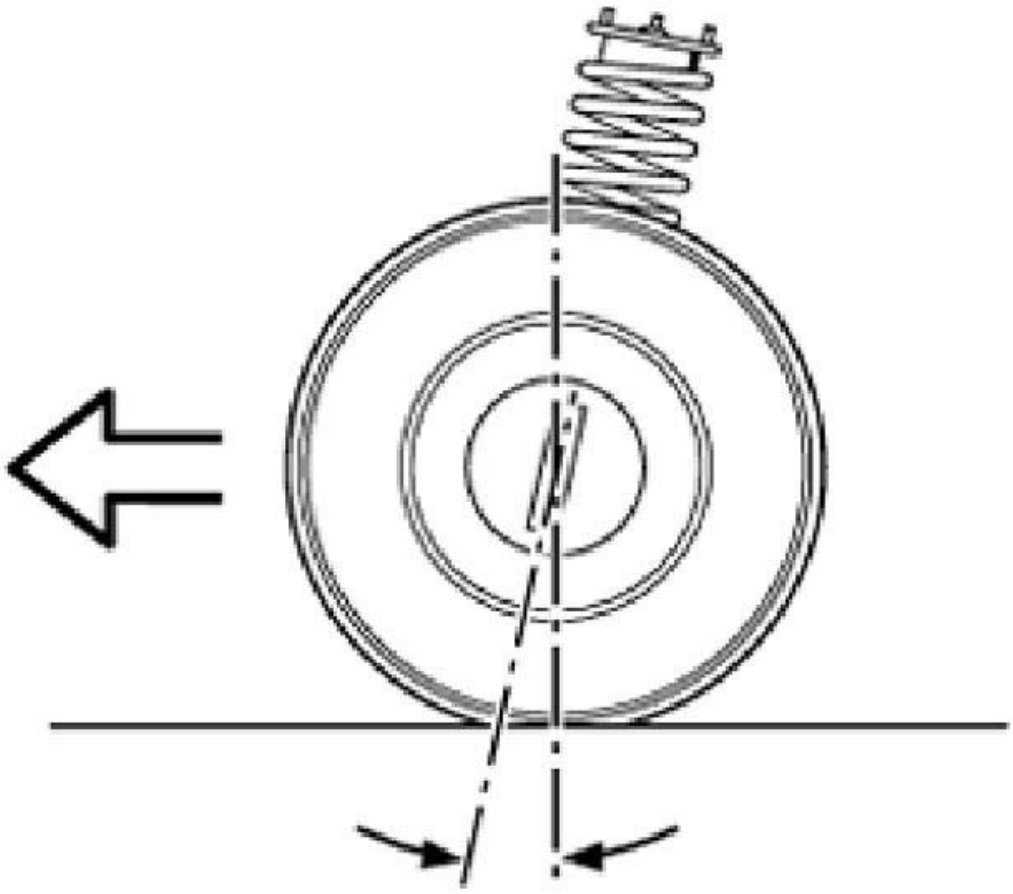

Fig. 21: Identifying Castor Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.5 Geometrical Drive Axis/Symmetrical Axis

- (1) The geometrical drive axis is the line bisecting the angle of the overall rear wheel toe. The measurements of the front wheels relate to this axis.
- (2) The symmetrical axis represents the centre line through the front and rear axes.

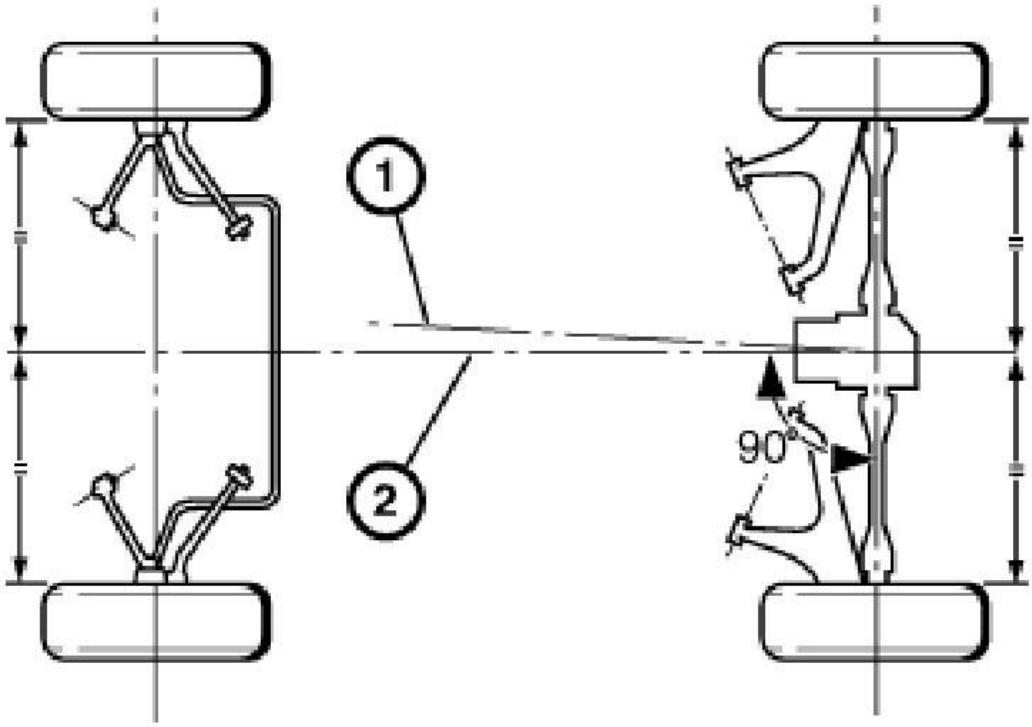

Fig. 22: Identifying Geometrical Drive Axis Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.6 Wheel Displacement Angle

- The wheel displacement angle is the angular deviation of the connecting line of the wheel contact points in relation to a line running at 90° to the geometrical drive axis. The wheel displacement angle is positive if the right-hand wheel is displaced to the front, and is negative if it is displaced to the rear.

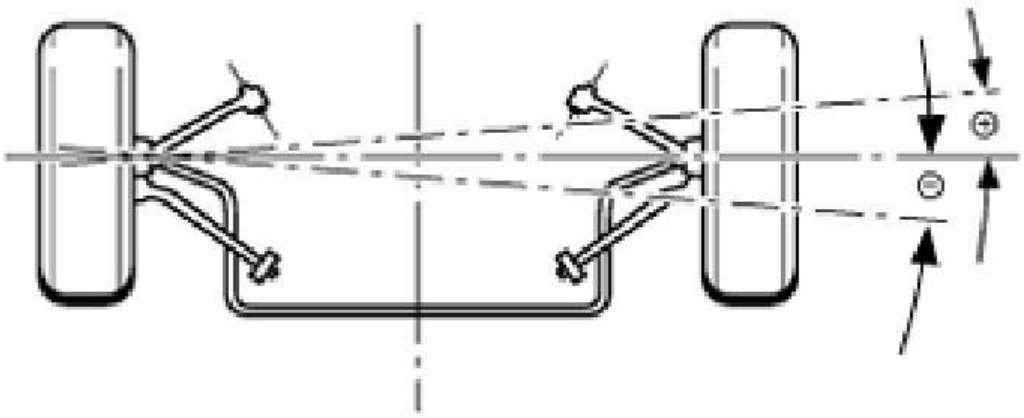

Fig. 23: Identifying Wheel Displacement Angle
Courtesy of BMW OF NORTH AMERICA, INC.

5.7 Kingpin Offset

- The kingpin offset is the distance from the centre of the wheel contact point to the contact point of the kingpin extrapolation.

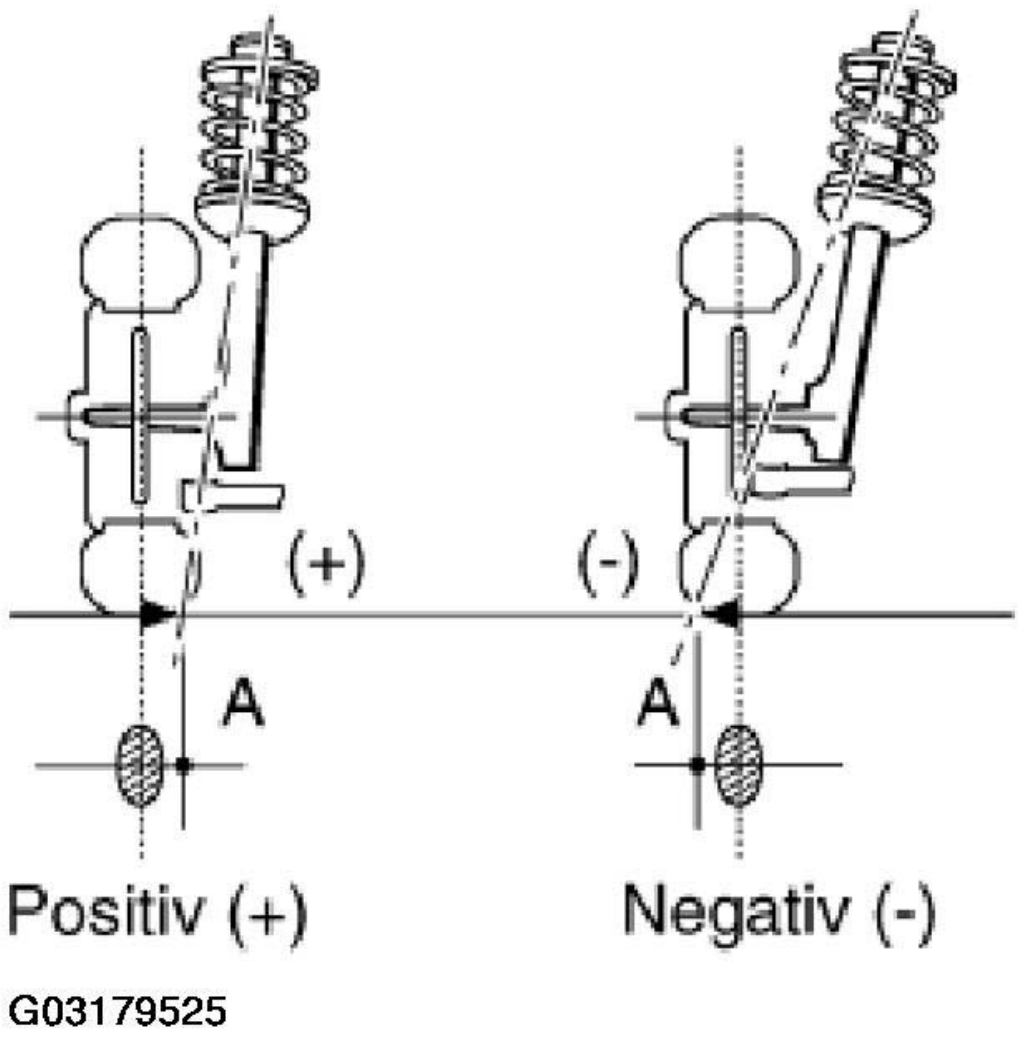

Fig. 24: Identifying Kingpin Offset Angle
Courtesy of BMW OF NORTH AMERICA, INC.

6. WHEEL SUSPENSION

Those parts which connect the wheel to the mostly load-bearing floor elements of the bodywork and guide it in the required direction belong to the wheel suspension. They are connected by axles or other comparable structures and guided by the arms. The wheel suspension plays a decisive role in the handling characteristics of a vehicle. Two main groups have to be distinguished: 1. Rigid axle suspension and 2. Independent wheel suspension.

6.1 Rigid Axle Suspension

RIGID AXLE SUSPENSION SPECIFICATIONS

Description	Advantages	Disadvantages
The rigid axle suspension has a rigid connection between both wheels or wheel pairs. Any change in one wheel is more or less transferred to the other. It is now only fitted as a rear axle, if at all. However it is frequently used for lorries or busses.	In the event of deflection taking place, there are no changes to the camber or wheel toe. This means: less tyre wear and good track stability.	Non-driven rear axles may also acquire negative camber as well as increasing tyre lateral guidance, thus increasing tyre wear.

6.2 Independent Wheel Suspension

INDEPENDENT WHEEL SUSPENSION DESCRIPTION

Description	Advantages	Disadvantages
State-of-the-art individual wheel suspension is available on BMW vehicles on the front and rear axles. This development has its cause in mass inertia, as a reduction in the non-suspended mass improves wheel and ground contact, and the wheel stays better on the road. Control arms and trailing arms, which have to absorb high longitudinal and lateral forces to some extent, are required for guiding independently suspended wheels.	Wheels suspended independently from each other have no mutual influence on each other.	Depending on the type, changes may occur in the camber, wheel toe, track width, castor and wheelbase.

7. WHEEL ALIGNMENT PROCEDURE

7.1 Measuring Options

An overview of all measuring options and values (VA = front axle, HA = rear axle) is shown below.

MEASURING OPTIONS SPECIFICATIONS

Measuring options	Measuring accuracy	In measuring range	Total measuring range
Total wheel toe (VA + HA)	+/- 2'	+/-2°	+/-18°
Single wheel toe (VA + HA)	+/-2'	+/-2°	+/-9°
Camber (VA + HA)	+/-1'	+/-3°	+/-10°
Wheel displacement (VA)	+/-2'	+/-2°	+/-9°
Geometrical drive axis	+/-2'	+/-2°	+/-9°

Castor	+/-4'	+/-18°	+/-22°
Kingpin inclination	+/-4'	+/-18°	+/-22°
Toe-differential angle	+/-4'	+/-20°	+/-20°
Maximum steering angle (VA)	+/-4'	+/-60°	+/-300°
Maximum steering angle (HA)	+/-4'	+/-9°	+/-9°
Castor correction range	+/-4'	+/-7°	+/-10°

NOTE: The measuring accuracy details only apply when using the precision rotating and sliding plates as well as the BMW quick-acting clamps.

7.2 Preparatory Work

Before commencing the measurement, preparatory work must be carried out at the measuring area and on the vehicle (see BMW KDS operating instructions). Preparatory work includes:

- Easy-running rotating and sliding plates
- Aligning the rotating and sliding plates in relation to the track width and wheelbase
- Centering the vehicle on the plates
- Applying the parking brake
- Removing the lock pins on the plates to prevent tension in the chassis under loading
- Checking the rim and tyre size, tread depth, tyre pressure, steering wheel play, wheel bearings and condition of suspension and shock absorbers
- Fastening the measuring equipment to the wheels
- Loading the vehicle according to BMW KDS specifications
- Rock the vehicle firmly with the brakes released to ensure a stable centre position
- Lock the service brake using the brake clamping device

7.3 Initial/Final Measurement

This measurement can be carried out as a program-guided measurement in the same way as any subsequent adjusting work and the final measurement. The sequence of the chassis measuring points to be called up is specified and controlled by the system software. The individual steps comprise:

- Driving straight ahead to correctly record the wheel toe and camber values for the rear axle
- Steering routine for recording the castor, kingpin inclination and toe-differential angle
- Recording the wheel toe and camber of the front axle (adjust the steering centre point in advance)
- Steering routine for measuring the maximum steering angle on the left/right
- Checking the overview of measured values with the setpoint and actual comparison of all measured values

7.4 Printing Out The Data

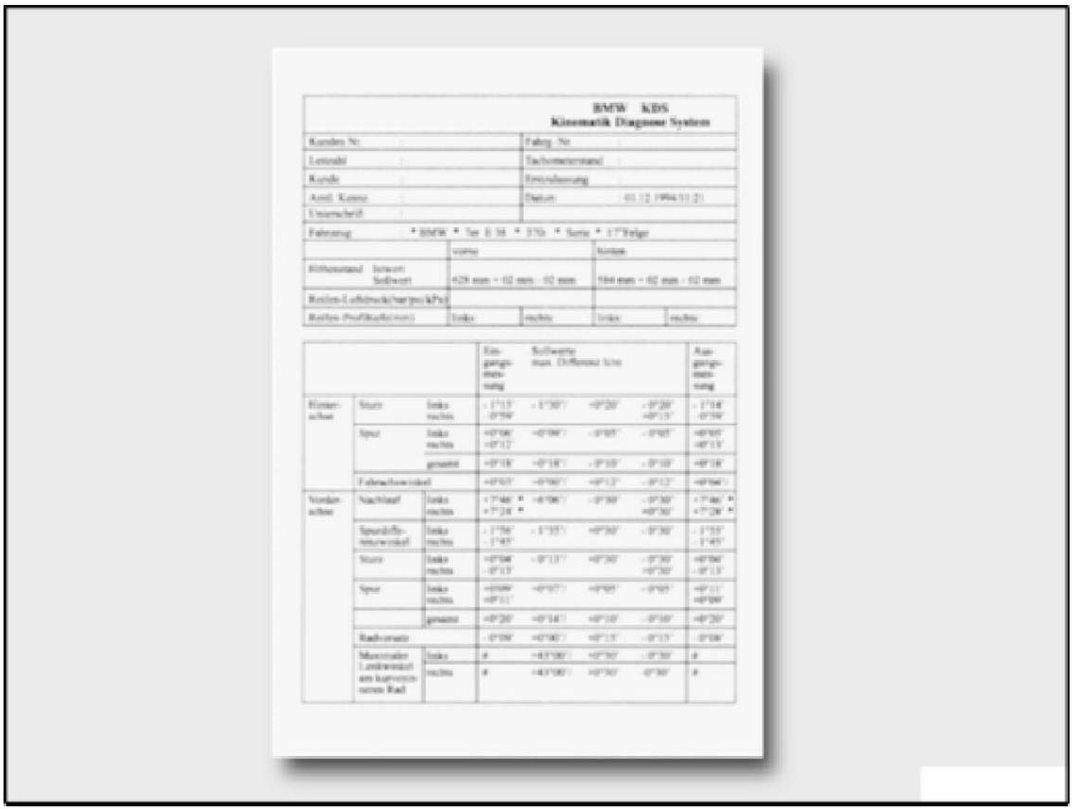

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Fig. 25: Specification Data
Courtesy of BMW OF NORTH AMERICA, INC.

The report printout from the integrated DIN A4 printer is subdivided into three sections:

- Header lines with customer and vehicle identification data --> the customer data entered before beginning the measurement as well as vehicle data are printed out here.
- Centre section with vehicle data -> this includes the make, type, model and vehicle model year defined when the setpoint data record was selected. The values previously measured for height level, tyre pressure and tread depth are also printed in this section.
- The end section with all vehicle alignment values comprises the 3 columns initial measurement, setpoint values and output measurement. The measured values are recorded separately in these three columns.

8. SPECIAL FEATURES

8.1 Free Wheel Alignment

With free wheel alignment the selection and sequence of the measuring points is freely selectable. The following points must be observed for attaining the correct measurement results:

- Carry out all work in the same way as with the program-guided measurement.
- Before measuring the wheel toe and camber values for the rear axle, the steering must be in the "straight ahead" position to ensure that it is perfectly aligned in relation to the longitudinal centre plane of the vehicle.
- Before measuring the single wheel toe values on the front axle, the centre of steering must be established to ensure the correct position of the steering wheel.

8.2 System Settings

The following settings must only be entered or set once: language, display format, date/time, advertising text, remote control with display, rotating plate selection and printer settings. They remain stored.

9. BMW KINEMATIC DIAGNOSIS SYSTEM COMPARISON (BOSCH - BEISSBARTH)

BMW KINEMATIC DIAGNOSIS SYSTEM SPECIFICATIONS

Bosch		Beissbarth
Measured value recording	Infrared	CCD camera
Data transmission	Cable	Infrared / cable
Measuring sensor power supply	Cable	Battery/ cable
Remote control	Infrared	Infrared
Remote control with measured value display	Cable	Infrared
Setpoint data memory	Floppy disk	Hard disk
Measured value memory	Always the last vehicle measured	Unlimited vehicle memory
Operating system	--	MS-DOS
Languages	English and one language on request	EN, DE, NI, SV, IT, FR, SP (further languages can be called up)
Update	3.5" floppy disk	3.5" floppy disk using TIS/DIS
Monitor	20"	17"
Computer	--	Pentium
Disk drives	2 x floppy disk	1 x floppy, 1 x CD ROM

10. CONTROL MODIFICATION (MENU)

10.1 Remote Control With Display

The following steps show how the remote control with display is activated:

1. Call up the "Service" menu in special functions ("S" key)
2. Call up the "Remote control" sub-menu in the "Service" menu.
3. Select the "Remote control with display" item in the "Remote control" sub-menu - this configuration is retained.

IMPORTANT: In the case of equipment without remote control, this must be configured to "No remote control".

10.2 Brief Operating Instructions

1. Activate the remote control with the "ON" button (it may also be switched on during alignment). The title page will appear on the LCD.
2. Select "Straight ahead" of the "Initial measurement", "Adjustment work" or "Final measurement" at the measuring equipment cabinet. The steering graphics for "Straight ahead" will appear on the LCD.
3. Use the "Forward arrow" to change to the next measurement image. Display blocks will appear on the LCD with the designation of the measured value and tolerance bar with the measured value. If the measured value is within the tolerance range, it is shown in dark figures against a light background. If the measured value is outside the tolerance range, it will be shown in inverse video (light figures against a dark background).
4. By pressing the "F" key shortly, you can move alternately between the designation of the measured value and the setpoint value with the tolerance inside the display blocks.
5. You can scroll through the measured values using the "Forward arrow", "Backward arrow" and "Cancel" (red dot) keys. The function of these keys is identical to that of the keys on the graphics panel.
6. Even with "Free alignment", it is possible to scroll through the measured values in the same way as with "Program-guided alignment".
7. During measurement, the report print-out can be initiated using the "Printer" key. The remote control keys are only active during measurement and adjustment (not during customer data input, vehicle selection etc.).

10.3 Display Support

- Measured values with a setpoint/actual comparison and tolerance bar (setpoint figures can be displayed with the "F" key).
- Steering graphics for steering routines.
- Overview of measured values with current setpoint/actual comparison
- Rim run-out compensation.
- With all other functions (e.g. customer input), the title illustration appears on the LCD display.

If the data transmission from the remote control to the computer is interrupted, the remote control icon in the bottom right-hand corner of the screen changes colour from green to red and the illustration on the LCD display is shown inversely - black turns to white, white to black. This change does not take place in the title illustration. Once the line-of-sight connection has been re-established, the remote control continues to operate from the point of interruption in the program. A continuous visual connection during alignment is therefore not necessary.

- The "Hour glass" icon in the LCD display means: "Please wait".
- The "Battery" icon in the top right-hand corner of the LCD display means that the battery reserve has been reached.
- To switch off the remote control: press the "F" key for 5 seconds, then return it to its charging unit or

connect it to a charge cable. The title illustration will again appear as a charging check.

- If, during the measurement, the remote control has been placed back in the charging unit, it must be switched on again using the "ON" button.

11. UPDATING THE SOFTWARE/SETPOINT DATA

Floppy disks will no longer be sent to BMW partners who have acquired a "BMW KDS (Beissbarth/Bosch)". For cost-related reasons, you can create these disks yourself on the "DIS-tester" or on the "TIS/EPC server". The data for this is regularly updated on the TIS CD.

11.1 Requirements

- BMW KDS (Beissbarth/Bosch)
- TIS CD program status (Beissbarth): from CD 12/95
- EPC program status: from 12/95
- TIS CD program status (Bosch): from CD 08/97
- DIS program status: from V6.0
- 3.5" diskettes, 1.44 MB (Beissbarth 5 diskettes/Bosch 1 diskette)

11.2 Procedure (Beissbarth)

1. Go to the "Administration" screen
2. Select the KDS button
3. Select Beissbarth
4. Insert "Diskette 1" on request and confirm with "OK" (program diskette 1 of 2 is created, label it)
5. Insert "Diskette 2" on request and confirm with "OK" (program diskette 2 of 2 is created, label it)
6. Insert "Diskette 3" on request and confirm with "OK" (setpoint data diskette 1 of 3 is created, label it)
7. Insert "Diskette 4" on request and confirm with "OK" (setpoint data diskette 2 of 3 is created, label it)
8. Insert "Diskette 5" on request and confirm with "OK" (setpoint data diskette 3 of 3 is created, label it)
9. Perform update and/or setpoint data on the KDS in the usual manner with the diskettes which have just been created.

11.3 Procedure (Bosch)

1. Go to the "Administration" screen
2. Select the KDS button
3. Select Bosch
4. Label "Diskette 3.1", insert it into the drive on request and confirm with "OK" (2x) --> Setpoint data is copied to the diskettes.
5. Insert setpoint data diskette 3.1 into the 3.1 floppy disk drive, insert operating system diskette 3.0 into the 3.0 drive.
6. Switch on the machine in the usual manner.

IMPORTANT: When creating the KDS diskettes, all data on the diskettes used is overwritten.

NOTE: In the event of an error, a corresponding message is shown and the program is cancelled completely. The procedure must be run from the beginning again and all data on the diskette will be deleted. A new diskette may have to be used.

12. CREATING, COPYING AND EDITING SETPOINT DATA

12.1 Copying

- Press the **"C"** button and select the vehicle to be copied.
- Select the **"Edit setpoint data"** menu item from the special functions. Create a new vehicle in the usual manner. The setpoint values for the last vehicle selected will appear in the data input screen. Enter the data and save the data record.

12.2 Creating

- Press the **"C"** button and select the **"Edit setpoint data"** menu item from the special functions. Create a new vehicle in the usual manner. An empty data input screen will appear. Enter the data and save the data record.

12.3 Editing

- Factory-programmed setpoint data can neither be deleted nor modified. If this data does need to be modified, a new vehicle with modified setpoint data must be created. New vehicles created by the user are identified by a "+" in the selection menu. These vehicles can be deleted by the user using the "-" key or modified using the "< >" key. These keys only appear if vehicles have been entered by the user.

13. SPECIAL FUNCTIONS

13.1 Customer-Specific Printer Report Header

The sub-item **"Customer-specific text"** must be called up in the **"Special functions"** menu. An input screen will appear on the monitor. This input screen must be filled out with the name and address and stored with the **"S"** screen key. The text entered is inserted into the report header.

13.2 Adjusting Options

- Call up the **"Service"** menu in the special functions (**"S"** key).
- Select the **"Wheel toe adjustment"** item or the **"Camber adjustment"** item from the **"Adjustment"** sub-menu. The toe and camber adjustment program will guide the user step by step through the adjustment using text and images. The measuring deviation for each measuring sensor will be shown on the screen when the adjustment has been completed.
- You can store the adjustment values in the measuring sensor using the **"Store"** key or you can quit the program with the **"Red dot key"** without saving them (check). The adjustment values can be printed out.

13.3 Rotating Plate Test

- Call up the **"Service"** menu in the special functions (**"S"** key).
- Call up the **"Rotating plate"** item in the **"Service"** menu. Turn the left-hand and right-hand rotating plate and check the display on the screen. Important: The measuring range is +/- 306 degrees.

13.4 Viewing And Deleting Customer Entries From Database

- Call up the menu item **"Delete"** in the **"Database"** menu in the special functions. The data input screen will appear. Fill in the search fields with the data to be deleted.
- Use the "-" button to delete this data record. A new data record can then be highlighted and deleted with the digital pen.
- You can scroll through the entire database with the **"Arrow up"** and **"Arrow down"** keys.

14. MODIFICATIONS WITHIN PROGRAM

Further modifications were carried out within the program which only slightly change the program sequence but which optimise the alignment in respect of comfort and speed. This is described below:

- Optimisation of the rim run-out compensation in respect of speed.
- Optimisation of the steering routines: Highlighted values within the gate can still be corrected. The message **"Rotating plates not connected"** no longer causes the steering routine to be cancelled. Further measurements can be carried out after the rotating plates have been connected.
- Standardisation of screen colours with the colours on the tablet.
- Addition of texts in several foreign languages.
- Elimination of program-related and cosmetic faults.
- Electronic water level.
- Omission of kingpin inclination measurement.

15. FAULTS

15.1 Tyre Faults

TYRE FAULTS SPECIFICATIONS

Fault	Effect
1) Wheel toe, camber, toe-differential angle and castor not correct	1) Severe tyre squeaking even at relatively low speeds
2) Excessive toe-in and excessive positive camber	2) Tyres are worn down on one outside edge in the longitudinal direction
3) Excessive negative camber	3) Tyre wear on inside edge
4) Worn front-axle suspension on front-wheel-drive vehicles	4) Increased noise / Vehicle pulls on one side when accelerating
5) Incorrect wheel alignment	5) Wheels scrubbing / Tyre surface shows feathering in the tread

6) Play in the suspension due to mechanical parts (suspension, steering)	6) Washout / Wobbling of front wheels
7) Tyre pressure too low	7) Outside tyre surface wear

15.2 Front Axle Faults

FRONT AXLE FAULTS SPECIFICATIONS

Fault	Cause	Remedy
1. Toe deviation	a. Vehicle not in normal position b. Tie rod(s) bent c. Tie rod ball joints worn d. Rubber mount in control arm defective	a. Correct height level b. Replace tie rod(s) c. Replace tie rod(s) d. Replace control arm
2. Camber deviation: The camber is fixed during the design stage and cannot be adjusted.	a. Rubber mount in control arm defective b. Control arm deformed c. Spring strut deformed d. Traction strut worn e. Spring deflection too great f. Front axle carrier deformed g. Spring strut mount deformed h. Distortion in the floor assembly (engine bracket)	a. Replace control arm b. Replace control arm c. Replace spring strut d. Replace control arm e. Replace coil spring, height level f. Replace front axle carrier g. Repair forward structure h. Repair body
3. Castor deviation: The castor is fixed during the design stage and cannot be adjusted.	a. Rubber mount for tension / traction strut defective b. Tension / traction strut deformed c. Control arm deformed d. Spring strut deformed e. Wheelhouse deformed (spring strut mount) f. Distortion in the floor assembly (engine bracket)	a. Replace rubber mount b. Replace tension / traction strut c. Replace control arm d. Replace spring strut e. Repair forward structure f. Repair body
4. Toe-differential angle deviation	Requirement: camber and castor are correct a. Tie rods unevenly adjusted	a. Set wheel toe on left and right to identical values
5. Wheel displacement deviation	Requirement: Front wheels have same single toe in relation to the	a. Replace front axle carrier

	geometrical axis a. Front axle carrier deformed b. Engine bracket deformed c. Control arm deformed d. Tension / traction strut deformed	b. Repair body c. Replace control arm d. Replace tension / traction strut

15.3 Rear Axle Faults

REAR AXLE FAULTS SPECIFICATIONS

Fault	Cause	Remedy
1. Camber deviation	a. Vehicle not in normal position: spring deflection too great b. Rubber mount on rear axle c. Rear axle carrier deformed d. Control arm deformed e. Traction strut deformed f. Distortion in the floor assembly g. Swinging arm deformed	a. Correct height level b. Replace rubber mount c. Check rear axle carrier and replace, if necessary d. Check control arm and replace, if necessary e. Check traction strut and replace, if necessary f. Repair body g. Replace swinging arm
2. Rear wheel position is not correct	a. Rear axle carrier has been shifted laterally b. Distortion in the floor assembly	a. Check the rubber mounts on the rear axle carrier and replace, if necessary b. Repair body
3. Toe deviation	a. Vehicle not in normal position, i.e. spring deflection too great b. Rubber mount in rear axle carrier defective c. Control arm deformed d. Rubber mount and swinging arm defective e. Rear axle carrier deformed f. Traction strut deformed	a. Correct height level b. Replace rubber mount c. Replace control arm d. Replace swinging arm e. Check rear axle carrier and replace, if necessary f. Check traction strut and replace, if necessary
4. Deviation from the geometrical drive axis	Requirement: Total wheel toe is correct a. Distortion in the floor assembly	a. Repair body

Further details on the "Kinematic Diagnosis System" can be found in the operating instructions for the BMW KDS (Beissbarth/Bosch).

Functional and system descriptions are not subject to change. Parts availability and immediate ordering availability cannot be derived from this information. The specialist departments will be providing further details at the relevant time.

RUNFLAT INDICATOR

All models

Fig. 26: Identifying Runflat Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

INTRODUCTION

The Run Flat Indicator (RPA) monitors the tyre pressure throughout the journey.

The entire vehicle weight is carried by the air pressure in the tyres. If the pressure in one of the tyres should drop, the tyre will gradually "cave in". The resulting flexing means that the defective tyre will quickly receive additional damage. The tyre could burst.

Some 80 % of all flat tyres are caused by small holes (e.g. caused by nails). The holes result in a gradual loss of pressure in the affected tyre. Many "tyre blowouts" can be traced back to preliminary damage caused by a gradual loss of pressure.

A gradual loss of pressure in one tyre may remain unnoticed for a long time. The lack of pressure only makes itself clearly felt when driving when the tyre is almost completely empty.

As tyre pressure drops, the radius of the wheel and with it the tyre's rolling circumference will also decrease. The upshot is that the wheel speed of the affected tyre is increased.

The RPA records the wheel speeds using the wheel-speed sensors of the Dynamic Stability Control (DSC). The RPA compares the speeds of the individual wheels and computes an average speed. In this way the RPA is able to detect a loss of tyre pressure.

The RPA detects a drop in pressure below about 30 % +/- 10 % of the initial value. The RPA indicator and warning light indicates a drop in tyre pressure. The RPA will indicate this after just a short distance, as a rule after a few minutes, from a certain minimum speed (e.g. 25 km/h) up to the permissible top speed.

IMPORTANT: Responsibility resides with the driver at all times.

Check tyre pressures regularly, at least twice a month and before embarking on lengthy journeys.

During initialisation, the set tyre pressure is taken as the initial value for the current set of tyres.

If all 4 tyres lose pressure at the same rate, the wheel speeds will also change at the same rate. The RPA is unable to detect a uniform drop in pressure in all tyres (e.g. due to diffusion = natural loss of air from all 4 tyres)

IMPORTANT: Correct function of the Run Flat Indicator is not guaranteed when the emergency wheel is fitted.

As the emergency wheel has a much smaller diameter, the correct operation of the RPA can no longer be guaranteed.

BRIEF DESCRIPTION OF COMPONENTS

The SMG system comprises the following key components:

4 Wheel Speed Sensors The wheel-speed sensors of the Dynamic Stability Control (DSC) measure the wheel speeds of the individual wheels.

RPA button (E46, E53, E83, E85) The RPA button is only needed for initializing the PRA.

(RPA initialisation means "teaching the system the tyre pressures".

CID: Central Information Display Vehicles that are equipped with CID are initialized using the CID.

On-board computer button and rocker switch on turn-signal/main-beam switch (E87, E90, E91) Initialisation is performed on the LCD display, using the BC button and the rocker switch on the turn-signal/main-beam switch. The on-board computer functions are selected with the rocker switch.

The RPA software is in the following control units, depending on model series:

- **RPA Control Unit** (E46 all-wheel drive)

  The E46 All-wheel drive has a separate RPA control unit.

  The 4 wheel-speed sensors measure the wheel speeds. The DSC control unit sends the signals through 4 direct wires to the RPA control unit.

Alternatively

- **DSC control unit with additional software for Run Flat Indicator** (E46, E53, E60, E61, E63, E64, E83, E85, E87, E90, E91)

  With DSC Mk60 and DSC 8, the RPA is integrated into the DSC control unit through additional software.

Alternatively

- **CIM: Chassis integration module** (E65, E66)

  The CIM controls:

  - Servotronic
  - Steering column adjustment
  - Run Flat Indicator (RPA)

The following control units are involved in the functions of the Run Flat Indicator:

- **CAS: Car Access System** E60, E61, E63, E64, E65, E66, E87, E90, E91

  The CAS control unit provides input signals relating to terminal status (e.g. terminal 15 ON).

- **GM: Basic Module** E46, E53, E83, E85

  The general module provides input signals relating to terminal status (e.g. terminal 15 ON).

- **JBE: Junction Box Electronics** E87, E90, E91

  The JBE is the data interface (= gateway) between the K-CAN and the PT-CAN. (K-CAN stands for "Body Controller Area Network"; PT-CAN stands for "Powertrain Controller Area Network") The junction box consists of the junction-box electronics and the electrical distribution centre.

- **KGM: Body-Gateway Module** E60, E61, E63, E64 from 09/2005

  The body-gateway module replaces the safety and gateway module (SGM). The KGM forms the data interface (= gateway) between the K-CAN and the PT-CAN.

- **M-ASK/CCC: Multi-Audio System Controller/Car Communication Computer** The M-ASK/CCC will emits an acoustic warning through the loudspeakers if tyre pressure drops. (On vehicles without M-ASK or CCC, the instrument cluster will emit the warning.)

- **SGM: Safety and gateway module** E60, E61, E63, E64 up to 09/2005 E65, E66 from 03/2004

  The SGM is the data interface (= gateway) between the K-CAN, byteflight and the PT-CAN.

- **SZL: Steering Column Switch Cluster** E87, E90, E91

  The signals from the on-board computer button and from the rocker switch are recorded and processed in the SZL. The data are transmitted to the instrument cluster through a direct wire (on-board computer).

- **ZGM: Central Gateway Module** E65, E66 until 03/2004

  The ZGM forms the data interface (= gateway) between the K-CAN and the PT-CAN.

- **KOMBI and CID:Instrument Cluster and Central Information Display** A fault in the RPA or drop in tyre pressure will be indicated by the RPA indicator and warning light in instrument cluster. At the same time, the symbol will light up in the LC display.

  Faults registered by the RPA are indicated as follows by the RPA indicator and warning light (for variations, please refer to national version):
  - The RPA indicator and warning light lights up:
    - **Red (with acoustic signal):** Drop in tyre pressure more than approx. 30 % +/- 10 %. Driving safety is no longer guaranteed.
    - **Yellow:** RPA failed

Information about the Check-Control message can be called up in the CID (CID is fitted depending on the vehicle's equipment).

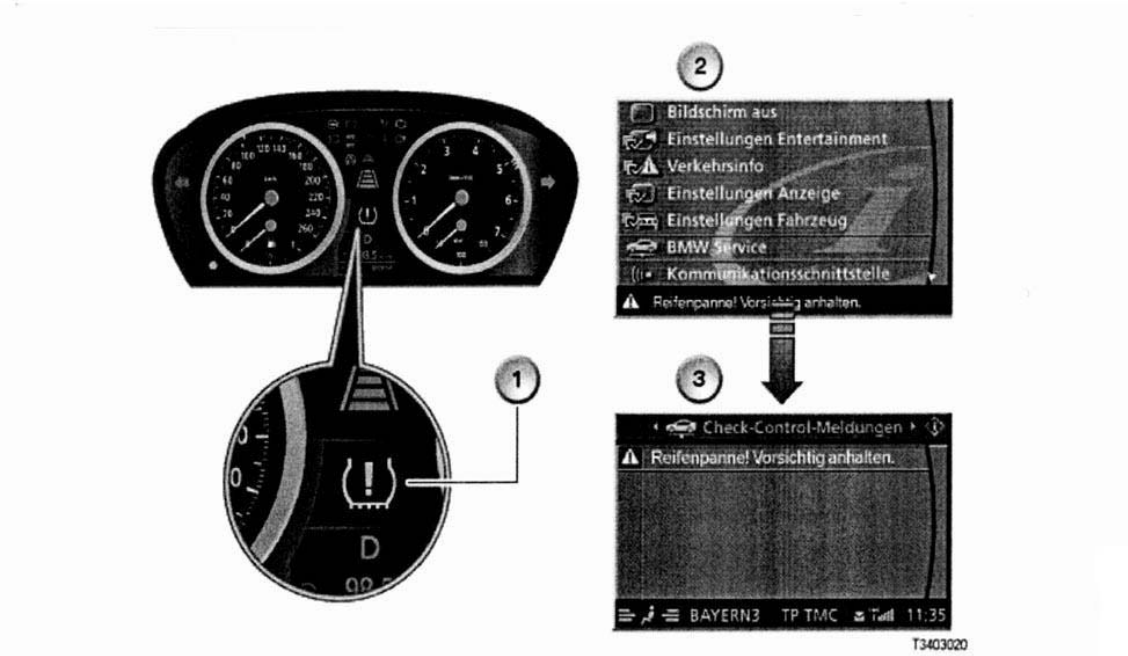
RPA Indicator And Warning Lights And Central Information Display

Installation Location

The Run Flat Indicator (RPA) has the following displays in the instrument cluster:

- RPA Indicator And Warning Light
- Symbol In LC Display

Fig. 27: Identifying Runflat Indicator (E83 Shown)
Courtesy of BMW OF NORTH AMERICA, INC.



Item	Description	Item	Description
1	Symbol for check control message (yellow or red) on E60	2	"BMW Service" menu in the Central Information Display (CID)
3	Check control message in the Central Information Display (CID)		

G00313240

Fig. 28: Identifying RPA Warning In Central Information Display
Courtesy of BMW OF NORTH AMERICA, INC.

How It Works RPA fault is displayed as follows:

- Via the RPA indicator and warning light The RPA indicator and warning light lights up:
  - **Red (with acoustic signal):** Drop in tyre pressure more than approx. 30 % +/- 10 %. Driving safety is no longer guaranteed.
  - **Yellow:** The RPA has developed a fault.
- Indicator or symbol in LC display (yellow or red).
- Check control message in Central Information Display (CID) with additional information text.

If the RPA should fail, the following Check-Control messages are possible (for example):

RPA FAILURE MESSAGES & EXPLANATIONS

Check Control Message In CID Status Bar	Further Information
Flat tyre!	Flat tyre Stop the vehicle carefully.

	Please refer to the Owner's Handbook for how to change a wheel. Tyres with emergency-running characteristics (RSC): The journey can be continued for a limited distance at speeds up to max. 80 km/h, please refer to the Owner's Handbook. Have the tyres checked by the nearest BMW Service
Run Flat Indicator failure!	Run Flat Indicator Run Flat Indicator failed Flat tyres cannot be detected. Have the problem checked by BMW Service as soon as possible.

SYSTEM FUNCTIONS

The Run Flat Indicator (RPA) comprises the following functions:

- Self-test
- Initialisation
- Detects drop in tyre pressure
- Visual and acoustic warning

Self-Test

The RPA performs a self-test when terminal 15 is switched ON. A fault in the RPA is indicated by the RPA indicator and warning light and by a symbol in the LCD display.

Initialisation

Initialisation is started manually (e.g. by pressing the RPA button). Then (after the journey has started), initialisation will run as a fully automatic calibration sequence. In other words, the circumference of individual tyres are recorded and evaluated.

To allow a drop in tyre pressure to be detected, the system considers different speed ranges and driving situations. Taking account of the driving situation means that the system has to be primed for each speed range individually.

From 09/2004 (starting with E87), these speed ranges and driving situations have been combined into 3 calibration ranges. This means greater clarity for output via the BMW diagnosis systems Group Tester One (GT1) and DISplus.

The initialisation phase lasts approx. 5 to 15 minutes for the individual speed ranges. The end of the initialisation phase is not indicated.

Detects Drop In Tyre Pressure

The RPA records the wheel speeds using the wheel-speed sensors from the DSC. The RPA compares the speeds of the individual wheels and computes an average speed. In this way the RPA is able to detect a loss of tyre pressure. (In the event of a tyre losing pressure, the tyre rolling circumference of the affected tyre is also reduced.)

Visual And Acoustic Warning

A drop in pressure in one tyre of approx. 30 % +/- 10 % from the initial value is indicated by the RPA indicator and warning light. In addition, an acoustic signal sounds.

Signal output: Depending on the model concerned, either via the instrument cluster or the multi-audio system controller (M-ASK)/Car Communication Computer (CCC).

NOTE: ***DSC malfunction***
The sensors used by the RPA are all monitored by the DSC. If DSC detect a fault, the RPA will also register a malfunction.

SPECIAL CONDITIONS FOR SYSTEM FUNCTION

The following operating conditions may cause a delay in the warning being given in the event of a drop in tyre pressure:

- Heavy braking
- Rapid acceleration
- High rate of lateral acceleration
- Cornering (in a tight corner)
- Vehicle speed dropping below a minimum speed (the RPA only responds when a certain minimum speed has been reached)
- Large difference in slip (between axles or between wheel on one side of vehicle)
- Initialisation not being completed in current speed range (see "Controls")
- Winter conditions

The following operating conditions may cause a delay in the warning being given in the event of a drop in tyre pressure:

- Driving with snow chains fitted

  Driving with snow chains may impair the correct function of the RPA.

  The system will work as normal again after the snow chains have been removed and the vehicle is driven for a few minutes. (Repeat initialisation not necessary.)

NOTE: **Do not perform initialisation when snow chains are fitted.**

Initialisation and snow chains will cause incorrect adaptation values.

- Trailer towing

  Initialisation should be performed when a trailer with a weight greater than approx. 300 kg is being towed.

  Repeat the initialisation process after detaching or unloading the trailer.

- Old/new tyres

  NOTE: Only fit tyres with the same tread depth!

  Avoid fitting tyres with greatly different tread depth (from approx. 2 millimetres) on one axle. The different diameters mean that the correct operation of the RPA is no longer guaranteed.

In the following cases, the system will **not emit a warning despite a drop in tyre pressure being detected** :

- The same amount of pressure is lost in 2 or more tyres.
- Drops in tyre pressures caused by diffusion and affecting all 4 tyres equally
- If a tyre is damaged with a sudden loss of all pressure (tyre blowout, warning is given too late)

OPERATION

The Run Flat Indicator (RPA) is initialized using the following control elements:

- RPA button
- On-board computer button on turn-signal/main-beam switch
- With iDrive in the Central Information Display (CID) with the controller

IMPORTANT: Always perform initialisation immediately after correcting the tyre pressure, especially if a tyre is changed or the wheels are interchanged. Only check tyre pressures when the tyres are cold.

Set the tyres to the correct pressure before performing initialisation. During initialisation, the set tyre pressure is taken as the initial value for the current set of wheels.

Correct the tyre pressures when the tyres are cold to prevent the data recorded from being affected by temperature.

IMPORTANT: Responsibility resides with the driver at all times.

Check tyre pressures regularly, at least twice a month and before embarking on lengthy journeys. During initialisation, the set tyre pressure is taken as the initial value for the current set of tyres.

Initialise the RPA in the following situations:

- If tyre pressure is changed

  (tyre pressure is corrected or reset)

- If the position of the tyres is changed (change of axles, wheels), even if the tyre pressure is not changed
- If a tyre is changed or the wheels are interchanged

  (e.g. old tyres for new tyres, summer tyres for winter tyres, etc.)

Start initialisation as follows:

- Terminal 15 ON

  (engine OFF or ON, do not pull away)

- Vehicles **with** RPA button
  - Press and hold the RPA button until the RPA indicator and warning light lights up yellow for a few seconds
- Vehicles **with** BC button (on-board computer function)
  - In the on-board computer function select "RPA" and "INIT" (LCD display) with the rocker switch on the turn-signal/main-beam switch. Press the BC button to confirm.
  - Press and hold the BC button for approx. 5 seconds, until a box with a tick appears behind the "INIT" display.
- Vehicles with Central Information Display

  Initialisation is performed via the Central Information Display (CID) and controller.

  - Select "RPA" in the "Settings" menu and confirm.
  - Select "Set" and confirm.
- Drive off

  The end of the initialisation phase is not indicated.

Preconditions For Activation

The Run Flat Indicator (RPA) is automatically activated when terminal 15 is switched ON. The RPA cannot be switched off manually.

NOTES FOR SERVICE STAFF

Service staff should note the following points:

General information:

General information for Service staff on the Run Flat Indicator The following general information on the Run Flat Indicator (RPA) is given for Service staff:

- Wheel-Speed Sensor Failure
- Read Off Status Of Initialisation Phase

Wheel-Speed Sensor Failure If no signal is received from one of the wheel-speed sensors, the RPA will switch to "inactive" mode after approx. 2 minutes. The RPA indicator and warning light lights up yellow. The fault is indicated with a check control message. A fault is recorded in the fault memory of the RPA control unit.

If the RPA is integrated into the DSC, a fault will be recorded in the DSC control unit. If the signal returns after a signal failure, the RPA will be active again after driving for approx. 30 minutes. The fault will remain stored in the fault memory.

Read off status of initialisation phase The status of the initialisation phase can be displayed in the service functions for the control unit concerned (e.g. DSC control unit).

Diagnosis:

Encoding/Programming The Run Flat Indicator

- **Encoding** At the factory, the Run Flat Indicator (RPA) software is adapted to the model series concerned (encoding data). The RPA is encoded with the encoding data. Here, different parameters specific to the various vehicle models are written into the control unit.
- **Programming** The RPA is automatically programmed with the software for the Dynamic Stability Control (DSC).

US NATIONAL VERSION

A flat tyre is indicated as follows:

- E53, E83, E85

  Yellow RPA indicator and warning light **without** acoustic signal

- E60, E61, E63, E64, E65, E66, E90, E91

  Yellow RPA indicator and warning light **with** acoustic signal

An RPA failure is indicated as follows:

- Yellow RPA indicator and warning light **without** acoustic signal

Subject to alteration due to misprints, errors and technical modifications.

TYRES WITH EMERGENCY RUNNING CHARACTERISTICS AND TYRE

PRESSURE WARNING SYSTEMS

All models

GENERAL INFORMATION

Warning Systems

BMW AG offers two different systems to warn the driver of a drop in tyre pressure.

WARNING SYSTEMS SPECIFICATIONS

System	Description	Measuring principle
RDC	Tyre pressure control	Tyre pressure/temperature
RDW	Tyre pressure warning	Comparison of wheel speeds

Emergency Running Systems

In addition to the warning systems, two emergency running systems are also employed to prevent a depressurised tyre from caving in:

Components of emergency running system with self-supporting tyres:

EMERGENCY RUNNING SYSTEM COMPONENTS (WITH SELF-SUPPORTING TYRES)

RDW (standard equipment)	Tyre pressure warning
RDC (available as option from 03/2000)	Tyre pressure control
SST	Self Supporting Tyre
EH2 disc wheel	Disc wheel with Extended Hump 2

Components of emergency running system with integrated support ring:

EMERGENCY RUNNING SYSTEM COMPONENTS (WITH INTEGRATED SUPPORT RING)

Support ring	**NOTE:** **In the future, only for heavy safety vehicles (E38/3)**
RDC (optional)	Tyre pressure control
H2 disc wheel	Standard disc wheel with Hump 2

TYRE PRESSURE CONTROL (RDC)

RDC System Description

RDC permanently monitors the tyre pressure and the temperature in the tyres, both while the vehicle is being driven and when it is stationary. Data is transmitted via data telegram by the wheel electronic units to the antennas installed in the wheel housing and on to the RDC control unit. There, the data received is compared with the stored limit values.

After correcting the air pressure with the engine off and the ignition on, press the Set button and hold (approx. 6 seconds) until the words "Set tyre pressure" appear in the instrument cluster (instrument cluster high) or the yellow LED lights up (basic instrument cluster).

If the limit values are exceeded, the driver will be warned via the instrument cluster in two stages, as follows:

RDC WARNING SYSTEM (LOSS OF TIRE PRESSURE)

Loss of tyre pressure	**Warning**
Drop in tyre pressure of 0.2 to 0.4 bar	Yellow LED on basic instrument cluster, or Text: "Check tyre pressure" on instrument cluster high Gong: no
Drop in tyre pressure of more than 0.4 bar	Red LED on basic instrument cluster, or Text: "Tyre failure" on instrument cluster high Gong: yes

Advantages of RDC

ADVANTAGES OF RDC

1) Safety	○ early warning in the event of rapid loss of pressure ○ warning of loss of tyre pressure through normal diffusion
2) Comfort	○ unchanging ride comfort ○ instruction to check tyre pressure as necessary
3) Service life, economy	○ minimisation of tyre wear ○ minimisation of fuel consumption
4) New developments	○ allow tyres with emergency running characteristics to be fitted ○ no spare wheel if tyres with emergency running characteristics are fitted (saves weight)

RDC System Layout

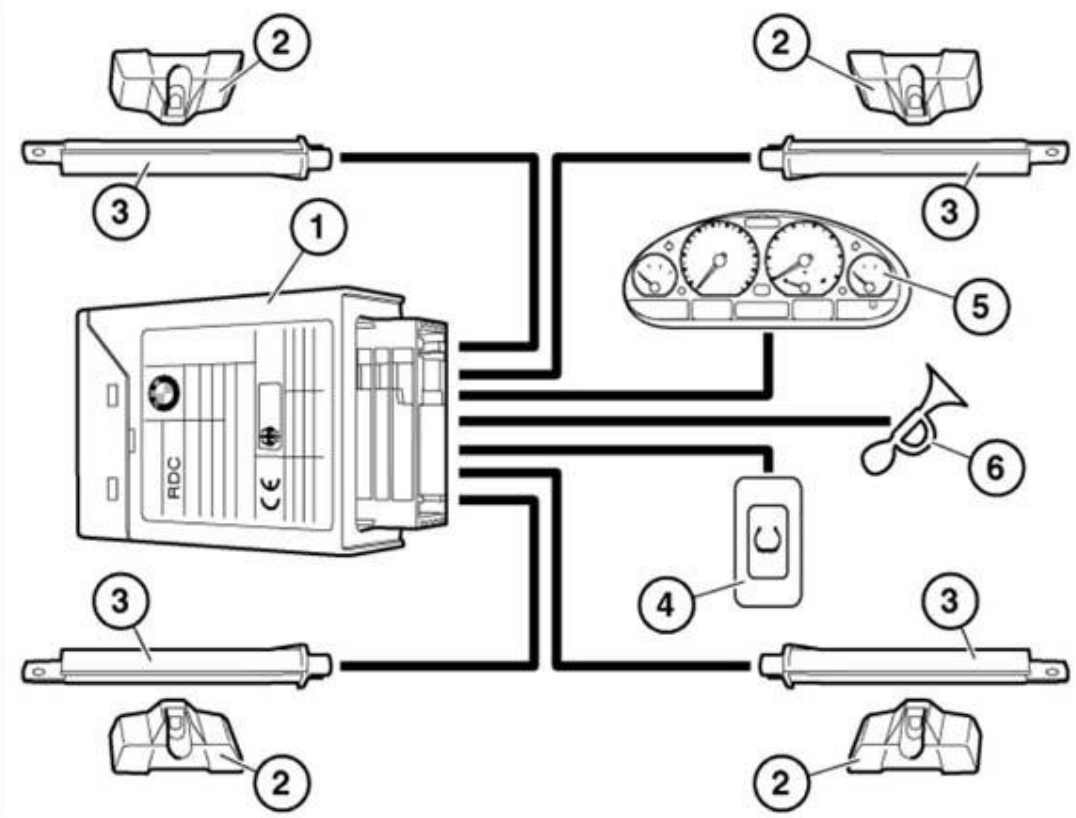


Fig. 29: RDC System Layout
Courtesy of BMW OF NORTH AMERICA, INC.

Component Description

RDC Control Unit

Fully diagnosis-compatible

Task:

Evaluates the following telegrams from the wheel electronic units:

- Tyre Pressure
- Tyre Air Temperature
- Identification Number Of Wheel Electronic Unit

- Remaining Service Life Of Wheel Electronic Unit Battery

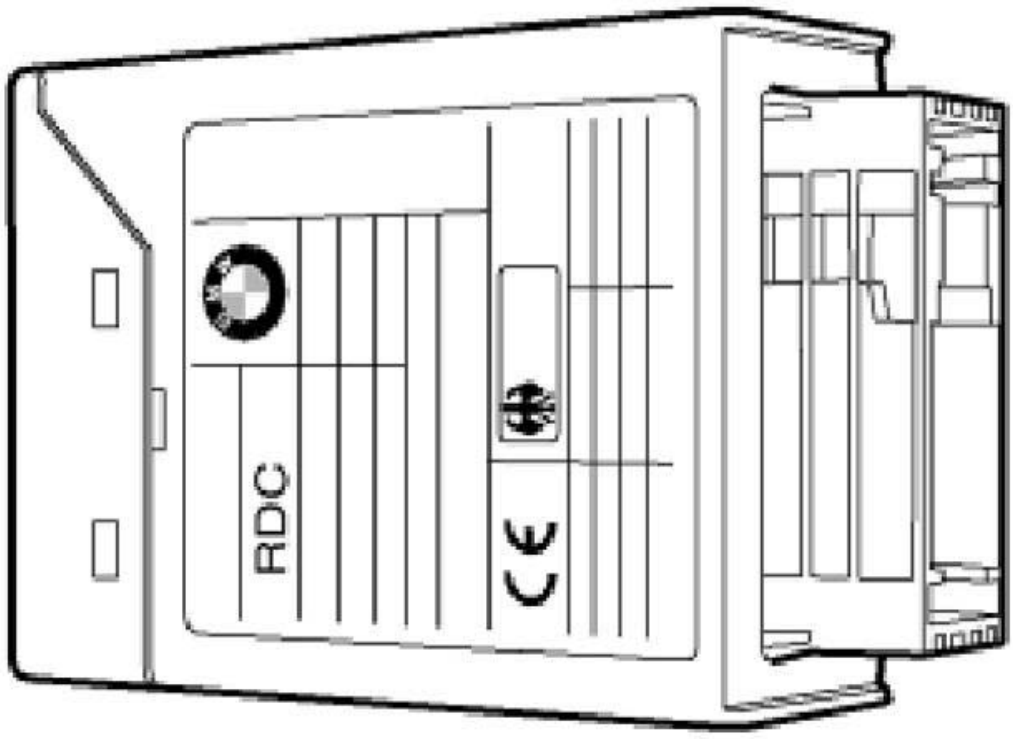


Fig. 30: Identifying RDC Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

If required, information or a warning is transmitted.

Wheel Electronic Unit With Valve

Components:

- Pressure Sensor
- Temperature Sensor
- Transmitter
  - Frequencies According To Country
- Power Supply

- Service Life: Approx. 7 Years
- Not Exchangeable

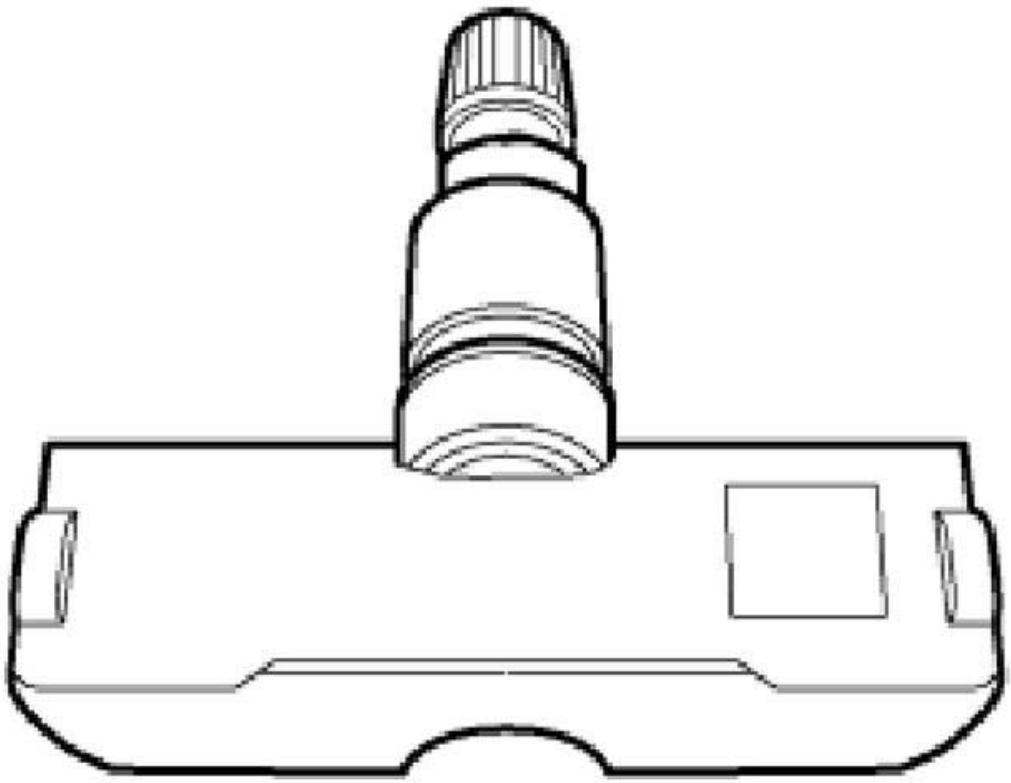


Fig. 31: Identifying Wheel Electronic Unit With Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Installation Location Of Wheel Electronic Unit In Disc Wheel

The wheel electronic unit (1) is screwed to the valve (2) on the disc wheel (3)

Identifying feature: Metal Tyre Valves

NOTE: Different valves have to be used to allow for the different disc wheel sizes. The valves are colour-coded. The correct coding can be taken from the spare parts catalogue.

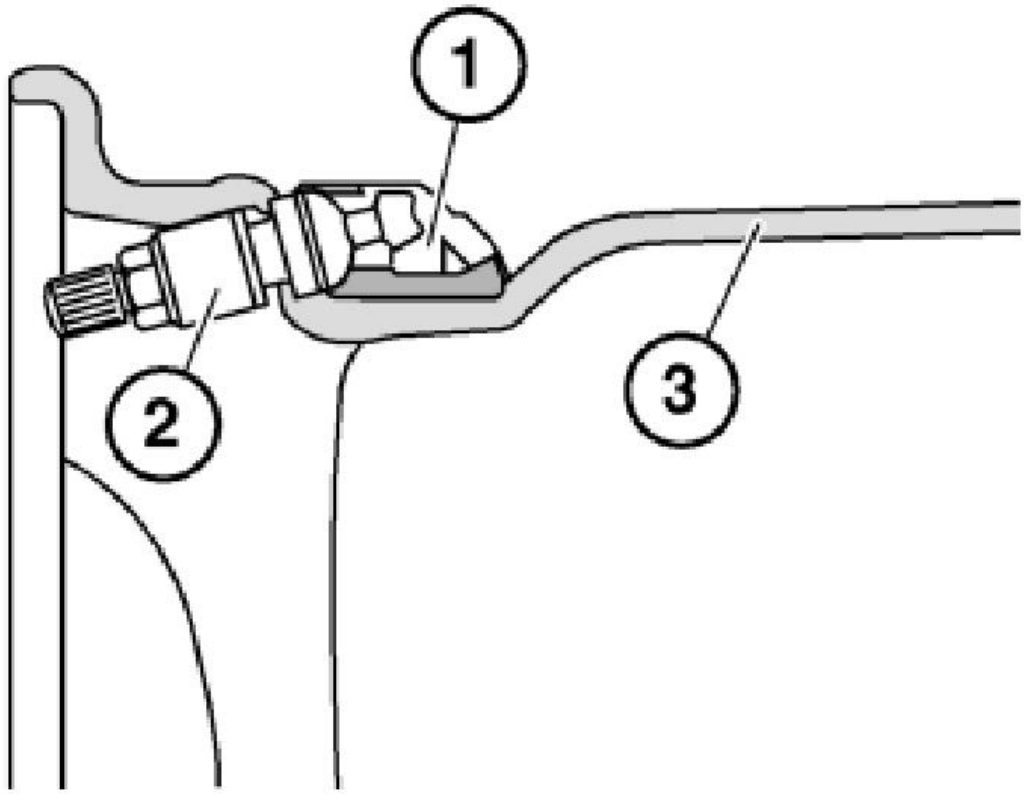
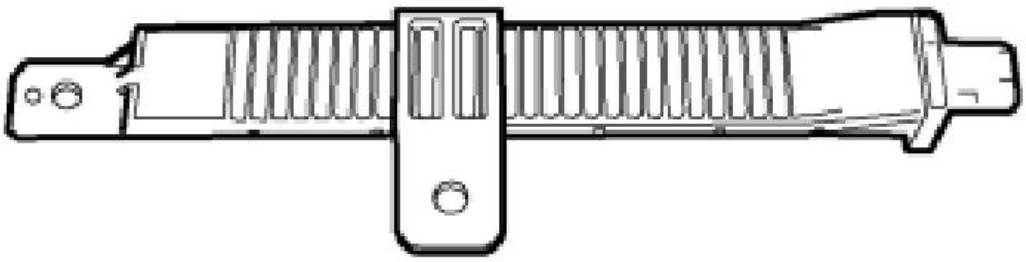


Fig. 32: Identifying Installed Position Of Wheel Electronic Unit In Disc Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

Antenna

There is an antenna in each wheel housing.

Task: Receives telegrams and forwards these to the RDC control unit.



G03179532

Fig. 33: Identifying RDC Antenna
Courtesy of BMW OF NORTH AMERICA, INC.

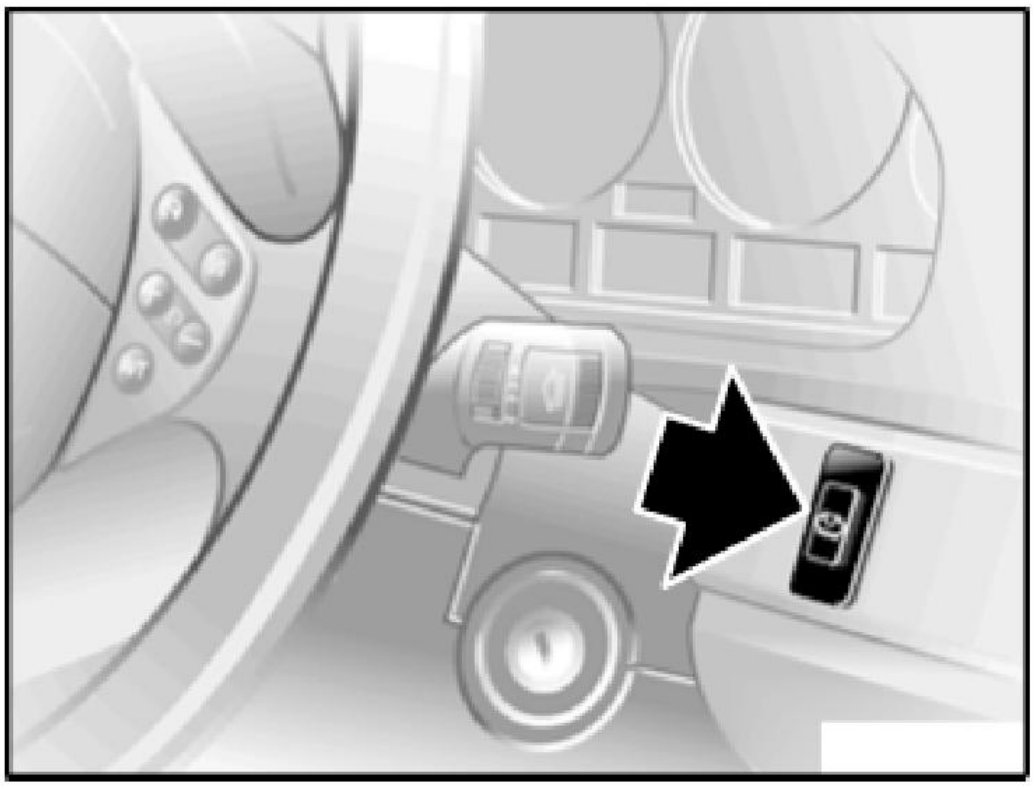
Component Description

Set Button

Installed in the instrument panel to the right of the steering wheel. (E46: in the centre console)

Symbol: tyre cross-section

Task: initialisation after resetting cold tyre pressure or after changing tyre or wheel location.



G03179533

Fig. 34: Identifying RDC Set Button
Courtesy of BMW OF NORTH AMERICA, INC.

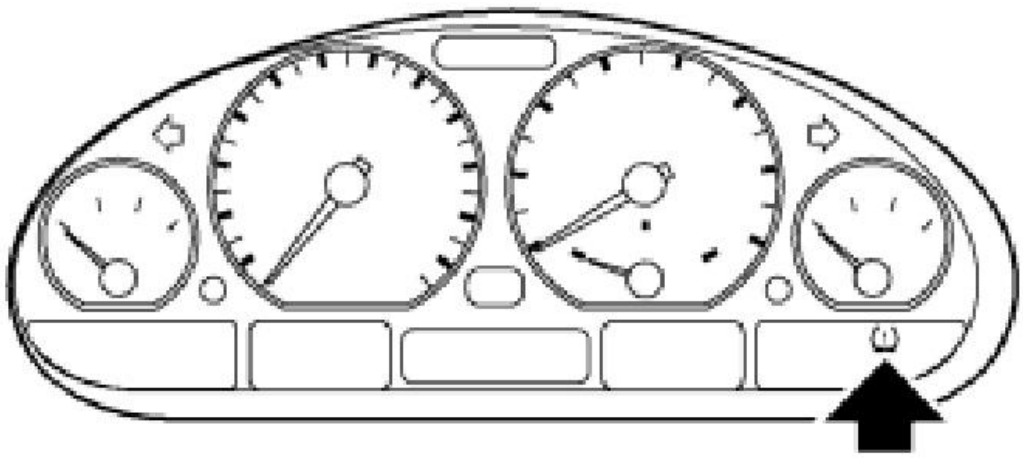
Display Element In Instrument Cluster

Indicator lamp lights up yellow:

- drop in tyre pressure of 0.2 to 0.4 bar

Indicator lamp lights up red:

- drop in tyre pressure of greater than 0.4 bar



G03179534

Fig. 35: Identifying RDC Indicator In Instrument Cluster Display
Courtesy of BMW OF NORTH AMERICA, INC.

TYRE PRESSURE WARNING RDW

RDW System Description

RDW measures the wheel speeds on all four wheels, using the wheel speed sensors of the ABS/ASC or ABS/DSC system. It compares the wheel speeds of the diagonally opposite wheels and of the average speed.

In the event of a drop in tyre pressure, the dynamic diameter of a wheel will change, leading to a changed wheel speed.

A drop in tyre pressure of 30 +/- 10 % can be detected on all wheels from about 15 km/h (10 mph) up to the vehicle's top speed.

If this value is exceeded, the driver will be warned via the instrument cluster as follows:

RDW SYSTEM DESCRIPTION

Loss of tyre pressure	**Warning**
Loss of tyre pressure of 30 +/- 10 %	Red LED Text: "Tyre failure" Gong: yes **The vehicle is not to be driven faster than 80 km/h (50 mph).**

NOTE: **A cautious driving style with moderate forward and transverse acceleration will help to prolong the service life of the defective tyre.**

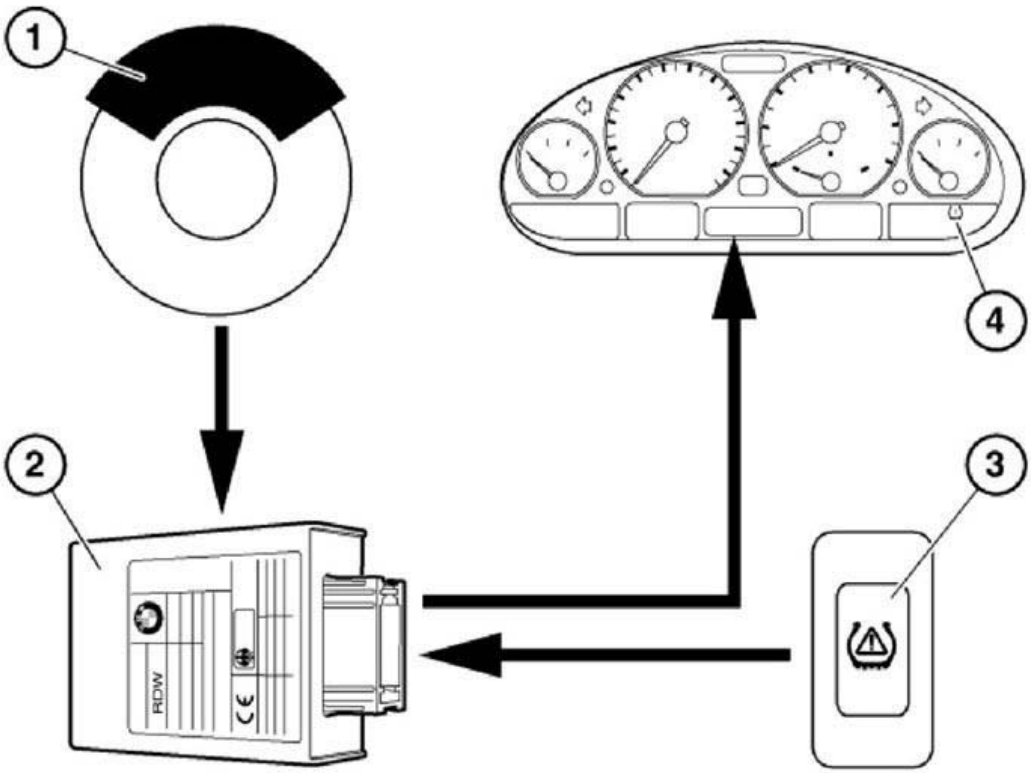
Advantages of RDW

With two exceptions, the advantages of RDC also apply to RDW.

Exceptions:

- no warning of loss of tyre pressure through normal diffusion
- tyre pressure still have to be checked regularly, every 14 days

RDW System Layout



(1) Wheel speed sensors of ABS/ASC or ABS/DSC system

ASC = Automatic Stability Control
DSC = Dynamic Stability Control

(2) RDW control unit

(3) Set button

(4) Display element

\- Wiring harness

G03179535

Fig. 36: RDW System Layout

Courtesy of BMW OF NORTH AMERICA, INC.

Component Description

RDW Control Unit

Fully diagnosis-compatible

Task:

- evaluates wheel speeds.
- a warning is transmitted as required.

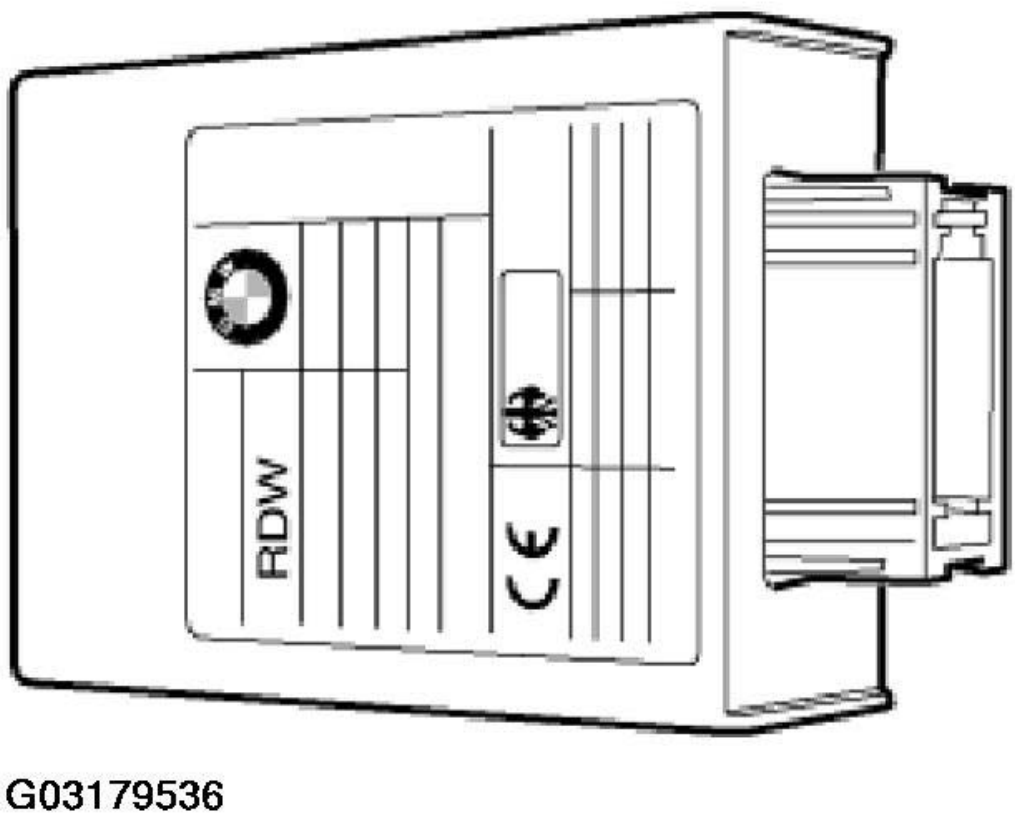
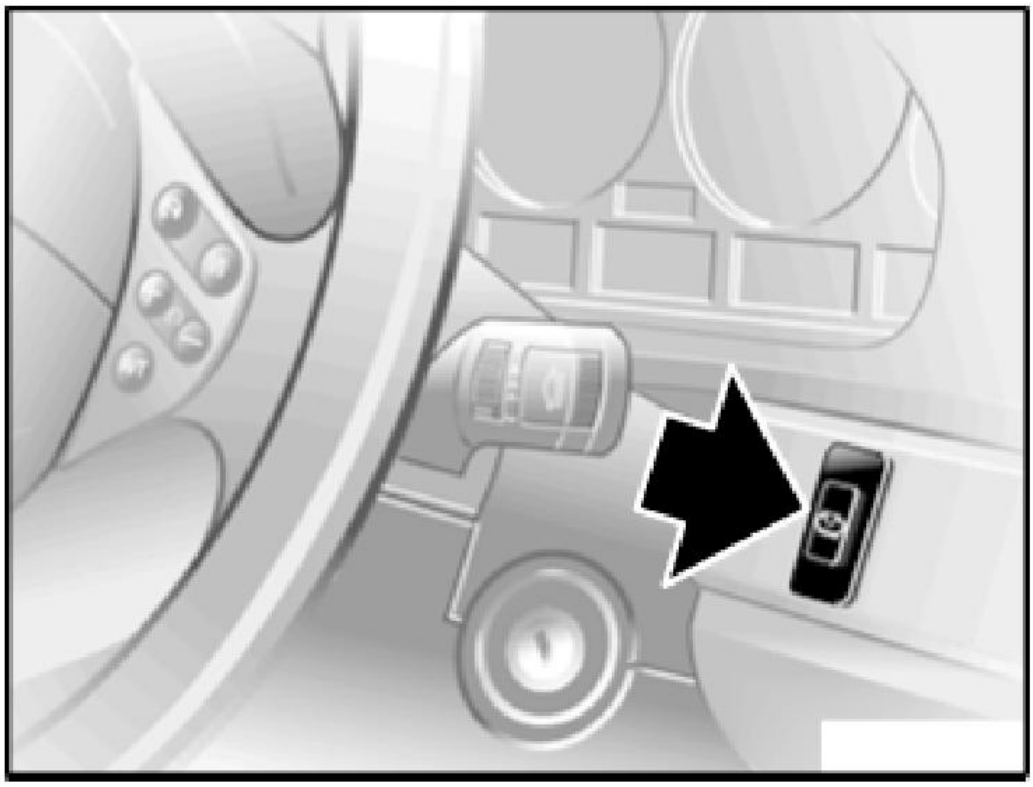


Fig. 37: Identifying RDW Control Unit
Courtesy of BMW OF NORTH AMERICA, INC.

Set Button

Installed in the dashboard to the right of the steering wheel. Symbol: tyre cross-section with warning triangle.

Task: initialisation after resetting cold tyre pressure or after changing tyre or wheel location.



G03179537

Fig. 38: Identifying Set Button
Courtesy of BMW OF NORTH AMERICA, INC.

Display Element In Instrument Cluster

Indicator lamp lights up red:

- drop in tyre pressure 30 +/- 10 %

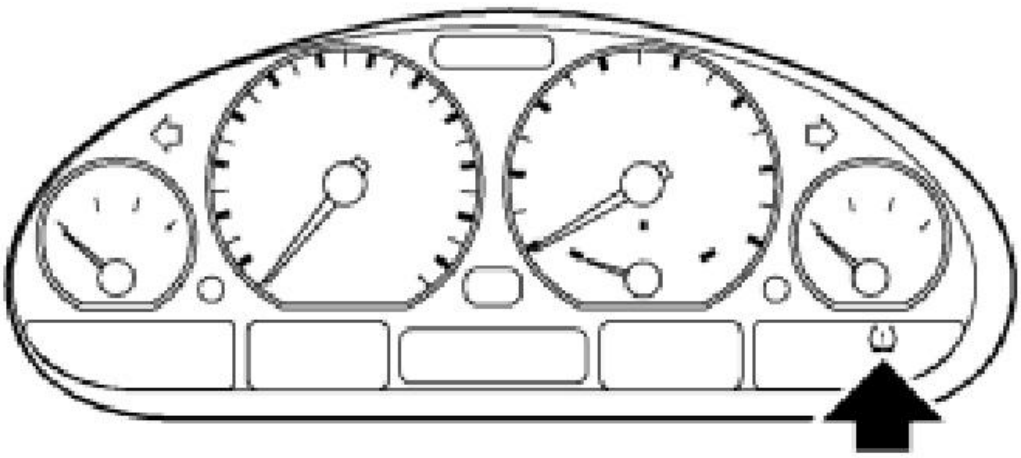


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Fig. 39: Identifying RDW Indicator Lamp
Courtesy of BMW OF NORTH AMERICA, INC.

EMERGENCY RUNNING SYSTEMS

Introduction

Tyres with emergency running characteristics can still be used for a certain distance even if they suffer a complete loss of pressure. There are two different systems which meet these requirements:

- emergency running system with self-supporting tyres
- emergency running system with integrated support ring

Emergency Running Systems Setup

Emergency Running System With Self-Supporting Tyres

The side walls of the self-supporting tyre are reinforced. In conjunction with a special disc wheel, the tyre can still be used for a certain distance even if it suffers a complete loss of pressure.

Mobility is retained for the following distances up to a speed of 80 km/h (50 mph) and with a cautious, suitably adapted driving style:

EMERGENCY RUNNING SYSTEM DESCRIPTION

Unloaded vehicle	max. 500 km (300 miles)
Unloaded roadster	less than 250 km (150 miles)

Fully loaded vehicle	max. 50 km (30 miles)

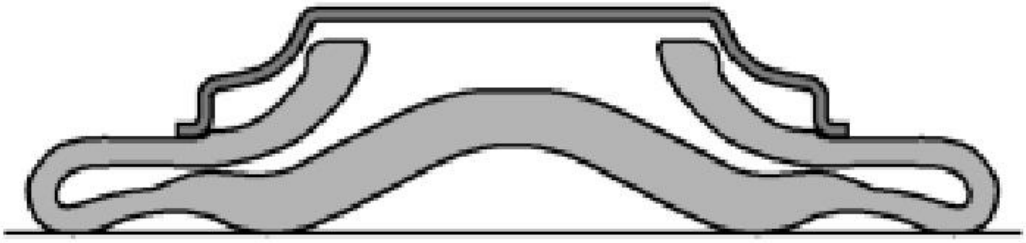
Self-supporting tyres demand permanent monitoring of the tyre pressure to ensure that the driver is given adequate warning if pressure is lost during a journey. For this reason, these tyres are only available in conjunction with the warning system RDW and from 03/2000 also with RDC.

To prevent the self-supporting tyres from becoming detached from the disc wheel in the event of a complete loss of tyre pressure, they must be fitted to newly developed wheels with modified disc wheel humps, but with unchanged tyre seating (= standard disc wheel).

However, the new wheels can also be used for standard tyres of the same size.

Comparison Standard Tyres/Self-Supporting Tyres

Standard Tyres, Unpressurised



G03179539

Fig. 40: Identifying Unpressurised, Standard Tyres
Courtesy of BMW OF NORTH AMERICA, INC.

Self-supporting tyres, unpressurised

Envulcanised reinforcement (1) made of a temperature-resistant rubber compound.

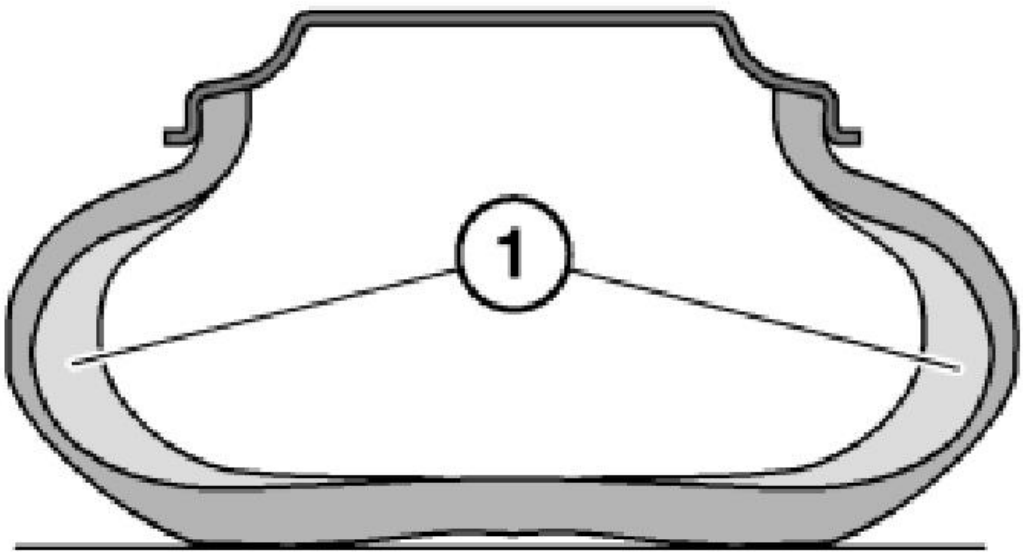


Fig. 41: Identifying Unpressurised, Self-Supporting Tyres
Courtesy of BMW OF NORTH AMERICA, INC.

Disc Wheels

H2 Disc Wheel (Standard Disc Wheel) For Emergency Running System With Integrated Support Ring

(1) Hump 2 of standard disc wheel

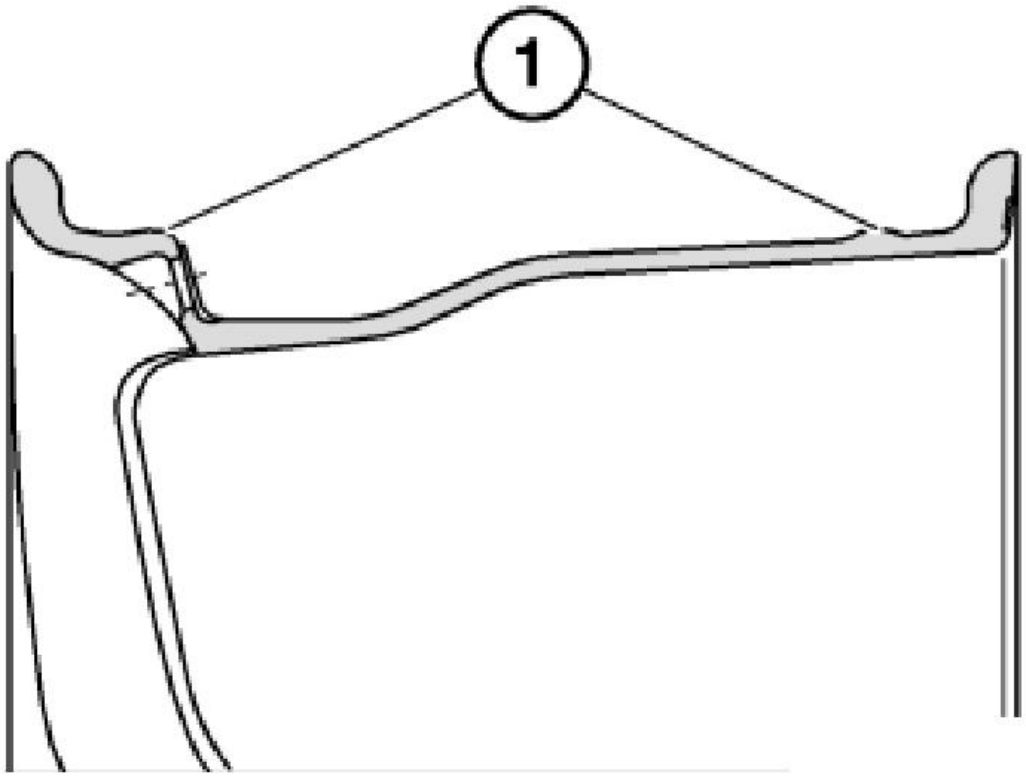


Fig. 42: Identifying H2 Disc Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

EH2 Disc Wheel For Emergency Running System With Self-Supporting Tyre

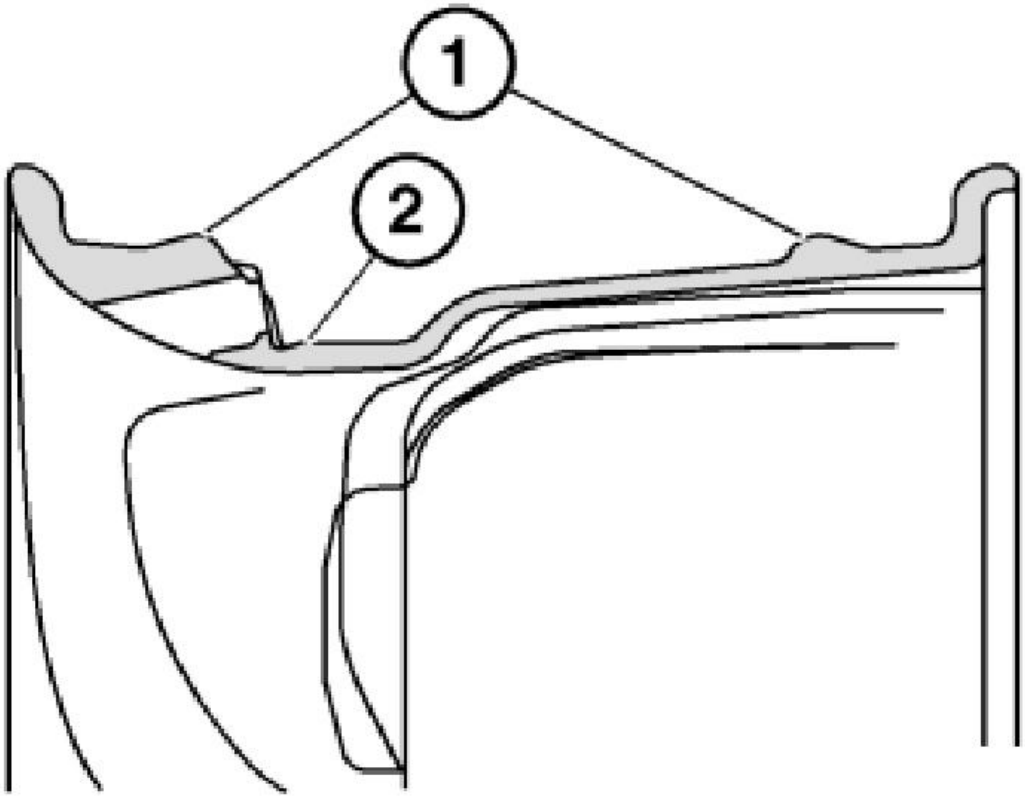


Fig. 43: Identifying EH2 Disc Wheel
Courtesy of BMW OF NORTH AMERICA, INC.

1. Extended Hump 2 of disc wheel
2. Drop centre relocated a few millimetres to the centre (precentring on outside)

NOTE: The new EH2 disc wheels (extended Hump 2 inner and outer) will be used more frequently on BMW vehicles in the future as they can also help to delay standard tyres from being lost in the event of a drop in tyre pressure. Example: from current 1.1 bar to 0.6 bar (X5 or Landrover disc wheel)

Emergency Running System With Integrated Support Ring

(In the future, primarily on heavy safety vehicles)

The support ring is made of a high-strength resilient plastic and is fitted on the disc wheel inside the tyre. The support ring can only be removed using special tools which have been specially approved by BMW. It can only

be removed after destroying the tyre.

Emergency running systems with integrated support ring are used in particular on heavy safety vehicles. They allow the vehicle to be driven away from a potential danger without dropping speed even if the tyres have suffered a complete loss of pressure (flight situation).

It is possible as an option to have the tyre pressure monitored by an RDC system. The RDC is installed by pressing the components into the support ring before it is fitted.

Wheel Structure With Integrated Support Ring

Emergency Running System With Integrated Support Ring

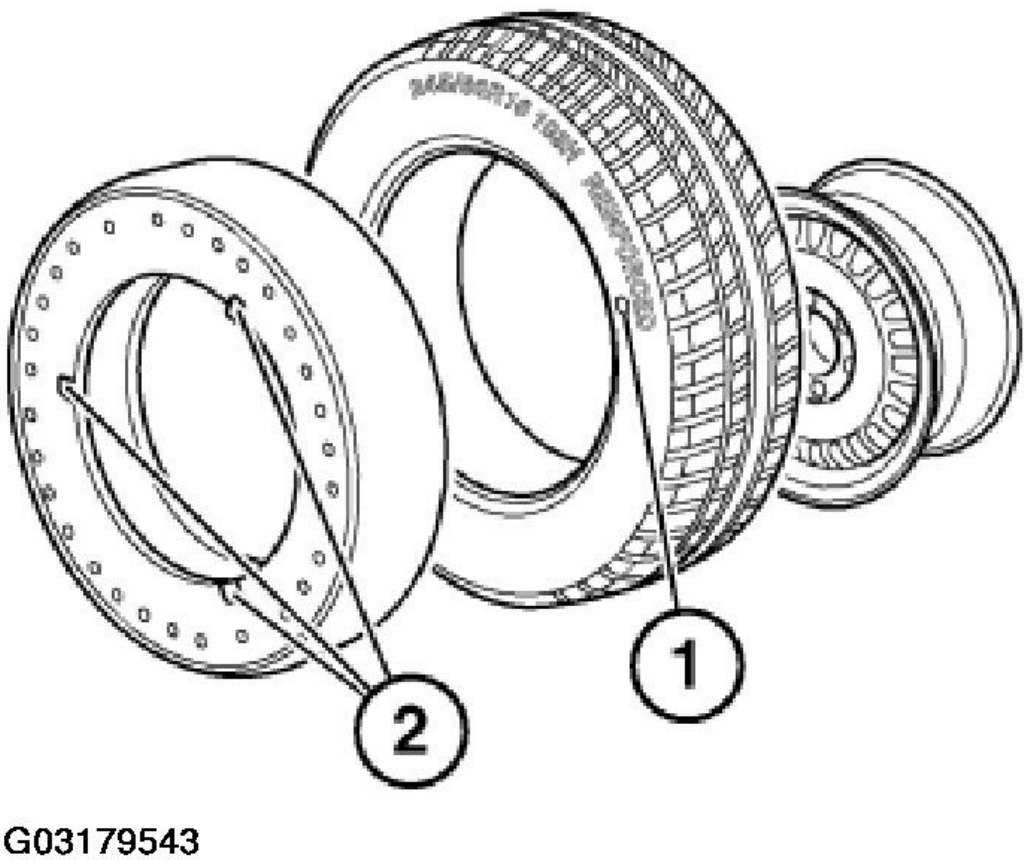


Fig. 44: Identifying Support Ring And Tyre
Courtesy of BMW OF NORTH AMERICA, INC.

1. Tyre

2. Support ring

Installation Location Of RDC Wheel Electronic Unit

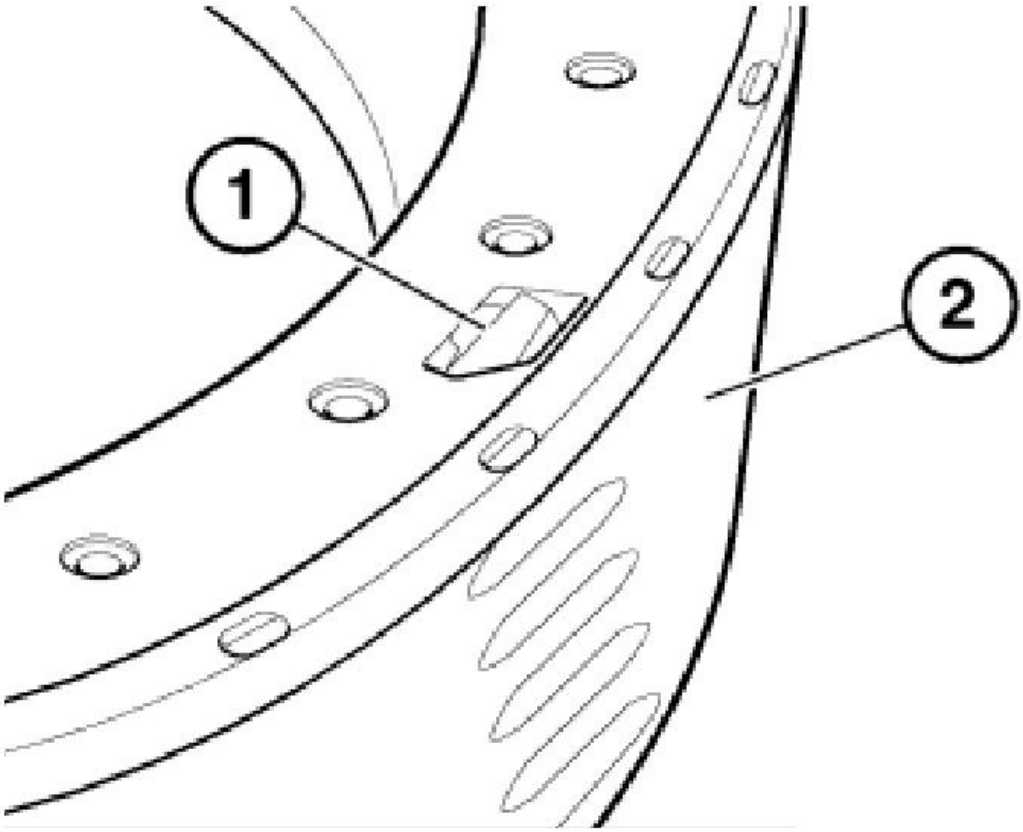


Fig. 45: Identifying Wheel Electronic Unit And Support Ring
Courtesy of BMW OF NORTH AMERICA, INC.

1. Wheel electronic unit
2. Support ring

For further information on the subject of "Tyre pressure warning systems and tyres with emergency running characteristics", please refer to the vehicle Owner's Handbook.

A Parts Information bulletin will be published with information on how to order parts.

Functional and system descriptions are not subject to change. Parts availability and immediate ordering

availability cannot be derived from this information. The specialised departments will inform the markets with further details at the appropriate time.

STORING WHEELS AND TYRES

All Models

WHEELS/TYRES - GENERAL NOTES

The service of storing a customer's wheels is one which is now almost taken for granted. For this reason, we have published this BMW Technical Service bulletin to provide a uniform storage concept, which will prevent damage being caused due to incorrect storage.

The tyre's rubber will age under the influence of sunlight, heat, humidity, movements in the air and ozone, and will thus lose some of its stability and elasticity. For this reason, tyres should never be stored in the open-air. If open-air storage cannot be avoided, the wheels/tyres must be stored in a clean and dry condition and covered with waterproof material. It is essential that wheels/tyres are protected against rain, snow and sunlight, but due to the risk of corrosion they must not be stored in tyre sacks. For more information on protective covers for wheels and tyres, see SI 36 01 88 (864).

Wheels/tyres with tyre pressure control (RDC) must not be cleaned with high-pressure cleaning equipment. For general information on RDC, **TYRES WITH EMERGENCY RUNNING CHARACTERISTICS AND TYRE PRESSURE WARNING SYSTEMS**.

Storage Requirements

The following requirements apply in general to storage in enclosed rooms:

STORING WHEELS AND TYRES SPECIFICATIONS

cool	15...25 °C / sources of heat screened, or 1 m minimum distance from source of heat
dry	Prevent water and condensation Avoid contact with mineral lubrication products
dark	Protect from direct sunlight and high-UV artificial light
moderate ventilation	Avoid a supply of oxygen and ozone

In short, the storage room should be cool and dry. It is not necessary to heat the room during the winter. In the summer, the doors and windows should be kept closed to ensure that no air can circulate. In addition, the windows can also be coated with sun protection paint.

The storage room should not contain any working electric machinery, welding equipment, distribution boxes etc. as electrical sparks generate ozone which can have a serious impact on the surface of the tyre (ozone cracks).

Tyres should not be allowed to come into contact with oil, petrol, or other mineral lubricants as these dissolve rubber, making the tyre porous.

Preparing Wheels/Tyres

1. Before removing a wheel, mark its position on the vehicle.
2. Whenever possible, keep the tyre on its wheel (complete wheels).
3. Correct the inflation pressure and recheck every 2 months.
4. Ensure that tyres are stored at a sufficient distance above the ground. Wheels/tyres should never be stored on the ground.
5. Complete the storage forms. These should contain the following data:
    - Type and size of tyre
    - Condition and tread depth
    - Customer's address
    - Date and signature of customer

Wheel/Tyre Storage Requirements

A. **Tyre fitted to wheel**

Do not store upright, ...

NOTE: If storing the wheels upright cannot be avoided, the inflation pressure must be increased to 3.5 bar.

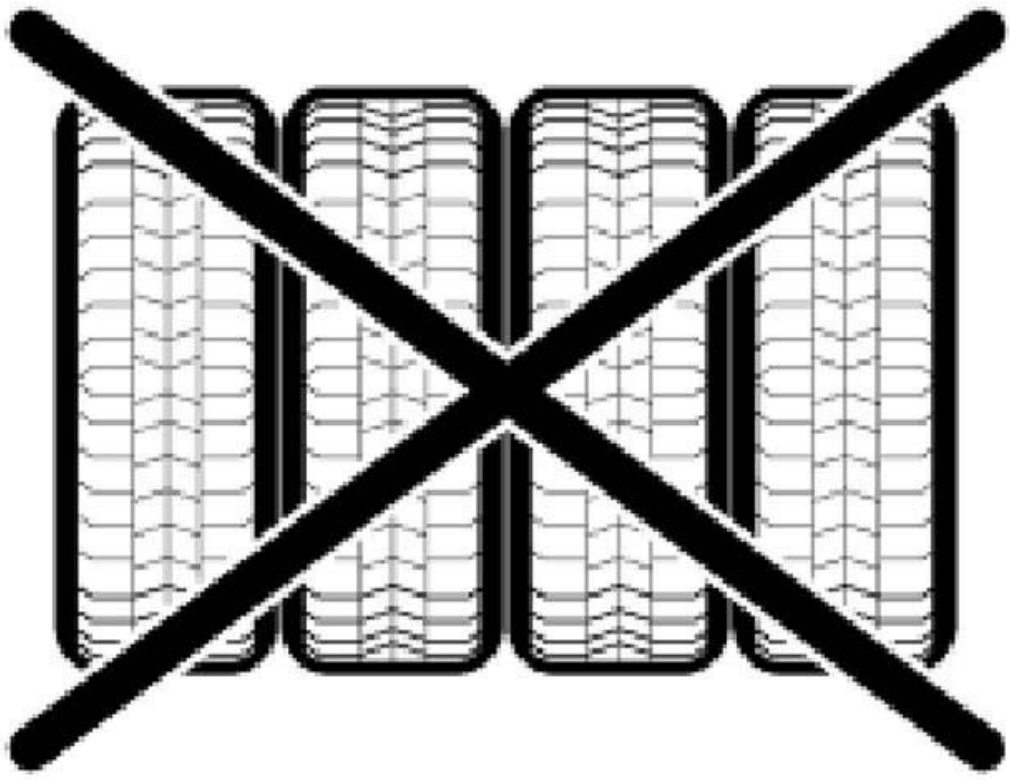


Fig. 46: Use Care When Storing Wheel/Tyre Storage In Upright Position (Tyre Fitted To Wheel)
Courtesy of BMW OF NORTH AMERICA, INC.

... but rather hang ...

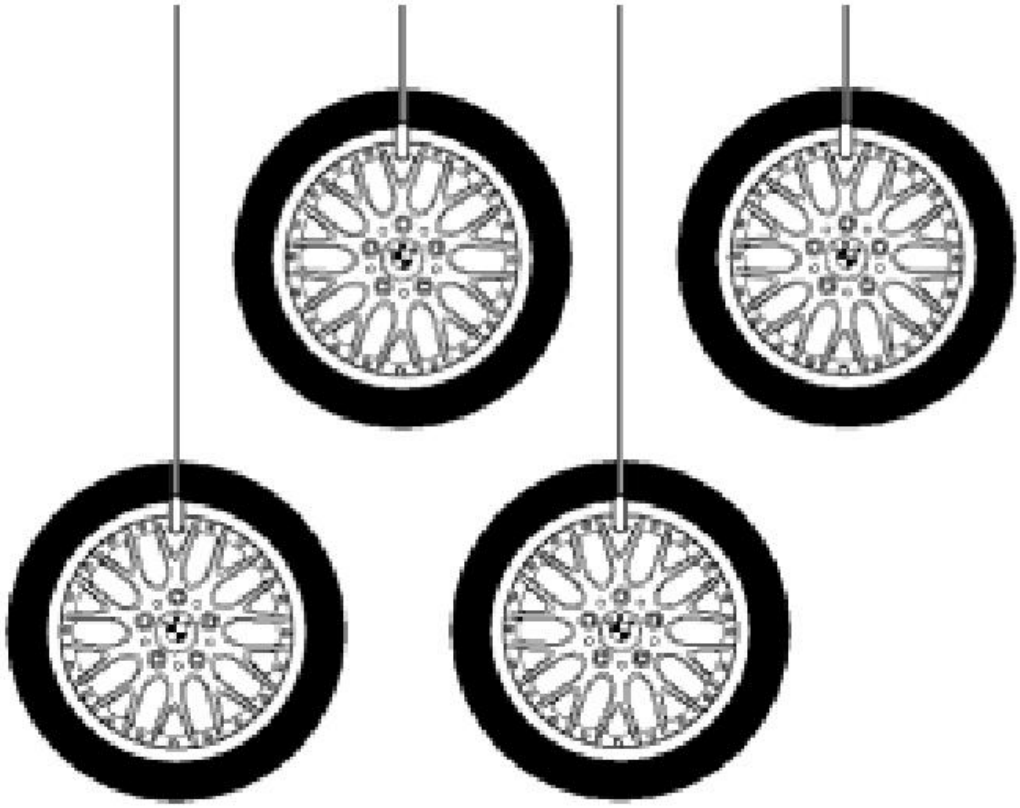


Fig. 47: Preferred: Store Tyres In Hanging Position (Tyre Fitted To Wheel)
Courtesy of BMW OF NORTH AMERICA, INC.

... or stack.

NOTE: Never store tyres on the ground.
Use a wooden palette or similar.

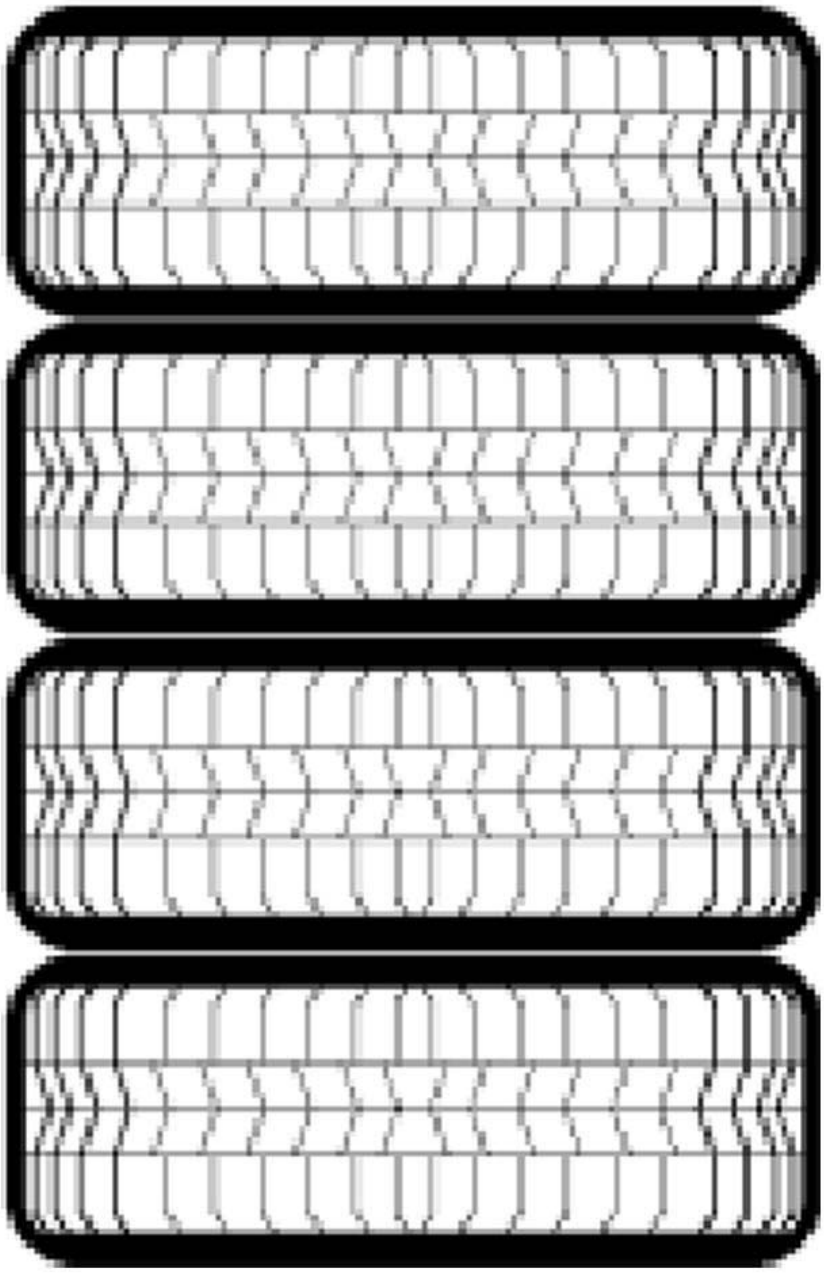


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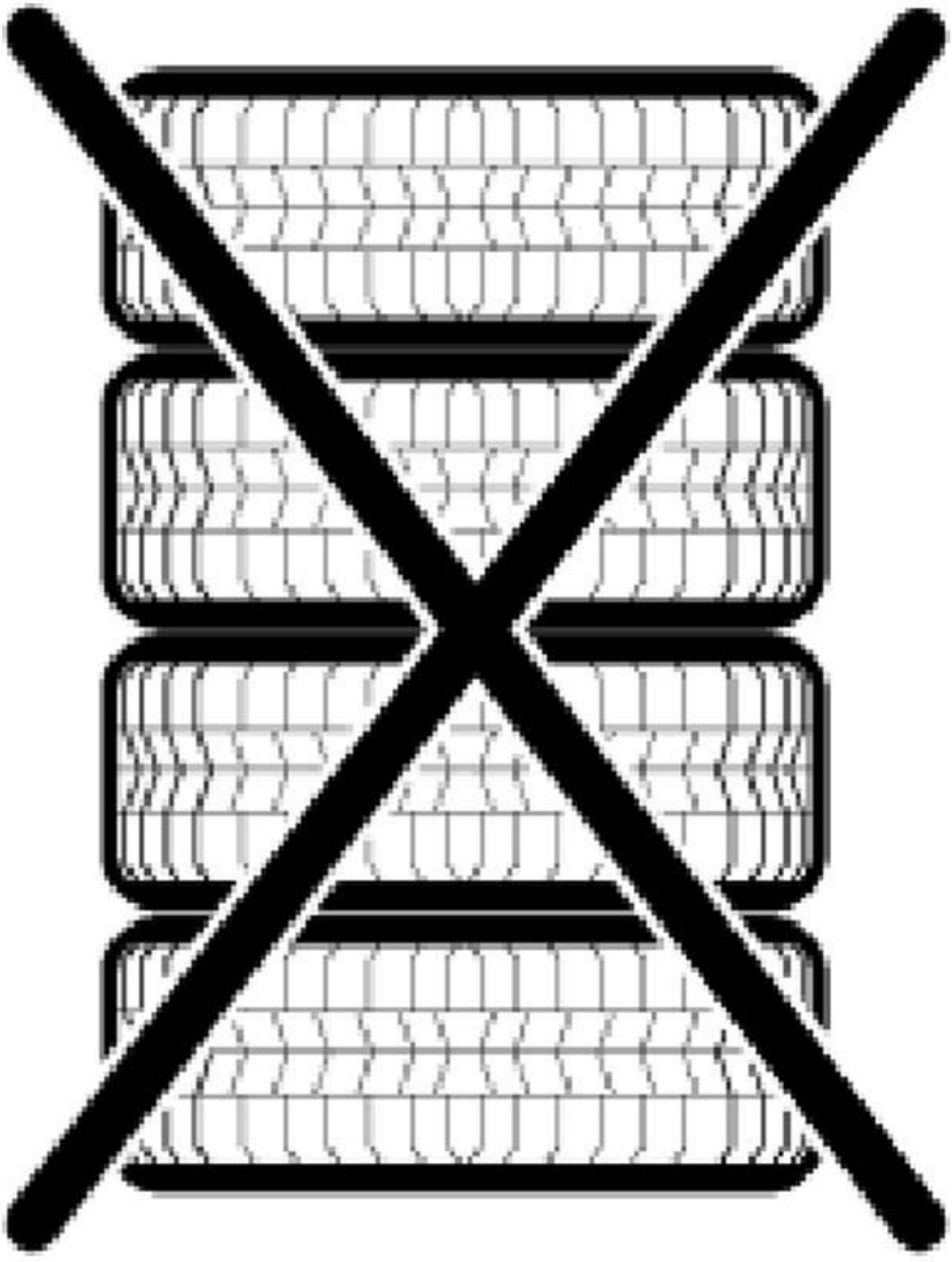
Fig. 48: Storing Tyres In Stacked Position (Tyre Fitted To Wheel)
Courtesy of BMW OF NORTH AMERICA, INC.

B. **Tyres Not Fitted**

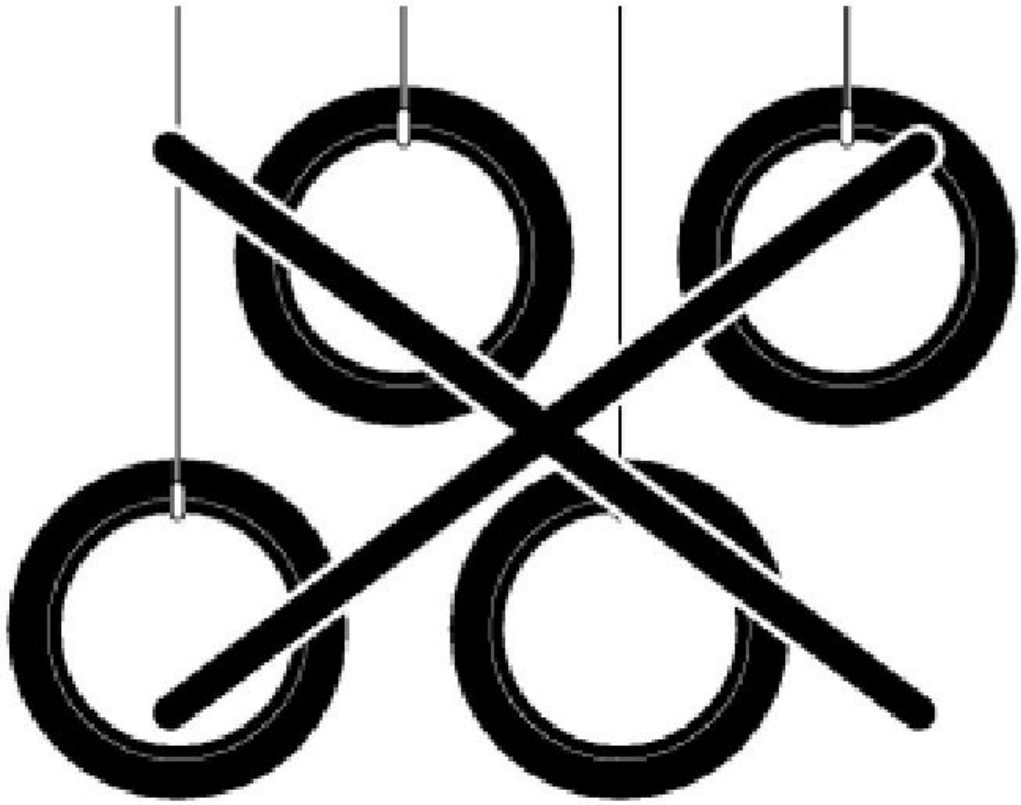
Do not stack, ...



G03179548

Fig. 49: DO NOT Store Wheel/Tyre In Staked Position (Tyres Not Fitted)
Courtesy of BMW OF NORTH AMERICA, INC.

... do not hang, ...



G03179549

Fig. 50: DO NOT Store Wheel/Tyre In Hanging Position (Tyres Not Fitted)
Courtesy of BMW OF NORTH AMERICA, INC.

... but rather store them upright and turn them every 4 weeks.

NOTE: **Never store tyres on the ground.**
Use commercially available shelves.

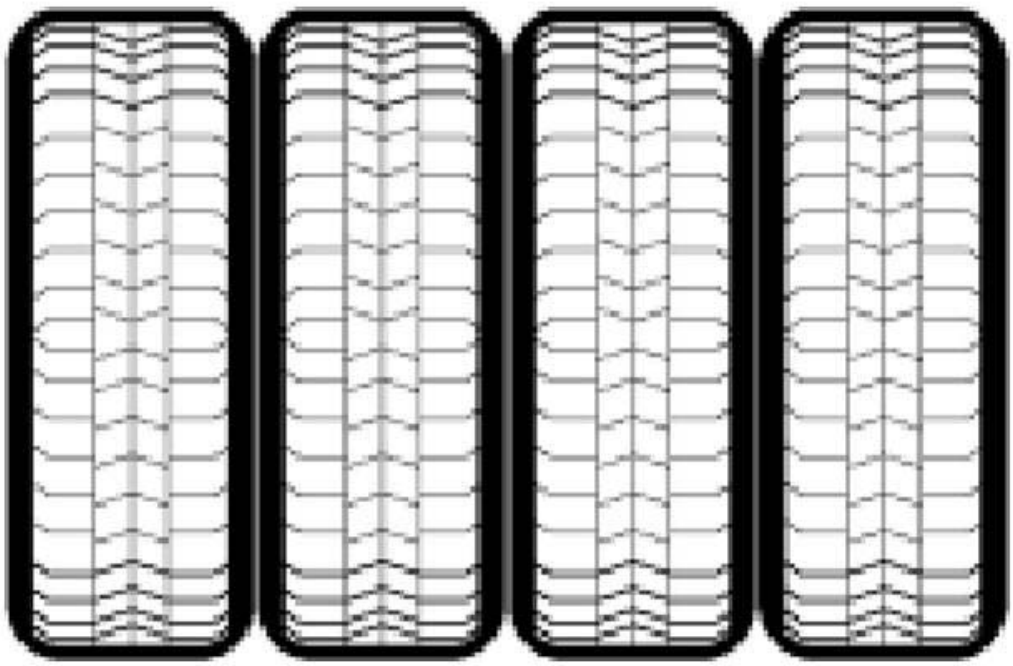


Fig. 51: Preferred: Store Tyres In Staked Position (Tyres Not Fitted)
Courtesy of BMW OF NORTH AMERICA, INC.

36 WHEELS WITH TIRES

36-1339 CASE WITH INLAY

36 1 339 Case with inlay

NOTE: incl. connection diagram sticker

Fig. 1: Identifying Case With Inlay (361339)
Courtesy of BMW OF NORTH AMERICA, INC.

36-1336 CONNECTION DIAGRAM STICKER

36 1 336 Connection diagram sticker

Fig. 2: Identifying Connection Diagram Sticker (361336)
Courtesy of BMW OF NORTH AMERICA, INC.

36-1335 SUPPLEMENTARY SET FOR WHEEL BOLT ADAPTER KIT 36 1 300

36 1 335 Supplementary set for wheel bolt adapter kit 36 1 300

NOTE: Consisting of: 36 1 323 Code 30 36 1 324 Code 31 36 1 325 Code 32 36 1 326 Code 33 36 1 327 Code 34 36 1 328 Code 35 36 1 329 Code 36 36 1 331 Code 37 36 1 332 Code 38 36 1 333 Code 40 36 1 336 Connection diagram sticker

SI number

1 27 04 (167)

Fig. 3: Identifying Supplementary Set For Wheel Bolt Adapter Kit 36 1 300 (361335)
Courtesy of BMW OF NORTH AMERICA, INC.

36-1030 TESTER

0493829 361030 Tester MW

NOTE: For measuring vertical and lateral runout of road wheels

SI number

01 11 00 (594)

Consisting of:

1 = 0493904 Holder

NOTE: (Holder) Discontinuation and replaced by 36 1 030.(0 493 829)

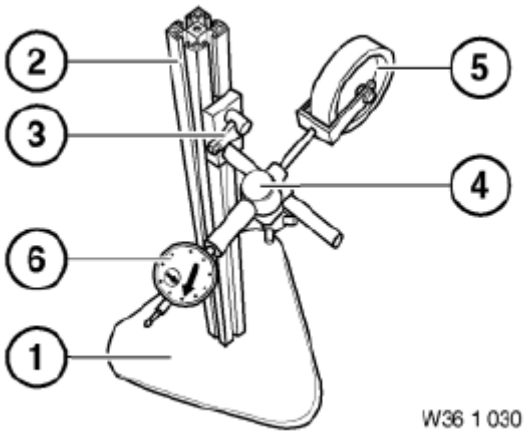


Fig. 4: Identifying Tester (361030)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0493905 Profile strip

NOTE: (Profile strip)

3 = 0493906 Adapter

NOTE: (Adapter) Replaced by 00 9 120 (0 490 504)

4 = 0493907 Terminal

NOTE: (Terminal)

5 = 0493908 Roller

NOTE: (Measuring roller)

6 = 0493909 Dial gauge

WHEELS ONE-PART ALLOY WHEELS

36 10 WHEELS ONE-PART ALLOY WHEELS

WHEELS ONE-PART ALLOY WHEELS SPECIFICATION

Max. radial runout of tire Rim with tire	max. mm	1.1
Max. axial runout or tire Rim with tire	max. mm	1.3
Max. radial runout out rim	max. mm	0.3
Max. axial runout of rim	max. mm	0.3
Max. imbalance for each side (before balancing)	max. g	90 for clamp weights 120 for stick-on weights
Permissible residual imbalance for each side (after balancing)	max. g	4
Elimination of imbalance: Up to 60 g with one weight or more than 60 g with two weights		

STEEL AND ALUMINIUM STRIP WHEELS

36 10 STEEL AND ALUMINIUM STRIP WHEELS

WHEELS STEEL AND ALUMINIUM STRIP WHEELS SPECIFICATION

Max. radial runout of tire Rim with tire	max. mm	1.6
Max. axial runout or tire Rim with tire	max. mm	1.8
Max. radial runout out rim	max. mm	0.8
Max. axial runout of rim	max. mm	0.8
Max. imbalance for each side (before balancing)	max. g	90 for clamp weights 120 for stick-on weights
Permissible residual imbalance for each side (after balancing)	max. g	4
Elimination of imbalance: Up to 60 g with one weight or more than 60 g with two weights		

TWO-PART ALLOY WHEELS

36 10 WHEELS TWO-PART ALLOY WHEELS

WHEELS TWO-PART ALLOY WHEELS SPECIFICATION

Max. radial runout of tire Rim with tire	max. mm	1.3
Max. axial runout or tire Rim with tire	max. mm	1.5
Max. radial runout out rim	max. mm	0.5
Max. axial runout of rim	max. mm	0.5
Max. imbalance for each side (before balancing)	max. g	90 for clamp weights 120 for stick-on weights
Permissible residual imbalance for each side (after balancing)	max. g	4
Elimination of imbalance: Up to 60 g with one weight or more than 60 g with two weights		

Wheel and Tires - Tightening Torques - Z4

WHEEL RIMS

36 11 WHEEL RIMS

TIGHTENING TORQUE SPECIFICATION - WHEEL RIMS

	Type	Thread	Tightening specification	Measure
1AZ Valve on disc wheel (RDC)	E89			3.5 Nm
2AZ Wheel electronics (RDC) on valve	E89			3.5 Nm
3AZ RDC transmitter to washer fluid reservoir	E89			1.5 Nm

WHEELS

36 10 WHEELS

TIGHTENING TORQUE SPECIFICATION - WHEELS

	Type	Thread	Tightening specification	Measure
1AZ Wheel bolt	E89	M12		120 Nm

1.0 TIRE MOUNTING PASTE

Use only a lubricant specifically designed for this purpose (former BMW Part No. 81 22 9 407 288).

Wurth Tire Mounting Paste Part No. 892800

Silicone sprays are not acceptable, as they are extremely slippery and don't dry. If applied to the tire bead, it is likely that the tire moves on the rim, causing an imbalance.

2.0 WHEEL CLEANERS

Liquids for cleaning the alloy wheels must be strong enough to lift brake dust, road dirt, etc. off the painted wheel surface with minimum manual agitation, yet not attack the wheel material. The following cleaner has been thoroughly tested for optimum cleaning action and long-term compatibility with the wheel's surfaces:

Wheel Cleaner Spray BMW Part No. 82 14 1 467 045

3.0 WHEEL HUB COVERS

Covers may be affixed to the alloy rim by using Loctite 638 (former BMW Part No. 07 58 9 056 030). Covers may only be used once.

WHEEL HUB COVERS SPECIFICATION

Loctite 638	-	Wurth Part No. 8936010
	-	Loctite Part No. 21447

The cooling-turbine wheel covers of the M5 (E34) produced from March 1990 to October 1990 may be secured to the wheel by applying Loctite 242 to the attaching screw threads. First clean screw threads with Loctite Cleaning Solvent 755.

4.0 ANTI-CORROSION PASTE

Apply small amounts of Plastilube paste evenly around the centering cone of the alloy wheel rim and onto the contact areas of the brake hub.

Plastilube BMW Part No. 81 22 9 407 103.

1.0 GENERAL INFORMATION ON AUTOMATIC TRANSMISSION FLUIDS

Automatic Transmission Fluid was developed especially for automatic transmissions. It requires additives which are carefully matched with each other, a high viscosity index and a solidification point below-40°F/-40° C.

Friction behavior of Automatic Transmission Fluid in plate-type clutches under very different operating conditions is extremely important. Other important factors are:

- Wear protection
- Oil film shear resistance
- Adhesive property
- Oxidation resistance
- Corrosion inhibition
- Sludge prevention
- Temperature-dependent viscosity changes
- Compatibility with sealing materials.

2.0 OIL ADDITIVES

Automatic transmissions are designed so that oil additives are not necessary. BMW disapproves the use of any oil additives and cannot accept the liability for any consequential damage which results from using oil additives.

3.0 APPROVED AUTOMATIC TRANSMISSION FLUIDS FOR INITIAL FILLINGS AND CORRECTING FLUID LEVELS

3.1 GM TRANSMISSIONS

USE OF ANY OTHER OIL WILL CAUSE A NON WARRANTABLE TRANSMISSION FAILURE

***Transmission identification plate can be utilized to determine proper transmission fitted in vehicle**

A4S 270R (THM-R1W)

E36

318i/is/iC/ti from 1996 to 1999 production

323i/is/iC from 1998 to 1999 production

328i/is/iC from 1996 to 1998 production

Z3 1.9 from 1996 to 1999 production

Z3 2.3/2.8 from 1997 to 2000 production

All reputable brand name Automatic Transmission Fluids of the Dexron® III formulation.

E39

528i/iT from1997-1999 production

All reputable brand name Automatic Transmission Fluids of the Dexron® III formulation.

A4S 310R (THM-R1)

E34

525i from 1990 to 1995 production

All reputable brand name Automatic Transmission Fluids of the Dexron® III formulation.

E36

318i/is/iC/ti from 1992 to 1995 production

325i/is/iC from 1992 to 1995 production

All reputable brand name Automatic Transmission Fluids of the Dexron® III formulation.

A5S 360R (GM5)

E46

323i/Ci/Cic from 6/98 to 3/00 production

323iT from 1//00 to 3/01 to production

328i/Ci/Cic from 6/98 to 3/01 production

The transmission oil pan will be labeled with either Texaco ETL - 7045 or Dexron® III, please fill or top off with the proper fluid only. Do not mix Texaco ETL - 7045 and Dexron® III fluids.

A5S 390R (GM 5)

E46

330xi from 6/00 production to present

325xiT from 9/00 production to present

E53

X5 3.0 from 8/03 production to present

E83

X3 2.5, 3.0 from 8/03 production to present

The transmission oil pan will be labeled with either Texaco ETL - 7045 or Dexron® III, please fill or top off with the proper fluid only. Do not mix Texaco ETL - 7045 and Dexron® III fluids.

E85

Z4 3.0 from 9/02 production to present

Z4 2.5 from 9/02 production to present

No subsequent transmission fluid changes are necessary. Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 71141, BMW Part No. 83 22 9 407 807.

GA6L45R (GM6)

DEXRON-VI Automatic Transmission Fluid

E83

X3 LCI from 9/06 production to present

E82, E88

128i, 135is from 12/07 production to present

E90

328Xi from 9/06 production to present

E91

328Xi from 9/06 production to present

The fluid can be sourced locally until a BMW PN is available.

3.2 ZF TRANSMISSIONS

USE OF ANY OTHER OIL WILL CAUSE A NON WARRANTABLE TRANSMISSION FAILURE

***Transmission identification plate can be utilized to determine proper transmission fitted in vehicle**

ZF 3HP22, 4HP22, 4HP24

Utilizes Castrol TQ or Texaco Havoline Automatic Transmission Fluids of the Dexron® III formulation. Never mix any other oil with this transmission fluid when doing repairs or topping up.

A5S 310Z (5HP18)

E36

M3 from 1995 to 1999 production

Utilizes a lifetime filling of synthetic transmission fluid, ESSO LT 71141, no subsequent transmission fluid changes are necessary. Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 71141, BMW Part No. 83 22 9 407 807.

E34

530i/iT from 1993 through 1995 production

Utilizes Castrol TQ or Texaco Havoline Automatic Transmission Fluids of the Dexron® III formulation. Never mix any other oil with this transmission fluid when doing repairs or topping up.

A5S325Z (5HP19)

E46

323i/Ci/Cic from 3/00 to 8/00 production

325iT from 4/01production to present

330i/Ci/Cic from 6/00 production to present

325i/Ci/Cic from 9/00 production to present

No subsequent transmission fluid changes are necessary. Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 71141, BMW Part No. 83 22 9 407 807.

E39

525i/iT from 3/01 production to present

530i from 3/01 production to present

No subsequent transmission fluid changes are necessary. Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 71141, BMW Part No. 83 22 9 407 807.

A5S 440Z (5HP24)

E31

840Ci from 9/96 to the present

No subsequent transmission fluid changes are necessary. Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 71141, BMW Part No. 83 22 9 407 807.

E38

740i/iL from 1/97 production to present

No subsequent transmission fluid changes are necessary. Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 71141, BMW Part No. 83 22 9 407 807.

E39

540i/iT from 1/97 production to present

No subsequent transmission fluid changes are necessary. Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 711 41, BMW Part No. 83 22 9 407 807.

E53

X5 4.4i from 9/99 production to present

X5 4.6i from 9/01 production to present

No subsequent transmission fluid changes are necessary. Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 711 41, BMW Part No. 83 22 9 407 807.

A5S 560Z (5HP30)

E31

840Ci equipped with M60 engine

Utilizes a lifetime fill of transmission fluid, no subsequent oil changes are necessary on this transmission. If transmission fluid is required for repair purposes, use only the oil approved for this transmission. It is not permitted to mix this oil with other grades of transmission fluid.

Shell LA 2634, BMW Part No. 83 22 9 407 765.

E31

840Ci equipped with M62 engine

850Ci equipped with M73 Engine

Utilizes lifetime fill of transmission fluid, no subsequent transmission fluid changes are necessary.

Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 711 41, BMW Part No. 83 22 9 407 807.

E32

740i/iL from 1993 through 1994 production

Utilizes a lifetime fill of transmission fluid, no subsequent oil changes are necessary on this transmission. If transmission fluid is required for repair purposes, use only the oil approved for this transmission. It is not permitted to mix this oil with other grades of transmission fluid.

Shell LA 2634, BMW Part No. 83 22 9 407 765.

E34

540i/iT from 1993 through 1995 production

Utilizes a lifetime fill of transmission fluid, no subsequent oil changes are necessary on this transmission. If transmission fluid is required for repair purposes, use only the oil approved for this transmission. It is not permitted to mix this oil with other grades of transmission fluid.

Shell LA 2634, BMW Part No. 83 22 9 407 765.

Effective with model year 1995 and later:

E31

850Ci from 10/94 to 6/97 production

840Ci from 12/95 to 8/96 production

Utilizes lifetime fill of transmission fluid, no subsequent transmission fluid changes are necessary.

Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 711 41, BMW Part No. 83 22 9 407 807.

E38

750iL from 1/95 production to present

740i/iL from 7/94 to 12/96 production

Utilizes lifetime fill of transmission fluid, no subsequent transmission fluid changes are necessary.

Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 711 41, BMW Part No. 83 22 9 407 807.

E39

540i/iT from 3/96 to 12/96 production

Utilizes lifetime fill of transmission fluid, no subsequent transmission fluid changes are necessary.

Never mix any other oil with this transmission fluid when doing repairs or topping up.

ESSO LT 711 41, BMW Part No. 83 22 9 407 807.

GA6HP19Z

E82/E88, E90/91/92

325i, 328i, 330i, 335i, All

The transmission fluid has a Condition Based Service interval of approximately 100,000 miles. Never mix any other oil with this transmission fluid when doing repairs or topping up.

Shell M-1375.4, BMW Part No. 83 22 0 142 516.

E60/61

525i, 530i from 8/03 production to present

The transmission fluid has a Condition Based Service interval of approximately 100,000 miles. Never mix any other oil with this transmission fluid when doing repairs or topping up.

Shell M-1375.4, BMW Part No. 83 22 0 142 516.

GA6HP19ZTU

E70 3.0i from start production to present

The transmission fluid has a Condition Based Service interval of approximately 100,000 miles. Never mix any other oil with this transmission fluid when doing repairs or topping up.

Shell M-1375.4, BMW Part No. 83 22 0 142 516.

GA6HP26Z

E60

545i from 8/03 production to present

550i All

The transmission fluid has a Condition Based Service interval of approximately 100,000 miles. Never mix any other oil with this transmission fluid when doing repairs or topping up.

Shell M-1375.4, BMW Part No. 83 22 0 142 516.

E63, E64

645Ci, 645CiC from start of production to present

650Ci, 650CiC All

The transmission fluid has a Condition Based Service interval of approximately 100,000 miles. Never mix any other oil with this transmission fluid when doing repairs or topping up.

Shell M-1375.4, BMW Part No. 83 22 0 142 516.

E65

745i from 11/2001 production to present

750i All

The transmission fluid has a Condition Based Service interval of approximately 100,000 miles. Never mix any

other oil with this transmission fluid when doing repairs or topping up.

Shell M-1375.4, BMW Part No. 83 22 0 142 516.

E66

745Li from 3/2002 production to present

750Li All

760Li from 9/2002 production to present

The transmission fluid has a Condition Based Service interval of approximately 100,000 miles. Never mix any other oil with this transmission fluid when doing repairs or topping up.

Shell M-1375.4, BMW Part No. 83 22 0 142 516.

GA6HP26ZTU

E70

X5 4.8i from start production to present

The transmission fluid has a Condition Based Service interval of approximately 100,000 miles. Never mix any other oil with this transmission fluid when doing repairs or topping up.

Shell M-1375.4, BMW Part No. 83 22 0 142 516.

4.0 CHECKING TRANSMISSION FLUID LEVEL

Due to the substantial expansion of transmission fluid when heated it is only possible to measure the oil level correctly at specified oil temperatures (after driving a distance of about 12 mi./20 km). All transmissions should be checked between a

ZF 3HP and 4HP

Due to the substantial expansion of transmission fluid when heated it is only possible to measure the oil level correctly at specified oil temperatures (after driving a distance of about 12 mi./20 km).

A5S 560Z, A5S440Z, GA6HP19Z, GA6HP26Z, GA6HP26Z, A5S325Z, A5S 310Z

All 5 and 6 speed transmissions require the fluid to be checked when fluid temperature is between 30-50° Celsius using DIS Plus or GT1. Do not check fluid level after temperature has exceeded 50° Celsius.

A4S 270R, A4S 310R and A5S 360R

See appropriate AUTOMATIC TRANSMISSION article for fluid level check procedure. These transmissions

generally do not have a dipstick and fluid level check (if necessary) must be performed through the oil fill hole.

2400 TRANSMISSION ASSEMBLY

24 00 018 ADJUSTING SELECTOR LEVER (6HP19Z)

NOTE: Check cable for ease of movement.
Move selector lever to "P" position.

Grip clamping sleeve (1).

Loosen nut (2).

Press gearshift lever (3) forwards into park position (P). Press cable (4) in direction of arrow and release again.

Grip clamping sleeve (1).

Tighten nut (2).

Tightening torque, **25 16 2AZ** .

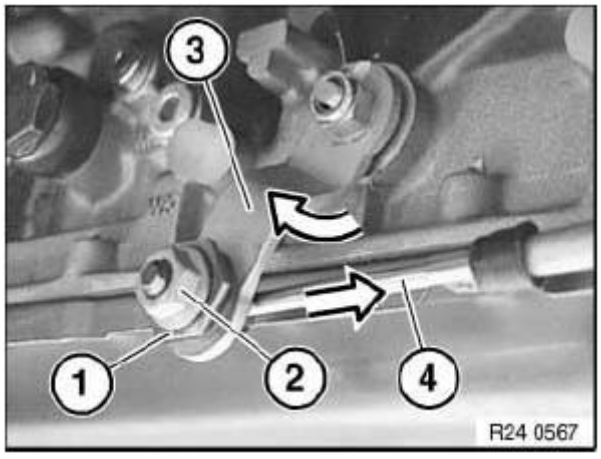


Fig. 1: Pressing Selector Lever And Cable
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Move selector lever to "P" position.

Check whether parking gear is engaged by turning propeller shaft.

00 11 237 CHECKING/TOPPING UP FLUID LEVEL IN AUTOMATIC TRANSMISSION

(GA6HP19Z)

IMPORTANT: Use only the approved AUTOMATIC TRANSMISSION - OPERATING FLUIDS . Failure to comply with this requirement will result in serious damage to the automatic transmission!

Installation:

Tighten down filler plug using

1. Hexagon wrench 8 A/F
2. Torque wrench
3. Socket 8 A/F

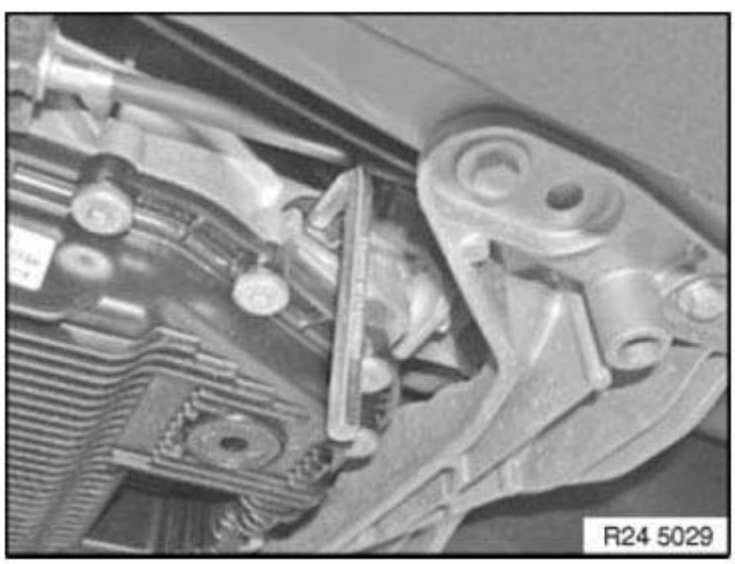


Fig. 2: Tightening Filler Plug Using Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Topping up transmission fluid after a repair

Stand vehicle on a level surface and secure against rolling off.

Undo filler plug (1).

Installation

Replace sealing ring.

Top up transmission fluid until it emerges from filling orifice.

Start engine.

Replenish transmission fluid until it emerges from filling orifice.

Screw in filler plug (1).

Tightening torque: **24 11 7AZ** .

Press brake pedal to floor and shift through gears 1 to 6 several times at idle speed. Then shift selector lever to "P" position (Park).

Then check fluid level.

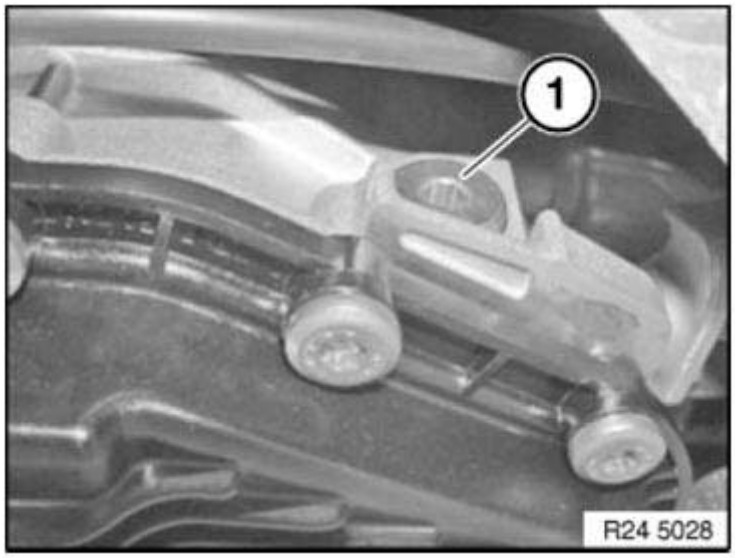


Fig. 3: Identifying Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Checking fluid level

- Connect BMW Diagnosis and Information System (DIS) or BMW MoDiC to car.
- Call up Service functions (drive).
- Carry out fluid level check in accordance with instructions.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness

- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

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24 00 050 INSTALLING REPLACEMENT TRANSMISSION (GA6HP19Z)

Drain automatic transmission fluid at oil drain plug.

Tightening torque: **24 11 6AZ** .

IMPORTANT: After completion of work, program control unit for transmission.

Recycling

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations

IMPORTANT:

- **Before installing replacement transmission, always flush TRANSMISSION FLUID COOLER TOGETHER WITH LINES .**
- **After completion of work, check TRANSMISSION OIL LEVEL .**

Replacement transmission is supplied filled with transmission fluid.

Use only the approved **AUTOMATIC TRANSMISSION - OPERATING FLUIDS** .

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION** .

NOTE: If necessary

Release screws.

Remove and convert transmission bearing block (1).

Tightening torque **24 71 6AZ** .

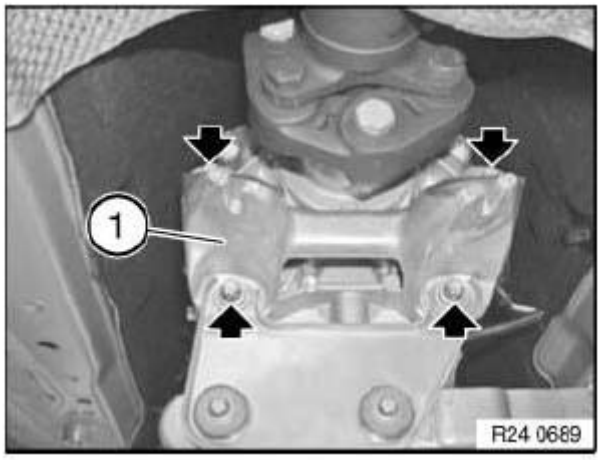

Fig. 4: Locating Transmission Bearing Block Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Convert transportation lock (1).

Convert all cable holders.

Convert all seal plugs.

Convert protective cap on output shaft.

IMPORTANT: After removing transportation lock, secure torque converter against slipping out.

Transmission identification:

- refer to BMW Parts Department.
- On type plate

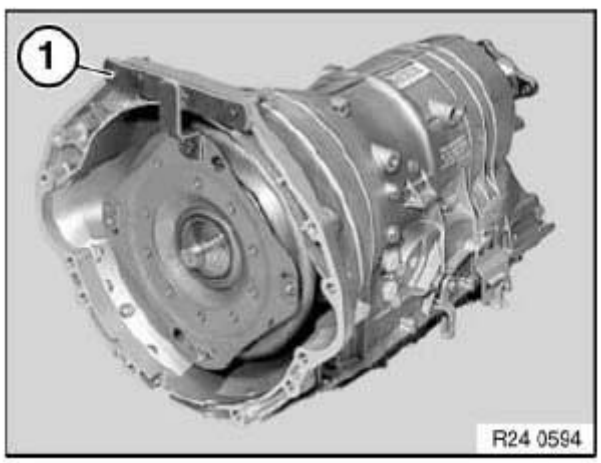

Fig. 5: Identifying Transportation Lock
Courtesy of BMW OF NORTH AMERICA, INC.

24 00 030 REMOVING AND INSTALLING AUTOMATIC TRANSMISSION (6HP19Z) N52K

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only the approved AUTOMATIC TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.

A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released.**

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary tasks

- Remove underbody protection at front and rear
- **REMOVE FAN COWL**
- Remove complete **EXHAUST SYSTEM**
- Remove heat shields

Slacken nut (1).

Remove heat shield (2).

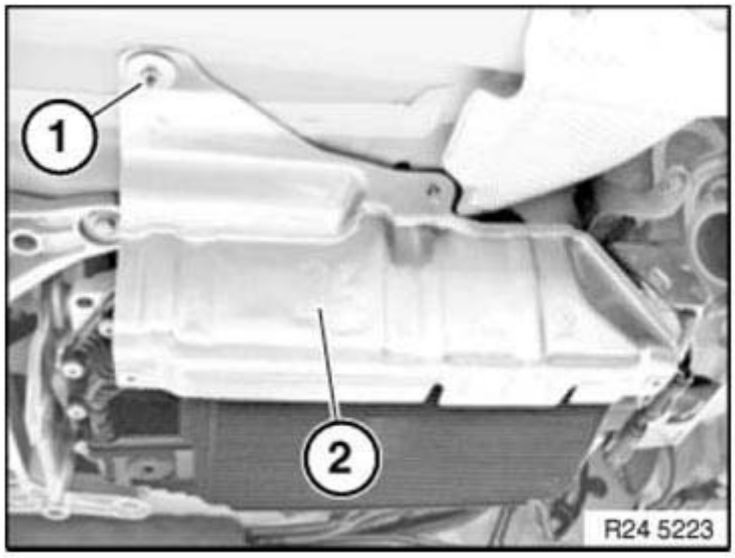

Fig. 6: Identifying Heat Shield With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plug connector (1).

Unfasten screws (2).

Remove cable retaining plate (3).

Tightening torque **24 11 2AZ** .

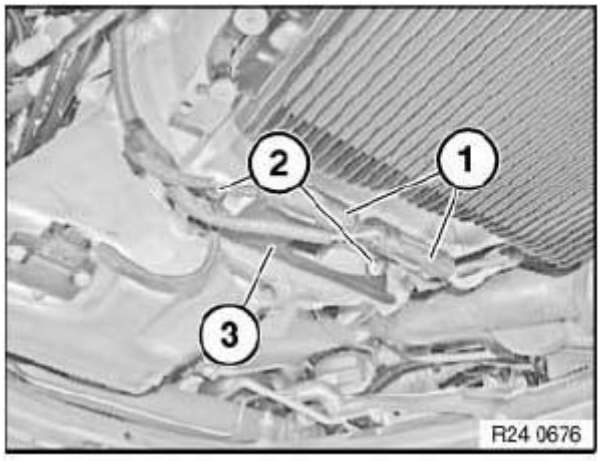

Fig. 7: Identifying Plug Connection And Cable Retaining Plate With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable (1) from holder.

Unfasten screws (2).

Remove bracket (3).

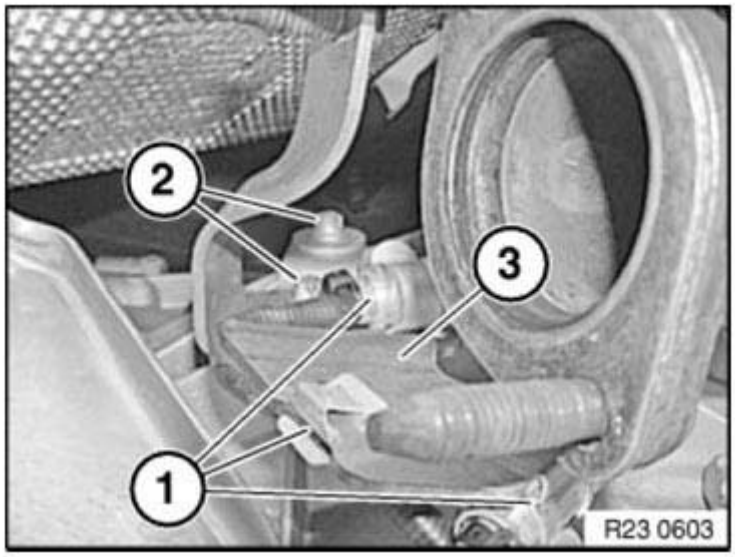

Fig. 8: Identifying Cable Of Holder And Bracket Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release aluminum bolt (1) on right next to cable retaining plate.

Aluminum screws must be replaced.

Tightening torque **24 00 2AZ** .

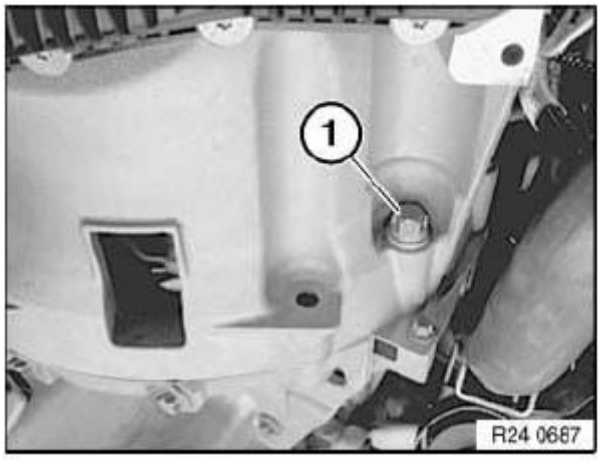

Fig. 9: Identifying Cable Retaining Plate Bolt
Courtesy of BMW OF NORTH AMERICA, INC.

Grip clamping sleeve (1).

Slacken nut (2).

Pull off retainer (3) towards bottom.

Pull cable (4) out of holder.

Installation:

ADJUST SELECTOR LEVER .

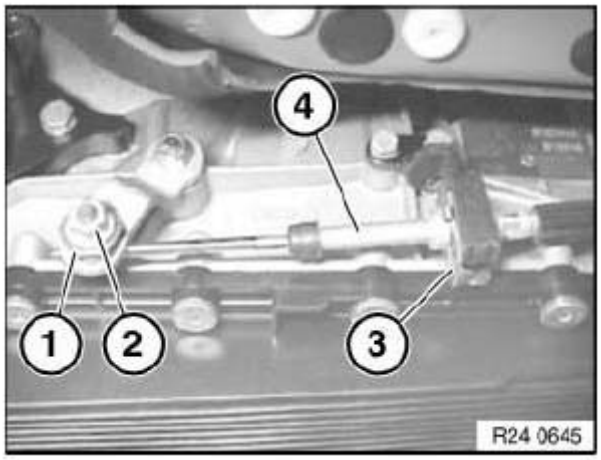

Fig. 10: Identifying Clamping Sleeve, Retainer, Cable And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools 23 4 050, 00 2 030.

Tasks are described in **23 ... UNIVERSAL BMW TRANSMISSION TAKE-UP** .

Secure transmission to mounting with tensioning strap (1).

After completion of work, check transmission oil level.

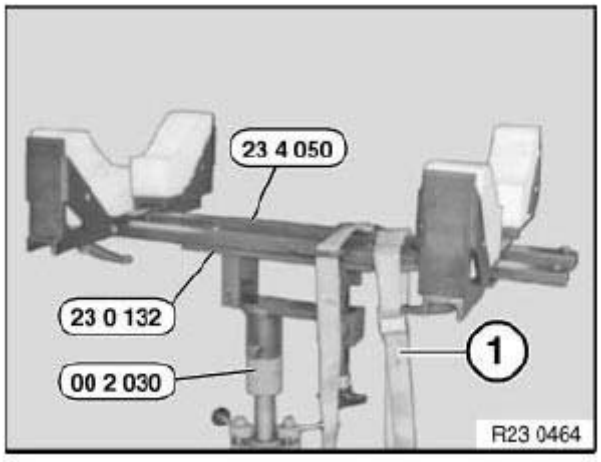

Fig. 11: Supporting Transmission Using Special Tools (23 4 050,00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1) and nuts (2).

Remove transmission cross-member.

Tightening torque **24 71 1AZ/2AZ** .

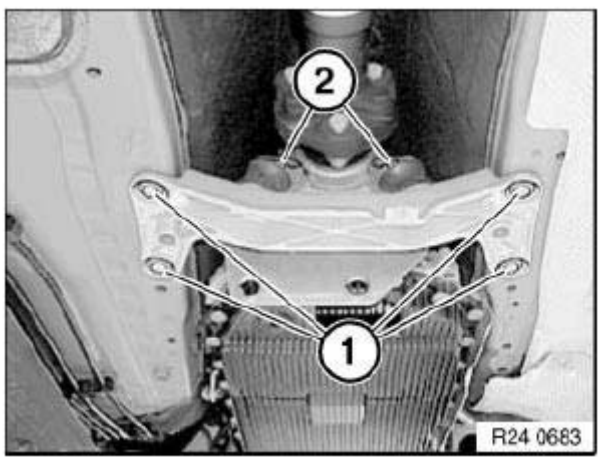

Fig. 12: Identifying Transmission Cross-Member Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove propeller shaft

Tasks are described in **REMOVING AND INSTALLING COMPLETE PROPELLER SHAFT** .

Release nut (1) and bracket from transmission oil lines on oil sump.

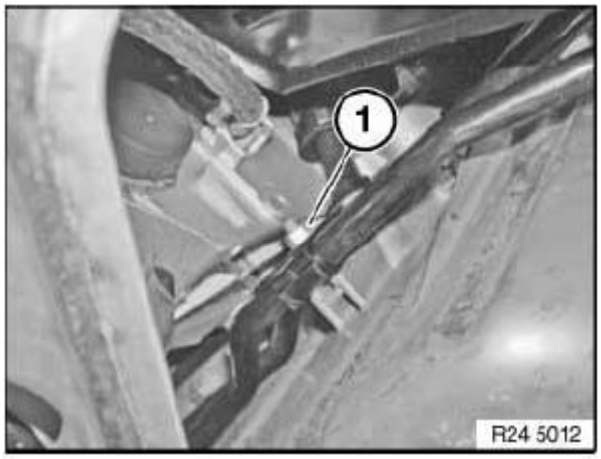

Fig. 13: Identifying Bracket Nut On Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Disconnect hydraulic lines (2) to transmission fluid cooler.

Installation:

Replace sealing rings.

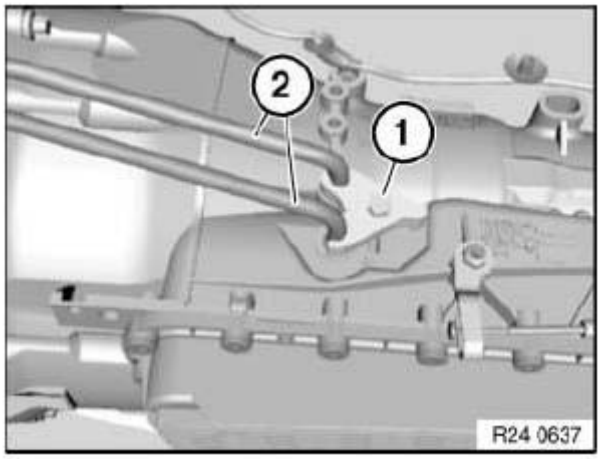

Fig. 14: Identifying Hydraulic Lines Of Transmission Fluid Cooler With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Crank engine at vibration damper in direction of arrow until bolt (1) on vibration damper is visible in opening.

Release all 6 bolts of torque converter with **24 1 110** .

Tightening torque **24 40 1AZ** .

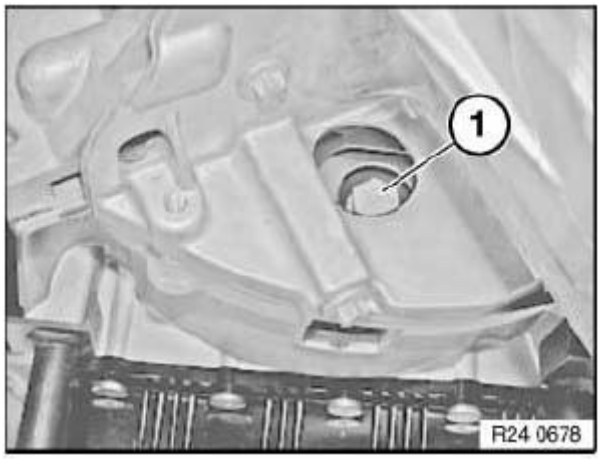

Fig. 15: Identifying Vibration Damper Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Prepare special tool (1) 24 4 161 (A) with shaped element (2) 24 4 165, side (A) to (A).

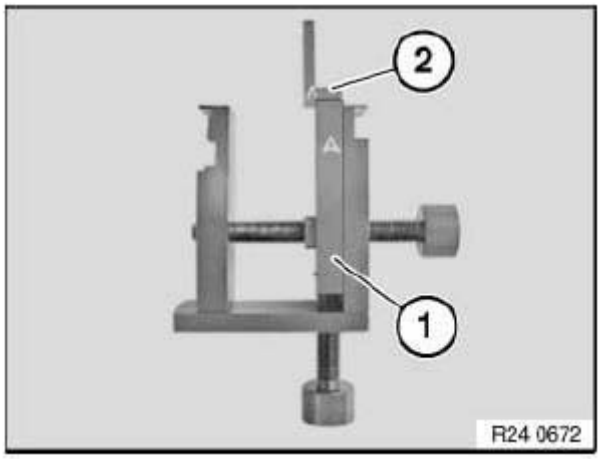

Fig. 16: Identifying Special Tool (24 4 161 And 24 4 165) With Shaped Element
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 24 4 160 into opening of transmission housing and clamp gently with screw (1).

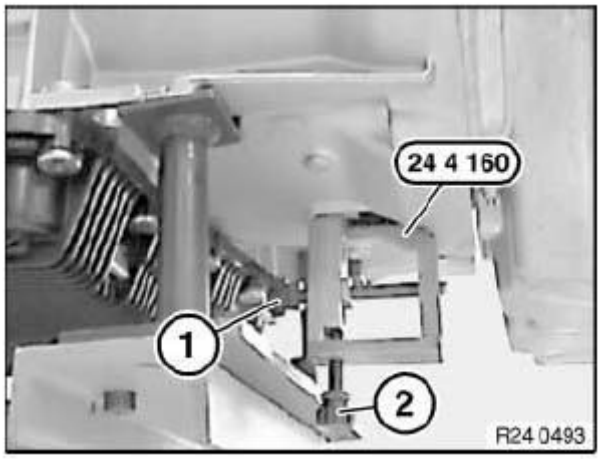

Fig. 17: Inserting Special Tool (24 4 160) Into Opening Of Transmission Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Twist in screw (2) and clamp down.

Then tighten down screw (1).

Graphics show E87.

Lower transmission and lock with a suitable block (1) between steering and oil sump.

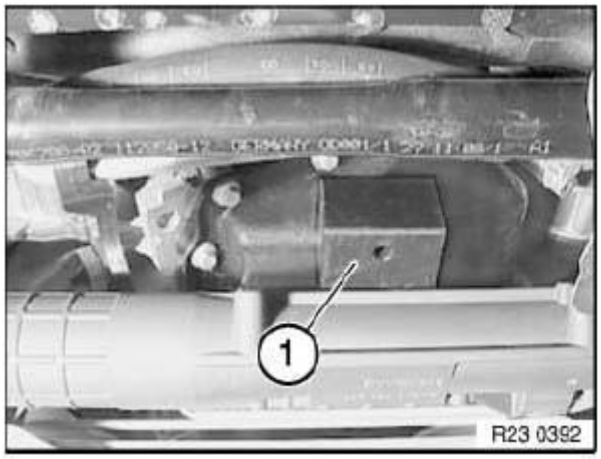

Fig. 18: Identifying Suitable Block Between Steering And Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

- Unlock and disconnect plug (1) by turning.
- Do not touch pins.
- Release cable from retainers.
- Insert special tool 24 2 390 in sealing sleeve.

IMPORTANT: Read and comply with important note.

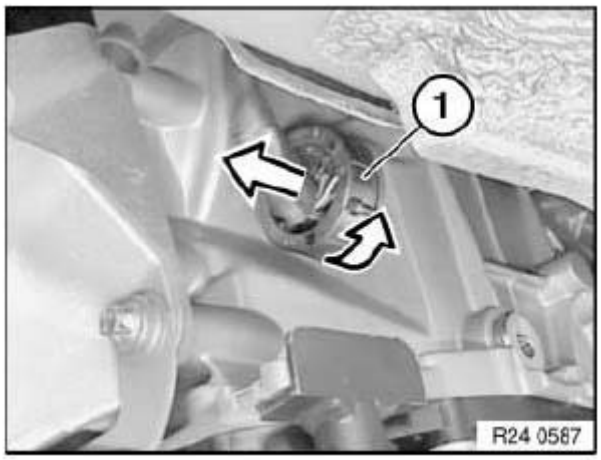

Fig. 19: Turning Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Installation:

Observe **screw fastening sequence** without fail.

Tightening torque, steel screws **24 00 1AZ** .

Aluminum screws **must** be replaced.

Tightening torque and angle of rotation, aluminum screws/bolts **24 00 2AZ** .

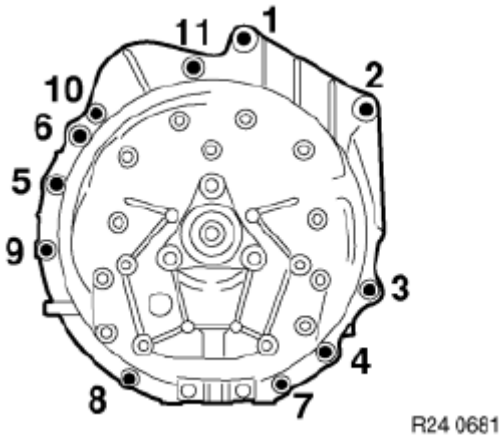

Fig. 20: Identifying Screws Fastening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tighten down screws/bolts to specified torque.

Special angle-of-rotation tool 00 9 120 with magnet **00 9 130**

Secure to floor plate and screw down aluminum screws/bolts in accordance with angle of rotation.

Angle of rotation **24 00 2AZ** .

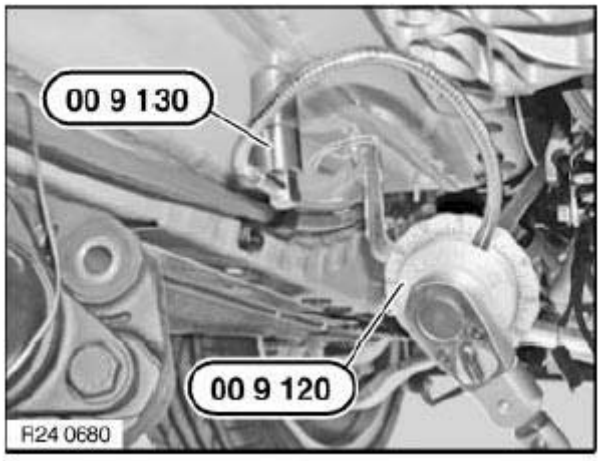

Fig. 21: Identifying Special Tool (00 9 120) And Magnet (00 9 130)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Hole (1) of drive plate must be accessible from opening on engine oil sump. Check fitting sleeves (2, 3) for correct seating.

Replace damaged dowel sleeves.

NOTE: Graphic representation similar.

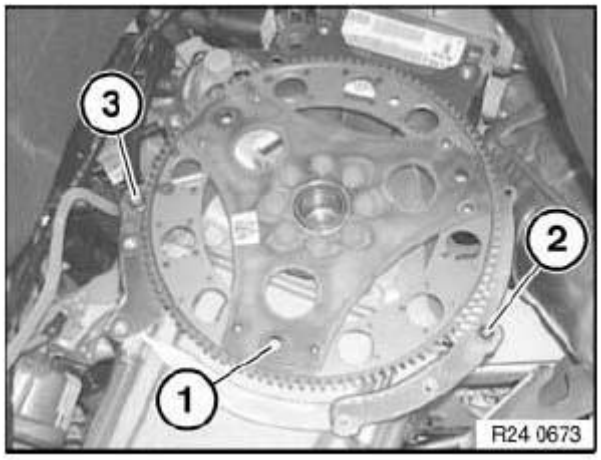

Fig. 22: Identifying Hole Of Drive Plate And Fitting Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Rotate torque converter until bore in torque converter is flush with bore in driving disc.

Bolt torque converter to drive plate.

Tightening torque **24 40 1AZ** .

Flange automatic transmission to engine.

Reassemble the vehicle.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves

- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

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- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

23 TRANSMISSION DESIGNATIONS

Breakdown of BMW designation:

BREAKDOWN OF BMW DESIGNATION

A5S 300J (former designation)		
A	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
5	Number of forward gears	
S	Type of top gear	○ D = Direct gear ○ S = Overdrive gear
300	Max. input torque (Nm)	
J	Code letter of transmission manufacturer	○ G = Getrag ○ J = Jatco ○ R = GMPT (General Motors Powertrain) ○ Z = ZF (Zahnradfabrik Friedrichshafen)
SMG	Notes	SMG = Sequential M gearbox/transmission

SEQUENTIAL M GEARBOX/TRANSMISSION DESIGNATION

GS6-37BZ (new designation according to BMW Group Standard GS 90007)		
G	Transmission	
S	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
6	Number of forward gears	
-		○ - = Standard with manual gearshift ○ HP = Hydraulic planetary gear train ○ DKG= Twin-clutch transmission/gearbox

37	Transmission type	○ 26 = D-transmission ○ 31 = C-transmission ○ 39 = F-transmission ○ 37 = H-transmission ○ 53 = G-transmission ○ 17 = I-transmission ○ 47= J transmission SMG -7-speed ○ 45 = K transmission ○ 36= Transmission DKG
B	Gear set	○ B = Petrol gear ratio ○ D = Diesel gear ratio ○ S= Sport gear ratio
Z	Code letter of transmission manufacturer	○ G = Getrag ○ Z = ZF (Zahnradfabrik Friedrichshafen)

Manual gearbox

MANUAL GEARBOX DESIGNATION

BMW designation	Manufacturer	Manufacturer designation	Remarks
S5D 200G	Getrag	B transmission (220/5)	
S5D 200G	Getrag	B transmission (221/5)	for M41 engine only
S5D 250G	Getrag	B transmission (220/5)	Reinforced design
S5D 260Z	ZF	C-transmission (S5-31 D)	for M51 engine only
S5D 280Z	ZF	C-transmission (S5-31)	
S5D 310Z	ZF	C-transmission (S5-31)	up to 9.95
S5D 320Z	ZF	C-transmission (S5-31)	from 9.95 (reinforced design)
GS5S31BZ (SMG)	ZF	C transmission	SMG
GS5-39DZ	ZF	F transmission	
S6S 420G	Getrag	D-transmission (226/6)	
S6S 420G (SMG)	Getrag	D transmission	SMG
S6S 560G	Getrag	E-transmission (286/6)	
GS6-37BZ	ZF	H-transmission	
GS6S37BZ (SMG)	ZF	H-transmission	
GS6-37DZ	ZF	H-transmission	
GS6-37BG	Getrag	H-transmission	
GS6-53BZ	ZF	G-transmission	

GS6-53DZ	ZF	G-transmission	
GS6-17BG	Getrag	I-transmission	
GS6-17DG	Getrag	I-transmission	
GS7S47BG (SMG)	Getrag	J-transmission (247)	SMG -7-speed
GS7D36SG	Getrag	DKG (436)	DKG -7-speed
GS6- 45BZ	ZF	K transmission	
GS6- 45DZ	ZF	K transmission	

Automatic transmission

AUTOMATIC TRANSMISSION DESIGNATION

BMW designation	Manufacturer	Manufacturer designation	Remarks
A4S 200R	GMPT	GM4	
A4S 270R	GMPT	THM-R1w	Transmission wide-stepped
A4S 310R	GMPT	THM-R1	
A5S 300J	Jatco	Jatco	
A5S 310Z	ZF	5HP-18	
A5S 325Z	ZF	5HP-19	
A5S 440Z	ZF	5HP-24	
A5S 560Z	ZF	5HP-30	
A5S 360R/390R	GM	GM5	
GA6HP19Z	ZF	6HP19	
GA6HP26Z	ZF	6HP26	
GA6HP32Z	ZF	6HP32	
GA6L45R	GM	GM6	
GA8HP45Z	ZF	8HP45	
GA8HP70Z	ZF	8HP70	
GA8HP90Z	ZF	8HP90	
GA7AHSCD	Daimler	AHS-C	Hybrid

23 ... UNIVERSAL BMW TRANSMISSION TAKE-UP

NOTE:

- **The universal transmission bracket is introduced for the E60 AWD**
- **Suitable for manual and automatic transmissions**

IMPORTANT: Front and rear supports (1) can be laterally adjusted by means of screws (2). Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.
Supports must be adapted in length and width to the transmission.

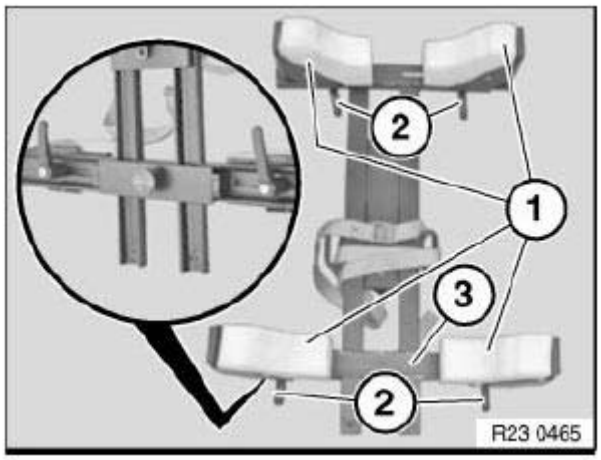


Fig. 23: Identifying Front And Rear Supports And Carrier With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools 23 4 050, 00 2 030.

IMPORTANT: Transmission must be secured with tensioning strap (1).

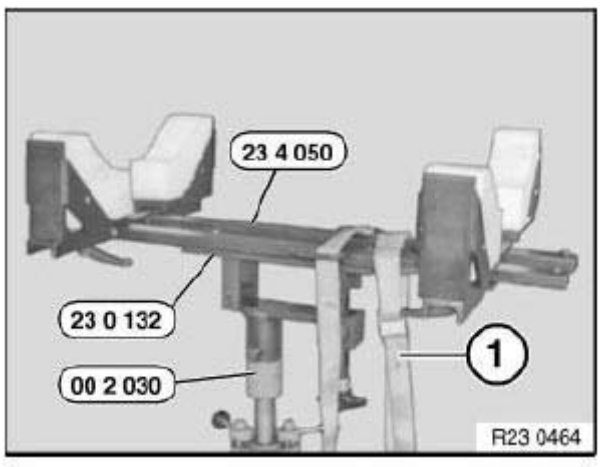


Fig. 24: Supporting Transmission With Special Tools (23 4 050,00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

23 .. ... UNIVERSAL TRANSMISSION RETAINING BRIDGE

NOTE:

- **The transmission retaining bridge 24 0 200 is suitable for both manual and automatic transmissions**

IMPORTANT: Adapters and spindles must be adapted for positive locking to the transmission.
(Risk of injury)

Adapt adapters (1) and spindle with thrust piece (3) to transmission.

Adapt length with slide (2).

Screw in spindle (4).

IMPORTANT: Before mounting on assembly stand 00 1 450, check retaining bridge for secure seating.

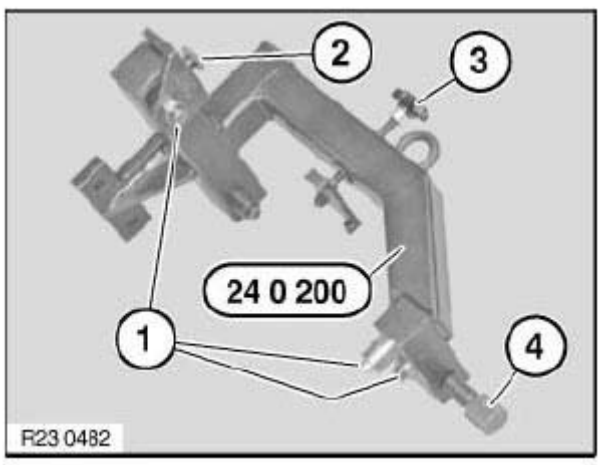


Fig. 25: Checking Universal Transmission Retaining Bridge Using Special Tool (00 1 450)
Courtesy of BMW OF NORTH AMERICA, INC.

2411 TRANSMISSION CASE, OIL SUMP

24 11 011 REMOVING AND INSTALLING/SEALING OR REPLACING TRANSMISSION SUMP (GA6HP19Z)

IMPORTANT: Remove transmission sump only after it has cooled down.
After completion of work, check TRANSMISSION OIL LEVEL .
Use only the approved AUTOMATIC TRANSMISSION - OPERATING FLUIDS .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Recycling

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations.

Necessary preliminary tasks

Remove rear underbody protection.

Remove oil drain plug (1).

Tightening torque: **24 11 6AZ** .

Drain automatic transmission fluid.

Installation:

Replace oil drain plug.

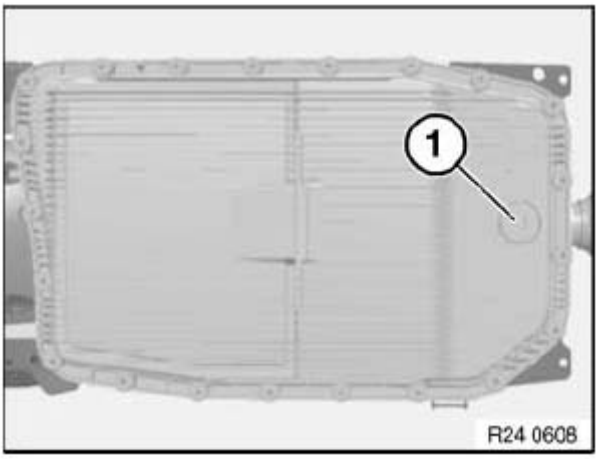


Fig. 26: Identifying Oil Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew all bolts.

Remove transmission sump (1).

Installation:

Insert screws (2) until screw heads make contact.

Insert all further screws in diagonal sequence from inside to outside until screw heads make contact.

Tightening torque: **24 11 5AZ** .

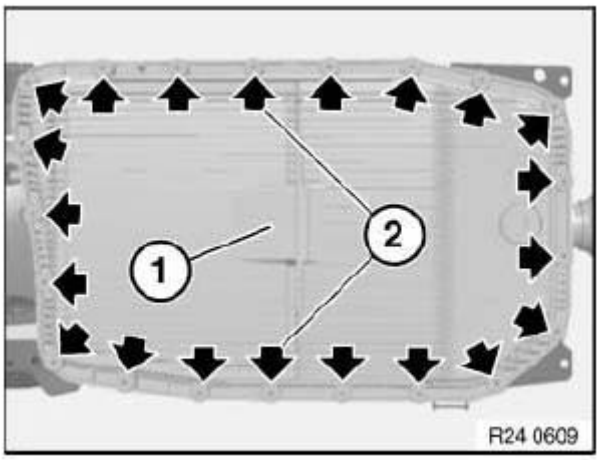


Fig. 27: Locating Transmission Sump Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Remove gasket (1) from transmission sump.

Clean sealing faces and groove with a cloth.

Insert new gasket in transmission sump groove.

IMPORTANT: Do not degrease transmission sump with cleaning agent.

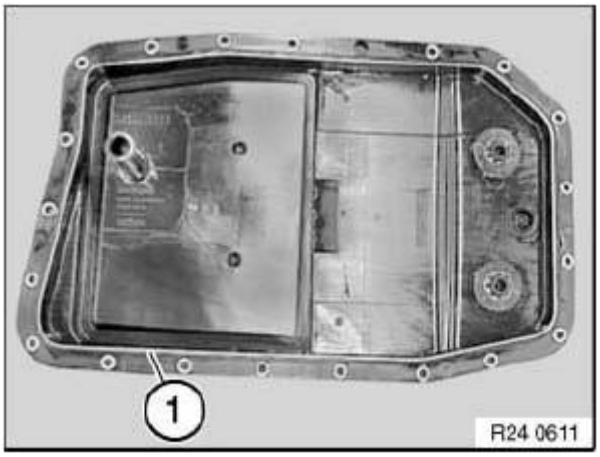


Fig. 28: Identifying Gasket Of Transmission Sump
Courtesy of BMW OF NORTH AMERICA, INC.

Replace sealing ring (1) on oil filter tube.

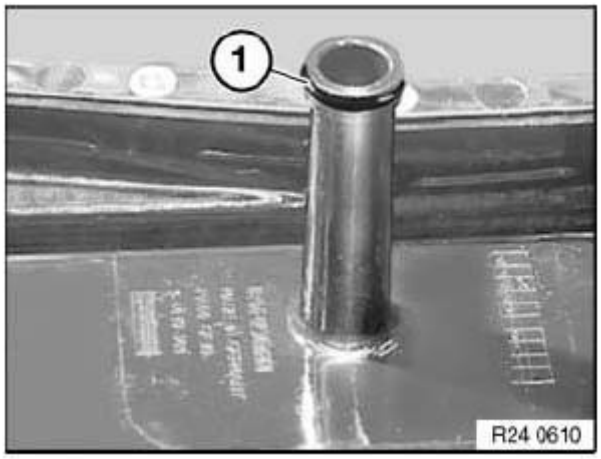


Fig. 29: Identifying Sealing Ring On Oil Filter Tube
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

The gasket is correctly installed when it is engaged in the locating opening of the transmission sump.

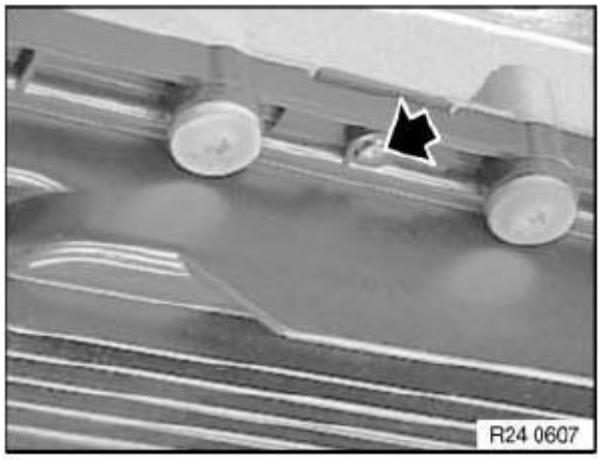


Fig. 30: Identifying Gasket Of Transmission Sump
Courtesy of BMW OF NORTH AMERICA, INC.

2413 EXTENSION HOUSING, BEARINGS, SEAL

24 13 013 REPLACING OUTPUT FLANGE SHAFT SEAL (GA6HP19Z)

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only the approved AUTOMATIC TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks

- Remove **UNDERBODY PROTECTION**
- Remove complete **EXHAUST SYSTEM**
- Remove heat shields
- Support transmission with engine support.
- Remove **TRANSMISSION CROSS-MEMBER** .
- Remove **PROPELLER SHAFT**

Release screws.

Remove transmission bearing block (1).

Tightening torque **24 71 6AZ** .

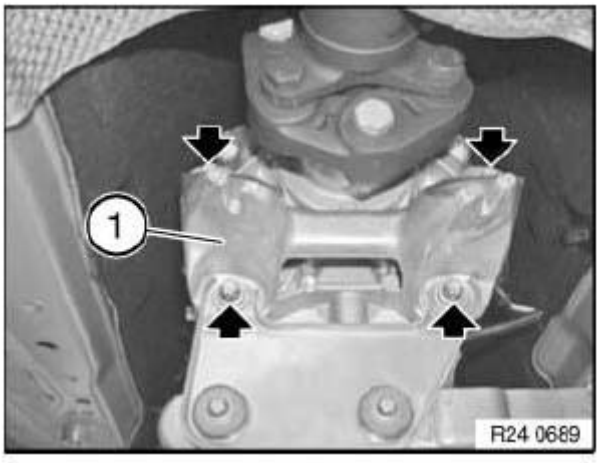


Fig. 31: Identifying Transmission Bearing Block Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Grip output flange (1) with special tool **24-0 020** .

Release nut with special tool 24 2 380.

Tightening torque: **24 13 2AZ** .

Installation:

Replace nut and secure with a mandrel (8 mm) by caulking.

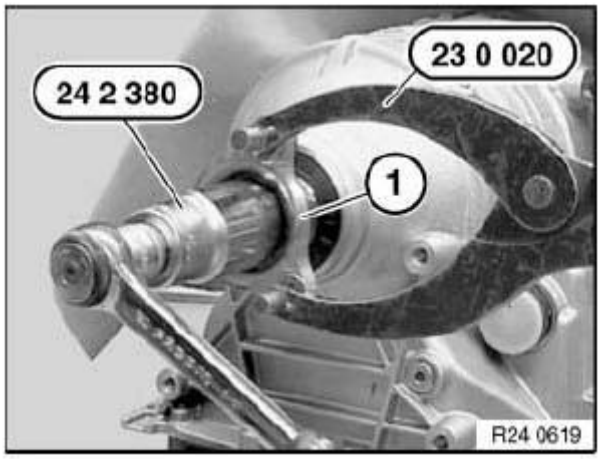


Fig. 32: Gripping Output Flange From Output Shaft Using Special Tool 23 0 020
Courtesy of BMW OF NORTH AMERICA, INC.

Detach output flange from output shaft.

Remove spacer.

Attach special tool 24 2 353 to output shaft (1).

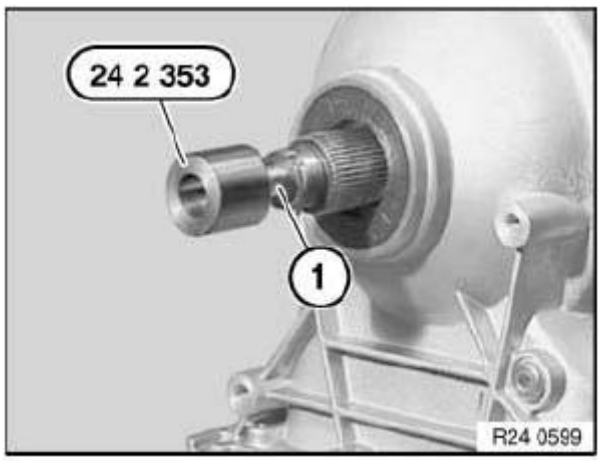


Fig. 33: Connecting Special Tool (24 2 353) To Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 2 351 until it is firmly connected with radial shaft seal hat.

Pull out radial shaft seal by screwing in special tool 24 2 352.

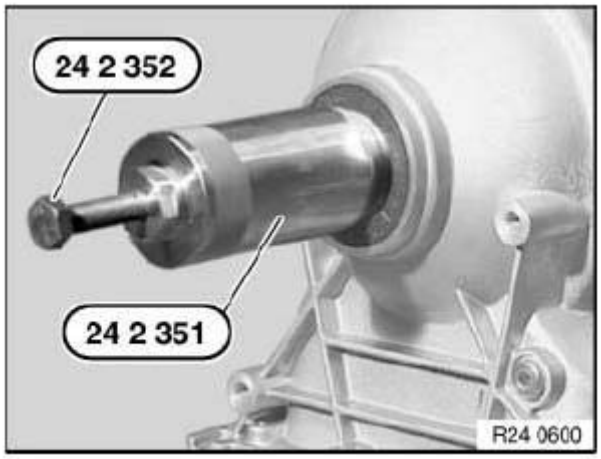


Fig. 34: Pulling Out Radial Shaft Seal Using Special Tool (24 2 352)
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip of radial shaft seal (1). Drive in radial shaft seal (1) as far as it will go using special tool 24 2 370 and adapter ring **24 2 410** .

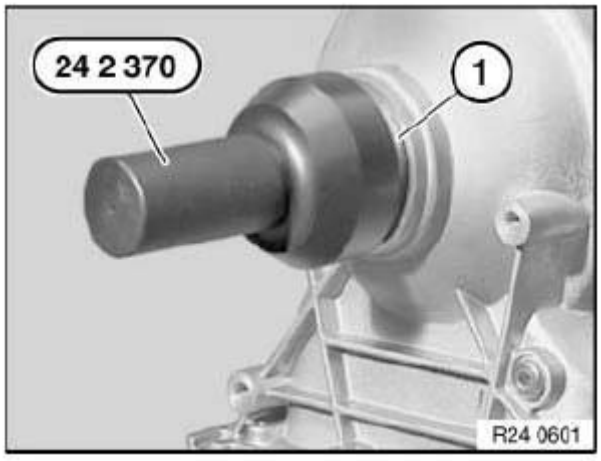


Fig. 35: Driving Radial Shaft Seal Using Special Tools (24 2 370, 24 2 370)
Courtesy of BMW OF NORTH AMERICA, INC.

2414 MECHANICAL ATTACHMENTS

24 14 002 REPLACING SHAFT SEAL FOR SELECTOR SHAFT (GA6HP19Z)

Special tools required

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only the approved AUTOMATIC TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks

- Remove heat shields

Brace clamping bush (1) and loosen nut (2).

Detach retainer (3) downwards using a screwdriver.

Pull cable (4) out of holder.

Installation:

ADJUST SELECTOR LEVER .

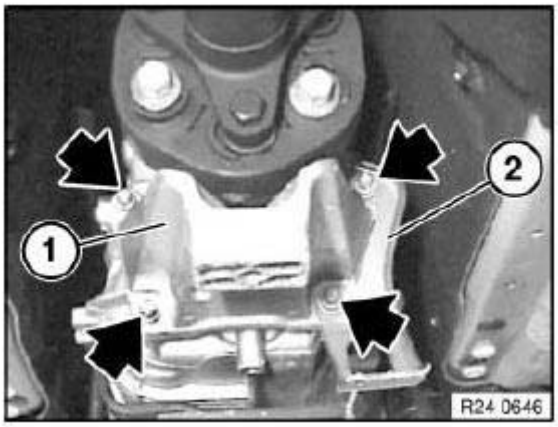


Fig. 36: Identifying Clamping Bush, Cable Of Holder And Retainer With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Slacken nut (1).

Take off holder (2).

Tightening torque **24 51 1AZ** .

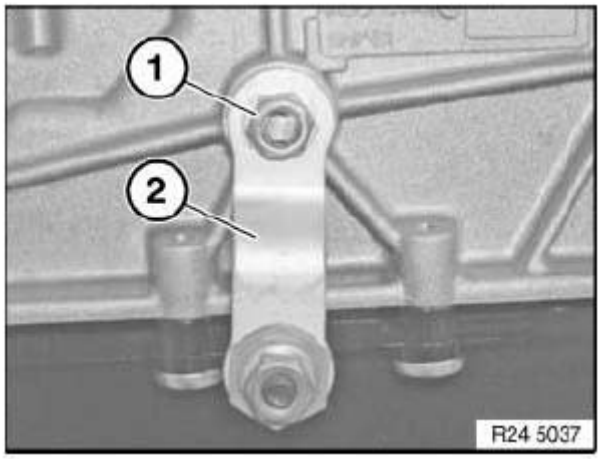


Fig. 37: Identifying Holder With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 5 361 until it is firmly connected with radial shaft seal hat.

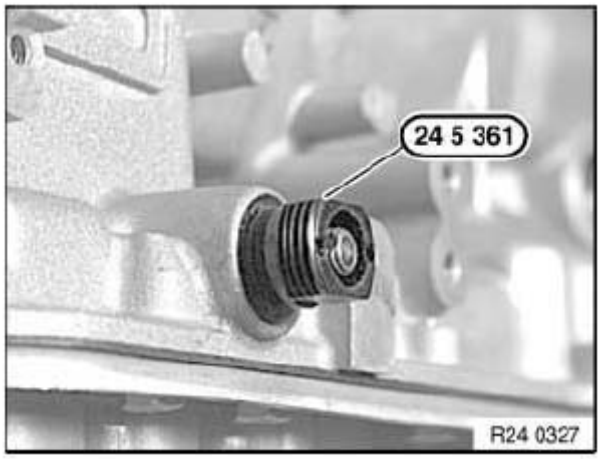


Fig. 38: Identifying Radial Shaft Seal With Special Tool (24 5 361)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 24 5 362 onto special tool 24 5 361 and tighten down.

This pulls the shaft seal out of the transmission housing.

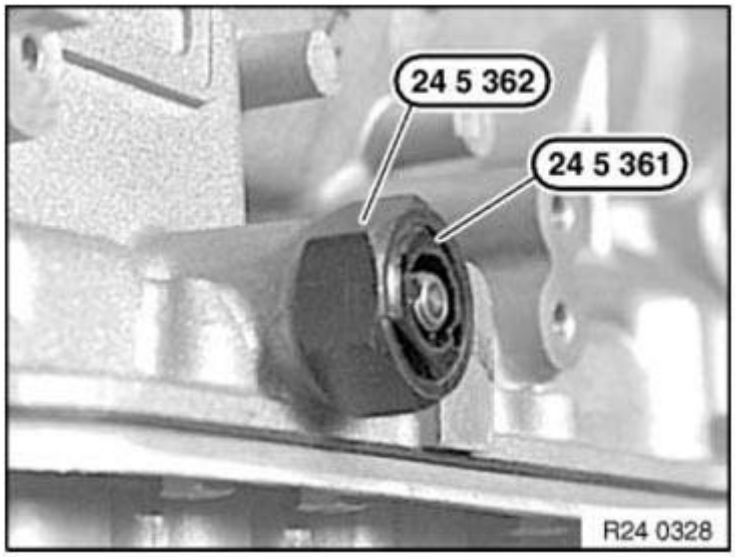


Fig. 39: Identifying Special Tools (24 5 362, 24 5 361)
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal (1).

Screw in radial shaft seal (1) with special tools 24 5 366 and 24 5 364 as far as it will go.

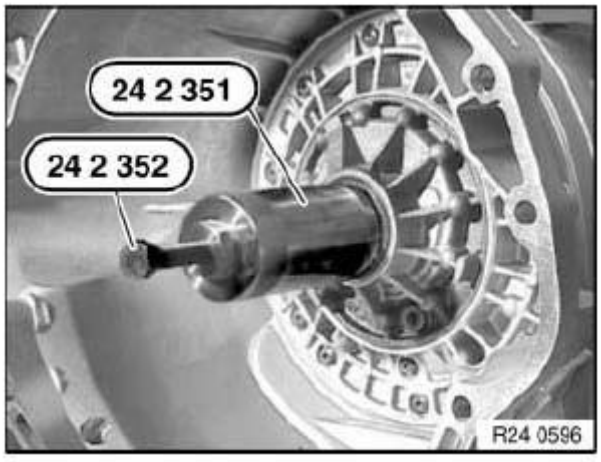


Fig. 40: Installing Radial Shaft Seal Using Special Tool (24 2 351) And (24 2 352)
Courtesy of BMW OF NORTH AMERICA, INC.

2431 OIL PUMP

24 31 011 REPLACING TORQUE CONVERTER FLANGE SHAFT SEAL (GA6HP19Z)

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION** .

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved AUTOMATIC TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this instruction will result in serious damage to the transmission.

Secure transmission with special tool 24 0 200 on assembly stand 00 1 450.

Remove **TORQUE CONVERTER** .

NOTE: Read and comply with note on installation of TRANSMISSION RETAINING BRIDGE .

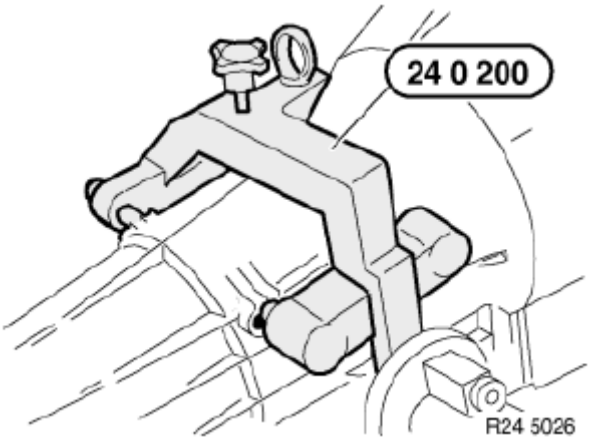


Fig. 41: Identifying Screw Special Tool 24 0 200
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 24 2 353 to input shaft (1).

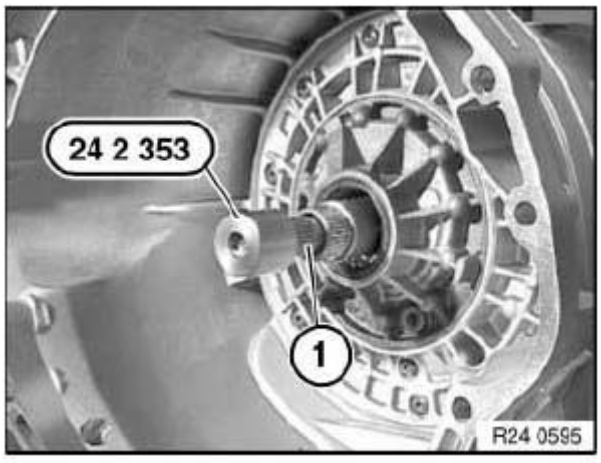


Fig. 42: Connecting Special Tool (24 2 353) To Drive Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 2 351 until it is firmly connected with radial shaft seal.

Screw in special tool 24 2 352 to remove radial shaft seal.

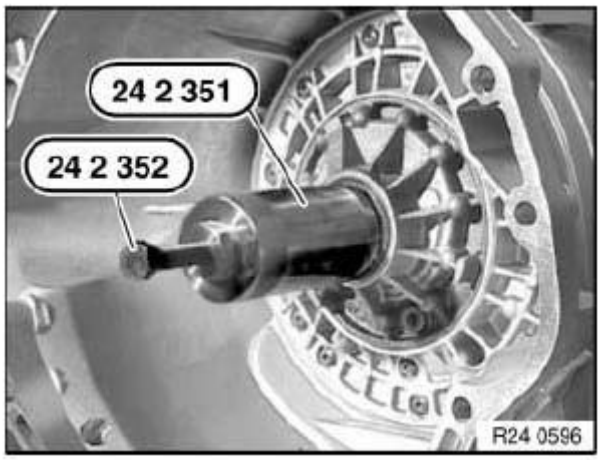


Fig. 43: Removing Radial Shaft Seal Using Special Tool (24 2 351) And (24 2 352)
Courtesy of BMW OF NORTH AMERICA, INC.

Oil sealing lip on shaft seal.

Drive in radial shaft seal (1) with special tool 24 2 400 as far as it will go.

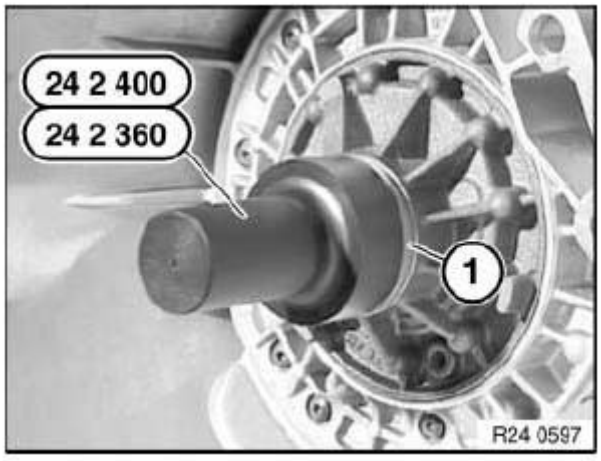


Fig. 44: Installing Radial Shaft Seal Using Special Tool 24 2 400
Courtesy of BMW OF NORTH AMERICA, INC.

2434 SHIFT VALVES, PARKING LOCK

24 34 ... NOTES ON MECHATRONICS (GA6HP26Z/GA6HP32Z

IMPORTANT: After completing work:

- Load specific data version with DIS
- Check **TRANSMISSION OIL LEVEL**

Use only **AUTOMATIC TRANSMISSION - OPERATING FLUIDS** .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Unscrew plug (1) and disconnect.

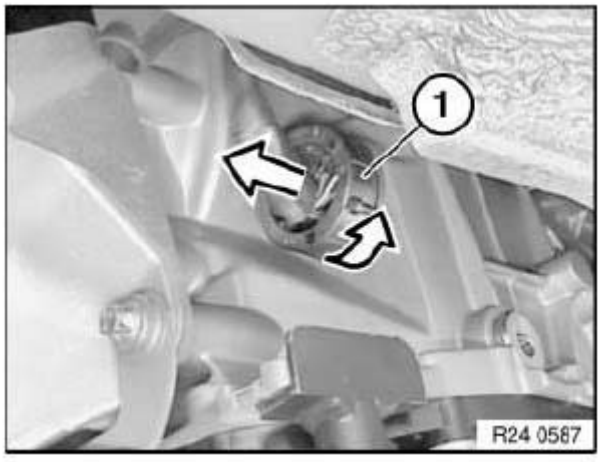


Fig. 45: Disconnecting Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 24 2 390 in sealing sleeve (1).

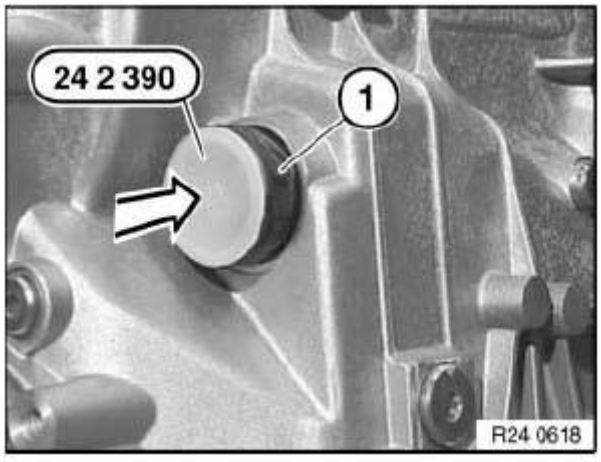


Fig. 46: Inserting Sealing Sleeve Using Special Tool (24 2 390)
Courtesy of BMW OF NORTH AMERICA, INC.

24 34 ... RELEASE TRANSMISSION LOCK ELECTRONICALLY

For various tasks, it is necessary to unlock and lock the parking lock.

Before unlocking the parking lock, secure the vehicle against rolling away.

- Emergency release is only possible if the engine does not start and the starter turns over.
- If an emergency release needs to be performed although the engine starts, pull out the fuse of the electrical fuel pump.
- Emergency release is active for 15 min.
- As soon as a wheel speed signal is recorded, this time increases by 15 min.
- After this period, the parking lock is engaged without a message.
- The time specification depends on the battery capacity.
- Only specially trained service personnel are permitted to operate both the mechanical as well as the electrical emergency transmission release system.
- The vehicle must be raised and the underbody panelling removed in order to operate the mechanical emergency transmission release.

IMPORTANT: To operate the electronic emergency transmission release the vehicle must not be towed but rather only pushed.
In the case of misuse, a corresponding fault code is stored in the fault code memory.

Release transmission lock electronically

- Switch the ignition on.
- Press on brake pedal and keep depressed throughout the procedure.
- Press START-STOP button.
- As soon as the starter can be heard to operate (this may take several seconds on diesel engines or at low temperatures).
- Press and hold release button (1).

Fig. 47: Identifying Transmission Release Button
Courtesy of BMW OF NORTH AMERICA, INC.

1. The specified time must be adhere to!
2. Push gear selector switch (2) forward up to pressure point and hold for two seconds.
3. Release gear selector switch and move one step forward briefly.

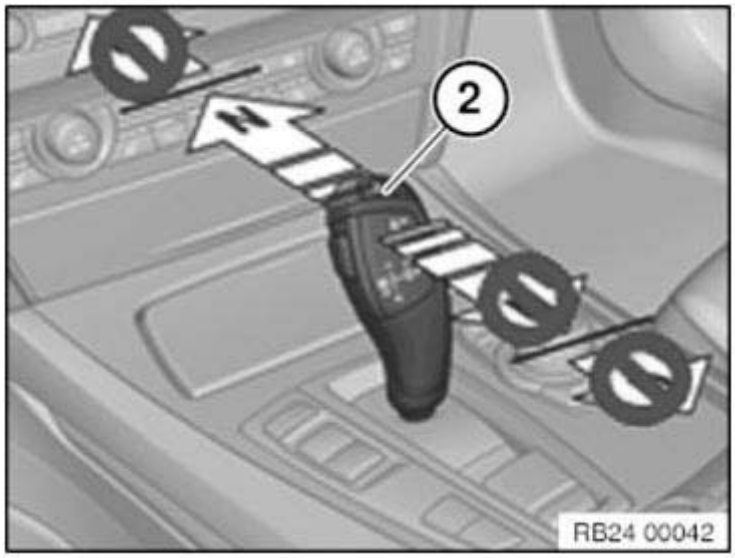


Fig. 48: Identifying Gear Selector Switch
Courtesy of BMW OF NORTH AMERICA, INC.

- Gear position N is shown in the instrument cluster.
- The parking lock is now electronically unlocked.
- After the parking lock is successfully unlocked, release the brake pedal.

- Leave the ignition switched on in order to subsequently move the vehicle.
- The transmission automatically shifts into P when the ignition is turned off.

Fig. 49: Identifying Gear Position N
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: After the start-stop button is pressed again, the parking lock is activated without a message.
If the gearbox cannot be released, turn the ignition off and on again and repeat the previous steps.
Allow the starter to cool down for approx. 10 minutes after unsuccessful attempts.

24 34 562 REPLACING MECHATRONICS (GA6HP19Z)

NOTE: After completing work:

- Load specific data version with DIS.

IMPORTANT: After completion of work, CHECK TRANSMISSION OIL LEVEL .
Use only AUTOMATIC TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this requirement will result in serious damage to the automatic transmission!

IMPORTANT: Read and comply with notes on PROTECTION AGAINST ELECTROSTATIC DISCHARGE (ESD PROTECTION) .

Necessary preliminary tasks

- Remove heat shields.
- Support automatic transmission with hydraulic lifter.
- Remove **TRANSMISSION CROSS-MEMBER** .

Brace clamping bush (1) and loosen nut (2).

Detach retainer (3) downwards using a screwdriver.

Pull cable (4) out of holder.

Installation:

ADJUST SELECTOR LEVER .

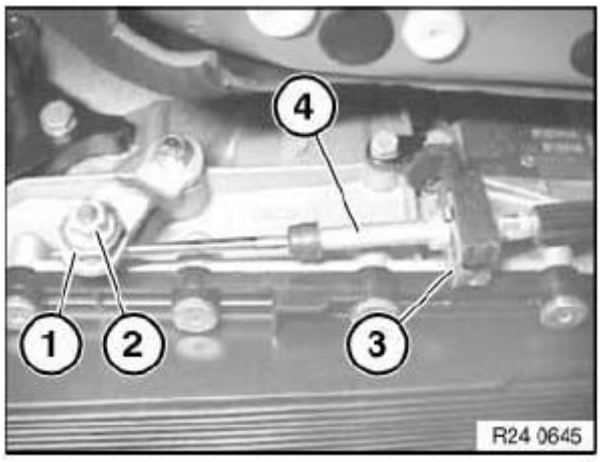


Fig. 50: Identifying Clamping Bush Cable, Retainer With Nut
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Mechatronics can be destroyed by static discharges. Therefore the contacts inside the plug must not be touched. Insert special tool immediately after work step.

Unscrew plug (1) and disconnect.

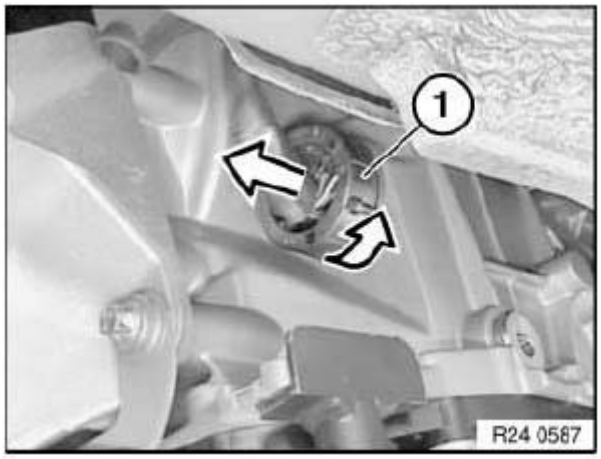


Fig. 51: Disconnecting Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 24 2 390 in sealing sleeve (1).

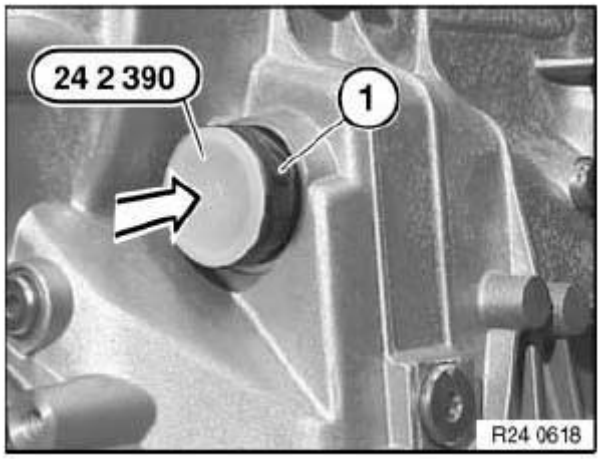


Fig. 52: Inserting Sealing Sleeve Using Special Tool (24 2 390)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **TRANSMISSION OIL SUMP** .

Unlock sealing sleeve with slide (1).

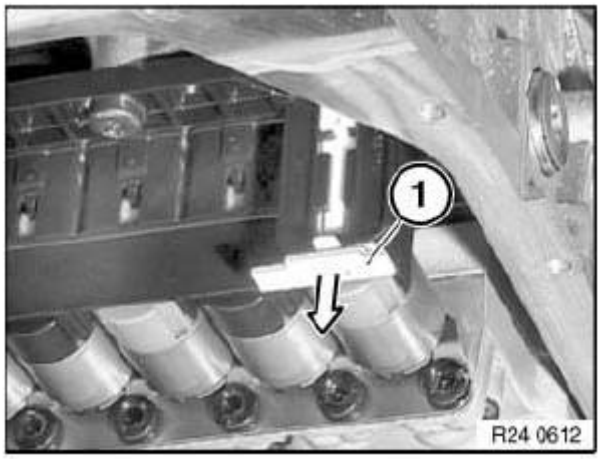


Fig. 53: Removing Sleeve With Slide
Courtesy of BMW OF NORTH AMERICA, INC.

Note position of sealing sleeve.

Pull out sealing sleeve (1).

Installation:

Screw in sealing sleeve partially (lug in upper area). Turn until lug engages in groove of transmission. Slide in sealing sleeve.

Lug on sealing sleeve must not be damaged!

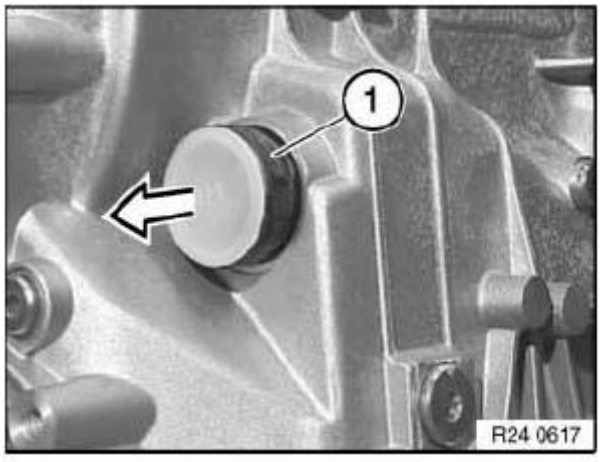


Fig. 54: Pulling Out Sealing Cup
Courtesy of BMW OF NORTH AMERICA, INC.

Release all screws (1 and 2).

- 1 = M6 x 59 mm

- 2 = M6 x 20 mm

Remove mechatronics.

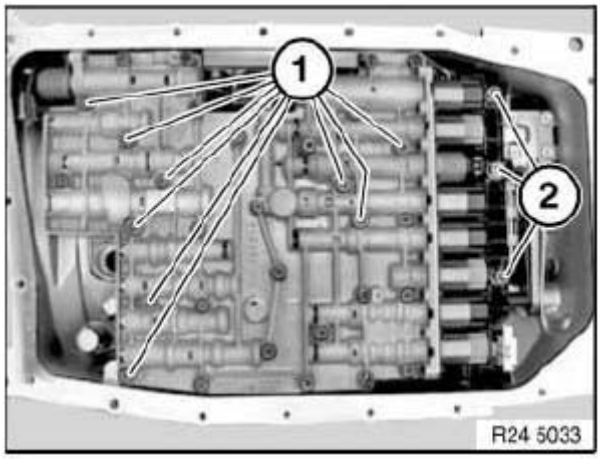


Fig. 55: Identifying Mechatronics Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check gaskets (1 and 2) for damage, replace gaskets if necessary.

Coat new seals with automatic transmission fluid and install.

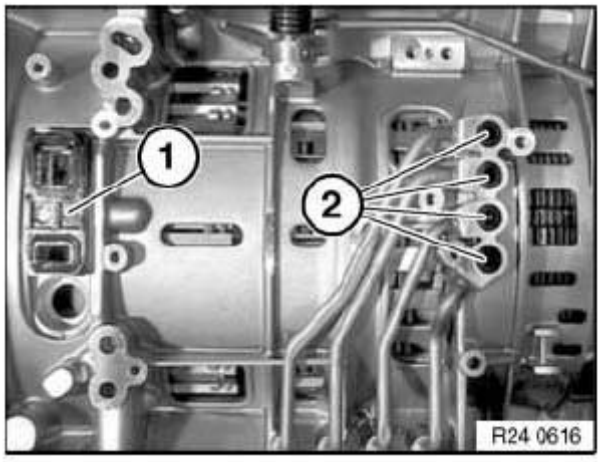


Fig. 56: Identifying Gaskets
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Insert screws (3) alternately until contact is made with each screw head.

Insert all further screws contact is made with each screw head.

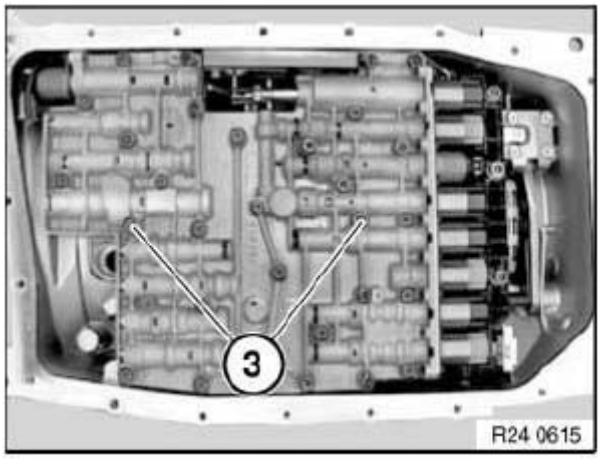


Fig. 57: Identifying Screw Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: GA6HP19Z TU

IMPORTANT: Tighten down screws in order 1...13.
Failure to comply with this requirement will result in serious damage to the automatic transmission!
Tightening torque 24 30 1AZ .

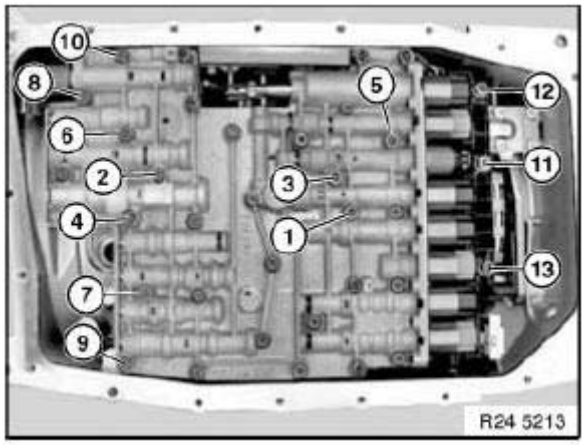


Fig. 58: Identifying Screw Head Screws
Courtesy of BMW OF NORTH AMERICA, INC.

24 34 021 REPLACING SEALING SLEEVE FOR TRANSMISSION HOUSING (GA6HP19Z)

IMPORTANT: After completion of work, CHECK TRANSMISSION OIL LEVEL .
Use only AUTOMATIC TRANSMISSION - OPERATING FLUIDS .

Failure to comply with this requirement will result in serious damage to the automatic transmission!

Necessary preliminary tasks

- Remove heat shields
- Remove **TRANSMISSION FLUID SUMP**
- Remove **TRANSMISSION CROSS-MEMBER** .

IMPORTANT: Support transmission with workshop hoist.

Unlock and disconnect plug (1) by turning.

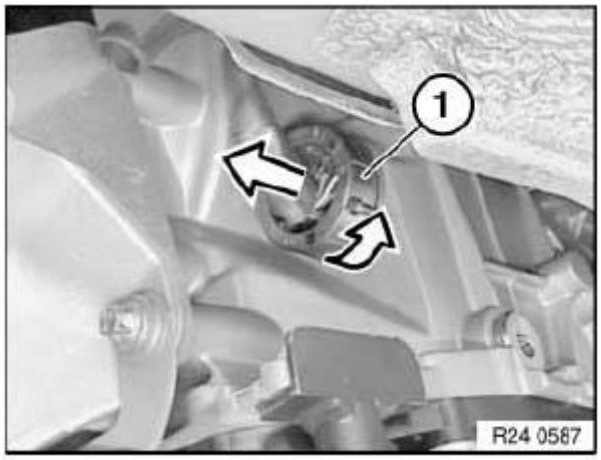


Fig. 59: Turning Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 24 2 390 in sealing sleeve (1).

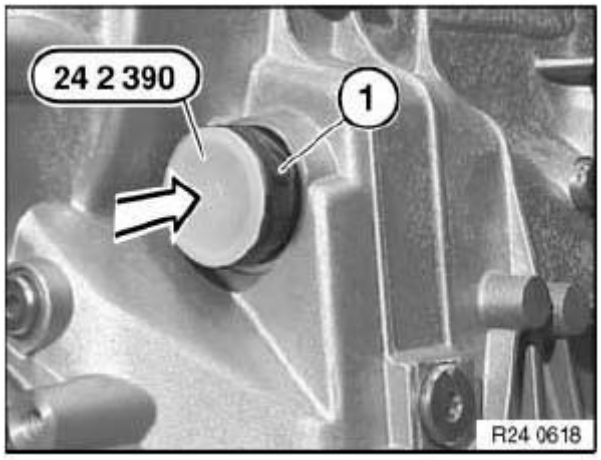


Fig. 60: Inserting Sealing Sleeve Using Special Tool (24 2 390)

Courtesy of BMW OF NORTH AMERICA, INC.

Unlock sealing sleeve with slide (1).

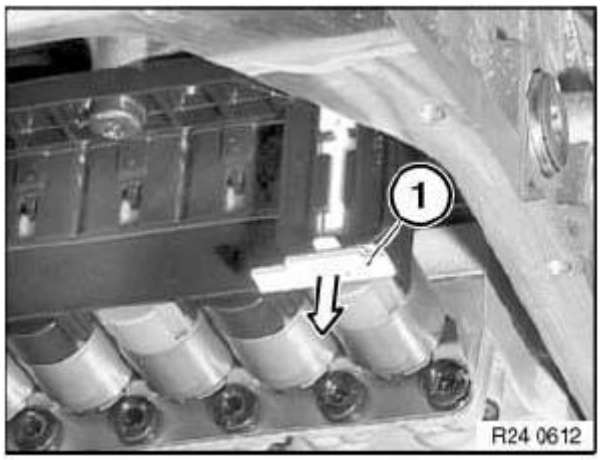


Fig. 61: Removing Sleeve With Slide
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Note position of sealing sleeve.

Pull out sealing sleeve (1).

Installation:

Screw in sealing sleeve partially (lug in upper area). Turn until lug engages in groove of gearbox. Slide in sealing sleeve.

Lug on sealing sleeve must not be damaged!

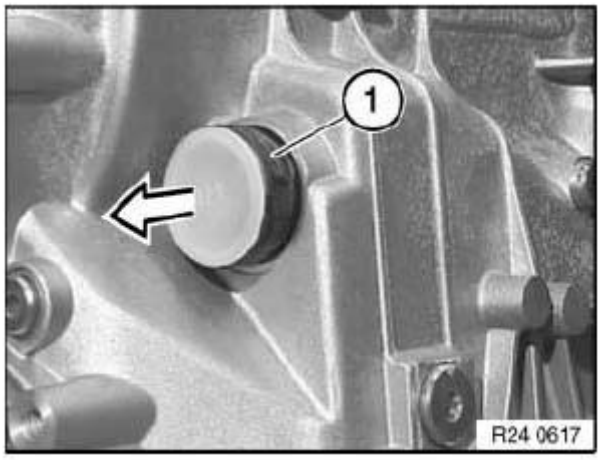


Fig. 62: Pulling Out Sealing Cup
Courtesy of BMW OF NORTH AMERICA, INC.

2440 TORQUE CONVERTER

24 40 011 REMOVING AND INSTALLING/REPLACING TORQUE CONVERTER (GA6HP19Z)

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved AUTOMATIC TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks

- Remove **AUTOMATIC TRANSMISSION**

Screw special tool 24 4 000 into torque converter.

Remove torque converter.

NOTE: When torque converter is removed, transmission oil flows out.

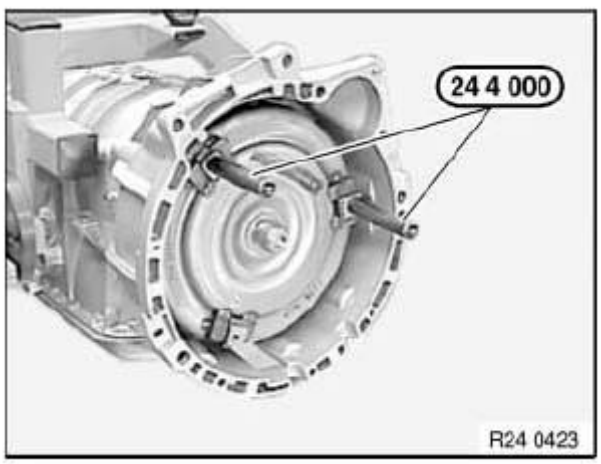


Fig. 63: Identifying Screw Special Tool 24 4 000
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

When installing, do not damage shaft seal and bearing.

If the torque converter is not correctly installed, the driver of the pump impeller may be damaged when the transmission is flanged to the engine.

Remove torque converter and set down vertically.

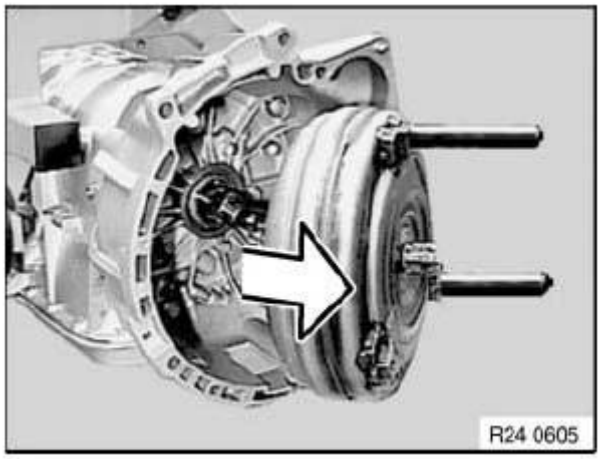


Fig. 64: Removing Torque Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Push torque converter through shaft seal onto transmission shaft as far as it will go.

Press torque converter by hand into converter housing and turn in the process. Converter hub opening must snap into place in driver of pump impeller. Torque converter must be felt to slip inwards.

24 AUTOMATIC TRANSMISSION

24-0030 ADAPTER

0491628 240030 Adapter MW

NOTE: For pressure gauge 13 3 061/For checking the converter pressure

Storage Location

A4

W24 0 030

Fig. 1: Identifying Adapter (240030)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2410 ADAPTER

0496482 242410 Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter ring) For driving in radial shaft seal on output shaft.

Storage Location

B25

SI number

01 18 08 (482)

Fig. 2: Identifying Adapter (242410)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5190 ADAPTER

0491767 245190 Adapter MW

NOTE: For pressure gauge 13 3 061 for checking oil pressure in transmission

Storage Location

A4

SI number

01 03 90 (184)

W24 5 190

Fig. 3: Identifying Adapter (245190)
Courtesy of BMW OF NORTH AMERICA, INC.

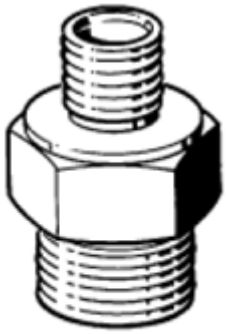
24-0070 ADAPTER

0491635 240070 Adapter MW

NOTE: For testing the pump pressure

Storage Location

A4



W24 0 070

Fig. 4: Identifying Adapter (240070)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1210 ANGLE

0491674 241210 Angle MW

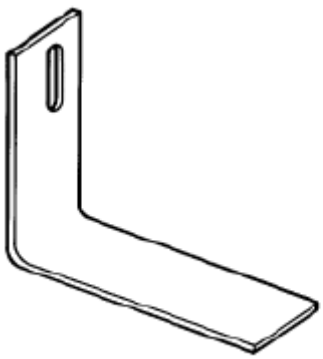
NOTE: (Sheet metal part) Retaining plate for disc package As of transmission number 11 2 300 not required

Storage Location

Z4

SI number

01 09 90 (282)



W24 1 210

Fig. 5: Identifying Angle (241210)

Courtesy of BMW OF NORTH AMERICA, INC.

24-5270 BUSH

0491775 245270 Bush Minimum set: Mechanical tools MW

NOTE: For fitting the radial sealing ring of the selector shaft

Storage Location

B3

SI number

01 08 96 (080)

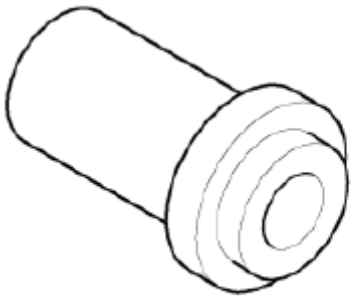


Fig. 6: Identifying Bush (245270)
Courtesy of BMW OF NORTH AMERICA, INC.

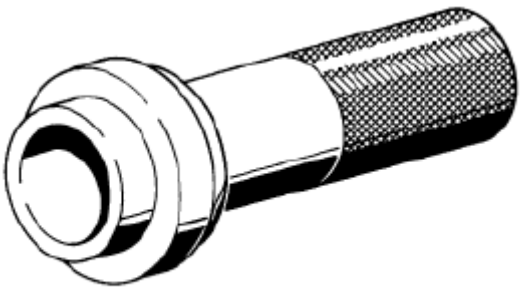
24-1050 BUSH

0491664 Bush 241050 MW

NOTE: (Impact bush) For fitting radial shaft seal for torque converter in oil pump housing

Storage Location

Y7



W24 1 050

Fig. 7: Identifying Bush (241050)
Courtesy of BMW OF NORTH AMERICA, INC.

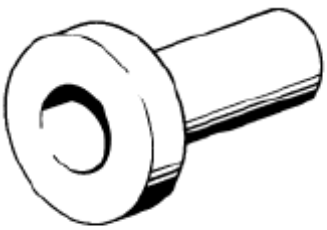
24-1060 BUSH

0491665 Bush 241060 MW

NOTE: (Impact bush) For driving in the radial seal ring for the torque converter in the oil pump housing and at the output flange

Storage Location

Y7



W24 1 060

Fig. 8: Identifying Bush (241060)
Courtesy of BMW OF NORTH AMERICA, INC.

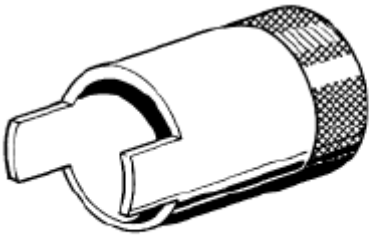
24-3140 BUSH

0491709 Bush 243140 MW

NOTE: (Driver bush) For checking the oil pump for ease of movement

Storage Location

A10



W24 3 140

Fig. 9: Identifying Bush (243140)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5200 BUSH

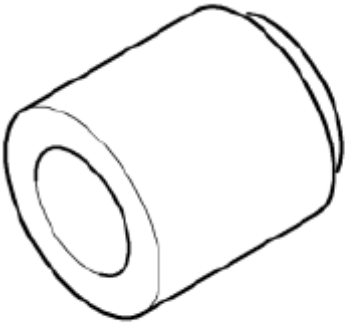
0491768 245200 Bush MW

Replaced by: 0491781

NOTE: (Impact bush) For fitting the radial sealing ring of the selector lever shaft/Replaced by 24 5 360 (0 491 781)

SI number

01 03 90 (184)



W24 5 200

Fig. 10: Identifying Bush (245200)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1080 BUSH

0493254 241080 Bush Minimum set: Mechanical tools MW

NOTE: (bushing (aluminium)) For placing on the drive shaft during removal of the shaft seal from the oil pump housing

Storage Location

C4

SI number

01 03 98 (303)

W24 1 080

Fig. 11: Identifying Bush (241080)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5250 BUSH

0491773 245250 Bush Minimum set: Mechanical tools MW

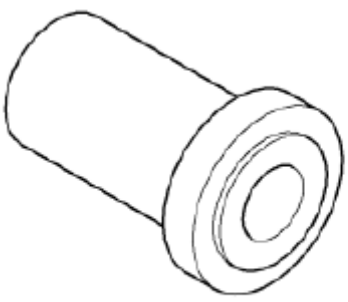
NOTE: For pressing in the radial seal ring of the selector shaft

Storage Location

B3

SI number

01 02 95 (896)



W 24 5 250

Fig. 12: Identifying Bush (245250)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1100 BUSH

0491666 241100 Bush MW

NOTE: (Impact bush) For driving in the radial seal ring for the output flange into the transmission extension

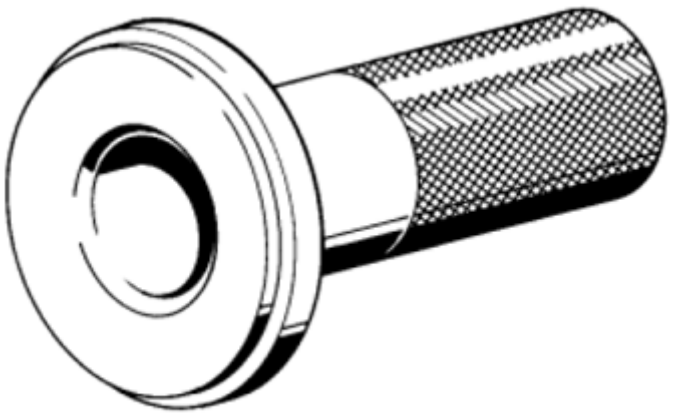


Fig. 13: Identifying Bush (241100)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4380 BUSH

0495601 244380 Bush Minimum set: Mechanical tools MW

NOTE: (Bush with nut) For inserting radial shaft seal of selector shaft.

Storage Location

A24

SI number

01 02 07 (334)

Consisting of:

1 = 0495788 Bush

2 = 0495789 Nut

NOTE: (Nut M8x1)

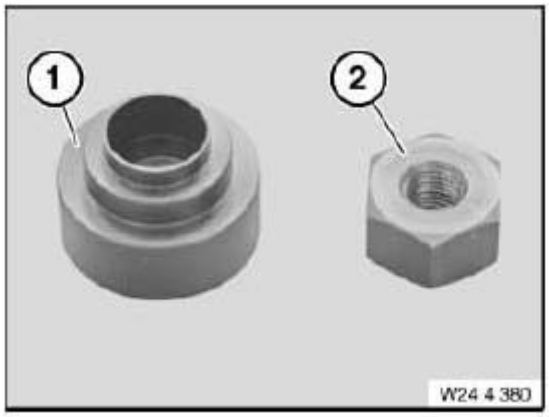


Fig. 14: Identifying Bush (244380)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1090 BUSH

0493335 241090 Bush MW

NOTE: (Impact bush) For driving in the radial shaft seal on the output flange

SI number

01 08 98 (333)

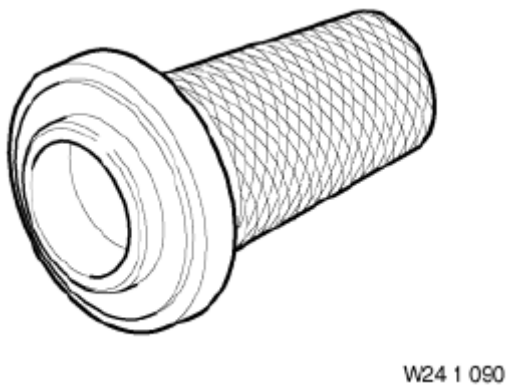


Fig. 15: Identifying Bush (241090)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1070 BUSH

0493253 241070 Bush Minimum set: Mechanical tools MW

NOTE: (Impact bush) For fitting radial shaft seal into oil pump housing

Storage Location

C17

SI number

01 03 98 (303)

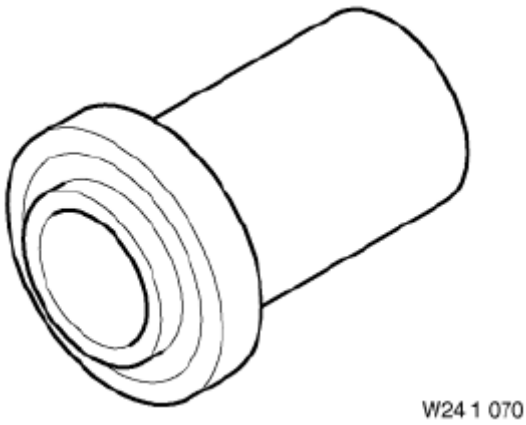


Fig. 16: Identifying Bush (241070)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2390 CAP

0494213 242390 Cap Minimum set: Mechanical tools MW

NOTE: (protective cap) For sealing off the guide sleeve of the transmission connector

Storage Location

C49

SI number

01 14 01 (766)

Fig. 17: Identifying Cap (242390)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5140 CENTERING PIN

24 5 140 Centering pin

NOTE: For transfer plate and gasket to shift unit (2 x)

Transmission: A4S 310R

24-0150 CLIP

0491644 240150 Clip MW

NOTE: (Mounting bracket) For mounting the transmission on the assembly stand

Consisting of:

6 = 0493913 Spindle

NOTE: With synchronising key, transmission: All

3 = 0491645 Shaped part

NOTE: (Shaped part) For mounting the transmission/transmissions: A5S 310Z

2 = 0491646 Frame

NOTE: (Main frame)

3 = 0491647 Spindle

NOTE: **(Spindle with rotary handle)**

3 = 0491648 Bolt

NOTE: **(Mounting bolts)**

3 = 0491649 Bush

NOTE: **(Spacer bush for spindle) Transmissions: A4S 310R**

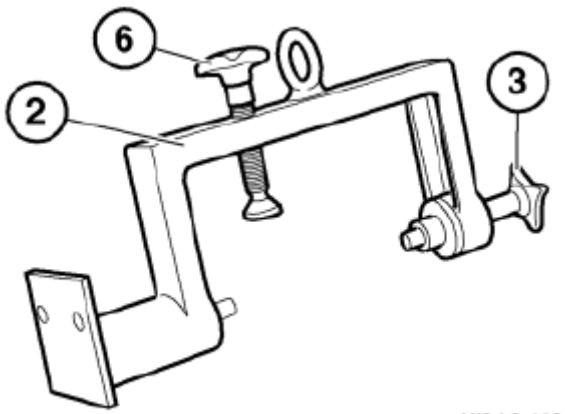


Fig. 18: Identifying Clip (240150)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0140 CONNECTION

0491643 240140 Connection Minimum set: Mechanical tools MW

Replaced by: 0495498

NOTE: **(Connection) For pressure gauge 13 3 061 and BMW diagnosis and information system for measuring the oil pressure in the transmission Replaced by 23 4 050 (0 495 498)**

Storage Location

A4

SI number

01 01 92 (469)

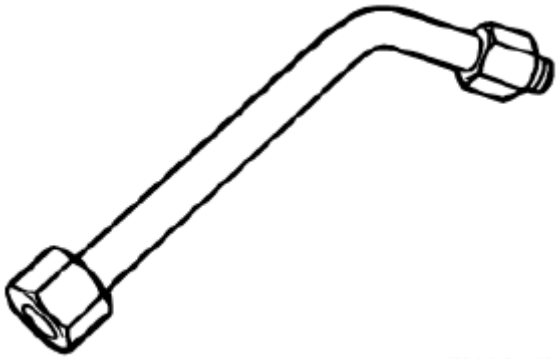


Fig. 19: Identifying Connection (240140)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0020 CONNECTION

0491618 240020 Connection Minimum set: Mechanical tools MW

NOTE: (Connections) Oil pressure testing accessory for pressure gauge 13 3 061 or BMW DIS for checking the oil pressure.

Storage Location

B24

B23

Individual

Consisting of:

1 = 0491619 Hose

NOTE: (Line) Pressure hose 1.7 m, connection M12x1.5 - M14x1.5 outer thread/For checking the different converter pressures/transmission: A4S 310R, A4S 270R

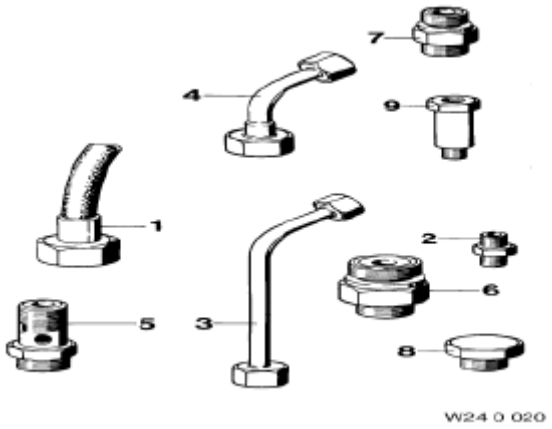


Fig. 20: Identifying Connection (240020)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491620 Connection

NOTE: (Connection) For checking the main pressure (3 HP 22, A5S 310Z) and clutch A (ZF transmission)/transmission: 3 HP 22, A5S 310Z, A5S 560Z and all ZF transmissions

3 = 0491621 Connection

NOTE: (Connection) Pipe bend, 145 mm, stretched length 145 mm/transmission: 4 HP 22, 4 HP 24

4 = 0491622 Connection

NOTE: (Connection) Pipe bend, 90 mm, stretched length 90 mm

5 = 0491623 Screw

NOTE: (Connection) Banjo bolt M20x1. - M18x1./For checking the converter pressure/transmission: 3 HP 12

6 = 0491624 Connection

NOTE: (Connection) Reducer M24x1.5 - 20x1.5/For checking the main pressure/transmission: 3 HP 20

7 = 0491625 Connection

NOTE: (Connection) Reducer M20x1.5 - M18x1.5/For checking the main pressure (3 HP 12) an converter pressure (3 HP 20)/Transmission: 3 HP 12, 3 HP 20

8 = 0491626 Screw

NOTE: (Screw) M18x1./For closing the engine oil feed pipe when checking the converter pressure/transmission: 3 HP 20

9 = 0491627 Adapter

NOTE: For closing the feed and return lines when checking the main pressure/transmission: 3 HP 22

24-0190 COUNTER SUPPORT

0491657 240190 Counter support Minimum set: Mechanical tools MW

NOTE: (Steady device) For the output flange of the propeller shaft while releasing and tightening the slotted nut

SI number

01 06 92 (509)

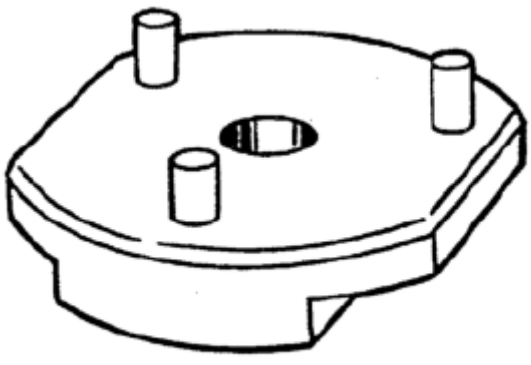


Fig. 21: Identifying Counter Support (240190)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1230 DEVICE

0491676 241230 Device MW

NOTE: (Pressing device) For removing and installing the piston (cover) at brake C

Storage Location

Y6

SI number

01 14 93 (718)

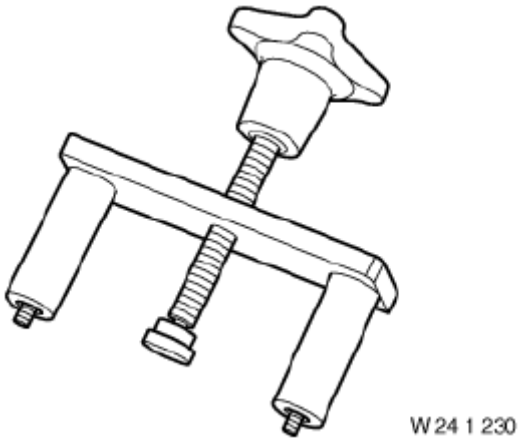


Fig. 22: Identifying Device (241230)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4120 DEVICE

0491730 244120 Device MW

Replaced by: 0491731

NOTE: For firmly holding torque converter in position while removing and fitting the transmission. Replaced by 24 4 130 (0 491 731)

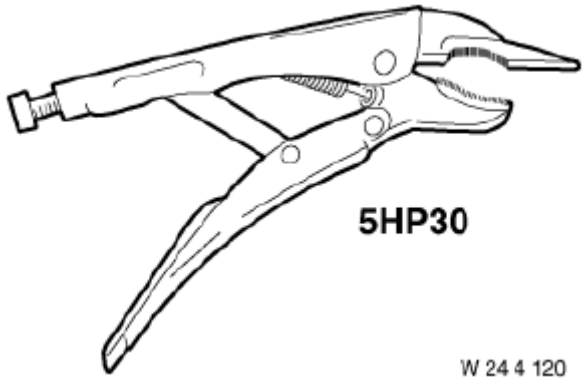


Fig. 23: Identifying Device (244120)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1240 DEVICE

0491677 241240 Device MW

NOTE: (device) For determining the shims on the brake C

Storage Location

Y6

SI number

01 14 93 (718)

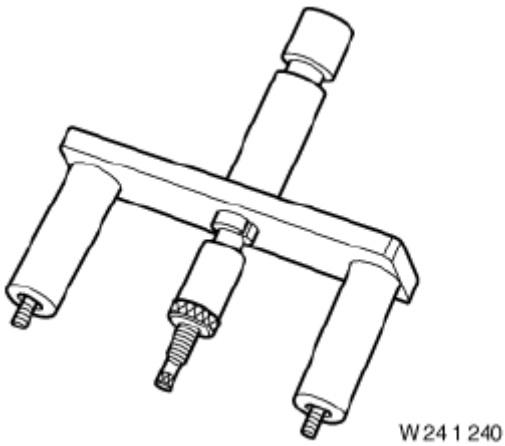


Fig. 24: Identifying Device (241240)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1370 DEVICE

0495486 241370 Device Minimum set: Mechanical tools MW

NOTE: (locating fixture) For securing converter during removal and installation of transmission.

Storage Location

A20

B20

SI number

01 23 05 (224)

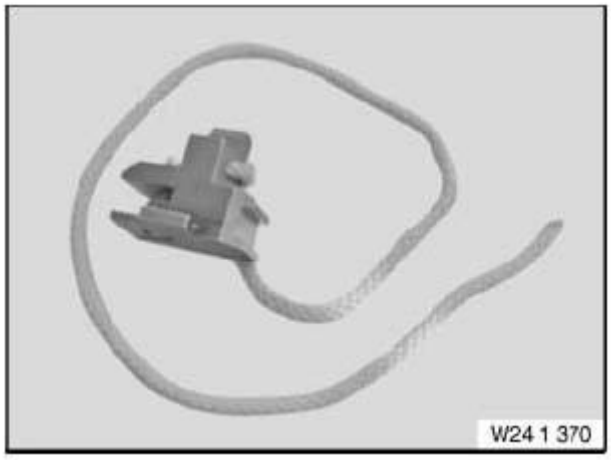


Fig. 25: Identifying Device (241370)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1250 DEVICE

0491678 241250 Device MW

NOTE: (Lifting gear) For removing and installing the brake clutch unit D/G incl. the parking lock gear

Storage Location

Y3

Z3

SI number

01 14 93 (718)

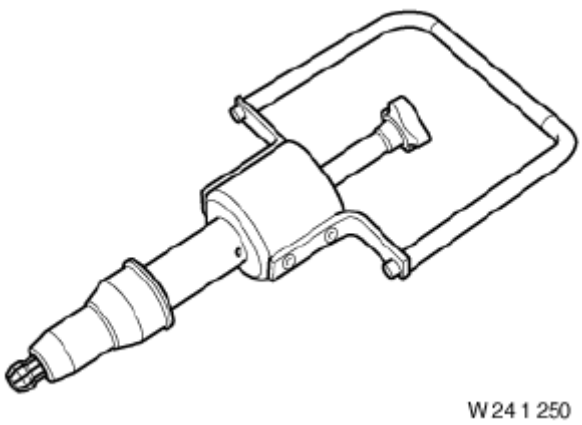


Fig. 26: Identifying Device (241250)

Courtesy of BMW OF NORTH AMERICA, INC.

24-5260 DEVICE

0491774 245260 Device Minimum set: Mechanical tools MW

NOTE: (Pulling device) For pulling off the radial seal of the selector shaft/transmission with positioning switch

Storage Location

B3

SI number

01 02 95 (896)

Consisting of:

1 = 0494592 Use

2 = 0494593 Bush

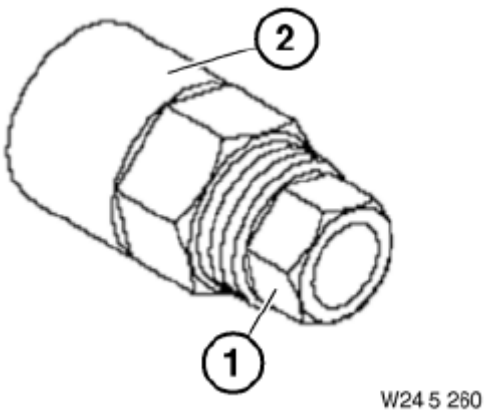


Fig. 27: Identifying Device (245260)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2310 DEVICE

0493156 242310 Device MW

NOTE: (Device) Tool set for dismantling and fitting the R gear piston. For dismantling and assembling the transmission for "Sealing the intermediate plate".

SI number

01 22 97 (239)

Consisting of:

1 = 0493157 Plate

NOTE: (Pressure plate) For removing and installing the spring cup

2 = 0493158 Spindle

NOTE: (Spindle with pressure plate) Spindle M14x1.5, nut M14, pressure plate and washer/For removing and installing the spring cup

3 = 0493159 Pin

NOTE: (Guide pin (2 pieces)) For fixing the gaskets and the intermediate plate on the intermediate case

4 = 0493160 Bush

NOTE: (Slip bush) For installing the piston in the cylinder of the intermediate plate

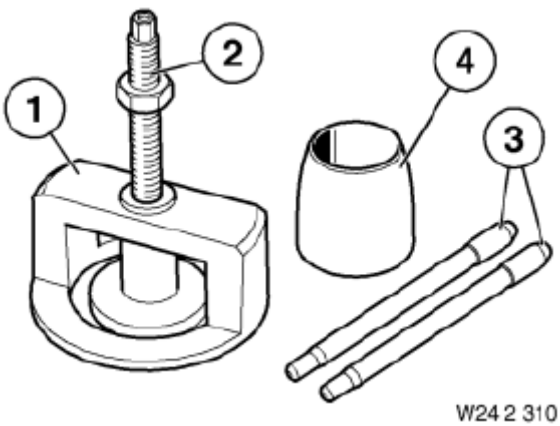


Fig. 28: Identifying Device (242310)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1180 DEVICE

0491671 241180 Device MW

NOTE: For removing and installing oil pump

Storage Location

Z2

Z1

SI number

01 09 90 (282)

Consisting of:

1 = 0494586 Tube

NOTE: (Retaining tube)

2 = 0494588 Spindle

NOTE: (Threaded spindle)

3 = 0494589 Ring

NOTE: (Clamping ring)

4 = 0496375 Ring

NOTE: (Clamping ring) Gearbox: GA6HP19Z, GA6HP26Z

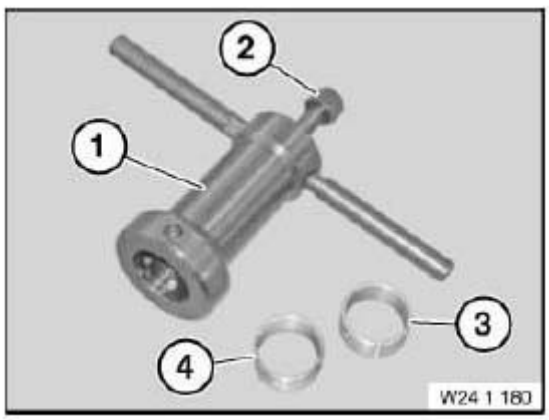
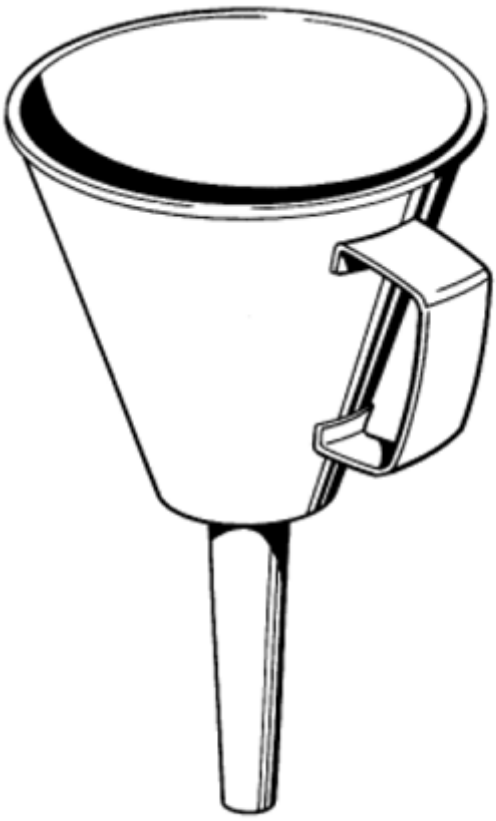


Fig. 29: Identifying Device (241180)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0080 DEVICE

0491636 240080 Device Minimum set: Mechanical tools MW

NOTE: **(funnel) For filling the transmission with transmission oil**



W24 0 080

Fig. 30: Identifying Device (240080)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1260 DEVICE

0491679 241260 Device MW

NOTE: **(Removal and mounting device) For removing and installing the cylinders D/E with the planetary gear set**

Storage Location

C1

C2

SI number

01 01 95 (892)

Consisting of:

1 = 0491680 Handle

2 = 0491681 Spindle

NOTE: (Spindle with knurled nut)

3 = 0491682 Bush

NOTE: (Centring bush)

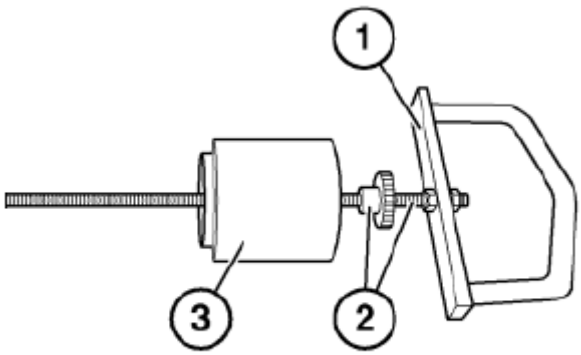


Fig. 31: Identifying Device (241260)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1270 DEVICE

0491683 241270 Device MW

NOTE: Removal and mounting device) For removing and installing the drive clutch A/B/C

Storage Location

Y2

Z2

SI number

01 01 95 (892)

Consisting of:

1 = 0491684 Pipe

NOTE: (Jack tube with ring bolt)

2 = 0491685 Pin

NOTE: (Locking pin)

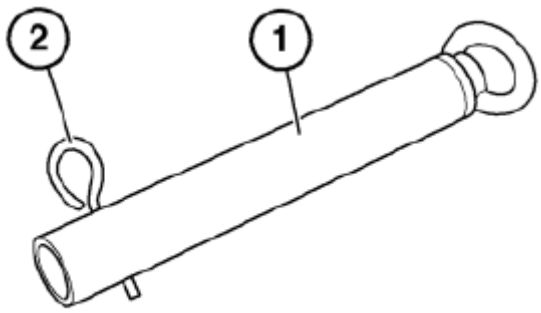


Fig. 32: Identifying Device (241270)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5360 DEVICE

0491781 245360 Device Minimum set: Mechanical tools MW

NOTE: For removing and installing the radial shaft seal of the gearshift shaft 24 5 361, 24 5 362, 24 5 364 and 24 5 366 for E90

Storage Location

C4

SI number

01 14 96 (105)

Consisting of:

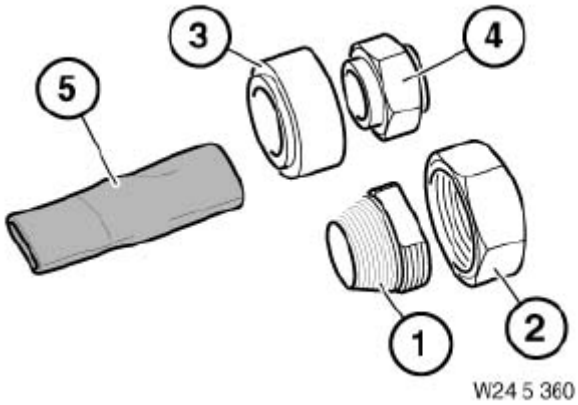


Fig. 33: Identifying Device (245360)
Courtesy of BMW OF NORTH AMERICA, INC.

6 = 0494208 Bush

NOTE: For fitting the radial shaft seal on the selector shaft (emergency release) Transmission: GA6 HP26Z

1 = 0491782 Bush

NOTE: (Threaded bush)

2 = 0491783 Nut

NOTE: (Union nut)

3 = 0491784 Bush

NOTE: For transmission without positioning switch Transmission: A4S 310R

4 = 0491785 Nut

5 = 0491786 Sleeve

NOTE: (Sliding sleeve (5 pieces)) Transmission: A4S 310R

24-1280 DEVICE

0491686 241280 Device MW

NOTE: (Assembly and disassembly tool) For removing and installing brake clutch F

Storage Location

Z4

Z3

SI number

01 01 95 (892)

Consisting of:

1 = 0491687 Handle

NOTE: (Handle)

2 = 0491688 Nut

NOTE: (knurled nut)

3 = 0491689 Handle

NOTE: (Centring handle)

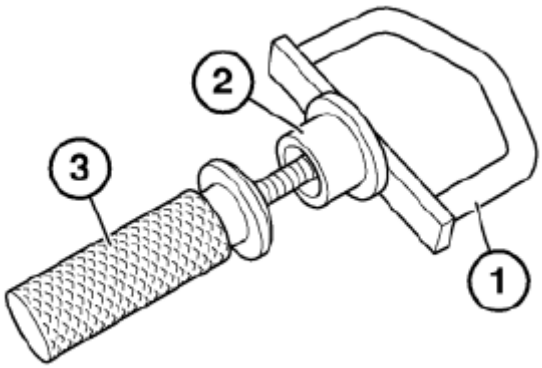


Fig. 34: Identifying Device (241280)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4080 DEVICE

0491726 244080 Device MW

NOTE: For fixing torque converter in position while removing and installing transmission.

Storage Location

Individual

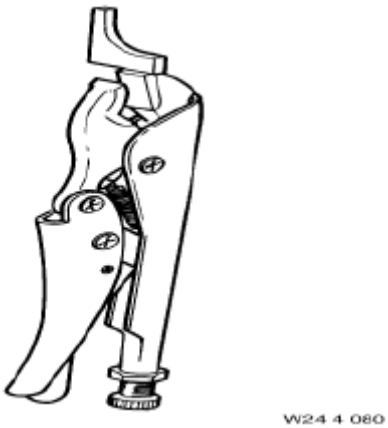


Fig. 35: Identifying Device (244080)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0010 DEVICE

0491615 240010 Device MW

NOTE: For checking the side clearance of the drive shaft

Storage Location

Y3

Consisting of:

1 = 0491616 Holder

NOTE: (Dial gauge holder)

2 = 0491617 Terminal

NOTE: (Terminal)

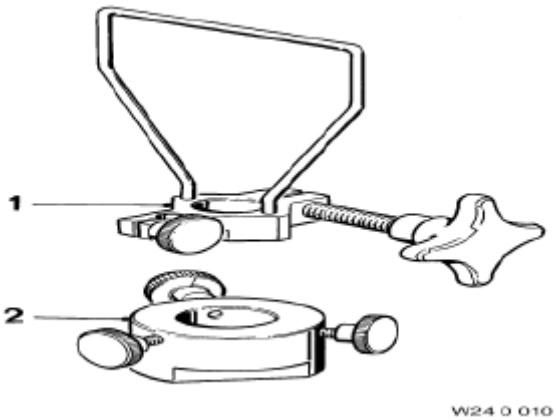


Fig. 36: Identifying Device (240010)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2140 DEVICE

0491698 242140 Device MW

NOTE: (Tensioning device) For removal and installation of the snap ring before the centring plate on ZF transmissions

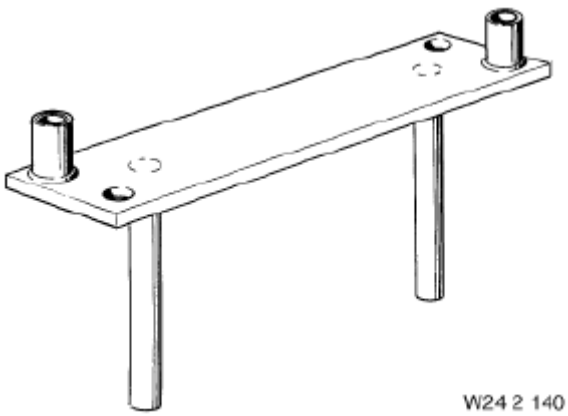


Fig. 37: Identifying Device (242140)
Courtesy of BMW OF NORTH AMERICA, INC.

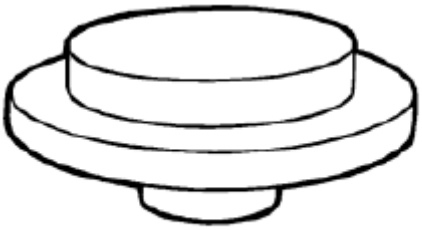
24-5400 DRIFT

24 5 400 Drift

In conjunction with: 00 5 500

NOTE: For drive shaft seal.

Transmission: GACVT16Z



W 24 5 400

Fig. 38: Identifying Drift (245400)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0180 FIXTURE

0491652 240180 Fixture MW

Replaced by: 0495446

NOTE: For mounting the gearbox on the assembly stand. Replaced by 24 0 200 (0 495 446)

SI number

01 06 92 (509)

Consisting of:

5 = 0495439 Adapter

NOTE: Replaced by 24 0 205 (0 495 492)

3 = 0491655 Spindle

NOTE: Replaced by 24 0 184 (0 491 656)

1 = 0491653 Frame

NOTE: (Main frame)

2 = 0491654 Spindle

NOTE: (Pressure spindle with star handle)

4 = 0491656 Spindle

NOTE: **(spindle, long (2 pieces))**

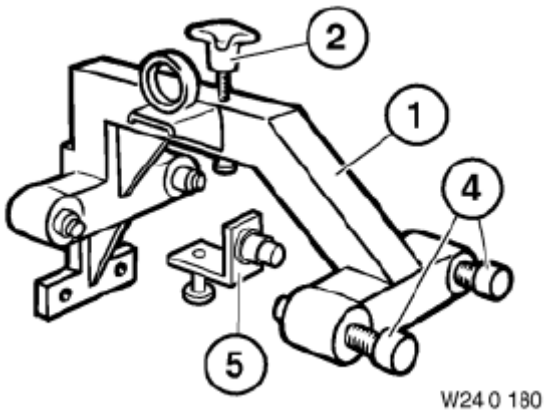


Fig. 39: Identifying Fixture (240180)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0200 FIXTURE

0495446 240200 Fixture MW

NOTE: **For mounting the gearbox on the assembly stand.**

SI number

01 27 06 (328)

Consisting of:

1 = 0495488 Basic body

2 = 0495489 Spindle

NOTE: **(spindle with synchronising key)**

3 = 0495490 Spindle

NOTE: **(spindle with screw)**

4 = 0495491 Shaped part

NOTE: **(Shaped part)**

5 = 0495492 Adapter

NOTE: **(adapter (long))**

6 = 0495493 Adapter

NOTE: **(adapter (medium))**

7 = 0495494 Adapter

NOTE: **(adapter (short))**

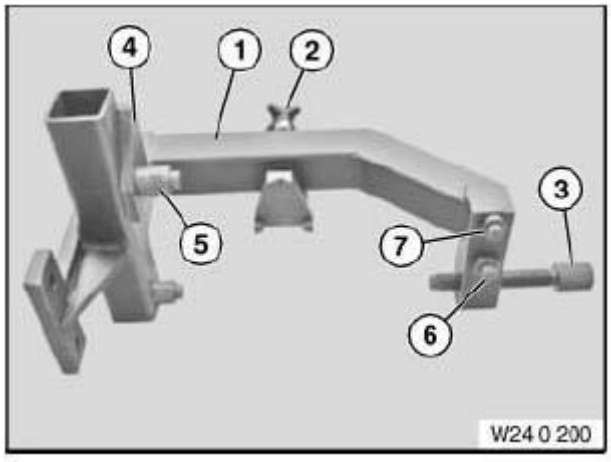


Fig. 40: Identifying Fixture (240200)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0130 FIXTURE

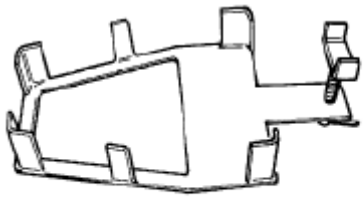
0491642 240130 Fixture MW

Replaced by: 0495498

NOTE: **(Fixture for transmission) For removal and installation Replaced by 23 4 050 (0 495 498)**

SI number

01 02 87 (721)



W24 0 130

Fig. 41: Identifying Fixture (240130)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0170 FIXTURE

0491651 240170 Fixture MW

Replaced by: 0495498

NOTE: For removing and installing transmission. Replaced by 23 4 050 (0 495 498)

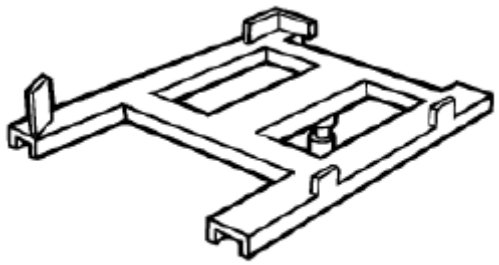
SI number

01 06 92 (509)

Consisting of:

3 = 0493258 Bolt

NOTE: (Adjusting screw) Discontinuation and replaced by 23 4 050 (0 495 498)



W 24 0 170

Fig. 42: Identifying Fixture (240170)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0250 FIXTURE

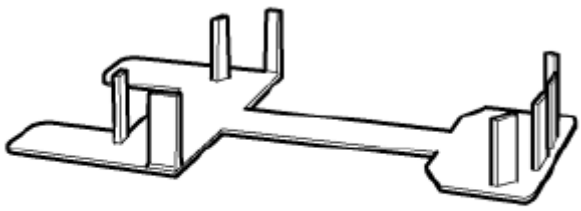
0491661 240250 Fixture MW

Replaced by: 0495498

NOTE: (Fixture for transmission) For removing and installing the transmission. Replaced by 23 4 050 (0 495 498)

SI number

01 08 96 (080)



W24 0 250

Fig. 43: Identifying Fixture (240250)
Courtesy of BMW OF NORTH AMERICA, INC.

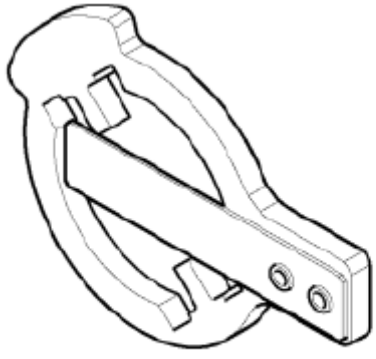
24-1120 GAUGE

0491668 241120 Gauge MW

NOTE: For setting the position switch to "P position" during installation/model year: from 03/96

SI number

01 07 96 (068)



W24 1 120

Fig. 44: Identifying Gauge (241120)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1440 HANDLE

0496717 241440 Handle MW

NOTE: For installing and removing the torque converter. 8HPxx

SI number

01 17 09 (577)

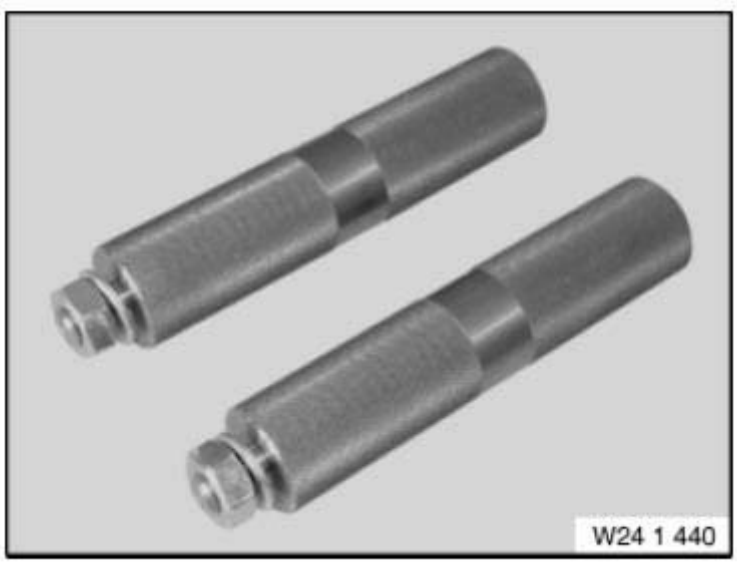


Fig. 45: Identifying Handle (241440)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2050 HANDLE

0491697 242050 Handle MW

Replaced by: 0491633

NOTE: (Pulling handle) For sealing plug in the lower section of the transmission housing/Replaced by 24 0 050 (0 491 633)

24-4000 HANDLE

0491715 244000 Handle Minimum set: Mechanical tools MW

NOTE: (Assembly handle (2 x)) For removing and installing the torque converter

Storage Location

B5

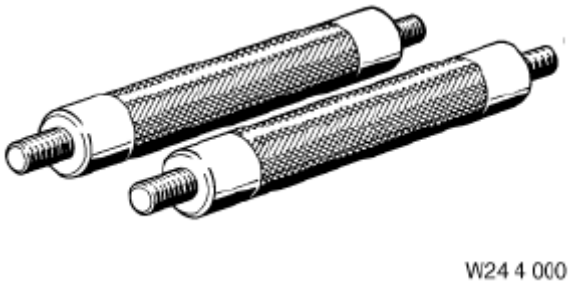


Fig. 46: Identifying Handle (244000)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0050 HANDLE

0491633 240050 Handle MW

NOTE: (extractor handle) For sealing plug in the lower section of transmission housing

Storage Location

Y5

Fig. 47: Identifying Handle (240050)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5240 HOLDER

0491772 245240 Holder MW

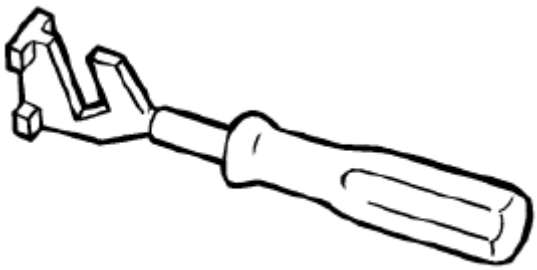
NOTE: (Counter support) For releasing and tightening the gear selector cable/transmission with position switch

Storage Location

A4

SI number

01 06 92 (509)



W 24 5 240

Fig. 48: Identifying Holder (245240)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5210 HOLDER

0491769 245210 Holder MW

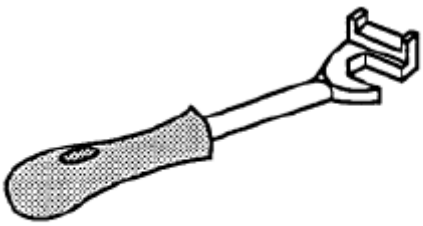
NOTE: (counter support) For loosening and tightening the gear selector cable

Storage Location

A4

SI number

01 04 91 (372)



W24 5 210

Fig. 49: Identifying Holder (245210)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5220 HOLDER

0491770 245220 Holder MW

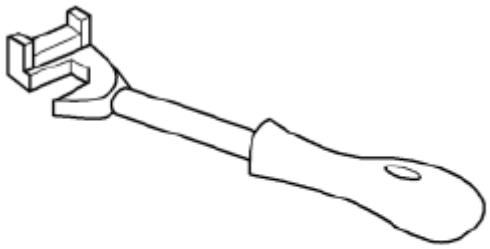
NOTE: (Counter support) For slackening and tightening the gear selector cable

Storage Location

A4

SI number

01 04 91 (372)



W24 5 220

Fig. 50: Identifying Holder (245220)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4160 HOLDER

0494451 244160 Holder Minimum set: Mechanical tools MW

NOTE: For securing converter during removal and installation of transmission

Storage Location

C46

A47

SI number

01 11 02 (908)

Consisting of:

3 = 0494477 Shaped element

NOTE: For converter variantM57TU

1 = 0494478 Basic body

2 = 0494479 Shaped element

NOTE: For converter variantN73

4 = 0494622 Shaped element

NOTE: For converter variantM54

5 = 0494965 Shaped element

NOTE: Transmission: GA6 HP19 in E87, E90

6 = 0496061 Shaped element

NOTE: Transmission: GA6L45R (GM6) in E83/N52K

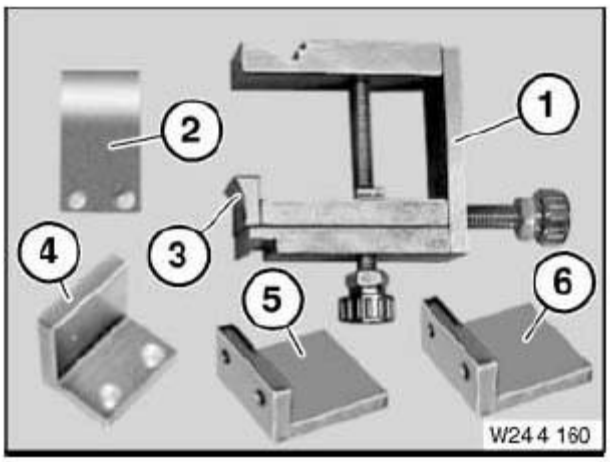


Fig. 51: Identifying Holder (244160)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1200 HOLDING SLEEVE

0491673 241200 Holding sleeve Minimum set: Mechanical tools MW

NOTE: (Assembly sleeve) For preventing damage to radial shaft seal when fitting it onto selector shaft

Storage Location

B3

SI number

01 09 90 (282)

W24 1 200

Fig. 52: Identifying Holding Sleeve (241200)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4110 KEY

0491729 244110 Key Minimum set: Mechanical tools MW

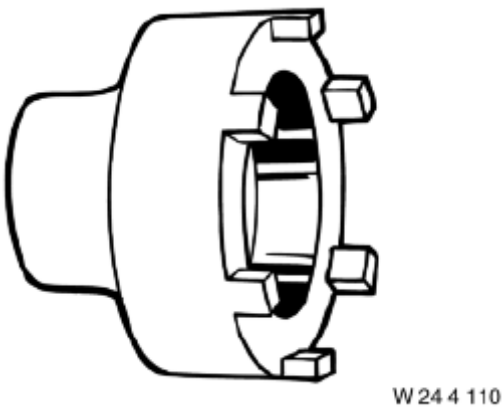
NOTE: For releasing and tightening the slotted nut of the output flange

Storage Location

A10

SI number

01 06 92 (509)



W 24 4 110

Fig. 53: Identifying Key (244110)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4340 LEVER

0496312 244340 Lever MW

NOTE: For removing and installing oil filler cap.

Storage Location

B22

SI number

01 19 07 (397)

Fig. 54: Identifying Lever (244340)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4100 MANDREL

0491728 244100 Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For driving in the radial seal ring on the drive side (behind converter)

Storage Location

A17

SI number

01 06 92 (509)

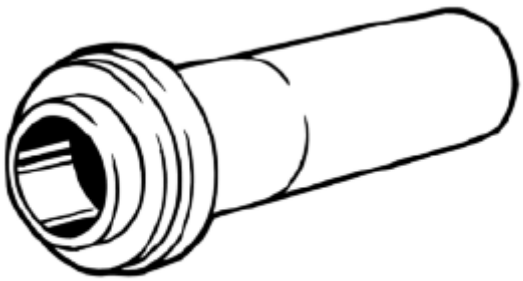


Fig. 55: Identifying Mandrel (244100)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4370 MANDREL

0495600 244370 Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For driving in radial shaft seal of output shaft (4x2).

Storage Location

A24

SI number

01 02 07 (334)

Fig. 56: Identifying Mandrel (244370)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4400 MANDREL

0495603 244400 Mandrel Minimum set: Mechanical tools MW

NOTE: **(Drift) For driving in oil filter sealing ring.**

Storage Location

A24

SI number

01 02 07 (334)

Fig. 57: Identifying Mandrel (244400)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0340 MANDREL

2208426 240340 Mandrel MW

NOTE: **For driving in the radial shaft seal on the output end.**

SI number

01 09 10 (639)

Fig. 58: Identifying Mandrel (240340)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0090 MANDREL

0491637 240090 Mandrel MW

Replaced by: 0491639

NOTE: (Drift) For punching the radial sealing ring in the front section of the transmission housing/Replaced by 24 0 110 (0 491 639) November 96

Fig. 59: Identifying Mandrel (240090)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0110 MANDREL

0491639 240110 Mandrel MW

NOTE: **(drift) For driving in the radial sealing ring in the front section of the transmission housing/Model year: from 90 and for the output flange of the transmissions S5D 200G and S5D 250G**

Storage Location

B17

SI number

01 03 90 (184)

Consisting of:

3 = 0491640 Washer

NOTE: **(ring washer 1 mm) Transmissions: 4 HP 24 - no. 0 029 160, 4 HP 22 - no. 1 113 936**

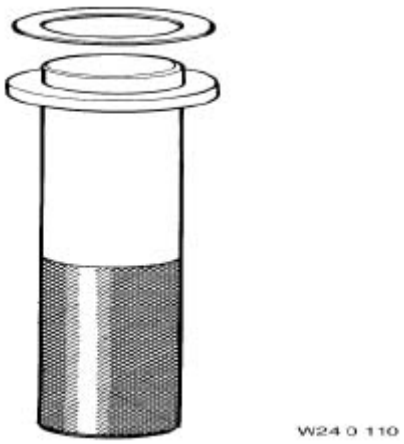


Fig. 60: Identifying Mandrel (240110)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0330 MANDREL

0496860 240330 Mandrel MW

NOTE: **For driving in the radial shaft seal on the drive end.**

SI number

01 09 10 (639)

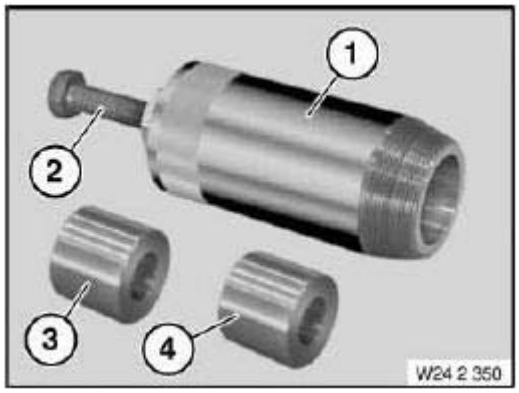


Fig. 61: Identifying Mandrel (240330)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0350 MANDREL

2208427 240350 Mandrel MW

NOTE: For driving in shaft seal on selector shaft.

SI number

01 09 10 (639)

Fig. 62: Identifying Mandrel (240350)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2370 MANDREL

0494199 242370 Mandrel Minimum set: Mechanical tools MW

NOTE: **(Drift) For inserting the radial shaft seal on the output flange**

Storage Location

B46

A46

SI number

01 14 01 (766)

Fig. 63: Identifying Mandrel (242370)
Courtesy of BMW OF NORTH AMERICA, INC.

0491672 241190 Mandrel Minimum set: Mechanical tools MW

NOTE: **(drift) For driving in the radial sealing ring in the front section of the transmission housing**

Storage Location

A15

SI number

01 09 90 (282)

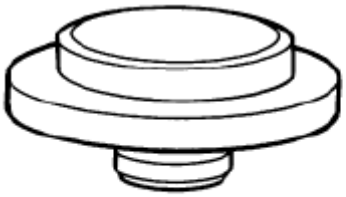


Fig. 64: Identifying Mandrel (242370)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2360 MANDREL

0494200 242360 Mandrel Minimum set: Mechanical tools MW

Replaced by: 0494506

NOTE: (Drift) For installing the radial shaft seal on the torque converter Replaced by 24 2 400 (0 494 506)

Storage Location

B46

SI number

01 14 01 (766)

Fig. 65: Identifying Mandrel (242360)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1410 MANDREL

0496719 241410 Mandrel Minimum set: Mechanical tools MW

NOTE: For driving in the radial shaft seal of the drive shaft.

SI number

01 17 09 (577)

Fig. 66: Identifying Mandrel (241410)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4330 MANDREL

0495497 244330 Mandrel MW

NOTE: (Drift) For driving in radial shaft seal of output shaft (all-wheel drive).

Storage Location

A23

Fig. 67: Identifying Mandrel (244330)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4090 MANDREL

0491727 244090 Mandrel Minimum set: Mechanical tools MW

NOTE: (drift) For fitting the radial sealing ring to the output end

Storage Location

A15

SI number

01 06 92 (509)

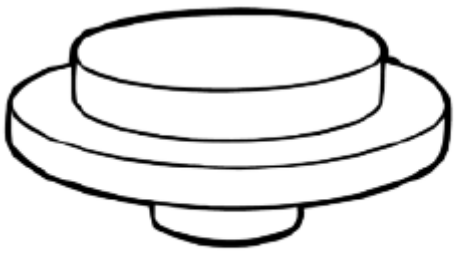


Fig. 68: Identifying Mandrel (244090)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2330 OPEN-END WRENCH

0493115 242330 Open-end wrench MW

NOTE: (Open-end wrench) Open-end wrench 1/2" for adjusting the brake band

SI number

01 24 97 (257)

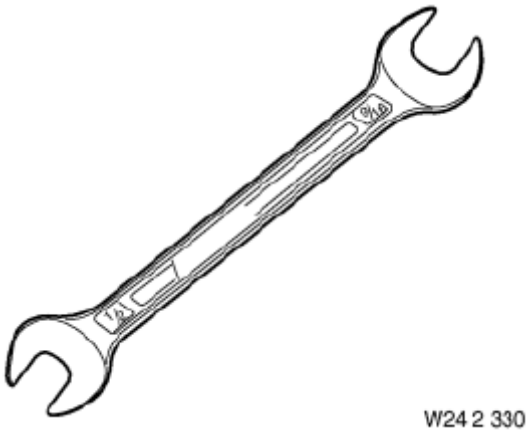


Fig. 69: Identifying Open-End Wrench (242330)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1430 PIN

0496715 241430 Pin MW

NOTE: For fixing the mechatronics in position during installation.

SI number

01 17 09 (577)

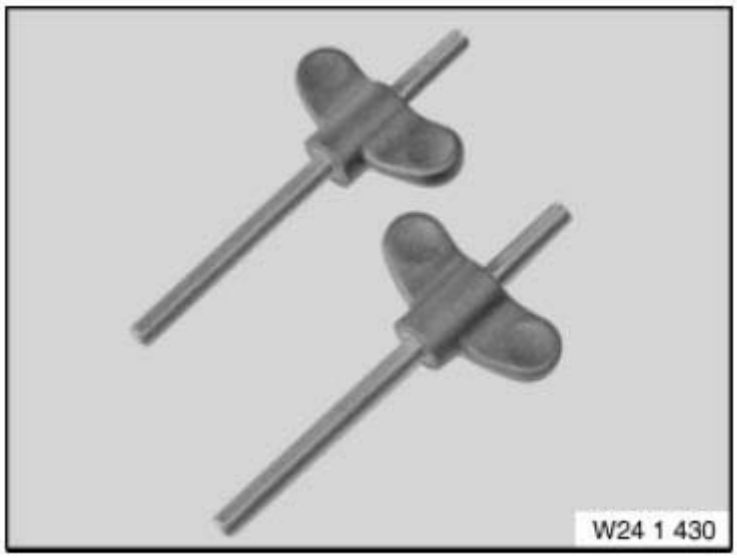


Fig. 70: Identifying Pin (241430)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0320 PIN

0496728 240320 Pin MW

NOTE: For securing transmission when installing in engine.

SI number

01 29 09 (601)

Fig. 71: Identifying Pin (240320)

Courtesy of BMW OF NORTH AMERICA, INC.

24-5160 PIN

0491764 245160 Pin MW

NOTE: (centring pin) For centring the main housing to the intermediate and converter housing (2 x)

Storage Location

Y3

SI number

01 03 93 (663)

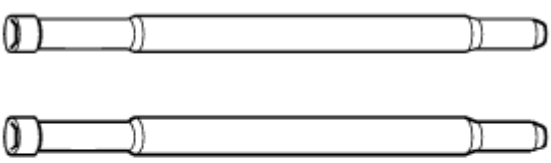


Fig. 72: Identifying Pin (245160)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1170 PIN WRENCH

0491670 241170 Pin wrench Minimum set: Mechanical tools MW

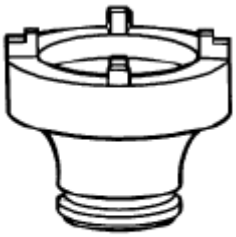
NOTE: For loosening and tightening the slotted nut on the output flange

Storage Location

A13

SI number

01 09 90 (282)



W24 1 170

Fig. 73: Identifying Pin Wrench (241170)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4360 PULLER

0495599 244360 Puller Minimum set: Mechanical tools MW

NOTE: For withdrawing radial shaft seal of output shaft (4 x 2).

Storage Location

A24

SI number

01 02 07 (334)

Consisting of:

1 = 0496113 Basic body

2 = 0496114 Claw

NOTE: (Claw (4 x))

3 = 0496115 Screw

4 = 0496116 Spindle

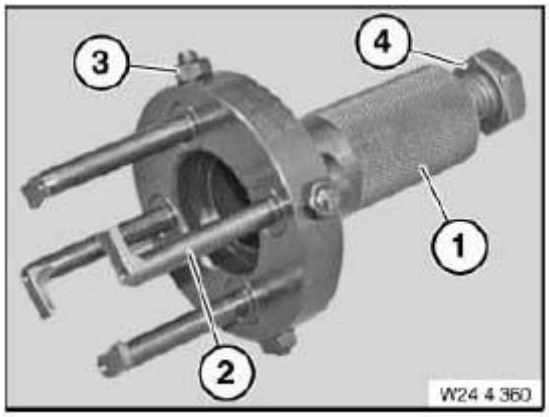


Fig. 74: Identifying Puller (244360)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2350 PULLER

0494201 242350 Puller Minimum set: Mechanical tools MW

NOTE: For extracting radial shaft seal on torque converter and on output flange

Storage Location

A46

SI number

01 14 01 (766)

Consisting of:

1 = 0494202 Puller

2 = 0494203 Spindle

NOTE: (Spindle M12 x 65 with ball head)

3 = 0494204 Synchronising key

4 = 0495597 Synchronising key

NOTE: Transmission: GA6L45R (GM6)

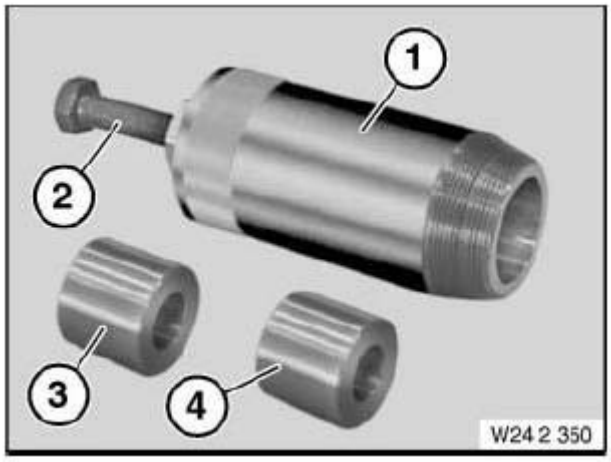


Fig. 75: Identifying Puller (242350)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4320 PULLER

0495496 244320 Puller MW

NOTE: For withdrawing output shaft seal (four-wheel drive).

SI number

01 02 07 (334)

Consisting of:

1 = 0495569 Basic body

2 = 0495570 Ring

NOTE: (Retaining ring)

3 = 0495571 Spindle

4 = 0495572 Hook wrench

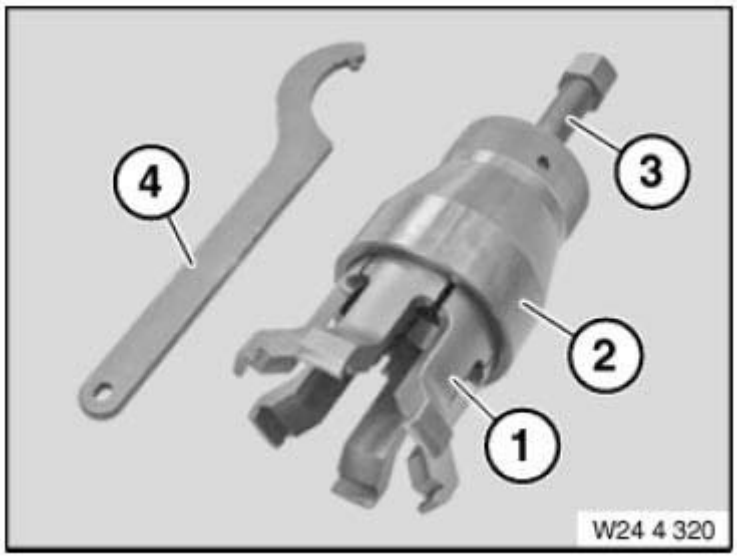


Fig. 76: Identifying Puller (244320)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5367 PULLER

0496718 245367 Puller Minimum set: Mechanical tools MW

NOTE: For removing the radial shaft seal of the gearshift shaft from the gearbox housing.

SI number

01 17 09 (577)

Fig. 77: Identifying Puller (245367)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1420 PULLER

0496716 241420 Puller MW

NOTE: Removing radial shaft seal from torque converter.

SI number

01 17 09 (577)

Consisting of:

1 = 2209493 Blade

NOTE: Replacement blade for 24 1 420

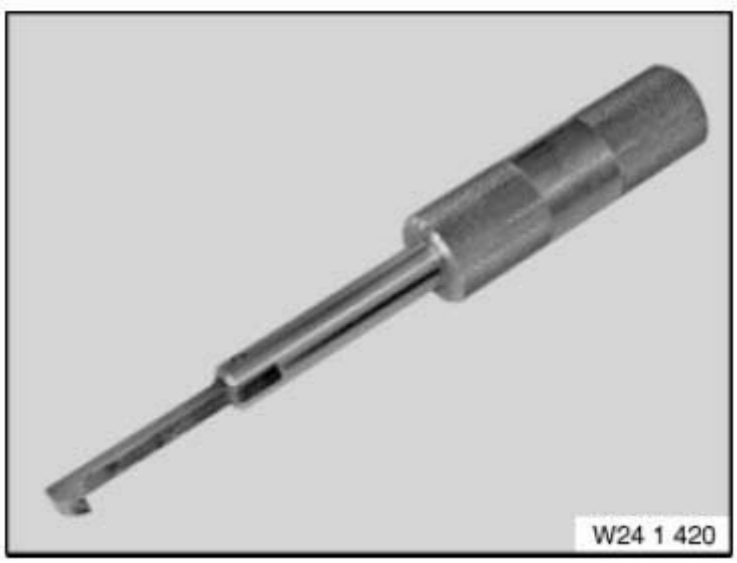


Fig. 78: Identifying Puller (241420)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4390 PULLER

0495602 244390 Puller Minimum set: Mechanical tools MW

NOTE: For removing oil filter sealing ring.

Storage Location

A23

SI number

01 02 07 (334)

Fig. 79: Identifying Puller (244390)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1310 RELEASE TOOL

0491692 241310 Release tool MW

NOTE: (release tool) For releasing the retaining tabs on the disc carrier C

Storage Location

Y6

SI number

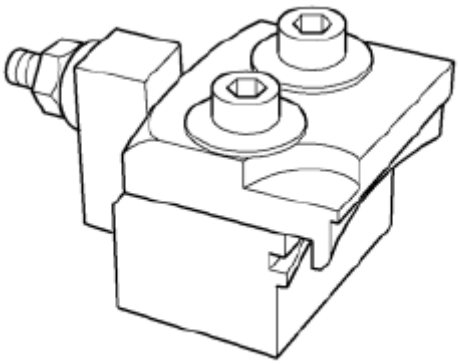
01 01 95 (892)

Consisting of:

1 = 0494693 Shaped part

NOTE: (shaped part)

2 = 0494694 Basic body



W24 1 310

Fig. 80: Identifying Release Tool (241310)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5230 RING

0491771 245230 Ring Minimum set: Mechanical tools MW

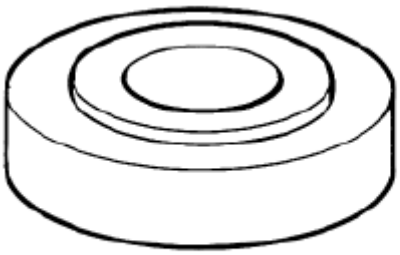
NOTE: (Assembly ring) For pressing in the radial seal of the gearshift shaft

Storage Location

B3

SI number

01 04 91 (372)



W24 5 230

Fig. 81: Identifying Ring (245230)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5490 SLEEVE

0491789 245490 Sleeve Minimum set: Mechanical tools MW

NOTE: (sliding sleeve (5 x)) For prevention of damage to the radial sealing ring while

fitting on the gearshift shaft

SI number

01 02 95 (896)

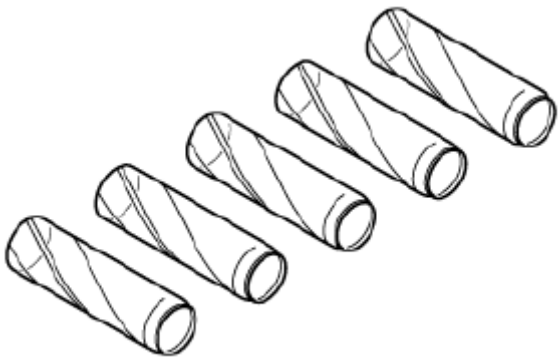


Fig. 82: Identifying Sleeve (245490)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1010 SLEEVE

0491662 241010 Sleeve MW

NOTE: (Assembly sleeve) For removing the disc set (4-gear) and for pressing in the needle bearing in the oil pump housing (A5S 560Z)

Storage Location

X5

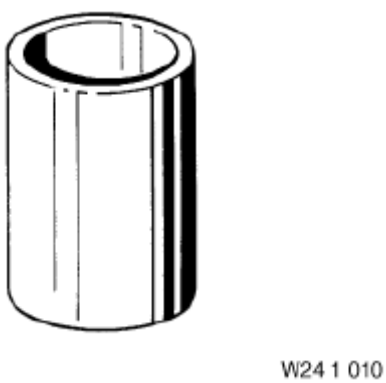


Fig. 83: Identifying Sleeve (241010)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4350 SOCKET

0495598 244350 Socket Minimum set: Mechanical tools MW

NOTE: (Socket with special Torx profile) For releasing and tightening down screw connection of Mechatronic.

Storage Location

A23

SI number

01 02 07 (334)

Fig. 84: Identifying Socket (244350)
Courtesy of BMW OF NORTH AMERICA, INC.

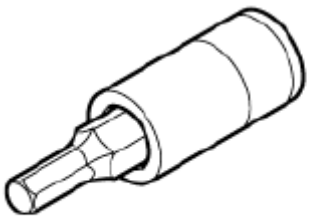
24-2320 SOCKET WRENCH

0493114 242320 Socket wrench MW

NOTE: For hexagon socket screw 3/16" with 1/4" drive for adjusting the brake band

SI number

01 24 97 (257)



W24 2 320

Fig. 85: Identifying Socket Wrench (242320)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0120 SUPPORT

0491641 240120 Support MW

NOTE: (support) For removing and fitting the transmission. Replaced by 24 0 130 in March 87

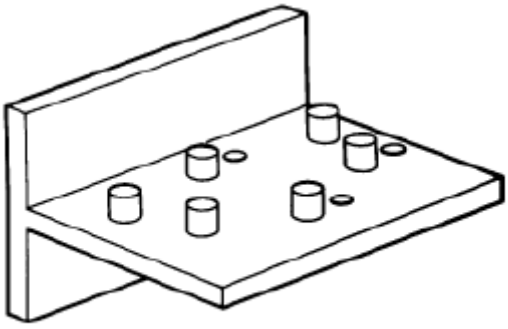
24-1220 SUPPORT

0491675 241220 Support MW

NOTE: (Fixture for drive flange) When undoing the slotted nut

SI number

01 09 90 (282)



W24 1 220

Fig. 86: Identifying Support (241220)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0300 SUPPORT

0496729 240300 Support MW

NOTE: For mounting transmission on assembly stand 00 2 300 and for transport.

SI number

01 29 09 (601)

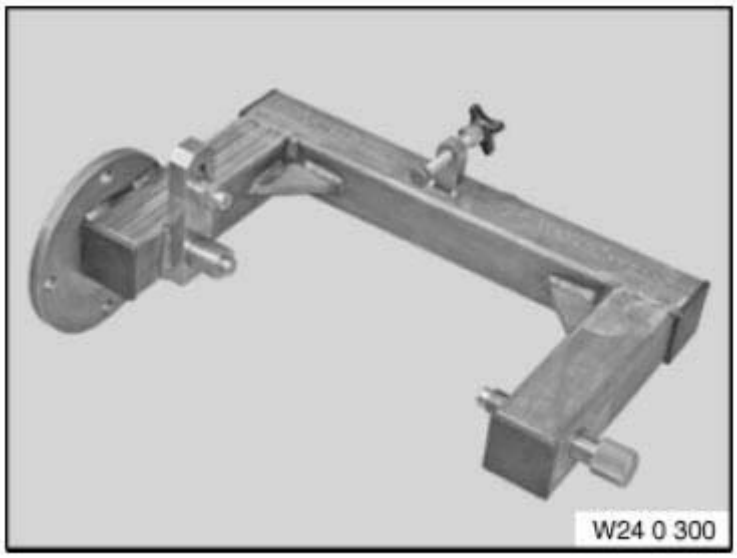


Fig. 87: Identifying Support (240300)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5350 SUPPORT

0491780 245350 Support MW

NOTE: (Support for automatic transmission) Other: Only Japan and South Africa

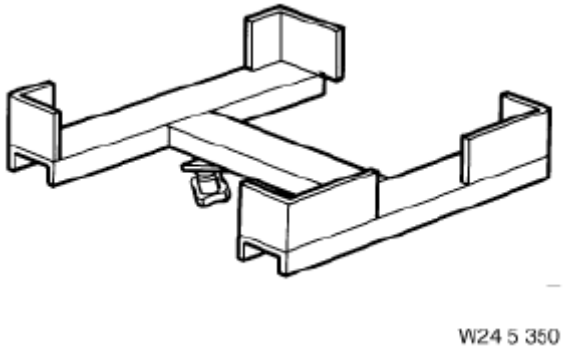


Fig. 88: Identifying Support (245350)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6080 TEST CABLE

0494137 246080 Test cable Minimum set: Measuring and testing equipment MP

NOTE: (test cable 16-pin)

Storage Location

L204

SI number

02 06 01 (763)

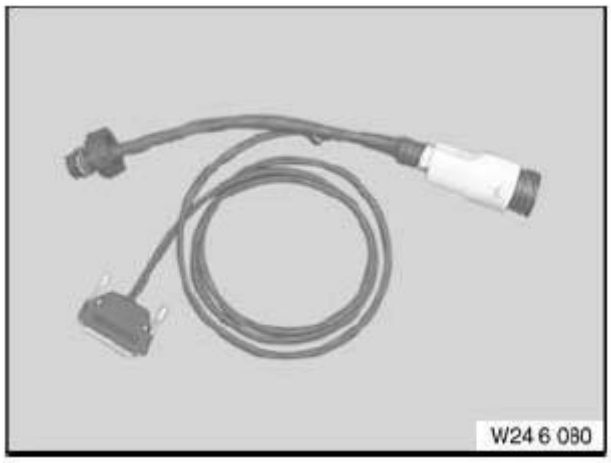


Fig. 89: Identifying Test Cable (246080)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6010 TEST CABLE

0491791 246010 Test cable MW

NOTE: (Test cable, 9-pin) For automatic transmission (EH transmission)

SI number

02 03 91 (313)

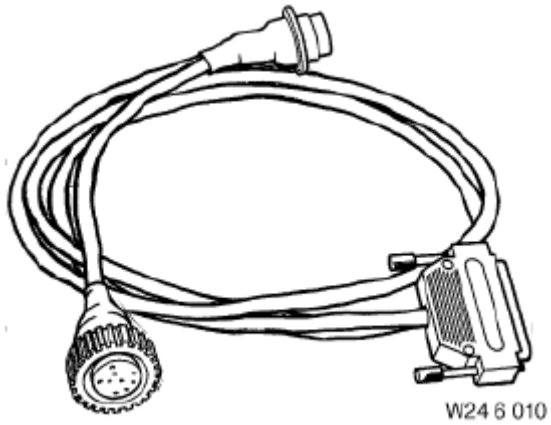


Fig. 90: Identifying Test Cable (246010)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6050 TEST CABLE

0491796 246050 Test cable MW

NOTE: (Test cable, 10-pin) For Jatco gearbox (AMP plug connection)

SI number

02 01 93 (649)

24-6000 TEST CABLE

0491790 246000 Test cable MW

NOTE: (Test cable, 8-pin) For automatic transmission (EH gearbox)

SI number

02 03 91 (313)

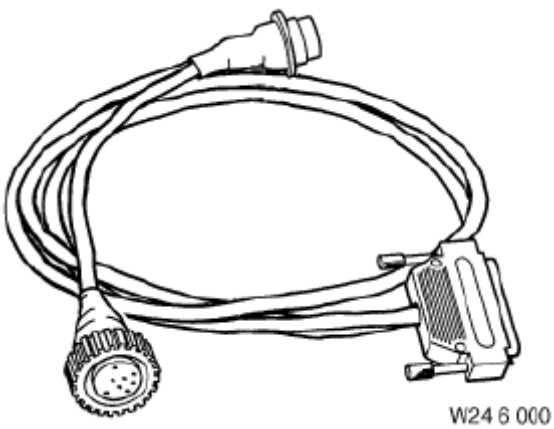


Fig. 91: Identifying Test Cable (246000)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6070 TEST CABLE

0493654 246070 Test cable MW

NOTE: (Test cable, 20-pin) For automatic transmission GM5

SI number

02 01 99 (468)

24-6060 TEST CABLE

0491797 246060 Test cable MW

NOTE: (Test cable, 16-pin) For automatic transmission (EH gearbox)

SI number

02 02 93 (650)

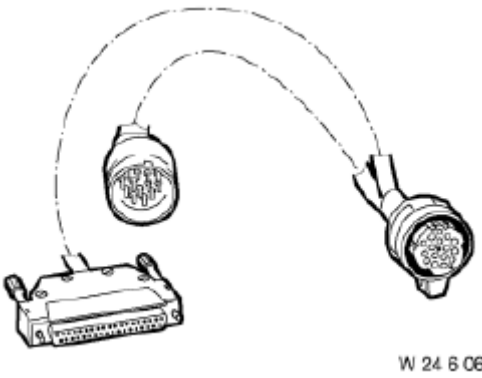


Fig. 92: Identifying Test Cable (246060)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6020 TEST CABLE

0491792 246020 Test cable MW

NOTE: (Test cable, 14-pin) For automatic transmission (EH transmission)

SI number

00 02 99 (399)

Consisting of:

5 = 0491793 Operating instructions

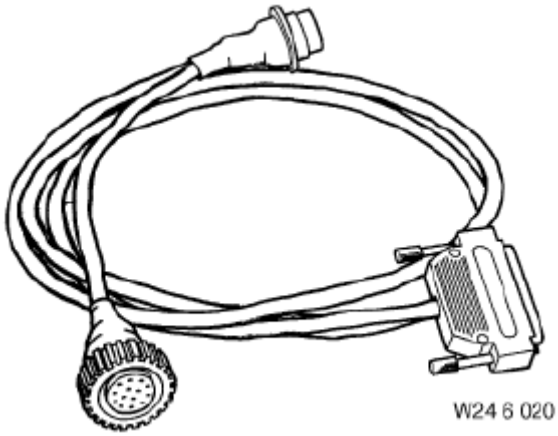


Fig. 93: Identifying Test Cable (246020)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2020 TOOL

0491694 242020 Tool MW

NOTE: For squeezing the disc spring

Storage Location

X5

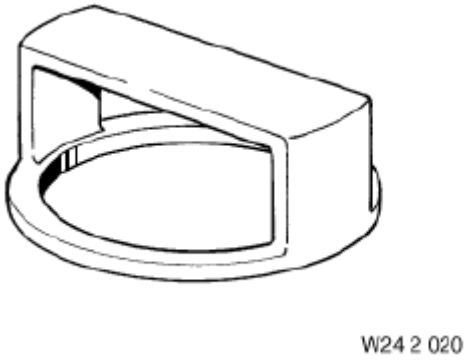


Fig. 94: Identifying Tool (242020)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5120 TOOL

0491758 245120 Tool MW

NOTE: For centring the converter housing relative to the oil pump when mounting

Storage Location

B2

SI number

01 04 95 (906)

Consisting of:

1 = 0491759 Bush

NOTE: (Centring bush)

2 = 0491760 Pin

NOTE: (Centring pin (3 pieces))

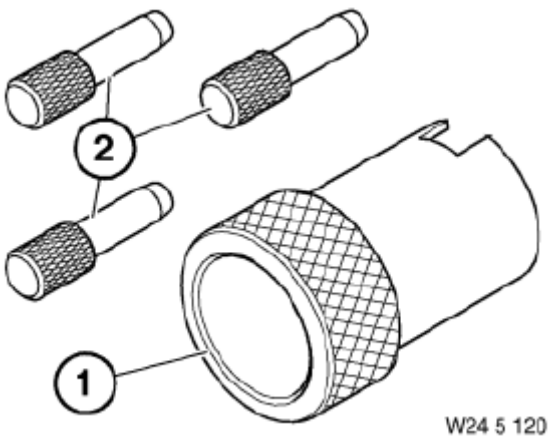


Fig. 95: Identifying Tool (245120)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4130 TOOL

0491731 244130 Tool Minimum set: Mechanical tools MW

NOTE: (Locating tool) For fixing torque converter during removal and installation of gearbox

Storage Location

C6

SI number

01 05 97 (181)

Consisting of:

7 = 0493804 Blade

NOTE: Transmission: A5S 360R

1 = 0491732 Basic body

NOTE: (basic body)

2 = 0491733 Blade

NOTE: Transmission: A5S 440Z, GA6HP26Z (N62)

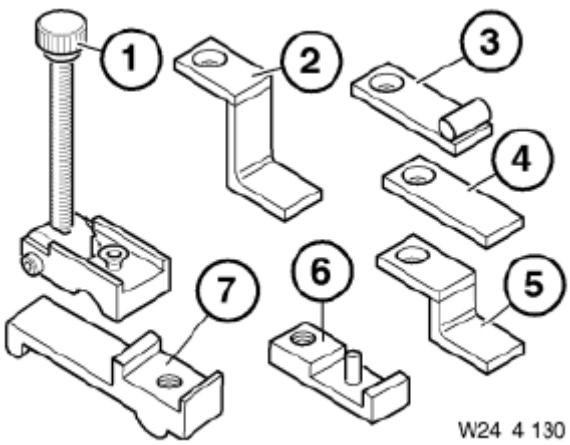


Fig. 96: Identifying Tool (244130)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0491734 Blade

NOTE: (Blade) Gearbox: A4S 310R and A5S 390G

4 = 0491735 Blade

NOTE: Transmission: A5S 310Z, A5S 560Z, A5S 300J and A5S 325Z

5 = 0491736 Blade

NOTE: Transmission: A5S 560Z, GA6 HP26Z (M67), GA6 HP32Z (N73)

6 = 0493180 Plate

NOTE: (Counter-support plate)

8 = 0496742 Blade

NOTE: For securing converter during removal and installation of transmission. In conjunction with: 24 4 131

24-1300 TOOL

0491691 241300 Tool MW

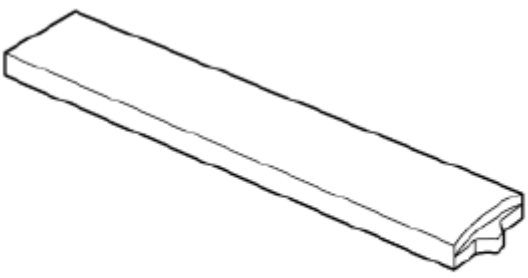
NOTE: (Striking tool) For securing the retaining tabs on disc carrier C

Storage Location

X5

SI number

01 01 95 (892)



W24 1 300

Fig. 97: Identifying Tool (241300)
Courtesy of BMW OF NORTH AMERICA, INC.

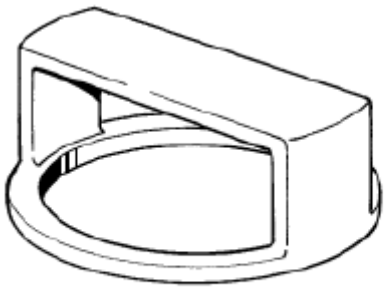
24-2040 TOOL

0491696 242040 Tool MW

NOTE: For squeezing the disc spring

Storage Location

X6



W24 2 020

Fig. 98: Identifying Tool (242040)
Courtesy of BMW OF NORTH AMERICA, INC.

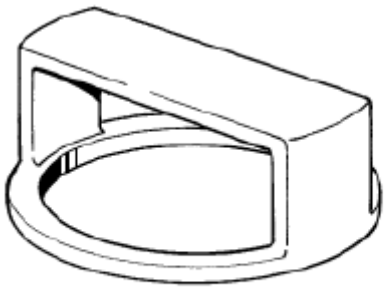
24-2030 TOOL

0491695 242030 Tool MW

NOTE: For compressing the disc spring

Storage Location

X5



W24 2 020

Fig. 99: Identifying Tool (242030)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1290 WEDGE

0491690 241290 Wedge MW

NOTE: (Wedges) For fixing the disc carrier C when securing the retaining tabs

Storage Location

X5

SI number

01 01 95 (892)

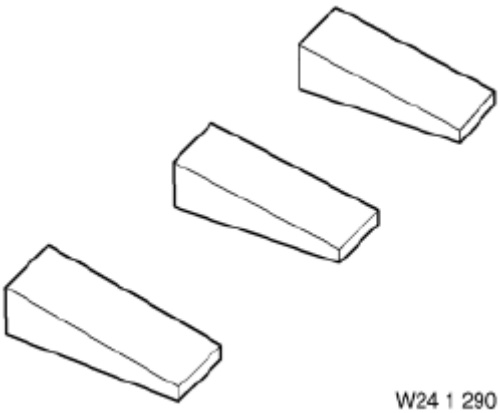


Fig. 100: Identifying Wedge (241290)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1110 WRENCH SOCKET

0491667 241110 Wrench socket Minimum set: Mechanical tools MW

NOTE: (Wrench socket with magnet) For loosening and tightening the converter fixation

Storage Location

A11

SI number

01 04 86 (566)

Fig. 101: Identifying Wrench Socket (241110)
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION FILLING CAPACITIES

24 00 TRANSMISSION FILLING CAPACITIES GA6HP19Z GA6HP26Z

TRANSMISSION FILLING CAPACITIES SPECIFICATION

Total oil volume (transmission and torque converter drained)	approx. ltr.	9.0-10

Automatic Transmission - Tightening Torques - Z4

EXTERNAL SHIFT LINKAGE

24 51 EXTERNAL SHIFT LINKAGE

TIGHTENING TORQUE SPECIFICATION - EXTERNAL SHIFT LINKAGE

	Type	Thread	Tightening specification	Measure
1AZ Selector lever on transmission	A4S 200R/A4S 270R/A4S 310R/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R/GA6HP19Z/GA6HP26Z/GA6 HP32Z/GA6L45R	M8x1		10 Nm
	A5S 300J	M8		15 Nm

HYDRAULIC/ELECTRIC CONTROL PARTS AND CONTROLLING ELEMENTS

24 30 HYDRAULIC/ELECTRIC CONTROL PARTS AND CONTROLLING ELEMENTS

TIGHTENING TORQUE SPECIFICATION - HYDRAULIC/ELECTRIC CONTROL PARTS AND CONTROLLING ELEMENTS

	Type	Thread	Tightening specifications	Dimension
1AZ Valve body to transmission	3HP-22	M6		11 Nm
	4HP-22/4HP-24/A5S 310Z/A5S 440Z/A5S 300J/A5S 325Z/GA6HP19Z/GA6HP26Z/GA6HP32Z	M6		8 Nm
	GA6HP19Z TU/GA6HP26TU	M6		10 Nm
	A4S 270R/A4S 310R	5/16 inch		20 Nm
	A5S 360R/A4S 360R	M6		11 Nm
	A5S 560Z	M6 x 12		6 Nm
	A5S 560Z	M6 x 55		8 Nm
	GA6L45R	M5		8 Nm
2AZ Valve housing to valve body	A4S 200R/A4S 270R/A4S 310R/A5S 300J/A5S 310Z/A5S 310Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M6		5 Nm
3AZ Intermediate plate on shift unit	A4S 270R/A4S 310			13 Nm

4AZ	Input- and output speed sensors to mechatronics		M6		12 Nm

INTERIOR SHIFT ELEMENTS

24 52 INTERIOR SHIFT ELEMENTS

TIGHTENING TORQUE SPECIFICATION - INTERIOR SHIFT ELEMENTS

		Type	Thread	Tightening specification	Measure
1AZ	Shift segment to shaft	A4S 270R/A4S 310R			22 Nm
		A5S 300J	M14x1.5		35 Nm
2AZ	Detent spring on shift unit	A4S 270R/A4S 310R	5/16"		25 Nm

PLANETARY GEAR DRIVE

24 22 PLANETARY GEAR DRIVE

TIGHTENING TORQUE SPECIFICATION - PLANETARY GEAR DRIVE

		Type	thread	tightening specification	Measure
1AZ	Brake coupling D/G on gear box housing	A5S 310Z/A5S 560Z	M10	Insert all screws until contact is made with screw head in each case center bolt both outer screws center bolt both outer screws both outer screws	 30 Nm 15 Nm 63 Nm 30 Nm 63 Nm

SHIFT CLUTCHES

24 23 SHIFT CLUTCHES

TIGHTENING TORQUE SPECIFICATION - SHIFT CLUTCHES

		Type	thread	tightening specification	Measure
1AZ	Torx screws for F clutch on transmission case	4HP-22/4HP- 24	M6		10 Nm
		/A5S 560Z	M8		23 Nm
2AZ	Brake band adjusting screw	A 4 S 270 R/A 4 S 310 R	5/16"		5 Nm
3AZ	Lock nut of brake band adjusting screw	A 4 S 270 R/A 4 S 310 R	5/16"		21 Nm

SHIFT VALVES, PARKING LOCK

24 34 SHIFT VALVES, PARKING LOCK

TIGHTENING TORQUE SPECIFICATION - SHIFT VALVES, PARKING LOCK

	Type	thread	tightening specification	Measure
7AZ Pulse generator, output speed	A5S 325Z			6 Nm
8AZ Pulse generator, turbine speed	A5S 325Z			8 Nm
9AZ Plug	A5S 325Z			20 Nm

TORQUE CONVERTER

24 40 TORQUE CONVERTER

TIGHTENING TORQUE SPECIFICATION - TORQUE CONVERTER

		Type	Thread	Tightening specification	Measure
1AZ	Torque converter to flywheel		M8		26 Nm
		A4S 270R/A4S 310R/A5S 310Z/A5S 300J/A5S 440Z/A5S 560Z/A5S 325Z/A4S 200R/GA6HP26Z/GA6HP19Z	M10 8.8		45 Nm
		A5S360/390R	M10		45 Nm
		A5S360/390R/GA6HP19Z/GA6HP26Z/GA6HP32Z/GA6L45R	M10 10.9		56 Nm

TRANSMISSION EXTENSION, BEARINGS, SEALS

24 13 TRANSMISSION EXTENSION, BEARINGS, SEALS

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION EXTENSION, BEARINGS, SEALS

		Type	Thread	Tightening specification	Measure
1AZ	Slotted nut/output flange	A5S 310Z/A5S 440Z/A5S 560Z/A5S 325Z			120 Nm
2AZ	Double hexagon nut/output flange	GA6HP26Z		until 09/02 without sealing ring in output flange	80 Nm
		GA6HP19Z/GA6HP26Z		from 09/02 with sealing ring in output flange	60 Nm
3AZ	Output shaft nut to output flange	GA6L45R	22x1.5		55 Nm

TRANSMISSION HOUSING, TRANSMISSION OIL SUMP

24 11 TRANSMISSION HOUSING, TRANSMISSION OIL SUMP

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION HOUSING, TRANSMISSION OIL

SUMP

	Type	Thread	Tightening specification	Measure
5AZ Transmission oil sump	4HP-22/4HP-24/A5S 310Z/A5S 325Z	M6		6 Nm
	A5S 560Z/A5S 440Z	M6		10 Nm
	A4S 270R/A4S 310R	M6		12 Nm
	A5S 360R/A4S 360R	M6		10 Nm
	A5S 300J			9 Nm
	GA6HP26Z/GA6HP19Z/GA6L45R/GA6HP32Z	M6		10 Nm
6AZ Oil drain plug	A4S 200R/A5S 310Z/	M10		16 Nm
	A5S 325Z			35 Nm
	A5S 440Z	M16x1.5		30 Nm
	A5S 560Z			50 Nm
	A5S 360R/A5S 390R	M14		18 Nm
	A4S 270R/A4S 310R			25 Nm
	A5S 300J			35 Nm
	GA6L45R	M12x1.75		14 Nm
	GA6HP19Z/GA6HP26Z/GA6HP32Z	M10x1	Metal oil sump	12 Nm
	GA6HP19Z/GA6HP26Z/GA6HP32Z	M16x1.5 M24x1	Plastic oil sump	8 Nm
7AZ Oil filler plug	A5S 325Z			30 Nm
	A5S 310Z/A5S 560Z			100 Nm
	A5S 440Z	M18x1.5		35 Nm
	A4S 270R/A4S 310R			33 Nm
	A5S 360R/A4S 360R	M14		18 Nm
	A5S 300J			40 Nm
	GA6HP26Z/GA6HP32Z	M30x1.5		80 Nm
	GA6HP19Z/GA6HP26Z/GA6HP32Z	M18x1.5		35 Nm
	GA6L45R	M18x1.5		19 Nm

TRANSMISSION HOUSING, TRANSMISSION OIL SUMP

24 11 TRANSMISSION HOUSING, TRANSMISSION OIL SUMP

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION HOUSING, TRANSMISSION OIL SUMP

	Type	Thread	Tightening specification	Measure
1AZ Transmission extension	A4s 200R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M8		25 Nm
		5/16		

	A4S 270R/A4S 310R	inch		32 Nm
	A5S 360R/A4S 360R	M8		22 Nm
2AZ Guard	A4s 200R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M6		9 Nm
3AZ Converter housing	A4s 200R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M8		25 Nm
	4HP-22/4HP-24	M10		46 Nm
	A4S 270R/A4S 310R	1/2 inch		42 Nm
4AZ Screw plug to intermediate plate	A4s 200R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M10		16 Nm
	4HP-22/4HP-24	M14		40 Nm
	4HP-22/4HP-24	M20		50 Nm
	A5S 440Z	M12		23 Nm

TRANSMISSION IN GENERAL

24 00 TRANSMISSION IN GENERAL

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION IN GENERAL

	Type	Thread	Tightening specifications	Dimens
1AZ Transmission to engine				
6 Kant Schrauben	A4S 200R/A4S 270R/A4S 310R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M8		24 Nm
6 Kant Schrauben	A4S 200R/A4S 270R/A4S 310R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M10		45 Nm
6 Kant Schrauben	A4S 200R/A4S 270R/A4S 310R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M12		82 Nm
Torx-Schrauben	A4S 200R/A4S 270R/A4S 310R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R	M8		21 Nm
Torx-Schrauben	A4S 200R/A4S 270R/A4S 310R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R	M10		42 Nm

Torx-Schrauben		A4S 200R/A4S 270R/A4S 310R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R	M12		72 Nm
Torx-Schrauben		GA6HP19Z/GA6HP26Z	M6		9 Nm
Torx-Schrauben		GA6HP26Z	M10		38 Nm
Torx-Schrauben Stahl		GA6HP19Z/GA6L26Z/GA6L45R	M8		19 Nm
Torx-Schrauben Stahl		GA6HP19Z/GA6HP26Z/GA6L45R	M12		66 Nm
2AZ	Transmission to engine N51/N52/N52K/N53/N54/N55 Aluminum screws are not magnetic	GA6HP19Z/GA6HP26Z/GA6L45R		Replace screws Jointing torque and angle of rotation must be observed without fail	
		GA6HP19Z/GA6L45R	M10x30	Jointing torque Angle of rotation	20 Nm 90-110
		GA6HP19Z	M10x85	Jointing torque Angle of rotation	20 Nm 180-20(
		GA6HP19Z/GA6L45R	M12	Jointing torque Angle of rotation	25 Nm 130 °
3AZ	Reinforcement shell to transmission/extension	A4S 200R/A4S 270R/A4S 310R/A5S 300J/A5S 310Z/A5S 325Z/A5S 440Z/A5S 560Z/A5S 360R/A5S 390R/GA6HP19Z/GA6HP26Z/GA6HP32Z	M8		23 Nm
4AZ	Cover plate for transmission	GA6HP19Z/GA6L45R	M6		9 Nm
5AZ	Heat shield, oil sump	GA6L45R	M6		8 Nm
6AZ	Air duct plate	GA6HP26Z	M6		10 Nm
7AZ	Line cover plate	GA6HP26Z	M6		10 Nm

TRANSMISSION MOUNTING

24 71 TRANSMISSION MOUNTING

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION MOUNTING

		Type
1AZ	Cross member to	E36/E38/E39/E46/E53/E85/E86/E83

	body	E60/E61/E63/E64/E66/E67/E68/E65/E83/E81/E87/E93/E92/E91/E90/E88/E82/E89/E
2AZ	Rubber mounts to cross member or transmission	E36/E38/E39/E46/E53
		E81/E60/E61/E63/E64/E65/E66/E87/E93/E92/E91/E90/E87/E86/E85/E68/E67/E88/E
		E83
3AZ	Support tube to engine subframe	E36
4AZ	Rubber mounts to carrier pipe	E36
5AZ	Carrier plate	E36
6AZ	Transmission support block to transmission	E60/E61/E63/E64/E87/E85/E86/E87/E90/E91/E92/E93/E81/E82/E88/E84
		E60/E61/E63/E64/E87/E85/E86/E87/E90/E91/E92/E93/E81/E82/E88/E84
7AZ	Transmission mount to transmission support bracket/transmission cross-member	E60/E61/E63/E64/E87/E90/E91/E92/E93/E81/E82/E88/E84

WIRE HARNESS, SHIFT ELEMENTS AND SENSOR

24 35 WIRE HARNESS, SHIFT ELEMENTS AND SENSOR

TIGHTENING TORQUE SPECIFICATION - WIRE HARNESS, SHIFT ELEMENTS AND SENSOR

		Type	thread	tightening specification	Measure
1AZ	Transmission socket to case	4HP-22 EH/4 HP- 24EH/A5S 310Z	M26		12 Nm
		A4S 270R/A4S 310R	M26		14 Nm

24 AUTOMATIC TRANSMISSION

24-0030 ADAPTER

Adapter MW

NOTE: For pressure gauge 13 3 061/For checking the converter pressure

Storage Location

A4

W24 0 030

Fig. 1: Identifying Adapter (24-0030)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2410 ADAPTER

Adapter Minimum set: Mechanical tools MW

NOTE: (Adapter ring) For driving in radial shaft seal on output shaft.

Storage Location

B25

SI number

01 18 08 (482)

Fig. 2: Identifying Adapter (24-2410)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5190 ADAPTER

Adapter MW

NOTE: For pressure gauge 13 3 061 for checking oil pressure in transmission

Storage Location

A4

SI number

01 03 90 (184)

W24 5 190

Fig. 3: Identifying Adapter (24-5190)
Courtesy of BMW OF NORTH AMERICA, INC.

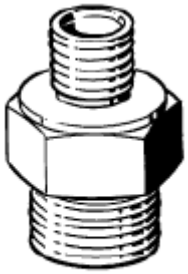
24-0070 ADAPTER

Adapter MW

NOTE: For testing the pump pressure

Storage Location

A4



W24 0 070

Fig. 4: Identifying Adapter (24-0070)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1210 ANGLE

Angle MW

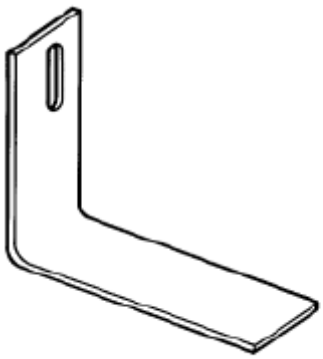
NOTE: (Sheet metal part) Retaining plate for disc package As of transmission number 11 2 300 not required

Storage Location

Z4

SI number

01 09 90 (282)



W24 1 210

Fig. 5: Identifying Angle (24-1210)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5270 BUSH

Bush Minimum set: Mechanical tools MW

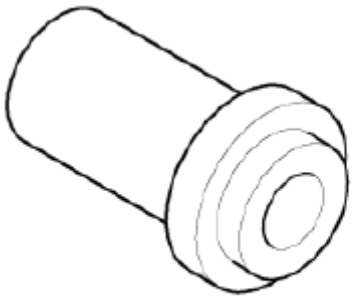
NOTE: For fitting the radial sealing ring of the selector shaft

Storage Location

B3

SI number

01 08 96 (080)



W 24 5 270

Fig. 6: Identifying Bush (24-5270)
Courtesy of BMW OF NORTH AMERICA, INC.

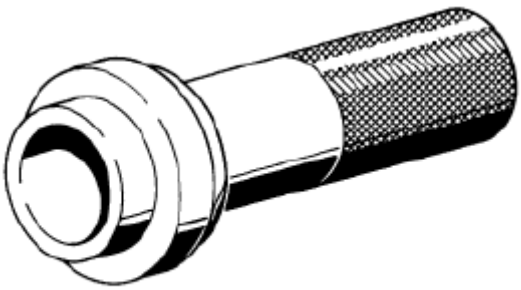
24-1050 BUSH

Bush MW

NOTE: (Impact bush) For fitting radial shaft seal for torque converter in oil pump housing

Storage Location

Y7



W24 1 050

Fig. 7: Identifying Bush (24-1050)
Courtesy of BMW OF NORTH AMERICA, INC.

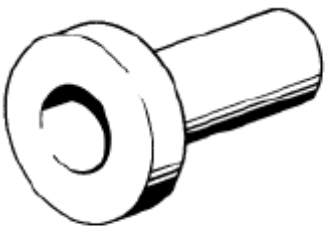
24-1060 BUSH

Bush MW

NOTE: (Impact bush) For driving in the radial seal ring for the torque converter in the oil pump housing and at the output flange

Storage Location

Y7



W24 1 060

Fig. 8: Identifying Bush (24-1060)
Courtesy of BMW OF NORTH AMERICA, INC.

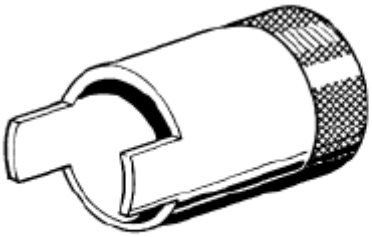
24-3140 BUSH

Bush MW

NOTE: (Driver bush) For checking the oil pump for ease of movement

Storage Location

A10



W24 3 140

Fig. 9: Identifying Bush (24-3140)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5200 BUSH

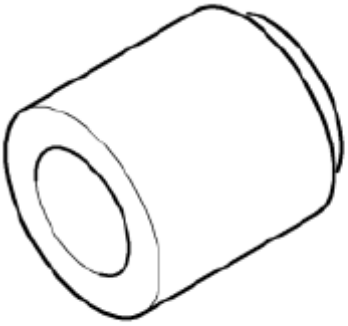
Bush MW

Replaced by: 0491781

NOTE: (Impact bush) For fitting the radial sealing ring of the selector lever shaft/Replaced by 24 5 360 (0 491 781)

SI number

01 03 90 (184)



W24 5 200

Fig. 10: Identifying Bush (24-5200)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1080 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: (bushing (aluminium)) For placing on the drive shaft during removal of the shaft seal from the oil pump housing

Storage Location

C4

SI number

01 03 98 (303)

W24 1 080

Fig. 11: Identifying Bush (24-1080)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5250 BUSH

Bush Minimum set: Mechanical tools MW

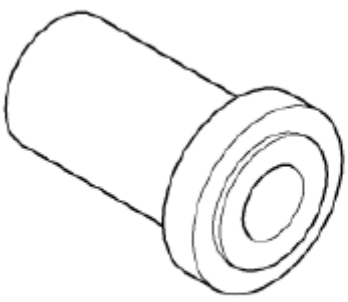
NOTE: For pressing in the radial seal ring of the selector shaft

Storage Location

B3

SI number

01 02 95 (896)



W 24 5 250

Fig. 12: Identifying Bush (24-5250)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1100 BUSH

Bush MW

NOTE: (Impact bush) For driving in the radial seal ring for the output flange into the transmission extension

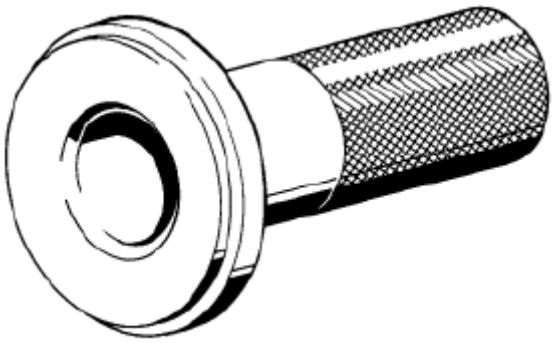


Fig. 13: Identifying Bush (24-1100)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4380 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: (Bush with nut) For inserting radial shaft seal of selector shaft.

Storage Location

A24

SI number

01 02 07 (334)

Consisting of:

1 = 0495788 Bush

2 = 0495789 Nut

NOTE: (Nut M8x1)

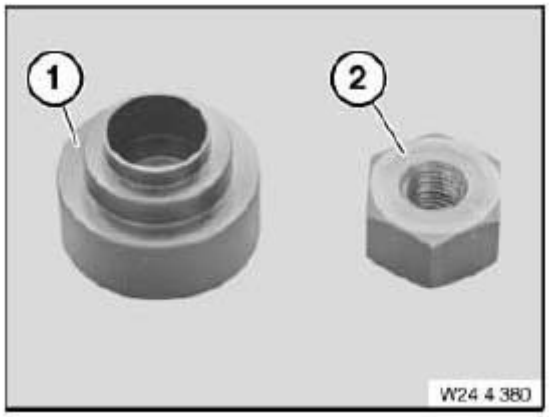


Fig. 14: Identifying Bush (24-4380)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1090 BUSH

Bush MW

NOTE: (Impact bush) For driving in the radial shaft seal on the output flange

SI number

01 08 98 (333)

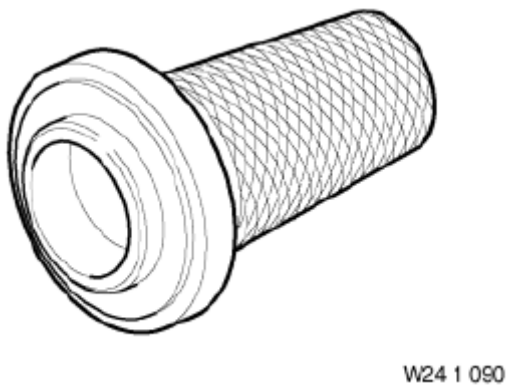


Fig. 15: Identifying Bush (24-1090)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1070 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: (Impact bush) For fitting radial shaft seal into oil pump housing

Storage Location

C17

SI number

01 03 98 (303)

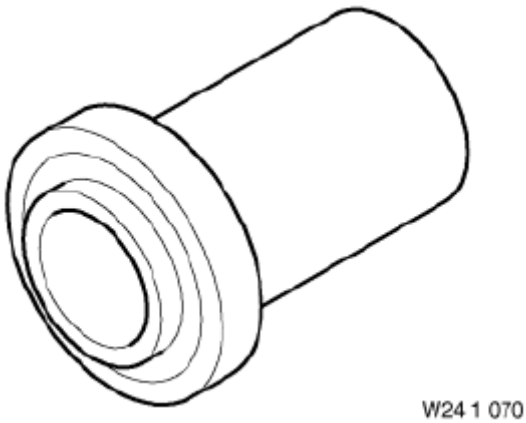


Fig. 16: Identifying Bush (24-1070)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2390 CAP

Cap Minimum set: Mechanical tools MW

NOTE: (protective cap) For sealing off the guide sleeve of the transmission connector

Storage Location

C49

SI number

01 14 01 (766)

Fig. 17: Identifying Cap (24-2390)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0150 CLIP

MW

NOTE: (Mounting bracket) For mounting the transmission on the assembly stand

Consisting of:

6 = 0493913 Spindle

NOTE: With synchronizing key, transmission: All

3 = 0491645 Shaped part

NOTE: (Shaped part) For mounting the transmission/transmissions: A5S 310Z

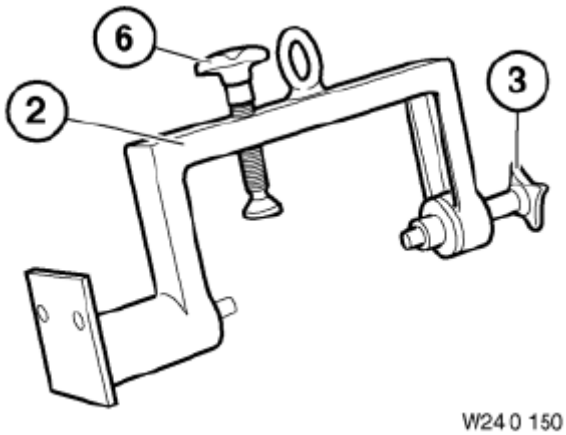


Fig. 18: Identifying Clip (24-0150)

Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491646 Frame

NOTE: (Main frame)

3 = 0491647 Spindle

NOTE: (Spindle with rotary handle)

3 = 0491648 Bolt

NOTE: (Mounting bolts)

3 = 0491649 Bush

NOTE: (Spacer bush for spindle) Transmissions: A4S 310R

24-0140 CONNECTION

Connection Minimum set: Mechanical tools MW

Replaced by: 0495498

NOTE: (Connection) For pressure gauge 13 3 061 and BMW diagnosis and information system for measuring the oil pressure in the transmission Replaced by 23 4 050 (0 495 498)

Storage Location

A4

SI number

01 01 92 (469)

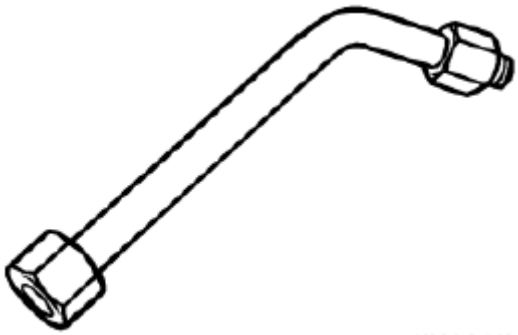


Fig. 19: Identifying Connection (24-0140)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0020 CONNECTION

Connection Minimum set: Mechanical tools MW

NOTE: (Connections) Oil pressure testing accessory for pressure gauge 13 3 061 or BMW DIS for checking the oil pressure.

Storage Location

B24

B23

Individual

Consisting of:

1 = 0491619 Hose

NOTE: (Line) Pressure hose 1.7 m, connection M12x1.5 - M14x1.5 outer thread/For checking the different converter pressures/transmission: A4S 310R, A4S 270R

2 = 0491620 Connection

NOTE: (Connection) For checking the main pressure (3 HP 22, A5S 310Z) and clutch A (ZF transmission)/transmission: 3 HP 22, A5S 310Z, A5S 560Z and all ZF transmissions

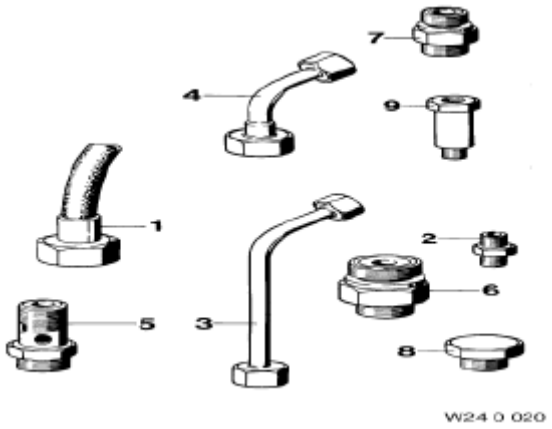


Fig. 20: Identifying Connection (24-0020)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0491621 Connection

NOTE: (Connection) Pipe bend, 145 mm, stretched length 145 mm/transmission: 4 HP 22, 4 HP 24

4 = 0491622 Connection

NOTE: (Connection) Pipe bend, 90 mm, stretched length 90 mm

5 = 0491623 Screw

NOTE: (Connection) Banjo bolt M20x1. - M18x1./For checking the converter pressure/transmission: 3 HP 12

6 = 0491624 Connection

NOTE: (Connection) Reducer M24x1.5 - 20x1.5/For checking the main pressure/transmission: 3 HP 20

7 = 0491625 Connection

NOTE: (Connection) Reducer M20x1.5 - M18x1.5/For checking the main pressure (3 HP 12) an converter pressure (3 HP 20)/Transmission: 3 HP 12, 3 HP 20

8 = 0491626 Screw

NOTE: (Screw) M18x1./For closing the engine oil feed pipe when checking the converter pressure/transmission: 3 HP 20

9 = 0491627 Adapter

NOTE: For closing the feed and return lines when checking the main pressure/transmission: 3 HP 22

24-0190 COUNTER SUPPORT

Counter support Minimum set: Mechanical tools MW

NOTE: (Steady device) For the output flange of the propeller shaft while releasing and tightening the slotted nut

SI number

01 06 92 (509)

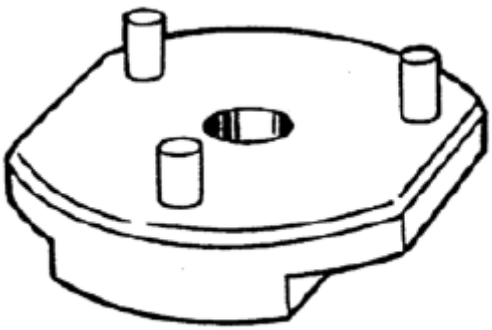


Fig. 21: Identifying Counter Support (24-0190)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1230 DEVICE

Device MW

NOTE: (Pressing device) For removing and installing the piston (cover) at brake C

Storage Location

Y6

SI number

01 14 93 (718)

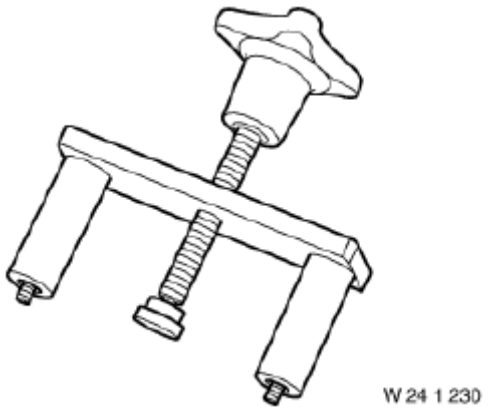


Fig. 22: Identifying Device (24-1230)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4120 DEVICE

Device MW

Replaced by: 0491731

NOTE: For firmly holding torque converter in position while removing and fitting the transmission. Replaced by 24 4 130 (0 491 731)

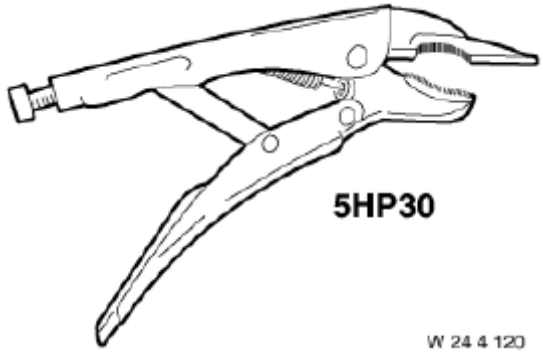


Fig. 23: Identifying Device (24-4120)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1240 DEVICE

Device MW

NOTE: (device) For determining the shims on the brake C

Storage Location

Y6

SI number

01 14 93 (718)

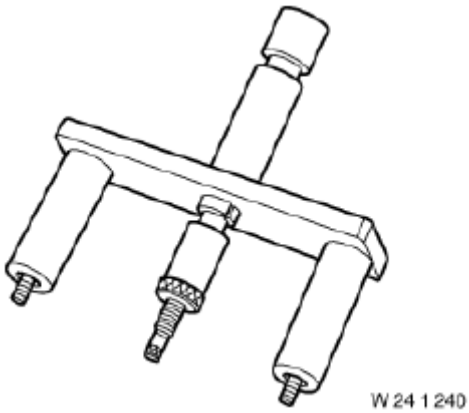


Fig. 24: Identifying Device (24-1240)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1370 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (locating fixture) For securing converter during removal and installation of transmission.

Storage Location

A20

B20

SI number

01 23 05 (224)

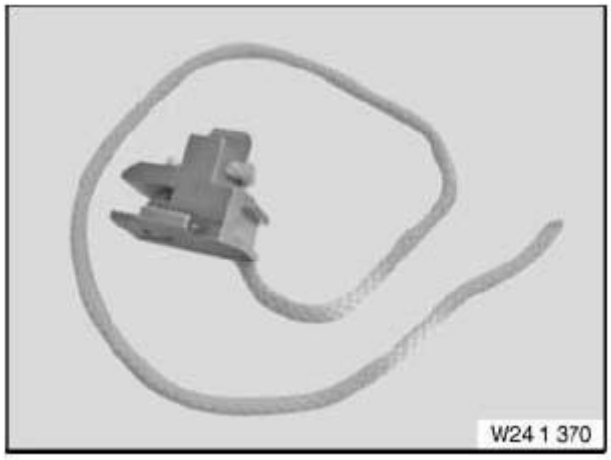


Fig. 25: Identifying Device (24-1370)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1250 DEVICE

Device MW

NOTE: (Lifting gear) For removing and installing the brake clutch unit D/G incl. the parking lock gear

Storage Location

Y3

Z3

SI number

01 14 93 (718)

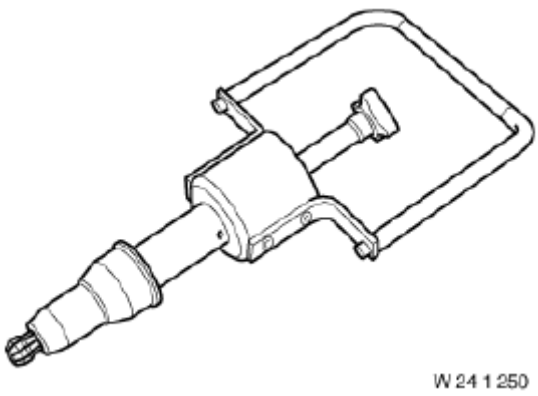


Fig. 26: Identifying Device (24-1250)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5260 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (Pulling device) For pulling off the radial seal of the selector shaft/transmission with positioning switch

Storage Location

B3

SI number

01 02 95 (896)

Consisting of:

1 = 0494592 Use

2 = 0494593 Bush

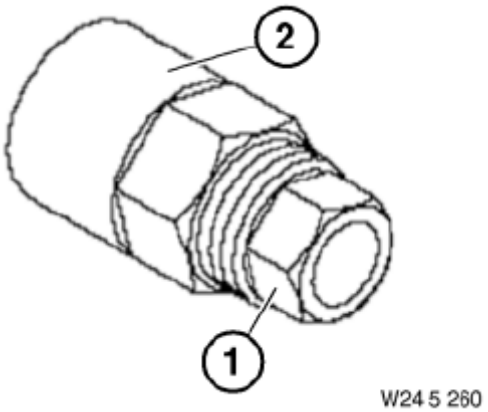


Fig. 27: Identifying Device (24-5260)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2310 DEVICE

Device MW

NOTE: (Device) Tool set for dismantling and fitting the R gear piston. For dismantling and assembling the transmission for "Sealing the intermediate plate".

SI number

01 22 97 (239)

Consisting of:

1 = 0493157 Plate

NOTE: (Pressure plate) For removing and installing the spring cup

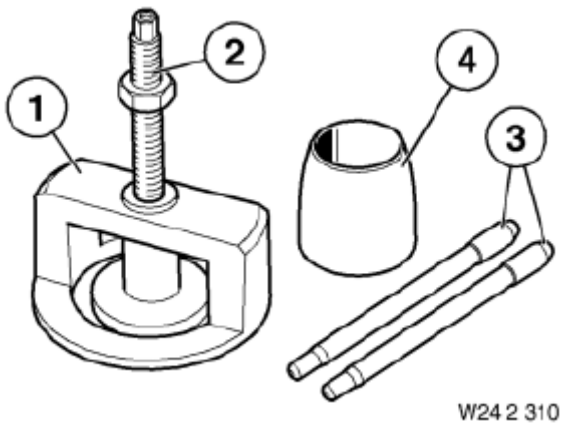


Fig. 28: Identifying Device (24-2310)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0493158 Spindle

NOTE: (Spindle with pressure plate) Spindle M14x1.5, nut M14, pressure plate and washer/For removing and installing the spring cup

3 = 0493159 Pin

NOTE: (Guide pin (2 pieces)) For fixing the gaskets and the intermediate plate on the intermediate case

4 = 0493160 Bush

NOTE: (Slip bush) For installing the piston in the cylinder of the intermediate plate

24-1180 DEVICE

Device MW

NOTE: For removing and installing oil pump

Storage Location

Z2

Z1

SI number

01 09 90 (282)

Consisting of:

1 = 0494586 Tube

NOTE: (Retaining tube)

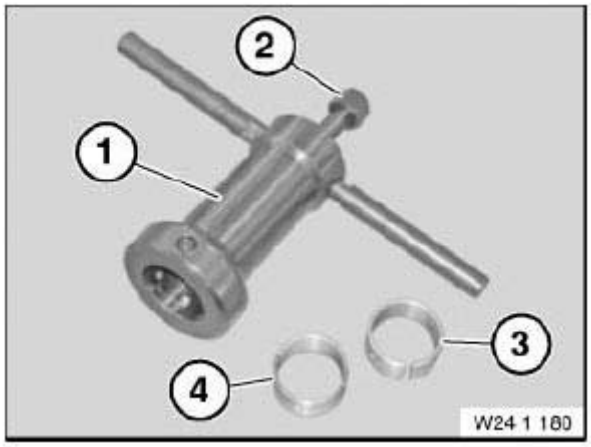


Fig. 29: Identifying Device (24-1180)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0494588 Spindle

NOTE: (Threaded spindle)

3 = 0494589 Ring

NOTE: (Clamping ring)

4 = 0496375 Ring

NOTE: (Clamping ring) Gearbox: GA6HP19Z, GA6HP26Z

24-0080 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (funnel) For filling the transmission with transmission oil

Fig. 30: Identifying Device (24-0080)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1260 DEVICE

Device MW

NOTE: (Removal and mounting device) For removing and installing the cylinders D/E with the planetary gear set

Storage Location

C1

C2

SI number

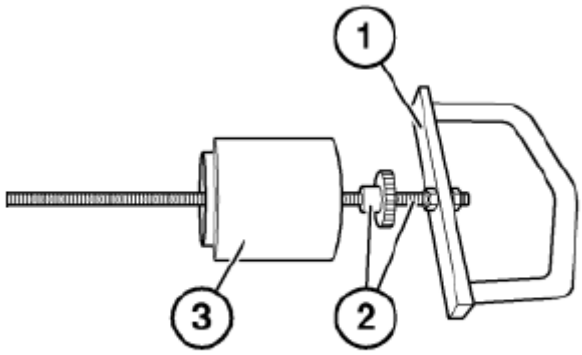
01 01 95 (892)

Consisting of:

1 = 0491680 Handle

2 = 0491681 Spindle

NOTE: (Spindle with knurled nut)



W24 1 260

Fig. 31: Identifying Device (24-1260)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0491682 Bush

NOTE: (Centring bush)

24-1270 DEVICE

Device MW

NOTE: Removal and mounting device) For removing and installing the drive clutch A/B/C

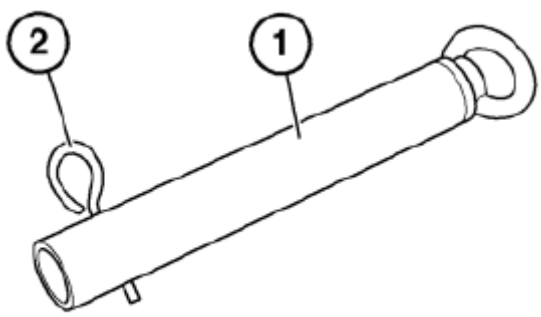
Storage Location

Y2

Z2

SI number

01 01 95 (892)



W24 1 270

Fig. 32: Identifying Device (24-1270)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0491684 Pipe

NOTE: (Jack tube with ring bolt)

2 = 0491685 Pin

NOTE: (Locking pin)

24-5360 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: For removing and installing the radial shaft seal of the gearshift shaft 24 5 361, 24 5 362, 24 5 364 and 24 5 366 for E90

Storage Location

C4

SI number

01 14 96 (105)

Consisting of:

6 = 0494208 Bush

NOTE: For fitting the radial shaft seal on the selector shaft (emergency release) Transmission: GA6 HP26Z

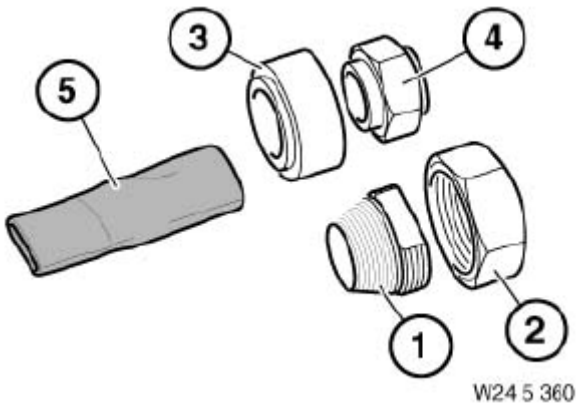


Fig. 33: Identifying Device (24-5360)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0491782 Bush

NOTE: (Threaded bush)

2 = 0491783 Nut

NOTE: (Union nut)

3 = 0491784 Bush

NOTE: For transmission without positioning switch Transmission: A4S 310R

4 = 0491785 Nut

5 = 0491786 Sleeve

NOTE: (Sliding sleeve (5 pieces)) Transmission: A4S 310R

24-1280 DEVICE

Device MW

NOTE: (Assembly and disassembly tool) For removing and installing brake clutch F

Storage Location

Z4

Z3

SI number

01 01 95 (892)

Consisting of:

1 = 0491687 Handle

NOTE: (Handle)

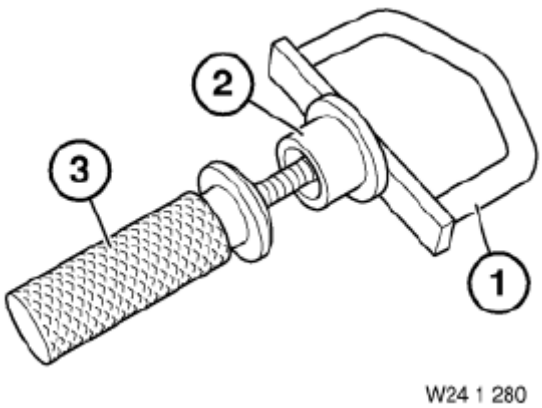


Fig. 34: Identifying Device (24-1280)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491688 Nut

NOTE: (knurled nut)

3 = 0491689 Handle

NOTE: (Centring handle)

24-4080 DEVICE

Device MW

NOTE: For fixing torque converter in position while removing and installing transmission.

Storage Location

Individual

Fig. 35: Identifying Device (24-4080)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0010 DEVICE

Device MW

NOTE: For checking the side clearance of the drive shaft

Storage Location

Y3

Consisting of:

1 = 0491616 Holder

NOTE: (Dial gauge holder)

2 = 0491617 Terminal

NOTE: (Terminal)

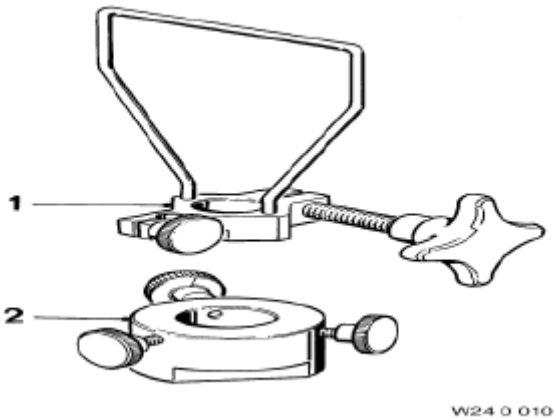


Fig. 36: Identifying Device (24-0010)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2140 DEVICE

Device MW

NOTE: **(Tensioning device) For removal and installation of the snap ring before the centring plate on ZF transmissions**

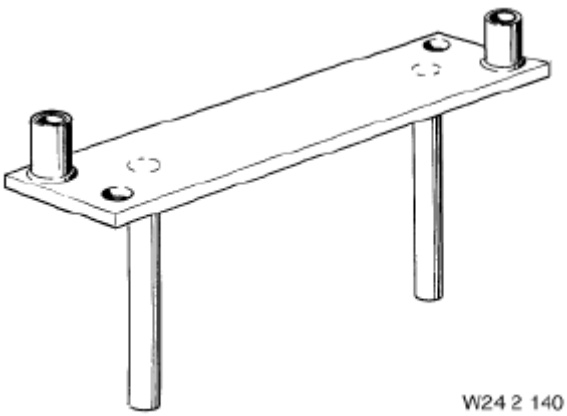


Fig. 37: Identifying Device (24-2140)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0180 FIXTURE

Fixture MW

Replaced by: 0495446

NOTE: **For mounting the gearbox on the assembly stand. Replaced by 24 0 200 (0 495 446)**

SI number

01 06 92 (509)

Consisting of:

5 = 0495439 Adapter

NOTE: Replaced by 24 0 205 (0 495 492)

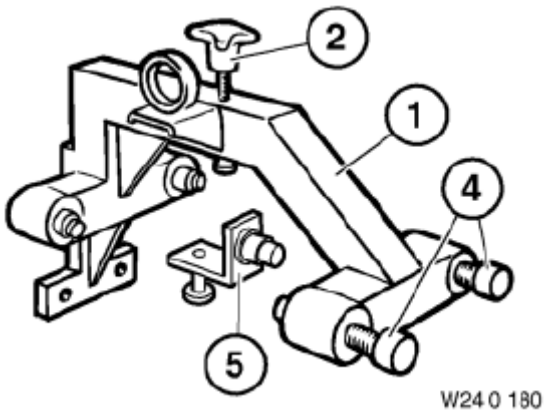


Fig. 38: Identifying Fixture (24-0180)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0491655 Spindle

NOTE: Replaced by 24 0 184 (0 491 656)

1 = 0491653 Frame

NOTE: (Main frame)

2 = 0491654 Spindle

NOTE: (Pressure spindle with star handle)

4 = 0491656 Spindle

NOTE: (spindle, long (2 pieces))

24-0200 FIXTURE

Fixture MW

NOTE: For mounting the gearbox on the assembly stand.

SI number

01 27 06 (328)

Consisting of:

1 = 0495488 Basic body

2 = 0495489 Spindle

NOTE: (spindle with synchronizing key)

3 = 0495490 Spindle

NOTE: (spindle with screw)

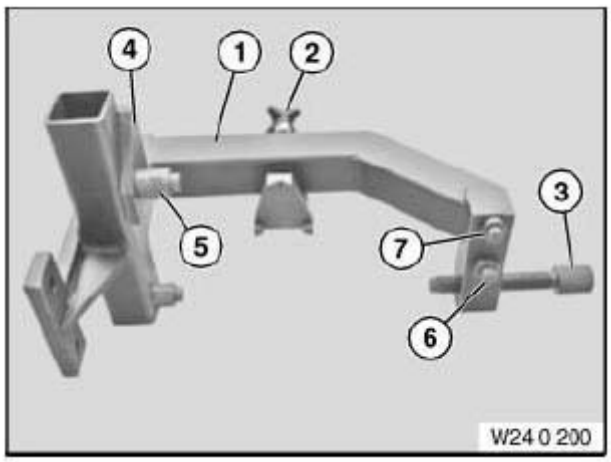


Fig. 39: Identifying Fixture (24-0200)
Courtesy of BMW OF NORTH AMERICA, INC.

4 = 0495491 Shaped part

NOTE: (Shaped part)

5 = 0495492 Adapter

NOTE: (adapter (long))

6 = 0495493 Adapter

NOTE: (adapter (medium))

7 = 0495494 Adapter

NOTE: (adapter (short))

24-0130 FIXTURE

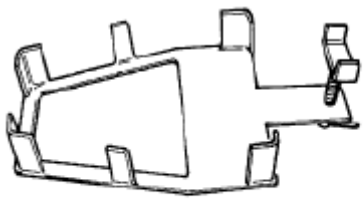
Fixture MW

Replaced by: 0495498

NOTE: (Fixture for transmission) For removal and installation Replaced by 23 4 050 (0 495 498)

SI number

01 02 87 (721)



W24 0 130

Fig. 40: Identifying Fixture (24-0130)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0170 FIXTURE

Fixture MW

Replaced by: 0495498

NOTE: For removing and installing transmission. Replaced by 23 4 050 (0 495 498)

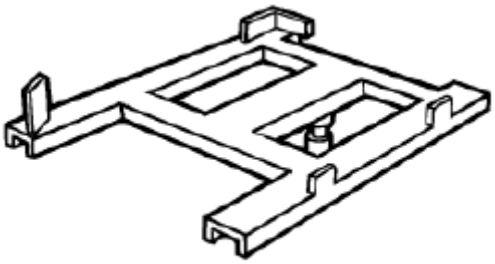
SI number

01 06 92 (509)

Consisting of:

3 = 0493258 Bolt

NOTE: (Adjusting screw) Discontinuation and replaced by 23 4 050 (0 495 498)



W 24 0 170

Fig. 41: Identifying Fixture (24-0170)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0250 FIXTURE

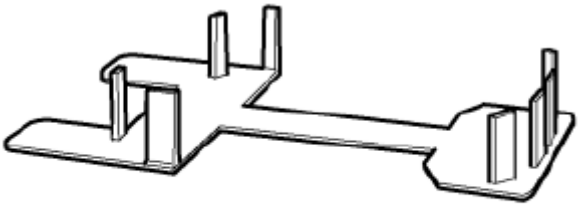
Fixture MW

Replaced by: 0495498

NOTE: (Fixture for transmission) For removing and installing the transmission. Replaced by 23 4 050 (0 495 498)

SI number

01 08 96 (080)



W24 0 250

Fig. 42: Identifying Fixture (24-0250)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1120 GAUGE

Gauge MW

NOTE: For setting the position switch to "P position" during installation/model year: from 03/96

SI number

01 07 96 (068)

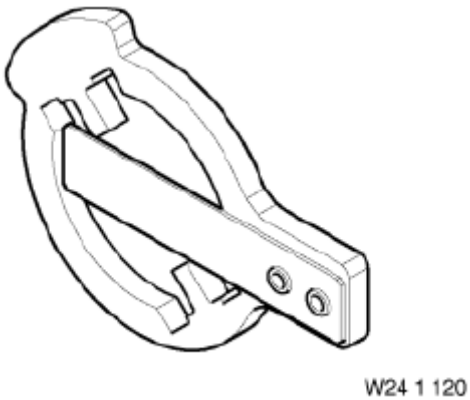


Fig. 43: Identifying Gauge (24-1120)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1440 HANDLE

Handle MW

NOTE: For installing and removing the torque converter. 8HPxx

SI number

01 17 09 (577)

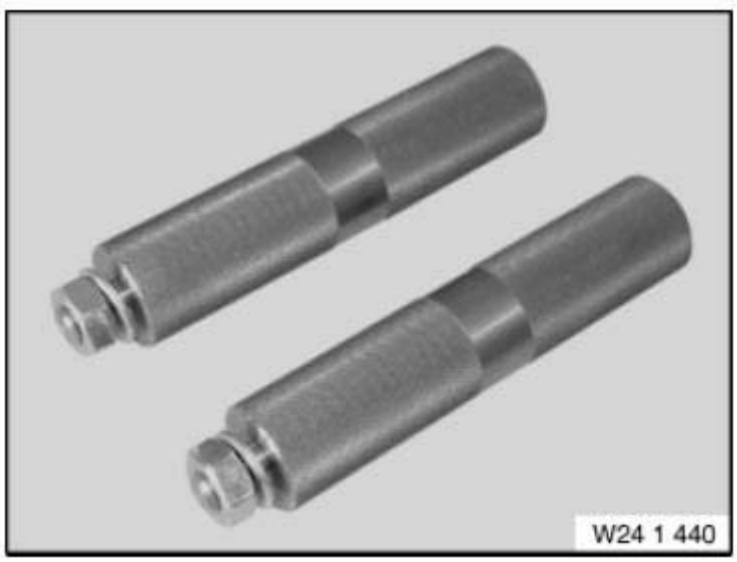


Fig. 44: Identifying Handle (24-1440)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2050 HANDLE

Handle MW

Replaced by: 0491633

NOTE: (Pulling handle) For sealing plug in the lower section of the transmission housing/Replaced by 24 0 050 (0 491 633)

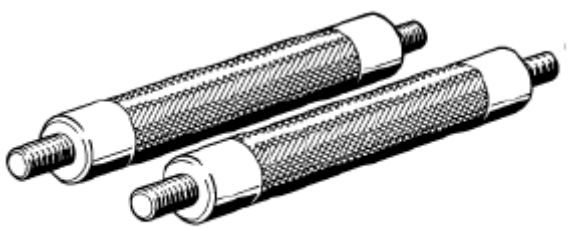
24-4000 HANDLE

Handle Minimum set: Mechanical tools MW

NOTE: (Assembly handle (2 x)) For removing and installing the torque converter

Storage Location

B5



W24 4 000

Fig. 45: Identifying Handle (24-4000)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0050 HANDLE

Handle MW

NOTE: (extractor handle) For sealing plug in the lower section of transmission housing

Storage Location

Y5

W24 0 060

Fig. 46: Identifying Handle (24-0050)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5240 HOLDER

Holder MW

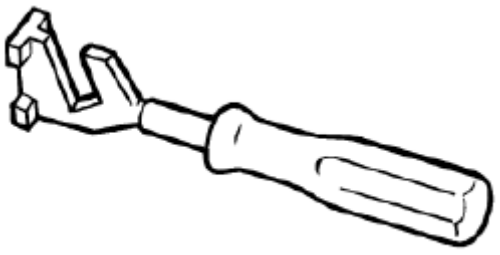
NOTE: (Counter support) For releasing and tightening the gear selector cable/transmission with position switch

Storage Location

A4

SI number

01 06 92 (509)



W 24 5 240

Fig. 47: Identifying Holder (24-5240)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5210 HOLDER

Holder MW

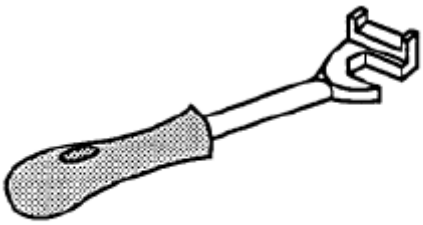
NOTE: (counter support) For loosening and tightening the gear selector cable

Storage Location

A4

SI number

01 04 91 (372)



W24 5 210

Fig. 48: Identifying Holder (24-5210)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5220 HOLDER

Holder MW

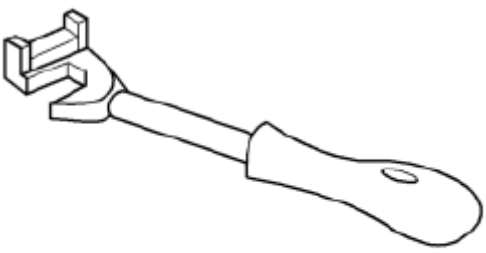
NOTE: (Counter support) For slackening and tightening the gear selector cable

Storage Location

A4

SI number

01 04 91 (372)



W24 5 220

Fig. 49: Identifying Holder (24-5220)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4160 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: For securing converter during removal and installation of transmission

Storage Location

C46

A47

SI number

01 11 02 (908)

Consisting of:

3 = 0494477 Shaped element

NOTE: For converter variantM57TU

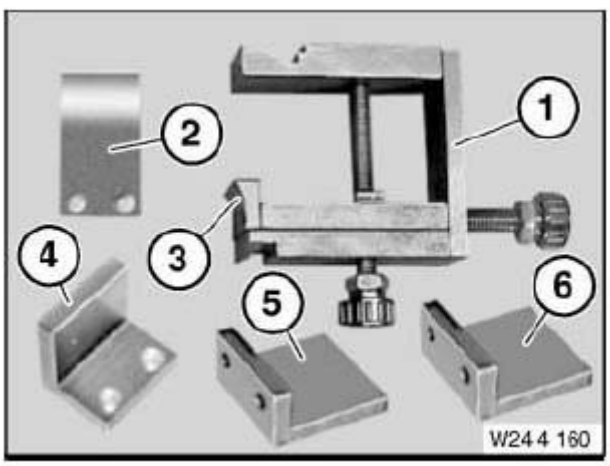


Fig. 50: Identifying Holder (24-4160)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494478 Basic body

2 = 0494479 Shaped element

NOTE: For converter variantN73

4 = 0494622 Shaped element

NOTE: For converter variantM54

5 = 0494965 Shaped element

NOTE: Transmission: GA6 HP19 in E87, E90

6 = 0496061 Shaped element

NOTE: Transmission: GA6L45R (GM6) in E83/N52K

24-1200 HOLDING SLEEVE

Holding sleeve Minimum set: Mechanical tools MW

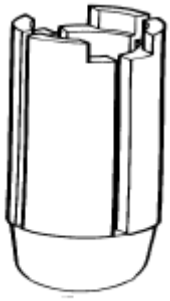
NOTE: (Assembly sleeve) For preventing damage to radial shaft seal when fitting it onto selector shaft

Storage Location

B3

SI number

01 09 90 (282)



W24 1 200

Fig. 51: Identifying Holding Sleeve (24-1200)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4110 KEY

Key Minimum set: Mechanical tools MW

NOTE: For releasing and tightening the slotted nut of the output flange

Storage Location

A10

SI number

01 06 92 (509)

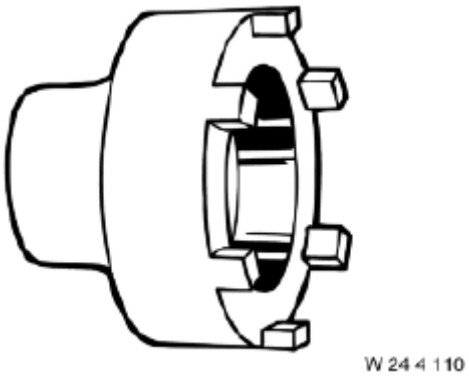


Fig. 52: Identifying Key (24-4110)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4340 LEVER

Lever MW

NOTE: For removing and installing oil filler cap.

Storage Location

B22

SI number

01 19 07 (397)

Fig. 53: Identifying Lever (24-4340)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4100 MANDREL

Mandrel Minimum set: Mechanical tools MW

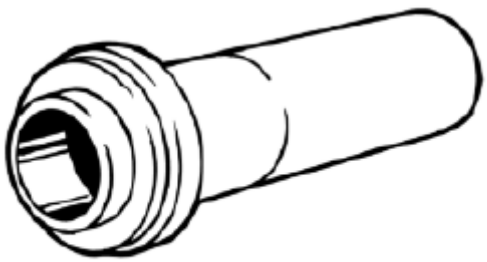
NOTE: (Drift) For driving in the radial seal ring on the drive side (behind converter)

Storage Location

A17

SI number

01 06 92 (509)



W 24 4 100

Fig. 54: Identifying Mandrel (24-4100)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4370 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For driving in radial shaft seal of output shaft (4x2).

Storage Location

A24

SI number

01 02 07 (334)

Fig. 55: Identifying Mandrel (24-4370)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4400 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For driving in oil filter sealing ring.

Storage Location

A24

SI number

01 02 07 (334)

Fig. 56: Identifying Mandrel (24-4400)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0340 MANDREL

Mandrel MW

NOTE: **For driving in the radial shaft seal on the output end.**

SI number

01 09 10 (639)

Fig. 57: Identifying Mandrel (24-0340)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0090 MANDREL

Mandrel MW

Replaced by: 0491639

NOTE: **(Drift) For punching the radial sealing ring in the front section of the transmission housing/Replaced by 24 0 110 (0 491 639) November 96**

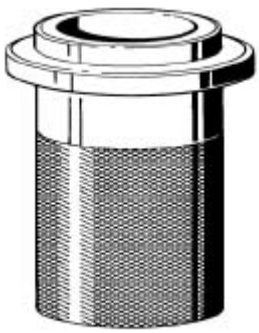


Fig. 58: Identifying Mandrel (24-0090)

Courtesy of BMW OF NORTH AMERICA, INC.

24-0110 MANDREL

Mandrel MW

NOTE: **(drift) For driving in the radial sealing ring in the front section of the transmission housing/Model year: from 90 and for the output flange of the transmissions S5D 200G and S5D 250G**

Storage Location

B17

SI number

01 03 90 (184)

Consisting of:

3 = 0491640 Washer

NOTE: **(ring washer 1 mm) Transmissions: 4 HP 24 - no. 0 029 160, 4 HP 22 - no. 1 113 936**

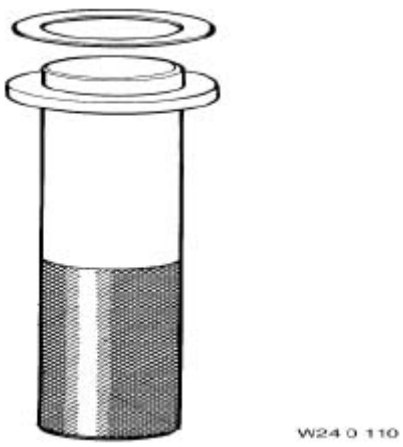


Fig. 59: Identifying Mandrel (24-0110)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0330 MANDREL

Mandrel MW

NOTE: **For driving in the radial shaft seal on the drive end.**

SI number

01 09 10 (639)

Fig. 60: Identifying Mandrel (24-0330)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0350 MANDREL

Mandrel MW

NOTE: For driving in shaft seal on selector shaft.

SI number

01 09 10 (639)

Fig. 61: Identifying Mandrel (24-0350)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2370 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For inserting the radial shaft seal on the output flange

Storage Location

B46

A46

SI number

01 14 01 (766)

Fig. 62: Identifying Mandrel (24-2370)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1190 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (drift) For driving in the radial sealing ring in the front section of the transmission housing

Storage Location

A15

SI number

01 09 90 (282)

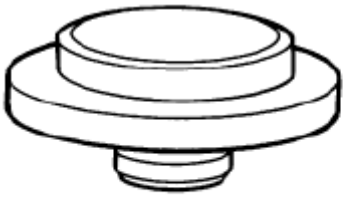


Fig. 63: Identifying Mandrel (24-1190)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2360 MANDREL

Mandrel Minimum set: Mechanical tools MW

Replaced by: 0494506

NOTE: (Drift) For installing the radial shaft seal on the torque converter Replaced by 24 2 400 (0 494 506)

Storage Location

B46

SI number

01 14 01 (766)

Fig. 64: Identifying Mandrel (24-2360)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1410 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: For driving in the radial shaft seal of the drive shaft.

SI number

01 17 09 (577)

Fig. 65: Identifying Mandrel (24-1410)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4330 MANDREL

Mandrel MW

NOTE: (Drift) For driving in radial shaft seal of output shaft (all-wheel drive).

Storage Location

A23

Fig. 66: Identifying Mandrel (24-4330)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4090 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (drift) For fitting the radial sealing ring to the output end

Storage Location

A15

SI number

01 06 92 (509)

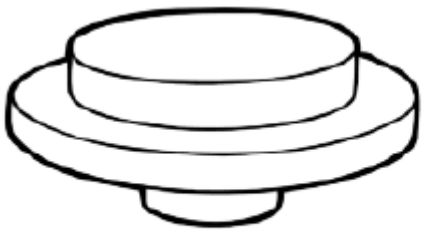


Fig. 67: Identifying Mandrel (24-4090)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2330 OPEN-END WRENCH

Open-end wrench MW

NOTE: (Open-end wrench) Open-end wrench 1/2" for adjusting the brake band

SI number

01 24 97 (257)

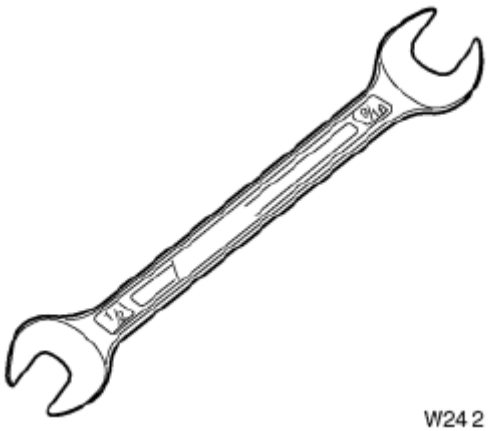


Fig. 68: Identifying Open-End Wrench (24-2330)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1430 PIN

Pin MW

NOTE: For fixing the mechatronics in position during installation.

SI number

01 17 09 (577)

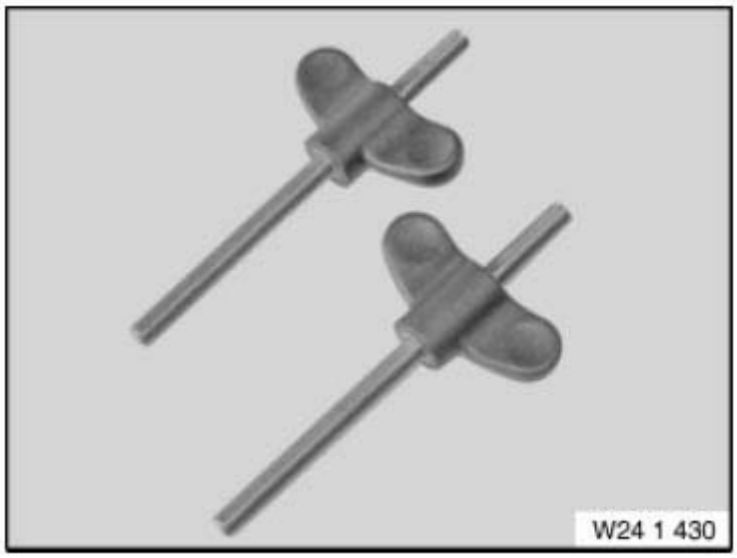


Fig. 69: Identifying Pin (24-1430)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0320 PIN

Pin MW

NOTE: For securing transmission when installing in engine.

SI number

01 29 09 (601)

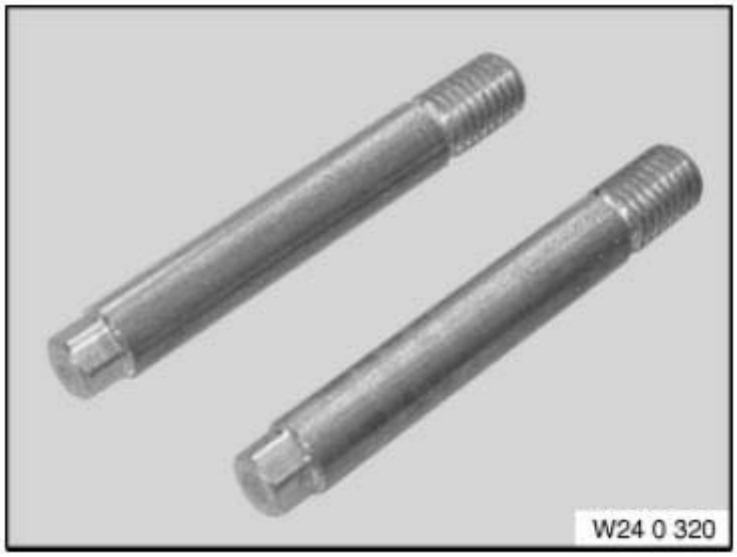


Fig. 70: Identifying Pin (24-0320)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5160 PIN

Pin MW

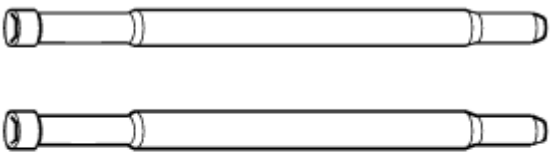
NOTE: (centring pin) For centring the main housing to the intermediate and converter housing (2 x)

Storage Location

Y3

SI number

01 03 93 (663)



W24 5 160

Fig. 71: Identifying Pin (24-5160)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1170 PIN WRENCH

Pin wrench Minimum set: Mechanical tools MW

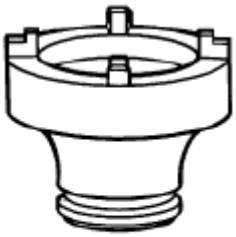
NOTE: For loosening and tightening the slotted nut on the output flange

Storage Location

A13

SI number

01 09 90 (282)



W24 1 170

Fig. 72: Identifying Pin Wrench (24-1170)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4360 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: For withdrawing radial shaft seal of output shaft (4 x 2).

Storage Location

A24

SI number

01 02 07 (334)

Consisting of:

1 = 0496113 Basic body

2 = 0496114 Claw

NOTE: (Claw (4 x))

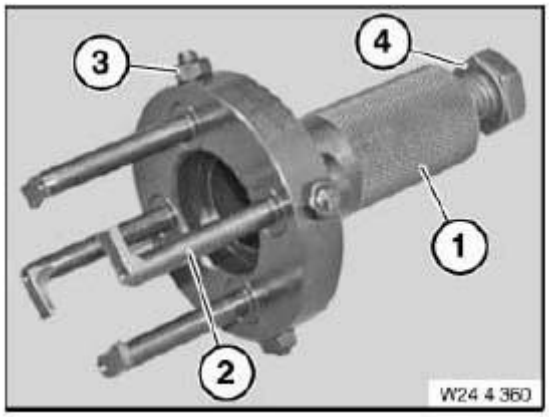


Fig. 73: Identifying Puller (24-4360)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0496115 Screw

4 = 0496116 Spindle

24-2350 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: For extracting radial shaft seal on torque converter and on output flange

Storage Location

A46

SI number

01 14 01 (766)

Consisting of:

1 = 0494202 Puller

2 = 0494203 Spindle

NOTE: (Spindle M12 x 65 with ball head)

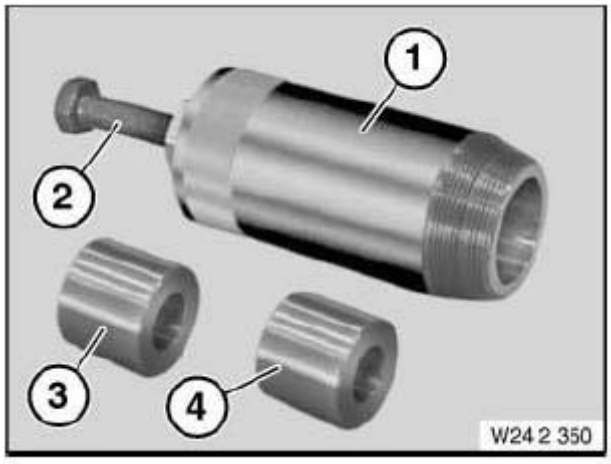


Fig. 74: Identifying Puller (24-2350)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0494204 Synchronizing key

4 = 0495597 Synchronizing key

NOTE: Transmission: GA6L45R (GM6)

24-4320 PULLER

Puller MW

NOTE: For withdrawing output shaft seal (four-wheel drive).

SI number

01 02 07 (334)

Consisting of:

1 = 0495569 Basic body

2 = 0495570 Ring

NOTE: (Retaining ring)

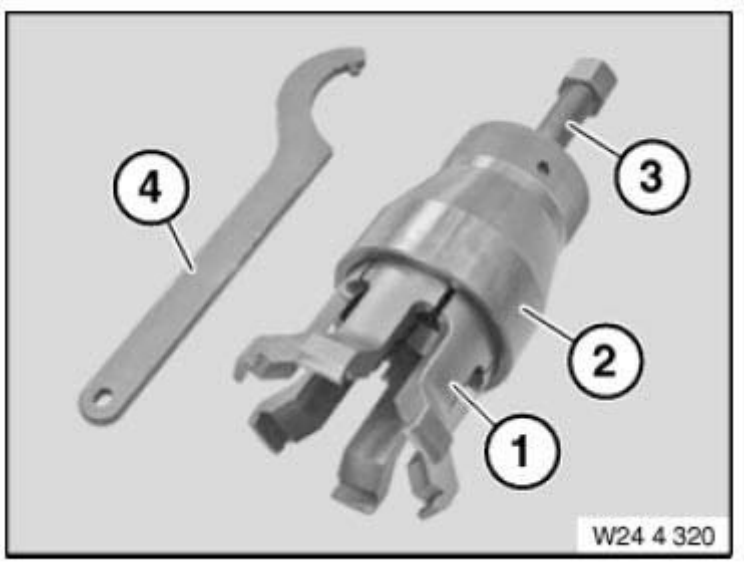


Fig. 75: Identifying Puller (24-4320)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0495571 Spindle

4 = 0495572 Hook wrench

24-5367 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: For removing the radial shaft seal of the gearshift shaft from the gearbox housing.

SI number

01 17 09 (577)

Fig. 76: Identifying Puller (24-5367)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1420 PULLER

Puller MW

NOTE: Removing radial shaft seal from torque converter.

SI number

01 17 09 (577)

Consisting of:

1 = 2209493 Blade

NOTE: Replacement blade for 24 1 420

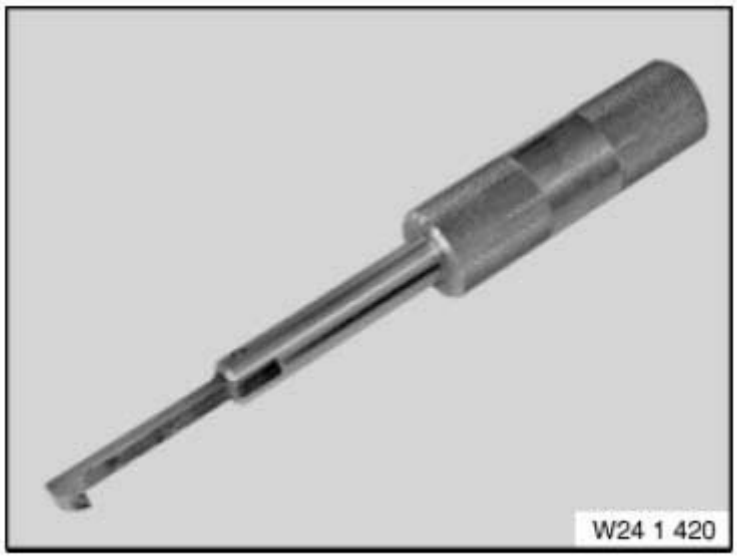


Fig. 77: Identifying Puller (24-1420)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4390 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: For removing oil filter sealing ring.

Storage Location

A23

SI number

01 02 07 (334)

Fig. 78: Identifying Puller (24-4390)

Courtesy of BMW OF NORTH AMERICA, INC.

24-1310 RELEASE TOOL

Release tool MW

NOTE: (release tool) For releasing the retaining tabs on the disc carrier C

Storage Location

Y6

SI number

01 01 95 (892)

Consisting of:

1 = 0494693 Shaped part

NOTE: (shaped part)

2 = 0494694 Basic body

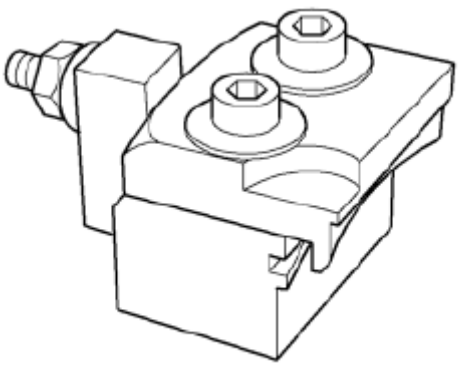


Fig. 79: Identifying Release Tool (24-1310)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5230 RING

Ring Minimum set: Mechanical tools MW

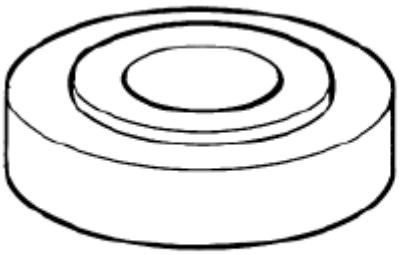
NOTE: (Assembly ring) For pressing in the radial seal of the gearshift shaft

Storage Location

B3

SI number

01 04 91 (372)



W24 5 230

Fig. 80: Identifying Ring (24-5230)
Courtesy of BMW OF NORTH AMERICA, INC.

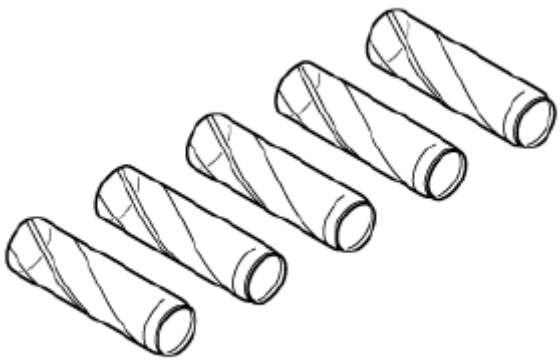
24-5490 SLEEVE

Sleeve Minimum set: Mechanical tools MW

NOTE: (sliding sleeve (5 x)) For prevention of damage to the radial sealing ring while fitting on the gearshift shaft

SI number

01 02 95 (896)



W24 5 490

Fig. 81: Identifying Sleeve (24-5490)
Courtesy of BMW OF NORTH AMERICA, INC.

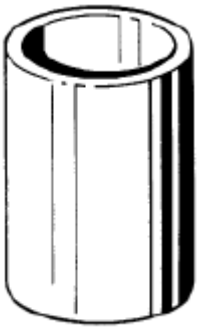
24-1010 SLEEVE

Sleeve MW

NOTE: **(Assembly sleeve) For removing the disc set (4-gear) and for pressing in the needle bearing in the oil pump housing (A5S 560Z)**

Storage Location

X5



W24 1 010

Fig. 82: Identifying Sleeve (24-1010)
Courtesy of BMW OF NORTH AMERICA, INC.

24-4350 SOCKET

Socket Minimum set: Mechanical tools MW

NOTE: **(Socket with special Torx profile) For releasing and tightening down screw connection of Mechatronic.**

Storage Location

A23

SI number

01 02 07 (334)

Fig. 83: Identifying Socket (24-4350)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2320 SOCKET WRENCH

Socket wrench MW

NOTE: For hexagon socket screw 3/16" with 1/4" drive for adjusting the brake band

SI number

01 24 97 (257)

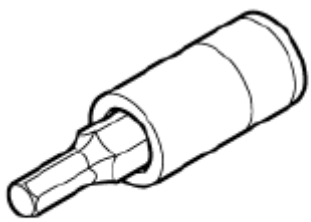


Fig. 84: Identifying Socket Wrench (24-2320)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0120 SUPPORT

Support MW

NOTE: (support) For removing and fitting the transmission. Replaced by 24 0 130 in March 87

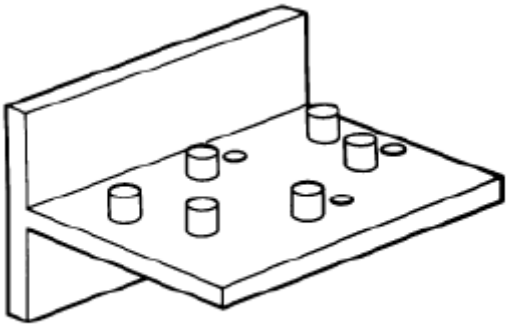
24-1220 SUPPORT

Support MW

NOTE: (Fixture for drive flange) When undoing the slotted nut

SI number

01 09 90 (282)



W24 1 220

Fig. 85: Identifying Support (24-1220)
Courtesy of BMW OF NORTH AMERICA, INC.

24-0300 SUPPORT

Support MW

NOTE: For mounting transmission on assembly stand 00 2 300 and for transport.

SI number

01 29 09 (601)

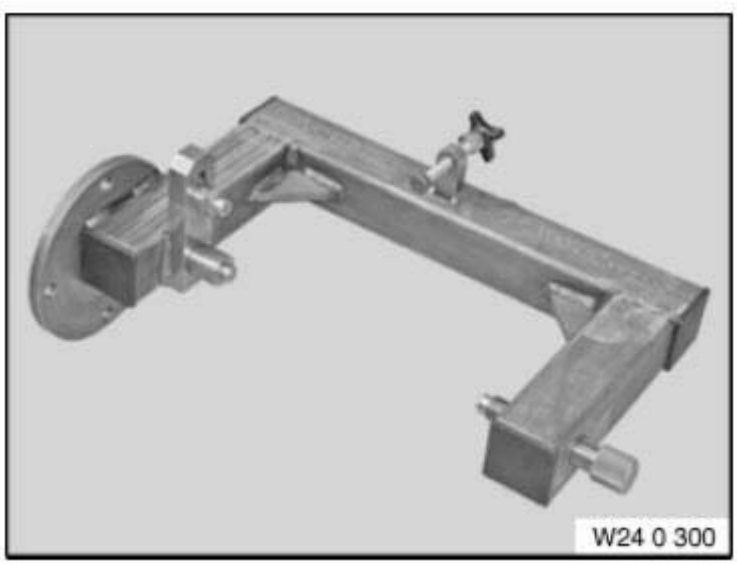


Fig. 86: Identifying Support (24-0300)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5350 SUPPORT

Support MW

NOTE: (Support for automatic transmission) Other: Only Japan and South Africa

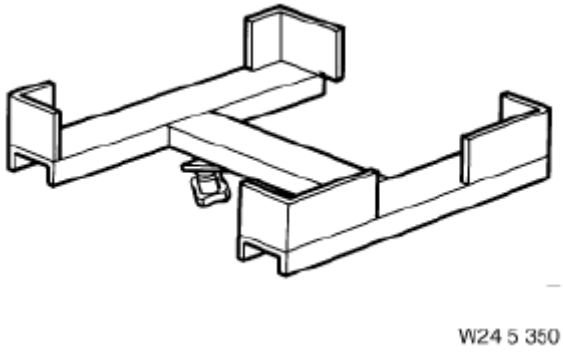


Fig. 87: Identifying Support (24-5350)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6080 TEST CABLE

Test cable Minimum set: Measuring and testing equipment MP

NOTE: (test cable 16-pin)

Storage Location

L204

SI number

02 06 01 (763)

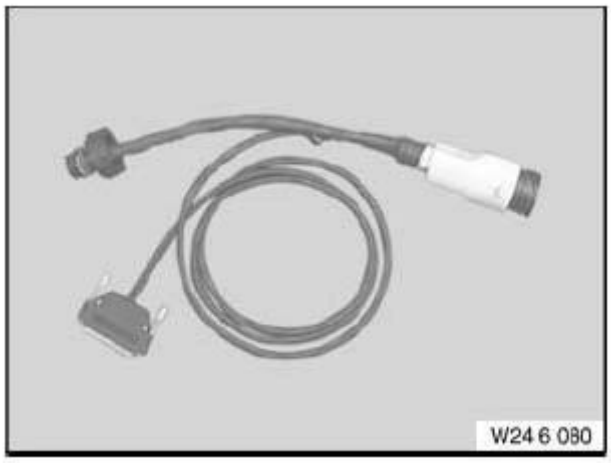


Fig. 88: Identifying Test Cable (24-6080)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6010 TEST CABLE

Test cable MW

NOTE: (Test cable, 9-pin) For automatic transmission (EH transmission)

SI number

02 03 91 (313)

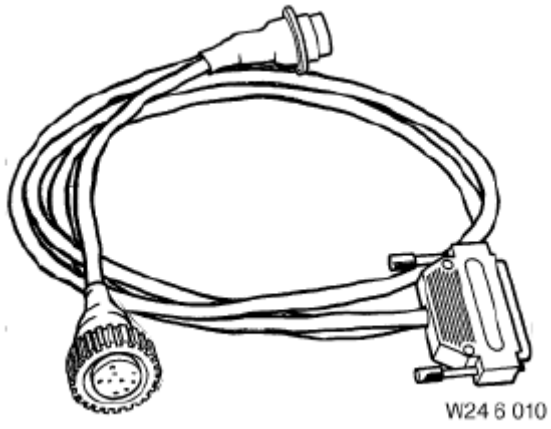


Fig. 89: Identifying Test Cable (24-6010)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6050 TEST CABLE

Test cable MW

NOTE: (Test cable, 10-pin) For Jatco gearbox (AMP plug connection)

SI number

02 01 93 (649)

24-6000 TEST CABLE

Test cable MW

NOTE: (Test cable, 8-pin) For automatic transmission (EH gearbox)

SI number

02 03 91 (313)

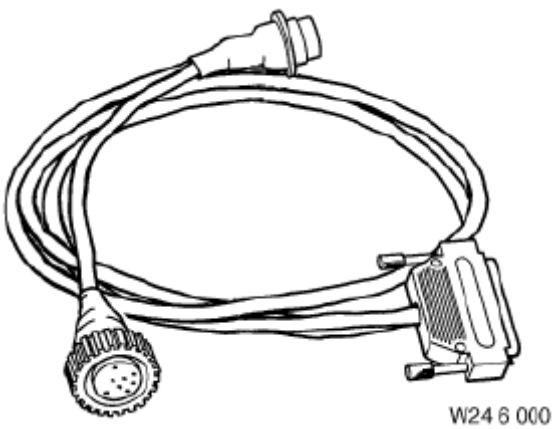


Fig. 90: Identifying Test Cable (24-6000)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6070 TEST CABLE

Test cable MW

NOTE: (Test cable, 20-pin) For automatic transmission GM5

SI number

02 01 99 (468)

24-6060 TEST CABLE

Test cable MW

NOTE: (Test cable, 16-pin) For automatic transmission (EH gearbox)

SI number

02 02 93 (650)

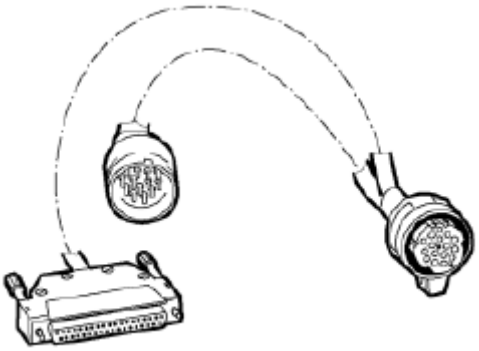


Fig. 91: Identifying Test Cable (24-6060)
Courtesy of BMW OF NORTH AMERICA, INC.

24-6020 TEST CABLE

Test cable MW

NOTE: (Test cable, 14-pin) For automatic transmission (EH transmission)

SI number

00 02 99 (399)

Consisting of:

5 = 0491793 Operating instructions

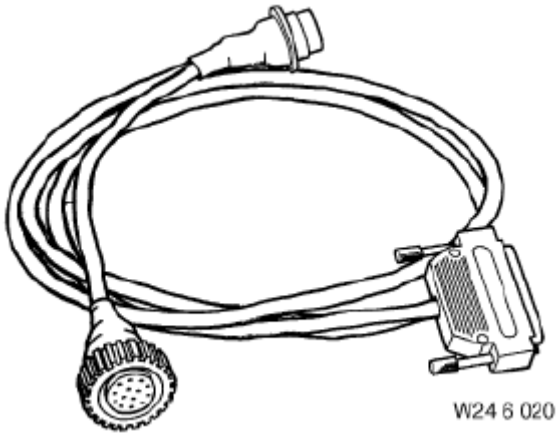


Fig. 92: Identifying Test Cable (24-6020)
Courtesy of BMW OF NORTH AMERICA, INC.

24-2020 TOOL

Tool MW

NOTE: For squeezing the disc spring

Storage Location

X5

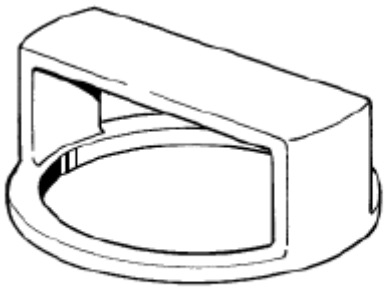


Fig. 93: Identifying Tool (24-2020)
Courtesy of BMW OF NORTH AMERICA, INC.

24-5120 TOOL

Tool MW

NOTE: For centring the converter housing relative to the oil pump when mounting

Storage Location

B2

SI number

01 04 95 (906)

Consisting of:

1 = 0491759 Bush

NOTE: (Centring bush)

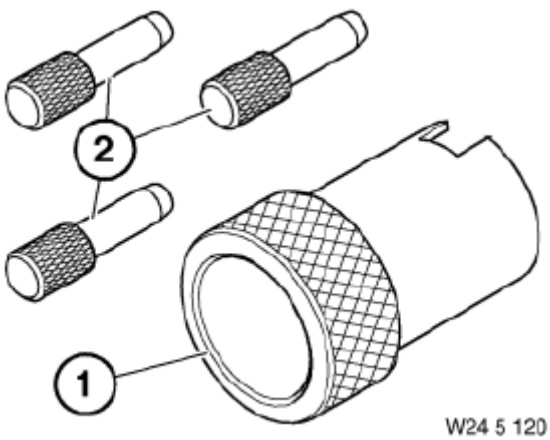


Fig. 94: Identifying Tool (24-5120)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491760 Pin

NOTE: (Centring pin (3 pieces))

24-4130 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (Locating tool) For fixing torque converter during removal and installation of gearbox

Storage Location

C6

SI number

01 05 97 (181)

Consisting of:

7 = 0493804 Blade

NOTE: Transmission: A5S 360R

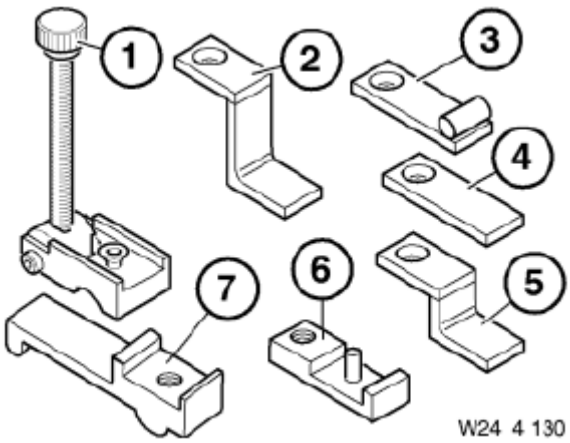


Fig. 95: Identifying Tool (24-4130)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0491732 Basic body

NOTE: (basic body)

2 = 0491733 Blade

NOTE: Transmission: A5S 440Z, GA6HP26Z (N62)

3 = 0491734 Blade

NOTE: (Blade) Gearbox: A4S 310R and A5S 390G

4 = 0491735 Blade

NOTE: Transmission: A5S 310Z, A5S 560Z, A5S 300J and A5S 325Z

5 = 0491736 Blade

NOTE: Transmission: A5S 560Z, GA6 HP26Z (M67), GA6 HP32Z (N73)

6 = 0493180 Plate

NOTE: (Counter-support plate)

8 = 0496742 Blade

NOTE: For securing converter during removal and installation of transmission.

In conjunction with: 24 4 131

24-1300 TOOL

Tool MW

NOTE: (Striking tool) For securing the retaining tabs on disc carrier C

Storage Location

X5

SI number

01 01 95 (892)

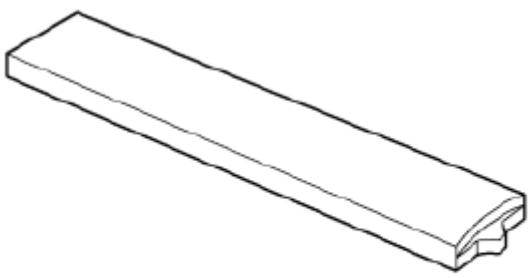


Fig. 96: Identifying Tool (24-1300)
Courtesy of BMW OF NORTH AMERICA, INC.

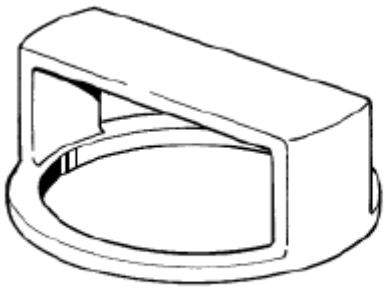
24-2040 TOOL

Tool MW

NOTE: For squeezing the disc spring

Storage Location

X6



W24 2 020

Fig. 97: Identifying Tool (24-2040)
Courtesy of BMW OF NORTH AMERICA, INC.

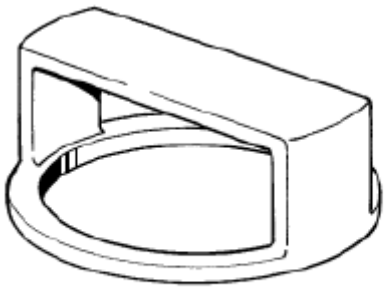
24-2030 TOOL

Tool MW

NOTE: For compressing the disc spring

Storage Location

X5



W24 2 020

Fig. 98: Identifying Tool (24-2030)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1290 WEDGE

Wedge MW

NOTE: (Wedges) For fixing the disc carrier C when securing the retaining tabs

Storage Location

X5

SI number

01 01 95 (892)

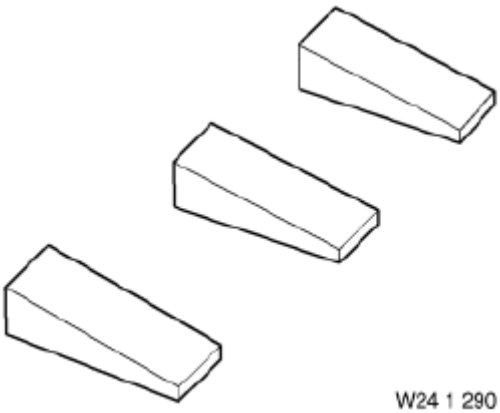


Fig. 99: Identifying Wedge (24-1290)
Courtesy of BMW OF NORTH AMERICA, INC.

24-1110 WRENCH SOCKET

Wrench socket Minimum set: Mechanical tools MW

NOTE: (Wrench socket with magnet) For loosening and tightening the converter fixation

Storage Location

A11

SI number

01 04 86 (566)

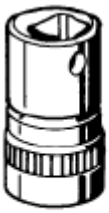


Fig. 100: Identifying Wrench Socket (24-1110)
Courtesy of BMW OF NORTH AMERICA, INC.

1.0 GENERAL INFORMATION

Brake fluid is used as an operating fluid for hydraulic clutch operation.

2.0 SMG: SEQUENTIAL MANUAL GEAR BOX

All models SMG Hydraulic Unit require the use of Pentosin CHF 11S fluid.

3.0 OTHER OPERATING FLUIDS

CLUTCH COMPONENT GREASE

Use UNIREX S2 (replaces Klueber Microlube GL 261) for the lubrication of splines on the transmission input shaft, lubricating groove of the clutch release bearing, piston rod sleeve, clutch master cylinder and front push rod of the clutch slave cylinder.

UNIREX S2 Grease BMW Part No. 83 23 9 416 138

As of 11/93 the clutch release bearings are available as a replacement part which have plastic sliding sleeves instead of aluminum. Such updated bearings should not be lubricated at all. This applies to all models with manual transmission except for 8 Series models.

2100 MAINTENANCE AND INSPECTIONS

21 00 006 BLEEDING CLUTCH HYDRAULICS (PLASTIC SLAVE CYLINDER)

Necessary preliminary tasks

- Remove **UNDERBODY PROTECTION**

Connect bleeder unit to brake fluid expansion tank.

IMPORTANT: Check relevant Operating Instructions for each device. Charging pressure should not exceed 2 bar.

Connect bleeder hose to bleed valve (1).

Open bleed valve (1) and flush until clear brake fluid emerges without air bubbles.

Close bleed valve.

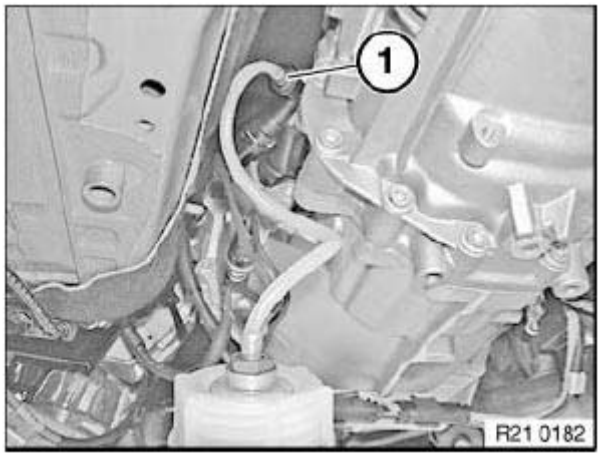


Fig. 1: Identifying Bleed Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Switch off bleeder unit or remove from brake fluid expansion tank.

Correct brake fluid level in expansion tank.

2121 CLUTCH WITH DRIVING DISC

21 21 500 REMOVING AND INSTALLING OR REPLACING CLUTCH (SAC 228)

Necessary preliminary tasks:

- Remove **TRANSMISSION** .

Installation:

Screws must be replaced.

Jointing torque and angle of rotation must be observed without fail.

Identification SAC clutch (Self-Adjusting Clutch)

- 3 openings each with a pressure piece (1) of adjustment ring and a pressure spring (2)

NOTE: Illustration shows new position of pressure pieces.

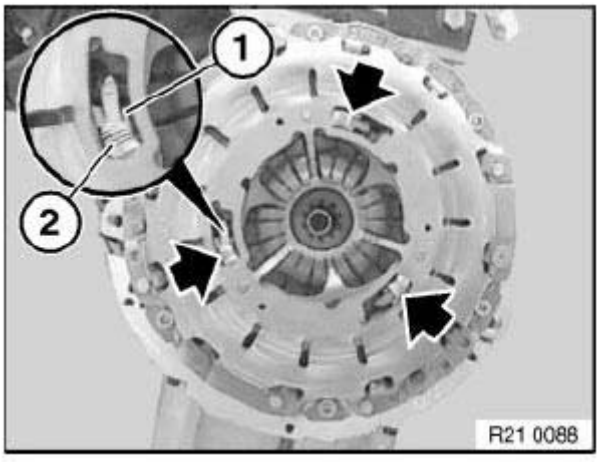


Fig. 2: Locating Pressure Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Block flywheel with special tool 11 9 260 Holder.

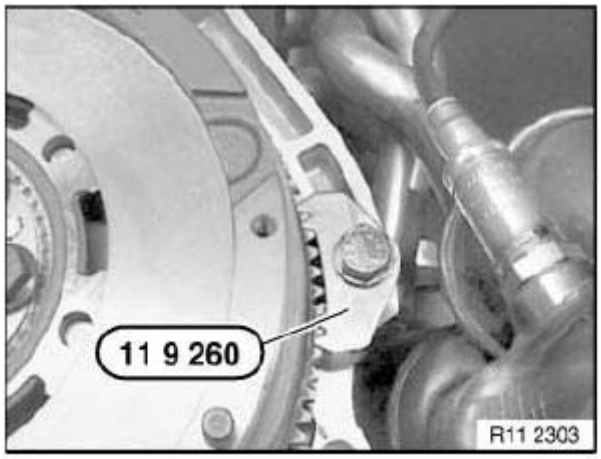


Fig. 3: Identifying Flywheel With Special Tools (11 9 260)
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten bolts and remove SAC clutch from flywheel.

IMPORTANT: Do not use a special tool to detach SAC clutch from flywheel.

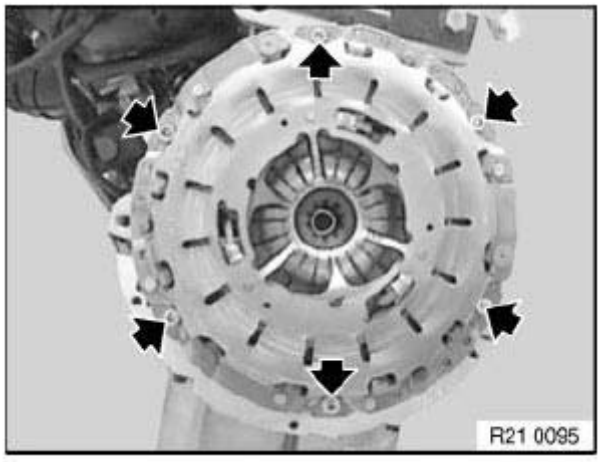


Fig. 4: Locating SAC Clutch Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove clutch plate (1) from flywheel.

Clean flywheel, check for wear and damage.

REPLACE DAMAGED FLYWHEEL.

Check grooved ball bearing in crankshaft for ease of movement and for leaks and if necessary replace **ROLLER BEARING** .

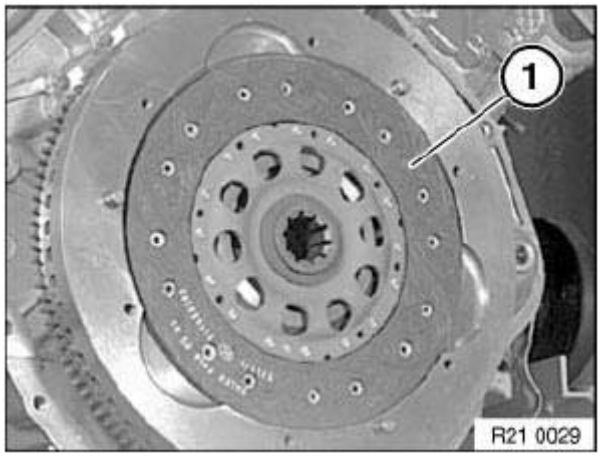


Fig. 5: Identifying Clutch Plate
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Always replace clutch plates fouled e.g. by oil, cleaning agent.

Check clutch plate for damage and friction rust in hub profile and replace if necessary.

Check clutch disk for wear:

Measure lining protrusion at lining rivets at closing head (A) in each case.

NOTE: Rivet connection

a. **Closing head**
b. **Swage head**

Replace clutch plate if lining protrusion at closing head (A) is less than 1 mm.

Push clutch disk onto the cleaned transmission input shaft and check for easy movability.

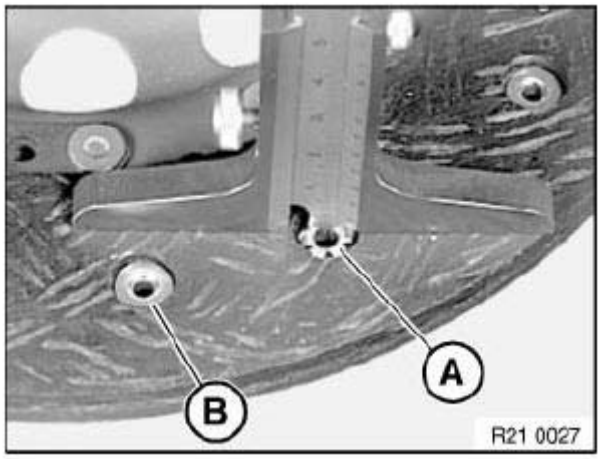


Fig. 6: Identifying Closing And Swage Head
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not clean SAC clutch with high-pressure cleaner or washing machine as this may impair function of adjustment unit.
Clean friction surface only.
Check SAC clutch for wear and damage and replace if necessary.

Reinstalling removed SAC clutch and clutch plate

Installation:

N52

Screws must be replaced.

Jointing torque and angle of rotation must be observed without fail.

Set SAC clutch (1) down on a clean surface.

Install special tool **21 2 180** in SAC clutch (1).

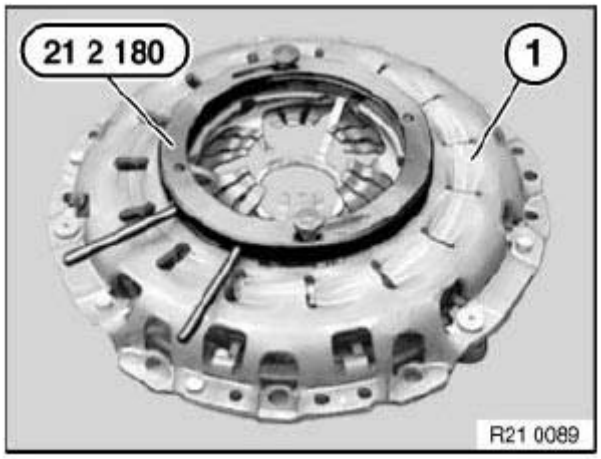


Fig. 7: Identifying SAC Clutch And Special Tool (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Locking hooks (1) of special tool 21 2 180 must engage in openings in SAC clutch.

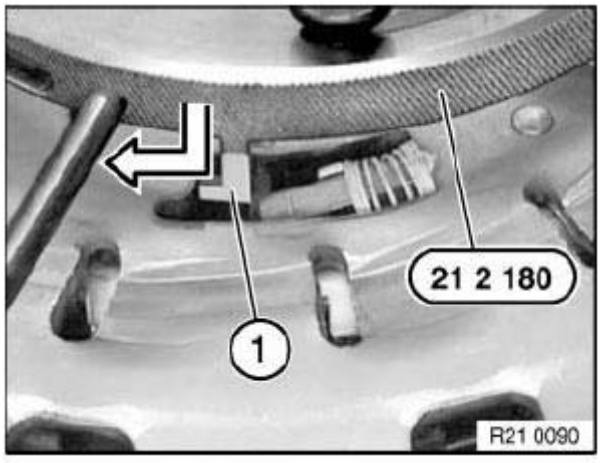


Fig. 8: Locking Hooks Using Special Tool (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool **21 2 180** together at handles (1) as far as it will go and grip firmly.

At same time tighten down knurled screws (2).

Adjustment ring of SAC clutch is now secured in its original position (wear position).

IMPORTANT: Do not reset adjustment ring to new position.

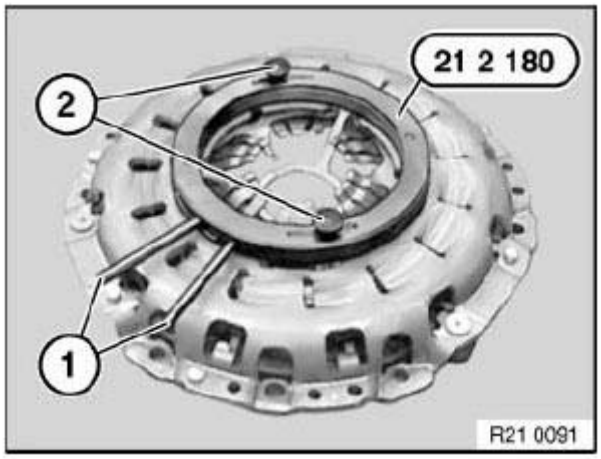


Fig. 9: Pressing Handles Using Special Tools (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Insert special tool 21 2 170 Device only in area of bores for dowel pins.

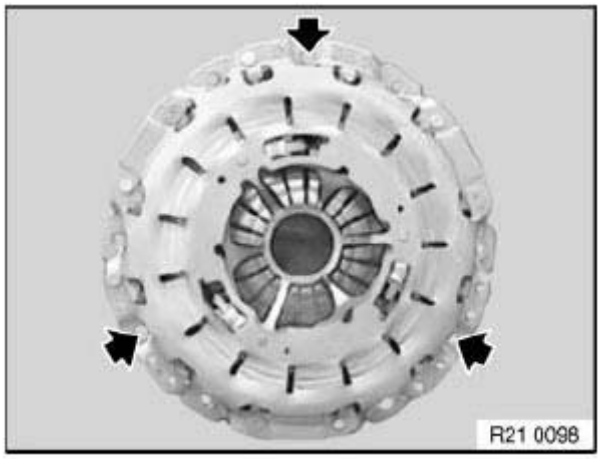


Fig. 10: Identifying Bores For Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 21 2 170 Device and tighten down at knurled screw (1).

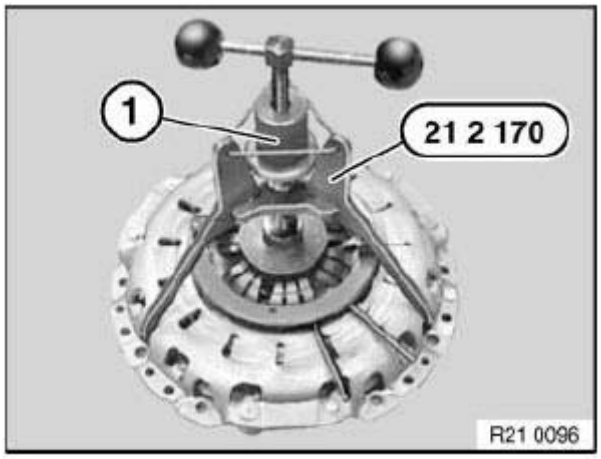


Fig. 11: Identifying Special Tool (21 2 170)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in spindle (1) until diaphragm spring (2) is tensioned up to stop.

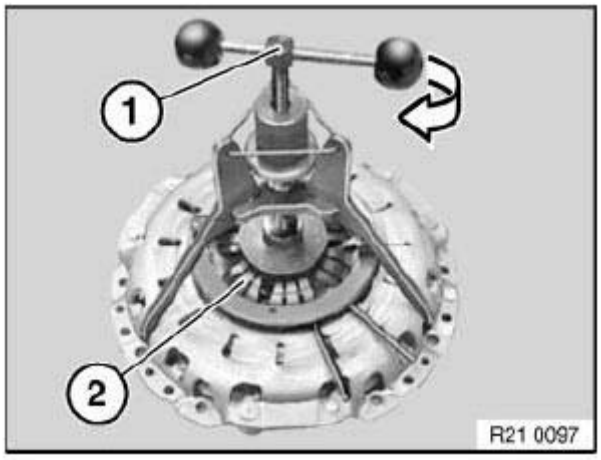


Fig. 12: Turning Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Handle clutch disk carefully, do not touch surfaces of friction pads.
Install clutch plate in correct position.
Note designation for "engine side"/"transmission side".

Installation:

N52

Screws must be replaced.

Jointing torque and angle of rotation must be observed without fail.

Centre clutch plate (1) with special tool.

Special tool

Transmission

21 2 141

S6S 420G; S6S 560G; S5D 390Z

21 2 142

S5D 200G; S5D 250G; S5D 260Z; S5D 310Z

21 2 201

GS6-37BZ

21 2 230 Mandrel

GS6-53DZ

21 2 250 Mandrel

GS6-17BG

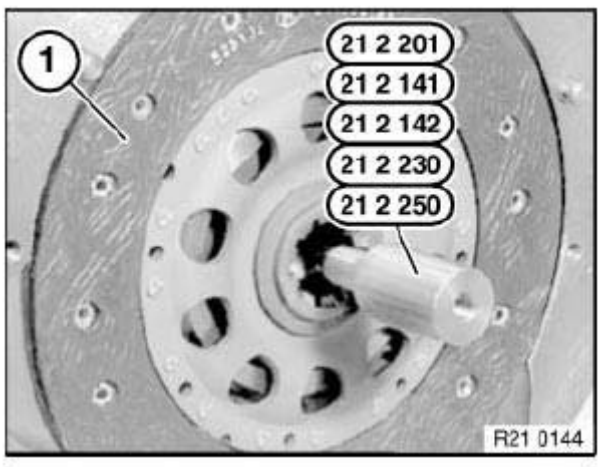


Fig. 13: Identifying Clutch Plate And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Fit SAC clutch (1) on flywheel.

Pay attention to dowel pins (2).

SAC clutch (1) must be secured by way of dowel pins (2).

Insert screws and tighten down.

Tightening torque: **21 21 1AZ** .

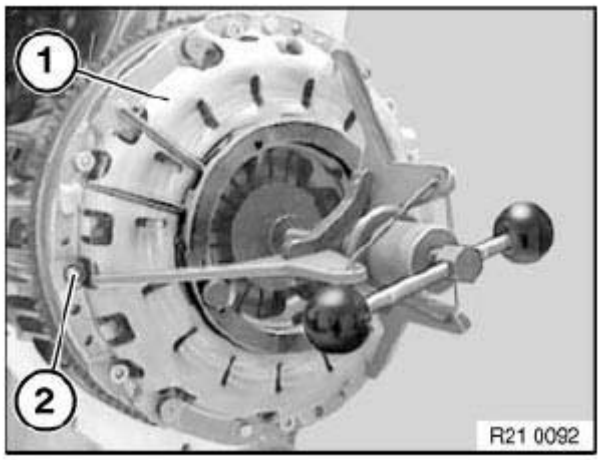


Fig. 14: Identifying SAC Clutch And Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release spindle (1) until tension is completely removed from diaphragm spring (2).

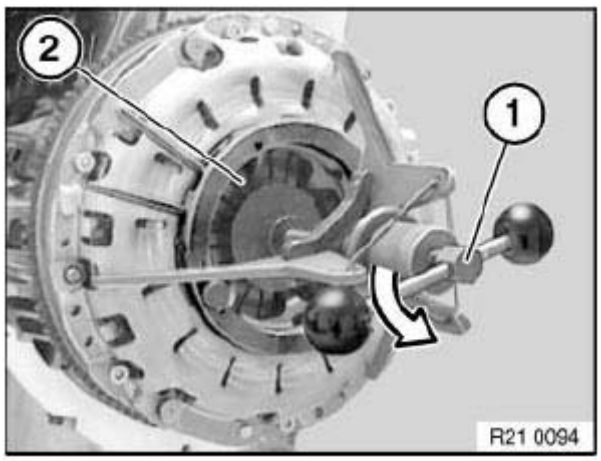


Fig. 15: Identifying Spindle And Diaphragm Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screw (1) and remove special tool 21 2 170 Device from SAC clutch.

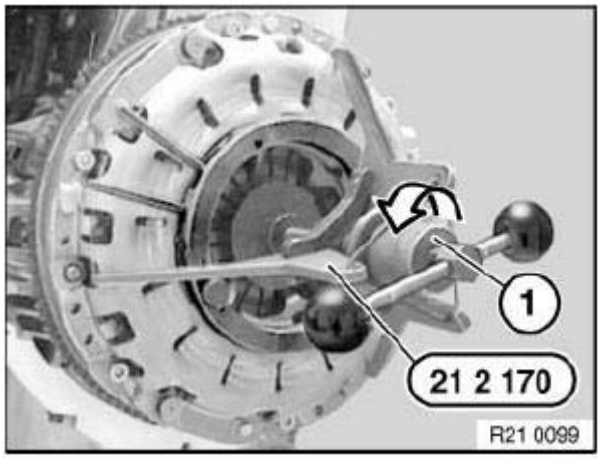


Fig. 16: Removing SAC Clutch Using Special Tools (21 2 170)
Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screws (2) and remove special tool **21 2 180** from SAC clutch.

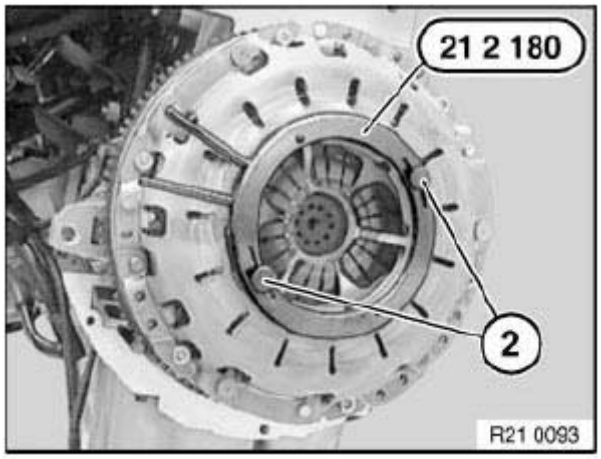


Fig. 17: Removing SAC Clutch Using Special Tool (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

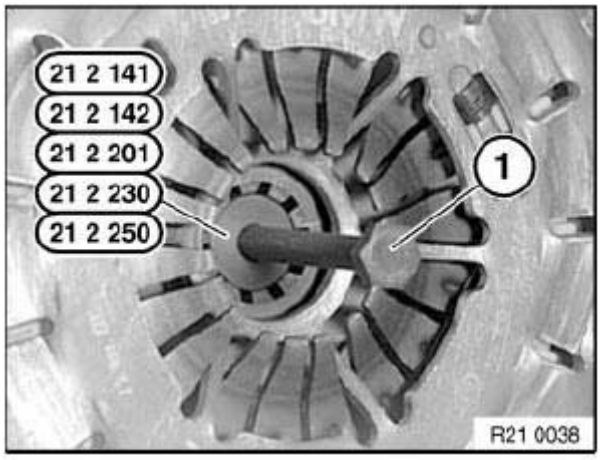


Fig. 18: Identifying Special Tools And Clutch Plate Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installing removed SAC clutch with new clutch plate

Installation:

N52

Screws must be replaced.

Jointing torque and angle of rotation must be observed without fail.

IMPORTANT: Before installing an SAC clutch which has been in service with a new clutch plate: always reset adjustment ring in new position.

Set SAC clutch down on a clean surface.

Install special tool **21 2 180** in SAC clutch (1).

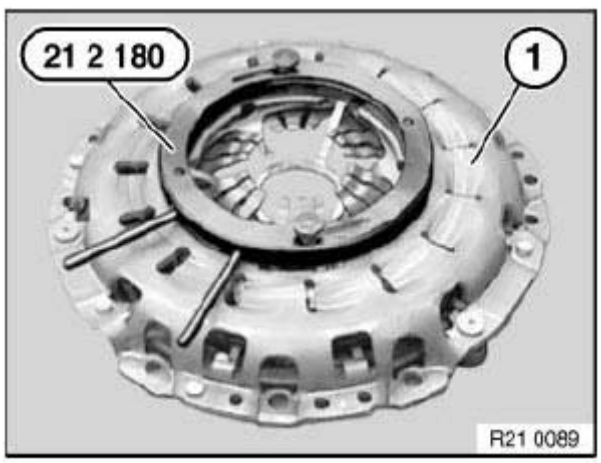


Fig. 19: Identifying SAC Clutch And Special Tool (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Locking hooks (1) of special tool 21 2 180 must engage in openings in SAC clutch.

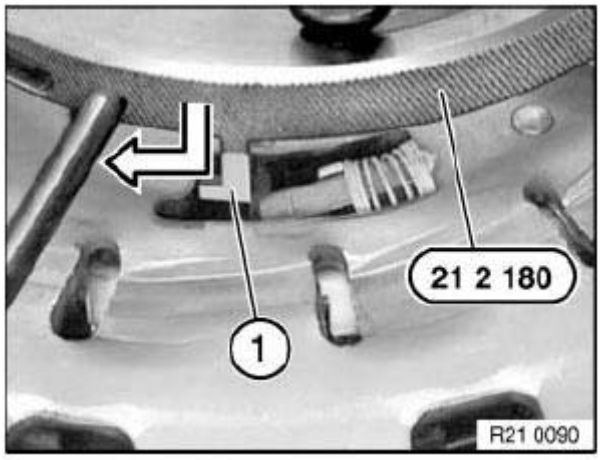


Fig. 20: Locking Hooks Using Special Tool (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Insert special tool 21 2 170 Device only in area of bores for dowel pins.

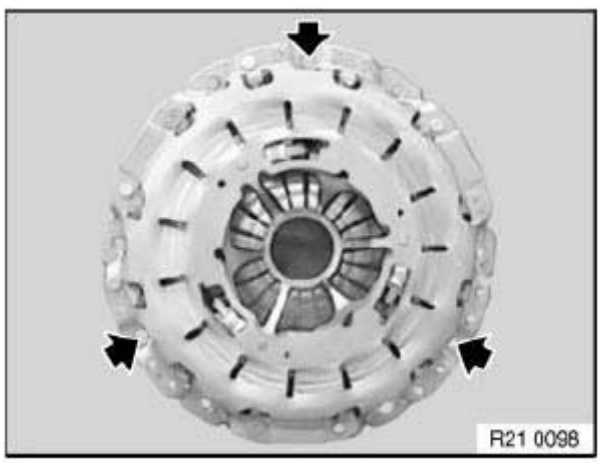


Fig. 21: Identifying Bores For Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool 21 2 170 Device and tighten down at knurled screw (1).

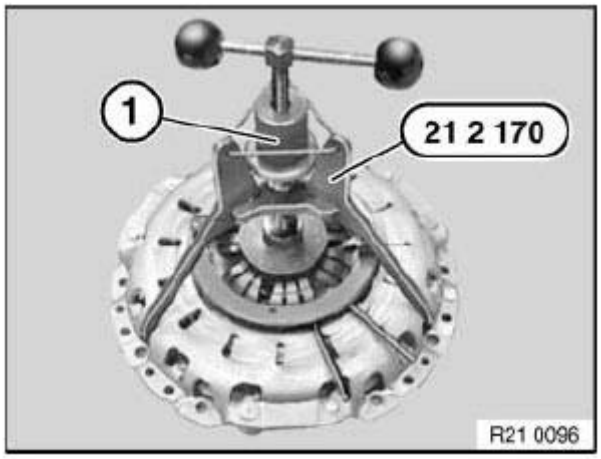


Fig. 22: Identifying Special Tool (21 2 170)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in spindle (1) until adjustment ring of SAC clutch (2) can be turned with special tool **21 2 180** at handles (3).

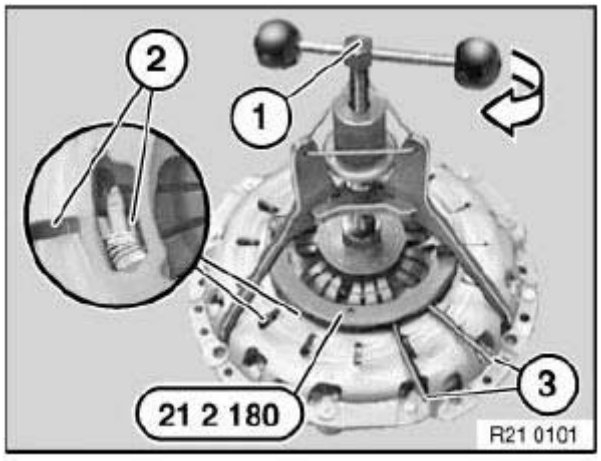


Fig. 23: Turning Handles Using Special Tools (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Press special tool **21 2 180** together at handles (3) as far as it will go and grip firmly.

At same time tighten down knurled screws (2).

Adjustment ring of SAC clutch is now secured in new position.

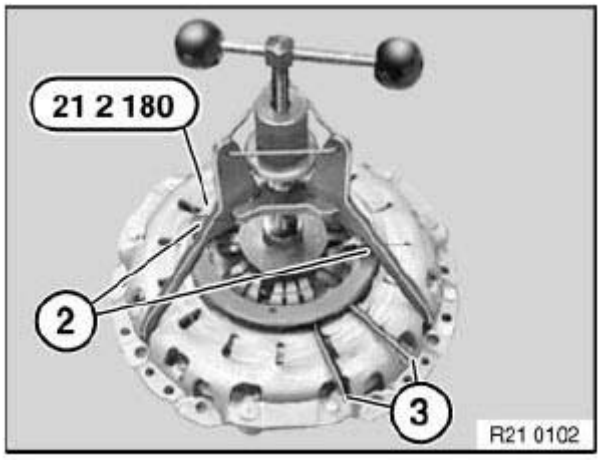


Fig. 24: Pressing Handles Using Special Tools (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in spindle (1) until diaphragm spring (2) is tensioned up to stop.

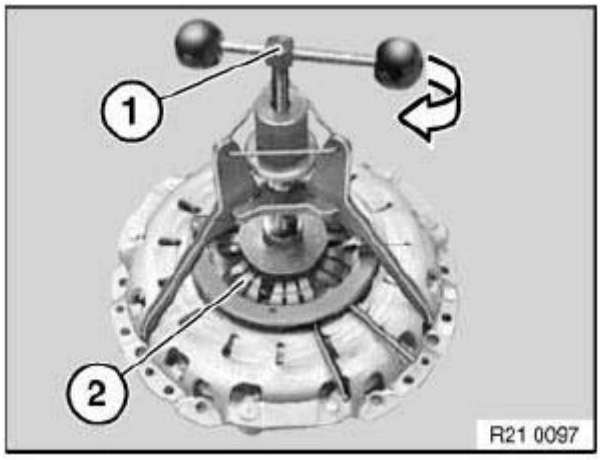


Fig. 25: Turning Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Handle clutch plate with care, do not touch surfaces of friction linings.
Install clutch plate in correct position.
Pay attention to text "engine end"/"transmission side".

Installation:

N52

Screws must be replaced.

Jointing torque and angle of rotation must be observed without fail.

Centre clutch plate (1) with special tool.

Special tool

Transmission

21 2 141

S6S 420G; S6S 560G; S5D 390Z

21 2 142

S5D 200G; S5D 250G; S5D 260Z; S5D 310Z

21 2 201

GS6-37BZ

21 2 230 mandrel

GS6-53DZ

21 2 250 mandrel

GS6-17BG

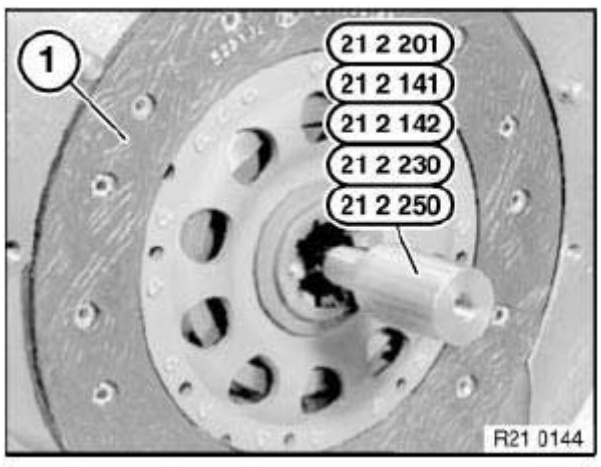


Fig. 26: Identifying Clutch Plate And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Fit SAC clutch (1) on flywheel.

Pay attention to dowel pins (2).

SAC clutch (1) must be secured by way of dowel pins (2).

Install retaining screws of SAC clutch and tighten down.

Tightening torque: **21 21 1AZ** .

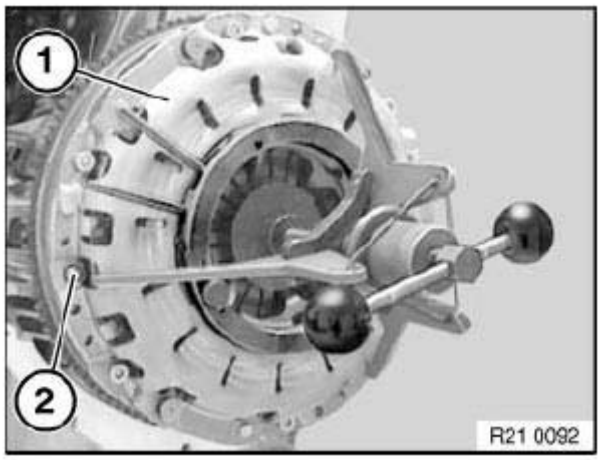


Fig. 27: Identifying SAC Clutch And Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release spindle (1) until tension is completely removed from diaphragm spring (2).

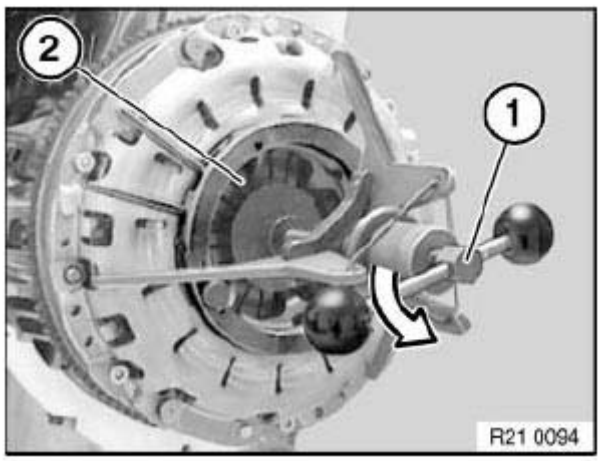


Fig. 28: Identifying Spindle And Diaphragm Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screw (1) and remove special tool 21 2 170 Device from SAC clutch.

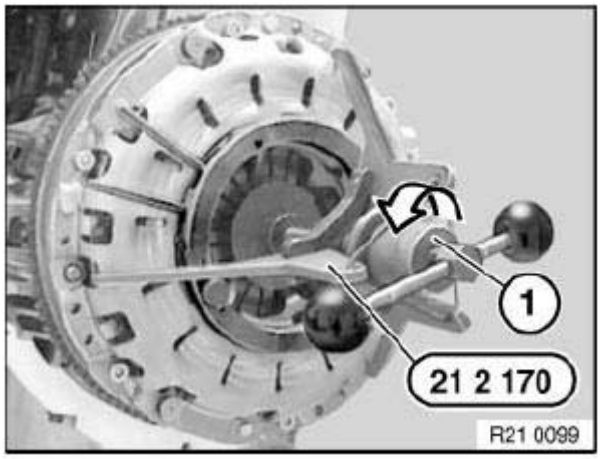


Fig. 29: Removing SAC Clutch Using Special Tools (21 2 170)
Courtesy of BMW OF NORTH AMERICA, INC.

Release knurled screws (2) and remove special tool **21 2 180** from SAC clutch.

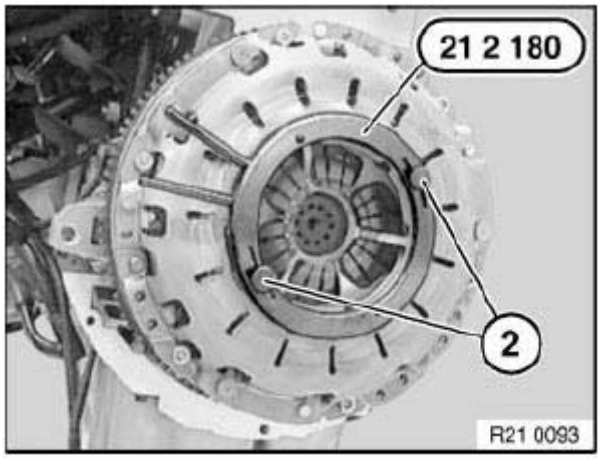


Fig. 30: Removing SAC Clutch Using Special Tool (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

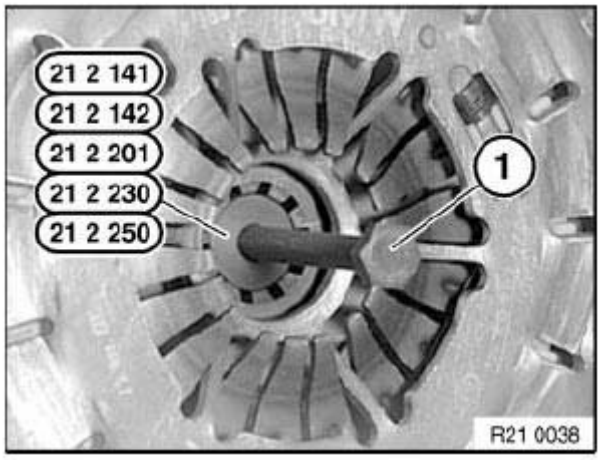


Fig. 31: Identifying Special Tools And Clutch Plate Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installing new SAC clutch

Installation:

N52

Screws must be replaced.

Jointing torque and angle of rotation must be observed without fail.

IMPORTANT: Handle clutch disk carefully, do not touch surfaces of friction pads. Install clutch plate (1) in correct position.

Note designation for "engine side"/"transmission side".

Centre clutch plate (1) with special tool.

Special tool

Transmission

21 2 141

S6S 420G; S6S 560G; S5D 390Z

21 2 142

S5D 200G; S5D 250G; S5D 260Z; S5D 310Z

21 2 201

GS6-37BZ

21 2 230 mandrel

GS6-53DZ

21 2 250 mandrel

GS6-17BG

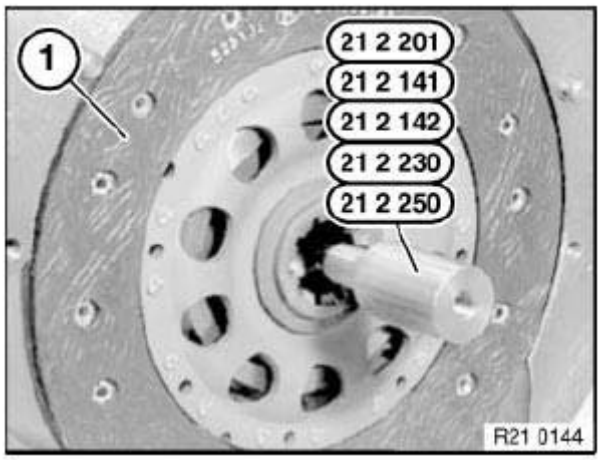


Fig. 32: Identifying Clutch Plate And Special Tools
Courtesy of BMW OF NORTH AMERICA, INC.

Push SAC clutch onto dowel pins (1) located in flywheel and screw down.

Tightening torque: **21 21 1AZ** .

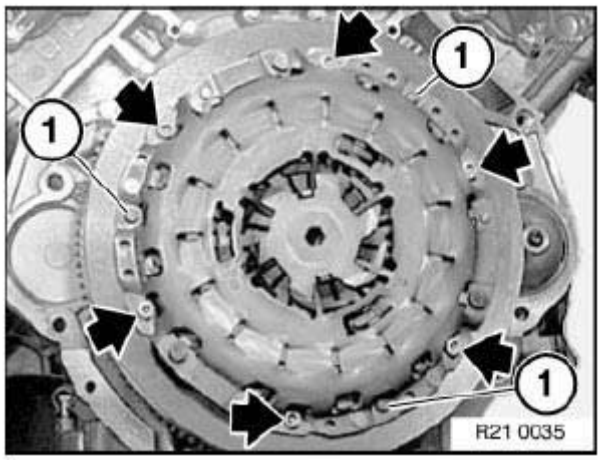


Fig. 33: Identifying Clutch And Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Locking piece (1) may only be removed with SAC screw-mounted clutch!

Carefully unscrew locking piece (1) clockwise or counterclockwise with a hexagon socket wrench 14 A/F (2).

NOTE: A slight snapping of the plate spring while unscrewing is possible.

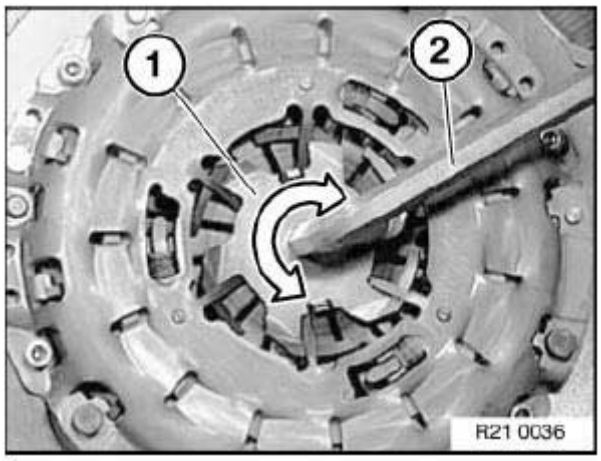


Fig. 34: Removing Clutch Plate Screw Using Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

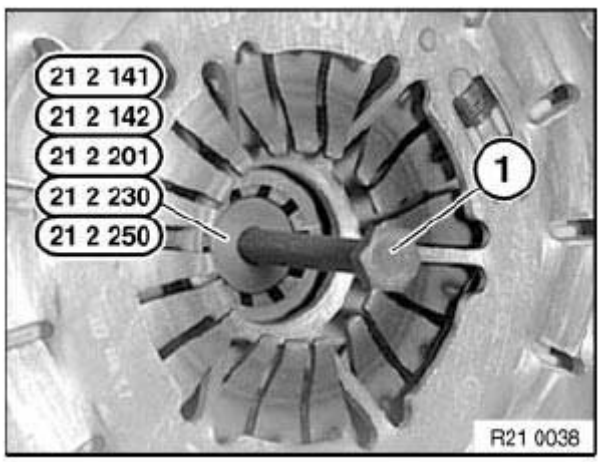


Fig. 35: Identifying Special Tools And Clutch Plate Screw
Courtesy of BMW OF NORTH AMERICA, INC.

2151 CLUTCH RELEASE CONTROLLER WITH LEVER

21 51 500 REMOVING AND INSTALLING OR REPLACING CLUTCH RELEASE BEARING/LEVER

NOTE: (transmission removed)

New version (except M models)

Release bearing and release lever have been combined to form a single release module.

Do not disassemble the release module. Otherwise there is a risk of the release module being **incorrectly** reassembled.

Installation:

Make sure that the correct cam (1) of the release bearing is on the sliding surface (2) of the release lever.

NOTE: Do not grease sliding surfaces (2).

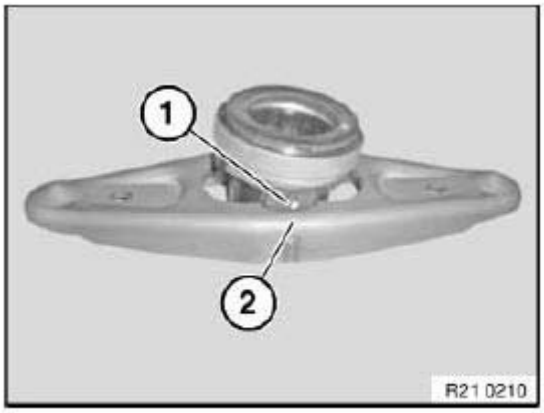


Fig. 36: Identifying Release Bearing And Lever Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Fig. 37: Cam (1) of release bearing (A=12 mm) is on sliding surface of release lever.

Version: 4-cylinder petrol/gasoline engines.

Fig. 37: Cam (1) of release bearing (A=7 mm) is on sliding surface of release lever.

Version: 6-cylinder petrol/gasoline engines and diesel engines.

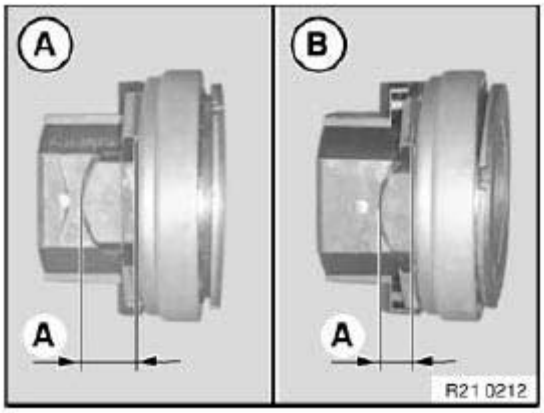


Fig. 37: Identifying Release Bearing And Lever Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Remove release module (1) from spring wire clip.

Remove release module.

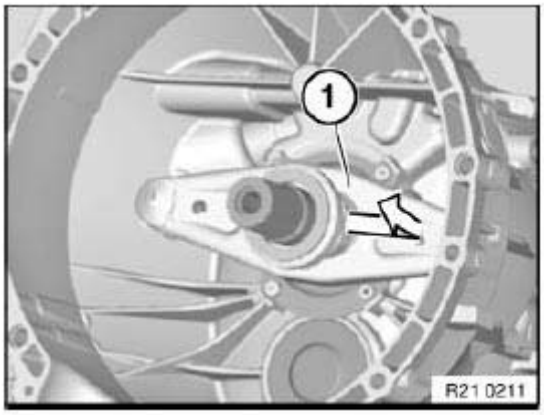


Fig. 38: Removing Release Module From Spring Wire Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw release lever (4) from spring wire clip (5) and remove.

Installation:

Clean release lever.

NOTE: Illustration similar.

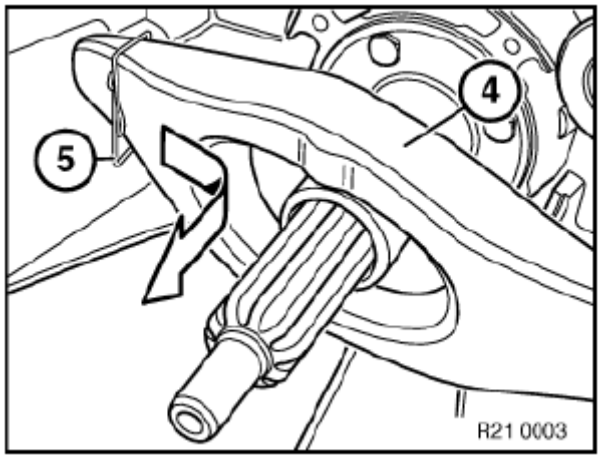


Fig. 39: Removing Release Lever From Spring Wire Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Check spring wire clip (5) and ball pin (6) for damage and replace if necessary.

Apply a thin coating of grease to ball pin (6).

Grease, refer to **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

Illustration similar.

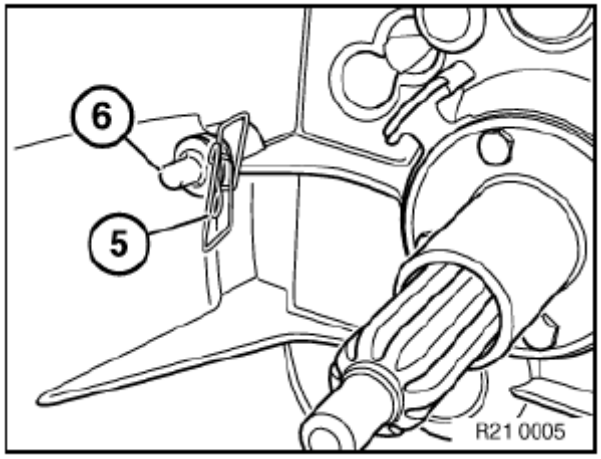


Fig. 40: Identifying Spring Wire Clip And Ball Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Clean guide sleeve (7).

Installation:

Do **not** grease guide sleeve.

If guide sleeve is greased, the release lever can stick on the guide sleeve.

NOTE: Illustration similar.

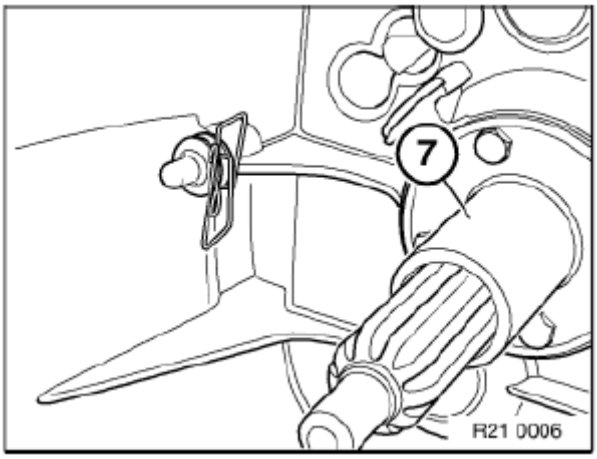


Fig. 41: Identifying Guide Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

2152 CLUTCH OPERATION (HYDRAULIC)

21 52 500 REMOVING AND INSTALLING/REPLACING CLUTCH MASTER CYLINDER

NOTE: After completing work, bleed CLUTCH HYDRAULIC SYSTEM .

Necessary preliminary tasks:

- Remove **TRIM PANEL** for pedal assembly.
- Remove **FOOTWELL MODULE** .

Draw off brake fluid up to supply hose of clutch hydraulic system (1). For this purpose, use only a vacuum pipe that is exclusively used for removing brake fluid.

Detach supply hose (1) from expansion tank.

NOTE: Illustration similar.

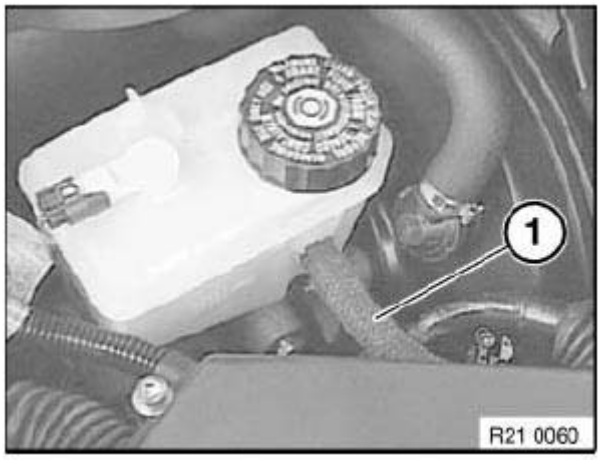


Fig. 42: Identifying Supply Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on cylinder (2).

Tightening torque: **21 52 4AZ**

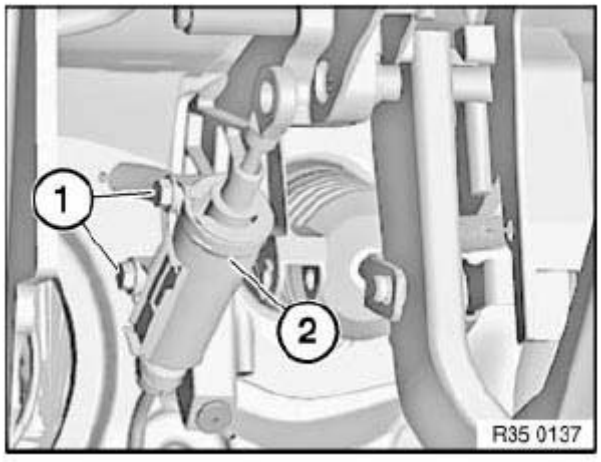


Fig. 43: Identifying Clutch Master Cylinder And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Two versions of clutch pedal.

Version 1 - plastic clutch pedal

Disconnect return spring (1).

Detach locking clip (3) and pull clutch pedal with clutch master cylinder off bearing block.

Press pin ends (2) together and remove pin.

Version 2 - metal clutch pedal

Detach retaining clip and remove clutch master cylinder from pedal

Installation:

Replace locking clip.

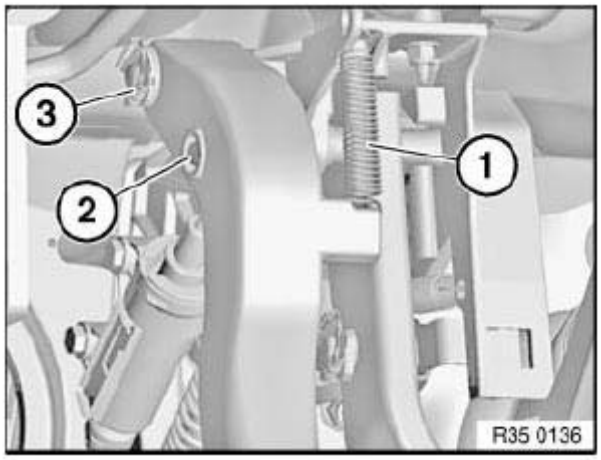


Fig. 44: Identifying Return Spring, Pin And Locking Clips
Courtesy of BMW OF NORTH AMERICA, INC.

The locking clip must be seated with both legs in the pin groove.

Detach retainer (1) with a screwdriver (2).

NOTE: Do not foul carpet with brake fluid.

Detach hydraulic line from clutch master cylinder.

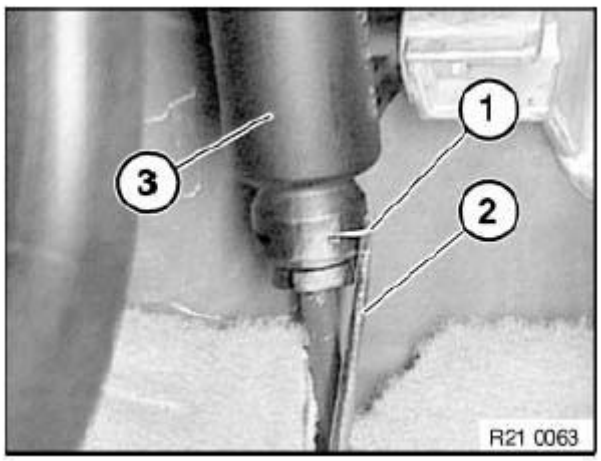


Fig. 45: Identifying Hydraulic Line Retainer

Courtesy of BMW OF NORTH AMERICA, INC.

Detach supply hose (1) from clutch master cylinder.

IMPORTANT: Do not pull supply hose completely into interior.

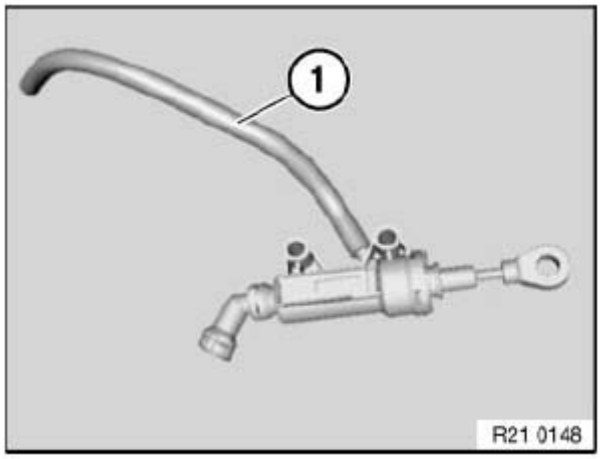


Fig. 46: Identifying Clutch Master Cylinder Supply Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out shift element (1) from clutch master cylinder (2) with screwdriver.

Release plug connection (3) and disconnect plug (4) from shift element (1).

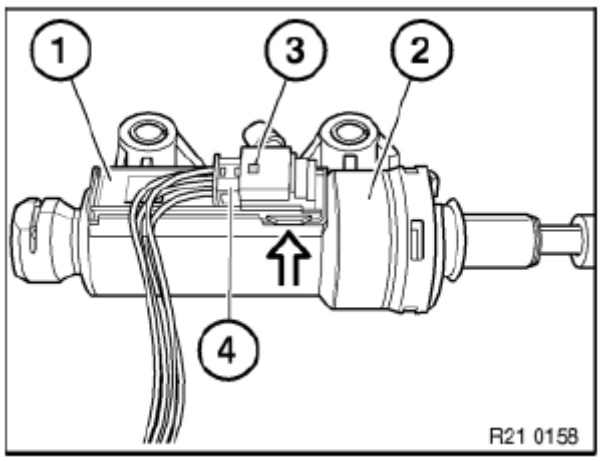


Fig. 47: Disconnecting Plug From Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Shift element is secured against incorrect installation.

Shift element must snap audibly into place.

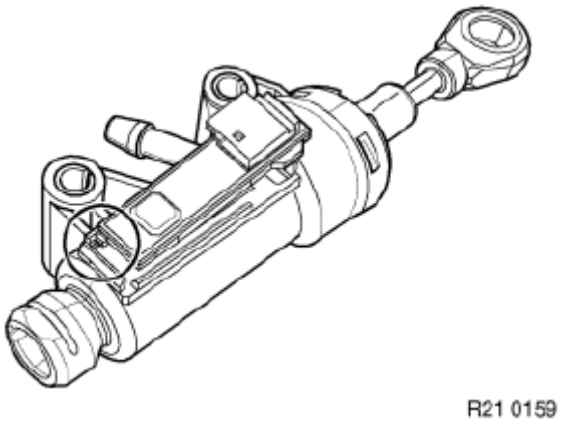


Fig. 48: Identifying Clutch Switch Module
Courtesy of BMW OF NORTH AMERICA, INC.

21 52 510 REMOVING AND INSTALLING/REPLACING CLUTCH SLAVE CYLINDER (PLASTIC)

NOTE: After completing work bleed CLUTCH HYDRAULIC SYSTEM .

Seal hydraulic line to clutch slave cylinder with special tool 13 3 010 hose clip.

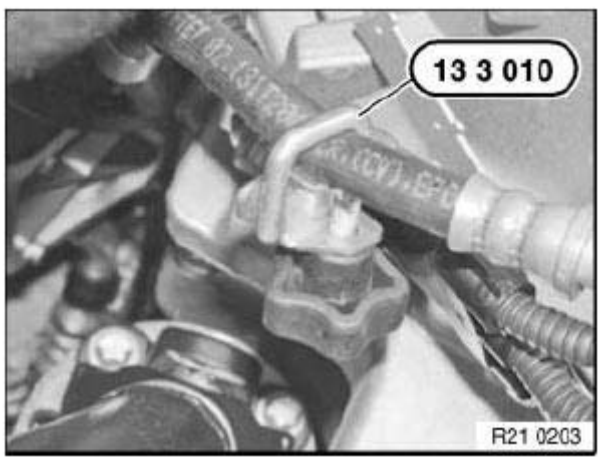


Fig. 49: Sealing Hydraulic Line To Clutch Slave Cylinder Using Special Tools (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and remove clutch slave cylinder (1) with holder (2).

Installation:

Replace self-locking nuts.

Tightening torque **21 52 5AZ** .

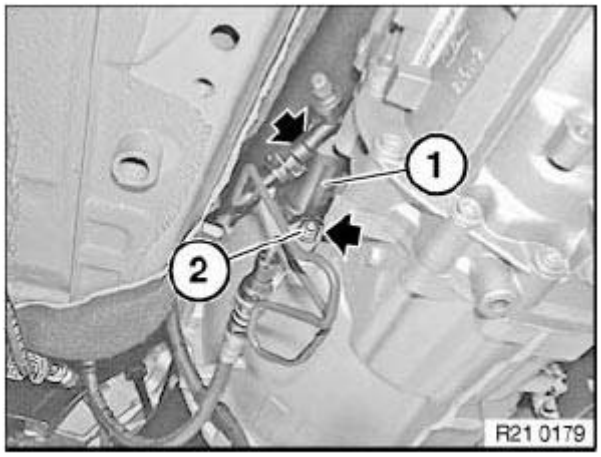


Fig. 50: Identifying Clutch Slave Cylinder Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock spring retainer (1).

Disconnect hydraulic line (2).

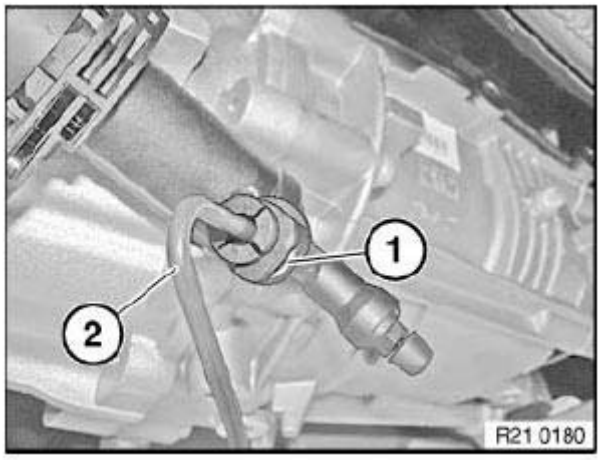


Fig. 51: Identifying Hydraulic Line And Spring Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Press cylinder together by hand.

Connect hydraulic line with cylinder pressed.

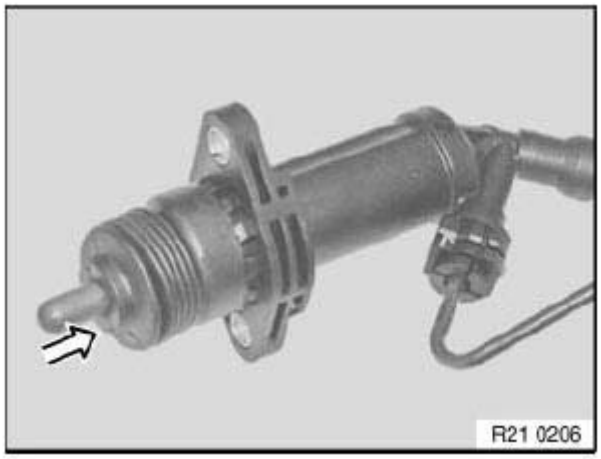


Fig. 52: Pressing Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 13 3 010 hose clip .

Hold cylinder piston vertically downwards.

Press piston 5 times into cylinder.

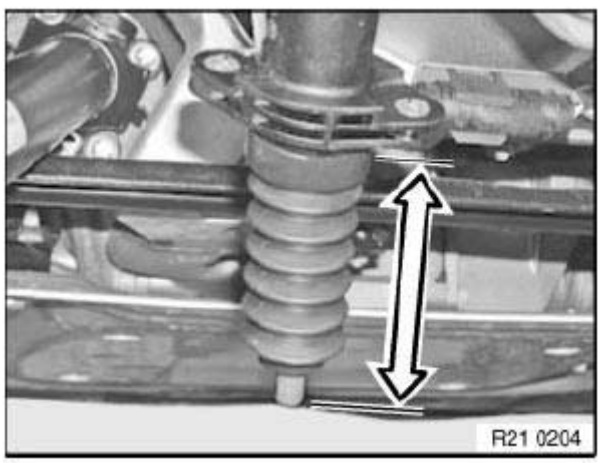


Fig. 53: Holding Cylinder Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Press in piston until it engages.

Install clutch slave cylinder.

Bleed **CLUTCH HYDRAULICS** .

Installation:

Clean thrust member (1) and contact face on release lever.

Lightly grease thrust member (1) on contact face (2). See **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

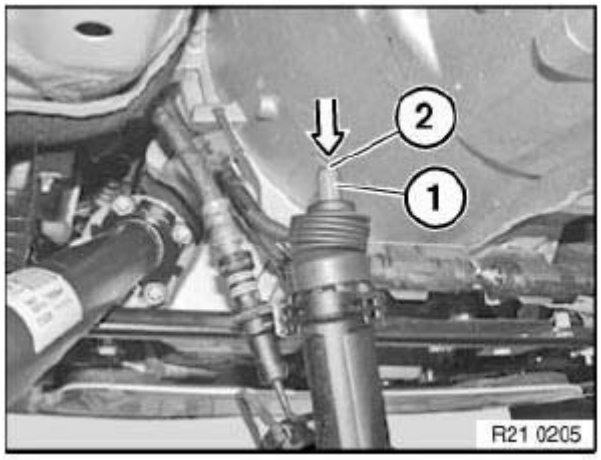


Fig. 54: Pressing Piston
Courtesy of BMW OF NORTH AMERICA, INC.

2100 MAINTENANCE AND INSPECTION

21 00 006 BLEEDING CLUTCH HYDRAULICS (PLASTIC SLAVE CYLINDER)

Necessary preliminary tasks

- Remove **REAR UNDERBODY PROTECTION**

Connect bleeder unit to brake fluid expansion tank.

IMPORTANT: Check relevant Operating Instructions for each device.

Charging pressure should not exceed 2 bar.

Connect bleeder hose to bleed valve (1).

Open bleed valve (1) and flush until clear brake fluid emerges without air bubbles.

Close bleed valve.

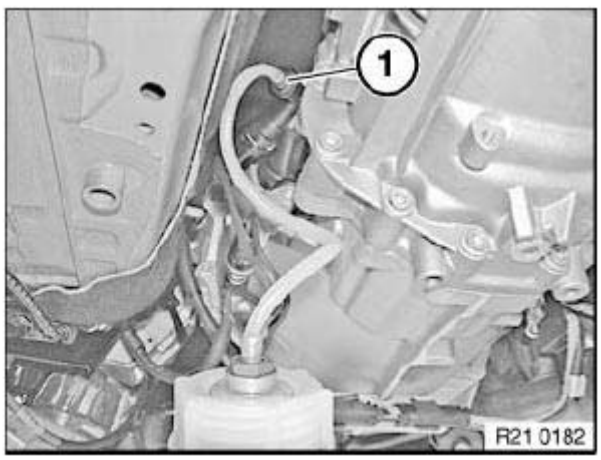


Fig. 1: Identifying Bleed Valve
Courtesy of BMW OF NORTH AMERICA, INC.

Switch off bleeder unit or remove from brake fluid expansion tank.

Correct brake fluid level in expansion tank.

2121 CLUTCH WITH DRIVING DISC

21 21 500 REMOVING AND INSTALLING/REPLACING CLUTCH (SAC 240)

Necessary preliminary tasks

- move **TRANSMISSION** .

N54

Block flywheel with special tools **11 9 260** and 11 9 265.

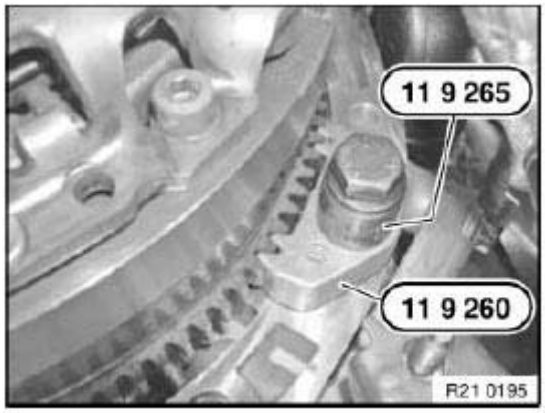


Fig. 2: Blocked Flywheel With Special Tool (11 9 260) And (11 9 265)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws and remove clutch from flywheel.

Installation:

Clean flywheel and check for wear and damage.

Replace damaged flywheel.

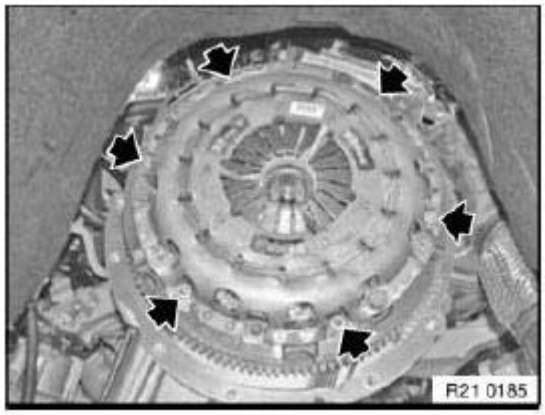


Fig. 3: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Always replace clutch plates fouled e.g. by oil, cleaning agent.

Observe the following procedure when installing the removed clutch and clutch plate.

Insert special tool **21 2 180** in clutch.

Press special tool **21 2 180** together at handles (1) as far as it will go and tighten down knurled screws (2).

Adjustment ring of clutch is now secured in its original position (wear position).

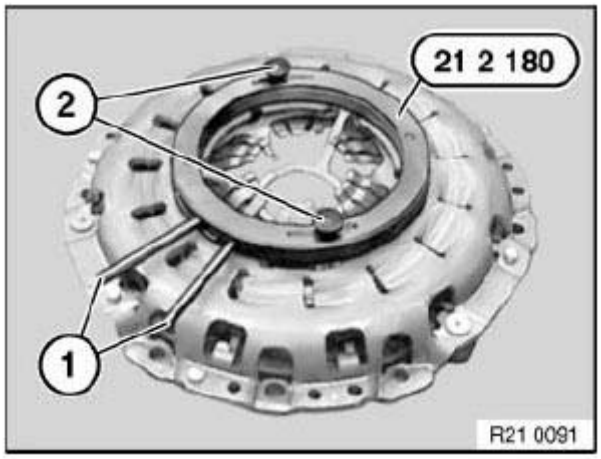


Fig. 4: Pressing Handles Using Special Tools (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Locking hooks (1) of special tool 21 2 180 must engage in openings of pressure spring.

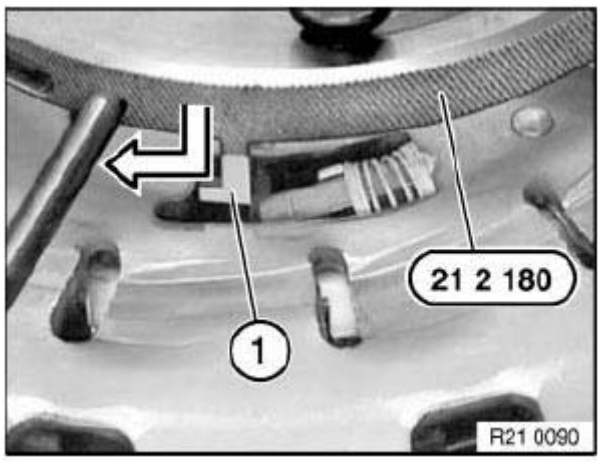


Fig. 5: Locking Hooks Using Special Tool (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **21 2 170** and tighten down at knurled screw (1).

Screw in spindle (2) until diaphragm spring (3) is tensioned on stop.

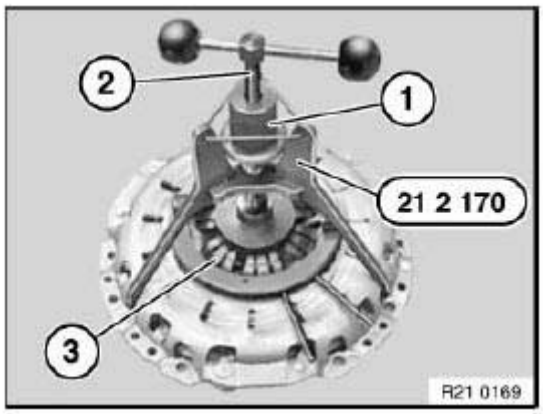


Fig. 6: Fitting Special Tool (21 2 170) Onto Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Insert special tool 21 2 170 only in area of bores for dowel pins.

Centre clutch plate (1) with special tool **21 2 270** .

IMPORTANT: Install clutch plate in correct position. Note designation for "engine side"/"transmission side".

Handle clutch plate with care. Do not touch surfaces of friction linings.

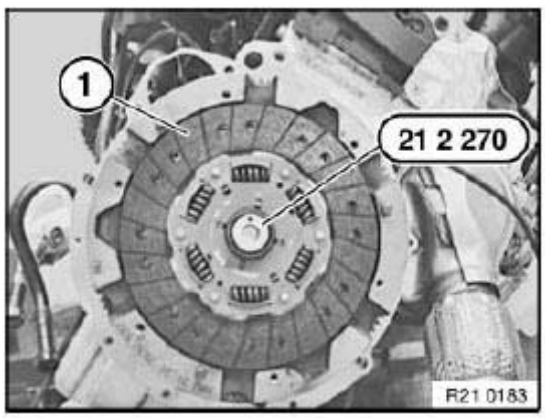


Fig. 7: Identifying Centre Clutch Plate With Special Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Fit clutch (1) to flywheel.

Tightening torque **21 21 1AZ** .

NOTE: Clutch (1) must be secured by way of dowel pins (2).

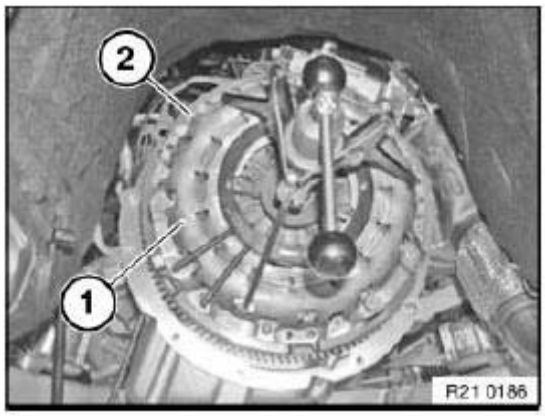


Fig. 8: Identifying Clutch And Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release spindle (1) until load is fully removed from diaphragm spring (2) Remove special tools **21 2 170** and **21 2 180** .

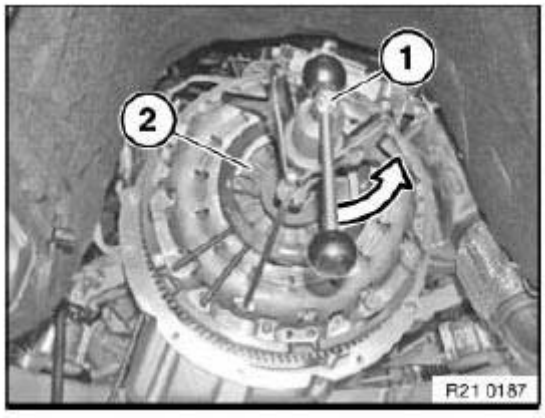


Fig. 9: Removing Spindle From Diaphragm Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

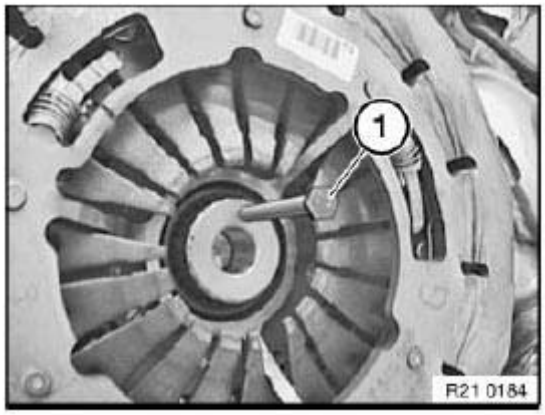


Fig. 10: Identifying Special Tool From Clutch Plate
Courtesy of BMW OF NORTH AMERICA, INC.

Installing removed clutch with new clutch plate

IMPORTANT: Before installing a used clutch with a new clutch plate, always reset adjustment ring in new position.

Set clutch down on a clean surface.

Insert special tool **21 2 180** in clutch (1).

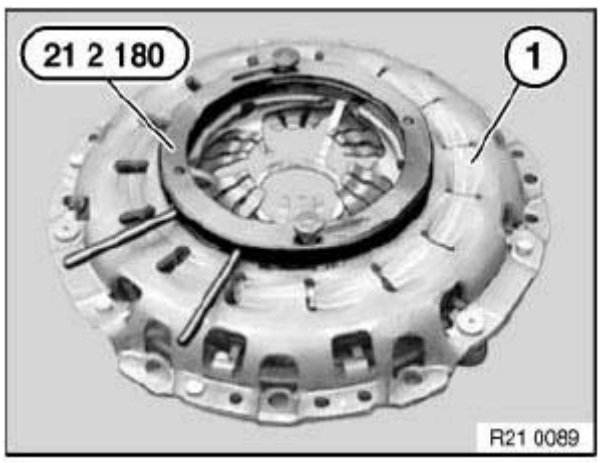


Fig. 11: Identifying SAC Clutch And Special Tool (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Locking hooks (1) of special tool 21 2 180 must engage in openings in clutch.

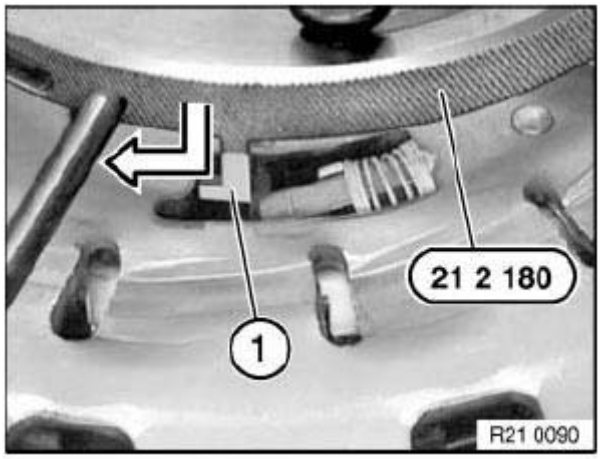


Fig. 12: Locking Special Tool (21 2 180) Hooks
Courtesy of BMW OF NORTH AMERICA, INC.

Fit special tool **21 2 170** and tighten down at knurled screw (1).

NOTE: Insert special tool 21 2 170 only in area of bores for dowel pins.

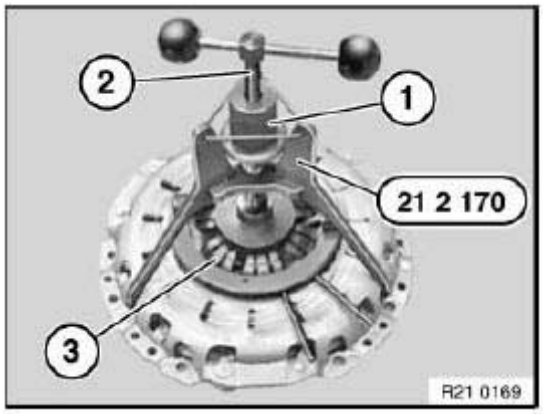


Fig. 13: Fitting Special Tool (21 2 170) Onto Knurled Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in spindle (1) until adjustment ring of clutch (2) can be turned with special tool **21 2 180** at handles (3).

Press special tool **21 2 180** together at handles (3) as far as it will go and grip firmly.

At same time tighten down knurled screws (2).

Adjustment ring of clutch is now secured in new position.

Screw in spindle (1) until diaphragm spring is tensioned on stop.

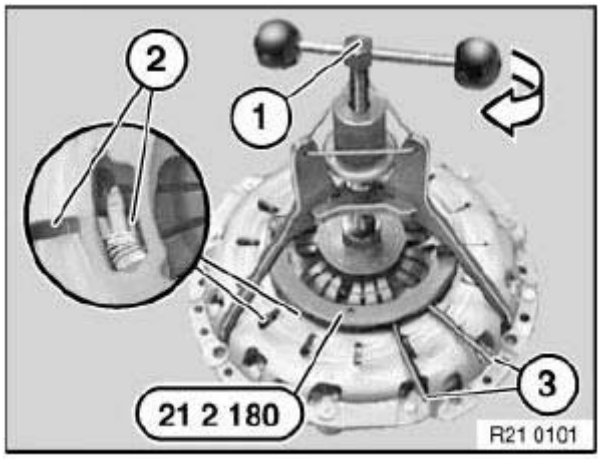


Fig. 14: Turning Handles Using Special Tools (21 2 180)
Courtesy of BMW OF NORTH AMERICA, INC.

Centre clutch plate (1) with special tool **21 2 270** .

IMPORTANT: Install clutch plate in correct position.

Note designation for "engine side"/"transmission side".

Handle clutch plate with care. Do not touch surfaces of friction linings.

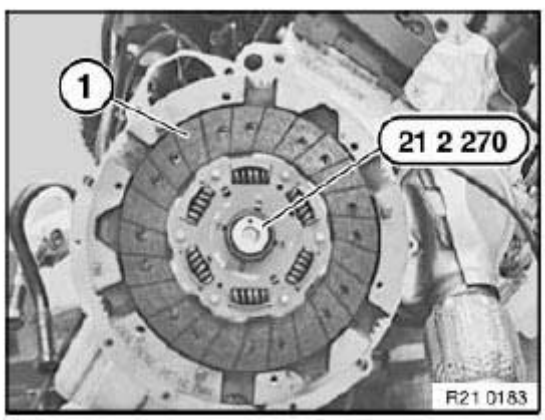


Fig. 15: Identifying Centre Clutch Plate With Special Tool (21 2 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit clutch (1) to flywheel.

Tightening torque **21 21 1AZ** .

IMPORTANT: Clutch (1) must be secured by way of dowel pins (2).

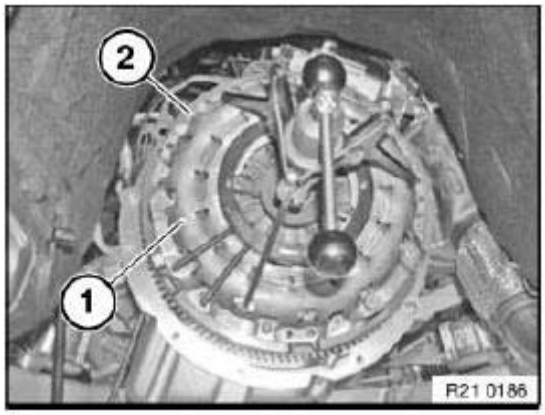


Fig. 16: Identifying Clutch And Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Release spindle (1) until load is fully removed from diaphragm spring (2)

Remove special tools **21 2 170** and **21 2 180** .

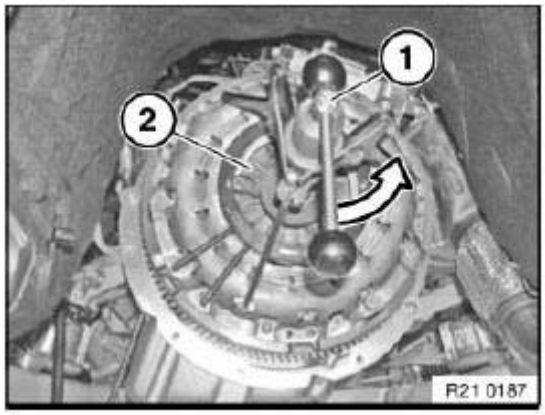


Fig. 17: Removing Spindle From Diaphragm Spring
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

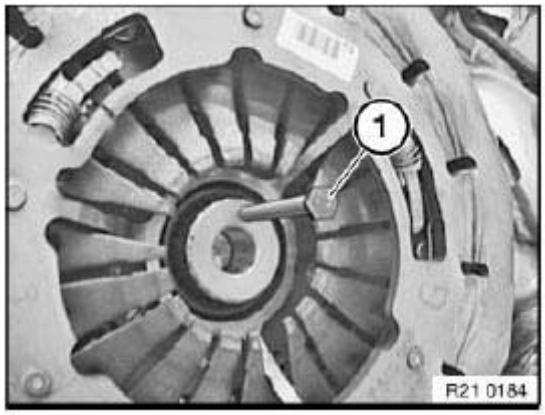


Fig. 18: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Installing new clutch

IMPORTANT: Locking piece may only be removed clutch is screwed down!

Centre clutch plate (1) with special tool **21 2 270** .

IMPORTANT: Install clutch plate in correct position.
Note designation for "engine side"/"transmission side".

Handle clutch plate with care. Do not touch surfaces of friction linings.

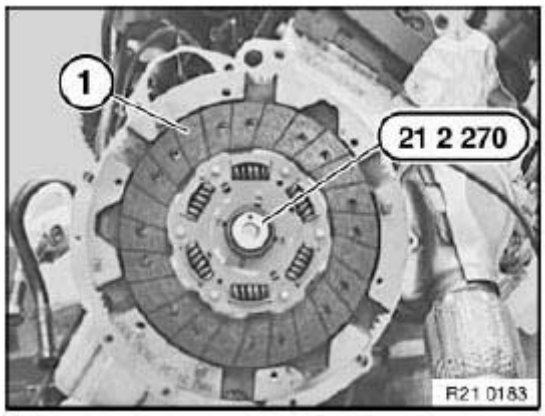


Fig. 19: Identifying Centre Clutch Plate With Special Tool (21 2 270)
Courtesy of BMW OF NORTH AMERICA, INC.

Fit clutch to flywheel.

Tightening torque **21 21 1AZ** .

IMPORTANT: Clutch must be secured by way of dowel pins (1).

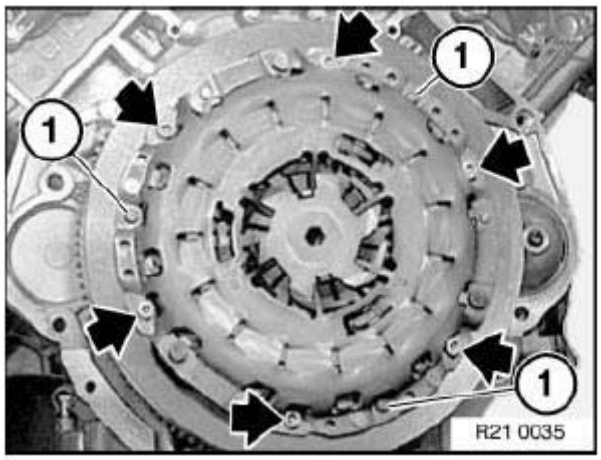


Fig. 20: Identifying Clutch And Dowel Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Carefully unscrew locking piece (1) clockwise or counterclockwise with a WAF 14 hexagon socket wrench (2).

NOTE: A slight snapping of the plate spring while unscrewing the lock is possible.

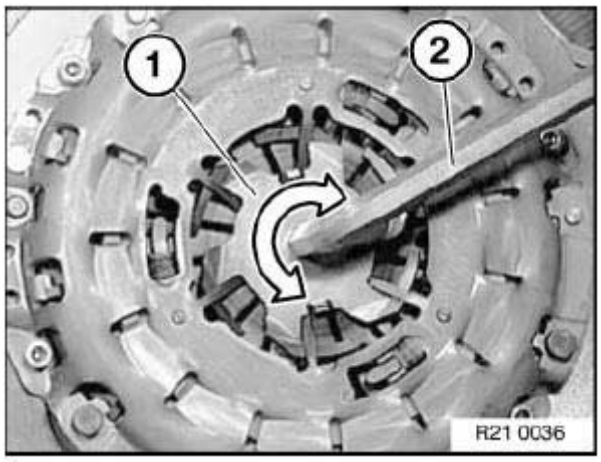


Fig. 21: Removing Locking Piece Using Hexagon Socket Wrench 14 A/F
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw special tool from clutch plate with aid of accompanying screw (1).

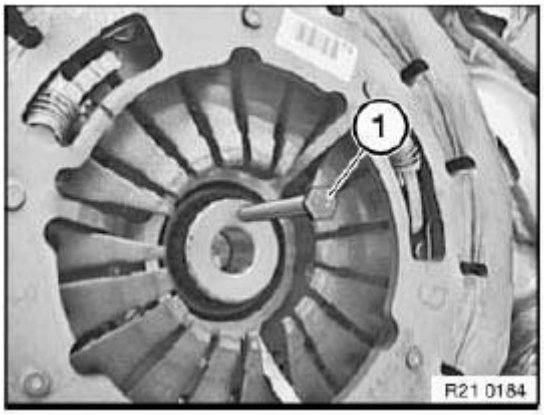


Fig. 22: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

11 22 513 REPLACING ROLLER BEARING FOR DUAL-MASS FLYWHEEL

Necessary preliminary tasks

- **TRANSMISSION** removed.
- Remove **CLUTCH RELEASE BEARING**

Pressing out roller bearing

Install special tool 23 4 031 in front of drive shaft spline teeth.

Screw in grease spindle 23 4 033 completely.

Brass tip must immerse fully into roller bearing.

Press in grease with grease gun **23 4 040** until roller bearing is disengaged from drive shaft.

When tensioning spring is compressed to full extent, release grease spindle and twist out slightly until spring is relieved.

Repeat grease press-in procedure until roller bearing has released completely.

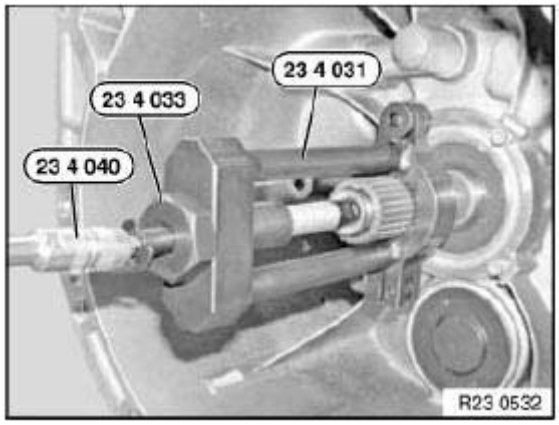


Fig. 23: Identifying Special Tools (23 4 033), (23 4 031) And (23 4 040)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool 23 4 031.

Remove pressed-in grease (1) from drive shaft completely.

Then reinstall special tool.

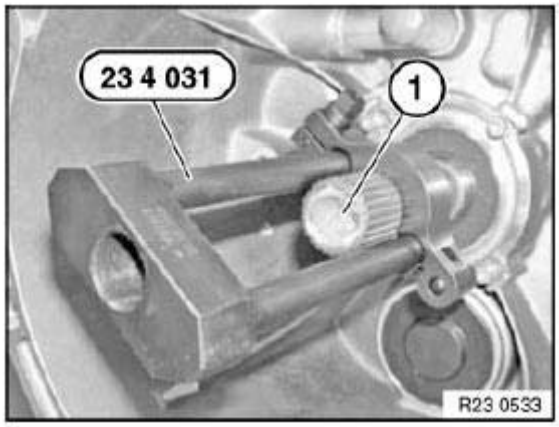


Fig. 24: Identifying Pressed-In Grease On Drive Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Pressing in roller bearing

Slide in pressure spindle 23 4 035.

Attach thrust piece 23 4 036 to pressure spindle.

Push roller bearing (1) onto thrust piece.

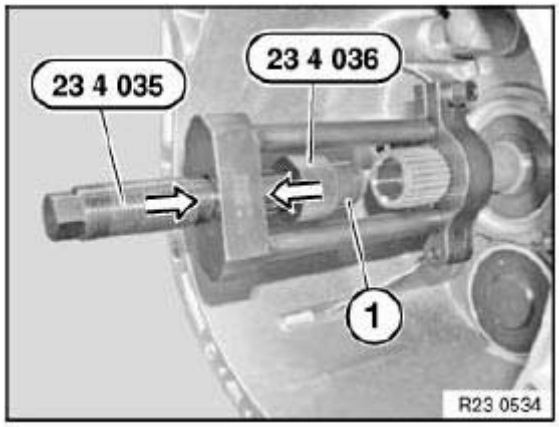


Fig. 25: Pushing Roller Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in pressure spindle (1) until roller bearing is fully pressed in.

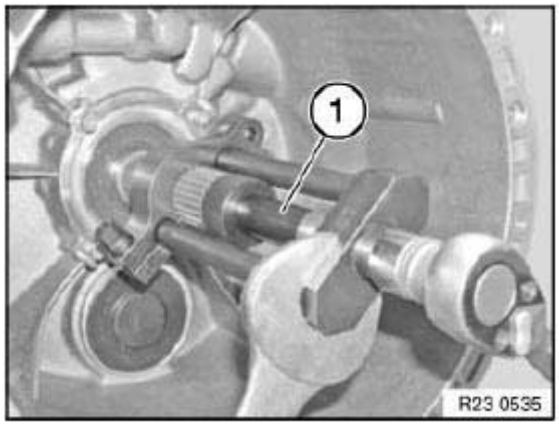


Fig. 26: Identifying Pressure Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

2151 CLUTCH RELEASE CONTROLLER WITH LEVER

21 51 500 REMOVING AND INSTALLING OR REPLACING CLUTCH RELEASE BEARING/LEVER

NOTE: (transmission removed)

New version (except M models)

Release bearing and release lever have been combined to form a single release module.

Do not disassemble the release module. Otherwise there is a risk of the release module being **incorrectly** reassembled.

Installation:

Make sure that the correct cam (1) of the release bearing is on the sliding surface (2) of the release lever.

NOTE: Do not grease sliding surfaces (2).

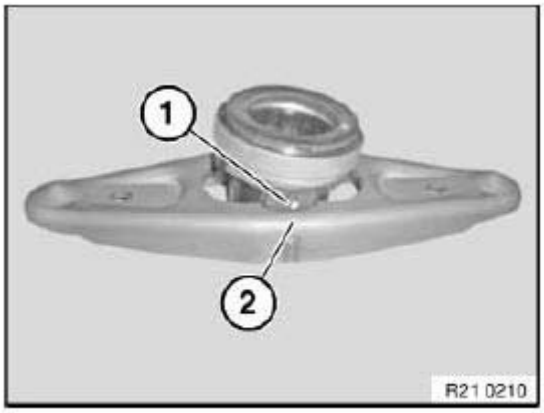


Fig. 27: Identifying Release Bearing And Lever Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Fig. 28: Cam (1) of release

bearing (A=12 mm) is on sliding surface of release lever.

Version: 4-cylinder petrol/gasoline engines.

Fig. 28: Cam (1) of release bearing (A=7 mm) is on sliding surface of release lever.

Version: 6-cylinder petrol/gasoline engines and diesel engines.

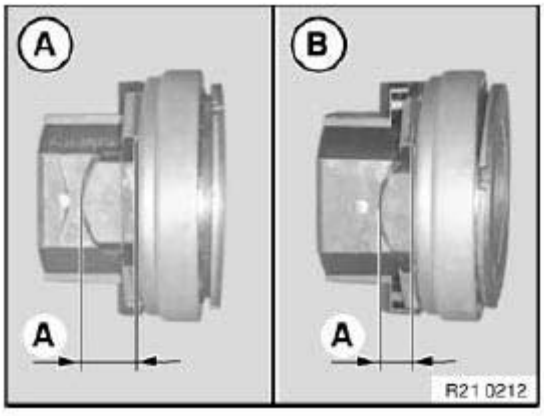


Fig. 28: Identifying Release Bearing And Lever Surface
Courtesy of BMW OF NORTH AMERICA, INC.

Remove release module (1) from spring wire clip.

Remove release module.

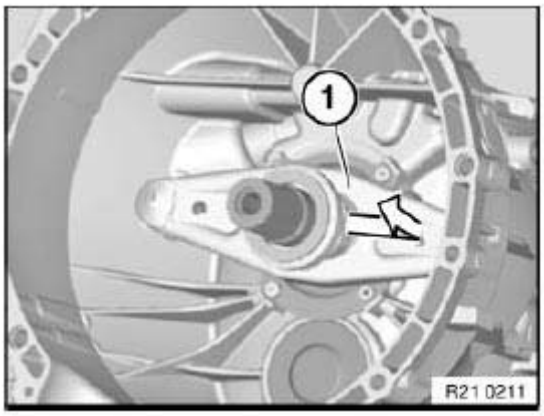


Fig. 29: Removing Release Module From Spring Wire Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw release lever (4) from spring wire clip (5) and remove.

Installation:

Clean release lever.

NOTE: Illustration similar.

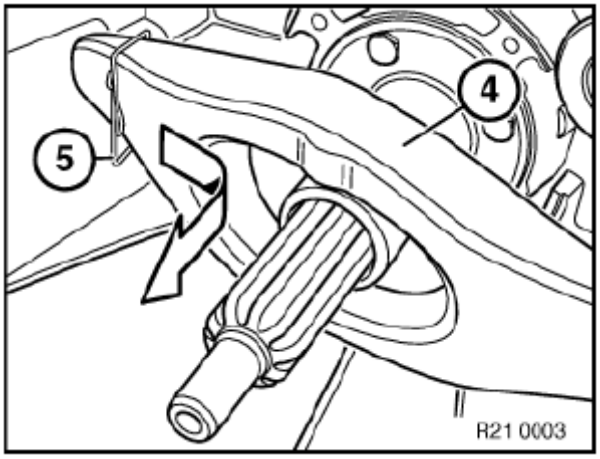


Fig. 30: Removing Release Lever From Spring Wire Clip
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check spring wire clip (5) and ball pin (6) for damage and replace if necessary.

Apply a thin coating of grease to ball pin (6).

Grease, refer to **CLUTCH - OPERATING FLUIDS** .

Illustration similar.

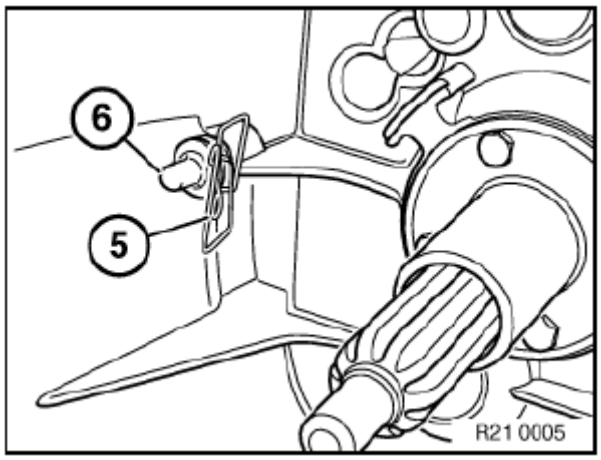


Fig. 31: Identifying Spring Wire Clip And Ball Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Clean guide sleeve (7).

Installation:

Do **not** grease guide sleeve.

If guide sleeve is greased, the release lever can stick on the guide sleeve.

NOTE: Illustration similar.

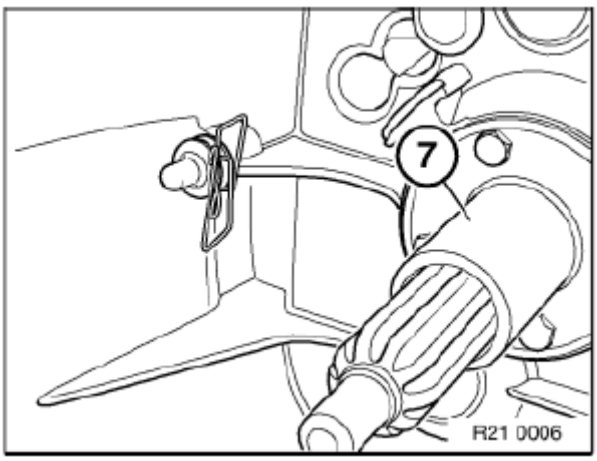


Fig. 32: Identifying Guide Sleeve

Courtesy of BMW OF NORTH AMERICA, INC.

2152 CLUTCH OPERATION (HYDRAULIC)

21 52 500 REMOVING AND INSTALLING/REPLACING CLUTCH MASTER CYLINDER

NOTE: After completing work, bleed CLUTCH HYDRAULIC SYSTEM .

Necessary preliminary tasks

- Remove **PANEL FOR PEDALS** for pedal assembly.
- Remove **FOOTWELL MODULE** .

Draw off brake fluid up to supply hose of clutch hydraulic system (1). For this purpose, use only a vacuum pipe that is exclusively used for removing brake fluid.

Detach supply hose (1) from expansion tank.

NOTE: Illustration similar.

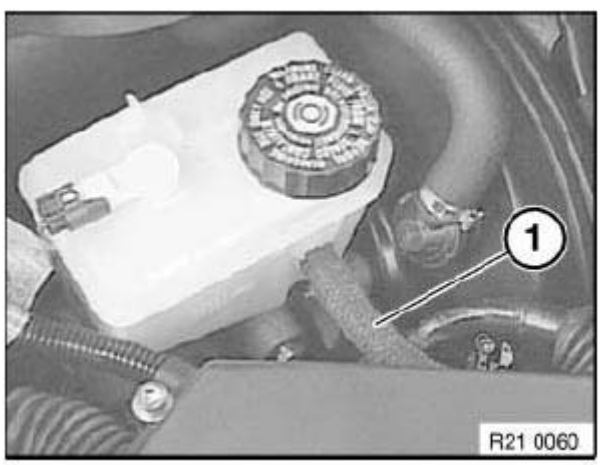


Fig. 33: Identifying Supply Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) on cylinder (2).

Tightening torque: **21 52 4AZ**

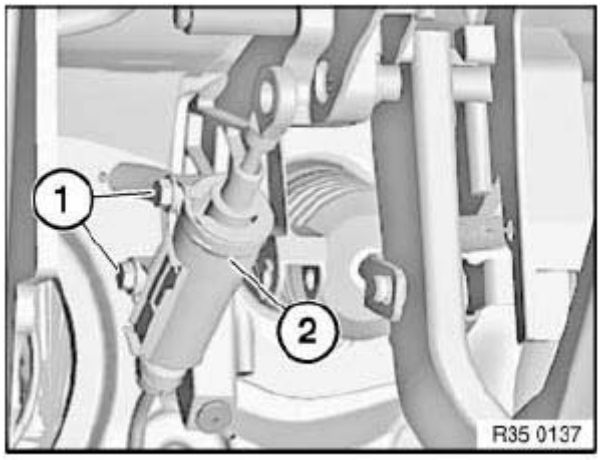


Fig. 34: Identifying Clutch Master Cylinder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Two versions of clutch pedal.

Version 1 - plastic clutch pedal

Disconnect return spring (1).

Detach locking clip (3) and pull clutch pedal with clutch master cylinder off bearing block.

Press pin ends (2) together and remove pin.

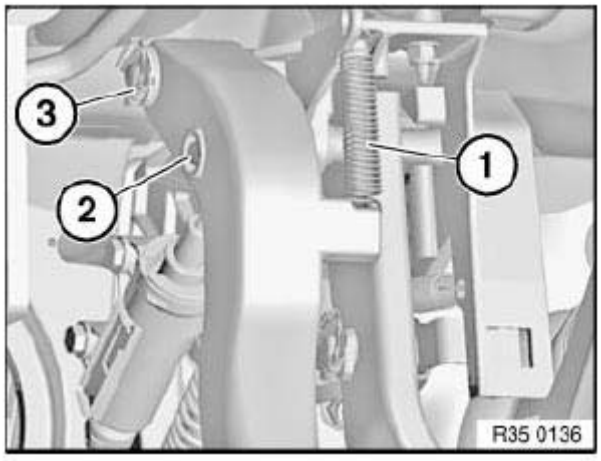


Fig. 35: Identifying Return Spring, Pin And Locking Clips
Courtesy of BMW OF NORTH AMERICA, INC.

Version 2 - metal clutch pedal

Detach retaining clip and remove clutch master cylinder from pedal

Installation:

Replace locking clip.

The locking clip must be seated with both legs in the pin groove.

Detach retainer (1) with a screwdriver (2).

NOTE: Do not foul carpet with brake fluid.

Detach hydraulic line from clutch master cylinder.

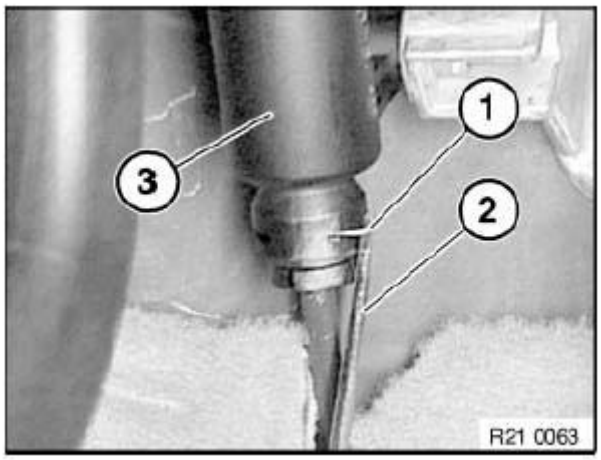


Fig. 36: Identifying Hydraulic Line Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Detach supply hose (1) from clutch master cylinder.

IMPORTANT: Do not pull supply hose completely into interior.

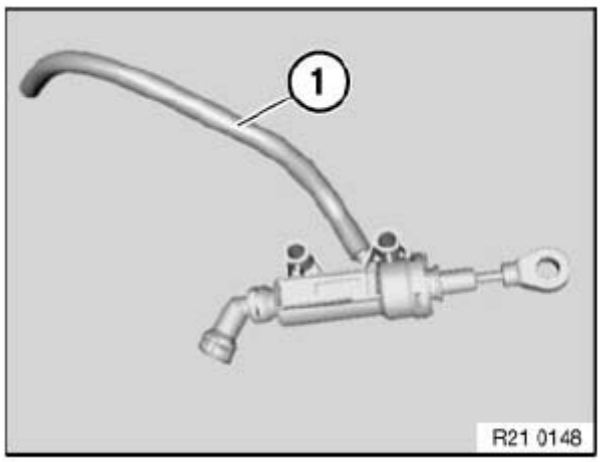


Fig. 37: Identifying Clutch Master Cylinder Supply Hose
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out shift element (1) from clutch master cylinder (2) with screwdriver.

Release plug connection (3) and disconnect plug (4) from shift element (1).

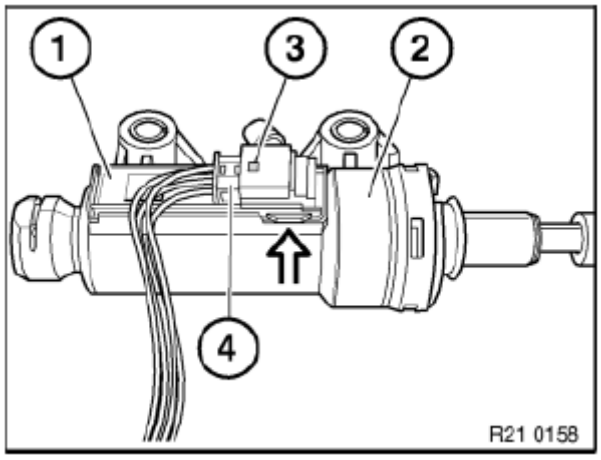


Fig. 38: Removing Clutch Master Cylinder And Shift Element
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Shift element is secured against incorrect installation.

Shift element must snap audibly into place.

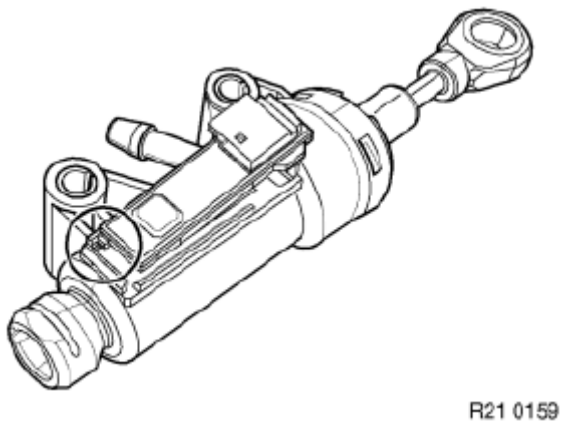


Fig. 39: Identifying Clutch Switch Module
Courtesy of BMW OF NORTH AMERICA, INC.

21 52 510 REMOVING AND INSTALLING/REPLACING CLUTCH SLAVE CYLINDER (PLASTIC)

NOTE: After completing work bleed CLUTCH HYDRAULIC SYSTEM .

Seal hydraulic line to clutch slave cylinder with special tool **13 3 010** .

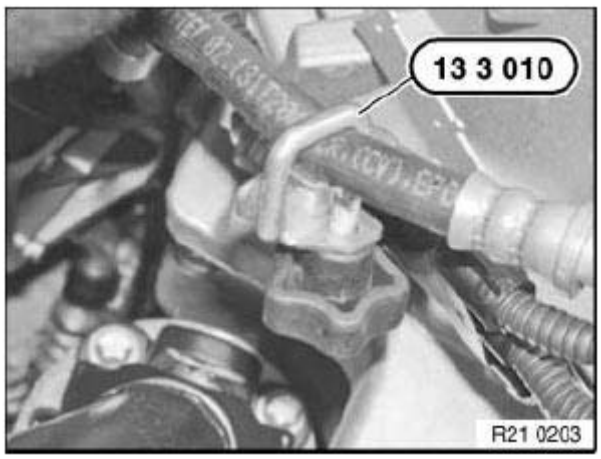


Fig. 40: Sealing Hydraulic Line To Clutch Slave Cylinder Using Special Tools (13 3 010)
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and remove clutch slave cylinder (1) with holder (2).

Installation:

Replace self-locking nuts.

Tightening torque **21 52 5AZ** .

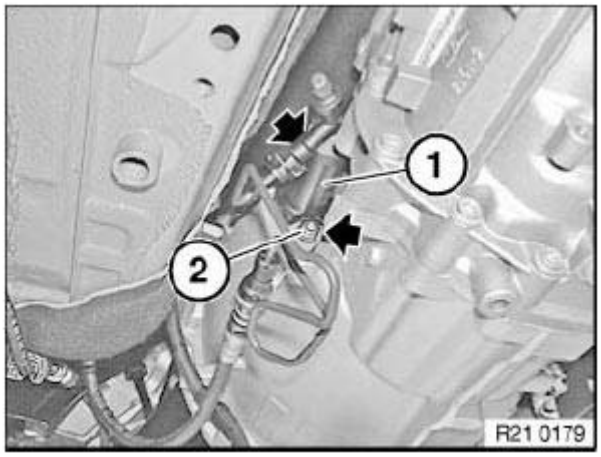


Fig. 41: Identifying Clutch Slave Cylinder Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock spring retainer (1).

Disconnect hydraulic line (2).

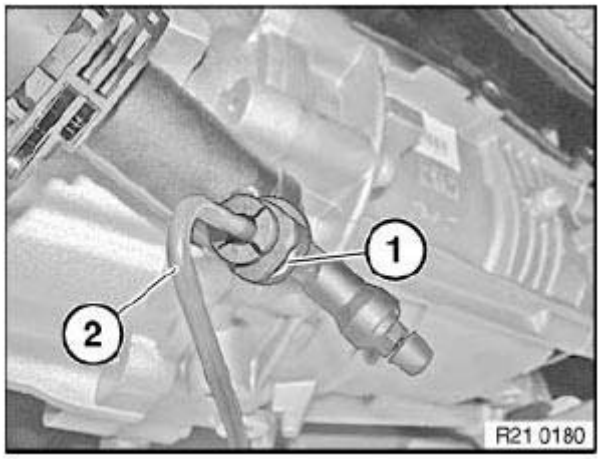


Fig. 42: Identifying Hydraulic Line And Spring Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Press cylinder together by hand.

Connect hydraulic line with cylinder pressed.

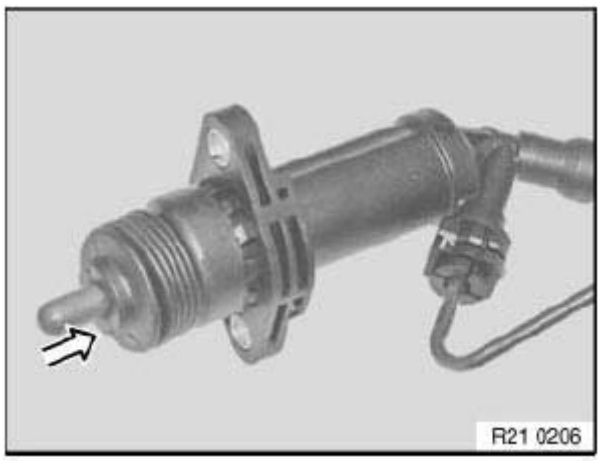


Fig. 43: Connecting Hydraulic Line With Cylinder
Courtesy of BMW OF NORTH AMERICA, INC.

Remove special tool **13 3 010** .

Hold cylinder piston vertically downwards.

Press piston 5 times into cylinder.

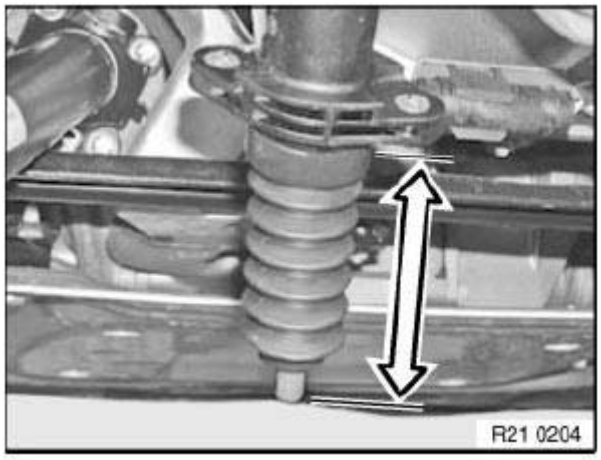


Fig. 44: Holding Cylinder Piston
Courtesy of BMW OF NORTH AMERICA, INC.

Press in piston until it engages.

Install clutch slave cylinder.

Bleed **CLUTCH HYDRAULICS** .

Installation:

Clean thrust member (1) and contact face on release lever.

Lightly grease thrust member (1) on contact face (2).

See **CLUTCH - OPERATING FLUIDS** .

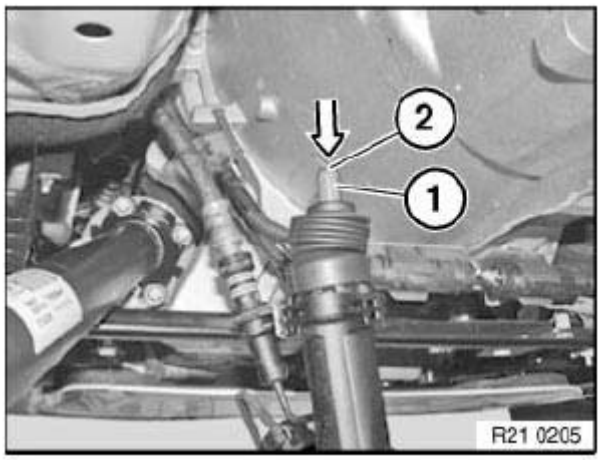


Fig. 45: Pressing Piston
Courtesy of BMW OF NORTH AMERICA, INC.

21 CLUTCH

21-5010 ADAPTER

Adapter MW

NOTE: **For expansion tank when bleeding clutch hydraulic system on automatic transmission**

Storage Location

Z4

SI number

01 06 97 (186)

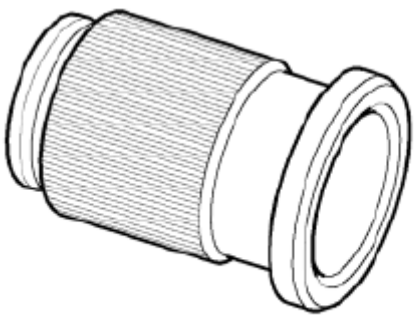


Fig. 1: Identifying Adapter (215010)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2270 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: **(Clutch centering socket) For centering drive plate to pressure plate when installing clutch on engine. Transmission: GS6- 53DG with M57T2, GS6-53BZ with N54 in E92, E60.**

Storage Location

C52

SI number

01 20 05 (218)

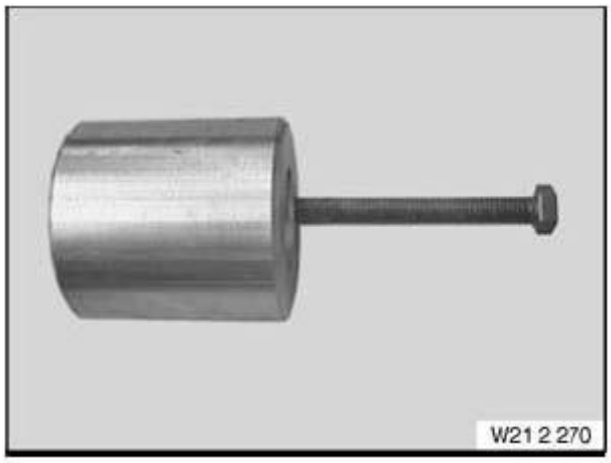


Fig. 2: Identifying Bush (212270)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2120 CLUTCH TOOL

Clutch tool Minimum set: Mechanical tools MW

NOTE: For centering drive plate when installing clutch and for pressing splined output shaft out of constant-velocity joint

Storage Location

B4

SI number

01 05 90 (207)

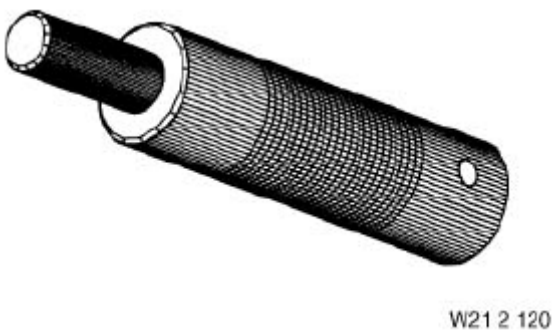


Fig. 3: Identifying Clutch Tool (212120)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2130 CLUTCH TOOL

Clutch tool Minimum set: Mechanical tools MW

NOTE: For centering driving disc when installing clutch.

Storage Location

B4

SI number

01 01 91 (312)

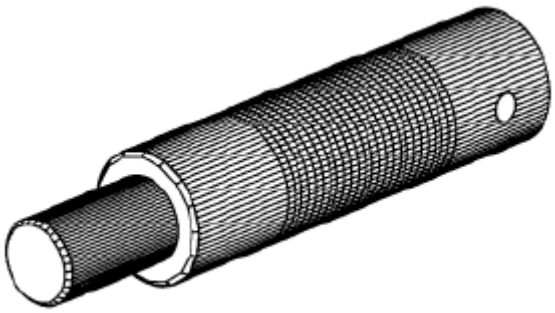


Fig. 4: Identifying Clutch Tool (212130)
Courtesy of BMW OF NORTH AMERICA, INC.

21-5020 CONTAINER

Container MW

NOTE: (Container) For hydraulic fluid (Pentosin) - For bleeding the clutch hydraulic system on the sequential M-drive.

SI number

01 15 97 (211)

Fig. 5: Identifying Container (215020)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2170 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (tensioning device) For resetting adjusting ring and installing self-adjusting clutch on flywheel without tension.

SI number

01 16 00 (622)

Consisting of:

1 = 0494558 Basic body

NOTE: (basic body) Basic body with adjusting spindle

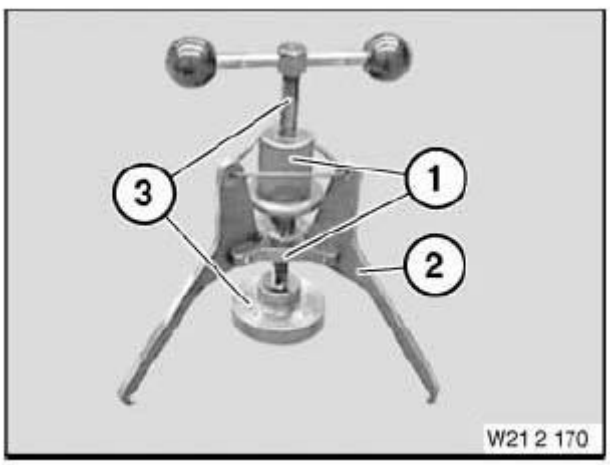


Fig. 6: Identifying Device (212170)

Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0494559 Claw

NOTE: (clamping claw (1 piece))

3 = 0494560 Spindle

NOTE: (pressure spindle with disc)

21-2070 GAUGE

Gauge MW

Replaced by: 0491418

NOTE: For checking lining thickness on clutch drive plate. Replaced 8/95 by 21 2 080 (0 491 418)

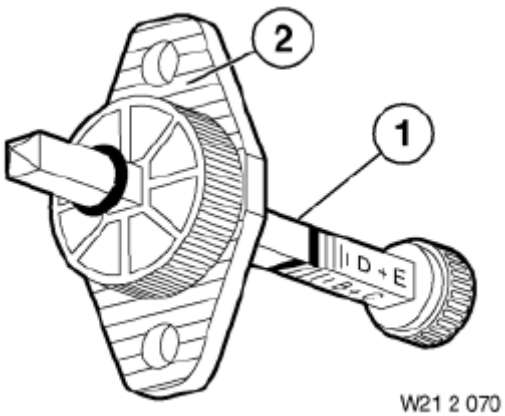


Fig. 7: Identifying Gauge (212070)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2230 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (clutch centering drift) With screw M10 (G transmission)

Storage Location

A47

SI number

01 03 03 (960)

Fig. 8: Identifying Mandrel (212230)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2140 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Clutch centering drift (2 pieces)) For centering the drive plate on the flywheel when installing the SAC clutch (self-adjusting clutch) - Use of SAC in E46, 09/97

Storage Location

B4

SI number

01 13 96 (104)

Consisting of:

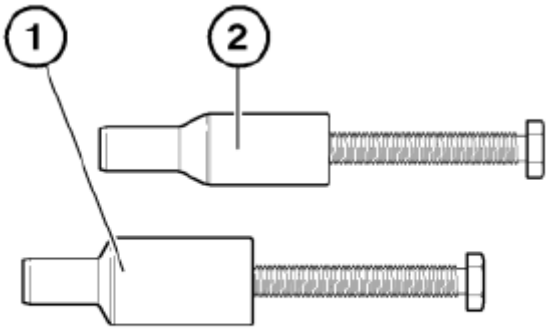


Fig. 9: Identifying Mandrel (212140)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0491426 Mandrel

NOTE: (Clutch centering drift) With screw M10 Transmission: S6S 420G, S6S 560G

2 = 0491427 Mandrel

NOTE: (Clutch centering drift) With screw M10 Transmission: S5D 200G, S5D 250G, S5D 260Z, S5D 310Z, S5D 320Z

21-2200 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Clutch centering pin and screw M10.) For centering clutch disc during installation.

Storage Location

C44

B44

SI number

01 10 02 (907)

Fig. 10: Identifying Mandrel (212200)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2250 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Clutch centering drift) For centering drive plate when installing. Clutch disc with modified gearing. Transmission: S5D 250G (B transmission)

Storage Location

A50

SI number

01 20 04 (135)

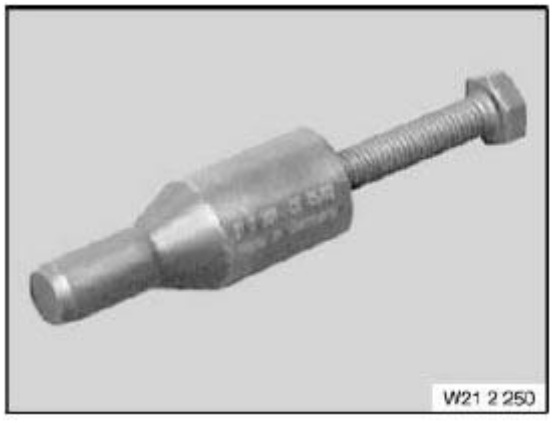


Fig. 11: Identifying Mandrel (212250)
Courtesy of BMW OF NORTH AMERICA, INC.

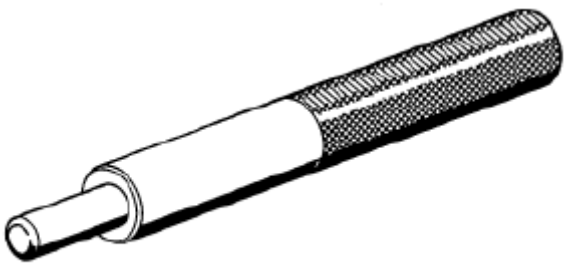
21-2100 MANDREL

Mandrel MW

NOTE: For centering drive plate while installing clutch

Storage Location

Y4



W21 2 100

Fig. 12: Identifying Mandrel (212100)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2280 MANDREL

Mandrel MW

NOTE: (Clutch centering pin) For centering drive plate to pressure plate when installing clutch on engine. Transmission: GS6-53DG with S85, S65

Storage Location

C18

SI number

01 18 06 (295)

Fig. 13: Identifying Mandrel (212280)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2240 RING

Ring Minimum set: Mechanical tools MW

NOTE: (Grease scraper ring) Scraping grease off splines of transmission drive shaft (G-transmission)

Storage Location

A47

SI number

01 03 03 (960)

Fig. 14: Identifying Ring (212240)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2180 RING

Ring Minimum set: Mechanical tools MW

NOTE: (Locating ring) For locating and resetting adjusting ring of self-adjusting clutch on all 6- and 8-cylinder engines.

Storage Location

A44

SI number

01 16 00 (622)

Consisting of:

1 = 0494561 Ring

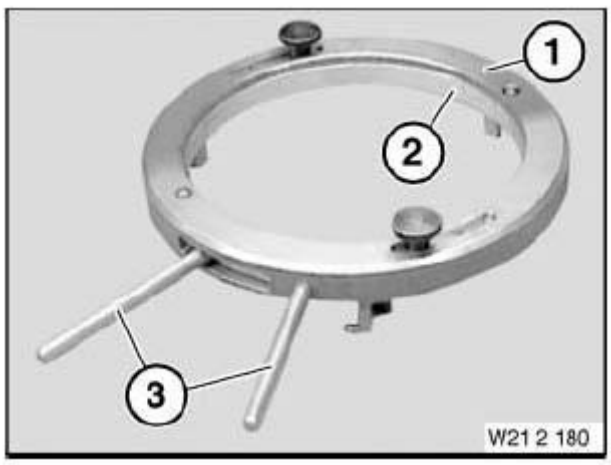


Fig. 15: Identifying Ring (212180)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Outer ring)

2 = 0494562 Ring

NOTE: (Inner ring)

3 = 0494563 Pin

NOTE: (Threaded bolt) Scope: 2 pcs.

21 CLUTCH

21-5010 ADAPTER

Adapter MW

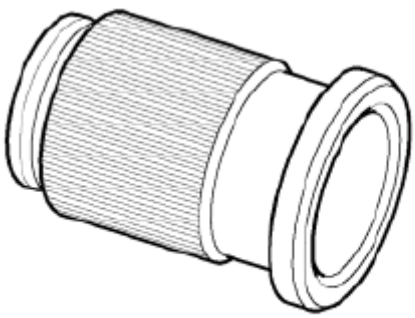
NOTE: For expansion tank when bleeding clutch hydraulic system on automatic transmission

Storage Location

Z4

SI number

01 06 97 (186)



W21 5 010

Fig. 1: Identifying Adapter (21-5010)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2270 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: (Clutch centring socket) For centring drive plate to pressure plate when installing clutch on engine. Transmission: GS6- 53DG with M57T2, GS6-53BZ with N54 in E92, E60.

Storage Location

C52

SI number

01 20 05 (218)

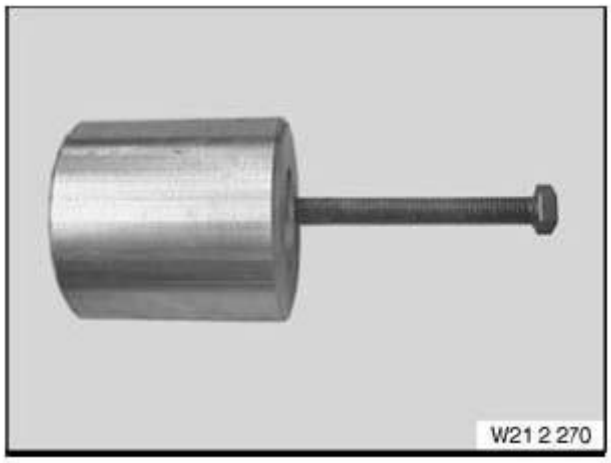


Fig. 2: Identifying Bush (21-2270)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2120 CLUTCH TOOL

Clutch tool Minimum set: Mechanical tools MW

NOTE: For centering drive plate when installing clutch and for pressing splined output shaft out of constant-velocity joint

Storage Location

B4

SI number

01 05 90 (207)

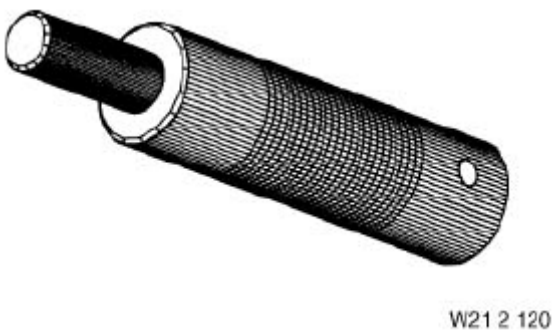


Fig. 3: Identifying Clutch Tool (21-2120)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2130 CLUTCH TOOL

Clutch tool Minimum set: Mechanical tools MW

NOTE: For centering driving disc when installing clutch.

Storage Location

B4

SI number

01 01 91 (312)

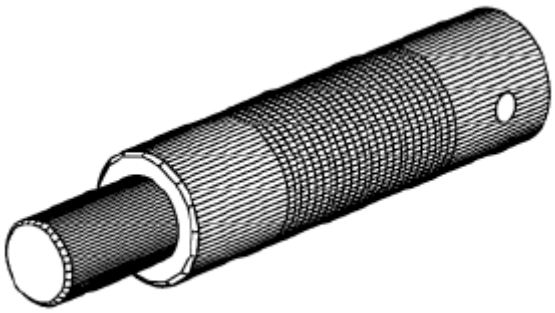


Fig. 4: Identifying Clutch Tool (21-2130)
Courtesy of BMW OF NORTH AMERICA, INC.

21-5020 CONTAINER

Container MW

NOTE: (Container) For hydraulic fluid (Pentosin) - For bleeding the clutch hydraulic system on the sequential M-drive.

SI number

01 15 97 (211)

Fig. 5: Identifying Container (21-5020)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2170 DEVICE

Device Minimum set: Mechanical tools MW

NOTE: (tensioning device) For resetting adjusting ring and installing self-adjusting clutch on flywheel without tension.

SI number

01 16 00 (622)

Consisting of:

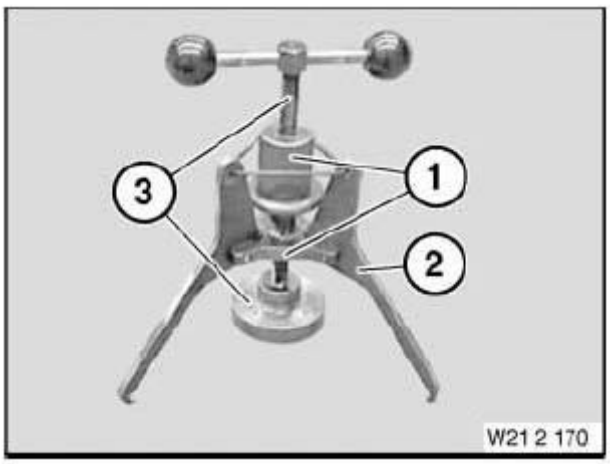


Fig. 6: Identifying Device (21-2170)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494558 Basic body

NOTE: **(basic body) Basic body with adjusting spindle**

2 = 0494559 Claw

NOTE: **(clamping claw (1 piece))**

3 = 0494560 Spindle

NOTE: **(pressure spindle with disc)**

21-2070 GAUGE

Gauge MW

Replaced by: 0491418

NOTE: **For checking lining thickness on clutch drive plate. Replaced 8/95 by 21 2 080 (0 491 418)**

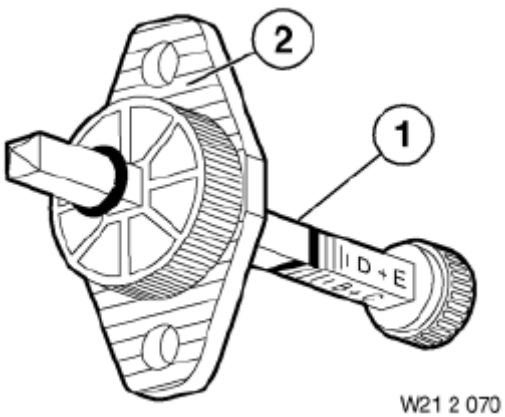


Fig. 7: Identifying Gauge (21-2070)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2230 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: **(clutch centring drift) With screw M10 (G transmission)**

Storage Location

A47

SI number

Fig. 8: Identifying Mandrel (21-2230)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2140 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Clutch centring drift (2 pieces)) For centring the drive plate on the flywheel when installing the SAC clutch (self-adjusting clutch) - Use of SAC in E46, 09/97

Storage Location

B4

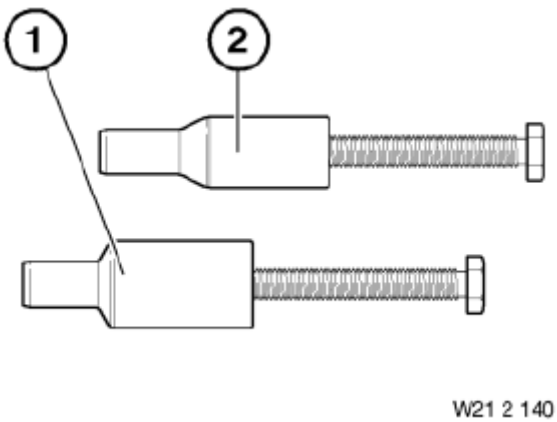


Fig. 9: Identifying Mandrel (21-2140)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 13 96 (104)

Consisting of:

1 = 0491426 Mandrel

NOTE: (Clutch centring drift) With screw M10 Transmission: S6S 420G, S6S 560G

2 = 0491427 Mandrel

NOTE: (Clutch centring drift) With screw M10 Transmission: S5D 200G, S5D 250G, S5D 260Z, S5D 310Z, S5D 320Z

21-2200 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Clutch centring pin and screw M10.) For centering clutch disc during installation.

Storage Location

C44

B44

SI number

01 10 02 (907)

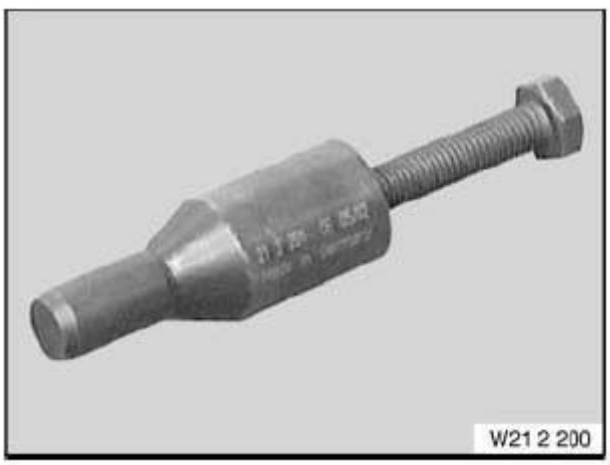


Fig. 10: Identifying Mandrel (21-2200)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2250 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Clutch centring drift) For centring drive plate when installing. Clutch disc with modified gearing. Transmission: S5D 250G (B transmission)

Storage Location

A50

SI number

01 20 04 (135)

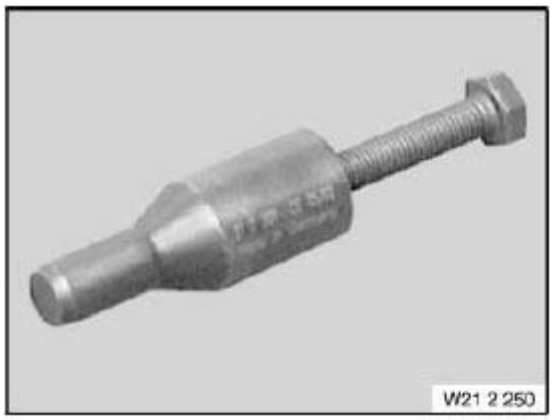


Fig. 11: Identifying Mandrel (21-2250)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2100 MANDREL

Mandrel MW

NOTE: For centering drive plate while installing clutch

Storage Location

Y4

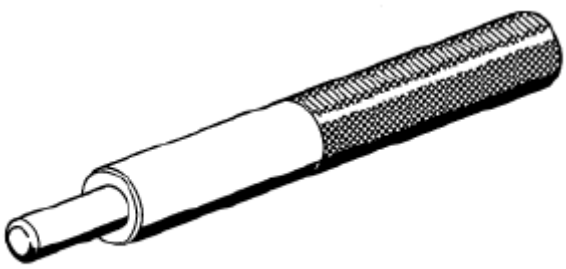


Fig. 12: Identifying Mandrel (21-2100)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2280 MANDREL

Mandrel MW

NOTE: (Clutch centring pin) For centring drive plate to pressure plate when installing clutch on engine. Transmission: GS6- 53DG with S85, S65

Storage Location

C18

SI number

01 18 06 (295)

Fig. 13: Identifying Mandrel (21-2280)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2240 RING

Ring Minimum set: Mechanical tools MW

NOTE: **(Grease scraper ring) Scraping grease off splines of transmission drive shaft (G-transmission)**

Storage Location

A47

SI number

01 03 03 (960)

Fig. 14: Identifying Ring (21-2240)
Courtesy of BMW OF NORTH AMERICA, INC.

21-2180 RING

Ring Minimum set: Mechanical tools MW

NOTE: **(Locating ring) For locating and resetting adjusting ring of self-adjusting clutch on all 6- and 8-cylinder engines.**

Storage Location

A44

SI number

01 16 00 (622)

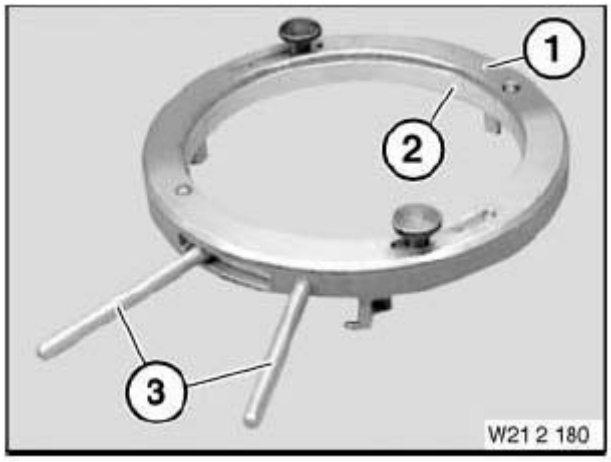


Fig. 15: Identifying Ring (21-2180)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494561 Ring

NOTE: (Outer ring)

2 = 0494562 Ring

NOTE: (Inner ring)

3 = 0494563 Pin

NOTE: (Threaded bolt) Scope: 2 pcs.

Clutch - Tightening Torques - Z4

CLUTCH DISC AND DRIVE PLATE

21 21 CLUTCH DISC AND DRIVE PLATE

TIGHTENING TORQUE SPECIFICATION - CLUTCH DISC AND DRIVE PLATE

		Type	Thread	W in
1AZ	Clutch to flywheel	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E83/E85/E86/E87/E90/E91	M8 8.8	Re sc
		E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E83/E85/E86/E87/E90/E91	M8 10.9	Re sc
Clutch to flywheel With ZNS bolts				Re Zl Jo to an ro m ob w
		S85/S65		Jo to To an
		N52/N53/N52K/M47T2/N45T/N54/N46T/N43/N45K/N47/M57T2/N47S/N62TU/N57	M8 10.9	Jo to To an

CLUTCH OPERATION (HYDRAULIC)

21 52 CLUTCH OPERATION (HYDRAULIC)

TIGHTENING TORQUE SPECIFICATION - CLUTCH OPERATION (HYDRAULIC)

		Type
1AZ	Hydraulic line to clutch slave cylinder or throttle.	E36/E38/E39/E52/E53/E60/E61/E63/E64/E83/E85/E86/E81/E87/E90/E91/E92
		E46
2AZ	Clutch master cylinder to bearing	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E85/E84/E86/E87/E89/E90/E91/E92
		E83

	support	
3AZ	Fitting screw, clutch master cylinder	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E83/E85/E86/E87/E90/E91/E92/E93
4AZ	Clutch master cylinder to pedal assembly	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E81/E82/E83/E84/E85/E86/E87/E88
5AZ	Clutch slave cylinder to clutch housing/transmission case	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E81/E82/E83/E84/E85/E86/E87/E88
		E60/E63
6AZ	Pressure accumulator to hydraulic unit	E36/M3
7AZ	Coupling bolts for hydraulic pipes	E46/M3
8AZ	Pressure accumulator for hydraulic unit	E46/M3
9AZ	Clutch position sensor to clutch slave cylinder	E46/E60/E61/E63/E64/E85
		E60/E61/E63
10AZ	Banjo bolt, pipe, actuator/pump block	E60/E61/E63
11AZ	Filler plug, expansion tank, pump block	E60/E61/E63
12AZ	Throttle valve to clutch slave cylinder	E60, E61

Clutch - Tightening Torques - Z4

CLUTCH DISC AND DRIVE PLATE

21 21 CLUTCH DISC AND DRIVE PLATE

TIGHTENING TORQUE SPECIFICATION - CLUTCH DISC AND DRIVE PLATE

	Type	Thread	Work instruc
1AZ Clutch to flywheel	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E83/E85/E86/E87/E90/E91	M8 8.8	Replac screws
	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E83/E85/E86/E87/E90/E91	M8 10.9	Replac screws
Clutch to flywheel With ZNS bolts			Replac ZNS b Jointin torque angle c rotatio must b observ withou
	S85/S65		Jointin torque Torque angle
	N52/N53/N52K/M47T2/N45T/N54/N46T/N43/N45K/N47/M57T2/N47S/N62TU/N57	M8 10.9	Jointin torque Torque angle

CLUTCH OPERATION (HYDRAULIC)

21 52 CLUTCH OPERATION (HYDRAULIC)

TIGHTENING TORQUE SPECIFICATION - CLUTCH OPERATION (HYDRAULIC)

	Type
1AZ Hydraulic line to clutch slave cylinder or throttle.	E36/E38/E39/E52/E53/E60/E61/E63/E64/E83/E85/E86/E81/E87/E90/E91/E92
	E46
2AZ Clutch master cylinder to bearing	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E85/E84/E86/E87/E89/E90/E91/E92/E93
	E83

support	
3AZ Fitting screw, clutch master cylinder	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E83/E85/E86/E87/E90/E91/E92/E93
4AZ Clutch master cylinder to pedal assembly	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E81/E82/E83/E84/E85/E86/E87/E88/E89/I
5AZ Clutch slave cylinder to clutch housing/transmission case	E36/E38/E39/E46/E52/E53/E60/E61/E63/E64/E81/E82/E83/E84/E85/E86/E87/E88/E89/I
	E60/E63
6AZ Pressure accumulator to hydraulic unit	E36/M3
7AZ Coupling bolts for hydraulic pipes	E46/M3
8AZ Pressure accumulator for hydraulic unit	E46/M3
9AZ Clutch position sensor to clutch slave cylinder	E46/E60/E61/E63/E64/E85
	E60/E61/E63
10AZ Banjo bolt, pipe, actuator/pump block	E60/E61/E63
11AZ Filler plug, expansion tank, pump block	E60/E61/E63
12AZ Throttle valve to clutch slave cylinder	E60, E61

28 DOUBLE CLUTCH GEARBOX (DKG)

28 00 ... CHECKING/TOPPING UP OIL LEVEL IN TWIN-CLUTCH GEARBOX (GS7D36SG)

Checking oil level

- Call up Service functions (Drive) in BMW diagnosis system
- Carry out oil level check in accordance with instructions

IMPORTANT: On the twin-clutch gearbox a run-in check fluid change is not required at 2000 km.
Use only the approved gear oil for dual clutch transmission GS7D36SG DCTF-1 Pentosin (P/N 83 22 2 147 477). .
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: The testing and filling procedure must be completed before the transmission oil temperature of 40°C is reached.
If a temperature in excess of 40°C is reached and no oil has emerged, insert the fluid adjusting screw and repeat the testing and filling procedure when it has cooled down.

Installation note:

Tighten down filler plug using

1. Hexagon wrench 8 A/F
2. Torque wrench
3. Socket 8 A/F

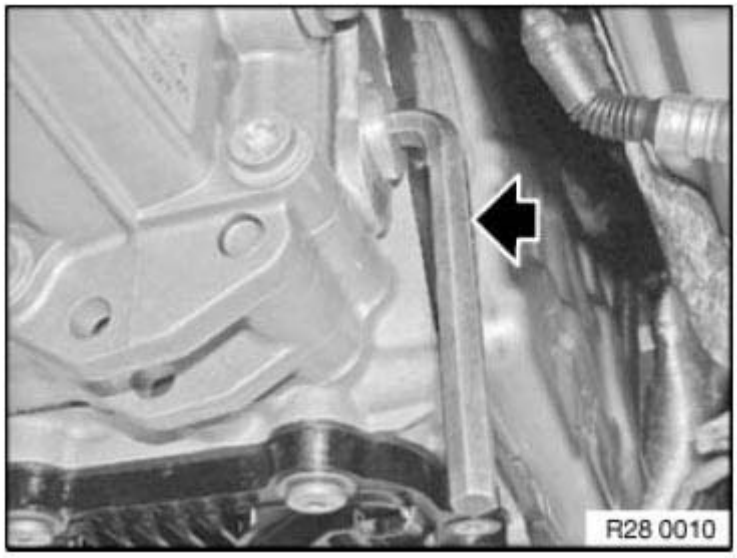


Fig. 1: Identifying Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Topping up transmission oil after a repair

Stand vehicle on a level surface and secure against rolling off.

- Open fluid adjusting screw (1). If oil emerges, close screw again immediately

  If no oil emerges, top up until oil emerges and close oil adjusting screw (1) again

  NOTE: If oil has been replenished here, a further refill must be carried out during the actual oil adjustment.

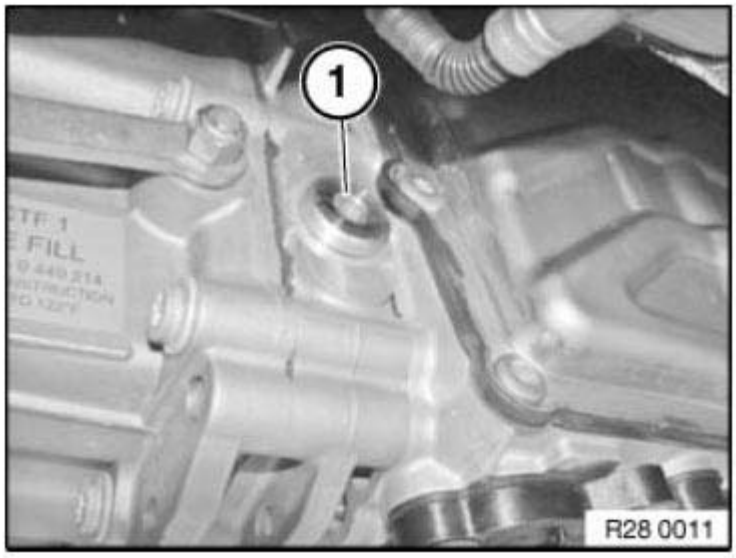


Fig. 2: Identifying Fluid Adjusting Screw
Courtesy of BMW OF NORTH AMERICA, INC.

- Connect diagnosis system and start service functions (drive).
- Start engine (drive position N or P)
- Record transmission temperature using Tester.
- (Drive position P)
- Permissible starting temperature < or = 32°C
- Idle speed: maintain at approx. 2000 RPM for 1 minute.
- Open the oil adjusting screw (1)
- Fill until oil emerges.

  Max. transmission oil temperature 40 degrees Celsius

- Insert screw.

Installation note:

Replace screw.

64 00 000 INFORMATION ON USING CLEANING AGENT/PAINTS (PERSONAL PROTECTION EQUIPMENT)

WARNING: Use of cleaning agents/paints not compliant with instructions can cause serious injuries or burns!
Handling cleaning agents/paints can trigger allergic skin and respiratory reactions!

IMPORTANT: Observe following instructions:

- **Store cleaning agents/paints only in a secure cabinet.**
- **Keep cleaning agents/paints away from naked flames and other sources of ignition.**
- **Protect cleaning agents/paints from high temperatures and direct sunlight.**
- **Always keep an eye bath on hand, change the water regularly (once a month).**

IMPORTANT: Observe following instructions before use:

- **Manufacturer's instructions (on container/packaging)**
- **Hazard warnings (on container/packaging)**
- **Manufacturer's instructions on package insert**

- **Material safety data sheet of manufacturer**
- **Product information in EPC**
- **National market regulations**

IMPORTANT: Observe following instructions during use:

- **Do not eat, drink or smoke while working with these products.**
- **Avoid direct contact with skin and eyes.**
- **Wear personal protective clothing/equipment.**
- **Ensure that all enclosed areas are well ventilated or extract fumes directly.**
- **Immediately change working clothes soiled with cleaning agent/paint.**
- **After finishing work, wash your hands and apply protective skin cream.**

IMPORTANT: Follow hazard warnings and wear personal protection equipment!

First Aid

- If product comes in contact with eyes, immediately flush with running water for about 10 - 15 minutes. Seek the advice of eye specialist.
- In the event of skin contact and where applicable an allergic skin reaction, clean the affected areas immediately with soap and water and then apply silicone-free skin cream. Seek advice of physician.
- If an adhesive product is swallowed, rinse mouth/parts of mouth thoroughly with running water. Drink 1-2 glasses of water. Do not induce vomiting. Consult a doctor.
- After inhaling vapors ensure ample supply of fresh air. Keep calm, keep respiratory tracks clear and call doctor.

Recycling

Dispose of cleaning agents/paints in a professional manner!

Observe national/country-specific disposal regulations.

28 00 101 INSTALLING REPLACEMENT TRANSMISSION (GS7D36SG)

Drain gear oil at oil drain plug.

IMPORTANT: After completion of work, program transmission control unit.

Recycling

Catch and dispose of escaping transmission fluid.

Observe country-specific waste disposal regulations

IMPORTANT:

- **In case of twin-clutch gearbox N54, N55, before installing exchange transmission, always flush TRANSMISSION OIL COOLER TOGETHER WITH LINES .**
- **After completion of work, check oil level. .**

Replacement transmission is supplied filled with transmission fluid.

Use only the approved gear oil for dual clutch transmission GS7D36SG DCTF-1 Pentosin (P/N 83 22 2 147 477). .

Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

Necessary preliminary tasks

- Remove twin-clutch gearbox.

NOTE: **Release screws.**
Remove and convert transmission bearing block (1).

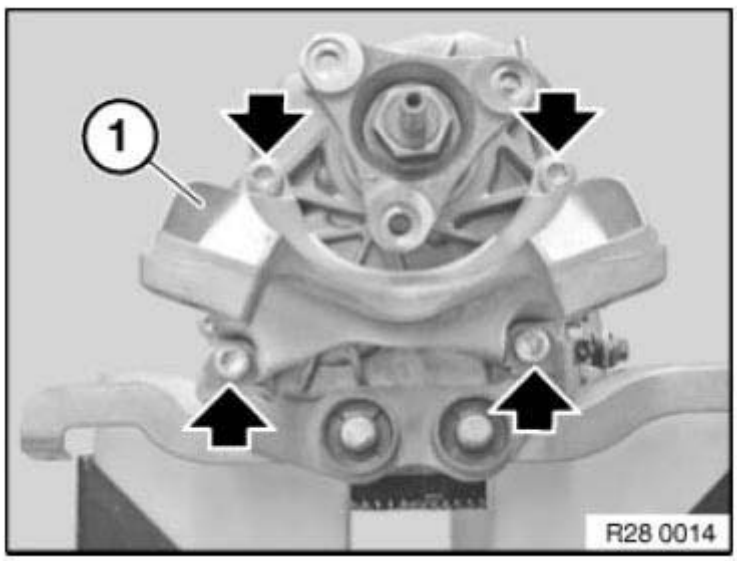


Fig. 3: Identifying Bearing Block With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Picture shows N54.

Modify all transportation retainers.

Convert all cable clips.

Convert all seal plugs.

Convert protective cap on input shaft.

Transmission identification:

- refer to BMW Parts Department.
- On type plate

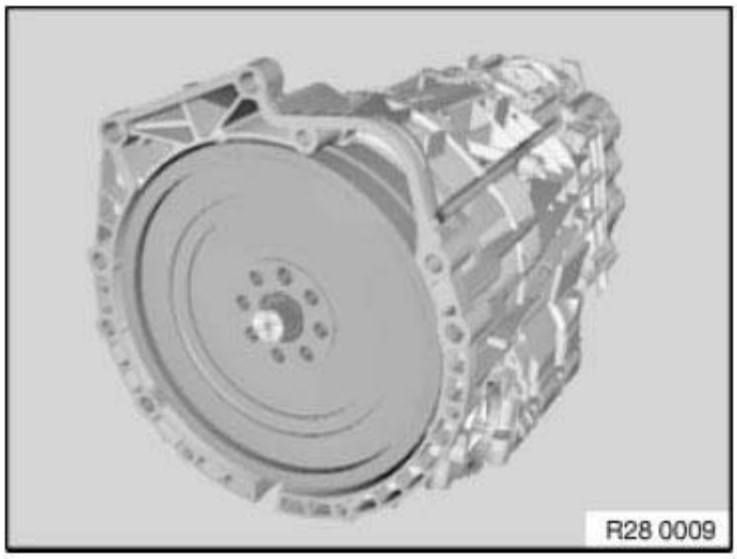


Fig. 4: Identifying Transportation Retainers, Cable Clips, Seal Plugs And Protective Cap
Courtesy of BMW OF NORTH AMERICA, INC.

00 .. ... INSTRUCTIONS FOR PERFORMING SERVICE FUNCTIONS ON THE TWIN-CLUTCH GEARBOX (GS7D36SG)

NOTE: The service functions must be carried out in the relevant order!

TWIN-CLUTCH GEARBOX SERVICE FUNCTIONS CHART

Replacement of clutch and after all work on opened transmission	1. Carry out fluid adjustment 2. Teach in valve characteristic curves 3. Teach in kiss point 4. Parking lock hook test
Replacement of oil pump	1. Carry out fluid adjustment 2. Teach in valve characteristic curves 3. Teach in kiss point 4. Parking lock hook test
Replacement of transmission (complete)	1. Read out transmission data before

	replacement 2. Parking lock hook test 3. Write transmission data 4. Carry out fluid adjustment
Replacement/repair of parking lock cable, selector lever with parking lock unit	1. Parking lock hook test
Replacement of combination sensor	1. Carry out fluid adjustment 2. Teach in valve characteristic curves 3. Teach in kiss point 4. Parking lock hook test
Opening/replacement of fluid adjustment screw, repair/replacement of transmission fluid cooler, oil cooler lines, thermostat, water/oil heat exchanger (M3) and seals	1. Carry out fluid adjustment

28 60 ... NOTES ON MECHATRONICS (GS7D36SG)

IMPORTANT: After completing work:

- **Load specific data status with the BMW diagnosis system**
- **Check oil level.**

  Use only gear oil for dual clutch transmission GS7D36SG DCTF-1 Pentosin (P/N 83 22 2 147 477). .

  Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Unscrew plug (1) and disconnect.

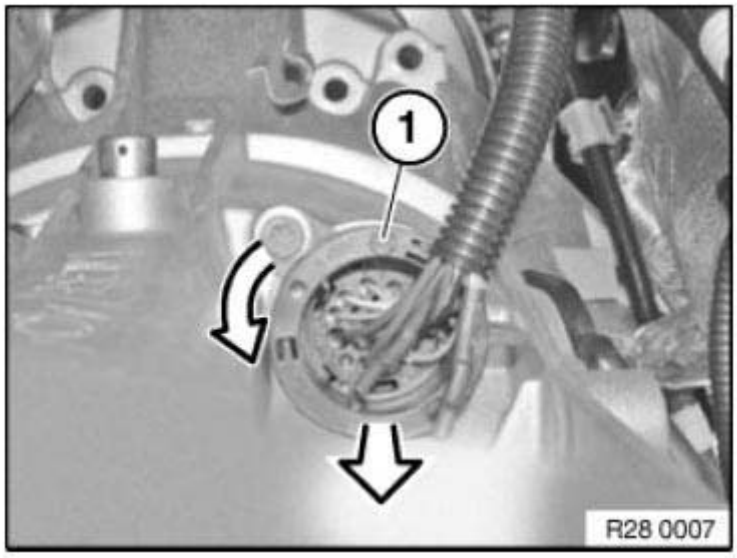


Fig. 5: Identifying Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **24 2 390** in sealing sleeve (1).

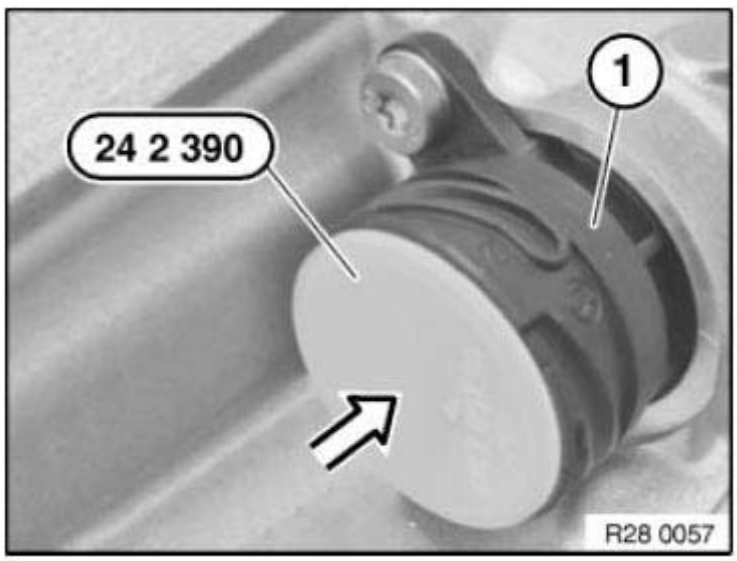
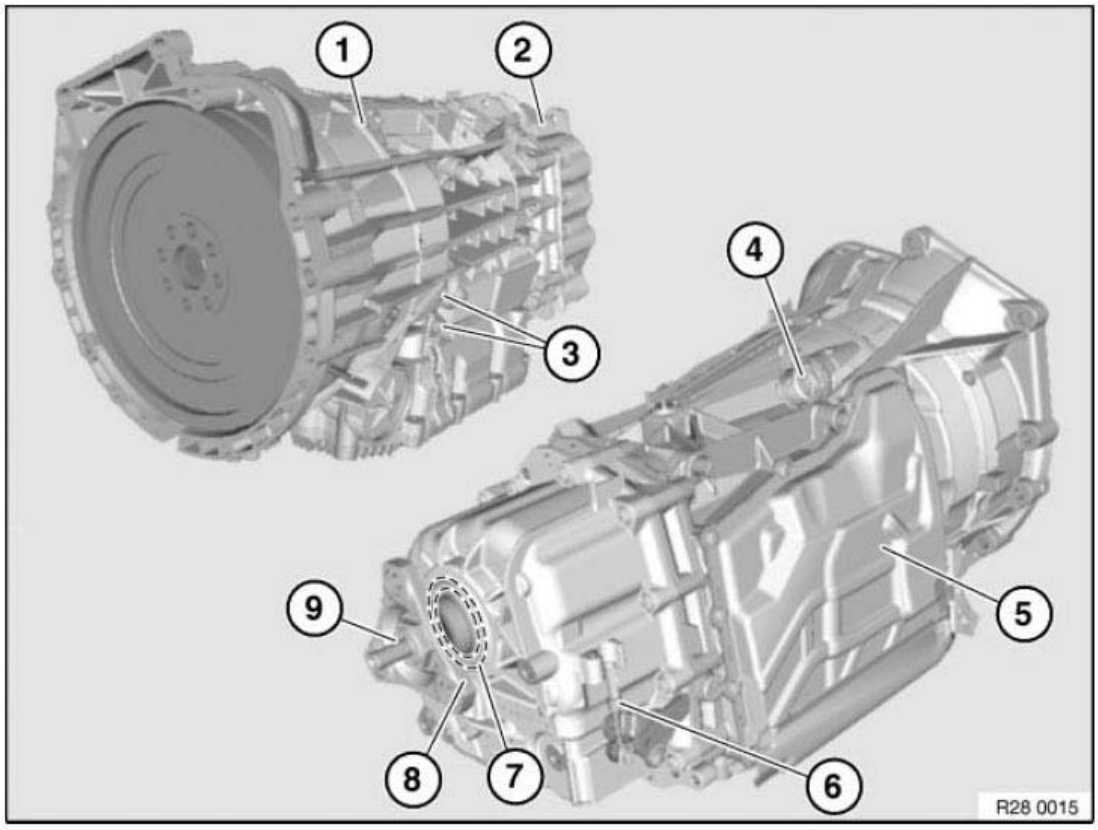


Fig. 6: Inserting Special Tool (24 2 390) In Sealing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

28 00 ... OVERVIEW OF TRANSMISSION HOUSING (GS7D36SG)



0	General information	Transmission designations, complete transmission, check fluid level, mechatronics
1	Transmission housing, front section	
2	Transmission housing, rear section	
3	Cooling line connection	
4	Transmission connector	
5	Mechatronics module	
6	Transmission interlock	
7	Radial seal	For output flange
8	Output flange	
9	Output shaft	

Fig. 7: Overview Of Transmission Housing
Courtesy of BMW OF NORTH AMERICA, INC.

28 60 010 REMOVING AND INSTALLING MECHATRONICS (GS7D36SG)

NOTE: When replacing mechatronics:

- Import present transmission data into new mechatronics

IMPORTANT: It is essential to adhere to conditions of absolute cleanliness.
Any dirty parts must be cleaned before the hydraulic cap is loosened.
After completion of work, check oil level. .
USE ONLY THE APPROVED gear oil for dual clutch transmission GS7D36SG DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Read out transmission data of mechatronics to be replaced
- Remove **twin-clutch gearbox**

Place twin clutch transmission on a suitable surface.

To prevent the gearbox oil from spilling out, make sure that the hydraulic cap points upward.

Remove **hydraulic cap** .

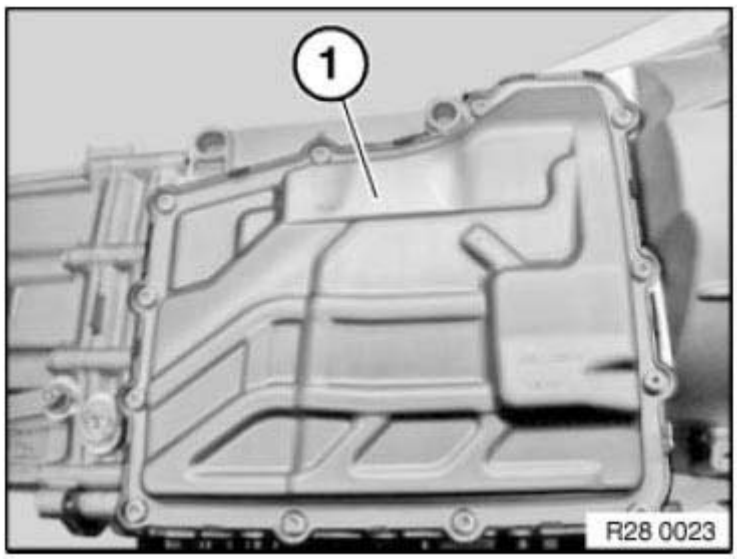


Fig. 8: Identifying Hydraulic cap
Courtesy of BMW OF NORTH AMERICA, INC.

Ensure correct installation position.

Press holder (2) together from right and release cable (1).

Installation note:

Replace holder.

Retaining lugs must point to the right.

If fitted: Pull out CPA pin (7) to second locking position.

Release connector lock (6) and at same time detach connector (3) from retaining tabs (5) towards right.

IMPORTANT: Bridge (4) of connector must not break.
Wiring harness must be replaced if bridge breaks.

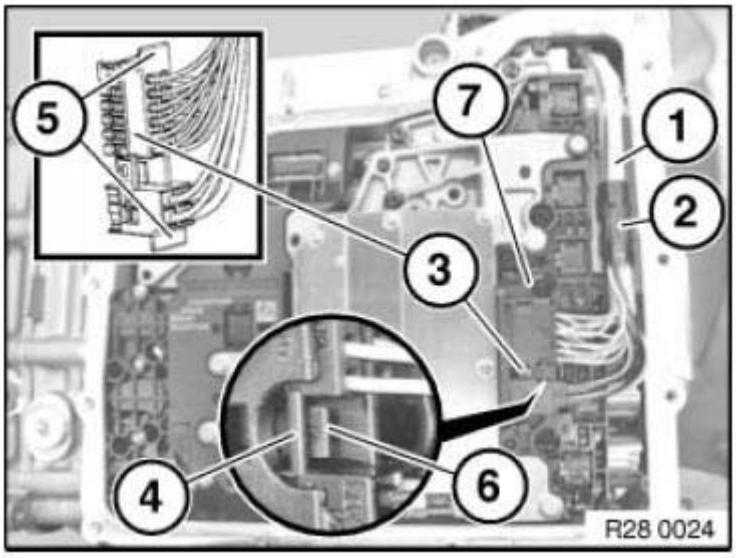


Fig. 9: Identifying Cable, Holder, Connector Bridge, Connector Lock And CPA Pin
Courtesy of BMW OF NORTH AMERICA, INC.

CPA (1) in second locking position.

Installation note:

Press CPA pin down until it is flush with the housing.

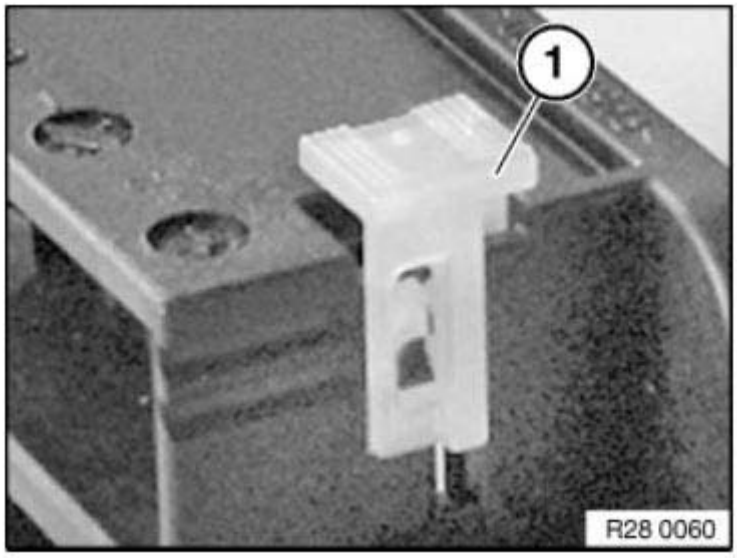


Fig. 10: Identifying CPA Pin
Courtesy of BMW OF NORTH AMERICA, INC.

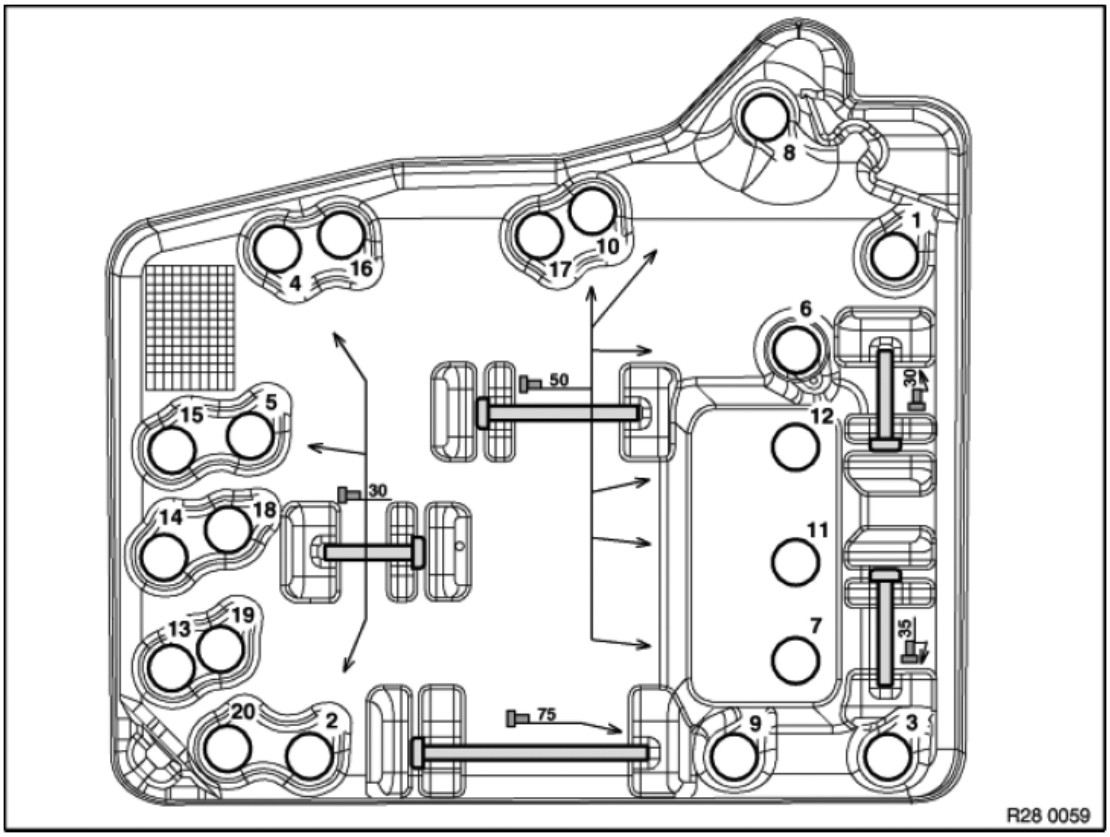


Fig. 11: Placing Mounting Template Over Mechatronics
Courtesy of BMW OF NORTH AMERICA, INC.

Place mounting template over mechatronics.

Open screws 1-20.

NOTE: Replace screws 1-12.

Screws 13-20 remain captive on module.

Remove mounting template.

Lift mechatronics out of housing.

Remove metal bead gasket.

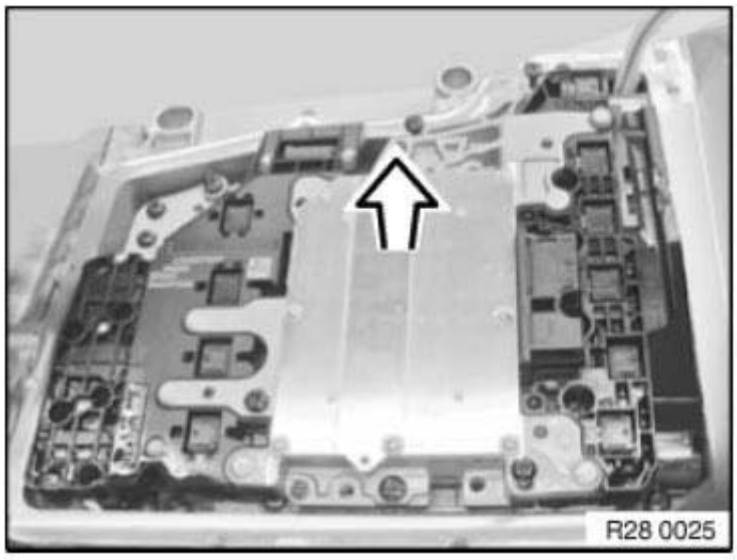


Fig. 12: Removing Metal Bead Gasket
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check the installation location of the centering pins (1).
The centering pins (1) of the mechatronics remain in the housing.

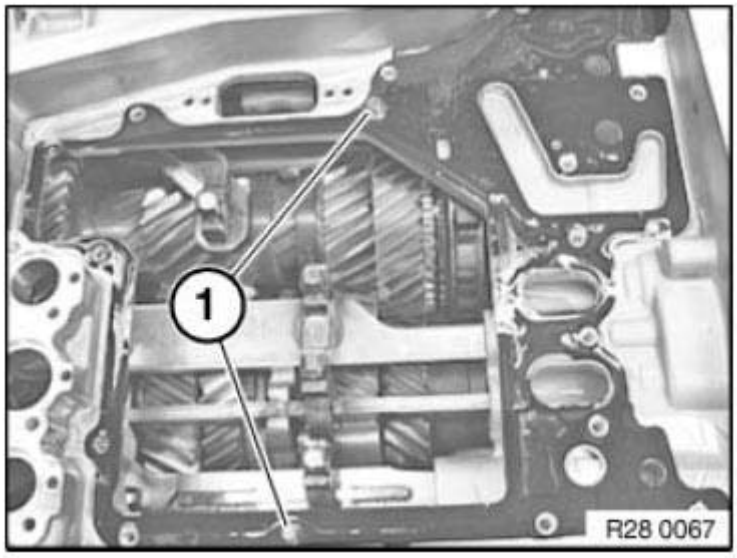


Fig. 13: Identifying Centering Pins
Courtesy of BMW OF NORTH AMERICA, INC.

Installing mechatronics

Install a new metal bead gasket.

Install mechatronics.

Fit mounting template.

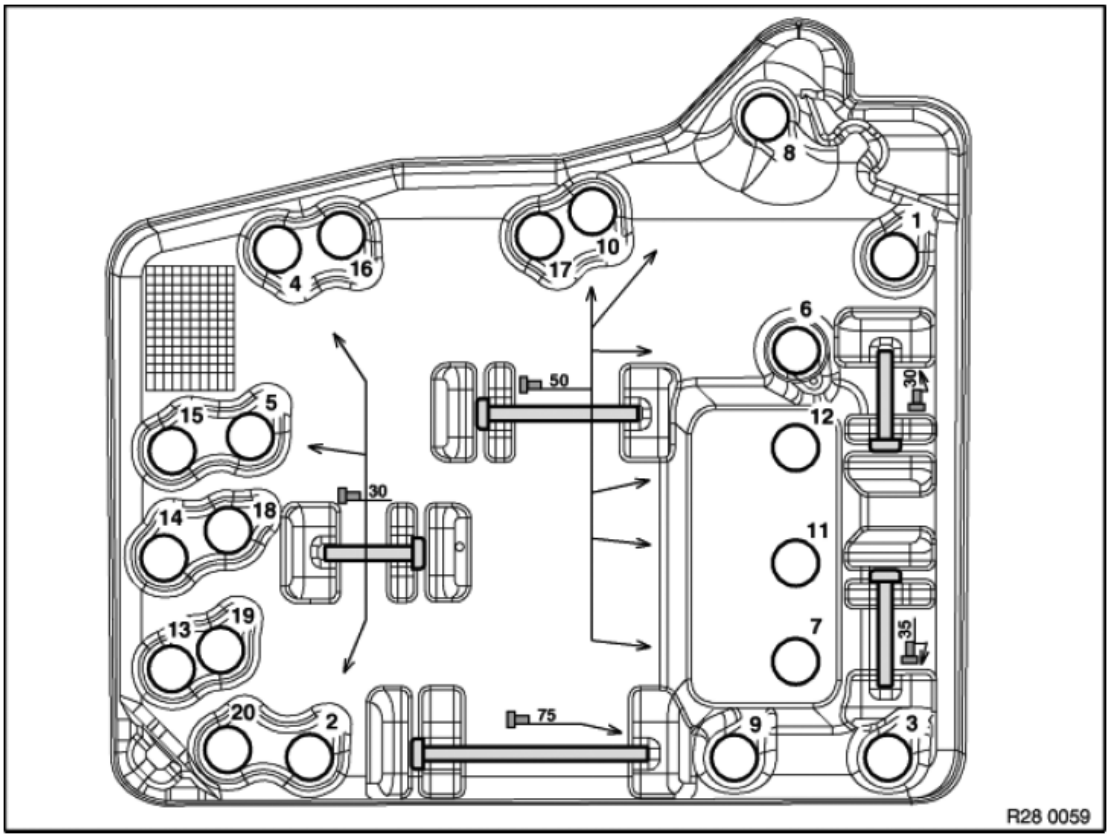


Fig. 14: Placing Mounting Template Over Mechatronics
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Adhere without fail to the screwing sequence indicated on the template.

The screw length can be checked by means of the insert pockets shaped in the template.

1. Insert screws in sequence 1-12 and pre-tighten to 2 Nm.
2. Tighten down screws 1-12 to tightening torque and angle of rotation.
3. Tighten down screws in sequence 13-20 to 5 Nm.
4. Remove mounting template.

28 40 000 REMOVING AND INSTALLING OR REPLACING CLUTCH COVER (GS7D36SG)

IMPORTANT: It is essential to adhere to conditions of absolute cleanliness.
Any dirty parts must be cleaned before removing the clutch cover.
After completion of work, check oil level. .
Use only the approved DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC

DISCHARGE) .

Installation note:

- **Removal and installation of clutch cover:**

  Replace **shaft seal for clutch cover** , O-ring and snap ring.

- **Replacement clutch cover:**

  Replace as a single assembly only (incl. radial shaft seal, O-ring, bearing, retaining plate and snap ring).

Necessary preliminary work

- Remove **twin-clutch gearbox**

To prevent the gearbox oil from spilling out, tilt the gearbox back before removing the clutch cover.

Installation note:

After completing work, add transmission oil and check **oil level**. .

Lever snap ring (1) out of housing with a suitable tool.

Installation note:

Replace snap ring.

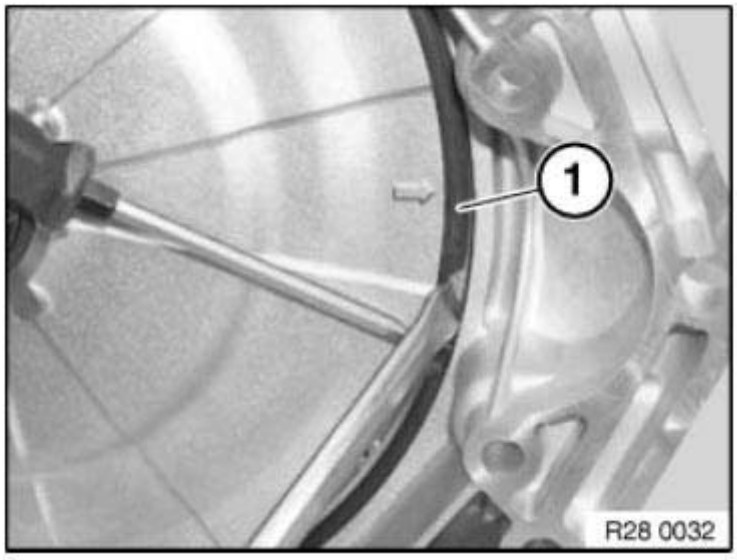


Fig. 15: Identifying Snap Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Graphic shows: Twin-clutch gearbox S65 Slip bush **23 0 390 must** be used when clutch cover is removed and installed.

Pull clutch cover with special tool **13 5 250** and adapter 54 0 163 out of housing.

IMPORTANT: Ensure uniform (non-tilting) detachment by alternately using the 3 tightening threads.

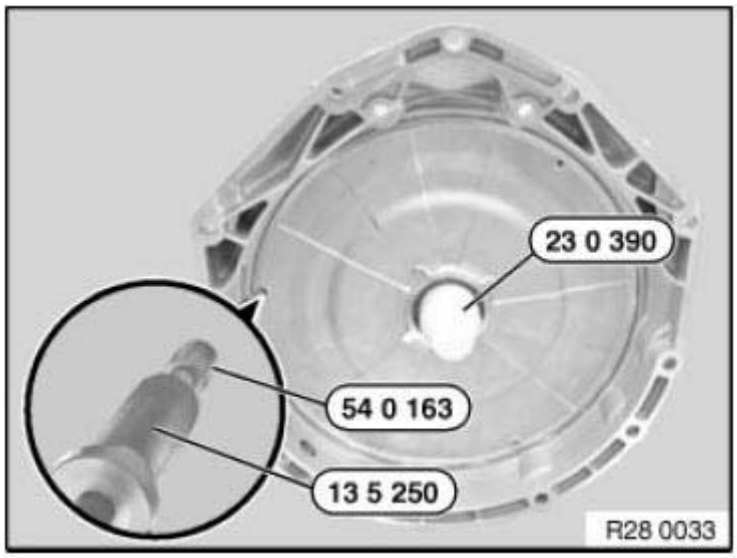


Fig. 16: Pulling Clutch Cover Using Special Tool (13 5 250) And (54 0 163)
Courtesy of BMW OF NORTH AMERICA, INC.

Graphic shows: Twin-clutch gearbox S65 Remove oil fouling with fluff-free cloth.

Clean snap ring groove before installing clutch cover.

Press clutch cover (1) into housing with arrow pointing up and strike evenly with a plastic hammer.

Then secure clutch cover with snap ring.

Make sure snap ring is correctly fitted.

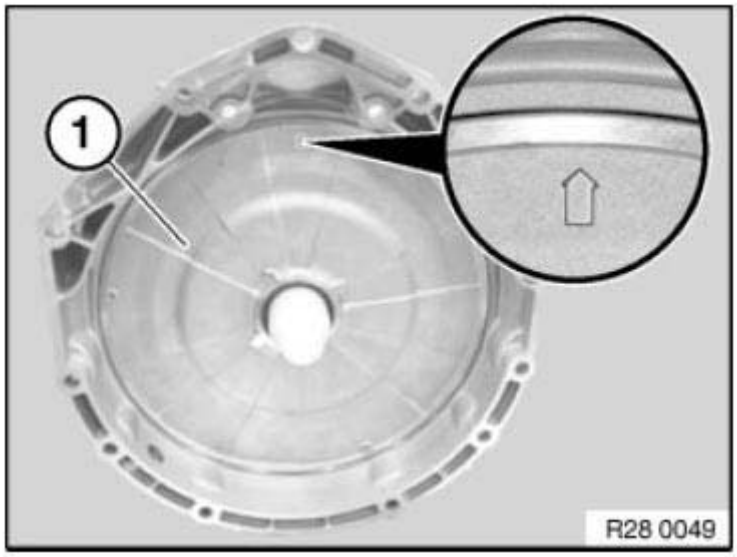


Fig. 17: Identifying Clutch Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Moisten O-ring and radial shaft seal with gearbox oil.

28 40 020 REMOVING AND INSTALLING OR REPLACING CLUTCH SUPPORT (GS7D36SG)

IMPORTANT: After completion of work, check oil level. .
Use only the approved DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary work

- Remove **twin-clutch gearbox**
- Remove **clutch**

Remove **pump unit**.

Unfasten screws (2).

Remove clutch support (3).

Installation note:

Replace screws and seal.

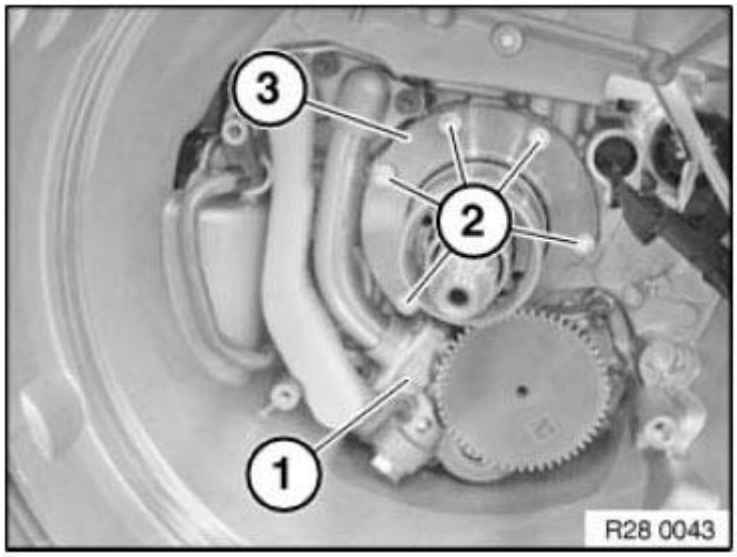


Fig. 18: Identifying Clutch Support, Oil Pump And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Before installing clutch support:
Make sure without fail that seal (1) is installed in correct position and piston rings are correctly fitted on drive shaft.
Secure clutch support screw connections in diagonal sequence.

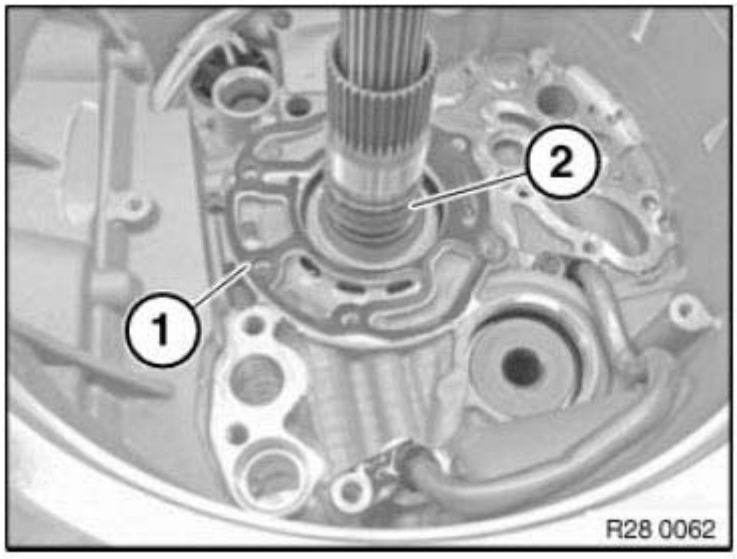


Fig. 19: Identifying Seal With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

28 10 020 REMOVING AND INSTALLING OR REPLACING COMBINATION SENSOR (GS7D36SG)

IMPORTANT: After completion of work, check oil level. .
Use only the DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary work

- Remove **twin-clutch gearbox**
- Remove **clutch**

Release screw (1).

Release combination sensor (2) from housing.

Disconnect connector (3).

Installation note:

Replace screw.

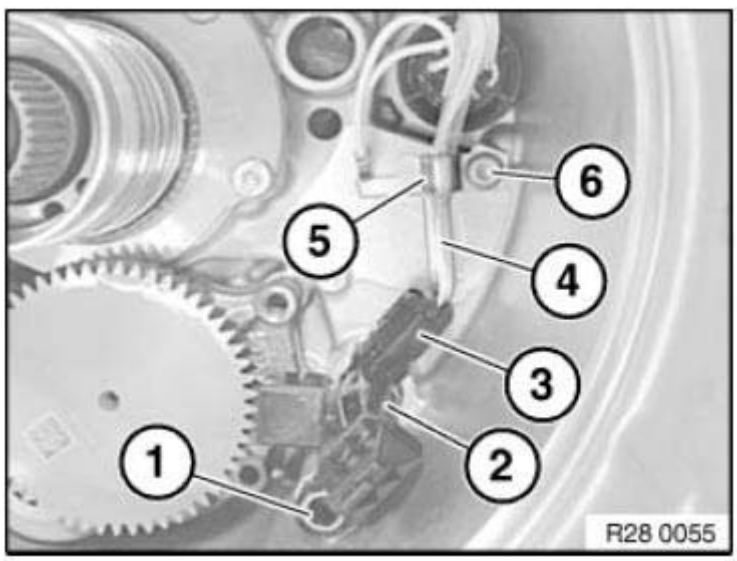


Fig. 20: Identifying Screw, Combination Sensor, Connector, Cable And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not where possible release cable (4) from bracket (5).

Installation note:

If bracket (5) does have to be released, replace aluminum screw (6).

Tightening torque, see 28 10 11AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

IMPORTANT: To disconnect the combination sensor connector:
Press lock together in area (1) and simultaneously detach connector.

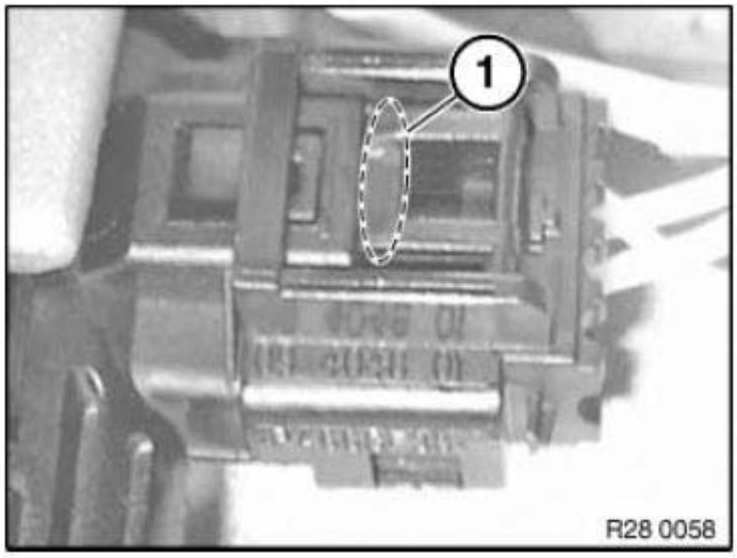


Fig. 21: Pressing Combination Sensor Connector Lock
Courtesy of BMW OF NORTH AMERICA, INC.

28 10 010 REMOVING AND INSTALLING OR REPLACING PUMP UNIT (GS7D36SG)

IMPORTANT: After completion of work, check oil level. .
Checking/topping up oil level in twin-clutch gearbox (GS7D36SG). Use only the approved transmission oil DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary work

- Remove **twin-clutch gearbox**
- Remove **clutch**

Release screws (1).

Tightening torque, see 28 10 7AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Remove oil separator (2).

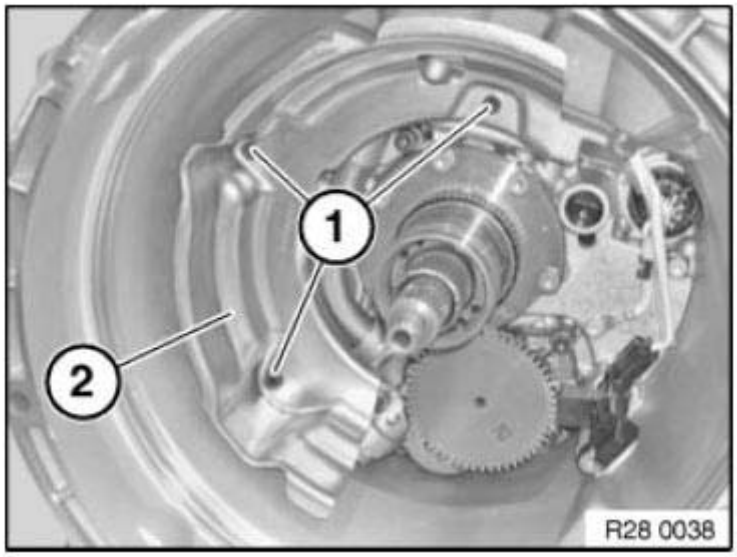


Fig. 22: Identifying Oil Separator And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque, see 28 10 6AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Disconnect connector (3).

Release combination sensor (2) from housing.

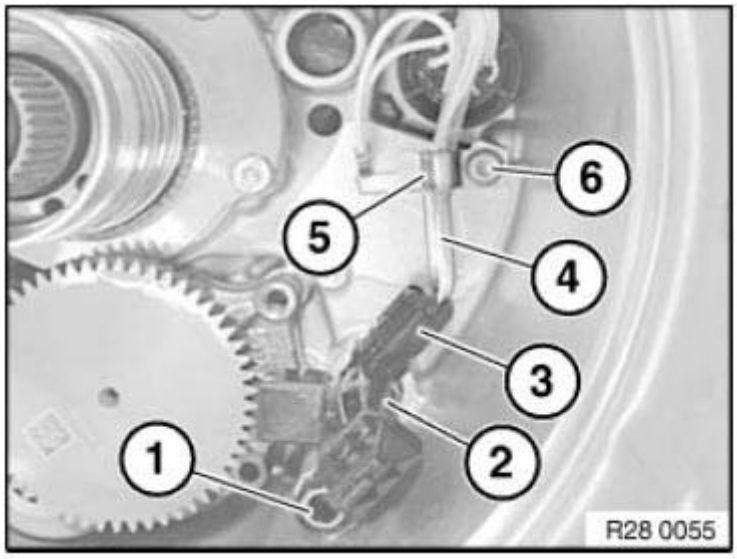


Fig. 23: Identifying Combination Sensor, Connector And Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and (2).

Tightening torque, see 28 10 8AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Installation note:

Observe installation position and screw length.

Replace sealing washer on screw (2).

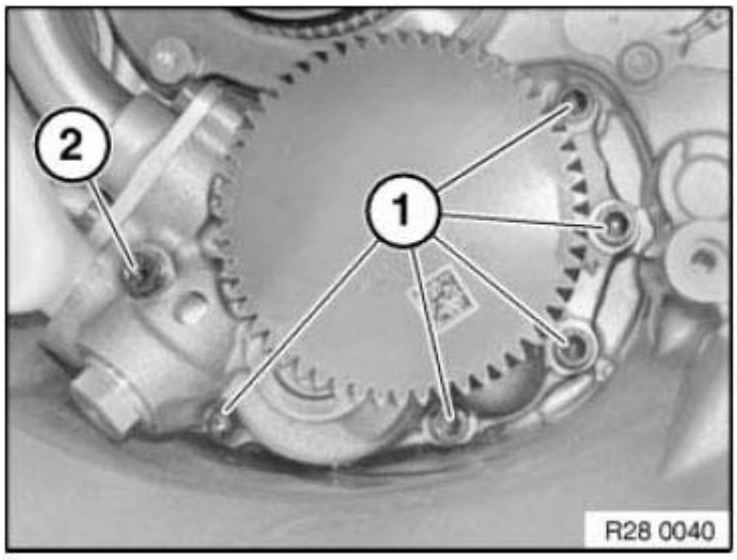


Fig. 24: Identifying Sealing Washer With Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque, see 28 10 9AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Release oil pump with pressure pipe (2) and return line (3) from housing.

Installation note:

Replace flat seal (4).

During reinstallation O-ring remains on return line.

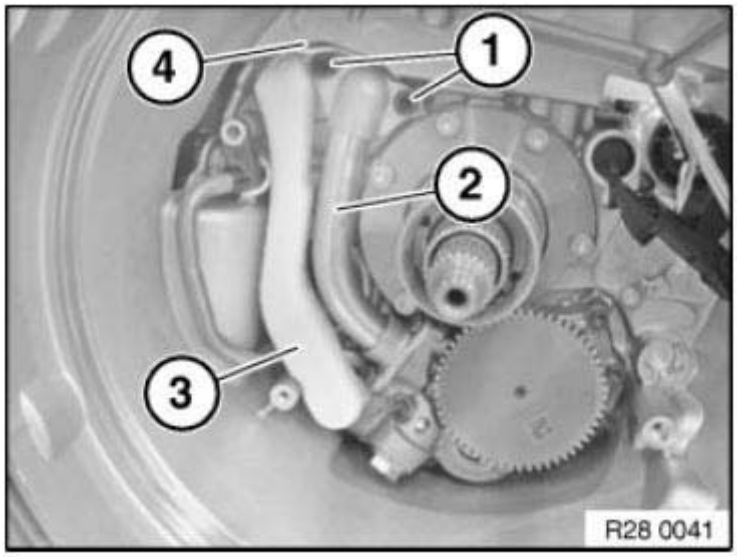


Fig. 25: Identifying Screws, Pressure Pipe, Return Line And Flat Seal
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: The pressure pipe must not be detached from the pump.

IMPORTANT: Before installing oil pump:
Depending on version, there is a bore hole and a recess for the O-ring (1).
If the bore hole is present, attention must be paid to ensuring the O-ring (1) is in the right installation position and correctly seated behind the pump.

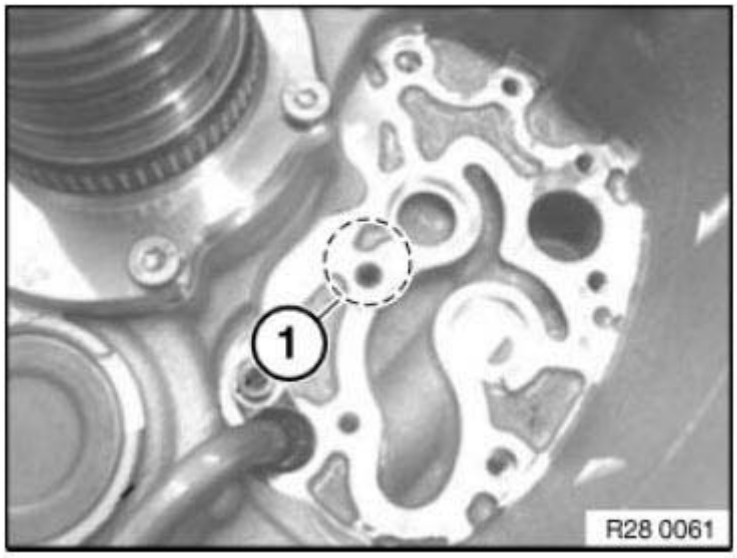


Fig. 26: Identifying O-Ring
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT:

Installation sequence, oil pump

1. Moisten O-ring with transmission oil
2. Position pump in transmission using centering sleeves.
3. Gently insert screws (1) with pressure pipe
4. Press in return line (2) until it audibly snaps into place
5. Screw in oil pump
6. The tightening sequence from 1-8 is mandatory

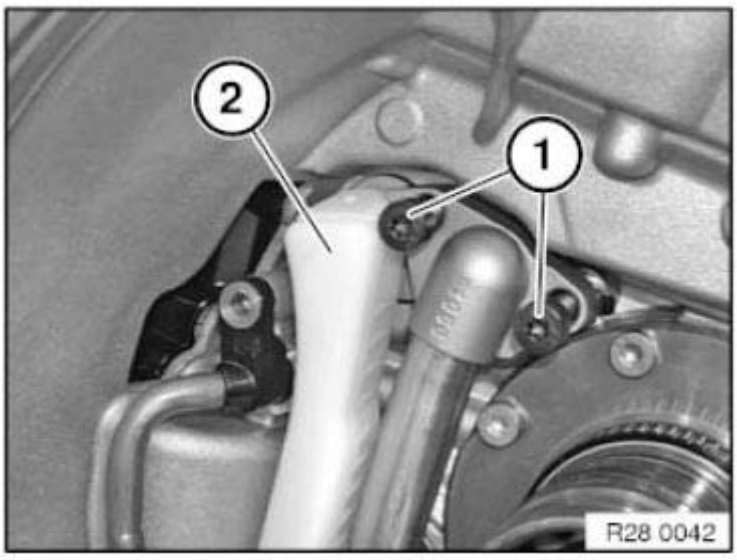


Fig. 27: Identifying Return Line With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Centering sleeves must not be damaged or crushed.

IMPORTANT:

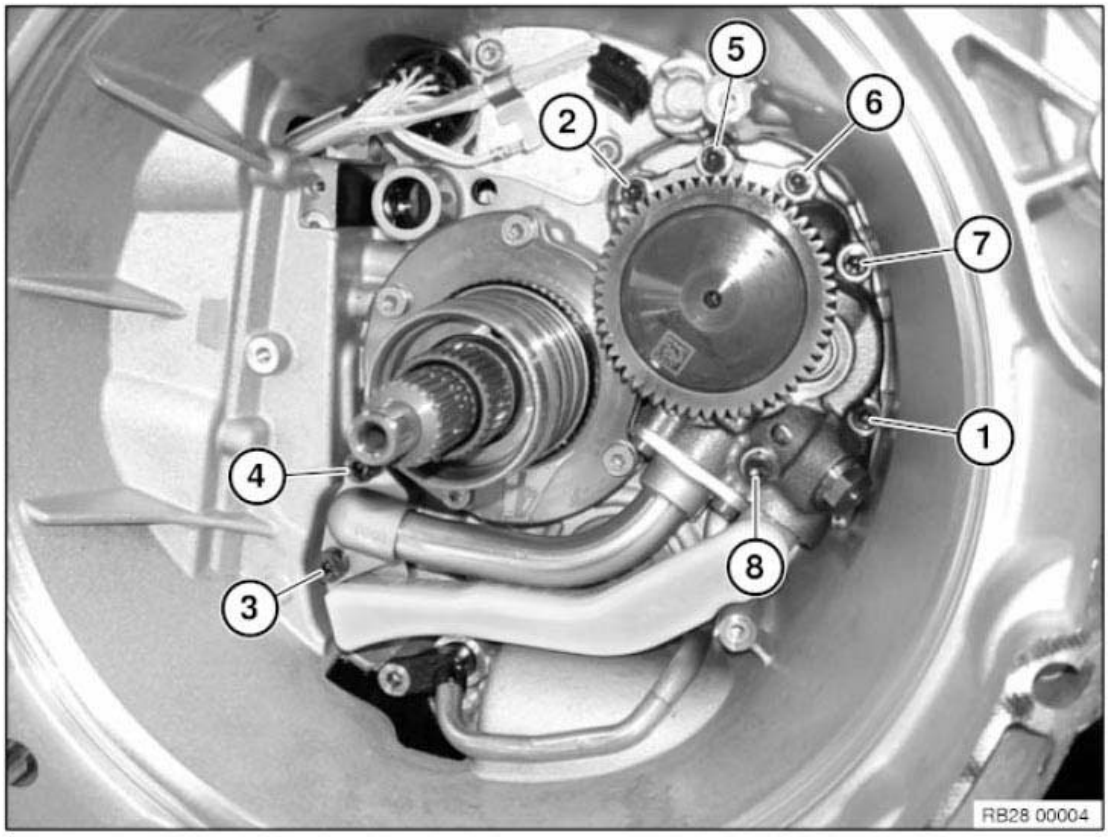


Fig. 28: Bolts Tightening Sequence Of Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

28 02 020 REMOVING AND INSTALLING OR REPLACING TRANSMISSION OIL SUMP (GS7D36SG)

IMPORTANT: Remove transmission oil sump only after it has cooled down.
It is essential to adhere to conditions of absolute cleanliness.
Any dirty parts must be cleaned before the hydraulic cap is loosened.
After completion of work, check oil level. .
Use only the DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

Recycling

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Remove rear underbody protection.

Remove oil drain plug (1).

Tightening torque, see 28 00 3AZ in **28 00 DOUBLE CLUTCH GEARBOX** .

Drain off transmission oil.

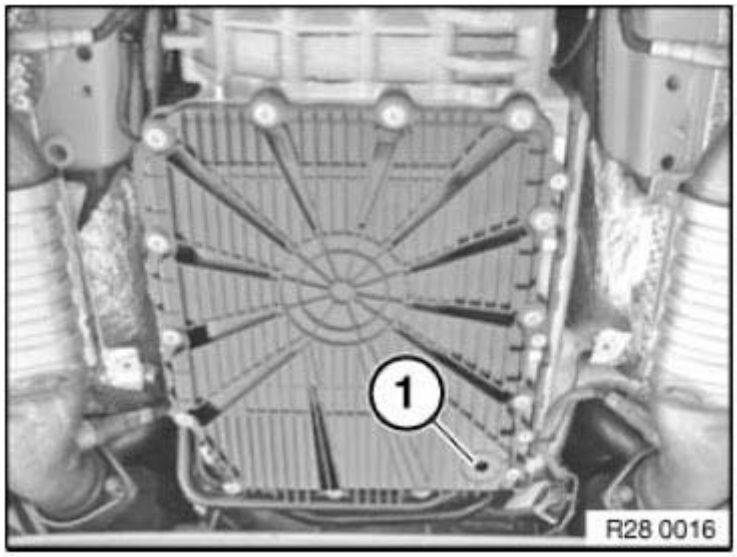


Fig. 29: Identifying Oil Drain Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Unscrew all bolts.

Remove transmission oil sump (1).

Installation note:

Clean sealing ring groove with fluff-free cloth.

Installation note:

Insert screws until contact with screw heads is made.

Screw down to torque in specified sequence (1-14).

Tightening torque, see 28 00 4AZ in **28 00 DOUBLE CLUTCH GEARBOX** .

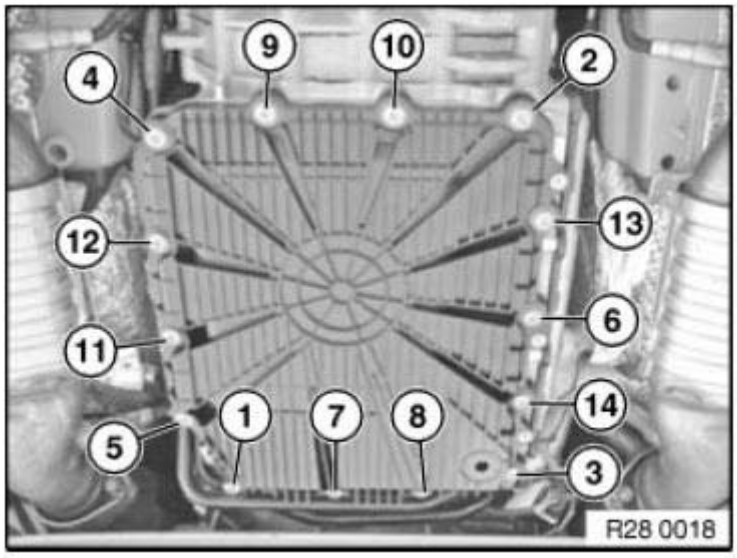


Fig. 30: Identifying Transmission Oil Sump With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

28 40 010 REMOVING AND INSTALLING OR REPLACING TWIN CLUTCH (GS7D36SG)

IMPORTANT: After completing work:

- **Check oil level. .**

  Use only the DCTF-1 Pentosin (P/N 83 22 2 147 477) approved transmission oil . .

- **Perform clutch adaptation (Service Functions).**
- **Teach in valve characteristics (Service Functions).**

Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

IMPORTANT: Twin-clutch gearbox must be on neutral (position "N") prior to removal of clutch or gear box!
Gear shifts are only possible with the engine running.
To prevent the transmission oil from spilling out, set the gearbox upright before removing the twin clutch.

Necessary preliminary tasks

- Remove twin-clutch gearbox
- Remove **clutch cover**

IMPORTANT: The clutch cage can only be removed and installed with special tool 23 0 400 . Special tool 23 0 400 must be pushed in entirely and rest flush on clutch cage. If necessary, turn the gearbox input shafts relative to each other.

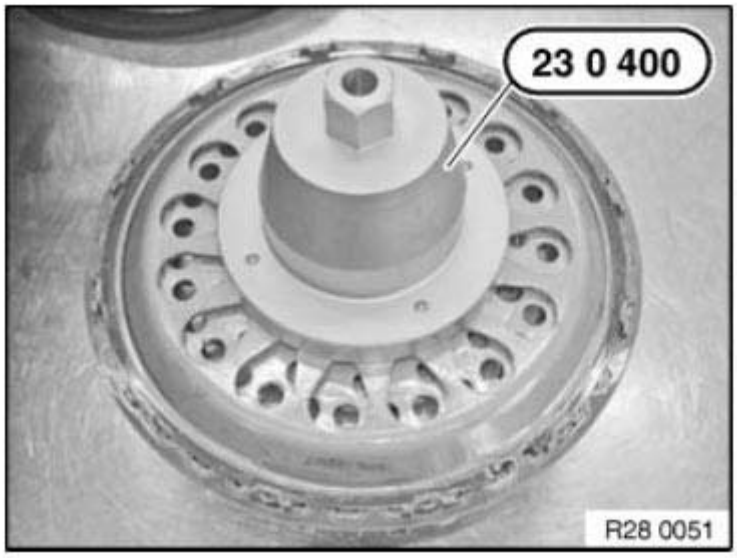


Fig. 31: Installing Clutch Cage Using Special Tool (23 0 400)
Courtesy of BMW OF NORTH AMERICA, INC.

Push parking lock lever (1) all the way up and secure it with cable strap (2).

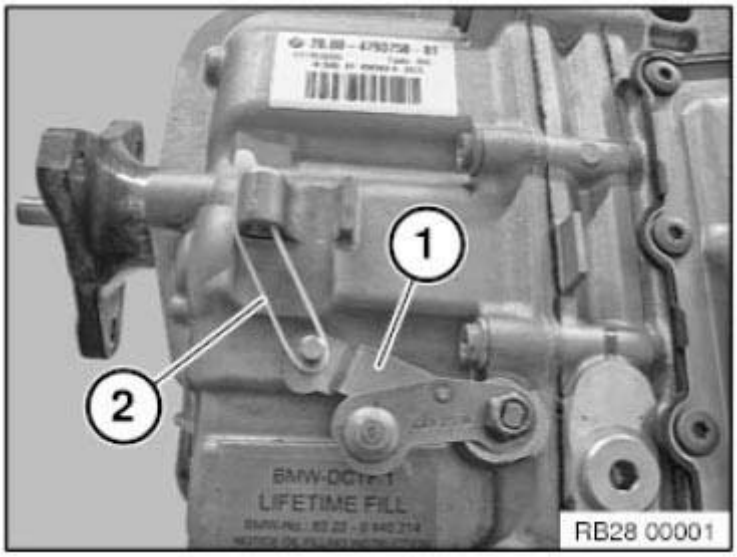


Fig. 32: Identifying Parking Lock Lever And Cable Strap
Courtesy of BMW OF NORTH AMERICA, INC.

Rotate drive shaft (1) until holes (2) are directly visible.

Check clearance with a suitable tool.

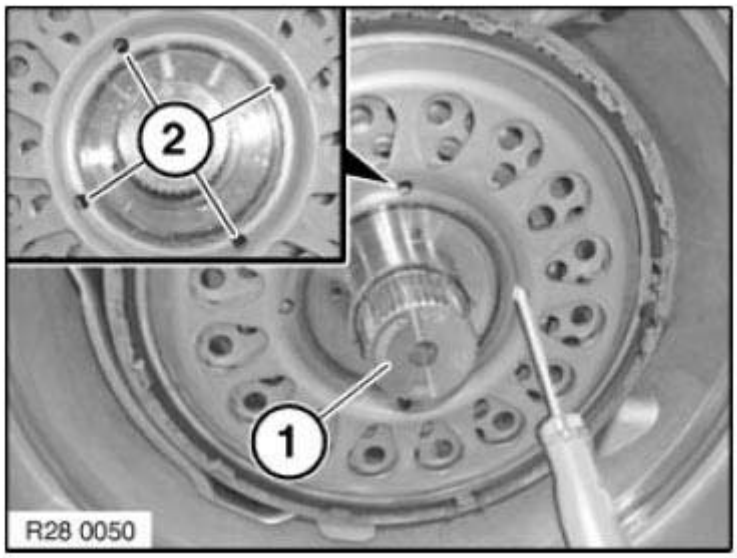


Fig. 33: Identifying Drive Shaft With Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Install special tool **23 0 400** and turn anticlockwise to release clutch (approx. 8 turns).

Pull clutch out of housing.

Installation note:

Set gearbox upright.

The clutch is correctly installed if the oil pump gear turns.

Install the clutch with special tool **23 0 400** while constantly rotating.

Turn clockwise up to stop, then screw down to torque.

Tightening torque, see 28 40 1AZ in **28 40 DOUBLE CLUTCH GEARBOX (DKG)** .

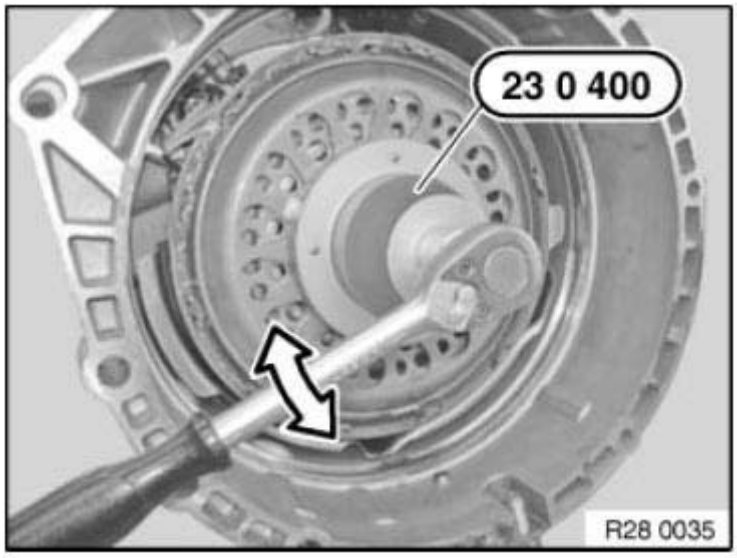


Fig. 34: Pulling Clutch From Housing Special Tool (23 0 400)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Warning: Installing the clutch may involve the danger of injury!

Installation note:

Under no circumstances are hammers or other pounding tools to be used when installing the clutch.

The clutch must be slid over the piston rings and onto the clutch support.

IMPORTANT: When reinstalling the clutch, check that piston rings (1) and needle bearing (2) are present and correctly seated on the clutch support.
Mount clutch carefully to clutch support/do not tilt, to avoid damaging the piston rings (1).

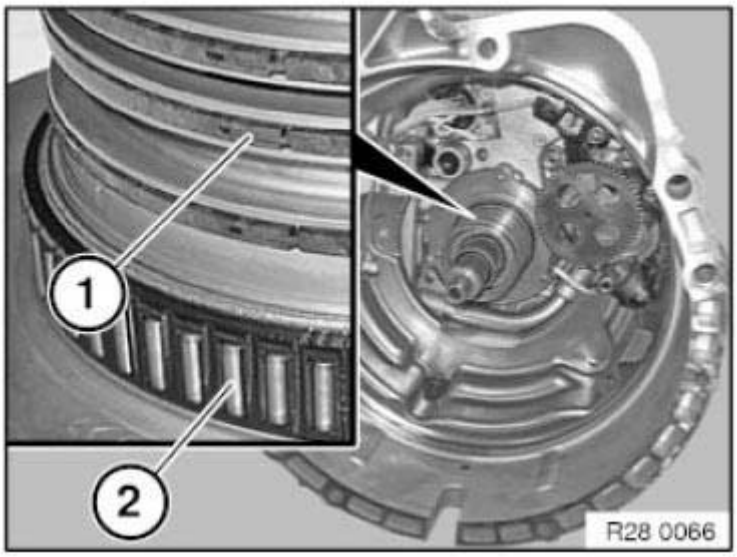


Fig. 35: Identifying Piston Rings And Needle Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

28 00 001 REMOVING AND INSTALLING TWIN-CLUTCH GEARBOX (GS7D36SG) N54

IMPORTANT: Before the gearbox is removed, it is imperative that a read-out is taken of the specific gearbox data status.
After completion of work, check oil level. .
Use only the approved DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this requirement will result in serious damage to the twin-clutch gearbox!
Apply a thin coating of "Ml_Setral- 43N" grease to transmission input shaft!

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.
Aluminum screws/bolts are permitted with and without color coding (blue).
For reliable identification:
Aluminum screws/bolts are not magnetic.
Jointing torque and angle of rotation must be observed without fail (risk of damage).

Necessary preliminary work

- Read out transmission data of the gearbox to be replaced with the BMW diagnosis system
- Clamp off **BATTERY NEGATIVE LEAD** .
- Remove underbody protection at front and rear. See **51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION** .
- Remove complete **EXHAUST SYSTEM** .
- Support engine with lifter when removing transmission.

Release screws (1).

Remove exhaust bracket (2).

Remove bracket (3).

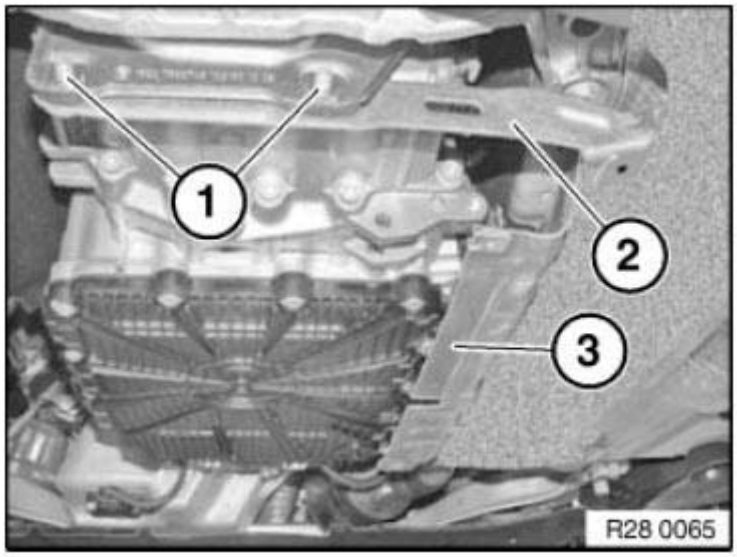


Fig. 36: Identifying Bracket, Exhaust Bracket And Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect connectors (1) and release leads.

Unfasten screws (2).

Remove cover plate (4).

Release aluminum bolt (3) on right next to cable retaining plate.

Aluminum screws must be replaced.

Tightening torque, see 28 00 1AZ in **28 00 DOUBLE CLUTCH GEARBOX** .

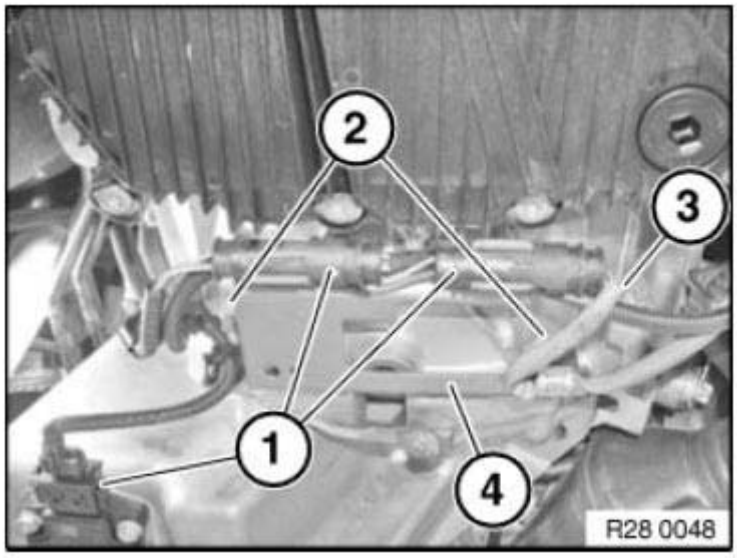


Fig. 37: Identifying Cover Plate, Connectors, Screws And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Unlock retainer (2).

Release cable from lever and holder.

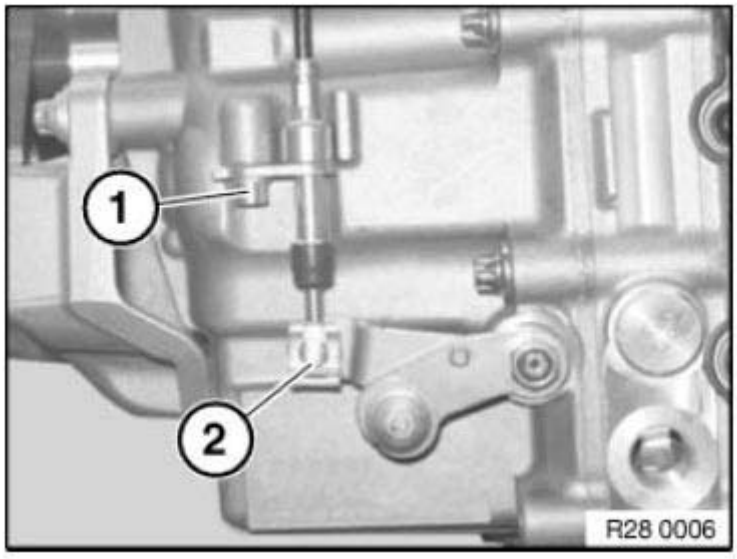


Fig. 38: Identifying Screw And Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools **23 4 050** .

Secure transmission to mounting with tensioning strap (1).

Torque is in **TRANSMISSION HOLDER** .

After completion of work, check **oil level**.

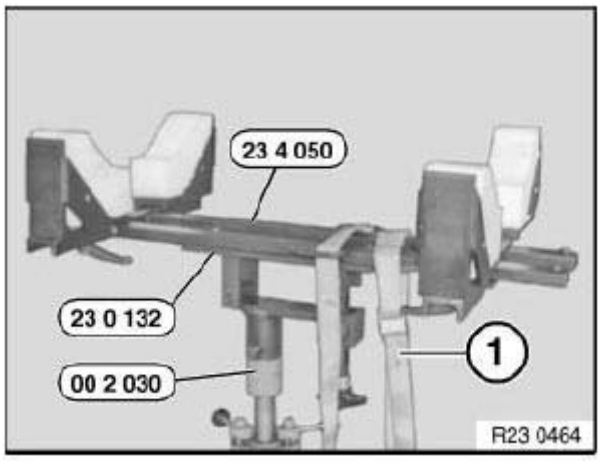


Fig. 39: Supporting Transmission Using Special Tools (23 4 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Unfasten screws (1) and nuts (2).

Remove transmission cross-member.

Tightening torque **22 32 3AZ/4AZ** .

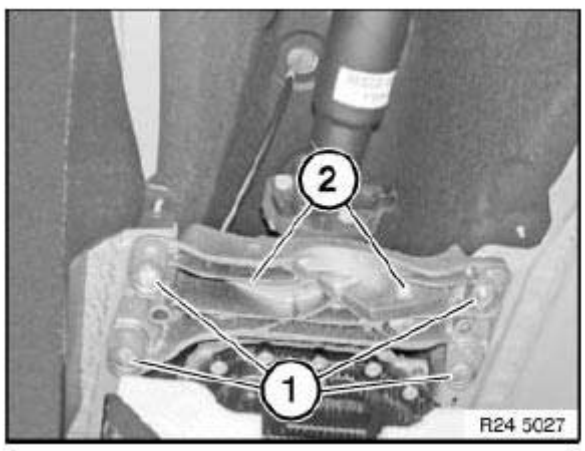


Fig. 40: Identifying Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **PROPELLER SHAFT** .

Release screw (1).

Disconnect hydraulic lines (2) to transmission oil cooler.

Seal off pipes and connection holes on gearbox with plugs.

Installation note:

Replace sealing rings.

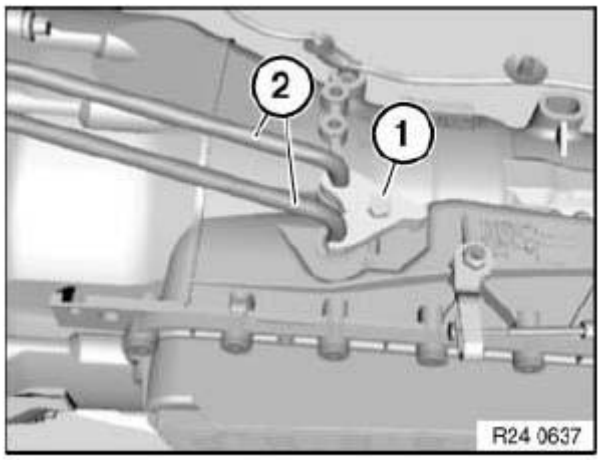


Fig. 41: Identifying Hydraulic Lines Of Transmission Fluid Cooler With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release nut (1) and bracket from transmission oil lines on oil sump.

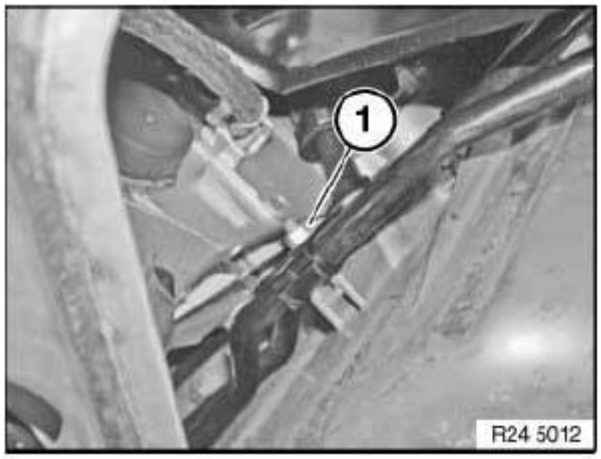


Fig. 42: Identifying Nut On Oil Sump
Courtesy of BMW OF NORTH AMERICA, INC.

- Lower transmission
- Unlock central transmission plug (1) by turning and disconnect.

- Do not touch pins.
- Release cable from retainers.

Operations are described in

Notes on mechatronics

IMPORTANT: Read and comply with important note.

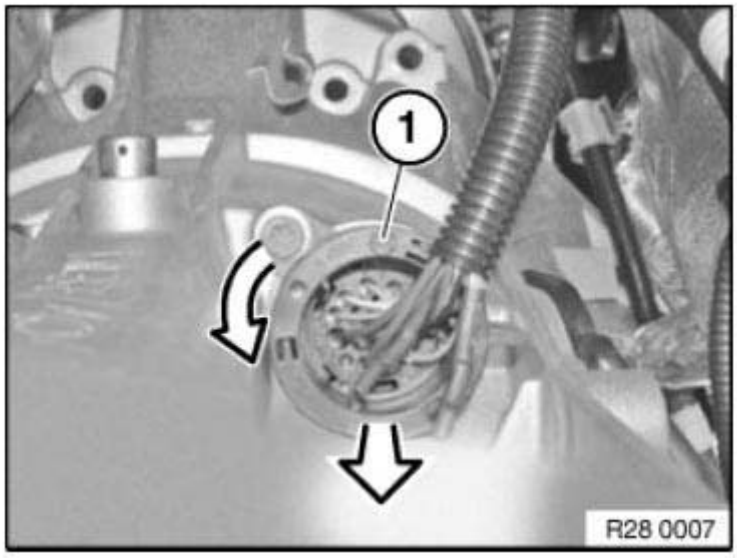


Fig. 43: Removing Central Transmission Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Pay attention to routing and length of wiring harness.

Insert special tool **24 2 390** in sealing cup (1).

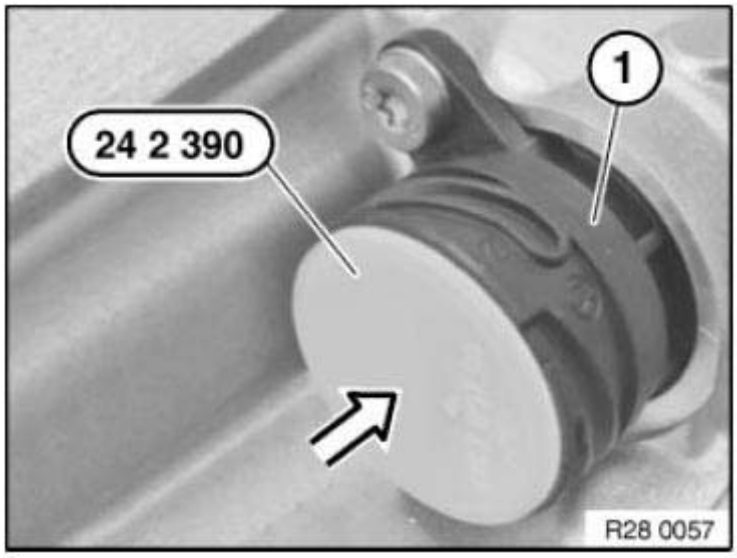


Fig. 44: Inserting Special Tool (24 2 390) In Sealing Cup
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Installation note:

Observe **screw fastening sequence** without fail.

Tightening torque, see 28 00 1AZ in **28 00 DOUBLE CLUTCH GEARBOX** .

Aluminum screws **must** be replaced.

Tightening torque and angle of rotation, aluminum screws (7.8.9.10.11), see 28 00 1AZ in **28 00 DOUBLE CLUTCH GEARBOX**

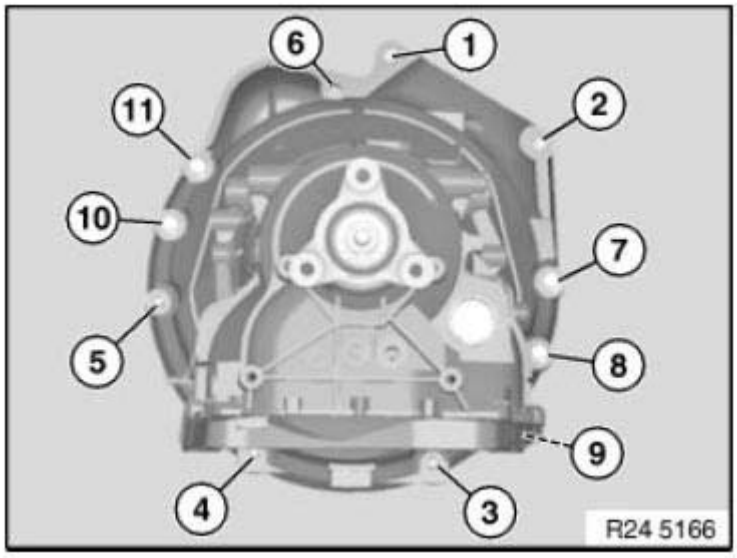


Fig. 45: Identifying Screw Fastening Sequence
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten down screws/bolts to specified torque.

Special angle-of-rotation tool **00 9 120** with **00 9 130 MAGNET**

Secure to floor plate and screw down aluminum screws/bolts in accordance with angle of rotation.

Angle of rotation, see **28 00 1AZ** in **28 00 DOUBLE CLUTCH GEARBOX** .

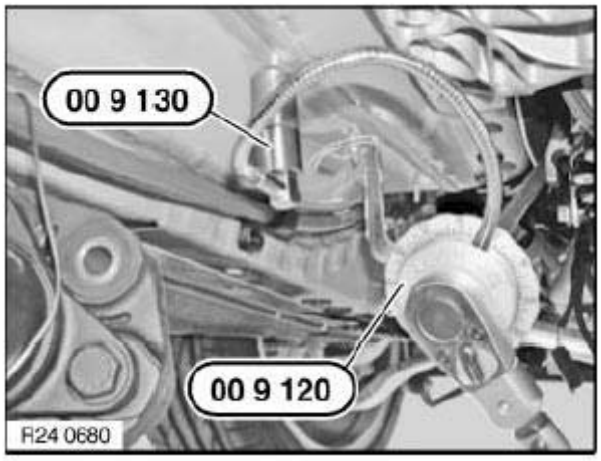


Fig. 46: Securing Angle Of Rotation Using Special Tool (00 9 120) And Magnet (00 9 130)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Apply a thin coating of "MI_Setral-43N" grease to transmission input shaft!

BMW part number EU: 83 23 2 152 082

BMW part number USA: 83 23 2 152 081

Check that fitting sleeves are correctly fitted.

Replace damaged fitting sleeves.

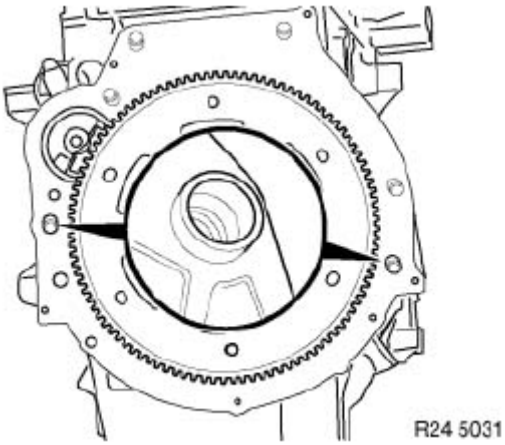


Fig. 47: Identifying Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

28 60 030 REMOVING AND INSTALLING/REPLACING THE HYDRAULIC CAP (GS7D36SG)

IMPORTANT: It is essential to adhere to conditions of absolute cleanliness.
Any dirty parts must be cleaned before the hydraulic cap is loosened.
After completion of work, check oil level..
Use only the DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary work

- Remove **twin-clutch gearbox**

Place twin clutch transmission on a suitable surface.

To prevent the transmission oil from spilling out, make sure that the hydraulic cap points upward.

Release screws.

Remove hydraulic cover (1).

Installation note:

Replace seal.

Replace screws.

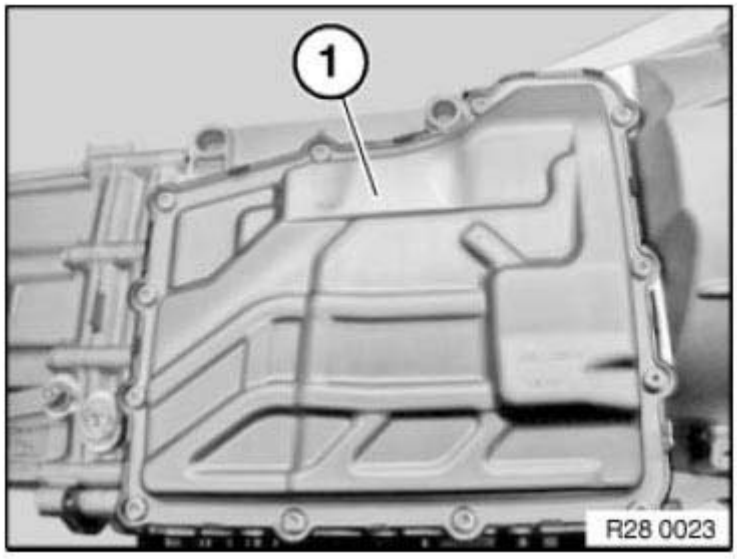


Fig. 48: Identifying Hydraulic Cover
Courtesy of BMW OF NORTH AMERICA, INC.

Installation of hydraulic cap:

Make sure seal is exactly seated.

It is mandatory to comply with the specified order of screw connections 1-12.

Tightening torque, see 28 60 1AZ in **28 60 CONTROL UNIT, MECHATRONICS, HYDRAULICS** .

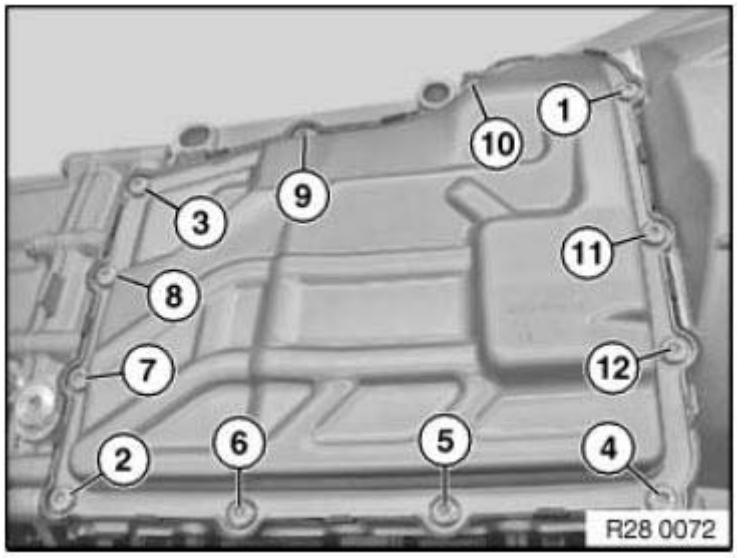


Fig. 49: Identifying Hydraulic Cover Screw Connections
Courtesy of BMW OF NORTH AMERICA, INC.

28 60 514 REPLACING MECHATRONICS (GS7D36SG)

NOTE: When replacing mechatronics:

- **Import present transmission data into new mechatronics**

IMPORTANT: It is essential to adhere to conditions of absolute cleanliness.
Any dirty parts must be cleaned before the hydraulic cap is loosened.
After completion of work, check oil level. .
Use only the approved transmission oil DCTF-1 Pentosin (P/N 83 22 2 147 477).
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary tasks

- Read out transmission data of mechatronics to be replaced
- Remove **twin-clutch gearbox**

Place twin clutch transmission on a suitable surface.

To prevent the transmission oil from spilling out, make sure that the hydraulic cap points upward.

Remove **hydraulic cap** .

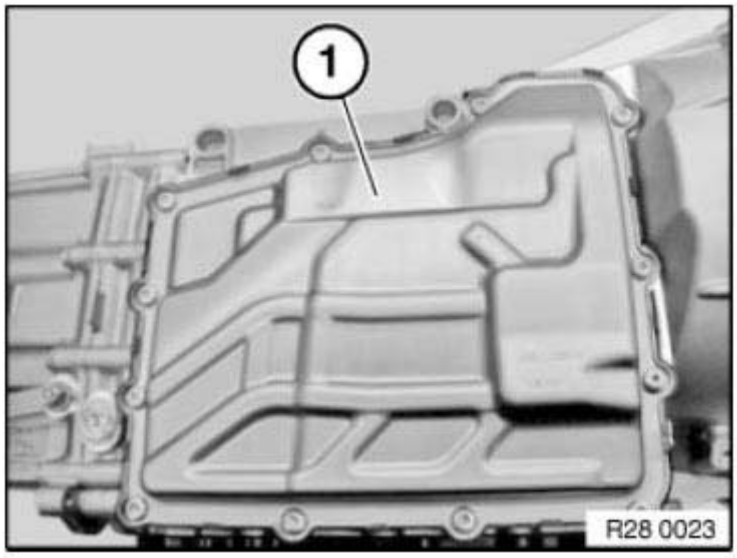


Fig. 50: Identifying Hydraulic Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Ensure correct installation position.

Press holder (2) together from right and release cable (1).

Installation note:

Replace holder.

Retaining lugs must point to the right.

If fitted: Pull out CPA pin (7) to second locking position.

Release connector lock (6) and at same time detach connector (3) from retaining tabs (5) towards right.

IMPORTANT: Bridge (4) of connector must not break.
Wiring harness must be replaced if bridge breaks.

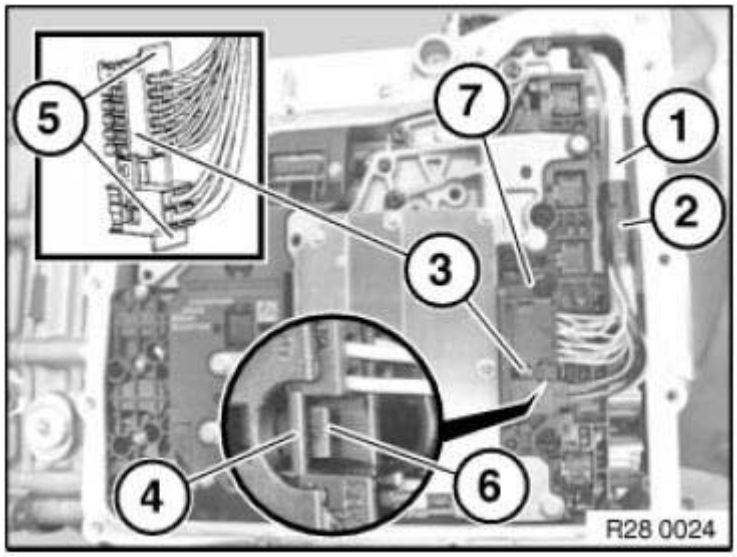


Fig. 51: Identifying Holder, Cable, Retaining Tabs, CPA Pin, Connector Lock And Bridge
Courtesy of BMW OF NORTH AMERICA, INC.

CPA (1) in second locking position.

Installation note:

Press CPA pin down until it is flush with the housing.

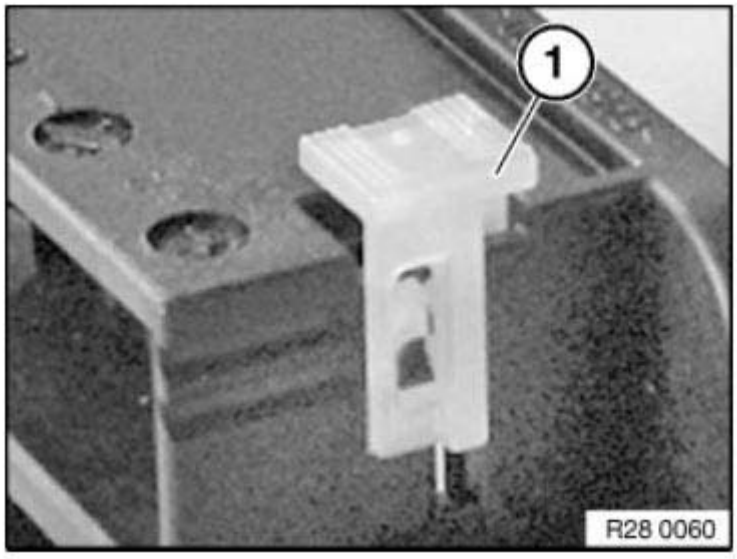


Fig. 52: Identifying CPA Pin
Courtesy of BMW OF NORTH AMERICA, INC.

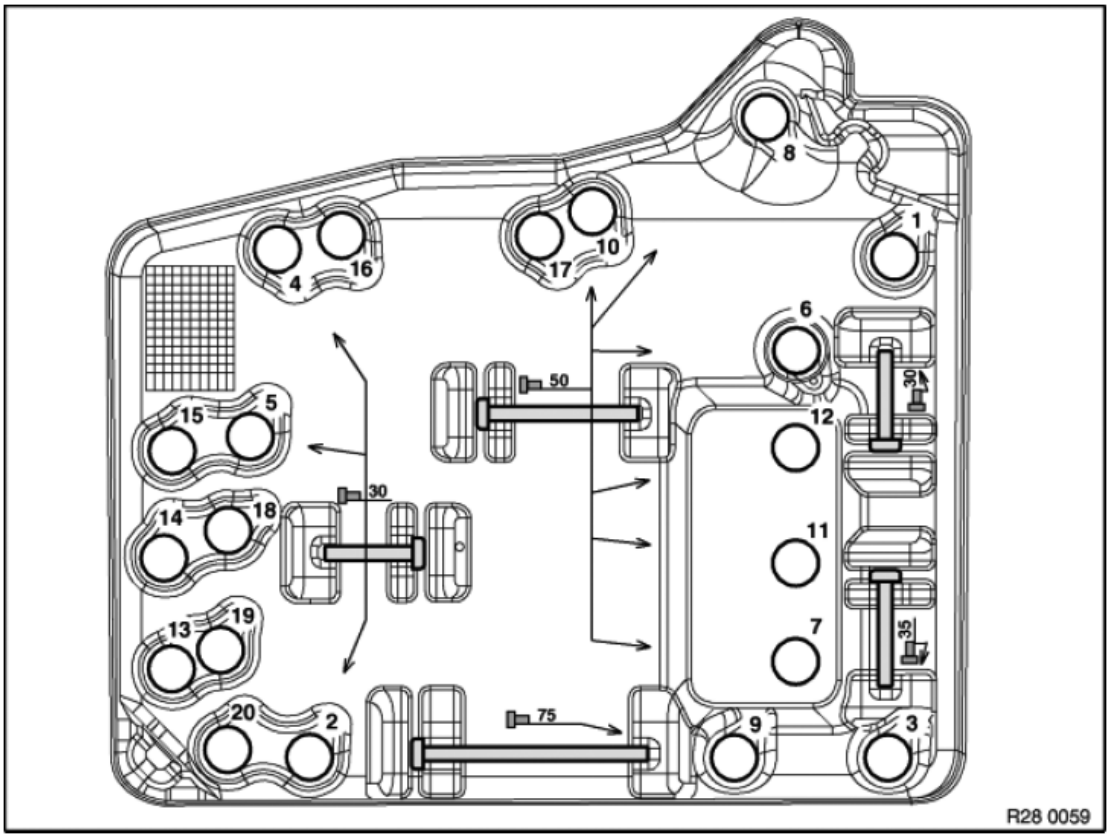


Fig. 53: Placing Mounting Template Over Mechatronics
Courtesy of BMW OF NORTH AMERICA, INC.

Place mounting template over mechatronics.

Open screws 1-20.

NOTE: Replace screws 1-12.
Screws 13-20 remain captive on module.
Remove mounting template.

Lift mechatronics out of housing.

Remove metal bead gasket.

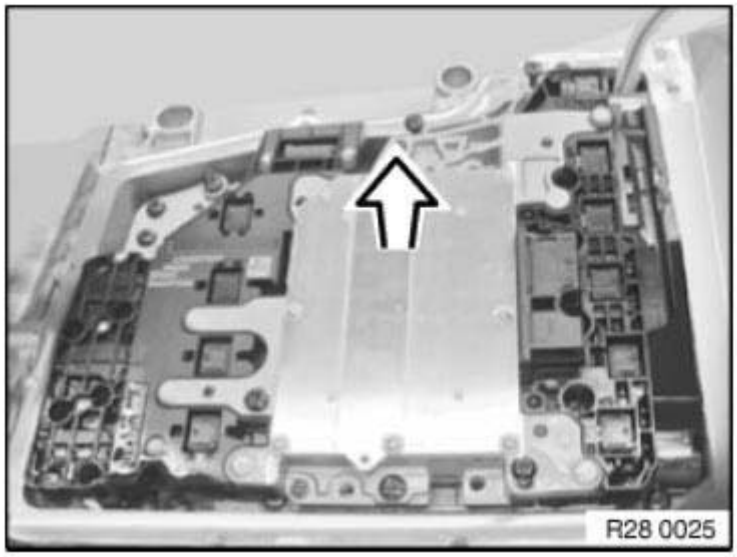


Fig. 54: Lifting Mechatronics From Housing
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Check the installation position of the centering pins (1).
The centering pins (1) of the mechatronics remain in the housing.

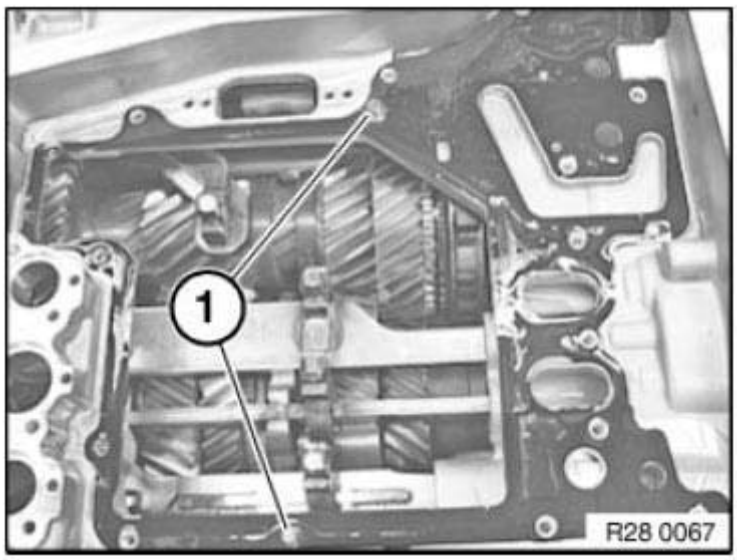


Fig. 55: Identifying Centering Pins
Courtesy of BMW OF NORTH AMERICA, INC.

The new mechatronics are supplied with the shift piston in neutral position as illustrated.

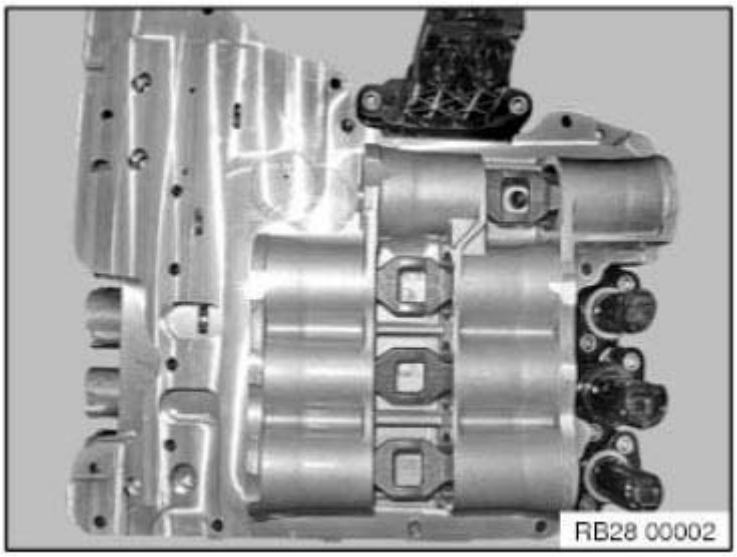


Fig. 56: Identifying Mechatronics Shift Piston In Neutral Position
Courtesy of BMW OF NORTH AMERICA, INC.

In the gearbox the gearshift rods must be set to neutral position (N) as illustrated before the new mechatronics are fitted.

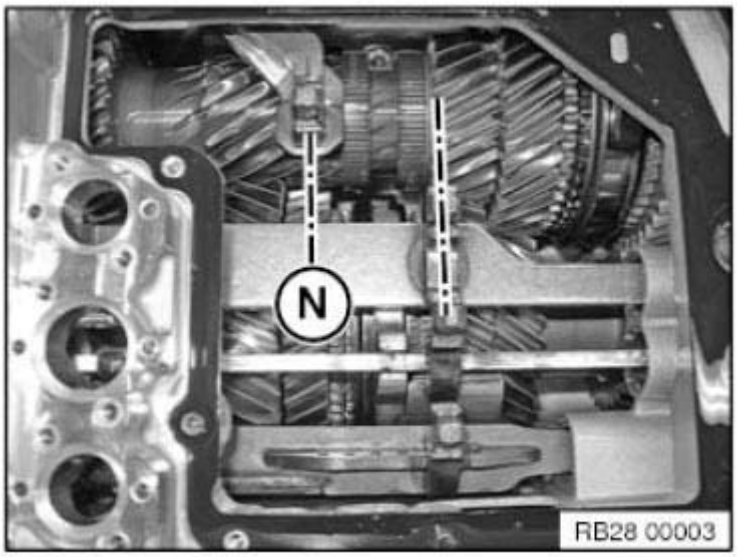


Fig. 57: Identifying Gearshift Rods In Neutral Position
Courtesy of BMW OF NORTH AMERICA, INC.

Installing mechatronics

Install a new metal bead gasket.

Install mechatronics.

Fit mounting template.

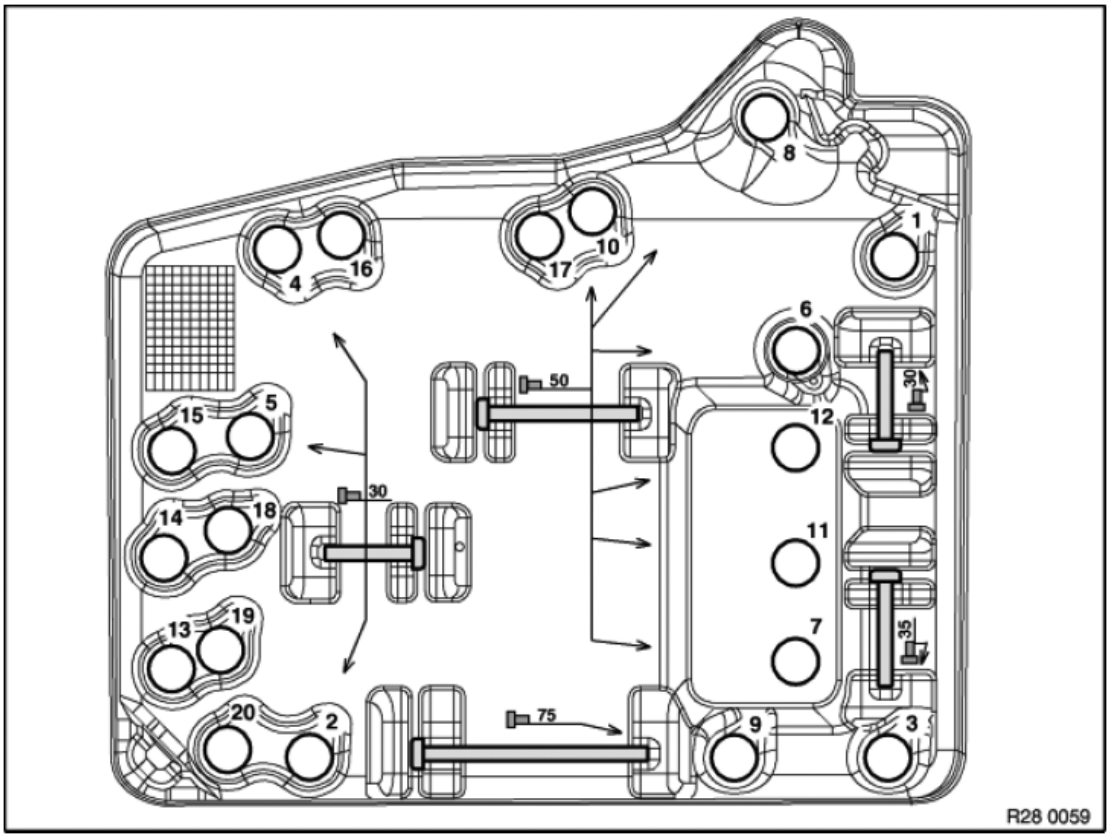


Fig. 58: Placing Mounting Template Over Mechatronics
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Adhere without fail to the screwing sequence indicated on the template. The screw length can be checked by means of the insert pockets shaped in the template.

1. **Insert screws in sequence 1-12 and pre-tighten to 2 Nm.**
2. **Tighten down screws 1-12 to tightening torque and angle of rotation. See 28 60 2AZ in 28 60 CONTROL UNIT, MECHATRONICS, HYDRAULICS .**
3. **Tighten down screws in sequence 13-20 to 5 Nm.**
4. **Remove mounting template.**

28 00 060 REPLACING OUTPUT FLANGE RADIAL SHAFT SEAL (GS7D36SG)

IMPORTANT: It is essential to adhere to conditions of absolute cleanliness. Any dirty parts must be cleaned before the hydraulic cap is loosened. After completion of work, check oil level. . Use only the approved transmission oil DCTF-1 Pentosin (P/N 83 22 2 147 477). Failure to comply with this instruction will result in serious damage to the twin-

clutch gearbox.

Necessary preliminary work

- Remove underbody protection. See **REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION**
- Remove heat shields.
- Remove **EXHAUST SYSTEM** .
- Support transmission from underneath. See **23 ... UNIVERSAL BMW TRANSMISSION TAKE-UP** .
- Remove transmission cross member.

- Remove propeller shaft.
- Tasks are described in **PROPELLER SHAFT** .

NOTE: To rotate propeller shaft, unlock parking lock.

Release screws.

Remove transmission bearing block (1).

Tightening torque: **22 32 2AZ** .

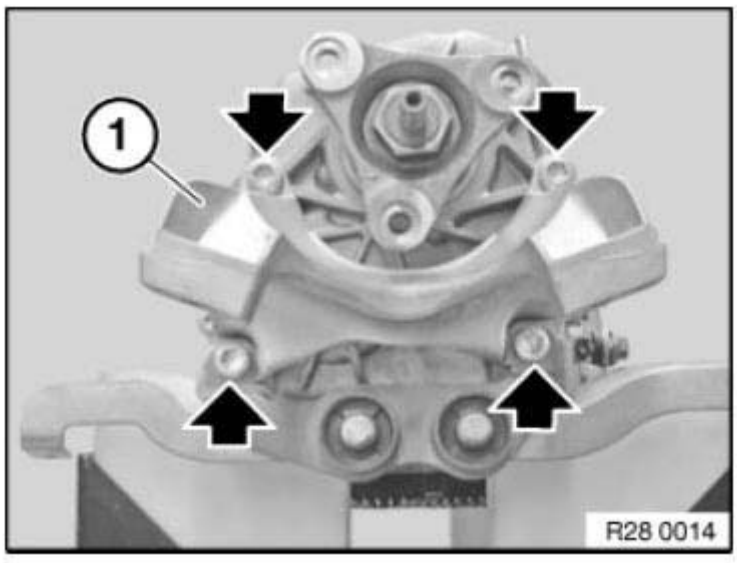


Fig. 59: Identifying Bearing Block With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Grip output flange (1) with special tool **23 0 020** .

Release nut with special tool **23 2 320** .

Tightening torque, see 28 10 14AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Installation note:

Replace nut and secure with Loctite 243.

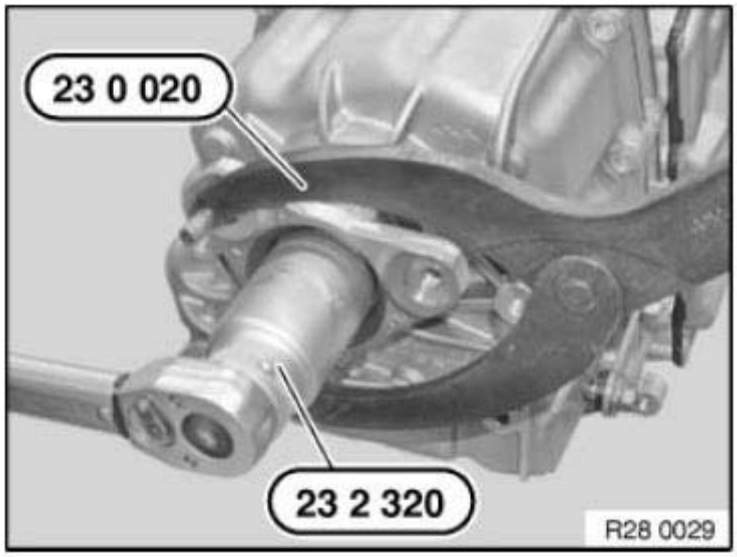


Fig. 60: Gripping Output Flange Using Special Tool (23 2 320)
Courtesy of BMW OF NORTH AMERICA, INC.

Detach output flange (1) with special tool **331 150 DEVICE** and adapter plate 33 1 154 from output shaft.

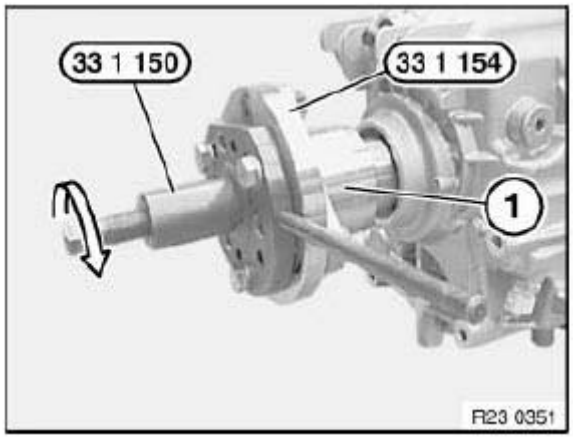


Fig. 61: Removing Output Flange Using Special Tool (33 1 150) And Adapter Plate (33 1 154)
Courtesy of BMW OF NORTH AMERICA, INC.

Attach special tool 24 2 353 to output shaft (1).

Graphic shows: Automatic transmission

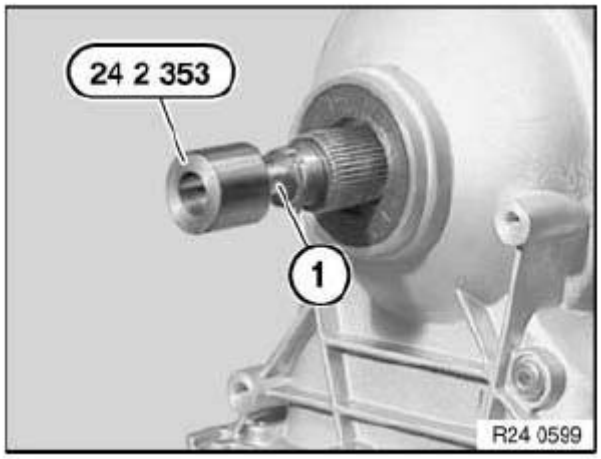


Fig. 62: Connecting Special Tool (24 2 353) To Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 24 2 351 until it is firmly connected with radial shaft seal.

Pull out radial shaft seal by screwing in special tool 24 2 352.

Graphic shows: Automatic transmission

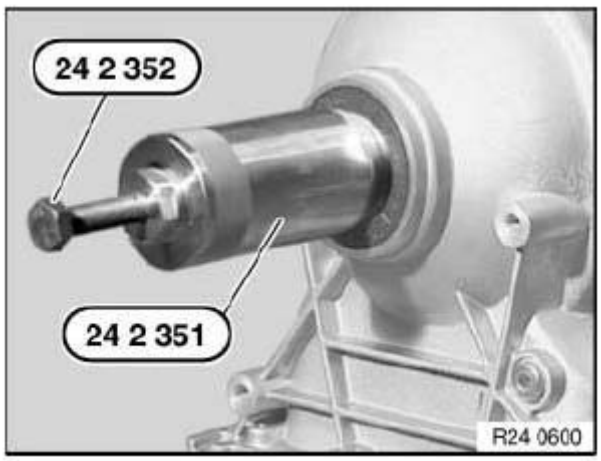


Fig. 63: Pulling Out Radial Shaft Seal Using Special Tool (24 2 352)
Courtesy of BMW OF NORTH AMERICA, INC.

Apply oil to the sealing lip of radial shaft seal (1). Drive in radial shaft seal (1) with special tool **23 0 410** as far as it will go.

Graphic shows: Automatic transmission

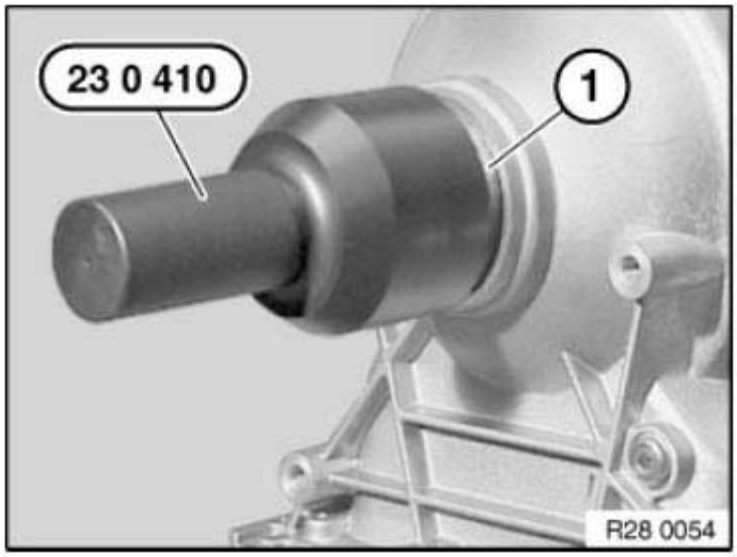


Fig. 64: Applying Oil To Radial Shaft Seal Sealing Lip
Courtesy of BMW OF NORTH AMERICA, INC.

28 60 000 REPLACING PRESSURE FILTER (GS7D36SG)

IMPORTANT: It is essential to adhere to conditions of absolute cleanliness.
Any dirty parts must be cleaned before the hydraulic cap is loosened.
After completion of work, check oil level. .
Use only the DCTF-1 Pentosin (P/N 83 22 2 147 477) approved transmission oil.
Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

Recycling

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Remove underbody protection at front and rear. See **51 47 490 REMOVING AND INSTALLING/REPLACING FRONT UNDERBODY PROTECTION**
- Remove **EXHAUST SYSTEM**
- Remove **PROPELLER SHAFT**

Supporting transmission

Support transmission with special tools **23 4 050** , **00-2030 DEVICE** .

Secure transmission with tensioning strap (1).

Tasks are described in **Gearbox holder** .

After completion of work, check **oil level**.

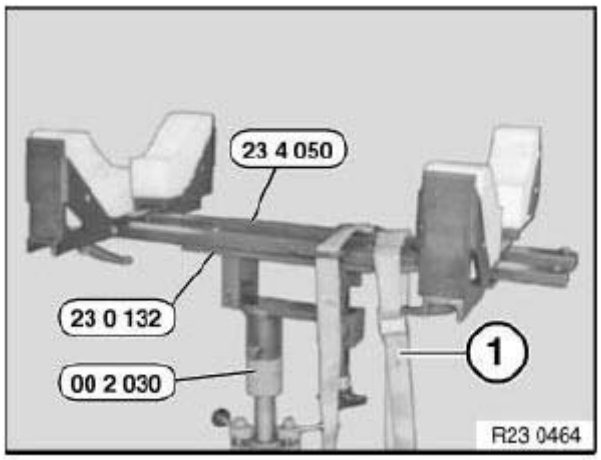


Fig. 65: Supporting Transmission Using Special Tools (23 4 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Lower engine with transmission until pressure filter lid (1) is accessible.

Remove retainer (2).

Installation note:

Replace retainer.

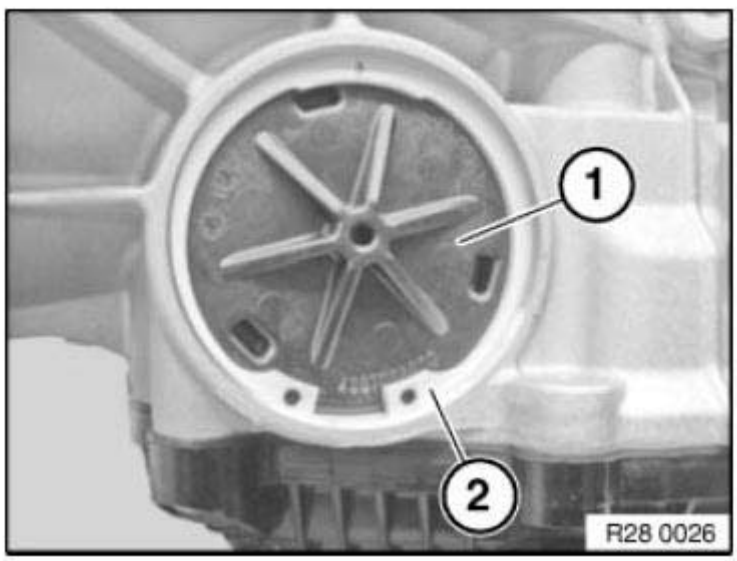


Fig. 66: Identifying Filter Lid And Retainer
Courtesy of BMW OF NORTH AMERICA, INC.

Lever out lid (1) with sealing ring.

Installation note:

Replace lid with sealing ring.

Lubricate sealing ring with transmission oil before installing.

IMPORTANT: Catch and dispose of escaping transmission oil.

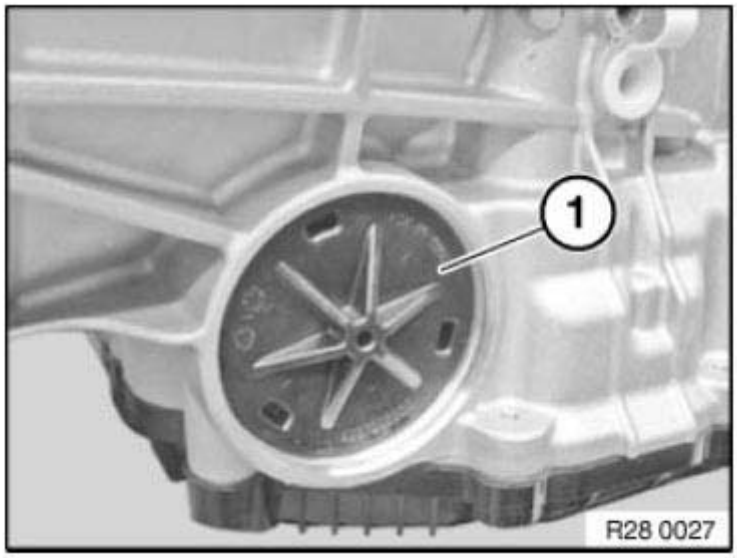


Fig. 67: Identifying Filter Lid With Sealing Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Remove pressure filter (1).

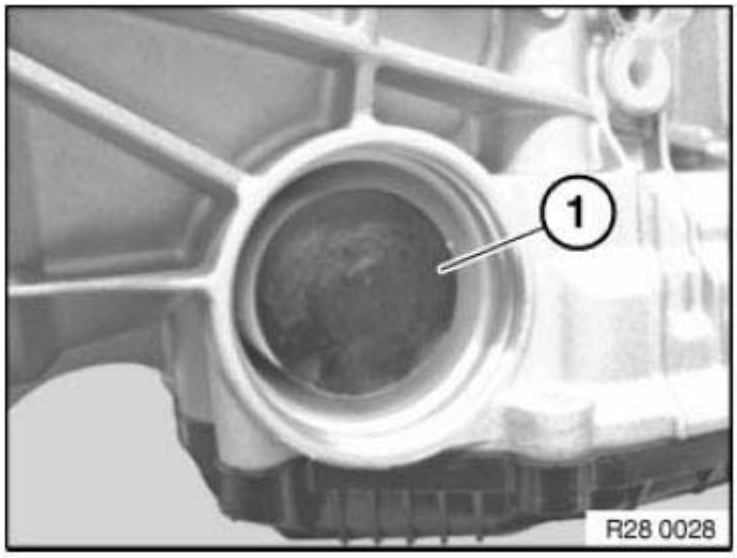


Fig. 68: Identifying Pressure Filter
Courtesy of BMW OF NORTH AMERICA, INC.

28 40 050 REPLACING SHAFT SEAL FOR CLUTCH COVER (GS7D36SG)

IMPORTANT: It is essential to adhere to conditions of absolute cleanliness. Any dirty parts must be cleaned before removing the clutch cover.

Necessary preliminary work

- Remove **clutch cover**

To prevent the transmission oil from spilling out, tilt the gearbox back before removing the clutch cover.

Installation note:

After completion of work, check **oil level**. .

Use only the DCTF-1 Pentosin (P/N 83 22 2 147 477) approved transmission oil.

Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

Use a suitable tool to take the radial shaft seal (1) off the clutch cover.

IMPORTANT: Risk of damage:
Damage to the clutch cover will result in oil leaks!
If the clutch cover was damaged on removing the radial shaft seal, it is imperative that the cover be replaced.

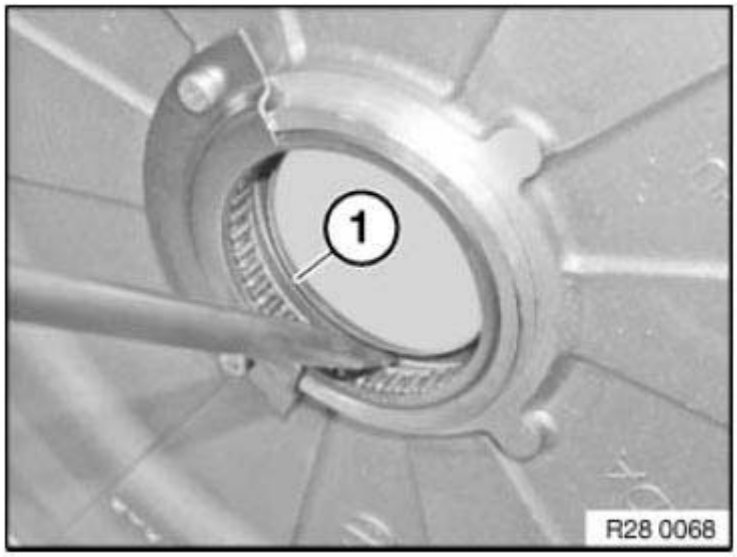


Fig. 69: Removing Radial Shaft Seal From Clutch Cover Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Place the clutch cover (1) out flat on a workbench.

IMPORTANT: Pay attention to lug (2).

Coat sealing lips of radial shaft seal with transmission oil.

Press the radial shaft seal (3) lightly into the clutch cover.

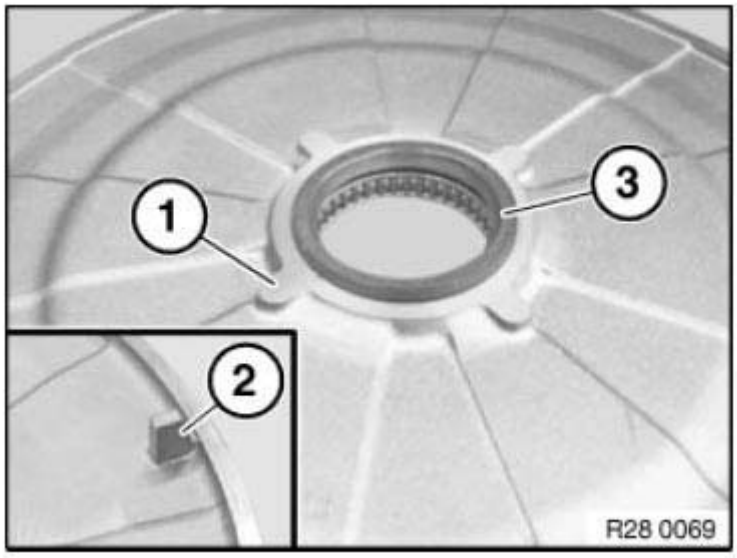


Fig. 70: Identifying Clutch Cover, Lug And Radial Shaft Seal
Courtesy of BMW OF NORTH AMERICA, INC.

Use special tool **24 2 370** to drive the radial shaft seal into the clutch cover until the sealing ring is flush.

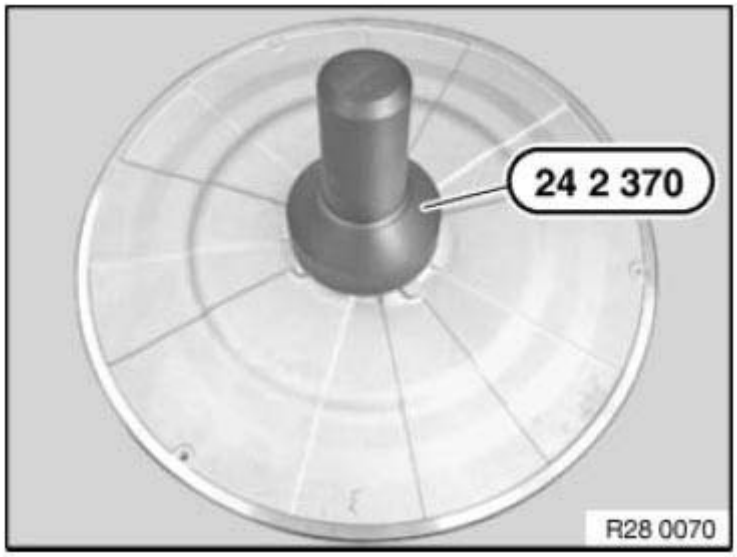


Fig. 71: Pressing Sealing Cap With Special Tool (24 2 370)
Courtesy of BMW OF NORTH AMERICA, INC.

Use a suitable tool to take the O-ring of the clutch cover out of the groove.

Use a lint-free cloth to remove oil contamination from the O-ring groove.

Installation note:

Replace O-ring.

Coat O-ring with transmission oil before installing.

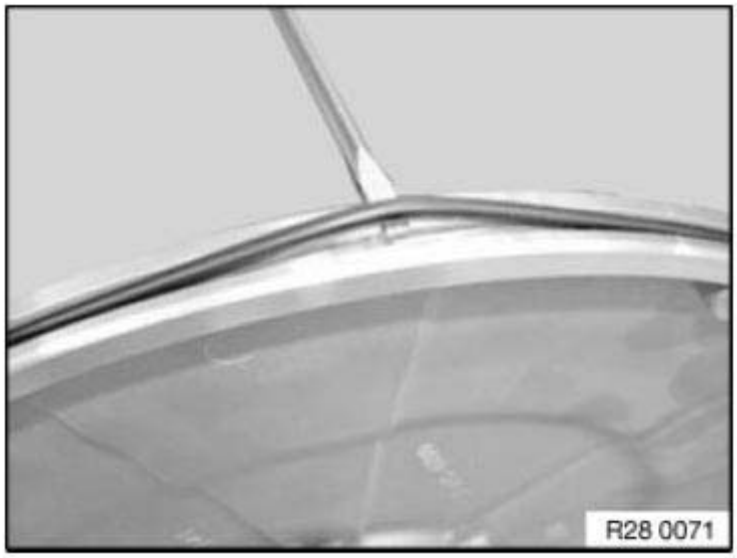


Fig. 72: Identifying Clutch Cover O-Ring From Groove Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

28 10 000 REPLACING SUCTION FILTER (GS7D36SG)

IMPORTANT: After completion of the work, check the oil level. .
Use only the approved DCTF-1 Pentosin (P/N 83 22 2 147 477).

Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

Recycling

Catch and dispose of escaping transmission oil.

Observe country-specific waste disposal regulations.

Necessary preliminary work

- Remove **TRANSMISSION SUMP** .

Release screw (1).

Tightening torque, see 28 10 12AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Pull suction jet pump (2) out of housing.

Installation note:

Moisten seals with transmission oil before installing.

Replace suction jet pump.

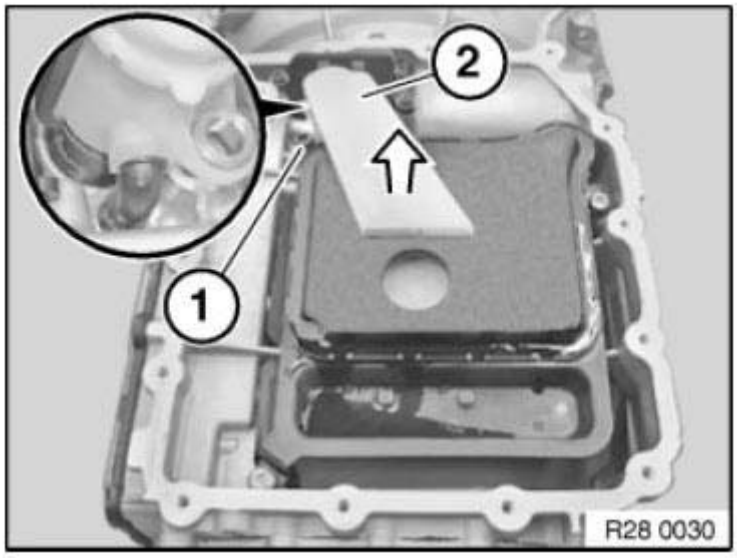


Fig. 73: Pulling Out Jet Pump From Housing
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1) and (2).

IMPORTANT: Screws have different torques.

Tightening torque, see 28 10 13AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Pull suction filter out of housing.

Installation note:

Moisten seal with transmission oil before installing.

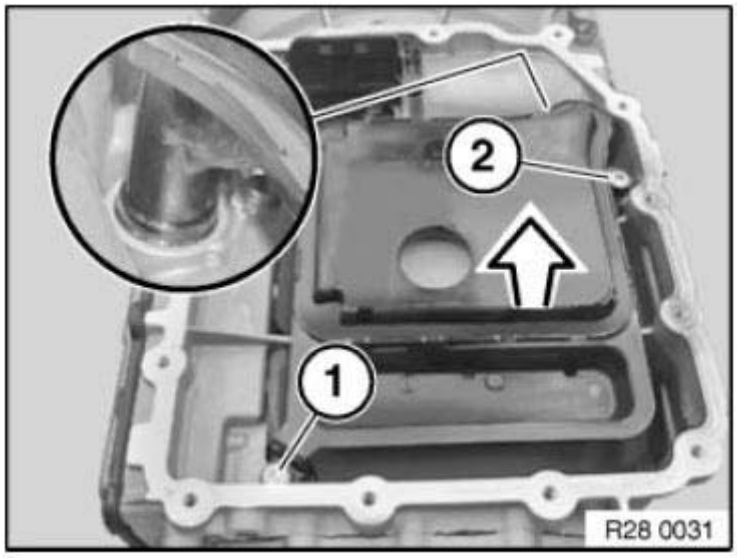


Fig. 74: Pulling Suction From Housing
Courtesy of BMW OF NORTH AMERICA, INC.

28 60 020 REPLACING WIRING HARNESS (GS7D36SG)

IMPORTANT: After completion of work, check oil level. .
Use only the approved DCTF-1 Pentosin (P/N 83 22 2 147 477) transmission oil. Failure to comply with this instruction will result in serious damage to the twin-clutch gearbox.

IMPORTANT: Read and comply with notes on ESD PROTECTION (ELECTRO STATIC DISCHARGE) .

Necessary preliminary work

- Remove **twin-clutch gearbox**
- Remove mechatronics
- Remove **clutch**

Release screw (1).

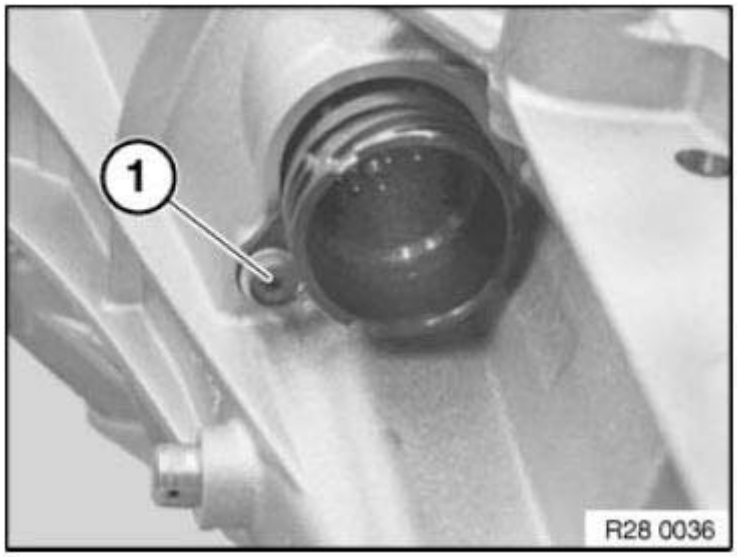


Fig. 75: Identifying Screw
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw (1).

Tightening torque, see 28 10 6AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Release aluminum screw (6).

Tightening torque, see 28 10 11AZ in **28 10 HOUSING WITH ADD-ON PARTS** .

Installation note:

Replace aluminum screw.

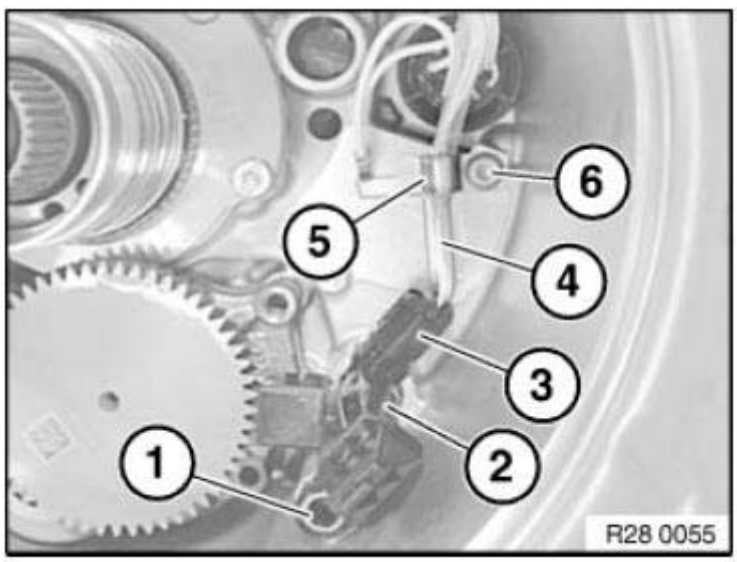


Fig. 76: Identifying Screw, Aluminum Screw, Combination Sensor, Connector, Wiring Harness And Earth Terminal
Courtesy of BMW OF NORTH AMERICA, INC.

Release combination sensor (2) from housing.

Disconnect connector (3).

Removing wiring harness (4) with earth terminal (5) from housing.

IMPORTANT: Guide earth terminal (5) carefully through transmission connector bore.

Risk of damage to sealing surface.

IMPORTANT: To disconnect the combination sensor connector:
Press lock together in area (1) and simultaneously detach connector.

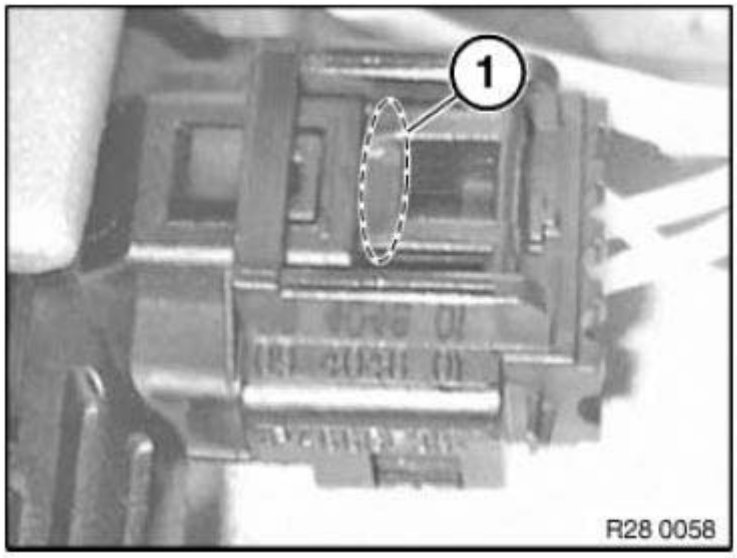


Fig. 77: Pressing Combination Sensor Lock
Courtesy of BMW OF NORTH AMERICA, INC.

DOUBLE CLUTCH GEARBOX

28 00 DOUBLE CLUTCH GEARBOX

Transmission In General

	Type	Thread	Tightening specification	Measure
Torx screw, steel	GS7D36SG	M8x50		19 Nm
	GS7D36SG	M10		38 Nm
	GS7D36SG	M12x50		66 Nm
Aluminium screws/bolts are not magnetic N54	GS7D36SG		Replace screws Jointing torque and angle of rotation must be observed without fail	
	GS7D36SG	M12	Jointing torque	25 Nm
			Torque angle	130 °
2AZ Oil filler plug	GS7D36SG	Replace screw		25±3 Nm
3AZ Oil drain plug	GS7D36SG	Replace screw		8 Nm
4AZ Transmission oil sump	GS7D36SG			10±1 Nm

HOUSING WITH ADD-ON PARTS

28 10 HOUSING WITH ADD-ON PARTS

Housing with add-on parts

	Type	Thread	Tightening specifications	Dimension
1AZ Oil-coolant heat exchanger to S65 transmission	GS7D36SG	M6		10 Nm
2AZ Holder, oil-coolant heat exchanger to S65 transmission	GS7D36SG	M6		8 Nm
3AZ Oil thermostat to transmission	GS7D36SG	M8x60		19 Nm
4AZ Hydraulic line to oil thermostat	GS7D36SG	M8		19 Nm

5AZ Transmission input speed sensor to transmission	GS7D36SG	M6		9 Nm
6AZ Instrument cluster sensor, oil pump, to transmission	GS7D36SG	M6		6 Nm
7AZ Oil pump spray plate to transmission	GS7D36SG			10 Nm
8AZ Oil pump to transmission	GS7D36SG	M6	Position:1, 2, 5, 6, 7, 8 to final torque.	
			Position: 1 loosen and to final torque.	10 Nm
9AZ Oil pump pressure pipe to transmission	GS7D36SG	M8	Position: 3 and 4 to final torque	25 Nm
10AZ Clutch support to transmission	GS7D36SG			10 Nm
11AZ Aluminium screws/bolts, earth cable to transmission	GS7D36SG		Jointing torque	5 Nm
12AZ Suction jet pump to transmission	GS7D36SG	M8		6 Nm
13AZ Suction filter to transmission	GS7D36SG	M6	Screw (1)	5 Nm
			Screw (2)	8 Nm
14AZ Output flange	GS7D36SG		Collar nut installed with screw locking	
			Pretension	175 Nm
			Release	
			Tighten Down	125 Nm

DOUBLE CLUTCH GEARBOX (DKG)

28 40 DOUBLE CLUTCH GEARBOX (DKG)

Twin clutch

	Type	Thread	Tightening specification	Measure
1AZ Twin clutch on support/ retaining nut	GS7D36SG			10-20 Nm

CONTROL UNIT, MECHATRONICS, HYDRAULICS

28 60 CONTROL UNIT, MECHATRONICS, HYDRAULICS

Mechatronics control unit

	Type	Thread	Tightening specification	Measure
1AZ Hydraulic cover to transmission	GS7D36SG	M6		10 Nm
2AZ Mechatronics to transmission	GS7D36SG	M5x30	Jointing torque	3 Nm
			Torque angle	+50 °
		M5X35	Jointing torque	3 Nm
			Torque angle	+50 °
		M5X50	Jointing torque	3 Nm
			Torque angle	+50 °
		M5X75	Jointing torque	3 Nm
			Torque angle	+90 °

ELECTRONIC TRANSMISSION CONTROL

PURPOSE OF THE SYSTEM

Electronically controlled transmissions were introduced on BMW products in 1986 on 5 and 7 series vehicles. Currently EH (Electro-hydraulic) transmissions are offered on almost every production model (Except E46 M3 and E39 M5). EH transmissions offer the following benefits the to driver:

- Increased driving safety by reducing fatigue. All shifts are automatic as opposed to manual transmissions which require more driver interaction.
- Increased fuel economy through use of lock up torque converter.
- Increased fuel economy through optimized shift points.
- Improved shift comfort by use of "Overlap Shift" technology (ZF).
- More available features through the use of CAN bus technology.

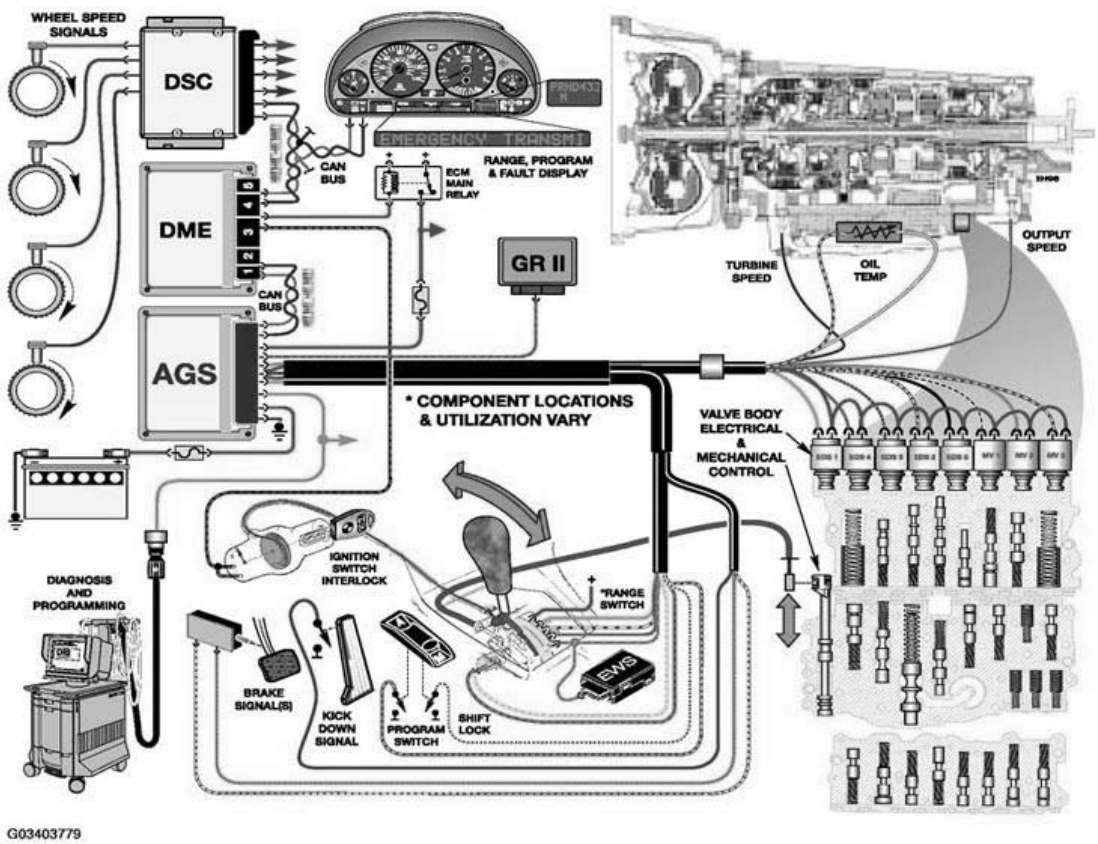


Fig. 1: Identifying Electro-Hydraulic Transmission Inputs/Outputs
Courtesy of BMW OF NORTH AMERICA, INC.

The EH Control System is designed to work in conjunction with the engine electronics for precise shift control. The TCM receives information on engine RPM, load and throttle position to provide optimum shift points to maximize fuel economy and driver comfort.

The function of an EGS System is to:

- Monitor all operating conditions through input signals
- Continually assess operating conditions by processing input data and select the appropriate operating program for current conditions.
- Activate transmission system components and to communicate with other drivetrain control systems.
- Respond to driver selected driving program (Economy, Sport or Manual).

In addition to providing shift control, the TCM also adapts to changing conditions within the transmission by monitoring slip ratios and modifying line pressure. This increases the life of the transmission and reduces maintenance and adjustments. The TCM controls the operation of the Lock-Up Torque Converter which further increases economy.

On current models, the TCM also has the capability of adapting to driver habits and responds to changing environmental conditions. Items such as rate of throttle input and kickdown requests are monitored to select the most appropriate shift program.

The EGS system is also required to maintain occupant safety, safeguard drivetrain damage, improve vehicle emissions and operate in fail-safe mode when a malfunction occurs.

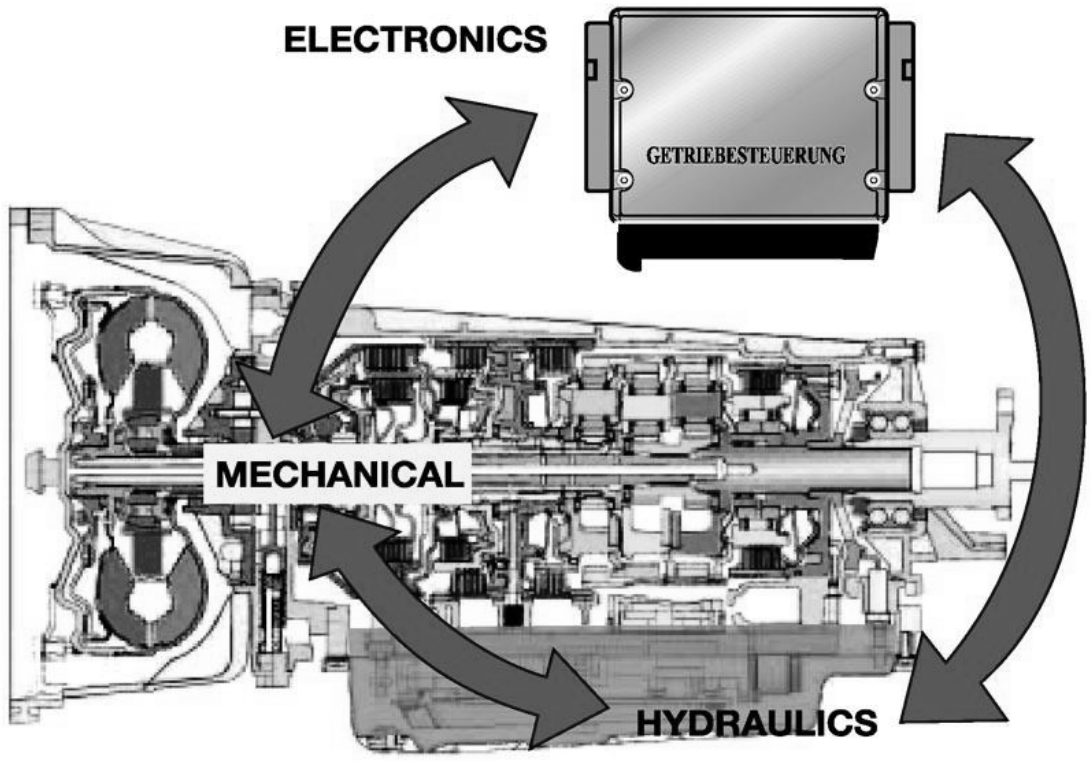


Fig. 2: Identifying EGS System
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION VERSION AND CONTROL SYSTEMS

Each BMW Electro-hydraulic transmission has a corresponding control system. They are designated "GS" which stands for Transmission Control. This acronym is from the German words **G** etriebe **S** teurung. Each transmission can have more than one control system, this depends upon application (model year, series etc.). Below is a listing of ZF control systems used on BMW vehicles, Hydramatic control systems are shown on the opposing page.

ZF Control Systems

ZF CONTROL SYSTEMS SPECIFICATIONS

Transmission BMW ID #	Manufacturer ID	Model/Year	Control System	Engine
4HP22 (EH)	4HP22 (EH)	86 535i 86 635i 86 735i	GS 1.2X GS 1.2X GS 1.2X	M30 M30 M30
4HP24 (EH)	4HP24 (EH)	88-9/91 750iL (E32) 92-94 750iL (E32) 90-94 850i/Ci (E31)	GS 1.27 GS 1.29 GS 1.29	M70 M70 M70
A5S310Z	5HP18	93 530i/iT (E34)	GS 7.3	M60

		94 530i/iT (E34) 95 M3 (E36) 96-99 M3 (E36)	GS 7.32 GS 7.11 GS 8.32	M60 S50 (US) S52
A5S325Z	5HP19	00 323i/Ci/CiC (3/00-8/00) 01 323iT (from 4/01) 01-02 325i/Ci/CiC from 9/00 00-01 330i/Ci/CiC from 6/00 01- 525 from 3/01 01- 530 from 3/01 03 Z4 (E85) 2.5i and 3.0i	GS 8.60 GS 8.60 GS 8.60.4 GS 8.60.4 GS 8.60.4 GS 8.60.4 GS 8.60.4	M52 TU M52 TU M54 M54 M54 M54 M54
A5S440Z	5HP24	97 840Ci (E31) from 9/96 97 540i (E39) 1/97-8/97 97 740i/iL (1/97 - 4/97) 97 740i/iL (5/97-8/97) 98-03 540i 98-01 740i/iL 00- X5 4.4i	GS 8.55 (CAN index 50) GS 8.55 (CAN index 50) GS 8.55 (CAN index 50) GS 8.55 (CAN index 60) GS 8.60.2 (CAN index 60) GS 8.60.2 (CAN index 60) GS 8.60.2	M62 M62 M62 M62 M62, M62 TU 99-02 M62, M62 TU 99-01 M62TU
A5S560Z	5HP30	93-94 740i/iL (E32) 93 540i (E34) 94-95 540i (E34) 94-95 840Ci (E31) 95 740i/iL (E38) 95-01 750iL (E38) 96-97 740i/iL (-1/97) 96 840Ci (E31) 95-97 850Ci	GS 9.2 GS 9.2 GS 9.22 GS 9.22 GS 9.22 GS 9.22.1 GS 9.22.1 GS 9.22.1 GS 9.22.1	M60 M60 M60 M60 M60 M73/M73TU M62 M62 M73
GA6HP26Z	GA6HP26Z GA6HP26Z	02- 745Li (E65/E66) 03- 760Li (E66)	GS 19 GS 19	N62 N73

Hydramatic Control Systems

HYDRAMATIC CONTROL SYSTEMS SPECIFICATIONS

Transmission BMW ID #	Manufacturer ID #	Model/Year	Control System	Engine

A4S310R (THM-R1)	4L30-E(A4S310R) >>>	90-92 525i (E34) 93-95 525i (E34) 92 325i,is,ic (E36) 93-95325i,is,ic (E36) 92-95 318ti (E36)	GS 4.14 GS 4.16 GS 4.14 GS 4.16 GS 4.14 & GS 4.16	M50 M50 TU M50 M50 TU M42
A4S270R	4L30-E(A4S270R) >>>	96-98 328i (is,ic - 97) 96-98 318i (is,ic-97) 96-98 318ti (E36/5) 96-98 Z3 1.9 (E36/7) 96-98 Z3 2.8 97-98 528i (E39)	GS 8.34 GS 8.34 GS 8.34 GS 8.34 GS 8.34 GS 8.34	M52 M44 M44 M44 M52 M52
A5S360R (GMS)	5L40-E (A5S360R) >>	99-00 323i/Ci (7/98-3/00) 99-00 328i/Ci (6/98-5/00) 99-00 528i (E39) 9/99-8/00 99-00 Z3 (E36/7) 2.3/2.8	GS 20 GS 20 GS 20 GS 20	M52 TU M52 TU M52 TU M52 TU
A5S390R (GM5)	5L40-E (A5S390R) >>	00-03 X5 3.0i (4/00 -) 01 325iT (8/00-3/01) 01-03 325xi/xiT & 330Xi (-8/00) 01 525i/iT (9/00-3/01) 01 530i (9/00-3/01) 01-02 Z3 2.5/3.0 (6/00-)	GS 20 GS 20 GS 20 GS 20 GS 20 GS 20	M54 M54 M54 M54 M54 M54

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Fig. 3: Hydramatic Control Systems - GS 20 TCM (Siemens)
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION IDENTIFICATION

BMW automatic transmission are manufactured by two suppliers for the US market:

- **Zahnradfabrik Friedrichshafen:** Commonly referred to as ZF. ZF manufactures both manual as well as automatic transmissions.
- **GM Powertrain - Hydramatic:** Hydramatic is a manufacturing division of General Motors located in Strasbourg, France. Hydramatic supplies automatic transmissions to BMW for four and six-cylinder vehicles.

BMW has developed an internal numbering system for their transmissions for ordering parts, information research and identification. Also, each transmission manufacturer uses an internal identification system. Here is a breakdown of these identification codes:

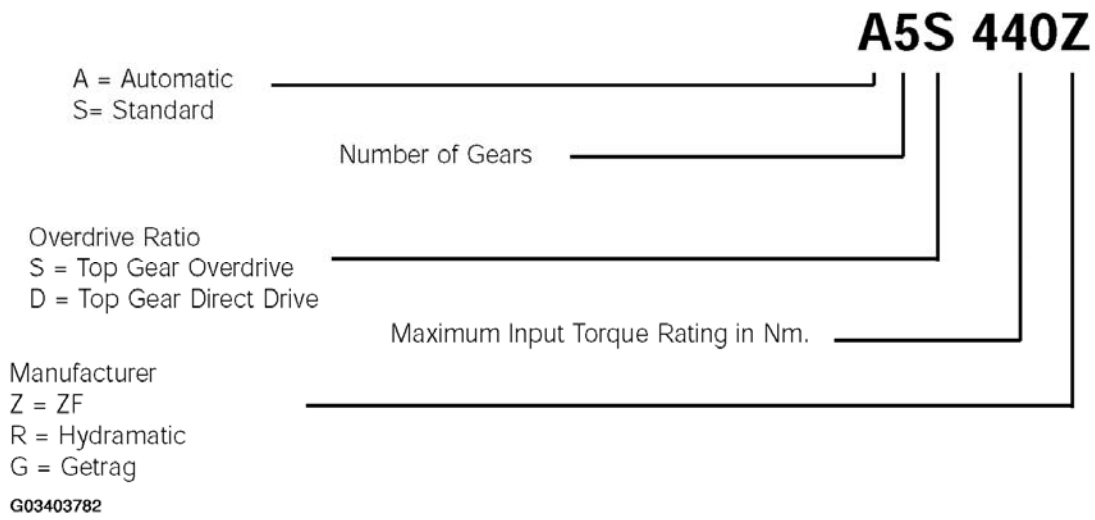

Fig. 4: Identifying BMW Identification Code Breakdown
Courtesy of BMW OF NORTH AMERICA, INC.

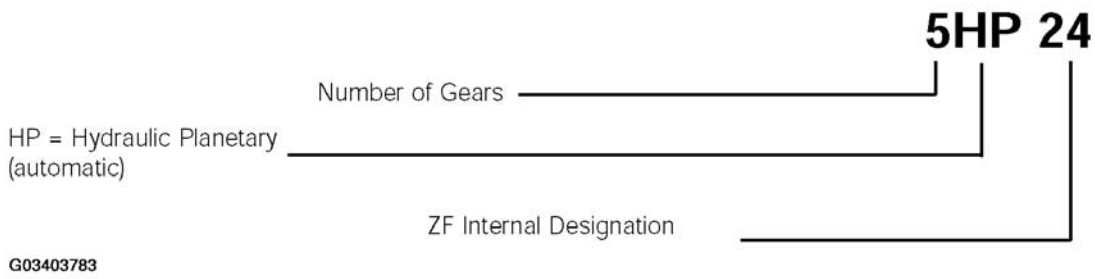

Fig. 5: Identifying ZF Identification Code Breakdown
Courtesy of BMW OF NORTH AMERICA, INC.

Hydramatic Transmissions have internal designations, however they are not used often. The internal code for the A4S310/270R is 4L30-E and the A5S360/390R is 5L40-E.

Transmission ID Tag Location

In order to identify BMW transmissions there are identification tags located externally on the transmission case. The tag contains information such as Manufacturer, Serial number, transmission type etc. This information is needed when ordering parts, referencing bulletins and calling for technical assistance.

- **ZF - Tag is Located on -**
    1. Right hand side (passenger side) of transmission case. (5HP30 and 5HP18)
    2. Left hand side (drivers side) of transmission case. (6HP26Z, 5HP24 and all 4HP)
    3. Rear under output shaft. (5HP19)

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Fig. 6: Identifying ID Tag Location 5HP19
Courtesy of BMW OF NORTH AMERICA, INC.

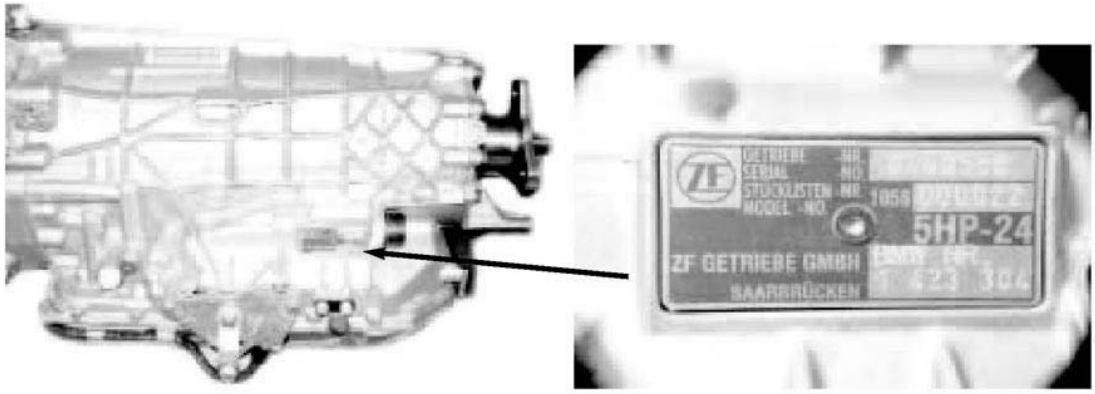

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Fig. 7: Identifying Typical ZF Tag
Courtesy of BMW OF NORTH AMERICA, INC.

- **GM** - Located on left hand side (drivers side) of transmission case.

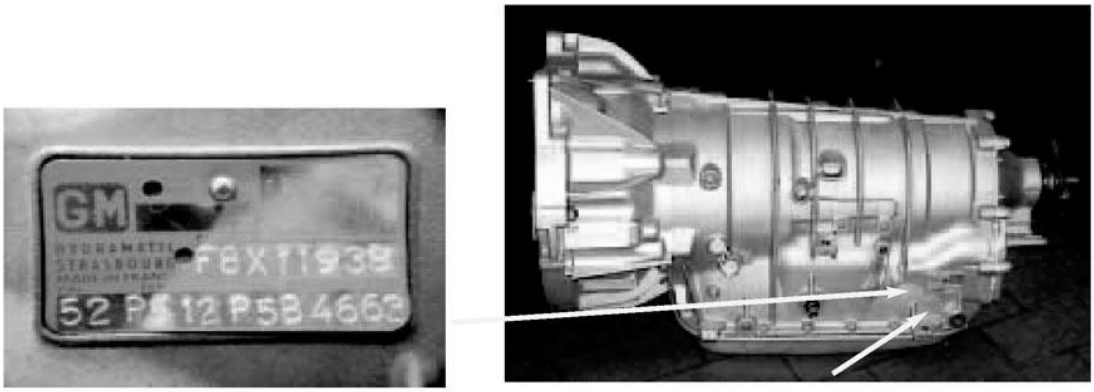


Fig. 8: Identifying GM ID Tag (GM 5)
Courtesy of BMW OF NORTH AMERICA, INC.

SYSTEM COMPONENTS (ELECTRICAL)

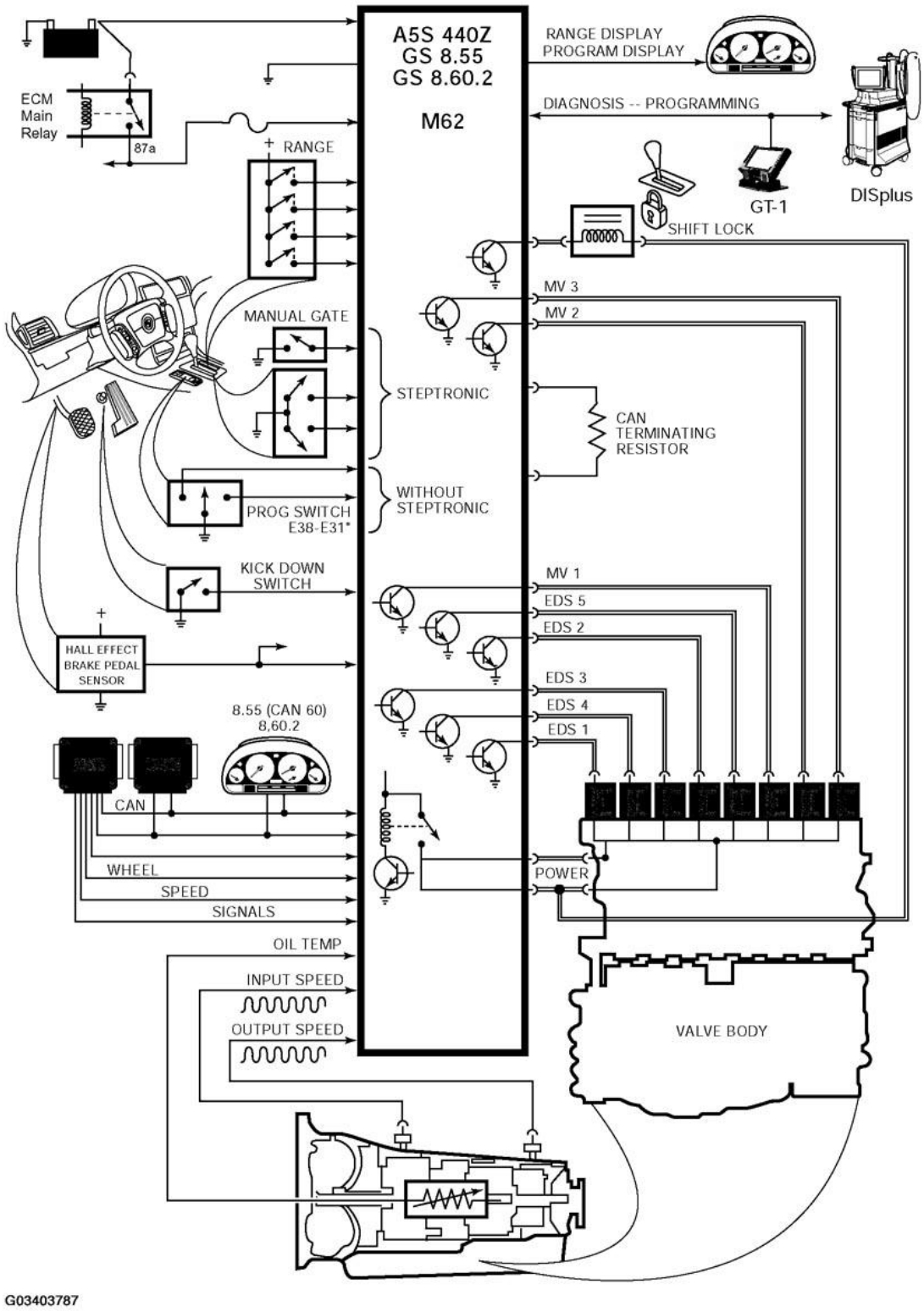


Fig. 9: Identifying System Components (Electrical)
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Control Module

The TCM receives inputs, processes information and actuates the output elements to provide optimal shift points. The TCM is programmed for maximum shift comfort and fuel economy. The TCM on most BMW vehicles is located in the E-Box next to the ECM (DME).

There are several types of TCM housings:

- 35 Pin TCM (TCU) - used on the 4HP transmissions
- 55 Pin TCM - used on the A4S310R (THM-R1)
- 88 Pin TCM - used on all others up to 98
- 134 Pin TCM - used on all BMW transmission from the 99 model year. (Note- the 134 pin TCM was introduced on the 98 Models equipped with the A5S440Z).

The 134 Pin TCM is also referred to as SKE (Standard Shell Construction). The SKE housing uses 5 separate connectors. On transmission applications only three connectors 1, 3 and 4) are used. Connectors 2 and 5 are blank and are **NOT** used. The connectors are blue in color to avoid confusion with the ECM (DME) connectors which are black.

!34 Pin control modules are supplied by Bosch for ZF transmissions and Siemens for Hydramatic transmissions. Bosch and Siemens control modules are NOT interchangeable.

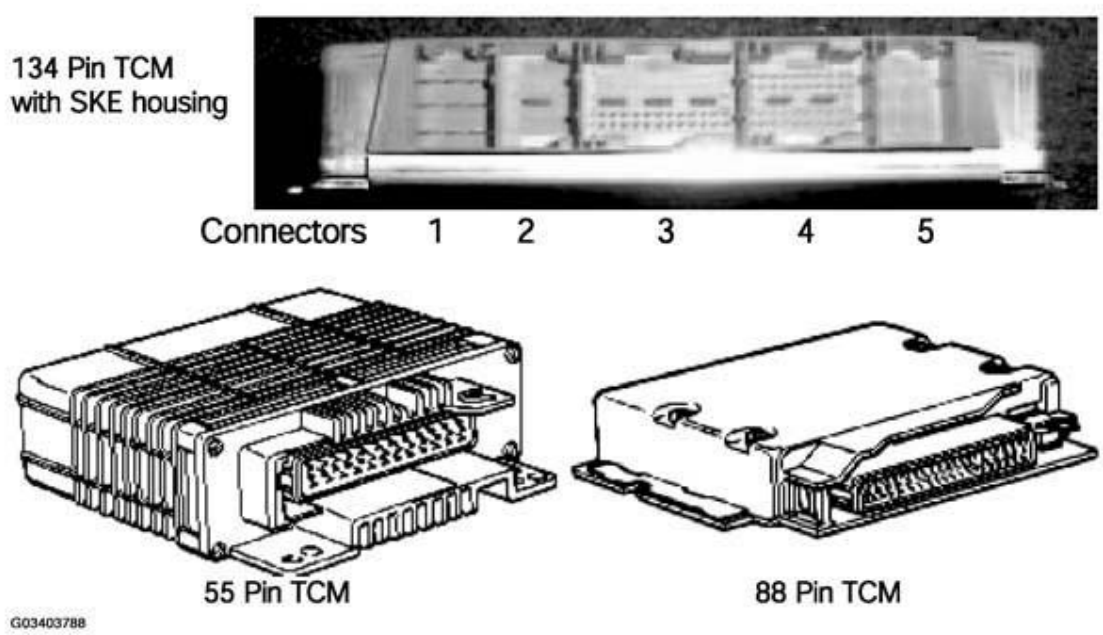


Fig. 10: Identifying Transmission Control Module
Courtesy of BMW OF NORTH AMERICA, INC.

Turbine Speed Sensor

The Turbine Speed Sensor is used to provide input (turbine) shaft speed information to the TCM (EGS). The input shaft speed signal is used in conjunction with the output shaft speed signal to determine gear range and slip time information for processing in the TCM. Not all BMW transmissions use a turbine speed sensor. Some TCM's use the TD (engine speed) signal to determine input shaft speed. All transmissions with the exception of the A5S325Z use an inductive type sensor which generates an AC analog signal. The A5S325Z currently uses a Hall Effect Turbine Speed Sensor which will send a digital square wave signal to the TCM.

4HP22/24 (EH), A4S310/270R: These transmissions do not use a Turbine Speed Sensor. The TD signal is used to determine input shaft speed. The TD signal is an output signal of the DME control unit.

A5S310Z, A5S325Z, A5S440Z, A5S560Z, A5S360/390R: These transmission use a turbine speed sensor. The TD signal is also used with the turbine speed signal to allow the TCM to monitor Torque Converter Clutch operation. The TCM can control torque converter clutch slippage and also monitor for faults.

Output Shaft Speed Sensor

The Output Shaft Speed Sensor is used to provide output shaft speed information to the TCM. The output shaft speed signal is used in conjunction with the turbine speed signal to provide the TCM with information on gear ranges and slip times.

All BMW electronic transmissions have an output shaft speed sensor. The output shaft speed sensor is an inductive type which will generate an AC analog signal to the TCM. The frequency and amplitude of the signal will increase as output shaft speed increases. The exact location of the output shaft speed sensor varies by transmission model.

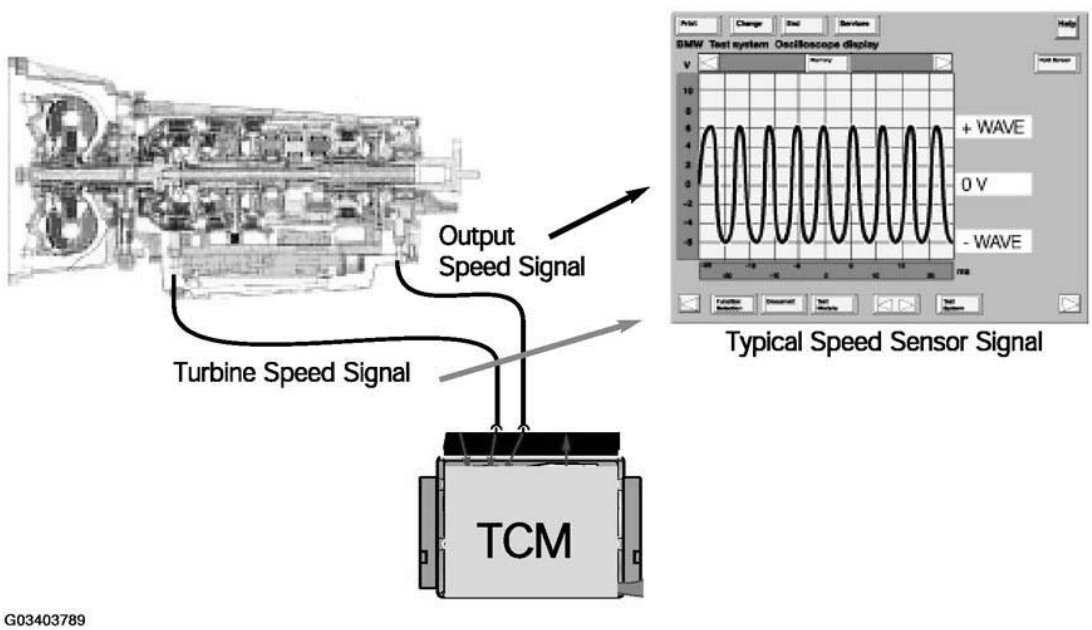


Fig. 11: Identifying Output Shaft Speed Sensor Graph
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Oil Temp Sensor

The TCM is provided with transmission oil temperature information via a temperature sensor. On most BMW transmissions, the sensor is an NTC element which is part of the transmission internal wiring harness.

4HP22/24 (EH): These transmissions do not use a transmission oil temperature sensor. There are no transmission oil temperature influenced features on the 4HP transmissions.

All Except A5S360/390R, GA6HP26Z: The transmission fluid temp sensor is part of the transmission internal wiring harness. On these transmissions, the sensor cannot be replaced separately. The harness must be replaced.

A5S360/390R transmission: the sensor is a separate, replaceable sensor that can be unplugged from the harness.

GA6HP26Z: the sensor is located in the Mechatronics Module, which is located inside of the transmission.

NOTE: The Mechatronics Module is not currently serviceable at this time. Contact the BMW Technical Hotline in the event of a failure. Do not attempt any repair or replacement of the Mechatronics Module.

The transmission oil temperature information is used to:

- Initiate the Warm Up Program
- To inhibit TCC operation until a specified temperature has been reached.
- For determining fluid level when used with diagnostic equipment.

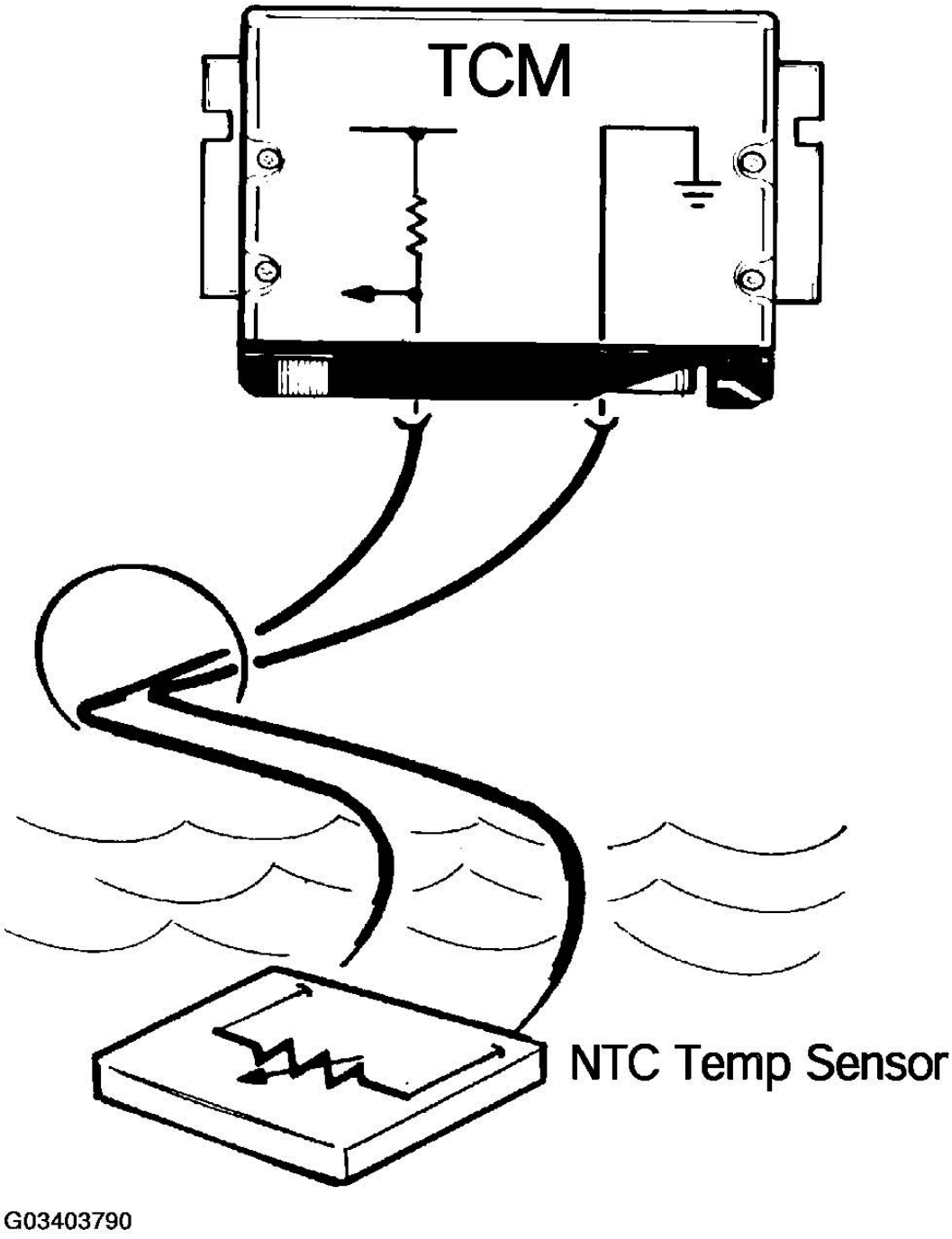


Fig. 12: Transmission Oil Temperature Sensor Is Connected To TCM
Courtesy of BMW OF NORTH AMERICA, INC.

The transmission oil temperature sensor is connected to the TCM via a 5 Volt reference and a circuit ground. As transmission oil temperature increases, the circuit resistance and voltage decrease proportionately.

Kickdown Switch

The TCM receives a kickdown request via one of two possible methods:

- The kickdown signal is a direct ground input to the TCM. The kickdown input is provided by a kickdown switch located under the accelerator pedal. This method is used on most BMW vehicles without electronic throttle control systems (except M52TU with MDK).

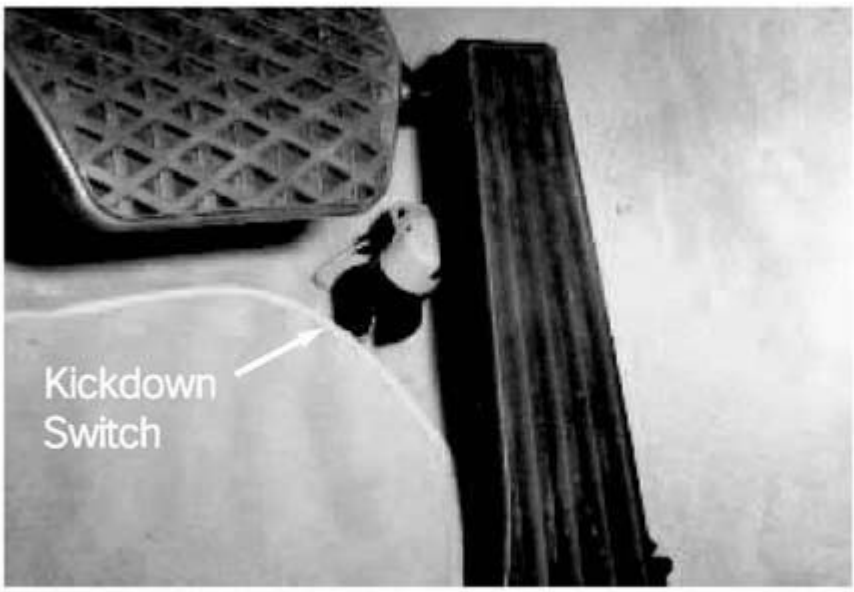


Fig. 13: Identifying Kickdown Switch
Courtesy of BMW OF NORTH AMERICA, INC.

- The kickdown request is provided by the ECM (DME) via the CAN bus. The kick down request originates from the PWG. There is no separate switch in the PWG. When the PWG voltage reaches approximately 4.5 volts, the ECM will process a kickdown request to the TCM via CAN. The PWG contains a kickdown detent to simulate the feel of a kickdown switch.

  This method is used on the M62TU, M54, M73, M73TU, N73 and N62 engines.

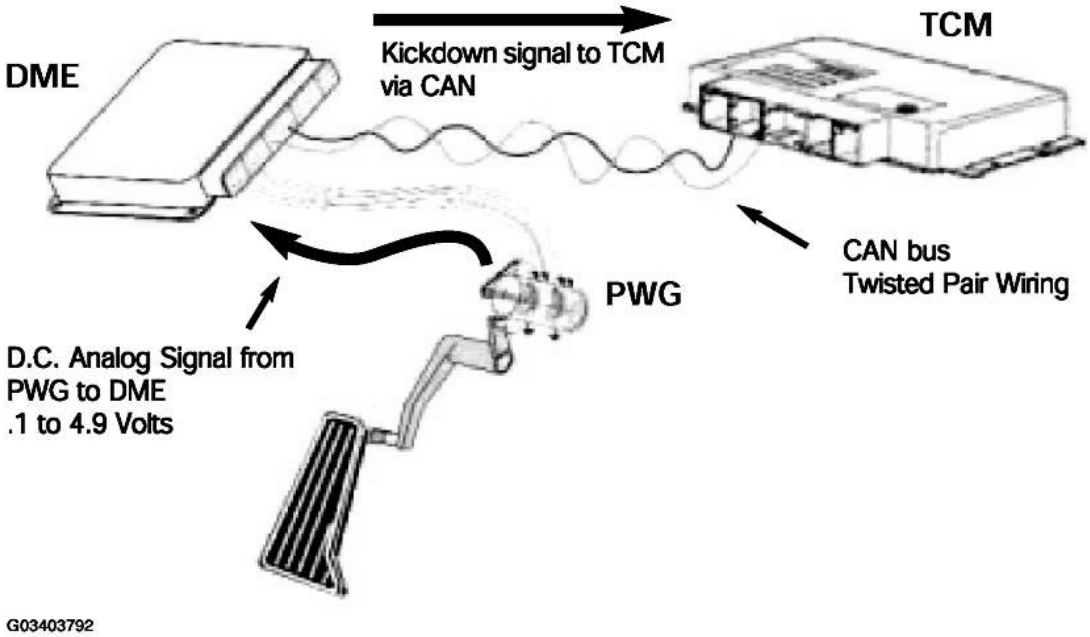


Fig. 14: Identifying Kickdown Signal Is A Direct Ground Input To
Courtesy of BMW OF NORTH AMERICA, INC.

Brake Switch

The brake switch is located on the brake pedal linkage. The brake switch signal is an input to the TCM which is used for:

- De-activation of the shift lock solenoid. When the ignition key is turned to KL15 the shift lock is active. The shift lock solenoid is de-activated when the brakes are applied.
- De-activate the Torque Converter. The TCC is deactivated whenever the brake is applied. (only on Hydramatic Transmissions).

There are two types of brake switches used on BMW vehicles:

- On early vehicles such as E32, E34, E36, E24, E28 and E31 the brake switch is a double-contact mechanical switch. There is a brake light circuit and a brake test circuit. The brake test circuit is used for a plausibility check to indicate faults within the brake light circuit.
- On the E38, E39, E46, E65/66, E85 and E53 the brake switch is a hall effect type switch. The electronic switch is also monitored for faults and plausibility.

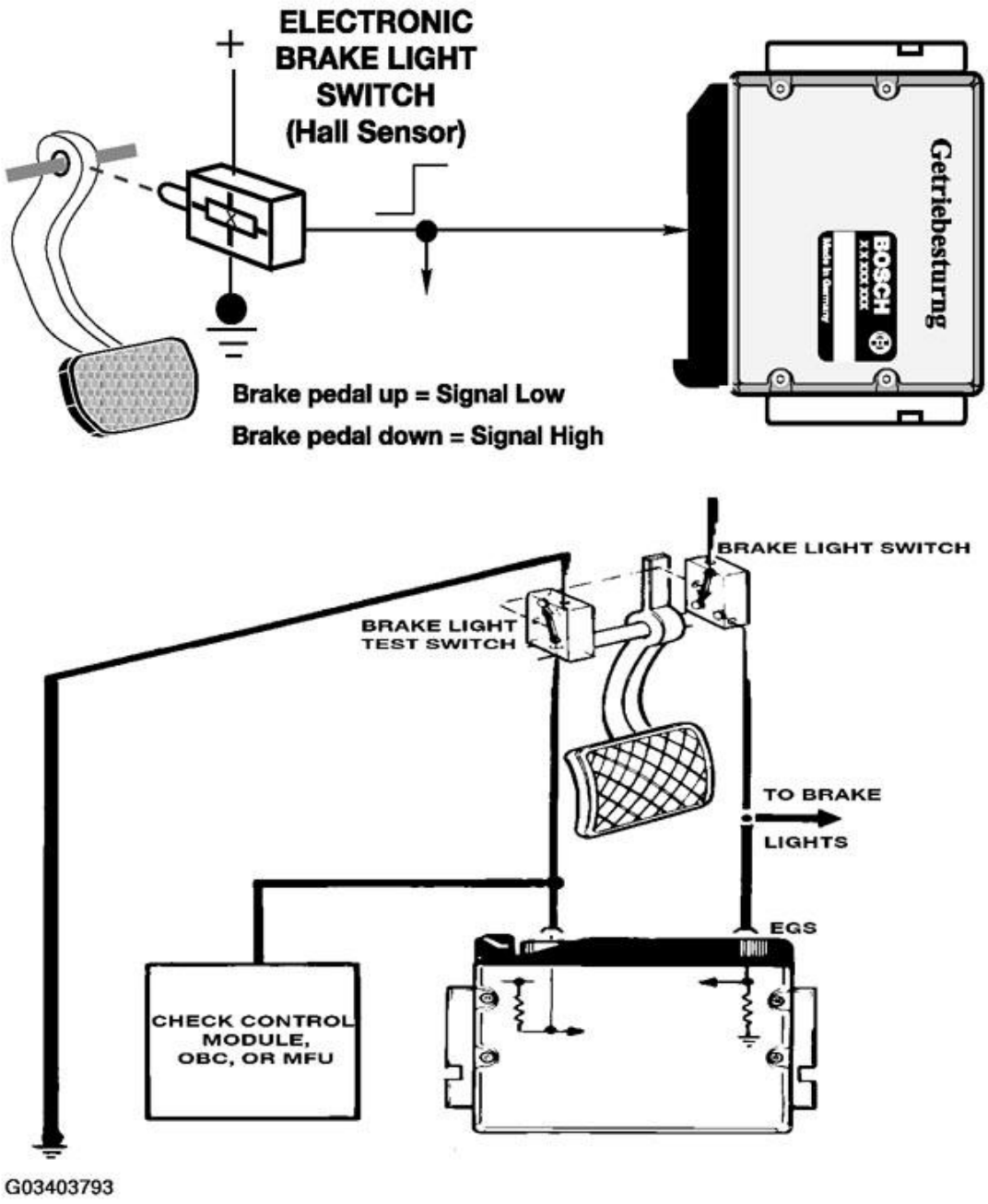


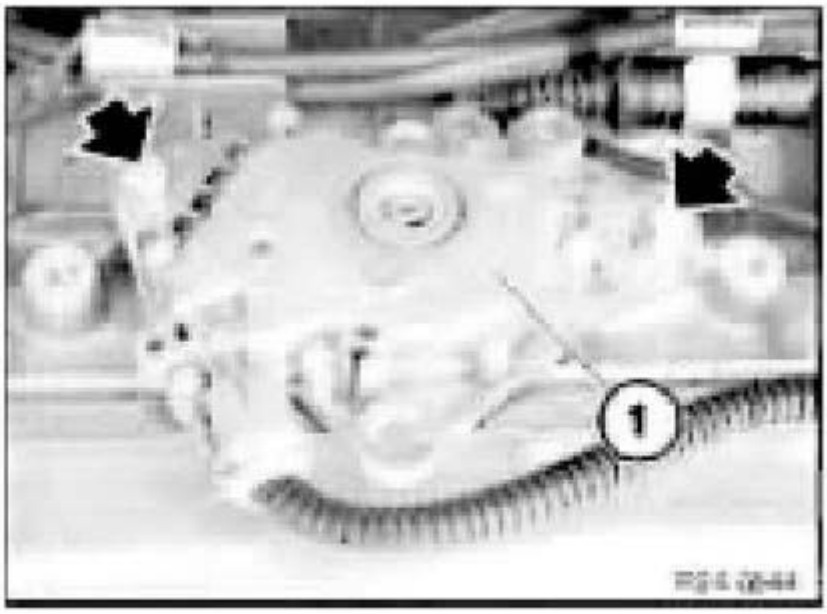
Fig. 15: Identifying Brake Switch Signal Is An Input To TCM
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Range Selector Switch

The range selector switch is an input to the TCM. The input is used by the TCM to determine the position of the manual valve. The range switch uses the familiar "coded input" signal to determine selector lever position. On all transmissions except the A5S360/390R, the range switch uses a 4 wire configuration to determine 7 range

selector positions. The A5S360/390R uses a five wire arrangement.

Most range switches are located on the transmission case with some exceptions. The E36 with the A4S270/310R the range switch is located is the center console on the selector lever assembly. The E39 with A4S270R the range switch is located on the transmission case and is adjustable. The range selector switch on the A5S360/390R is located inside the transmission housing. GA6HP26Z is part of the Mechatronics Module.



G03403794

Fig. 16: Identifying Transmission Range Selector Switch
Courtesy of BMW OF NORTH AMERICA, INC.

The range switch can be checked by using "Status Requests" in the DISplus or GT-1.

A multimeter or an oscilloscope can also be used to check the range switch. If the reading on "Status Requests" does not match the actual selector lever position, there will be various transmission malfunctions.

Use the switch logic chart to diagnose faults in the switch.

In the example below, the range switch is in neutral. Using the logic chart, switches L1, L2 and L3 are closed providing B+ voltage to the corresponding pins of the TCM. Switch L4 is open and no voltage is sent to the TCM. Malfunctions in the range switch or wiring can cause various shifting complaints and possible No-Start complaints.

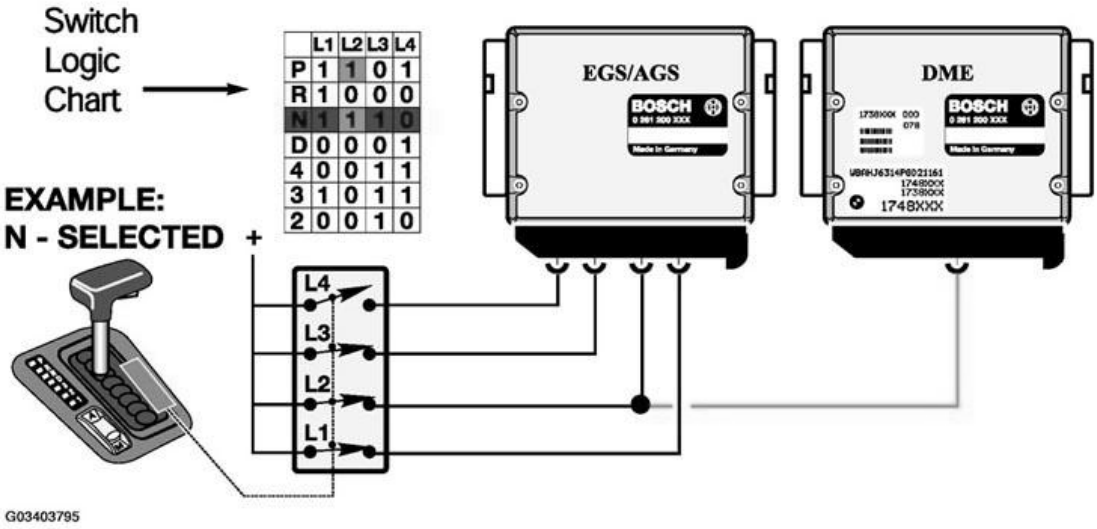


Fig. 17: Identifying Transmission Range Selector Switch Logic Chart
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Program Switch

The transmission program switch is used to switch between various operating modes of the transmission. The normal default mode of the TCM is Economy which is indicated in the program display as "E". Economy mode allows the transmission to operate in the most efficient mode. Shift priorities are for maximum economy and shift comfort. On some vehicles the program switch is designated "A" for economy mode. Program switches come in 2 or 3 position configurations. Early vehicles with the 4HP (Early E7) used a rotary program switch.

The TCM can also be switched to "Manual Mode" which on some vehicles is designated "Winter Mode". Manual mode is used to start the vehicle off in a higher gear when encountering slippery conditions. The program display will indicate "M" (manual) or an asterisk symbol for "Winter Mode".

Sport Mode is the third operating mode that is available. Sport mode allows for a slightly delayed and more aggressive shift. Sport mode is obtained a number of ways. On vehicles with 2 position program switches, moving the selector lever out of drive to 4,3, or 2 with the program switch in Economy will allow Sport mode. On vehicles with 3 position program switches, Sport mode can be obtained by switching to "S".

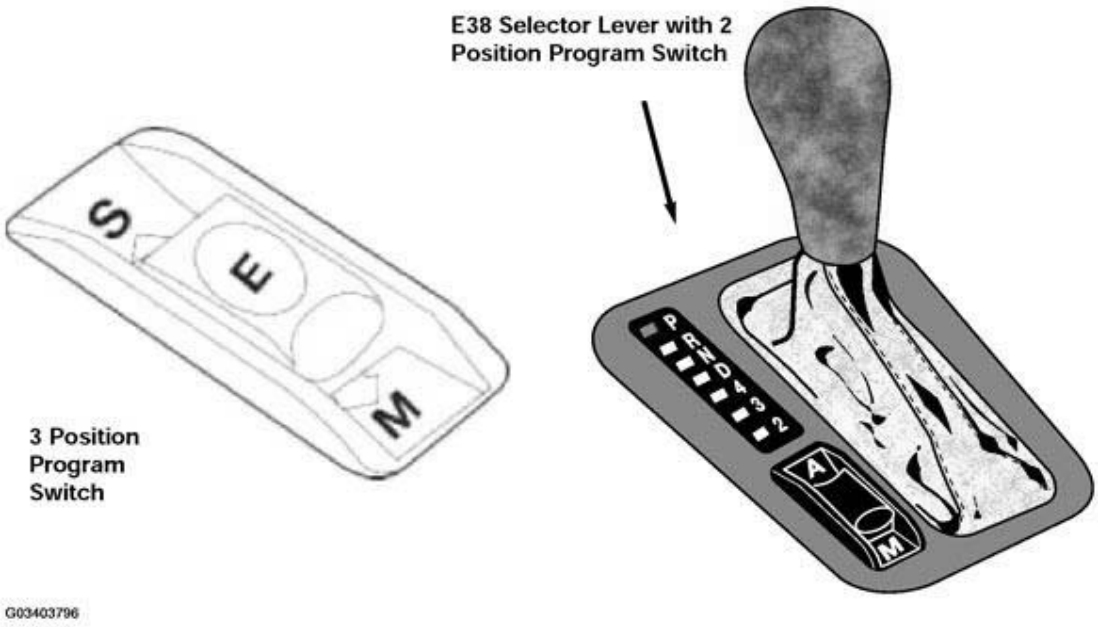


Fig. 18: Identifying Transmission Program Switch
Courtesy of BMW OF NORTH AMERICA, INC.

Steptronic Components

The Steptronic system uses additional components not found on a conventional system. These components consist of a manual switch and an Up/Down microswitch. Otherwise, the Steptronic system uses the same transmission and TCM.

The TCM monitors the Steptronic shifter position from P through D via the conventional range selector switch located on the transmission. The Range Selector Switch provides positions P through D to the TCM because the automatic gate of the shifter only travels through these positions.

When the Steptronic Shifter is moved to the left 15 degrees into the manual gate, the TCM receives a ground input from the manual gate switch. The ground signal is provided to the TCM through the Transmission Position Indicator. The transmission position indicator also provides range position signaling to the range position indicator in the shift console.

Steptronic was introduced on the E31 850Ci (10/94) and the 840Ci (1/96). Steptronic was subsequently introduced into the E38, E39, E46, E36/7 and the E53.

The Steptronic system can be diagnosed through "Status Requests" with the DISplus or GT-1.

From 2002 model year the Steptronic shifter has changed slightly. Downshifts are now achieved by moving the selector lever forward and upshifts are now rearward.

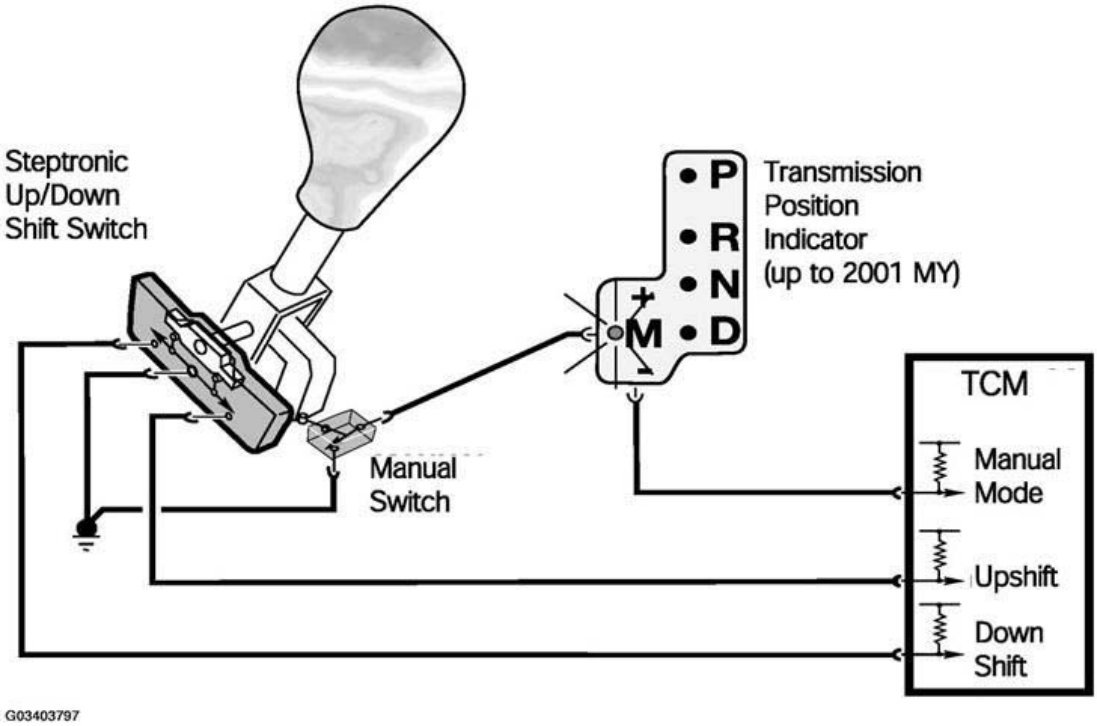


Fig. 19: Identifying Steptronic Components
Courtesy of BMW OF NORTH AMERICA, INC.

Magnetic Valves

Magnetic Valves (MV) are used to electronically control hydraulic fluid flow to the various shift elements within the transmission. Magnetic valves are located on the valvebody and replaceable as separate components. In ZF transmissions, MV valves are designated MV1, MV2, MV3 etc. In Hydramatic transmissions, they are designated Shift Valve A, Shift Valve B, Shift Valve C etc.

The magnetic valves are controlled by the TCM. They are supplied power by an internal TCM relay and are ground controlled. The TCM switches one or more of the MV's on or off in various combinations to achieve various shifts. Most transmission have 2 or 3 MV's to control shifting.

In addition to controlling shifts within the transmission, magnetic valves are also used for overlap shifting and pressure regulation on some transmission applications. For example MV4 and MV5 are used for overlap shifting in the A5S310Z. MV5 is used for pressure regulation on the 4HP22/24EH transmissions. When used for pressure regulation, the magnetic valves are pulse width modulated by the TCM.

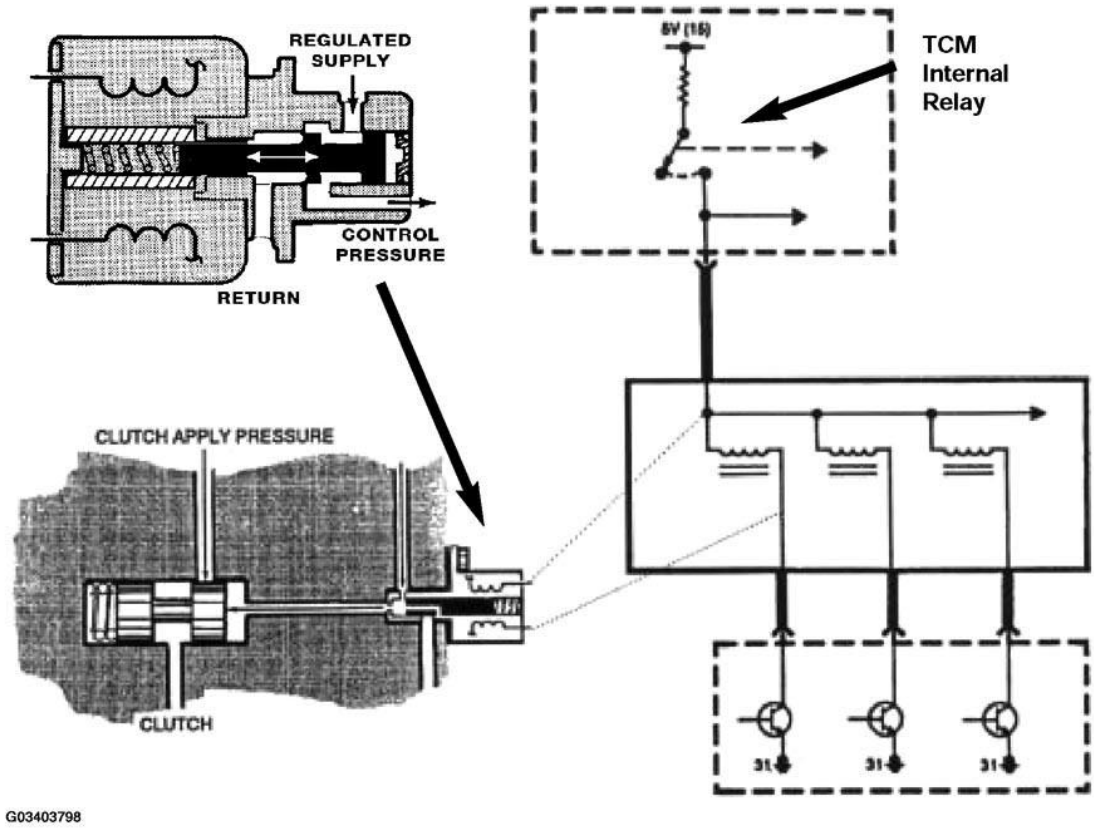


Fig. 20: Identifying Magnetic Valves Are Pulse Width Modulated By TCM
Courtesy of BMW OF NORTH AMERICA, INC.

Pressure Regulating Solenoids

Pressure Regulating Solenoids are used to modify line pressure for use in the transmission. There are numerous terms for these solenoids depending upon transmission type and manufacturer. ZF transmissions use the term EDS, while Hydramatic Transmissions use the term DR solenoid, Force Motor Solenoid and Variable Bleed Solenoid (VBS).

EDS valves are used for main line pressure regulation, TCC application and Overlap Shift Pressure Control on the A5S440Z and A5S560Z. All pressure regulating solenoid are controlled by Pulse Width Modulation.

Using the example in the picture below, this is a section of the A5S440Z/560Z valve body. The EDS valves are used for the following:

- EDS 1 is used for main line pressure regulation
- EDS 2, 3 and 5 are used Overlap Shift Pressure Control
- EDS 4 is used for TCC application. (GWK) Gradually applied TCC.

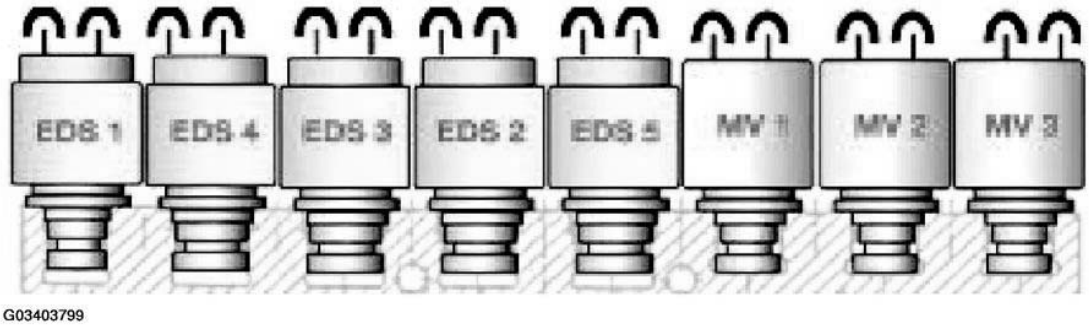


Fig. 21: Identifying Pressure Regulating Solenoids
Courtesy of BMW OF NORTH AMERICA, INC.

Hydramatic Pressure Regulator

The valve body shown at the right is from the A5S360/390R. Note the location of the main pressure regulator. Depending upon the reference text, the pressure regulator is also known as the Force Motor Solenoid, Variable Bleed Solenoid or PC Solenoid.

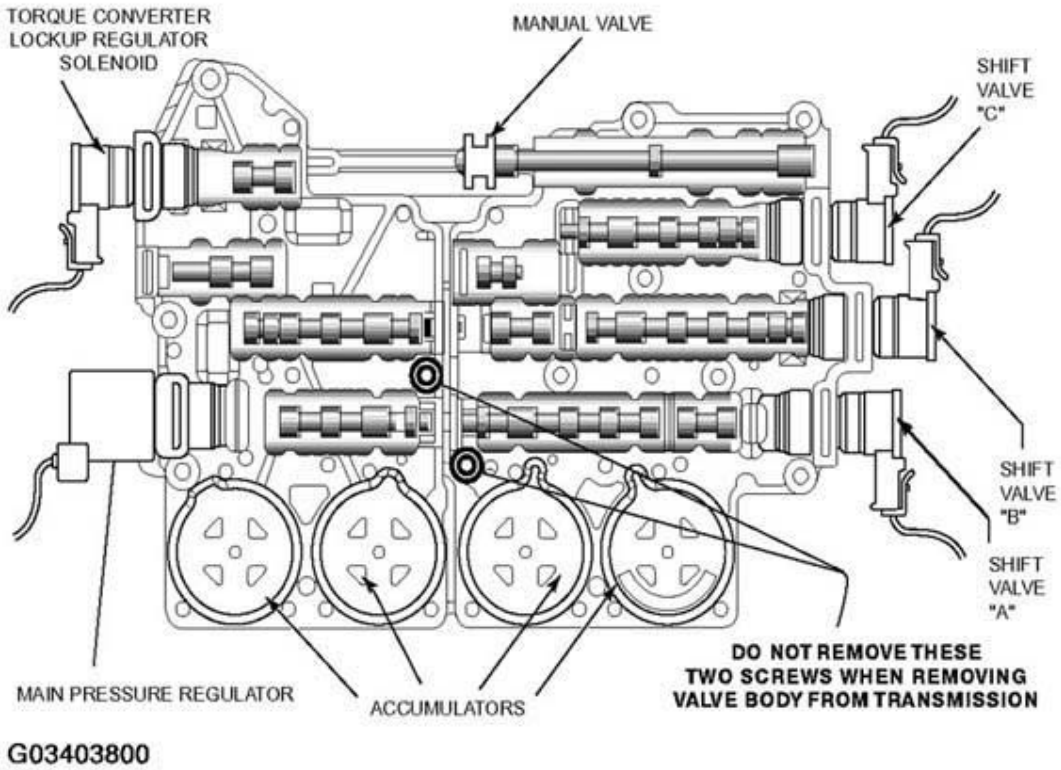
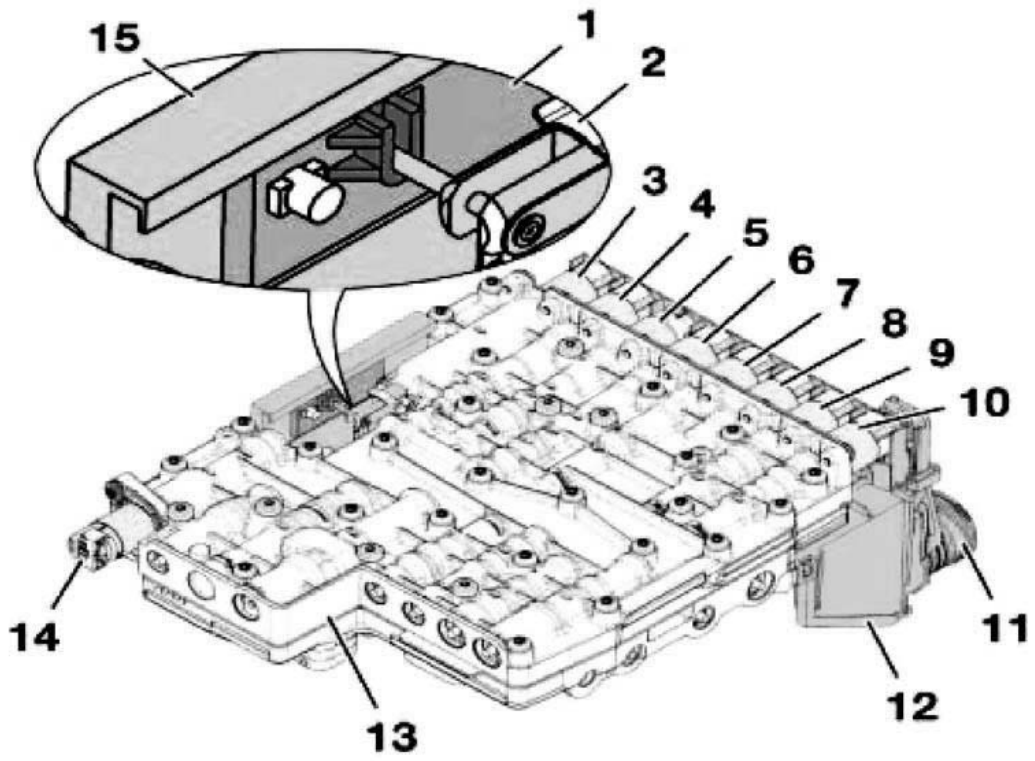


Fig. 22: Identifying Hydramatic Pressure Regulator
Courtesy of BMW OF NORTH AMERICA, INC.

Mechatronics Module GA 6HP26Z



1	Position Slide Switch	9	EDS 2
2	Parking Lock Cylinder Piston	10	EDS 1
3	Solenoid Valve 3, parking lock Cylinder	11	Electronic Plug Connector
4	EDS	12	Electronic Module
5	Solenoid Valve 1	13	Hydraulic Module (Valve body)
6	EDS 4	14	Solenoid Valve 2
7	EDS 5	15	Position Switch
8	EDS 3		

G03403801

Fig. 23: Identifying Mechatronics Module GA 6HP26Z
Courtesy of BMW OF NORTH AMERICA, INC.

Instrument Cluster

The cluster is used to report information to the driver regarding transmission status. There are three items of information needed by the driver:

- **Transmission Range** - this indicates the position of the range selector lever. The driver needs to know whether the transmission is in P, R, N, D, 4, 3, or 2.
- **Transmission Program** - this indicates the mode of operation. There are 3 modes, Economy, Manual and

Sport.

- **Transmission Fault Information** - the driver needs to know of there is a malfunction in the transmission. Depending upon application, transmission faults can be indicated by an icon or by a "Transmission Program" message in the instrument cluster display matrix.

Fig. 24: Identifying Instrument Cluster
Courtesy of BMW OF NORTH AMERICA, INC.

Depending upon vehicle model and transmission, these pieces of information arrive at the cluster through different methods.

- The most current method for this information to arrive at the cluster is through the CAN bus. The cluster processes this information from the TCM via CAN.
- On early E38 and E39 vehicles these is a "One Way Data Signal" from the TCM to the cluster. There is a one way serial data line that transfers this information to the cluster. On later vehicles, the cluster was introduced to the CAN bus and this method was no longer used. This was used on the E38 vehicles to 5/97 and E39 vehicles to 8/97 production.
- Early vehicles such as E32, E34, E36 etc. used a various combination of methods to transfer this data. Some clusters use the "Coded Input" method for the program indicator. Fault indication is done by a ground circuit through the TCM. Transmission range indication is achieved by a direct connection between the range switch and cluster or by a coded input to cluster.

There will be a FC6 in the Kombi when the TCM goes into fail-safe mode.

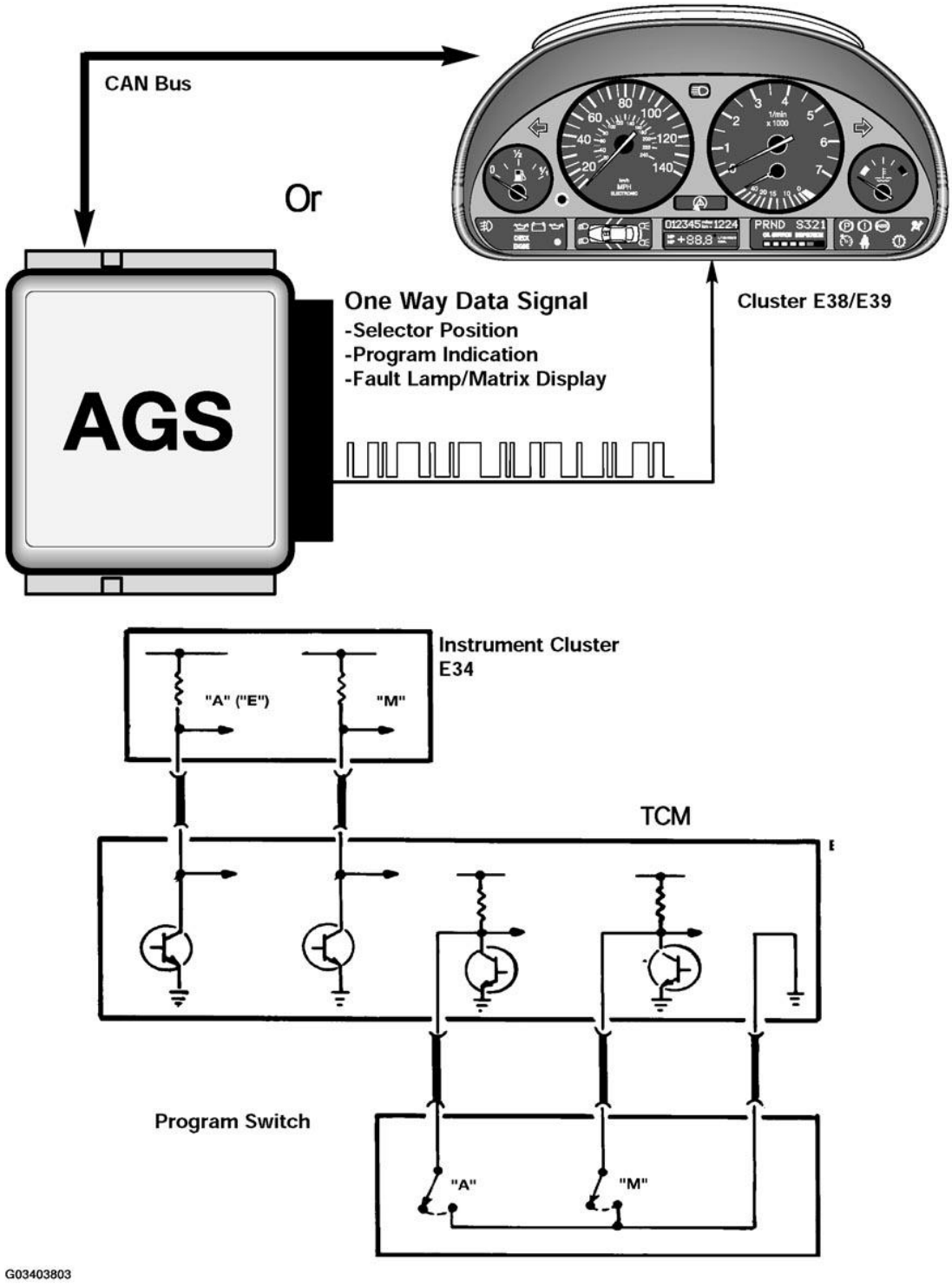


Fig. 25: Identifying Instrument Cluster Circuit
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION FEATURES AND PRINCIPLES OF OPERATION

Adaptive Hydraulic Pressure Control

Pressure adaptation has been a feature of ZF automatic transmissions since the 4HP22EH. The TCM will maximize shift quality by adapting to transmission wear over time. The TCM will adjust transmission shift pressures to compensate for wear in the multi-plate clutches. This is accomplished by monitoring the input and output speeds of the transmission. When the transmission shifts, the TCM monitors the time that it takes to accomplish the shift. The time change in gear ratio is monitored and compared to an internal time value in the TCM. If the ratio change takes more time than the stored value, the TCM will compensate by adjusting the transmission shift pressures via the EDS valve solenoids. The adaptation value is stored in the TCM. This adaptation values can only be cleared by the diagnostic tester (DIS plus or GT-1).

NOTE: DO NOT clear adaptation values unless directed to do so by technical assistance. Clearing pressure adaptations should not be done to resolve a customer complaint. The only time that you would need to do so is after a transmission or valve body replacement or software change.
Also it is important not to confuse pressure adaptation with AGS features. AGS features will be discussed later in this chapter. AGS features are not stored on a long term basis and will not be cleared when the pressure adaptations are cleared. Driving style is NOT stored.

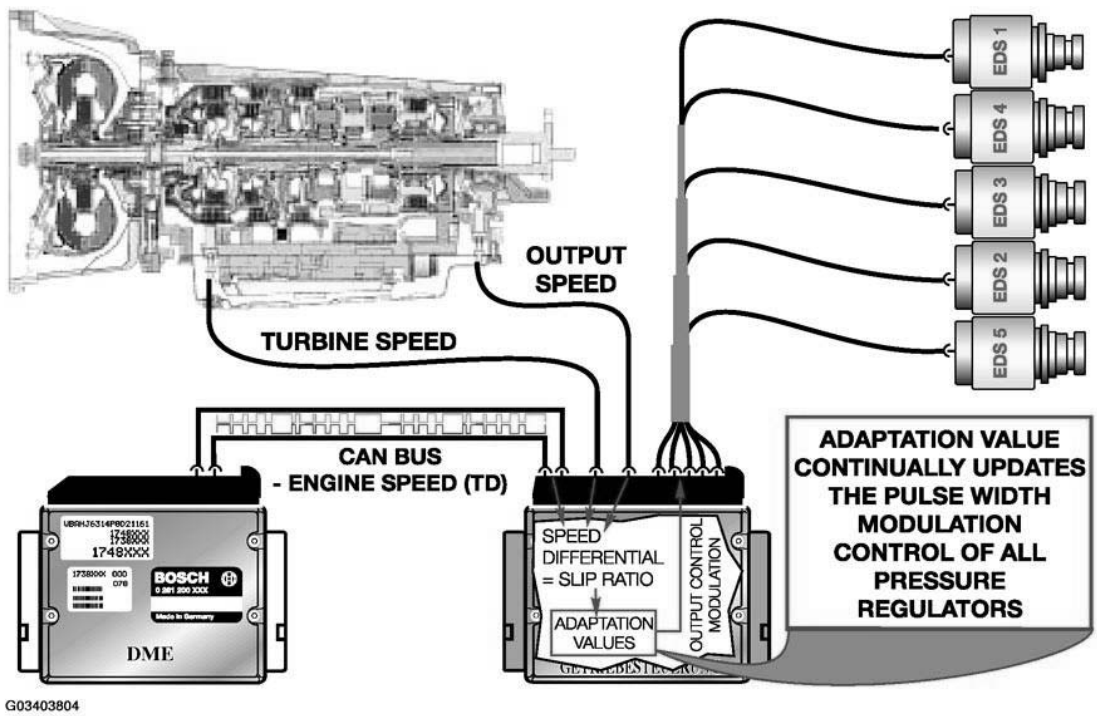


Fig. 26: Identifying Adaptive Hydraulic Pressure Control
Courtesy of BMW OF NORTH AMERICA, INC.

Downshift Protection

Downshift protection is a feature that prevents unwanted or improper downshifting. If the range selector were moved to a lower gear at a high road speed, engine damage could occur from an unintended over-rev. This feature will prevent engine over-rev by delaying or preventing the unwanted downshift until the proper road speed is achieved. The result is increased safety by preventing unwanted deceleration slip.

Reverse Lockout

The TCM will lockout reverse above 3 MPH to prevent drivetrain damage. The range selector lever will go into the reverse detent, but reverse will not engage. This is achieved by the TCM through hydraulic intervention. The transmission will appear to be in neutral.

NOTE: Reverse Lockout is not operative when in fail-safe.

Engine Warm Up Cycle

The transmission shift points are modified after cold start to raise engine RPM during shifting. This allows for a faster engine warm up and reduction of catalyst warm up time. The TCM uses the transmission oil temperature information to determine the implementation of this function.

The warm up phase program will be terminated if any of the following conditions exist:

- The vehicle exceeds 25 MPH or
- Transmission oil temperature exceeds 60 Degrees Celsius or
- A Maximum of three minutes is exceeded.

ASC/DSC Shift Intervention

During ASC/DSC regulation upshifts are inhibited to enhance the effectiveness of tractional control. Depending upon vehicle model, this action can take place via the CAN bus or a dedicated shift intervention signal wire. On later model vehicles where the ASC/DSC module is connected to the CAN bus, the shift intervention signal is sent to the TCM via CAN.

Torque Reduction

In order to allow a smoother shift and reduce load on the transmission, engine torque is reduced during shifting. This is accomplished by a signal that is sent from the TCM (EGS) to the ECM (DME) during shifting. The ECM will retard timing momentarily during the shift for a few milliseconds. This timing change is transparent to the driver. Depending upon application, the torque reduction signal is sent over a dedicated wire or a signal over the CAN bus.

Emergency Program

When a malfunction occurs within the transmission, the Emergency program (fail-safe mode) will be initiated. The Emergency Program will prevent unintended gear engagement and ensure driver safety. The following will occur during Fail-safe Operation:

- All shift solenoids are de-energized via TCM internal relay.

- The pressure regulation solenoid is de-energized resulting in maximum line pressure.
- The Torque Converter Clutch is de-activated.
- The Reverse Lockout function is cancelled.
- Shift lock solenoid is de-energized.
- Fault indicators are active.

The fault indicator varies depending upon model, year and cluster type etc. High version instrument cluster will display a message in the matrix display. Vehicles with low version clusters will display a fault symbol in the cluster.

During fail-safe mode the transmission will be shifted into a higher gear to allow the vehicle to be driven to a service location. Depending upon application, the transmission will shift into 3rd or 4th gear (on a 4spd) and 4th or 5th gear (on a 5 spd). For example the A5S360R transmission will go into 5th gear when there is a malfunction and 4th when there is a power failure to the TCM. Since pressure regulation ceases, the shift to fail-safe mode will be abrupt or harsh, unless the transmission is already in the fail-safe gear.

On newer OBD II compliant vehicles, the MIL light will also be illuminated by the ECM (DME).

NOTE: **When diagnosing transmission related complaints, it is possible to have an erroneous fault indicator warning. Faults in the cluster can cause a false indication or "Trans Program" message. One indication of this scenario would be a transmission fault message in the cluster with no transmission faults stored in the TCM.**

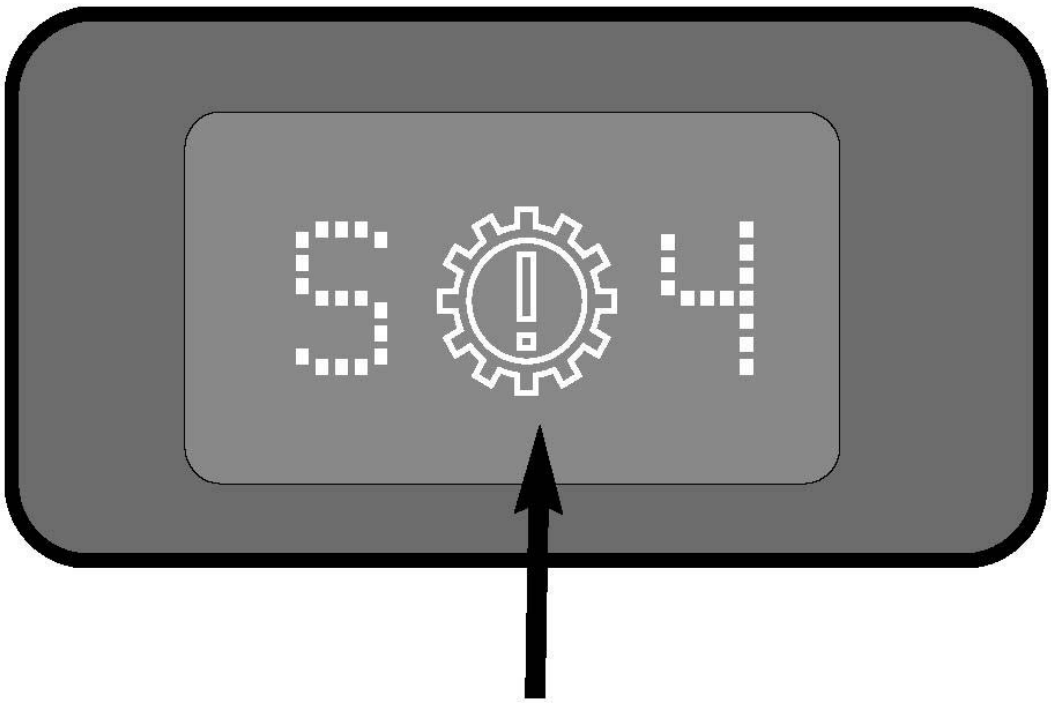


Fig. 27: Identifying E46 Transmission Fault Indicator
Courtesy of BMW OF NORTH AMERICA, INC.

AC Compressor Load Sensing (Hydramatic Transmissions)

When the AC Compressor is switched on, additional load is placed on the engine. To compensate for the additional load, the TCM modifies line pressure and shift points. On the THMR-1, the TCM receives these signals via a direct connection to the AC compressor control circuit.

On vehicles equipped with CAN bus technology, the "AC on" signal is sent to the TCM from the DME as a CAN bus message.

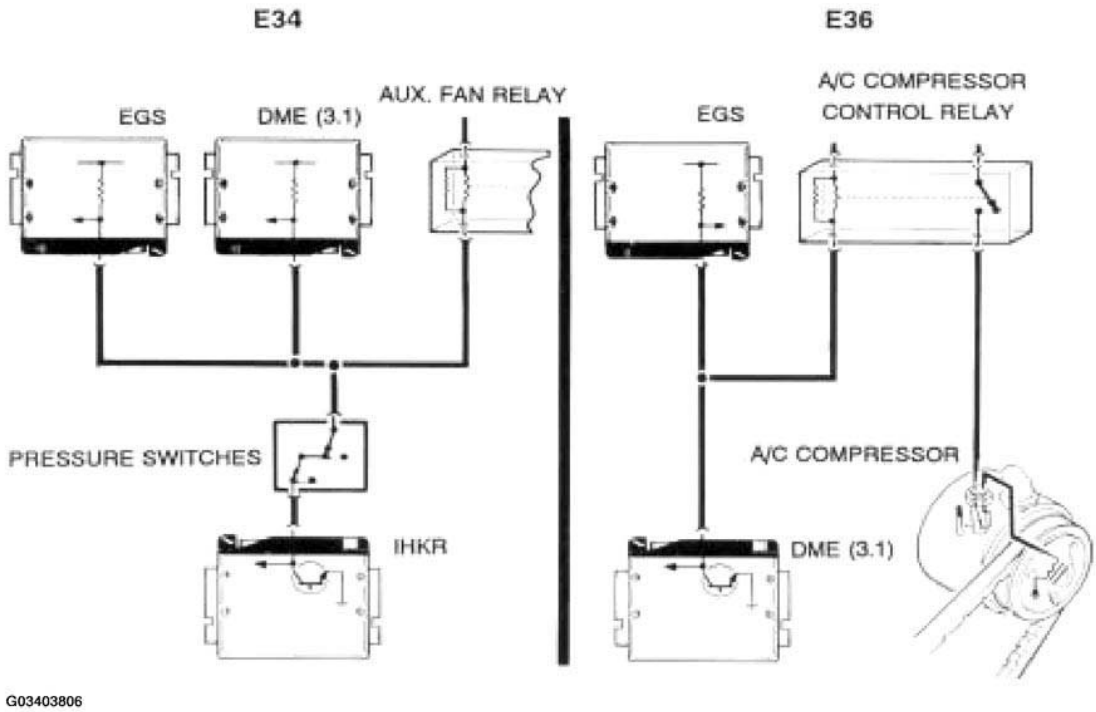


Fig. 28: Identifying AC Compressor Load Sensing (Hydramatic Transmissions)
Courtesy of BMW OF NORTH AMERICA, INC.

Shift Lock

The shift lock solenoid is mounted on the selector lever assembly and locks the selector lever in Park or Neutral when the ignition is ON. This prevent the selection of a gear unless the brake pedal is depressed. The solenoid is activated by a switched ground from the TCM. Power is supplied by the TCM internal relay. During fail-safe operation, the shift lock is disabled. On later models, the shift lock will also be active when the TD signal is present and the shifter will remain locked above an engine speed of 2500 RPM regardless of brake application.

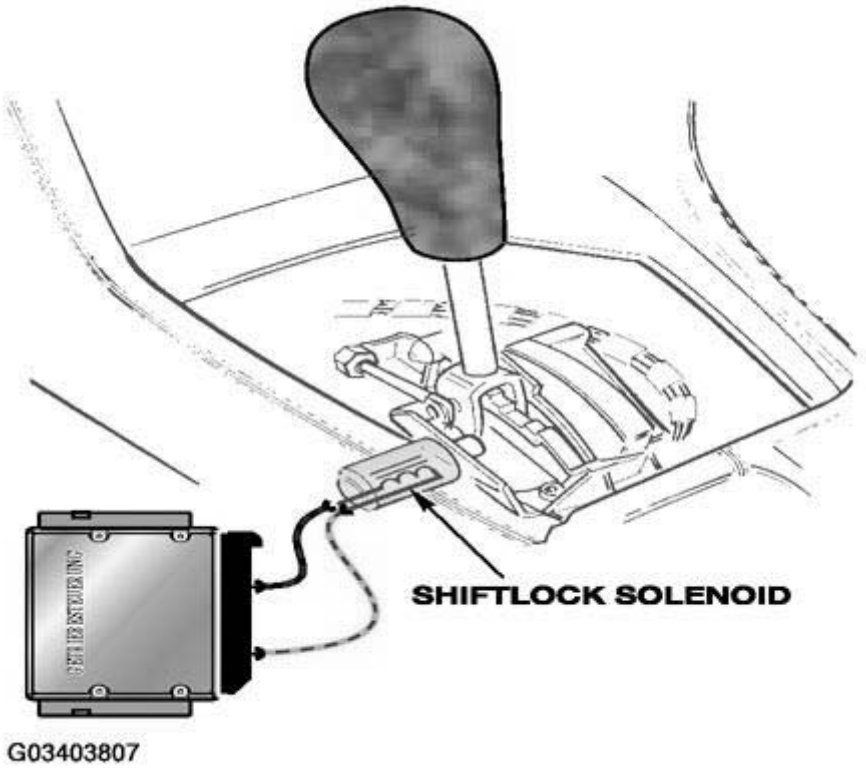


Fig. 29: Identifying Shift Lock Solenoid
Courtesy of BMW OF NORTH AMERICA, INC.

Torque Converter Clutch

Since the efficiency of the torque converter at coupling speed is approximately 1.1 to 1, fuel economy is compromised. To offset this a torque converter clutch was added on EH controlled transmissions. The torque converter clutch locks the turbine to the converter housing. This creates a mechanical coupling with a ratio of 1:1. This can only be achieved at higher engine speeds, the torque converter clutch must be disengaged at low engine speeds to prevent stalling.

There are two methods for controlling the torque converter clutch on BMW transmissions:

- **A4S310/270R, 4HP22/24 EH, A5S310Z** - These transmissions use an on/off control method to lock and unlock the torque converter. The Torque Converter Clutch is either completely engaged or disengaged. This method of engagement provides an abrupt sensation when the TCC is locking and unlocking. This abrupt sensation can be undesirable to some drivers.
- **A5S560Z, A5S440Z, A5S325Z, GA6HP26Z,A5S360/390R** - These transmissions use a gradual approach to TCC control. The TCC is gradually applied and released, this method reduces the abrupt feel of the on/off type TCC. The TCC solenoid is controlled by pulse width modulation. This allows fluid to be gradually introduced and released to the TCC.

The TCC is spring loaded to the engaged position. Pressurized fluid releases the TCC, when the pressurized fluid is released, the TCC is engaged. Depending on transmission application, the TCC can be engaged in 3rd, 4th or 5th gear. The TCC must be disengaged at low speeds to prevent stalling.

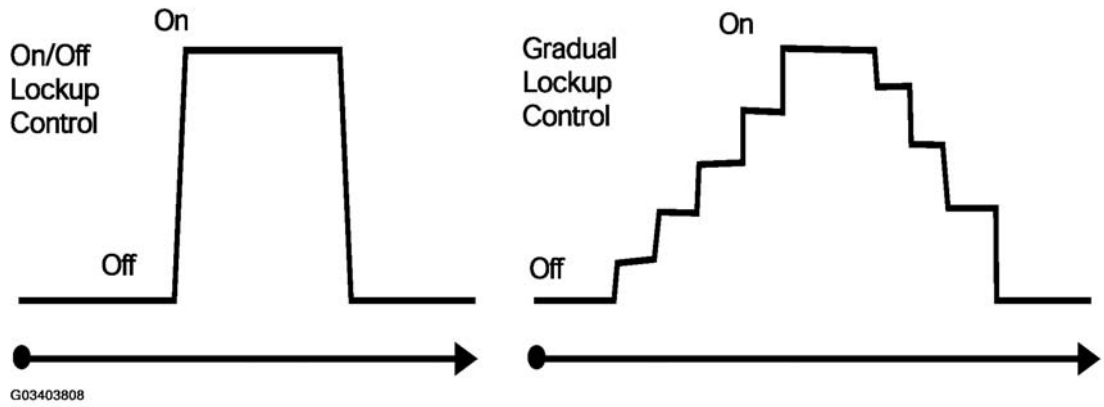


Fig. 30: Identifying Two Methods For Controlling Torque Converter Clutch On BMW Transmissions
Courtesy of BMW OF NORTH AMERICA, INC.

Lock-Up Torque Converter

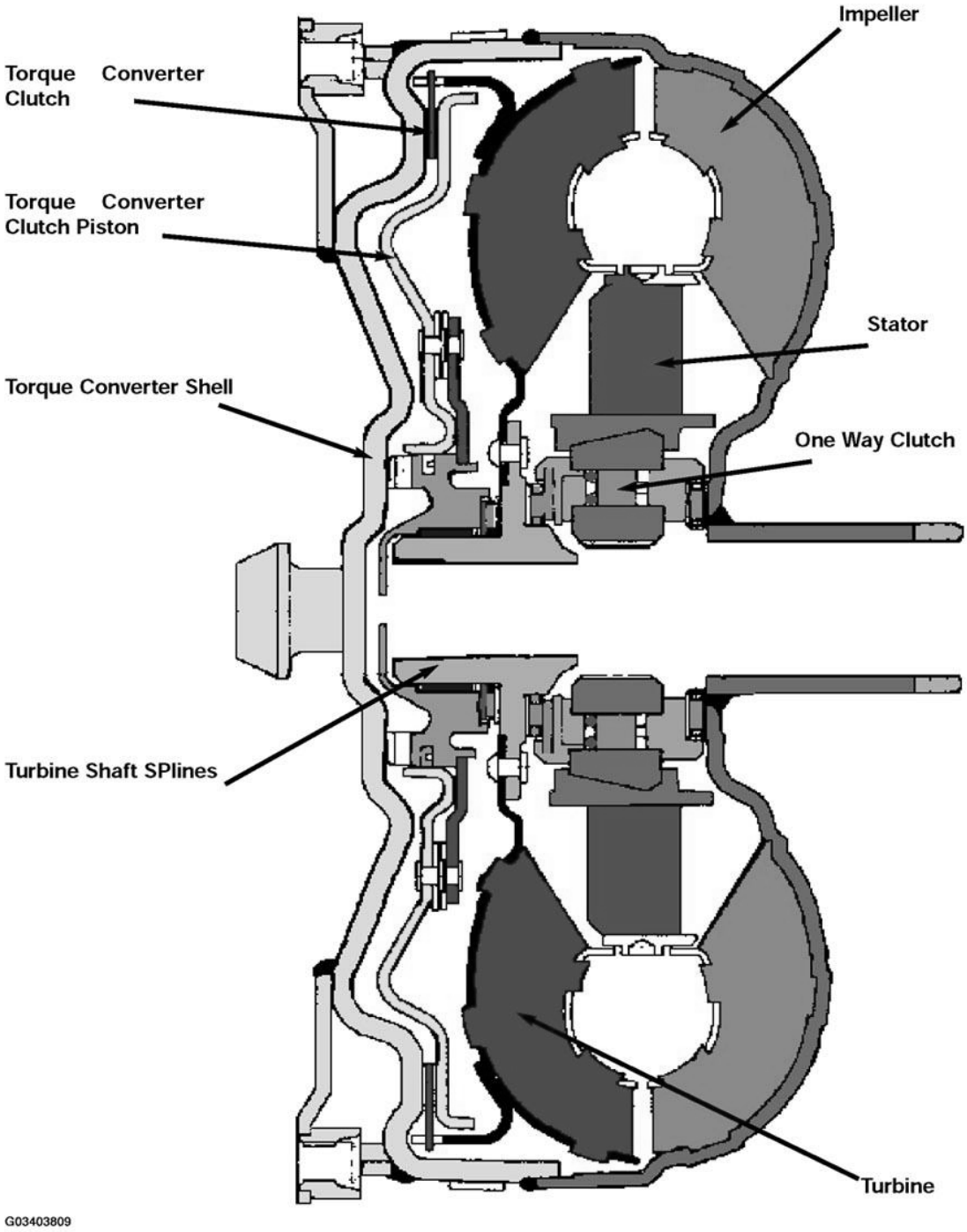


Fig. 31: Identifying Cross Section View Of Lock-Up Torque Converter
Courtesy of BMW OF NORTH AMERICA, INC.

Shift Solenoid Control

Magnetic valves are used to direct the flow of transmission fluid to control shift elements in the transmission. Another Term for "Magnetic Valve" is "Shift Valve". Magnetic valves (MV) are solenoids controlled by the

TCM. They can be switched by B+ or B-.

On ZF transmissions, magnetic valves are designated MV1, MV2, MV3 etc. On GM transmissions they are designated Shift Valve A, Shift Valve B, Shift Valve C etc.

Either valve can be checked for proper resistance using a multi-meter, DISplus or GT-1. Also, the "Activate Components" function can be used to check the Magnetic valves. Most all magnetic valves are switched on/off instead of Pulse Width Modulation (PWM).

All magnetic valves (except THM R-1 to 12/95) are supplied power from an internal relay located in the TCM. The magnetic valves are switched on and off by final stage transistors in the TCM. During fail-safe operation, power to all MV's is switched off by the internal relay.

Magnetic valves are located on the valve body. They can be replaced individually.

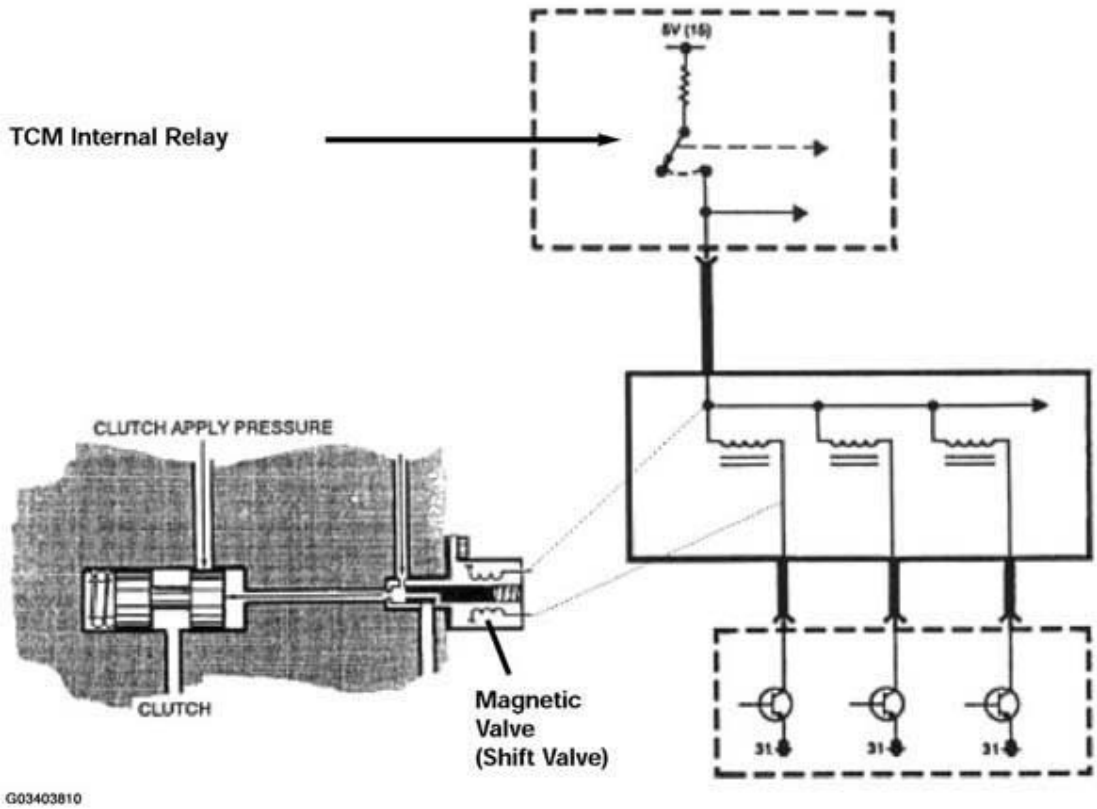


Fig. 32: Identifying Shift Solenoid Control Circuit Diagram
Courtesy of BMW OF NORTH AMERICA, INC.

Pressure Regulation

Pressure regulating solenoids modify line pressure for hydraulic operation. Solenoids for pressure regulation are referred to as EDS valves in ZF transmissions. GM transmissions have a few terms such as Force Motor Solenoid, Variable Bleed Solenoid, and DR solenoid. Regardless of the name used, they are all used to control

main line pressure based on throttle position and engine load.

On ZF transmissions, EDS valves are also used to control "Overlap Shifting". This allows for improved shift comfort by controlling pressures during shifting.

Depending upon transmission application, pressure regulating solenoids can be controlled using Pulse Width Modulation on B+ or B-.

The TCM will increase line pressure by regulating current flow to the pressure regulator. Current flow is controlled by pulse width modulation. When the duty cycle is low, the current flow to the solenoid is low. This allows spring pressure to close the valve. Therefore maximum line pressure is achieved. As the duty cycle increases, the current flow also increases. The valve opening increases, which allows pressure to be released through the pressure discharge which in turn decreases line pressure.

Main line pressure is also increased during fail-safe operation and when needed during "Adaptive Hydraulic Pressure Control" functions. Mainline pressure will also default to maximum pressure when power to the TCM is switched off.

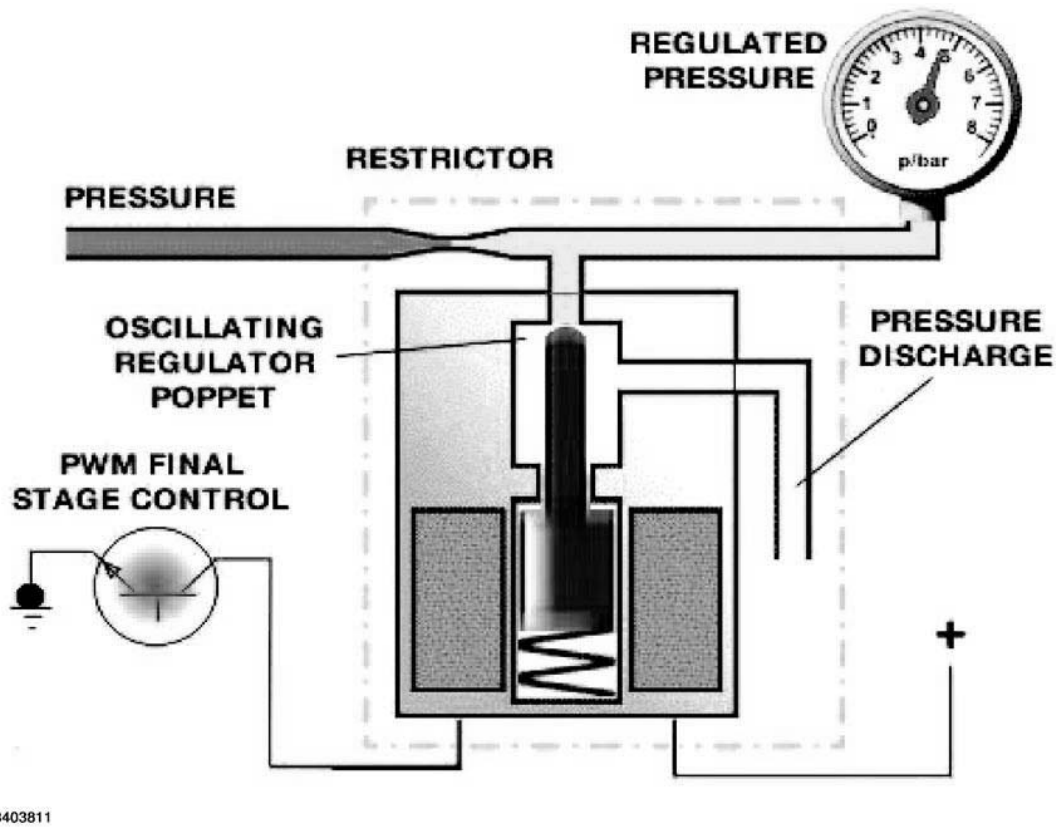


Fig. 33: Identifying Pressure Regulation
Courtesy of BMW OF NORTH AMERICA, INC.

Shift Programs

BMW EH transmissions have selectable shift programs (or modes) to suit driver needs and operating conditions. There are 3 basic shift programs available:

- **Economy Program** - The economy program is the default program which is adopted every time the vehicle is started. When in economy mode, the operating priority is for maximum economy and shift comfort. Shifts will take place at low engine RPM and road speed. The economy mode is indicated by an **"A"** on the program switch. The cluster will display an **"E"** to indicate economy mode.
- **Manual Mode (Winter Mode)** - Manual mode is used to start out the vehicle in a higher gear on slippery surfaces when more traction is needed. A higher gear will reduce torque to the rear wheels. Manual mode can also be used to select a lower gear when needed such as when climbing a hill. Depending upon vehicle application an **"M"** will appear in the cluster when in Manual Mode or an asterisk (*) symbol will appear in the instrument cluster to indicate Winter Mode.
- **Sport Mode** - Sport Mode provides raised shift points and a more aggressive shift program for the "Enthusiastic" BMW driver. The cluster will display an "S" when in sport mode.

Regardless of vehicle application, the program switch provides a momentary ground to the TCM to switch between modes. There have been numerous designs of the program switch since it's introduction. The program switch configurations are as follows:

- **2 Position Slide Switch** - This switch has the "A" and the "M" selection. Sport mode is achieved by moving the selector lever from "D" to 4, 3 or 2 when in the Economy Mode. The 2 Position slide switch is used on most models. These vehicles usually have a range and program display located in the instrument cluster.
- **2 Position Rocker Switch** - This switch operates the same as the slide switch, but it is used exclusively on the E36. The E36 does not have a program indicator in the cluster. The rocker switch will illuminate, indicating the current program.
- **3 Position Slide Switch** - This switch has the added position for sport mode. The shifter does not have to be moved out of drive (D) to be in sport mode. This switch is used on the E36 M3 and the 4HP22/24 EH (Version Late E-7).
- **3 Position Rotary Switch** - This switch is used only on the Early 4HP22 EH trans missions (Version Early E-7).
- **No Program Switch** - On some vehicles with AGS features, there is no program switch. Shift modes are obtained by moving the shift lever out of "D" range or automatically by adaptive shift functions. (Example E39)

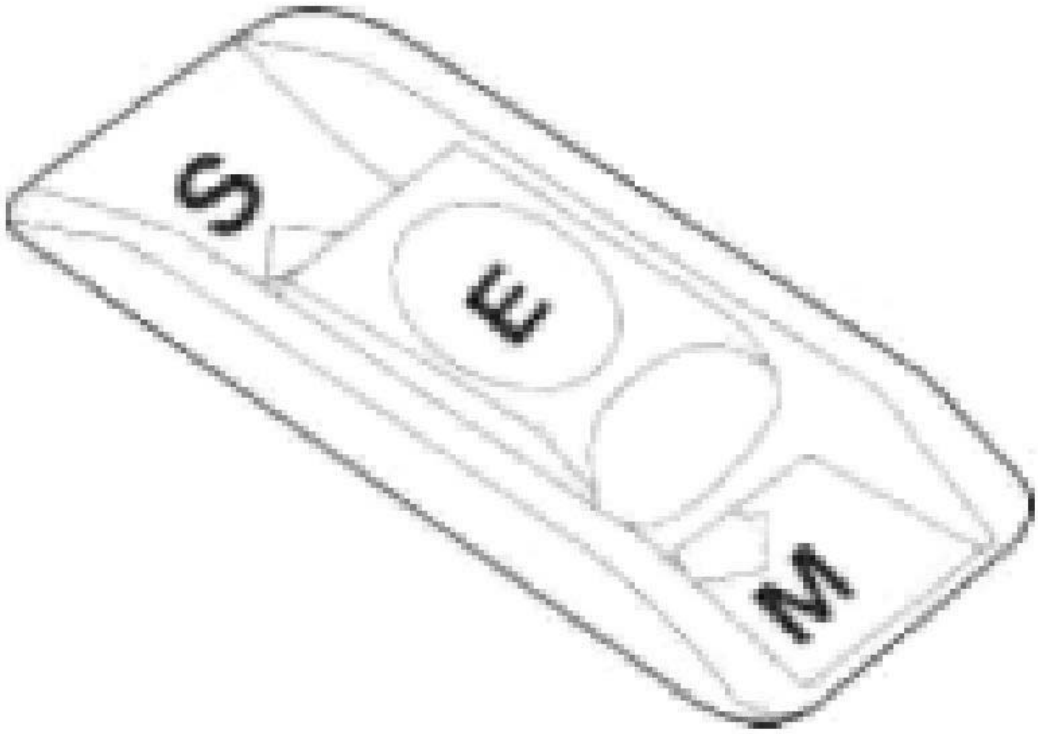


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Fig. 34: Identifying 3 Position Program Switch
Courtesy of BMW OF NORTH AMERICA, INC.

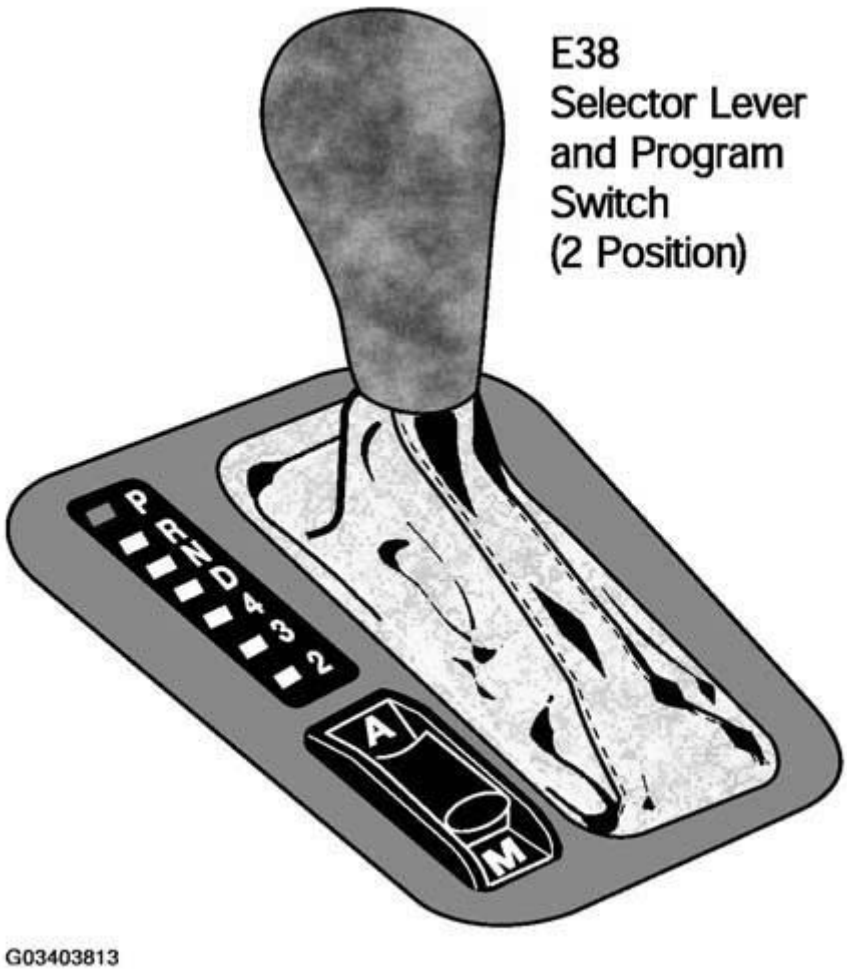

Fig. 35: Identifying E38 Selector Lever And Program Switch (2 Position)
Courtesy of BMW OF NORTH AMERICA, INC.

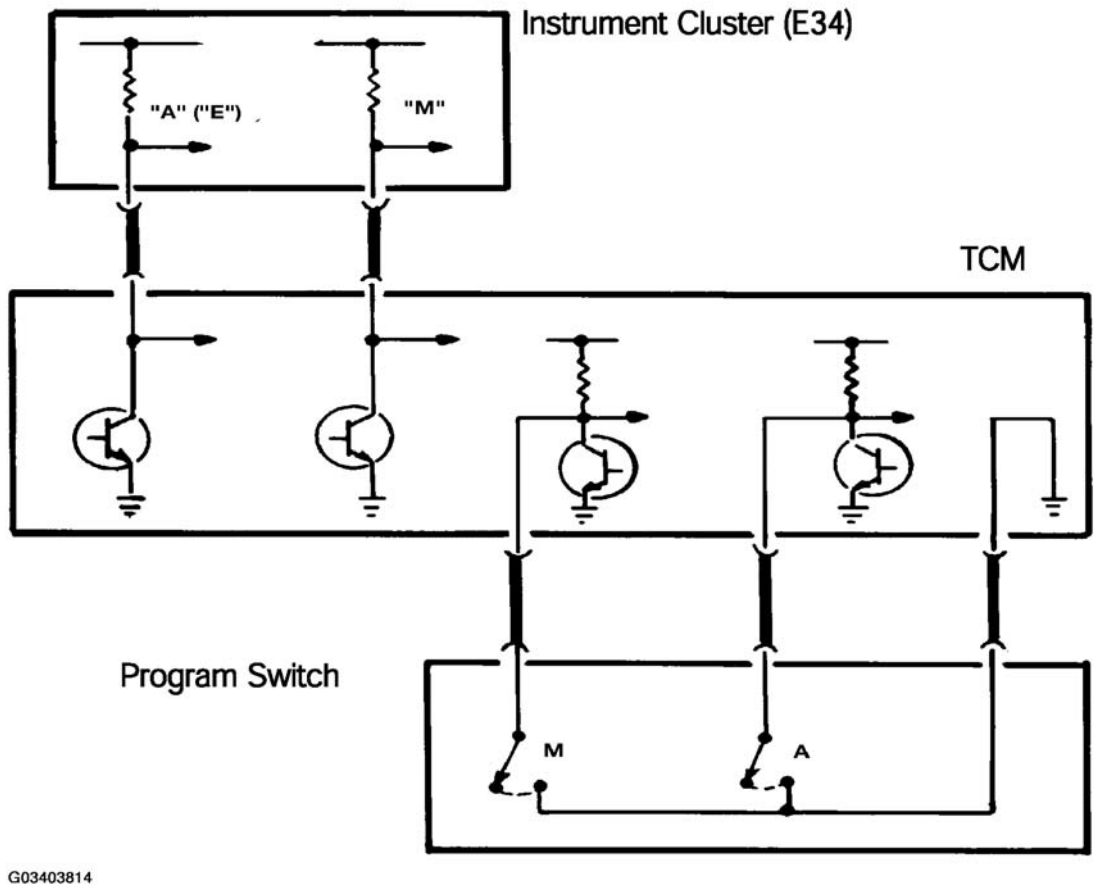

Fig. 36: Shift Programs Circuit
Courtesy of BMW OF NORTH AMERICA, INC.

Steptronic Shift Modes

The Steptronic shifting system was introduced to the BMW model line on the 95 E31 850Ci (from 10/94). Steptronic was subsequently added to other BMW models and is available on all BMW models with automatic transmissions. Other than a few additional components in the shifter mechanism, Steptronic equipped vehicles use the same transmission and TCM as non-Steptronic equipped vehicles.

Since the introduction of Steptronic, there have been several variations in Steptronic function. Regardless of version, the Steptronic system provides the driver with two modes of operation:

- To operate the transmission in fully automatic mode as with a non-Steptronic transmission.
- To operate the transmission in the manual shift mode by tilting the shift lever forward or backward when in the manual gate.

The Steptronic shift lever console contains and automatic and a manual shift gate. The automatic gate contains the gear lever positions P/R/N/D. When the lever is placed in "D" all of the shifting takes place based on the shift map programming in the TCM. To enter the manual gate the shift lever is moved 15 degrees to the left.

Depending upon application, there are three possible configurations of the manual gate:

- On the E31 850Ci, the gate is marked as "M" only. There is a plus and minus sign for manual shifting. Upshifts are achieved by momentarily moving the shifter forward. Downshifts are achieved by moving the shifter rearward. When placing the shifter into the "M" gate, the transmission will adopt the current gear that is engaged. The transmission will stay in that gear until an upshift or down shift request is made.
- On all other vehicles until the 2002 model year, the gate is marked M/S. There is also a plus and minus sign for manual shifting. When placing the shifter into the M/S gate, the transmission will adopt Sport mode. All shifts will still be automatic. Full manual mode is achieved when an upshift or downshift request is made. Upshifts are achieved by moving the shifter forward momentarily and downshifts are achieved by moving the shifter rearward.
- On all models with Steptronic from 2002, the only change is to the manual shifting modes. In order to be consistent with SMG operation, the positions were reversed. Upshifts are now achieved by moving the shifter rearward and downshifts are now forward. Otherwise, Steptronic operation is identical to the previous models.

Automatic Functions In Manual Mode

When in manual mode there are certain functions which occur automatically to prevent drivetrain damage and improve driveability:

- **Engine Overspeed Prevention:** To prevent engine over-rev, the TCM will upshift automatically just prior to max engine cutoff.
- **Kickdown:** If plausible, the TCM will automatically shift down to the next lower when a kickdown request is received.
- **Decelerating:** If in 5th gear and coasting to a stop, the TCM will automatically down shift to 4th gear at approximately 31 mph and then 3rd gear at approximately 19 mph. The automatic downshift allows for an acceptable gear when re-accelerating. (6 cylinder models will shift to 2nd gear when stopping vehicle)
- **Implausible Gear Requests:** Certain shift requests are ignored by the TCM. For example, requesting a downshift at a high rate of speed would be ignored. Any shift request that would cause the engine to exceed the maximum RPM limit would not be allowed. Also starting out in a high gear is also not allowed. Only 1st, 2nd or third gear is allowed when accelerating from a stop.

E31 850Ci Shifter Console

1995 to 1997 Model Year.

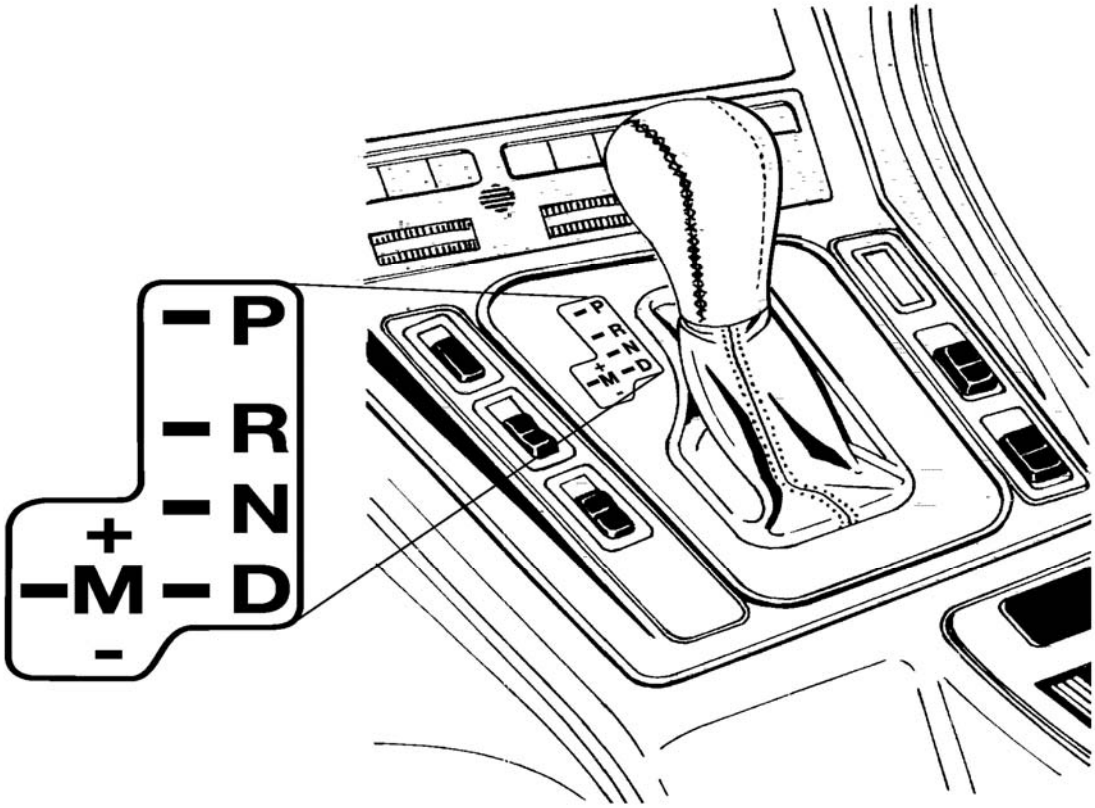

Fig. 37: Identifying E31 850Ci Shifter Console
Courtesy of BMW OF NORTH AMERICA, INC.

Steptronic Shifter Circuit

In order to achieve manual shifts with Steptronic, the selector lever is moved 15 degrees to the left. A pin on the selector lever engages the "up/down" microswitches which are a ground input to the TCM. The selector lever also triggers the "M" gate microswitch which is also a ground input to the TCM.

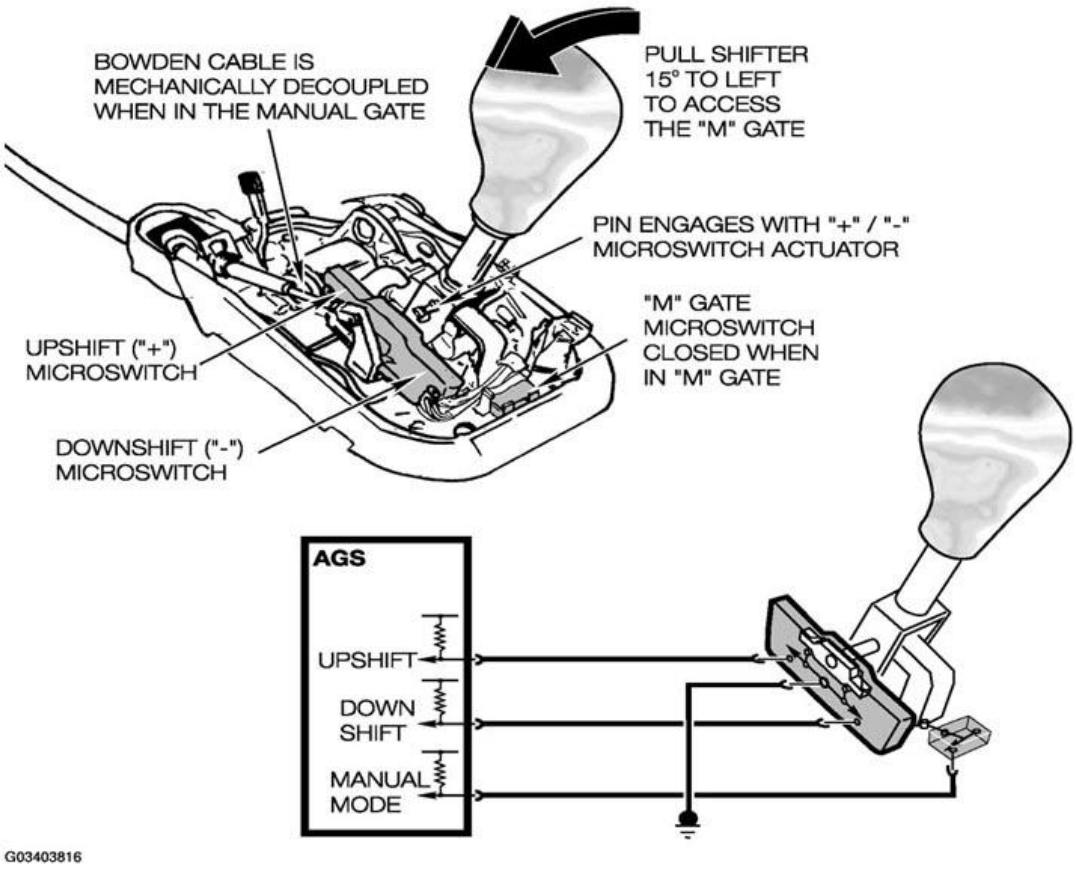

Fig. 38: Identifying Steptronic Shifter Circuit
Courtesy of BMW OF NORTH AMERICA, INC.

The example on the right shows a typical shift console for an E31. Note the shift pattern, upshifts are forward and downshifts are rearward. This shift pattern was used on vehicles up to the end of 2001 production. On vehicles from 2002 production, the shift pattern is reversed.

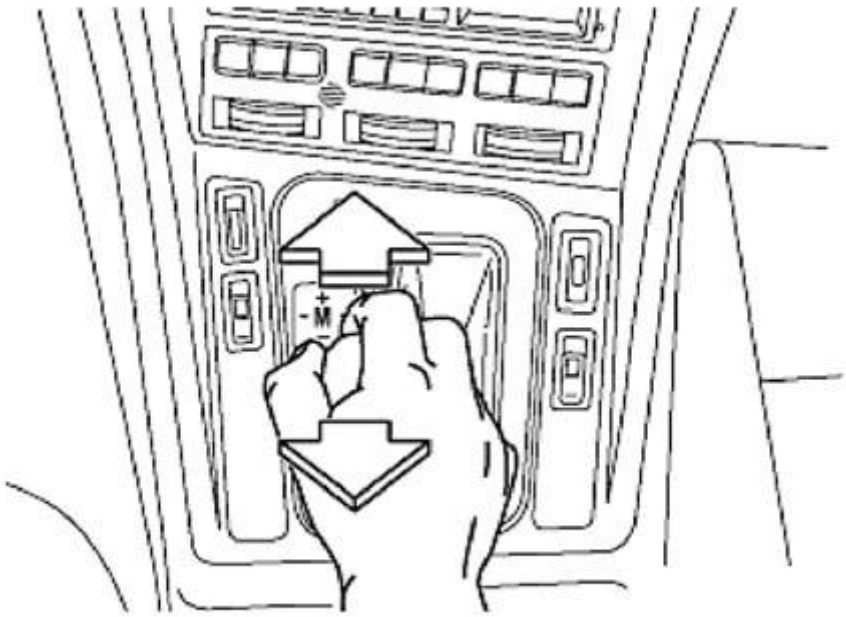

Fig. 39: Identifying Shift Pattern
Courtesy of BMW OF NORTH AMERICA, INC.

Steptronic System Comparison

STEPTRONIC SYSTEM COMPARISON

Detail	E31 850Ci 1995 to 1997	All model except E31 850Ci up to 2001 Model year with Steptronic.	All Models from 2002 model year with Steptronic
Shift Console Layout	"M" Gate	M/S Gate	M/S Gate
Selection of Manual Mode	Shift to "M" gate	Shift to "M/S" gate and move lever momentarily to "+" or to "-".	Shift to "M/S" gate and move lever momentarily to "+" or to "-".
Gear Range in Manual Mode.	2nd to 5th gear (1st gear only accepted for 2 minutes after cold start. If the throttle is pressed 100% a 2-1 shift will occur	1st to 5th gears	1st to 5th gears
Un-allowable gear requests.	4th and 5th gear after vehicle standstill. Downshifts that can cause engine over-rev. 1st gear after engine warm up.	4th and 5th gear after vehicle standstill. Downshifts that can cause engine over-rev.	4th and 5th gear after vehicle standstill. Downshifts that can cause engine over-rev.

Upshifts/Downshifts	Upshifts - Forward Downshifts - Rear	Upshifts - Forward Downshifts - Rear	Upshifts - Rear Downshifts - Forward

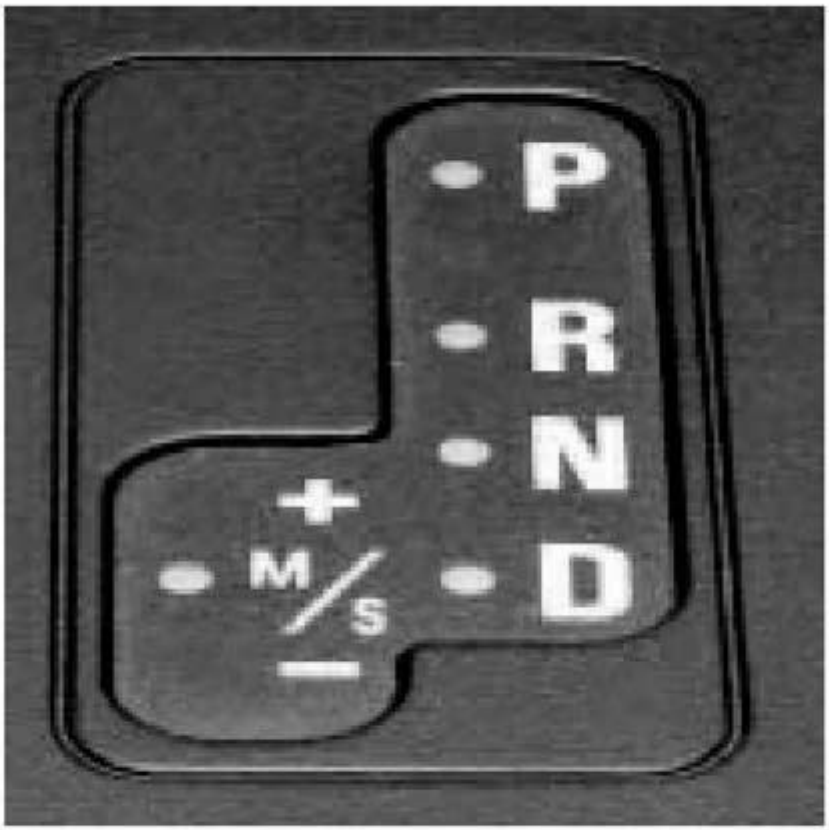

Fig. 40: Identifying Shift Pattern Up To 2001
Courtesy of BMW OF NORTH AMERICA, INC.

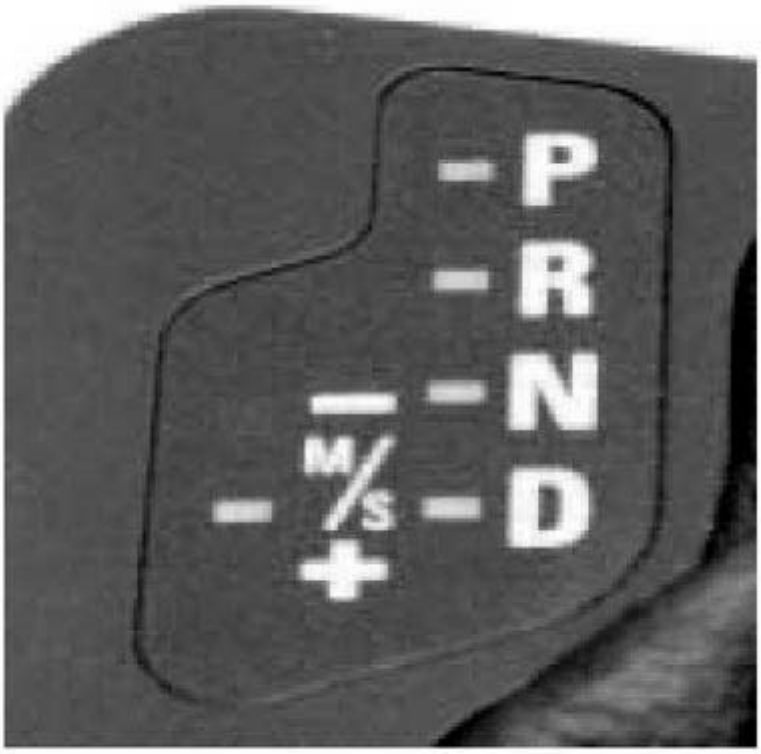

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Fig. 41: Identifying Shift Pattern From 2002
Courtesy of BMW OF NORTH AMERICA, INC.

ADAPTIVE FEATURES (AGS)

AGS features were introduced in 1994 with the A5S560Z transmission. AGS control consists of adaptive features that will modify transmission operation according to various factors. AGS operation can be influenced by two major functional groups:

- Driver influenced features (influenced by throttle and kickdown input)
- Environmental influences (such as road conditions - icy, traffic etc.)

--EGS-- CONDITIONS THAT INFLUENCE SHIFT PROGRAM

--AGS-- ADDITIONAL CONDITIONS THAT INFLUENCE SHIFT PROGRAM

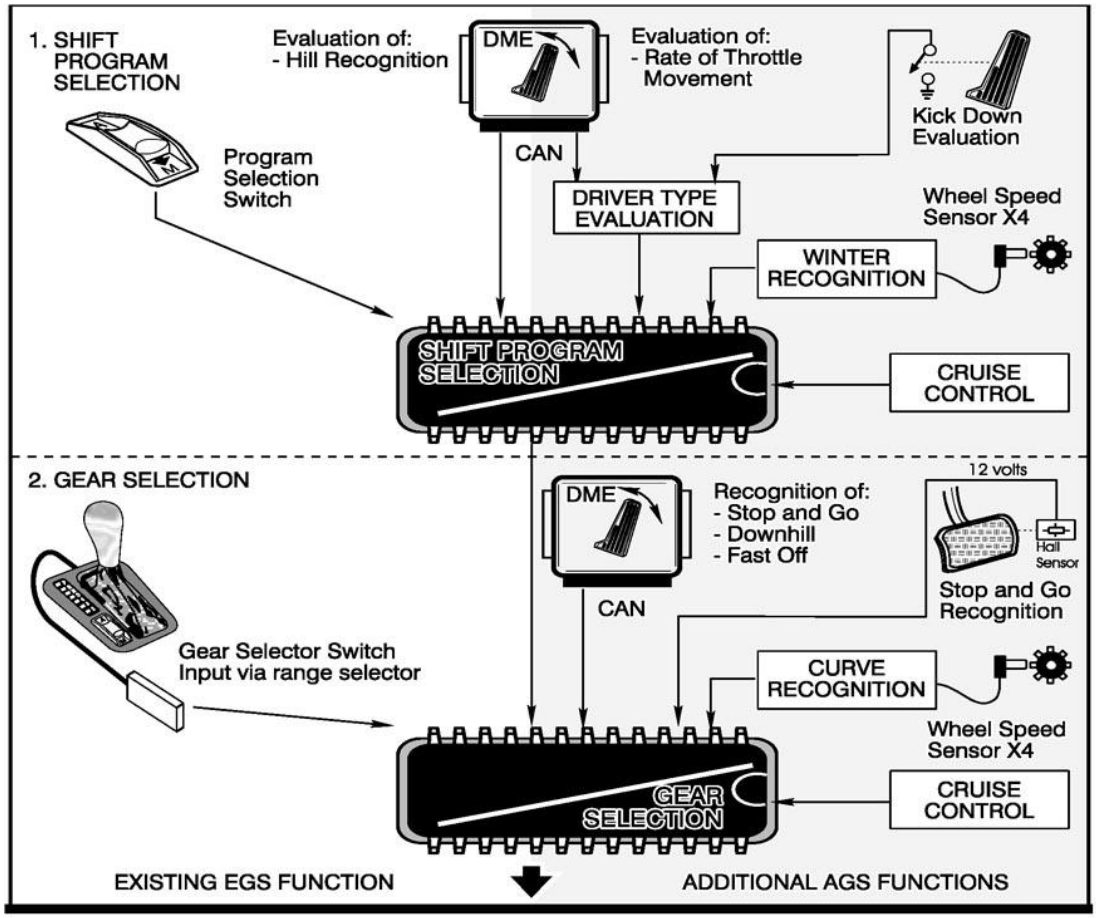

Fig. 42: Identifying Adaptive Features (AGS)
Courtesy of BMW OF NORTH AMERICA, INC.

The driving program selection is not adapted on a long term basis - nor is it stored in the control module memory when the ignition is switched off. It continually changes as the driver of the vehicle changes driving habits.

Driver Influenced Features Of AGS

The adaptive drive program is based primarily on throttle input. The throttle information comes from the ECM (DME) via the CAN bus. The TCM continuously monitors the throttle input for:

- The current throttle position
- The rate of change in pedal movement
- The number of acceleration requests
- The number of kickdown requests

Drive Away Evaluation

The AGS system selects the appropriate shift program based on the amount of acceleration that occurs during takeoff. When driving away under full throttle the transmission will shift from XE to E.

Kick Fast Feature

Based on these inputs, the AGS will select one three different driving programs as follows:

- Extreme Economy - Shift points are a low speeds for maximum comfort and economy
- Economy - The shift points are raised for more performance with economy as priority
- Sport - The shift points are higher to take advantage of full engine performance.

  Under full throttle acceleration at high speed, single gear downshifts are possible. A two gear downshift is possible if the accelerator pedal is moved quickly to kick-down. The Extreme Sport program was eliminated as part of the kick-fast feature.

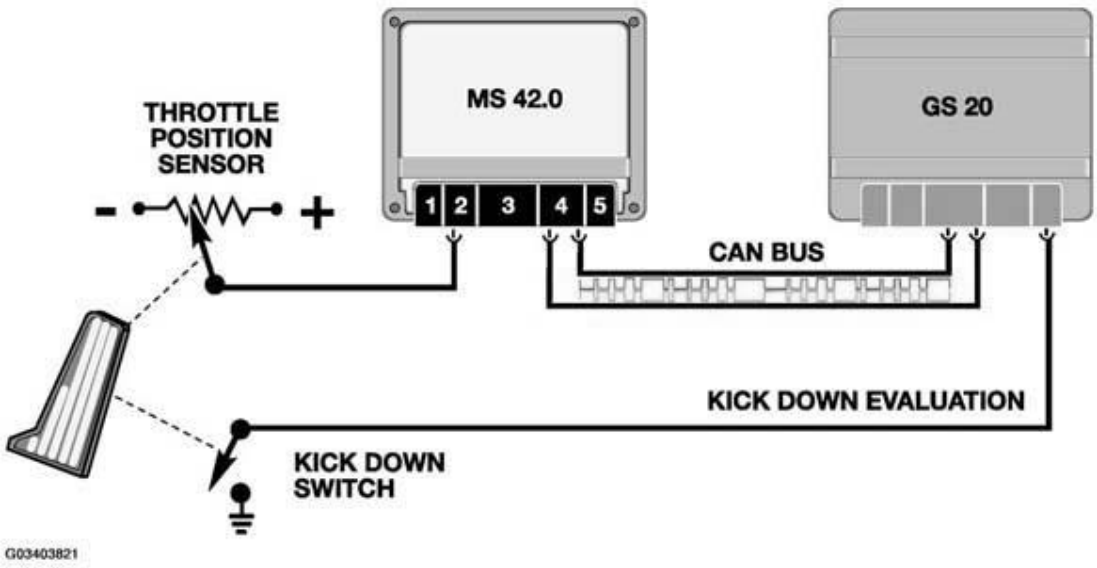

Fig. 43: Identifying Kick Fast Feature
Courtesy of BMW OF NORTH AMERICA, INC.

Environmentally Influenced AGS Features

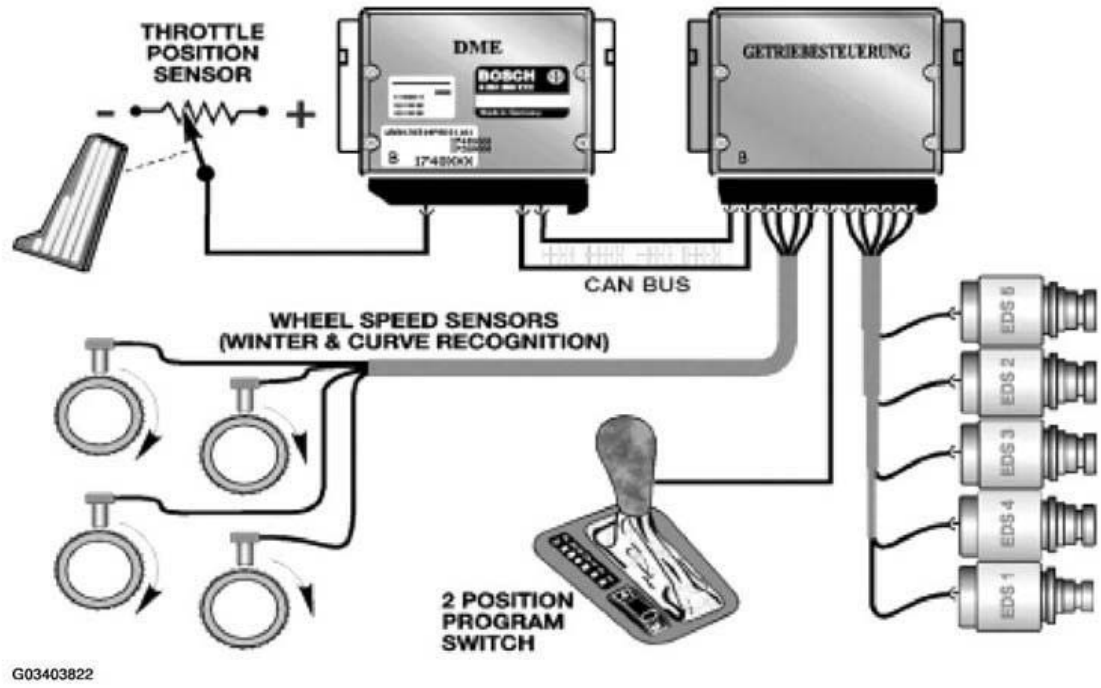

Fig. 44: Identifying Environmentally Influenced AGS Features
Courtesy of BMW OF NORTH AMERICA, INC.

STOP And GO

The feature is activated by defined sequence of shifts which are as follows:

- Upshift from first to second - followed by a downshift from second to first - followed by another upshift from first to second. This is then followed by the vehicle coming to a complete stop.

After this sequence occurs, the transmission will stay in second gear. The AGS control has recognized stop and go driving and this function will prevent excessive shifting during heavy conditions. The second gear start will be cancelled when:

- The vehicle speed exceeds 40 MPH
- The throttle pedal is pressed more than 90%
- The range selector is moved to Park, Neutral, Reverse or Sport (4,3 or 2)
- The vehicle is in Sport Mode

Winter Drive Program

This feature is activated when the TCM detects slippage at the rear wheels by comparing front and rear wheel speed signals. When slippage is detected by the TCM, the transmission will start in second gear and the shift points will be lowered. This will reduce torque to the rear wheels allowing improved driveability and traction on slippery roads.

Hill Recognition Program

There are two hill recognition programs, one for Uphill and one for Downhill. The TCM will activate this feature when it receives a high engine load signal at slower road speeds. The TCM will perceive this information as being consistent with climbing a hill. The shift points will be raised to prevent constant up and down shifting. This is referred to as the pendulum shift effect. When driving downhill, road speed will increase with minimal throttle input. The TCM will detect a downhill situation and hold the current gear to prevent an upshift when going downhill.

Curve Recognition

This feature will inhibit upshifts when the vehicle is in a curve. This is to improve stability when the vehicle is cornering at high speeds. The TCM will initiate this feature when it detects a difference between left and right (front) wheel speed signals. The difference in these signals will indicate that the vehicle is in a curve. Be aware that improper tire sizes, brands and inflation pressures can influence this feature. Always address these issues first when diagnosing delayed upshift complaints.

Cruise Control Drive program

A special cruise control shift map is selected by the TCM when cruise control is active. The TCM will prevent unwanted locking and unlocking of the torque converter clutch. Also, upshifting and downshifting will be minimized. Depending upon application, the cruise control interfaces with TCM via a single wire data link or as on vehicles with electronic throttle control, the TCM will interface with the ECM (DME).

Manually Selected "Extreme Sport" Program

This feature is activated by moving the shift lever to position 4, 3 or 2. This activates the "Extreme Sport Program" where the shift points are raised for maximum RPM and performance. On Steptronic equipped vehicles, the sport program is obtained by moving the shifter to the manual gate to initiate the "Sport Program".

Modifications To AGS Features

Since the introduction of AGS features in 1994, there have been some software changes to address customer concerns. Some AGS features have been perceived by the customer as malfunctions. To correct this, some of the AGS features were modified with updated software. The AGS features previously discussed in this text reflect the updated modifications.

CAN BUS COMMUNICATION

The CAN bus is a serial communications bus in which all connected control units can send as well as receive information. Data over the CAN bus operates at a rate of up to 1Mb/s (megabits per second).

The CAN protocol was developed by Intel and Bosch in 1988 for use in the automotive industry to provide a standardized, reliable and cost-effective communications bus to combat the increasing size of wiring harnesses.

The CAN bus was originally introduced on BMW automobiles in the 1993 E32 740i/IL as a data link between the TCM (EGS) and the ECM (DME).

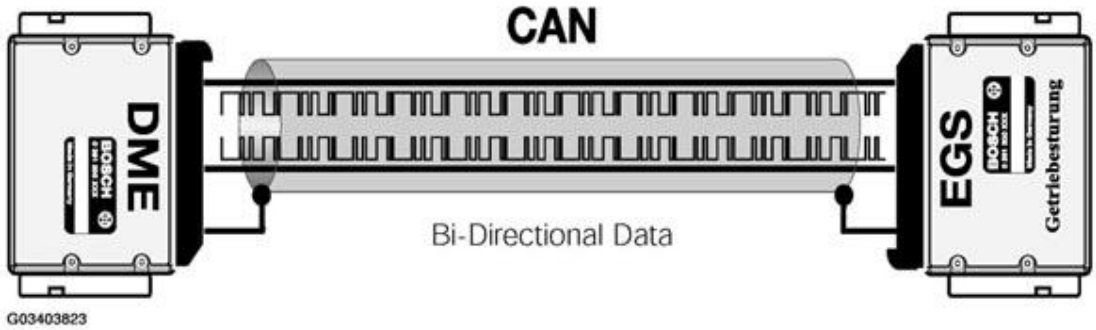

Fig. 45: Identifying CAN Bus
Courtesy of BMW OF NORTH AMERICA, INC.

On earlier EGS systems, various signals were transmitted on individual signal wires. This reduced reliability and increased the amount of wiring needed. The CAN bus allows faster signal transmission and increased versatility. For example, the signals listed in the chart below were previously transmitted on individual wires, now these signals are all on the CAN bus. This chart represents only some of the signals on the CAN bus, there are many more signals transmitted between the TCM and ECM.

EGS SYSTEMS SIGNALS

Sender	Information Item	Receiver	Signal Use
ECM	Engine Temperature	TCM	Shift Point Calculation
ECM	Engine Load (tL)	TCM	Shift Point Calculation
ECM	Engine RPM (TD)	TCM	TCC Slippage
ECM	Throttle Position (DKV)	TCM	Shift Point Calculation
ECM	A/C Compressor ON	TCM	Fine tune shift points to compensate for increased engine load.
TCM	Transmission Range	ECM	Engine Idle Speed Control
TCM	Torque Reduction Signal (ME)	ECM	Timing Retard during shifts.
TCM	TCC Lockup Status	ECM	Engine Timing Map adjustment.

CAN Bus Topology

The CAN bus consists of two twisted copper wires. Each wire contains an opposing signal with the exact same information (CAN-High, CAN-Low). The opposing signals transmitted through the twisted wire serve to suppress any electrical interference. Early CAN bus wiring included a grounded shield around the two wires, later vehicles discarded the shield in favor of the unshielded twisted pair wiring.

Due to the linear structure of the network, the CAN bus is available for other modules in the event of a disconnected or failed control unit. This is referred to as a "Tree" structure with each control unit occupying a branch.

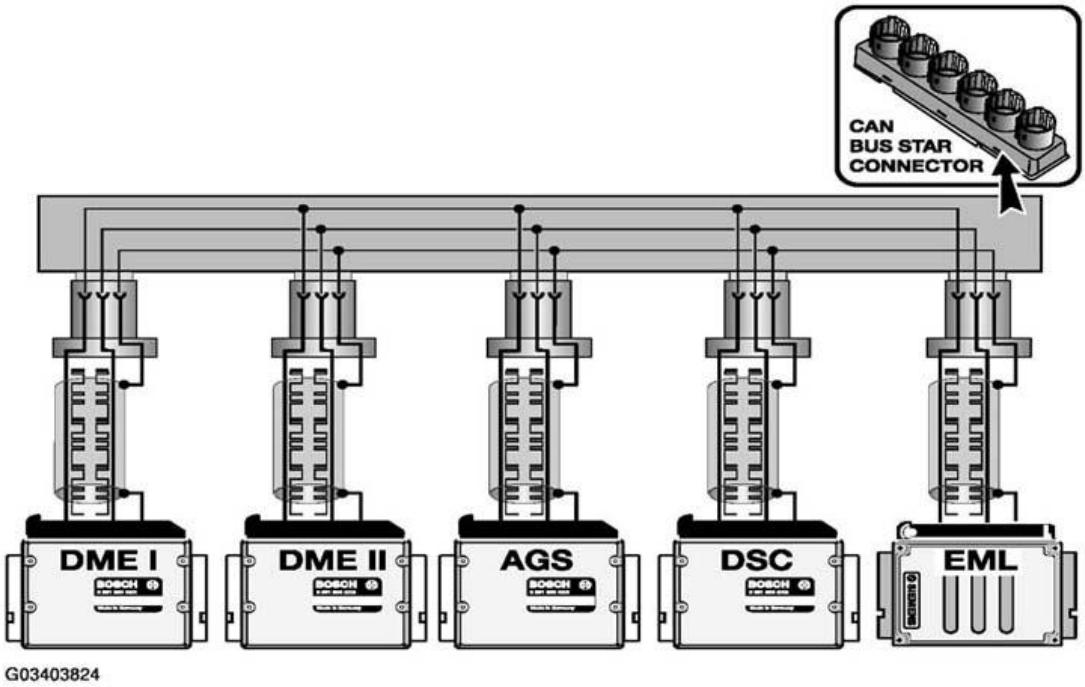

Fig. 46: Identifying CAN Bus Topology
Courtesy of BMW OF NORTH AMERICA, INC.

As previously mentioned, the CAN bus initially was used as a high speed communication link between the DME and AGS control units.

With the introduction of the E38 750iL (95 M.Y.), the CAN bus was expanded to include the EML and DSC control modules. The 750iL made exclusive use of the "star coupler" to link the individual CAN bus ends to a common connector.

The 1998 model year introduced new users of the CAN bus. The instrument cluster and the steering angle sensor were linked to expand the signal sharing capabilities of the vehicle.

The 1999 750iL was the last vehicle to use the shielded cable, after which the entire CAN bus went to twisted pair wiring.

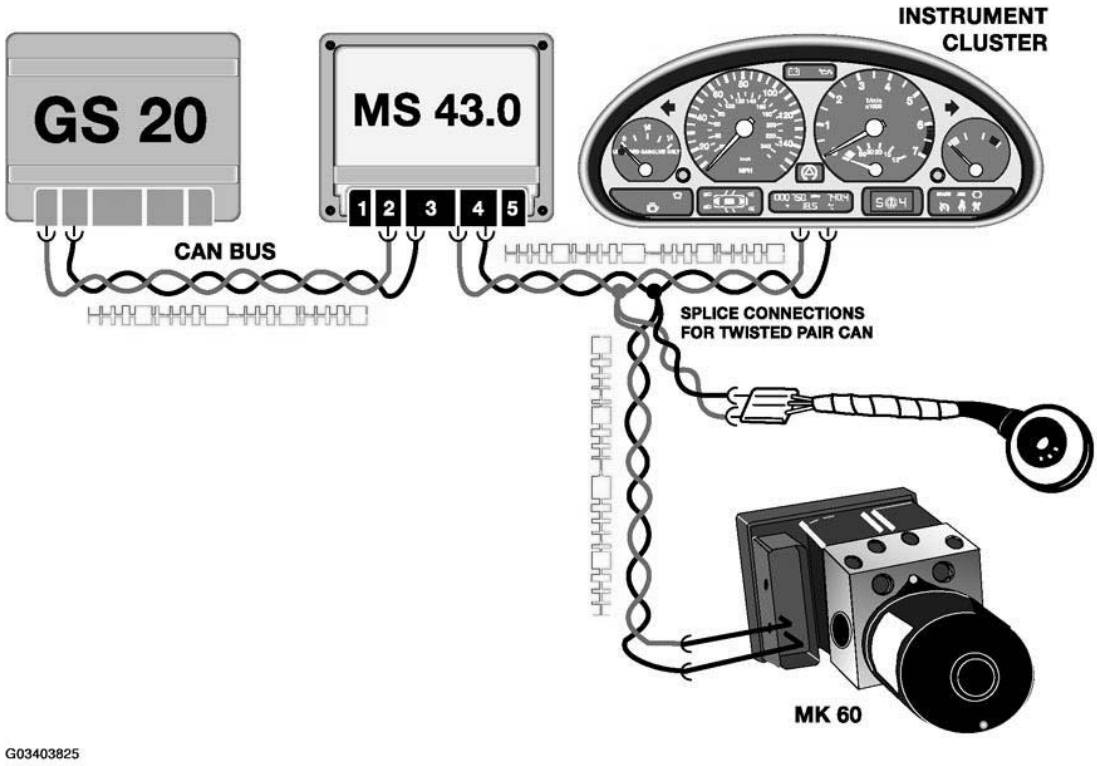

Fig. 47: Identifying CAN Bus Signal Sharing Capabilities
Courtesy of BMW OF NORTH AMERICA, INC.

On most current models the CAN bus provides data exchange between the following control modules:

- ECM (DME)
- EML (750iL E38)
- TCM (EGS)
- IKE/Kombi
- ASC/DSC
- LEW

On models that use twisted pair, the wire color of the CAN bus is uniform throughout the vehicle with: CAN-Low GE/BR and CAN-High GE/SW or GE/RT. Shielded wiring is easily identified by the black sheath surrounding the CAN bus.

Troubleshooting The CAN Bus

The failure of communication on the CAN bus can be caused by several sources:

- Failure of the CAN bus cables.
- Failure of one of the control units attached to the CAN.

- Failure of the voltage supply or ground to individual modules.
- Interference in the CAN bus cables.

Failure of the CAN bus cables

The following faults can occur to the CAN bus wiring:

- CAN-H/L interrupted
- CAN-H/L shorted to battery voltage
- CAN-H/L shorted to ground
- CAN-H shorted to CAN-L
- Defective plug connections (damaged, corroded, or improperly crimped)

In each instance, the connected control units will store a fault due to the lack of information received over the CAN bus.

The voltage of the CAN bus is divided between the two data lines: CAN-High and CAN-Low for an average of 2.5V per line. The voltage measurement is taken from each data line to ground. Each module on the CAN contributes to this voltage.

The fact that 2.5V are present does not mean that the CAN bus is fault free, it just means that the voltage level is sufficient to support communication.

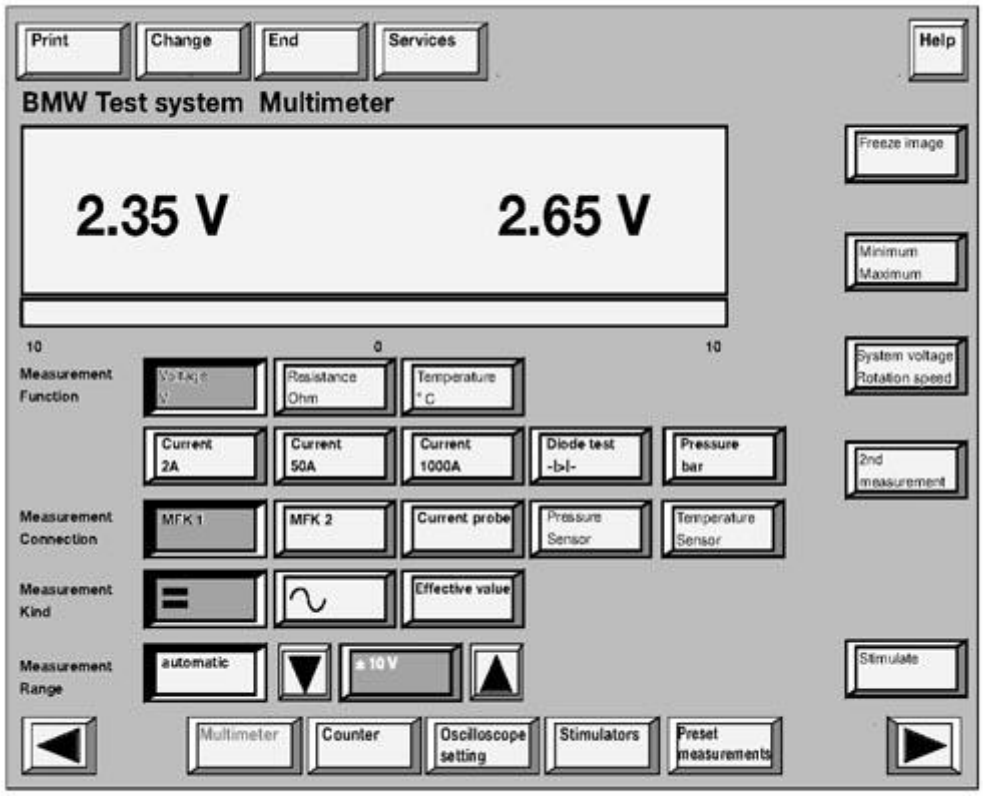

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Fig. 48: Identifying BMW Test System Multimeter Display
Courtesy of BMW OF NORTH AMERICA, INC.

Terminal Resistors: are used in the CAN bus circuit to establish the correct impedance to ensure fault free communication. A 120 Ohm resistor is installed in two control units of the CAN between CAN-H and CAN-L. Because the CAN is a parallel circuit, the effective resistance of the complete circuit is 60 Ohms. On some vehicles there is a jumper wire that connects the two parallel branches together, others have an internal connection at the instrument cluster.

The resistance is measured by connecting the appropriate adapter to any of the modules on the CAN and measuring the resistance between CAN-L and CAN-H. The resistance should be 60 Ohms. The CAN bus is very stable and can continue to communicate if the resistance on the CAN bus is not completely correct; however, sporadic communication faults will occur.

The terminal resistors are located in the ASC/DSC control unit and either the instrument cluster or in the DME.

Early 750iL vehicles that used the star connector have a separate external resistor which connect CAN-H and CAN-L together.

Modules which do not have the terminal resistor can be checked by disconnecting the module and checking the

resistance directly between the pins for CANH and CAN-L. The value at these control units should be between 10 kOhms and 50 kOhms.

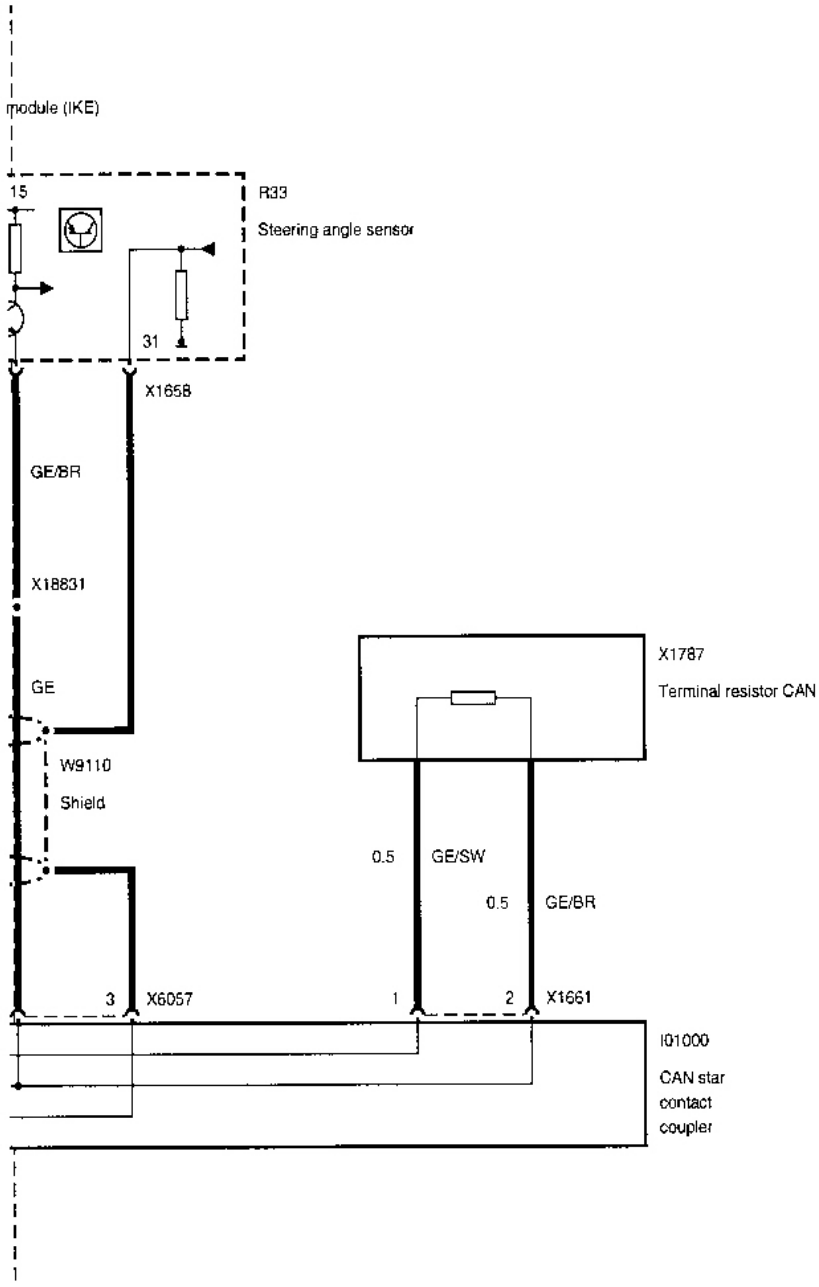

Fig. 49: Identifying Terminal Resistor Circuit
Courtesy of BMW OF NORTH AMERICA, INC.

DIAGNOSIS AND TROUBLESHOOTING

Due to the cost and complexity of today's electronic transmissions, BMW recommends that the technical hotline be contacted before any repairs are performed. It is important that the technician perform some basic diagnostic procedures before contacting technical assistance. The following procedures should be followed:

- Always Verify customer complaint, make sure the complaint is not related to normal operation. (i.e. Warm Up Phase, AGS operation etc.)
- Survey Fault Memory - Perform **complete** quick test. There may be other systems that interface with EGS that could cause faults. (i.e DME, ASC/DSC, IKE/Kombi etc.)
- Print out all fault code with fault conditions. Also print out copy of Identification page and diagnostic report.
- CHECK TO SEE IF THERE ARE ANY SERVICE BULLETINS THAT APPLY TO YOUR SPECIFIC COMPLAINT. THIS INCLUDES THE SERVICE ROUND TABLE.
- Ensure that battery voltage is sufficient. Battery voltage must be greater than 12.5 with ignition switched off. Check battery connections for tightness and condition.
- Check ground connections. (chassis to engine, grounds to bulkhead and shock tower.)
- Check over vehicle to look for transmission leaks, physical damage, loose connections etc.
- If necessary, check fluid level and condition using DISplus or GT-1.
- Check to see if any aftermarket or performance components have been installed that could effect transmission operation. (DME or EGS software as well as any engine modifications).
- Check repair history to see if there were any recent repairs that could effect the proper operation of the transmission (i.e. Engine replacement with damaged dowel pin etc.).
- Check DCS for any open campaigns or recalls pertaining to drivetrain.
- Check and record chassis number, production date and transmission serial # before contacting technical assistance.

Establishing A Diagnostic Plan

Once all of the pre-diagnostic criteria has been satisfied, a logical diagnostic plan should be followed. A logical, well organized diagnostic plan will help avoid improper diagnosis, unnecessary parts replacement and lost diagnostic time. A technician's goal should be to satisfy the customer by "Fixing it the first time, on time, every time". The productivity of the technician can also be improved by following a logical, common-sense approach to problem solving. The following steps are recommended to form a diagnostic plan:

- **Verify the Customer Complaint** - This step is the most important, but also the most overlooked. The focus should always be on the exact customer concern. Make sure that the customer complaint is not a misunderstanding of proper vehicle operation. This step can avoid unnecessary diagnosis and lost time. If the customer concern is not exactly identified, any subsequent repairs can not be verified as being effective. This is the most common cause of "comeback" repairs. Communication between the customer to advisor and the advisor to technician must be clear. Vague or misunderstood customer complaints are often improperly diagnosed. Also make sure that the conditions under which the concern has occurred are duplicated. For example: If the customer is customer is complaining about a shifting concern after a cold start, then the vehicle should be road tested under those conditions.
- **Analyze the Problem** - Once the complaint has been verified, then all available resources should be used

to find the "root cause" of the complaint. Start out by checking Service Information Bulletins, DCS messages, and Service Round table information. Use the DISplus or GT-1 to access the diagnostic program and per form Diagnostic Test Modules where applicable. Electrical Troubleshooting Manuals (ETM's) should also be used when needed.

- **Isolate the Problem** - Now, the problem can be narrowed down into the final steps of diagnosis. Using proper tools and procedures, the technician can "Isolate" by using the process of elimination and common sense. Having a working knowledge of BMW systems is helpful in this area. When applicable, use all available BMW special tools and equipment. Perform all necessary electrical checks such as Voltage Drop, resistance measurements etc.
- **Repair the Problem** - Once the concern has been correctly identified, perform all necessary repairs as per BMW guidelines. Make sure all repairs are properly documented to comply with warranty policies and procedures.
- **Verify the Repair** - Make sure the customer concern has been rectified. Road test the vehicle under the same conditions whenever possible. Failure to complete this step properly is almost a guaranteed comeback. Repeat repair attempts are costly to the BMW Center and the BMW Service Technician.

REMEMBER - Fix it the first time, On Time, Every time.

Fault Codes

When diagnosing transmission fault codes, always print out the fault code(s) and the fault conditions. When referring to the fault code itself, be aware that there are actually 3 formats for the fault code. The fault code breakdown is as follows:

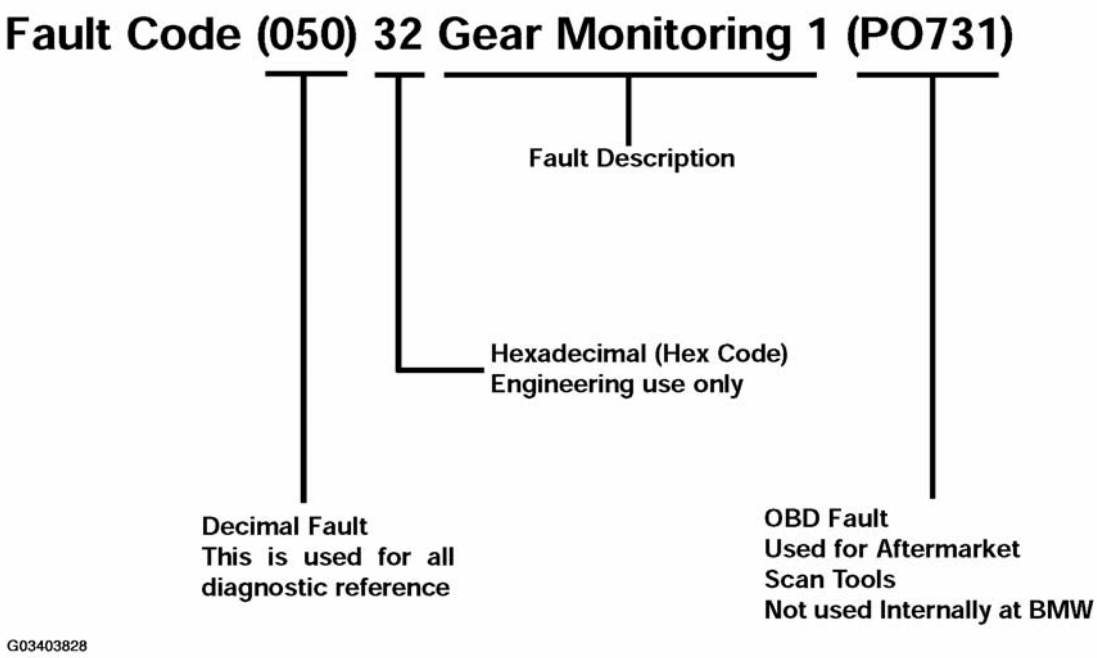

Fig. 50: Identifying Fault Codes
Courtesy of BMW OF NORTH AMERICA, INC.

When referring to the "Fault Code" during diagnosis always use the fault that is in Decimal Format. The Decimal fault is referred to in all reference material such as Service Information Bulletins, Test Modules and DCS messages etc. In the example above, FC 050 would be the correct choice.

Fault Conditions

When a fault code is set, it is stored with a set of environmental conditions. The environmental conditions are used to aid in pinpointing the root cause of the fault. Some of the information found in the fault conditions contain information on transmission temperature, engine speed and road speed etc. This information is also helpful when trying to duplicate the customer complaint. For example, if a customer complains about a shifting complaint when cold, check the fault conditions to verify this complaint. Remember to always print out the fault codes with the fault conditions. This information is helpful to the technician as well as technical assistance.

Identification Page

The ID page is helpful to determine the Transmission and control system used as well as the chassis number and current software version. Always print out a copy of the ID page when performing any diagnosis or programming procedures.

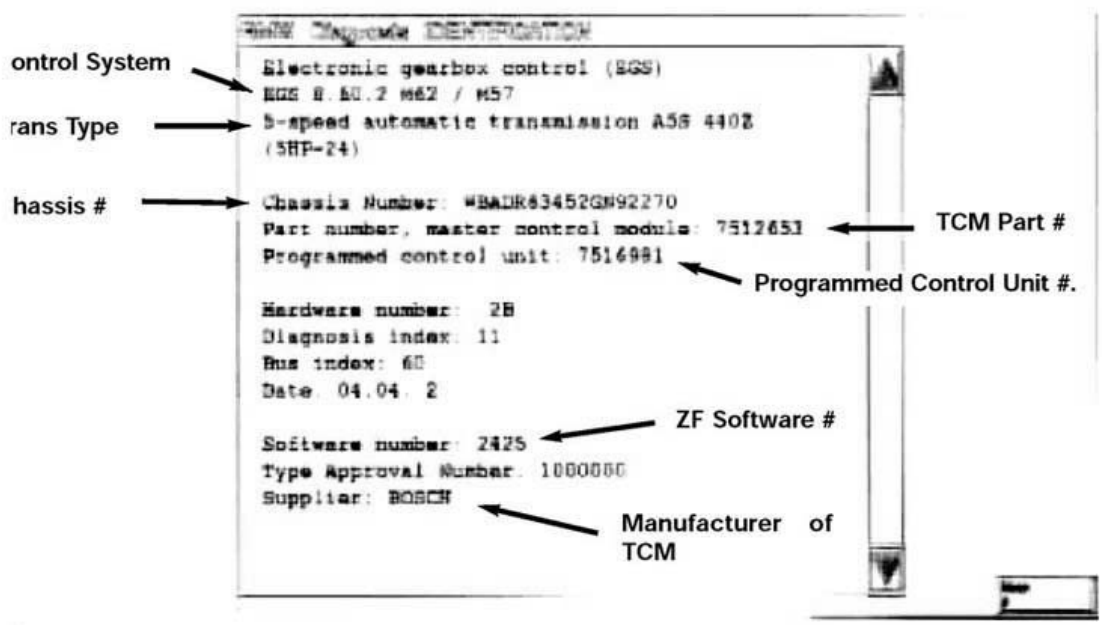

Fig. 51: Identifying Identification Page
Courtesy of BMW OF NORTH AMERICA, INC.

Diagnosis Program

There are two diagnostic formats (programs) used on current model BMW vehicles. The earlier diagnostic program was used on the E38 and E39. The latter diagnostic program was introduced as the "E46 Diagnostic Concept". This is used on the E46, E65 and the E52 (Z8). The E53 X5 uses a mixture of both diagnostic programs depending upon engine/transmission options. Below is an example of the earlier diagnostic program.

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Fig. 52: Identifying Diagnosis Program
Courtesy of BMW OF NORTH AMERICA, INC.

The diagnostic program contains the following features:

- **Fault Symptoms** - This is a symptom driven program that will lead the technician into guided diagnostics. It contains several possible fault scenarios that are common to electronic transmissions. This path is helpful when the technician is not sure where to start in his diagnostic plan.
- **Function Test** - There are no function tests for electronic transmissions.
- **Service Functions** - This is where you will find the ATF level check function. Also Test Codes can be obtained and printed out for warranty purposes. The Adaptation values can be cleared as well as printed out.
- **Expert Mode** - Expert Mode should be used when the technician has a thorough working knowledge of the system. You will find several items in expert mode: Read/Clear fault memory, Diagnosis (Status) requests, Component Activation and Test Modules.

Test Modules

Test modules are found in the diagnosis program of the DISplus and GT-1. These allow the technician to take advantage of a guided diagnostic plan. The program will direct the technician through the various steps using a "trouble tree" format. When using test modules it is important to follow the instructions exactly. Due to the complex nature of some faults, the test modules are not always conclusive. The test module is only as effective

as the information provided by the technician. The technician also needs to rely on his experience and some common sense. The test modules should be used to assist the technician, not as a replacement for good diagnostic skills.

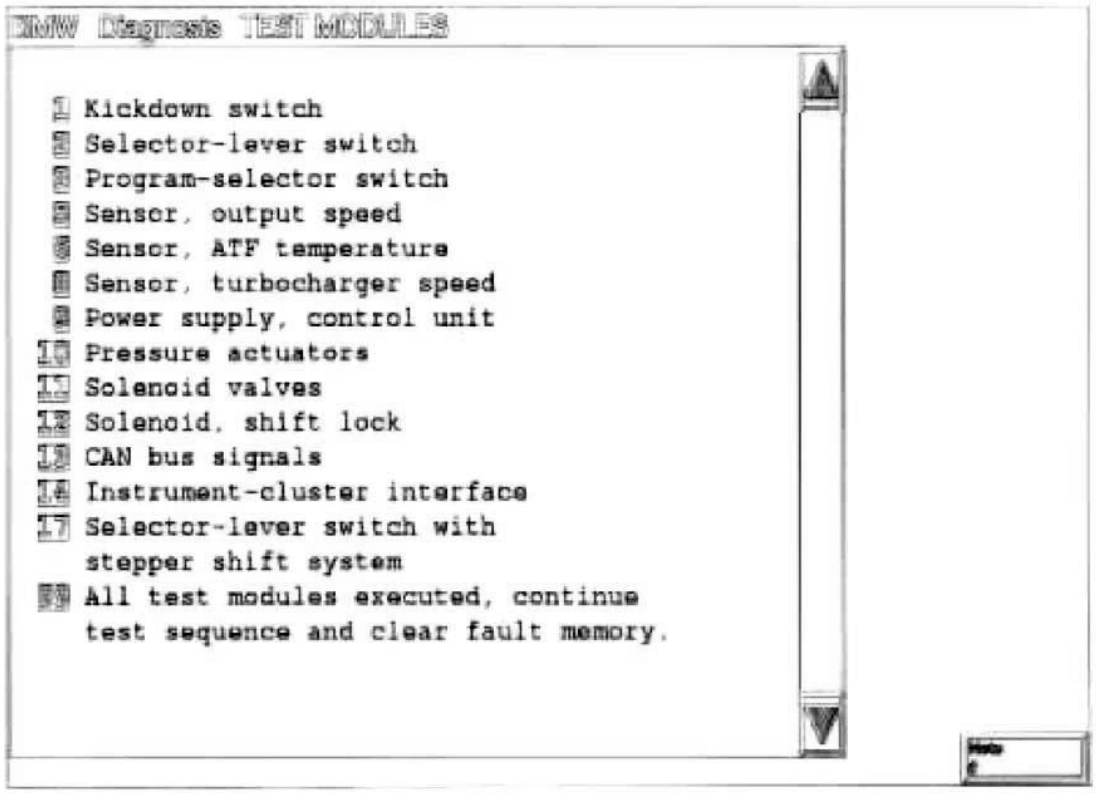

Fig. 53: Identifying Test Modules
Courtesy of BMW OF NORTH AMERICA, INC.

Test modules come in two formats. The one shown above is used on E38/E39 vehicles and the E53 with 4.4 and 4.6 engines. The E46, E65 and E53 (with 3.0 M54) uses the new "E46 Diagnostic Concept" which was introduced with the E46 in the 1999 model year. Regardless of the format used, the technician is still guided through a step by step procedure.

Diagnostic Tips

The following consists of some helpful hints to assist the BMW diagnostic technician. It is designed to assist the technician to form a logical path of diagnosis. These suggestions should be used in conjunction with other approved diagnostic routines. This does not exclude the technician from the responsibility to contact technical assistance. All major repairs and transmission replacement must be pre-approved by the BMW Technical Hotline. Transmission concerns can be broken down into several categories:

- **Shift Quality Complaints** - Shift Quality complaints consist of harsh up or down shifts, improper shift points and erratic shifting. These complaints could be related to electronic/software issues or hydraulic/mechanical problems. Perform quick test and check SIB's before proceeding. As with most

concerns, check the transmission fluid level and condition as well.

Do not clear adaptation values unless instructed to do so by BMW Technical Hotline.

- **Delayed/No Upshifts** - Before proceeding on delayed upshift complaints, make sure you are aware of the conditions that this occurs. This could be normal operation, such as the "Warm-up Phase" program. Always check front tires for proper inflation pressures, correct size and type. Also check for uneven tire wear. Variations in front tire size from left to right can activate the AGS "Curve Recognition" feature. The TCM will interpret the difference in wheel speed signals as being a turn and suppress (or delay) upshifts.
- **Slipping** - This type of issue is usually associated with a fault code. Be sure to check the transmission fluid level and condition.
- **Noise, Vibration** - Noises and vibrations should be checked over by a good visual inspection. Look for loose transmission or engine mounts. Check the driveshaft, center bearing and flexible coupling (or constant velocity joints). Also check the lateral alignment of the driveshaft. There are several SIB's pertaining to noise and vibration.
- **No Forward or Reverse Gear** - Start by checking transmission fluid level and note the fluid condition. Inspect for leaks and external transmission damage.
- **Leaks** - When investigation transmission leaks, be sure to verify that the suspected leak is actually transmission fluid. Engine oil, hydraulic and brake fluid can be mistaken for a transmission leak. Check the transmission cooler lines, transmission cooler and transmission pan gasket. Try to locate the source of the leak. Do not make any major repairs until the technical hotline is contacted.
- **Fault Codes** - Perform COMPLETE short test (Quick test) on all vehicle systems. It is important to survey all systems in the event that a related system is causing the transmission fault. Always print out the ID Page, Fault codes and fault conditions.

Information Resources

When diagnosing transmission related concerns it is important to use all information resources available. The following information sources should be utilized at all times:

- Service Information Bulletins
- Technical Data
- ETM Electrical Troubleshooting Manual
- DCS (Dealer Communication System)
- Repair Instructions
- Tightening Torques
- Technical Training Manuals
- Special Tool Information

Technical Information System (TIS)

Most of the above information can be accessed by using the BMW TIS CD or by logging on the BMW TIS website through **www.bmwcenternet.com.** The BMW TIS website contains a wealth of helpful information for the technician. The information is updated on a regular basis.

Service Round Table

In addition to the above sources of information, the technician should be up to date on the latest edition of the BMW Service Round table. The round table will cover the most recent topics and offer some hints that will assist the technician. The Service Round table is broadcast live on a monthly basis via the BMW Visionwerke Network. In addition to live broadcasts, the round table is rebroadcast on a regular schedule during the month.

TCM CODING AND PROGRAMMING

As with other control modules used on BMW systems, the TCM must be programmed and/or coded for the vehicle. Over the years, these methods have varied from system to system.

Coding

Coding will assign the control unit to a particular application. Information such as differential ratio, tire size, vehicle series, engine, engine control system, w/wo AC etc.are some of the possible variants that have to be considered. Transmission control units are coded using various methods.

- **Grounding pins in wiring harness connector** - On early models equipped with the 4HP22/24 EH transmissions, the TCM was coded to the vehicle by means of grounding pins in the wiring harness connector for the TCM. By selectively grounding specific pins in the harness, the TCM was assigned to that vehicle. For Example: The TCM could be installed in a 535, 635, or a 735. This only applies to the Early E- 7 Versions. (E23, E24, E28)
- **TCM ordered for Specific Application** - On some later models, the TCM was ordered for a specific vehicle application, coding was not necessary.
- **Coding performed during programming** - On systems that use a flash programmable TCM, the coding process is done during flash programming.

Programming

Programming refers to the instructions that the TCM is to follow. The TCM is programmed to apply certain shift maps according to operating conditions such as vehicle speed, engine speed, engine temperature, engine load and throttle position. This information can be entered into the TCM via an updated EPROM or through flash programming.

Flash programmable control units use a EEPROM which is Electronically Erasable. The EEPROM is also soldered into the TCM and cannot be removed or replaced. Flash programmable TCM's can be programmed up to 14 times (with a new TCM).

NOTE: Always clear adaptations after programming.

NOTE: Do not program a TCM to correct a complaint unless there is a specific SIB that covers the issue. Only program when installing a new TCM or when instructed to do so by BMW Technical Assistance. Always have the ID page available when calling for technical assistance.

TCM PROGRAMMING

Control System	Transmission	Coding	Programming	TCM Type
GS 1.26 GS 1.27 GS 1.29	4HP22 EH (Early E-7) 4HP22/24 EH (Late E-7 and E-9)	Grounding pins in Harness. (Early E-7 Only) TCM ordered for specific application. Coding not needed.	Replaceable EPROM Replaceable EPROM	35 Pin 35 Pin
GS 7.3 GS 7.32 GS 7.11 GS 8.32	A5S310Z (5HP18)	TCM ordered for specific application. Coding not needed.	Replaceable EPROM	88 Pin
GS 8.60 GS 8.60.4	A5S325Z (5HP19)	Coding done when Programmed	Flash Programming (EEPROM)	134 Pin SKE
GS 8.55 GS 8.60.2	A5S440Z (5HP24)	Coding done when programmed	Flash Programming (EEPROM)	88 Pin up to 98 (E38 M62) 134 Pin SKE from 98 to present.
GS 9.2 GS 9.22 GS 9.22.1 GS 8.60.3	A5S560Z (5HP30) A5S560Z (5HP30) (E38 M73TU)	TCM ordered for specific application. Coding not needed. Coding done when programmed.	Replaceable EPROM Flash Programming (EEPROM)	88 Pin 134 Pin
GS 4.14 GS 4.16	A4S310R (THMR-1)	TCM ordered for specific application. Coding not needed.	Replaceable EPROM	55 Pin
GS 8.34	A4S270R (THMR-1)	TCM ordered for specific application. Coding not needed.	Replaceable EPROM	88 Pin
GS 20	A5S360R A5S390R	Coding done when programmed	Flash Programming (EEPROM)	134 Pin SKE

TRANSMISSION FLUID INFORMATION

Transmission Fluid (Oil)

The automatic transmission provides filtered, pressure regulated hydraulic fluid for all of the transmissions functional requirements. All BMW automatic transmissions are designed to operate with specific fluids. Use of non-approved oil will cause malfunctions and irreparable transmission damage which is not covered by BMW warranty.

The transmission fluid provides the following functions:

- Lubricates mechanical components (planetary gears, bearings etc.).
- Removes heat and transfers heat to transmission cooling system. (Heat Exchanger).
- Removes debris and contaminants to sump and filter when circulated.
- Provides a transfer of kinetic energy in the torque converter.

- Allows hydraulic operation of mechanical components (clutches, brakes) via control of the valve body.

Also, transmission fluid has various properties to prevent oxidation and breakdown from heat and friction. Each type of transmission fluid has properties specific for each transmission application.

Fluid level is crucial in the proper operation of an automatic transmission. Improper fluid levels will cause improper operation and eventually irreparable transmission damage. Improper fluid level can cause:

- A low fluid level can cause an interruption in oil flow during fast acceleration or hard braking which can cause gear shift malfunctions and noises.
- An excessively high fluid level can cause the rotating mechanical components to paddle in the oil. This produces foam which introduces air into the hydraulic system.
- A low fluid level can also cause transmission overheating causing premature transmission failure.

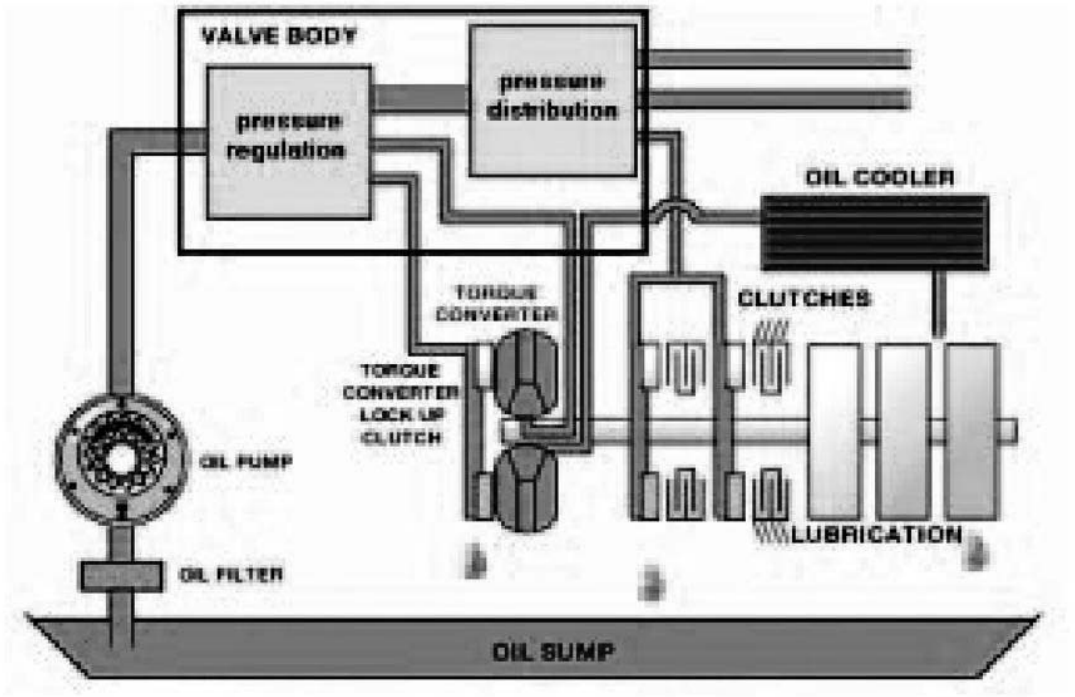

Fig. 54: Identifying Transmission Fluid Flow
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Fluid Checking Procedures

Transmission fluid checking is accomplished using the DISplus or GT-1. The DISplus or GT-1 is used to monitor transmission fluid temperature to insure the transmission is not over or under-filled. As with most other current ZF transmissions there is no dipstick, the fluid level is checked and filled at the fill plug. The location of the fill plug varies between transmissions.

Transmission fluid should be checked between 30 and 50 degrees Celsius (unless otherwise specified). Use the DISplus and/or GT-1 to determine transmission temperature. The transmission temperature information can be found in the diagnosis section under Service Functions.

Proper procedures for checking and filling transmission fluid can be found in BMW Service Information Bulletin B 24 01 98.

When checking transmission fluid, observe the following items:

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Fig. 55: Identifying Transmission Fluid Checking Procedures
Courtesy of BMW OF NORTH AMERICA, INC.

- Transmission in Park
- Parking brake applied
- Engine Running
- Vehicle level
- No engine load
- Trans Temp 30-50C
- Observe correct drain plug torque

- Use correct fluid

  When replacing parts on transmissions that use lifetime fluid, drain fluid into a clean container and reuse.

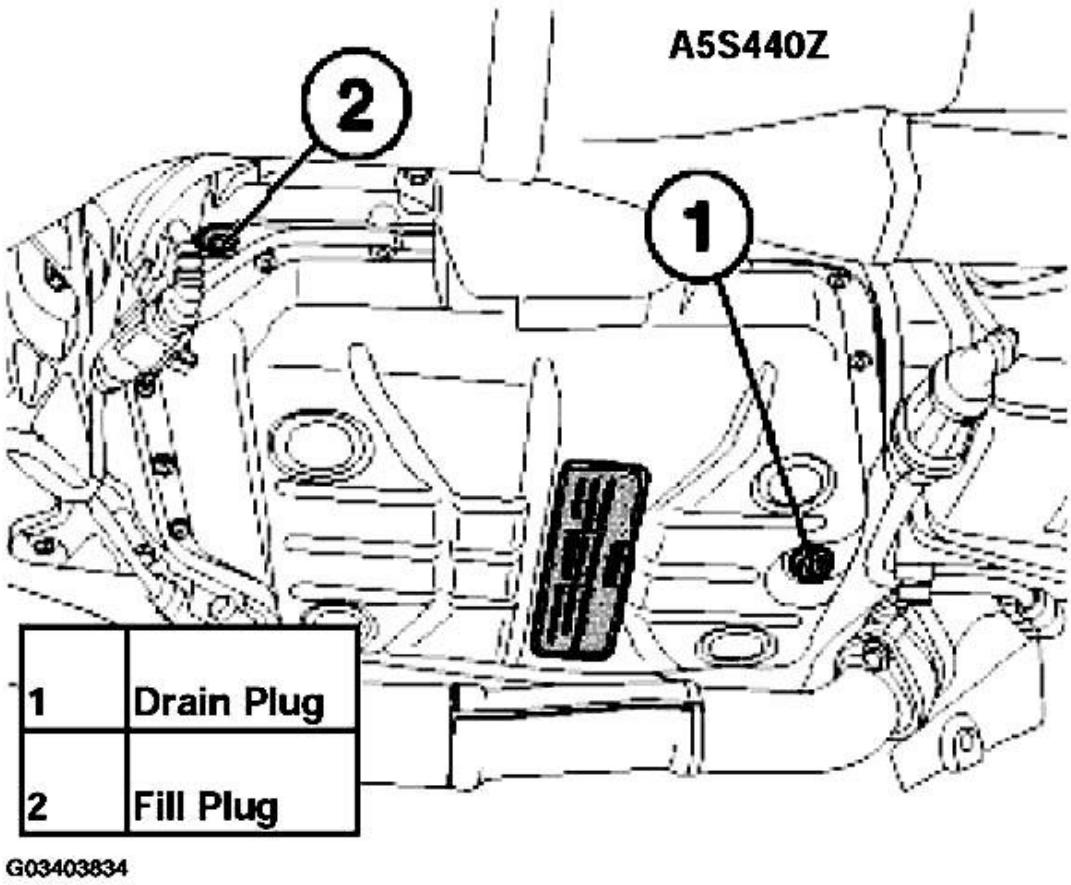

Fig. 56: Identifying Transmissions Drain Plug And Fill Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Fluid Application

There are numerous types of transmission fluid used in BMW transmissions. With the exception of the early transmissions (4HP22/24, A4S310/270R and the A5S310Z in the E34) all current BMW transmissions use "Lifetime Fill" transmission fluid. There is no maintenance required for these transmissions. It is important to use the correct fluid. Incorrect use of the transmission fluid can cause non-warrantable transmission damage.

When performing repairs on transmissions with lifetime fluid, it is important to drain the transmission fluid in to a clean container for re-use. New fluid should only be used for transmission replacement and for topping off after repairs.

Also, transmission fluid level is vital to the proper operation of the transmission.

When servicing or repairing BMW automatic transmissions, refer to TIS for fluid capacities.

TRANSMISSION FLUID

Transmission	Fluid Type	BMW Part #	Container	SIB Ref.
4HP22 **4HP24**	Dexron III Mercon	Available Commercially (Castrol or Texaco)	N/A	
A5S310Z 530i/iT (E34)	Dexron III	Available Commercially (Castrol or Texaco)	N/A	
M3 (E36)	ESSO LT 71141	83 22 9 407 807	20 liter container	B 24 03 95
A5S325Z	ESSO LT 71141	83 22 9 407 807	20 liter container	
A5S440Z	ESSO LT 71141	83 22 9 407 807	20 liter container	
A5S560Z 740 (E32), 540 (E34) 840Ci (E31- 6/93-12/94) 740i/iL-750iL (E38)	Shell LA2634	83 22 9 407 765	5 liter container	B 24 11 92
540i (3/96-12/96) 850Ci (10/94-6/97)	ESSO LT 71141	83 22 9 407 807	20 liter container	B 24 02 94
A4S310R **A4S270R** **(THM-R1)**	Dexron III Mercon	Available Commercially (Castrol or Texaco)	N/A	
A5S360R **A5S390R**	Texaco ETL 7045E Texaco ETL 8072B	83 22 0 026 922 83 22 0 024 359	25 liter container 25 liter container	
GA6HP26Z **GA6HP32Z**	Shell M-1375.4	83 22 0 142 516	20 liter container	

TRANSMISSION SERVICE

Overview Of Allowable Repairs

Currently, service of transmissions covered under warranty is limited to level I. Level I service includes electrical, minor mechanical and hydraulic repairs as well as repair manual provided service adjustments.

Part availability is limited to include the repair of the following:

- **Oil Leaks** - Radial Seals and gaskets.
- **Mechanical/Hydraulic Faults** - Torque Converter, Valve Body, parking pawl, oil pan, output shaft bearing.
- **Electrical Faults** - Solenoid Valves, pressure regulator valves, wiring harness.
- **Signal Sensing** - Turbine and Output Speed Sensors, CAN bus, Temp Sensor.

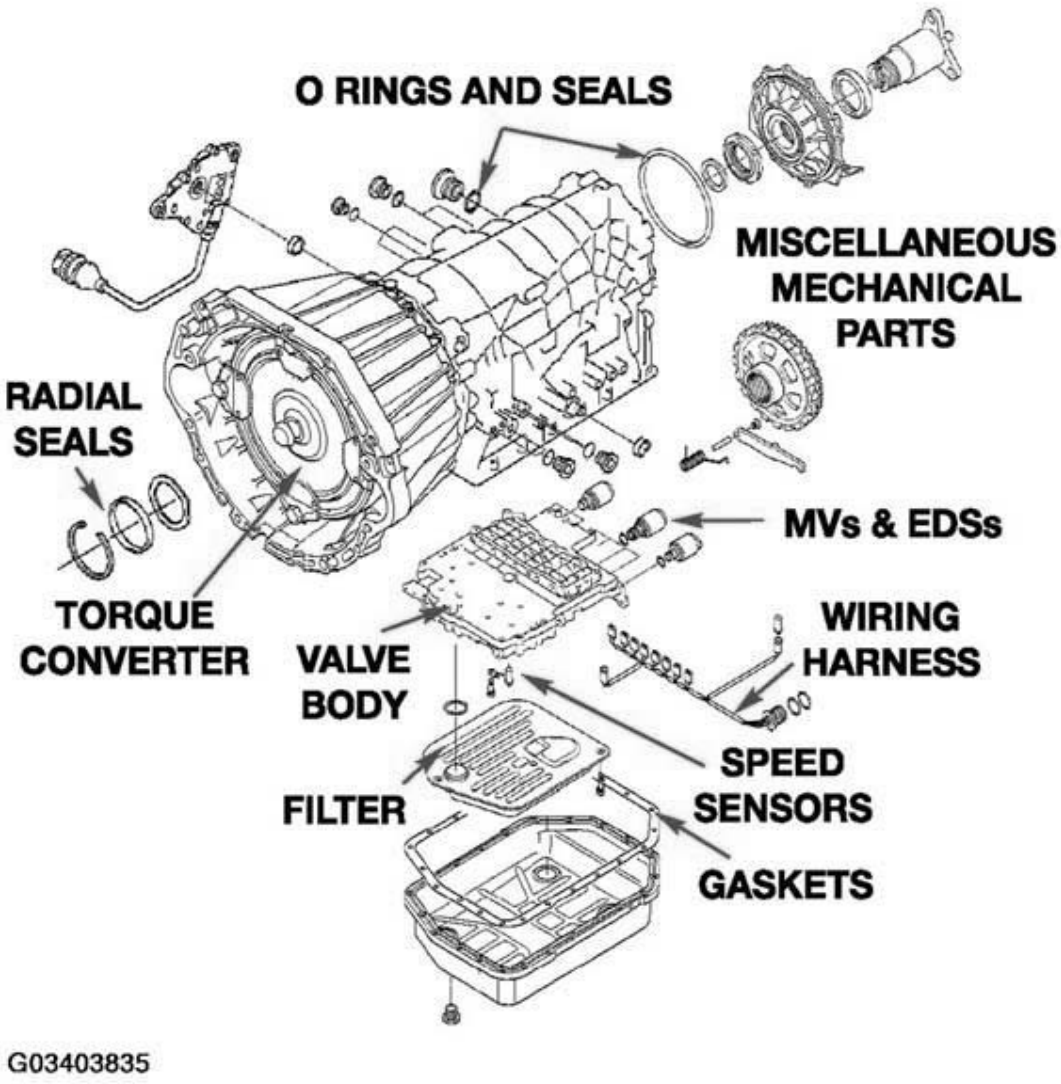

Fig. 57: Exploded View Of Transmission Parts
Courtesy of BMW OF NORTH AMERICA, INC.

BMW Technical Hotline

Before performing any majors repairs or transmission replacement, always contact the BMW Technical Hotline at 1-800-472-7222. When prompted to do so, select option 1 for the Drivetrain Group. Be prepared will all necessary information such as transmission serial number, ID page, fault codes etc. Failure to contact the technical hotline could result in the non payment of warranty claims.

BMW Value Line Program

The Value-Line replacement transmission program provides the availability of factory certified rebuilt units at a very competitive cost.

BMW SPECIAL TOOLS (TRANSMISSION)

The following pages contain information about BMW special tools, this is not an all inclusive list. This is a list of tools that would be helpful in the diagnosis and service of BMW transmissions.

Transmission Removal And Installation

Tool # 24 1 110

This tool is used to remove the torque converter to flexplate bolts. It is a 17 mm socket with 3/8" drive. There is a magnet to help retain the bolt during installation and removal.

Fig. 58: Identifying BMW Special Tools - Tool # 24 1 110
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 4 130

During transmission installation and removal the oil pump must be protected from damage. This tool helps keep the torque converter in place, to prevent oil pump damage due to misalignment.

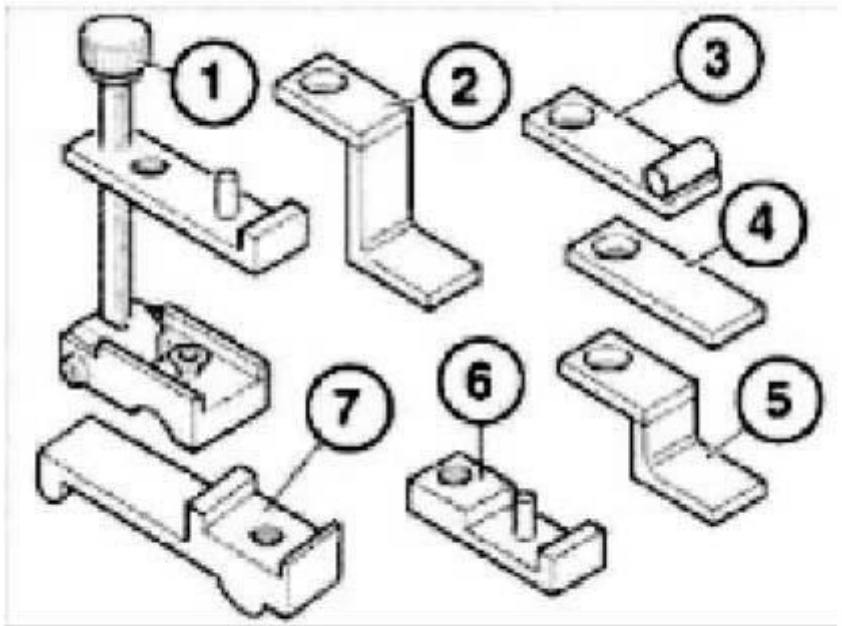

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Fig. 59: Identifying BMW Special Tools - Tool # 24 4 130
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 2 300

Used to align torque converter with flexplate during installation. Use on all BMW automatic transmissions.

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Fig. 60: Identifying BMW Special Tools - Tool # 24 2 300
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Adjustments

Tool # 24 2 320

3/16" socket head cap screw (hex) with 1/4" drive. Used to adjust brake band on the THMR-1.

Fig. 61: Identifying BMW Special Tools - Tool # 24 2 320
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 2 330

1/2 open end wrench used to turn lock-nut on the brake band servo when adjusting the brake band. Used only on the THMR-1 transmissions.

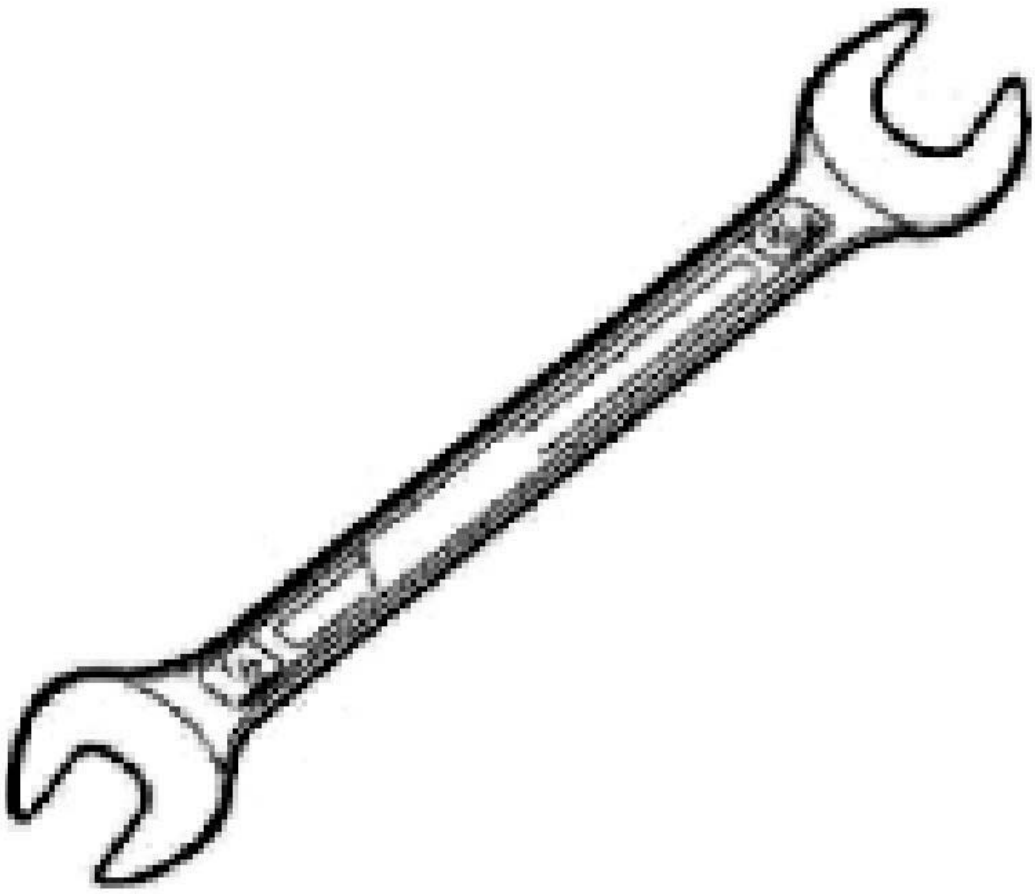

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Fig. 62: Identifying BMW Special Tools - Tool # 24 2 330
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 1 120

Used as guide to lock the range selector switch in "P" when installing. It is used on the A4S270R transmission. Used only for applications which have the selector switch mounted on the transmission case.

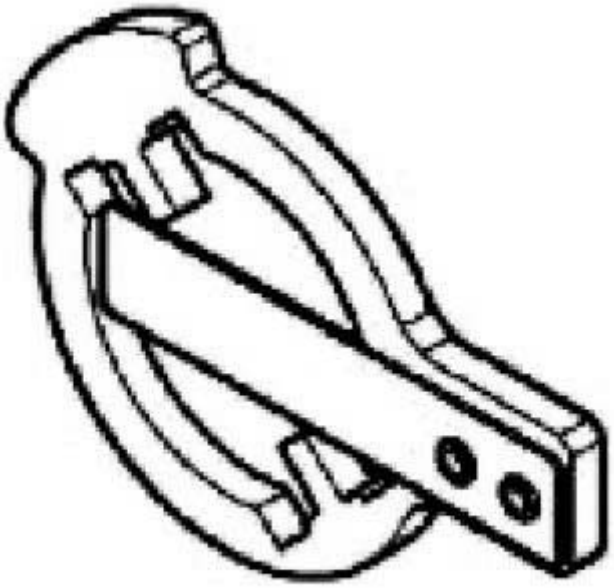

Fig. 63: Identifying BMW Special Tools - Tool # 24 1 120
Courtesy of BMW OF NORTH AMERICA, INC.

Transmission Diagnostic Tools

Tool # 24 6 000

8-pin test cable used to test the transmission at the "Cannon Plug" located on transmission case. This cable is used for the 4HP22/24 EH. Used in conjunction with 61 1 459.

Fig. 64: Identifying Transmission Diagnostic Tools - Tool # 24 6 000
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 6 060

16 pin test cable used to test the transmission at the "Cannon Plug" located on the transmission case. This cable is used for the A5S310Z and A5S560Z. Used in conjunction with 61 1 459.

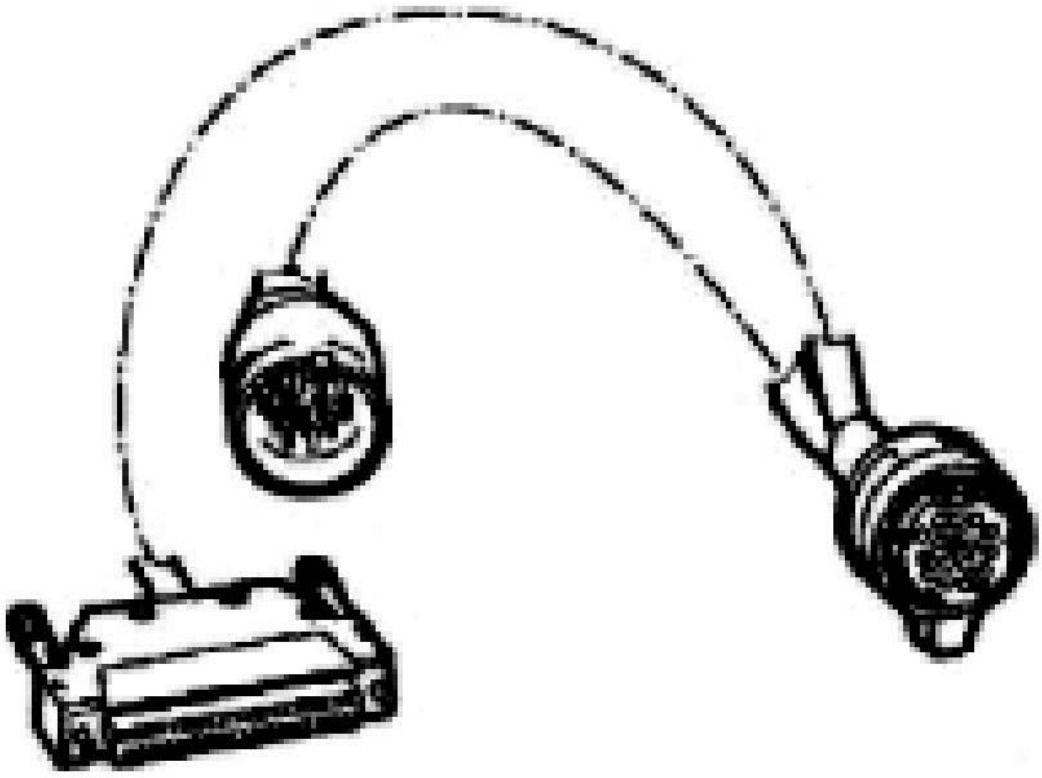

Fig. 65: Identifying Transmission Diagnostic Tools - Tool # 24 6 060
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 6 020

14 pin test cable used to test the transmission at the "Cannon Plug" located on the transmission case. This cable is used on the A5S310Z.

Used in conjunction with 61 1 459.

Fig. 66: Identifying Transmission Diagnostic Tools - Tool # 24 6 020
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 6 010

8-pin test cable used to test the transmission at the "Cannon Plug" located on transmission case. This cable is used for the A4S270/310R.

Used in conjunction with 61 1 459.

Fig. 67: Identifying Transmission Diagnostic Tools - Tool # 24 6 010
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 6 080

16-pin test cable used to test the transmission at the "Cannon Plug" located on transmission case. This cable is used for the 6HP26Z.

Used in conjunction with 61 1 459.

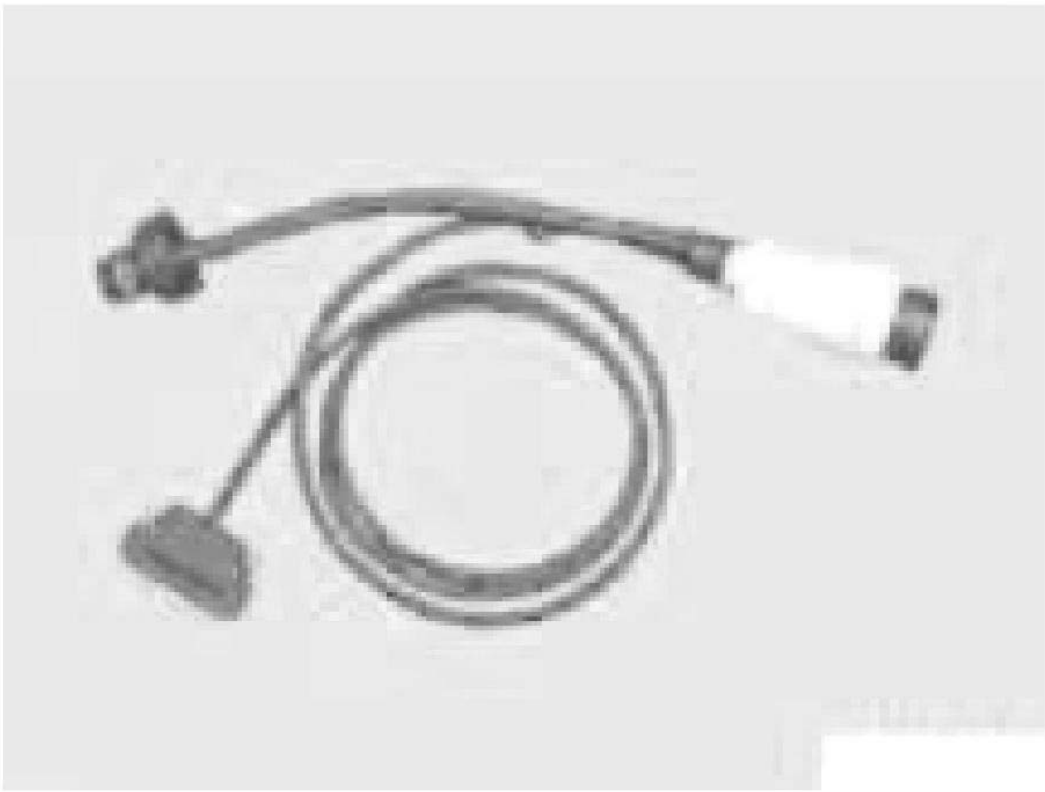

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Fig. 68: Identifying Transmission Diagnostic Tools - Tool # 24 6 080
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 6 070

20-pin test cable used to test the transmission at the "Cannon Plug" located on transmission case. This cable is used for the A5S360/390R.

Used in conjunction with 61 1 459.

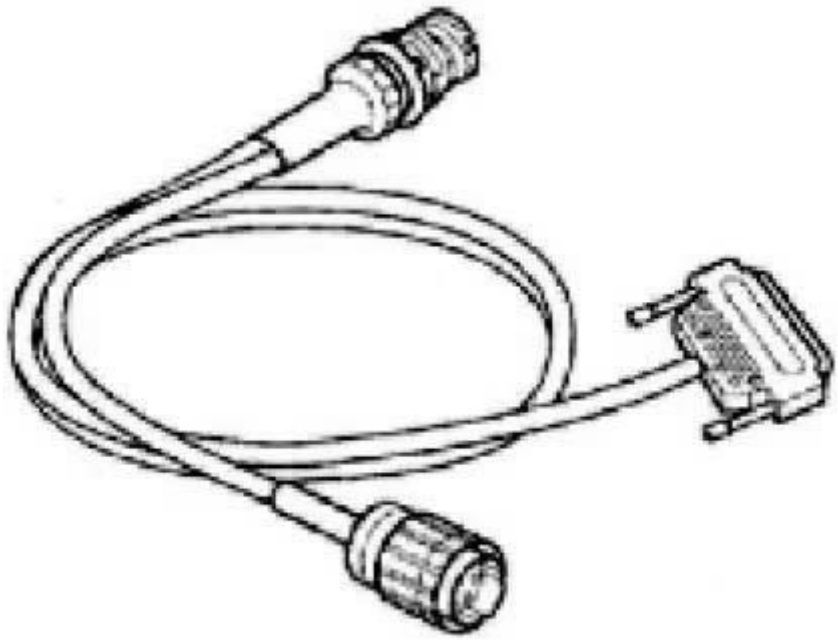

Fig. 69: Identifying Transmission Diagnostic Tools - Tool # 24 6 070
Courtesy of BMW OF NORTH AMERICA, INC.

Service and Repair Tools

Tool # 24 1 170

For loosening and tightening slotted nut on output drive flange. Used on 5HP18 (A5S310Z). Use in conjunction with tool #24 1 220.

Fig. 70: Identifying Service And Repair Tools - Tool # 24 1 170
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 4 110

For loosening and tightening slotted nut on output drive flange. Used on 5HP24 and 5HP30. Use in conjunction with tool #24 1 220.

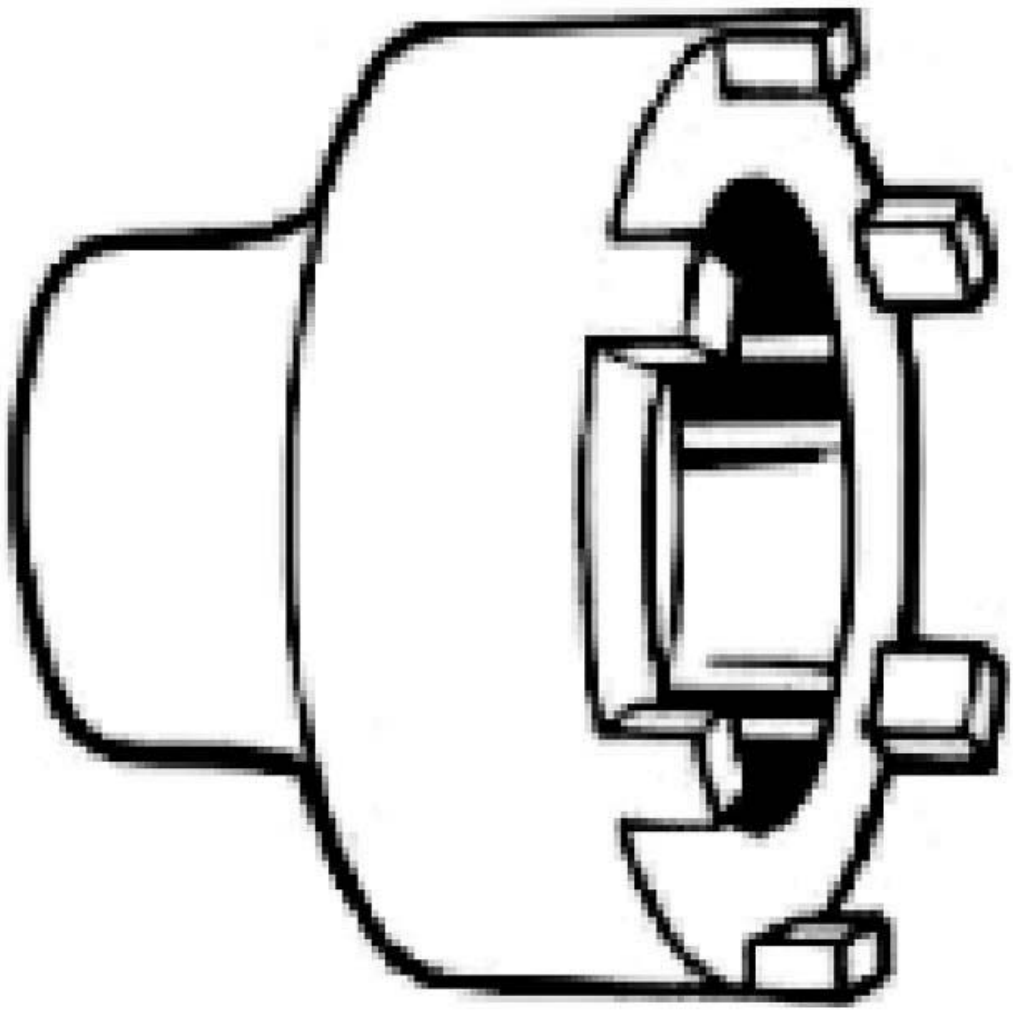

Fig. 71: Identifying Service And Repair Tools - Tool # 24 4 110
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 1 220

Take up support for drive flange. Used when tightening of loosening slotted nut on output drive flange. Used with tool numbers 24 4 170 and 24 4 110.

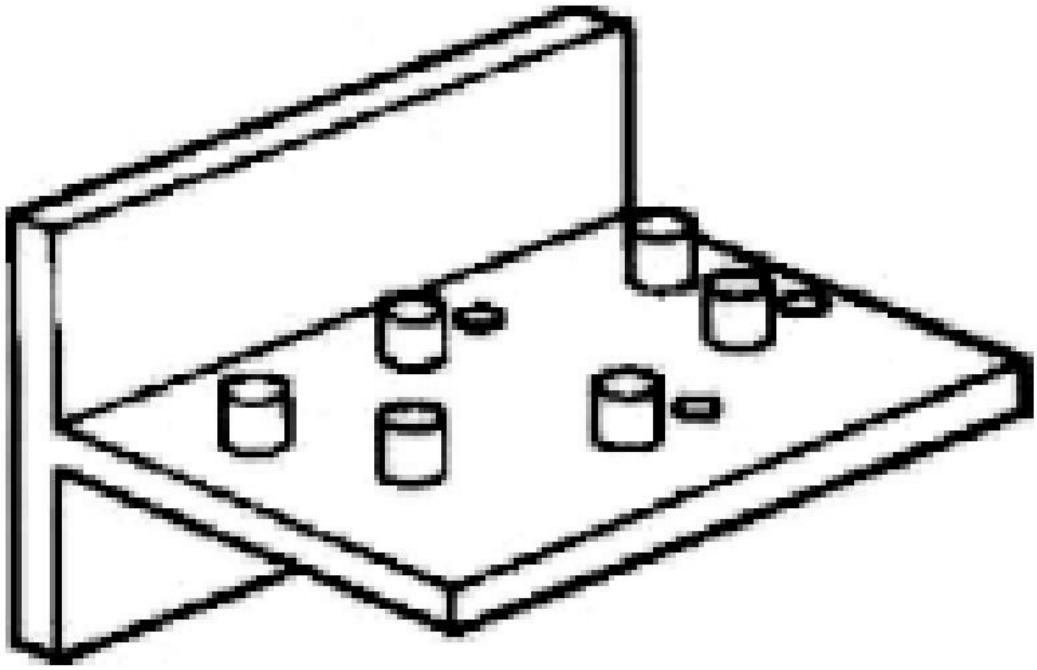

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Fig. 72: Identifying Service And Repair Tools - Tool # 24 1 220
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 2 380

34 mm Socket used to tighten and loosen nut on output drive flange. Used with special tool 23 0 020. For GA6HP26Z transmission.

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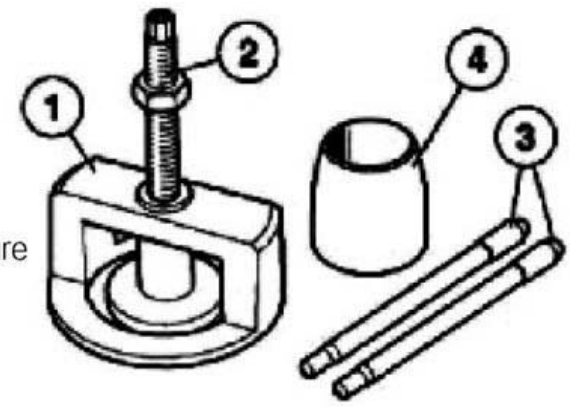
Fig. 73: Identifying Service And Repair Tools - Tool # 24 2 380
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 2 310

Set of tools used to re-seal intermediate plate. Used on A4S310R and A4S270R. Tool Set Consists of:



1. 24 2 311 Pressure Plate
2. 24 2 312 Spindle with Pressure Plate
3. 24 2 313 Guide Pins (2)
4. 24 2 314 Slip Bushing

G03403852

Fig. 74: Identifying Service And Repair Tools - Tool # 24 2 310
Courtesy of BMW OF NORTH AMERICA, INC.

Tool # 24 1 200

Used to prevent damage to rotary shift shaft seal when fitting new seal on shift shaft. Used on A5S310Z (5HP18).

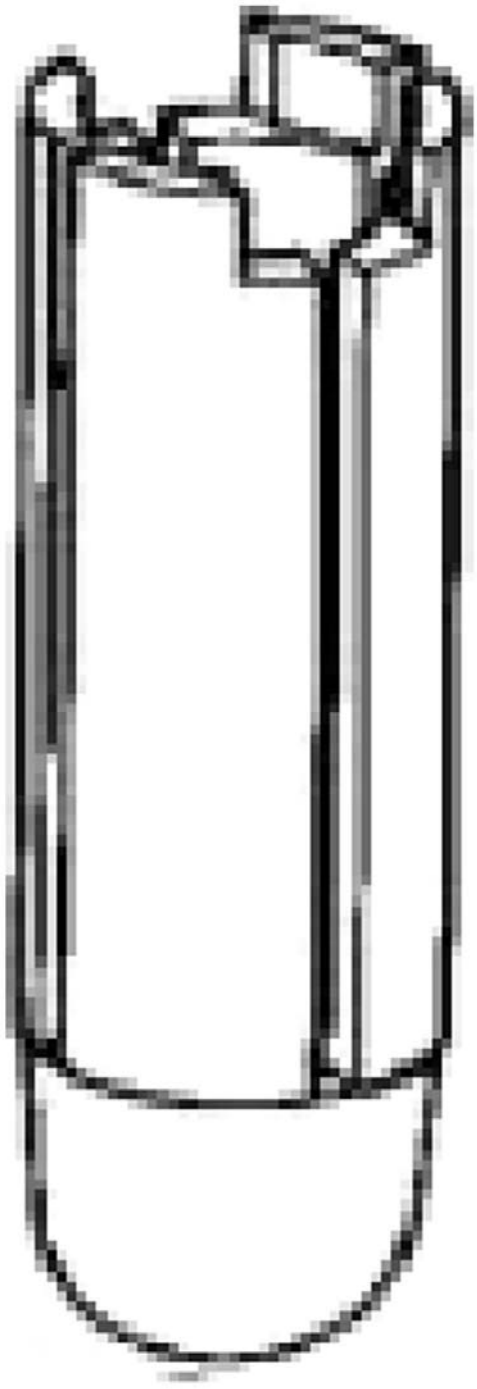


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Fig. 75: Identifying Service And Repair Tools - Tool # 24 1 200
Courtesy of BMW OF NORTH AMERICA, INC.

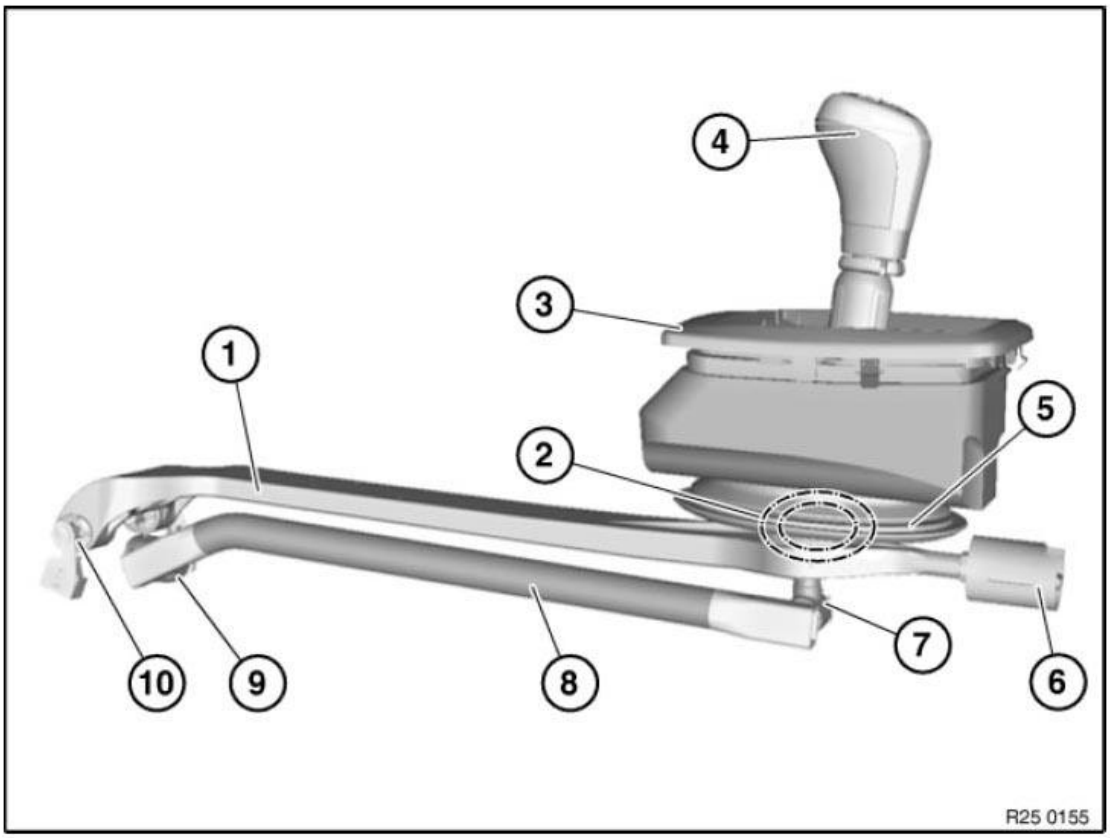
Gear Shift Mechanism - Operating Fluids

1.0 GENERAL INFORMATION

Components of the gear shift mechanism located outside of the transmission housings, such as ball cups, bearing bushings, gearshift joints, etc. may be lubricated with Polylub GLY 801 (BMW Part No. 81 22 9 407 647).

2511 CENTRE SHIFT, MANUAL TRANSMISSION

25 11 ... OVERVIEW OF GEARSHIFT MECHANISM FOR MANUAL TRANSMISSION



1 Shift arm
2 Ball socket (shift lever bearing)
3 Shift lever cover (gaiter)
4 Shift lever knob
5 U-gaiter
6 Support bearing (shift arm bearing)
7 Shift lever
8 Shift rod
9 Shift rod joint
10 Bearing bush

Fig. 1: Overview Of Gearshift Mechanism For Manual Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

1. Shift arm

2. Ball socket (shift lever bearing)
3. Shift lever cover (gaiter)
4. Shift lever knob
5. U-gaiter
6. Support bearing (shift arm bearing)
7. Shift lever
8. Shift rod
9. Shift rod joint
10. Bearing bush

25 11 000 REMOVING AND INSTALLING SHIFT LEVER

Necessary preliminary tasks:

- Remove **KNOB** for shift lever.
- Remove complete **EXHAUST SYSTEM** .
- Remove rear **UNDERBODY PROTECTION** .
- Remove heat shields.

If necessary

Support transmission with workshop jack.

Remove screws and nuts.

Remove cross-member.

Tightening torque **23 71 1AZ/2AZ** .

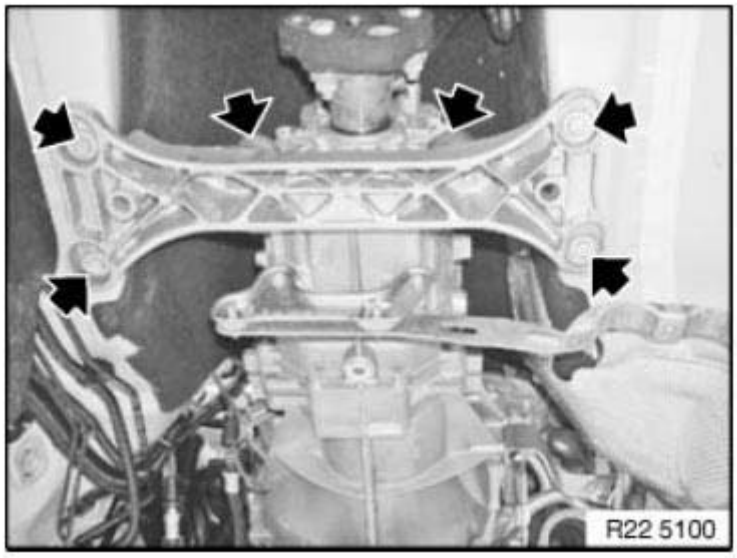
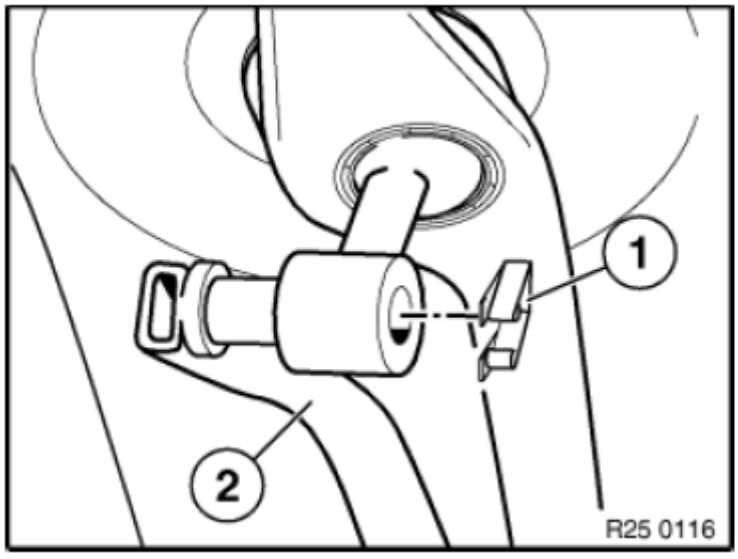


Fig. 2: Locating Cross-Member Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **SHIFT ROD** (2).

Installation:

Grease shift rod pin. See **GEAR SHIFT MECHANISM - OPERATING FLUIDS**



1. Retainer
2. Shift rod

Fig. 3: Identifying Retainer And Shift Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Key:

1. Retainer

2. Shift rod

IMPORTANT: New retaining clips fitted as from 04.08.
Retaining clip must interlock captively with retaining web (1) behind shift rod pin.

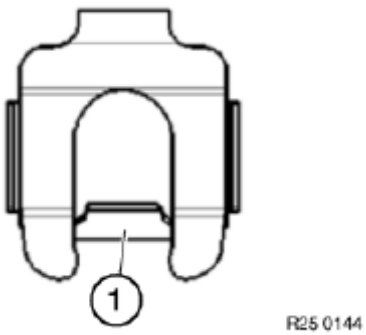


Fig. 4: Identifying Retaining Web
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool 25 1 120 into mount and turn 90° counterclockwise.

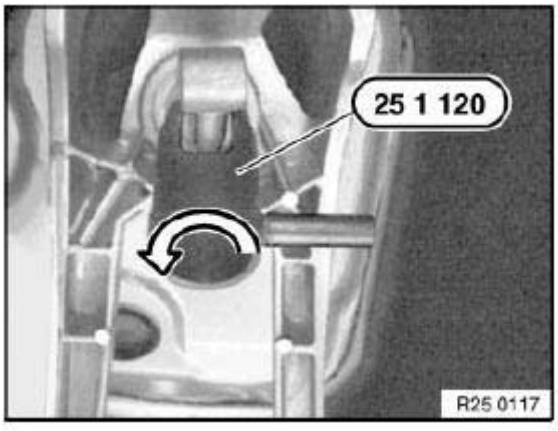


Fig. 5: Inserting Mount Using Special Tools (25 1 120)
Courtesy of BMW OF NORTH AMERICA, INC.

Press mount upwards out of shift arm.

Feed U-gaiter from shift arm and out of body cutout.

Lift out shift lever.

Installation:

Pull U-gaiter from below completely over shift arm receptacle.

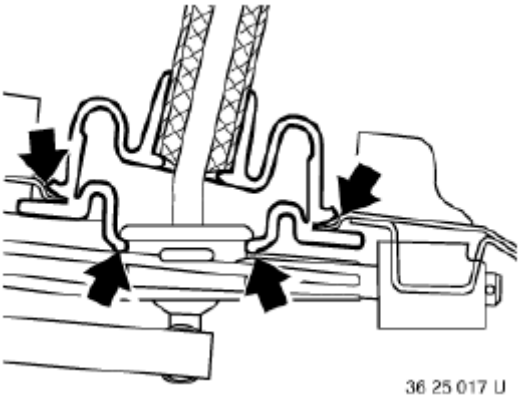


Fig. 6: Locating U-Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull U-gaiter bead (4) over receptacle on shift arm and pop U-gaiter lips (3) into body cutout.

Make sure the arrow on the upper U-gaiter lip (3) is seated in the direction of travel and crossways to the shift lever eye (5).

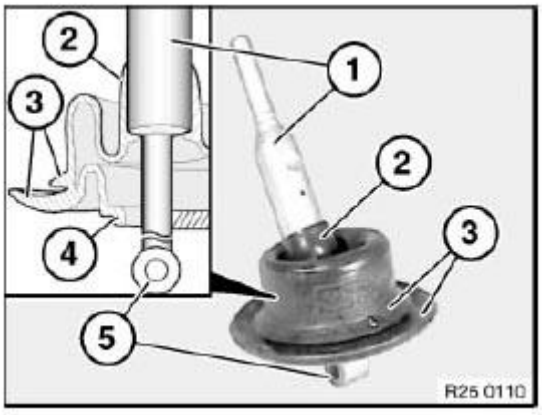


Fig. 7: Identifying Shift Lever Components
Courtesy of BMW OF NORTH AMERICA, INC.

Key:

1. Shift lever
2. U-gaiter moulded section
3. U-gaiter lips
4. U-gaiter bead
5. Shift lever eye

Installation:

Grease shift lever ball. See **GEAR SHIFT MECHANISM - OPERATING FLUIDS**

Fit mount on shift arm receptacle.

Align retaining lugs of mount to openings in receptacle (crossways to direction of travel).

Press shift arm with mount downwards until mount snaps audibly into place (if necessary, use a pressing-in tool).

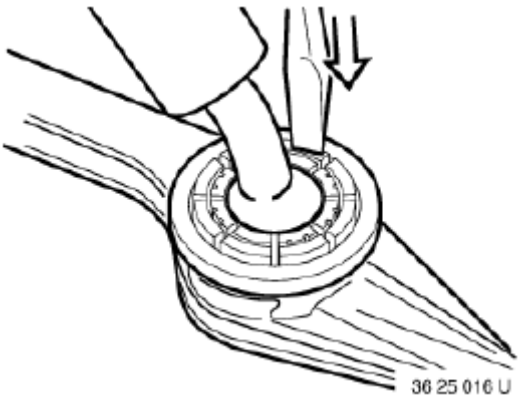


Fig. 8: Fitting Mount On Shift Arm
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 ... REPLACING U-GAITER

Necessary preliminary tasks

- Remove **SHIFT LEVER**

Detach U-gaiter from shift lever.

If necessary, rub inside of moulded section (1) beforehand with Circolight.

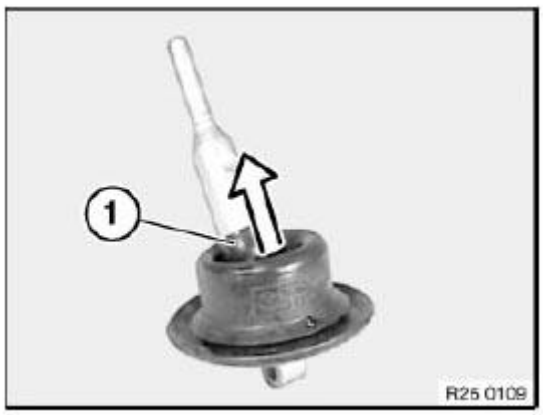


Fig. 9: Removing Moulded Section

Courtesy of BMW OF NORTH AMERICA, INC.

Installation

- Degrease shift lever (1)
- Coat inside of moulded section (2) with Circolight.
- Pull U-gaiter from above over shift lever and align
- Arrow on upper lip (3) must point crossways to mount eye (5) in direction of travel

Key:

1. Shift lever
2. U-gaiter moulded section
3. U-gaiter lip
4. U-gaiter bead
5. Mount eye

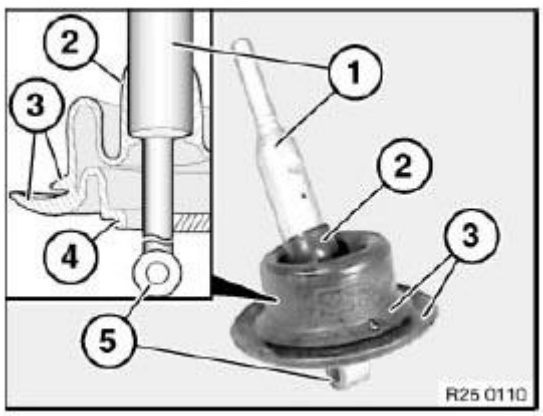


Fig. 10: Identifying Shift Lever Components
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 235 REPLACING BEARING BUSHES FOR SHIFT ARM

Necessary preliminary tasks

- Remove **SHIFT ARM**

- Press out bearing bush (1).
- Coat new bearing bush with Circolight.
- Then press into shift arm until side surface of bush protrudes uniformly.

NOTE: Illustration shows: shift arm simply supported.

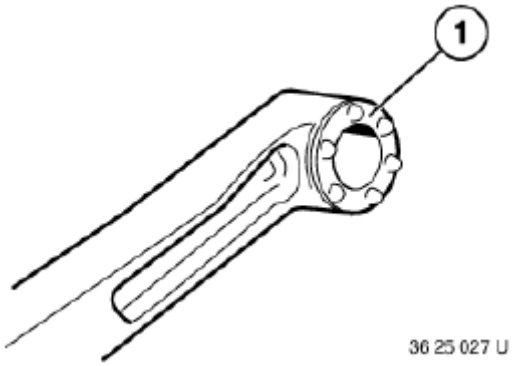


Fig. 11: Identifying Bearing Bush
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 041 REPLACING BEARING SHELL FOR SHIFT LEVER

Necessary preliminary tasks

- Remove **SHIFT LEVER**

Detach mount from selector lever.

Installation:

Grease ball joint. See **GEAR SHIFT MECHANISM - OPERATING FLUIDS**

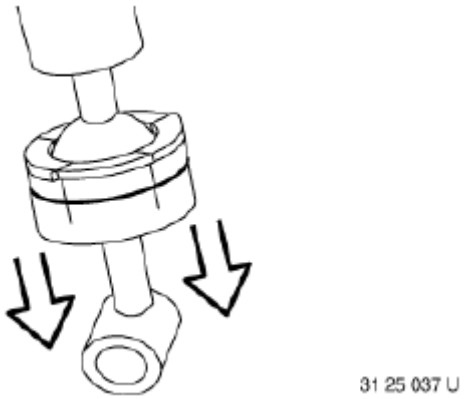


Fig. 12: Removing Mount From Selector Lever
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 001 REPLACING COMPLETE SHIFT LEVER

Necessary preliminary tasks:

- Remove **SHIFT LEVER** .

Detach mount from selector lever.

Installation:

Grease ball joint.

Grease, refer to **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

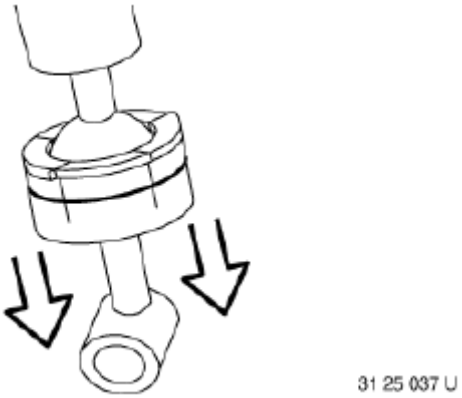


Fig. 13: Removing Mount From Selector Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Detach rubber gaiter from selector lever.

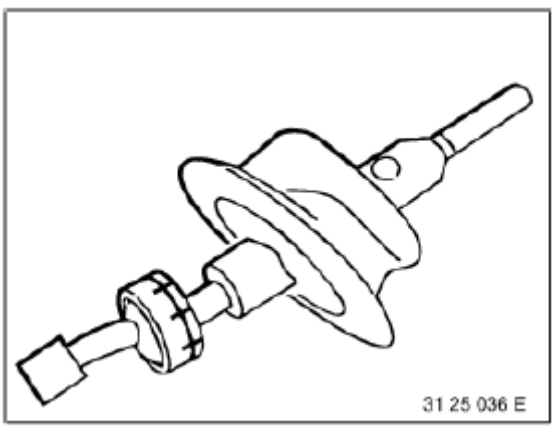


Fig. 14: Identifying Rubber Gaiter Of Selector Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Degrease selector lever (1).

Coat rubber bellows on inside of shaped section (2) with Circolight.

Pull rubber gaiter from above over selector lever and align. Arrow (3) on rubber gaiter must point in direction of

travel (A).

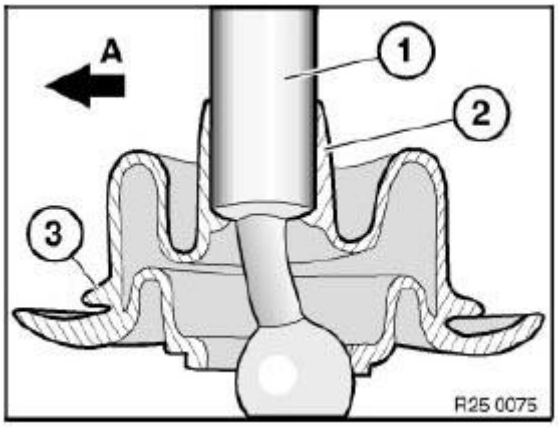


Fig. 15: Pulling Rubber Gaiter Over Selector Lever
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 071 REPLACING KNOB FOR SHIFT LEVER

Pull installation frame of gaiter (1) from front upwards out of centre console.

IMPORTANT: Do not use a tool, as this would damage the installation frame or the centre console.

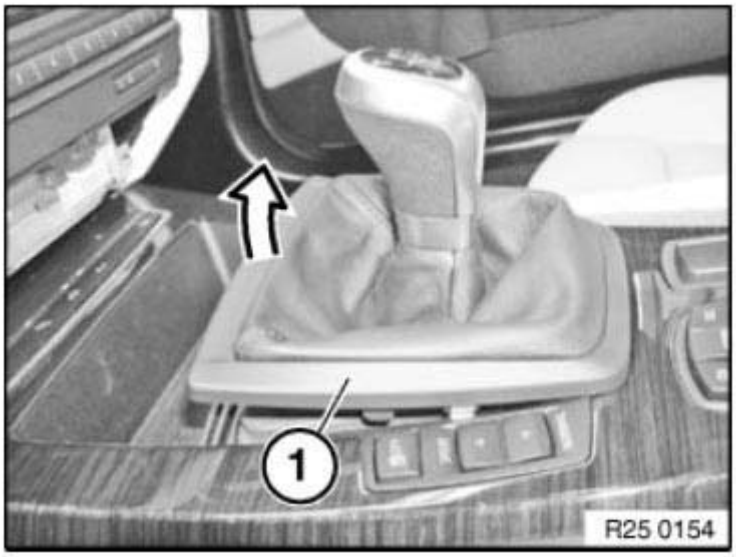


Fig. 16: Pulling Gaiter Installation Frame From Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not twist knob during removal as this would cause the turning lock in the knob to shear off.

Tug firmly to remove knob.

Installation:

Fit knob on shift lever, align and press on until it snaps noticeably into place.

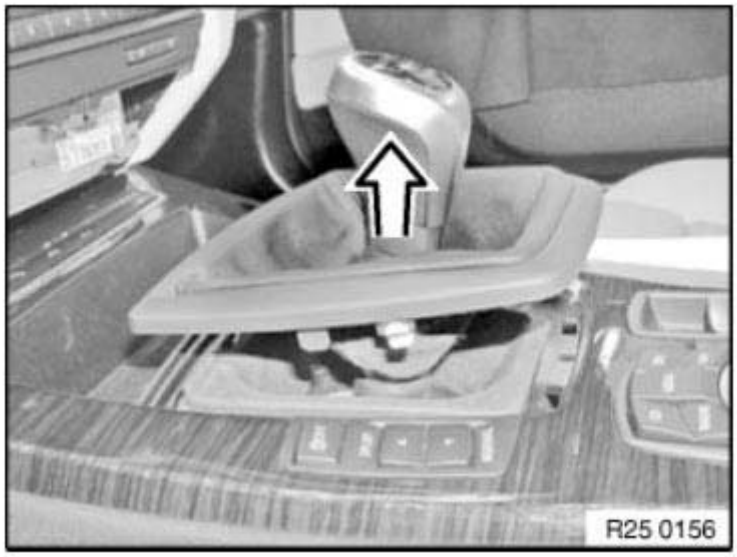


Fig. 17: Removing Knob
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 211 REPLACING SHIFT ARM FOR SHIFT LEVER MOUNT

Necessary preliminary tasks

- Remove **SHIFT LEVER**

Lever support bearing (1) out of fixture.

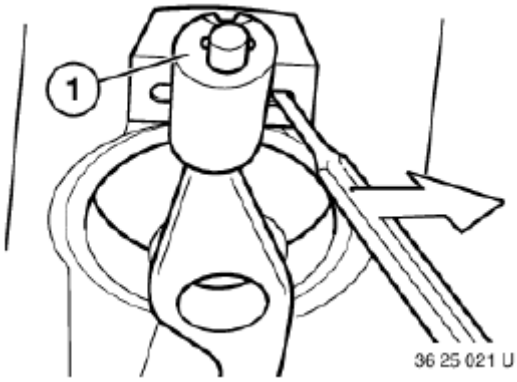


Fig. 18: Removing Support Bearing From Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install support bearing (1) with arrow (2) facing upwards in holder.

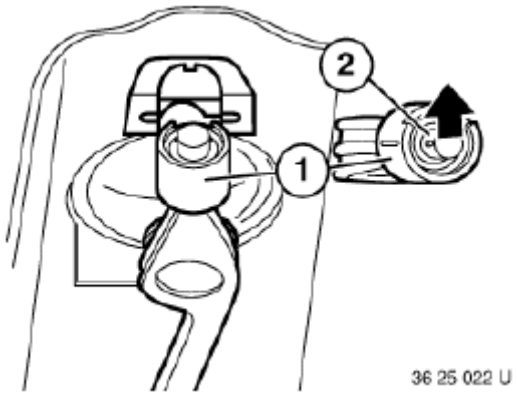


Fig. 19: Identifying Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock bearing pin (1) in direction of arrow and remove.

Installation:

Grease bearing pin.

Grease, refer to **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

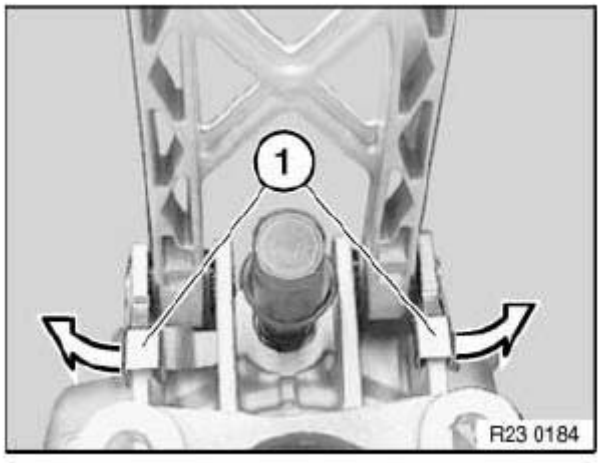


Fig. 20: Removing Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Remove shift arm.

Detach support bearing (1) from shift arm.

Installation:

Grease bearing journal.

Grease, refer to **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

Attach support bearing (1) with opening (3) towards rear on shift arm.

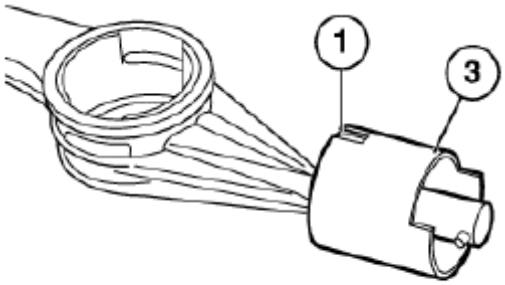


Fig. 21: Identifying Support Bearing With Opening
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **BEARING BUSH** (1) if damaged.

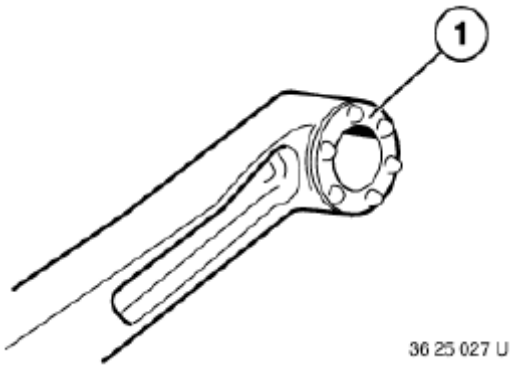


Fig. 22: Identifying Bearing Bush
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 245 REPLACING SHIFT ARM SUPPORT BEARING

Necessary preliminary tasks

- Remove complete **EXHAUST SYSTEM** .
- Remove rear **UNDERBODY PROTECTION** .
- Remove heat shield.

Lever support bearing (1) with a short screwdriver out of mounting.

Pull support off shift arm.

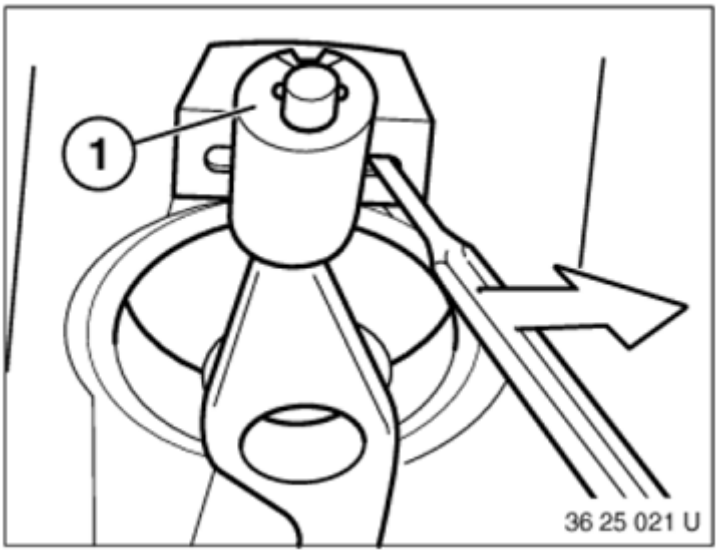


Fig. 23: Removing Support Bearing With Short Screwdriver Out Of Mounting
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Grease bearing pin of shift arm. See **GEAR SHIFT MECHANISM - OPERATING FLUIDS**

Fit support bearing (1) with opening (2) towards top rear onto mounting.

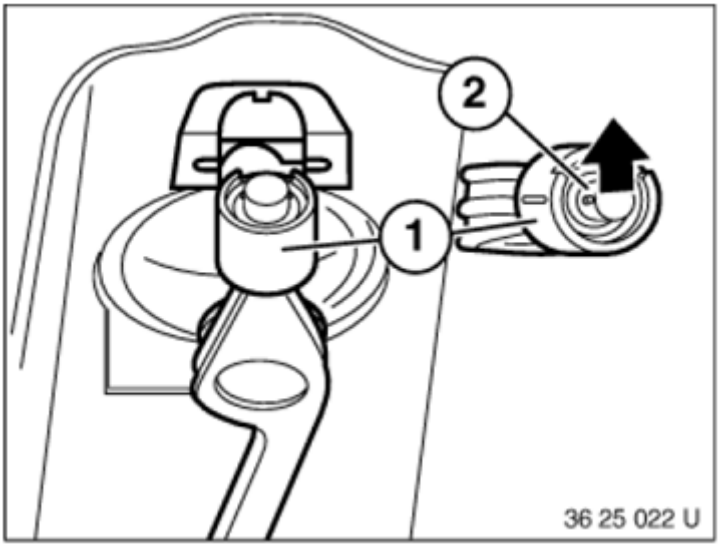


Fig. 24: Identifying Support Bearing With Opening
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 101 REPLACING SHIFT ROD

Necessary preliminary tasks

- Remove rear assembly underside protection
- Release bracket for exhaust system on transmission
- Remove heat shields
- Remove **TRANSMISSION CROSS-MEMBER** .

Detach locking clip.

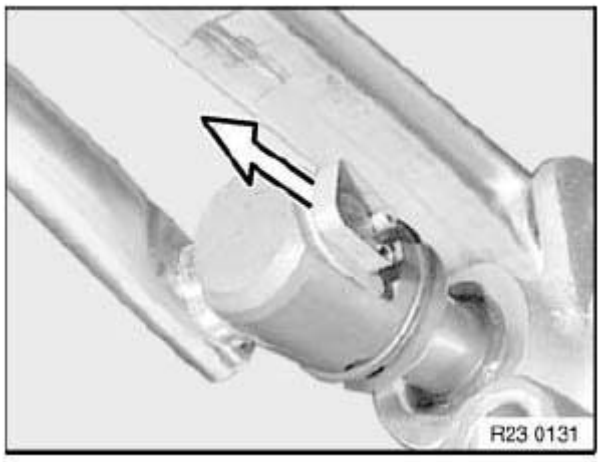


Fig. 25: Removing Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New retaining clips fitted as from 04.08.
Retaining clip must interlock captively with retaining web (1) behind shift rod pin.

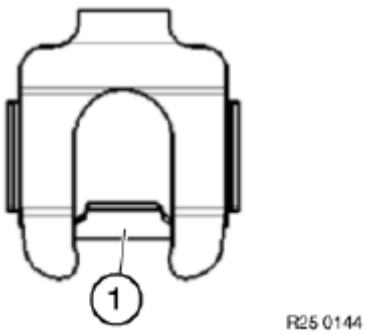


Fig. 26: Identifying Retaining Web
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shift rod (1) out of shift rod joint (2).

Installation

Grease shift rod pin (3). See **GEAR SHIFT MECHANISM - OPERATING FLUIDS**

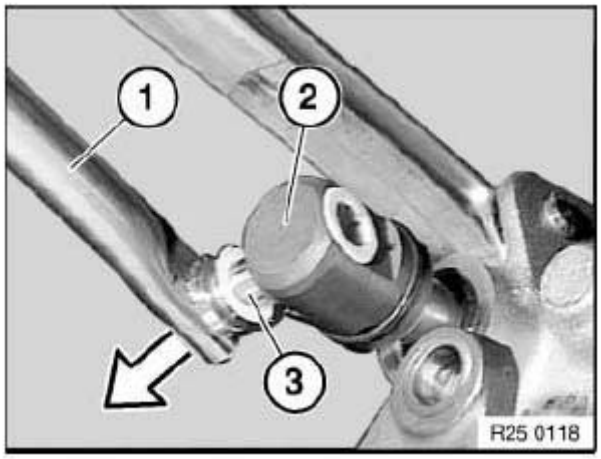


Fig. 27: Pulling Shift Rod From Shift Rod Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Detach locking clip (1).

Remove selector rod (2).

Installation:

Grease selector rod pin. See **GEAR SHIFT MECHANISM - OPERATING FLUIDS**

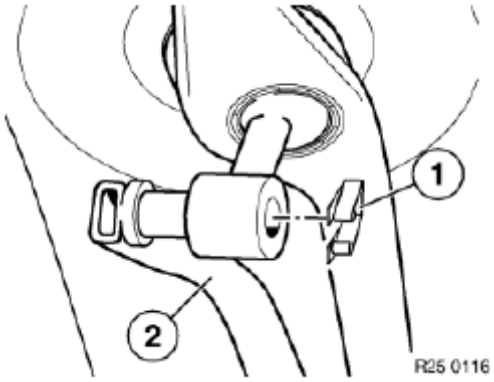


Fig. 28: Identifying Clip And Selector Rod
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 111 REPLACING SHIFT ROD JOINT

Necessary preliminary tasks

- Release propeller shaft at transmission and centre mount, tie propeller shaft to one side

Tasks are described in **REMOVING PROPELLER SHAFT** .

Lift off retainer (1).

Clamp off shift rod (2).

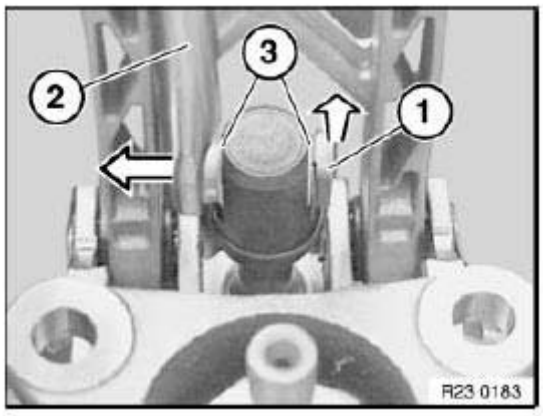


Fig. 29: Disconnecting Shift Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Grease shift rod.

Grease, refer to **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

Make sure shims (3) are in correct position.

IMPORTANT: New retaining clips fitted as from 04.08.
Retaining clip must interlock captively with retaining web (1) behind shift rod pin.

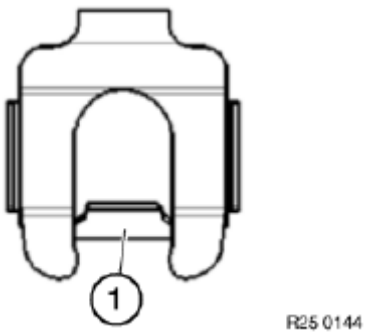


Fig. 30: Identifying Retaining Web
Courtesy of BMW OF NORTH AMERICA, INC.

Lever spring washer (1) out of groove and push a little towards rear.

Press dowel pin (2) upwards/downwards out of shift rod joint and remove shift rod joint.

Installation:

Grease ball of selector shaft.

Grease, refer to **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

Replace spring washer (1).

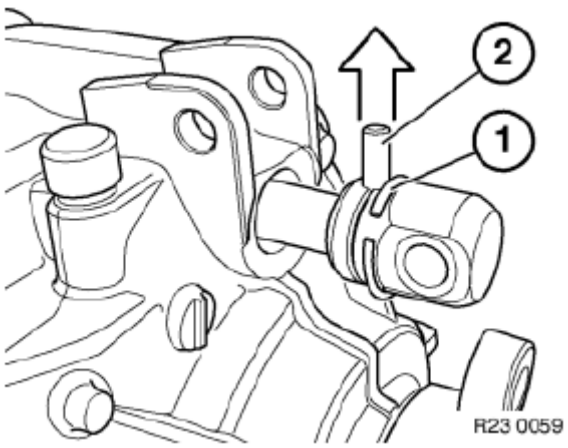


Fig. 31: Pressing Dowel Pin From Shift Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check rubber ring (1) in shift rod joint (2) and replace if necessary.

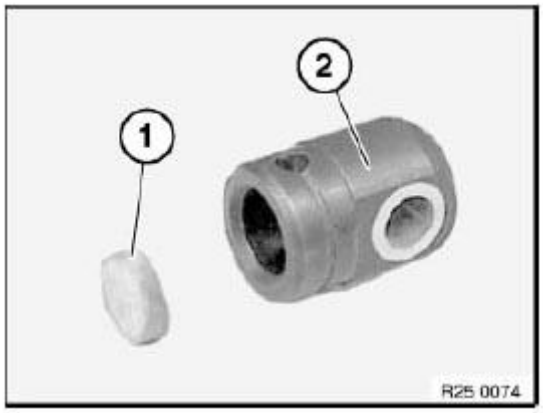


Fig. 32: Identifying Rubber Ring And Shift Rod Joint
Courtesy of BMW OF NORTH AMERICA, INC.

2516 CENTRE SHIFT, AUTOMATIC TRANSMISSION

25 16 056 REMOVING AND INSTALLING OR REPLACING SHIFT TOWER (STEPTRONIC)

Necessary preliminary tasks

- Remove rear underbody protection.
- Remove **TRIM** for storage compartment.

Grip clamping sleeve (1) and slacken nut (2).

Detach retainer (3) downwards using a screwdriver.

Pull cable (4) out of holder.

Installation:

ADJUSTING SHIFT LEVER

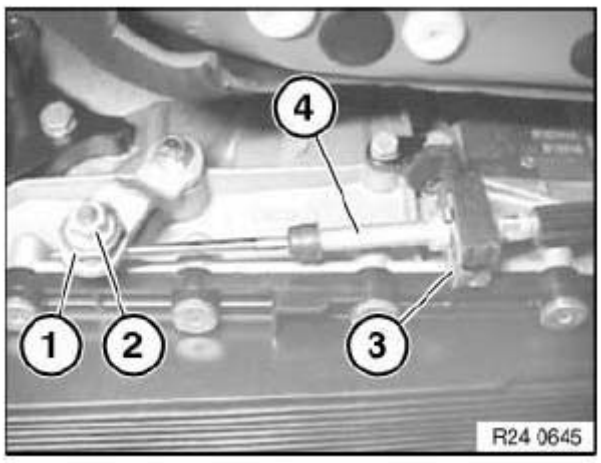


Fig. 33: Identifying Clamping Sleeve, Retainer, Cable And Nut
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Tightening torque: **25 16 3AZ** .

Disconnect plug connections (2).

Remove cables from holders.

Lift shift tower out of centre console.

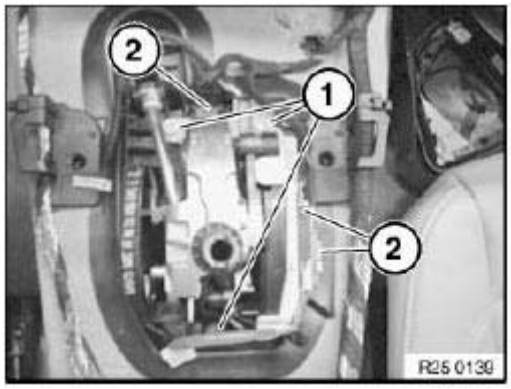


Fig. 34: Identifying Plug Connections With Screws
Courtesy of BMW OF NORTH AMERICA, INC.

25 16 065 REPLACING GAITER (SELECTOR LEVER COVER) FOR SHIFT TOWER

Necessary preliminary tasks

- Remove **GRIP**

1. Carefully pull gaiter taut on leather
2. Gently press frame inwards until catch is released
3. Lift out gaiter

Fig. 35: Lifting Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Start removing at top left, otherwise the frame will be damaged.

Installation:

Retaining lugs must not be damaged.

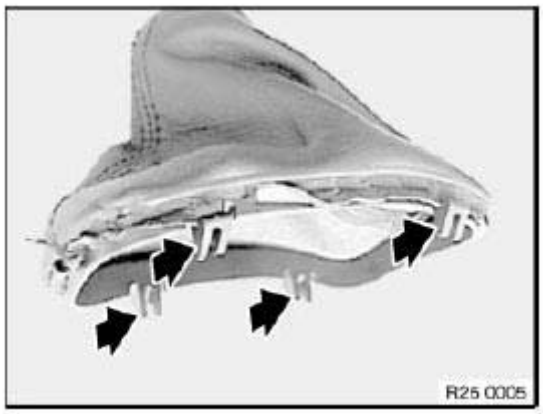


Fig. 36: Locating Retaining Lugs
Courtesy of BMW OF NORTH AMERICA, INC.

25 16 061 REPLACING SELECTOR LEVER KNOB

NOTE: Do not twist selector lever knob during removal as this would cause the anti-twist lock to shear off.

Pull off knob with a firm tug in direction of arrow.

Installation:

Fit knob on gearshift lever, align and press on until it snaps noticeably into place.

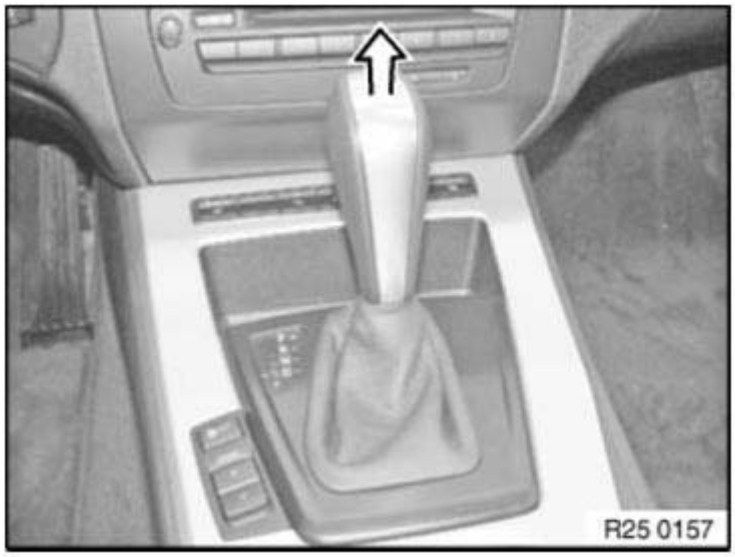
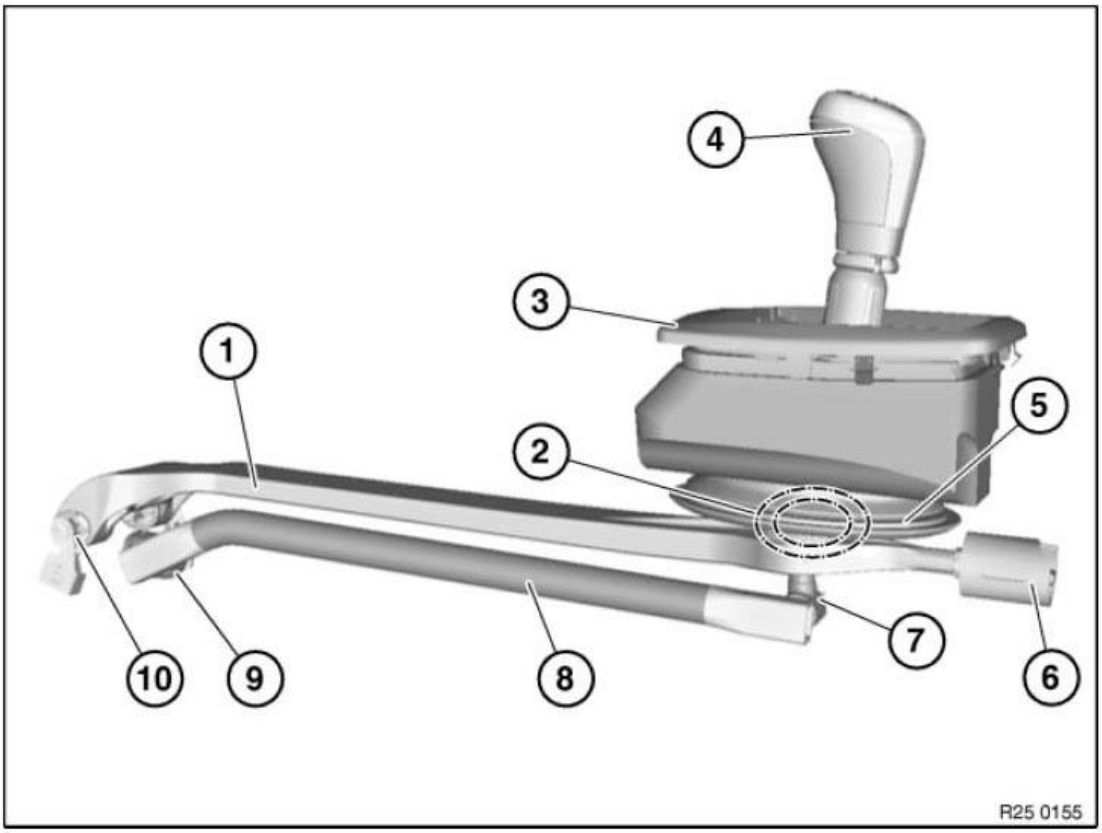


Fig. 37: Pulling Knob With Firm Tug
Courtesy of BMW OF NORTH AMERICA, INC.

2511 CENTRE SHIFT, MANUAL TRANSMISSION

25 11 ... OVERVIEW OF GEARSHIFT MECHANISM FOR MANUAL TRANSMISSION



1 Shift arm
2 Ball socket (shift lever bearing)
3 Shift lever cover (gaiter)
4 Shift lever knob
5 U-gaiter
6 Support bearing (shift arm bearing)
7 Shift lever
8 Shift rod
9 Shift rod joint
10 Bearing bush

Fig. 1: Overview Of Gearshift Mechanism For Manual Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 000 REMOVING AND INSTALLING SHIFT LEVER

Necessary preliminary tasks

- Remove **KNOB** for shift lever.
- Remove complete **EXHAUST SYSTEM** .

- Remove rear underbody protection .
- Remove heat shields.

If necessary

Support transmission with workshop jack.

Remove screws and nuts.

Remove cross-member.

Tightening torque **23 71 1AZ/2AZ** .

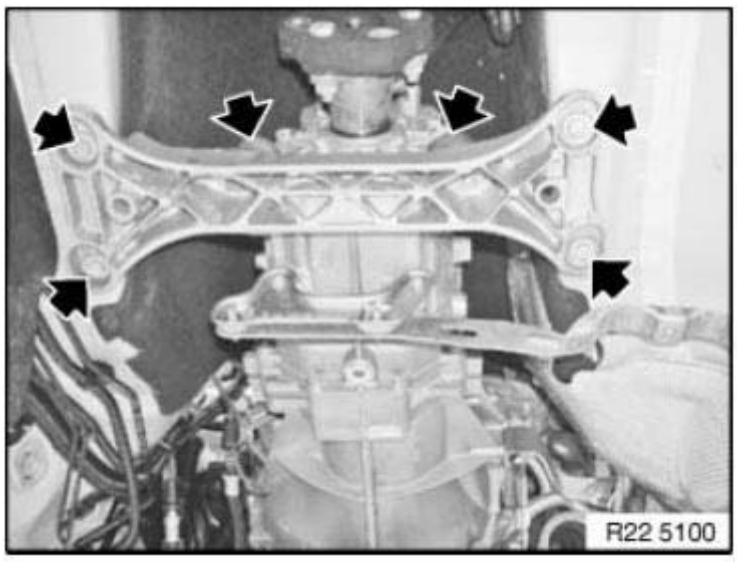


Fig. 2: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **SHIFT ROD** (2).

Installation:

Grease shift rod pin.

Key:

1. Retainer
2. Shift rod

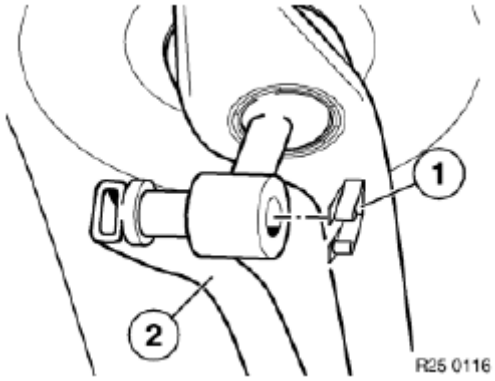


Fig. 3: Identifying Retainer And Shift Rod
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New retaining clips fitted as from 04.08.

Retaining clip must interlock captively with retaining web (1) behind shift rod pin.

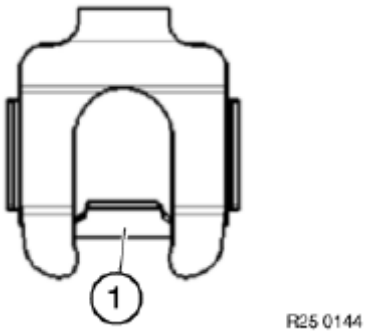


Fig. 4: Identifying Retaining Web
Courtesy of BMW OF NORTH AMERICA, INC.

Insert special tool **25 1 120** into mount and turn 90° counterclockwise.

Press mount upwards out of shift arm.

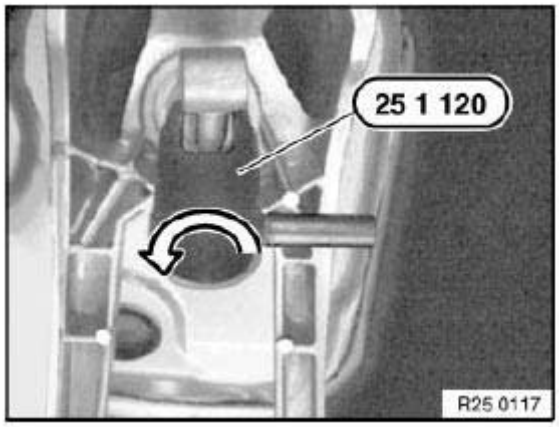


Fig. 5: Inserting Special Tools (25 1 120) Into Mount
Courtesy of BMW OF NORTH AMERICA, INC.

Feed U-gaiter from shift arm and out of body cutout.

Lift out shift lever.

Installation:

Pull U-gaiter from below completely over shift arm receptacle.

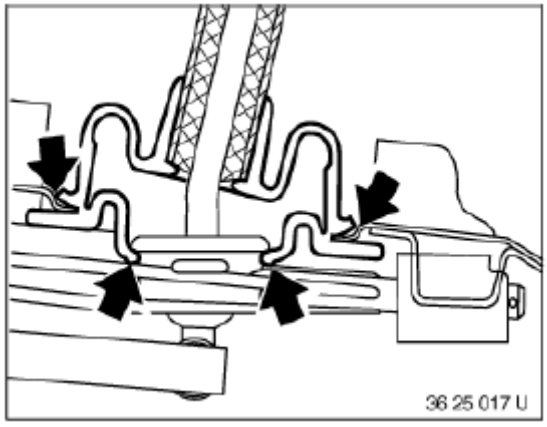


Fig. 6: Locating U-Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Pull U-gaiter bead (4) over receptacle on shift arm and pop U-gaiter lips (3) into body cutout.

Make sure the arrow on the upper U-gaiter lip (3) is seated in the direction of travel and crossways to the shift lever eye (5).

Key:

1. Shift lever
2. U-gaiter moulded section
3. U-gaiter lips
4. U-gaiter bead
5. Shift lever eye

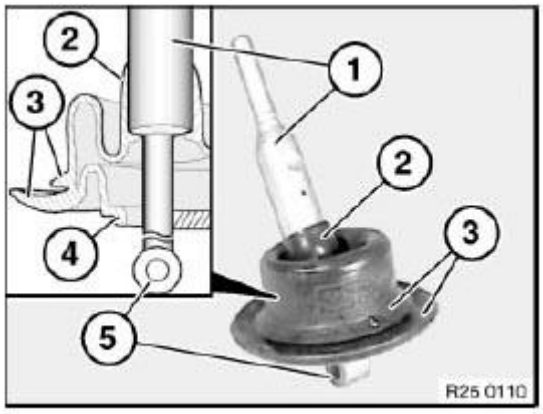


Fig. 7: Identifying Shift Lever, Shift Lever Eye, U-Gaiter Moulded Section, U-Gaiter Lips And Bead
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Grease shift lever ball.

Fit mount on shift arm receptacle.

Align retaining lugs of mount to openings in receptacle (crossways to direction of travel).

Press shift arm with mount downwards until mount snaps audibly into place (if necessary, use a pressing-in tool).

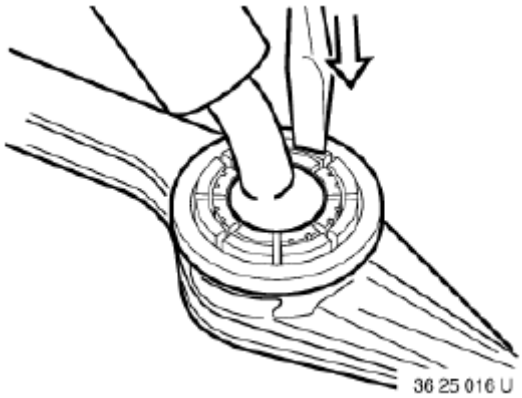


Fig. 8: Fitting Mount On Shift Arm
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 ... REPLACING U-GAITER

Necessary preliminary tasks

- Remove **SHIFT LEVER**

Detach U-gaiter from shift lever.

If necessary, rub inside of moulded section (1) beforehand with Circolight.

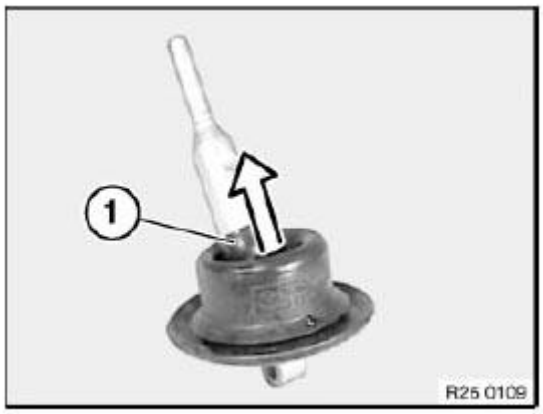


Fig. 9: Removing Moulded Section
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

- Degrease shift lever (1)
- Coat inside of moulded section (2) with Circolight
- Pull U-gaiter from above over shift lever and align
- Arrow on upper lip (3) must point crossways to mount eye (5) in direction of travel

Key:

1. Shift lever
2. U-gaiter moulded section
3. U-gaiter lip
4. U-gaiter bead
5. Mount eye

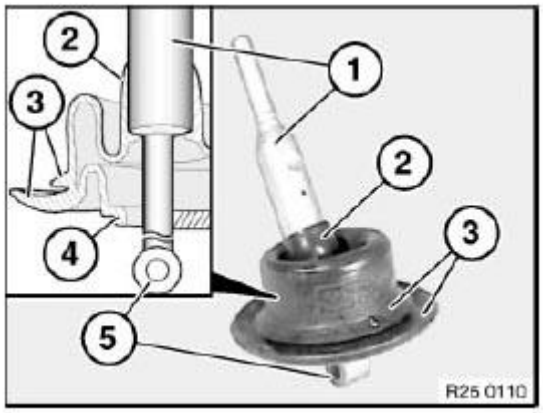


Fig. 10: Identifying Shift Lever, Shift Lever Eye, U-Gaiter Moulded Section, U-Gaiter Lips And Bead
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 235 REPLACING BEARING BUSHES FOR SHIFT ARM

Necessary preliminary tasks

- Remove **SHIFT ARM**

- Press out bearing bush (1).
- Coat new bearing bush with Circolight
- Then press into shift arm until side surface of bush protrudes uniformly.

NOTE: Illustration shows: shift arm simply supported.

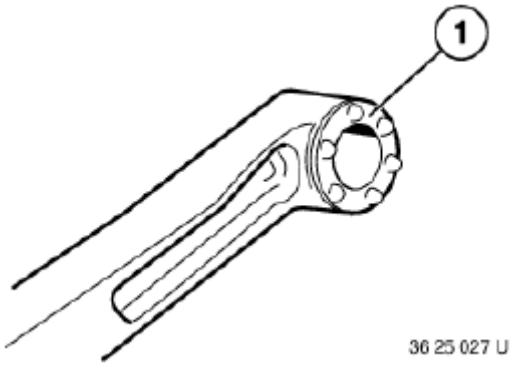


Fig. 11: Identifying Bearing Sleeve
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 041 REPLACING BEARING SHELL FOR SHIFT LEVER

Necessary preliminary tasks

- Remove **SHIFT LEVER**

Detach mount from selector lever.

Installation

Grease ball joint.

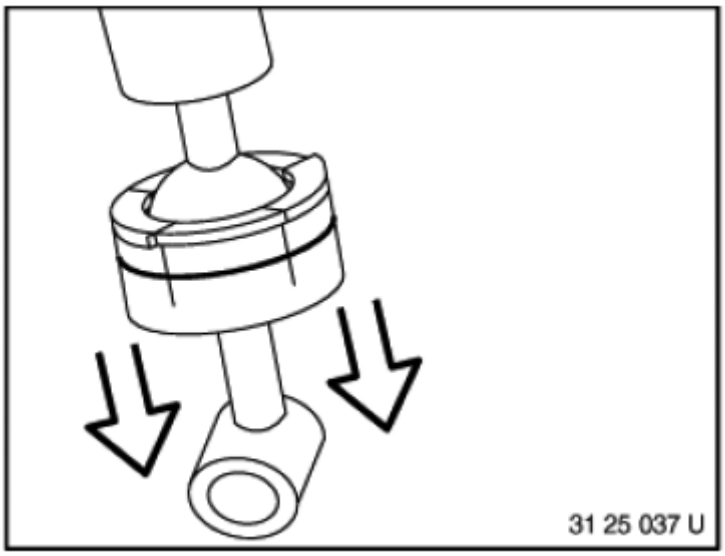


Fig. 12: Removing Mount From Selector Lever
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 001 REPLACING COMPLETE SHIFT LEVER

Necessary preliminary tasks:

- Remove **SHIFT LEVER** .

Detach mount from selector lever.

Installation

Grease ball joint.

Grease,

refer to BMW Service **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

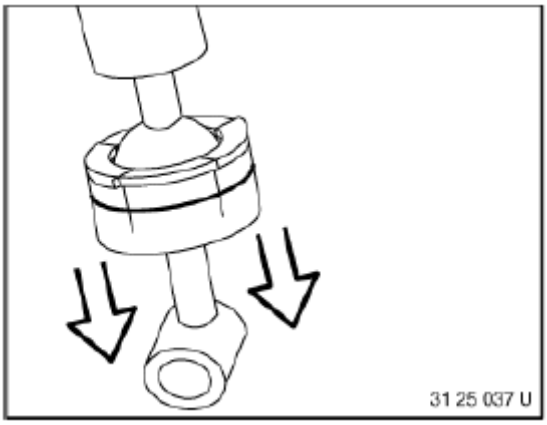


Fig. 13: Removing Mount From Selector Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Detach rubber gaiter from selector lever.

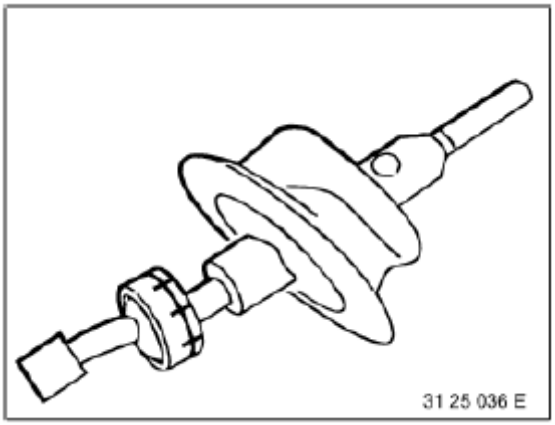


Fig. 14: Detaching Rubber Gaiter From Selector Lever
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Degrease selector lever (1).

Coat rubber bellows on inside of shaped section (2) with Circolight.

Pull rubber gaiter from above over selector lever and align. Arrow (3) on rubber gaiter must point in direction of travel (A).

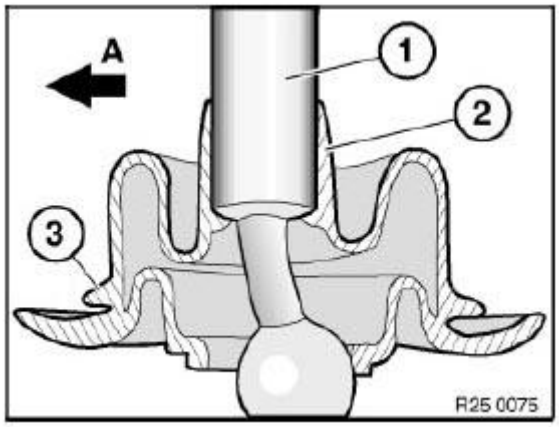


Fig. 15: Identifying Selector Lever And Rubber Gaiter
Courtesy of BMW OF NORTH AMERICA, INC.

25 12 060 REPLACING GEARSHIFT LEVER KNOB FOR TWIN-CLUTCH GEARBOX N54

Release installation frame (1) from centre console.

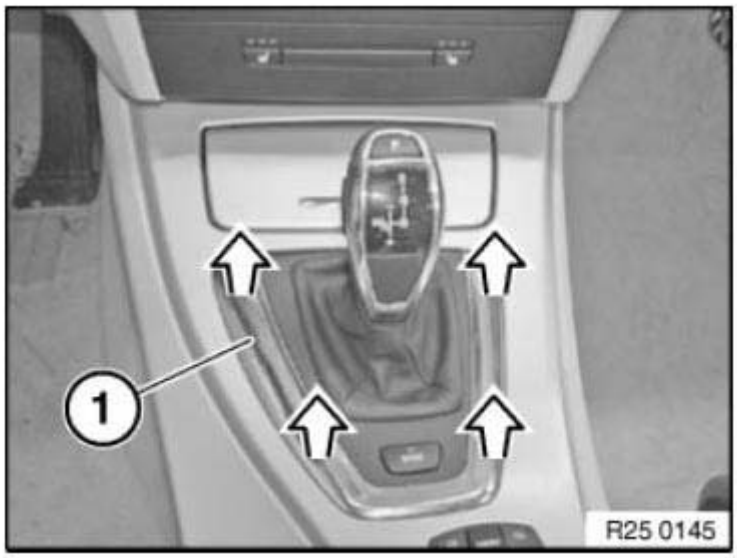


Fig. 16: Removing Installation Frame From Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect plugs (1) and (2).

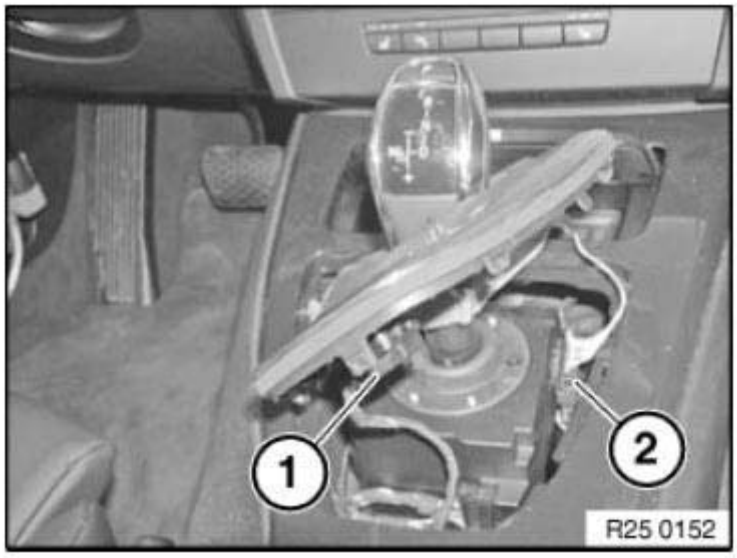


Fig. 17: Identifying Plugs
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not twist shift lever knob during removal as this would cause the antitwist lock in the knob to shear off.

Tug firmly to remove knob.

Installation

Fit shift lever knob on shift lever, align and press on until it snaps noticeably into place.

Fig. 18: Removing Knob
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 071 REPLACING KNOB FOR SHIFT LEVER

Pull installation frame of gaiter (1) from front upwards out of centre console.

IMPORTANT: Do not use a tool, as this would damage the installation frame or the centre console.

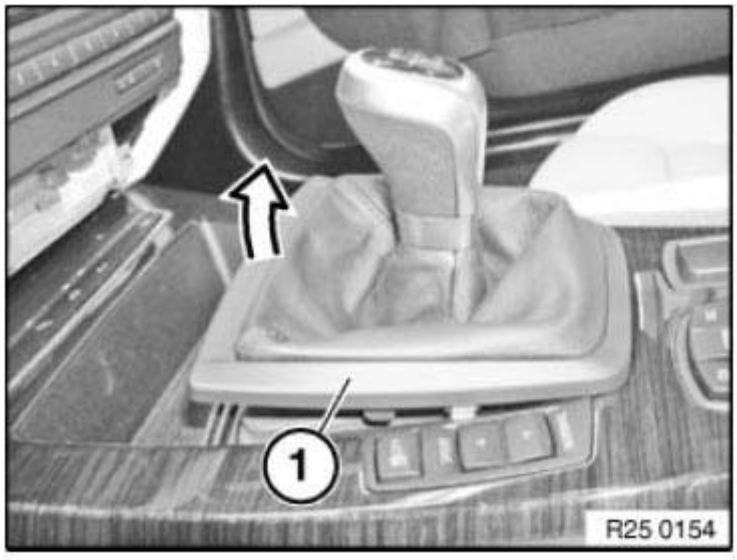


Fig. 19: Pulling Gaiter Installation Frame From Centre Console
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Do not twist knob during removal as this would cause the turning lock in the knob to shear off.

Tug firmly to remove knob.

Installation

Fit knob on shift lever, align and press on until it snaps noticeably into place.

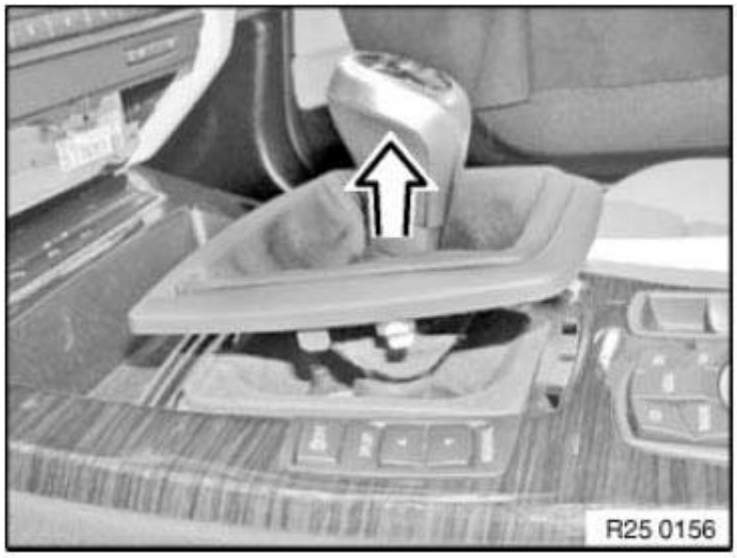


Fig. 20: Removing Knob
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 211 REPLACING SHIFT ARM FOR SHIFT LEVER MOUNT

Necessary preliminary tasks

- Remove **SHIFT LEVER**

Lever support bearing (1) out of fixture.

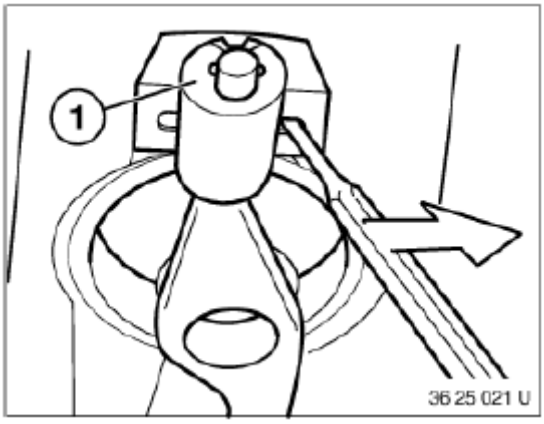


Fig. 21: Removing Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Install support bearing (1) with arrow (2) facing upwards in holder.

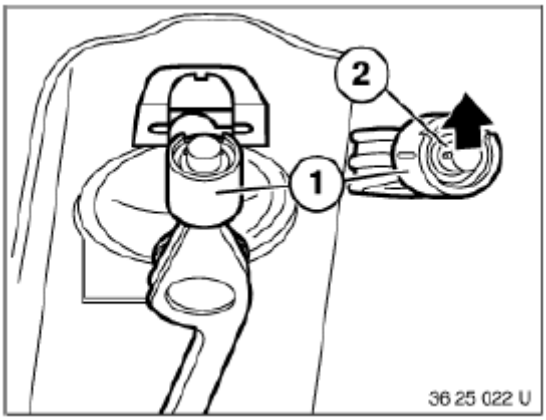


Fig. 22: Identifying Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock bearing pin (1) in direction of arrow and remove.

Installation:

Grease bearing pin.

Grease, refer to BMW Service **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

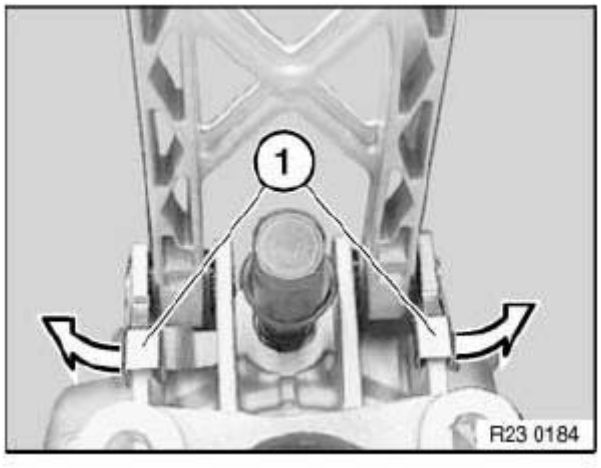


Fig. 23: Removing Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Remove shift arm.

Detach support bearing (1) from shift arm.

Installation:

Grease bearing journal.

Grease, refer to BMW Service **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

Attach support bearing (1) with opening (3) towards rear on shift arm.

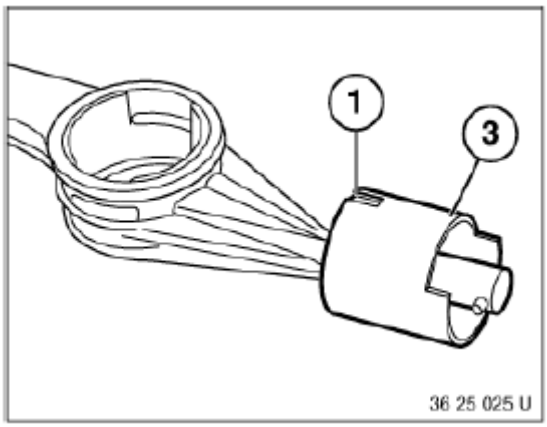


Fig. 24: Identifying Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Replace **BEARING BUSH** (1) if damaged.

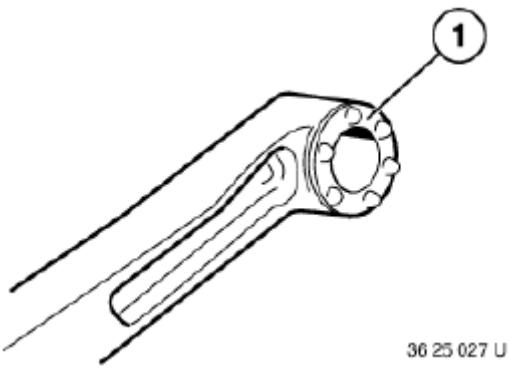


Fig. 25: Identifying Bearing Bush
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 245 REPLACING SHIFT ARM SUPPORT BEARING

Necessary preliminary tasks

- Remove complete **EXHAUST SYSTEM** .
- Remove rear underbody protection .
- Remove heat shield.

Lever support bearing (1) with a short screwdriver out of mounting.

Pull support off shift arm.

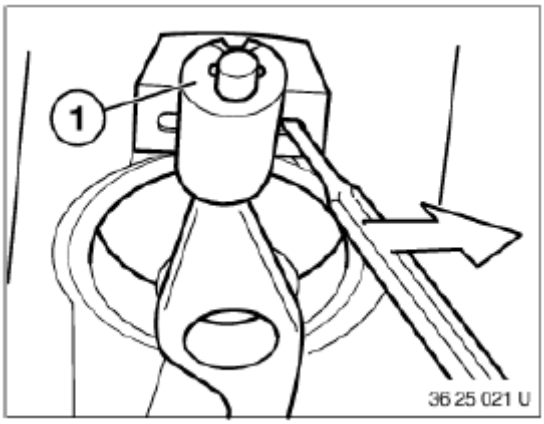


Fig. 26: Removing Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Grease bearing pin of shift arm.

Fit support bearing (1) with opening (2) towards top rear onto mounting.

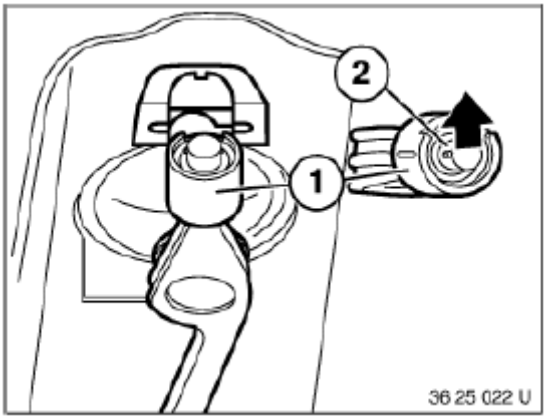


Fig. 27: Identifying Support Bearing
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 101 REPLACING SHIFT ROD

Necessary preliminary tasks

- Remove rear assembly underside protection
- Release bracket for exhaust system on transmission
- Remove heat shields
- Remove **TRANSMISSION CROSSMEMBER** .

Detach locking clip.

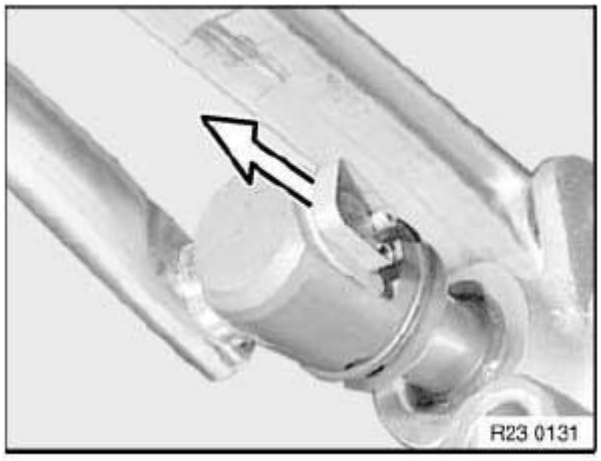


Fig. 28: Removing Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New retaining clips fitted as from 04.08.

Retaining clip must interlock captively with retaining web (1) behind shift rod pin.

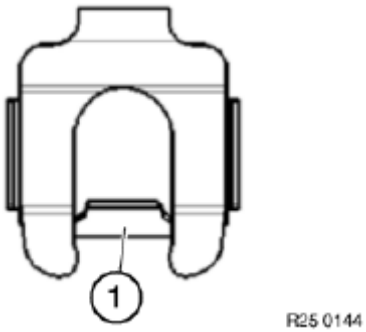


Fig. 29: Identifying Retaining Web
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shift rod (1) out of shift rod joint (2).

Installation

Grease shift rod pin (3).

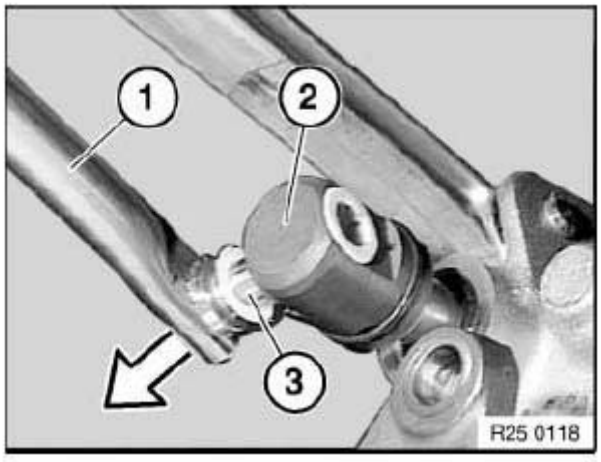


Fig. 30: Pulling Shift Rod From Shift Rod Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Detach locking clip (1).

Remove selector rod (2).

Installation

Grease selector rod pin.

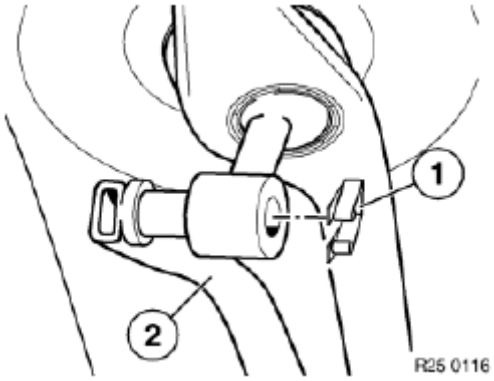


Fig. 31: Identifying Clip And Selector Rod
Courtesy of BMW OF NORTH AMERICA, INC.

25 11 111 REPLACING SHIFT ROD JOINT

Necessary preliminary tasks

- Release propeller shaft at transmission and centre mount, tie propeller shaft to one side

Tasks are described in **REMOVING PROPELLER SHAFT** .

Lift off retainer (1).

Clamp off shift rod (2).

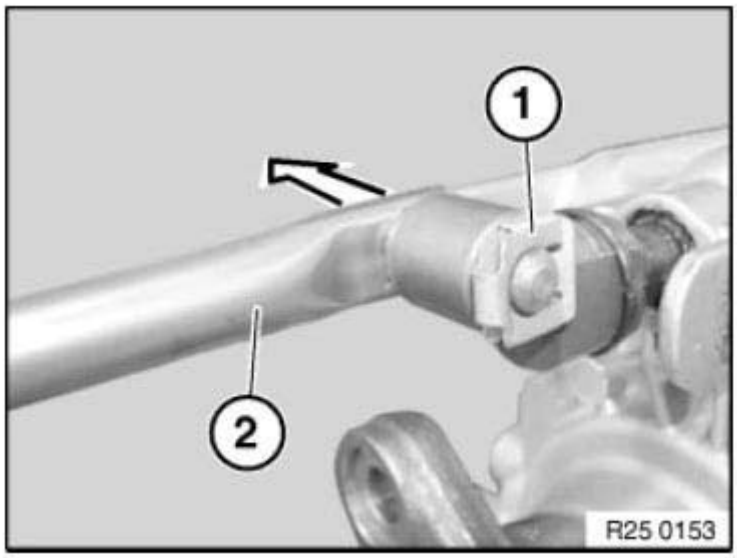


Fig. 32: Identifying Retainer And Shift Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Grease shift rod.

Grease, refer to BMW Service **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

IMPORTANT: New retaining clips fitted as from 04.08.

Retaining clip must interlock captively with retaining web (1) behind shift rod pin.

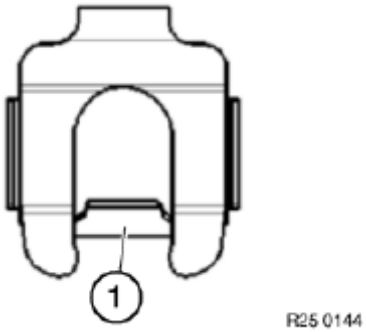


Fig. 33: Identifying Retaining Web
Courtesy of BMW OF NORTH AMERICA, INC.

Lever spring washer (1) out of groove and push a little towards rear.

Press dowel pin (2) upwards/downwards out of shift rod joint and remove shift rod joint.

Installation

Grease ball of selector shaft.

Grease, refer to BMW Service **GEAR SHIFT MECHANISM - OPERATING FLUIDS** .

Replace spring washer (1).

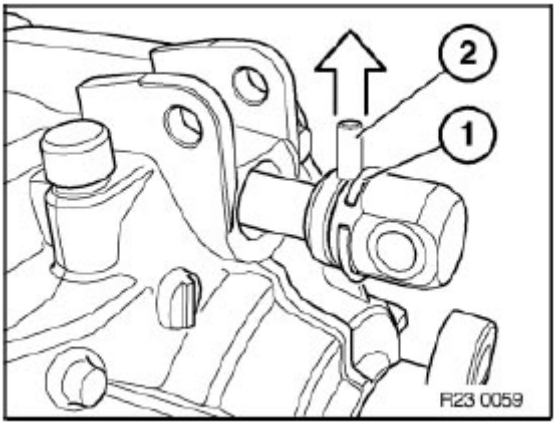


Fig. 34: Pressing Dowel Pin Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check rubber ring (1) in shift rod joint (2) and replace if necessary.

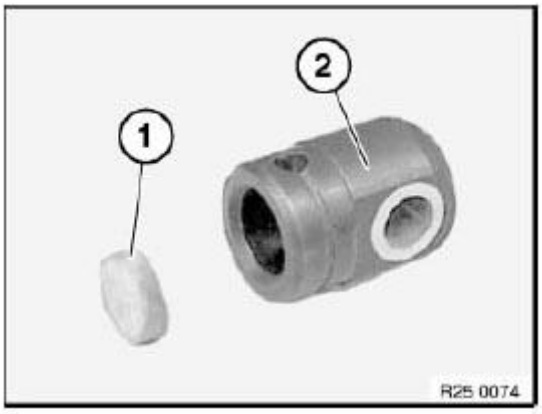


Fig. 35: Identifying Rubber Ring And Shift Rod Joint
Courtesy of BMW OF NORTH AMERICA, INC.

25 GEAR SHIFT MECHANISM

25-1120 PIN WRENCH

Pin wrench Minimum set: Mechanical tools MW

NOTE: For removing gear lever (releasing gearshift lever bearing).

Storage Location

A10

SI number

01 17 05 (212)

Fig. 1: Identifing Pin Wrench (251120)
Courtesy of BMW OF NORTH AMERICA, INC.

25 GEAR SHIFT MECHANISM

25-1120 PIN WRENCH

Pin wrench Minimum set: Mechanical tools MW

NOTE: For removing gear lever (releasing gearshift lever bearing).

Storage Location

A10

SI number

01 17 05 (212)

Fig. 1: Identifying Pin Wrench (25-1120)
Courtesy of BMW OF NORTH AMERICA, INC.

SHIFT CONSOLE - AUTOMATIC TRANSMISSION

25 16 SHIFT CONSOLE - AUTOMATIC TRANSMISSION

TIGHTENING TORQUE SPECIFICATION - SHIFT CONSOLE - AUTOMATIC TRANSMISSION

		Type
1	AZ Bowden cable to shift tower/transmission	E36/E38/E39/E46/E53/E60/E61/E63/E64/E65/E66/E67/E68/E83/E85/E86/E87/E90/E9
2	AZ Clamping screw on shift lever	E36/E38/E39/E46/E53/E60/E61/E63/E64/E65/E66/E67/E68/E83/E85/E86/E87/E90/E9
3	AZ Shift console to tunnel	E36/E38/E39/E46/E53/E60/E61/E63/E64/E65/E66/E67/E68/E83/E85/E86/E87/E90/E9
4	AZ Switch to shift console	E36/E38/E39/E46/E53/E60/E61/E63/E64/E65/E66/E67/E68/E83/E85/E86/E87/E90/E9
5	AZ Interlock cable to shift tower	E36/E38/E39/E46/E53/E60/E61/E63/E64/E65/E66/E67/E68/E83/E85/E86
6	AZ Cable retaining tab to transmission	E91/E92 4WD
7	AZ Oval-head screw for emergency release device	E60, E61
8	AZ Screw for adjusting cable on transmission	E60/E61/E81/E82/E83/E84/E87/E88/E90/E91/E92/E93
9	AZ Vulcanised support angle to transmission	E81/E82/E87/E88/E90/E91/E92/E93/E84

Manual Transmission - Operating Fluids

1.0 GENERAL INFORMATION ON GEAR LUBRICANTS

Gear lubricants for manual transmissions must conform to the following requirements due to the different transmission designs with considerable variation in loads, temperature and speeds.

The qualities of a recommended gear lubricant are:

A. Load carrying capacity, i.e. high-pressure resistance.
B. Noise reduction.
C. Non-corrosive to various metals.
D. Non-foaming.
E. Non-separation of additives at operating temperatures.
F. Non-sludge forming.
G. Prevention of swelling, hardening and shrinking of seals.

These properties are already provided in manual transmission oil by:

- High-pressure additives.
- Corrosion inhibitors.
- Oxidation inhibitors (inhibitors which limit or prevent chemical reactions).
- Anti-foaming agents.

2.0 OIL ADDITIVES

BMW manual transmissions are designed so that they do not require aftermarket oil additives.

BMW disapproves the use of any oil additives and cannot accept the liability for any consequential damage that results from using oil additives.

3.0 MANUAL TRANSMISSION OIL REQUIREMENTS AND SPECIFICATIONS

BMW

A. All reputable brand mineral-based transmission oils of viscosity class SAE 80 according to specifications MIL-L-2105 or API GL-4 (**no label** on transmission bell housing).
B. Synthetic transmission fluid, Mobil SHC 630 (325e/528e without dual mass flywheel, produced before mid-1986). Manual transmissions which are filled with Mobil SHC 630 synthetic gear lube have a **green label** with the words "Special Oil" located next to the oil filter plug.

Fig. 1: Identifying Manual Transmission - Green Label
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Mobil SHC 630 is available in 5-gallon pails or 55-gallon drums from:

Filling BMW transmissions with unapproved synthetic gear lubes could cause the following damage:

- Premature synchromesh ring wear
- Reduced service life of bearings
- Tooth profile damage
- Faster wear of selector forks
- Damage to radial shaft oil seals

Transmission gear clashing will eventually result.

NOTE: Do not use synthetic fluid Mobil SHC 630 in other vehicles. The transmission synchronizers of cars other than listed above are not compatible with synthetic fluid and premature wear will result.

NOTE: To reduce the physical effort required to change gear at low ambient temperatures, the following oils can be used in the transmission during the winter:

- Single-grade HD mineral engine oils SAE40, SAE30, SAE20
- In countries where the ambient temperatures are particularly low, ATF oils can also be used.

This has the disadvantage that the transmission tends to rattle or knock while in neutral at higher temperatures.

CAUTION: These transmissions must never be filled with synthetic engine oils or multigrade engine oils, since these oils contain coefficient of friction-reducing agents that can adversely affect operation of the synchromesh mechanism.

C. Automatic Transmission Fluid (ATF) of Dexron® II or Dexron® III formulation on any of the following:
   - Dual mass flywheel
   - Direct drive fifth gear as of 9/90
   - Six-speeds

Manual transmissions which are filled with ATF have 17mm external hex plugs in the filler and drain openings as well as an **orange label** on the transmission bell housing next to the filler plug.

Fig. 2: Identifying Manual Transmission - Orange Label
Courtesy of BMW OF NORTH AMERICA, INC.

D. From model year 1998 (9/97 production) all manual transmissions are filled with Esso/Exxon "MTF-LT-1" lifetime fluid. A **yellow label** with the letters "MTF-LT-1" is located next to the oil filler plug.

No oil change is required for the entire service life of these transmissions.

In the event of a repair, the transmission must only be filled with the lifetime oil.

Esso/Exxon MTF-LT-1

BMW P/N 83 22 9 408 942.

E. From model year 2004 some manual transmissions are filled with Castrol "MTF-LT-2" lifetime fluid. This fluid has the same properties as the "MTF-LT-1" fluid indicated above in section D. The "MTF-LT-1" fluid may be mixed and/or substituted for the "MTF-LT-2" manual transmission fluid.

2006 MY and later E60 M5 and E63/64 M6 equipped with and without SMG utilizes only MTF-LT-2 fluid.

2006 MY and later E85 M Roadster and Coupe require MTF-LT-2 fluid.

MTF-LT-2 Fluid

BMW P/N 83 22 0 309 031

F. From Model Year 2006 all vehicles equipped with a manual transmission and the N52 engine require the MTF-LT-3 lifetime fluid.

N52 equipped vehicles:

- E60 from 3/2005 production
- E85 from 9/2005 production
- E86 from 1/2006 production
- E90/91 from 3/2005 production
- E92 from 7/2006 production

- E83 from 9/2006 production

MTF-LT-3

BMW P/N 83 22 0 409 878

No oil change is required for the entire service life of these transmissions.

MANUAL TRANSMISSION COLD SHIFT EFFORT

NOTE: The following information does not apply to transmissions filled with lifetime fluid.

Transmission cold shift effort is reduced by replacing the original oil (SAE 80 or Mobil SHC 630) with a reputable brand single-grade HD engine mineral oil of API-SE standards (SAE 20, SAE 30, or SAE 40). Thinner oils will run the risk of increased gear noise.

A further reduction in shift effort can be obtained by using ATF, but gear noise will be more noticeable compared to single-grade engine mineral oils.

For summer operation it is recommended that ATF or engine oil be drained and replaced by the original lubricant, either SAE 80 or Mobil SHC 630 (as specified) transmission fluid.

CAUTION: Never fill a manual transmission with synthetic engine oils or multigrade mineral-based engine oils, since they have friction-reducing components that could impair the function of the synchronizers.

4.0 TRANSMISSION OIL CHANGE INTERVAL

Starting with 1998 models all manual transmissions are filled with lifetime fluid and require no fluid changes for the life of the vehicle.

5.0 SMG: SEQUENTIAL MANUAL GEAR BOX

All models SMG Hydraulic Unit require the use of Pentosin CHF 11S fluid.

2300 COMPLETE TRANSMISSION

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

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If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 11.. ... DRAINING/TOPPING UP GEAR OIL IN MANUAL TRANSMISSION

NOTE: Gearbox must be at normal operating temperature.

Gear oil:

- Refer to **MANUAL TRANSMISSION - OPERATING FLUIDS** .

Filling capacities:

- Refer to Technical Data . See **TRANSMISSION FILLING CAPACITIES** .

Draining gear oil:

- Release oil drain plug (1) and filler plug (2).
- Clean oil drain plug (1) and screw in.

Tightening torque **23 00 4AZ** .

Fill transmission with ATF.

- Pour in gear oil until overflowing.
- Tighten in filler screw (2).

Tightening torque: **23 00 4AZ** .

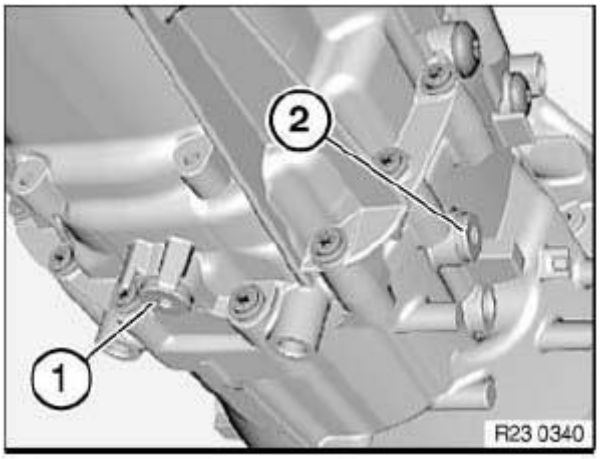


Fig. 1: Identifying Gear Oil Drain Plug And Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

23 00 038 INSTALLING REPLACEMENT TRANSMISSION (GS6-17BG/DG)

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL . Use only approved transmission oil. See MANUAL TRANSMISSION - OPERATING FLUIDS .

Failure to comply with this instruction will result in serious damage to the transmission.

Recycling

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks

- Drain gear oil at oil drain plug. Tightening torque:**23 00 4AZ**
- Remove **TRANSMISSION**

Transfer shift-rod joint.

Slide back retaining ring (1) and drive out cylinder pin (2).

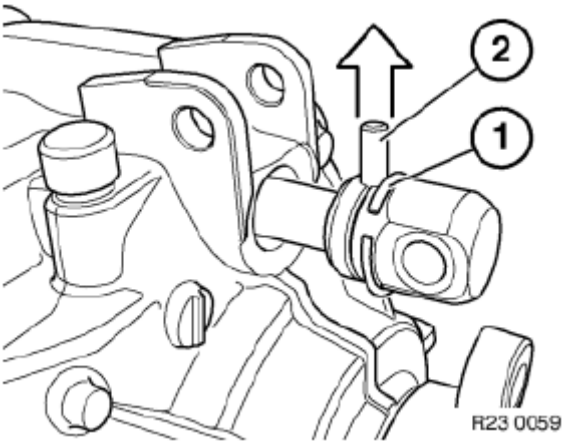


Fig. 2: Pressing Dowel Pin Upwards
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check damping disk (6) for damage and replace if necessary.

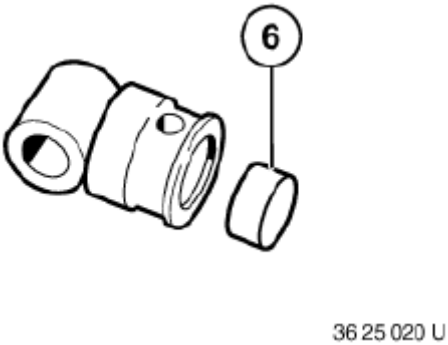


Fig. 3: Identifying Damping Disk
Courtesy of BMW OF NORTH AMERICA, INC.

Convert following parts from previous transmission to new transmission.

- **RELEASE BEARING AND RELEASE LEVER**
- Ball pin and spring wire clip
- Studs for clutch slave cylinder
- Reversing light switch, tightening torque: **23 11 1AZ**

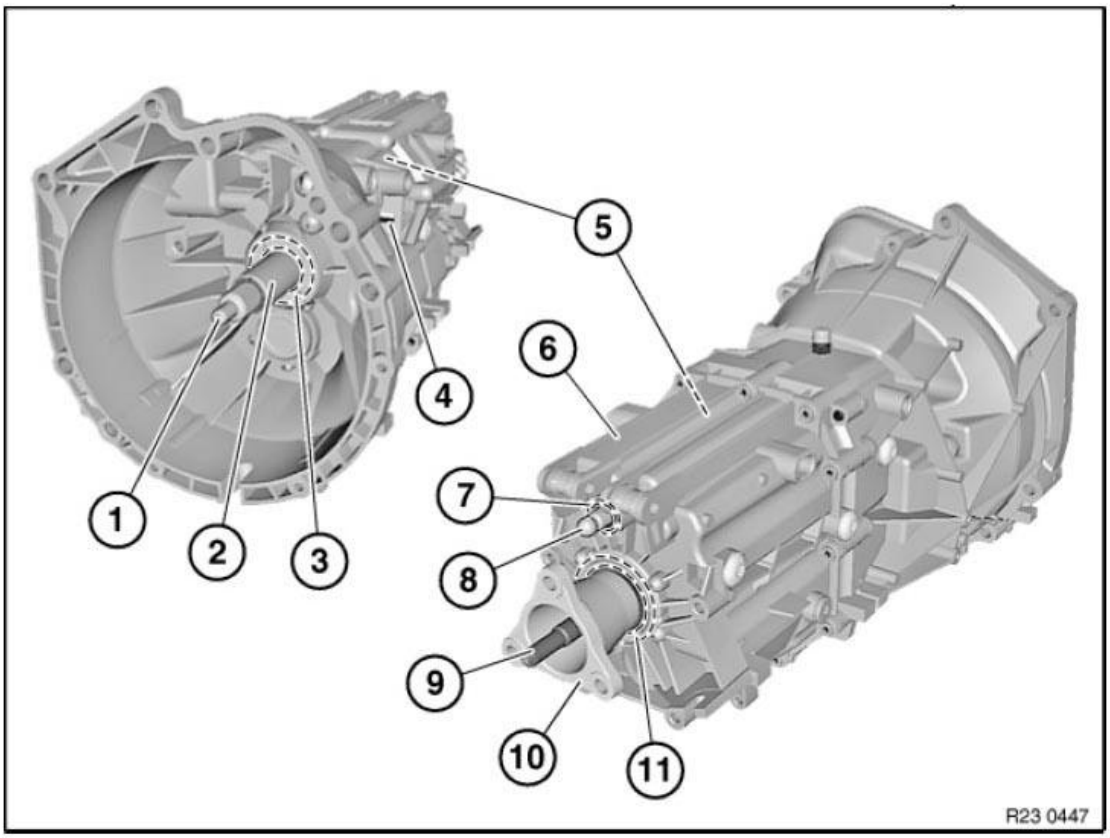
Add final details to vehicle.

Check oil level.

Installation:

Observe **GREASING SPECIFICATION** .

23 00 ... OVERVIEW OF TRANSMISSION HOUSING (GS6-17BG)



1	Input shaft	
2	Guide tube	
3	Radial seal	For drive shaft
4	Transmission housing, front section	
5	Internal components	
6	Transmission housing, rear section	shafts, gear wheels, gearshift components
7	Radial seal	For selector shaft
8	Shift shaft	
9	Output shaft	
10	Output flange	
11	Radial seal	For output flange

Fig. 4: Overview Of Transmission Housing (GS6-17BG)
Courtesy of BMW OF NORTH AMERICA, INC.

0 General information Complete transmission, oil change, transmission designations

1. Input shaft
2. Guide tube
3. Radial seal For drive shaft
4. Transmission housing, front section
5. Internal components
6. Transmission housing, rear section shafts, gear wheels, gearshift components
7. Radial seal For selector shaft
8. Shift shaft
9. Output shaft
10. Output flange
11. Radial seal For output flange

23 00 017 REMOVING AND INSTALLING TRANSMISSION (GS6-17BG) N52K

IMPORTANT: After completion of work, check transmission oil level.
Use only the approved transmission fluid. See MANUAL TRANSMISSION - OPERATING FLUIDS .

Failure to comply with this requirement will result in serious damage to the manual transmission.

IMPORTANT: Aluminium-magnesium materials.
No steel screws/bolts may be used due to the threat of electrochemical corrosion.
A magnesium crankcase requires aluminum screws/bolts exclusively.

Aluminum screws/bolts must be replaced each time they are **released** .

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are not **magnetic** .

Jointing torque and angle of rotation must be observed without fail **(risk of damage)** .

Necessary preliminary tasks

- Clamp off **BATTERY**
- Remove underbody protection
- Remove complete exhaust system . See **EXHAUST SYSTEM - REPAIR (N52)**
- Remove heat shields
- Support engine

Release screws (1).

Remove exhaust system bracket (2).

Tightening torque **23 00 1AZ** .

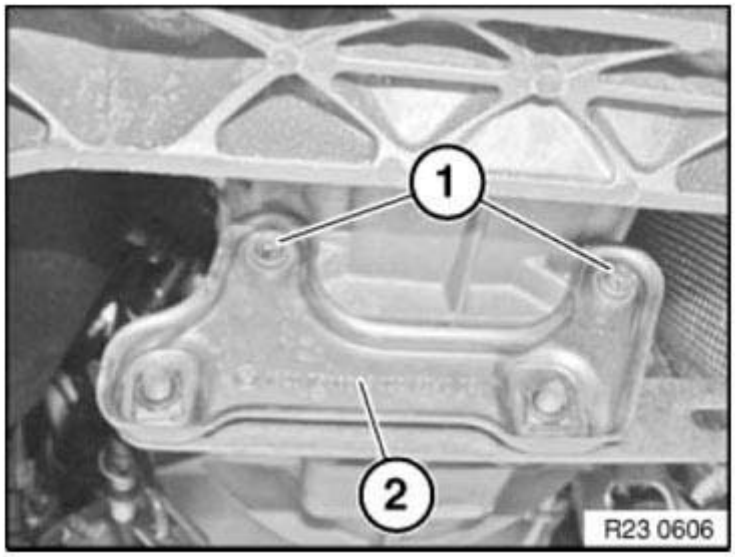


Fig. 5: Identifying Screw And Exhaust System Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Remove holder (1).

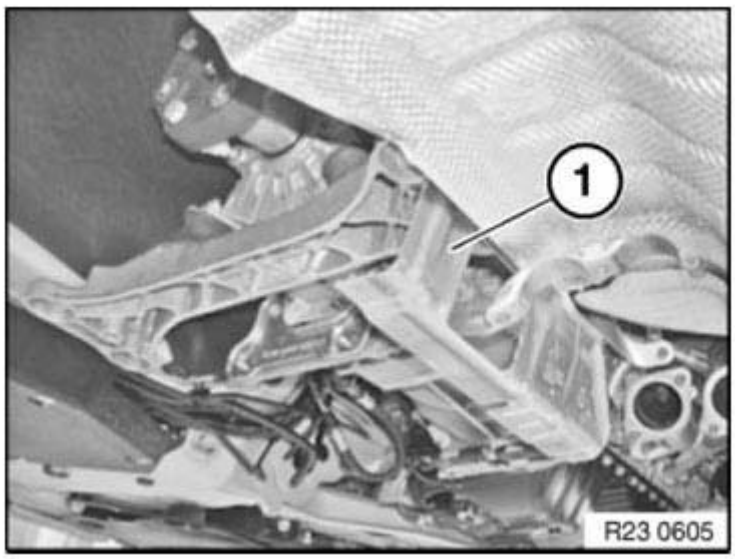


Fig. 6: Identifying Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Disconnect connector (1).

Unfasten screws (2).

Release screw (3) on grounding strap

Remove holder (4).

Tightening torque **23 00 1AZ** .

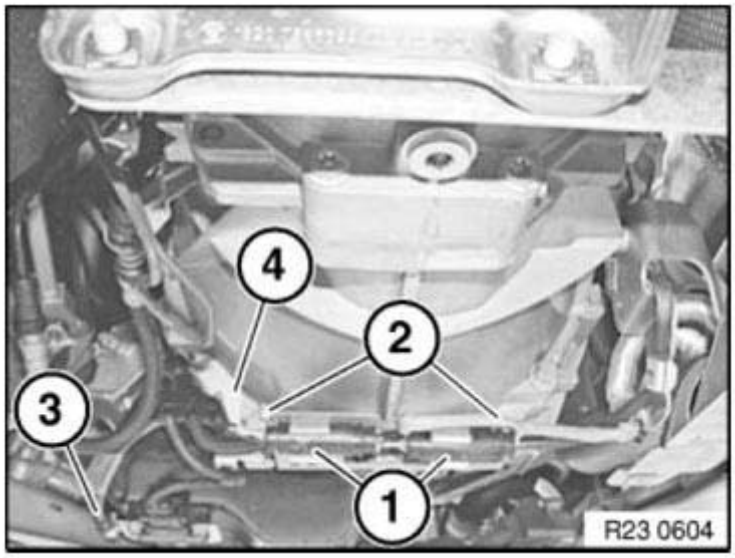


Fig. 7: Identifying Connector, Screw And Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Unclip cable (1) from holder.

Unfasten screws (2).

Remove bracket (3).

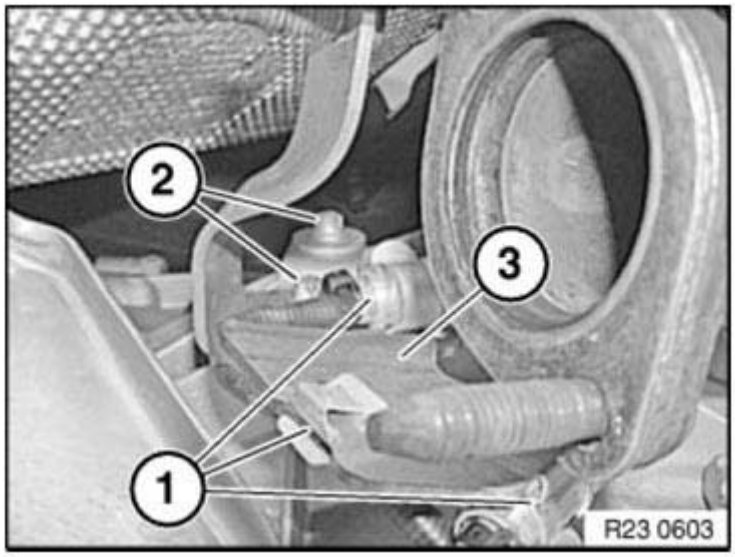


Fig. 8: Identifying Cable, Screws And Bracket
Courtesy of BMW OF NORTH AMERICA, INC.

Detach plug (1) from reverse gear switch.

Detach cables from fixtures on transmission.

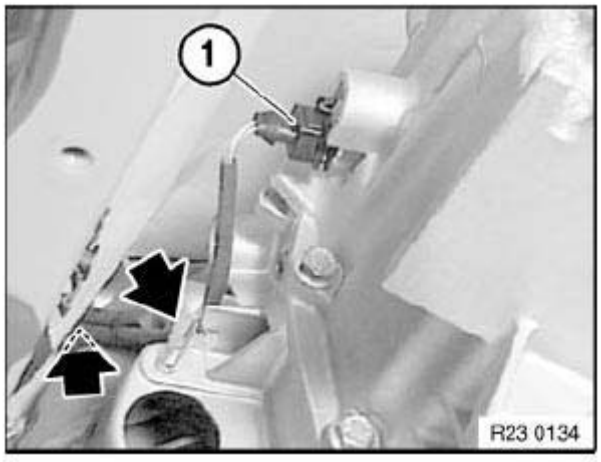


Fig. 9: Identifying Reverse Gear Switch Plug
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools **23 4 050** .

Secure transmission to mounting with tensioning strap (1).

Tasks are described in **Universal BMW transmission take-up**.

After completion of work, check transmission oil level.

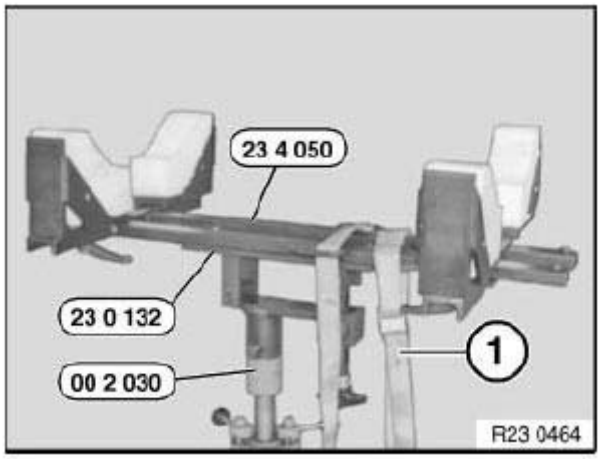


Fig. 10: Support Transmission With Special Tools (23 4 050,00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

Remove screws and nuts.

Unscrew cross member.

Tightening torque **23 71 1AZ/2AZ** .

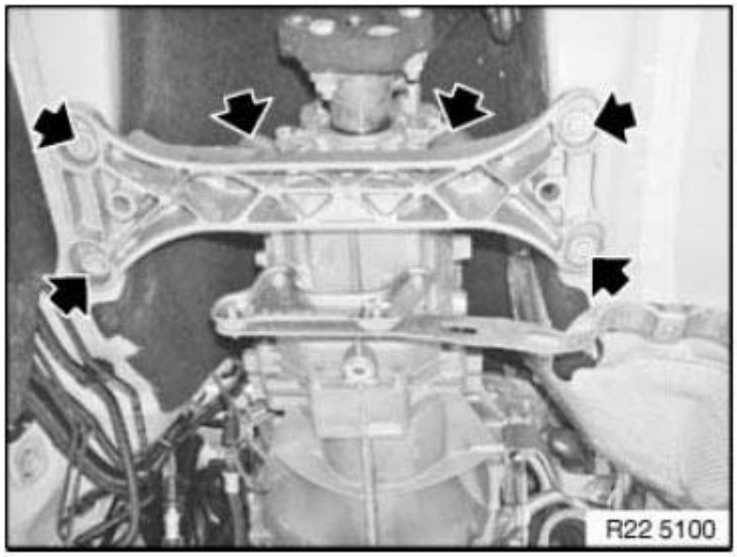


Fig. 11: Locating Screws And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Remove **PROPELLER SHAFT**

NOTE: Pressure line of clutch slave cylinder remains connected.

IMPORTANT: Relieve tension on clutch slave cylinder slowly; otherwise air will be drawn in through sealing sleeve.

Release nuts (2) and remove clutch slave cylinder (1).

Tightening torque **21 52 5AZ** .

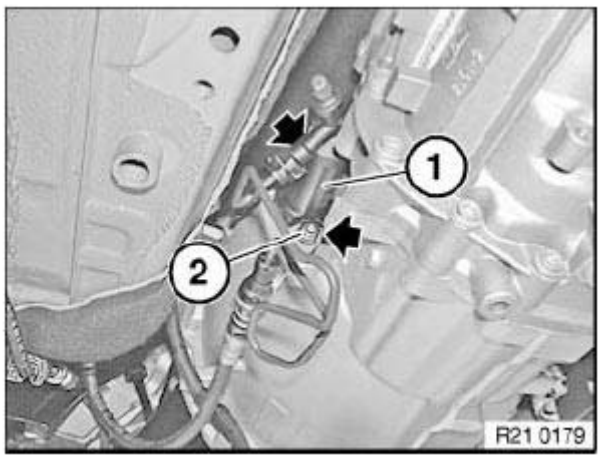


Fig. 12: Identifying Clutch Slave Cylinder Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Detach locking clip.

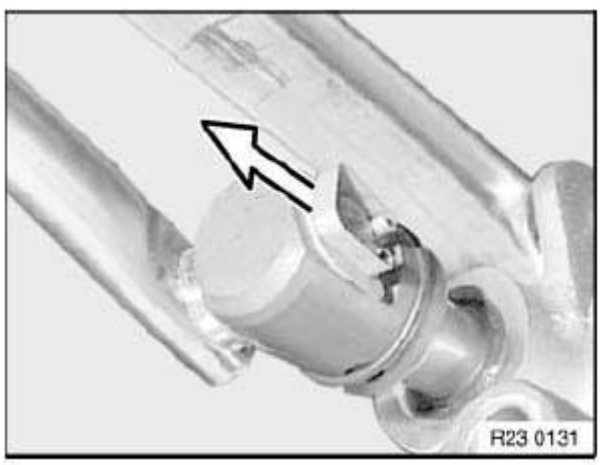


Fig. 13: Removing Locking Clip
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: New retaining clips fitted as from 04.08.
Retaining clip must interlock captively with retaining web (1) behind shift rod pin.

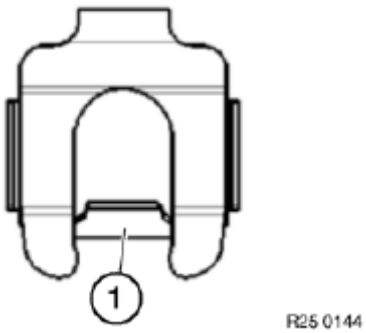


Fig. 14: Identifying Retaining Web
Courtesy of BMW OF NORTH AMERICA, INC.

Pull shift rod (1) out of shift rod joint (2).

Installation:

Grease shift rod pin (3).

Grease, refer to **OPERATING FLUIDS** .

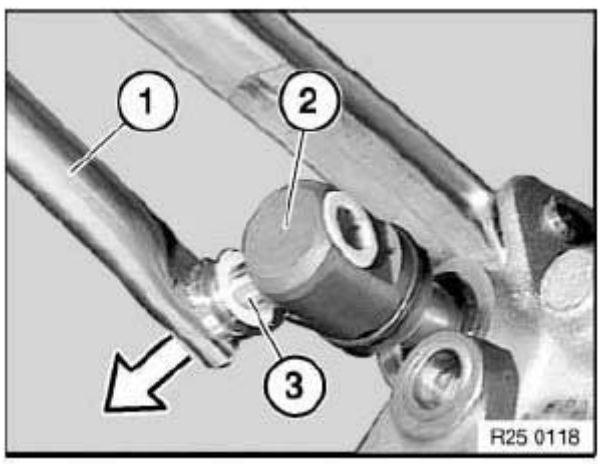


Fig. 15: Pulling Shift Rod From Shift Rod Joint
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock bearing pin (1) in direction of arrow and remove.

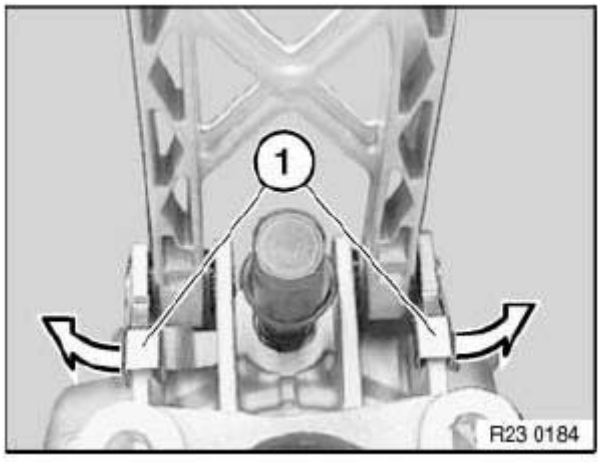


Fig. 16: Removing Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Lift out shift arm (1).

Installation:

Grease bearing pin.

Grease, refer to **OPERATING FLUIDS** .

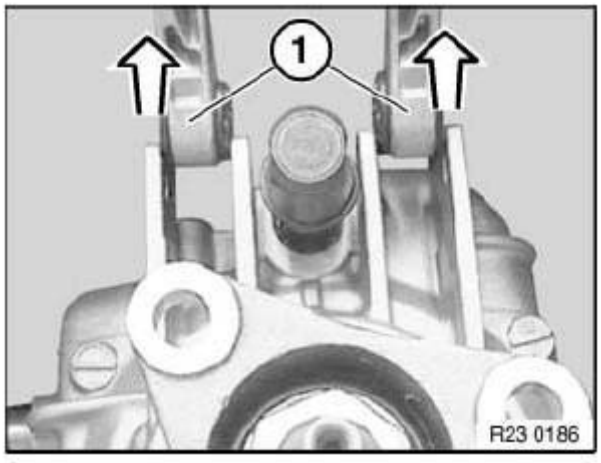


Fig. 17: Lifting Out Shift Arm
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Installation:

Tightening torque, steel screws **23 00 1AZ** .

Aluminum screws **must** be replaced.

Tightening torque and angle of rotation

Aluminum screws/bolts **23 00 2AZ** .

IMPORTANT: Do not suspend the transmission from the transmission input shaft during removal and installation as this will deform the clutch plate. Pull out transmission towards rear and remove.

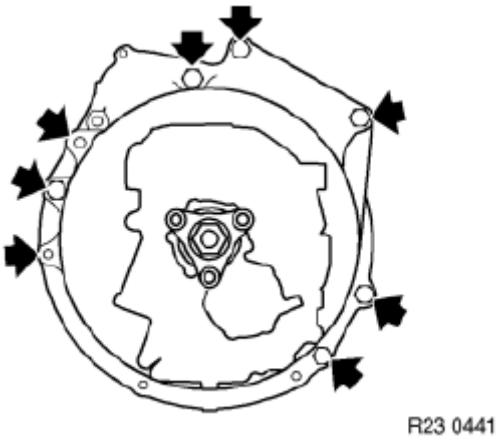


Fig. 18: Locating Clutch Disc Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Tighten down screws/bolts to specified torque.

Secure special tool and angle of rotation 00 9 120 with magnet **00 9 130** to floor plate.

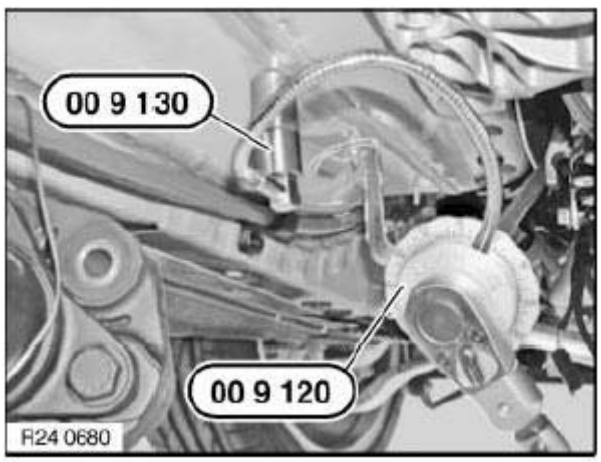


Fig. 19: Identifying Special Tool (00 9 120) And Magnet (00 9 130)

Courtesy of BMW OF NORTH AMERICA, INC.

Screw down aluminum screws/bolts further according to angle of rotation.

Angle of rotation **23 00 2AZ** .

Installation

Check dowel sleeves (1 and 2) for correct seating.

Replace damaged sleeves.

Ensure correct position of cover plate.

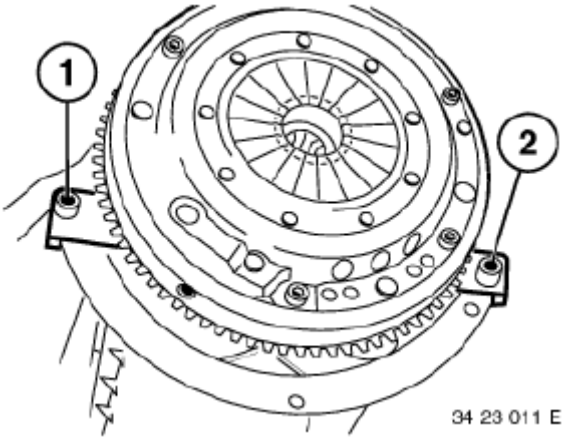


Fig. 20: Identifying Dowel Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Check lubrication of transmission input shaft for sticky consistency. If grease is sticky, clean input shaft and **REPLACE CLUTCH PLATE** .

Check clutch plate for friction rust in splines and **REPLACE IF NECESSARY** .

Remove any grease and lining abrasion from splines of clutch plate by mechanical means (with a cloth).

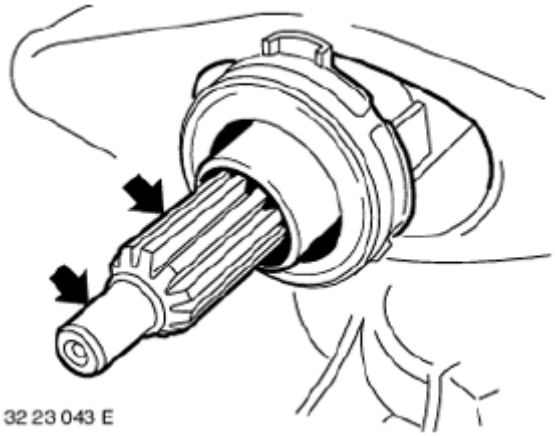


Fig. 21: Locating Transmission Input Shaft Lubrication
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Greasing specification:

- Remove and clean release bearing and release lever (do not grease).
- Push on grease scraper ring 21 2 220 as far as it will go.
- Grease splines (1) of input shaft with a brush.
- Refer to **OPERATING FLUIDS**
- Detach grease scraper ring.

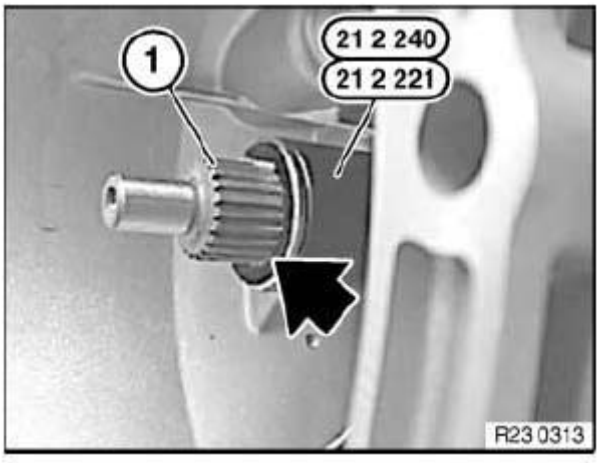


Fig. 22: Identifying Grease Scraper Ring And Splines
Courtesy of BMW OF NORTH AMERICA, INC.

23 01 010 REPLACING SEALING CAP (GS6-17BG/DG)

Necessary preliminary work:

- Remove **GEARBOX**
- Remove **CLUTCH RELEASE BEARING/LEVER**

Drive a hole into the sealing cap (1) with a suitable tool (2).

IMPORTANT: Do not use a drill as drillings may result in transmission malfunction.

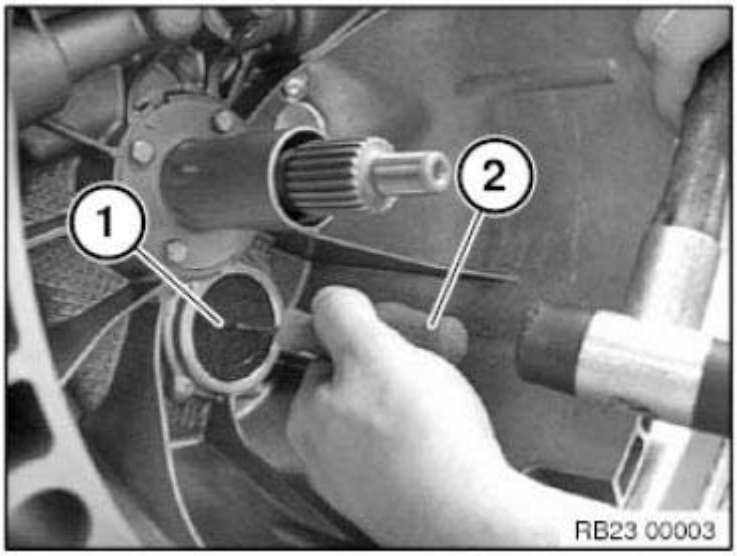


Fig. 23: Drilling Hole Into Sealing Cap Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 23 0 490 into sealing cap.

Withdraw sealing cap from transmission housing with aid of impact weight.

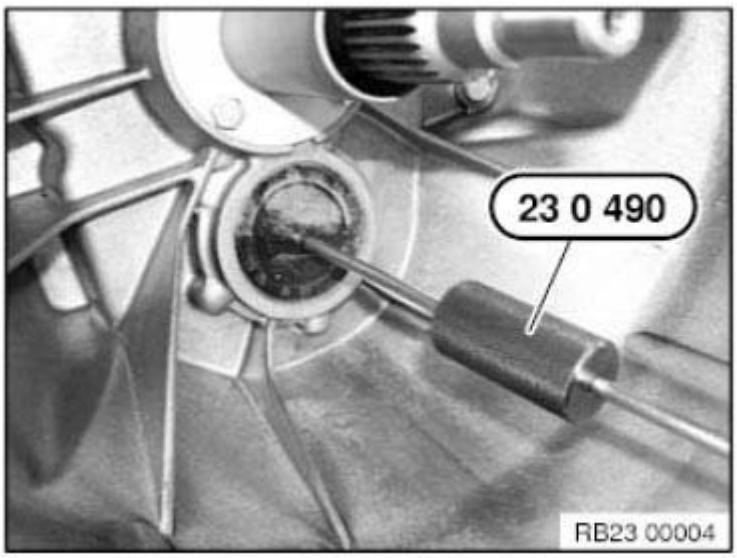


Fig. 24: Turning Sealing Cap Using Special Tool (23 0 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Apply transmission oil to the sealing lip of the sealing cap (1) and insert.

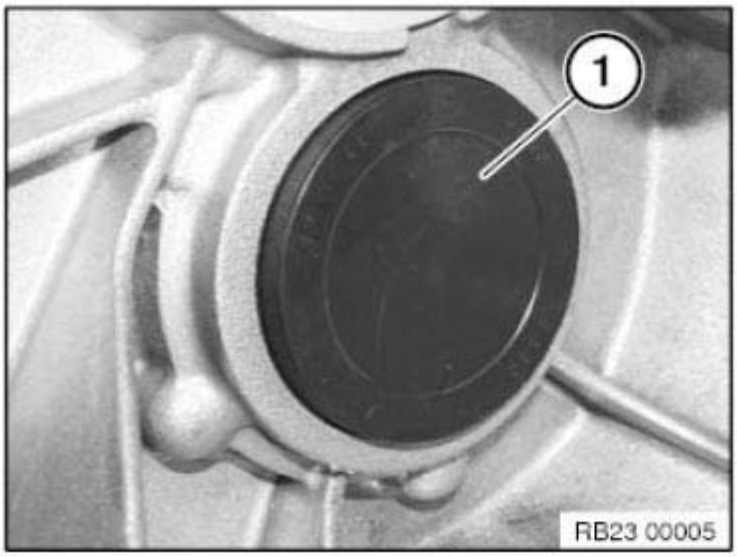


Fig. 25: Identifying Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Drive sealing cap firmly home with special tool 23 0 330.

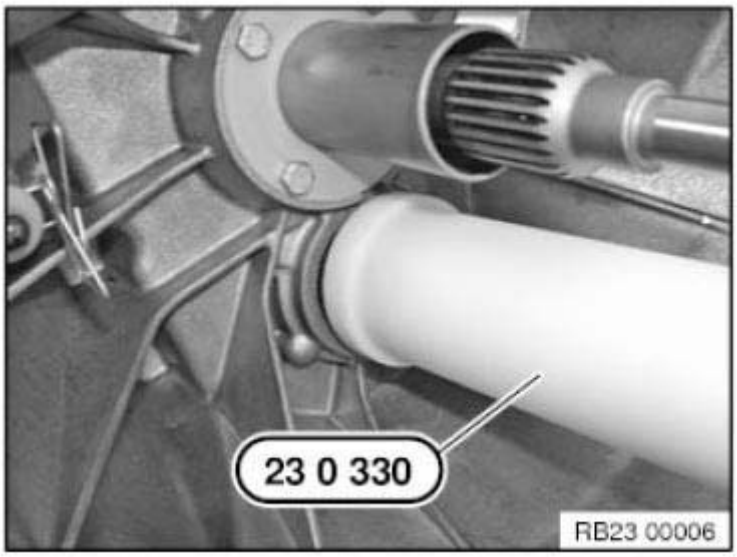


Fig. 26: Inserting Sealing Cap Using Special Tool (23 0 330)
Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Risk of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- Skin contact: Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

23 TRANSMISSION DESIGNATIONS

Breakdown of BMW designation

BMW BREAKDOWN DESIGNATION - TRANSMISSION

A5S 300J (former designation)		
A	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
5	Number of forward gears	
S	Type of top gear	○ D = Direct gear ○ S = Overdrive gear
300	Max. input torque (Nm)	
J	Code letter of transmission manufacturer	○ G = Getrag ○ J = Jatco

		○ R = GMPT (General Motors Powertrain) ○ Z = ZF (Zahnradfabrik Friedrichshafen)
SMG	Notes	SMG = Sequential M gearbox/transmission

BMW BREAKDOWN DESIGNATION - SEQUENTIAL M GEARBOX

GS6-37BZ (new designation according to BMW Group Standard GS 90007)		
G	Transmission	
S	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
6	Number of forward gears	○ - = Standard with manual gearshift ○ HP = Hydraulic planetary gear train ○ DKG= Twin-clutch transmission/gearbox
37	Transmission type	○ 26 = D-transmission ○ 31 = C-transmission ○ 39 = F-transmission ○ 37 = H-transmission ○ 53 = G-transmission ○ 17 = I-transmission ○ 47= J transmission SMG -7-speed ○ 45 = K transmission ○ 36= Transmission DKG
B	Gear set	○ B = Petrol gear ratio ○ D = Diesel gear ratio ○ S= Sport gear ratio
Z	Code letter of transmission manufacturer	○ G = Getrag ○ Z = ZF (Zahnradfabrik Friedrichshafen)

Manual gearbox

BMW BREAKDOWN DESIGNATION - MANUAL GEARBOX

BMW designation	**Manufacturer**	**Manufacturer designation**	**Remarks**
S5D 200G	Getrag	B transmission (220/5)	
S5D 200G	Getrag B transmission (221/5)	for M41 engine only	
S5D 250G	Getrag B transmission (220/5)	Reinforced design	
S5D 260Z	ZF	C-transmission (S5-31 D)	for M51 engine only
S5D 280Z	ZF	C-transmission (S5-31)	
S5D 310Z	ZF	C-transmission (S5-31)	up to 9.95

S5D 320Z	ZF C-transmission (S5-31)	from 9.95 (reinforced design)	
GS5S31BZ (SMG)	ZF	C transmission	SMG
GS5-39DZ	ZF	F transmission	
S6S 420G	Getrag	D-transmission (226/6)	
S6S 420G	(SMG)	Getrag D transmission	SMG
S6S 560G	Getrag	E-transmission (286/6)	
GS6-37BZ	ZF	H-transmission	
GS6S37BZ (SMG)	ZF	H-transmission	
GS6-37DZ	ZF	H-transmission	
GS6-37B	Getrag	H-transmission	
GS6-53BZ	ZF	G-transmission	
GS6-53DZ	ZF	G-transmission	
GS6-17BG	Getrag	I-transmission	
GS6-17DG	Getrag	I-transmission	
GS7S47BG (SMG)	Getrag	J-transmission (247)	SMG -7-speed
GS7D36SG	Getrag	DKG (436)	DKG -7-speed
GS6- 45BZ	ZF	K transmission	
GS6- 45DZ	ZF	K transmission	

Automatic transmission

BMW BREAKDOWN DESIGNATION - AUTOMATIC TRANSMISSION

BMW designation	Manufacturer	Manufacturer designation	Remarks
A4S 200R	GMPT	GM4	
A4S 270R	GMPT	THM-R1w	Transmission wide-stepped
A4S 310R	GMPT	THM-R1	
A5S 300J	Jatco	Jatco	

A5S 310Z	ZF	5HP-18	
A5S 325Z	ZF	5HP-19	
A5S 440Z	ZF	5HP-24	
A5S 560Z	ZF	5HP-30	
A5S 360R/390R	GM	GM5	
GA6HP19Z	ZF	6HP19	
GA6HP26Z	ZF	6HP26	
GA6HP32Z	ZF	6HP32	
GA6L45R	GM	GM6	
GA8HP45Z	ZF	8HP45	
GA8HP70Z	ZF	8HP70	
GA8HP90Z	ZF	8HP90	
GA7AHSCD	Daimler	AHS-C	Hybrid

23 ... UNIVERSAL BMW TRANSMISSION TAKE-UP

NOTE:

- **The universal transmission bracket is introduced for the E60 AWD**
- **Suitable for manual and automatic transmissions**

IMPORTANT: Front and rear supports (1) can be laterally adjusted by means of screws (2). Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.
Supports must be adapted in length and width to the transmission.

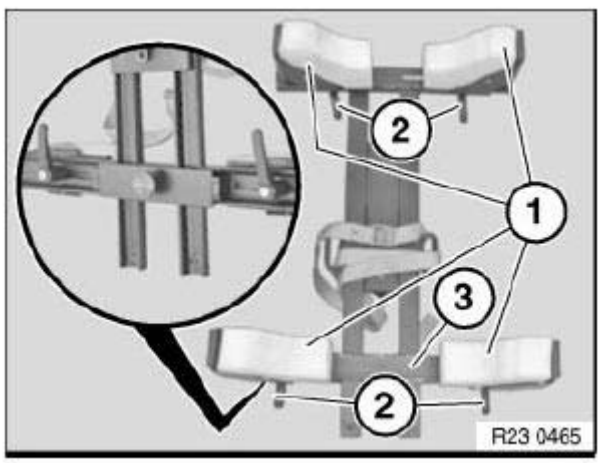


Fig. 27: Identifying Carrier, Screw, Front And Rear Supports

Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools 23 4 050, 00 2 030.

IMPORTANT: Transmission must be secured with tensioning strap (1).

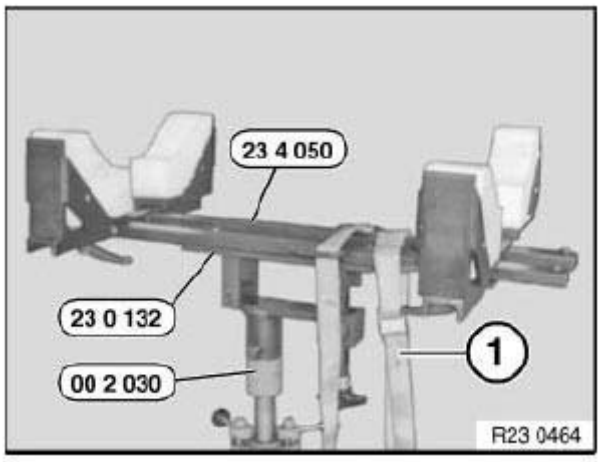


Fig. 28: Support Transmission With Special Tools (23 4 050,00 2 030)
Courtesy of BMW OF NORTH AMERICA, INC.

23 .. ... UNIVERSAL TRANSMISSION RETAINING BRIDGE

NOTE:

- **The transmission retaining bridge 24 0 200 is suitable for both manual and automatic transmissions**

IMPORTANT: Adapters and spindles must be adapted for positive locking to the transmission.
(Risk of injury)

Adapt adapters (1) and spindle with thrust piece (3) to transmission.

Adapt length with slide (2).

Screw in spindle (4).

IMPORTANT: Before mounting on assembly stand 00 1 450, check retaining bridge for secure seating.

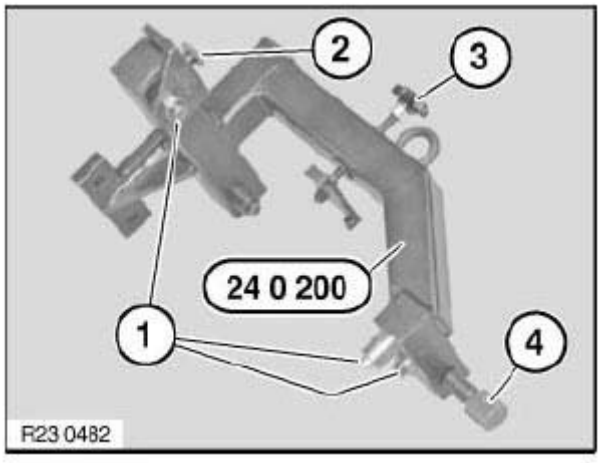


Fig. 29: Checking Universal Transmission Retaining Bridge Using Special Tool (00 1 450)
Courtesy of BMW OF NORTH AMERICA, INC.

2311 HOUSING WITH COVER

23 11 608 REPLACING GUIDE TUBE FOR CLUTCH RELEASE UNIT (GS6-17BG/DG)

Necessary preliminary tasks:

- Remove **TRANSMISSION**
- Remove **CLUTCH CONTROLLER** and release lever from guide tube.

Release screws.

Remove guide tube.

Tightening torque **23 11 2AZ** .

Installation:

Replace bolts.

Clean new guide tube.

Guide surface must be clean (no labels/stickers or residual adhesive, etc.).

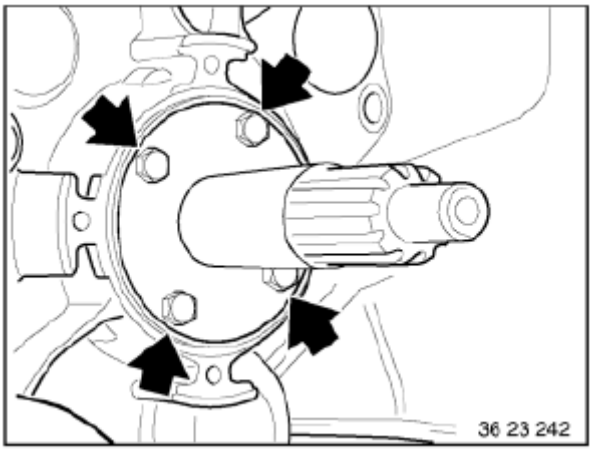


Fig. 30: Locating Guide Tube Screws
Courtesy of BMW OF NORTH AMERICA, INC.

2312 BEARING IN HOUSING, SEALING RING

23 11 608 REPLACING GUIDE TUBE FOR CLUTCH RELEASE UNIT (GS6-17BG/DG)

Necessary preliminary tasks:

- Remove **TRANSMISSION**
- Remove **CLUTCH CONTROLLER** and release lever from guide tube.

Release screws.

Remove guide tube.

Tightening torque **23 11 2AZ** .

Installation:

Replace bolts.

Clean new guide tube.

Guide surface must be clean (no labels/stickers or residual adhesive, etc.).

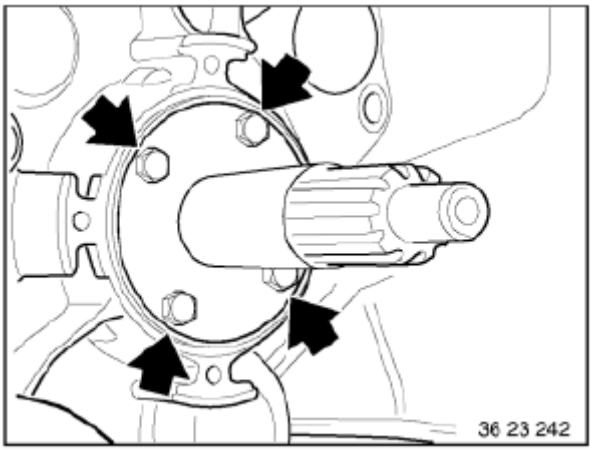


Fig. 31: Locating Guide Tube Screws
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 513 REPLACING RADIAL SEAL FOR DRIVE SHAFT (GS6-17BG/DG)

IMPORTANT: After completion of work, change FINAL DRIVE FLUID .
Use only approved transmission oil. See MANUAL TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove **GUIDE TUBE**

NOTE: Two covered removal holes (1) are located on end face of radial seal.

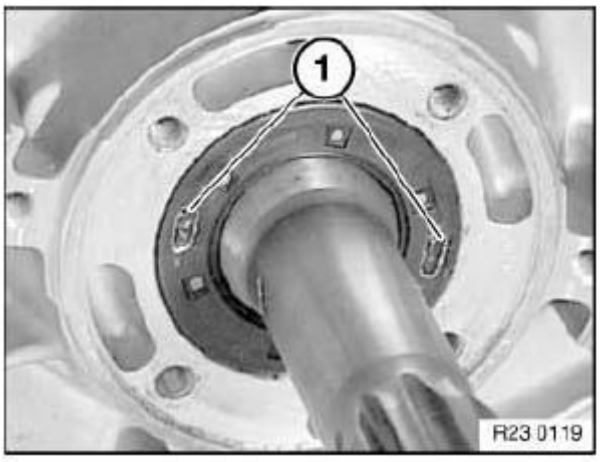


Fig. 32: Identifying Radial Seal Holes
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool 23 0 490 into one of two removal holes.

Withdraw radial seal from transmission housing with aid of impact weight.

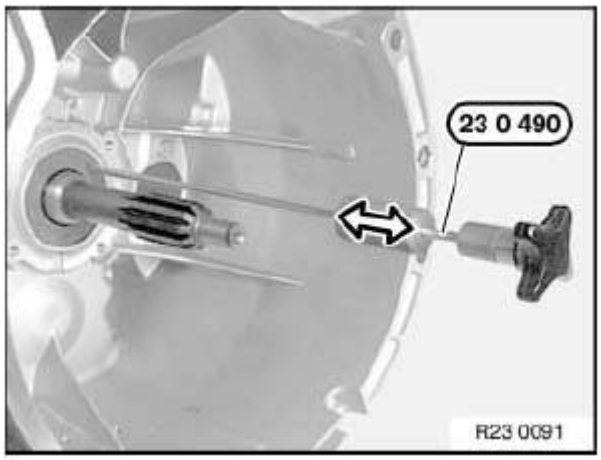


Fig. 33: Removing Radial Shaft Seal Special Tools (23 0 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Push radial seal (1) onto special tool 23 0 320 .

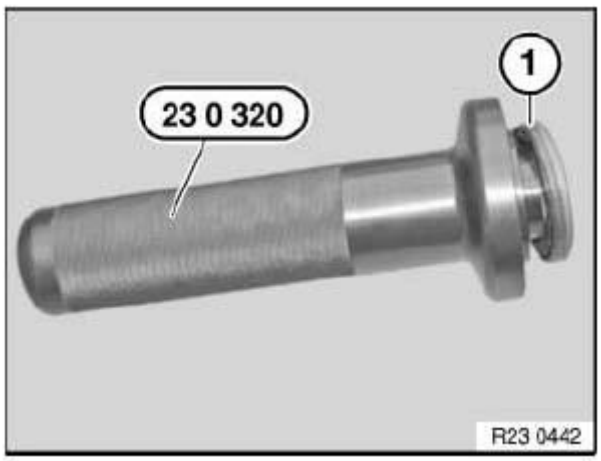


Fig. 34: Pushing Radial Shaft Seal Using Special Tools (23 0 320)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of radial seal with gear oil.

Slide special tool 23 0 320 onto input shaft.

Drive in radial seal with plastic hammer as far as it will go.

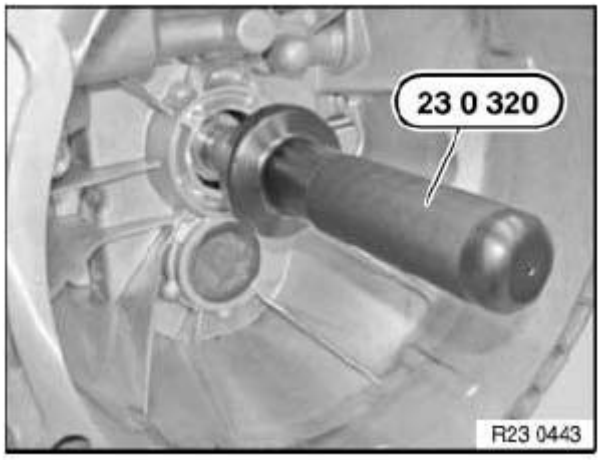


Fig. 35: Positioning Special Tools (23 0 320) Onto Drive Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 090 REPLACING RADIAL SEAL FOR SELECTOR SHAFT (GS6-17BG)

IMPORTANT: Use only approved transmission oil. See MANUAL TRANSMISSION - OPERATING FLUIDS .

Failure to comply with this requirement will result in serious damage to the manual transmission.

NOTE: After completion of work, check transmission oil level.

Shift transmission into 2nd gear.

Unflange propeller **SHAFT** from transmission and tie up to one side.

Lever retaining ring (1) out of groove with a small screwdriver.

Slide locking ring (1) towards rear.

Drive out cylindrical pin (2).

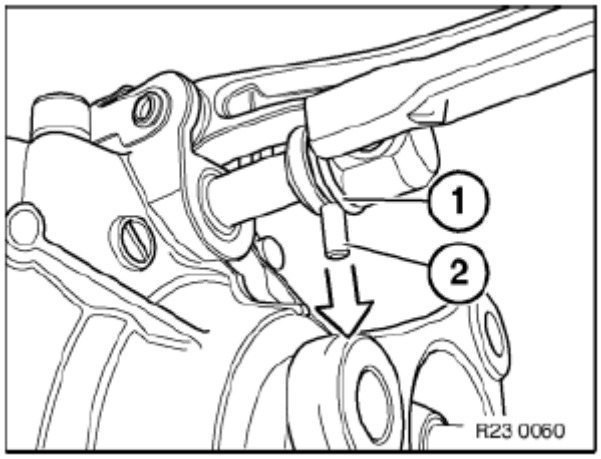


Fig. 36: Removing Cylindrical Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool 23 0 210 until it is firmly connected with radial seal (1).

Pull out radial seal with special tool 23 0 210 .

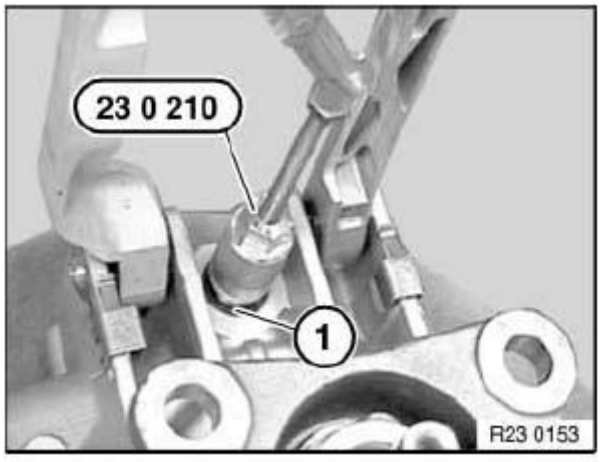


Fig. 37: Connecting Radial Shaft Seal Using Special Tool (23 0 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat sealing lips of radial seal and selector shaft with gear oil.

Drive in radial seal with special tool 23 0 220 .

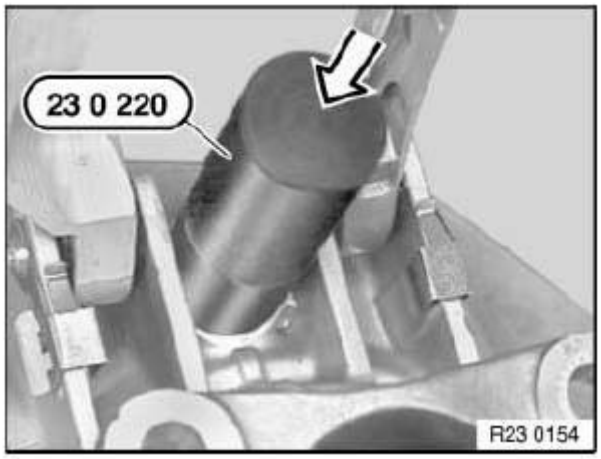


Fig. 38: Installing Radial Seal Using Special Tool (23 0 220)
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 060 REPLACING RADIAL SHAFT SEAL FOR OUTPUT FLANGE (GS6-17BG/DG)

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .
Use only approved transmission oil. See MANUAL TRANSMISSION - OPERATING FLUIDS .
Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks:

- Remove underbody protection
- Remove **EXHAUST SYSTEM**
- Remove heat shields
- Tie **PROPELLER SHAFT** to one side.

Brace output flange with special tool 23 0 020 .

Release collar nut with special tool 23 1 210 .

Tightening torque **23 21 1AZ** .

Insert collar nut with Loctite 243 screw securing adhesive (sourcing reference: BMW Parts Service).

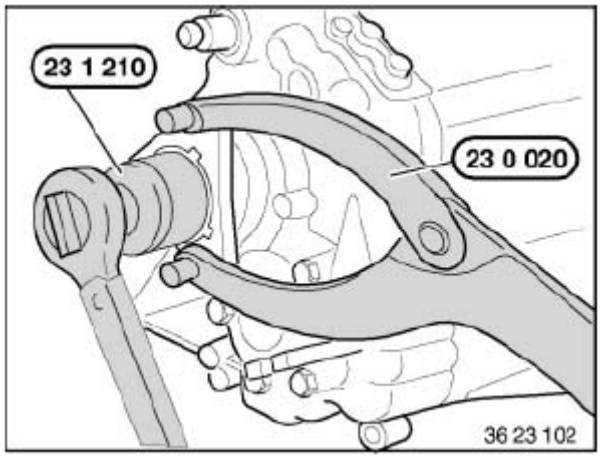


Fig. 39: Removing Collar Nut Using Special Tool (23 1 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Detach output flange with special tool 33 1 150 from output shaft.

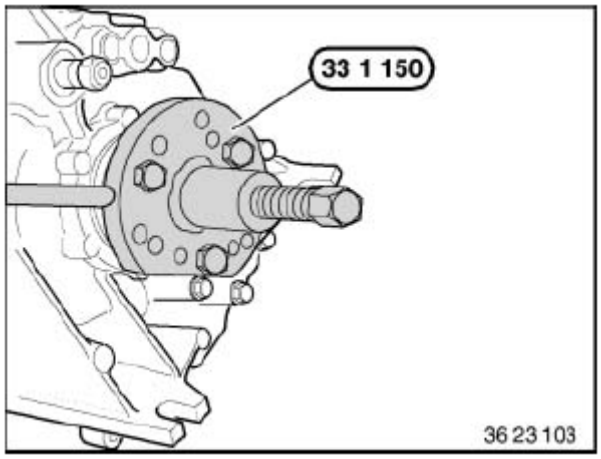


Fig. 40: Removing Output Flange From Output Shaft Using Special Tool (33 1 150)
Courtesy of BMW OF NORTH AMERICA, INC.

Withdraw radial shaft seal with special tool 00 5 011.

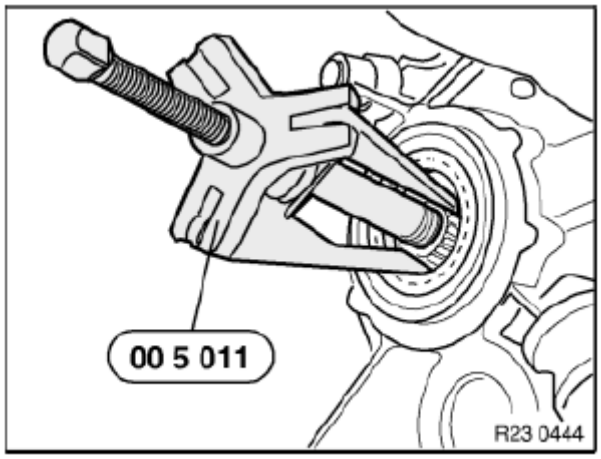


Fig. 41: Pulling Radial Shaft Seal Using Special Tool (00 5 011)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation:

Coat sealing lips of new radial seal with gear oil.

Drive in radial shaft seal with special tool 24 0 110 and plastic hammer until flush.

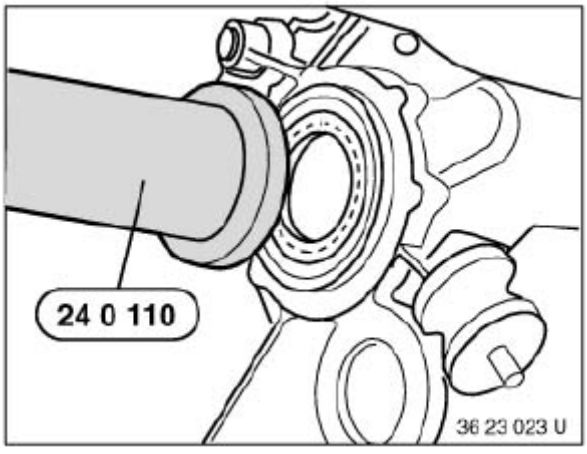


Fig. 42: Installing Radial Shaft Seal Using Special Tool (24 0 110)
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 506 REPLACING THE DRIVE SHAFT RADIAL SHAFT SEAL (GS6-85BG)

NOTE: After completion of work, check gearbox oil level.
Use only the approved gearbox oil.
Failure to comply with this requirement will result in serious damage to the manual transmission!

Necessary preliminary work:

- Remove transmission.
- Remove clutch release bearing.

Release bolts (1) and remove guide tube (2).

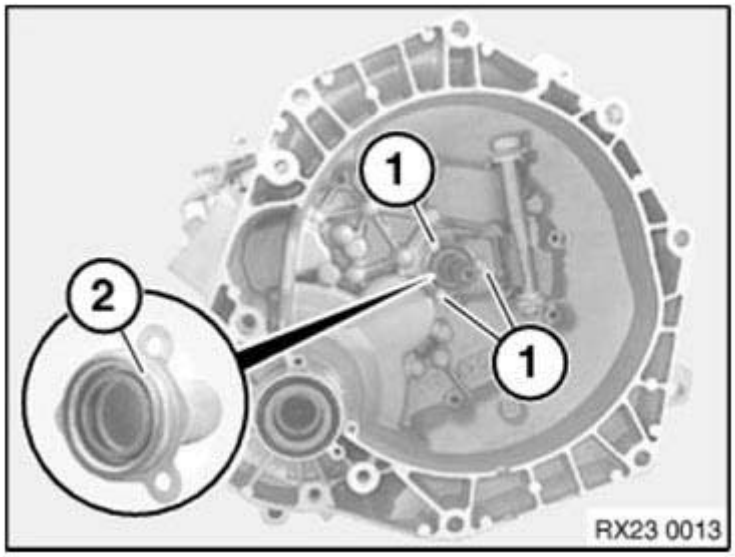


Fig. 43: Identifying Guide Tube With Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The shaft seal and the guide tube are replaced together.

Installation note:

Wrap adhesive tape round keyway splines of drive shaft to avoid damaging the sealing ring while it is being installed.

Lubricate sealing lip of sealing ring.

Replace mounting bolts of guide bush.

Tightening torque 23 11 1AZ.

23 MANUAL TRANSMISSION

23-2470 BUSH

0491595 232470 Bush MW

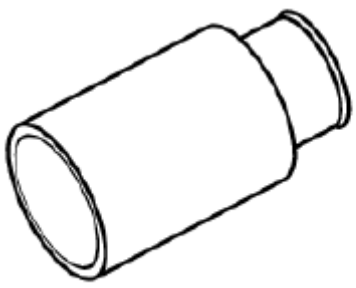
NOTE: **(Impact bush) For driving in the retainer of the mounting nut on the output flange**

Storage Location

C15

SI number

01 10 93 (689)



W 23 2 470

Fig. 1: Identifying Bush (232470)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2490 BUSH

0491597 232490 Bush Minimum set: Mechanical tools MW

NOTE: **(impact bush and sliding sleeve) For fitting the radial sealing ring to the drive shaft**

Storage Location

A17

SI number

01 10 93 (689)

Consisting of:

1 = 0491598 Bush

NOTE: (impact bush)

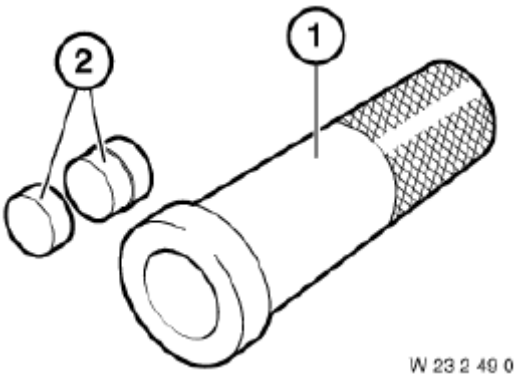


Fig. 2: Identifying Bush (232490)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491599 Sleeve

NOTE: (sliding sleeve (2-part))

23-3020 BUSH

0491604 233020 Bush MW

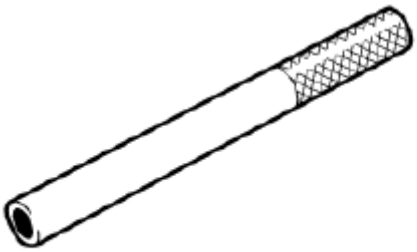
NOTE: (Assembly bush) For installing the gaiter of the gearshift rod

Storage Location

Z3

SI number

01 10 93 (689)



W 23 3 020

Fig. 3: Identifying Bush (233020)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0190 BUSH

0493420 230190 Bush Minimum set: Mechanical tools MW

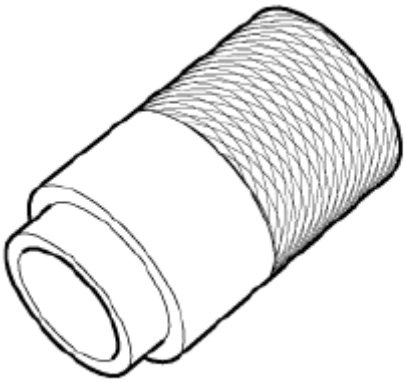
NOTE: (Impact bush) For driving in the radial shaft seal on the output end - F transmission

Storage Location

A17

SI number

01 14 99 (482)



W23 0 190

Fig. 4: Identifying Bush (230190)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2180 BUSH

0491562 232180 Bush MW

NOTE: **(Guide bush) For fitting the transmission housing front section onto the gearshift shaft**

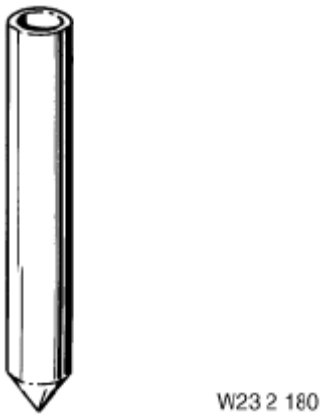


Fig. 5: Identifying Bush (232180)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0390 BUSH

0496582 230390 Bush MW

NOTE: **(slip bush) For removing and installing clutch cover with shaft seal on drive shaft.**

SI number

01 04 09 (517)

Fig. 6: Identifying Bush (230390)

Courtesy of BMW OF NORTH AMERICA, INC.

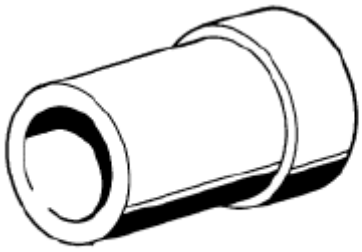
23-2150 BUSH

0491559 232150 Bush MW

NOTE: **(Pressure bush) For pressing in the grooved ball bearing of the transmission output shaft (260/5, 245/5), pressing the front taper roller bearing onto the drive bevel gear for all rear axle final drives as well as installation of the lid of the countershaft (S5D 310Z)**

Storage Location

Y6



W23 2 150

Fig. 7: Identifying Bush (232150)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0220 BUSH

0493423 230220 Bush Minimum set: Mechanical tools MW

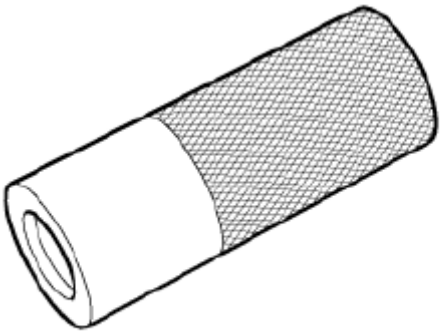
NOTE: **(Impact bush) For driving in radial shaft seal on gearshift shaft - F transmission**

Storage Location

B15

SI number

01 14 99 (482)



W23 0 220

Fig. 8: Identifying Bush (230220)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2480 BUSH

0491596 232480 Bush MW

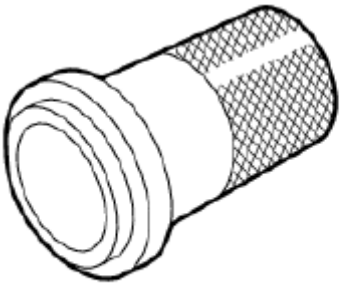
NOTE: (Impact bush) For driving radial shaft seal onto output shaft

Storage Location

A17

SI number

01 10 93 (689)



W 23 2 480

Fig. 9: Identifying Bush (232480)
Courtesy of BMW OF NORTH AMERICA, INC.

23-4040 CARTRIDGE GUN

0495530 234040 Cartridge gun MW

NOTE: (grease gun) For actuating cartridge 23 4 033.

SI number

01 05 06 (248)

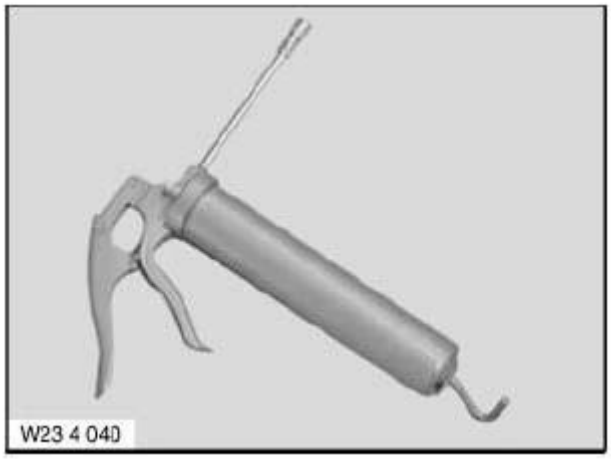


Fig. 10: Identifying Cartridge Gun (234040)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2250 CLAMP

0491569 232250 Clamp MW

NOTE: For clamping together the main shaft and countershaft

Storage Location

Y7

SI number

01 07 90 (244)

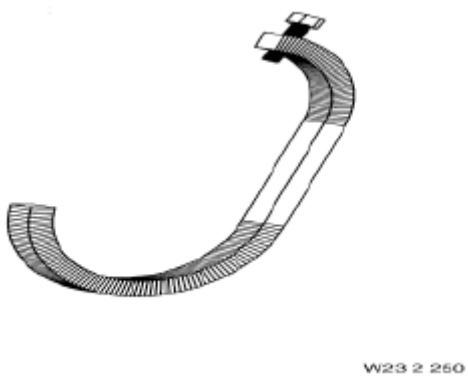


Fig. 11: Identifying Clamp (232250)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1100 CLAW

0491481 231100 Claw MW

NOTE: (Extractor claw) For the speedometer wheel

Storage Location

Y9

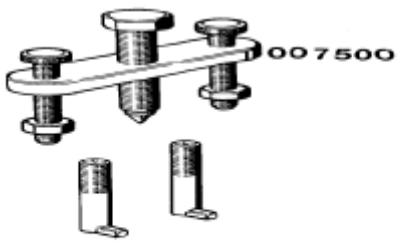


Fig. 12: Identifying Claw (231100)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1400 DEVICE

0491522 231400 Device MW

NOTE: For inserting the radial seal ring in the plug socket of the speedometer-drive pinion

Consisting of:

1 = 0491523 Shaft

NOTE: (Press-in shaft)

2 = 0491524 Shaped part

NOTE: (shaped part)

3 = 0491525 Holding sleeve

NOTE: (Union sleeve)

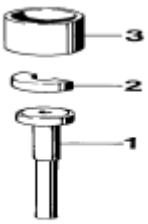


Fig. 13: Identifying Device (231400)
Courtesy of BMW OF NORTH AMERICA, INC.

23-4030 DEVICE

0495529 234030 Device MW

NOTE: For removing and installing guide bearing (pilot bearing) in transmission drive shaft.

SI number

01 05 06 (248)

Consisting of:

1 = 0495535 Basic body

2 = 0495536 Nut

NOTE: (nut M8)

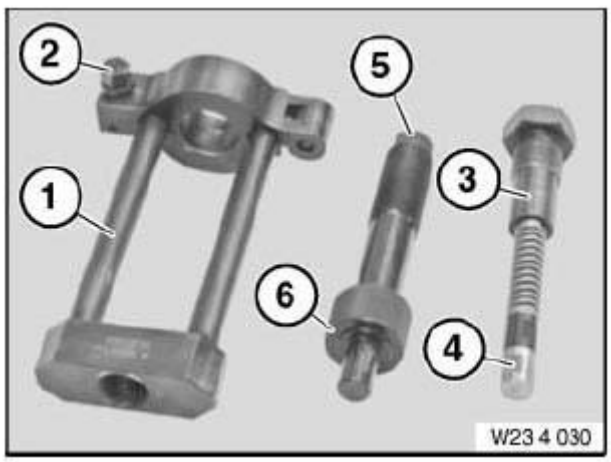


Fig. 14: Identifying Device (234030)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0495537 Cartridge

NOTE: (cartridge)

4 = 0495538 Adapter

5 = 0495539 Spindle

NOTE: (pressure spindle)

6 = 0495540 Thrust piece

NOTE: (thrust piece)

23-1350 DEVICE

0491514 231350 Device MW

NOTE: (Pull-off device) For transmission housing rear section

Consisting of:

1 = 0491515 Plate

2 = 0491516 Screw

NOTE: (Screw, short (2 x))

3 = 0491517 Screw

NOTE: (Screw, long (2 x))

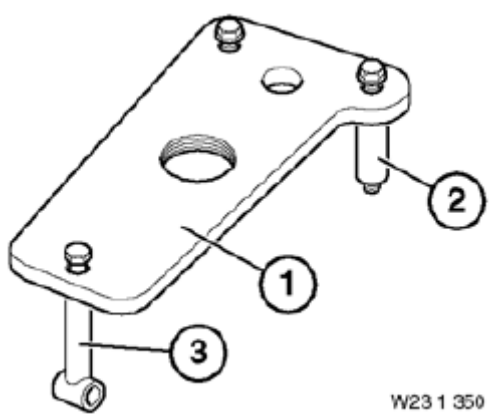


Fig. 15: Identifying Device (231350)

Courtesy of BMW OF NORTH AMERICA, INC.

23-2270 DEVICE

0491571 232270 Device MW

NOTE: For centering the gearshift shaft when fitting the front section of the transmission housing

Storage Location

Z6

SI number

01 07 90 (244)

W23 2 270

Fig. 16: Identifying Device (232270)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2330 DEVICE

0491581 232330 Device MW

NOTE: For pulling the complete gear set into the transmission housing rear section

Storage Location

Z6

SI number

01 07 90 (244)

W23 2 330

Fig. 17: Identifying Device (232330)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1420 DEVICE

0491527 231420 Device MW

NOTE: For pulling off the sliding piece (5th gear)

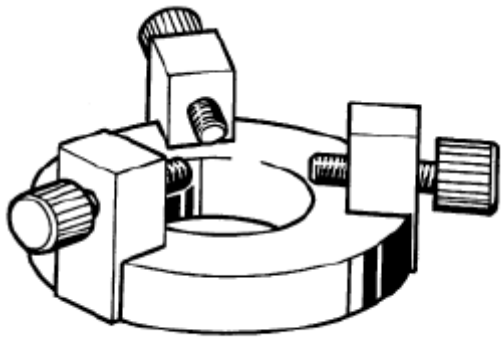
Storage Location

Z4

Consisting of:

3 = 0493257 Screw

NOTE: (Clamping bolt)



W23 1 420

Fig. 18: Identifying Device (231420)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1490 DEVICE

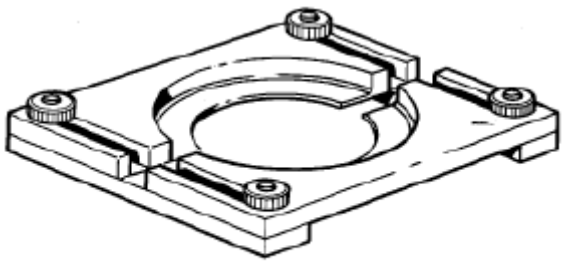
0491534 231490 Device MW

NOTE: For pressure-test of the gear wheels

Consisting of:

3 = 0491535 Shaped part

NOTE: (shaped part)



W23 1 490

Fig. 19: Identifying Device (231490)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1170 DEVICE

0491492 231170 Device MW

NOTE: For pulling off the gearbox housing front section

Consisting of:

1 = 0491493 Plate

2 = 0491494 Screw

NOTE: (Knurled screw (3 x))

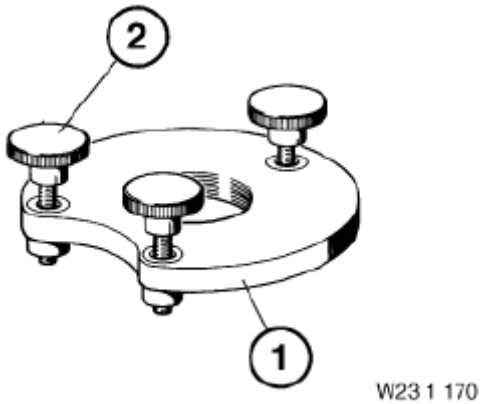


Fig. 20: Identifying Device (231170)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3010 DEVICE

0491600 233010 Device MW

NOTE: For mounting the output flange on the output shaft

Storage Location

B16

SI number

01 10 93 (689)

Consisting of:

1 = 0491601 Spindle

NOTE: (Adapter spindle)

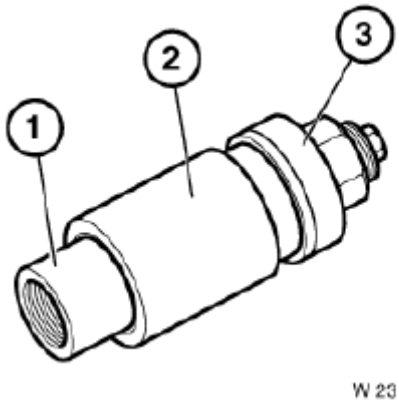


Fig. 21: Identifying Device (233010)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491602 Sleeve

NOTE: (Pressure sleeve)

3 = 0491603 Nut

NOTE: (Thrust nut with bearing)

23-1060 DEVICE

0491474 231060 Device MW

NOTE: For extracting the bearing inner race - reverse gearwheel

Storage Location

Z4

Consisting of:

1 = 0491475 Shell

NOTE: (bearing shell) 2 pieces

2 = 0491476 Ring

NOTE: (threaded ring)

3 = 0491477 Sleeve

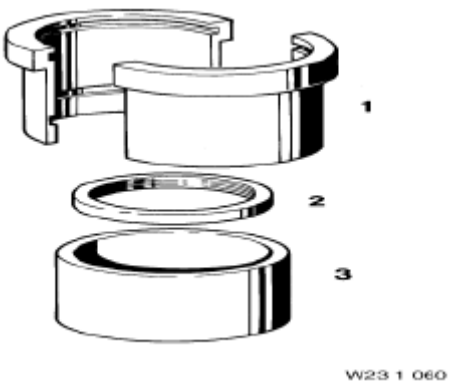


Fig. 22: Identifying Device (231060)

Courtesy of BMW OF NORTH AMERICA, INC.

23-2310 DEVICE

0491579 232310 Device MW

NOTE: For pressure-test of the 3rd and 4th gear wheels of the countershaft

Storage Location

Y7

SI number

01 07 90 (244)

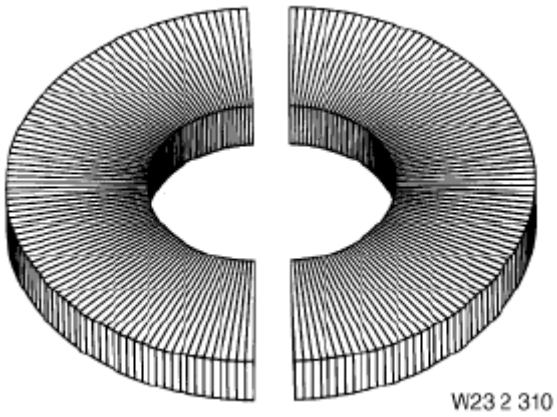


Fig. 23: Identifying Device (232310)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1020 DEVICE

0491466 231020 Device MW

NOTE: (Device for pulling off the transmission housing (front and rear sections))

Storage Location

Z5

Z6

W23 1 020

Fig. 24: Identifying Device (231020)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0080 DEVICE

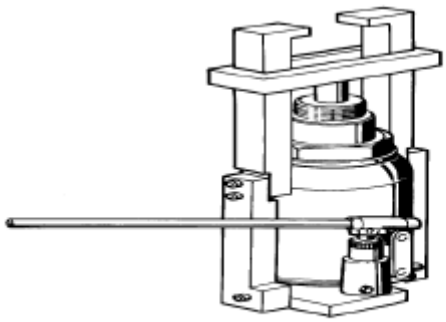
0491448 230080 Device MW

NOTE: For pulling off 5th gear wheel

Consisting of:

2 = 0491449 Shaped part

NOTE: (Shaped part) 2x



W23 0 080

Fig. 25: Identifying Device (230080)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1010 DEVICE

0491465 231010 Device MW

NOTE: (Device for pulling off the rear part of the transmission housing)

Fig. 26: Identifying Device (231010)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1000 DEVICE

0491457 231000 Device MW

NOTE: For pressing the transmission housing and grooved ball bearing onto the transmission drive shaft and into the transmission housing

Storage Location

C15

C16

Consisting of:

1 = 0491458 Holding sleeve

2 = 0491459 Pin

NOTE: (Dowel pin (2 x))

3 = 0491460 Synchronizing key

NOTE: (Synchronizing key, long)

4 = 0491461 Synchronizing key

NOTE: (Synchronizing key, short)

5 = 0491462 Handle

5 = 0491463 Pin

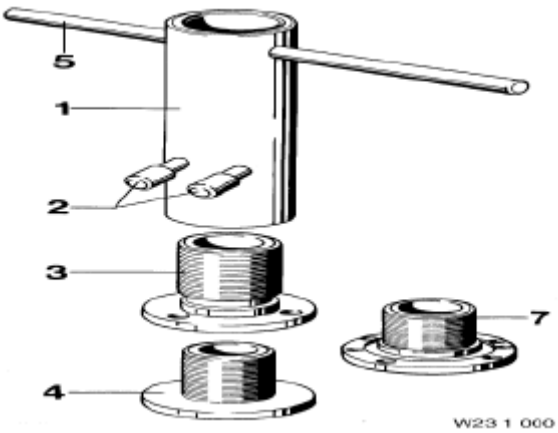


Fig. 27: Identifying Device (231000)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Dowel pins for Getrag transmission)

7 = 0491464 Synchronizing key

NOTE: (Synchronizing key for Getrag transmission)

23-2170 DEVICE

0491561 232170 Device MW

NOTE: For tensioning the transmission leaf springs

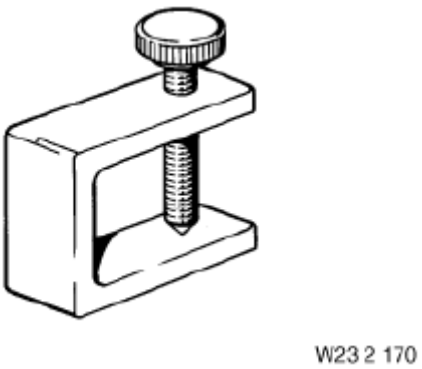


Fig. 28: Identifying Device (232170)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2370 DEVICE

0491585 232370 Device MW

NOTE: For removing the gear set

Storage Location

Y8

SI number

01 02 91 (330)

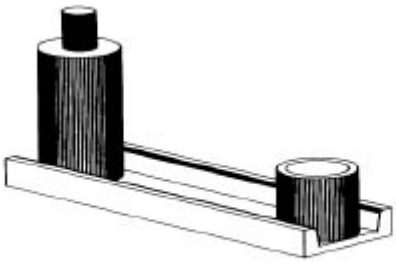


Fig. 29: Identifying Device (232370)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1050 EXTRACTOR

0491469 231050 Extractor MW

NOTE: (Extractor (Kukko)) For the 5th gear - and for the reverse gear wheel

Consisting of:

1 = 0491470 Claw

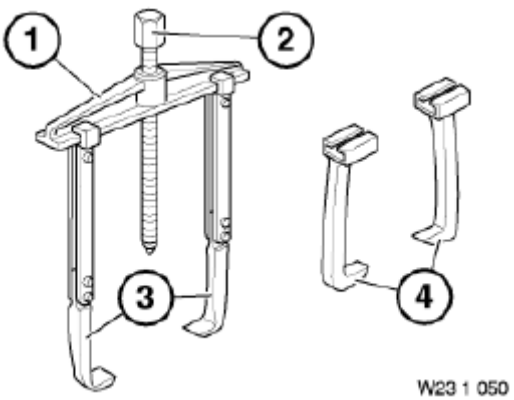


Fig. 30: Identifying Extractor (231050)

Courtesy of BMW OF NORTH AMERICA, INC.

23-0040 FIXTURE

0491442 230040 Fixture MW

Replaced by: 0495498

NOTE: For transmissions for removal and installation. Replaced by 23 4 050 (0 495 498)

SI number

01 05 90 (207)

Consisting of:

1 = 0491443 Cage

NOTE: (Retaining cage) Transmission: S6S 560G Replaced by 23 4 050 (0 495 498)

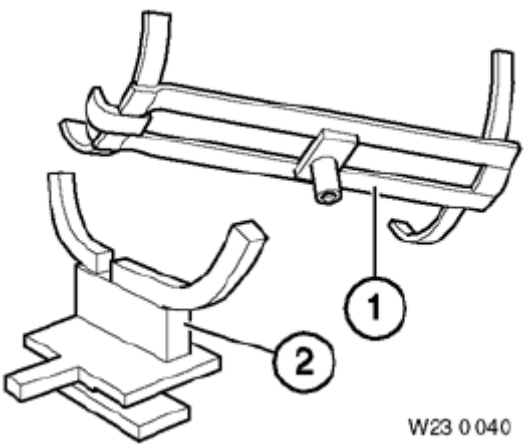


Fig. 31: Identifying Fixture (230040)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491444 Retaining bracket

NOTE: (Holding bracket) Transmission: S6S 420G Replaced by 23 4 050 (0 495 498)

23-0140 FIXTURE

0493417 230140 Fixture MW

Replaced by: 0495498

NOTE: **For accommodating transmission during removal and installation. Transmission: F-transmission. Replaced by 23 4 050 (0 495 498)**

SI number

01 20 98 (378)

W23 0 160

Fig. 32: Identifying Fixture (230140)
Courtesy of BMW OF NORTH AMERICA, INC.

23-4050 FIXTURE

0495498 234050 Fixture MW

NOTE: **(Universal gearbox holder) Fixture for removing and installing manual and automatic transmissions for BMW&RR.**

SI number

01 07 06 (256)

Consisting of:

4 = 0495550 Belt

NOTE: **(Tensioning strap)**

5 = 0496018 Fixture

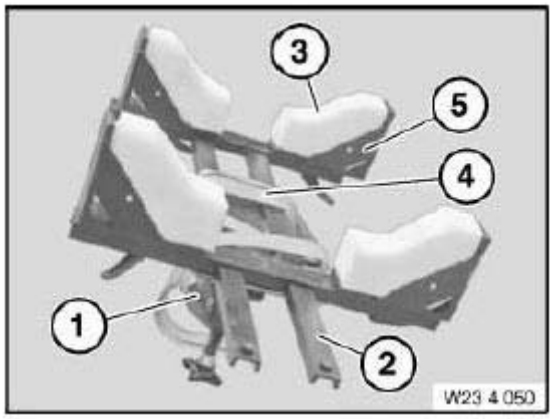


Fig. 33: Identifying Fixture (234050)
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: (Fixture for foam material insert)

1 = 0495547 Joint

2 = 0495548 Frame

NOTE: (Main frame)

3 = 0495549 Insert

NOTE: (Foam inserts (1 set = 4 pieces))

23-0150 FIXTURE

0491452 230150 Fixture MW

NOTE: For supporting the transmission on the assembly stand. For ZF transmissions.

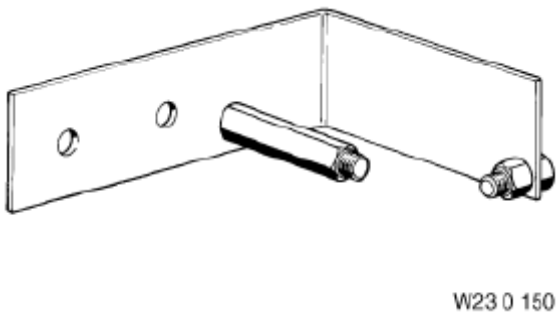


Fig. 34: Identifying Fixture (230150)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0170 FIXTURE

0493418 230170 Fixture MW

Replaced by: 0495466

NOTE: For mounting the F gearbox on the assembly stand. Replaced by 24 0 200 (0 495 466)

SI number

01 14 99 (482)

Consisting of:

1 = 0493439 Basic body

NOTE: Replaced by 24 0 201 (0 495 488)

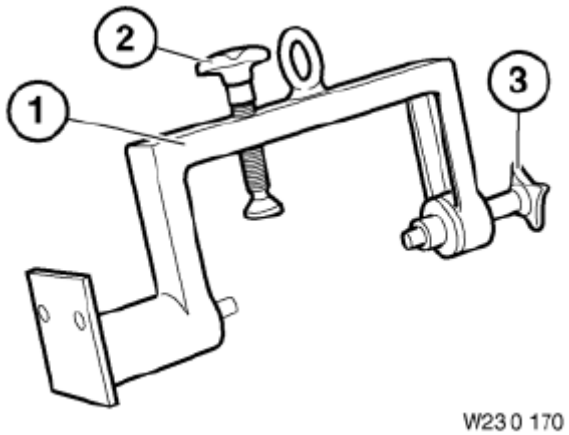


Fig. 35: Identifying Fixture (230170)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0493440 Spindle

NOTE: (Spindle (2 pieces)) With handle Replaced by 24 0202 (0 495 489)

23-0110 FIXTURE

0493764 230110 Fixture MW

NOTE: For removing and installing transmission. Replaced by 23 4 050.

SI number

01 02 00 (551)

Consisting of:

1 = 0494568 Fixture

NOTE: Transmission: S6S 560G

2 = 0494569 Retaining bracket

NOTE: (Holding bracket (not shown)) Transmission: S6S 420G

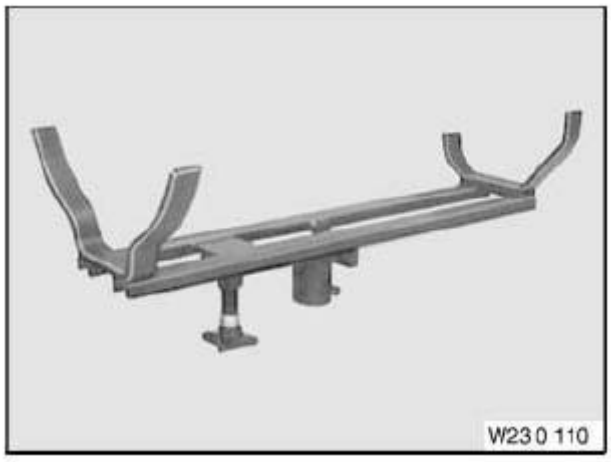


Fig. 36: Identifying Fixture (230110)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0100 FIXTURE

0491451 230100 Fixture MW

NOTE: For mounting transmission on assembly stand

SI number

01 07 90 (244)

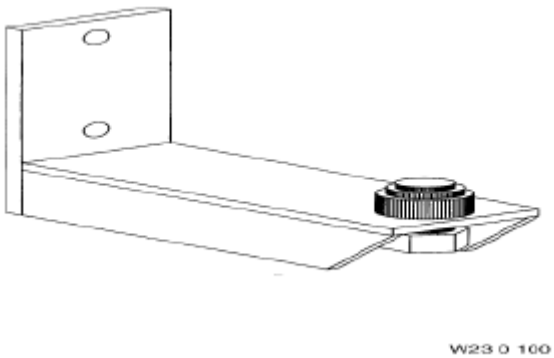


Fig. 37: Identifying Fixture (230100)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0250 HOLDER

0493685 230250 Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) Help with slackening and tightening the output flange

Storage Location

B41

SI number

01 06 00 (575)

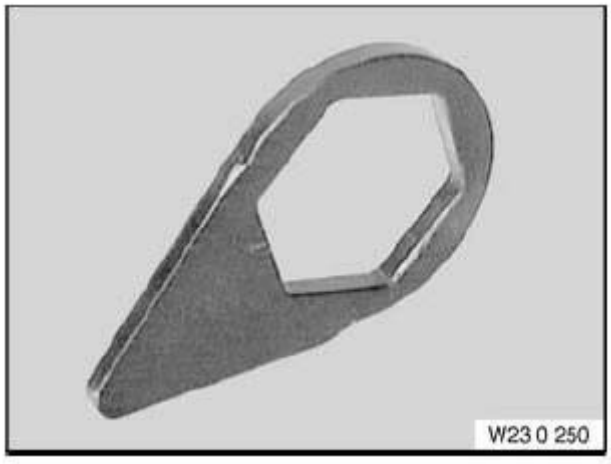


Fig. 38: Identifying Holder (230250)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0020 HOLDER

0491440 230020 Holder Minimum set: Mechanical tools MW

NOTE: **(counter support) For all three- and four-hole flanges when releasing and tightening down**

Storage Location

A1

C1

B1

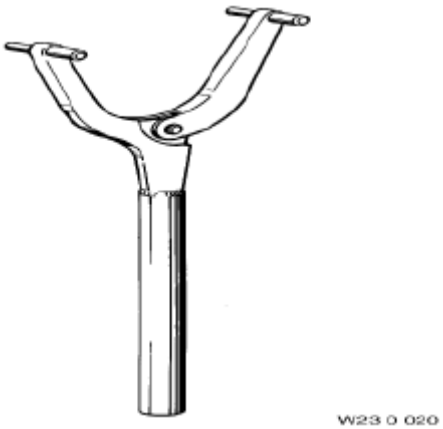


Fig. 39: Identifying Holder (230020)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1320 HOLDER

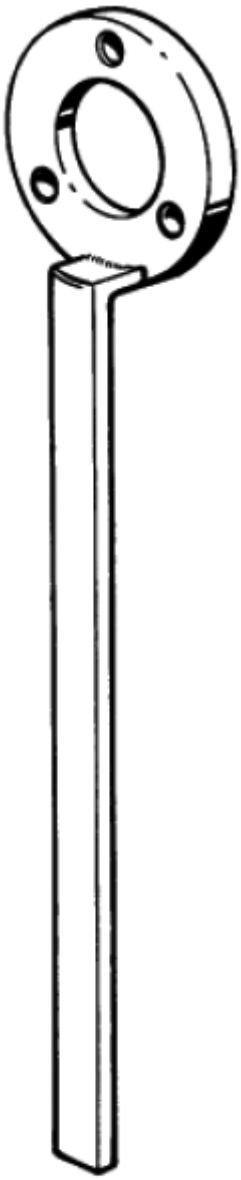
0491511 231320 Holder MW

NOTE: **(Counter support) For releasing and tightening the nut on the output flange with vibration absorber**

Storage Location

Y2

X2



W23 1 320

Fig. 40: Identifying Holder (231320)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1440 HOLDING SLEEVE

0491529 231440 Holding sleeve MW

NOTE: For pressing the bearing bush and bearing inner race onto the output shaft, as

well as for driving out the bearing of the output shaft (S5D 310Z)

Storage Location

Z7

Z8

W23 1 440

Fig. 41: Identifying Holding Sleeve (231440)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0400 KEY

0496583 230400 Key MW

NOTE: For removing and installing clutch package.

SI number

01 04 09 (517)

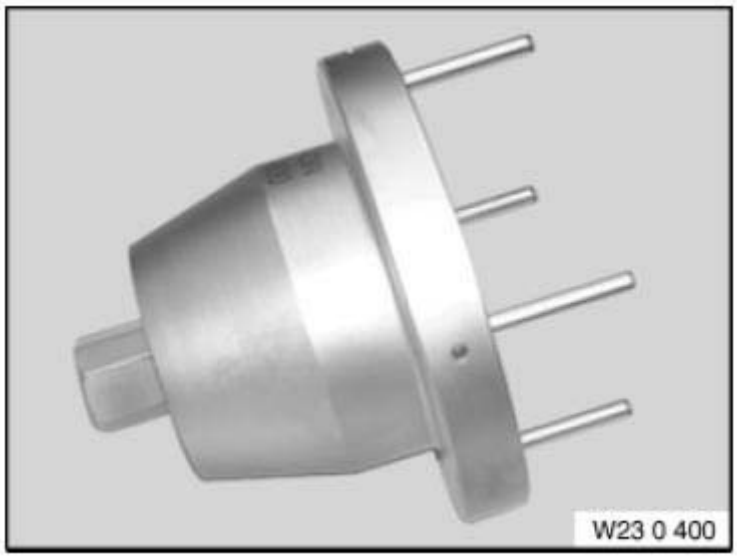


Fig. 42: Identifying Key (230400)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3220 MANDREL

0494651 233220 Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For driving in the radial shaft seal of drive shaft (G transmission)

Storage Location

A49

SI number

01 11 04 (093)

Fig. 43: Identifying Mandrel (233220)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2160 MANDREL

0491560 232160 Mandrel MW

NOTE: (Mandrel) For radial seal ring in the transmission housing rear section - output shaft

Storage Location

B17

A17

W23 2 160

Fig. 44: Identifying Mandrel (232160)
Courtesy of BMW OF NORTH AMERICA, INC.

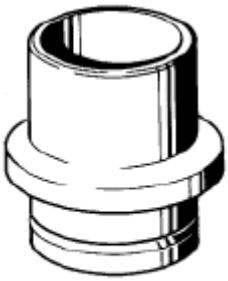
23-1390 MANDREL

0491521 231390 Mandrel MW

NOTE: (Drift) For driving in the roller bearing of the countershaft in the transmission housing rear section

Storage Location

X8



W31 1 440

Fig. 45: Identifying Mandrel (231390)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2220 MANDREL

0491566 232220 Mandrel MW

NOTE: (Drift) For bearing (countershaft) in front and rear sections of transmission housing

W23 2 220

Fig. 46: Identifying Mandrel (232220)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2300 MANDREL

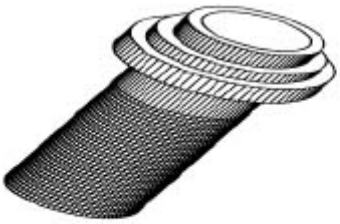
0491578 232300 Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For fitting the radial seal of the output shaft in the rear part of the transmission housing

Storage Location

SI number

01 07 90 (244)



W23 2 300

Fig. 47: Identifying Mandrel (232300)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0410 MANDREL

0496584 230410 Mandrel MW

NOTE: (drift) For driving in output shaft seal.

Storage Location

B54

SI number

01 04 09 (517)

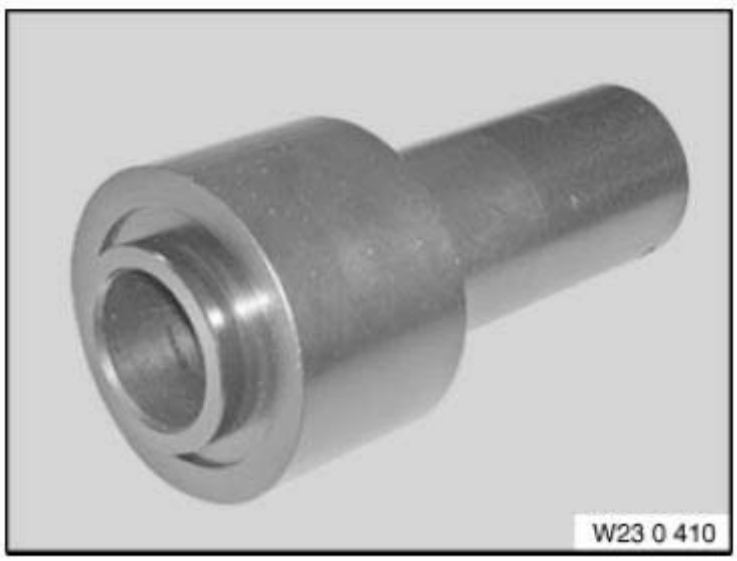


Fig. 48: Identifying Mandrel (230410)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1160 MANDREL

0491491 231160 Mandrel MW

NOTE: **(drift) For fitting bearing inner race and bearing bush on output shaft (245) - Fitting sliding piece (5th gear-265/5) -Mounting output flange -Mounting bearing on countershaft (S5D 310Z) -Mounting centre bearing on propeller shaft, E46**

Storage Location

B17

W23 1 160

Fig. 49: Identifying Mandrel (231160)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1240 MANDREL

0491501 231240 Mandrel Minimum set: Mechanical tools MW

NOTE: **(Drift) For driving in the radial seal ring on the gearshift shaft**

Storage Location

A10

W23 1 240

Fig. 50: Identifying Mandrel (231240)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2340 MANDREL

0491582 232340 Mandrel Minimum set: Mechanical tools MW

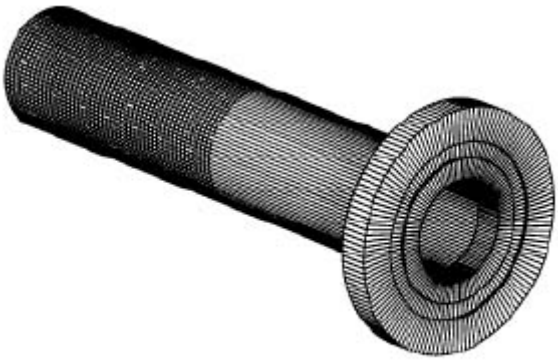
NOTE: (drift) For driving in the radial sealing ring into the front section of the transmission housing

Storage Location

B17

SI number

01 07 90 (244)



W23 2 340

Fig. 51: Identifying Mandrel (232340)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2360 MANDREL

0491584 232360 Mandrel MW

NOTE: **(Drift) For driving in seal cap for catch pin**

Storage Location

Z3

SI number

01 07 90 (244)

W23 2 360

Fig. 52: Identifying Mandrel (232360)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0330 MANDREL

0496958 230330 Mandrel Minimum set: Mechanical tools MW

NOTE: **For driving in the sealing cap of the countershaft.**

SI number

01 08 10 (638)

Fig. 53: Identifying Mandrel (230330)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1370 MANDREL

0491519 231370 Mandrel MW

NOTE: (Drift) For fitting the radial seal of the transmission output flange

Storage Location

Z7

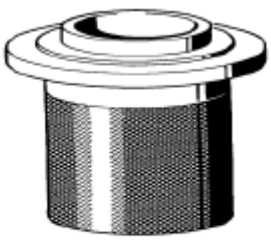


Fig. 54: Identifying Mandrel (231370)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3240 MANDREL

0495627 233240 Mandrel MW

NOTE: **(Drift) Driving in radial shaft seal of drive shaft. Transmission: GS6-53BZ (G gearbox) with engine S85, S65**

Storage Location

B18

A18

SI number

01 18 06 (295)

Fig. 55: Identifying Mandrel (233240)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2350 MANDREL

0491583 232350 Mandrel MW

NOTE: **(drift) For fitting the sealing cap for the gearshift shaft catch pin**

Storage Location

Z3

SI number

01 07 90 (244)

W23 2 350

Fig. 56: Identifying Mandrel (232350)
Courtesy of BMW OF NORTH AMERICA, INC.

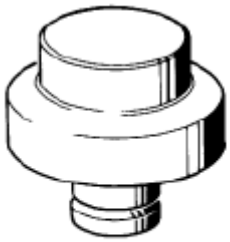
23-1220 MANDREL

0491499 231220 Mandrel MW

NOTE: (drift) For removing and fitting the countershaft roller bearing in the front section of the transmission housing

Storage Location

X7



W23 1 220

Fig. 57: Identifying Mandrel (231220)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3110 MANDREL

0494500 233110 Mandrel MW

NOTE: For fitting guide bushes for catch pins on manual gearboxes.

Storage Location

Y5

SI number

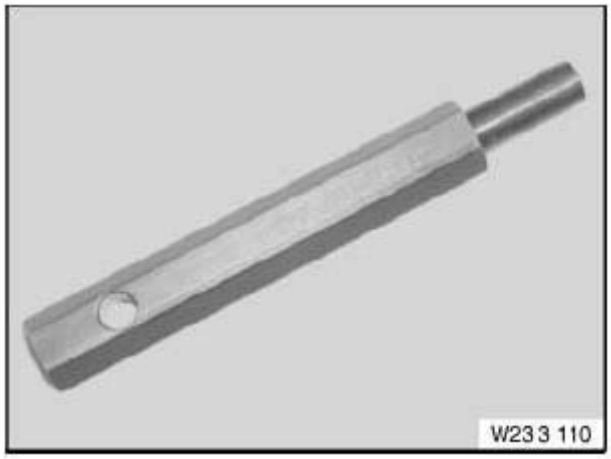


Fig. 58: Identifying Mandrel (233110)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1480 MANDREL

0491533 231480 Mandrel MW

NOTE: (drift) For removing and fitting the grooved ball bearing in the front section of the transmission

Storage Location

X8

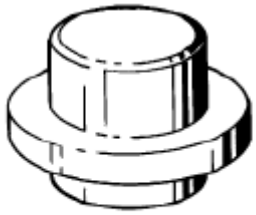


Fig. 59: Identifying Mandrel (231480)
Courtesy of BMW OF NORTH AMERICA, INC.

23-4020 MANDREL

0494888 234020 Mandrel MW

NOTE: (Drift) For driving in bearing bushes for locking bolts, 5th and reverse gears.

Storage Location

B49

SI number

01 03 04 (070)

Consisting of:

1 = 0494889 Mandrel

NOTE: (Drift) For driving in cover caps on gear notch, 5th and reverse gears.

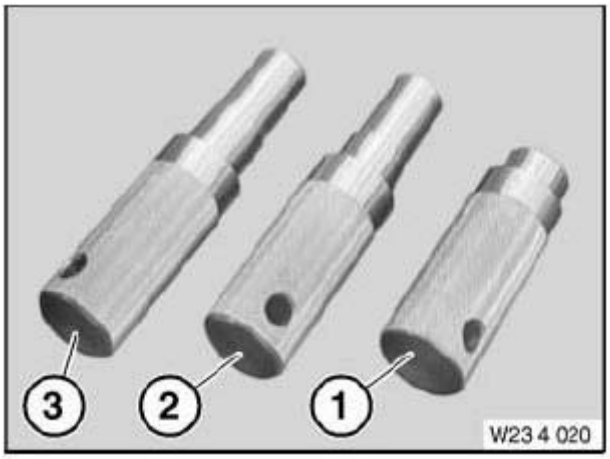


Fig. 60: Identifying Mandrel (234020)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0494890 Mandrel

NOTE: (Drift) For driving in bearing bush for locking bolt, 5th gear.

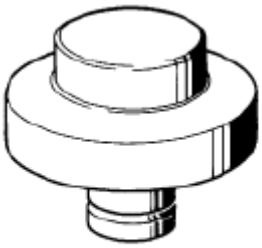
3 = 0494891 Mandrel

NOTE: (Drift) For driving in bearing bush for locking bolt, reverse gear.

23-1190 MANDREL

0491496 231190 Mandrel MW

NOTE: (drift) For removing and fitting the drive shaft ball bearing in the front section of transmission housing



W23 1 190

Fig. 61: Identifying Mandrel (231190)
Courtesy of BMW OF NORTH AMERICA, INC.

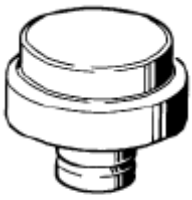
23-1090 MANDREL

0491480 231090 Mandrel MW

NOTE: **(drift) For removing and fitting the outer bearing race of the drive shaft in the front section of the transmission housing**

Storage Location

A15



W23 1 090

Fig. 62: Identifying Mandrel (231090)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1040 MANDREL

0491468 231040 Mandrel MW

NOTE: **(Drift) For mounting sliding piece (5th gear) and driving water pipe out of engine block, engine: N73**

Storage Location

Z7

W23 1 040

Fig. 63: Identifying Mandrel (231040)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3230 MANDREL

0494652 233230 Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For driving in shaft seal on output shaft (G-transmission)

Storage Location

A49

SI number

01 11 04 (093)

Fig. 64: Identifying Mandrel (233230)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0320 MANDREL

0495213 230320 Mandrel Minimum set: Mechanical tools MW

NOTE: **For driving in the radial shaft seal on the drive shaft.**

Storage Location

B54

SI number

01 06 06 (249)

Fig. 65: Identifying Mandrel (230320)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1080 MANDREL

0491479 231080 Mandrel MW

NOTE: **(Drift) For driving outer bearing race into and out of front and centre sections of transmission housing (countershaft) and for driving ball bearing into and out of rear section of transmission housing (drive shaft)**

Storage Location

X8

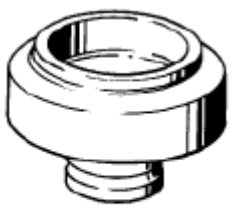


Fig. 66: Identifying Mandrel (231080)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1270 MANDREL

0491504 231270 Mandrel MW

NOTE: (Drift) For driving out the outer bearing race for the countershaft in the transmission housing front section, as well as for pressing the sealing ring and needle bearing out of the oil pump housing (A5S 560Z)

Storage Location

X7

W23 1 270

Fig. 67: Identifying Mandrel (231270)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1380 MANDREL

0491520 231380 Mandrel MW

NOTE: (drift) For fitting the countershaft roller bearing in the rear section of the transmission housing

Storage Location

X8

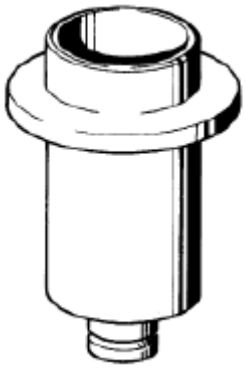


Fig. 68: Identifying Mandrel (231380)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2260 MANDREL

0491570 232260 Mandrel Minimum set: Mechanical tools MW

NOTE: (Fitting mandrel) For driving in the radial sealing ring on the gearshift shaft of the rear section of transmission housing

Storage Location

A10

SI number

01 07 90 (244)

Fig. 69: Identifying Mandrel (232260)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2280 PLATE

0491572 232280 Plate MW

NOTE: (Extractor plate) For the front section of the transmission housing

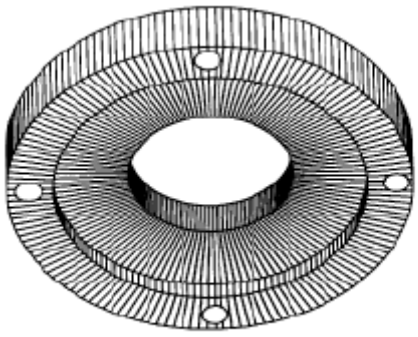
Storage Location

Z4

Z3

SI number

01 07 90 (244)



W23 2 280

Fig. 70: Identifying Plate (232280)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2210 PLIERS

0491565 232210 Pliers MW

NOTE: (Circlip pliers (straight)) For removing and installing the inside circlip in the transmission housings when replacing the grooved ball bearings

W23 2 210

Fig. 71: Identifying Pliers (232210)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2100 PLIERS

0491558 232100 Pliers MW

NOTE: **For removing and fitting the circlip on the transmission output shaft**

W23 2 100

Fig. 72: Identifying Pliers (232100)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2200 PLIERS

0491564 232200 Pliers MW

NOTE: **(Seeger ring pliers (straight)) For removing and installing the outer Seeger rings on the gearbox shaft**

W23 2 200

Fig. 73: Identifying Pliers (232200)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3210 PULLER

0494546 233210 Puller Minimum set: Mechanical tools MW

NOTE: **For removing shaft seal on output shaft**

Storage Location

A50

SI number

01 11 04 (093)

Fig. 74: Identifying Puller (233210)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3200 PULLER

0494543 233200 Puller Minimum set: Mechanical tools MW

NOTE: For removing shaft seal on drive shaft

Storage Location

A49

A50

SI number

01 11 04 (093)

Fig. 75: Identifying Puller (233200)

Courtesy of BMW OF NORTH AMERICA, INC.

23-0210 PULLER

0493422 230210 Puller Minimum set: Mechanical tools MW

NOTE: For removing radial shaft seal on gearshift shaft - F transmission

Storage Location

A12

SI number

01 14 99 (482)

Consisting of:

1 = 0493632 Basic body

2 = 0493633 Spindle

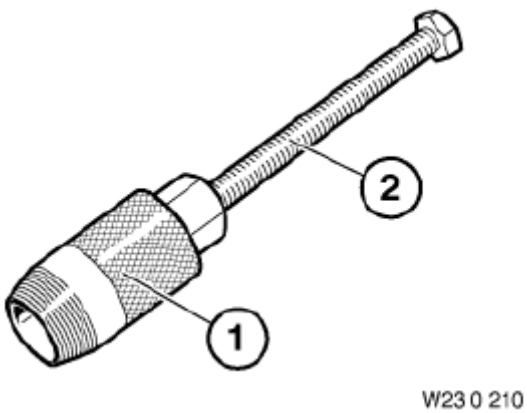


Fig. 76: Identifying Puller (230210)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0490 PULLER

0491454 230490 Puller MW

NOTE: For removing shaft seal

Storage Location

A13

B13

SI number

01 15 96 (106)

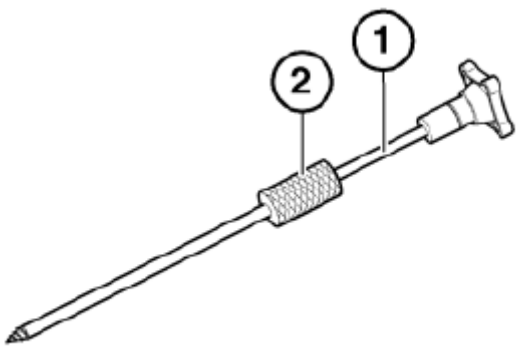
Consisting of:

1 = 0491455 Rod

NOTE: With self-tapping screw

2 = 0491456 Weight

NOTE: (Weight)



W23 0 490

Fig. 77: Identifying Puller (230490)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2000 PULLER

0491536 232000 Puller MW

NOTE: (Rillex ball-bearing extractor 6206) 9 ball bearings with steel cage - For pulling out the grooved ball bearing of the transmission drive shaft

Consisting of:

1 = 0491537 Claw

NOTE: (Claw for Rillex 6206 (9 x))

2 = 0491538 Holding sleeve

NOTE: **(Union sleeve)**

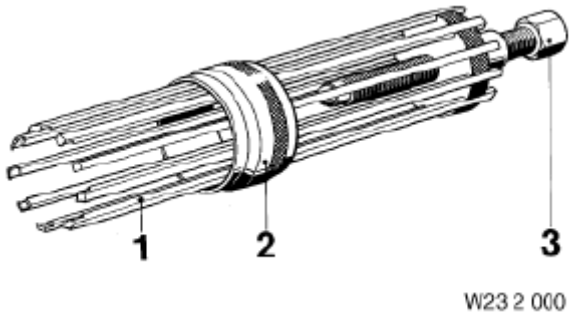


Fig. 78: Identifying Puller (232000)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0491539 Spindle

NOTE: **(pressure spindle)**

23-1070 RING

0491478 231070 Ring MW

NOTE: **(Measuring ring) For determining the shim between the outer bearing race and the countershaft circlip**

Storage Location

X6

Fig. 79: Identifying Ring (231070)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0180 RING

0493419 230180 Ring Minimum set: Mechanical tools MW

NOTE: **(impact ring with sliding sleeve) For fitting the radial shaft seal to the input end - F transmission**

SI number

01 14 99 (482)

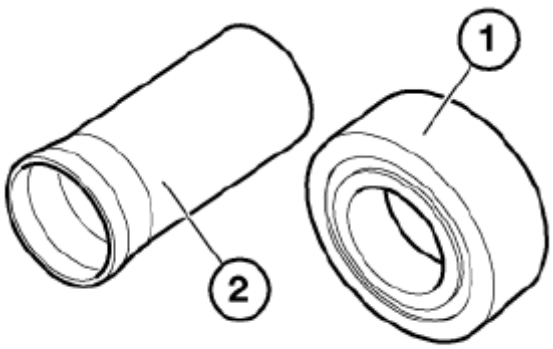
Consisting of:

1 = 0493424 Ring

NOTE: (impact ring)

2 = 0493425 Sleeve

NOTE: (Sliding sleeve)



W23 0 180

Fig. 80: Identifying Ring (230180)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3169 SET OF TOOLS

23 3 169 Set of tools Minimum set: Mechanical tools

NOTE: Removing and installing shaft seals on output side

Transmission: GS6-37BZ

23-2080 SHAPED ELEMENT

0491557 232080 Shaped element MW

NOTE: For pressure testing the guide sleeve - 2nd/3rd gear

Storage Location

Y8

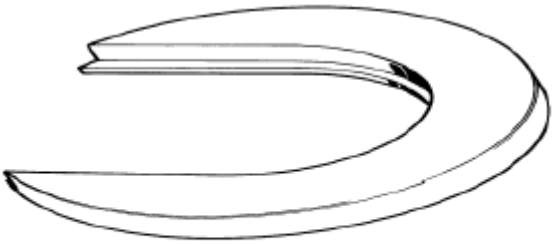


Fig. 81: Identifying Shaped Element (232080)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2460 SLEEVE

0491594 232460 Sleeve MW

NOTE: (Assembly sleeve) For the retaining ring on the drive shaft

Storage Location

A7

SI number

01 02 91 (330)

Fig. 82: Identifying Sleeve (232460)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2380 SLEEVE

0491586 232380 Sleeve MW

NOTE: (assembly sleeve) For the circlip on the drive shaft

Storage Location

A7

SI number

01 02 91 (330)

W23 2 380

Fig. 83: Identifying Sleeve (232380)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0200 SOCKET

0493421 230200 Socket Minimum set: Mechanical tools MW

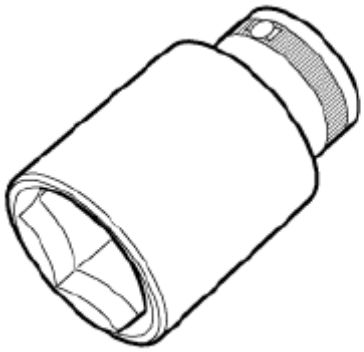
NOTE: (Socket) SW41 Long version for loosening and tightening output flange - F-transmission

Storage Location

A9

SI number

01 14 99 (482)



W23 0 200

Fig. 84: Identifying Socket (230200)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1210 SOCKET WRENCH INSERT

0491498 231210 Socket wrench insert MW

NOTE: (socket wrench insert SW30) For releasing and tightening down gearbox output flange and rear axle final drive flange

Storage Location

A9

W23 1 210

Fig. 85: Identifying Socket Wrench Insert (231210)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2320 SOCKET WRENCH INSERT

0491580 232320 Socket wrench insert Minimum set: Mechanical tools MW

NOTE: (socket wrench insert WAF 36) For loosening and tightening the collar nut

Storage Location

A13

SI number

01 07 90 (244)

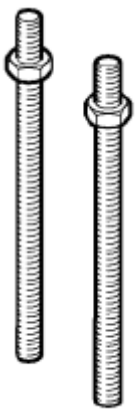
W23 2 320

Fig. 86: Identifying Socket Wrench Insert (232320)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1230 SPINDLE

0491500 231230 Spindle MW

NOTE: (spindle (2 pieces)) For pulling off the bearing inner race from the drive shaft in the front section of the transmission housing



W23 1 230

Fig. 87: Identifying Spindle (231230)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3150 TOOL

0494410 233150 Tool Minimum set: Mechanical tools MW

NOTE: **(Tool set) For removing and installing the radial shaft seal of the drive shaft. Transmission: GS6-37BZ/DZ (H transmission)**

Storage Location

B44

C44

SI number

01 10 02 (907)

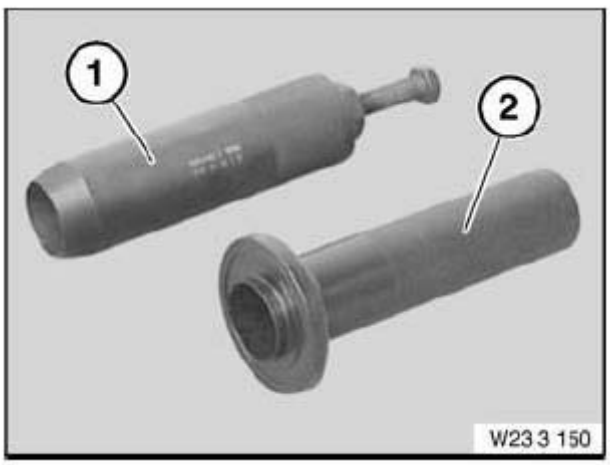


Fig. 88: Identifying Tool (233150)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494411 Puller

2 = 0494412 Mandrel

NOTE: **(Drift)**

23-1310 TOOL

0491510 231310 Tool MW

NOTE: **For inserting the fuse on the relay lever**

W23 1 310

Fig. 89: Identifying Tool (231310)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3160 TOOL

0494416 233160 Tool Minimum set: Mechanical tools MW

NOTE: (Tool set) For removing and installing the radial shaft seal of the output shaft. Transmission: GS6-37BZ/DZ (H transmission)

Storage Location

B44

C44

SI number

01 10 02 (907)

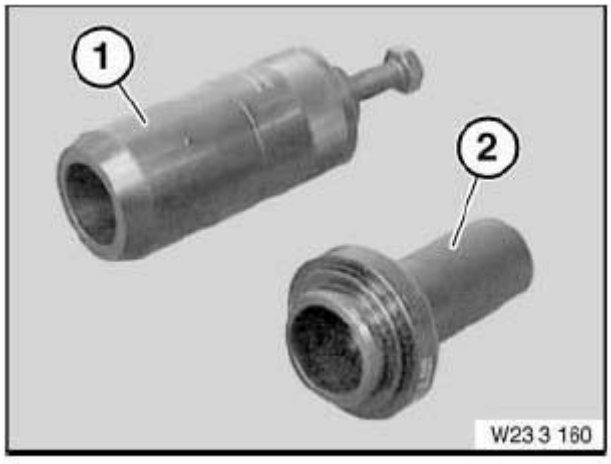


Fig. 90: Identifying Tool (233160)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0494414 Puller

2 = 0494415 Mandrel

NOTE: **(Drift)**

CASE AND COVER 240/5/MECH/OVERDRIVE

23 11 CASE AND COVER 240/5/MECH OVERDRIVE

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

CASE AND COVER 260/5/MECH/OVERDRIVE

23 11 CASE AND COVER 260/5/MECH OVERDRIVE

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

CASE AND COVER 260/5/MECH/SPORT

23 11 CASE AND COVER 260/5/MECH SPORT

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

CASE AND COVER 260/6/MECH/OVERDRIVE

23 11 CASE AND COVER 260/6/MECH OVERDRIVE

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

CASE AND COVER 265/5/MECH/SPORT

23 11 CASE AND COVER 265/5/MECH SPORT

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

CASE AND COVER 265/6/MECH/OVERDRIVE

23 11 CASE AND COVER 265/6/MECH OVERDRIVE

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

CASE AND COVER 280/5/MECH/SPORT

23 11 CASE AND COVER 280/5/MECH SPORT

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

CASE AND COVER S6-37BZ/DZ/MECH

23 11 CASE AND COVER S6-37BZ/DZ/MECH

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

CASE AND COVER ZF-S5-16/MECH

23 11 CASE AND COVER ZF-S5-16/MECH

CASE AND COVER SPECIFICATION

Temperature for installation of bearings	°C	80

GEARS (LAYSHAFT) 240/5/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 240/5/MECH OVERDRIVE

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
5th gear wheel	t	4.5 ... 5.5
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -

GEARS (LAYSHAFT) 260/5/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 260/5/MECH OVERDRIVE

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
5th gear wheel	t	5.5 ... 6.8

Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t °C	4.9 ... 6.8approx. 120

GEARS (LAYSHAFT) 260/5/MECH/SPORT

23 22 GEARS (LAYSHAFT) 260/5/MECH SPORT

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
5th gear wheel	t	5.5 ... 6.8
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t °C	4.9 ... 6.8approx. 120

GEARS (LAYSHAFT) 260/6/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 260/6/MECH OVERDRIVE

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
5th gear wheel	t	5.5 ... 6.8
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	4.9 ... 6.8 120

GEARS (LAYSHAFT) 260/6/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 260/6/MECH OVERDRIVE

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
5th gear wheel	t	5.5 ... 6.8
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	4.9 ... 6.8 120

GEARS (LAYSHAFT) 265/5/MECH/SPORT

23 22 GEARS (LAYSHAFT) 265/5/MECH SPORT

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	5 ... 6150

GEARS (LAYSHAFT) 265/6/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 265/6/MECH OVERDRIVE

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	5 ... 6150

GEARS (LAYSHAFT) 280/5/MECH/SPORT

23 22 GEARS (LAYSHAFT) 280/5/MECH SPORT

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	5 ... 6 150

GEARS (LAYSHAFT) 280/5/MECH/SPORT

23 22 GEARS (LAYSHAFT) 280/5/MECH SPORT

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	5 ... 6150

GEARS (LAYSHAFT) GS6-53DZ/MECH

23 22 GEARS (LAYSHAFT) GS6-53DZ/MECH

GEARS (LAYSHAFT) SPECIFICATION

Press-off and press-on force		
5th gear wheel	kN	50
4th gear wheel	kN	50

GEARS (LAYSHAFT) S 5 D 200 G/MECH

23 22 GEARS (LAYSHAFT) S 5 D 200 G/MECH

GEARS (LAYSHAFT) SPECIFICATION

Press-off and press-on force		
5th gear wheel	kN	50 ... 70
4th gear wheel	kN	

GEARS (LAYSHAFT) S 5 D 250 G/MECH

23 22 GEARS (LAYSHAFT) S 5 D 250 G/MECH

GEARS (LAYSHAFT) SPECIFICATION

Press-off and press-on force		
5th gear wheel	kN	50 ... 70

GEARS (LAYSHAFT) ZF-S5-16/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) ZF-S5-16/MECH OVERDRIVE

GEARS (LAYSHAFT) SPECIFICATION

Pressing-off force at ambient temperature		
3rd	gear	wheel t 7.5
4th	gear	wheel t 8.0
5th	gear	wheel t 8.0
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	0.015 150 ... 180
5th gear wheel	t °C	- -

INTERNAL SHIFT COMPONENTS 240/5/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS 240/5/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS SPECIFICATION

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 260/5/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS 260/5/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS SPECIFICATION

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 260/5/MECH/SPORT

23 31 INTERNAL SHIFT COMPONENTS 260/5/MECH SPORT

INTERNAL SHIFT COMPONENTS SPECIFICATION

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 260/6/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS 260/6/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS SPECIFICATION

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 265/5/MECH/SPORT

23 31 INTERNAL SHIFT COMPONENTS 265/5/MECH SPORT

INTERNAL SHIFT COMPONENTS SPECIFICATION

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 265/6/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS 265/6/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS SPECIFICATION

Shift fork guide width		
1st ... 5th gear		

Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 280/5/MECH/SPORT

23 31 INTERNAL SHIFT COMPONENTS 280/5/MECH SPORT

INTERNAL SHIFT COMPONENTS SPECIFICATION

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS ZF-S5-16/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS ZF-S5-16/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS SPECIFICATION

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

SYNCHRONIZATION 240/5/MECH/OVERDRIVE

23 23 SYNCHRONIZATION 240/5/MECH OVERDRIVE

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 260/5/MECH/OVERDRIVE

23 23 SYNCHRONIZATION 260/5/MECH OVERDRIVE

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 260/5/MECH/SPORT

23 23 SYNCHRONIZATION 260/5/MECH SPORT

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 260/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION 260/6/MECH OVERDRIVE

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 265/5/MECH/SPORT

23 23 SYNCHRONIZATION 265/5/MECH SPORT

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 265/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION 265/6/MECH OVERDRIVE

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3

Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 280/5/MECH/SPORT

23 23 SYNCHRONIZATION 280/5/MECH SPORT

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION GS6-37BZ/DZ/MECH

23 23 SYNCHRONIZATION GS6-37BZ/DZ/MECH

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.05
Wear limit size	mm	1.0
3st/4nd gear	mm	0.8 ... 1.40
Wear limit size	mm	0.7
5/6st gear	mm	0.95 ... 1.5
Wear limit size	mm	0.75
Reverse gear		
New condition	mm	0.65 ... 1.25
Max. wear limit size	mm	0.5

SYNCHRONIZATION GS6-53DZ

23 23 SYNCHRONIZATION GS6-53DZ

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	2.70 ... 3.50

3rd/4th gear	mm	2.40 ... 3.10
5th/6th gear	mm	1.75 ... 2.10
Max. wear limit size	mm	
Reverse gear		
New condition	mm	2.70 ... 3.25
Max. wear limit size	mm	

SYNCHRONIZATION GUIDE SLEEVES 240/5/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 240/5/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.7
3rd/4th gear	t max	3.0
Pressing-on force		
1st/2nd and 5th/R gear	t max	2.5
3rd/4th gear	t max	2.1
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH/SPORT

23 23 SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH SPORT

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.7
3rd/4th gear	t max	3.0
Pressing-on force		
1st/2nd and 5th/R gear	t max	2.5
3rd/4th gear	t max	2.1
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.7
3rd/4th gear	t max	3.0
Pressing-on force		
1st/2nd and 5th/R gear	t max	2.5
3rd/4th gear	t max	2.1
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.7
3rd/4th gear	t max	3.0
Pressing-on force		
1st/2nd and 5th/R gear	t max	2.5
3rd/4th gear	t max	2.1
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 265/5/MECH/SPORT

23 23 SYNCHRONIZATION GUIDE SLEEVES 265/5/MECH SPORT

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
Pressing-on force		
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 265/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 265/6/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
Pressing-on force		
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH/SPORT

23 23 SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH SPORT

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
Pressing-on force		
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH/SPORT

23 23 SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH SPORT

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
Pressing-on force		
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES GS6-37BZ/DZ/MECH

23 23 SYNCHRONIZATION GUIDE SLEEVES GS6-37BZ/DZ/MECH

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

1st/2nd gear	kN	10 ... 36
3rd/4th gear	kN	20 ... 58
5th/6th gear	kN	19 ... 55

SYNCHRONIZATION GUIDE SLEEVES GS6-53DZ/MECH

23 23 SYNCHRONIZATION GUIDE SLEEVES GS6-53DZ/MECH

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Press-off and press-on force	kN	50/2

SYNCHRONIZATION GUIDE SLEEVES S 5 D 200 G/MECH

23 23 SYNCHRONIZATION GUIDE SLEEVES S 5 D 200 G/MECH

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Press-off and press-on force	kN	10 ... 20

SYNCHRONIZATION GUIDE SLEEVES S 5 D 250 G/MECH

23 23 SYNCHRONIZATION GUIDE SLEEVES S 5 D 250 G/MECH

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Press-off and press-on force	kN	10 ... 20

SYNCHRONIZATION GUIDE SLEEVES ZF-S5-16/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES ZF-S5-16/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES SPECIFICATION

Pressing-off force		
Pressing-on force		
1st/2nd and 5th/R gear	t max	0.08
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION S 5 D 200 G/MECH

23 23 SYNCHRONIZATION S 5 D 200 G/MECH

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.1
3rd gear	mm	1.1 ... 1.5
4th/5th gear	mm	0.9 ... 1.5
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	1.1 ... 1.7
Max. wear limit size	mm	0.5

SYNCHRONIZATION S 5 D 250 G/MECH

23 23 SYNCHRONIZATION S 5 D 250 G/MECH

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.1
3rd gear	mm	1.1 ... 1.5
4th/5th gear	mm	0.9 ... 1.5
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	1.1 ... 1.7
Max. wear limit size	mm	0.5

SYNCHRONIZATION S 5 D 310 Z/MECH

23 23 SYNCHRONIZATION S 5 D 310 Z/MECH

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.1 ... 1.6
3rd gear	mm	0.95 ... 1.35
4th/5th gear	mm	0.95 ... 1.35
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.7 ... 1.15
Max. wear limit size	mm	0.5

SYNCHRONIZATION S 6 S 420 G/MECH

23 23 SYNCHRONIZATION S 6 S 420 G/MECH

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition		
Max. wear limit size	mm	0.8
Reverse gear		
Max. wear limit size	mm	0.5

SYNCHRONIZATION S 6 S 560 G/MECH

23 23 SYNCHRONIZATION S 6 S 560 G/MECH

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition		
Max. wear limit size	mm	0.8
Reverse gear		
Max. wear limit size	mm	0.5

SYNCHRONIZATION ZF-S5-16/MECH/OVERDRIVE

23 23 SYNCHRONIZATION ZF-S5-16/MECH OVERDRIVE

SYNCHRONIZATION SPECIFICATION

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8

Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

TRANSMISSION SHAFTS 240/5/MECH/OVERDRIVE

23 21 TRANSMISSION SHAFTS 240/5/MECH OVERDRIVE

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 260/5/MECH/OVERDRIVE

23 21 TRANSMISSION SHAFTS 260/5/MECH OVERDRIVE

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 260/5/MECH/SPORT

23 21 TRANSMISSION SHAFTS 260/5/MECH SPORT

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09

Layshaft	mm	0.13 ... 0.23
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 260/6/MECH/OVERDRIVE

23 21 TRANSMISSION SHAFTS 260/6/MECH OVERDRIVE

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 265/5/MECH/SPORT

23 21 TRANSMISSION SHAFTS 265/5/MECH SPORT

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 265/6/MECH/OVERDRIVE

23 21 TRANSMISSION SHAFTS 265/6/MECH OVERDRIVE

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 280/5/MECH/SPORT

23 21 TRANSMISSION SHAFTS 280/5/MECH SPORT

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS GS6-37BZ/DZ

23 21 TRANSMISSION SHAFTS GS6-37BZ/DZ

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0.15 ... 0.19
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS GS6-53DZ/MECH

23 21 TRANSMISSION SHAFTS GS6-53DZ/MECH

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing play) of:		
Output shaft	mm	
Input shaft	Max. mm	
Output journal:		
Radial runout	Max. mm	0.15
Output flange		
Radial runout	Max. mm	0.15
Axial runout	Max. mm	0.15

TRANSMISSION SHAFTS S 5 D 200 G/MECH

23 21 TRANSMISSION SHAFTS S 5 D 200 G/MECH

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	Max. mm	0.04
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS S 5 D 250 G/MECH

23 21 TRANSMISSION SHAFTS S 5 D 250 G/MECH

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	Max. mm	0.04
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS S 5 D 310 Z/MECH

23 21 TRANSMISSION SHAFTS S 5 D 310 Z/MECH

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS S 6 S 420 G/MECH

23 21 TRANSMISSION SHAFTS S 6 S 420 G/MECH

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS S 6 S 560 G/MECH

23 21 TRANSMISSION SHAFTS S 6 S 560 G/MECH

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS ZF-S5-16/MECH

23 21 TRANSMISSION SHAFTS ZF-S5-16/MECH

TRANSMISSION SHAFTS SPECIFICATION

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	1.1 ... 1.3

Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION FILLING CAPACITIES

23 00 TRANSMISSION FILLING CAPACITIES
E46/E53/E60/E61/E63/E64/E81/E82/E83/E87/E89/E90/E91/E92/E93 GS6-53DZ/BZ/MANUAL

TRANSMISSION FILLING CAPACITIES SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	litre	1.5
Oil fill quantity for initial fill or replacement transmission	litre	1.6

TRANSMISSION FILLING CAPACITIES

23 00 TRANSMISSION FILLING CAPACITIES
E60/E61/E63/E64/E81/E82/E83/E84/E85/E87/E89/E90/E91/E92/E93 GS6-17BG/DG/MANUAL

TRANSMISSION FILLING CAPACITIES SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	litre	1.3
Oil fill quantity for initial fill or replacement transmission	litre	1.4

TRANSMISSION IN GENERAL 240/5/MECH/OVERDRIVE

23 00 TRANSMISSION IN GENERAL 240/5/MECH OVERDRIVE

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	ltr.	1.05
Oil fill quantity for initial fill or replacement transmission	ltr.	1.15

TRANSMISSION IN GENERAL 260/5/MECH/OVERDRIVE

23 00 TRANSMISSION IN GENERAL 260/5/MECH OVERDRIVE

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	ltr.	1.25
Oil fill quantity for initial fill or replacement transmission	ltr.	1.35

TRANSMISSION IN GENERAL 260/5/MECH/SPORT

23 00 TRANSMISSION IN GENERAL 260/5/MECH SPORT

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	ltr.	1.25
Oil fill quantity for initial fill or replacement transmission	ltr.	1.35

TRANSMISSION IN GENERAL S5D 280Z

23 00 TRANSMISSION IN GENERAL S5D 280Z

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade, refer to Operating Fluids		
Oil fill quantity for oil change	Litres	- -
Oil fill quantity for initial fill or replacement transmission	Litres	1.3

TRANSMISSION IN GENERAL S7S 47BG

23 00 TRANSMISSION IN GENERAL S7S 47BG

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade, refer to Operating Fluids		
Oil fill quantity for oil change	Litres	2.55
Oil fill quantity for initial fill or replacement transmission	Litres	2.75

TRANSMISSION IN GENERAL ZF-S5-16/MECH

23 00 TRANSMISSION IN GENERAL ZF-S5-16/MECH

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	ltr.	1.05
Oil fill quantity for initial fill or replacement transmission	ltr.	1.15

TRANSMISSION IN GENERAL: 260/6/MECH/OVERDRIVE

23 00 TRANSMISSION IN GENERAL: 260/6/MECH OVERDRIVE

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	ltr.	1.25
Oil fill quantity for initial fill or repair transmission	ltr.	1.35

TRANSMISSION IN GENERAL: 265/5/MECH/SPORT

23 00 TRANSMISSION IN GENERAL: 265/5/MECH SPORT

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	ltr.	1.5
Oil fill quantity for initial fill or repair transmission	ltr.	1.7

TRANSMISSION IN GENERAL: 265/6/MECH/OVERDRIVE

23 00 TRANSMISSION IN GENERAL: 265/6/MECH OVERDRIVE

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	ltr.	1.5
Oil fill quantity for initial fill or repair transmission	ltr.	1.7

TRANSMISSION IN GENERAL: 280/5/MECH/SPORT

23 00 TRANSMISSION IN GENERAL: 280/5/MECH SPORT

TRANSMISSION IN GENERAL SPECIFICATION

Oil grade: refer to Operating Fluids		
Oil volume	ltr.	1.25
Oil fill quantity for initial fill or repair transmission	ltr.	1.35

CASE AND COVER 240/5/MECH/OVERDRIVE

23 11 CASE AND COVER 240/5/MECH OVERDRIVE

CASE AND COVER 240/5/MECH/OVERDRIVE SPECIFICATIONS

Temperature for installation of bearings	°C	80

CASE AND COVER 260/5/MECH/OVERDRIVE

23 11 CASE AND COVER 260/5/MECH OVERDRIVE

CASE AND COVER 260/5/MECH/OVERDRIVE SPECIFICATIONS

Temperature for installation of bearings	°C	80

CASE AND COVER 260/5/MECH/SPORT

23 11 CASE AND COVER 260/5/MECH SPORT

CASE AND COVER 260/5/MECH/SPORT SPECIFICATIONS

Temperature for installation of bearings	°C	80

CASE AND COVER 260/6/MECH/OVERDRIVE

23 11 CASE AND COVER 260/6/MECH OVERDRIVE

CASE AND COVER 260/6/MECH/OVERDRIVE SPECIFICATIONS

Temperature for installation of bearings	°C	80

CASE AND COVER 265/5/MECH/SPORT

23 11 CASE AND COVER 265/5/MECH SPORT

CASE AND COVER 265/5/MECH/SPORT SPECIFICATIONS

Temperature for installation of bearings	°C	80

CASE AND COVER 265/6/MECH/OVERDRIVE

23 11 CASE AND COVER 265/6/MECH OVERDRIVE

CASE AND COVER 265/6/MECH/OVERDRIVE SPECIFICATIONS

Temperature for installation of bearings	°C	80

CASE AND COVER 280/5/MECH/SPORT

23 11 CASE AND COVER 280/5/MECH SPORT

CASE AND COVER 280/5/MECH/SPORT SPECIFICATIONS

Temperature for installation of bearings	°C	80

CASE AND COVER S6-37BZ/DZ/MECH

23 11 CASE AND COVER S6-37BZ/DZ/MECH

CASE AND COVER S6-37BZ/DZ/MECH SPECIFICATIONS

Temperature for installation of bearings	°C	80

CASE AND COVER ZF-S5-16/MECH

23 11 CASE AND COVER ZF-S5-16/MECH

CASE AND COVER ZF-S5-16/MECH SPECIFICATIONS

Temperature for installation of bearings	°C	80

GEARS (LAYSHAFT) 240/5/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 240/5/MECH OVERDRIVE

GEARS (LAYSHAFT) 240/5/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force at ambient temperature		
5th gear wheel	t	4.5 ... 5.5
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -

GEARS (LAYSHAFT) 260/5/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 260/5/MECH OVERDRIVE

GEARS (LAYSHAFT) 260/5/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force at ambient temperature		
5th gear wheel	t	5.5 ... 6.8

Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t °C	4.9 ... 6.8approx. 120

GEARS (LAYSHAFT) 260/5/MECH/SPORT

23 22 GEARS (LAYSHAFT) 260/5/MECH SPORT

GEARS (LAYSHAFT) 260/5/MECH/SPORT SPECIFICATIONS

Pressing-off force at ambient temperature		
5th gear wheel	t	5.5 ... 6.8
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t °C	4.9 ... 6.8approx. 120

GEARS (LAYSHAFT) 260/6/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 260/6/MECH OVERDRIVE

GEARS (LAYSHAFT) 260/6/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force at ambient temperature		
5th gear wheel	t	5.5 ... 6.8
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	4.9 ... 6.8 120

GEARS (LAYSHAFT) 260/6/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 260/6/MECH OVERDRIVE

GEARS (LAYSHAFT) 260/6/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force at ambient temperature		
5th gear wheel	t	5.5 ... 6.8
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	4.9 ... 6.8 120

GEARS (LAYSHAFT) 265/5/MECH/SPORT

23 22 GEARS (LAYSHAFT) 265/5/MECH SPORT

GEARS (LAYSHAFT) 265/5/MECH/SPORT SPECIFICATIONS

Pressing-off force at ambient temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	5 ... 6150

GEARS (LAYSHAFT) 265/6/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) 265/6/MECH OVERDRIVE

GEARS (LAYSHAFT) 265/6/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force at ambient temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	5 ... 6150

GEARS (LAYSHAFT) 280/5/MECH/SPORT

23 22 GEARS (LAYSHAFT) 280/5/MECH SPORT

GEARS (LAYSHAFT) 280/5/MECH/SPORT SPECIFICATIONS

Pressing-off force at ambient temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	5 ... 6 150

GEARS (LAYSHAFT) 280/5/MECH/SPORT

23 22 GEARS (LAYSHAFT) 280/5/MECH SPORT

GEARS (LAYSHAFT) 280/5/MECH/SPORT SPECIFICATIONS

Pressing-off force at ambient temperature		
3rd gear wheel	t	5 ... 7
4th gear wheel	t	5 ... 7
5th gear wheel	t	9 ... 10
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	- -
5th gear wheel	t approx. °C	5 ... 6150

GEARS (LAYSHAFT) GS6-53DZ/MECH

23 22 GEARS (LAYSHAFT) GS6-53DZ/MECH

GEARS (LAYSHAFT) GS6-53DZ/MECH SPECIFICATIONS

Press-off and press-on force		
5th gear wheel	kN	50
4th gear wheel	kN	50

GEARS (LAYSHAFT) S 5 D 200 G/MECH

23 22 GEARS (LAYSHAFT) S 5 D 200 G/MECH

GEARS (LAYSHAFT) S 5 D 200 G/MECH SPECIFICATIONS

Press-off and press-on force		
5th gear wheel	kN	50 ... 70
4th gear wheel	kN	

GEARS (LAYSHAFT) S 5 D 250 G/MECH

23 22 GEARS (LAYSHAFT) S 5 D 250 G/MECH

GEARS (LAYSHAFT) S 5 D 250 G/MECH SPECIFICATIONS

Press-off and press-on force		
5th gear wheel	kN	50 ... 70

GEARS (LAYSHAFT) ZF-S5-16/MECH/OVERDRIVE

23 22 GEARS (LAYSHAFT) ZF-S5-16/MECH OVERDRIVE

GEARS (LAYSHAFT) ZF-S5-16/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force at ambient temperature		
3rd gear wheel	t	7.5
4th gear wheel	t	8.0
5th gear wheel	t	8.0
Contact pressure force at warming temperature		
3rd gear wheel	t °C	- -
4th gear wheel	t °C	0.015 150 ... 180
5th gear wheel	t °C	- -

INTERNAL SHIFT COMPONENTS 240/5/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS 240/5/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS 240/5/MECH/OVERDRIVE SPECIFICATIONS

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 260/5/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS 260/5/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS 260/5/MECH/OVERDRIVE SPECIFICATIONS

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 260/5/MECH/SPORT

23 31 INTERNAL SHIFT COMPONENTS 260/5/MECH SPORT

INTERNAL SHIFT COMPONENTS 260/5/MECH/SPORT SPECIFICATIONS

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 260/6/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS 260/6/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS 260/6/MECH/OVERDRIVE SPECIFICATIONS

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 265/5/MECH/SPORT

23 31 INTERNAL SHIFT COMPONENTS 265/5/MECH SPORT

INTERNAL SHIFT COMPONENTS 265/5/MECH/SPORT SPECIFICATIONS

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 265/6/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS 265/6/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS 265/6/MECH/OVERDRIVE SPECIFICATIONS

Shift fork guide width		
1st ... 5th gear		

Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS 280/5/MECH/SPORT

23 31 INTERNAL SHIFT COMPONENTS 280/5/MECH SPORT

INTERNAL SHIFT COMPONENTS 280/5/MECH/SPORT SPECIFICATIONS

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

INTERNAL SHIFT COMPONENTS ZF-S5-16/MECH/OVERDRIVE

23 31 INTERNAL SHIFT COMPONENTS ZF-S5-16/MECH OVERDRIVE

INTERNAL SHIFT COMPONENTS ZF-S5-16/MECH/OVERDRIVE SPECIFICATIONS

Shift fork guide width		
1st ... 5th gear		
Wear limit	mm	4.8

SYNCHRONIZATION 240/5/MECH/OVERDRIVE

23 23 SYNCHRONIZATION 240/5/MECH OVERDRIVE

SYNCHRONIZATION 240/5/MECH/OVERDRIVE SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 260/5/MECH/OVERDRIVE

23 23 SYNCHRONIZATION 260/5/MECH OVERDRIVE

SYNCHRONIZATION 260/5/MECH/OVERDRIVE SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 260/5/MECH/SPORT

23 23 SYNCHRONIZATION 260/5/MECH SPORT

SYNCHRONIZATION 260/5/MECH/SPORT SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 260/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION 260/6/MECH OVERDRIVE

SYNCHRONIZATION 260/6/MECH/OVERDRIVE SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 265/5/MECH/SPORT

23 23 SYNCHRONIZATION 265/5/MECH SPORT

SYNCHRONIZATION 265/5/MECH/SPORT SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 265/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION 265/6/MECH OVERDRIVE

SYNCHRONIZATION 265/6/MECH/OVERDRIVE SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3

Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION 280/5/MECH/SPORT

23 23 SYNCHRONIZATION 280/5/MECH SPORT

SYNCHRONIZATION 280/5/MECH/SPORT SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

SYNCHRONIZATION GS6-37BZ/DZ/MECH

23 23 SYNCHRONIZATION GS6-37BZ/DZ/MECH

SYNCHRONIZATION GS6-37BZ/DZ/MECH SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.05
Wear limit size	mm	1.0
3st/4nd gear	mm	0.8 ... 1.40
Wear limit size	mm	0.7
5/6st gear	mm	0.95 ... 1.5
Wear limit size	mm	0.75
Reverse gear		
New condition	mm	0.65 ... 1.25
Max. wear limit size	mm	0.5

SYNCHRONIZATION GS6-53DZ

23 23 SYNCHRONIZATION GS6-53DZ

SYNCHRONIZATION GS6-53DZ SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	2.70 ... 3.50

3rd/4th gear	mm	2.40 ... 3.10
5th/6th gear	mm	1.75 ... 2.10
Max. wear limit size	mm	
Reverse gear		
New condition	mm	2.70 ... 3.25
Max. wear limit size	mm	

SYNCHRONIZATION GUIDE SLEEVES 240/5/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 240/5/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES 240/5/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.0
3rd/4th gear	t max	2.7
Pressing-on force		
1st/2nd and 5th/R gear	t max	2.1
3rd/4th gear	t max	1.9
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.7
3rd/4th gear	t max	3.0
Pressing-on force		
1st/2nd and 5th/R gear	t max	2.5
3rd/4th gear	t max	2.1
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH/SPORT

23 23 SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH SPORT

SYNCHRONIZATION GUIDE SLEEVES 260/5/MECH/SPORT SPECIFICATIONS

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.7
3rd/4th gear	t max	3.0
Pressing-on force		

1st/2nd and 5th/R gear	t max	2.5
3rd/4th gear	t max	2.1
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.7
3rd/4th gear	t max	3.0
Pressing-on force		
1st/2nd and 5th/R gear	t max	2.5
3rd/4th gear	t max	2.1
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES 260/6/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force		
1st/2nd and 5th/R gear	t max	3.7
3rd/4th gear	t max	3.0
Pressing-on force		
1st/2nd and 5th/R gear	t max	2.5
3rd/4th gear	t max	2.1
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 265/5/MECH/SPORT

23 23 SYNCHRONIZATION GUIDE SLEEVES 265/5/MECH SPORT

SYNCHRONIZATION GUIDE SLEEVES 265/5/MECH/SPORT SPECIFICATIONS

Pressing-off force		
Pressing-on force		
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 265/6/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES 265/6/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES 265/6/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force		
Pressing-on force		
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH/SPORT

23 23 SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH SPORT

SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH/SPORT SPECIFICATIONS

Pressing-off force		
Pressing-on force		
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH/SPORT

23 23 SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH SPORT

SYNCHRONIZATION GUIDE SLEEVES 280/5/MECH/SPORT SPECIFICATIONS

Pressing-off force		
Pressing-on force		
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION GUIDE SLEEVES GS6-37BZ/DZ/MECH

23 23 SYNCHRONIZATION GUIDE SLEEVES GS6-37BZ/DZ/MECH

SYNCHRONIZATION GUIDE SLEEVES GS6-37BZ/DZ/MECH SPECIFICATIONS

1st/2nd gear	**kN**	**10 ... 36**
3rd/4th gear	kN	20 ... 58
5th/6th gear	kN	19 ... 55

SYNCHRONIZATION GUIDE SLEEVES GS6-53DZ/MECH

23 23 SYNCHRONIZATION GUIDE SLEEVES GS6-53DZ/MECH

SYNCHRONIZATION GUIDE SLEEVES GS6-53DZ/MECH SPECIFICATIONS

Press-off and press-on force	kN	50/2

SYNCHRONIZATION GUIDE SLEEVES S 5 D 200 G/MECH

23 23 SYNCHRONIZATION GUIDE SLEEVES S 5 D 200 G/MECH

SYNCHRONIZATION GUIDE SLEEVES S 5 D 200 G/MECH SPECIFICATIONS

Press-off and press-on force	kN	10 ... 20

SYNCHRONIZATION GUIDE SLEEVES S 5 D 250 G/MECH

23 23 SYNCHRONIZATION GUIDE SLEEVES S 5 D 250 G/MECH

SYNCHRONIZATION GUIDE SLEEVES S 5 D 250 G/MECH SPECIFICATIONS

Press-off and press-on force	kN	10 ... 20

SYNCHRONIZATION GUIDE SLEEVES ZF-S5-16/MECH/OVERDRIVE

23 23 SYNCHRONIZATION GUIDE SLEEVES ZF-S5-16/MECH OVERDRIVE

SYNCHRONIZATION GUIDE SLEEVES ZF-S5-16/MECH/OVERDRIVE SPECIFICATIONS

Pressing-off force		
Pressing-on force		
1st/2nd and 5th/R gear	t max	0.08
Bearing Sleeves	approx. °C	80

SYNCHRONIZATION S 5 D 200 G/MECH

23 23 SYNCHRONIZATION S 5 D 200 G/MECH

SYNCHRONIZATION S 5 D 200 G/MECH SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.1
3rd gear	mm	1.1 ... 1.5
4th/5th gear	mm	0.9 ... 1.5
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	1.1 ... 1.7
Max. wear limit size	mm	0.5

SYNCHRONIZATION S 5 D 250 G/MECH

23 23 SYNCHRONIZATION S 5 D 250 G/MECH

SYNCHRONIZATION S 5 D 250 G/MECH SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.3 ... 2.1

3rd gear	mm	1.1 ... 1.5
4th/5th gear	mm	0.9 ... 1.5
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	1.1 ... 1.7
Max. wear limit size	mm	0.5

SYNCHRONIZATION S 5 D 310 Z/MECH

23 23 SYNCHRONIZATION S 5 D 310 Z/MECH

SYNCHRONIZATION S 5 D 310 Z/MECH SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition		
1st/2nd gear	mm	1.1 ... 1.6
3rd gear	mm	0.95 ... 1.35
4th/5th gear	mm	0.95 ... 1.35
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.7 ... 1.15
Max. wear limit size	mm	0.5

SYNCHRONIZATION S 6 S 420 G/MECH

23 23 SYNCHRONIZATION S 6 S 420 G/MECH

SYNCHRONIZATION S 6 S 420 G/MECH SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition		
Max. wear limit size	mm	0.8
Reverse gear		
Max. wear limit size	mm	0.5

SYNCHRONIZATION S 6 S 560 G/MECH

23 23 SYNCHRONIZATION S 6 S 560 G/MECH

SYNCHRONIZATION S 6 S 560 G/MECH SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition		
Max. wear limit size	mm	0.8
Reverse gear		

Max. wear limit size	mm	0.5

SYNCHRONIZATION ZF-S5-16/MECH/OVERDRIVE

23 23 SYNCHRONIZATION ZF-S5-16/MECH OVERDRIVE

SYNCHRONIZATION ZF-S5-16/MECH/OVERDRIVE SPECIFICATIONS

Distance between synchronizer ring and clutch body		
New condition	mm	1.0 ... 1.3
Max. wear limit size	mm	0.8
Reverse gear		
New condition	mm	0.5 ... 0.6
Max. wear limit size	mm	0.4

TRANSMISSION SHAFTS 240/5/MECH/OVERDRIVE

23 21 TRANSMISSION SHAFTS 240/5/MECH OVERDRIVE

TRANSMISSION SHAFTS 240/5/MECH/OVERDRIVE SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout max	mm	0.07
Output flange		
Radial runout max	mm	0.07
Axial runout max	mm	0.1

TRANSMISSION SHAFTS 260/5/MECH/OVERDRIVE

23 21 TRANSMISSION SHAFTS 260/5/MECH OVERDRIVE

TRANSMISSION SHAFTS 260/5/MECH/OVERDRIVE SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout max	mm	0.07
Output flange		
Radial runout	max mm	0.07

Axial runout	max mm	0.1

TRANSMISSION SHAFTS 260/5/MECH/SPORT

23 21 TRANSMISSION SHAFTS 260/5/MECH SPORT

TRANSMISSION SHAFTS 260/5/MECH/SPORT SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.13 ... 0.23
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 260/6/MECH/OVERDRIVE

23 21 TRANSMISSION SHAFTS 260/6/MECH OVERDRIVE

TRANSMISSION SHAFTS 260/6/MECH/OVERDRIVE SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 265/5/MECH/SPORT

23 21 TRANSMISSION SHAFTS 265/5/MECH SPORT

TRANSMISSION SHAFTS 265/5/MECH/SPORT SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		

Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 265/6/MECH/OVERDRIVE

23 21 TRANSMISSION SHAFTS 265/6/MECH OVERDRIVE

TRANSMISSION SHAFTS 265/6/MECH/OVERDRIVE SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Layshaft	mm	0.1 ... 0.2
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS 280/5/MECH/SPORT

23 21 TRANSMISSION SHAFTS 280/5/MECH SPORT

TRANSMISSION SHAFTS 280/5/MECH/SPORT SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	0 ... 0.09
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION SHAFTS GS6-37BZ/DZ

23 21 TRANSMISSION SHAFTS GS6-37BZ/DZ

TRANSMISSION SHAFTS GS6-37BZ/DZ SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0.15 ... 0.19
Output spigot		

Radial runout Max.	max mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS GS6-53DZ/MECH

23 21 TRANSMISSION SHAFTS GS6-53DZ/MECH

TRANSMISSION SHAFTS GS6-53DZ/MECH SPECIFICATIONS

Axial play (axial bearing play) of:		
Output shaft	mm	
Input shaft	Max. mm	
Output journal:		
Radial runout	Max. mm	0.15
Output flange		
Radial runout	Max. mm	0.15
Axial runout	Max. mm	0.15

TRANSMISSION SHAFTS S 5 D 200 G/MECH

23 21 TRANSMISSION SHAFTS S 5 D 200 G/MECH

TRANSMISSION SHAFTS S 5 D 200 G/MECH SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	Max. mm	0.04
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS S 5 D 250 G/MECH

23 21 TRANSMISSION SHAFTS S 5 D 250 G/MECH

TRANSMISSION SHAFTS S 5 D 250 G/MECH SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	Max. mm	0.04
Output spigot		

Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS S 5 D 310 Z/MECH

23 21 TRANSMISSION SHAFTS S 5 D 310 Z/MECH

TRANSMISSION SHAFTS S 5 D 310 Z/MECH SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS S 6 S 420 G/MECH

23 21 TRANSMISSION SHAFTS S 6 S 420 G/MECH

TRANSMISSION SHAFTS S 6 S 420 G/MECH SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07
Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS S 6 S 560 G/MECH

23 21 TRANSMISSION SHAFTS S 6 S 560 G/MECH

TRANSMISSION SHAFTS S 6 S 560 G/MECH SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Output spigot		
Radial runout	Max. mm	0.07
Output flange		
Radial runout	Max. mm	0.07

Axial runout	Max. mm	0.1

TRANSMISSION SHAFTS ZF-S5-16/MECH

23 21 TRANSMISSION SHAFTS ZF-S5-16/MECH

TRANSMISSION SHAFTS ZF-S5-16/MECH SPECIFICATIONS

Axial play (axial bearing clearance) of:		
Output shaft	mm	0 ... 0.09
Input shaft	mm	1.1 ... 1.3
Output spigot		
Radial runout	max mm	0.07
Output flange		
Radial runout	max mm	0.07
Axial runout	max mm	0.1

TRANSMISSION FILLING CAPACITIES

23 00 TRANSMISSION FILLING CAPACITIES
E46/E53/E60/E61/E63/E64/E81/E82/E83/E87/E89/E90/E91/E92/E93 GS6-53DZ/BZ/MANUAL

TRANSMISSION FILLING CAPACITIES SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	litre	1.5
Oil fill quantity for initial fill or replacement transmission	litre	1.6

TRANSMISSION FILLING CAPACITIES

23 00 TRANSMISSION FILLING CAPACITIES
E60/E61/E63/E64/E81/E82/E83/E84/E85/E87/E89/E90/E91/E92/E93 GS6-17BG/DG/MANUAL

TRANSMISSION FILLING CAPACITIES SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	litre	1.3
Oil fill quantity for initial fill or replacement transmission	litre	1.4

TRANSMISSION FILLING CAPACITIES

28 00 TRANSMISSION FILLING CAPACITIES E92/E93/E89/N54/N55 GS7D36SG/MANUAL

TRANSMISSION FILLING CAPACITIES SPECIFICATIONS

Oil grade: **refer to Operating Fluids Specifications**		
Oil capacity on initial filling	litre	7.8

TRANSMISSION FILLING CAPACITIES 240/5/MECH/OVERDRIVE

23 00 TRANSMISSION FILLING CAPACITIES 240/5/MECH OVERDRIVE

Transmission filling capacities 240/5/MECH/OVERDRIVE SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	ltr.	1.05
Oil fill quantity for initial fill or replacement transmission	ltr.	1.15

TRANSMISSION FILLING CAPACITIES 260/5/MECH/OVERDRIVE

23 00 TRANSMISSION FILLING CAPACITIES 260/5/MECH OVERDRIVE

Transmission filling capacities 260/5/MECH/OVERDRIVE SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	ltr.	1.25
Oil fill quantity for initial fill or replacement transmission	ltr.	1.35

TRANSMISSION FILLING CAPACITIES 260/5/MECH/SPORT

23 00 TRANSMISSION FILLING CAPACITIES 260/5/MECH SPORT

Transmission filling capacities 260/5/MECH/SPORT SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	ltr.	1.25
Oil fill quantity for initial fill or replacement transmission	ltr.	1.35

TRANSMISSION FILLING CAPACITIES S5D 280Z

23 00 TRANSMISSION FILLING CAPACITIES S5D 280Z

Transmission filling capacities S5D 280Z SPECIFICATIONS

Oil grade, refer to Operating Fluids		
Oil fill quantity for oil change	Litres	- -
Oil fill quantity for initial fill or replacement transmission	Litres	1.3

TRANSMISSION FILLING CAPACITIES S7S 47BG

23 00 TRANSMISSION FILLING CAPACITIES S7S 47BG

Transmission filling capacities S7S 47BG SPECIFICATIONS

Oil grade, refer to Operating Fluids		
Oil fill quantity for oil change	Litres	2.55
Oil fill quantity for initial fill or replacement transmission	Litres	2.75

TRANSMISSION FILLING CAPACITIES ZF-S5-16/MECH

23 00 TRANSMISSION FILLING CAPACITIES ZF-S5-16/MECH

Transmission filling capacities ZF-S5-16/MECH SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	ltr.	1.05
Oil fill quantity for initial fill or replacement transmission	ltr.	1.15

TRANSMISSION FILLING CAPACITIES: 260/6/MECH/OVERDRIVE

23 00 TRANSMISSION FILLING CAPACITIES: 260/6/MECH OVERDRIVE

Transmission filling capacities: 260/6/MECH/OVERDRIVE SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	ltr.	1.25
Oil fill quantity for initial fill or repair transmission	ltr.	1.35

TRANSMISSION FILLING CAPACITIES: 265/5/MECH/SPORT

23 00 TRANSMISSION FILLING CAPACITIES: 265/5/MECH SPORT

Transmission filling capacities: 265/5/MECH/SPORT SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	ltr.	1.5
Oil fill quantity for initial fill or repair transmission	ltr.	1.7

TRANSMISSION FILLING CAPACITIES: 265/6/MECH/OVERDRIVE

23 00 TRANSMISSION FILLING CAPACITIES: 265/6/MECH OVERDRIVE

Transmission filling capacities: 265/6/MECH/OVERDRIVE SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	ltr.	1.5
Oil fill quantity for initial fill or repair transmission	ltr.	1.7

TRANSMISSION FILLING CAPACITIES: 280/5/MECH/SPORT

23 00 TRANSMISSION FILLING CAPACITIES: 280/5/MECH SPORT

Transmission filling capacities: 280/5/MECH/SPORT SPECIFICATIONS

Oil grade: **refer to Operating Fluids**		
Oil volume	ltr.	1.25
Oil fill quantity for initial fill or repair transmission	ltr.	1.35

CASE AND COVER

23 11 CASE AND COVER

TIGHTENING TORQUE SPECIFICATION - CASE AND COVER

		Type	Thread	Tightening specification	Measure
16AZ	Holder to transfer case	265/Sport	M6		9 Nm
17AZ	Retaining plates for bearings on housing	S5D 310Z/S5D 320Z/S5D 200G/S5D 250G	M6		10 Nm
18AZ	Retaining plate to housing	S5D 320Z SMG	M6		5.5 Nm

CASE AND COVER

23 11 CASE AND COVER

TIGHTENING TORQUE SPECIFICATION - CASE AND COVER

		Type	Thread	Tightening specification	Measure
1AZ	Transmission housing, rear section/front section	B/C/D/E/F/G/H/I/7-speed SMG			22 Nm
2AZ	Cover with guide tube/transmission case	B/C/D/E/F/G/H/I/7-speed SMG	M8 x 22		18 Nm
		B/C/D/E/F/G/H/I/7-speed SMG	M8 x 30		25 Nm
		B/C/D/E/F/G/H/I/7-speed SMG	M6		10 Nm
3AZ	Bearing cap/sealing flange	B/C/D/E/F/G/H/I/7-speed SMG			10.5 Nm
4AZ	Reverse gear wheel axle to intermediate housing	B/C/D/E/F/G/H/I/7-speed SMG			49 Nm
5AZ	Retaining plate for reverse gear wheel axle to intermediate housing	B/C/D/E/F/G/H/I/7-speed SMG			25 Nm

6AZ	Transmission closing plate	B/C/D/E/F/G/H/I/7-speed SMG	M6		8 Nm

ELECTRICAL ADD-ON PARTS

23 14 ELECTRICAL ADD-ON PARTS

TIGHTENING TORQUE SPECIFICATION - ELECTRICAL ADD-ON PARTS

		Type	Thread	Tightening specifications	Dimension
1AZ	Reversing light switch	G/H/I/C/Gearbox	M12		16 Nm
2AZ	Zero-gear sensor to transmission	G/H/I/C/Gearbox			5 Nm

INTERIOR SHIFT COMPONENTS

23 31 INTERIOR SHIFT COMPONENTS

TIGHTENING TORQUE SPECIFICATION - INTERIOR SHIFT COMPONENTS

		Type	Thread	Tightening specification	Measure
1AZ	Shift arms to transmission case	S5D 310Z			45 Nm
2AZ	Sealing cap for locking sleeves of gearshift rods	S6S 420G	M6		10 Nm
3AZ	Retaining screw, shift actuator/selector shaft	S5D 320Z/S6S37BZ/S6S53BZ SMG	M6		10 Nm

TRANSMISSION SHAFTS

23 21 TRANSMISSION SHAFTS

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION SHAFTS

		Type	Thread	Tightening specification	Measure
1AZ	Output flange	S5D 200G/S5D 250G/S5D260Z/S5D 310Z/S6S 420G		Collar nut installed with bolt cement Pretension	 190 Nm

				Release Tighten down	120 Nm
		S5D 280Z/S5D 320Z		Collar nut installed with bolt cement Pretension Release Tighten down	170 Nm 130 Nm
		S5D 390Z		Collar nut installed with bolt cement Pretension Release Tighten down	200 Nm 145 Nm
		GS6-37BZ/GS6-17BG		Collar nut installed with bolt cement Pretension Release Tighten down	170 Nm 120 Nm
		GS6-53DZ		Collar nut installed with bolt cement Pretension Release Tighten down	200 Nm 140 Nm
		GS7S47BG		Collar nut installed with bolt cement	200 Nm
2AZ	Gear to countershaft	265/Sport	M10		60 Nm

TRANSMISSION IN GENERAL

23 00 TRANSMISSION IN GENERAL

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION IN GENERAL

		Type	Thread	Tightening specification	Measure
2AZ	Transmission to clutch housing	B/C/D/E/F/G/H/I/7-speed SMG	M12		76 Nm
3AZ	Reinforcement plate to transmission	B/C/D/E/F/G/H/I/7-speed SMG	M8		23 Nm

4AZ	Oil drain plug/filler plug	B/C-transmission			50 Nm
		D/E-transmission			52 Nm
		G/H-transmission	M18x1.5 hexagon socket		35 Nm
		H/I-transmission	M12x1.5		25 Nm
		I transmission	M18x1.5	Steel screw without seal	45 Nm
		7-speed SMG			40 Nm
5AZ	Transmission extension	g/H transmission	M10		46 Nm

TRANSMISSION IN GENERAL

23 00 TRANSMISSION IN GENERAL

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION IN GENERAL

		Type	Thread	Tightening specifications	Dimension
1AZ	Transmission to engine **TRANSMISSION DESIGNATIONS**				
6 KT-Schrauben		B/C/D/E/F/G/H/I/7 Gang SMG	M6		8 Nm
		B/C/D/E/F/G/H/I/7 Gang SMG	M8		25 Nm
		B/C/D/E/F/G/H/I/7 Gang SMG	M10		49 Nm
		B/C/D/E/F/G/H/I/7 Gang SMG	M12		74 Nm
Torx-Schraube		B/C/D/E/F/G/H/I/7 Gang SMG	M6		9 Nm
		B/C/D/E/F/7 Gang SMG	M8		19 Nm
		B/C/D/E/H/I/7 Gang SMG	M10		43 Nm
		G-Getriebe	M10		38 Nm
		7 Gang SMG	M10x55 8.8		43 Nm
		7 Gang SMG	M10x42 8.8		42 Nm
Stahlschrauben mit Torx-Kopf		I/G/H-Getriebe	M8		19 Nm
Stahlschrauben mit Torx-Kopf		I/G/H-Getriebe	M12		66 Nm
2AZ	Transmission to N52/N52K/N53/N54 aluminum screws/bolts are not magnetic.	I/G/H-transmission		Replace screws Jointing torque and angle of rotation must be	

				observed without fail	
		I/G/H-transmission	M10x30	Jointing torque Angle of rotation	20 Nm 90 -110°
		I/G/H-transmission	M10x85	Jointing torque Angle of rotation	20 Nm 180 -200°
		I/H/G-transmission	M12	Jointing torque Angle of rotation	25 Nm 130 ° +20 °
3AZ	Cover plate, transmission	I/H transmission	M6		8 Nm

TRANSMISSION MOUNTS

23 71 TRANSMISSION MOUNTS

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION MOUNTS

		Type	Thread	Tightening specification	Measure
1AZ	Transmission mounts (rubber) to body	B/C/D/E/F/G/H/I/7-speed SMG	M10		42 Nm
		B/C/D/E/F/G/H/I/7-speed SMG	M12		73 Nm
2AZ	Transmission cross-member to body	B/C/D/E/F/G/H/I/7-speed SMG	M10		42 Nm
		B/C/D/E/F/G/H/I/7-speed SMG	M8		19 Nm
		B/C/D/E/F/G/H/I/7-speed SMG	M8	E83, E85, E86, E46 only	21 Nm
3AZ	Mount bracket to transmission	B/C/D/E/F/G/H/I/7-speed SMG	M8		19 Nm
4AZ	Transmission support block to transmission	B/C/D/E/F/G/H/I/7-speed SMG	M10 ASA screw		38 Nm
		B/C/D/E/F/G/H/I/7-speed SMG	M10 ISA pan head		48 Nm
5AZ	Transmission mount to transmission support bracket/transmission crossmember	B/C/D/E/F/G/H/I/7-speed SMG	M8		19 Nm

CASE AND COVER

23 11 CASE AND COVER

TIGHTENING TORQUE SPECIFICATION - CASE AND COVER

	Type	Thread	Tightening specification	Measure
16AZ Holder to transfer case	265/Sport	M6		9 Nm
17AZ Retaining plates for bearings on housing	S5D 310Z/S5D 320Z/S5D 200G/S5D 250G	M6		10 Nm
18AZ Retaining plate to housing	S5D 320Z SMG	M6		5.5 Nm

CASE AND COVER

23 11 CASE AND COVER

TIGHTENING TORQUE SPECIFICATION - CASE AND COVER

	Type	Thread	Tightening specification	Measure
1AZ Transmission housing, rear section/front section	B/C/D/E/F/G/H/I/7-speed SMG			22 Nm
2AZ Cover with guide tube/transmission case	B/C/D/E/F/G/H/I/7-speed SMG	M8 x 22		18 Nm
	B/C/D/E/F/G/H/I/7-speed SMG	M8 x 30		25 Nm
	B/C/D/E/F/G/H/I/7-speed SMG	M6		10 Nm
3AZ Bearing cap/sealing flange	B/C/D/E/F/G/H/I/7-speed SMG			10.5 Nm
4AZ Reverse gear wheel axle to intermediate housing	B/C/D/E/F/G/H/I/7-speed SMG			49 Nm
5AZ Retaining plate for reverse gear wheel axle to intermediate housing	B/C/D/E/F/G/H/I/7-speed SMG			25 Nm
6AZ Transmission closing plate	B/C/D/E/F/G/H/I/7-speed SMG	M6		8 Nm

ELECTRICAL ADD-ON PARTS

23 14 ELECTRICAL ADD-ON PARTS

TIGHTENING TORQUE SPECIFICATION - ELECTRICAL ADD-ON PARTS

	Type	Thread	Tightening specifications	Dimension
1AZ Reversing light switch	G/H/I/C/Gearbox	M12		16 Nm
2AZ Zero-gear sensor to transmission	G/H/I/C/Gearbox			5 Nm

INTERIOR SHIFT COMPONENTS

23 31 INTERIOR SHIFT COMPONENTS

TIGHTENING TORQUE SPECIFICATION - INTERIOR SHIFT COMPONENTS

	Type	Thread	Tightening specification	Measure
1AZ Shift arms to transmission case	S5D 310Z			45 Nm
2AZ Sealing cap for locking sleeves of gearshift rods	S6S 420G	M6		10 Nm
3AZ Retaining screw, shift actuator/selector shaft	S5D 320Z/S6S37BZ/S6S53BZ SMG	M6		10 Nm

TRANSMISSION SHAFTS

23 21 TRANSMISSION SHAFTS

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION SHAFTS

	Type	Thread	Tightening specification	Measure
1AZ Output flange	S5D 200G/S5D 250G/S5D260Z/S5D 310Z/S6S 420G		Collar nut installed with bolt cement	
			Pretension Release	190 Nm
			Tighten down	120 Nm
	S5D 280Z/S5D 320Z		Collar nut installed with bolt cement	
			Pretension Release	170 Nm
			Tighten down	130 Nm
	S5D 390Z		Collar nut installed with bolt cement	
			Pretension Release	200 Nm
			Tighten down	145 Nm
			Collar nut installed with	

	GS6-37BZ/GS6-17BG		bolt cement	
			Pretension Release	170 Nm
			Tighten down	120 Nm
	GS6-53DZ		Collar nut installed with bolt cement	
			Pretension Release	200 Nm
			Tighten down	140 Nm
		GS7S47BG	Collar nut installed with bolt cement	200 Nm
2AZ Gear to countershaft	265/Sport	M10		60 Nm

TRANSMISSION IN GENERAL

23 00 TRANSMISSION IN GENERAL

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION IN GENERAL

	Type	Thread	Tightening specification	Measure
2AZ Transmission to clutch housing	B/C/D/E/F/G/H/I/7-speed SMG	M12		76 Nm
3AZ Reinforcement plate to transmission	B/C/D/E/F/G/H/I/7-speed SMG	M8		23 Nm
4AZ Oil drain plug/filler plug	B/C-transmission			50 Nm
	D/E-transmission			52 Nm
	G/H-transmission	M18x1.5 hexagon socket		35 Nm
	H/I-transmission	M12x1.5		25 Nm
	I transmission	M18x1.5	Steel screw without seal	45 Nm
	7-speed SMG			40 Nm
5AZ Transmission extension	g/H transmission	M10		46 Nm

TRANSMISSION IN GENERAL

23 00 TRANSMISSION IN GENERAL

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION IN GENERAL

	Type	Thread	Tightening specifications	Dimension
6 KT-Schrauben	B/C/D/E/F/G/H/I/7 Gang SMG	M6		8 Nm

	B/C/D/E/F/G/H/I/7 Gang SMG	M8		25 Nm
	B/C/D/E/F/G/H/I/7 Gang SMG	M10		49 Nm
	B/C/D/E/F/G/H/I/7 Gang SMG	M12		74 Nm
Torx-Schraube	B/C/D/E/F/G/H/I/7 Gang SMG	M6		9 Nm
	B/C/D/E/F/7 Gang SMG	M8		19 Nm
	B/C/D/E/H/I/7 Gang SMG	M10		43 Nm
	G-Getriebe	M10		38 Nm
	7 Gang SMG	M10x55 8.8		43 Nm
	7 Gang SMG	M10x42 8.8		42 Nm
Stahlschrauben mit Torx-Kopf	I/G/H-Getriebe	M8		19 Nm
Stahlschrauben mit Torx-Kopf	I/G/H-Getriebe	M12		66 Nm
2Az Transmission to N52/N52K/N53/N54 aluminium screws/bolts are not magnetic.	I/G/H-transmission		Replace screws Jointing torque and angle of rotation must be observed without fail	
	I/G/H-transmission	M10x30	Jointing torque Angle of rotation	20 Nm 90 - -110°
	I/G/H-transmission	M10x85	Jointing torque Angle of rotation	20 Nm 180 - -200°
	I/H/G-transmission	M12	Jointing torque Angle of rotation	25 Nm 130° +20°
3AZ Cover plate, transmission	I/H-transmission	M6		8 Nm

TRANSMISSION MOUNTS

23 71 TRANSMISSION MOUNTS

TIGHTENING TORQUE SPECIFICATION - TRANSMISSION MOUNTS

	Type	**Thread**	**Tightening specification**	**Measure**
1AZ Transmission mounts (rubber) to body	B/C/D/E/F/G/H/I/7-speed SMG	M10		42 Nm
	B/C/D/E/F/G/H/I/7-speed SMG	M12		73 Nm

2AZ Transmission cross-member to body	B/C/D/E/F/G/H/I/7-speed SMG	M10		42 Nm
	B/C/D/E/F/G/H/I/7-speed SMG	M8		19 Nm
	B/C/D/E/F/G/H/I/7-speed SMG	M8	E83, E85, E86, E46 only	21 Nm
3AZ Mount bracket to transmission	B/C/D/E/F/G/H/I/7-speed SMG	M8		19 Nm
4AZ Transmission support block to transmission	B/C/D/E/F/G/H/I/7-speed SMG	M10 ASA screw		38 Nm
	B/C/D/E/F/G/H/I/7-speed SMG	M10 ISA pan head		48 Nm
5AZ Transmission mount to transmission support bracket/transmission cross-member	B/C/D/E/F/G/H/I/7-speed SMG	M8		19 Nm

23 MANUAL TRANSMISSION

23-2470 BUSH

Bush MW

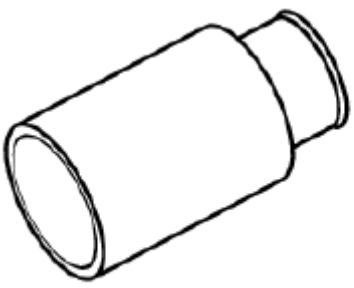
NOTE: (Impact bush) For driving in the retainer of the mounting nut on the output flange

Storage Location

C15

SI number

01 10 93 (689)



W 23 2 470

Fig. 1: Identifying Bush (23-2470)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2490 BUSH

Bush Minimum set: Mechanical tools MW

NOTE: (impact bush and sliding sleeve) For fitting the radial sealing ring to the drive shaft

Storage Location

A17

SI number

01 10 93 (689)

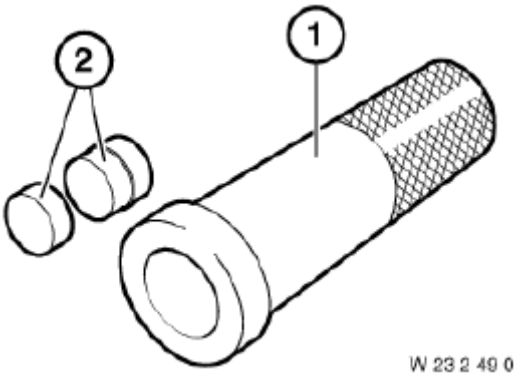


Fig. 2: Identifying Bush (23-2490)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0491598 Bush

NOTE: (impact bush)

2 = 0491599 Sleeve

NOTE: (sliding sleeve (2-part))

23-3020 BUSH

Bush MW

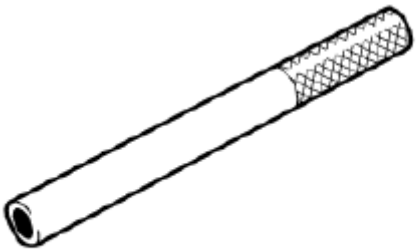
NOTE: (Assembly bush) For installing the gaiter of the gearshift rod

Storage Location

Z3

SI number

01 10 93 (689)



W 23 3 020

Fig. 3: Identifying Bush (23-3020)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0190 BUSH

Bush Minimum set: Mechanical tools MW

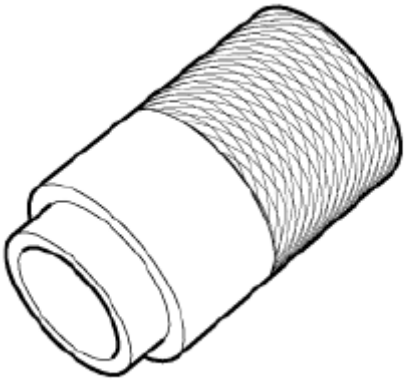
NOTE: (Impact bush) For driving in the radial shaft seal on the output end - F transmission

Storage Location

A17

SI number

01 14 99 (482)



W23 0 190

Fig. 4: Identifying Bush (23-0190)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2180 BUSH

Bush MW

NOTE: **(Guide bush) For fitting the transmission housing front section onto the gearshift shaft**

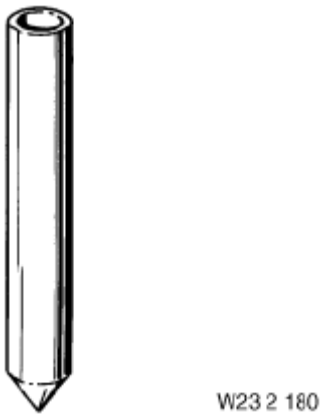


Fig. 5: Identifying Bush (23-2180)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0390 BUSH

Bush MW

NOTE: **(slip bush) For removing and installing clutch cover with shaft seal on drive shaft.**

SI number

01 04 09 (517)

Fig. 6: Identifying Bush (23-0390)

Courtesy of BMW OF NORTH AMERICA, INC.

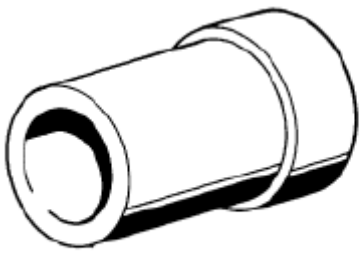
23-2150 BUSH

Bush MW

NOTE: **(Pressure bush) For pressing in the grooved ball bearing of the transmission output shaft (260/5, 245/5), pressing the front taper roller bearing onto the drive bevel gear for all rear axle final drives as well as installation of the lid of the countershaft (S5D 310Z)**

Storage Location

Y6



W23 2 150

Fig. 7: Identifying Bush (23-2150)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0220 BUSH

Bush Minimum set: Mechanical tools MW

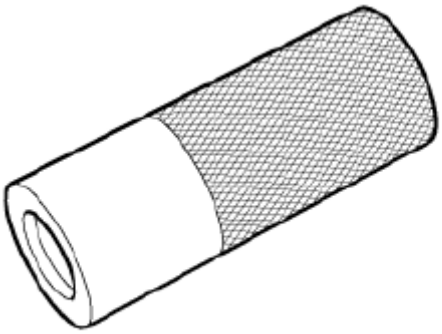
NOTE: **(Impact bush) For driving in radial shaft seal on gearshift shaft - F transmission**

Storage Location

B15

SI number

01 14 99 (482)



W23 0 220

Fig. 8: Identifying Bush (23-0220)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2480 BUSH

Bush MW

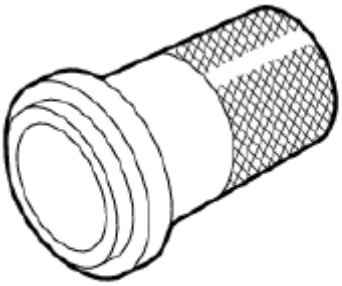
NOTE: (Impact bush) For driving radial shaft seal onto output shaft

Storage Location

A17

SI number

01 10 93 (689)



W 23 2 480

Fig. 9: Identifying Bush (23-2480)
Courtesy of BMW OF NORTH AMERICA, INC.

23-4040 CARTRIDGE GUN

Cartridge gun MW

NOTE: (grease gun) For actuating cartridge 23 4 033.

SI number

01 05 06 (248)

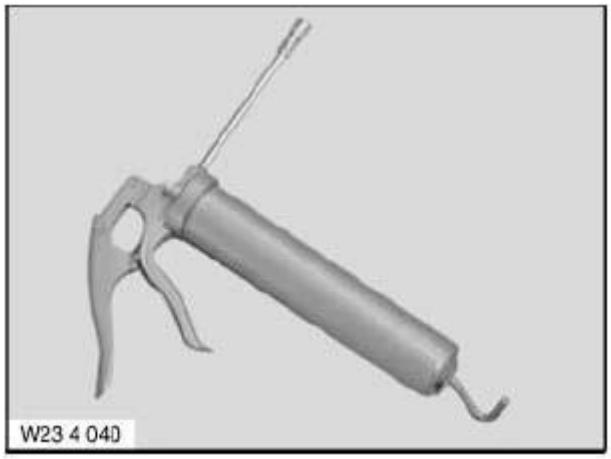


Fig. 10: Identifying Cartridge Gun (23-4040)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2250 CLAMP

Clamp MW

NOTE: For clamping together the main shaft and countershaft

Storage Location

Y7

SI number

01 07 90 (244)

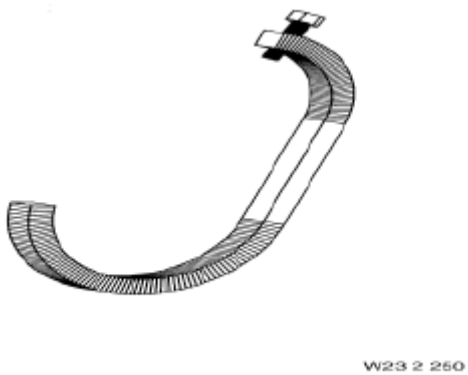


Fig. 11: Identifying Clamp (23-2250)
Courtesy of BMW OF NORTH AMERICA, INC.

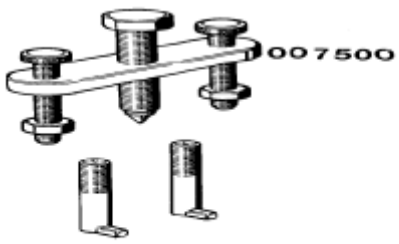
23-1100 CLAW

Claw MW

NOTE: (Extractor claw) For the speedometer wheel

Storage Location

Y9



W23 1 100

Fig. 12: Identifying Claw (23-1100)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1400 DEVICE

Device MW

NOTE: For inserting the radial seal ring in the plug socket of the speedometer-drive pinion

Consisting of

1 = 0491523 Shaft

NOTE: (Press-in shaft)

2 = 0491524 Shaped part

NOTE: (shaped part)

3 = 0491525 Holding sleeve

NOTE: (Union sleeve)

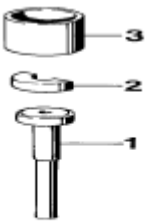


Fig. 13: Identifying Device (23-1400)
Courtesy of BMW OF NORTH AMERICA, INC.

23-4030 DEVICE

Device MW

NOTE: For removing and installing guide bearing (pilot bearing) in transmission drive shaft.

SI number

01 05 06 (248)

Consisting of:

1 = 0495535 Basic body

2 = 0495536 Nut

NOTE: (nut M8)

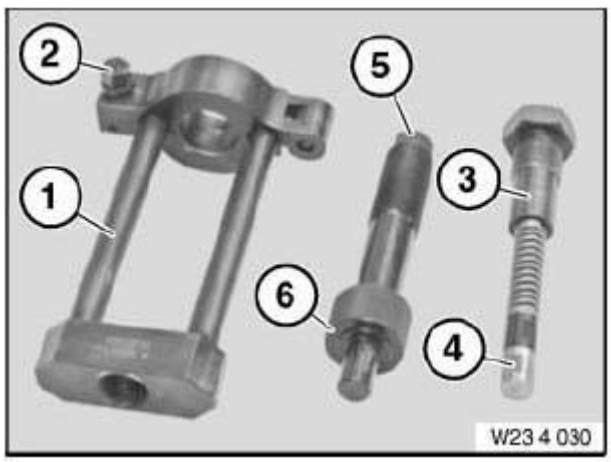


Fig. 14: Identifying Device (23-4030)
Courtesy of BMW OF NORTH AMERICA, INC.

3 = 0495537 Cartridge

NOTE: (cartridge)

4 = 0495538 Adapter

5 = 0495539 Spindle

NOTE: (pressure spindle)

6 = 0495540 Thrust piece

NOTE: (thrust piece)

23-1350 DEVICE

Device MW

NOTE: (Pull-off device) For transmission housing rear section

Consisting of:

1 = 0491515 Plate

2 = 0491516 Screw

NOTE: (Screw, short (2 x))

3 = 0491517 Screw

NOTE: (Screw, long (2 x))

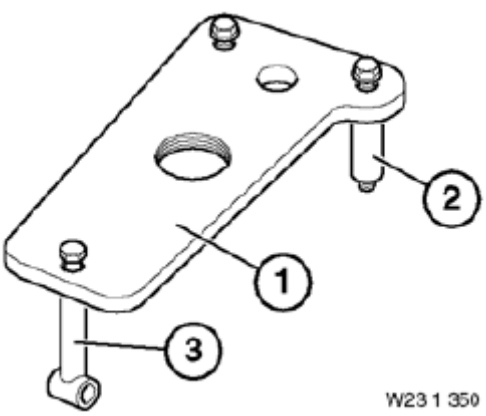


Fig. 15: Identifying Device (23-1350)

Courtesy of BMW OF NORTH AMERICA, INC.

23-2270 DEVICE

Device MW

NOTE: For centring the gearshift shaft when fitting the front section of the transmission housing

Storage Location

Z6

SI number

01 07 90 (244)

W23 2 270

Fig. 16: Identifying Device (23-2270)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2330 DEVICE

Device MW

NOTE: For pulling the complete gear set into the transmission housing rear section

Storage Location

Z6

SI number

01 07 90 (244)

W23 2 330

Fig. 17: Identifying Device (23-2330)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1420 DEVICE

Device MW

NOTE: For pulling off the sliding piece (5th gear)

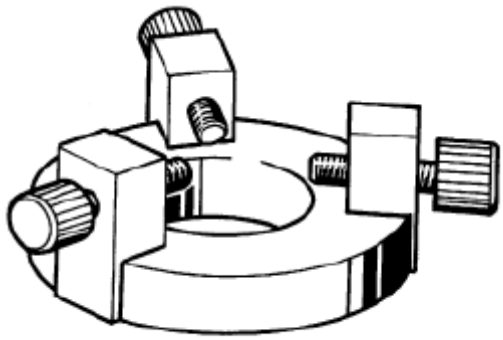
Storage Location

Z4

Consisting of:

3 = 0493257 Screw

NOTE: (Clamping bolt)



W23 1 420

Fig. 18: Identifying Device (23-1420)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1490 DEVICE

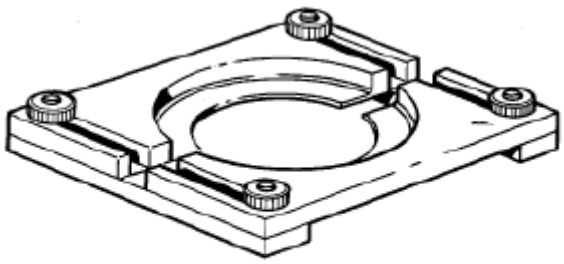
Device MW

NOTE: For pressure-test of the gear wheels

Consisting of:

3 = 0491535 Shaped part

NOTE: (shaped part)



W23 1 490

Fig. 19: Identifying Device (23-1490)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1170 DEVICE

Device MW

NOTE: For pulling off the gearbox housing front section

Consisting of:

1 = 0491493 Plate

2 = 0491494 Screw

NOTE: (Knurled screw (3 x))

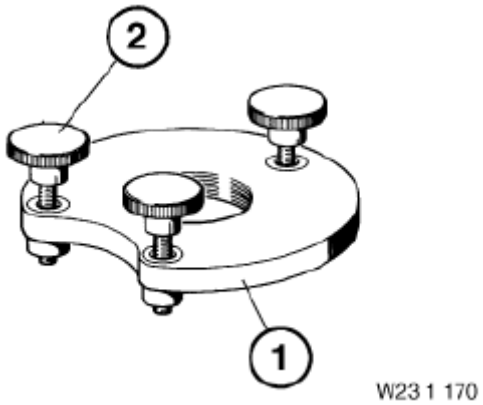


Fig. 20: Identifying Device (23-1170)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3010 DEVICE

Device MW

NOTE: For mounting the output flange on the output shaft

Storage Location

B16

SI number

01 10 93 (689)

Consisting of:

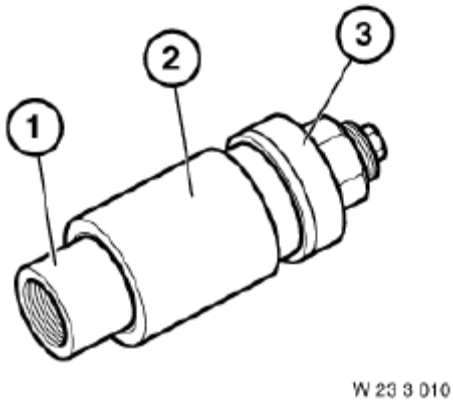


Fig. 21: Identifying Device (23-3010)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0491601 Spindle

NOTE: (Adapter spindle)

2 = 0491602 Sleeve

NOTE: (Pressure sleeve)

3 = 0491603 Nut

NOTE: (Thrust nut with bearing)

23-1060 DEVICE

Device MW

NOTE: For extracting the bearing inner race - reverse gearwheel

Storage Location

Z4

Consisting of:

1 = 0491475 Shell

NOTE: (bearing shell) 2 pieces

2 = 0491476 Ring

NOTE: (threaded ring)

3 = 0491477 Sleeve

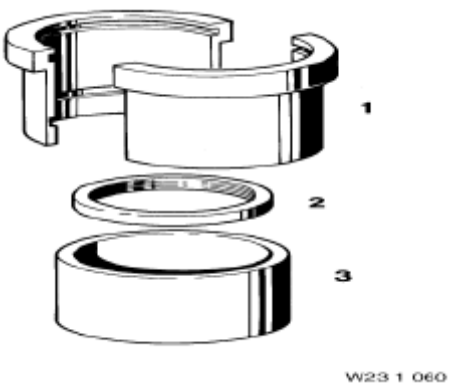


Fig. 22: Identifying Device (23-1060)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2310 DEVICE

Device MW

NOTE: For pressure-test of the 3rd and 4th gear wheels of the countershaft

Storage Location

Y7

SI number

01 07 90 (244)

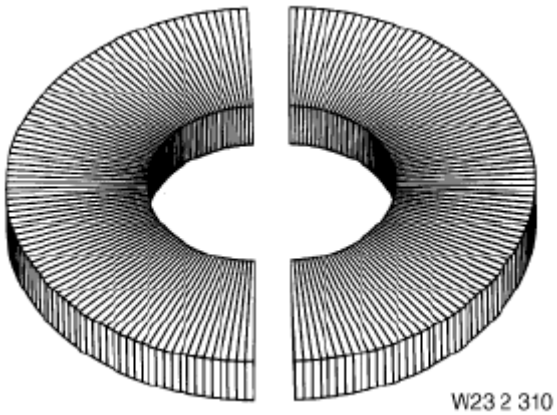


Fig. 23: Identifying Device (23-2310)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1020 DEVICE

Device MW

NOTE: (Device for pulling off the transmission housing (front and rear sections))

Storage Location

Z5

Z6

W23 1 020

Fig. 24: Identifying Device (23-1020)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0080 DEVICE

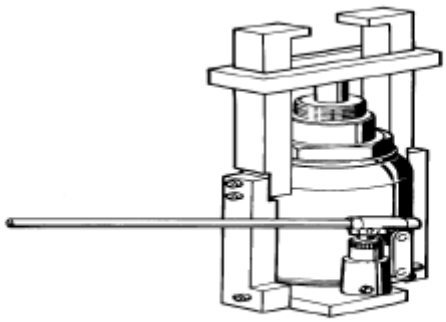
Device MW

NOTE: For pulling off 5th gear wheel

Consisting of:

2 = 0491449 Shaped part

NOTE: (Shaped part) 2x



W23 0 080

Fig. 25: Identifying Device (23-0080)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1010 DEVICE

Device MW

NOTE: (Device for pulling off the rear part of the transmission housing)

Fig. 26: Identifying Device (23-1010)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1000 DEVICE

Device MW

NOTE: For pressing the transmission housing and grooved ball bearing onto the transmission drive shaft and into the transmission housing

Storage Location

C15

C16

Consisting of:

1 = 0491458 Holding sleeve

2 = 0491459 Pin

NOTE: (Dowel pin (2 x))

3 = 0491460 Synchronizing key

NOTE: (Synchronizing key, long)

4 = 0491461 Synchronizing key

NOTE: (Synchronizing key, short)

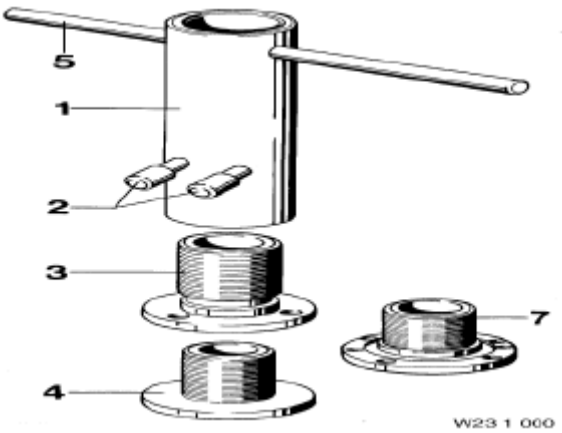


Fig. 27: Identifying Device (23-1000)
Courtesy of BMW OF NORTH AMERICA, INC.

5 = 0491462 Handle

5 = 0491463 Pin

NOTE: (Dowel pins for Getrag transmission)

7 = 0491464 Synchronizing key

NOTE: (Synchronizing key for Getrag transmission)

23-2170 DEVICE

Device MW

NOTE: For tensioning the transmission leaf springs

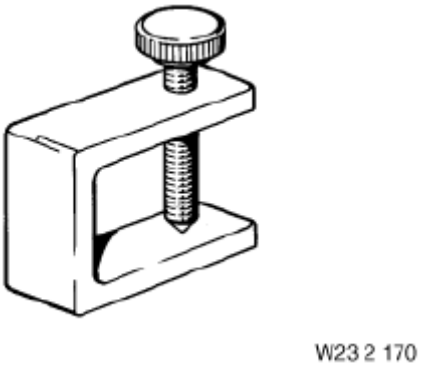


Fig. 28: Identifying Device (23-2170)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2370 DEVICE

Device MW

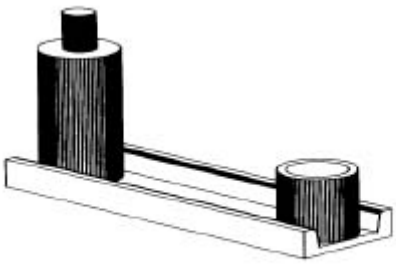
NOTE: For removing the gear set

Storage Location

Y8

SI number

01 02 91 (330)



W23 2 370

Fig. 29: Identifying Device (23-2370)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1050 EXTRACTOR

Extractor MW

NOTE: (Extractor (Kukko)) For the 5th gear - and for the reverse gear wheel

Consisting of:

1 = 0491470 Claw

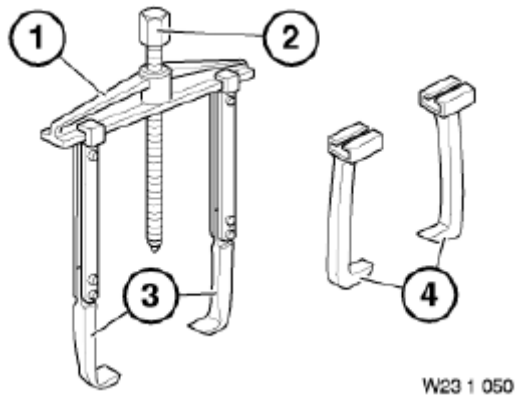


Fig. 30: Identifying Extractor (23-1050)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0040 FIXTURE

Fixture MW

Replaced by: 0495498

NOTE: For transmissions for removal and installation. Replaced by 23 4 050 (0 495 498)

SI number

01 05 90 (207)

Consisting of:

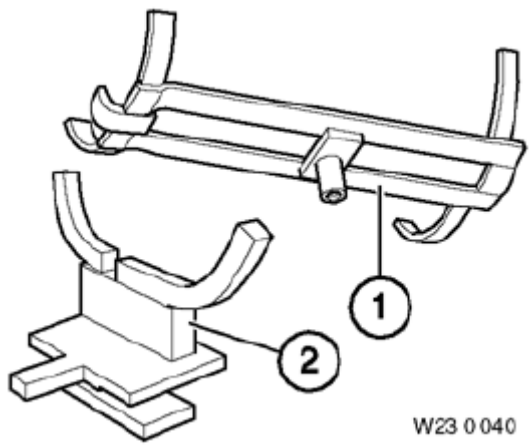


Fig. 31: Identifying Fixture (23-0040)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0491443 Cage

NOTE: (Retaining cage) Transmission: S6S 560G Replaced by 23 4 050 (0 495 498)

2 = 0491444 Retaining bracket

NOTE: (Holding bracket) Transmission: S6S 420G Replaced by 23 4 050 (0 495 498)

23-0140 FIXTURE

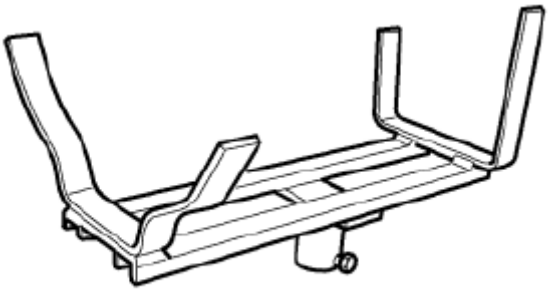
Fixture MW

Replaced by: 0495498

NOTE: For accommodating transmission during removal and installation. Transmission: F-transmission. Replaced by 23 4 050 (0 495 498)

SI number

01 20 98 (378)



W23 0 160

Fig. 32: Identifying Fixture (23-0140)
Courtesy of BMW OF NORTH AMERICA, INC.

23-4050 FIXTURE

Fixture MW

NOTE: (Universal gearbox holder) Fixture for removing and installing manual and automatic transmissions for BMW&RR.

SI number

01 07 06 (256)

Consisting of:

4 = 0495550 Belt

NOTE: **(Tensioning strap)**

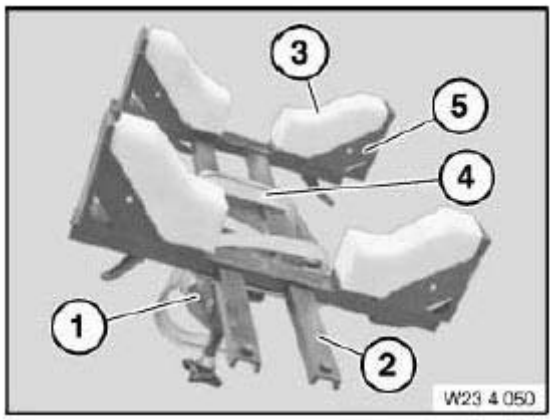


Fig. 33: Identifying Fixture (23-4050)
Courtesy of BMW OF NORTH AMERICA, INC.

5 = 0496018 Fixture

NOTE: **(Fixture for foam material insert)**

1 = 0495547 Joint

2 = 0495548 Frame

NOTE: **(Main frame)**

3 = 0495549 Insert

NOTE: **(Foam inserts (1 set = 4 pieces))**

23-0150 FIXTURE

Fixture MW

NOTE: **For supporting the transmission on the assembly stand. For ZF transmissions.**

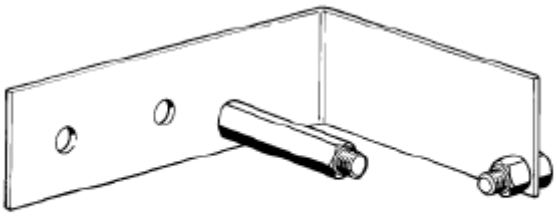


Fig. 34: Identifying Fixture (23-0150)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0170 FIXTURE

Fixture MW

Replaced by: 0495466

NOTE: For mounting the F gearbox on the assembly stand. Replaced by 24 0 200 (0 495 466)

SI number

01 14 99 (482)

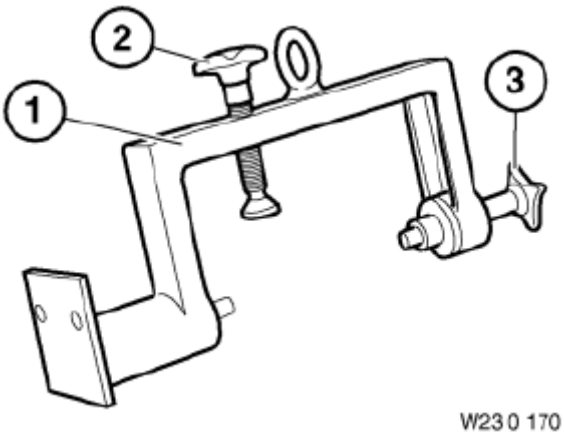


Fig. 35: Identifying Fixture (23-0170)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0493439 Basic body

NOTE: Replaced by 24 0 201 (0 495 488)

2 = 0493440 Spindle

NOTE: (Spindle (2 pieces)) With handle Replaced by 24 0202 (0 495 489)

23-0110 FIXTURE

Fixture MW

NOTE: For removing and installing transmission. Replaced by 23 4 050.

SI number

01 02 00 (551)

Consisting of:

1 = 0494568 Fixture

NOTE: Transmission: S6S 560G

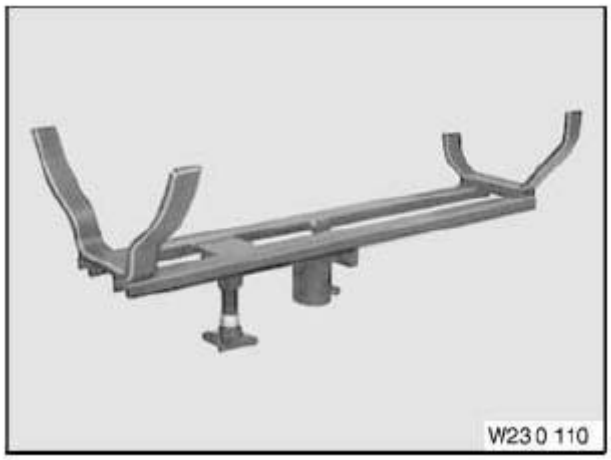


Fig. 36: Identifying Fixture (23-0110)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0494569 Retaining bracket

NOTE: (Holding bracket (not shown)) Transmission: S6S 420G

23-0100 FIXTURE

Fixture MW

NOTE: For mounting transmission on assembly stand

SI number

01 07 90 (244)

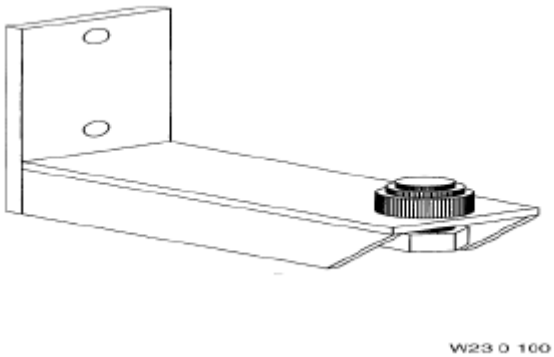


Fig. 37: Identifying Fixture (23-0100)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0250 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (Counter support) Help with slackening and tightening the output flange

Storage Location

B41

SI number

01 06 00 (575)

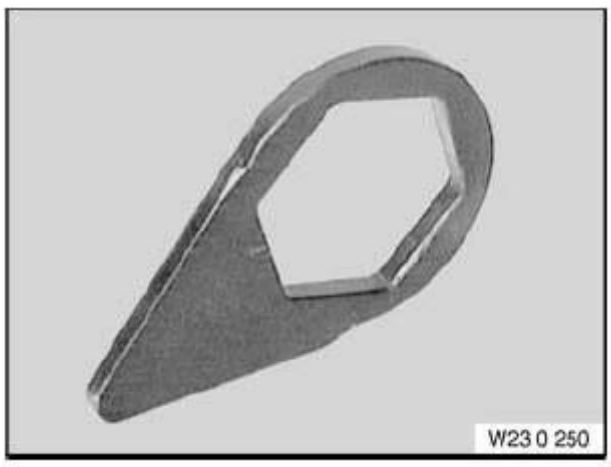


Fig. 38: Identifying Holder (23-0250)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0020 HOLDER

Holder Minimum set: Mechanical tools MW

NOTE: (counter support) For all three- and four-hole flanges when releasing and tightening down

Storage Location

A1

C1

B1

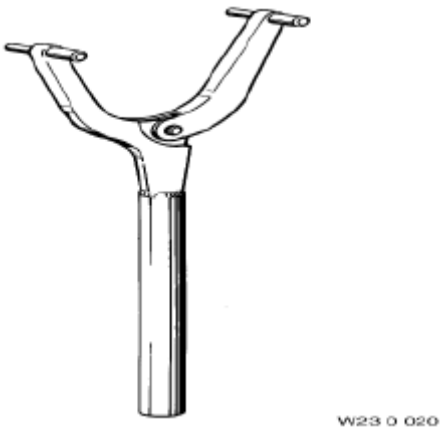


Fig. 39: Identifying Holder (23-0020)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1320 HOLDER

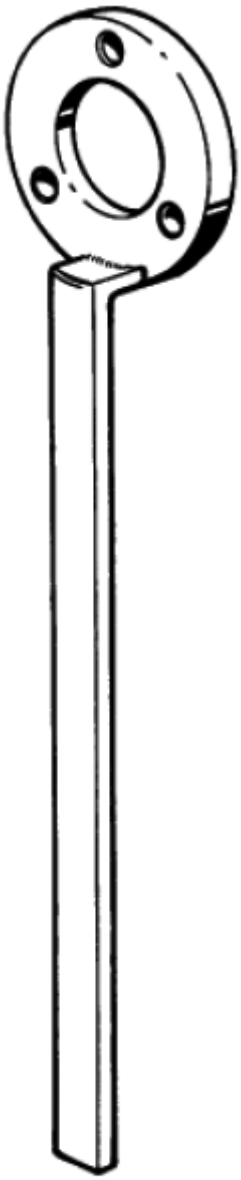
Holder MW

NOTE: (Counter support) For releasing and tightening the nut on the output flange with vibration absorber

Storage Location

Y2

X2



W23 1 320

Fig. 40: Identifying Holder (23-1320)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1440 HOLDING SLEEVE

Holding sleeve MW

NOTE: For pressing the bearing bush and bearing inner race onto the output shaft, as

well as for driving out the bearing of the output shaft (S5D 310Z)

Storage Location

Z7

Z8

W23 1 440

Fig. 41: Identifying Holding Sleeve (23-1440)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0400 KEY

Key MW

NOTE: For removing and installing clutch package.

SI number

01 04 09 (517)

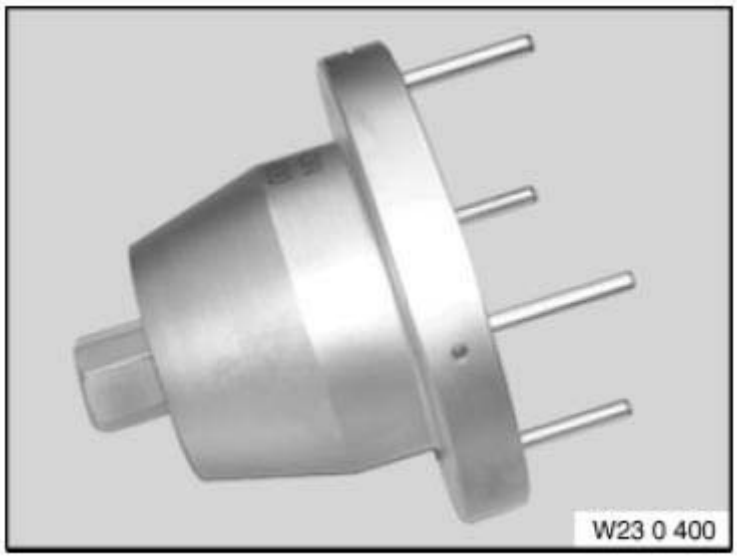


Fig. 42: Identifying Key (23-0400)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3220 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For driving in the radial shaft seal of drive shaft (G transmission)

Storage Location

A49

SI number

01 11 04 (093)

Fig. 43: Identifying Mandrel (23-3220)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2160 MANDREL

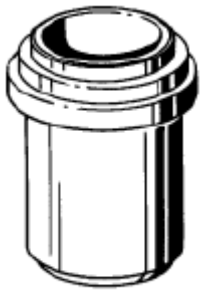
Mandrel MW

NOTE: (Mandrel) For radial seal ring in the transmission housing rear section - output shaft

Storage Location

B17

A17



W23 2 160

Fig. 44: Identifying Mandrel (23-2160)
Courtesy of BMW OF NORTH AMERICA, INC.

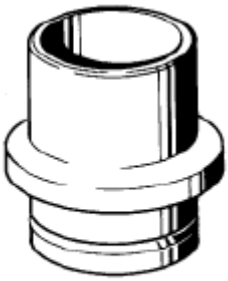
23-1390 MANDREL

Mandrel MW

NOTE: (Drift) For driving in the roller bearing of the countershaft in the transmission housing rear section

Storage Location

X8



W31 1 440

Fig. 45: Identifying Mandrel (23-1390)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2220 MANDREL

Mandrel MW

NOTE: **(Drift) For bearing (countershaft) in front and rear sections of transmission housing**

W23 2 220

Fig. 46: Identifying Mandrel (23-2220)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2300 MANDREL

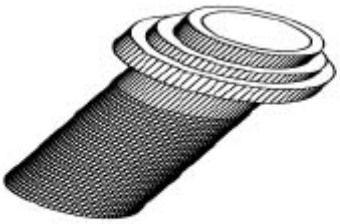
Mandrel Minimum set: Mechanical tools MW

NOTE: **(Drift) For fitting the radial seal of the output shaft in the rear part of the transmission housing**

Storage Location

SI number

01 07 90 (244)



W23 2 300

Fig. 47: Identifying Mandrel (23-2300)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0410 MANDREL

Mandrel MW

NOTE: (drift) For driving in output shaft seal.

Storage Location

B54

SI number

01 04 09 (517)

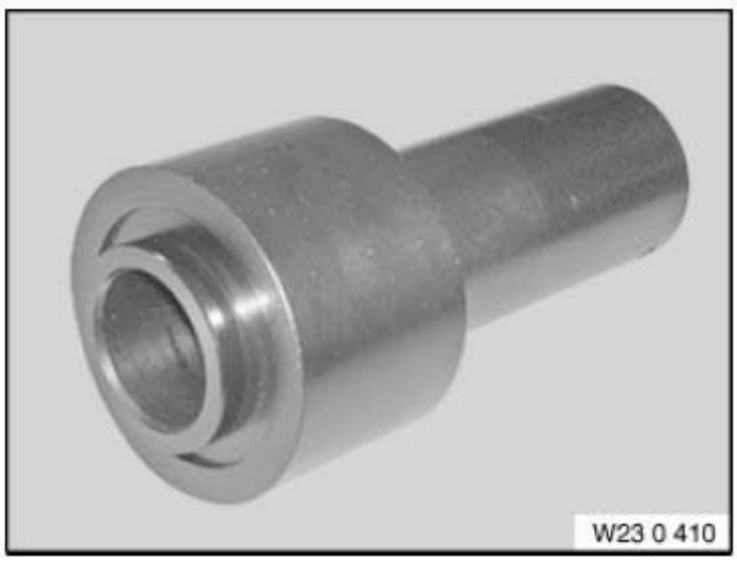


Fig. 48: Identifying Mandrel (23-0410)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1160 MANDREL

Mandrel MW

NOTE: **(drift) For fitting bearing inner race and bearing bush on output shaft (245) - Fitting sliding piece (5th gear-265/5) -Mounting output flange -Mounting bearing on countershaft (S5D 310Z) -Mounting centre bearing on propeller shaft, E46**

Storage Location

B17

W23 1 160

Fig. 49: Identifying Mandrel (23-1160)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1240 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: **(Drift) For driving in the radial seal ring on the gearshift shaft**

Storage Location

A10

W23 1 240

Fig. 50: Identifying Mandrel (23-1240)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2340 MANDREL

Mandrel Minimum set: Mechanical tools MW

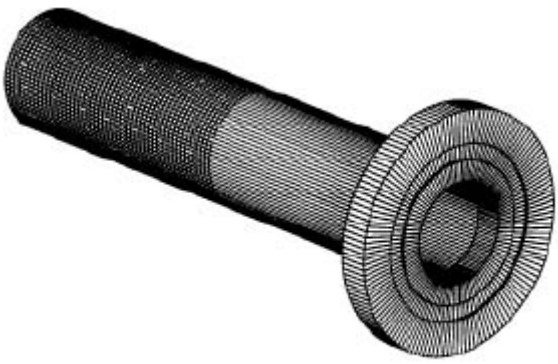
NOTE: (drift) For driving in the radial sealing ring into the front section of the transmission housing

Storage Location

B17

SI number

01 07 90 (244)



W23 2 340

Fig. 51: Identifying Mandrel (23-2340)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2360 MANDREL

Mandrel MW

NOTE: **(Drift) For driving in seal cap for catch pin**

Storage Location

Z3

SI number

01 07 90 (244)

W23 2 360

Fig. 52: Identifying Mandrel (23-2360)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0330 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: **For driving in the sealing cap of the countershaft.**

SI number

01 08 10 (638)

Fig. 53: Identifying Mandrel (23-0330)
Courtesy of BMW OF NORTH AMERICA, INC.

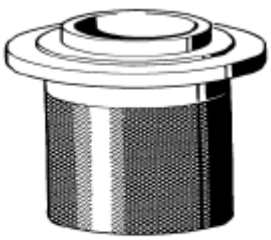
23-1370 MANDREL

Mandrel MW

NOTE: (Drift) For fitting the radial seal of the transmission output flange

Storage Location

Z7



W23 1 370

Fig. 54: Identifying Mandrel (23-1370)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3240 MANDREL

Mandrel MW

NOTE: **(Drift) Driving in radial shaft seal of drive shaft. Transmission: GS6-53BZ (G gearbox) with engine S85, S65**

Storage Location

B18

A18

SI number

01 18 06 (295)

Fig. 55: Identifying Mandrel (23-3240)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2350 MANDREL

Mandrel MW

NOTE: **(drift) For fitting the sealing cap for the gearshift shaft catch pin**

Storage Location

Z3

SI number

01 07 90 (244)

W23 2 350

Fig. 56: Identifying Mandrel (23-2350)
Courtesy of BMW OF NORTH AMERICA, INC.

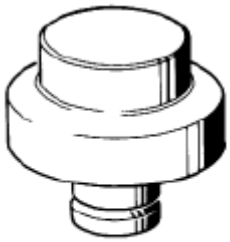
23-1220 MANDREL

Mandrel MW

NOTE: **(drift) For removing and fitting the countershaft roller bearing in the front section of the transmission housing**

Storage Location

X7



W23 1 220

Fig. 57: Identifying Mandrel (23-1220)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3110 MANDREL

Mandrel MW

NOTE: **For fitting guide bushes for catch pins on manual gearboxes.**

Storage Location

Y5

SI number

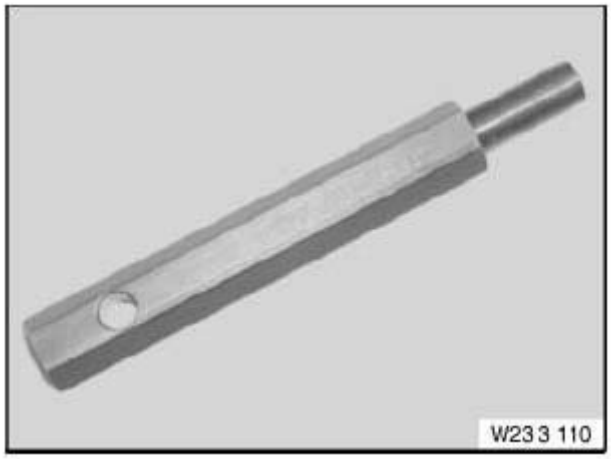


Fig. 58: Identifying Mandrel (23-3110)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1480 MANDREL

Mandrel MW

NOTE: (drift) For removing and fitting the grooved ball bearing in the front section of the transmission

Storage Location

X8

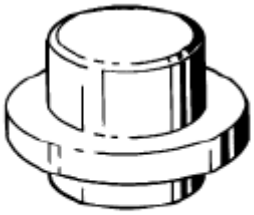


Fig. 59: Identifying Mandrel (23-1480)
Courtesy of BMW OF NORTH AMERICA, INC.

23-4020 MANDREL

Mandrel MW

NOTE: (Drift) For driving in bearing bushes for locking bolts, 5th and reverse gears.

Storage Location

B49

SI number

01 03 04 (070)

Consisting of:

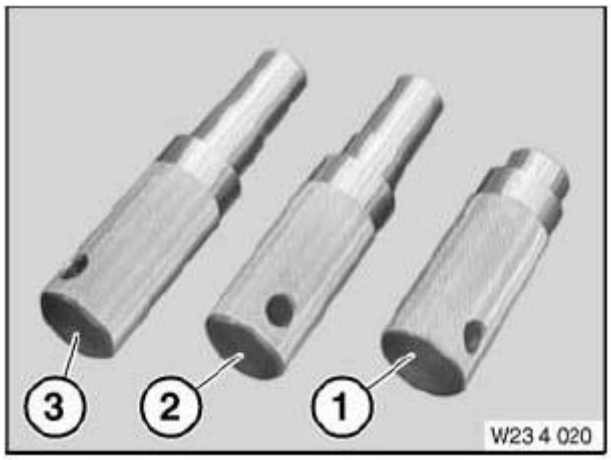


Fig. 60: Identifying Mandrel (23-4020)
Courtesy of BMW OF NORTH AMERICA, INC.

1 = 0494889 Mandrel

NOTE: (Drift) For driving in cover caps on gear notch, 5th and reverse gears.

2 = 0494890 Mandrel

NOTE: (Drift) For driving in bearing bush for locking bolt, 5th gear.

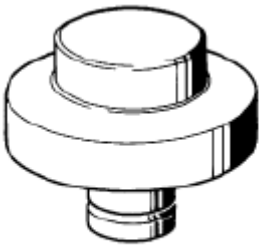
3 = 0494891 Mandrel

NOTE: (Drift) For driving in bearing bush for locking bolt, reverse gear.

23-1190 MANDREL

0491496

NOTE: (drift) For removing and fitting the drive shaft ball bearing in the front section of transmission housing



W23 1 190

Fig. 61: Identifying Mandrel (23-1190)
Courtesy of BMW OF NORTH AMERICA, INC.

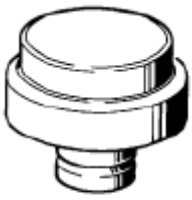
23-1090 MANDREL

Mandrel MW

NOTE: **(drift) For removing and fitting the outer bearing race of the drive shaft in the front section of the transmission housing**

Storage Location

A15



W23 1 090

Fig. 62: Identifying Mandrel (23-1090)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1040 MANDREL

Mandrel MW

NOTE: **(Drift) For mounting sliding piece (5th gear) and driving water pipe out of engine block, engine: N73**

Storage Location

Z7

W23 1 040

Fig. 63: Identifying Mandrel (23-1040)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3230 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Drift) For driving in shaft seal on output shaft (G-transmission)

Storage Location

A49

SI number

01 11 04 (093)

Fig. 64: Identifying Mandrel (23-3230)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0320 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: **For driving in the radial shaft seal on the drive shaft.**

Storage Location

B54

SI number

01 06 06 (249)

Fig. 65: Identifying Mandrel (23-0320)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1080 MANDREL

Mandrel MW

NOTE: **(Drift) For driving outer bearing race into and out of front and centre sections of transmission housing (countershaft) and for driving ball bearing into and out of rear section of transmission housing (drive shaft)**

Storage Location

X8

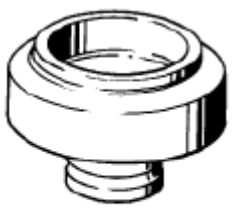


Fig. 66: Identifying Mandrel (23-1080)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1270 MANDREL

Mandrel MW

NOTE: **(Drift) For driving out the outer bearing race for the countershaft in the transmission housing front section, as well as for pressing the sealing ring and needle bearing out of the oil pump housing (A5S 560Z)**

Storage Location

X7

W23 1 270

Fig. 67: Identifying Mandrel (23-1270)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1380 MANDREL

Mandrel MW

NOTE: **(drift) For fitting the countershaft roller bearing in the rear section of the transmission housing**

Storage Location

X8

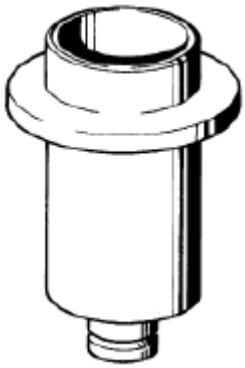


Fig. 68: Identifying Mandrel (23-1380)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2260 MANDREL

Mandrel Minimum set: Mechanical tools MW

NOTE: (Fitting mandrel) For driving in the radial sealing ring on the gearshift shaft of the rear section of transmission housing

Storage Location

A10

SI number

01 07 90 (244)

Fig. 69: Identifying Mandrel (23-2260)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2280 PLATE

Plate MW

NOTE: (Extractor plate) For the front section of the transmission housing

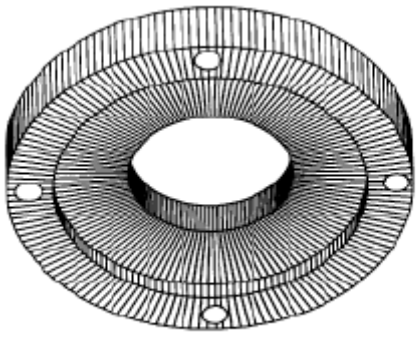
Storage Location

Z4

Z3

SI number

01 07 90 (244)



W23 2 280

Fig. 70: Identifying Plate (23-2280)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2210 PLIERS

Pliers MW

NOTE: (Circlip pliers (straight)) For removing and installing the inside circlip in the transmission housings when replacing the grooved ball bearings

W23 2 210

Fig. 71: Identifying Pliers (23-2210)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2100 PLIERS

Pliers MW

NOTE: **For removing and fitting the circlip on the transmission output shaft**

W23 2 100

Fig. 72: Identifying Pliers (23-2100)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2200 PLIERS

Pliers MW

NOTE: **(Seeger ring pliers (straight)) For removing and installing the outer Seeger rings on the gearbox shaft**

W23 2 200

Fig. 73: Identifying Pliers (23-2200)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3210 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: **For removing shaft seal on output shaft**

Storage Location

A50

SI number

01 11 04 (093)

Fig. 74: Identifying Puller (23-3210)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3200 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: For removing shaft seal on drive shaft

Storage Location

A49

A50

SI number

01 11 04 (093)

Fig. 75: Identifying Puller (23-3200)

Courtesy of BMW OF NORTH AMERICA, INC.

23-0210 PULLER

Puller Minimum set: Mechanical tools MW

NOTE: For removing radial shaft seal on gearshift shaft - F transmission

Storage Location

A12

SI number

01 14 99 (482)

Consisting of:

1 = 0493632 Basic body

2 = 0493633 Spindle

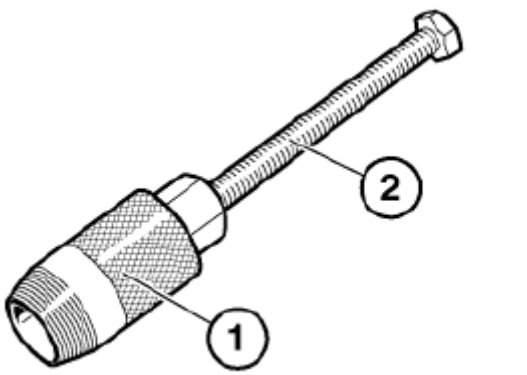


Fig. 76: Identifying Puller (23-0210)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0490 PULLER

Puller MW

NOTE: For removing shaft seal

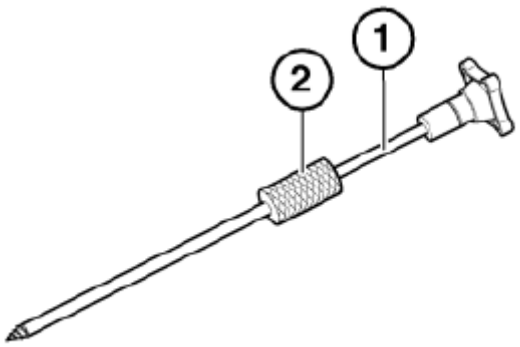
Storage Location

A13

B13

SI number

01 15 96 (106)



W23 0 490

Fig. 77: Identifying Puller (23-0490)
Courtesy of BMW OF NORTH AMERICA, INC.

Consisting of:

1 = 0491455 Rod

NOTE: With self-tapping screw

2 = 0491456 Weight

NOTE: (Weight)

23-2000 PULLER

Puller MW

NOTE: (Rillex ball-bearing extractor 6206) 9 ball bearings with steel cage - For pulling out the grooved ball bearing of the transmission drive shaft

Consisting of:

1 = 0491537 Claw

NOTE: (Claw for Rillex 6206 (9 x))

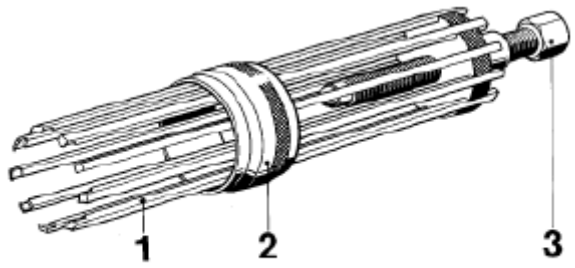


Fig. 78: Identifying Puller (23-2000)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0491538 Holding sleeve

NOTE: (Union sleeve)

3 = 0491539 Spindle

NOTE: (pressure spindle)

23-1070 RING

Ring MW

NOTE: (Measuring ring) For determining the shim between the outer bearing race and the countershaft circlip

Storage Location

X6

Fig. 79: Identifying Ring (23-1070)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0180 RING

Ring Minimum set: Mechanical tools MW

NOTE: **(impact ring with sliding sleeve) For fitting the radial shaft seal to the input end - F transmission**

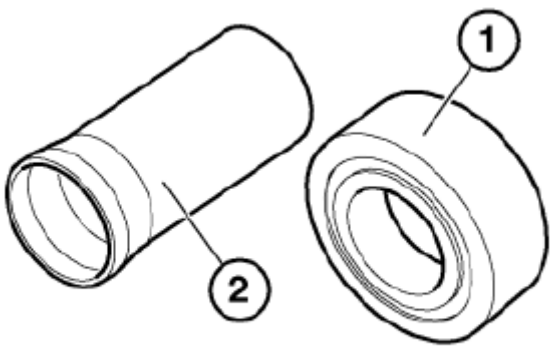
SI number

01 14 99 (482)

Consisting of:

1 = 0493424 Ring

NOTE: **(impact ring)**



W23 0 180

Fig. 80: Identifying Ring (23-0180)
Courtesy of BMW OF NORTH AMERICA, INC.

2 = 0493425 Sleeve

NOTE: **(Sliding sleeve)**

23-3169 SET OF TOOLS

Set of tools Minimum set: Mechanical tools

NOTE: **Removing and installing shaft seals on output side**

Transmission: GS6-37BZ

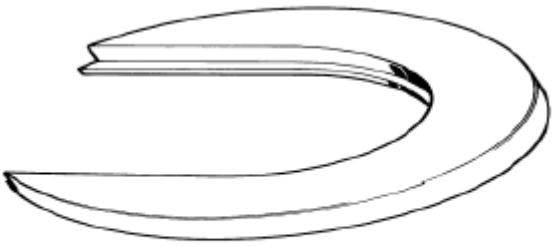
23-2080 SHAPED ELEMENT

Shaped element MW

NOTE: **For pressure testing the guide sleeve - 2nd/3rd gear**

Storage Location

Y8



W23 2 080

Fig. 81: Identifying Shaped Element (23-2080)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2460 SLEEVE

Sleeve MW

NOTE: (Assembly sleeve) For the retaining ring on the drive shaft

Storage Location

A7

SI number

01 02 91 (330)

W23 2 460

Fig. 82: Identifying Sleeve (23-2460)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2380 SLEEVE

Sleeve MW

NOTE: (assembly sleeve) For the circlip on the drive shaft

Storage Location

A7

SI number

01 02 91 (330)

W23 2 380

Fig. 83: Identifying Sleeve (23-2380)
Courtesy of BMW OF NORTH AMERICA, INC.

23-0200 SOCKET

Socket Minimum set: Mechanical tools MW

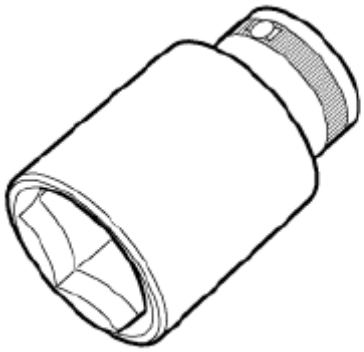
NOTE: (Socket) SW41 Long version for loosening and tightening output flange - F-transmission

Storage Location

A9

SI number

01 14 99 (482)



W23 0 200

Fig. 84: Identifying Socket (23-0200)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1210 SOCKET WRENCH INSERT

Socket wrench insert MW

NOTE: (socket wrench insert SW30) For releasing and tightening down gearbox output flange and rear axle final drive flange

Storage Location

A9

W23 1 210

Fig. 85: Identifying Socket Wrench Insert (23-1210)
Courtesy of BMW OF NORTH AMERICA, INC.

23-2320 SOCKET WRENCH INSERT

Socket wrench insert Minimum set: Mechanical tools MW

NOTE: (socket wrench insert WAF 36) For loosening and tightening the collar nut

Storage Location

A13

SI number

01 07 90 (244)

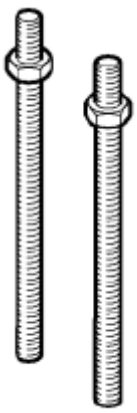
W23 2 320

Fig. 86: Identifying Socket Wrench Insert (23-2320)
Courtesy of BMW OF NORTH AMERICA, INC.

23-1230 SPINDLE

Spindle MW

NOTE: (spindle (2 pieces)) For pulling off the bearing inner race from the drive shaft in the front section of the transmission housing



W23 1 230

Fig. 87: Identifying Spindle (23-1230)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3150 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: **(Tool set) For removing and installing the radial shaft seal of the drive shaft. Transmission: GS6-37BZ/DZ (H transmission)**

Storage Location

B44

C44

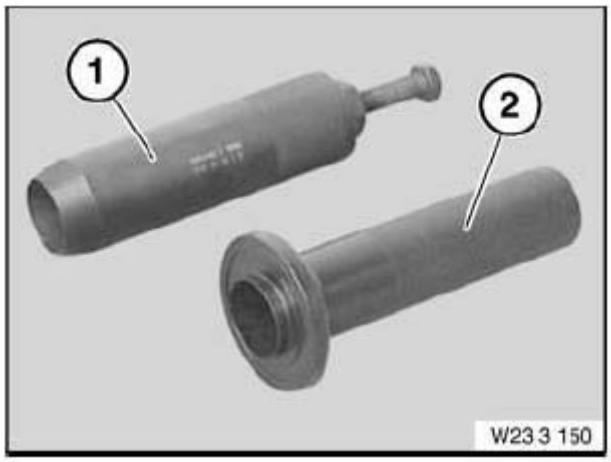


Fig. 88: Identifying Tool (23-3150)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 10 02 (907)

Consisting of:

1 = 0494411 Puller

2 = 0494412 Mandrel

NOTE: **(Drift)**

23-1310 TOOL

Tool MW

NOTE: **For inserting the fuse on the relay lever**

W23 1 310

Fig. 89: Identifying Tool (23-1310)
Courtesy of BMW OF NORTH AMERICA, INC.

23-3160 TOOL

Tool Minimum set: Mechanical tools MW

NOTE: (Tool set) For removing and installing the radial shaft seal of the output shaft. Transmission: GS6-37BZ/DZ (H transmission)

Storage Location

B44

C44

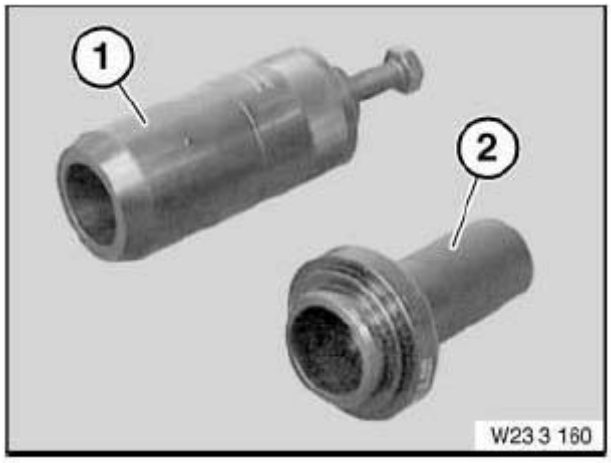


Fig. 90: Identifying Tool (23-3160)
Courtesy of BMW OF NORTH AMERICA, INC.

SI number

01 10 02 (907)

Consisting of:

1 = 0494414 Puller

2 = 0494415 Mandrel

NOTE: **(Drift)**

2300 COMPLETE TRANSMISSION

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

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If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

00 11.. ... DRAINING/TOPPING UP GEAR OIL IN MANUAL TRANSMISSION

NOTE: Gearbox must be at normal operating temperature.

Gear oil:

- Refer to **MANUAL TRANSMISSION - OPERATING FLUIDS**

Filling capacities:

- See **TRANSMISSION FILLING CAPACITIES** or **TRANSMISSION FILLING CAPACITIES**

Draining gear oil:

- Release oil drain plug (1) and filler plug (2).
- Clean oil drain plug (1) and screw in.

Tightening torque **23 00 4AZ** .

Fill transmission with ATF.

- Pour in gear oil until overflowing.
- Tighten in filler screw (2).

Tightening torque: **23 00 4AZ** .

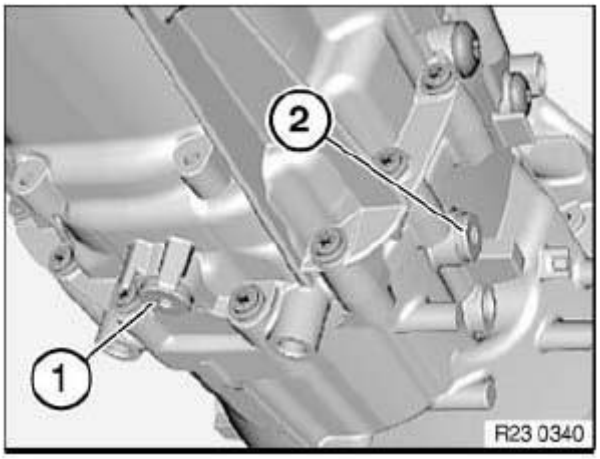


Fig. 1: Identifying Gear Oil Drain Plug And Filler Plug
Courtesy of BMW OF NORTH AMERICA, INC.

23 00 037 INSTALLING REPLACEMENT TRANSMISSION (GS6-53BZ/DZ)

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .

Use only the approved transmission fluid. See MANUAL TRANSMISSION - OPERATING FLUIDS .

Failure to comply with this instruction will result in serious damage to the transmission.

Recycling

Catch and dispose of escaping transmission fluid.

Observe country-specific waste-disposal regulations

Necessary preliminary tasks

- Drain gear oil at oil drain plug. Tightening torque: **23 00 4AZ** .
- **REMOVE TRANSMISSION** .

If necessary, unfasten screws.

Remove and convert transmission bearing block.

Tightening torque **22 32 2AZ** .

NOTE: Illustration shows E46.

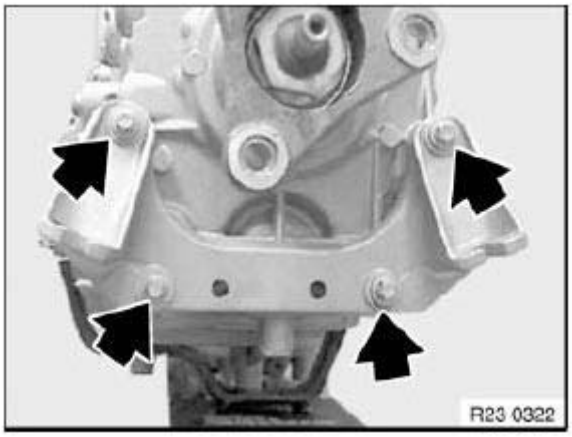


Fig. 2: Locating Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Convert shift rod joint.

Push back retaining ring (1) and drive out dowel pin (2).

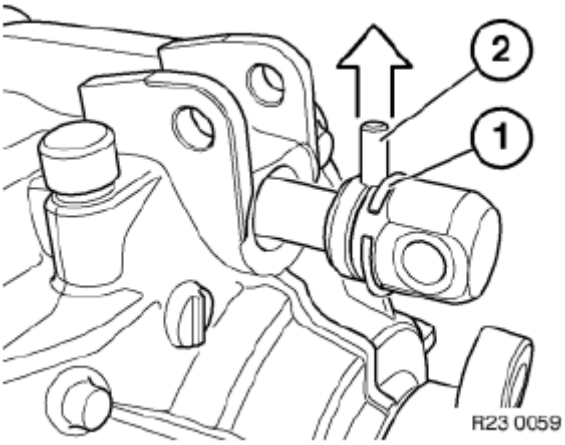


Fig. 3: Removing Dowel Pin
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Check damping disk (6) for damage and replace if necessary.

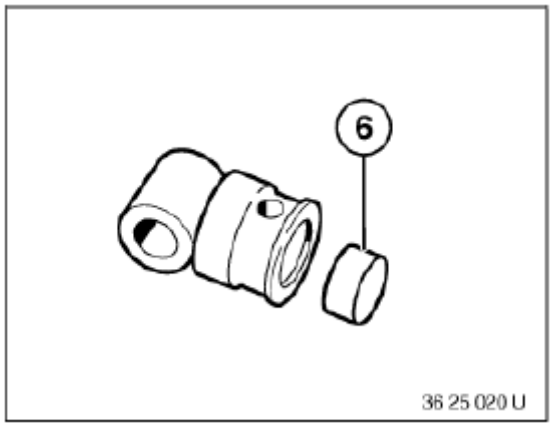


Fig. 4: Identifying Damping Disk
Courtesy of BMW OF NORTH AMERICA, INC.

Convert following parts from previous transmission to new transmission.

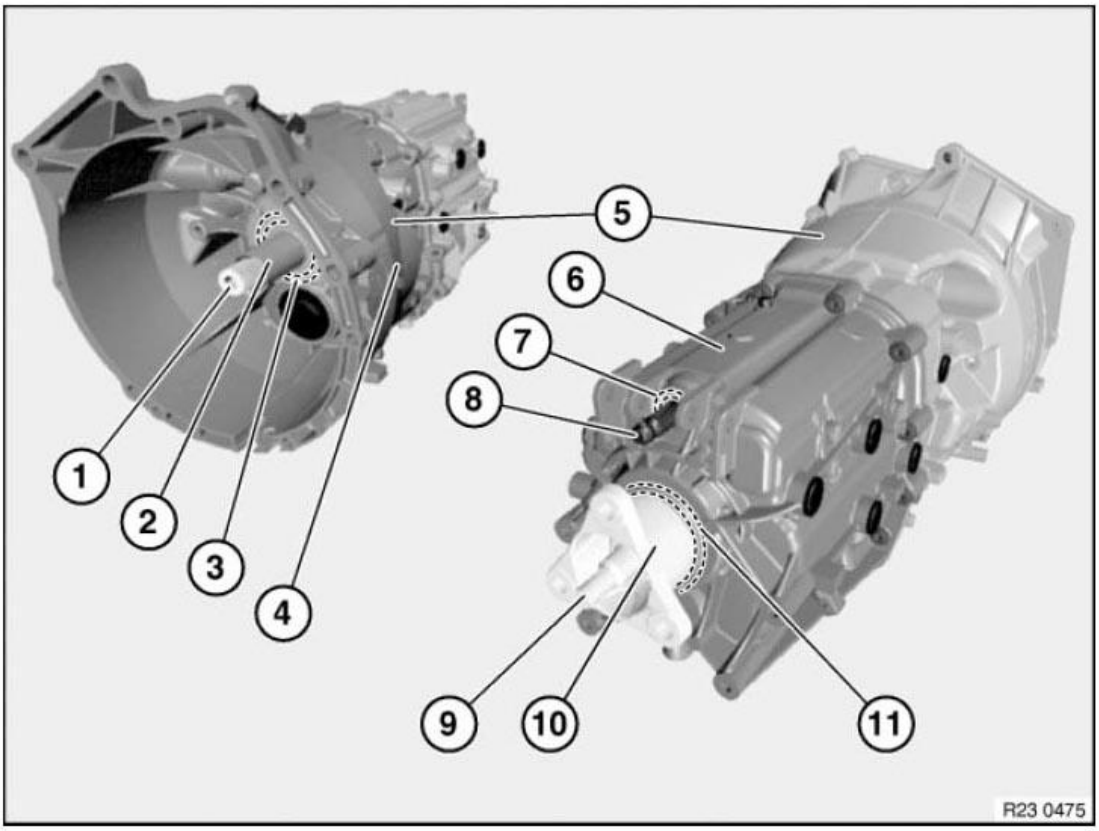
- **RELEASE BEARING AND RELEASE LEVER** .
- Ball pin and spring wire clip
- Studs for clutch slave cylinder.

Check oil level.

Installation:

Observe greasing specification. See **MANUAL TRANSMISSION - OPERATING FLUIDS** .

23 00 ... OVERVIEW OF TRANSMISSION HOUSING (GS6-53BZ/DZ)



0	General information	Complete transmission, oil change, transmission designations
1	Input shaft	
2	Guide tube	
3	Radial seal	For drive shaft
4	Transmission housing, front section	
5	Internal components	
6	Transmission housing, rear section	shafts, gear wheels, gearshift components
7	Radial seal	For selector shaft
8	Shift shaft	
9	Output shaft	
10	Output flange	
11	Radial seal	For output flange

Fig. 5: Overview Of Transmission Housing
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION HOUSING COMPONENTS

General information	Complete transmission, oil change, transmission designations

1 Input shaft	
2. **Guide tube**	
3. **Radial seal**	For drive shaft
4 Transmission housing, front section	
5 Internal components	
6 Transmission housing, rear section	shafts, gear wheels, gearshift components
7 **Radial seal**	For selector shaft
8 Shift shaft	
9 Output shaft	
10 **Output flange**	
11 **Radial seal**	

23 00 018 REMOVING AND INSTALLING TRANSMISSION (GS6-53BZ) N54

IMPORTANT: After completion of work, check TRANSMISSION OIL LEVEL .

Use only approved MANUAL TRANSMISSION - OPERATING FLUID .

Failure to comply with this instruction will result in serious damage to the transmission.

IMPORTANT: Aluminum screws/bolts must be replaced each time they are released.

Aluminum screws/bolts are permitted with and without color coding (blue).

For reliable identification:

Aluminum screws/bolts are **not magnetic.**

Jointing torque and angle of rotation must be observed without fail **(risk of damage).**

Necessary preliminary work

- Clamp off battery. See **61 20 900 DISCONNECTING AND CONNECTING BATTERY NEGATIVE LEAD**
- Remove **FRONT UNDERBODY PROTECTION**
- Remove rear underbody protection
- Remove complete **EXHAUST SYSTEM**
- Remove heat shields
- Support engine with jack when removing gearbox

Remove holder (1).

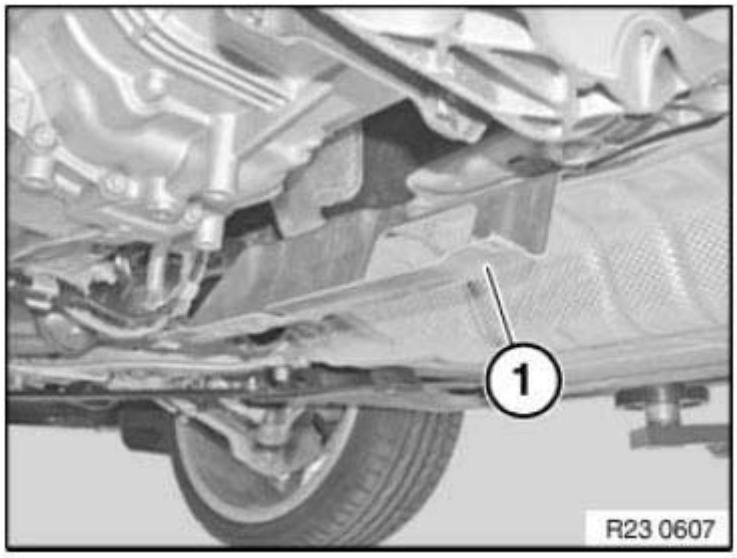


Fig. 6: Identifying Holder
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Disconnect connector (2).

Steel screws, tightening torque **23 00 1AZ** .

Aluminum screws, tightening torque **23 00 2AZ** .

Release aluminum screws with special tool **00 9 010** .

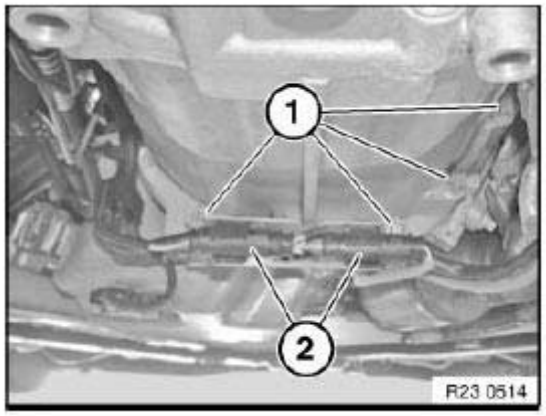


Fig. 7: Identifying Connector
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove holder (2).

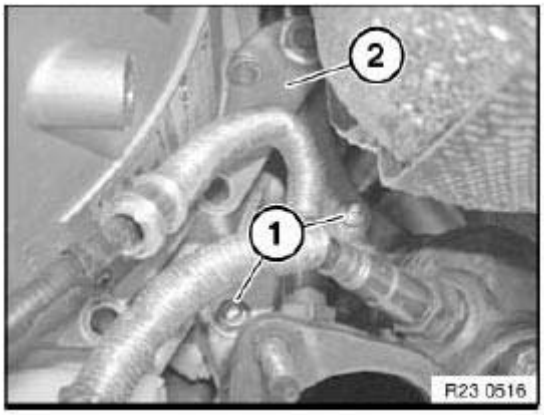


Fig. 8: Identifying Holder Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock connector (1) from reversing light switch and detach.

Release cable from brackets.

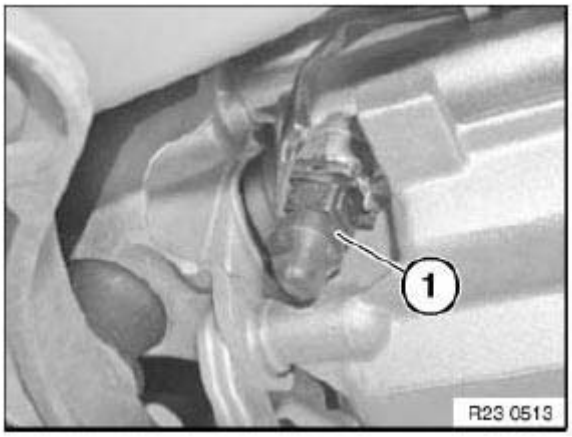


Fig. 9: Identifying Plug Connection
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws (1).

Remove exhaust bracket (2).

Tightening torque **23 71 4AZ** .

NOTE: Graphic similar

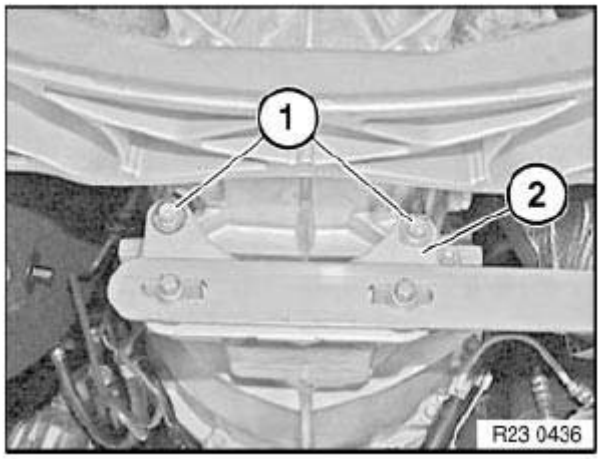


Fig. 10: Identifying Exhaust System Bracket With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools **23 4 050** , **00 2 030** .

Secure transmission to mounting with tensioning strap (1).

After completion of work, check transmission oil level.

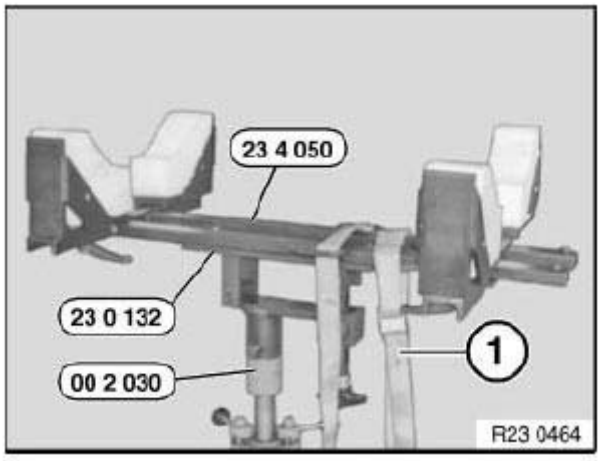


Fig. 11: Supporting Transmission Using Special Tools (23 4 050)
Courtesy of BMW OF NORTH AMERICA, INC.

Release bolts (1) and nuts (2) and remove cross-member.

Tightening torque **23 71 2AZ** .

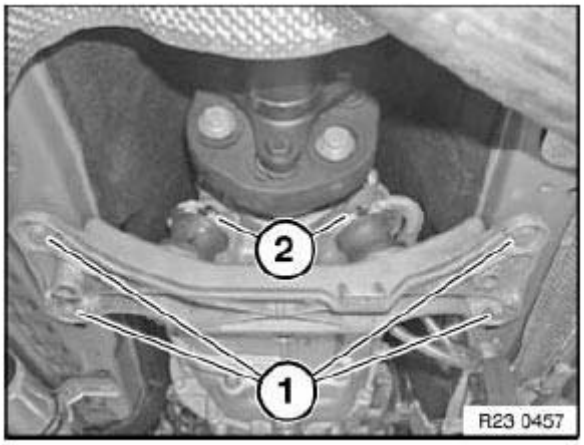


Fig. 12: Identifying Cross-Member Bolts And Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

- Remove propeller shaft from transmission. See **26 11 000 REMOVING AND INSTALLING PROPELLER SHAFT (INSERTED) COMPLETELY** .

IMPORTANT: Do not allow propeller shaft to hang from fixed ball joint (risk of damage).

NOTE: Pressure line of clutch slave cylinder remains connected.

IMPORTANT: Relieve tension on clutch slave cylinder slowly; otherwise air will be drawn in through sealing cup.

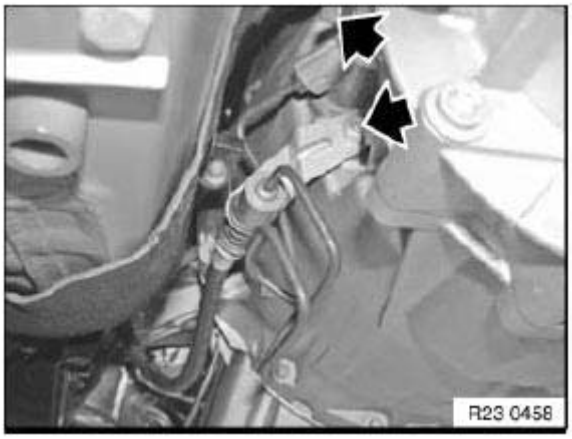


Fig. 13: Locating Clutch Slave Cylinder Nuts
Courtesy of BMW OF NORTH AMERICA, INC.

Release nuts and remove clutch slave cylinder.

Tightening torque **21 52 5AZ** .

Lever out retainer (1).

Disengage gearshift rod (2).

Installation note:

Grease gearshift rod.

Grease, refer to **MANUAL TRANSMISSION - OPERATING FLUIDS** .

Make sure shims (3) are in correct position.

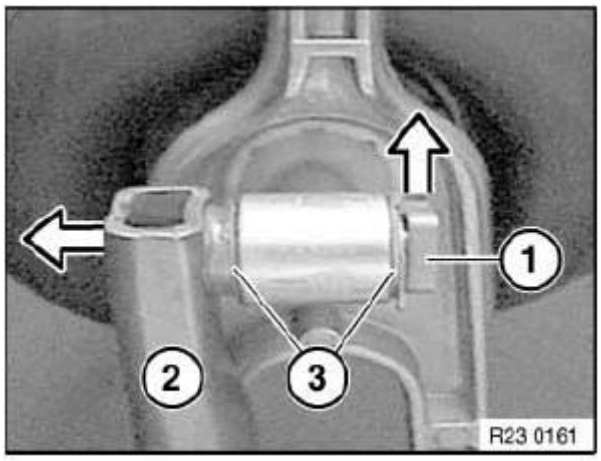


Fig. 14: Disengaging Shift Rod
Courtesy of BMW OF NORTH AMERICA, INC.

Unlock bearing journal (1) in direction of arrow and remove.

Lift out gearshift arm.

Installation note:

Grease bearing journals (1).

Grease, refer to **MANUAL TRANSMISSION - OPERATING FLUIDS** .

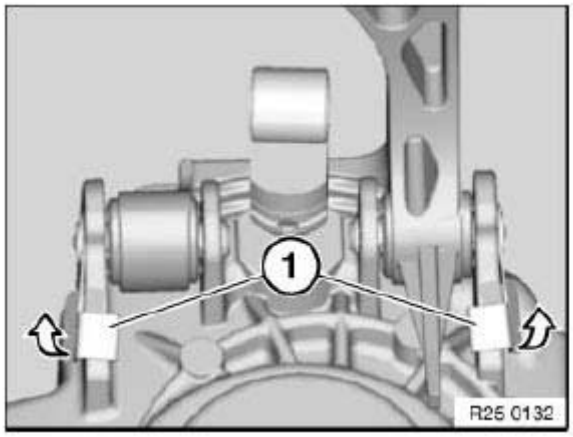


Fig. 15: Removing Bearing Pin
Courtesy of BMW OF NORTH AMERICA, INC.

Release screws.

Steel screws, tightening torque **23 00 1AZ** .

Aluminum screws/bolts (3, 4, 5, 9, 10), tightening torque **23 00 2AZ** .

IMPORTANT: Do not suspend the transmission from the transmission input shaft during removal and installation as this will deform the clutch disc. Pull out transmission towards rear and remove.

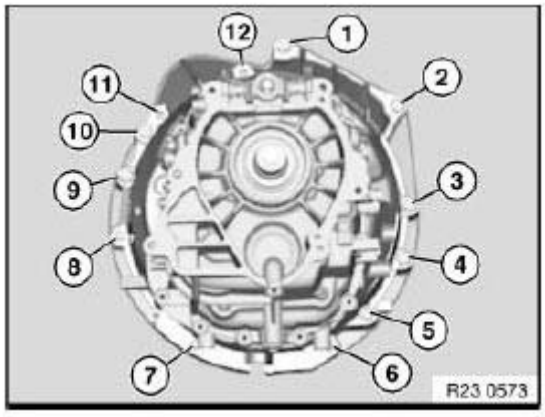


Fig. 16: Identifying Aluminum Screws And Bolts
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Tighten down screws/bolts to specified torque.

Special angle-of-rotation tool **00 9 120** with magnet **00 9 130** .

Secure to vehicle underbody and screw down aluminum screws/bolts in accordance with angle of rotation.

Angle of rotation **23 00 2AZ** .

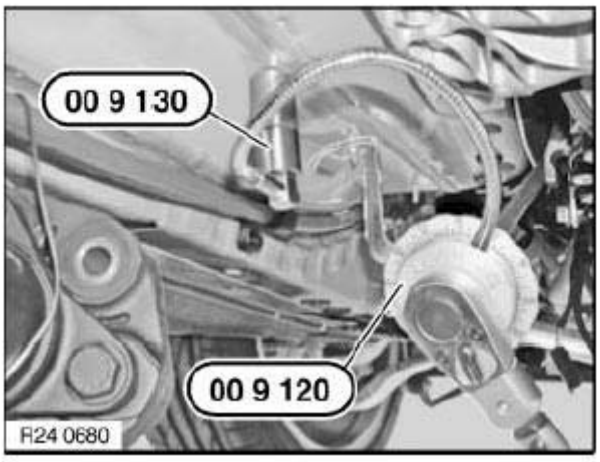


Fig. 17: Securing Angle Of Rotation Using Special Tool (00 9 120) And Magnet (00 9 130)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check that fitting sleeves are correctly fitted.

Replace damaged fitting sleeves.

Ensure correct position of cover plate.

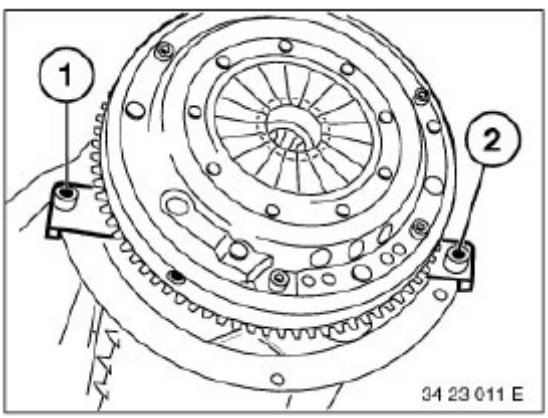


Fig. 18: Identifying Fitting Sleeves
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Check lubrication of transmission input shaft for sticky consistency. If grease is sticky, clean transmission input

shaft and **REPLACE CLUTCH DISC** .

Check clutch disc for friction rust in gearing and **REPLACE** if necessary.

Mechanically remove existing grease and lining abrasion from gearing of clutch disc (with a cloth).

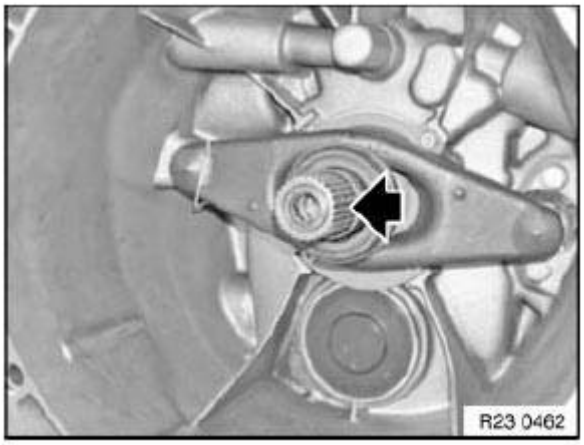


Fig. 19: Locating Transmission Input Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Greasing specification:

- Remove and clean **RELEASE BEARING AND RELEASE LEVER** .
- Push on grease scraper ring **21 2 240** to the limit position.
- Grease gearing (1) of input shaft with a brush. refer to **MANUAL TRANSMISSION - OPERATING FLUIDS** .
- Detach grease scraper ring.

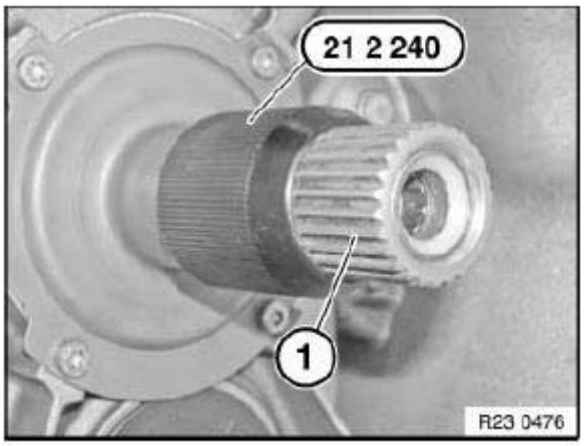


Fig. 20: Identifying Grease Scraper Ring (21 2 240) And Splines

Courtesy of BMW OF NORTH AMERICA, INC.

23 01 010 REPLACING SEALING CAP (GS6-17BG/DG)

Necessary preliminary work

- Remove gearbox
- Remove **CLUTCH RELEASE BEARING/LEVER**

Drive a hole into the sealing cap (1) with a suitable tool (2).

IMPORTANT: Do not use a drill as drillings may result in transmission malfunction.

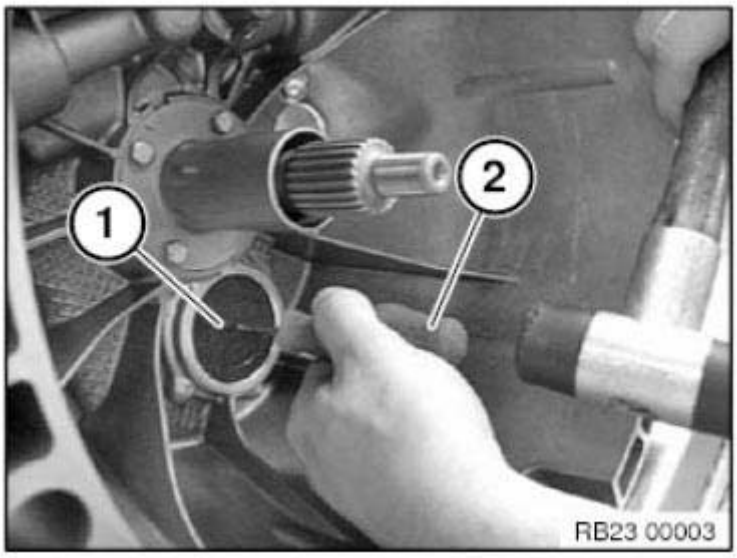


Fig. 21: Drilling Hole Into Sealing Cap Using Suitable Tool
Courtesy of BMW OF NORTH AMERICA, INC.

Screw special tool **23 0 490** into sealing cap.

Withdraw sealing cap from transmission housing with aid of impact weight.

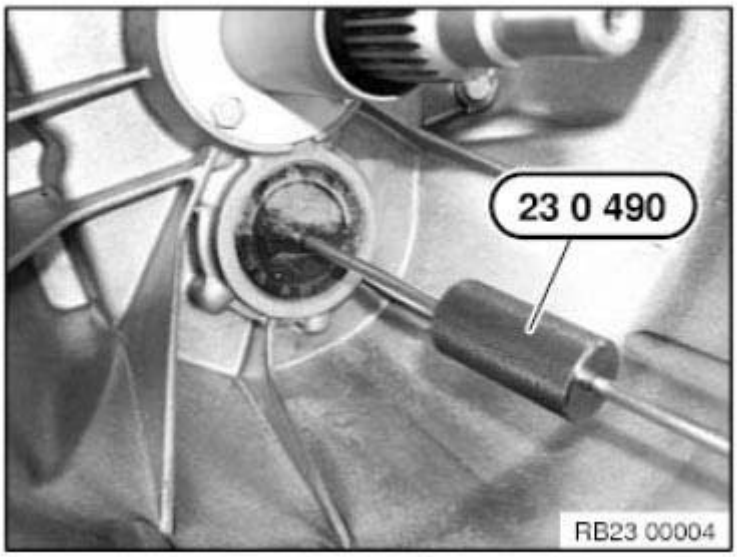


Fig. 22: Turning Sealing Cap Using Special Tool (23 0 490)
Courtesy of BMW OF NORTH AMERICA, INC.

Apply transmission oil to the sealing lip of the sealing cap (1) and insert.

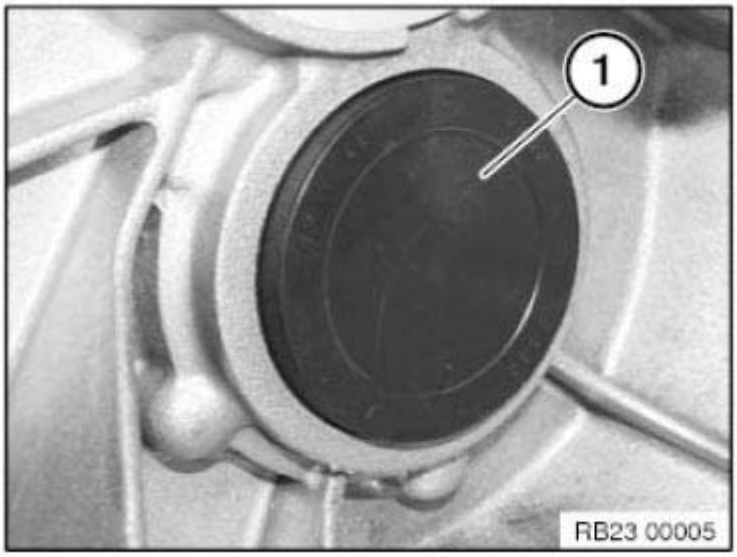


Fig. 23: Identifying Sealing Cap
Courtesy of BMW OF NORTH AMERICA, INC.

Drive sealing cap firmly home with special tool **23 0 330** .

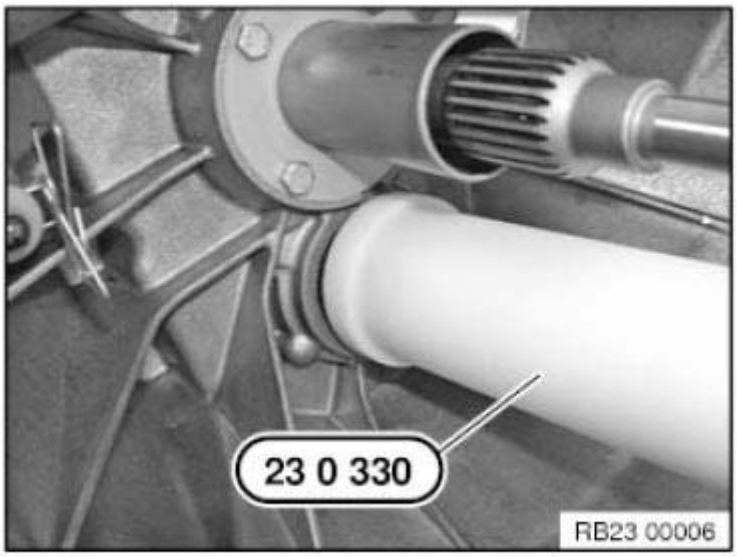


Fig. 24: Driving Sealing Cap Using Special Tool (23 0 330)
Courtesy of BMW OF NORTH AMERICA, INC.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Danger of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Risk of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
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Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
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First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!

RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.

- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

23 TRANSMISSION DESIGNATIONS

Breakdown of BMW designation

BMW BREAKDOWN DESIGNATION - TRANSMISSION

A5S 300J (former designation)		
A	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
5	Number of forward gears	
S	Type of top gear	○ D = Direct gear ○ S = Overdrive gear
300	Max. input torque (Nm)	
J	Code letter of transmission manufacturer	○ G = Getrag ○ J = Jatco ○ R = GMPT (General Motors Powertrain) ○ Z = ZF (Zahnradfabrik Friedrichshafen)
SMG	Notes	SMG = Sequential M gearbox/transmission

BMW BREAKDOWN DESIGNATION - M GEARBOX/TRANSMISSION

GS6-37BZ (new designation according to BMW Group Standard GS 90007)		
G	Transmission	
S	Transmission type	○ S = Manual gearbox ○ A = Automatic transmission
6	Number of forward gears	
-		○ - = Standard with manual gearshift ○ HP = Hydraulic planetary gear train ○ DKG= Twin-clutch transmission/gearbox
37	Transmission type	○ 26 = D-transmission ○ 31 = C-transmission ○ 39 = F-transmission ○ 37 = H-transmission

		o 53 = G-transmission o 17 = I-transmission o 47= J transmission SMG -7-speed o 45 = K transmission o 36= Transmission DKG
B	Gear set	o B = Petrol gear ratio o D = Diesel gear ratio o S= Sport gear ratio
Z	Code letter of transmission manufacturer	o G = Getrag o Z = ZF (Zahnradfabrik Friedrichshafen)

Manual gearbox

BMW BREAKDOWN DESIGNATION - MANUAL GEARBOX

BMW designation	Manufacturer	Manufacturer designation	Remarks
S5D 200G	Getrag	B transmission (220/5)	
S5D 200G	Getrag	B transmission (221/5)	for M41 engine only
S5D 250G	Getrag	B transmission (220/5)	Reinforced design
S5D 260Z	ZF	C-transmission (S5-31 D)	for M51 engine only
S5D 280Z	ZF	C-transmission (S5-31)	
S5D 310Z	ZF	C-transmission (S5-31)	up to 9.95
S5D 320Z	ZF	C-transmission (S5-31)	from 9.95 (reinforced design)
GS5S31BZ (SMG)	ZF	C transmission	SMG
GS5-39DZ	ZF	F transmission	
S6S 420G	Getrag	D-transmission (226/6)	
S6S 420G (SMG)	Getrag	D transmission	SMG
S6S 560G	Getrag	E-transmission (286/6)	
GS6-37BZ	ZF	H-transmission	
GS6S37BZ (SMG)	ZF	H-transmission	
GS6-37DZ	ZF	H-transmission	
GS6-37BG	Getrag	H-transmission	
GS6-53BZ	ZF	G-transmission	
GS6-53DZ	ZF	G-transmission	
GS6-17BG	Getrag	I-transmission	

GS6-17DG	Getrag	I-transmission	
GS7S47BG (SMG)	Getrag	J transmission (247)	SMG -7-speed
GS7D36SG	Getrag	DKG (436)	DKG -7-speed
GS6- 45BZ	ZF	K transmission	
GS6- 45DZ	ZF	K transmission	

Automatic transmission

BMW BREAKDOWN DESIGNATION - AUTOMATIC TRANSMISSION

BMW designation	Manufacturer	Manufacturer designation	Remarks
A4S 200R	GMPT	GM4	
A4S 270R	GMPT	THM-R1w	Transmission wide-stepped
A4S 310R	GMPT	THM-R1	
A5S 300J	Jatco	Jatco	
A5S 310Z	ZF	5HP-18	
A5S 325Z	ZF	5HP-19	
A5S 440Z	ZF	5HP-24	
A5S 560Z	ZF	5HP-30	
A5S 360R/390R	GM	GM5	
GA6HP19Z	ZF	6HP19	
GA6HP26Z	ZF	6HP26	
GA6HP32Z	ZF	6HP32	
GA6L45R	GM	GM6	
GA8HP45Z	ZF	8HP45	
GA8HP70Z	ZF	8HP70	
GA8HP90Z	ZF	8HP90	
GA7AHSCD	Daimler	AHS-C	Hybrid

23 ... UNIVERSAL BMW TRANSMISSION TAKE-UP

NOTE:

- **The universal transmission bracket is introduced for the E60 AWD**
- **Suitable for manual and automatic transmissions**

IMPORTANT: Front and rear supports (1) can be laterally adjusted by means of screws (2).

Carrier (3) of rear supports (1) can be longitudinally adjusted by means of screw.

Supports must be adapted in length and width to the transmission.

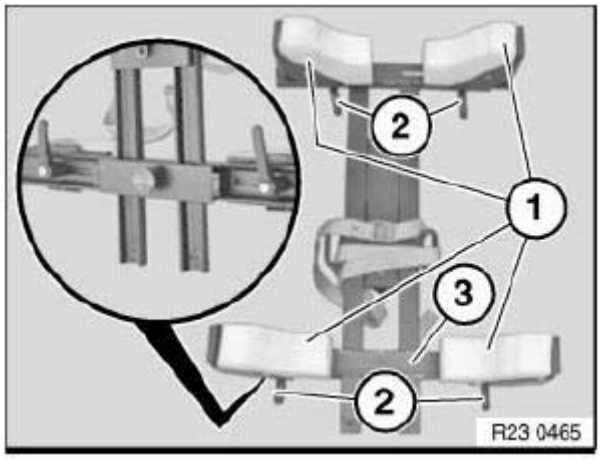

Fig. 25: Identifying Rear Support Carrier, Front And Rear Support Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Supporting transmission

Support transmission with special tools **23 4 050** , **00 2 030** .

IMPORTANT: Transmission must be secured with tensioning strap (1).

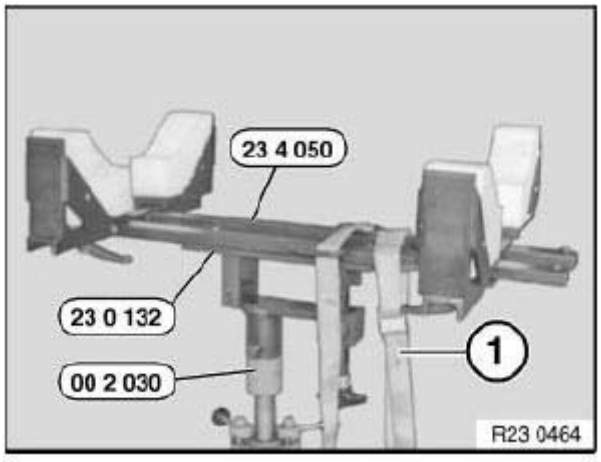

Fig. 26: Supporting Transmission Using Special Tools (23 4 050)
Courtesy of BMW OF NORTH AMERICA, INC.

23 .. ... UNIVERSAL TRANSMISSION RETAINING BRIDGE

NOTE:

- **The transmission retaining bridge 24 0 200 is suitable for both manual and automatic transmissions**

IMPORTANT: Adapters and spindles must be adapted for positive locking to the transmission.

(Risk of injury)

Adapt adapters (1) and spindle with thrust piece (3) to transmission.

Adapt length with slide (2).

Screw in spindle (4).

IMPORTANT: Before mounting on assembly stand 00 1 450, check retaining bridge for secure seating.

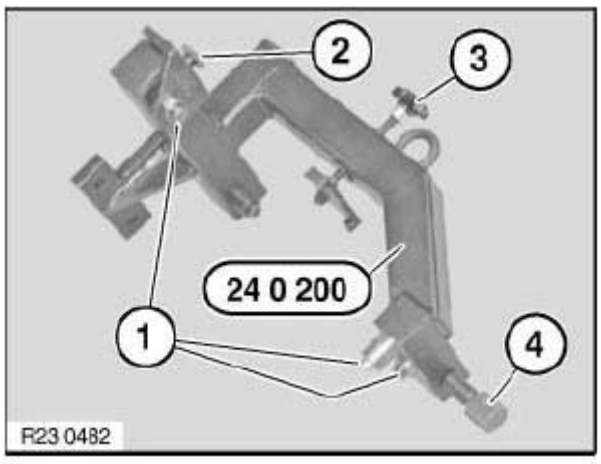

Fig. 27: Identifying Transmission Retaining Bridge, Adapters, Spindle
Courtesy of BMW OF NORTH AMERICA, INC.

2311 HOUSING WITH COVER

23 11 615 REPLACING GUIDE TUBE FOR CLUTCH RELEASE UNIT (GS6-53BZ/DZ)

NOTE: (transmission removed)

Necessary preliminary tasks

- Remove **CLUTCH RELEASE BEARING AND RELEASE LEVER** from guide tube

Release screws.

Remove guide tube (1).

Installation:

Clean thread.

Install screws with Loctite 243.

Tightening torque **23 11 2AZ** .

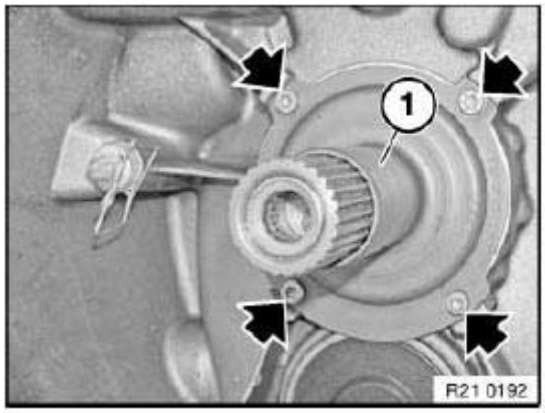

Fig. 28: Identifying Guide Tube With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: Remove sticker (1) and adhesive with a suitable solvent.

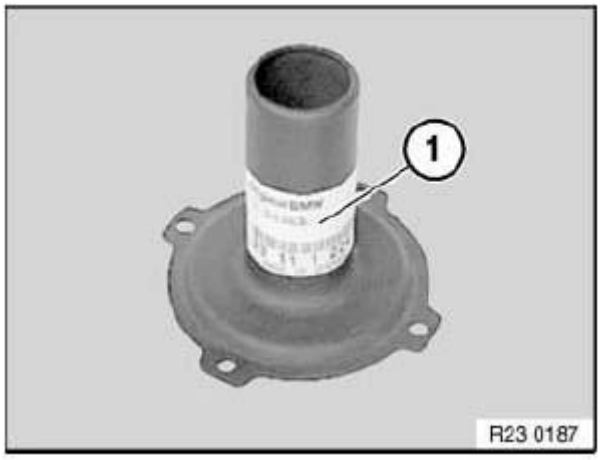

Fig. 29: Identifying Sticker
Courtesy of BMW OF NORTH AMERICA, INC.

2312 BEARING IN HOUSING, SEALING RING

23 12 510 REPLACING RADIAL SHAFT SEAL FOR DRIVE SHAFT (GS6-53BZ/DZ)

IMPORTANT: After completion of work, check TRANSMISSION FLUID LEVEL .

Use only approved MANUAL TRANSMISSION - OPERATING FLUID .

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks

- Remove **TRANSMISSION** .
- Remove **CLUTCH RELEASE UNIT AND RELEASE LEVER** from guide tube.

Release screws.

Tightening torque: **23 11 2AZ** .

Remove guide tube (1).

Installation:

Clean guide tube.

Do not grease guide tube.

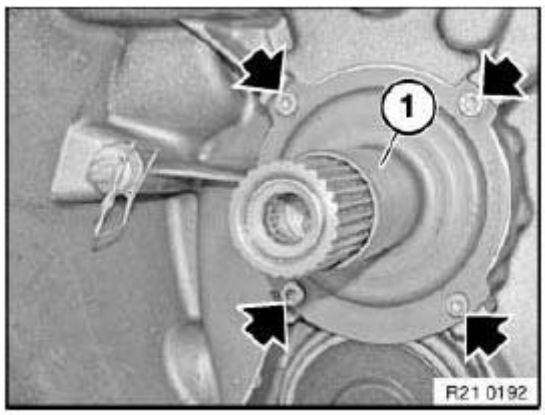

Fig. 30: Identifying Guide Tube With Mounting Screws
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on special tool **23 3 200** .

Push special tool onto drive shaft and screw into sealing ring.

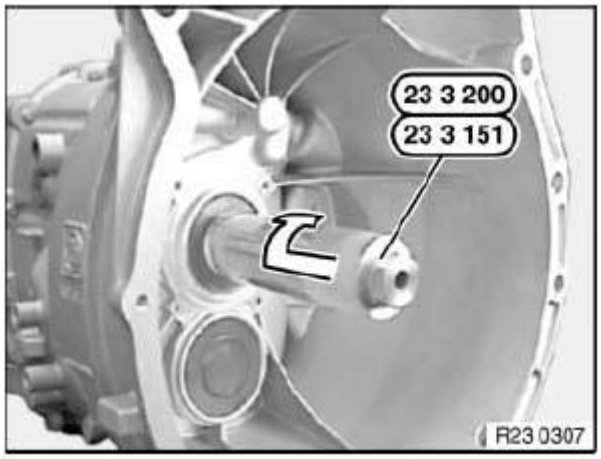

Fig. 31: Pushing Special Tool Onto Drive Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw into special tool **23 3 200** again and continue turning until sealing ring is pulled out of transmission housing.

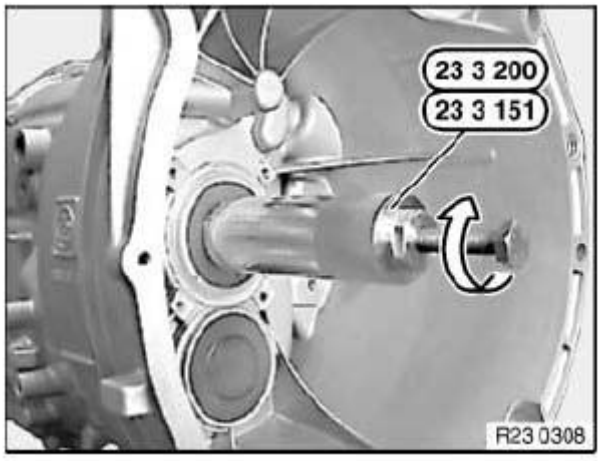

Fig. 32: Turning Screw Into Special Tool (23 3 200)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation

Coat sealing lips of radial seal with gear oil.

Push radial seal (1) onto drive shaft up to housing.

Drive in radial seal (1) as far as it will go with special tool **23 3 220** and plastic hammer.

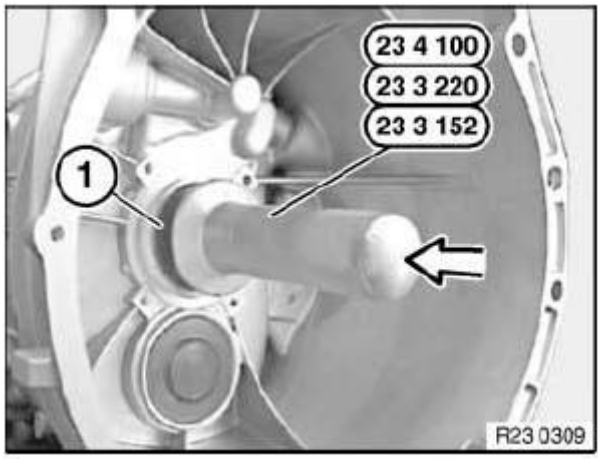

Fig. 33: Installing Radial Seal Using Special Tool 23 3 220
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 059 REPLACING RADIAL SHAFT SEAL FOR OUTPUT FLANGE (GS6-53BZ/DZ)

IMPORTANT: After completion of the work, check the TRANSMISSION OIL LEVEL .

Use only approved MANUAL TRANSMISSION - OPERATING FLUID .

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary work

- Remove propeller shaft.

Tasks are described at "Removing the **PROPELLER SHAFT** ".

Brace output flange with special tool **23 0 020** .

Undo collar nuts with special tool **23 0 200** .

Installation note:

Mark flange with thermo crayon and heat to min. 80° 100°.

WARNING: Risk of burning! Fit flange with suitable protective gloves only.

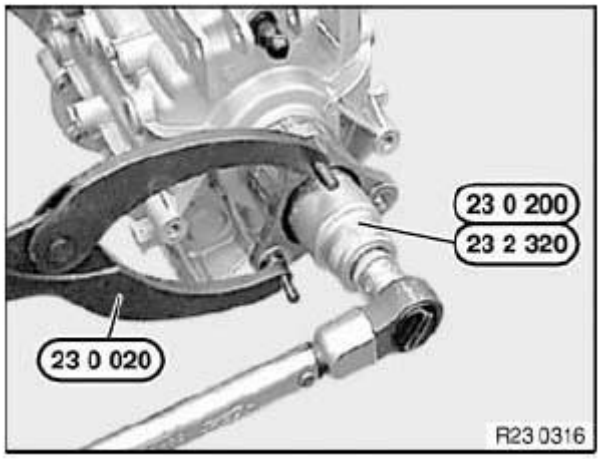

Fig. 34: Removing Collar Nut Using Special Tool (23 2 320)
Courtesy of BMW OF NORTH AMERICA, INC.

IMPORTANT: Do not drive on flange.

Secure collar nut with Loctite 243.

- Loctite 243: BMW Parts Department.
- Tightening torque: **23 21 1AZ** .

Detach output flange (1) with special tool **331 150 DEVICE** and adapter plate 33 1 154 from output shaft.

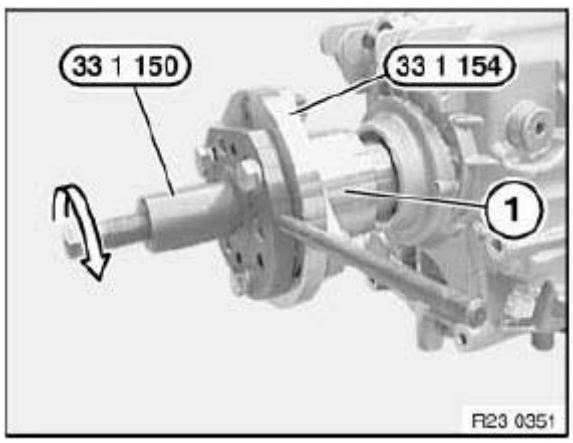

Fig. 35: Detaching Output Flange With Special Tool (33 1 150) And Adapter Plate (33 1 154)
Courtesy of BMW OF NORTH AMERICA, INC.

Release screw on special tool **23 3 210** .

23 3 210 Push special tool over output shaft and screw firmly into sealing ring.

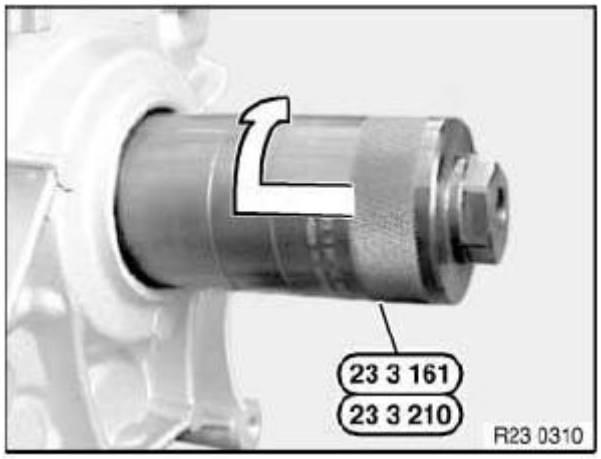

Fig. 36: Sliding Special Tool (23 3 210) Over Output Shaft
Courtesy of BMW OF NORTH AMERICA, INC.

Insert screw into special tool **23 3 210** again and continue turning until sealing ring is pulled out of transmission housing.

If necessary, remove ring spring of sealing ring.

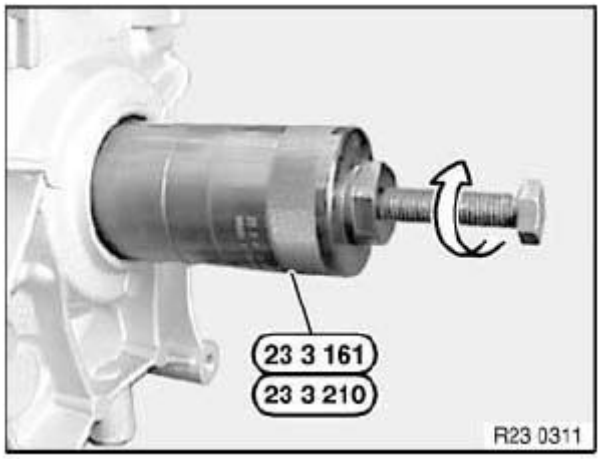

Fig. 37: Inserting Screw Into Special Tool (23 3 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Installation note:

Coat sealing lips of new radial shaft seal with transmission oil.

Drive radial shaft seal fully home using special tool **23 3 230** and plastic hammer.

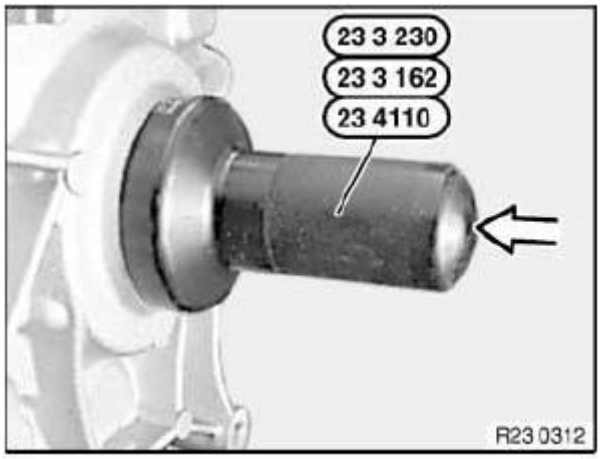

Fig. 38: Installing Radial Seal Using Special Tool (23 3 230)
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 089 REPLACING RADIAL SHAFT SEAL FOR SELECTOR SHAFT (GS6-53BZ/DZ)

IMPORTANT: After completion of work, check TRANSMISSION FLUID LEVEL .

Use only approved transmission oil. See MANUAL TRANSMISSION - OPERATING FLUID .

Failure to comply with this instruction will result in serious damage to the transmission.

Necessary preliminary tasks

- Shift transmission into 2nd gear
- Unflange propeller shaft from transmission.

Tasks are described in Removing **PROPELLER SHAFT** .

Lever retaining ring (1) out of groove with a small screwdriver.

Slide locking ring (1) towards rear.

Drive out cylinder pin (2).

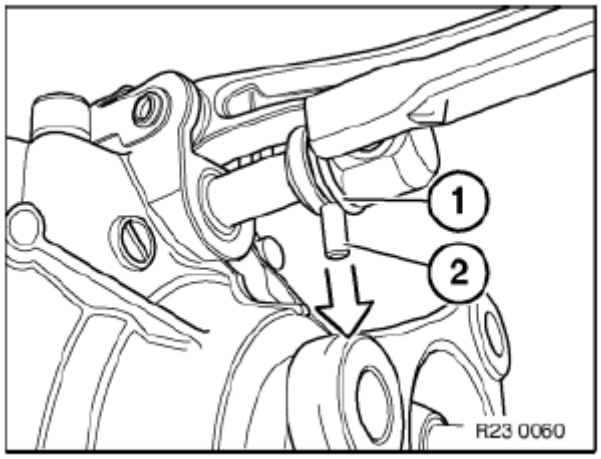

Fig. 39: Pushing Cylindrical Ring
Courtesy of BMW OF NORTH AMERICA, INC.

Screw in special tool **23 0 210** until it is firmly connected with radial seal (1).

Pull out radial seal with special tool **23 0 210** .

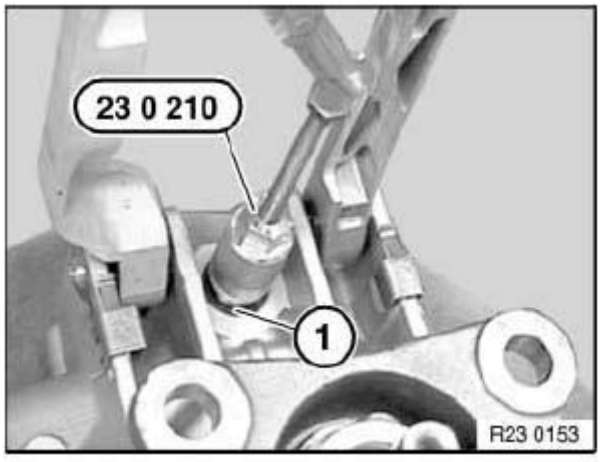

Fig. 40: Connecting Radial Shaft Seal Using Special Tool (23 0 210)
Courtesy of BMW OF NORTH AMERICA, INC.

Coat sealing lips of radial seal and selector shaft with transmission oil.

Drive in radial seal with special tool **23 0 220** .

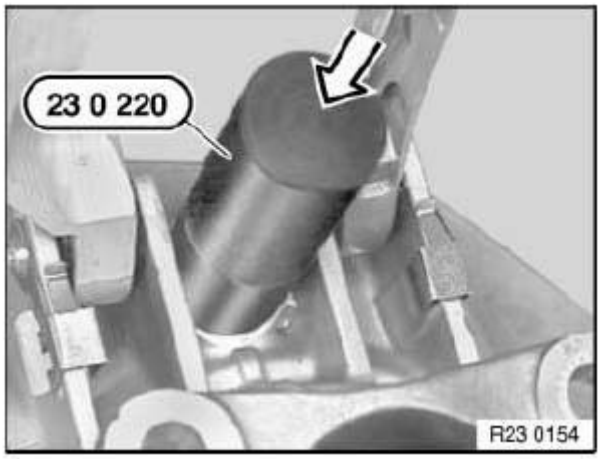

Fig. 41: Installing Radial Seal Using Special Tool (23 0 220)
Courtesy of BMW OF NORTH AMERICA, INC.

23 12 506 REPLACING THE DRIVE SHAFT RADIAL SHAFT SEAL (GS6-85BG)

NOTE: After completion of work, check gearbox oil level.

Use only the approved gearbox oil. See MANUAL TRANSMISSION - OPERATING FLUIDS .

Failure to comply with this requirement will result in serious damage to the manual transmission!

Necessary preliminary work

- Remove transmission.
- Remove clutch release bearing.

Release bolts (1) and remove guide tube (2).

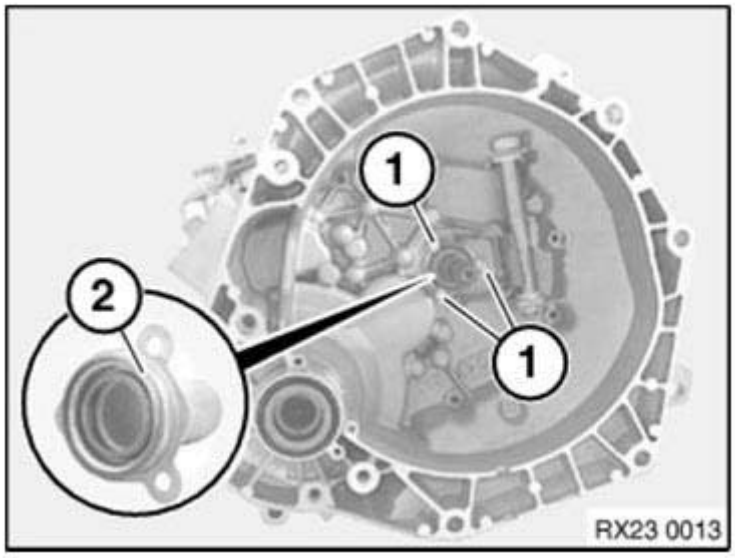

Fig. 42: Identifying Guide Tube
Courtesy of BMW OF NORTH AMERICA, INC.

NOTE: The shaft seal and the guide tube are replaced together.

Installation note:

Wrap adhesive tape round keyway splines of drive shaft to avoid damaging the sealing ring while it is being installed.

Lubricate sealing lip of sealing ring.

Replace mounting bolts of guide bush.

Tightening torque **23 11 1AZ** .

STANDARD/AUTOMATIC TRANSMISSION

In today's modern vehicles, the automatic transmission has become a vital part of the powertrain. Automatic transmissions provide overall better fuel economy and efficiency while adapting to changing road conditions and driving habits. Standard transmissions offer more driver interaction with the vehicle, however automatic transmissions reduce driver fatigue and increase safety by shifting automatically. Automatic transmissions also offer improved driveability in stop and go traffic. If there is a disadvantage to an automatic transmission, it would be complexity and cost of manufacturing. See **Fig. 1**.

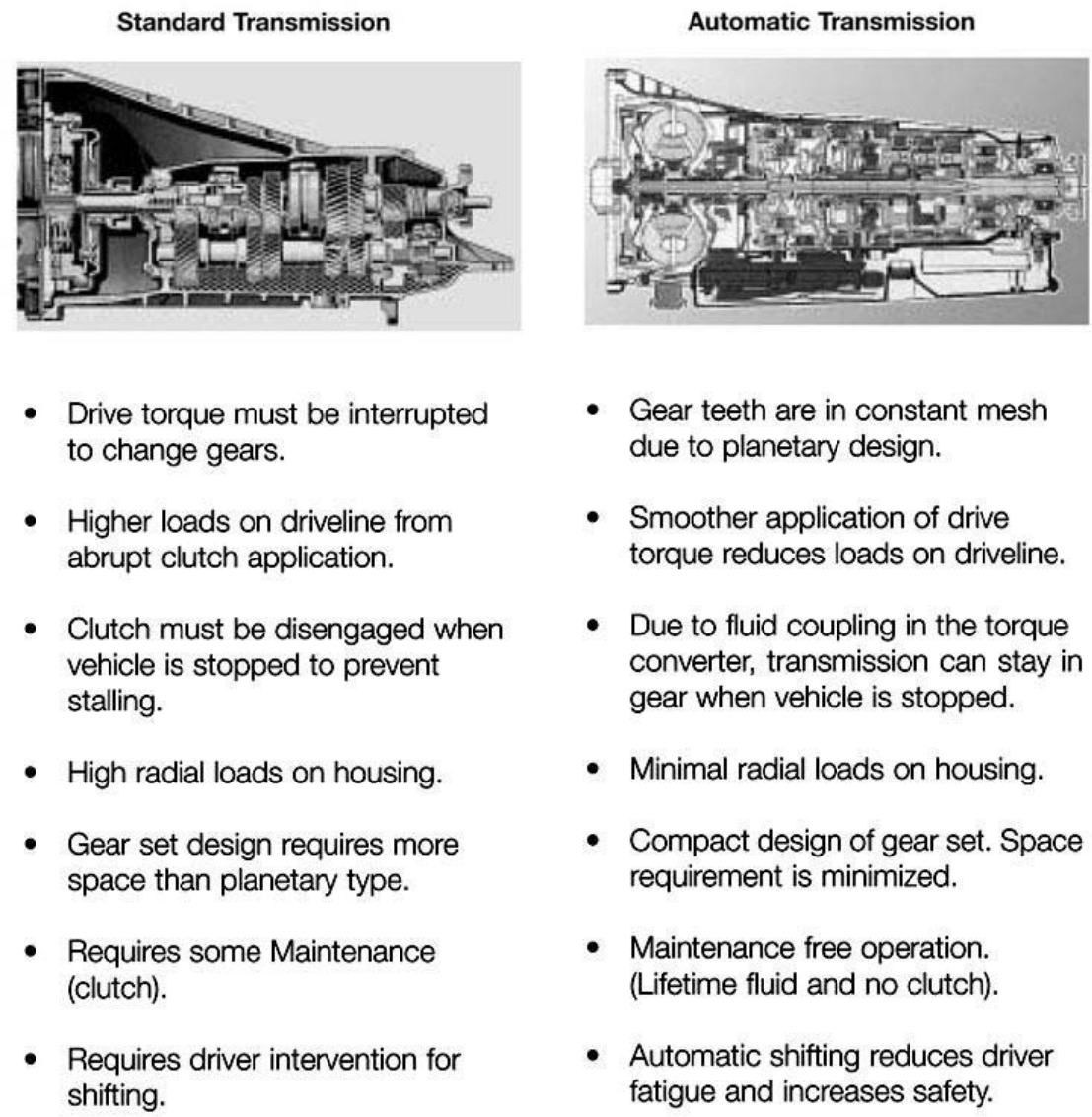

Fig. 1: Standard & Automatic Transmission Comparison
Courtesy of BMW OF NORTH AMERICA, INC.

HYDRAULIC TRANSMISSION VS. ELECTRO-HYDRAULIC TRANSMISSION

Since the introduction of the automatic transmission there have been numerous refinements to improve shift comfort as well as fuel economy. Early automatic transmissions used only hydraulic control, there was no electronic intervention. In 1986 BMW introduced their first EH (Electro-Hydraulic) transmission into production vehicles. The acronym EGS is used by BMW for its electronic transmission control system. EGS stands for "Electronic Transmission Control" which comes from the German words "Elektronisch Getriebe Steurung". In order to comply with SAE terminology we will refer to the EGS control module as the TCM "Transmission Control Module". EH controlled transmissions allow for optimized shift points by closely

monitoring changing conditions. Engine speed, road speed and throttle angle are some of the inputs that are monitored by the TCM to determine optimal shift points. The TCM will then process this information and control shift point via electronic solenoids mounted on the valve body. With the introduction of Adaptive Transmission Control, shift comfort and fuel economy was further improved. The TCM now monitors throttle angle deviations, wheel speeds and CAN Bus information to fine tune shift points. See **Fig. 2**.

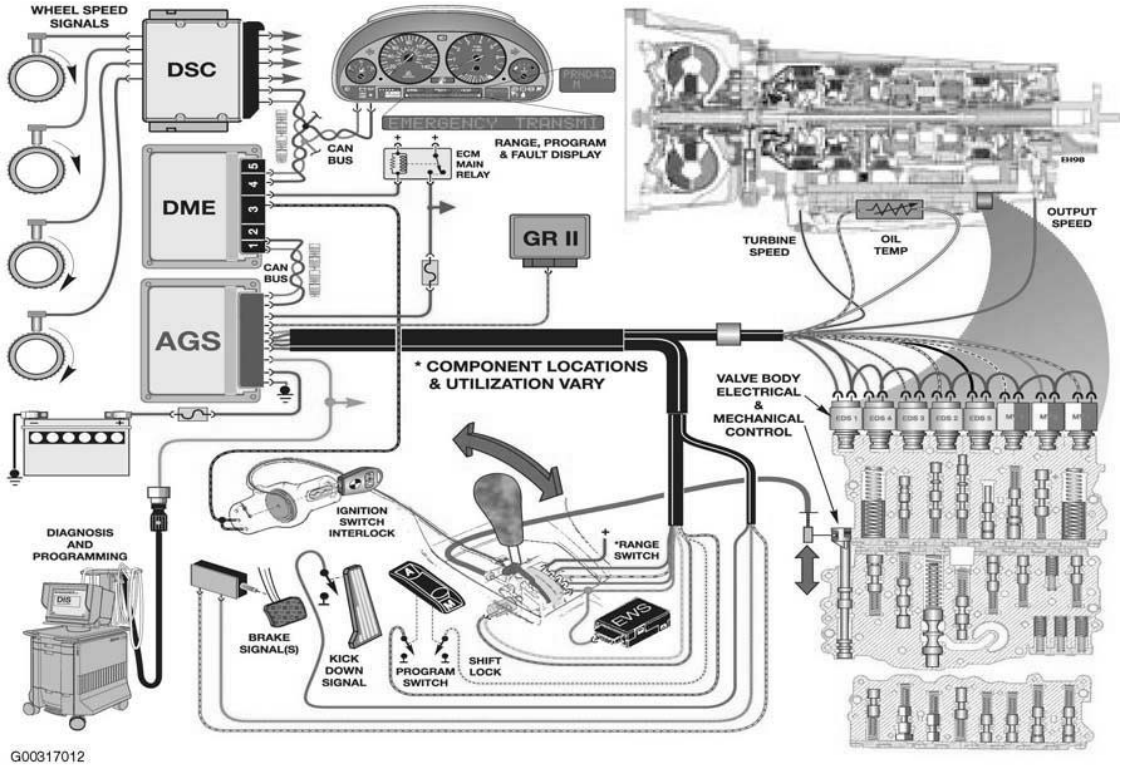

Fig. 2: Electronic Transmission Control System
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION IDENTIFICATION

BMW automatic transmissions are manufactured by two suppliers for the US market:

- Zahnradfabrik Friedrichshafen: Commonly referred to as ZF. ZF manufactures both manual and automatic transmissions.
- GM Powertrain - Hydramatic: Hydramatic is a manufacturing division of General Motors located in Strasbourg France. Hydramatic supplies automatic transmissions to BMW for four and six-cylinder vehicles.

BMW has developed an internal numbering system for their transmissions for parts ordering, information research and identification. Also, each manufacturer uses their own internal identification system. Here is a breakdown of these identification codes. See **Fig. 3**.

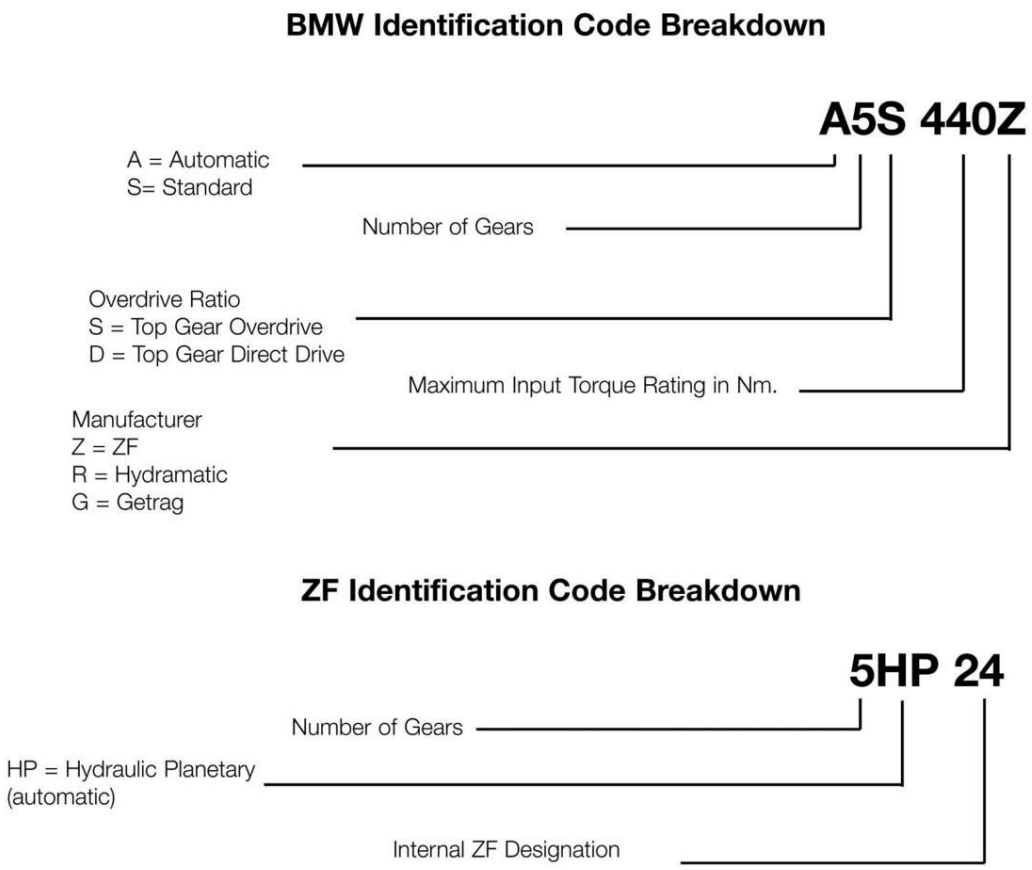

Fig. 3: Transmission Code Breakdown
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION HYDRAULICS

TRANSMISSION FLUID (OIL)

The automatic transmission provides pressure regulated hydraulic fluid which is filtered for all of the transmissions functional requirements. See **Fig. 4**. All BMW automatic transmissions are designed to operate with specific fluids. Use of non-approved oil will cause malfunctions and irreparable transmission damage which is not covered by BMW warranty. The transmission fluid provides the following functions:

- Lubricates mechanical components (planetary gears, bearings etc.).
- Removes heat and transfers heat to transmission cooling system. (heat exchanger).
- Removes debris and contaminants to sump and filter when circulated.
- Provides a transfer of kinetic energy in the torque converter.
- Allows hydraulic operation of mechanical components (clutches, brakes) via control of the valve body.

Also, transmission fluid has various properties to prevent oxidation and breakdown from heat and friction. Each

type of transmission fluid has properties specific for each transmission application. Fluid level is crucial in the proper operation of an automatic transmission. Improper fluid levels will cause improper operation and eventually irreparable transmission damage. Improper fluid level can cause:

- A low fluid level can cause an interruption in oil flow during fast acceleration or hard braking which can cause gear shift malfunctions.
- An excessively high fluid level can cause the rotating mechanical components to paddle in the oil. This produces foam which introduces air into the hydraulic system.
- A low fluid level can also cause transmission overheating causing premature transmission failure.

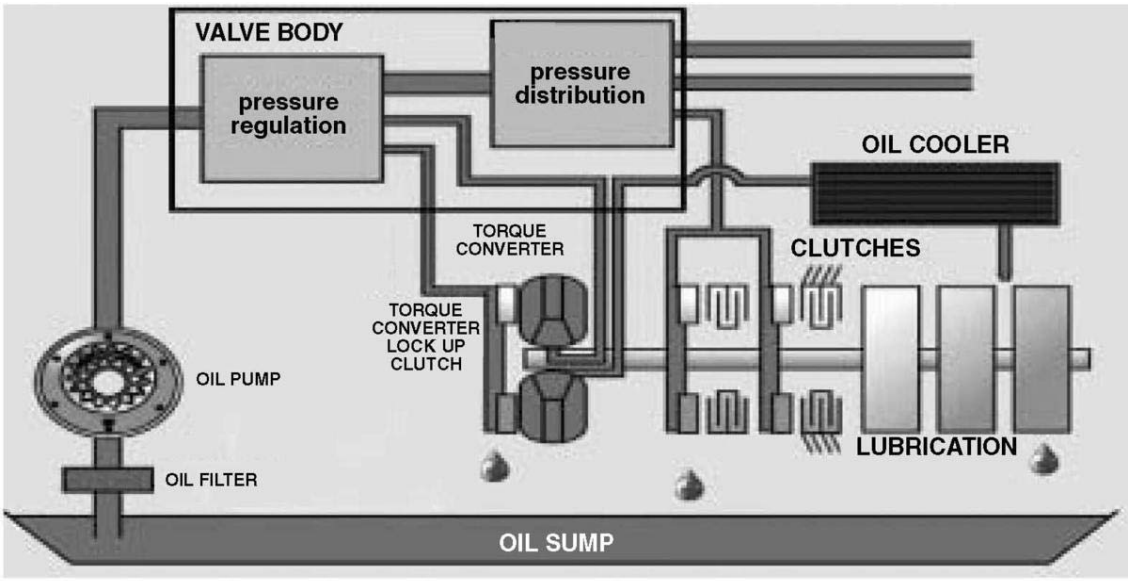

Fig. 4: Identifying Transmission Hydraulics
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION FLUID APPLICATION

There are numerous types of transmission fluid used in BMW transmissions. With the exception of the early transmissions (4HP22/24, A4S310/270R and the A5S310Z) all current BMW transmissions use "Lifetime Fill" transmission fluid. There is no maintenance required for these transmissions. It is important to use the correct fluid. Incorrect use of the transmission fluid can cause non-warrantable transmission damage.

When performing repairs on transmissions with lifetime fluid, it is important to drain the transmission fluid in to a clean container for re-use. New fluid should only be used for transmission replacement and for topping off after repairs.

Also, transmission fluid level is vital to the proper operation of the transmission. See **Fig. 5**.

Transmission	Fluid Type	BMW Part #	Container	SIB Ref.
4HP22 **4HP24**	Dexron III Mercon	Available Commercially (Castrol or Texaco)	N/A	
A5S310Z 530i/iT (E34)	Dexron III	Available Commercially (Castrol or Texaco)	N/A	
M3 (E36)	ESSO LT 71141	83 22 9 407 807	20 liter contalner	B 24 03 95
A5S325Z	ESSO LT 71141	83 22 9 407 807	20 liter contalner	
A5S440Z	ESSO LT 71141	83 22 9 407 807	20 liter container	
A5S560Z 740 (E32), 540 (E34) 840Ci (E31- 6/93-12/94) 740i/iL-750iL (E38)	Shell LA2634	83 22 9 407 765	5 liter container	B 24 11 92
540i (3/96-12/96) 850Ci (10/94-6/97)	ESSO LT 71141	83 22 9 407 807	20 liter container	B 24 02 94
A4S310R **A4S270R** **(THM-R1)**	Dexron III Mercon	Available Commercially (Castrol or Texaco)	N/A	
A5S360R **A5S390R**	Texaco ETL 7045E Texaco ETL 8072B	83 22 0 026 922 83 22 0 024 359	25 liter container 25 liter container	
GA6HP26Z	Shell M1375.4	83 22 0 142 516		

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Fig. 5: Transmission Fluid Application
Courtesy of BMW OF NORTH AMERICA, INC.

TORQUE CONVERTER

In standard transmissions the crankshaft is linked to the transmission input shaft via the clutch assembly. Power flows from the crankshaft through the flywheel. The pressure plate transfers power to the clutch disc which is splined to the transmission input shaft. The pressure plate is used to disconnect (or interrupt) power flow to the transmission input shaft. Because the engine is mechanically connected to the driveline, power flow must be interrupted when the vehicle is stationary. Otherwise the engine would stall. In automatic transmissions, there is a fluid coupling between the engine and transmission. This fluid coupling is more commonly referred to as the torque converter. In the torque converter there is no rigid connection between the engine and transmission (except for lock up clutch). In order to understand the operation of the torque converter, we must first start with the components. The breakdown of the components are as follows:

- The Impeller, which is rigidly connected to the torque converter housing.
- The Turbine, which is splined to the input shaft (turbine shaft) of the transmission.
- The Stator, which has a one-way clutch. The inner race of the one-way clutch is splined to a stationary

shaft attached to the transmission. See **Fig. 6**.

The addition of the stator allows the fluid coupling to be referred to as a torque converter. The stator provides for a multiplication of torque at low speeds. Without the stator there would be no multiplication of torque.

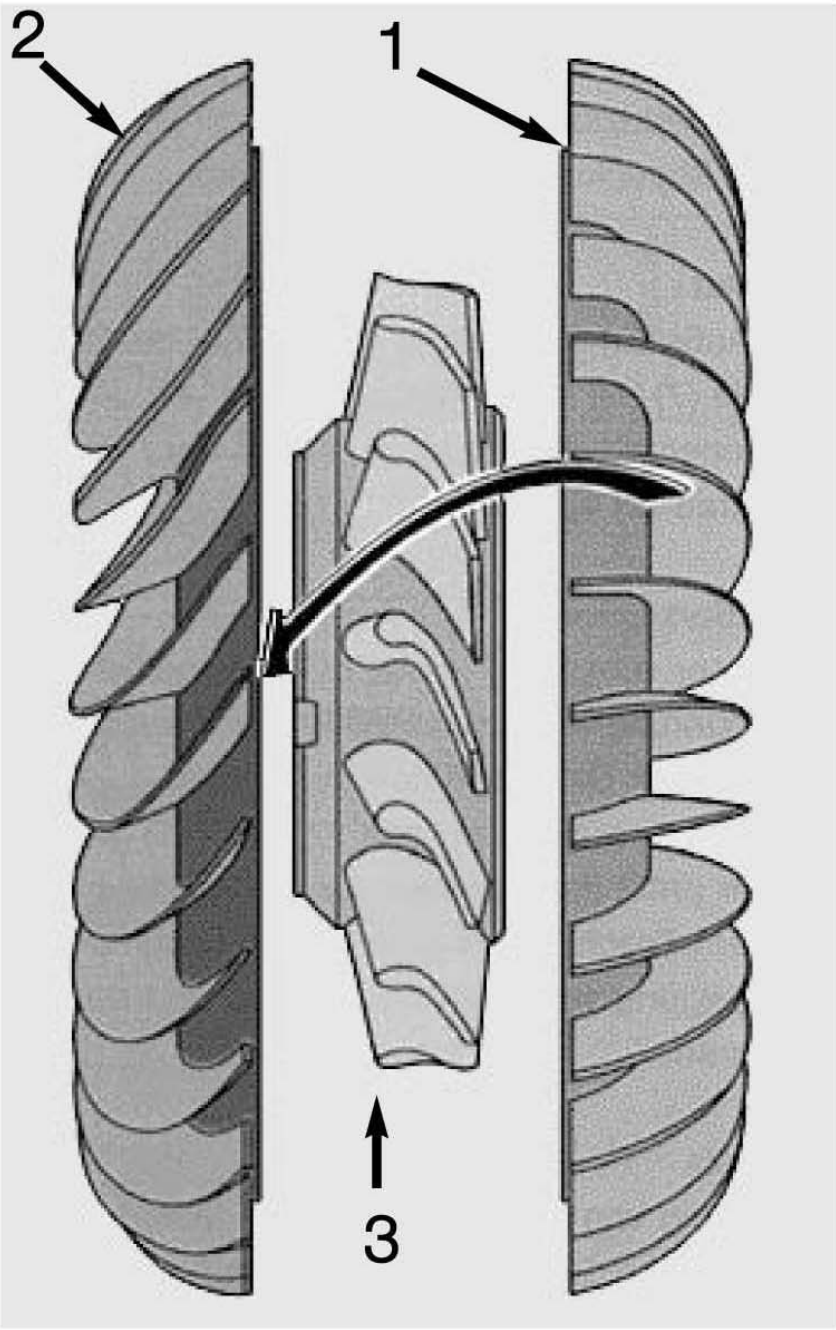

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Fig. 6: Identifying Impeller, Turbine & Stator
Courtesy of BMW OF NORTH AMERICA, INC.

When the engine is running, the impeller which is directly connected to the converter housing, rotates at engine speed. Fluid is directed from the impeller blades to the turbine blades. The fluid drives the turbine which is splined to the input (turbine) shaft of the transmission. This functions the same way as a waterfall acting on a paddle wheel. The ratio of the impeller speed to turbine speed is approximately 1.1 to 1. This ratio is improved to 1:1 with the addition of the torque converter clutch which is discussed later.

Torque Converter Operation At Low Speeds

1. At low engine speeds there is a large difference in rotational speed between the impeller and the turbine
2. Fluid flow is directed from the impeller to the turbine. Fluid strikes the vanes of the turbine. The turbine is driven forward in the direction of engine rotation.
3. Fluid flow is then directed back towards the impeller.
4. Before the fluid reaches the impeller, the fluid strikes the vanes of the stator.
5. When the fluid strikes the stator, the one way clutch prevents the stator from rotating.
6. The fluid is then re-directed by the curved vanes of the stator. The fluid is now flowing in the same direction as the impeller.
7. The fluid that is acting on the impeller increases the force on the impeller which multiplies torque. See **Fig. 7**.

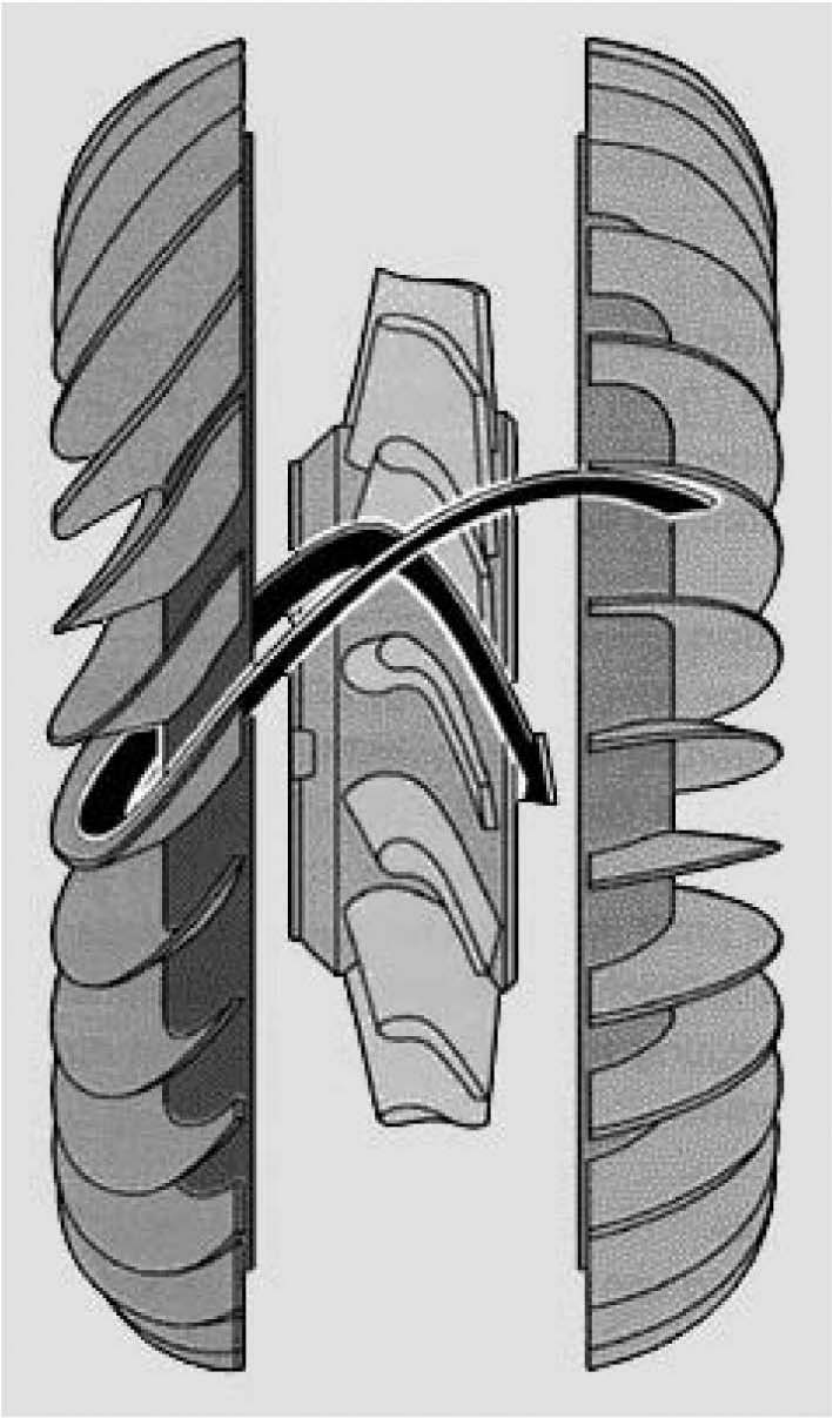

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Fig. 7: Torque Converter Operation At Low Speed
Courtesy of BMW OF NORTH AMERICA, INC.

Torque Converter Operation at High Speed

1. As engine speed increases, the turbine speed approaches the speed of the impeller.
2. The fluid flow is directed from the turbine to the back side of the impeller blades.
3. The one-way clutch in the stator unlocks and the stator blades turn in the direction of engine rotation.
4. Fluid is no longer re-directed and torque multiplication no longer takes place.
5. This is referred to as "Coupling Speed". The turbine never reaches the same speed as the impeller as fluid flow would come to a halt. Ratio is approximately 1.1 to 1. See **Fig. 8**.

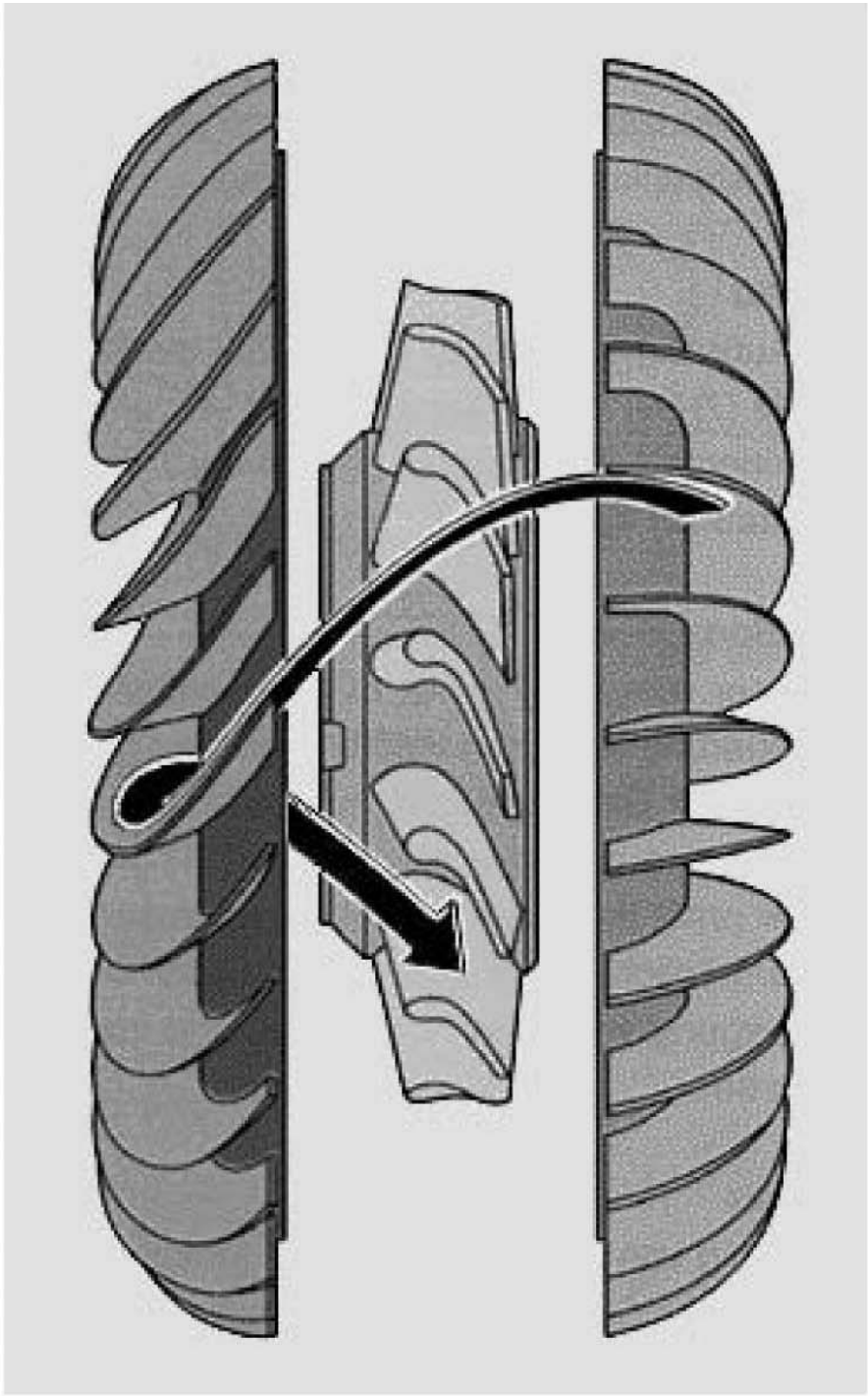

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Fig. 8: Torque Converter Operation At High Speed
Courtesy of BMW OF NORTH AMERICA, INC.

Torque Converter Clutch

Since the efficiency of the torque converter at coupling speed is approximately 1.1 to 1, fuel economy is compromised. To offset this a torque converter clutch was added on EH controlled transmissions. The torque converter clutch locks the turbine to the converter housing. This creates a mechanical coupling with a ratio of 1:1. This can only be achieved at higher engine speeds. The torque converter clutch must be disengaged at low engine speeds to prevent stalling. There are two methods for controlling the torque converter clutch on BMW transmissions:

- A4S310/270R, 4HP22/24 EH, A5S310Z - These transmission use an on/off control method to lock and unlock the torque converter. The TCC is either completely engaged or completely disengaged. This method of engagement provides an abrupt sensation when the TCC is locking and unlocking. This abrupt sensation can be unpleasant and undesirable to some drivers.
- A5S560Z, A5S440Z, A5S325Z, GA6HP26Z,A5S360/390R - These transmissions use a gradual approach to TCC control. The TCC is gradually applied and released, this method reduces the abrupt feel of the on/off type TCC. The TCC solenoid is controlled by pulse width modulation. This allows fluid to be gradually introduced and released to the TCC.

The TCC is spring loaded to the engaged position. Pressurized fluid releases the TCC, when the pressurized fluid is released, the TCC is engaged. Depending on transmission application, the TCC can be engaged in 3rd, 4th or 5th gear. The TCC must be disengaged at low speeds to prevent stalling. See **Fig. 9** and **Fig. 10** .

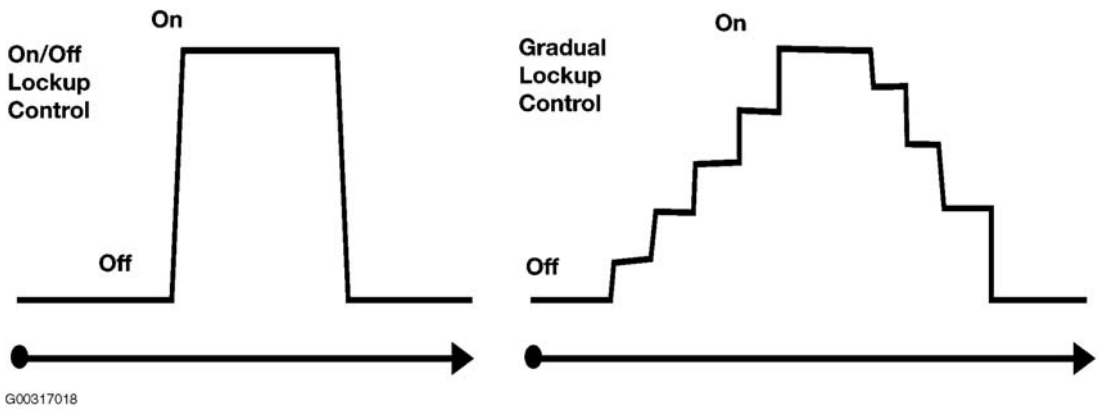

Fig. 9: Identifying TCC Operation
Courtesy of BMW OF NORTH AMERICA, INC.

Example of TCC oil control circuit from the A5S440/560Z transmission.

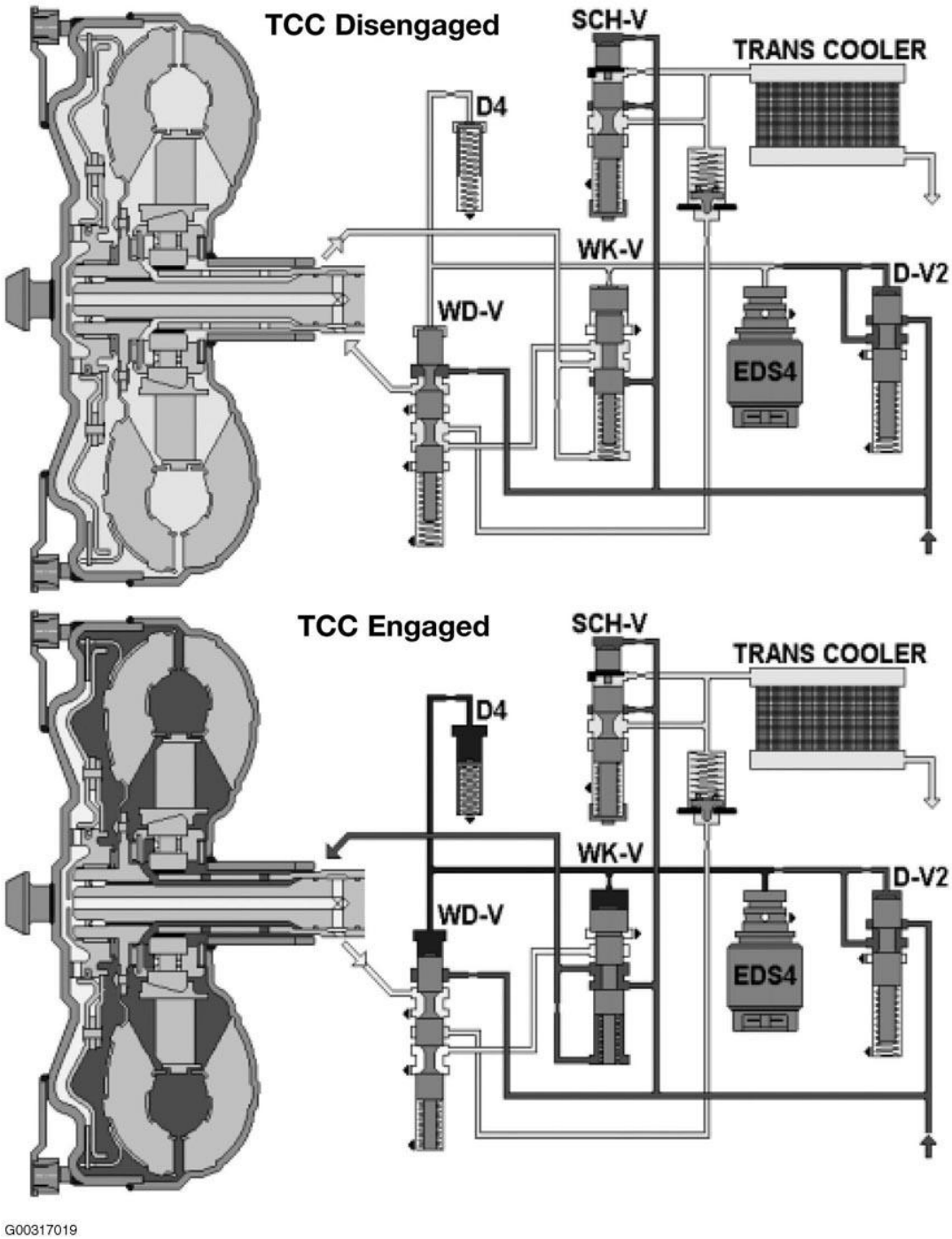

Fig. 10: TCC Oil Control Circuit
Courtesy of BMW OF NORTH AMERICA, INC.

OIL PUMP

The transmission oil pump is used to circulate oil and provide pressure for hydraulic operation. The pump is driven by the torque converter shell and rotates with engine. Fluid is drawn from the sump through the filter and distributed to the various transmission hydraulic systems. The output pressure is regulated to an operating pressure of approximately 25 bar. Currently there are two types of oil pumps used in BMW transmissions: Crescent type and Vane type. See **Fig. 11**.

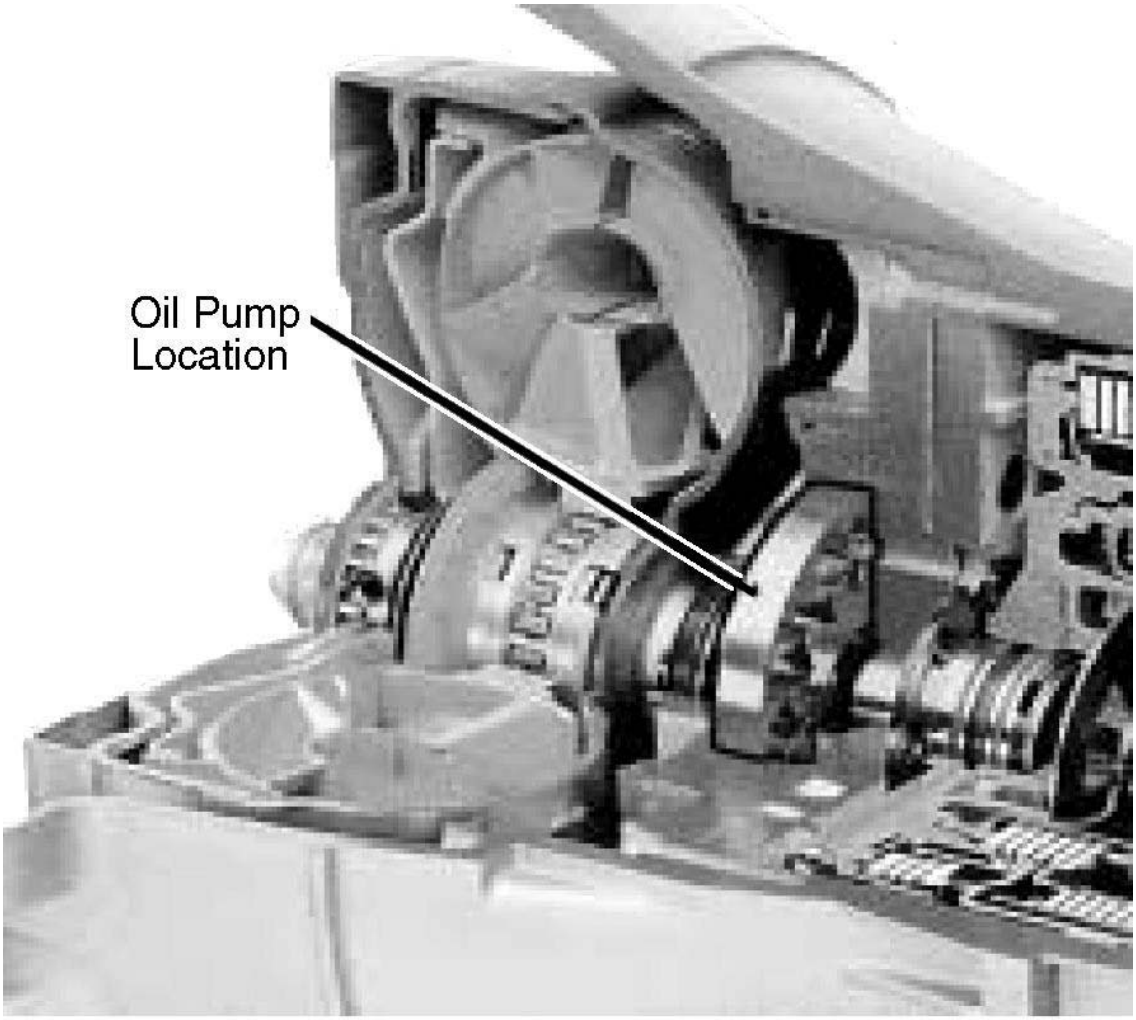

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Fig. 11: Locating Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Crescent Type Oil Pump (All except A5S360/390R)

The crescent type is an internal gear pump containing a drive gear and a driven gear. The inner gear is driven by the torque converter and acts as the impeller. The outer gear is driven by the inner gear. The gap between the teeth varies from the input, through the crescent and to the output of the pump. A low pressure area is created on the input side of the pump by the widening gap between the gear teeth. The oil is drawn to the crescent and transferred to the output side of the pump, where the pressure is increased by the narrowing gap between the

gear teeth. The output pressure of the pump is controlled by spring loaded pressure regulator. See **Fig. 12**.

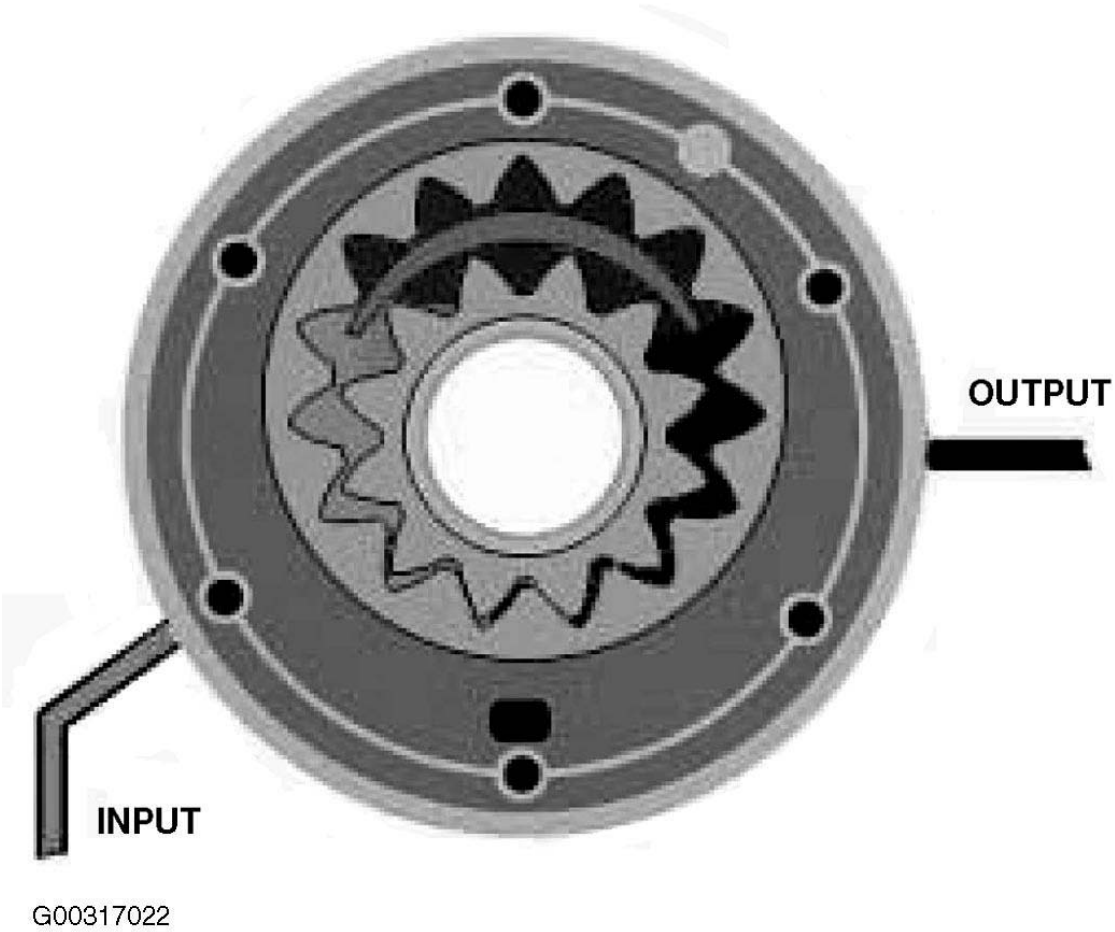

Fig. 12: Identifying Crescent Type Oil Pump
Courtesy of BMW OF NORTH AMERICA, INC.

Oil Volume Control

On the A5S440Z transmission, oil pump output volume is controlled based on engine RPM. High oil volume is initially required at start up to quickly fill the transmission requirements. As engine RPM increases, the volume is greater than is required. The Oil Volume Control Damper regulates the pump output volume based on engine RPM. This helps improve fuel economy by reducing the load on the engine at high RPM.

Vane Type Pump (A5S360/390R)

The new A5S360/390R (GM5) transmission uses a vane type pump. See **Fig. 13**. The torque converter drives the pump rotor and 13 vanes. The rotor and vanes are placed inside a slide mechanism. As the rotor spins, the vanes sweep oil from the pump intake to the output along the mating surface on the vane ends and the interior surface of the slide. The slide is mounted on a pivot pin. As it pivots, it changes the eccentricity of the rotor to slide mating surface. This in turn will alter the output oil volume. This provides the same function as the Oil

Control Volume Damper on the A5S440Z. The slide's position is influenced by a calibrated spring and hydraulic control pressure from the main pressure regulator solenoid on the valve body. See **Fig. 14**. The benefit of changing the slide position is to optimize pump output volume to meet the following operating conditions:

- Provide maximum volume during engine start-up. This condition provides a fast priming action of the pump for immediate lubrication and for hydraulic pressure operation.
- Regulated output volume at higher engine speeds. Maximum pump volume is not required at all times.

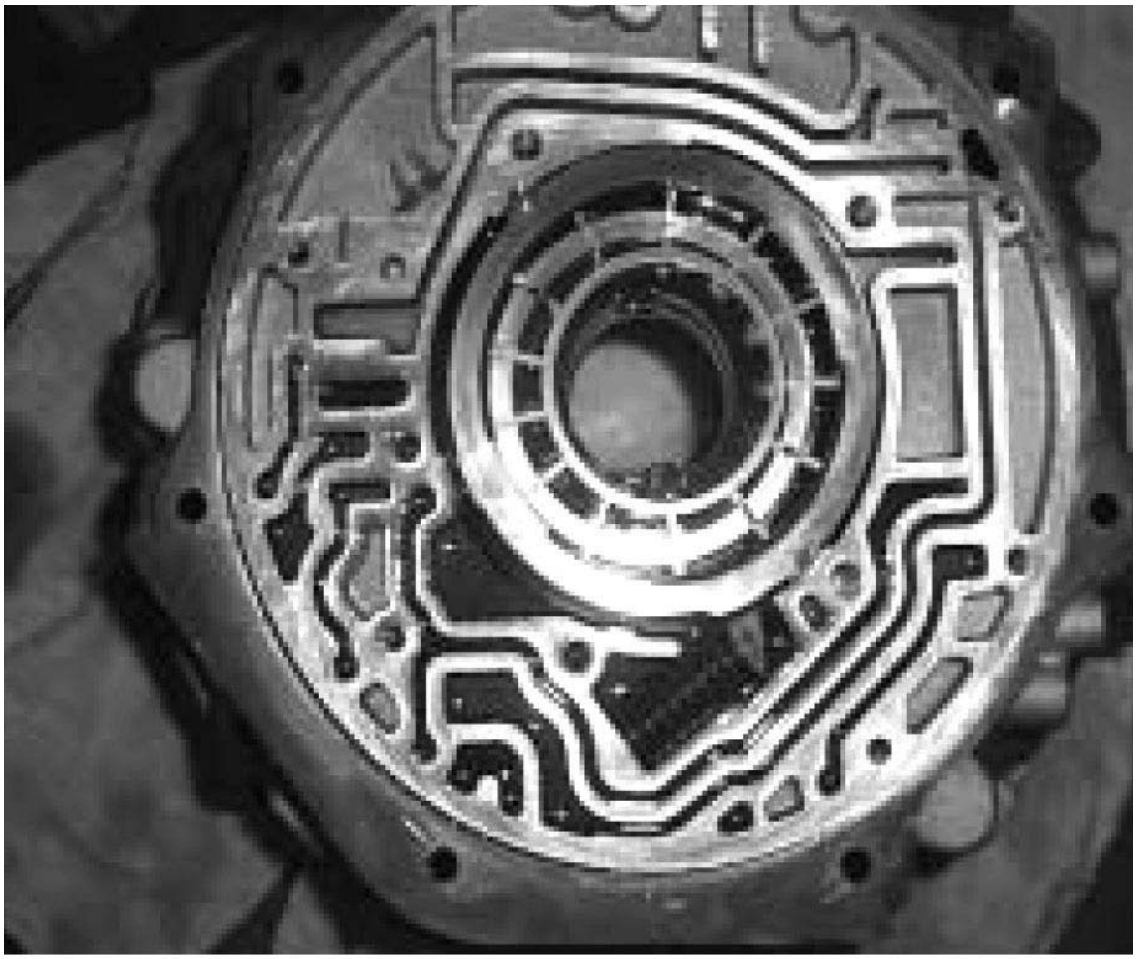

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Fig. 13: Identifying Vane-Type Pump
Courtesy of BMW OF NORTH AMERICA, INC.

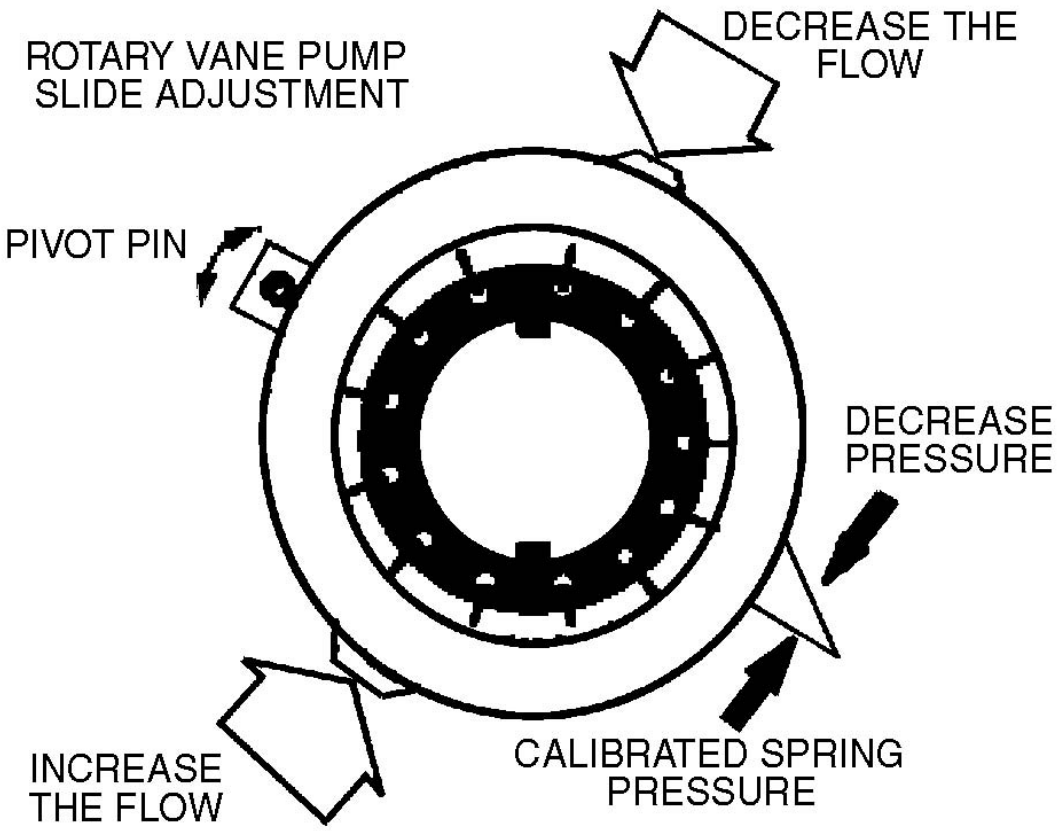


Fig. 14: Rotary Vane Pump Slide Adjustment
Courtesy of BMW OF NORTH AMERICA, INC.

HYDRAULIC CONTROL COMPONENTS

Electro/Hydraulic Valve Body

The valve body assembly is the main shift control element in the transmission. In non-EH transmissions the valve body was only hydraulically controlled. In the current EH (electrohydraulic) transmissions the valve body is similar in design, but now also housing a number of shift solenoids which are controlled by the TCM. The valve body consists of a number of sub-assemblies. Each sub-assembly contains a number of spool valves which are hydraulically controlled. Most spool valves are opposed by spring pressure. The spool valves are used to direct hydraulic fluid flow to the various shift elements in the transmission. There is also a manual valve which is connected to the shift assembly by a cable. The manual valve allows the drivers to select the basic operating mode (or ratio). See **Fig. 15**. The valve body is responsible for the following:

- Regulating main pressure.

- Controlling fluid flow to shift elements for Upshifts and Downshifts.
- Providing for manual operation by driver via manual valve.
- Reverse Lockout.
- Failsafe Operation.
- Shift Comfort through: Overlap Shift Control (ZF) Pressure Accumulators (GM).
- Torque Converter Control.
- Distribution of lubrication.

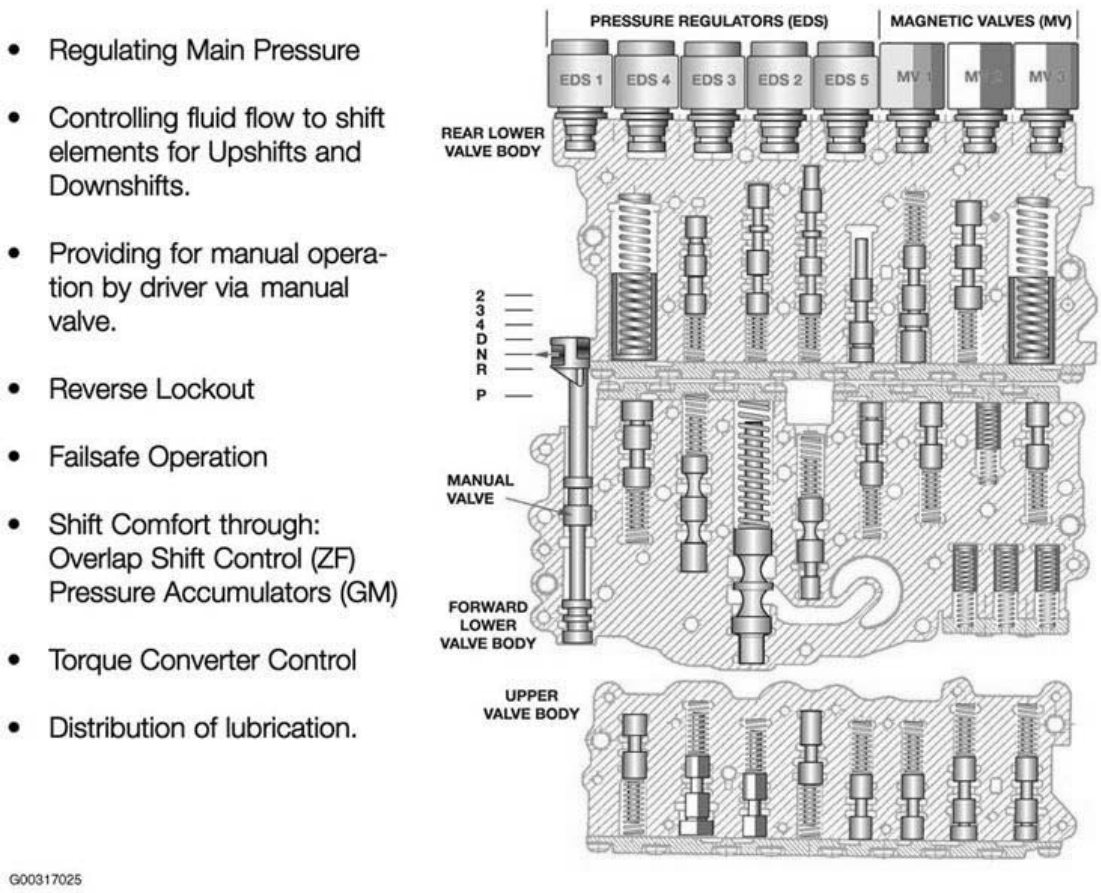


Fig. 15: Identifying Electro/Hydraulic Valve Body Components
Courtesy of BMW OF NORTH AMERICA, INC.

Shift Valves

Shift valves are used to direct application pressure to the various shift elements. Shift valves are regulated by spring pressure and control pressure for the shift solenoids. Shift valves come in various configurations depending upon application and transmission type. The most basic is the 3/2 shift valve. The 3/2 shift valve has 2 positions which are switched through one or two control pressures.

With no control pressure from shift solenoid present, the shift valve is moved to its end travel (left) by spring pressure. Operating pressure is blocked to the shift component. Also in this position any application pressure is drained from the shift component. See **Fig. 16**.

Once the control pressure is applied to the 3/2 shift valve, the shift valve moves to the right. This allows operating pressure to reach the shift component. When the control pressure is again reduced, spring pressure returns the 3/2 shift valve to the rest position. This drains and operating pressure from the shift component. See **Fig. 17**.

Operating Pressure to Shift Component. The example shown is a 4/2 shift valve. The operation is similar to the 3/2 valve. The primary difference is that the 4/2 shift valve affects 2 shift components. See **Fig. 18**.

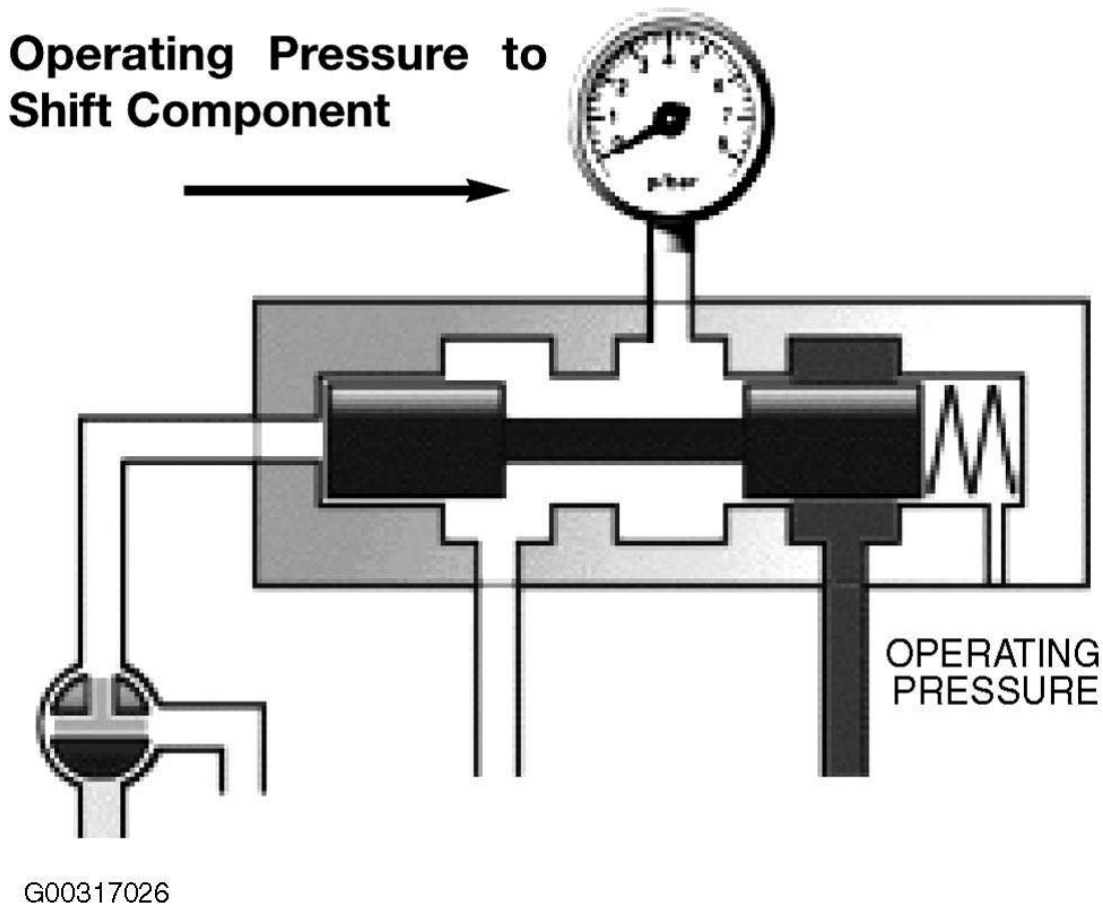


Fig. 16: Shift Valve Operation (1 Of 3)
Courtesy of BMW OF NORTH AMERICA, INC.

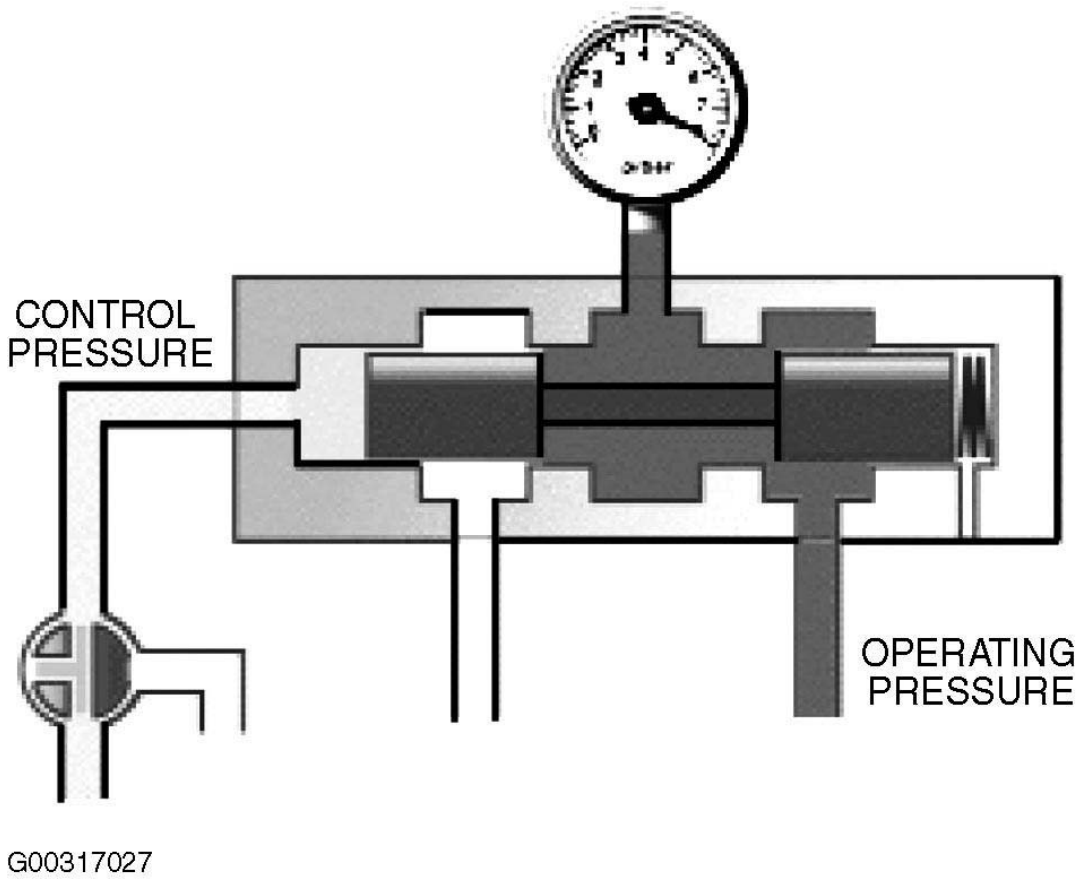


Fig. 17: Shift Valve Operation (2 Of 3)
Courtesy of BMW OF NORTH AMERICA, INC.

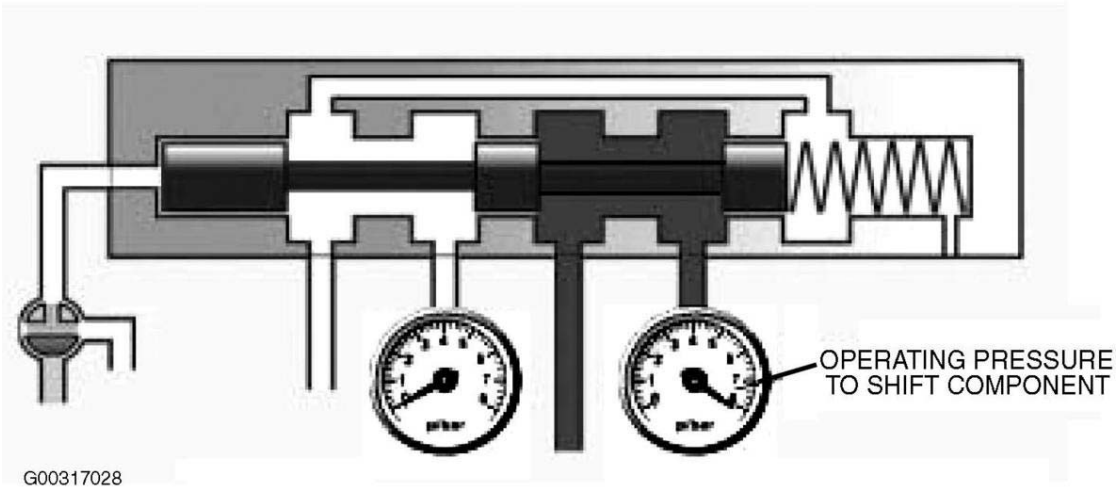


Fig. 18: Shift Valve Operation (3 Of 3)

Courtesy of BMW OF NORTH AMERICA, INC.

Pressure Regulation

Pressurized oil from the pump must be regulated for use within the transmission. Otherwise, the high pressure directly from the pump would influence shift quality. The shifts would be more abrupt and harsh. In order to "fine tune" the pressures within the transmission, there is a pressure regulating valve and a pressure regulating solenoid. The pressure regulating valve is located in the oil pump housing or the valve body dependent upon transmission type. The pressure regulating solenoid is a pulse width modulated (PWM) solenoid. Current is controlled by the TCM. The pressure regulating solenoid is normally closed, there is maximum line pressure available when minimum (or no) current is applied to the pressure regulating solenoid. Depending upon application, pressure regulating solenoid can be PWM with B- or B+ control. GM transmissions use B+ control with a constant ground supply. ZF transmissions uses B- control with a constant B+ supply.

There are also pressure regulators used in ZF transmissions that are used to control shift pressures. The A5S440Z and A5S560Z both use EDS solenoids for "Overlap Shift Control" this will be explained later in this text. There are a few different names for pressure regulating solenoids depending upon the transmission type and manufacturer:

- ZF transmissions use the following terms - EDS solenoid (valve), or MV (magnetic valve).
- Hydramatic (GM) transmissions use the following terms: DR solenoid, Force Motor Solenoid or Variable Bleed Solenoid.

Transmission operating pressures are regulated based on engine speed, throttle angle and engine load. The regulated pressure from the pressure regulating solenoid is referred to as throttle pressure. This pressure is fed to the main pressure regulating valve. See **Fig. 19**.

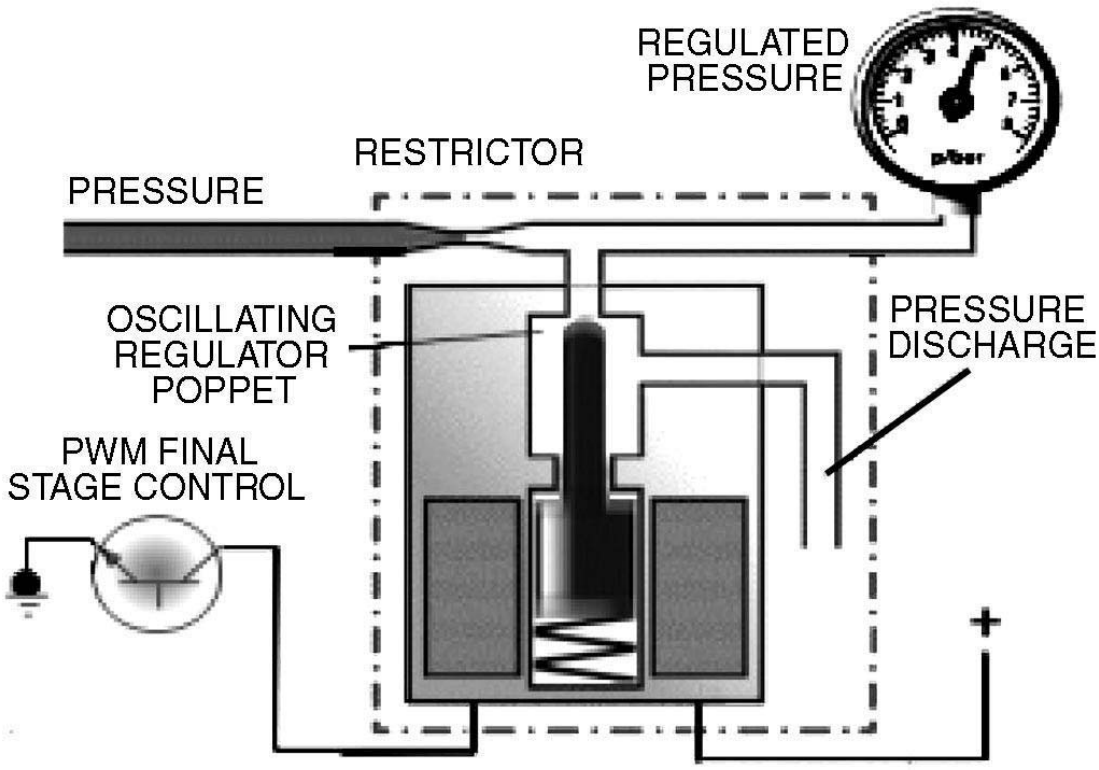


Fig. 19: Identifying Transmission Operating Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

Pressure Regulation

As the diagram shows, regulating valve pressure is fed to the pressure regulating solenoid. See **Fig. 20**. This pressure is then regulated to create throttle pressure. Throttle pressure is modified based on throttle angle, engine speed and engine load. Throttle pressure is then fed to the pressure regulating valve. As throttle pressure increases, the regulating valve piston is moved to the left (with respect to the diagram). As the regulating valve piston is moved to the left , operating pressure is increased to the 4/2 shift valve. The operating pressure to the 4/2 shift valve will be fed to Shift Component A or Shift Component B depending the position on the 4/2 shift valve. The operating pressure to the shift components will be increased or decreased depending upon the throttle valve pressure. As engine speed and load are increased, the operating pressure will be increased to provide higher clamping forces on the shift components. When there is no electrical power present to the pressure regulator solenoid, throttle pressure will be a maximum. Therefore maximum operating pressure will be available at the 4/2 shift valve. This condition would exist if the transmission was operating in failsafe mode.

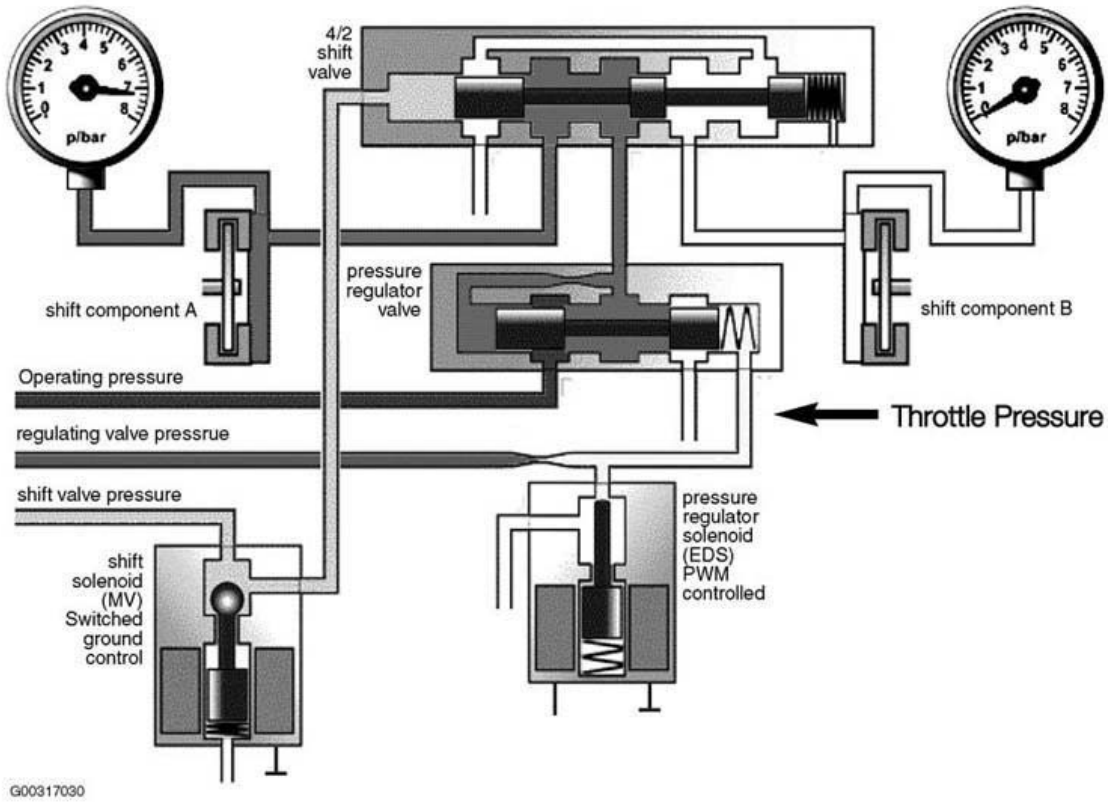


Fig. 20: Identifying Transmission Regulation Pressure
Courtesy of BMW OF NORTH AMERICA, INC.

APPLY COMPONENTS

Multi - Plate Clutches and Brakes

Multi Plate Clutches and Brakes are used to drive or hold members of the planetary gear set. See **Fig. 21**. As a general rule, Multi Plate Clutches connect one planetary member to another. Multi Plate Brakes connect a planetary member to the case to hold it stationary. The clutches and brakes consist of a number of friction discs and steel discs. The friction discs are coated with a friction material and have engaging lugs (splines) on the inner perimeter. The steel discs are steel on both sides and have engaging lugs located on the outer perimeter. The engaging lugs on the friction discs are usually engaged with a planetary member. The engaging lugs on the steel discs are usually engaged with the clutch piston housing. In addition to the friction and steel discs, there is also an apply piston, housing and return spring. Once hydraulic fluid is applied to the clutch assembly, the friction discs and steel discs will be locked together. Once hydraulic pressure is released, the return spring will cause the clutch piston to return to its rest position which will unlock the clutch assembly. See **Fig. 22**.

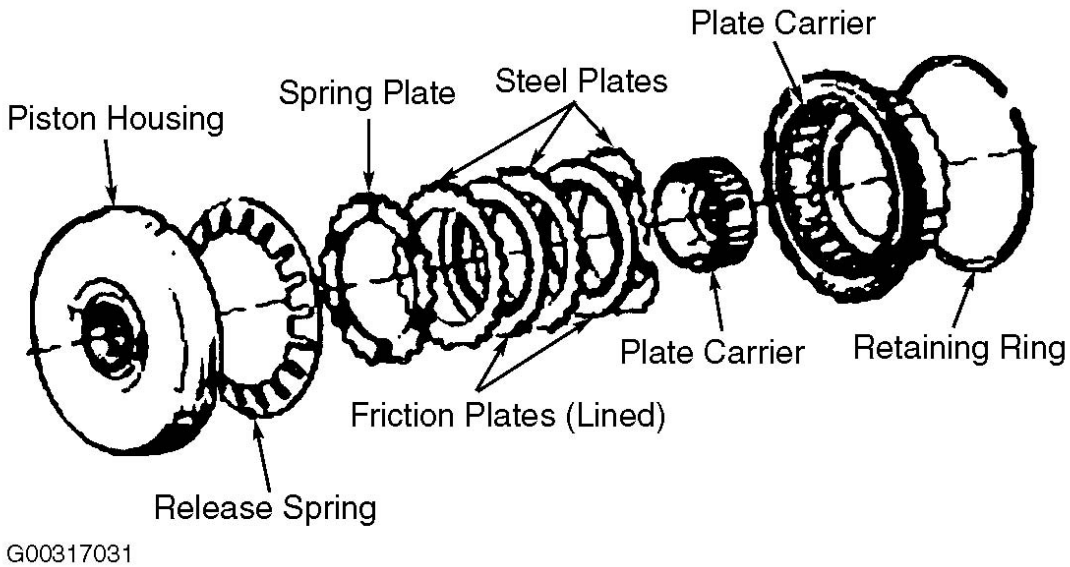


Fig. 21: Identifying Multi-Plate Clutches & Brakes
Courtesy of BMW OF NORTH AMERICA, INC.

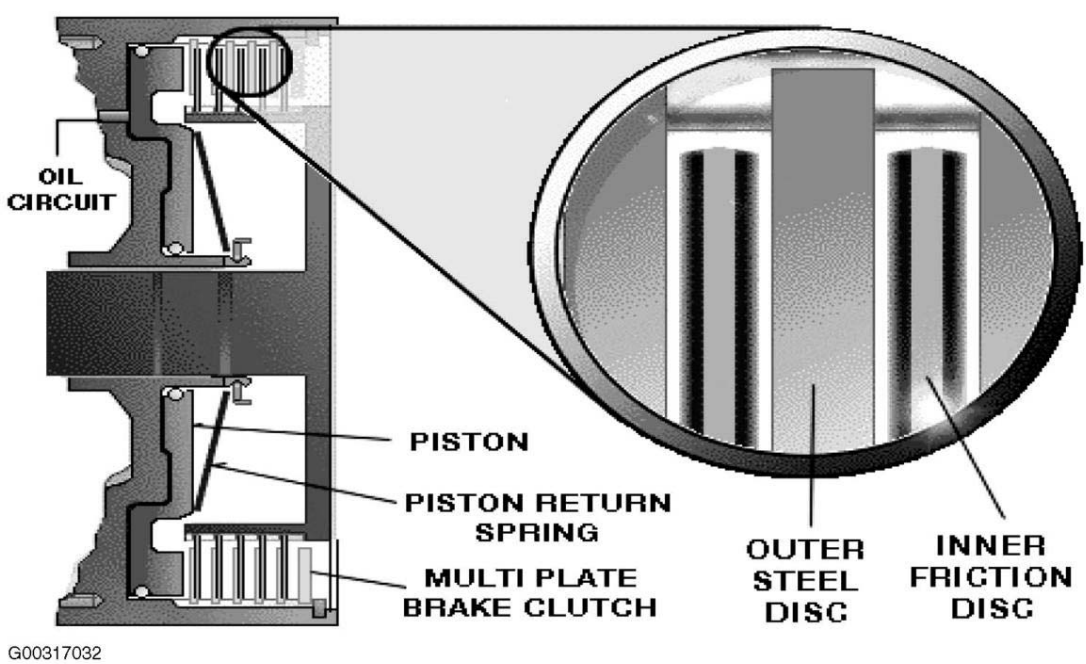


Fig. 22: Multi-Plate Clutch Identification
Courtesy of BMW OF NORTH AMERICA, INC.

Multi - Plate Clutch Operation

In order to carry out a shift in ratio, fluid needs to be applied or released from the Multi - Plate Clutch (or Brake). As shown in the example at the right, the following sequence occurs:

1. Fluid from a shift valve in the valve body is applied to the clutch assembly.
2. Fluid pressure builds behind the apply piston and overcomes the resistance from the diaphragm spring.
3. The friction and steel discs are compressed together and become locked, preventing any slippage between them.
4. Two planetary members are now locked together.
5. When fluid pressure is released, the steel and friction discs are allowed to unlock.
6. The diaphragm spring pushes against the apply piston and returns the piston back to the rest position.
7. The check ball in the apply piston is unseated by centrifugal force which allows the clutch to drain completely. See **Fig. 23**.

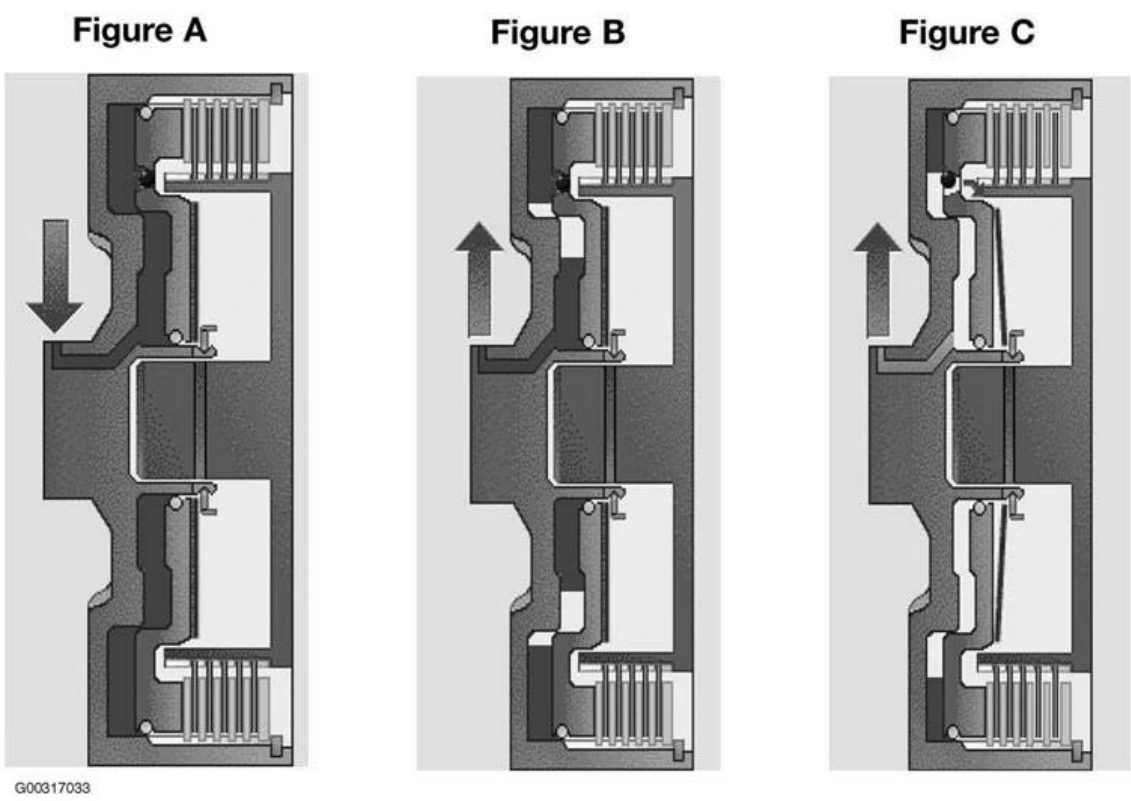


Fig. 23: Multi-Plate Clutch Operation
Courtesy of BMW OF NORTH AMERICA, INC.

BAND BRAKES

On some BMW transmissions there is a band type brake used for some applications. The A4S270/310R and the A5S310Z use a band type brake. The brake band is a circular band with friction material bonded to the inner surface. The band wraps around a particular planetary component (clutch drum) and locks that component to the transmission case. The brake band is applied and released by the clutch apply piston. The brake band is not

adjustable on the A5S310Z, however there is some adjustment allowed when needed on the A4S270/310R. The brake band functions in the following manner on BMW transmissions:

- A4S270/310R - The brake band is active (applied) in first and second gear. The brake band holds the reaction sun drum stationary. The reaction sun drum is splined to the reaction sun gear.
- A5S310Z - The brake band is active (applied) in second, third and fifth gear. The brake band holds the forward sun gear to the case. See **Fig. 24**.

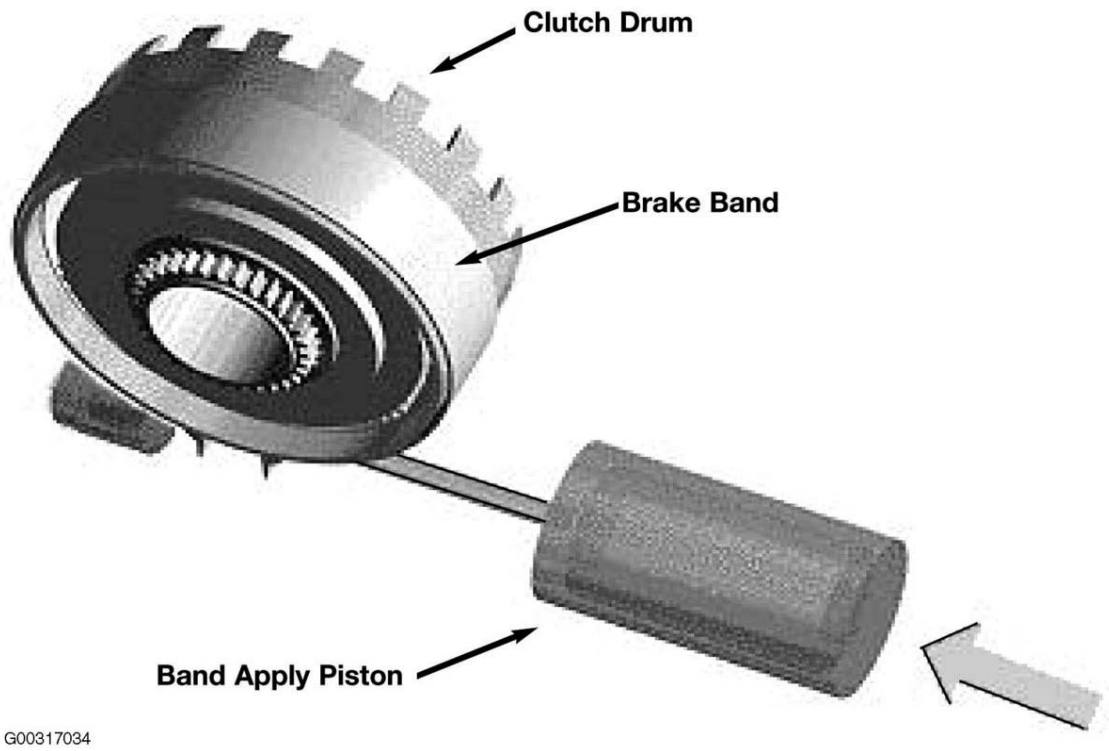


Fig. 24: Identifying Band Brake Operation
Courtesy of BMW OF NORTH AMERICA, INC.

ONE-WAY CLUTCHES (FREEWHEEL)

The one way clutch consists of an inner and outer ring with a locking device between the two. The one way clutch is designed to lock in one direction and to allow free rotation in the other direction. See **Fig. 25**. Currently there are two types of one way clutches used in BMW transmissions:

- Roller type which consists of spring loaded rollers between the inner and outer race of the one way clutch. (Roller type is also used without springs on some applications).
- Sprag type which consists of asymmetrical shaped wedges located between the inner and outer race of the one way clutch.

In both versions of the one way clutch (freewheel), rotation is only allowed in one direction. Using the diagrams above, imagine that the inner races were locked stationary. The outer race would only be allowed to turn

counter clock wise. In the clock wise direction, the outer race of both versions would be locked. In the roller type, the helper springs would push the rollers up the ramp on the outer race. This would force the rollers in to the smaller area which would cause the outer race to lock, In the sprag type, the asymmetrical wedges would lock between the inner and outer race. The one way clutches are used in the transmission to prevent an interruption of drive torque during certain gear shifts and to allow engine braking during coasting. Also there is a one way clutch in the stator of the torque converter.

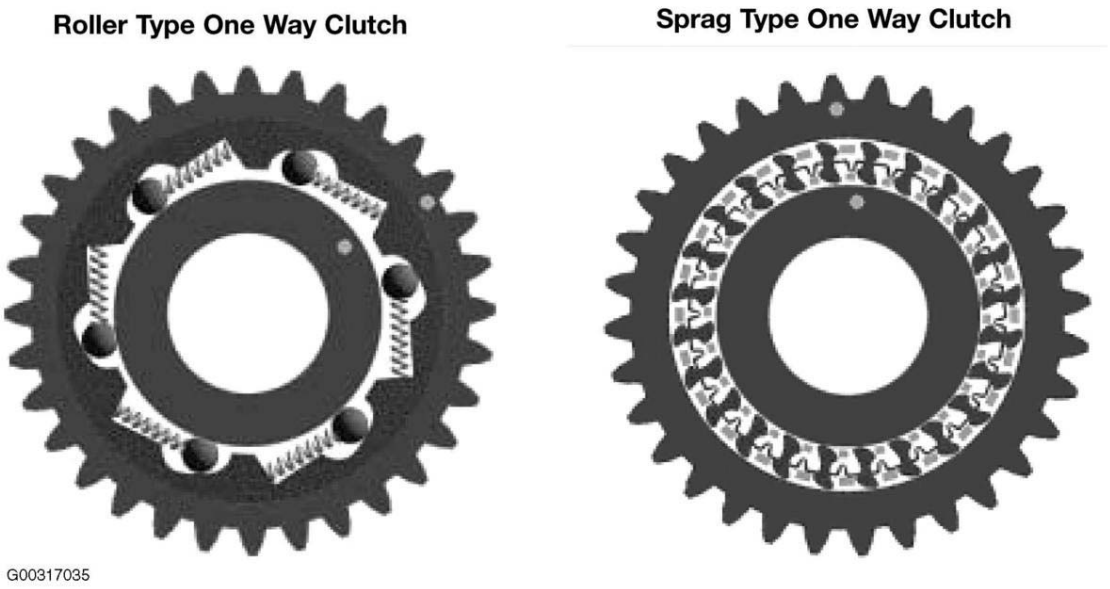


Fig. 25: Identifying One-Way Clutches
Courtesy of BMW OF NORTH AMERICA, INC.

PLANETARY GEAR SET

Planetary gear seats are compact gear units that receive input drive torque and provide the required output ratios for all forward gears and reverse gear. The planetary gear set consists of four main components:

1. Internal ring gear.
2. Planetary gears (pinions).
3. Sun gear.
4. Planetary gear carrier.

Various ratios are obtained by driving or holding different components in the planetary gear set. The example shown is a simple planetary gear set. See **Fig. 26**. Today's modern transmissions use a combination of multiple planetary gear sets referred to as a compound planetary gear set.

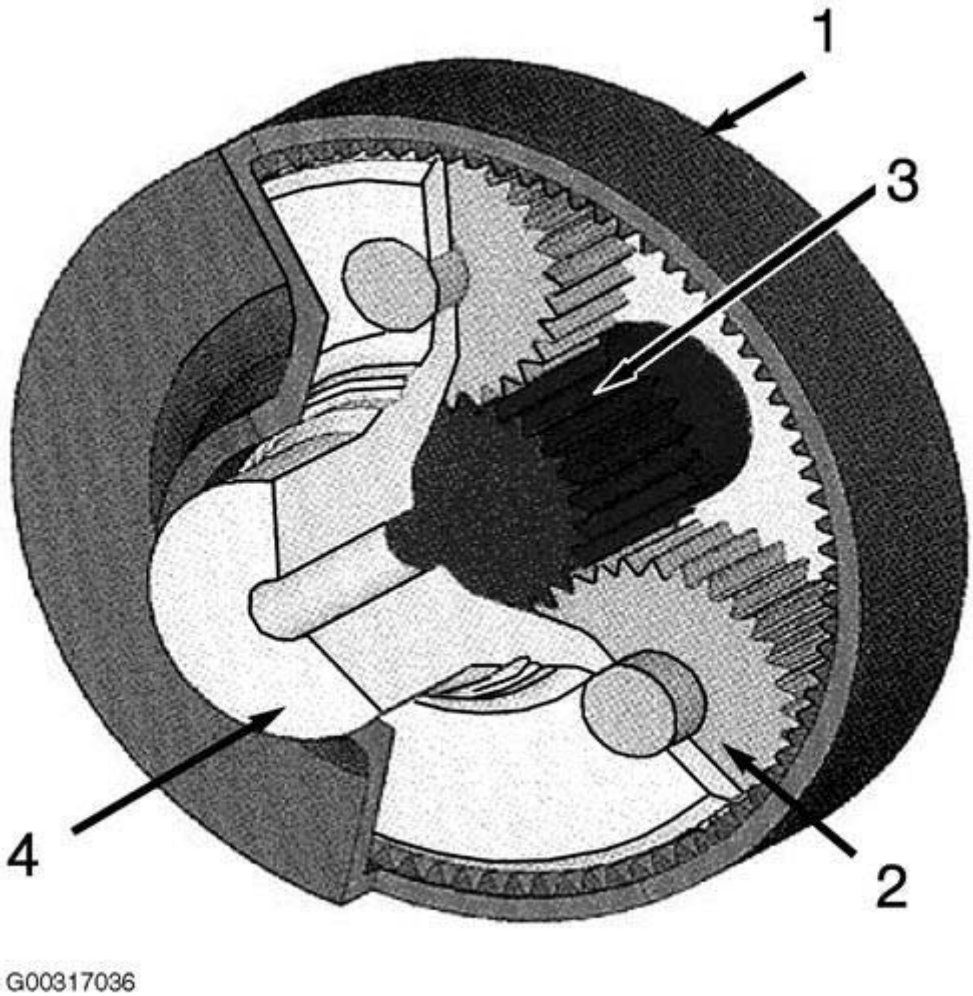


Fig. 26: Identifying Planetary Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Advantages of Planetary Design

There are distinct advantages to the planetary gear set in comparison with a standard transmission gear set. Primarily, drive torque does not need to be interrupted to change gears. The planetary members are in constant mesh and there are more teeth engaged in any given ratio. This allows more torque to be transferred through the transmission.

Basic Power Flow Example

As an example of power flow in reverse gear, planetary gear carrier (4) is held stationary. The sun gear (3) is driven in a clockwise direction. The planetary pinions (2) are driven counterclockwise, which in turn drives the internal ring gear (1) counter clockwise as well. See **Fig. 27**.

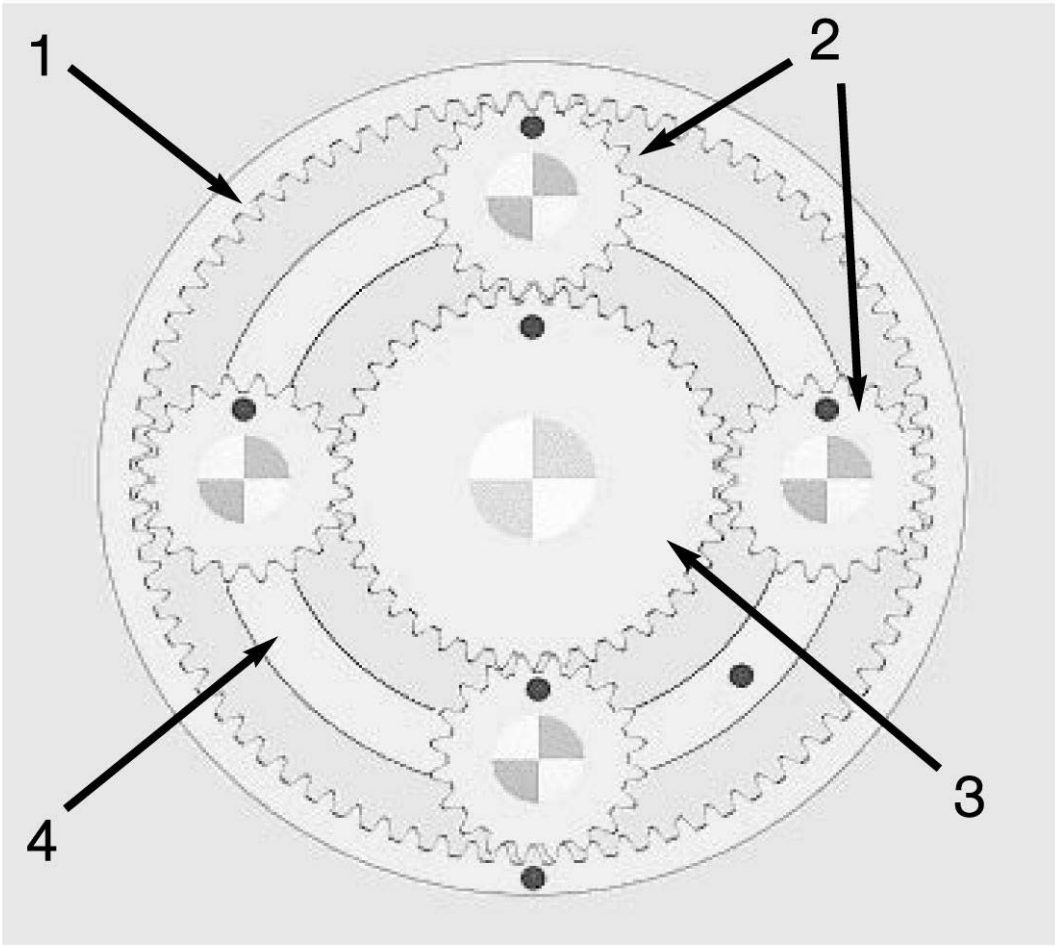


Fig. 27: Identifying Basic Power Flow
Courtesy of BMW OF NORTH AMERICA, INC.

Compound Planetary Gear Sets

Compound planetary gear sets use multiple planetary components which are a variation on the simple planetary gear set. Since the inception of the simple planetary gear set, there have been numerous compound gear sets introduced. BMW transmissions use the following gear sets:

- Simpson Gear Set - used on 4HP22 and 4HP24.
- Ravigneax Gear Set - used on A4S270R, A4S310R, A5S310Z, A5S325Z, A5S360R and A5S390R.
- Wilson Gear Set - used on A5S440Z and A5S560Z.
- Lepelletier Gear Set - used on the GA6HP26Z.

Simpson Gear Set

The Simpson Gear Set is one of the early variations on the simple set. It is capable of 3 forward gears and one

reverse. On BMW transmissions, the Simpson Gear set is used in the 4HP transmission which is a four speed automatic. See **Fig. 28**. Fourth gear (overdrive) is obtained by the addition of an auxiliary gear set (simple). Characteristics of the Simpson Gear set are as follows:

- Two Internal Ring Gears, one rear input ring and one attached to the rear planetary carrier.
- Two Planetary carriers, each containing three planetary pinions.
- One common Sun gear, which meshes with both sets of planetary pinions.

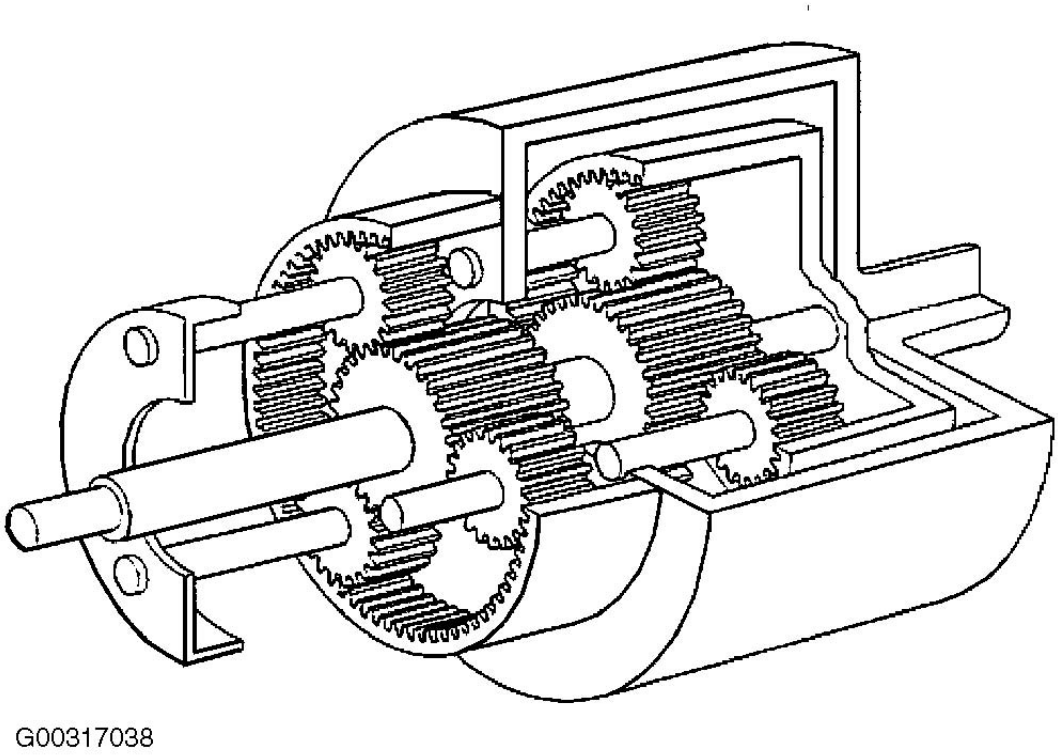


Fig. 28: Identifying Simpson Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Ravigneaux Gear Set

A new version on the planetary design is the Ravigneaux gear set. See **Fig. 29**. This gear set is capable of 4 forward gears and one reverse. However, depending upon application it may be used with an auxiliary gear set. Here are some examples:

- The A4S310/270R uses the Ravigneax set for 3 forward gears and one reverse. Overdrive is obtained by the auxiliary gear set.
- The A5S310Z uses a combination of the Ravigneaux gear set and the auxiliary gear set to obtain 5 forward gear and one reverse. First, second and reverse gears are achieved by using a combination of both gear sets.

- The A5S360/390R uses a modified version of the Ravigneaux set that provides five forward gears and one reverse. There is no auxiliary gear set used.

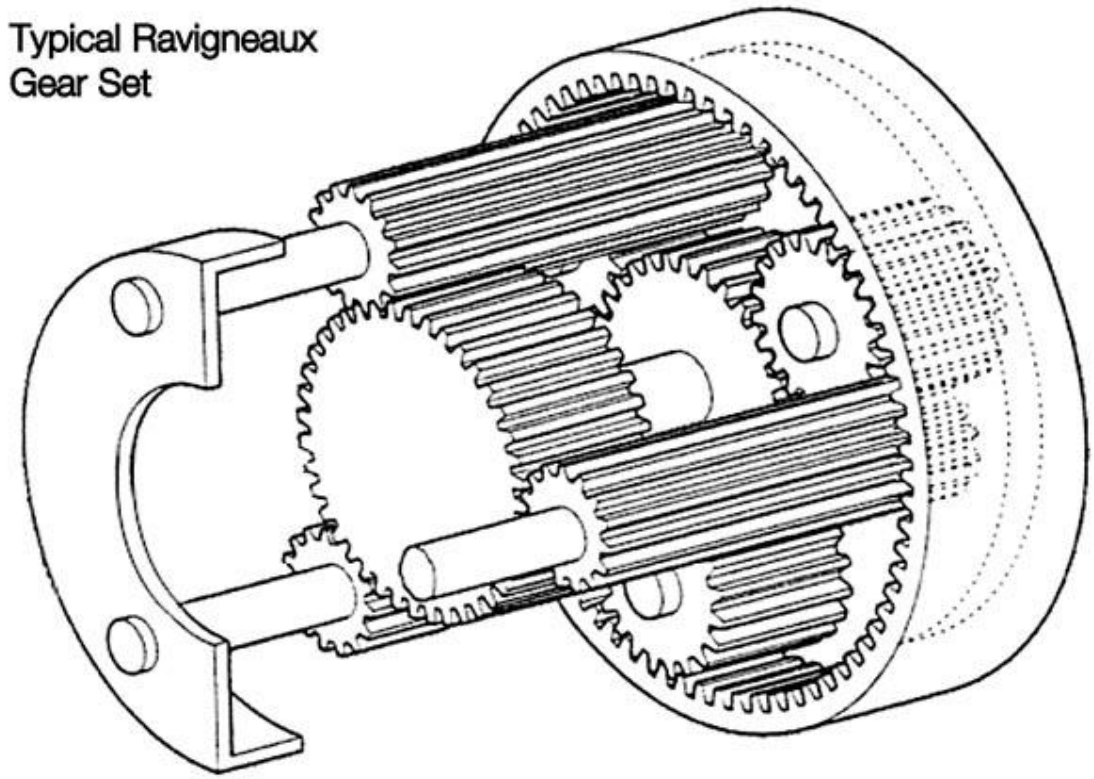


Fig. 29: Identifying Ravigneaux Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Characteristics of the Ravigneaux Gear Set are:

- One planetary carrier which is common to both sets of planetary pinions.
- Two sets of planetary pinions, one long set with small diameter and one short set with large diameter.
- Two sun gears, one input sun gear and one reaction sun gear.
- One common ring gear.

NOTE: The Ravigneaux Gear Set shown in the figure is a typical representation. There are a few variations of this arrangement used on BMW transmissions.

Wilson Gear Set

On BMW transmissions, the Wilson gear set is only used on the A5S440Z and A5S560Z. See **Fig. 30**. The Wilson Gear Set consists of three planetary gear sets. The ring gear of the first gear set, the planetary carrier of the second gear set and the ring gear of the third planetary gear set and directly connected to the "Pot". The "Pot" is a cylindrical device that slides over all of the components to unitize the individual gear sets into an

assembly. The characteristics of the Wilson Gear Set are:

- Three planetary carriers.
- Three ring gears, with ring gear 1 and 3 meshed to "Pot" assembly.
- Three sun gears, sun gear 2 and 3 are common (attached). Sun gears 2 and 3 are also referred to as the "Double Sun Gear".

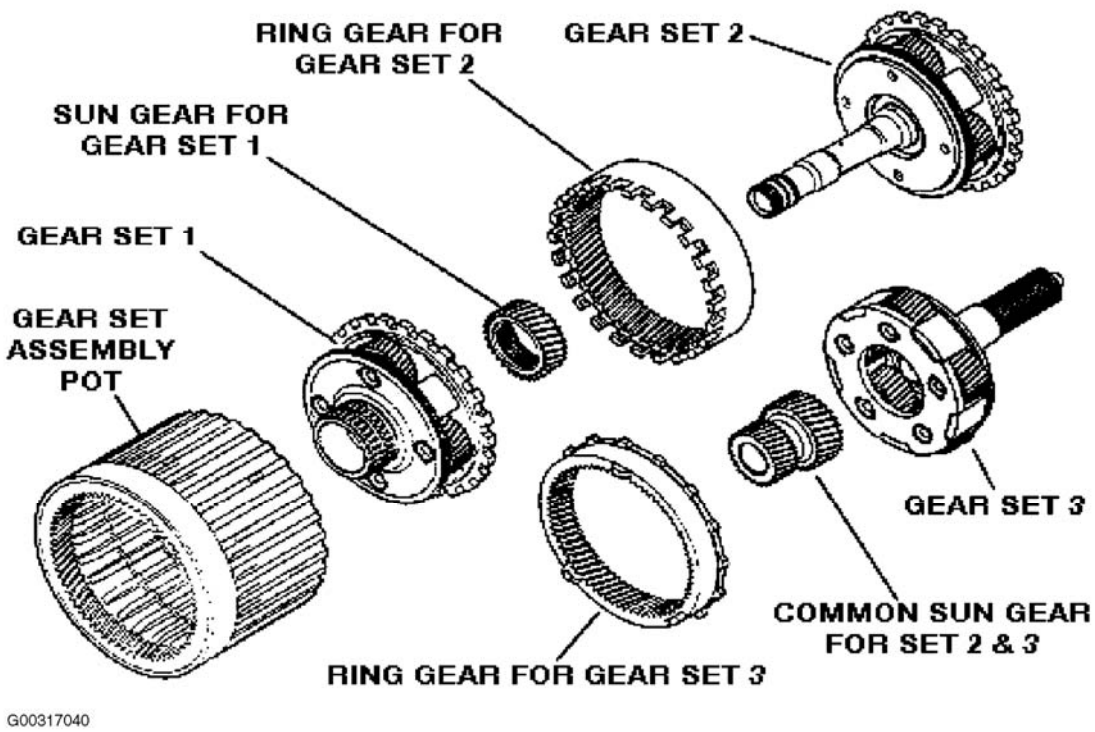


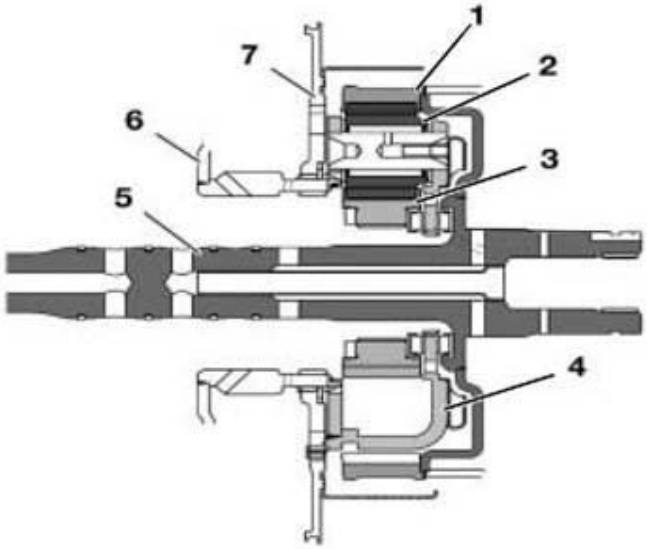
Fig. 30: Identifying Wilson Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Lepelletier Gear Set

The Lepelletier Gear Set was introduced to BMW on the ZF GA6HP26Z. See **Fig. 31**. This gear set allows for 6 forward speeds and one reverse gear using a light weight design. The planetary gear train consists of a single carrier planetary gear train and a downstream double planetary gear train.

Lepelletier Gear Set

1. Internal Ring Gear 1
2. Planet Gear (pinion)
3. Planet Carrier
4. Planet Carrier
5. Turbine Shaft
6. Cylinder A
7. Pressure Plate A



Double Planetary Set

1. Internal Gear 2
2. Planet Carrier Clutch E
3. Output
4. Double Planet Gear Long
5. Sun Gear 3, Clutch E
6. Sun Gear 2, Clutch A
7. Planer carrier 1
8. Planet Gear (short)

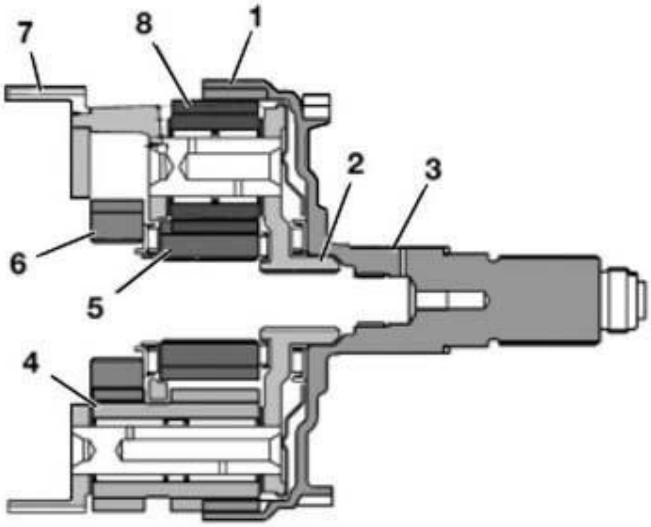


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Fig. 31: Identifying Lepelletier Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Planetary Gear Set Operation

In order to understand planetary gear set operation, it is important to understand some basic rules of operation:

- It is assumed that engine rotation is clockwise when referring to power flow charts and diagrams.
- Planetary pinions will always rotate in the same direction as the internal ring gear.
- When the sun gear is driven clockwise and the planetary carrier is held stationary the internal ring gear will rotate counter clockwise (reverse gear).

- When two or more planetary members are locked together, the assembly will rotate together. The ratio from input to output is 1:1.
- When the sun gear is held stationary and the planetary carrier is driven clockwise, the ring gear will be driven clockwise in an overdrive ratio (.75:1)

When trying to understand power flow schematics, it is important to be able to draw a comparison between the actual planetary components and the schematic symbols. The diagram below outlines the relationship between these components and the power flow schematic. The schematic is a representation of a cross section of the transmission, but you only see the top half of the cross section. The transmission is shown as though it has been quartered lengthwise. See **Fig. 32**.

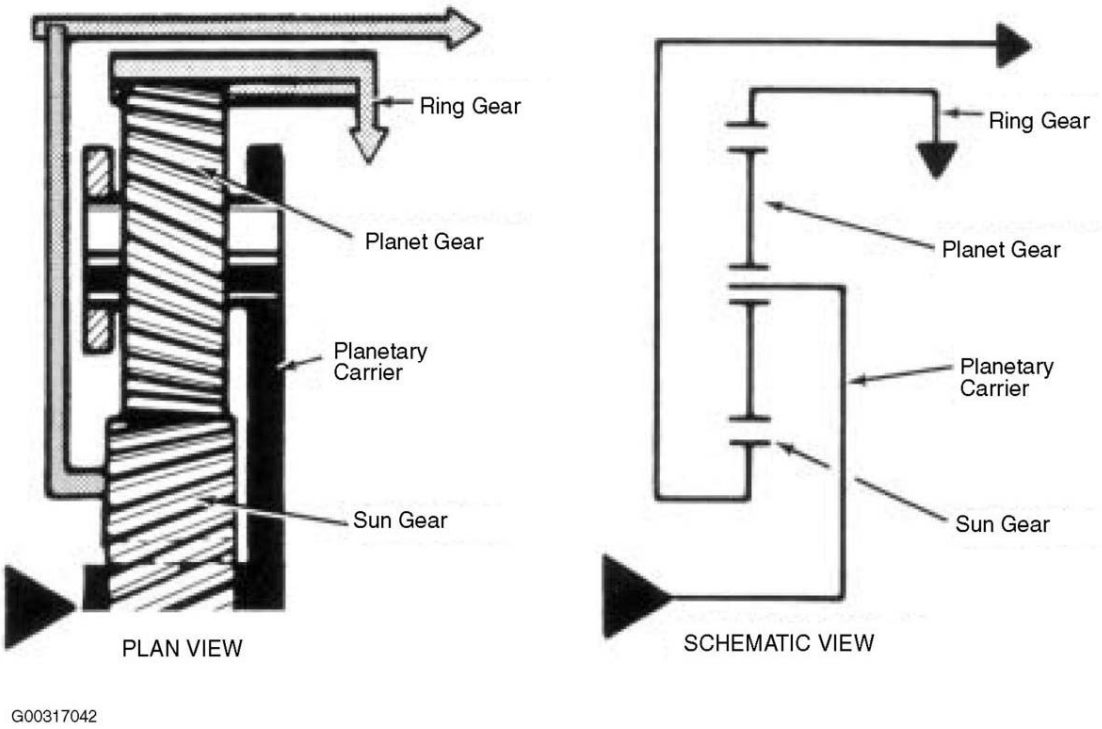

Fig. 32: Identifying Gear Set Operation
Courtesy of BMW OF NORTH AMERICA, INC.

POWER FLOW SCHEMATIC

In order to understand power flow schematics, a relationship must be drawn between the actual components and the schematic representation. This example uses the 4HP22/24 power flow schematic. The 4HP22/24 transmission uses a Simpson Planetary Gearset and an auxiliary gearset. The auxiliary gear set is a simple planetary gearset. See **Fig. 33**.

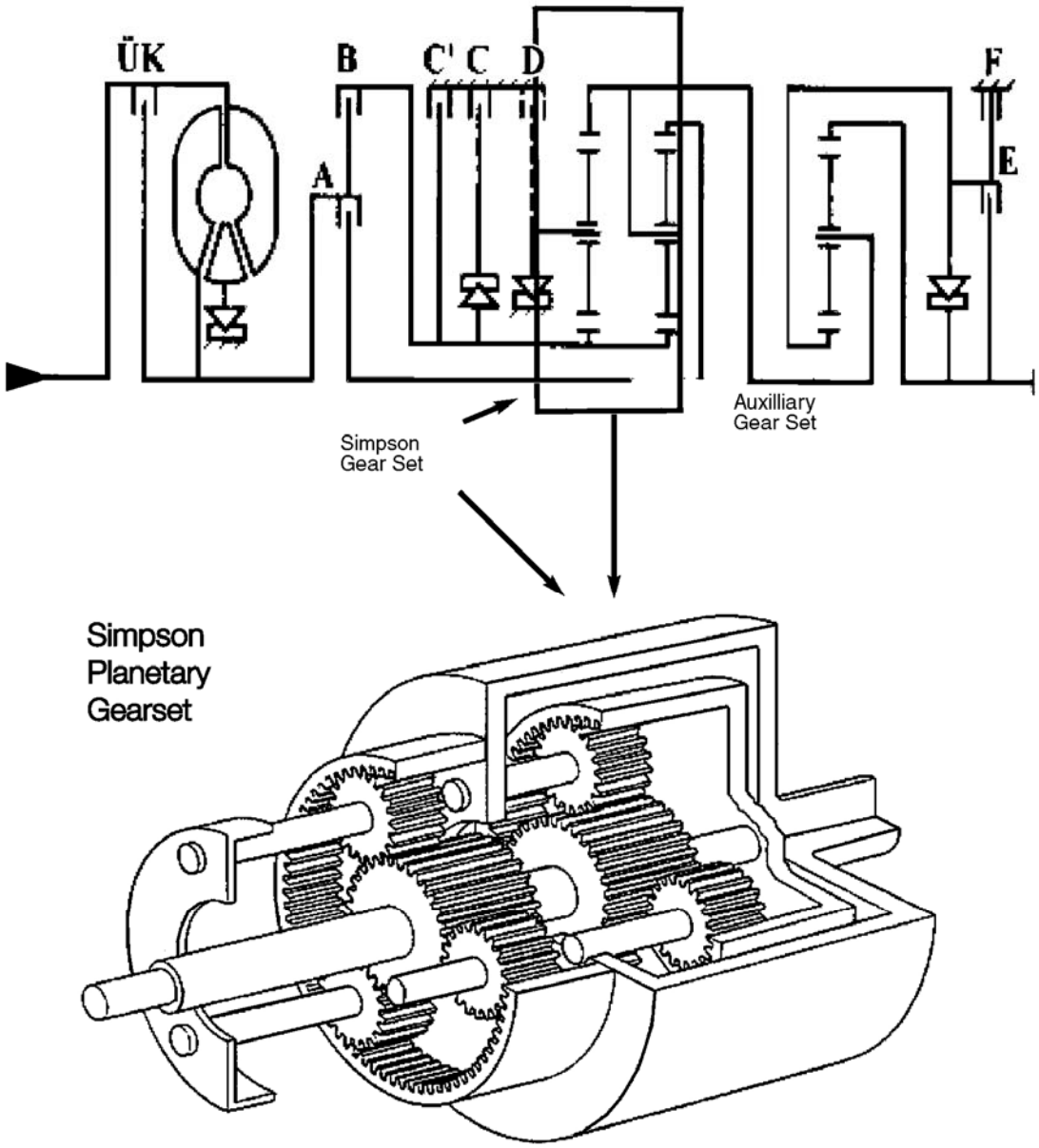

Fig. 33: Identifying Power Flow Schematic
Courtesy of BMW OF NORTH AMERICA, INC.

Power Flow In First Gear

Drive torque is applied to the torque converter impeller and transferred to the turbine. The turbine shaft rotates clockwise (CW). The "A" clutch locks the turbine shaft to the rear input ring gear. The rear input ring gear rotates CW driving the rear planet pinions CW. The planetary pinions drive the common sun gear CCW, which in turn drive the front planet pinions CW. The front planetary carrier is held from rotating CCW by one way clutch "J". The front planetary pinions which are rotating CW drive the front ring gear/rear carrier CW. The rear

planetary carrier is rotating CW and is driving the planetary carrier from the auxiliary gear set. The "E" clutch in the auxiliary gear set is holding the Sun gear and the ring gear together. Therefore the auxiliary gear set is locked in a 1:1 ratio. See **Fig. 34**.

One Way Clutch "J" is locked to prevent the front planetary carrier from rotating CCW. One Way Clutch "H" is not used and One Way Clutch "K" is locked. One way clutch "K" is used to prevent an interruption in power flow before the "E" clutch is locked during the 4-3 shift. See **Fig. 35**.

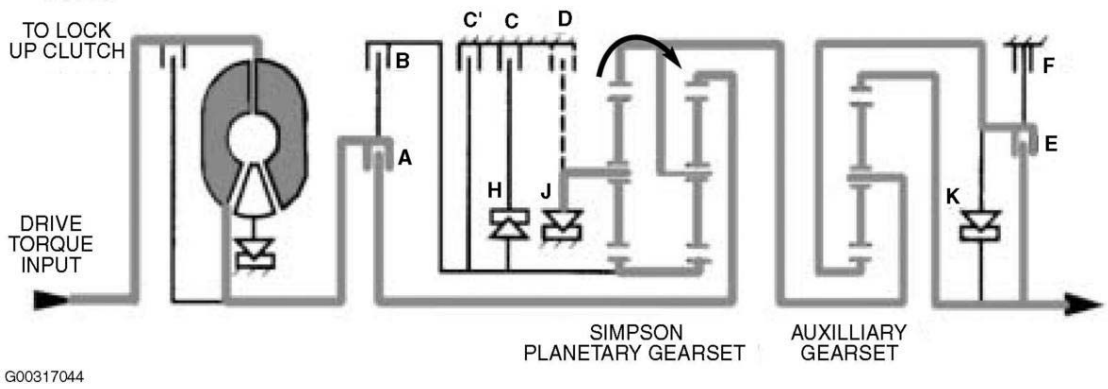

Fig. 34: Power Flow Schematic In First Gear
Courtesy of BMW OF NORTH AMERICA, INC.

ent an interruption in power flow before the "E" clutch is locked during the 4-

POSITION GEAR	D				3			2		1	R
	1	2	3	4	1	2	3	1	2	1	R
Clutch A	X	X	X	X	X	X	X	X	X	X	
Clutch B			X	X			X				X
Clutch C'		X				X			X		
Clutch C		X	X	X		X	X		X		
One Way Clutch H		X				X			X		
Clutch D										X	X
One Way Clutch J	X				X			X		X	
Clutch E	X	X	X		X	X	X	X	X	X	X
One Way Clutch K	X	X	X		X	X	X	X	X	X	X
Clutch F				X							

Fig. 35: Power Flow In First Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Second Gear

Drive torque is applied to the torque converter impeller and transferred to the turbine. See **Fig. 36**. The turbine shaft rotates clockwise (CW). The "A" clutch locks the turbine shaft to the rear input ring gear. The rear input ring gear rotates CW driving the rear planet pinions CW. The sun gear is held stationary by the C' clutch. The rear planet pinions rotate around the fixed sun gear CW. The rear planetary carrier will rotate CW. The rear planetary carrier will drive the auxiliary gear set and will rotate as a complete unit. The auxiliary gear set is locked in a 1:1 ratio due to the "E" clutch locking the sun and ring gear together. The "C" clutch is locking the outer race of the "H" freewheel to the case. This is used for the 3/2 downshift. Freewheel "J" is not active and Freewheel "K" is locked.

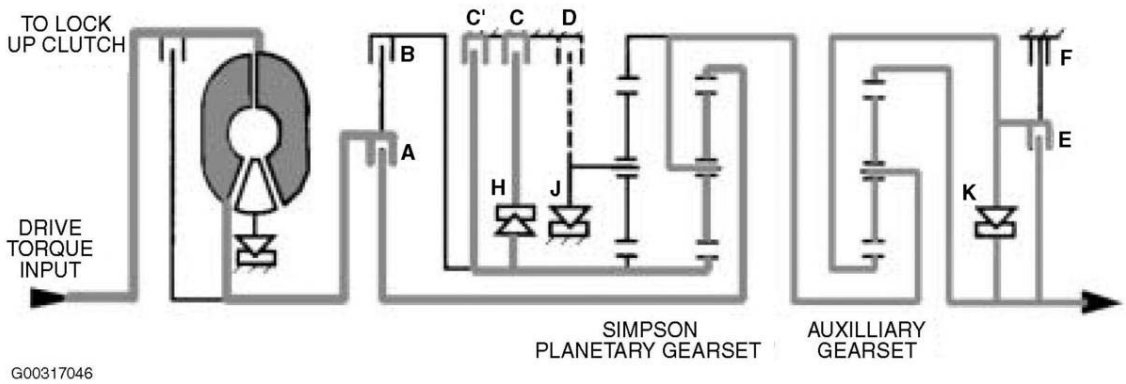

Fig. 36: Power Flow Schematic In Second Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Third Gear

Drive torque is applied to the torque converter impeller and transferred to the turbine. See **Fig. 37**. The turbine shaft rotates clockwise (CW). The "A" clutch and the "B" clutch are locked, this causes the rear input ring gear to be locked to the sun gear in the Simpson Gear set. The Simpson gear set is locked in a 1:1 ratio. The "E" clutch is locked which locks the ring gear to the sun gear in the Simpson gear set. The entire transmission planetary system is now locked in a 1:1 ratio. Freewheel "H" is overrun and freewheel "J" is not used. Freewheel "K" continues to be locked.

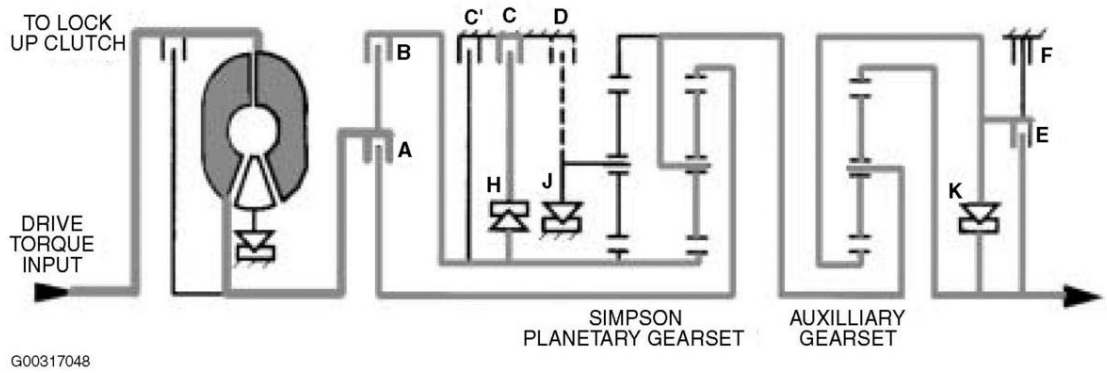

Fig. 37: Power Flow Schematic In Third Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Fourth Gear

Drive torque is applied to the torque converter impeller and transferred to the turbine. See **Fig. 38**. The turbine shaft rotates clockwise (CW). (The turbine shaft can also be driven by the lock up clutch when engaged). The "A" clutch and the "B" clutch are locked, this causes the rear input ring gear to be locked to the sun gear in the Simpson Gear set. The Simpson gear set is locked in a 1:1 ratio. The "F" clutch is locked which locks the sun gear in the auxiliary gear set to the case. The Simpson gear set drives the planetary carrier CW. The planet pinions walk around the fixed sun gear in a CW direction. This causes the ring gear to rotate CW as well. The ring gear, which is the output of the transmission is driven in an overdrive ratio. Freewheel "H" and "K" are overrun. Freewheel "J" is not used.

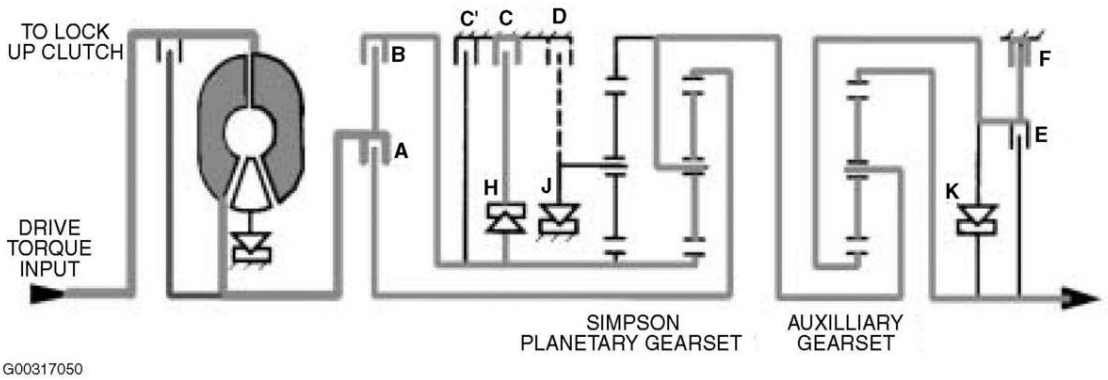

Fig. 38: Power Flow Schematic In Fourth Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Reverse Gear

Drive torque is applied to the torque converter impeller and transferred to the turbine. See **Fig. 39**. The turbine shaft rotates clockwise (CW). The "B" clutch is locked which drives the sun gear in the Simpson gear set CW.

The sun gear drives the planet pinions CCW. The planetary carrier is held stationary by the "D" clutch. The planet pinions cause the front ring gear to rotate CCW. The front ring gear (and rear carrier) drive the auxiliary gear set CCW which rotates at a ratio of 1:1 due to the "E" clutch locking the sun and ring gear of the auxiliary gear set. Freewheel "H" and "J" are not used. Freewheel "K" is locked.

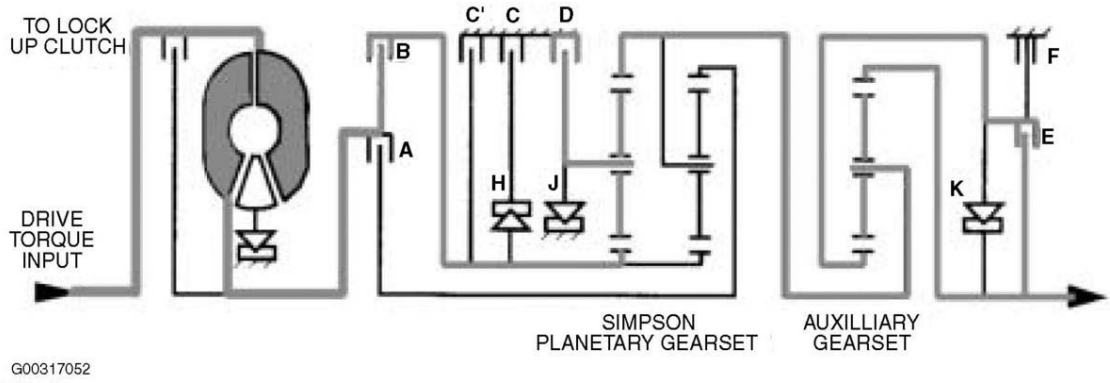

Fig. 39: Power Flow Schematic In Reverse Gear
Courtesy of BMW OF NORTH AMERICA, INC.

SHIFT CONTROL

Freewheel Shifting

In order to prevent an interruption in power flow, freewheel (One Way Clutches) are used to lock members of the planetary gear set. Certain transmissions such as the 4HP22/24, A4S270/310R and the A5S360R use freewheel shifting on all gear shifts. Transmissions such as A5S310Z, A5S440Z, A5S560Z and GA6HP26Z use freewheel shifting for only specific shifts. Other shifts in these transmissions use overlap shifting technology. To demonstrate how the freewheel is used, the freewheel "H" in the 4HP22/24 transmission will be examined.

In third gear, the sun gear is rotating clockwise. Freewheel "H" is overrun (unlocked) allowing the sun gear to rotate. Clutch "C" is active which locks the outer race of freewheel "H" to the case. During a 3/2 downshift, clutch "B" is released. The sun gear is held from rotating counter clockwise by freewheel "H" and the "C" clutch. Freewheel "H" is used to stop the counter clockwise rotation of the sun gear before the "C" clutch can engage. This prevents an interruption of power flow during the 3/2 downshift. If freewheel "H" fails to operate, there would be an increase in engine RPM from 3rd to 2nd gear. See **Fig. 40** and **Fig. 41** .

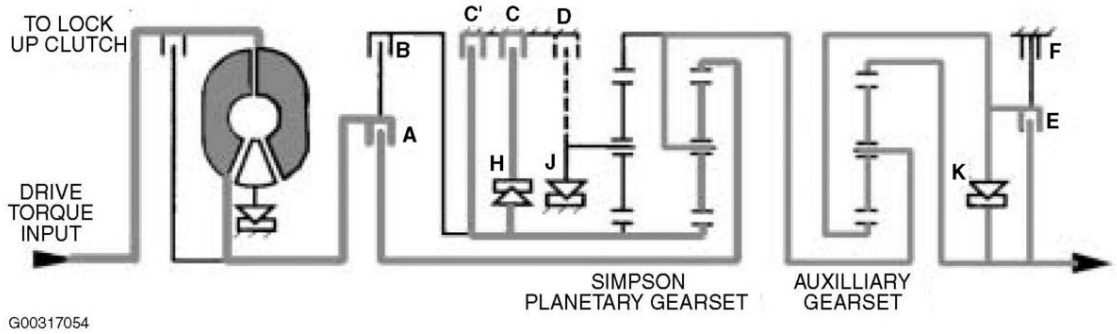

Fig. 40: Freewheel Shifting (Second Gear)
Courtesy of BMW OF NORTH AMERICA, INC.

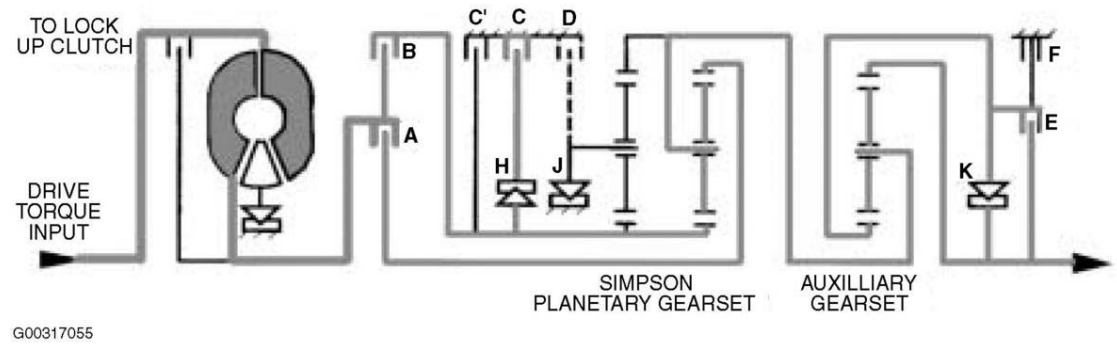

Fig. 41: Freewheel Shifting (Third Gear)
Courtesy of BMW OF NORTH AMERICA, INC.

Overlap Shift Control

Overlap shift technology is currently used on ZF transmissions. The A5S310Z, A5S440Z, A5S560Z and the GA6HP26Z use overlap shift technology on most gear changes. The advantages of this design allows for the reduction of the use of One Way Clutches (freewheel) and a significant improvement in shift quality. During an overlap shift, the releasing clutch pressure is reduced at the same rate that the engaging clutch pressure is increased. The result is a smooth transfer or torque between gear ratios.

As shown in the diagram, clutch 1 is fully engaged with maximum pressure. Clutch 2 is fully released. During overlap shifting, the TCM closely monitors the rotational speeds of the turbine (input) shaft and output shaft. The TCM then uses the EDS solenoids to control pressures during shifting to provide the optimum shift timing and overlap control. See **Fig. 42**.

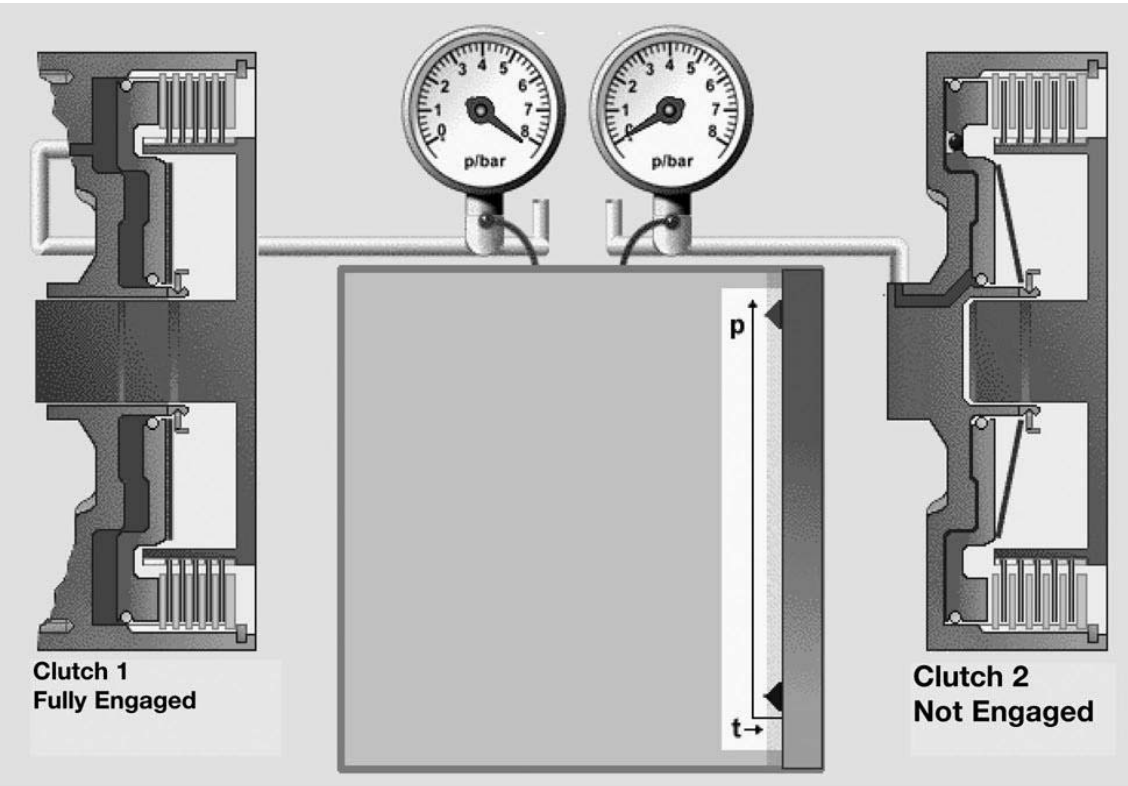

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Fig. 42: Identifying Overlap Shift Control
Courtesy of BMW OF NORTH AMERICA, INC.

Overlap Shifting

During the transition of overlap, the clutches run through a slip zone. The torque is gradually transferred from the clutch that is releasing to the clutch that is engaging. The new gear engages the moment the torque level exceeds that of the first clutch. This is described as overlap. If the overlap is correct, (zero overlap) the engaging clutch takes over as much torque as the disengaging clutch releases. The result is a seemingly unnoticed shift of the best quality. See **Fig. 43** and **Fig. 44** .

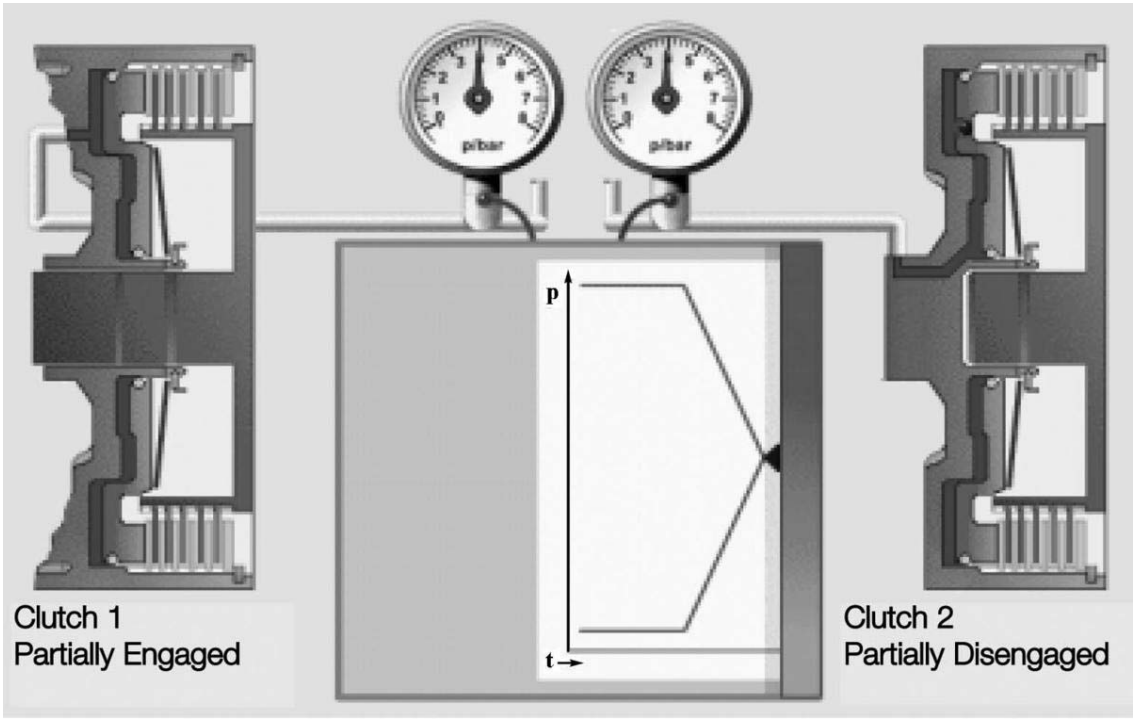

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Fig. 43: Identifying Overlap Shifting (Clutch 1 Engaged)
Courtesy of BMW OF NORTH AMERICA, INC.

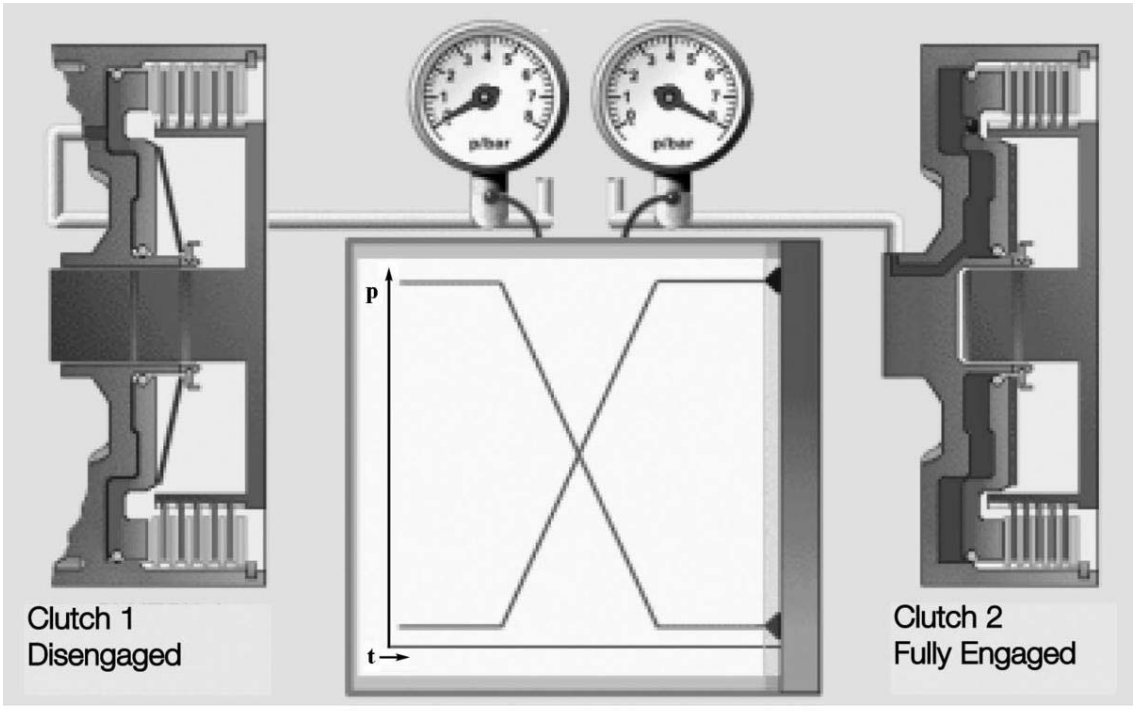

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Fig. 44: Identifying Overlap Shifting (Clutch 1 Disengaged)
Courtesy of BMW OF NORTH AMERICA, INC.

Negative Overlap

Negative overlap occurs when the engaging clutch takes over too late or the releasing clutch drops pressure too early. The result is that the drive torque is briefly interrupted. When the engine is operating under load, the engine speed increases due to the interruption. When coasting the engine speed drops. See **Fig. 45**.

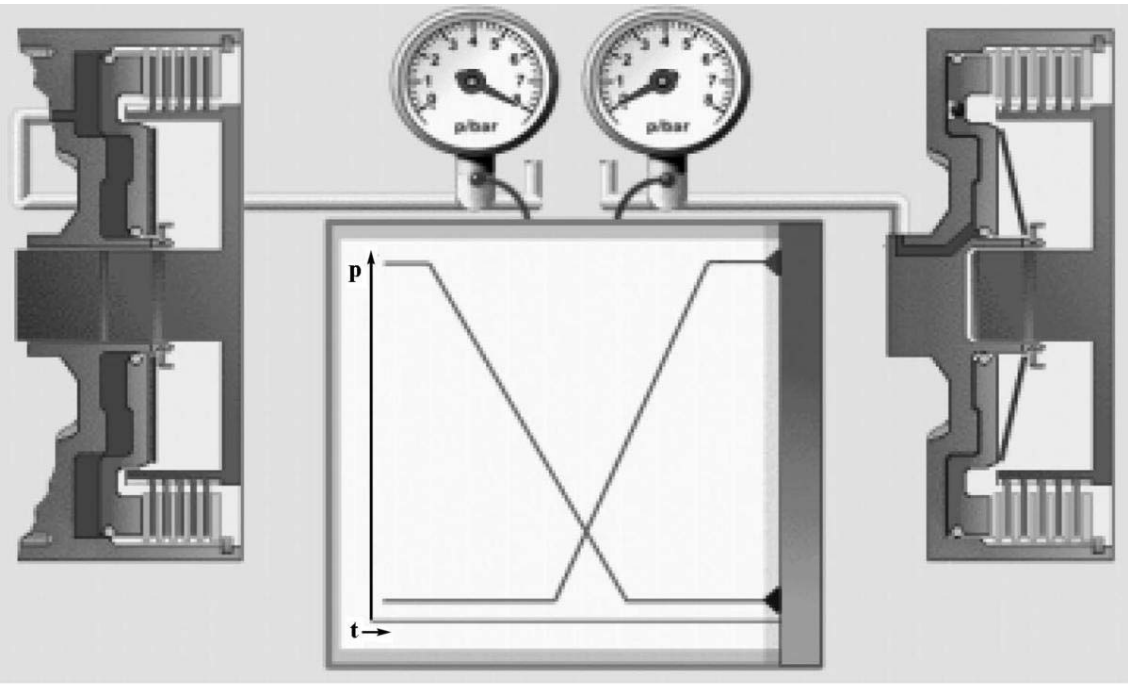

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Fig. 45: Identifying Negative Overlap
Courtesy of BMW OF NORTH AMERICA, INC.

Positive Overlap

If positive overlap occurs, the engaging clutch takes over too early or the releasing clutch pressure drops too late. The gear set would become momentarily blocked if this condition occurs during an upshift. When this occurs the ratio of the gear set becomes 1:1 momentarily. The result is a loss in drive torque during a gear shift. See **Fig. 46**.

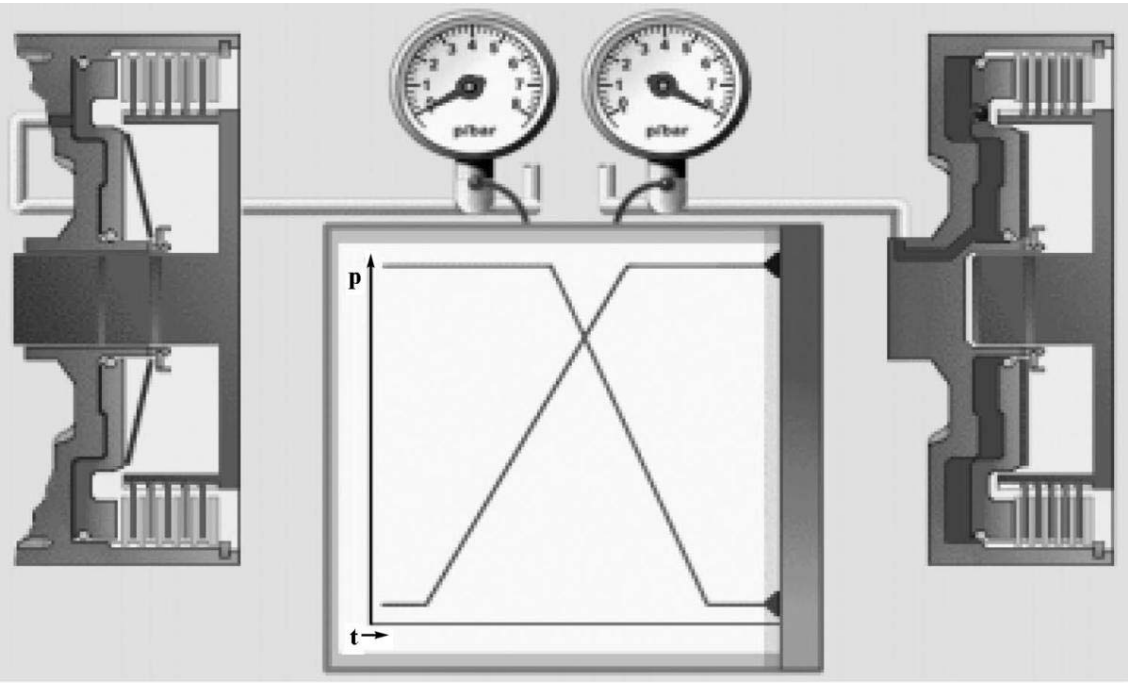

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Fig. 46: Identifying Positive Overlap
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION CONTROL MODULE

The TCM receives inputs, processes information and actuates the output elements to provide optimal shift points. The TCM is programmed for maximum shift comfort and fuel economy. The TCM on most BMW vehicles is located in the E-Box next to the ECM (DME). There are several types of TCM housings:

- 35 Pin TCM (TCU) - used on the 4HP transmissions.
- 55 Pin TCM used on the A4S310R (THM-R1).
- 88 Pin TCM used on all others up to 98.
- 134 Pin TCM used on all BMW transmission from the 99 model year. (Note- the 134 pin TCM was introduced on the 98 Models equipped with the A5S440Z).

The 134 Pin TCM is also referred to as SKE (Standard Shell Construction). The SKE housing uses 5 separate connectors. On transmission applications only three connectors (1, 3 and 4) are used. Connectors 2 and 5 are blank and are NOT used. The connectors are Blue in color to avoid confusion with the ECM (DME) connectors which are Black. See **Fig. 47**.

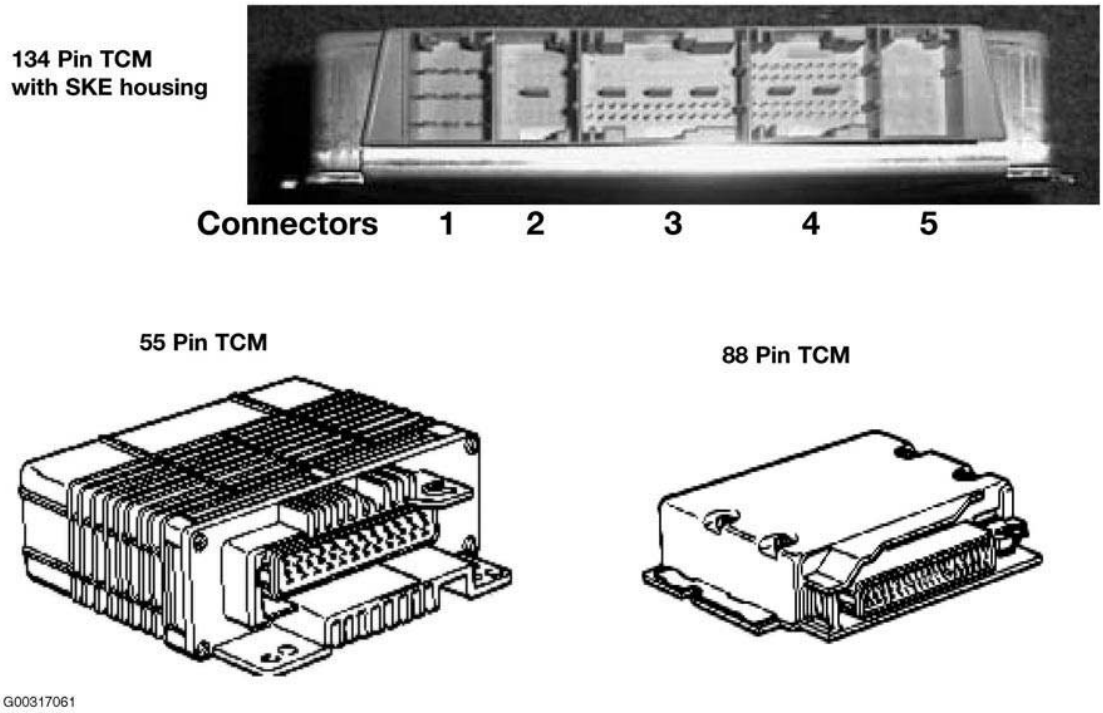

Fig. 47: Identifying Transmission Control Modules & Connectors
Courtesy of BMW OF NORTH AMERICA, INC.

2700 TRANSFER CASE, GENERAL

00 DANGER OF POISONING IF OIL IS INGESTED/ABSORBED THROUGH THE SKIN

Danger of poisoning!

Ingesting oil or absorbing through the skin may cause poisoning!

Possible symptoms are:

- Headaches
- Dizziness
- Stomach aches
- Vomiting
- Diarrhoea
- Cramps/fits
- Unconsciousness

Protective measures/rules of conduct

- Pour oil only into appropriately marked containers
- Do **not** pour oil into drinking vessels (drinks bottles, glasses, cups or mugs)
- Observe country-specific safety regulations

First aid measures

- Do not induce vomiting.

If the person affected is still conscious, he/she must rinse out their mouth with water, drink plenty of water and consult a doctor immediately.

If the person affected is unconscious, do not administer anything by mouth, place the person in the recovery position and seek immediate medical attention.

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00 RISK OF INJURY IF OIL COMES INTO CONTACT WITH EYES AND SKIN

Risk of injury!

Contact with eyes or skin may result in injury!

Possible symptoms are:

- Impaired sight
- Irritation of the eyes
- Reddening of the skin
- Rough and cracked skin

Protective measures/rules of conduct

- Wear protective goggles
- Wear oil-resistant protective gloves
- Observe country-specific safety regulations

First aid measures

- **Eye contact:** Rinse eyes immediately with plenty of water for at least 15 minutes; if available, use an eye-rinsing bottle. If irritation of the eyes persists, consult a doctor.
- **Skin contact:** Wash off with soap and water immediately. If irritation persists, consult a doctor.

NOTE: Do not use solvents/thinners.

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00 SAFETY INSTRUCTIONS FOR HANDLING OIL

WARNING: DANGER OF POISONING if oil is ingested/absorbed through the skin!
RISK OF INJURY if oil comes into contact with eyes and skin!

Recycling

Observe country-specific waste-disposal regulations.

Measures if oil is unintentionally released

- **Personal precautionary measures:** Danger of slipping! Keep non-involved persons away from the work area. Wear personal protective clothing/equipment.
- **Environmental protection measures:** Prevent oil from draining into drain channels, sewerage systems, pits, cellars, water and the ground.
- **Limiting spread:** Use oil blocks to prevent the surface spread of oil.
- **Cleaning procedure:** Bind and dispose of escaped oil with nonflammable absorbents.

NOTE: Do not flush oil away with water or aqueous cleaning agents.

2700 TRANSFER CASE, GENERAL

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1.0 TRANSFER CASE OPERATING FLUIDS

TRANSFER CASE OPERATING FLUIDS SPECIFICATION

Model:	Fluid:	BMW Part Number:
E30 325iX	ATF Dexron® III formulation	
E46/16 325xi/xiT, 330xi	MTF-LT-1	83 22 9 408 942 (MTF-LT-2 = 5 Liters)
E53 All models produced up to 2/2005 with NV125 transfer case	ATF Dexron® III formulation	
E53 All models with X-Drive transfer case	TF0870	83 22 0 397 244 (1 Liter)
E60 All models	TF0870	83 22 0 397 244 (1 Liter)
E61 All models	TF0870	83 22 0 397 244 (1 Liter)
E70 All models	TF0870	83 22 0 397 244 (1 Liter)
E83 All models with X-Drive transfer case	TF0870	83 22 0 397 244 (1 Liter)
E90, E91 and E92 All models	TF0870	83 22 0 397 244 (1 Liter)

NOTE: Before opening the container, shake the container to evenly mix the additives with the oil.

TRANSMISSION FUNDAMENTALS

STANDARD/AUTOMATIC TRANSMISSION COMPARISON

In today's modern vehicles, the automatic transmission has become a vital part of the powertrain. Automatic transmissions provide overall better fuel economy and efficiency while adapting to changing road conditions and driving habits. Standard transmissions offer more driver interaction with the vehicle, however automatic transmissions reduce driver fatigue and increase safety by shifting automatically. Automatic transmissions also offer improved driveability in stop and go traffic. If there is a disadvantage to an automatic transmission, it would be complexity and cost of manufacturing.

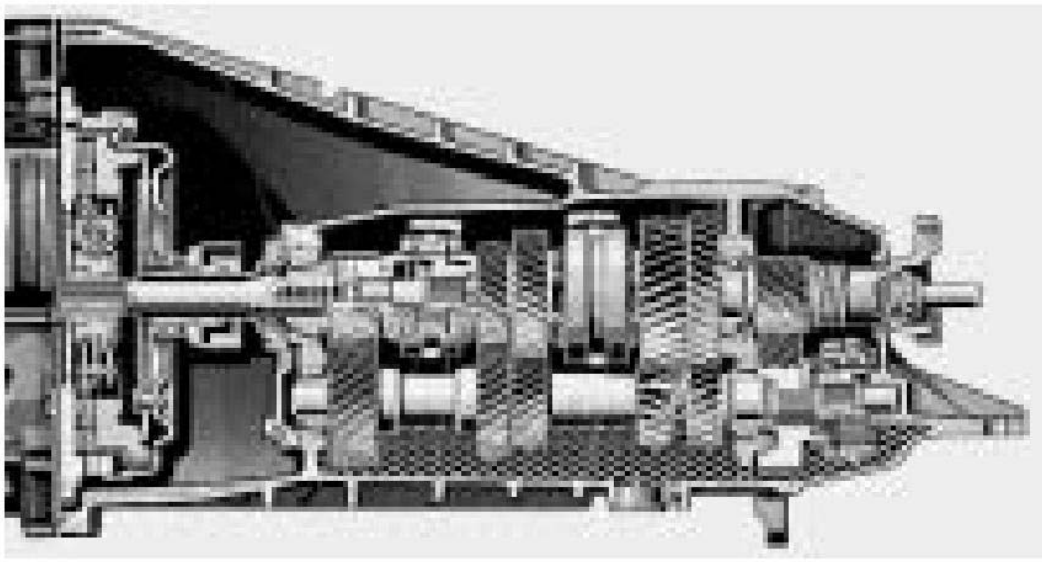

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Fig. 1: Identifying Standard Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

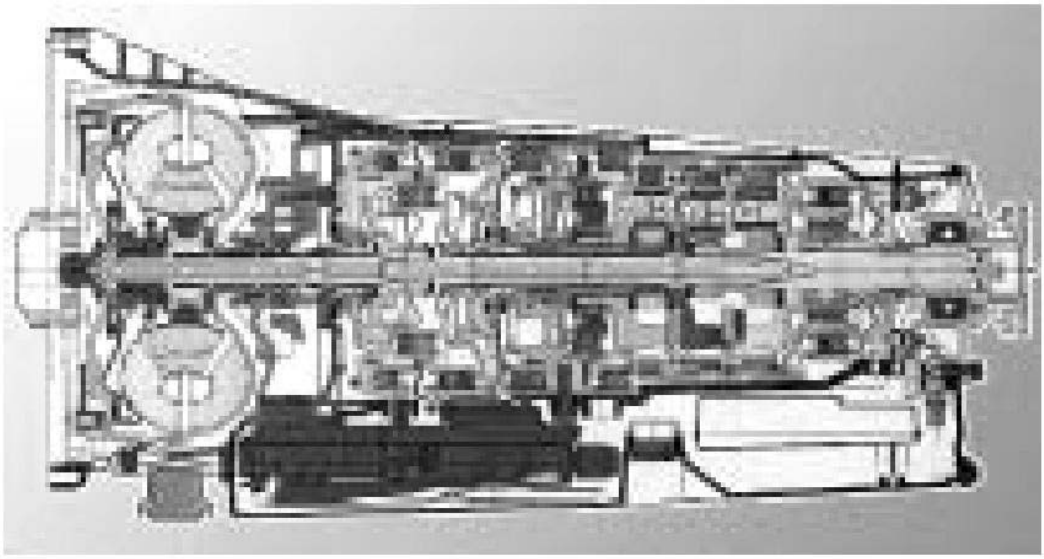

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Fig. 2: Identifying Automatic Transmission
Courtesy of BMW OF NORTH AMERICA, INC.

- Drive torque must be interrupted to change gears.
- Higher loads on driveline from abrupt clutch application.
- Clutch must be disengaged when vehicle is stopped to prevent stalling.
- High radial loads on housing.
- Gear set design requires more space than planetary type.
- Requires some Maintenance (clutch).
- Requires driver intervention for shifting.
- Gear teeth are in constant mesh due to planetary design.
- Smoother application of drive torque reduces loads on driveline.
- Due to fluid coupling in the torque converter, transmission can stay in gear when vehicle is stopped.
- Minimal radial loads on housing.
- Compact design of gear set. Space requirement is minimized.
- Maintenance free operation. (Lifetime fluid and no clutch).
- Automatic shifting reduces driver fatigue and increases safety.

HYDRAULIC TRANSMISSION VS. ELECTRO-HYDRAULIC TRANSMISSION

Since the introduction of the automatic transmission there have been numerous refinements to improve shift comfort as well as fuel economy. Early automatic transmissions used only hydraulic control, there was no

electronic intervention. In 1986 BMW introduced their first EH (Electro-Hydraulic) transmission into production vehicles.

The acronym EGS is used by BMW for its electronic transmission control system. EGS stands for "Electronic Transmission Control" which comes from the German words "**E** lektronisch **G** etriebe **S** teurung". In order to comply with SAE terminology we will refer to the EGS control module as the TCM "**T** ransmission **C** ontrol **M** odule".

EH controlled transmissions allow for optimized shift points by closely monitoring changing conditions. Engine speed, road speed and throttle angle are some of the inputs that are monitored by the TCM to determine optimal shift points. The TCM will then process this information and control shift point via electronic solenoids mounted on the valve body.

With the introduction of Adaptive Transmission Control, shift comfort and fuel economy was further improved. The TCM now monitors throttle angle deviations, wheel speeds and CAN Bus information to fine tune shift points.

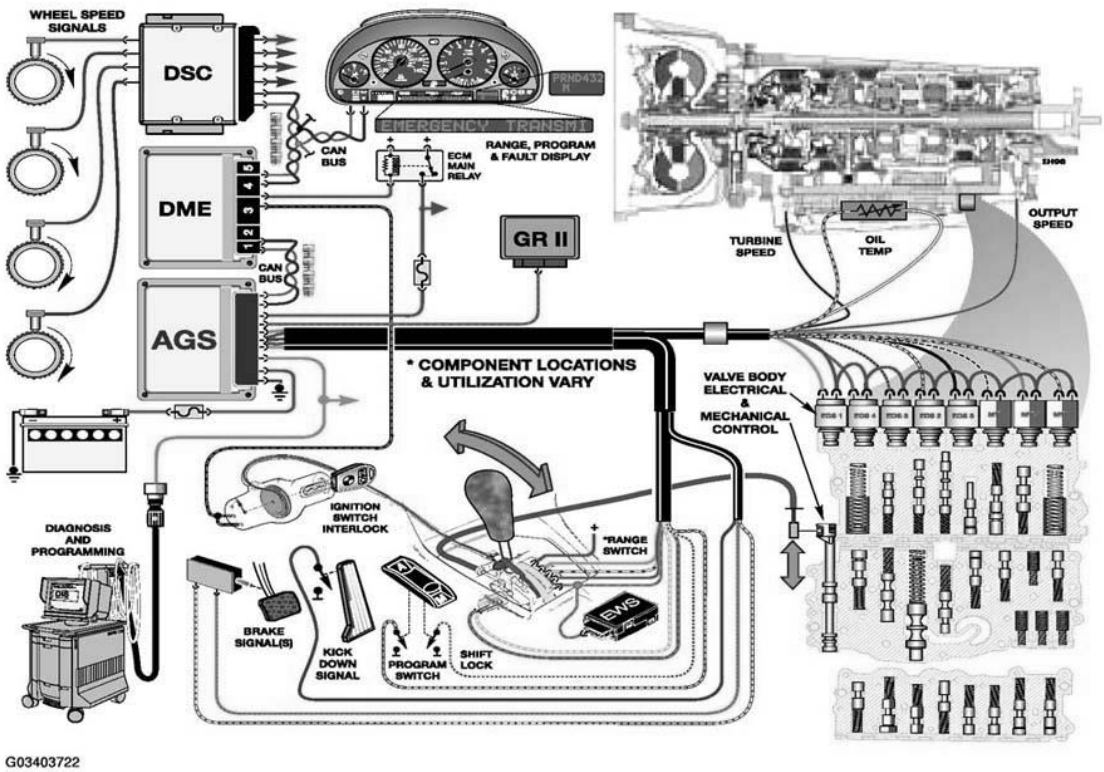

Fig. 3: Identifying Electro-Hydraulic Transmission Inputs/Outputs
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION IDENTIFICATION

BMW automatic transmission are manufactured by two suppliers for the US market:

- **Zahnradfabrik Friedrichshafen:** Commonly referred to as ZF. ZF manufactures both manual and automatic transmissions.

- **GM Powertrain - Hydramatic:** Hydramatic is a manufacturing division of General Motors located in Strasbourg France. Hydramatic supplies automatic transmissions to BMW for four and six-cylinder vehicles.

BMW has developed an internal numbering system for their transmissions for parts ordering, information research and identification. Also each manufacturer uses their own internal identification system. Here is a breakdown of these identification codes:

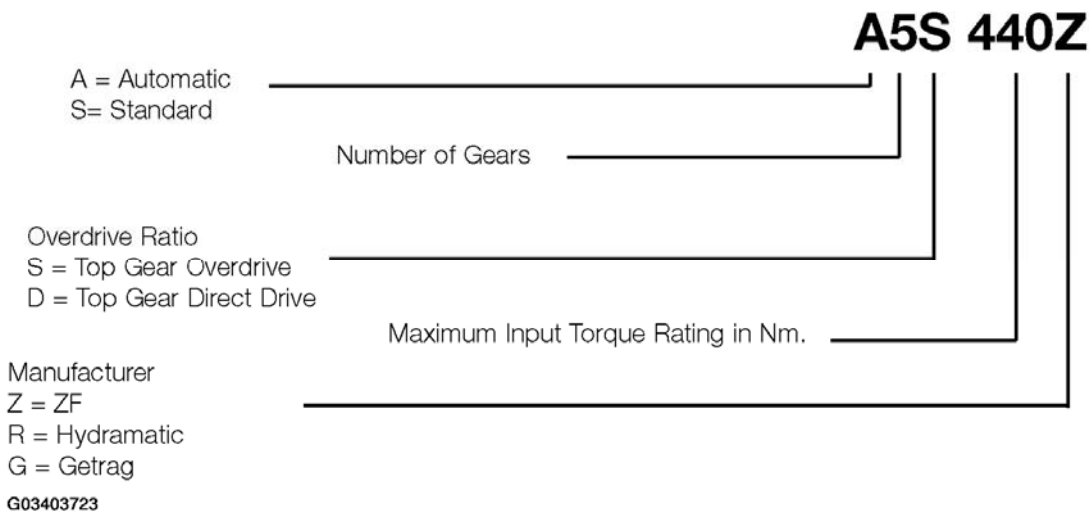

Fig. 4: Identifying BMW Identification Code Breakdown
Courtesy of BMW OF NORTH AMERICA, INC.

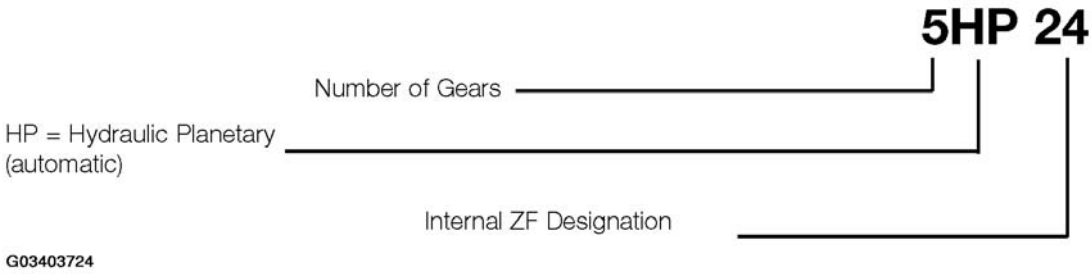

Fig. 5: Identifying ZF Identification Code Breakdown
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION HYDRAULICS

Transmission Fluid (Oil)

The automatic transmission provides pressure regulated hydraulic fluid which is filtered for all of the transmissions functional requirements. All BMW automatic transmissions are designed to operate with specific

fluids. Use of non-approved oil will cause malfunctions and irreparable transmission damage which is not covered by BMW warranty.

The transmission fluid provides the following functions:

- Lubricates mechanical components (planetary gears, bearings etc.).
- Removes heat and transfers heat to transmission cooling system. (Heat Exchanger).
- Removes debris and contaminants to sump and filter when circulated.
- Provides a transfer of kinetic energy in the torque converter.
- Allows hydraulic operation of mechanical components (clutches, brakes) via control of the valve body.

Also, transmission fluid has various properties to prevent oxidation and breakdown from heat and friction. Each type of transmission fluid has properties specific for each transmission application.

Fluid level is crucial in the proper operation of an automatic transmission. Improper fluid levels will cause improper operation and eventually irreparable transmission damage. Improper fluid level can cause:

- A low fluid level can cause an interruption in oil flow during fast acceleration or hard braking which can cause gear shift malfunctions.
- An excessively high fluid level can cause the rotating mechanical components to paddle in the oil. This produces foam which introduces air into the hydraulic system.
- A low fluid level can also cause transmission overheating causing premature transmission failure.

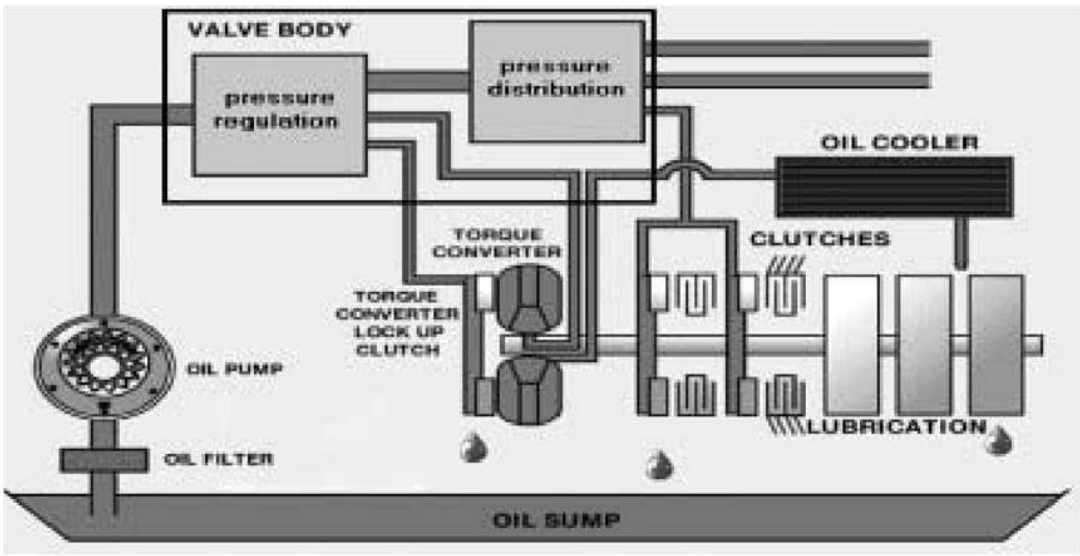

Fig. 6: Identifying Transmission Fluid Flow
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION FLUID APPLICATION

There are numerous types of transmission fluid used in BMW transmissions. With the exception of the early transmissions (4HP22/24, A4S310/270R and the A5S310Z) all current BMW transmissions use "Lifetime Fill" transmission fluid. There is no maintenance required for these transmissions. It is important to use the correct fluid. Incorrect use of the transmission fluid can cause non-warrantable transmission damage.

When performing repairs on transmissions with lifetime fluid, it is important to drain the transmission fluid in to a clean container for re-use. New fluid should only be used for transmission replacement and for topping off after repairs.

Also, transmission fluid level is vital to the proper operation of the transmission.

BMW AUTOMATIC TRANSMISSIONS FLUID SPECIFICATIONS

Transmission	Fluid Type	BMW Part #	Container	SIB Ref.
4HP22 **4HP24**	Dexron III Mercon	Available Commercially (Castrol or Texaco)	N/A	
A5S310Z 530i/iT (E34)	Dexron III	Available Commercially (Castrol or Texaco)	N/A	
M3 (E36)	ESSO LT 71141	83 22 9 407 807	20 liter container	B 24 03 95
A5S325Z	ESSO LT 71141	83 22 9 407 807	20 liter contalner	
A5S440Z	ESSO LT 71141	83 22 9 407 807	20 liter contalner	
A5S560Z 740 (E32), 540 (E34) 840Ci (E31- 6/93-12/94) 740i/iL-750iL (E38)	Shell LA2634	83 22 9 407 765	5 liter contalner	B 24 11 92
540i (3/96-12/96) 850Ci (10/94-6/97)	ESSO LT 71141	83 22 9 407 807	20 liter contalner	B 24 02 94
A4S310R **A4S270R** **(THM-R1)**	Dexron III Mercon	Available Commercially (Castrol or Texaco)	N/A	
A5S360R **A5S390R**	Texaco ETL 7045E Texaco ETL 8072B	83 22 0 026 922 83 22 0 024 359	25 liter contalner 25 liter contalner	
GA6HP26Z	Shell M1375.4	83 22 0 142 516		

TORQUE CONVERTER

In standard transmissions the crankshaft is linked to the transmission input shaft via the clutch assembly. Power flows from the crankshaft through the flywheel. The pressure plate transfers power to the clutch disc which is splined to the transmission input shaft. The pressure plate is used to disconnect (or interrupt) power flow to the transmission input shaft. Because the engine is mechanically connected to the driveline, power flow must be interrupted when the vehicle is stationary. Otherwise the engine would stall.

In automatic transmissions, there is a fluid coupling between the engine and transmission. This fluid coupling is more commonly referred to as the torque converter. In the torque converter there is no rigid connection between

the engine and transmission (Except for lock up clutch). In order to understand the operation of the torque converter, we must first start with the components.

The breakdown of the components are as follows:

- The Impeller (1), which is rigidly connected to the torque converter housing.
- The Turbine (2) which is splined to the input shaft (turbine shaft) of the transmission.
- The Stator (3) which has a one-way clutch. The inner race of the one-way clutch is splined to a stationary shaft attached to the transmission.

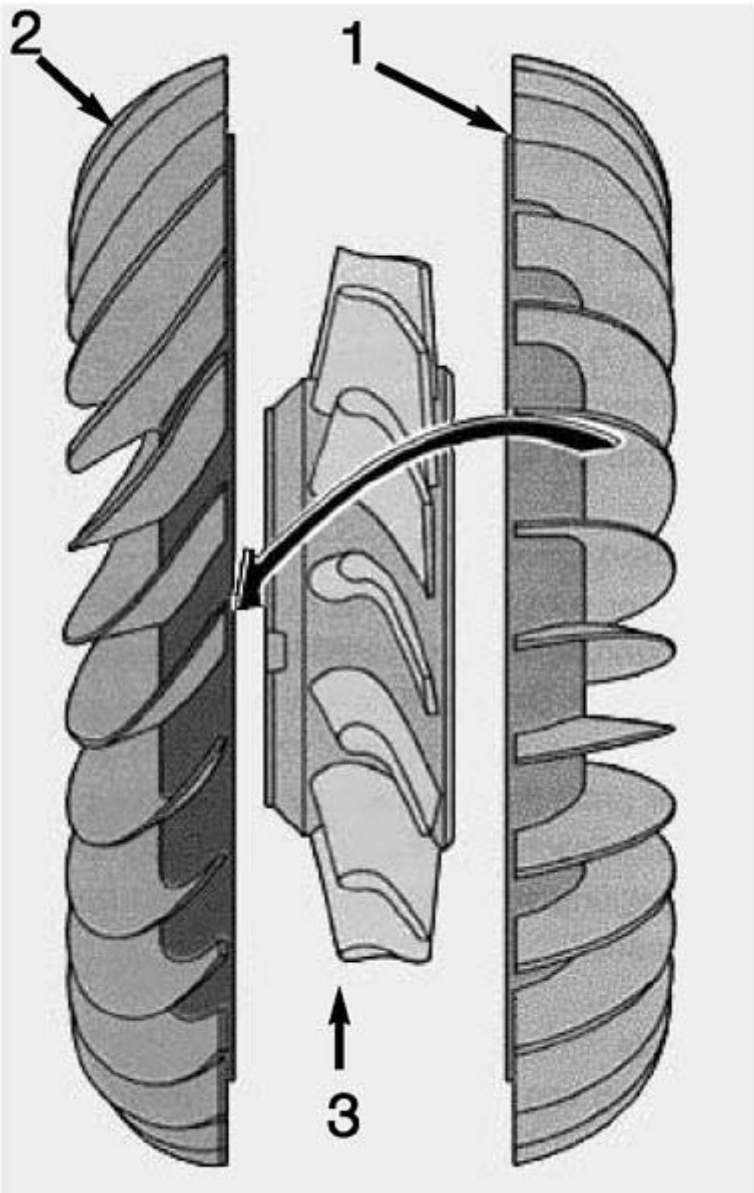

Fig. 7: Identifying Torque Converter Components
Courtesy of BMW OF NORTH AMERICA, INC.

The addition of the stator allows the fluid coupling to be referred to as a torque converter. The stator provides for a multiplication of torque at low speeds. Without the stator there would be no multiplication of torque.

When the engine is running, the impeller which is directly connected to the converter housing, rotates at engine speed. Fluid is directed from the impeller blades to the turbine blades. The fluid drives the turbine which is splined to the input (turbine) shaft of the transmission. This functions the same way as a waterfall acting on a

paddle wheel. The ratio of the impeller speed to turbine speed is approximately 1.1 to 1. This ratio is improved to 1:1 with the addition of the torque converter clutch which is discussed later.

Torque Converter

Torque Converter Operation At Low Speeds

1. At low engine speeds there is a large difference in rotational speed between the impeller and the turbine
2. Fluid flow is directed from the impeller to the turbine. Fluid strikes the vanes of the turbine. The turbine is driven forward in the direction of engine rotation.
3. Fluid flow is then directed back towards the impeller.
4. Before the fluid reaches the impeller, the fluid strikes the vanes of the stator.
5. When the fluid strikes the stator, the one way clutch prevents the stator from rotating.
6. The fluid is then re-directed by the curved vanes of the stator. The fluid is now flowing in the same direction as the impeller.
7. The fluid that is acting on the impeller increases the force on the impeller which multiplies torque.

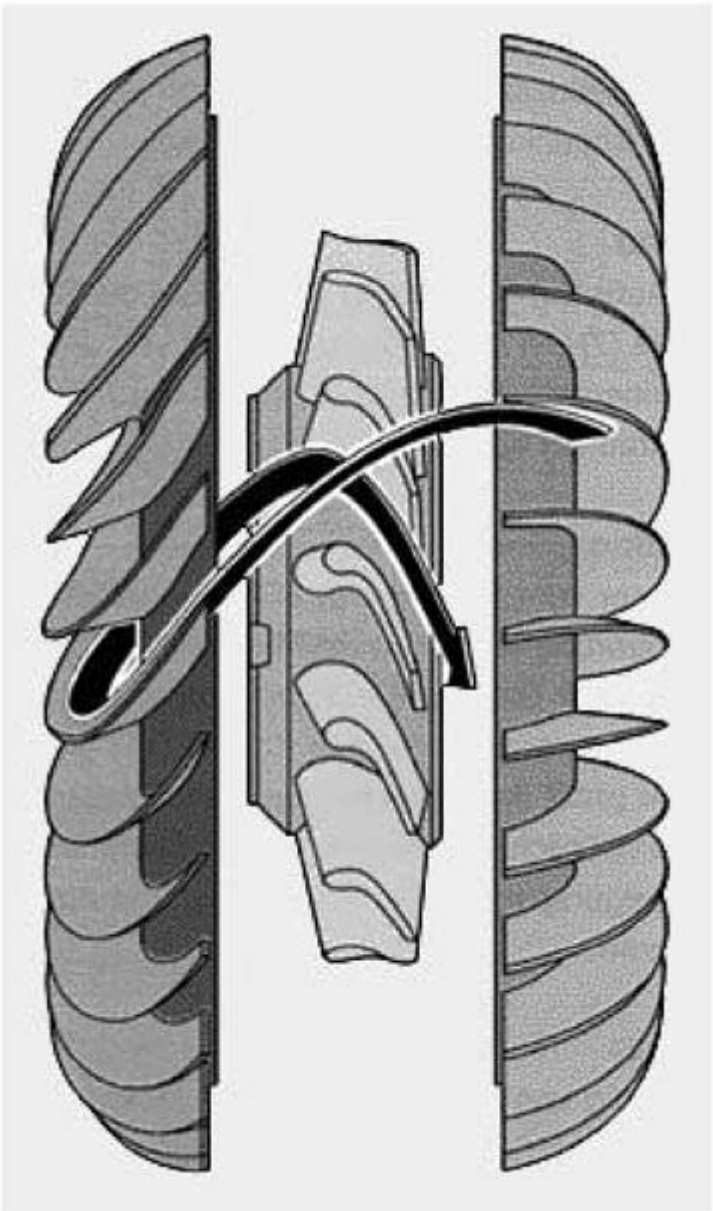

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Fig. 8: Identifying Torque Converter Operation At Low Speeds
Courtesy of BMW OF NORTH AMERICA, INC.

Torque Converter Operation At High Speed

1. As engine speed increases, the turbine speed approaches the speed of the impeller.
2. The fluid flow is directed from the turbine to the back side of the impeller blades.
3. The one-way clutch in the stator unlocks and the stator blades turn in the direction of engine rotation.

4. Fluid is no longer re-directed and torque multiplication no longer takes place.
5. This is referred to as "Coupling Speed". The turbine never reaches the same speed as the impeller as fluid flow would come to a halt. Ratio is approximately 1.1 to 1.

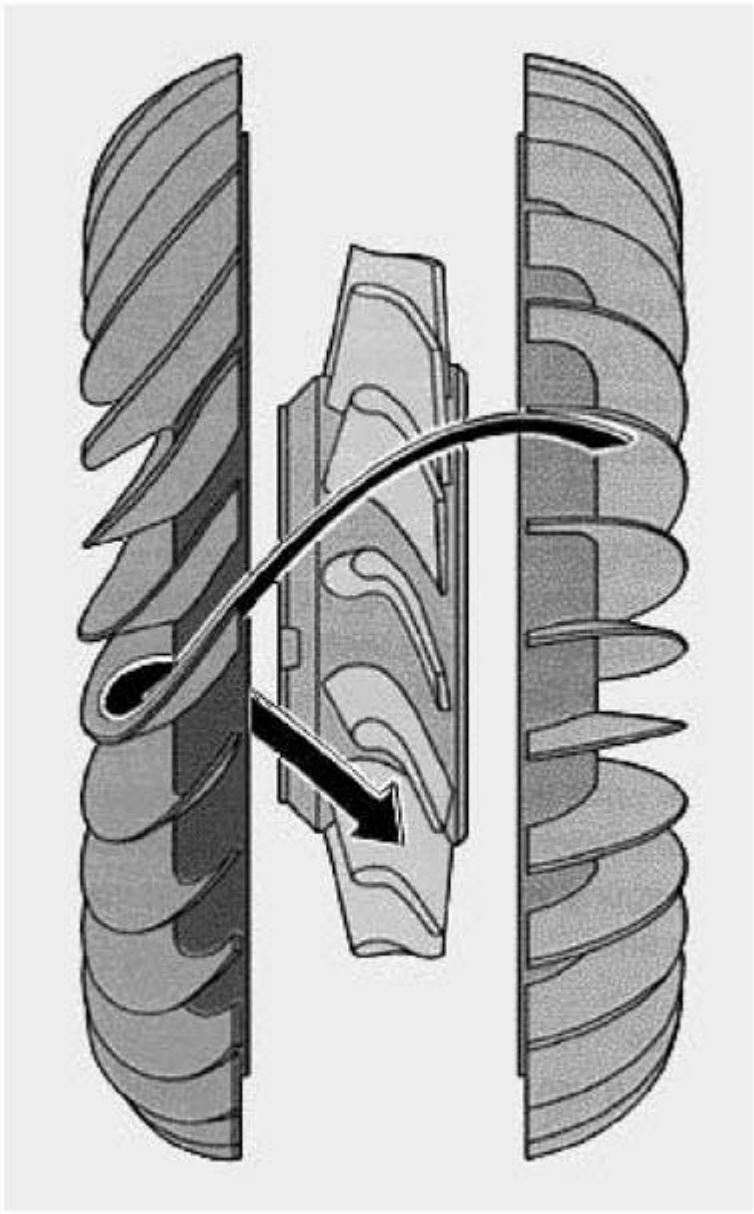

Fig. 9: Identifying Torque Converter Operation At High Speed
Courtesy of BMW OF NORTH AMERICA, INC.

TORQUE CONVERTER CLUTCH

Since the efficiency of the torque converter at coupling speed is approximately 1.1 to 1, fuel economy is compromised. To offset this a torque converter clutch was added on EH controlled transmissions. The torque converter clutch locks the turbine to the converter housing. This creates a mechanical coupling with a ratio of 1:1. This can only be achieved at higher engine speeds, the torque converter clutch must be disengaged at low engine speeds to prevent stalling.

There are two methods for controlling the torque converter clutch on BMW transmissions:

- **A4S310/270R, 4HP22/24 EH, A5S310Z -** These transmission use an on/off control method to lock and unlock the torque converter. The TCC is either completely engaged or completely disengaged. This method of engagement provides an abrupt sensation when the TCC is locking and unlocking. This abrupt sensation can be unpleasant and undesirable to some drivers.
- **A5S560Z, A5S440Z, A5S325Z, GA6HP26Z, A5S360/390R -** These transmissions use a gradual approach to TCC control. The TCC is gradually applied and released, this method reduces the abrupt feel of the on/off type TCC. The TCC solenoid is controlled by pulse width modulation. This allows fluid to be gradually introduced and released to the TCC.

The TCC is spring loaded to the engaged position. Pressurized fluid releases the TCC, when the pressurized fluid is released, the TCC is engaged. Depending on transmission application, the TCC can be engaged in 3rd, 4th or 5th gear. The TCC must be disengaged at low speeds to prevent stalling.

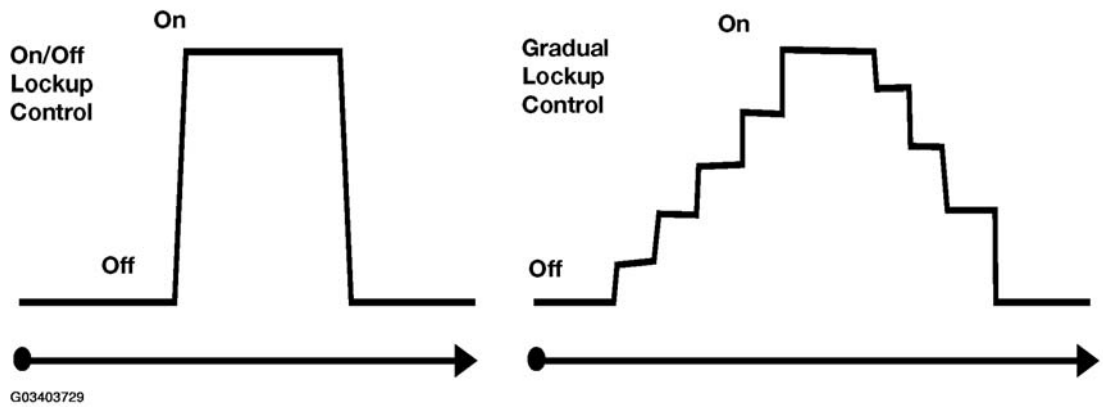

Fig. 10: Identifying Two Methods For Controlling Torque Converter Clutch On BMW Transmissions
Courtesy of BMW OF NORTH AMERICA, INC.

Example Of TCC Oil Control Circuit From The A5S440/560Z Transmission.

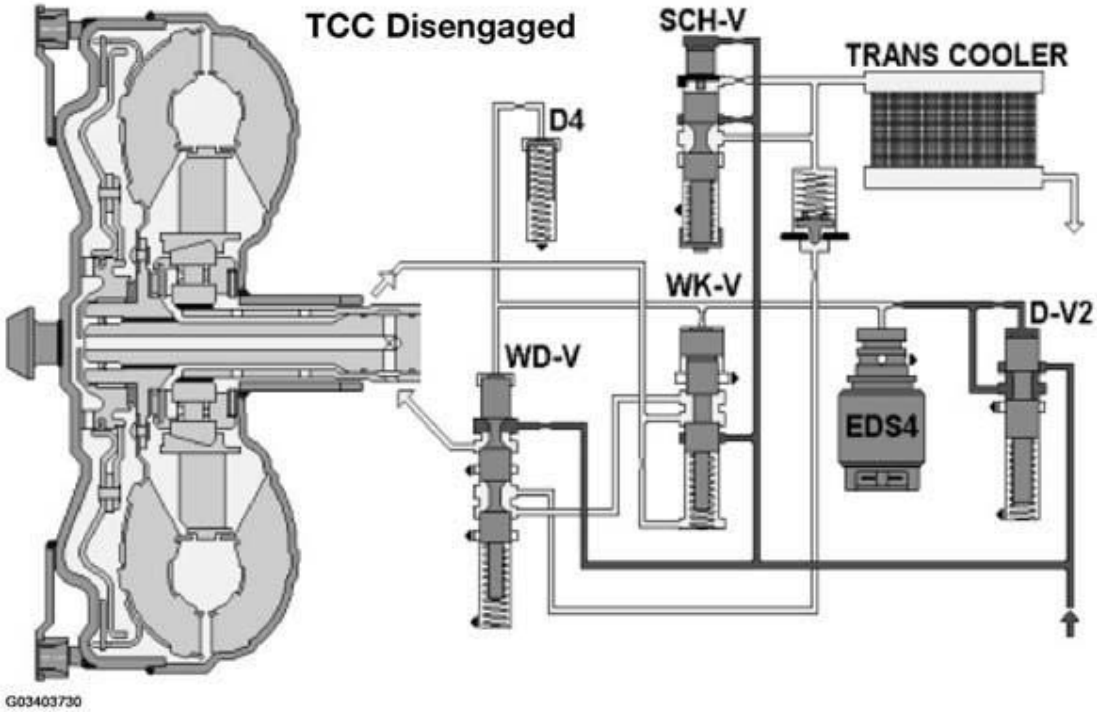

Fig. 11: Identifying TCC Oil Control Circuit From A5S440/560Z Transmission (TCC Disengaged)
Courtesy of BMW OF NORTH AMERICA, INC.

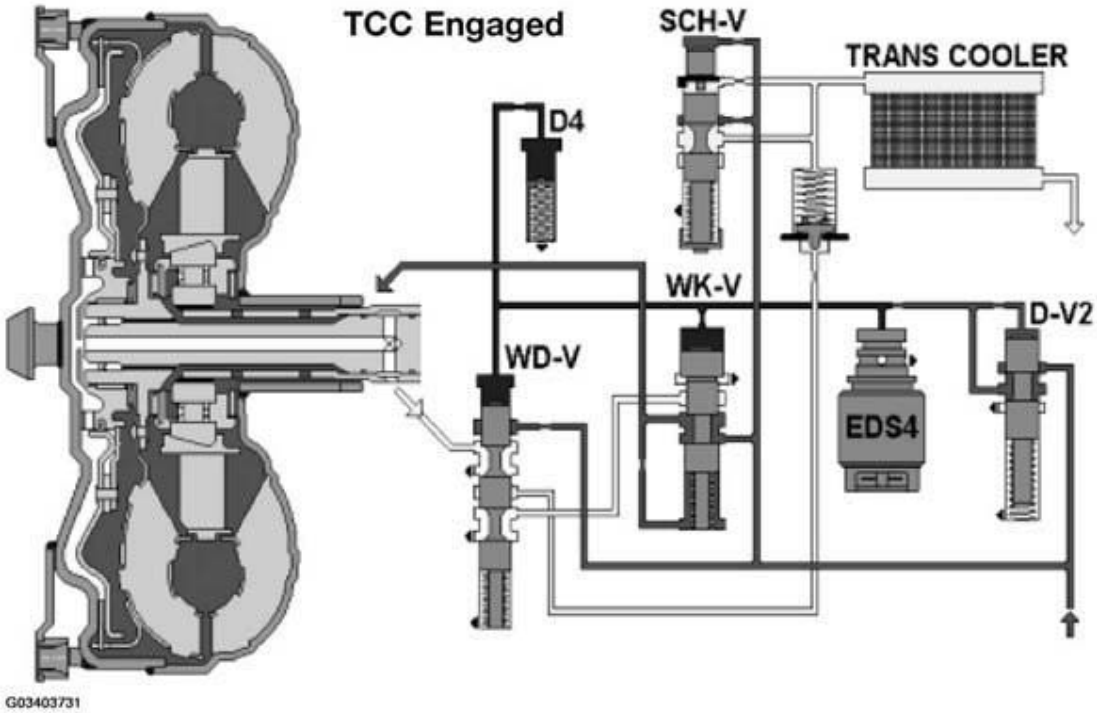

Fig. 12: Identifying TCC Oil Control Circuit From A5S440/560Z Transmission (TCC Engaged)
Courtesy of BMW OF NORTH AMERICA, INC.

OIL PUMP

The transmission oil pump is used to circulate oil and provide pressure for hydraulic operation.

The pump is driven by the torque converter shell and rotates with engine. Fluid is drawn from the sump through the filter and distributed to the various transmission hydraulic systems.

The output pressure is regulated to an operating pressure of approximately 25 bar.

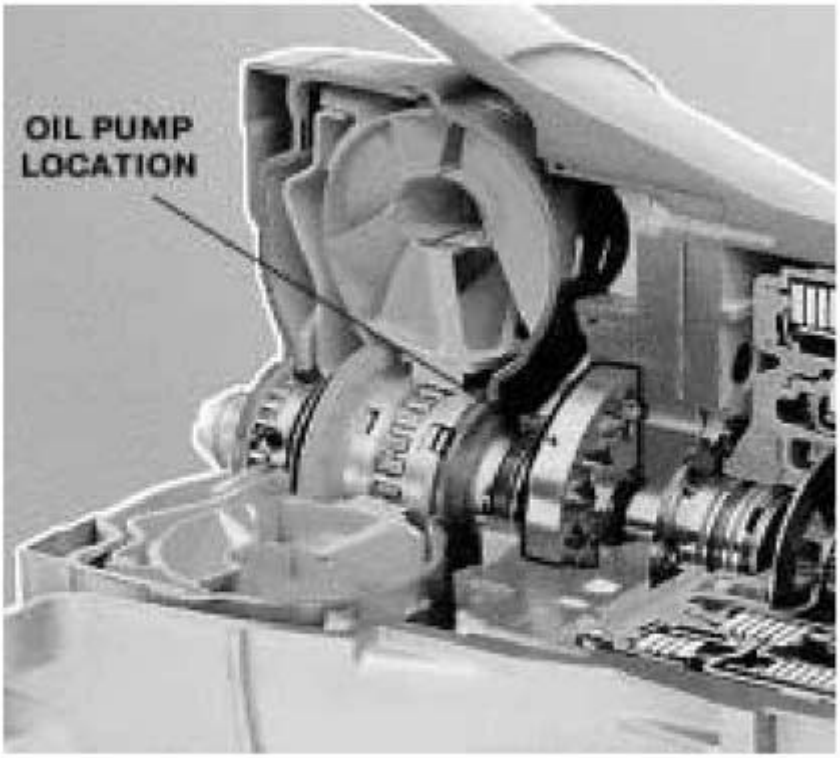

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Fig. 13: Identifying Transmission Oil Pump Location
Courtesy of BMW OF NORTH AMERICA, INC.

Currently there are two types of oil pumps used in BMW transmissions; Crescent type and Vane type.

Crescent Type Oil Pump (All Except A5S360/390R)

The crescent type is an internal gear pump containing a drive gear and a driven gear. The inner gear is driven by the torque converter and acts as the impeller. The outer gear is driven by the inner gear.

The gap between the teeth varies from the input, through the crescent and to the output of the pump.

A low pressure area is created on the input side of the pump by the widening gap between the gear teeth.

The oil is drawn to the crescent and transferred to the output side of the pump, where the pressure is increased by the narrowing gap between the gear teeth.

The output pressure of the pump is controlled by spring loaded pressure regulator.

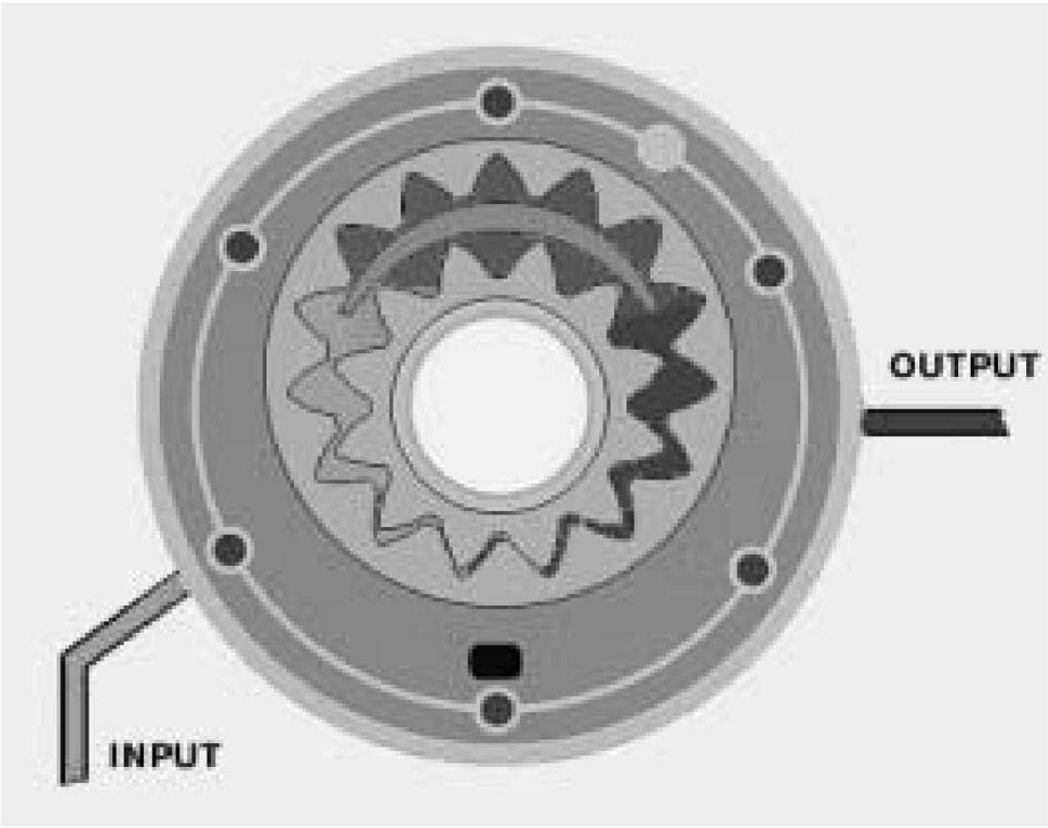

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Fig. 14: Identifying Crescent Type Oil Pump (All Except A5S360/390R)
Courtesy of BMW OF NORTH AMERICA, INC.

Oil Volume Control

On the A5S440Z transmission, oil pump output volume is controlled based on engine RPM. High oil volume is initially required at start up to quickly fill the transmission requirements. As engine RPM increases, the volume is greater than is required. The Oil Volume Control Damper regulates the pump output volume based on engine RPM. This helps improve fuel economy by reducing the load on the engine at high RPM.

Vane Type Pump (A5S360/390R)

The new A5S360/390R (GM5) transmission uses a vane type pump. The torque converter drives the pump rotor and 13 vanes.

The rotor and vanes are placed inside a slide mechanism. As the rotor spins, the vanes sweep oil from the pump intake to the output along the mating surface on the vane ends and the interior surface of the slide.

The slide is mounted on a pivot pin. As it pivots, it changes the eccentricity of the rotor to slide mating surface. This in turn will alter the output oil volume. This provides the same function as the Oil Control Volume Damper on the A5S440Z.

The slide's position is influenced by a calibrated spring and hydraulic control pressure from the main pressure regulator solenoid on the valve body.

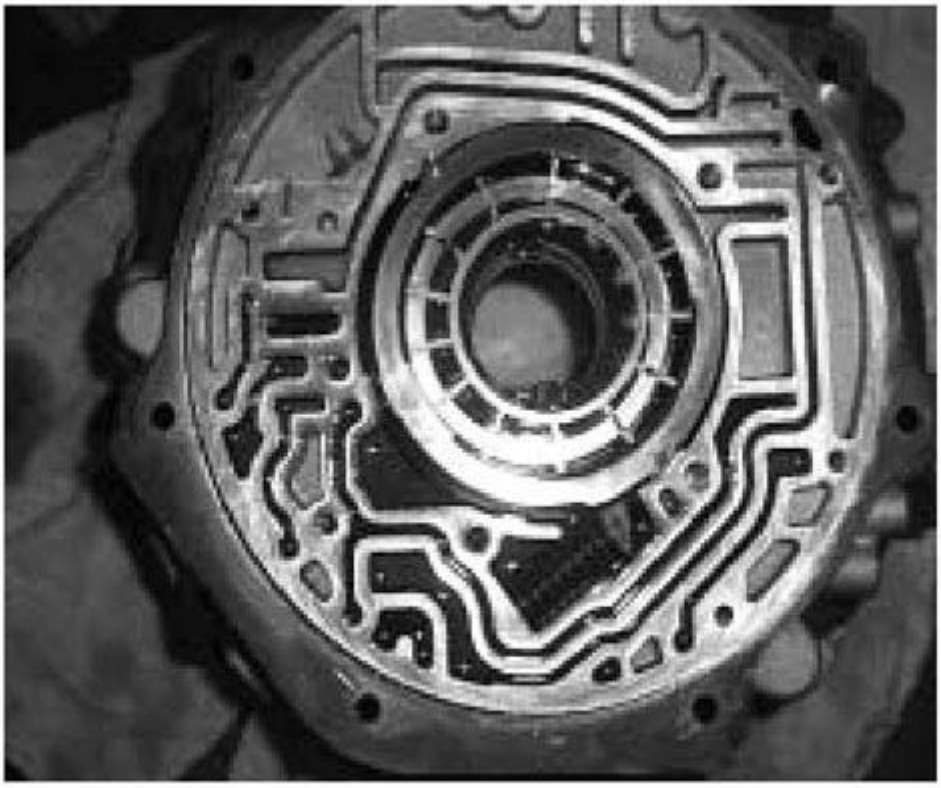

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Fig. 15: Identifying Vane Type Pump (A5S360/390R)
Courtesy of BMW OF NORTH AMERICA, INC.

The benefit of changing the slide position is to optimize pump output volume to meet the following operating conditions:

- Provide maximum volume during engine start-up. This condition provides a fast priming action of the pump for immediate lubrication and for hydraulic pressure operation.
- Regulated output volume at higher engine speeds. Maximum pump volume is not required at all times.

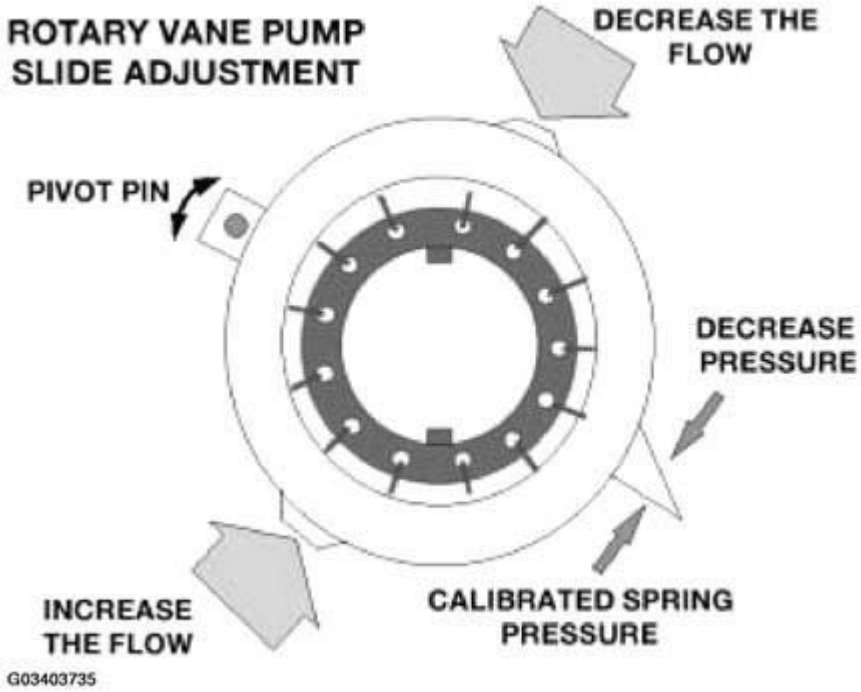

Fig. 16: Identifying Rotary Vane Pump
Courtesy of BMW OF NORTH AMERICA, INC.

HYDRAULIC CONTROL COMPONENTS

Electro/Hydraulic Valve Body

The valve body assembly is the main shift control element in the transmission. In non-EH transmissions the valve body was only hydraulically controlled. In the current EH (electrohydraulic) transmissions the valve body is similar in design, but now also housing a number of shift solenoids which are controlled by the TCM.

The valve body consists of a number of sub-assemblies. Each sub-assembly contains a number of spool valves which are hydraulically controlled. Most spool valves are opposed by spring pressure. The spool valves are used to direct hydraulic fluid flow to the various shift elements in the transmission. There is also a manual valve which is connected to the shift assembly by a cable. The manual valve allows the drivers to select the basic operating mode (or ratio).

The valve body is responsible for the following:

- Regulating Main Pressure
- Controlling fluid flow to shift elements for Upshifts and Downshifts.

- Providing for manual operation by driver via manual valve.
- Reverse Lockout
- Fail-safe Operation
- Shift Comfort through: Overlap Shift Control (ZF) Pressure Accumulators (GM)
- Torque Converter Control
- Distribution of lubrication.

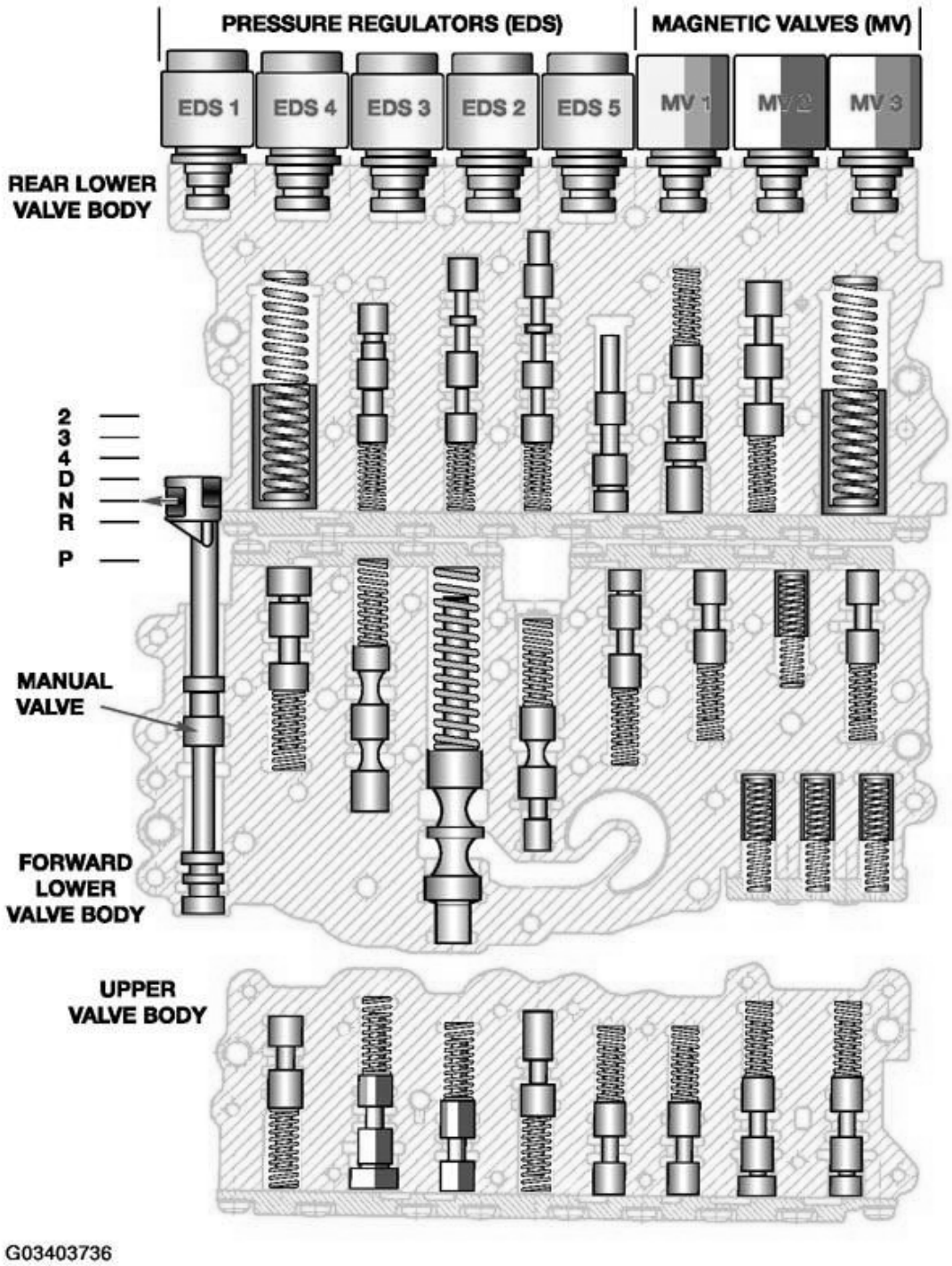

Fig. 17: Identifying Electro/Hydraulic Valve Body
Courtesy of BMW OF NORTH AMERICA, INC.

Shift Valves

Shift valves are used to direct application pressure to the various shift elements. Shift valves are regulated by spring pressure and control pressure for the shift solenoids. Shift valves come in various configurations depending upon application and transmission type. The most basic is the 3/2 shift valve. The 3/2 shift valve has 2 positions which are switched through one or two control pressures.

With no control pressure from shift solenoid present, the shift valve is moved to its end travel (left) by spring pressure.

Operating pressure is blocked to the shift component. Also in this position any application pressure is drained from the shift component.

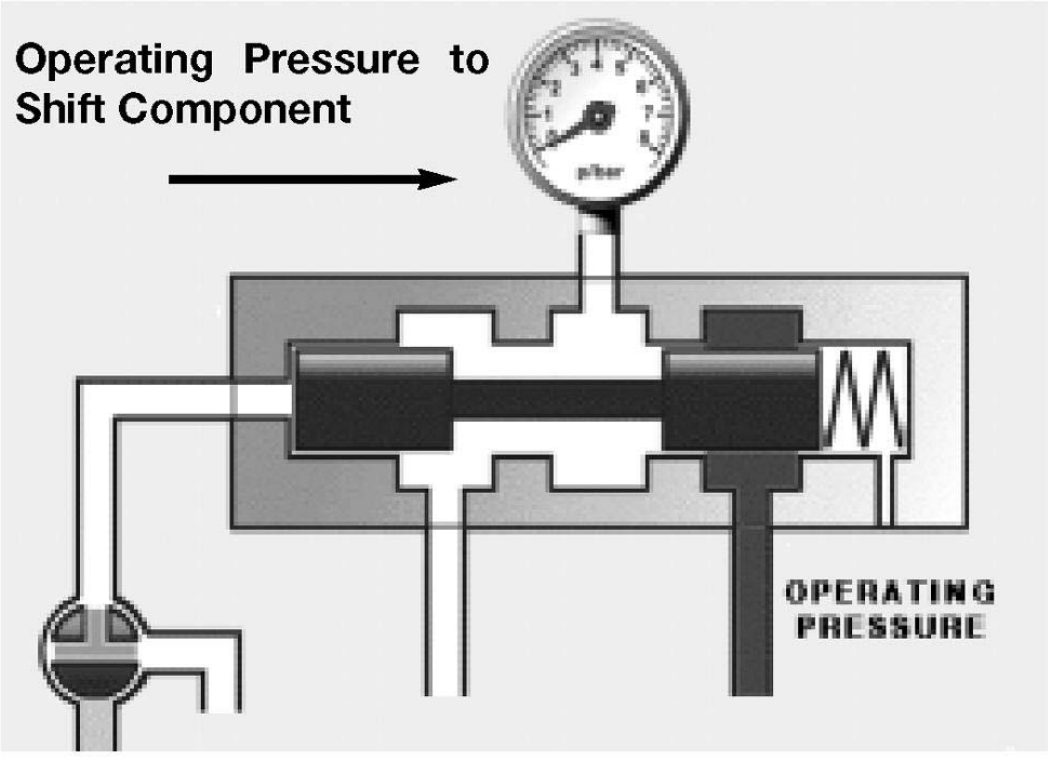

Fig. 18: Identifying Blocked Operating Pressure To Shift Component
Courtesy of BMW OF NORTH AMERICA, INC.

Once the control pressure is applied to the 3/2 shift valve, the shift valve moves to the right.

This allows operating pressure to reach the shift component.

When the control pressure is again reduced, spring pressure returns the 3/2 shift valve to the rest position. This drains and operating pressure from the shift component.

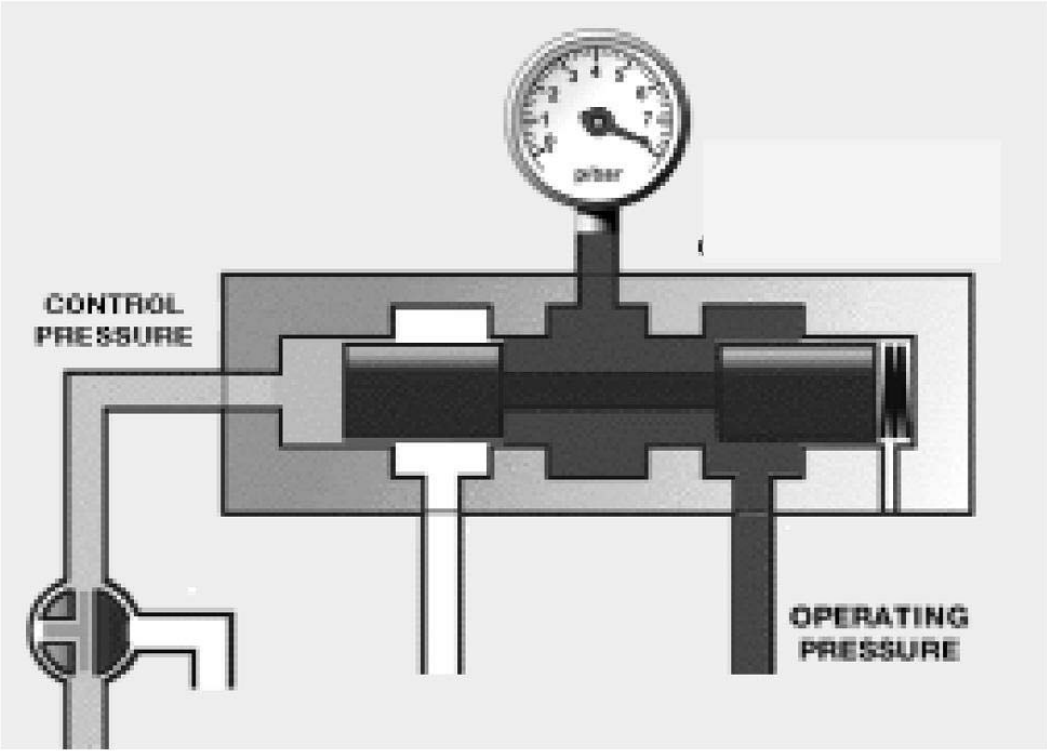

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Fig. 19: Identifying Operating Pressure To Reach Shift Component
Courtesy of BMW OF NORTH AMERICA, INC.

The example shown at right is a 4/2 shift valve. The operation is similar to the 3/2 valve. The primary difference is that the 4/2 shift valve affects 2 shift components.

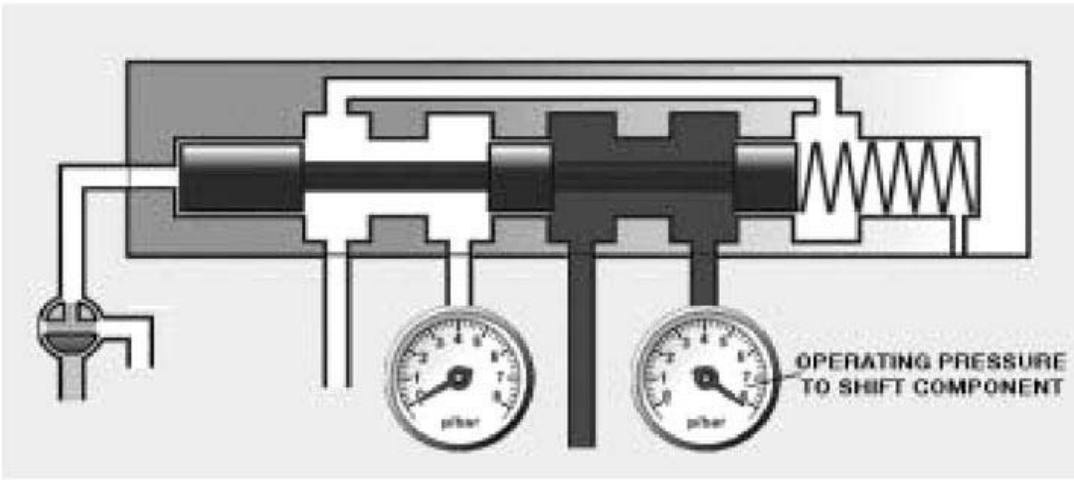

Fig. 20: Identifying Primary Difference 4/2 Shift Valve Affects 2 Shift Components
Courtesy of BMW OF NORTH AMERICA, INC.

PRESSURE REGULATION

Pressurized oil from the pump must be regulated for use within the transmission. Otherwise, the high pressure directly from the pump would influence shift quality. The shifts would be more abrupt and harsh. In order to "fine tune" the pressures within the transmission, there is a pressure regulating valve and a pressure regulating solenoid. The pressure regulating valve is located in the oil pump housing or the valve body dependent upon transmission type.

The pressure regulating solenoid is a pulse width modulated (PWM) solenoid. Current is controlled by the TCM. The pressure regulating solenoid is normally closed, there is maximum line pressure available when minimum (or no) current is applied to the pressure regulating solenoid. Depending upon application, pressure regulating solenoid can be PWM with B- or B+ control. GM transmissions use B+ control with a constant ground supply. ZF transmissions uses B- control with a constant B+ supply.

There are also pressure regulators used in ZF transmissions that are used to control shift pressures. The A5S440Z and A5S560Z both use EDS solenoids for "Overlap Shift Control" this will be explained later in this text.

There are a few different names for pressure regulating solenoids depending upon the transmission type and manufacturer:

- ZF transmissions use the following terms - EDS solenoid (valve), or MV (magnetic valve).
- Hydramatic (GM) transmissions use the following terms: DR solenoid, Force Motor Solenoid or Variable Bleed Solenoid.

Transmission operating pressures are regulated based on engine speed, throttle angle and engine load. The regulated pressure from the pressure regulating solenoid is referred to as throttle pressure. This pressure is fed to

the main pressure regulating valve.

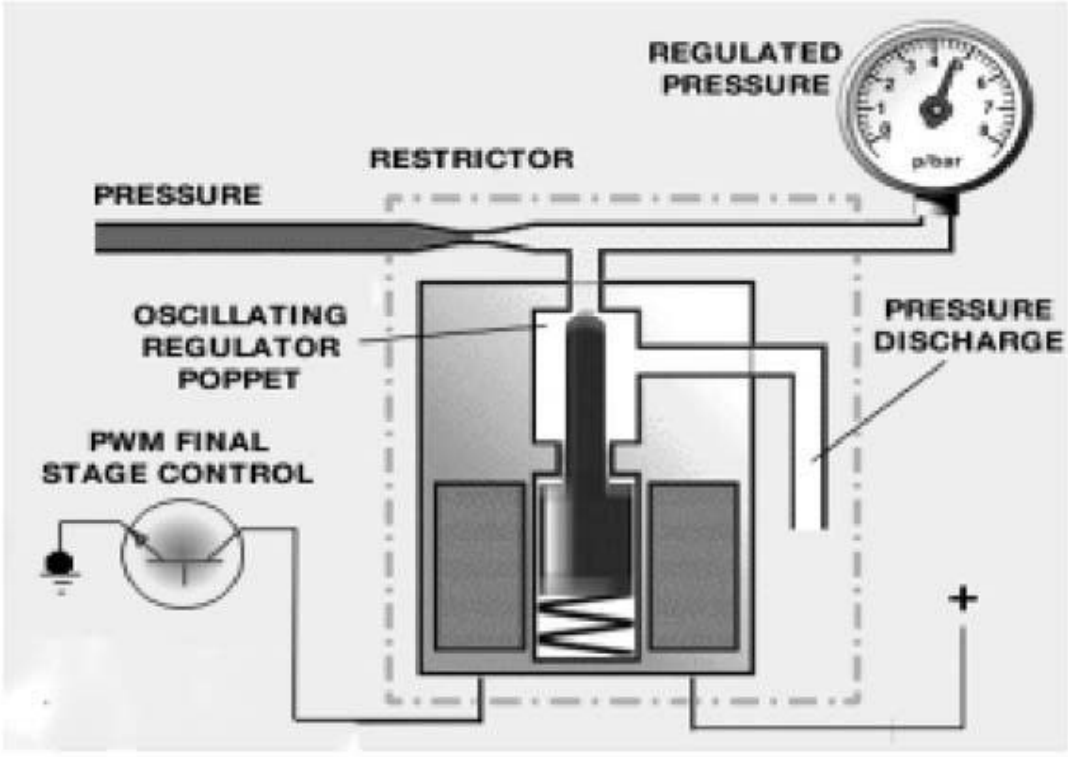

Fig. 21: Identifying Transmission Operating Pressures
Courtesy of BMW OF NORTH AMERICA, INC.

Pressure Regulation

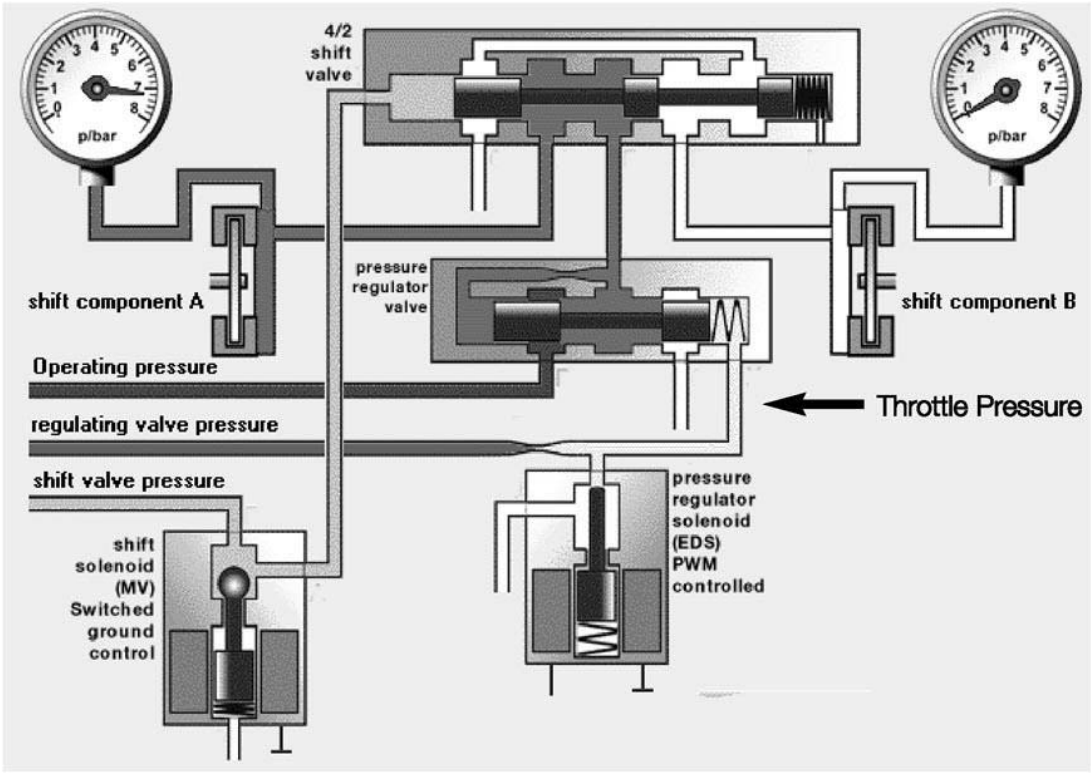

Fig. 22: Identifying Pressure Regulation
Courtesy of BMW OF NORTH AMERICA, INC.

As the diagram shows, regulating valve pressure is fed to the pressure regulating solenoid. This pressure is then regulated to create throttle pressure. Throttle pressure is modified based on throttle angle, engine speed and engine load. Throttle pressure is then fed to the pressure regulating valve. As throttle pressure increases, the regulating valve piston is moved to the left (with respect to the diagram). As the regulating valve piston is moved to the left, operating pressure is increased to the 4/2 shift valve. The operating pressure to the 4/'2 shift valve will be fed to Shift Component A or Shift Component B depending the position on the 4/2 shift valve. The operating pressure to the shift components will be increased or decreased depending upon the throttle valve pressure. As engine speed and load are increased, the operating pressure will be increased to provide higher clamping forces on the shift components.

When there is no electrical power present to the pressure regulator solenoid, throttle pressure will be a maximum. Therefore maximum operating pressure will be available at the 4/2 shift valve. This condition would exist if the transmission was operating in fail-safe mode.

APPLY COMPONENTS

Multi - Plate Clutches And Brakes

Multi Plate Clutches and Brakes are used to drive or hold members of the planetary gear set. As a general rule, Multi Plate Clutches connect one planetary member to another. Multi Plate Brakes connect a planetary member

to the case to hold it stationary.

The clutches and brakes consist of a number of friction discs and steel discs. The friction discs are coated with a friction material and have engaging lugs (splines) on the inner perimeter. The steel discs are steel on both sides and have engaging lugs located on the outer perimeter. The engaging lugs on the friction discs are usually engaged with a planetary member. The engaging lugs on the steel discs are usually engaged with the clutch piston housing.

In addition to the friction and steel discs, there is also an apply piston, housing and return spring. Once hydraulic fluid is applied to the clutch assembly, the friction discs and steel discs will be locked together. Once hydraulic pressure is released, the return spring will cause the clutch piston to return to its rest position which will unlock the clutch assembly.

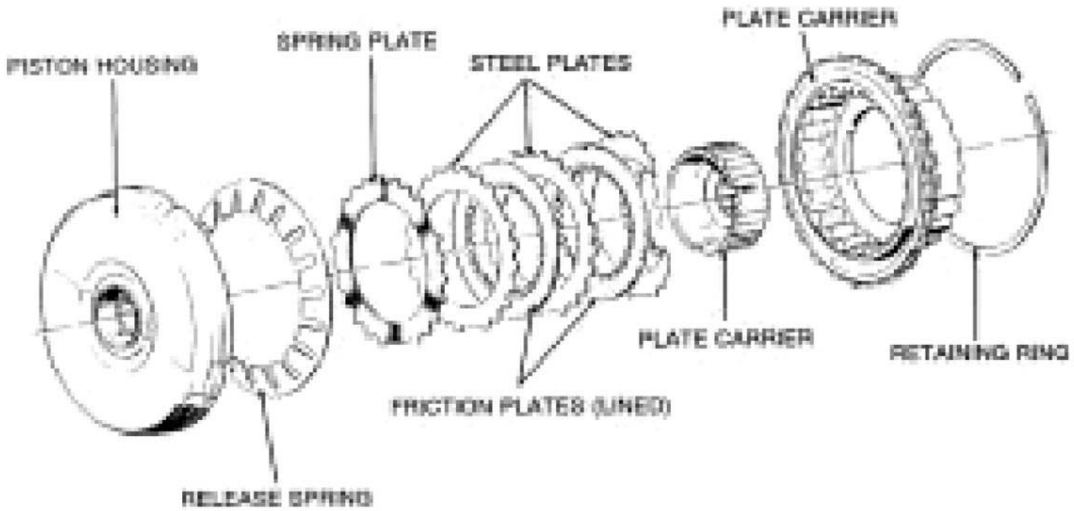

Fig. 23: Exploded View Of Multi - Plate Clutches
Courtesy of BMW OF NORTH AMERICA, INC.

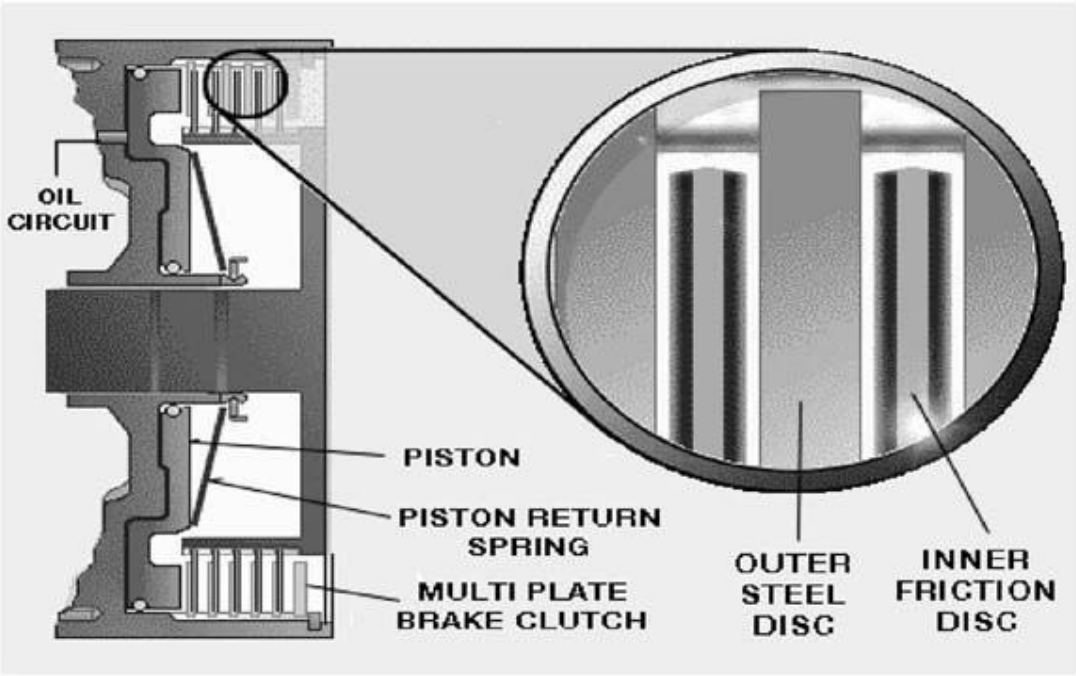

Fig. 24: Identifying Friction Discs And Steel Discs
Courtesy of BMW OF NORTH AMERICA, INC.

Multi - Plate Clutch Operation

In order to carry out a shift in ratio, fluid needs to be applied or released from the Multi - Plate Clutch (or Brake). As shown in the example , the following sequence occurs:

1. Fluid from a shift valve in the valve body is applied to the clutch assembly. (Figure A, see **Fig. 25**.)
2. Fluid pressure builds behind the apply piston and overcomes the resistance from the diaphragm spring. (Figure A, see **Fig. 25**.)
3. The friction and steel discs are compressed together and become locked, preventing any slippage between them. (Figure A, see **Fig. 25**.)
4. Two planetary members are now locked together.
5. When fluid pressure is released, the steel and friction discs are allowed to unlock. (Figure B, see **Fig. 25**.)
6. The diaphragm spring pushes against the apply piston and returns the piston back to the rest position. (Figure C, see **Fig. 25**.)
7. The check ball in the apply piston is unseated by centrifugal force which allows the clutch to drain completely.

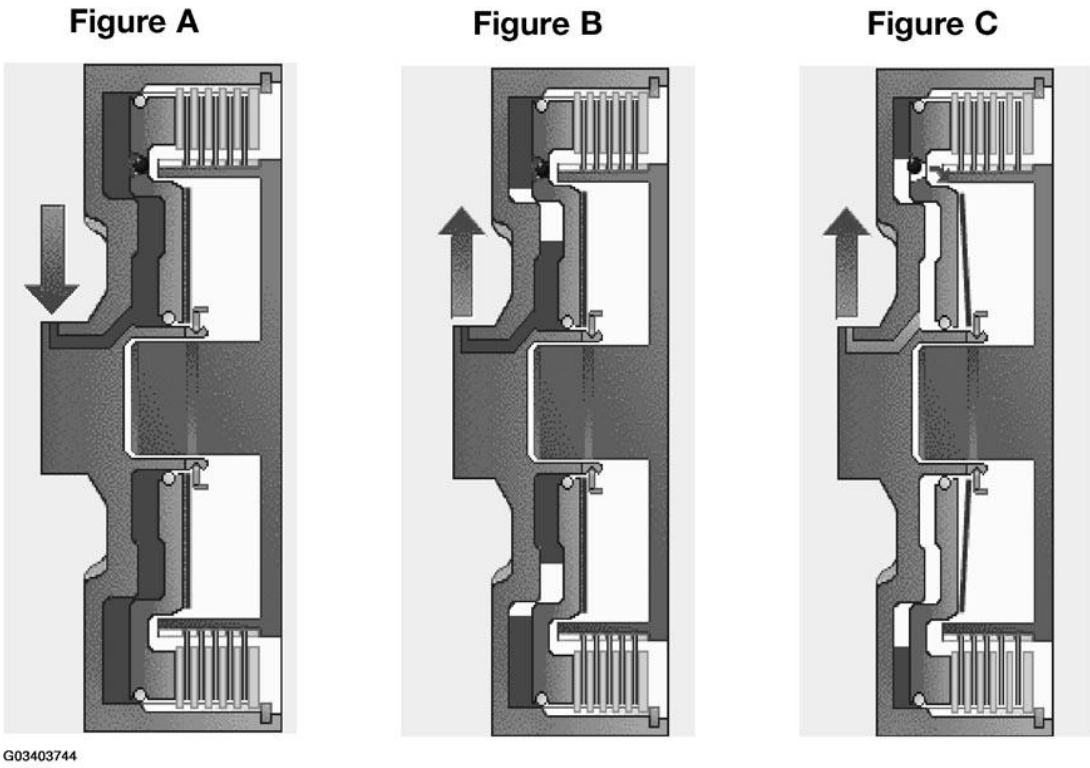

Fig. 25: Identifying Multi - Plate Clutch Operation
Courtesy of BMW OF NORTH AMERICA, INC.

Band Brakes

On some BMW transmissions there is a band type brake used for some applications. The A4S270/310R and the A5S310Z use a band type brake. The brake band is a circular band with friction material bonded to the inner surface. The band wraps around a particular planetary component (clutch drum) and locks that component to the transmission case. The brake band is applied and released by the clutch apply piston.

The brake band is not adjustable on the A5S310Z, however there is some adjustment allowed when needed on the A4S270/310R.

The brake band functions in the following manner on BMW transmissions:

- **A4S270/310R** - The brake band is active (applied) in first and second gear. The brake band holds the reaction sun drum stationary. The reaction sun drum is splined to the reaction sun gear.
- **A5S310Z** - The brake band is active (applied) in second, third and fifth gear. The brake band holds the forward sun gear to the case.

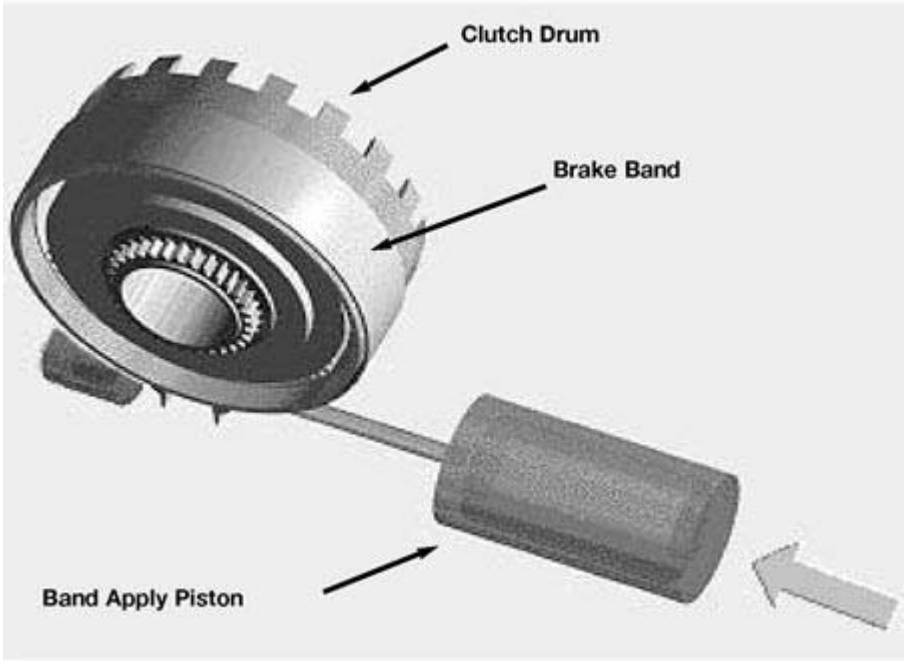

Fig. 26: Identifying Band Brakes
Courtesy of BMW OF NORTH AMERICA, INC.

One-Way Clutches (Freewheel)

The one way clutch consists of an inner and outer ring with a locking device between the two. The one way clutch is designed to lock in one direction and to allow free rotation in the other direction. Currently there are two types of one way clutches used in BMW transmissions:

- Roller type which consists of spring loaded rollers between the inner and outer race of the one way clutch. (Roller type is also used without springs on some applications)
- Sprag type which consists of asymmetrically shaped wedges located between the inner and outer race of the one way clutch.

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Fig. 27: Identifying Roller Type One Way Clutch
Courtesy of BMW OF NORTH AMERICA, INC.

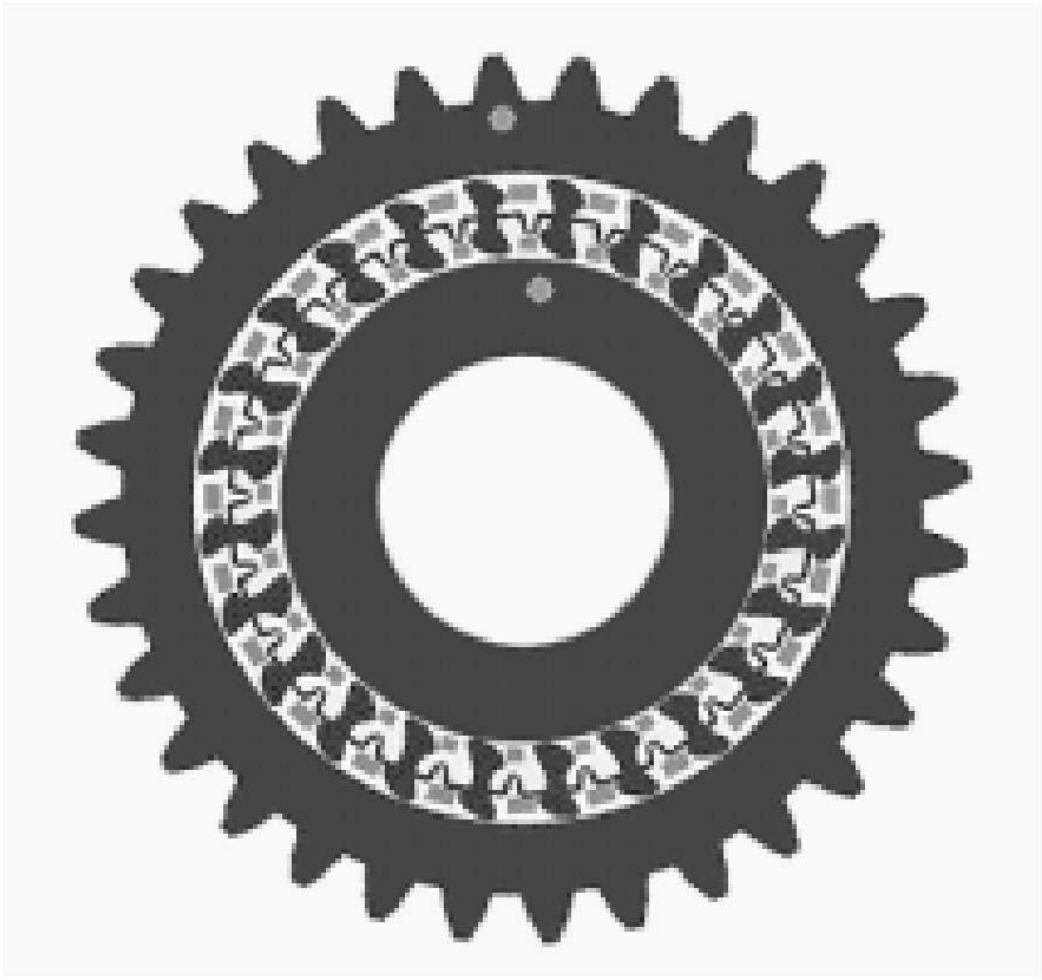

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Fig. 28: Identifying Sprag Type One Way Clutch
Courtesy of BMW OF NORTH AMERICA, INC.

In both versions of the one way clutch (freewheel), rotation is only allowed in one direction. Using the diagrams above, imagine that the inner races were locked stationary. The outer race would only be allowed to turn counter clock wise. In the clock wise direction, the outer race of both versions would be locked. In the roller type, the helper springs would push the rollers up the ramp on the outer race. This would force the rollers in to the smaller area which would cause the outer race to lock, In the sprag type, the asymmetrical wedges would lock between the inner and outer race.

The one way clutches are used in the transmission to prevent an interruption of drive torque during certain gear shifts and to allow engine braking during coasting. Also there is a one way clutch in the stator of the torque converter.

PLANETARY GEAR SET

Planetary gear seats are compact gear units that receive input drive torque and provide the required output ratios for all forward gears and reverse gear. The planetary gear set consists of four main components:

1. Internal Ring Gear
2. Planetary Gears (pinions)
3. Sun Gear
4. Planetary Gear Carrier

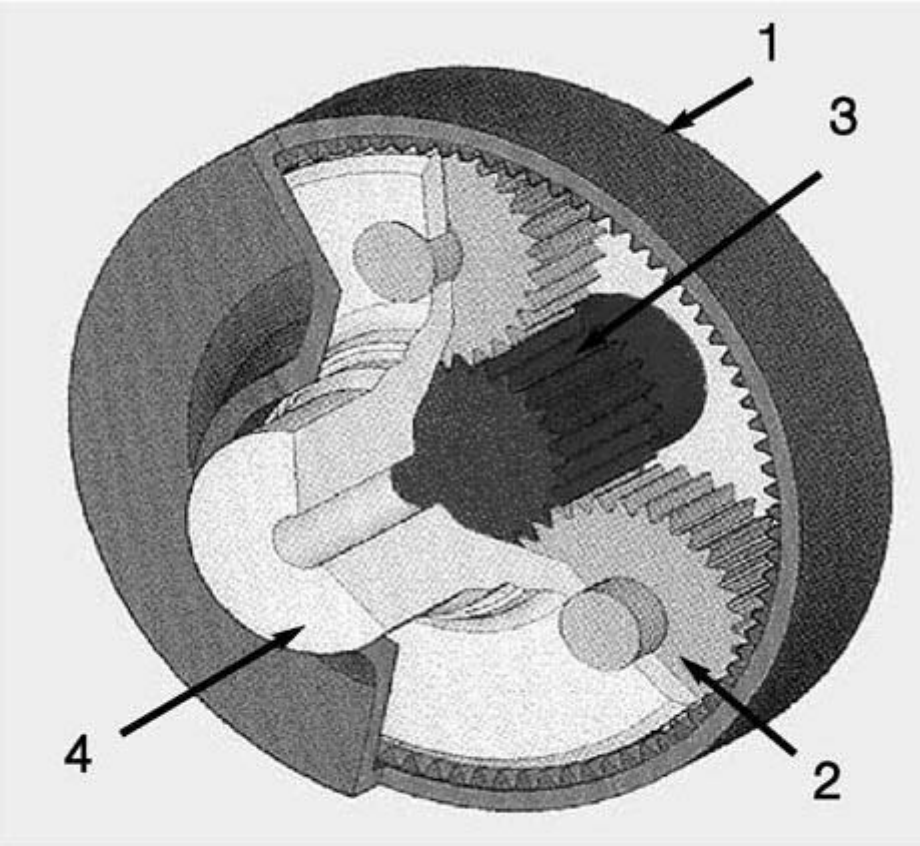

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Fig. 29: Identifying Planetary Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Various ratios are obtained by driving or holding different components in the planetary gear set. The example shown at right is a simple planetary gear set. Today's modern transmissions use a combination of multiple planetary gear sets referred to as a compound planetary gear set.

Advantages Of Planetary Design

There are distinct advantages to the planetary gear set in comparison with a standard transmission gear set.

Primarily, drive torque does not need to be interrupted to change gears. The planetary members are in constant mesh and there are more teeth engaged in any given ratio. This allows more torque to be transferred through the transmission.

Basic Power Flow

In the example shown at left, let's follow through an example of power flow in reverse gear:

The Planetary gear carrier (4) is held stationary. The sun gear (3) is driven in a clockwise direction. The planetary pinions (2) are driven counterclockwise, which in turn drives the internal ring gear (1) counter clockwise as well.

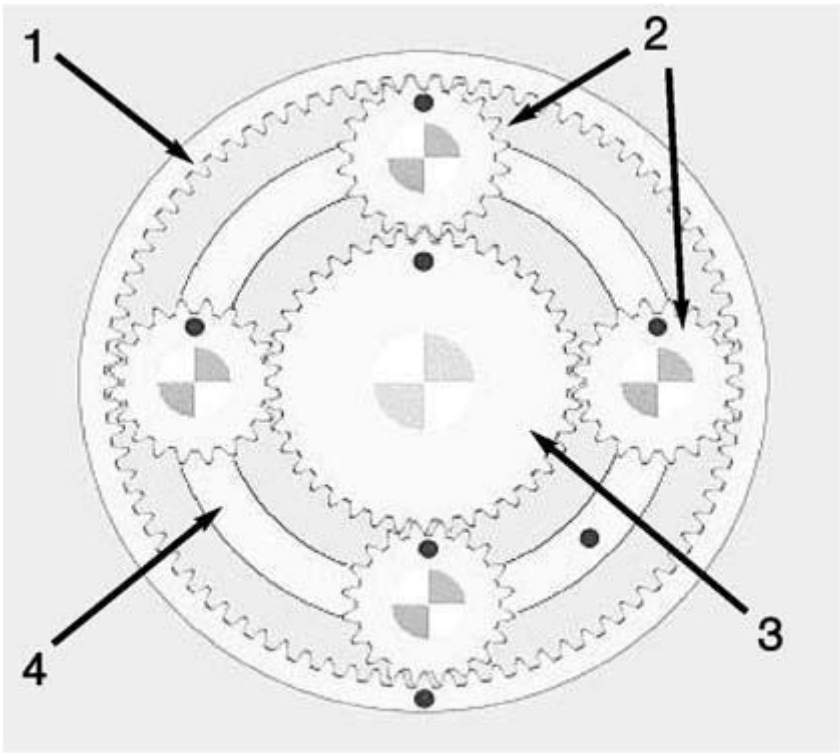

Fig. 30: Identifying Basic Power Flow
Courtesy of BMW OF NORTH AMERICA, INC.

COMPOUND PLANETARY GEAR SETS

Compound planetary gear sets use multiple planetary components which are a variation on the simple planetary gear set. Since the inception of the simple planetary gear set, there have been numerous compound gear sets introduced. BMW transmissions use the following gear sets:

- Simpson Gear Set - used on 4HP22 and 4HP24

- Ravigneax Gear Set - used on A4S270R, A4S310R, A5S310Z, A5S325Z, A5S360R and A5S390R.
- Wilson Gear Set - used on A5S440Z and A5S560Z
- Lepelletier Gear Set - used on the GA6HP26Z.

Simpson Gear Set

The Simpson Gear Set is one of the early variations on the simple set. It is capable of 3 forward gears and one reverse. On BMW transmissions, the Simpson Gear set is used in the 4HP transmission which is a four speed automatic. Fourth gear (overdrive) is obtained by the addition of an auxiliary gear set (simple).

Characteristics of the Simpson Gear set are as follows:

- Two Internal Ring Gears, one rear input ring and one attached to the rear planetary carrier.
- Two Planetary carriers, each containing three planetary pinions.
- One common Sun gear, which meshes with both sets of planetary pinions.

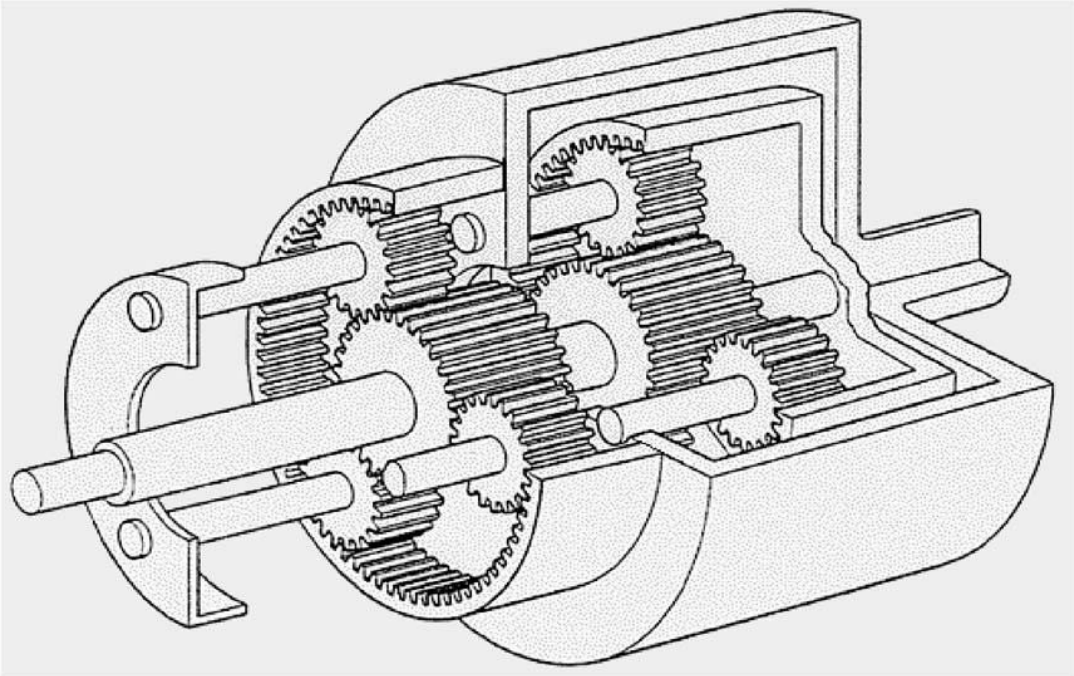

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Fig. 31: Identifying Simpson Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Ravigneaux Gear Set

A new variation on the planetary design is the Ravigneaux gear set. This gear set is capable of 4 forward gears and one reverse. However, depending upon application it may be used with an auxiliary gear set. Here are some examples:

- A4S310/270R uses the Ravigneax set for 3 forward gears and one reverse. Overdrive is obtained by the auxiliary gear set.
- A5S310Z uses a combination of the Ravigneaux gear set and the auxiliary gear set to obtain 5 forward gear and one reverse. First, second and reverse gears are achieved by using a combination of both gear sets.
- The A5S360/390R uses a modified version of the ravigneaux set that provides five forward gears and one reverse. There is no auxiliary gear set used.

Characteristics of the Ravigneaux Gear Set are:

NOTE: The Ravigneaux Gear Set shown below is a typical representation, refer to Fig. 32. There are a few variations of this arrangement used on BMW transmissions.

- One planetary carrier which is common to both sets of planetary pinions.
- Two sets of planetary pinions, one long set with small diameter and one short set with large diameter.
- Two sun gears, one input sun gear and one reaction sun gear.
- One common ring gear.

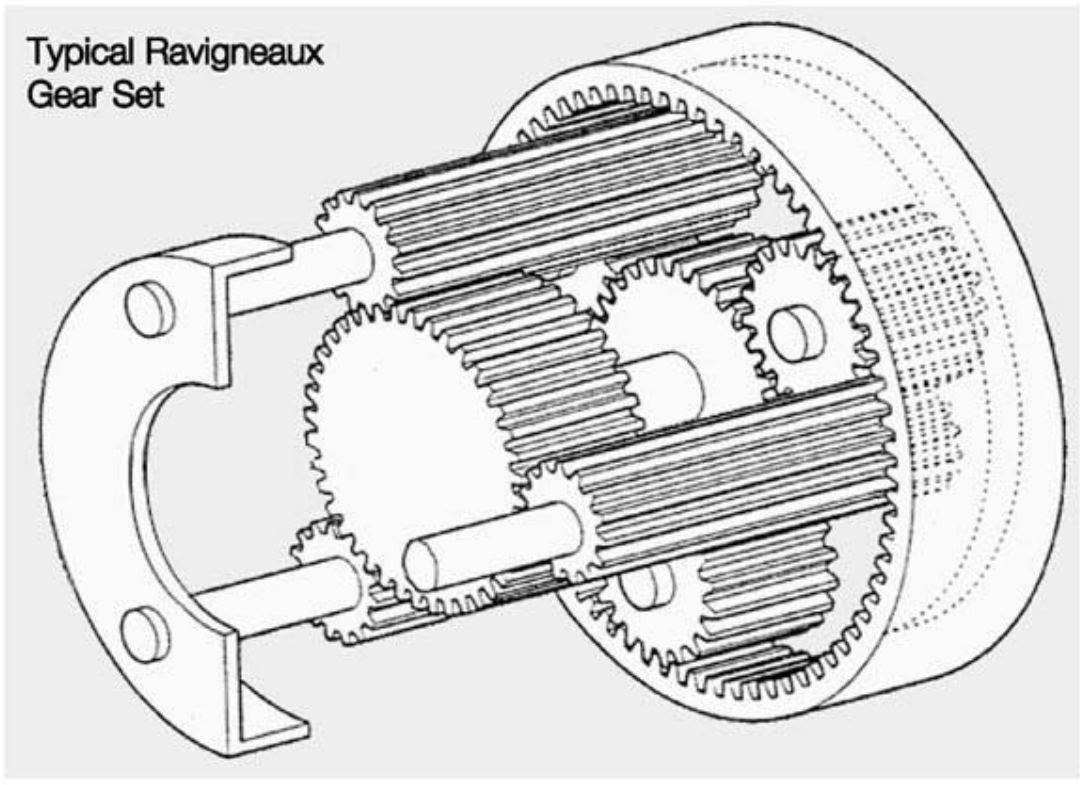

Fig. 32: Identifying Ravigneaux Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Wilson Gear Set

On BMW transmissions, the Wilson gear set is only used on the A5S440Z and A5S560Z. The Wilson Gear Set consists of three planetary gear sets.

The ring gear of the first gear set, the planetary carrier of the second gear set and the ring gear of the third planetary gear set and directly connected to the "Pot". The "Pot" is a cylindrical device that slides over all of the components to unitize the individual gear sets into an assembly.

The characteristics of the Wilson Gear Set are:

- Three planetary carriers.
- Three ring gears, with ring gear 1 and 3 meshed to "Pot" assembly.
- Three sun gears, sun gear 2 and 3 are common. (Attached). Sun gears 2 and 3 are also referred to as the "Double Sun Gear"

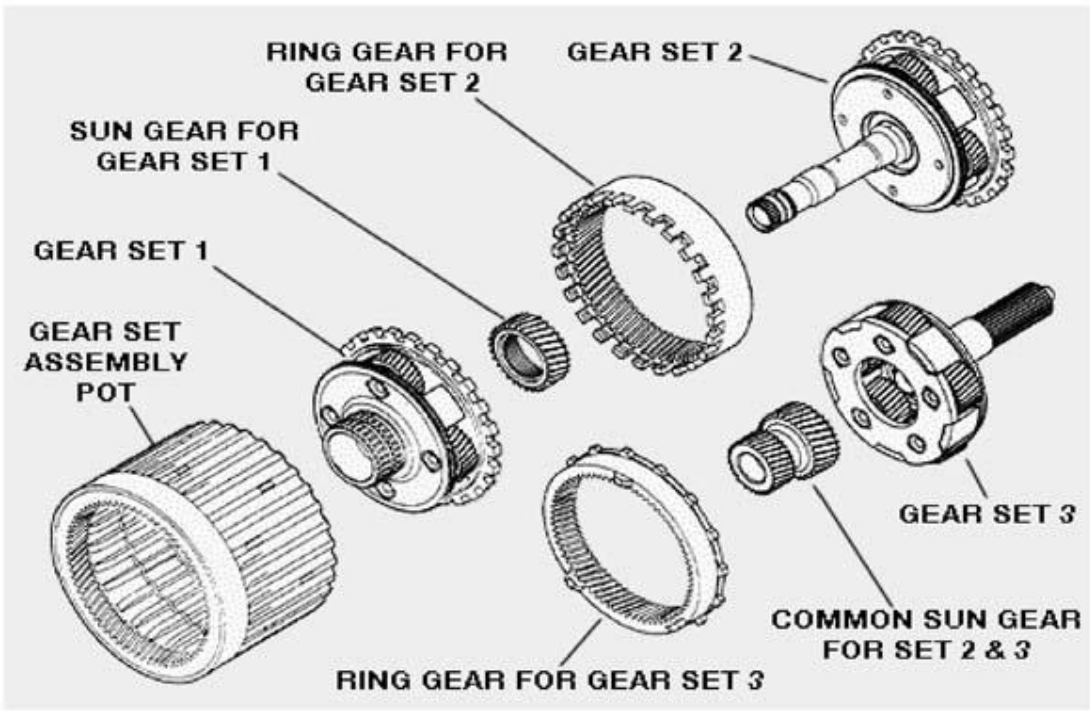

Fig. 33: Exploded View Of Wilson Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Lepelletier Gear Set

The Lepelletier Gear Set was introduced to BMW on the ZF GA6HP26Z. This gear set allows for 6 forward speeds and one reverse gear using a light weight design. The planetary gear train consists of a single carrier planetary gear train and a downstream double planetary gear train.

1. Internal Ring Gear 1
2. Planet Gear (pinion)
3. Planet Carrier
4. Planet Carrier
5. Turbine Shaft
6. Cylinder A
7. Pressure Plate A

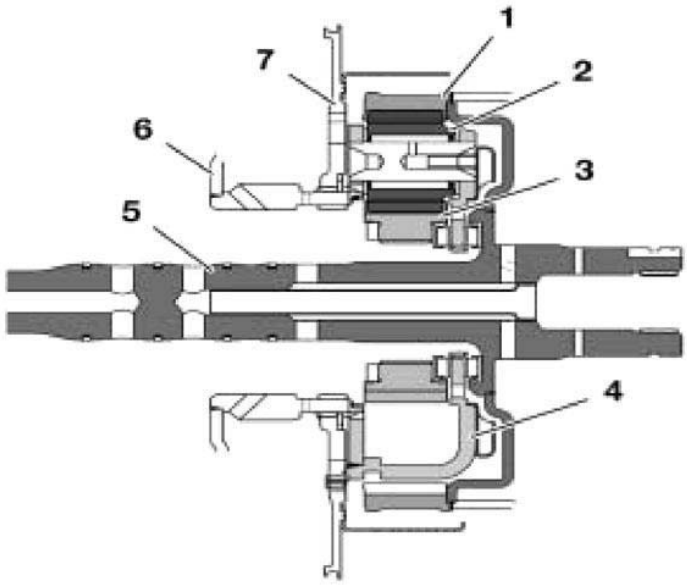

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Fig. 34: Identifying Cross Section View Of Lepelletier Gear Set
Courtesy of BMW OF NORTH AMERICA, INC.

Double Planetary Set

1. Internal Gear 2
2. Planet Carrier Clutch E
3. Output
4. Double Planet Gear Long
5. Sun Gear 3, Clutch E
6. Sun Gear 2, Clutch A
7. Planer carrier 1
8. Planet Gear (short)

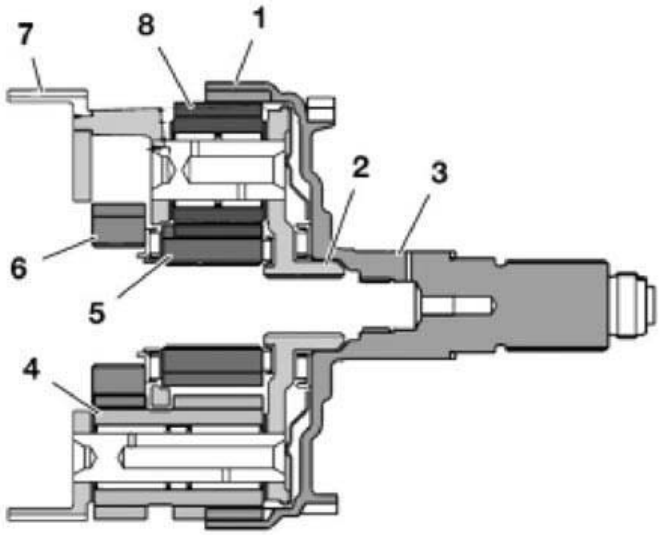

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Fig. 35: Identifying Cross Section View Of Double Planetary Set
Courtesy of BMW OF NORTH AMERICA, INC.

PLANETARY GEAR SET OPERATION

In order to understand planetary gear set operation, it is important to understand some basic rules of operation.

- It is assumed that engine rotation is clockwise when referring to power flow chart s and diagrams.
- Planetary pinions will always rotate in the same direction as the internal ring gear.
- When the sun gear is driven clockwise and the planetary carrier is held stationary the internal ring gear will rotate counter clockwise (reverse gear).
- When two or more planetary members are locked together, the assembly will rotate together. The ratio from input to output is 1:1.
- When the sun gear is held stationary and the planetary carrier is driven clockwise, the ring gear will be driven clockwise in an overdrive ratio. (i.e. .75:1)

When trying to understand power flow schematics, it is important to be able to draw a comparison between the actual planetary components and the schematic symbols. The diagram below outlines the relationship between these components and the power flow schematic. The schematic is a representation of a cross section of the transmission, but you only see the top half of the cross section. The transmission is shown as though it has been quartered lengthwise.

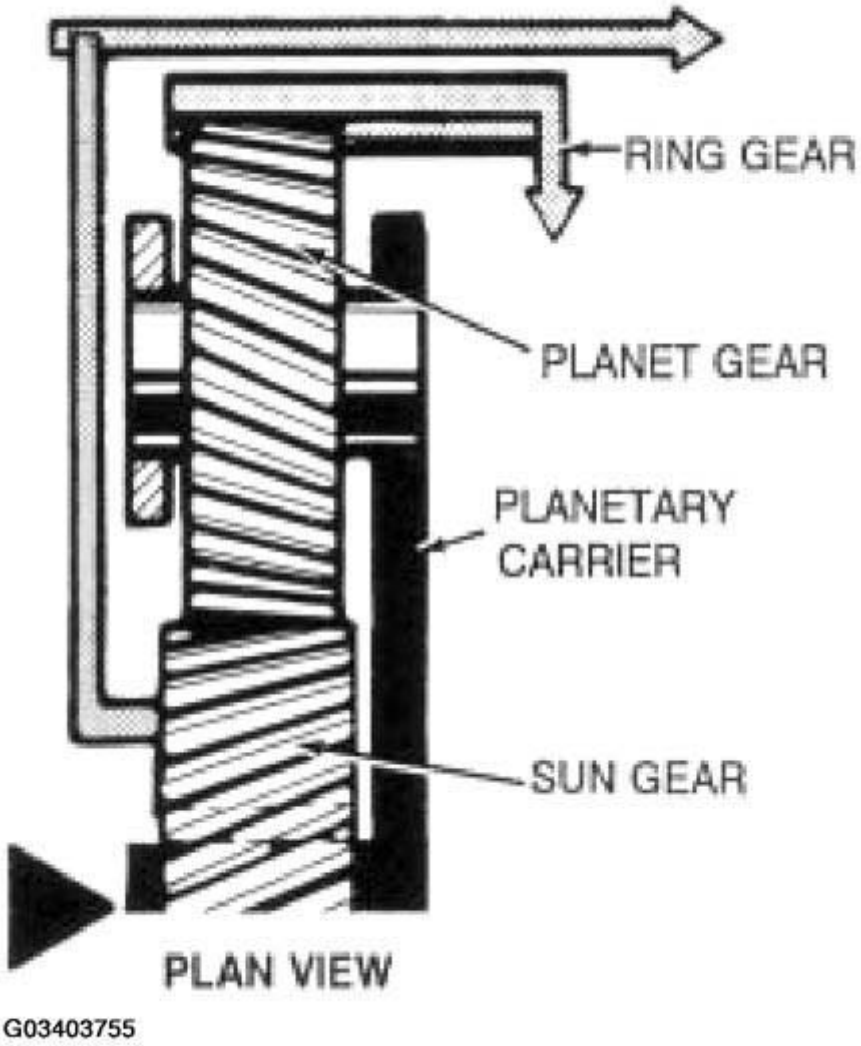

Fig. 36: Identifying Planetary Gear Set Power Flow - Plan View
Courtesy of BMW OF NORTH AMERICA, INC.

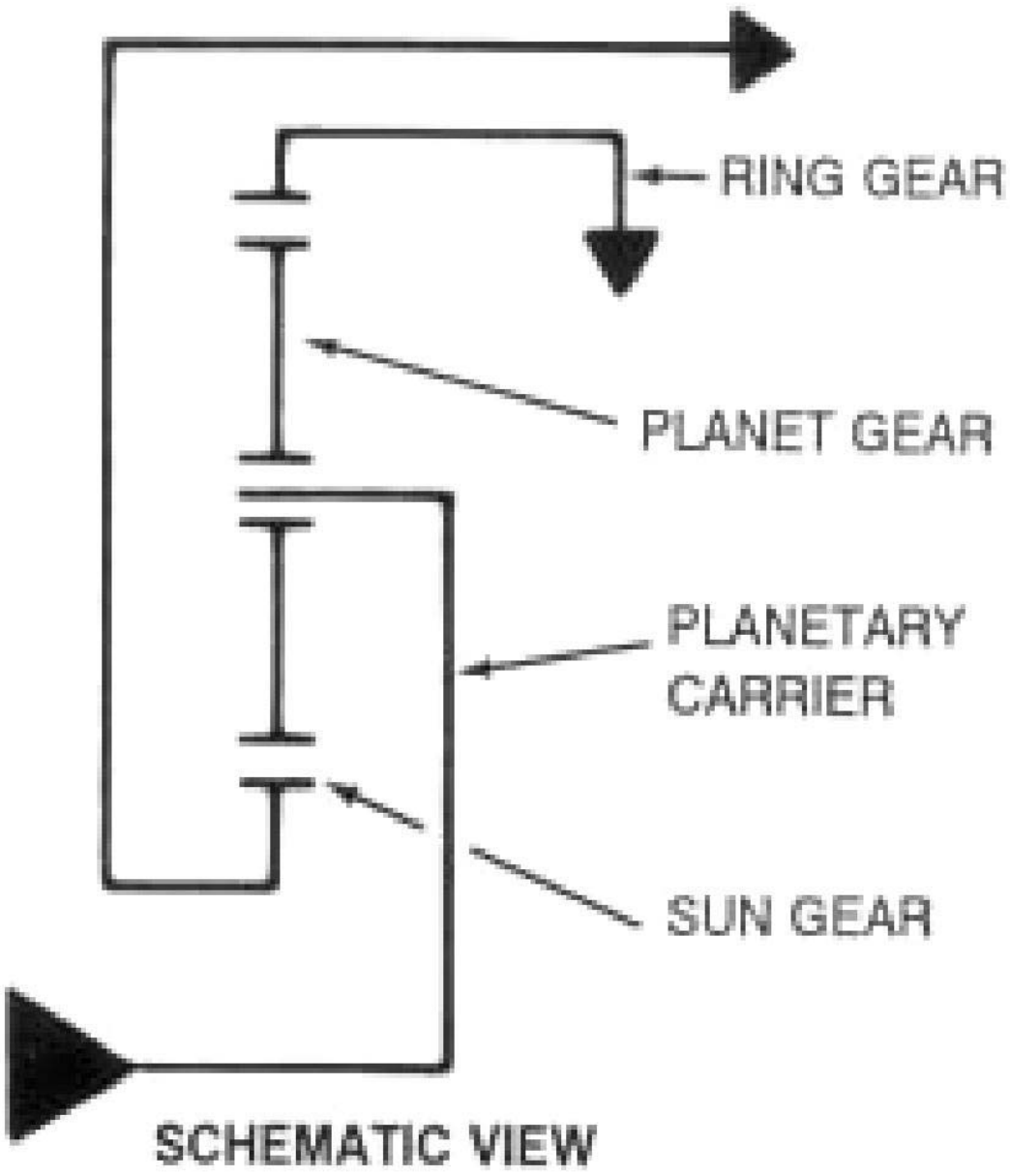

Fig. 37: Identifying Planetary Gear Set Power Flow - Schematic View
Courtesy of BMW OF NORTH AMERICA, INC.

Power Flow Schematic

In order to understand power flow schematics, a relationship must be drawn between the actual components and the schematic representation. In our example, we are going to use the 4HP22/24 power flow schematic. The

4HP22/24 transmission uses a Simpson Planetary Gearset and an auxiliary gearset. The auxiliary gear set is a simple planetary gearset.

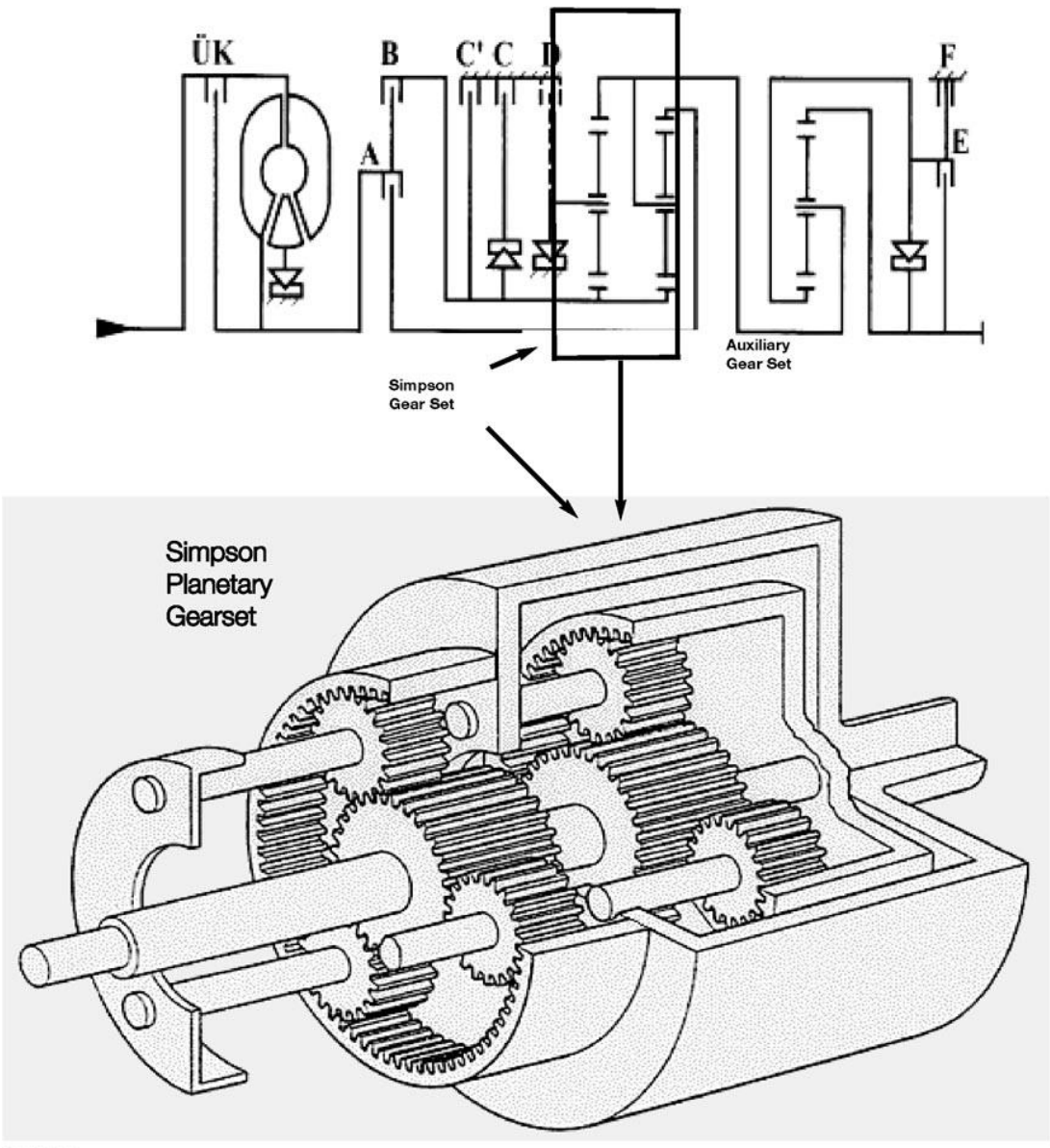

Fig. 38: Identifying Power Flow Schematic
Courtesy of BMW OF NORTH AMERICA, INC.

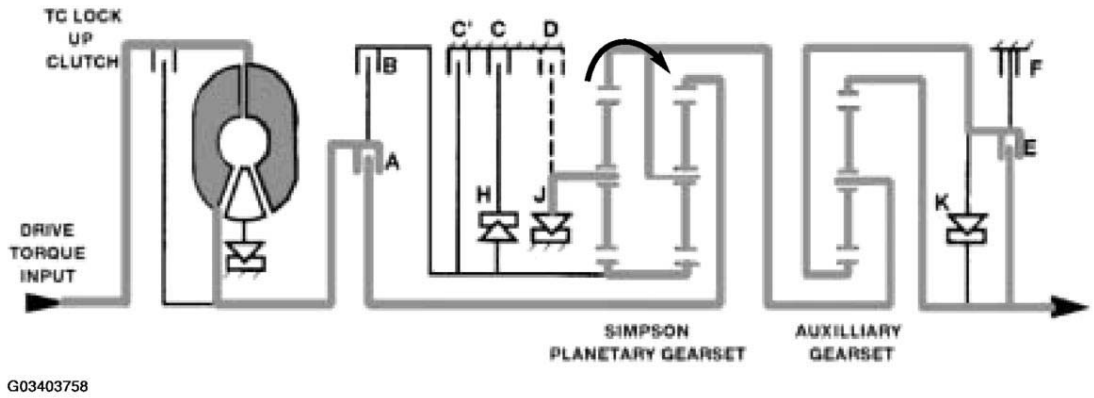

Fig. 39: Identifying Power Flow Schematic - First Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Power flow in first gear - Drive torque is applied to the torque converter impeller and transferred to the turbine. The turbine shaft rotates clockwise (CW). The "A" clutch locks the turbine shaft to the rear input ring gear. The rear input ring gear rotates CW driving the rear planet pinions CW. The planetary pinions drive the common sun gear CCW, which in turn drive the front planet pinions CW. The front planetary carrier is held from rotating CCW by one way clutch "J". The front planetary pinions which are rotating CW drive the front ring gear/rear carrier CW. The rear planetary carrier is rotating CW and is driving the planetary carrier from the auxiliary gear set. The "E" clutch in the auxiliary gear set is holding the Sun gear and the ring gear together. Therefore the auxiliary gear set is locked in a 1:1 ratio.

One Way Clutch "J" is locked prevent the front planetary carrier from rotating CCW. One Way Clutch "H" is not used and One Way Clutch "K" is locked. One way clutch "K" is used to prevent an interruption in power flow before the "E" clutch is locked during the 4-3 shift.

POSITION GEAR	D				3			2		1	R
	1	2	3	4	1	2	3	1	2	1	R
Clutch A	X	X	X	X	X	X	X	X	X	X	
Clutch B			X	X			X				X
Clutch C'		X				X			X		
Clutch C		X	X	X		X	X		X		
One Way Clutch H		X				X			X		
Clutch D										X	X
One Way Clutch J	X				X			X		X	
Clutch E	X	X	X		X	X	X	X	X	X	X
One Way Clutch K	X	X	X		X	X	X	X	X	X	X
Clutch F				X							

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Fig. 40: Gear Position Chart - First Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Second Gear

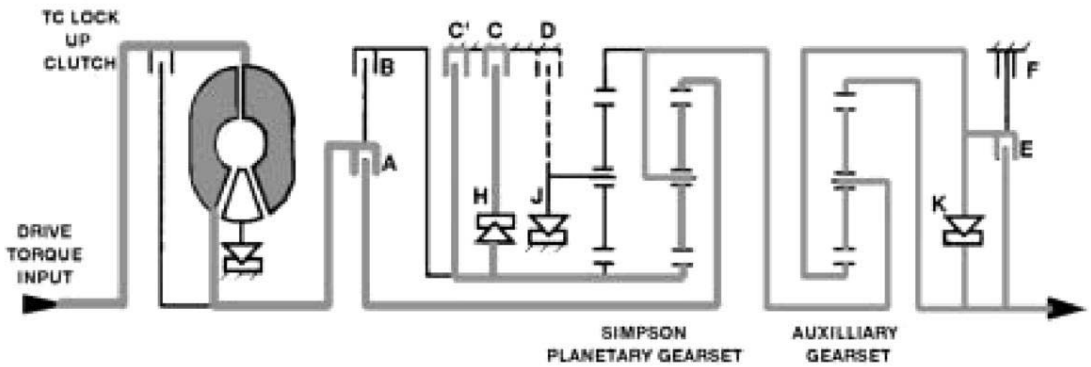

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Fig. 41: Identifying Power Flow Schematic - Second Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Second Gear - Drive torque is applied to the torque converter impeller and transferred to the turbine. The turbine shaft rotates clockwise (CW). The "A" clutch locks the turbine shaft to the rear input ring gear. The rear

input ring gear rotates CW driving the rear planet pinions CW. The sun gear is held stationary by the C' clutch. The rear planet pinions rotate around the fixed sun gear CW. The rear planetary carrier will rotate CW. The rear planetary carrier will drive the auxiliary gear set will rotate as a complete unit. The auxiliary gear set is locked in a 1:1 ratio due to the "E" clutch locking the sun and ring gear together.

The "C" clutch is locking the outer race of the "H" freewheel to the case. This is used for the 3/2 downshift. Freewheel "J" is not active and Freewheel "K" is locked.

POSITION	D				3			2		1	R
GEAR	1	2	3	4	1	2	3	1	2	1	R
Clutch A	X	X	X	X	X	X	X	X	X	X	
Clutch B			X	X			X				X
Clutch C'		X				X			X		
Clutch C		X	X	X		X	X		X		
One Way Clutch H		X				X			X		
Clutch D										X	X
One Way Clutch J	X				X			X		X	
Clutch E	X	X	X		X	X	X	X	X	X	X
One Way Clutch K	X	X	X		X	X	X	X	X	X	X
Clutch F				X							

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Fig. 42: Gear Position Chart - Second Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Third Gear

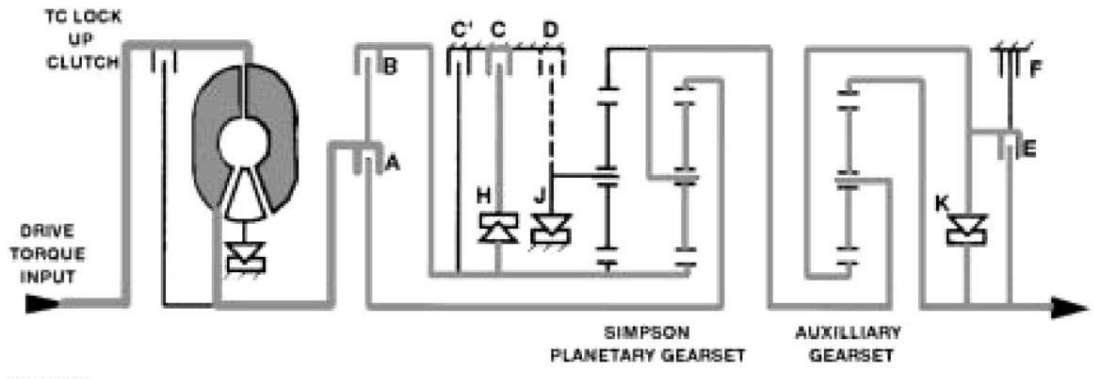

Fig. 43: Identifying Power Flow Schematic - Third Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Third Gear - Drive torque is applied to the torque converter impeller and transferred to the turbine. The turbine shaft rotates clockwise (CW). The "A" clutch and the "B" clutch are locked, this causes the rear input ring gear to be locked to the sun gear in the Simpson Gear set. The Simpson gear set is locked in a 1:1 ratio. The "E" clutch is locked which locks the ring gear to the sun gear in the Simpson gear set. The entire transmission planetary system is now locked in a 1:1 ratio.

Freewheel "H" is overrun and freewheel "J" is not used. Freewheel "K" continues to be locked.

POSITION GEAR	D				3			2		1	R
	1	2	3	4	1	2	3	1	2	1	R
Clutch A	X	X	X	X	X	X	X	X	X	X	
Clutch B			X	X			X				X
Clutch C'		X				X			X		
Clutch C		X	X	X		X	X		X		
One Way Clutch H		X				X			X		
Clutch D										X	X
One Way Clutch J	X				X			X		X	
Clutch E	X	X	X		X	X	X	X	X	X	X
One Way Clutch K	X	X	X		X	X	X	X	X	X	X
Clutch F				X							

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Fig. 44: Gear Position Chart - Third Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Fourth Gear

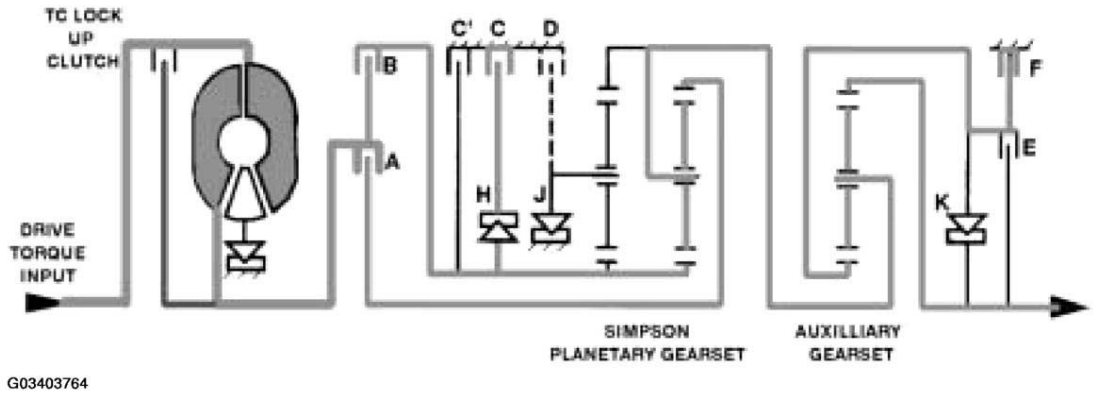

Fig. 45: Identifying Power Flow Schematic - Fourth Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Fourth Gear - Drive torque is applied to the torque converter impeller and transferred to the turbine. The turbine shaft rotates clockwise (CW). (The turbine shaft can also be driven by the lock up clutch when engaged). The "A" clutch and the "B" clutch are locked, this causes the rear input ring gear to be locked to the sun gear in the Simpson Gear set. The Simpson gear set is locked in a 1:1 ratio. The "F" clutch is locked which locks the sun gear in the auxiliary gear set to the case. The Simpson gear set drives the planetary carrier CW. The planet pinions walk around the fixed sun gear in a CW direction. This causes the ring gear to rotate CW as well. The ring gear, which is the output of the transmission is driven in a overdrive ratio.

Freewheel "H" and "K" are overrun. Freewheel "J" is not used.

POSITION GEAR	D				3			2		1	R
	1	2	3	4	1	2	3	1	2	1	R
Clutch A	X	X	X	X	X	X	X	X	X	X	
Clutch B			X	X			X				X
Clutch C'		X				X			X		
Clutch C		X	X	X		X	X		X		
One Way Clutch H		X				X			X		
Clutch D										X	X
One Way Clutch J	X				X			X		X	
Clutch E	X	X	X		X	X	X	X	X	X	X
One Way Clutch K	X	X	X		X	X	X	X	X	X	X
Clutch F				X							

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Fig. 46: Gear Position Chart - Fourth Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Reverse Gear

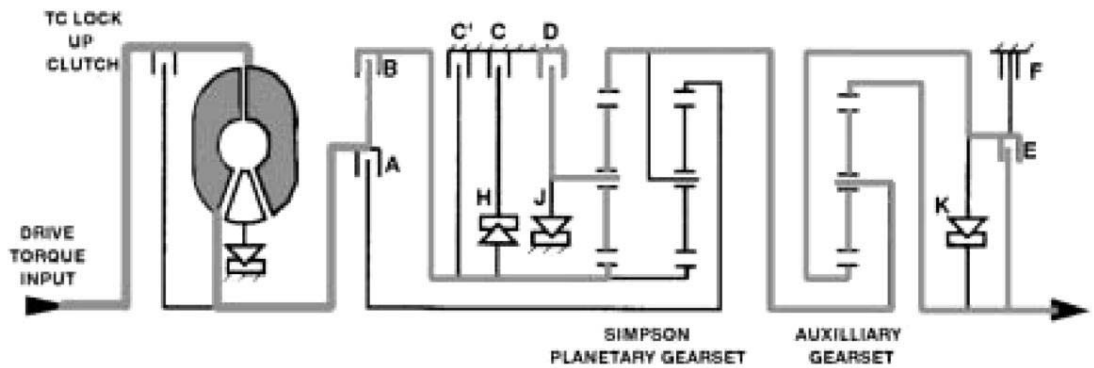

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Fig. 47: Identifying Power Flow Schematic - Reverse Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Reverse Gear - Drive torque is applied to the torque converter impeller and transferred to the turbine. The turbine shaft rotates clockwise (CW). The "B" clutch is locked which drives the sun gear in the Simpson gear set CW. The sun gear drives the planet pinions CCW. The planetary carrier is held stationary by the "D" clutch. The planet pinions cause the front ring gear to rotate CCW. The front ring gear (and rear carrier) drive the

auxiliary gear set CCW which rotates at a ratio of 1:1 due to the "E" clutch locking the sun and ring gear of the auxiliary gear set.

Freewheel "H" and "J" are not used. Freewheel "K" is locked.

POSITION GEAR	D				3			2		1	R
	1	2	3	4	1	2	3	1	2	1	R
Clutch A	X	X	X	X	X	X	X	X	X	X	
Clutch B			X	X			X				X
Clutch C'		X				X			X		
Clutch C		X	X	X		X	X		X		
One Way Clutch H		X				X			X		
Clutch D										X	X
One Way Clutch J	X				X			X		X	
Clutch E	X	X	X		X	X	X	X	X	X	X
One Way Clutch K	X	X	X		X	X	X	X	X	X	X
Clutch F				X							

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Fig. 48: Gear Position Chart - Reverse Gear
Courtesy of BMW OF NORTH AMERICA, INC.

SHIFT CONTROL

Freewheel Shifting

In order to prevent an interruption in power flow, freewheel (One Way Clutches) are used to lock members of the planetary gear set. Certain transmissions such as the 4HP22/24, A4S270/310R and the A5S360R use freewheel shifting on all gear shifts. Transmissions such as A5S310Z, A5S440Z, A5S560Z and GA6HP26Z use freewheel shifting for only specific shifts. Other shifts in these transmissions use overlap shifting technology.

The demonstrate how the freewheel is used, we will examine freewheel "H" in the 4HP22/24 transmission.

In third gear, the sun gear is rotating clockwise. Freewheel "H" is overrun (unlocked) allowing the sun gear to rotate. Clutch "C" is active which locks the outer race of freewheel "H" to the case. During a 3/2 downshift, clutch "B" is released. The sun gear is held from rotating counter clockwise by freewheel "H" and the C' clutch. Freewheel "H" is used to stop the counter clockwise rotation of the sun gear before the C' clutch can engage. This prevents an interruption of power flow during the 3/2 downshift. If freewheel "H" fails to operate, there would be an increase in engine RPM from 3rd to 2nd gear.

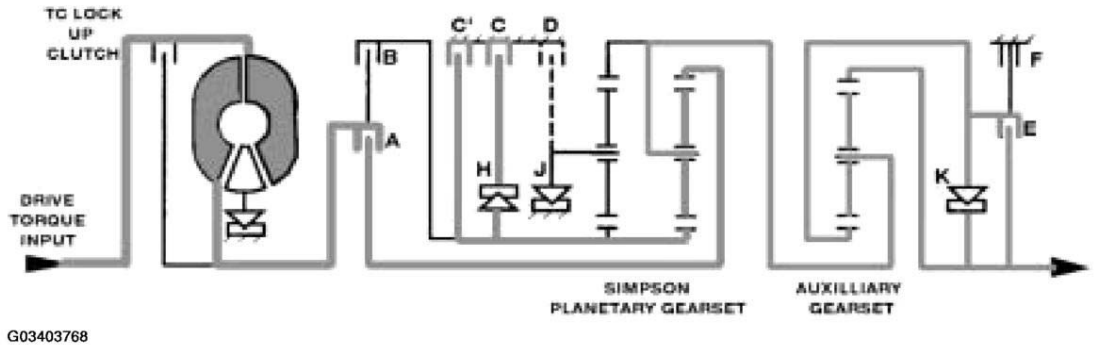

Fig. 49: Identifying Power Flow Freewheel Shifting Schematic - Second Gear
Courtesy of BMW OF NORTH AMERICA, INC.

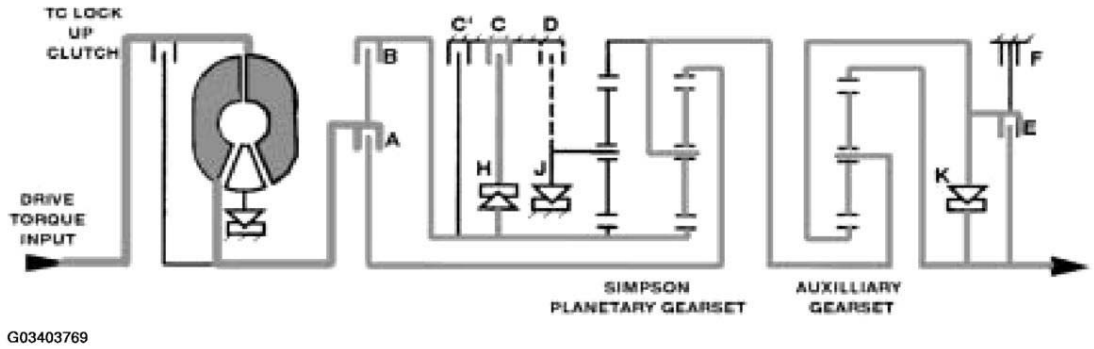

Fig. 50: Identifying Power Flow Freewheel Shifting Schematic - Third Gear
Courtesy of BMW OF NORTH AMERICA, INC.

Overlap Shift Control

Overlap shift technology is currently used on ZF transmissions. The A5S310Z, A5S440Z, A5S560Z and the GA6HP26Z use overlap shift technology on most gear changes. The advantages of this design allows for the reduction of the use of One Way Clutches (freewheel) and a significant improvement in shift quality.

During an overlap shift, the releasing clutch pressure is reduced at the same rate that the engaging clutch pressure is increased. The result is a smooth transfer or torque between gear ratios.

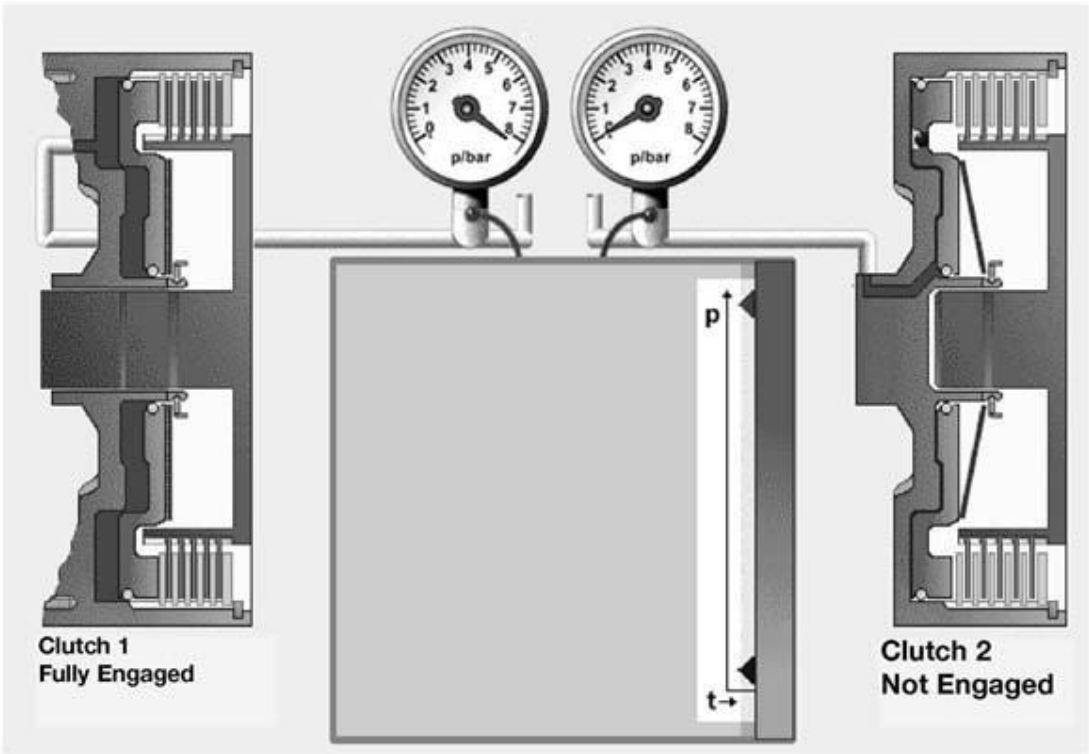

Fig. 51: Identifying Overlap Shift Technology
Courtesy of BMW OF NORTH AMERICA, INC.

As shown in the diagram above, Clutch 1 is fully engaged with maximum pressure. Clutch 2 is fully released.

During overlap shifting, the TCM closely monitors the rotational speeds of the turbine (input) shaft and output shaft. The TCM then uses the EDS solenoids to control pressures during shifting to provide the optimum shift timing and overlap control.

Overlap Shifting

During the transition of overlap, the clutches run through a slip zone. The torque is gradually transferred from the clutch that is releasing to the clutch that is engaging.

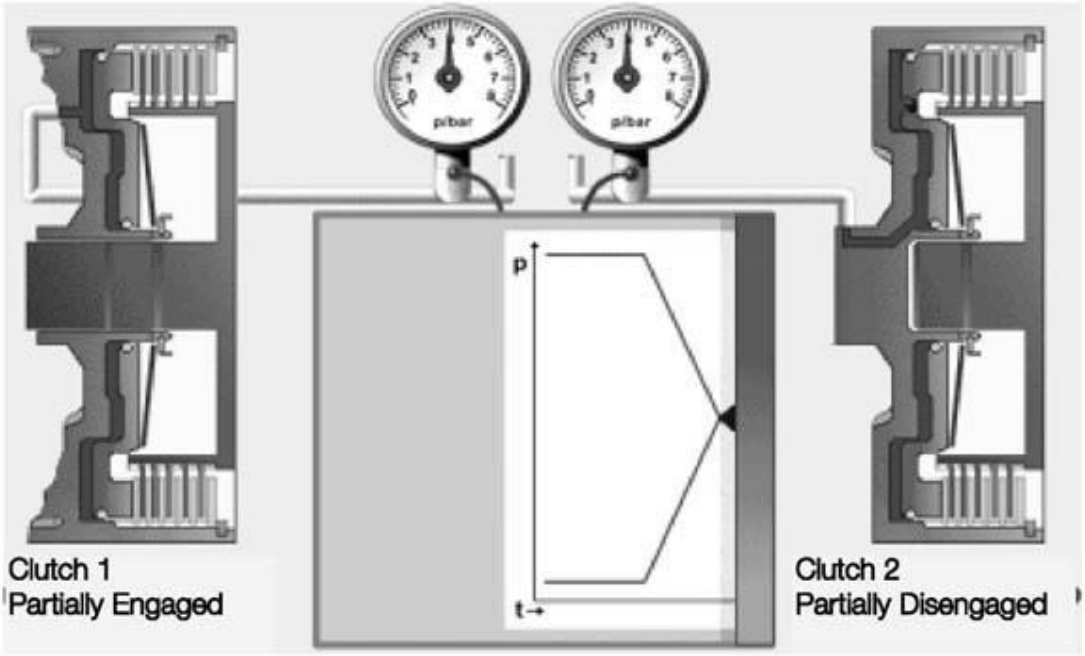

Fig. 52: Identifying Overlap Shifting (Clutch 1 Partially Engaged And Clutch 2 Partially Disengaged)
Courtesy of BMW OF NORTH AMERICA, INC.

The new gear engages the moment the torque level exceeds that of the first clutch. This is described as overlap. If the overlap is correct, (zero overlap) the engaging clutch takes over as much torque as the disengaging clutch releases. The result is a seemingly unnoticed shift of the best quality.

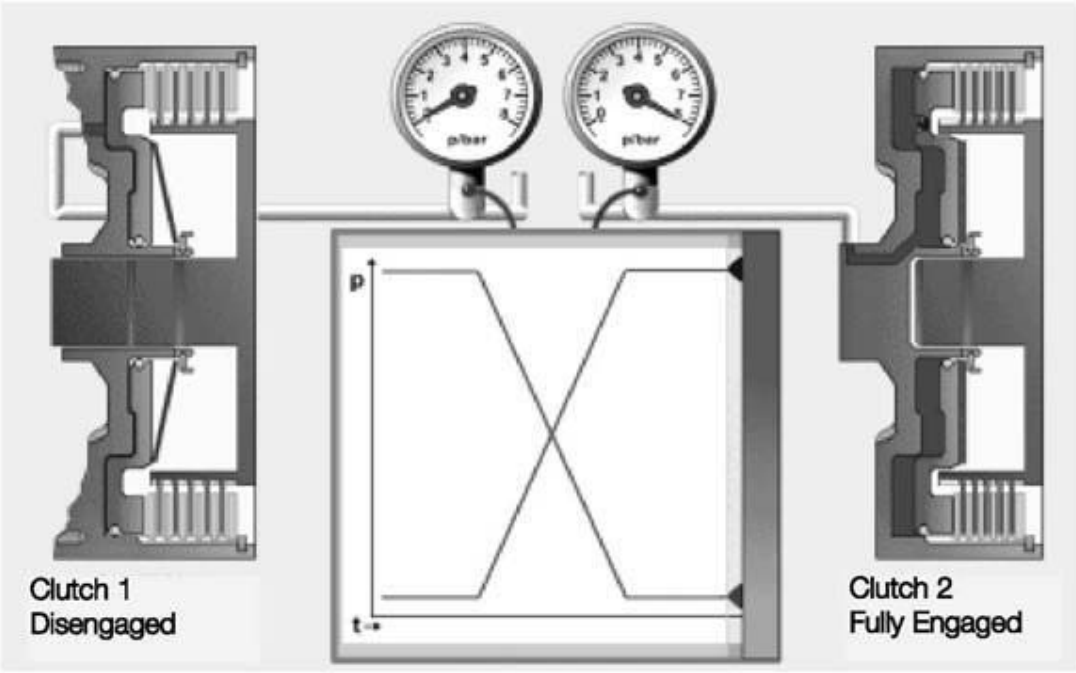

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Fig. 53: Identifying Overlap Shifting (Clutch 1 Disengaged And Clutch 2 Fully Engaged)
Courtesy of BMW OF NORTH AMERICA, INC.

Negative Overlap

Negative overlap occurs when the engaging clutch takes over too late or the releasing clutch drops pressure too early.

The result is that the drive torque is briefly interrupted. When the engine is operating under load, the engine speed increases due to the interruption. When coasting the engine speed drops.

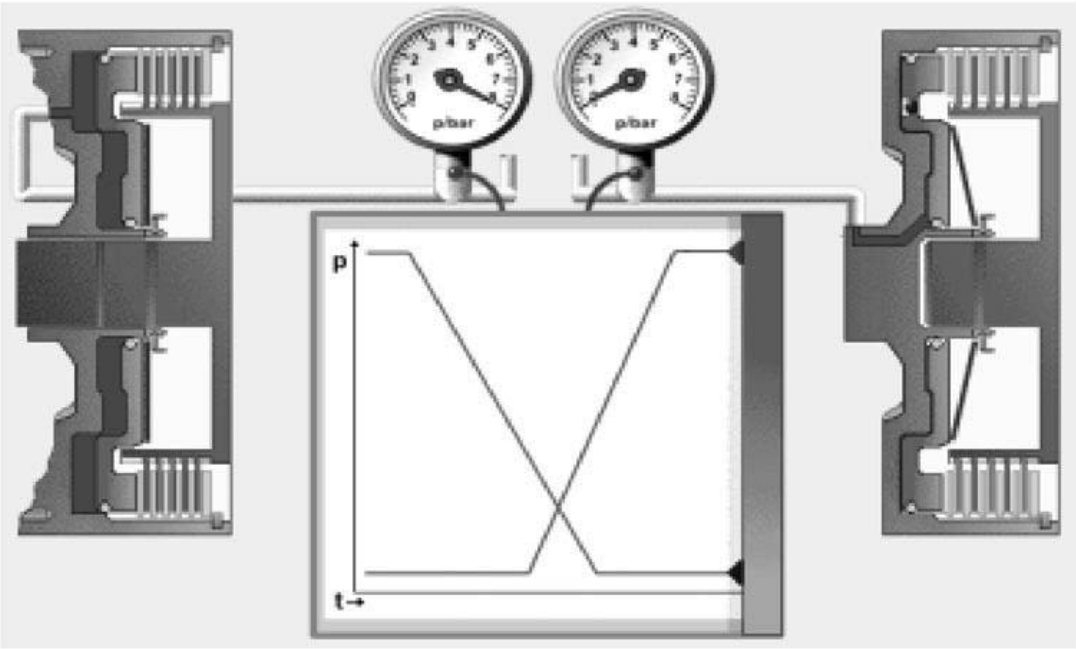

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Fig. 54: Identifying Negative Overlap
Courtesy of BMW OF NORTH AMERICA, INC.

Positive Overlap

If positive overlap occurs, the engaging clutch takes over too early or the releasing clutch pressure drops too late. The gear set would become momentarily blocked if this condition occurs during an upshift. When this occurs the ratio of the gear set becomes 1:1 momentarily. The result is a loss in drive torque during a gear shift.

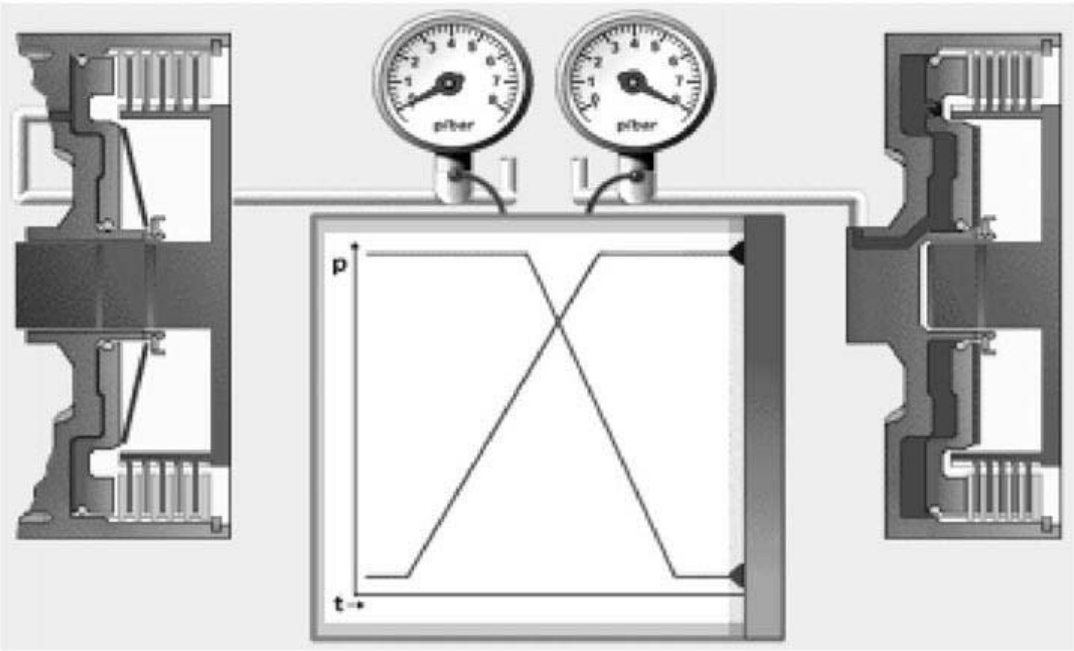

Fig. 55: Identifying Positive Overlap
Courtesy of BMW OF NORTH AMERICA, INC.

TRANSMISSION CONTROL MODULE

The TCM receives inputs, processes information and actuates the output elements to provide optimal shift points. The TCM is programmed for maximum shift comfort and fuel economy. The TCM on most BMW vehicles is located in the E-Box next to the ECM (DME).

There are several types of TCM housings:

- 35 Pin TCM (TCU) - used on the 4HP transmissions
- 55 Pin TCM used on the A4S310R (THM-R1)
- 88 Pin TCM used on all others up to 98
- 134 Pin TCM used on all BMW transmission from the 99 model year. (Note- the 134 pin TCM was introduced on the 98 Models equipped with the A5S440Z).

The 134 Pin TCM is also referred to as SKE (Standard Shell Construction). The SKE housing uses 5 separate connectors. On transmission applications only three connectors 1, 3 and 4) are used. Connectors 2 and 5 are blank and are NOT used. The connectors are blue in color to avoid confusion with the ECM (DME) connectors which are black.

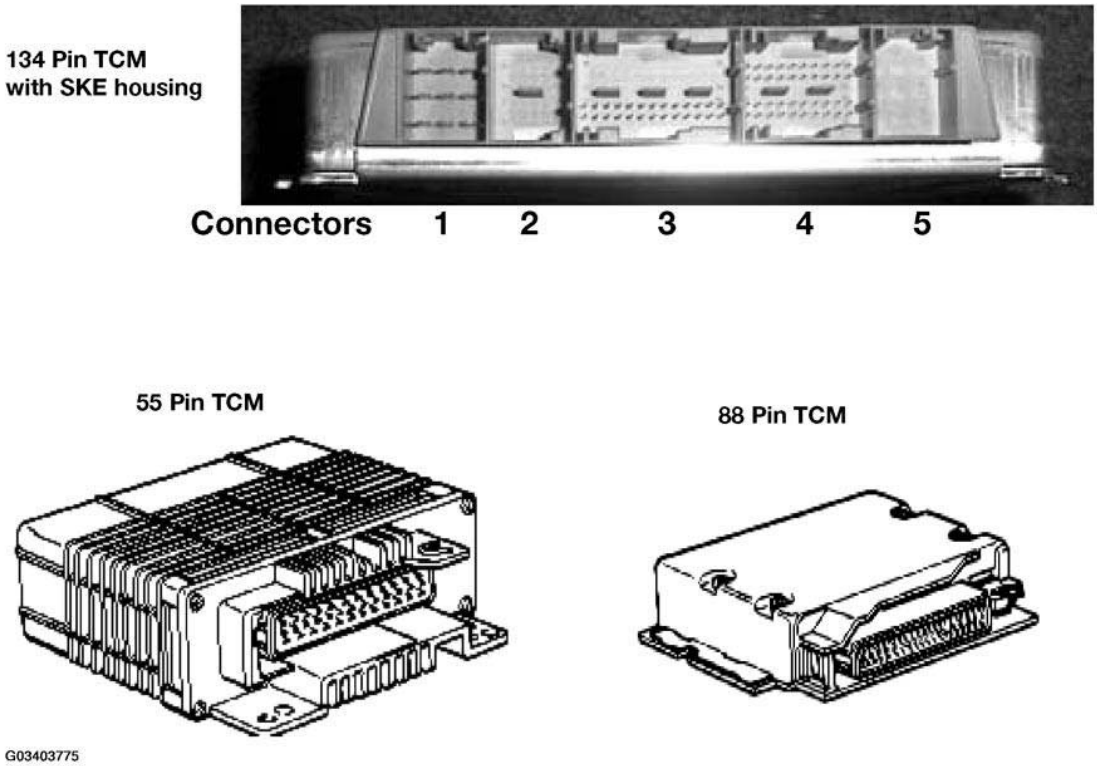

Fig. 56: Identifying Transmission Control Module
Courtesy of BMW OF NORTH AMERICA, INC.

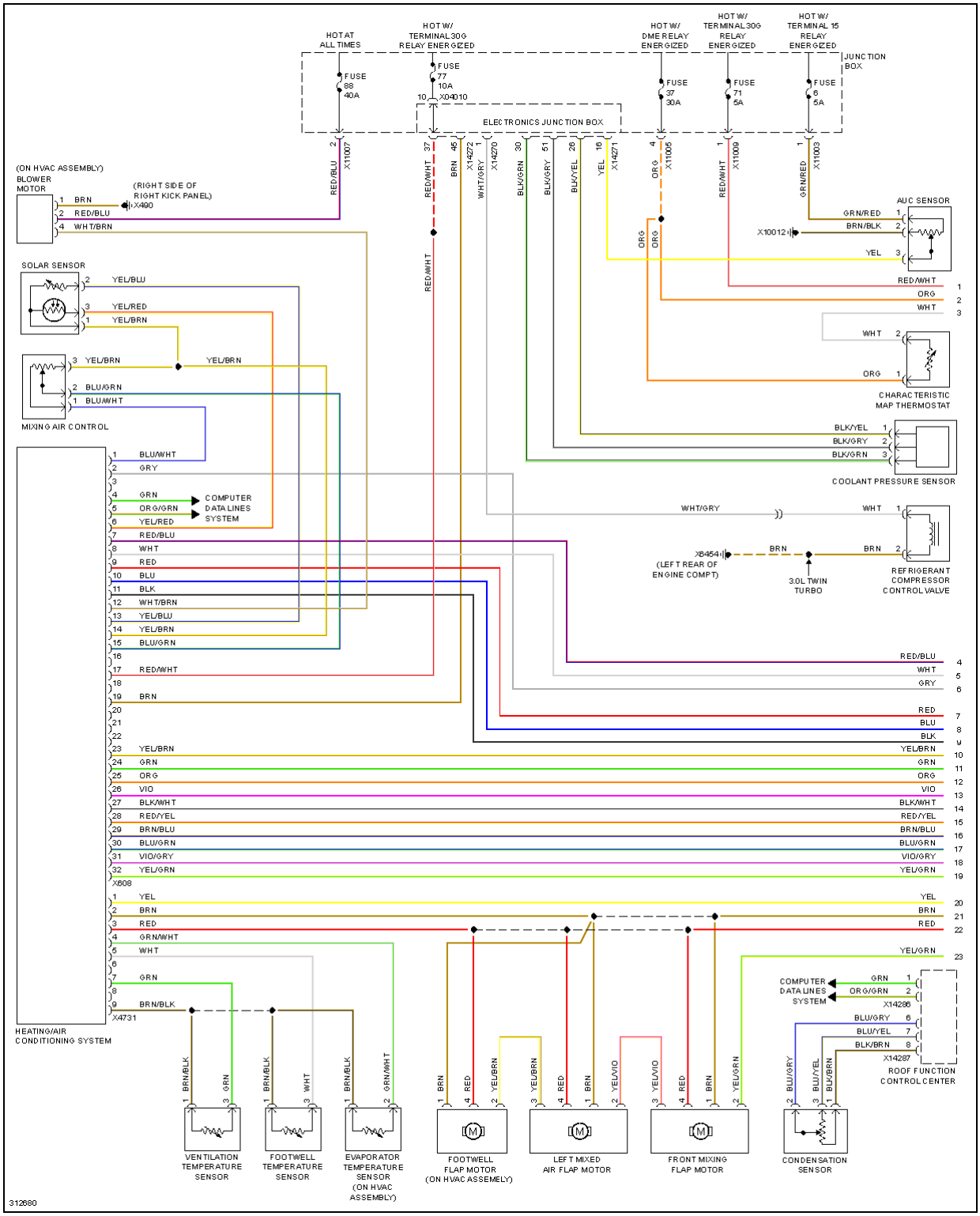

Fig. 1: Automatic A/C Circuit (1 of 2)

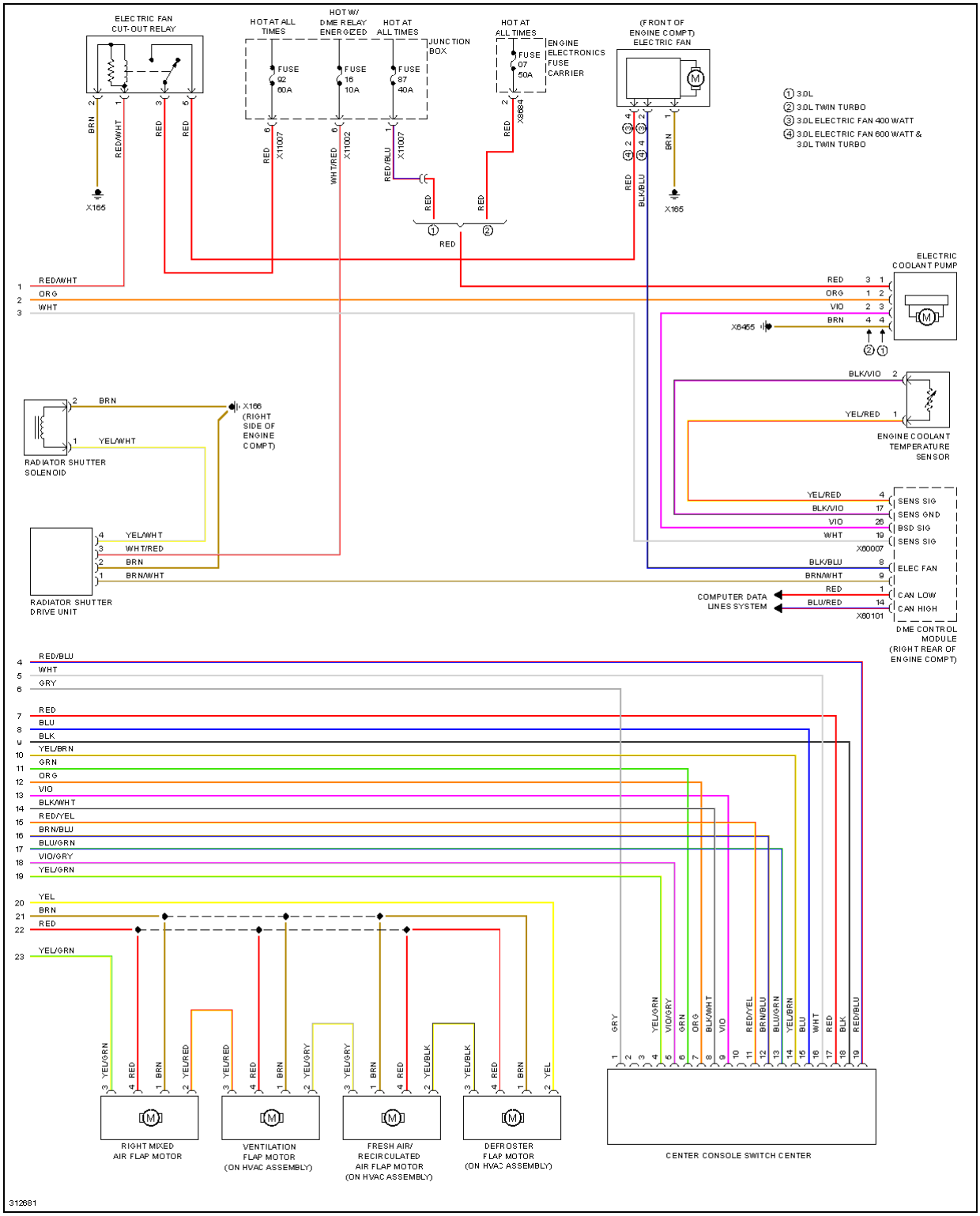

Fig. 2: Automatic A/C Circuit (2 of 2)

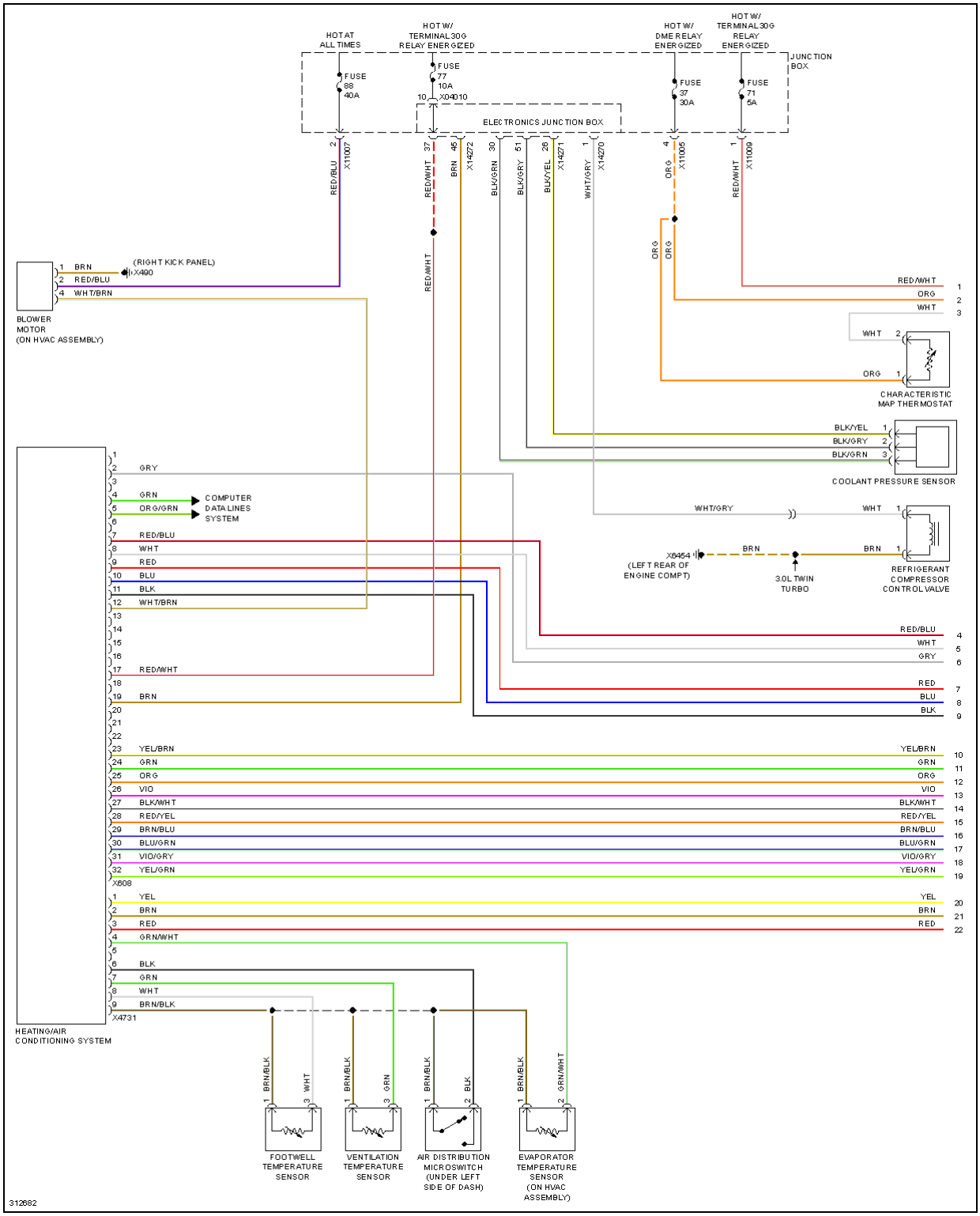

Fig. 3: Manual A/C Circuit (1 of 2)

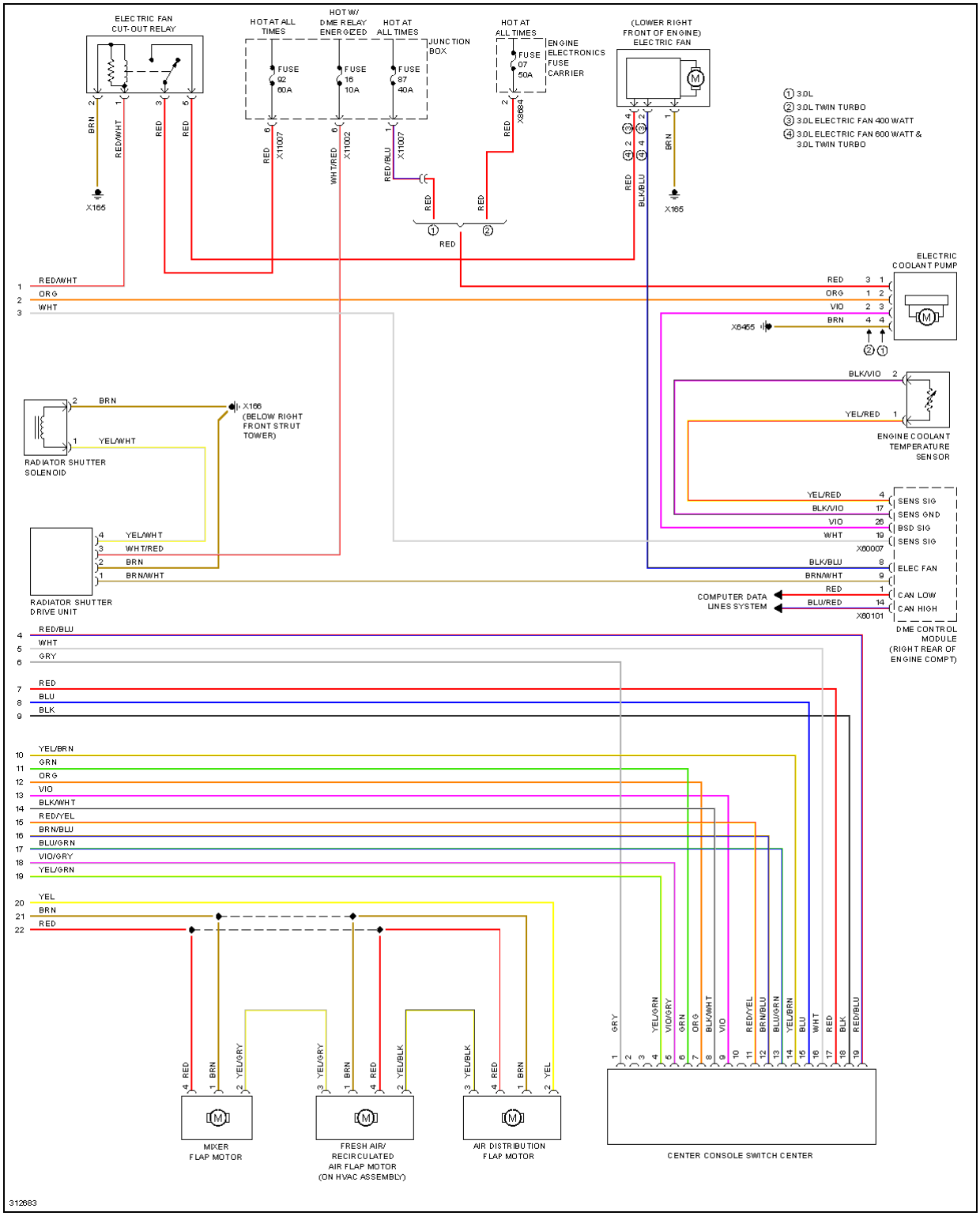

Fig. 4: Manual A/C Circuit (2 of 2)

ANTI-LOCK BRAKES

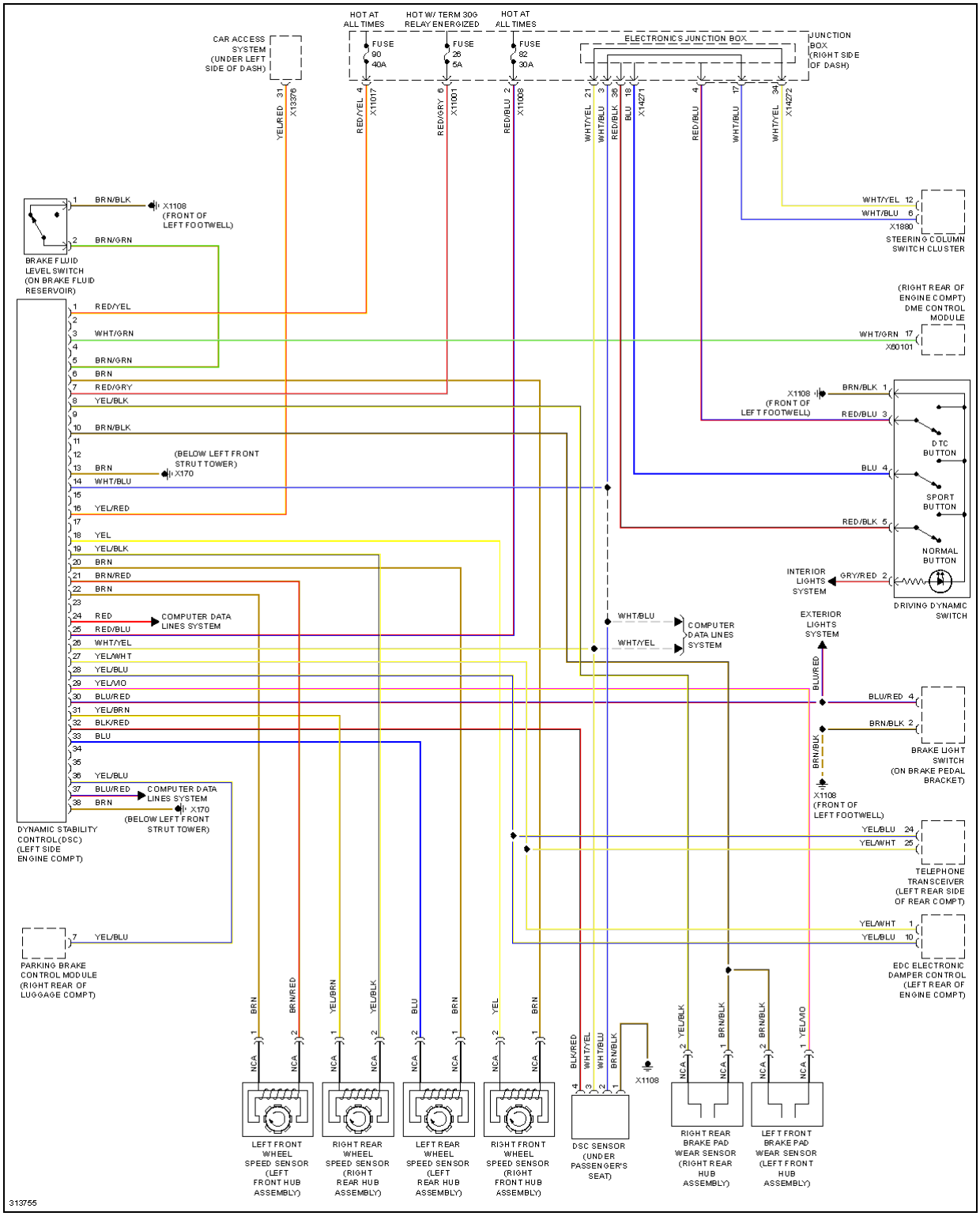

Fig. 5: Anti-lock Brakes Circuit, W/ Bosch DSC

ANTI-THEFT

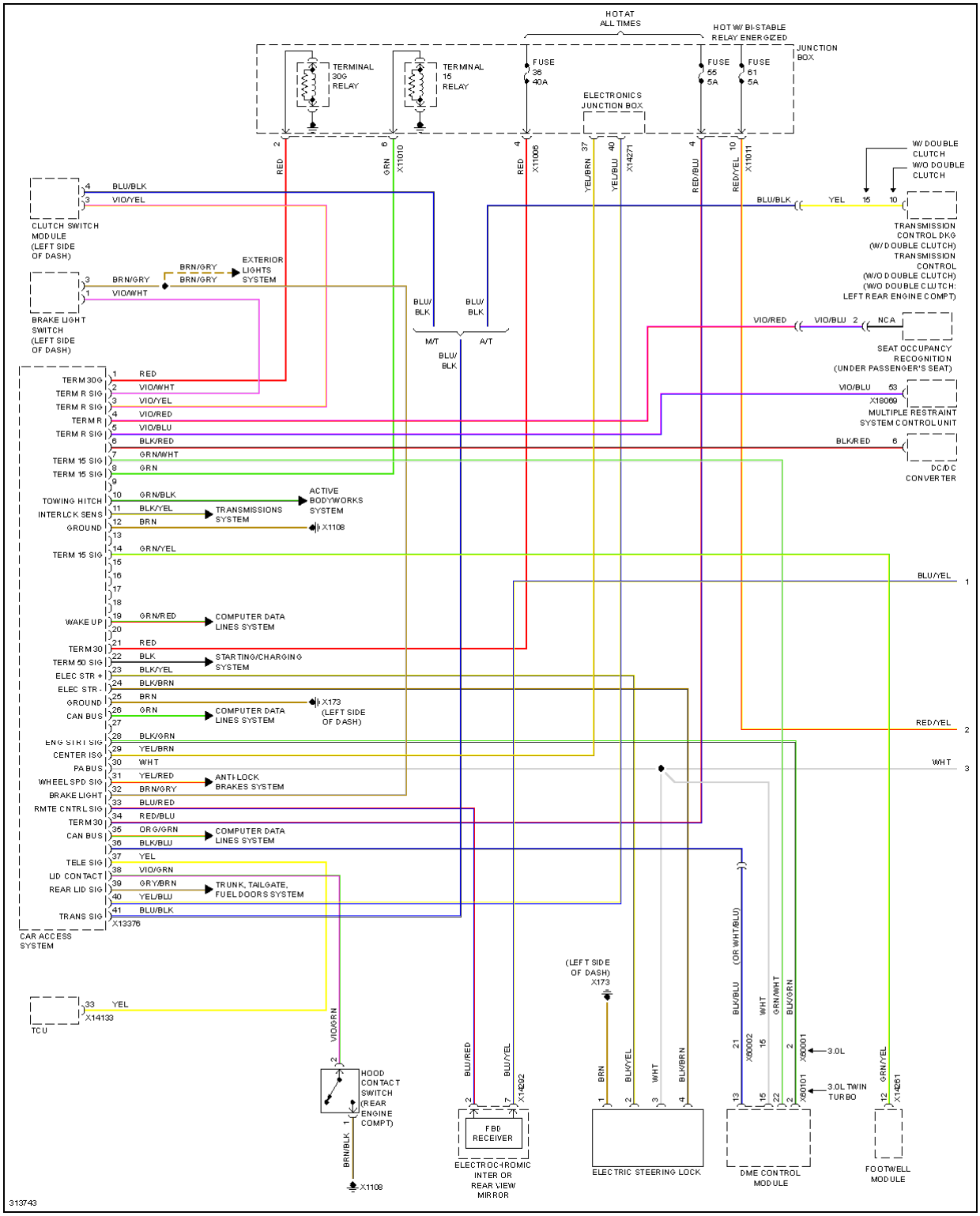

Fig. 6: Access/Start Circuit (1 of 2)

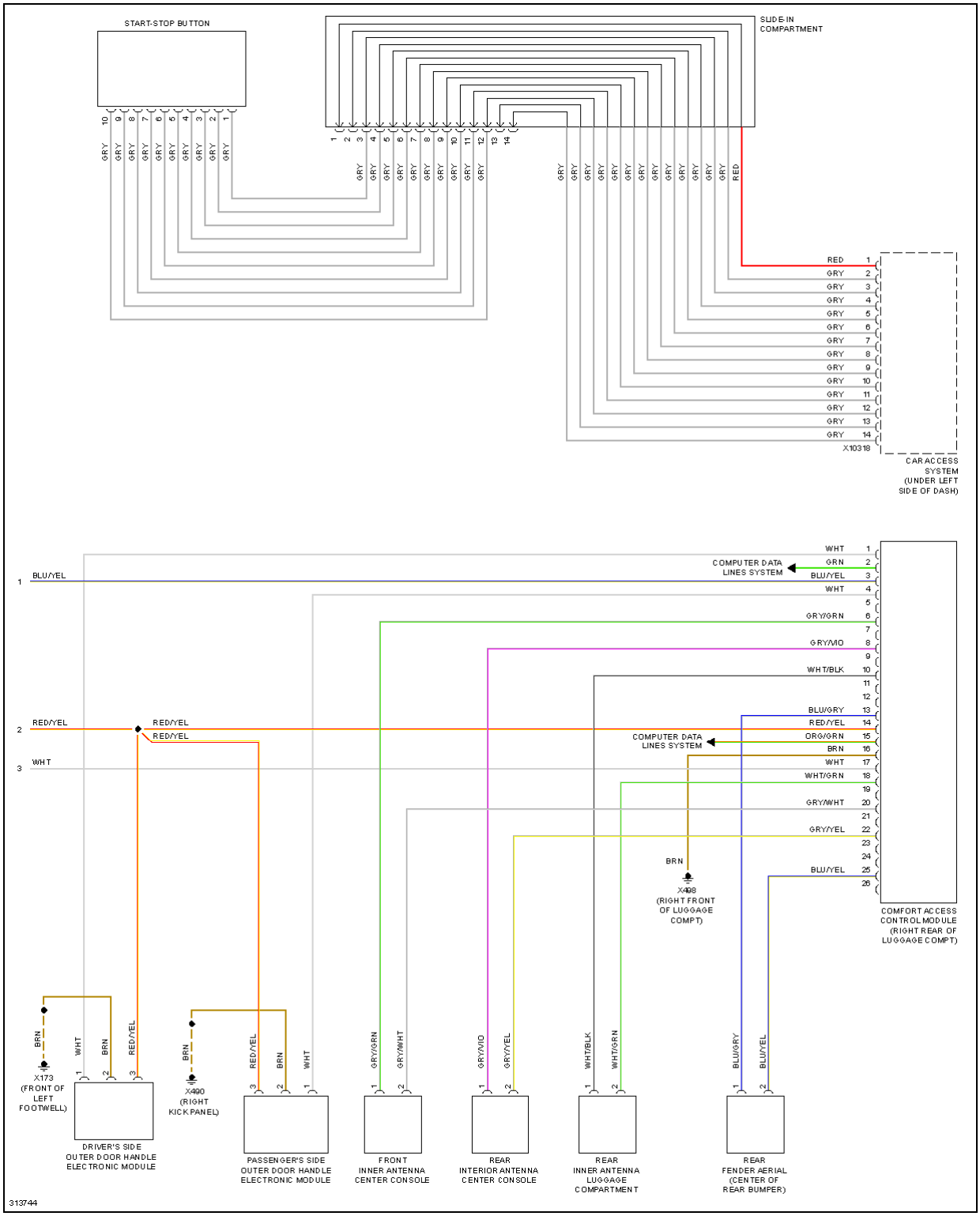

Fig. 7: Access/Start Circuit (2 of 2)

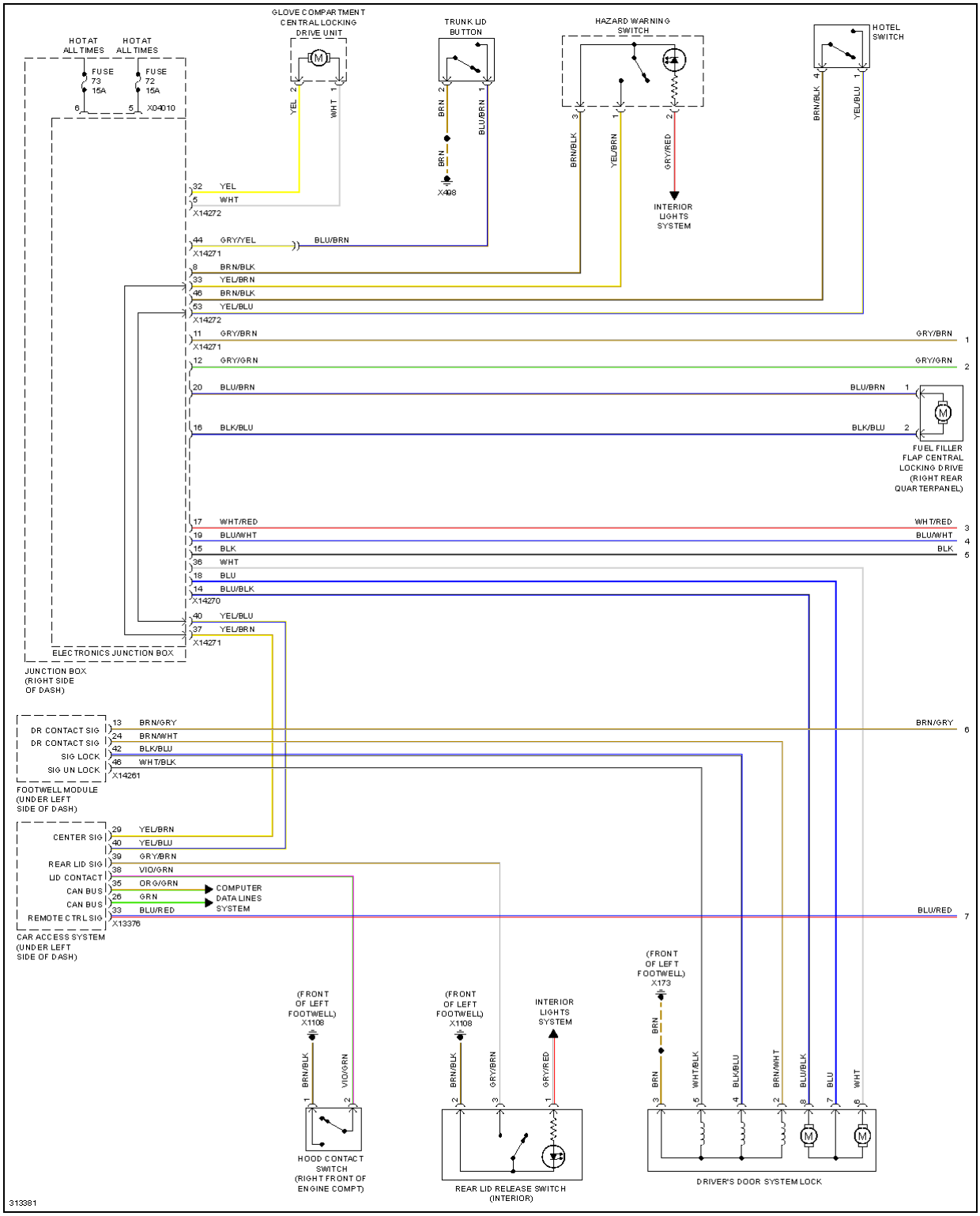

Fig. 8: Anti-theft & Central Locking Circuit (1 of 2)

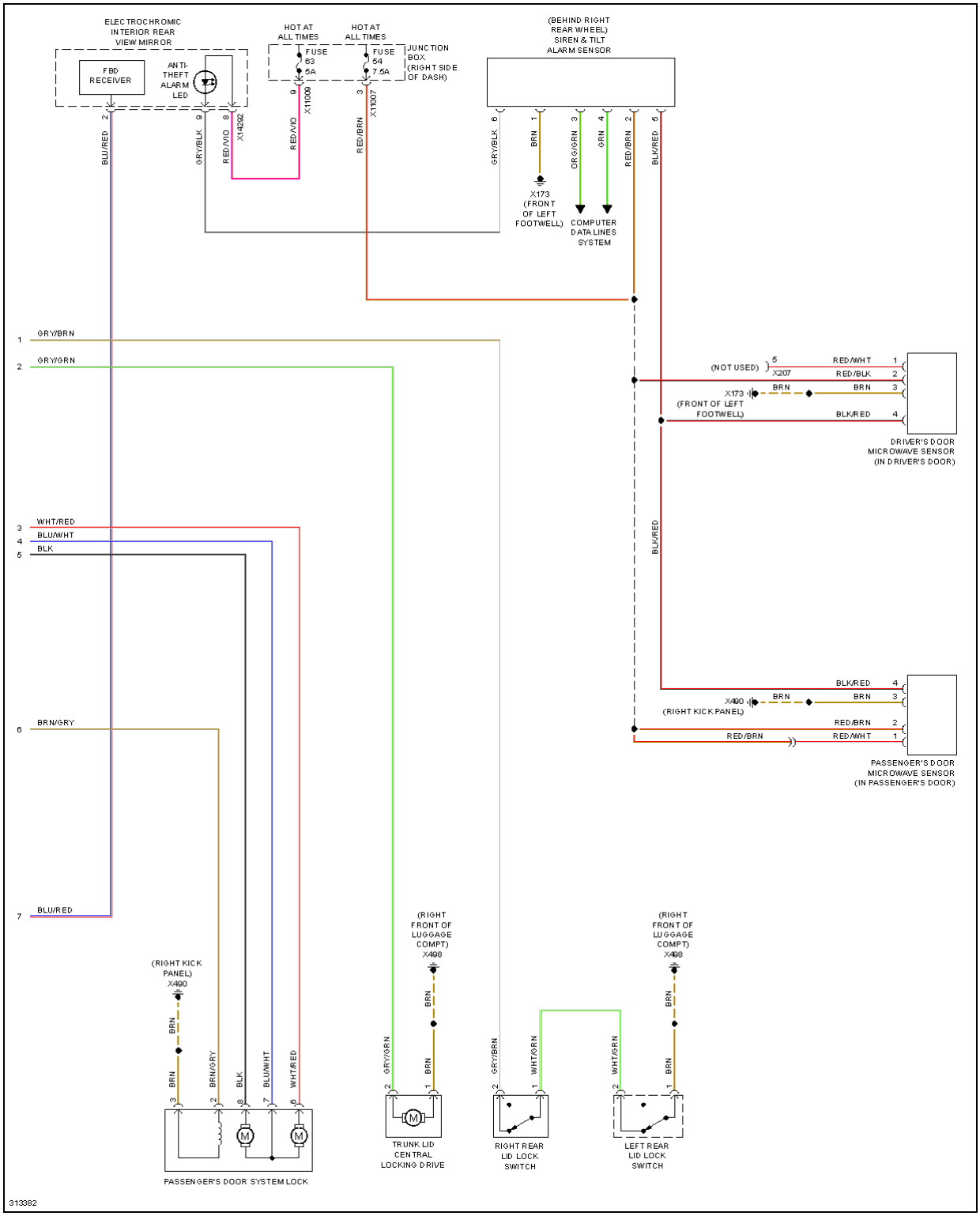

Fig. 9: Anti-theft & Central Locking Circuit (2 of 2)

BODY CONTROL MODULES

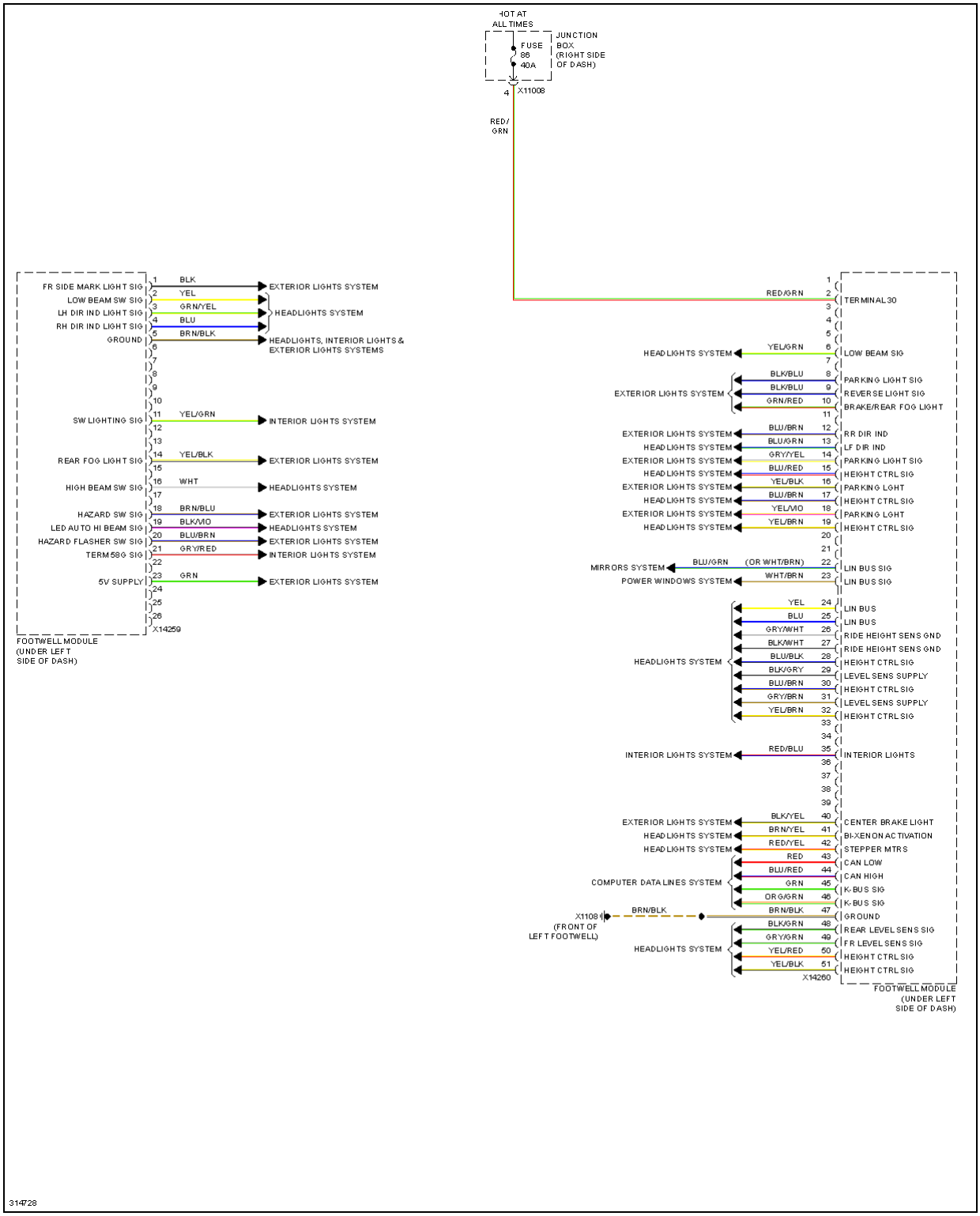

Fig. 10: Body Control Modules Circuit (1 of 2)

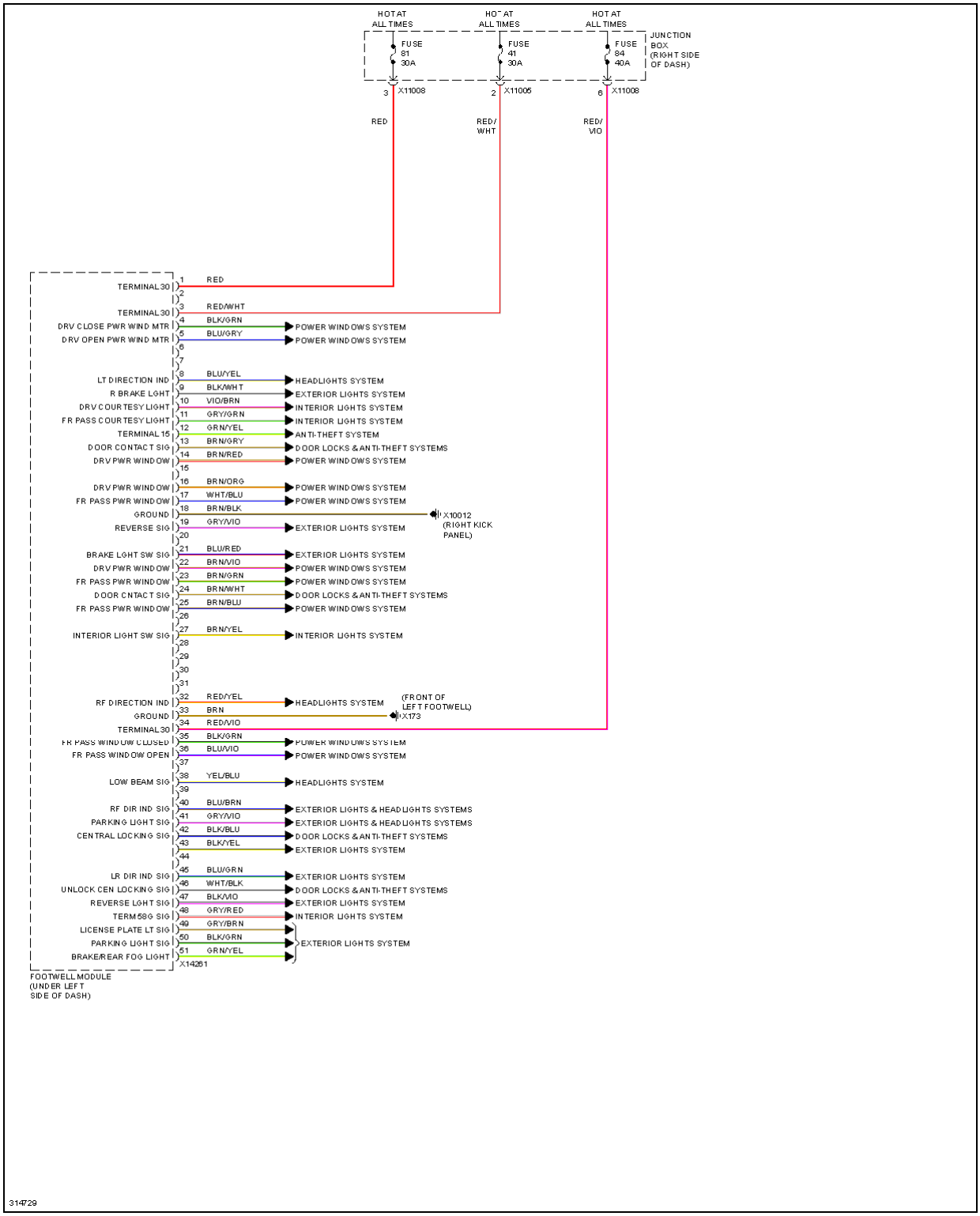

Fig. 11: Body Control Modules Circuit (2 of 2)

COMPUTER DATA LINES

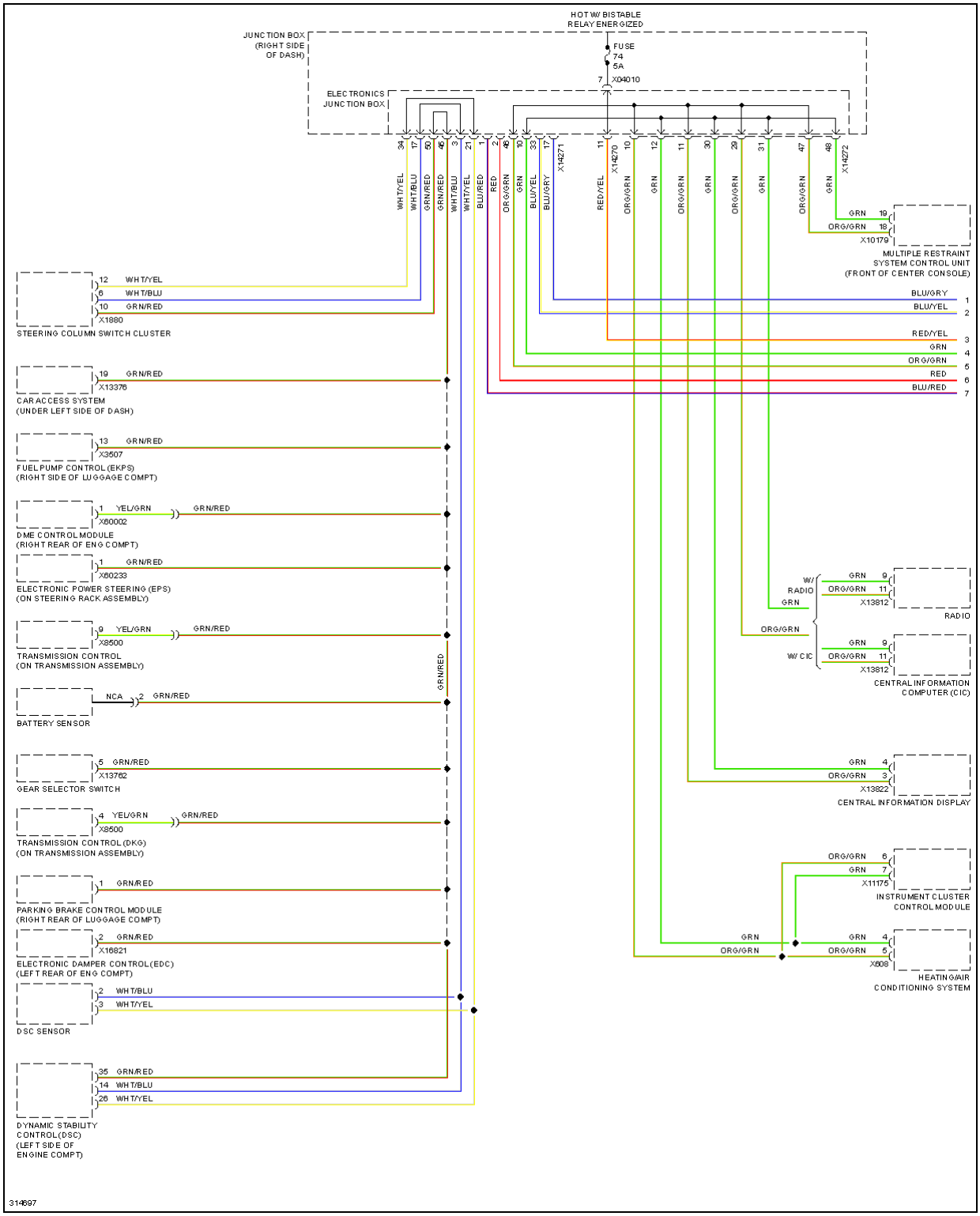

Fig. 12: Computer Data Lines Circuit (1 of 2)

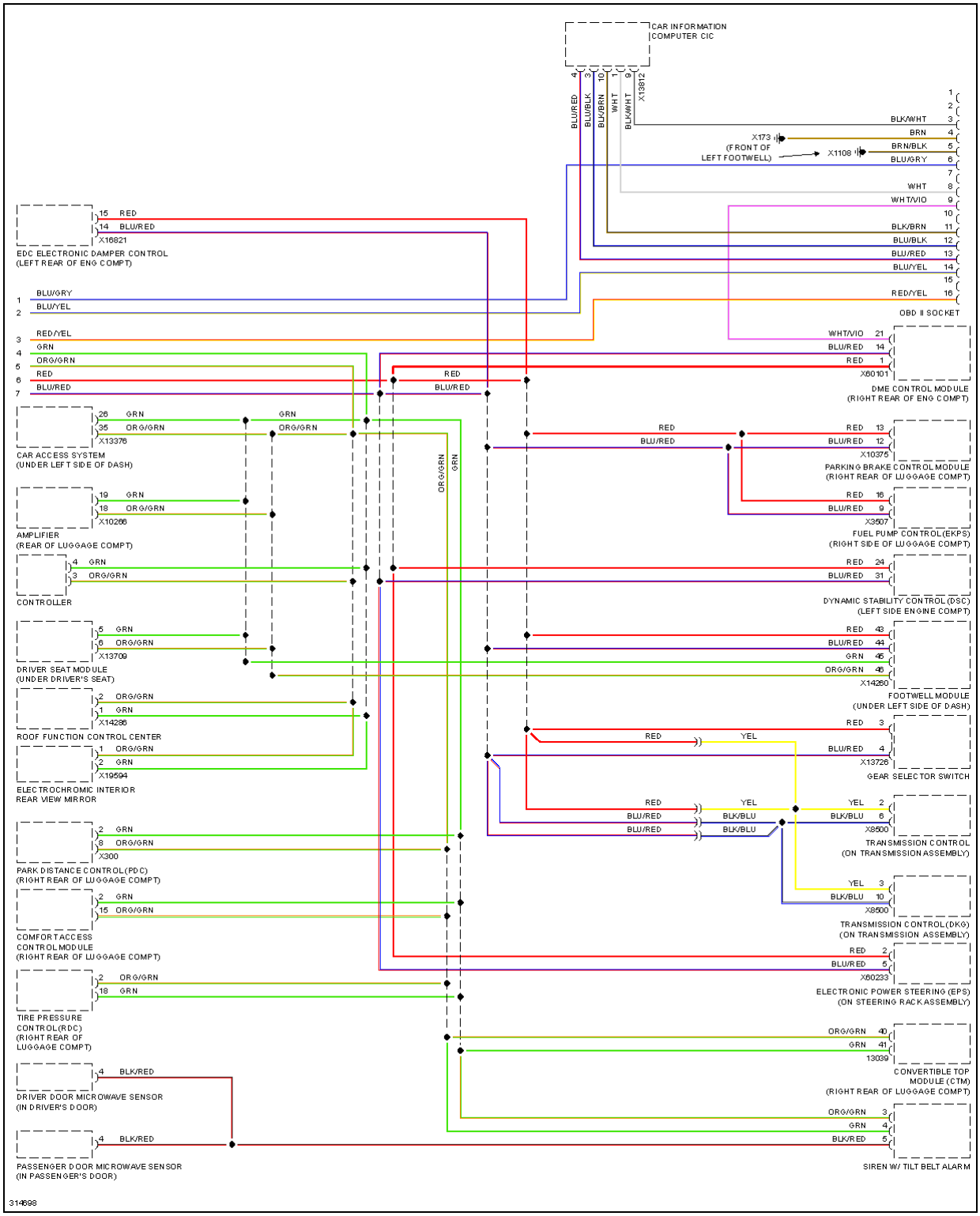

Fig. 13: Computer Data Lines Circuit (2 of 2)

COOLING FAN

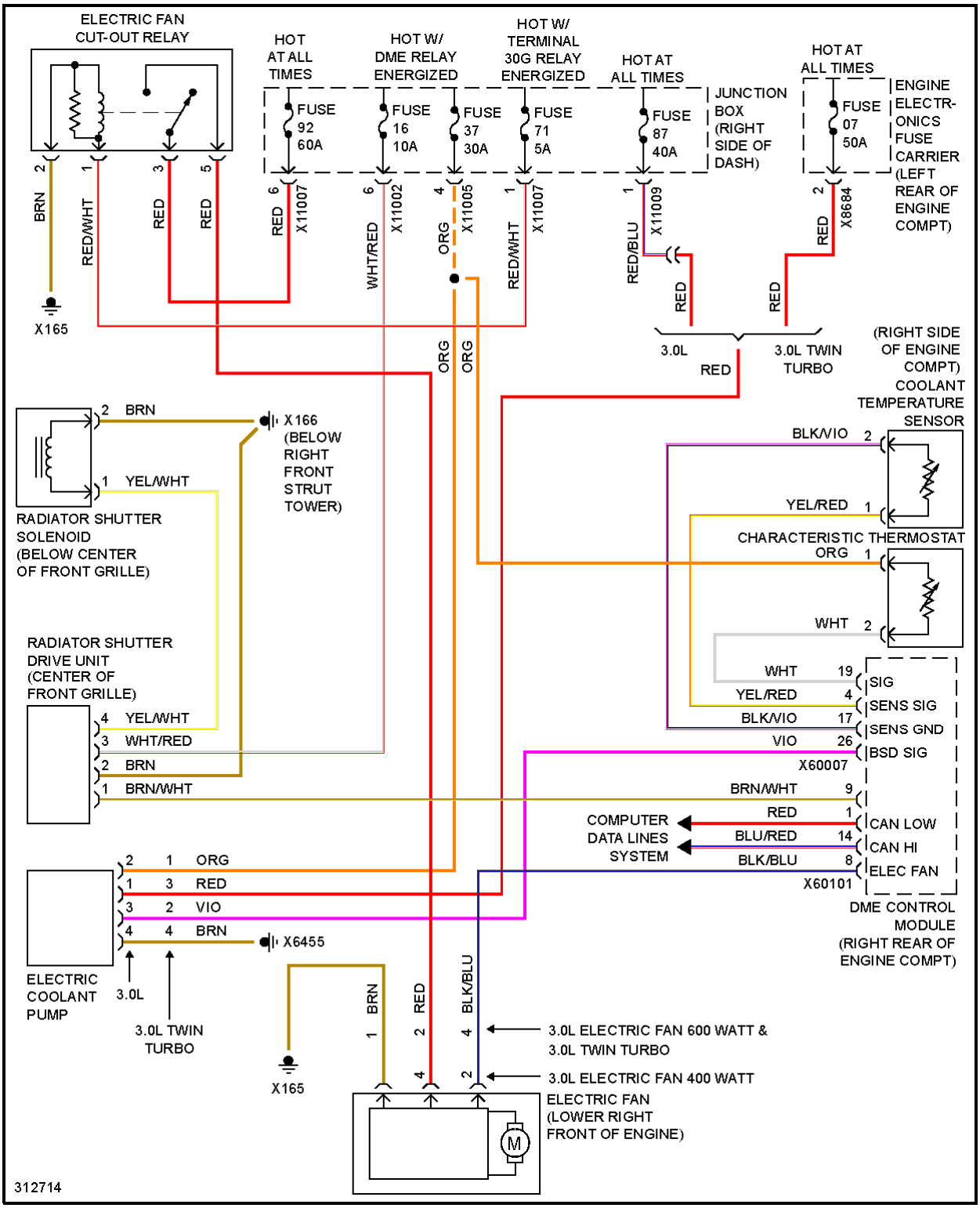

Fig. 14: Cooling Fan Circuit

CRUISE CONTROL

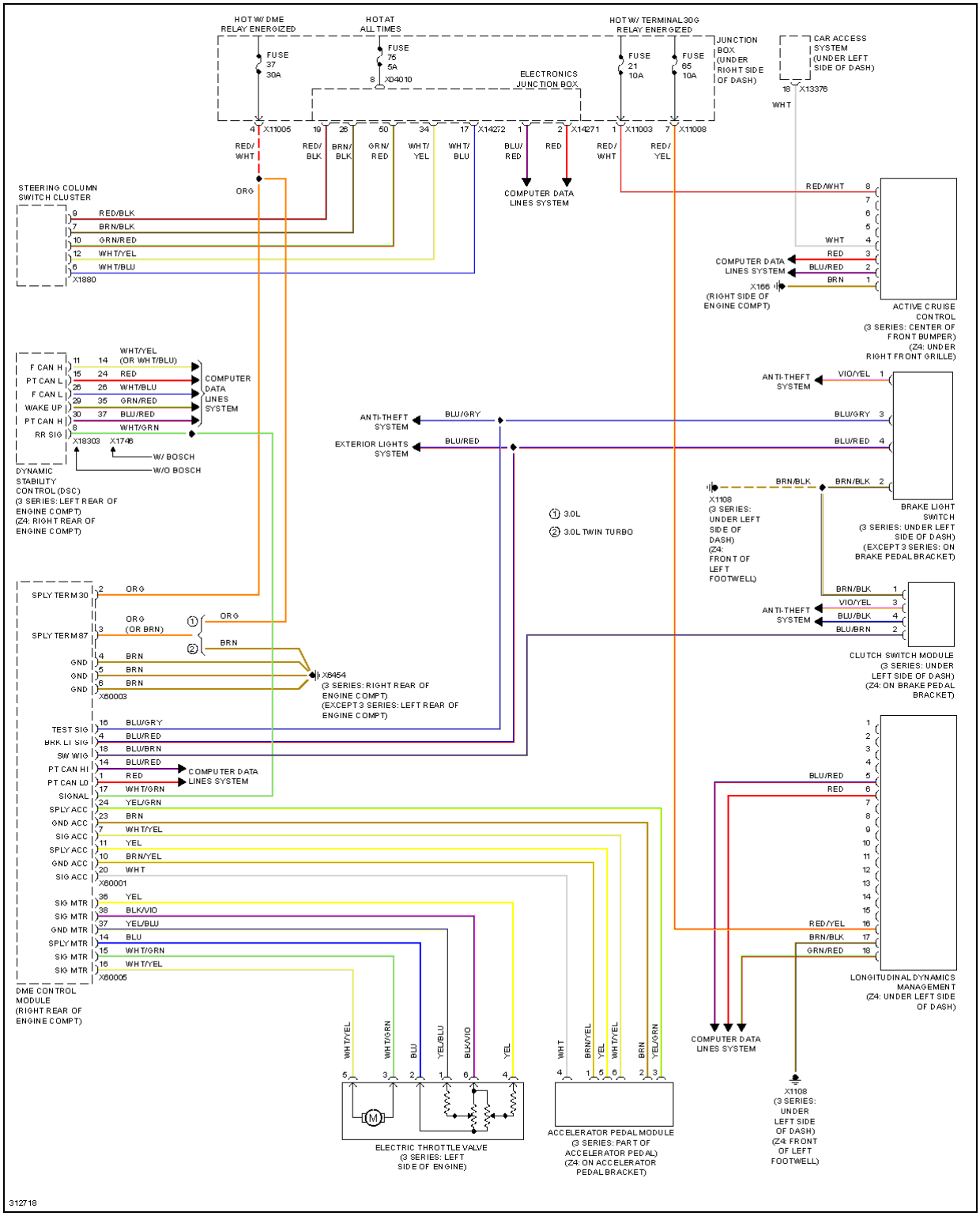

Fig. 15: Cruise Control Circuit

DEFOGGERS

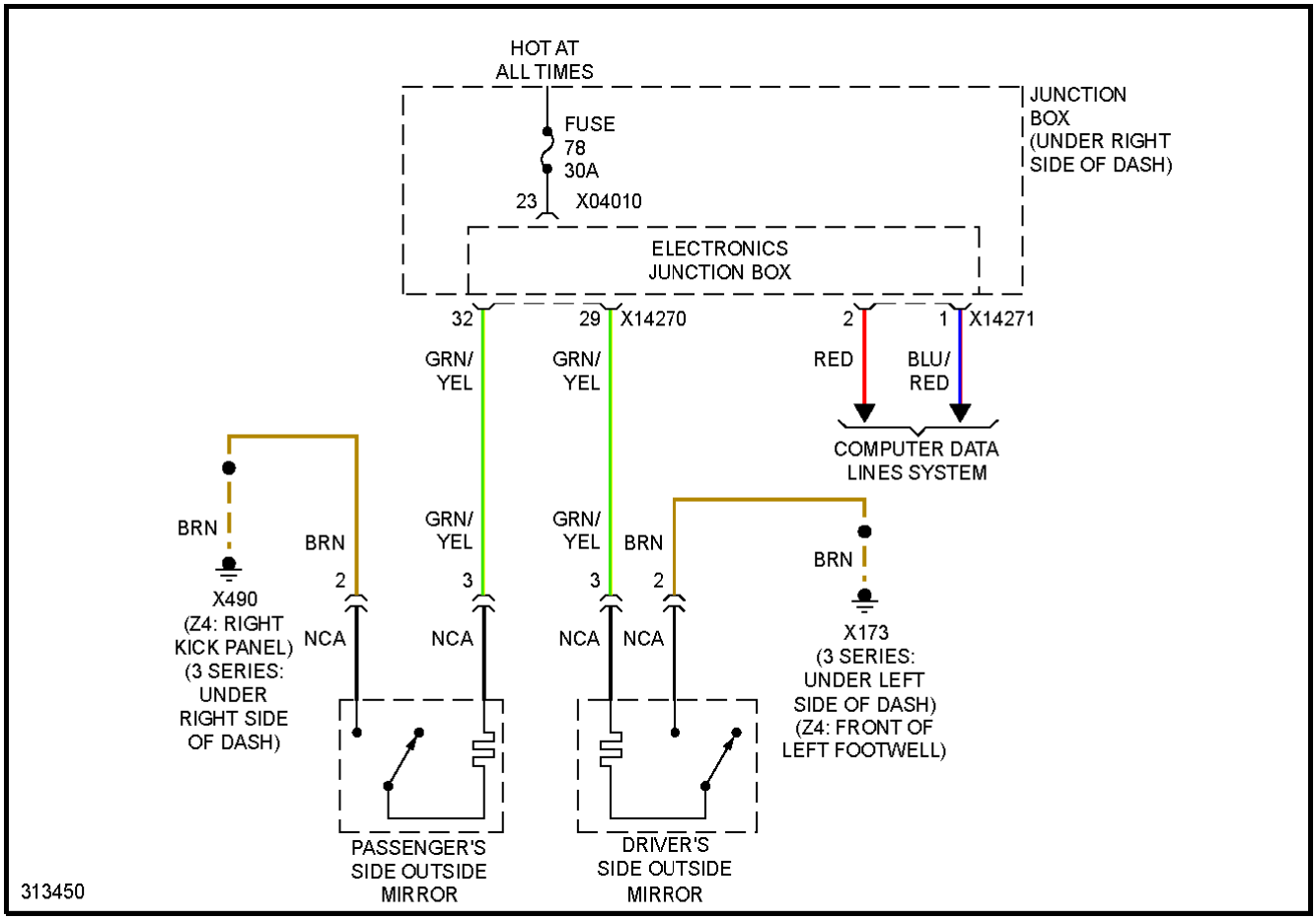

Fig. 16: Heated Mirrors Circuit

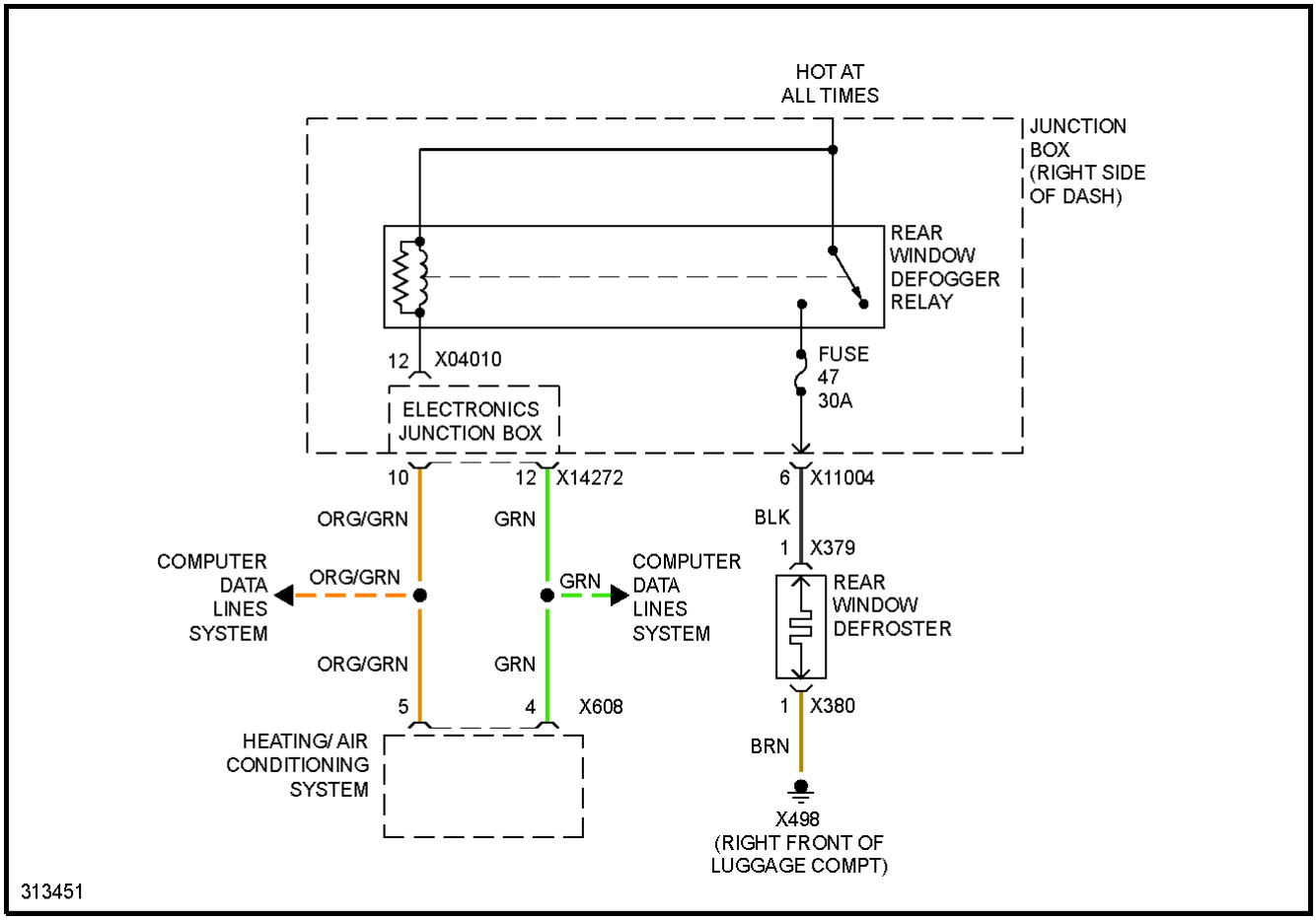

Fig. 17: Rear Defogger Circuit

ELECTRONIC POWER STEERING

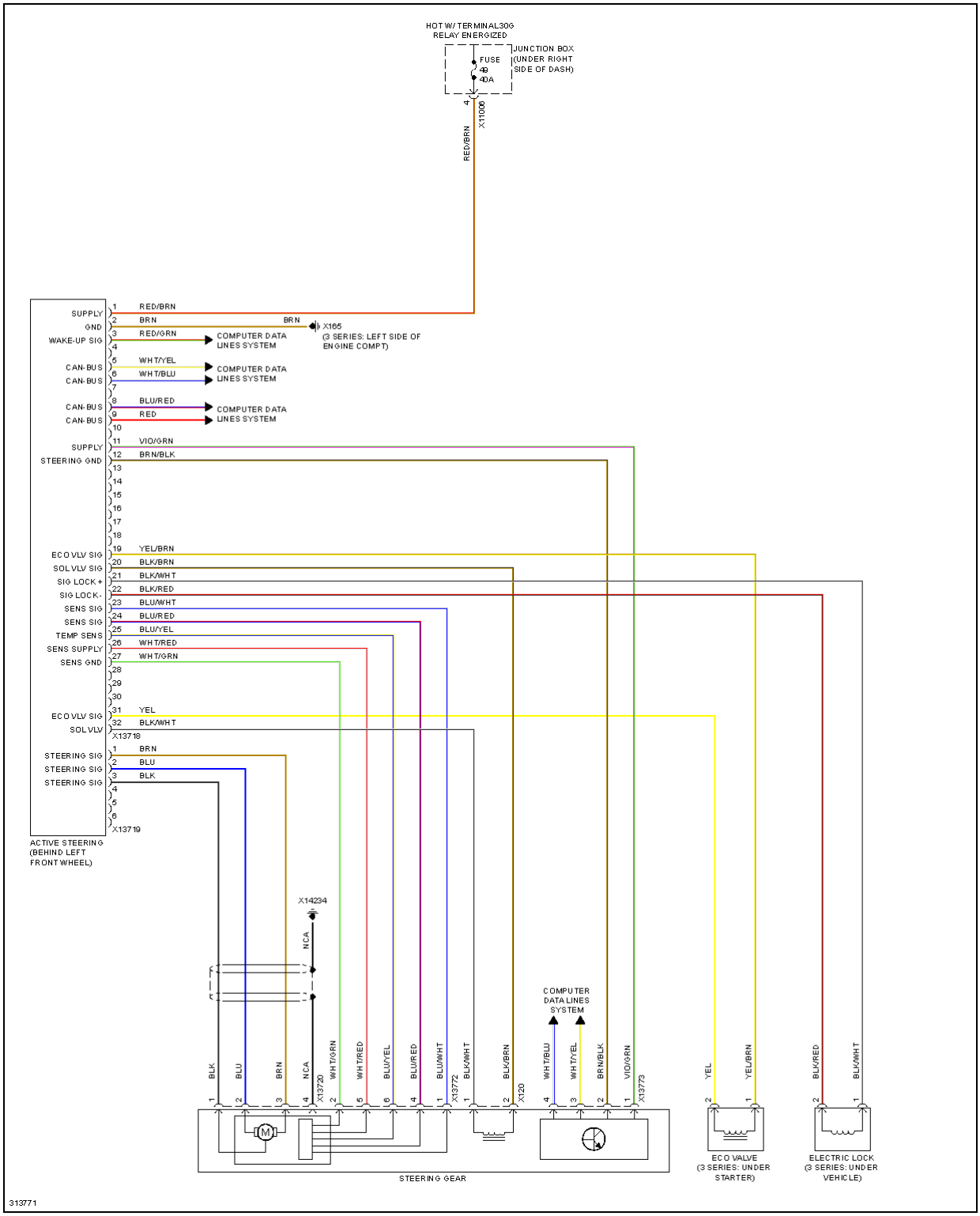

Fig. 18: Active Power Steering Circuit

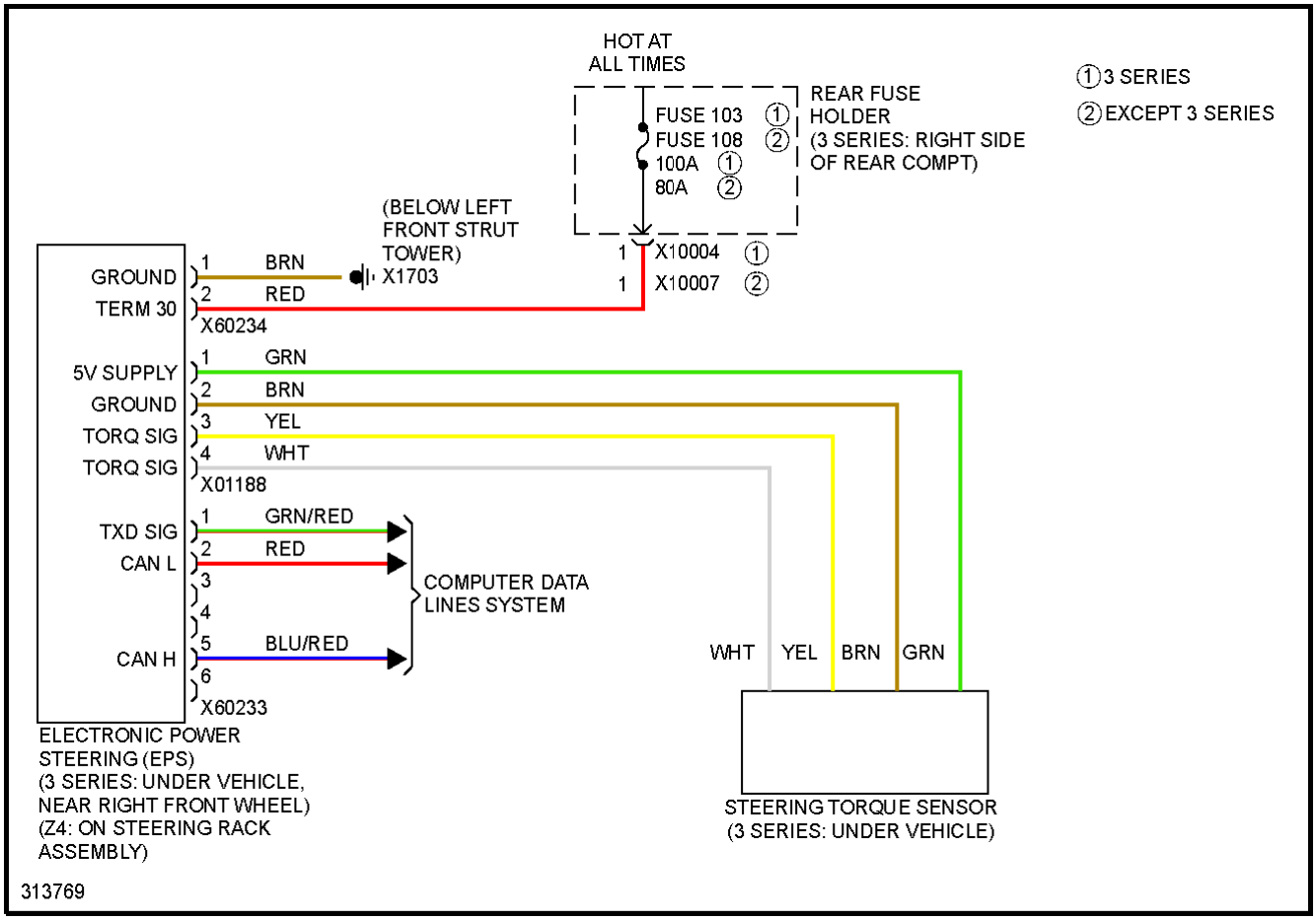

Fig. 19: Electronic Power Steering Circuit

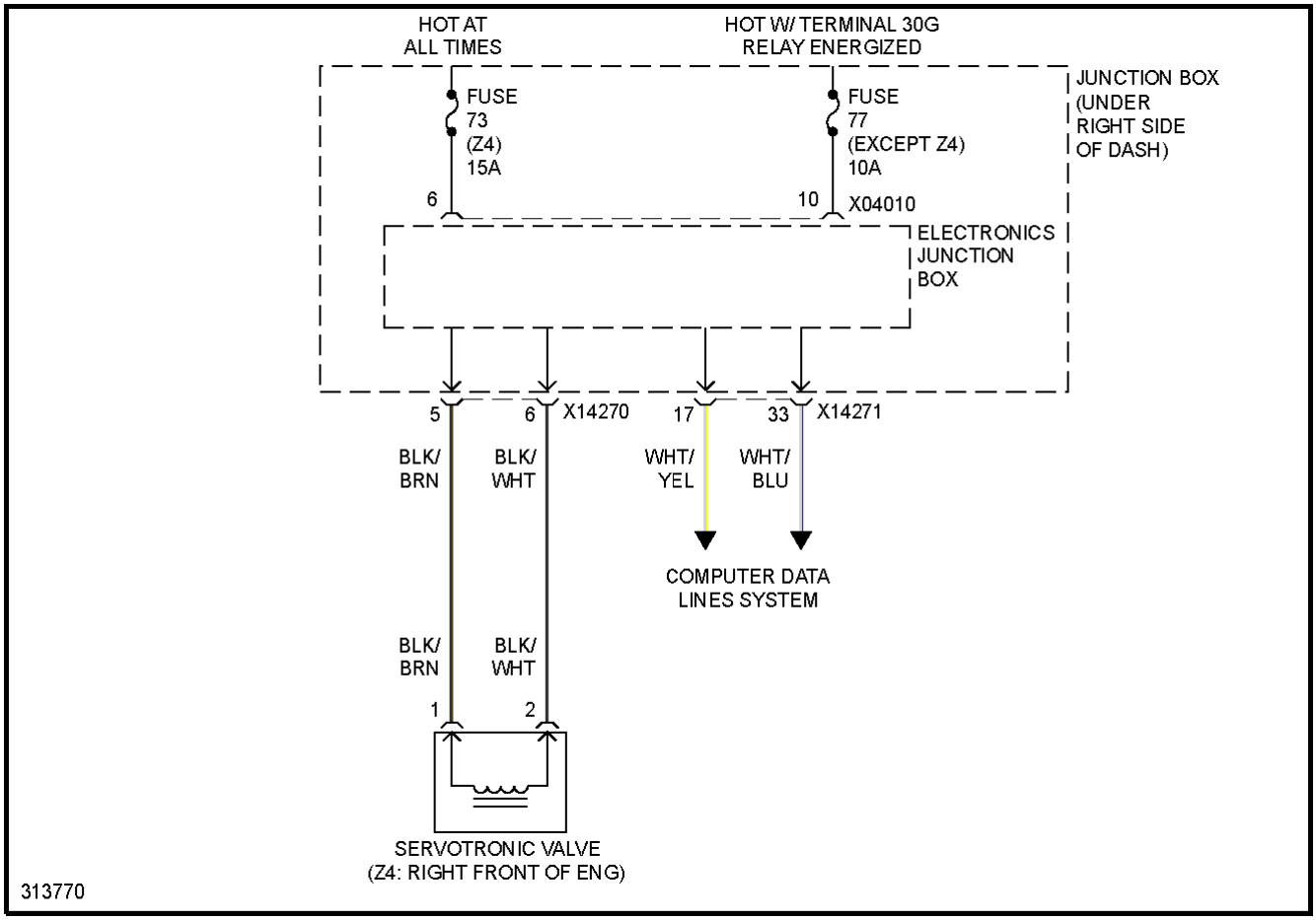

Fig. 20: Power Steering Circuit

ELECTRONIC SUSPENSION

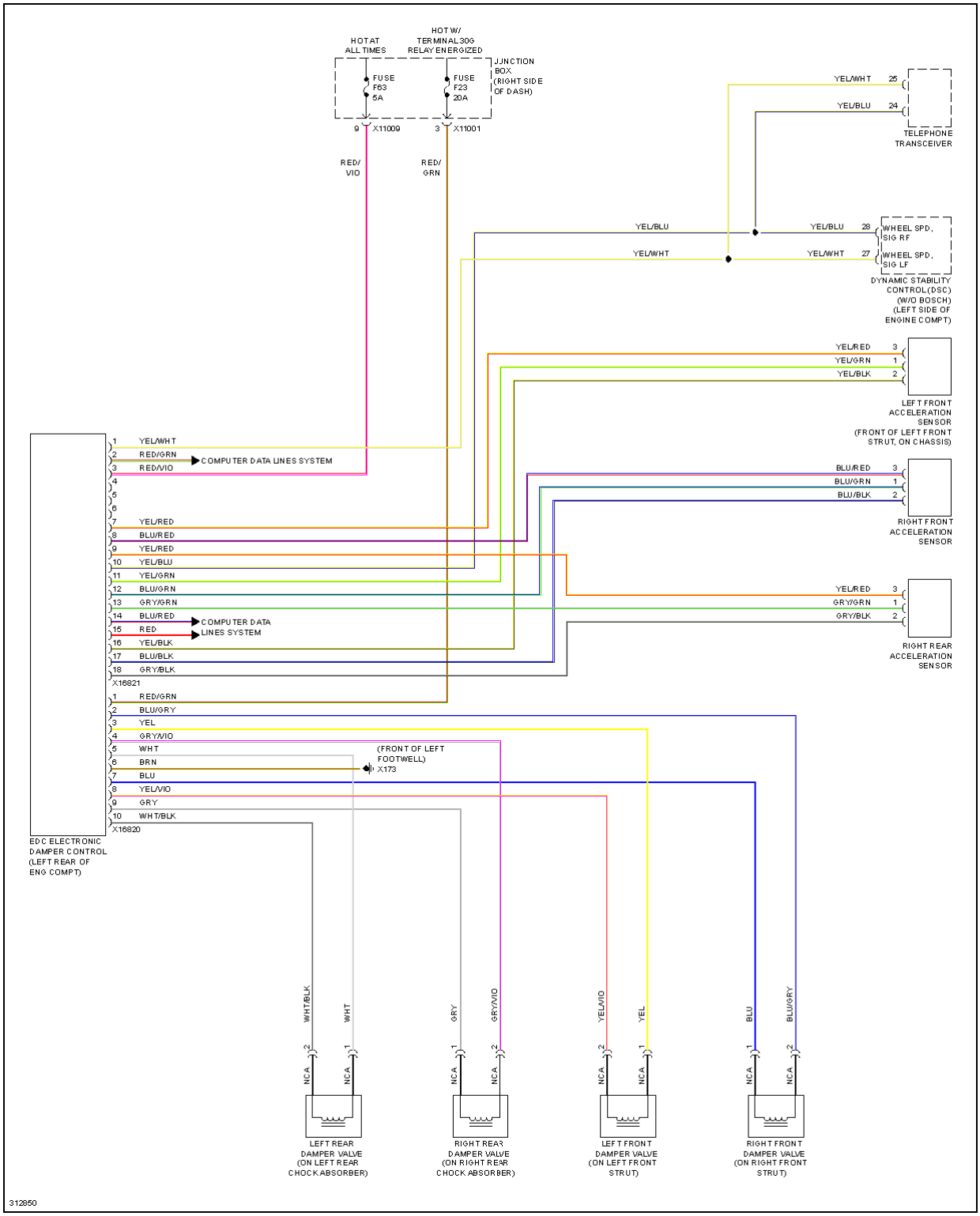

Fig. 21: Electronic Suspension Circuit

ENGINE PERFORMANCE

3.0L

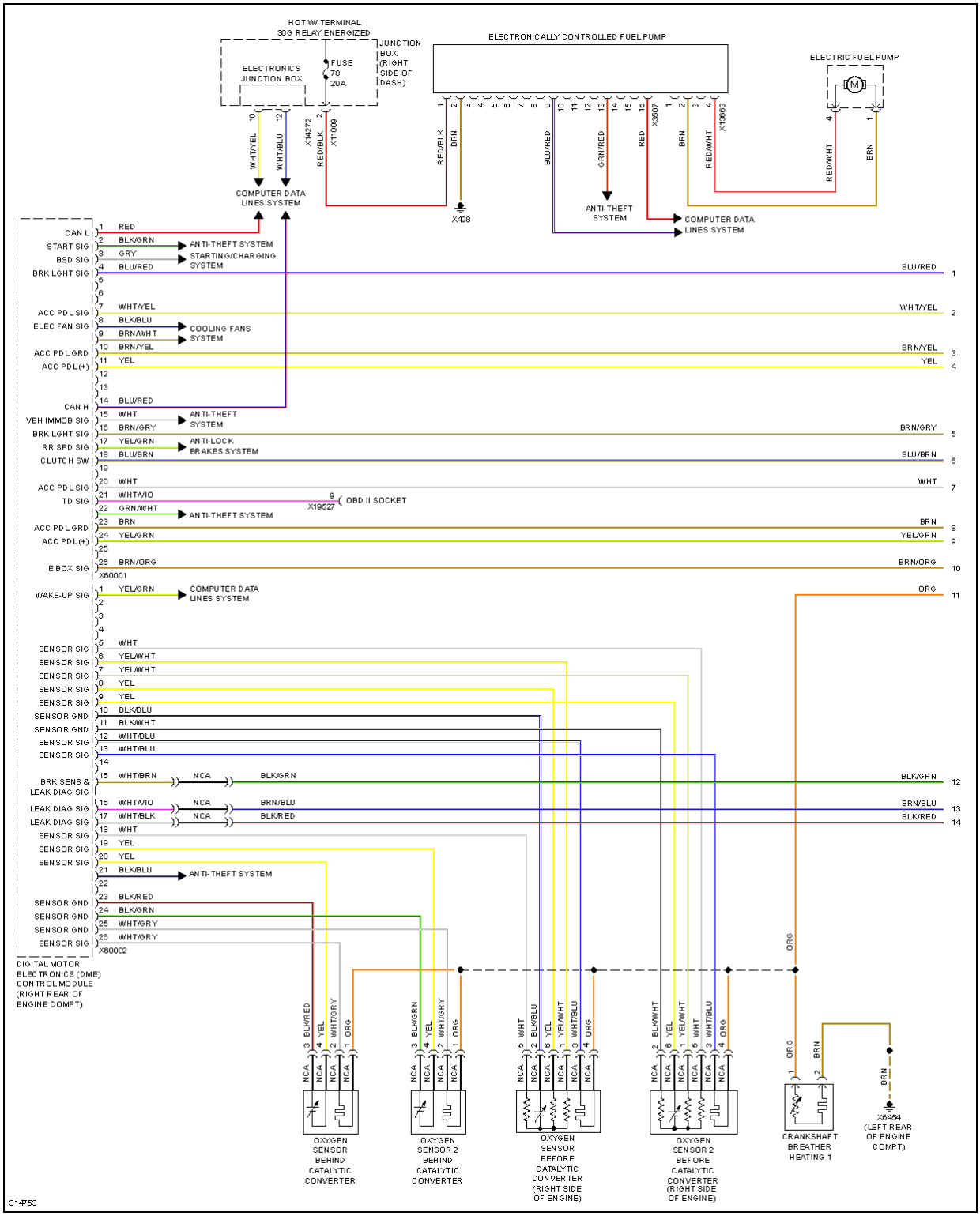

Fig. 22: 3.0L, Engine Performance Circuit (1 of 4)

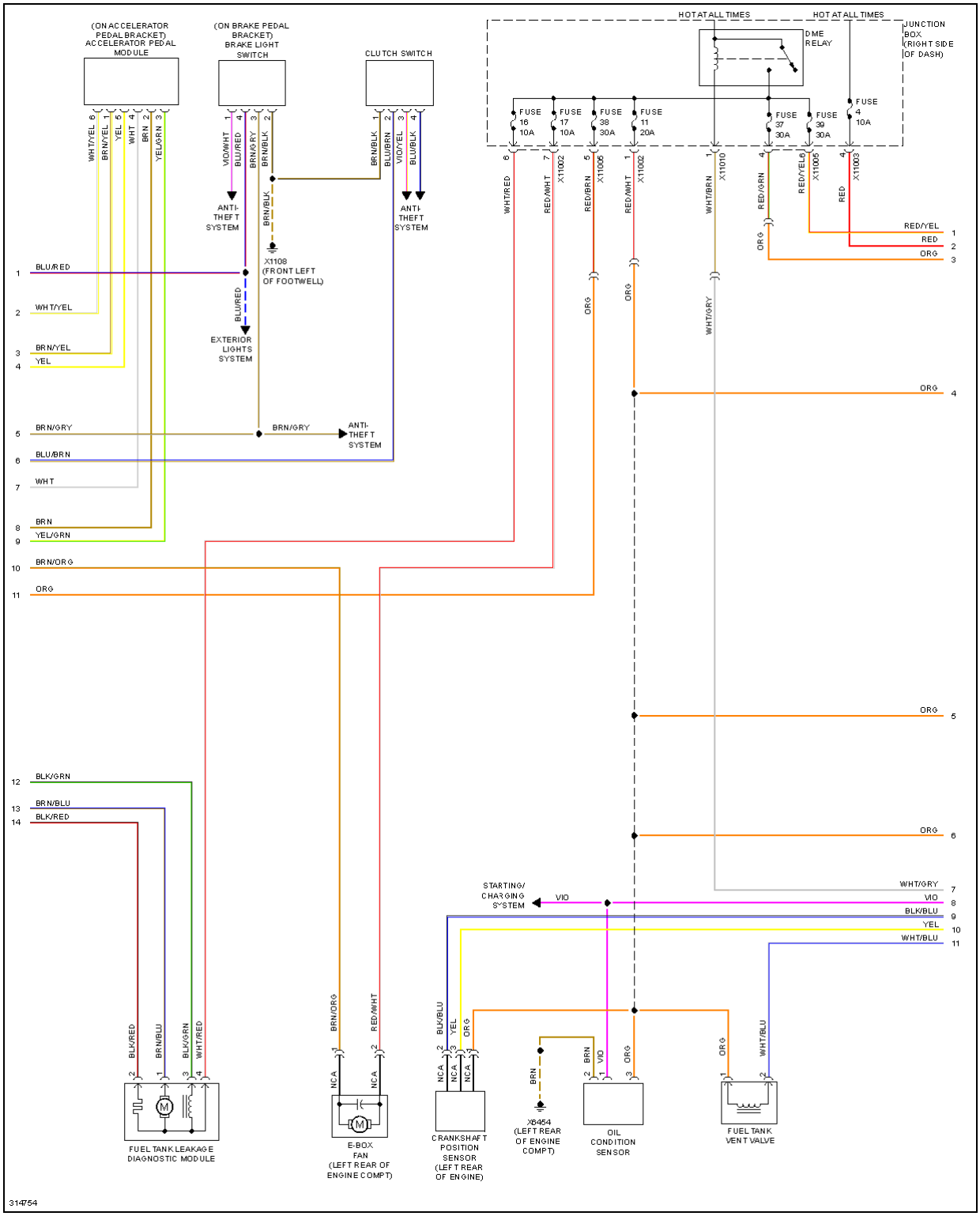

Fig. 23: 3.0L, Engine Performance Circuit (2 of 4)

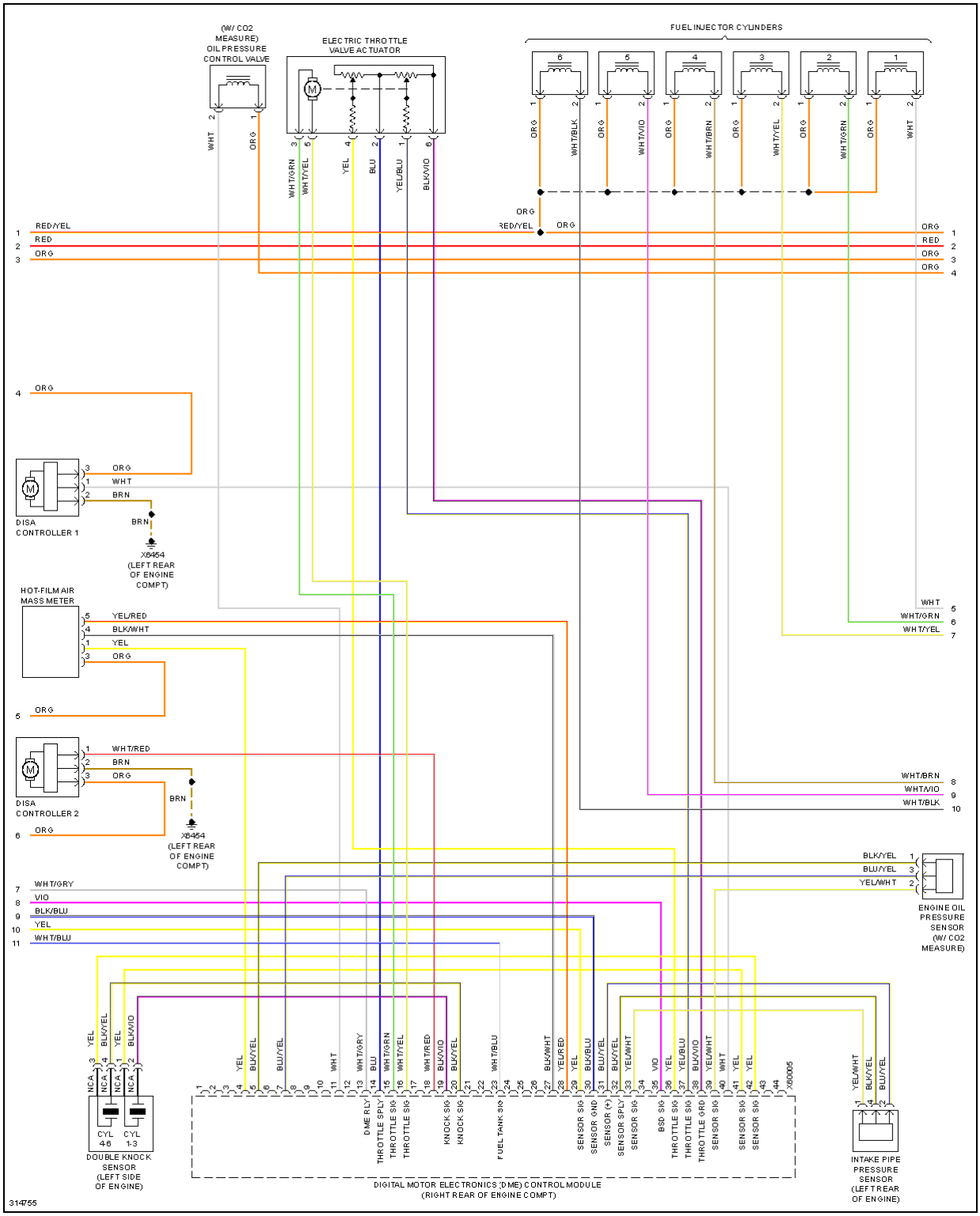

Fig. 24: 3.0L, Engine Performance Circuit (3 of 4)

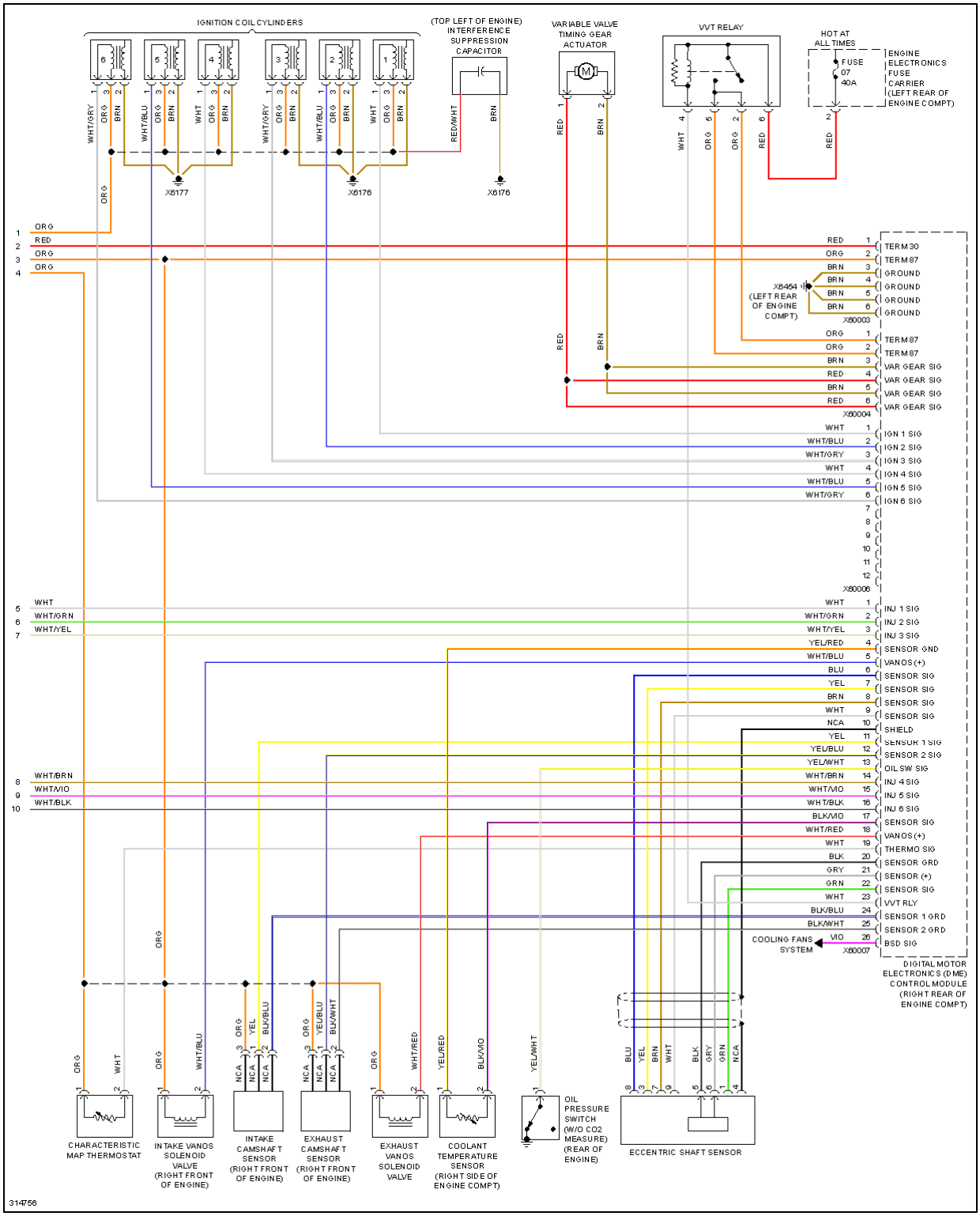

Fig. 25: 3.0L, Engine Performance Circuit (4 of 4)

3.0L TWIN TURBO

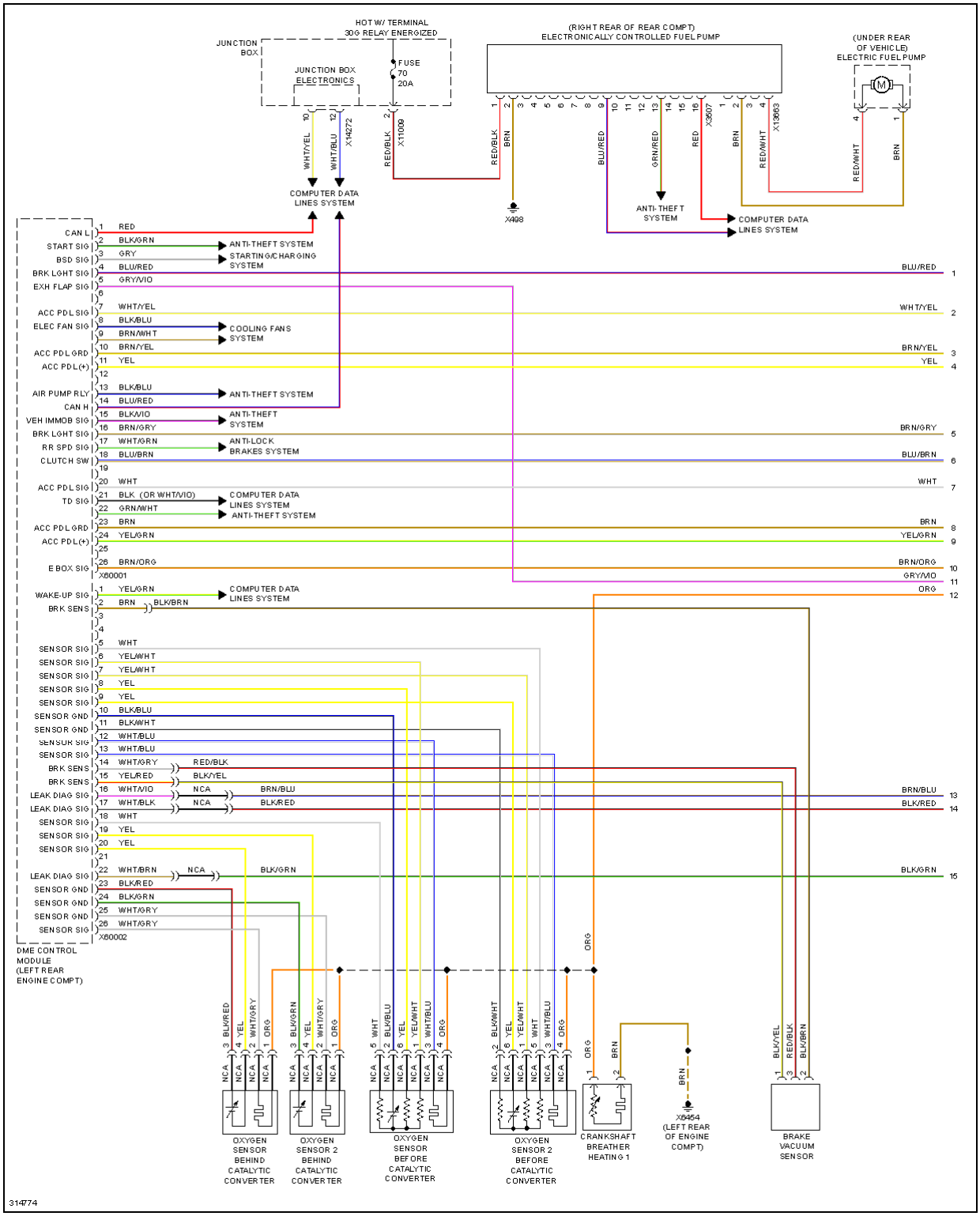

Fig. 26: 3.0L Twin Turbo, Engine Performance Circuit (1 of 4)

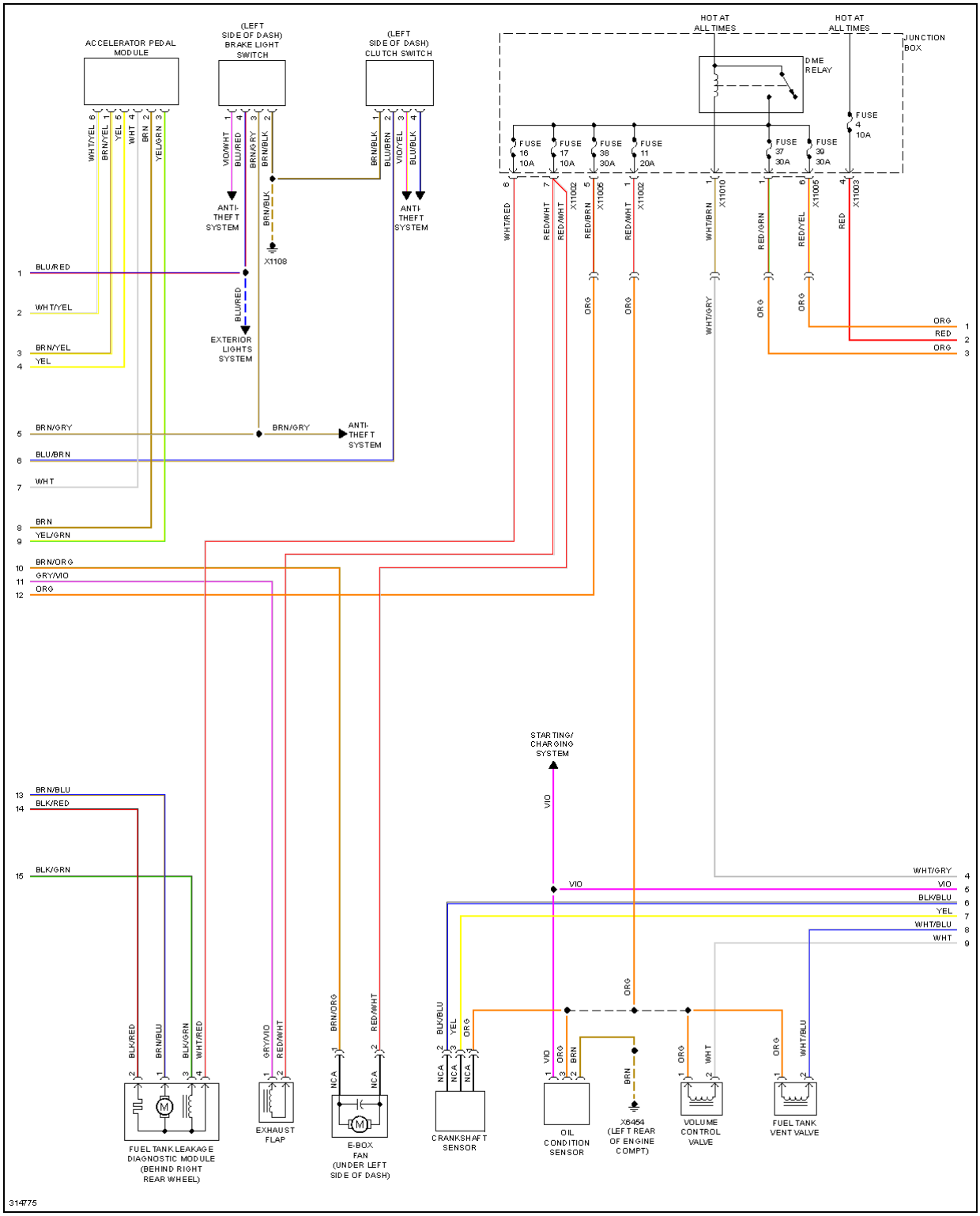

Fig. 27: 3.0L Twin Turbo, Engine Performance Circuit (2 of 4)

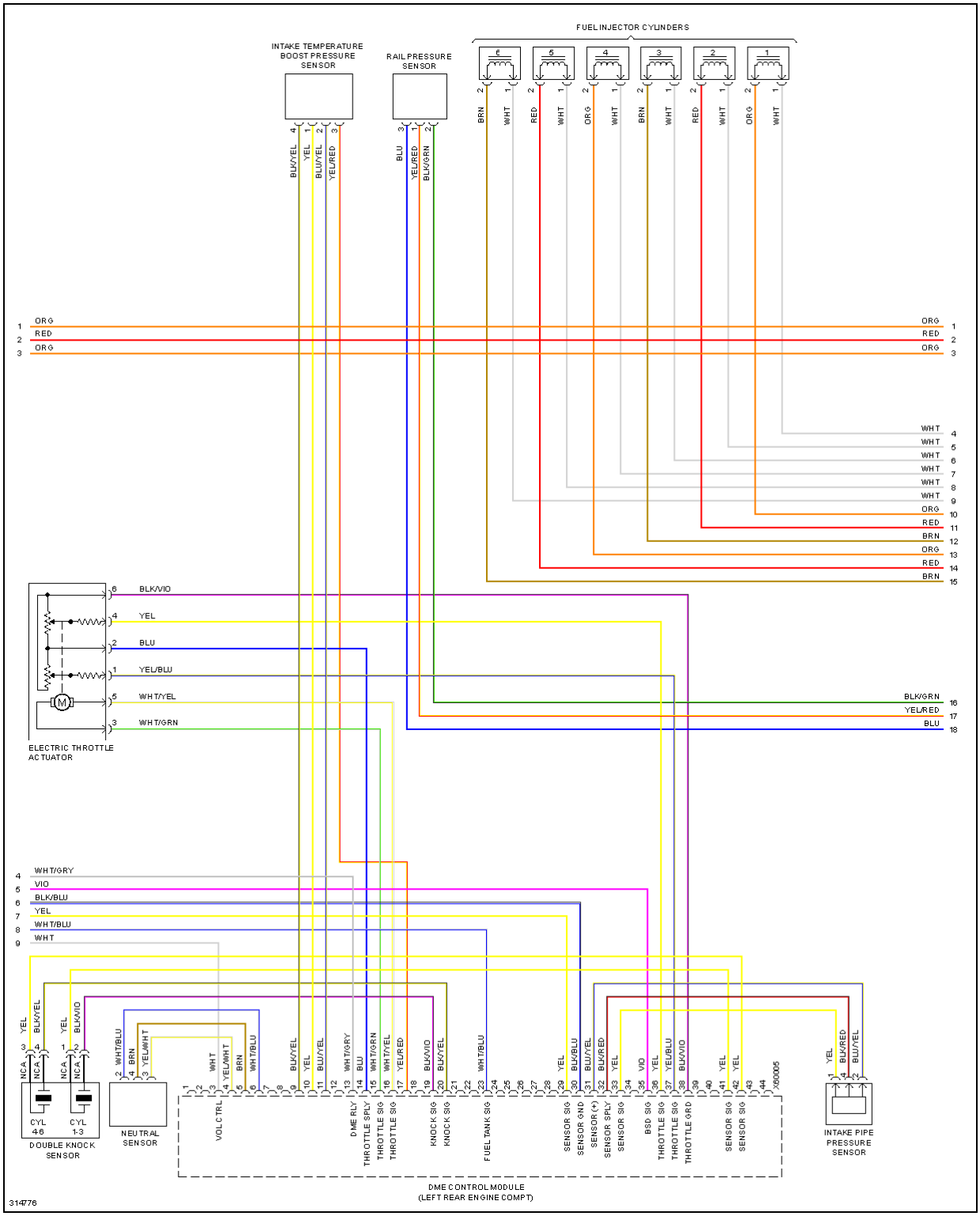

Fig. 28: 3.0L Twin Turbo, Engine Performance Circuit (3 of 4)

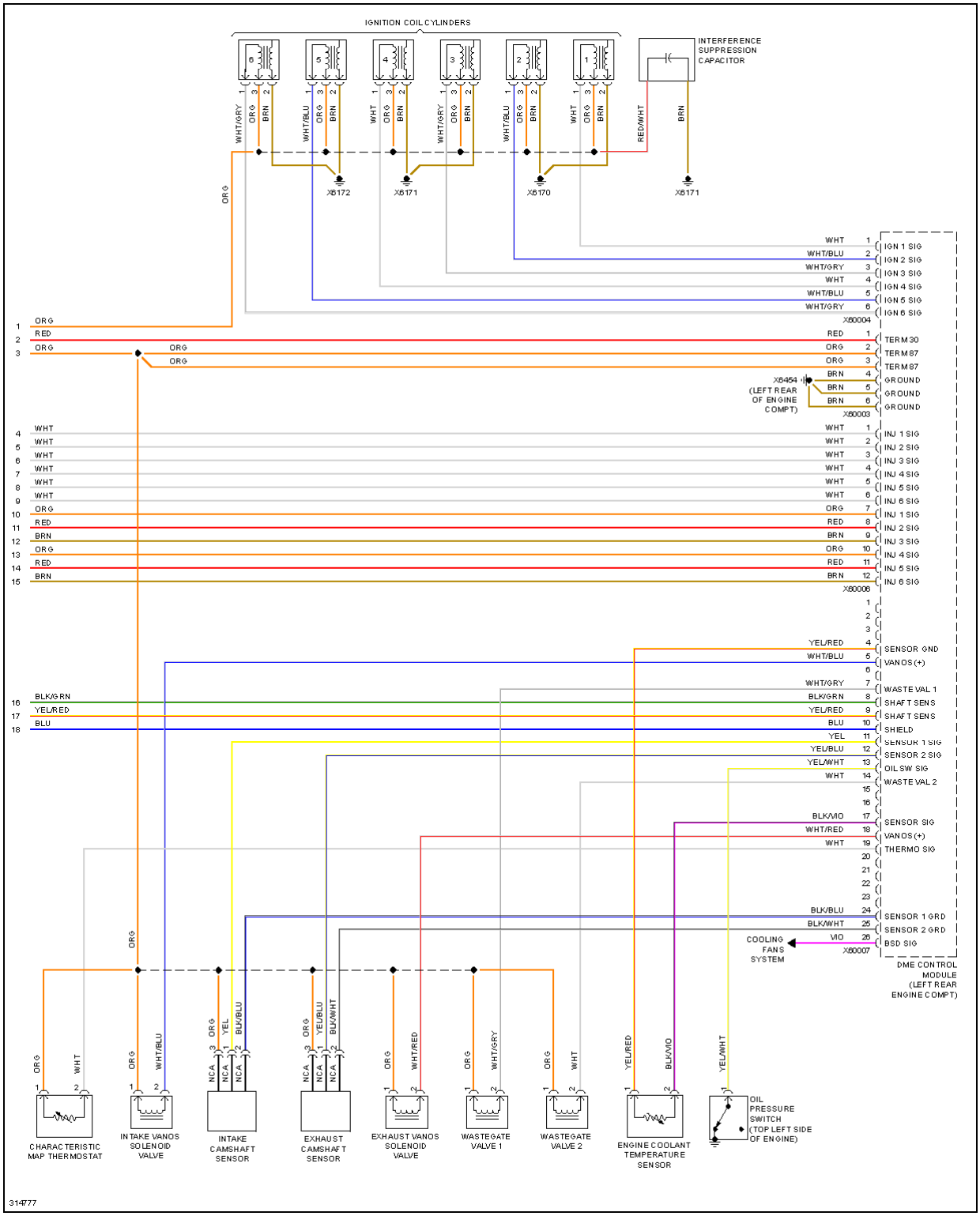

Fig. 29: 3.0L Twin Turbo, Engine Performance Circuit (4 of 4)

EXTERIOR LIGHTS

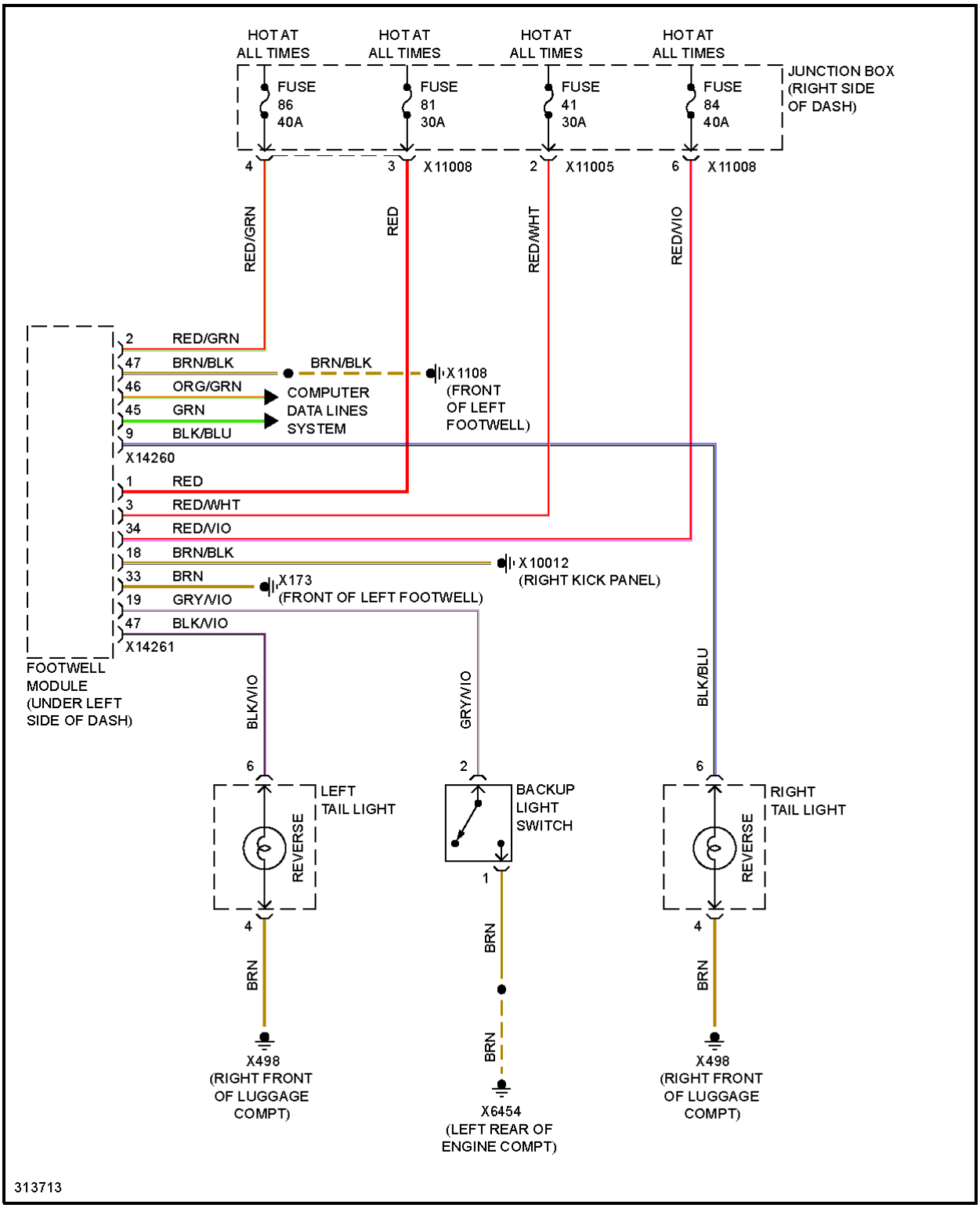

Fig. 30: Back-up Lamps Circuit

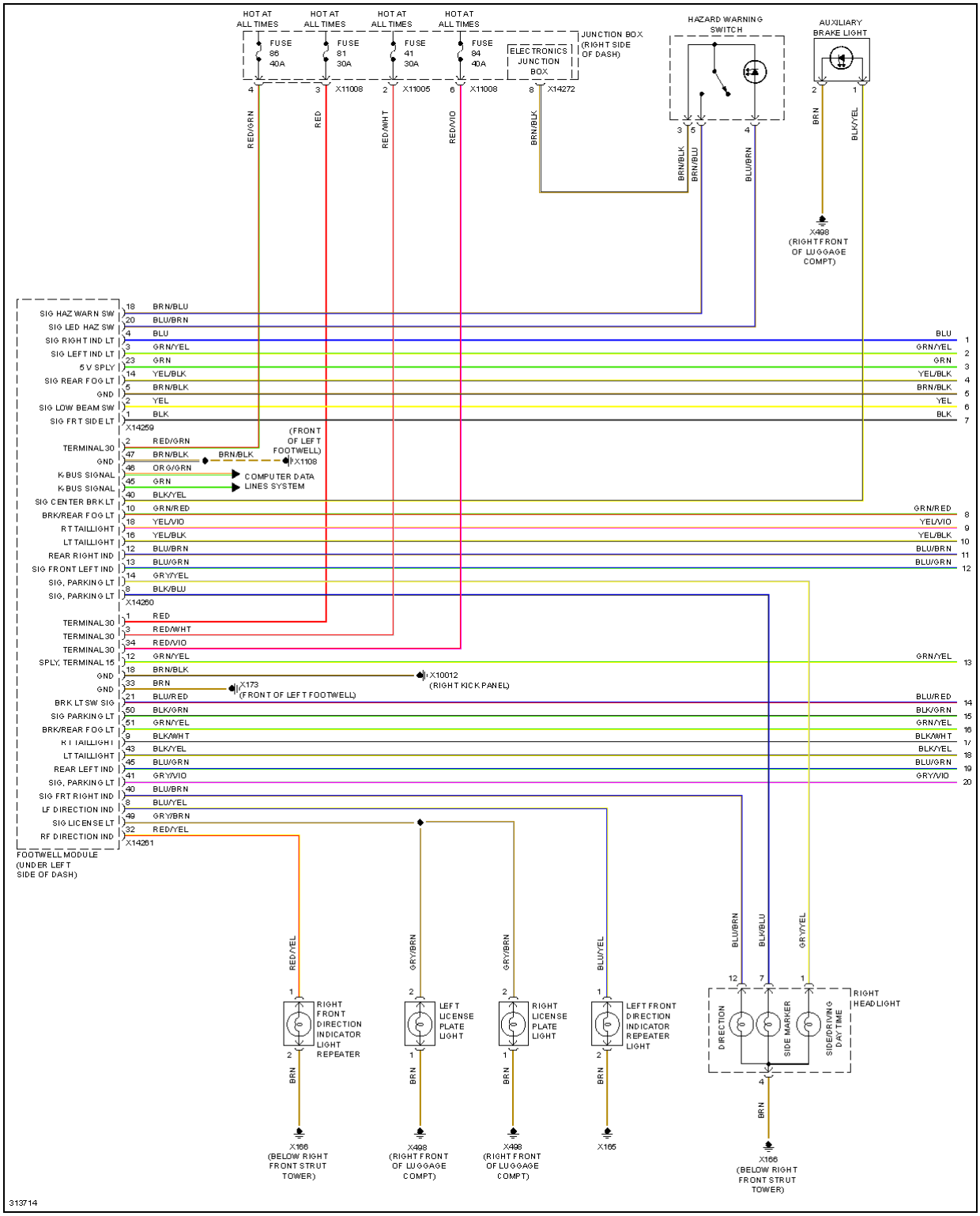

Fig. 31: Exterior Lamps Circuit (1 of 2)

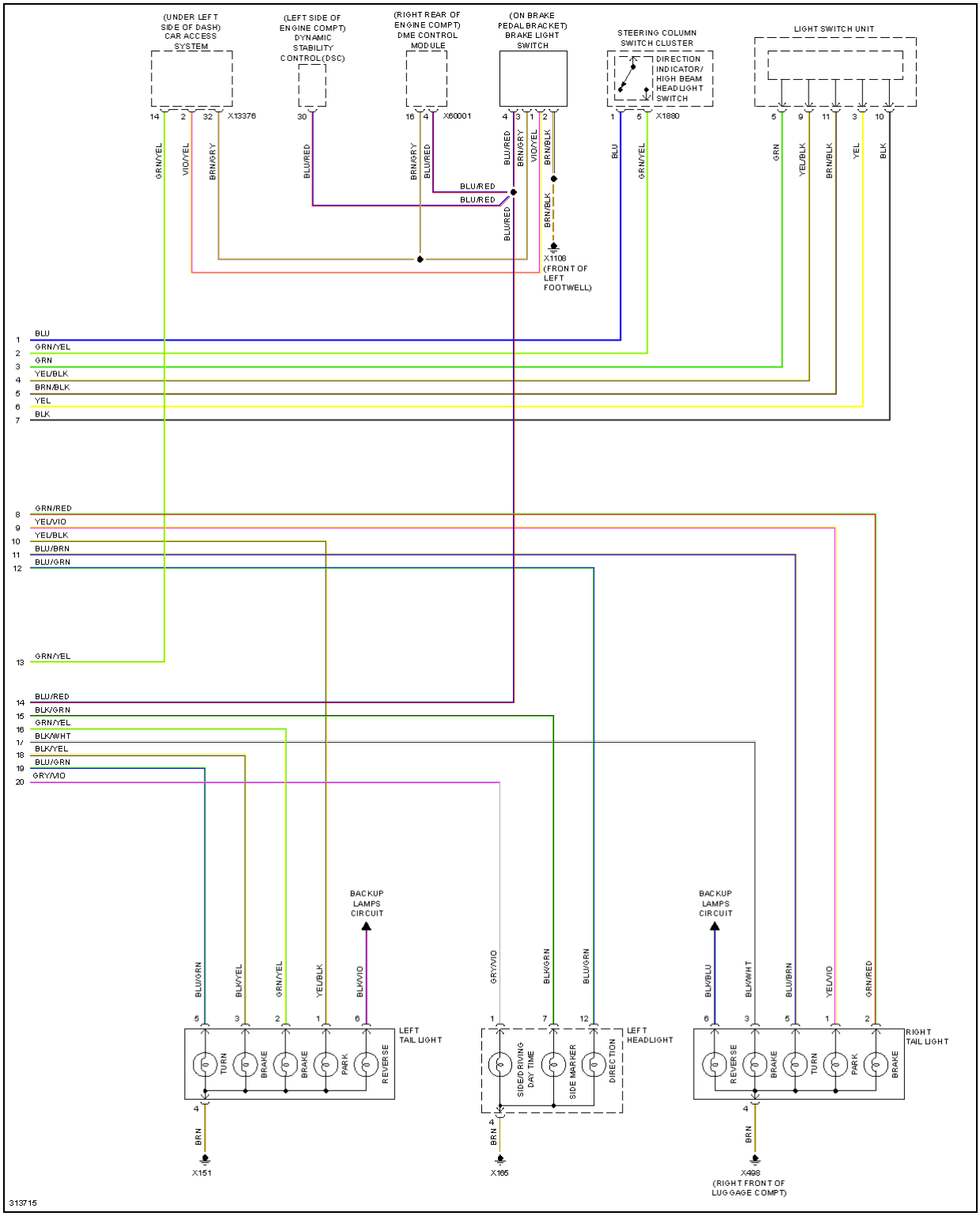

Fig. 32: Exterior Lamps Circuit (2 of 2)

GROUND DISTRIBUTION

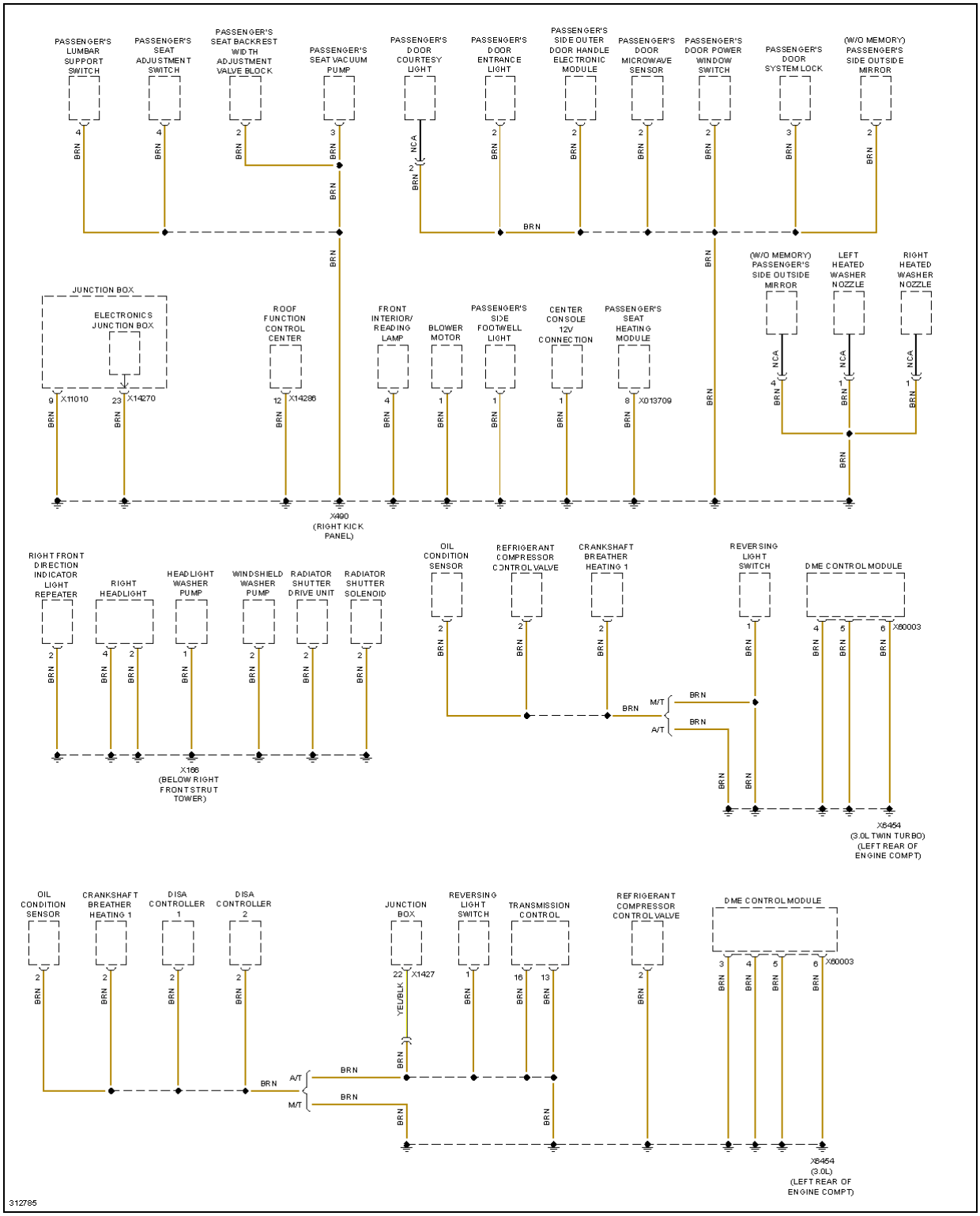

Fig. 33: Ground Distribution Circuit (1 of 3)

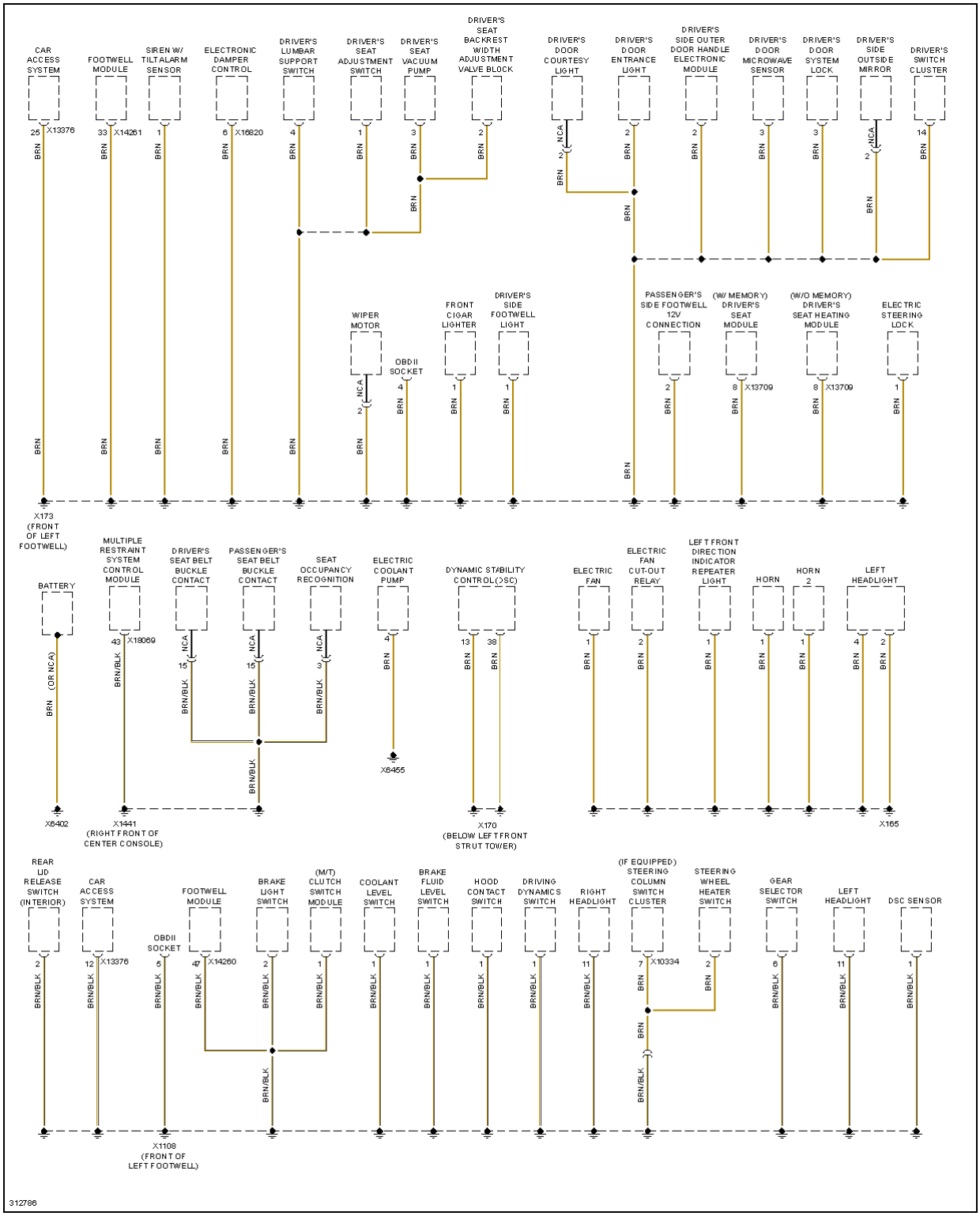

Fig. 34: Ground Distribution Circuit (2 of 3)

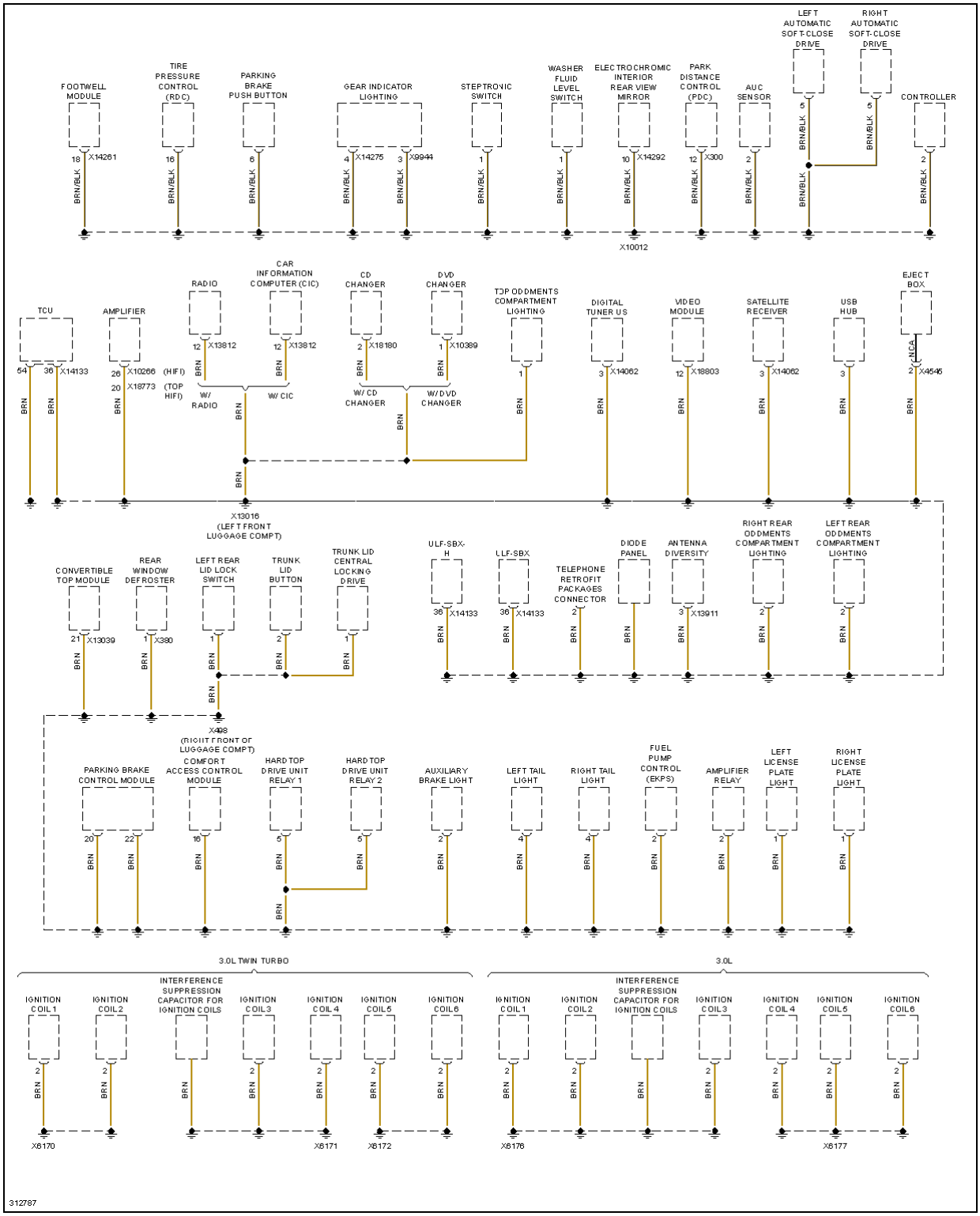

Fig. 35: Ground Distribution Circuit (3 of 3)

HEADLIGHTS

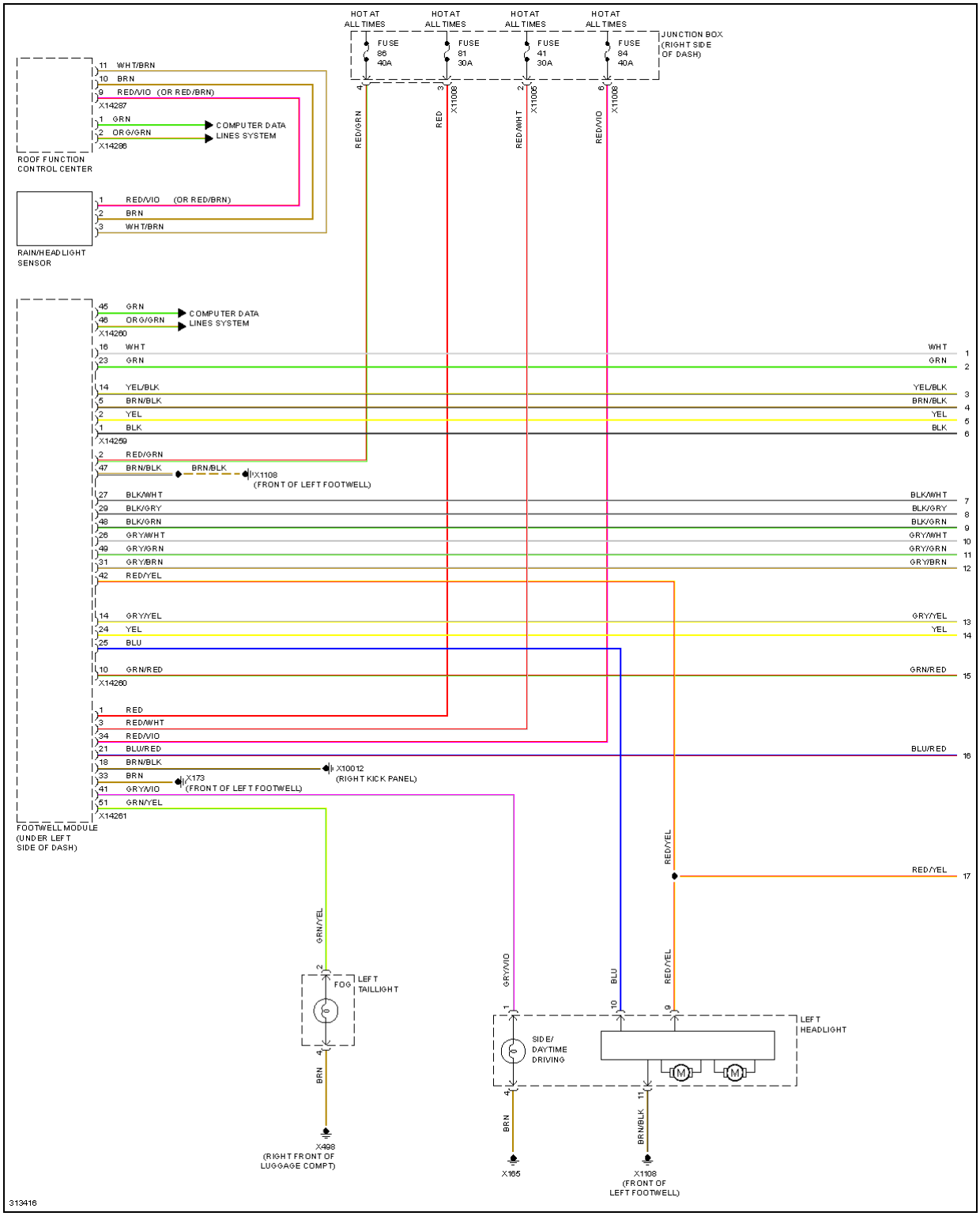

Fig. 36: Adaptive Front Lighting Circuit (1 of 2)

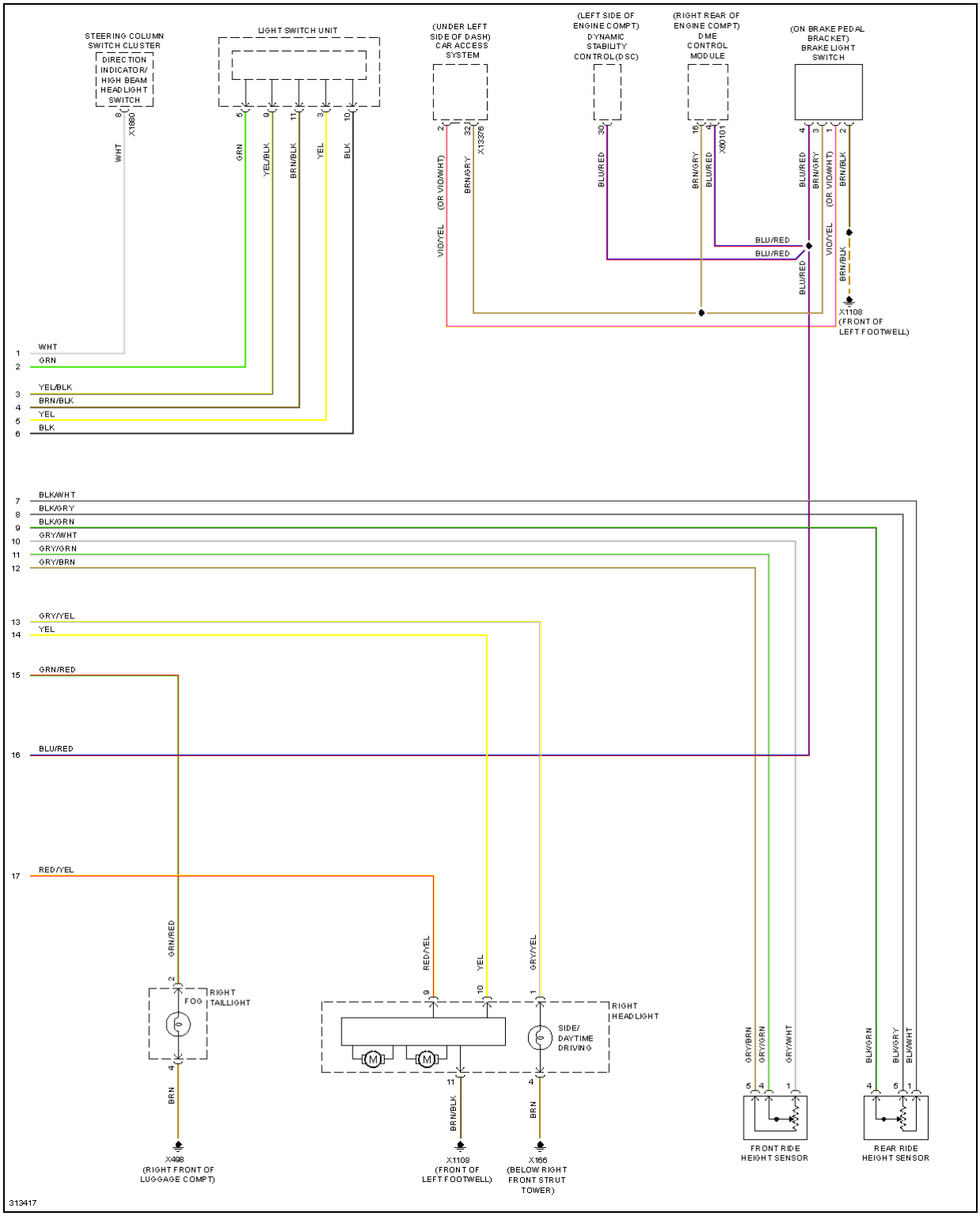

Fig. 37: Adaptive Front Lighting Circuit (2 of 2)

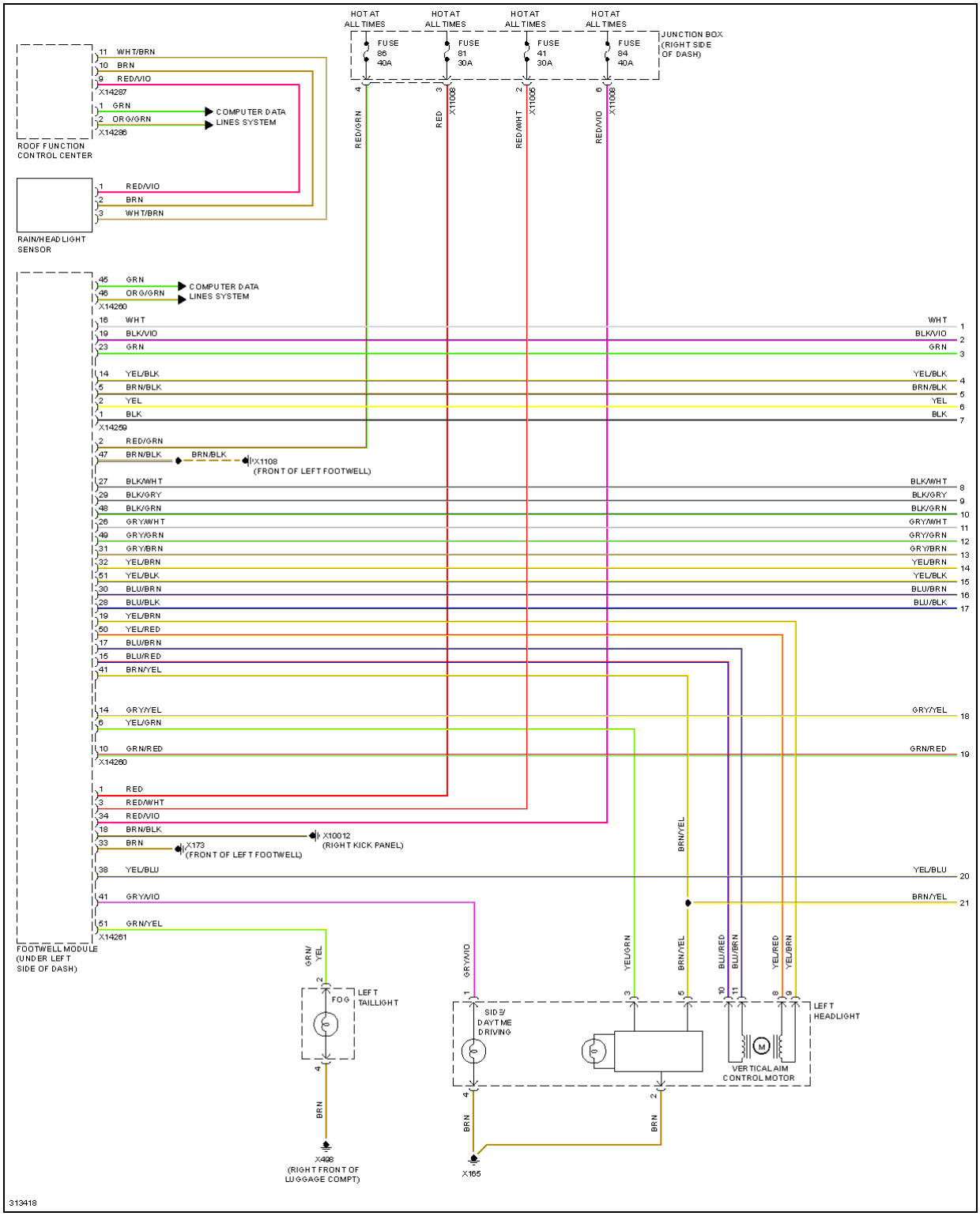

Fig. 38: Headlamps Circuit (1 of 2)

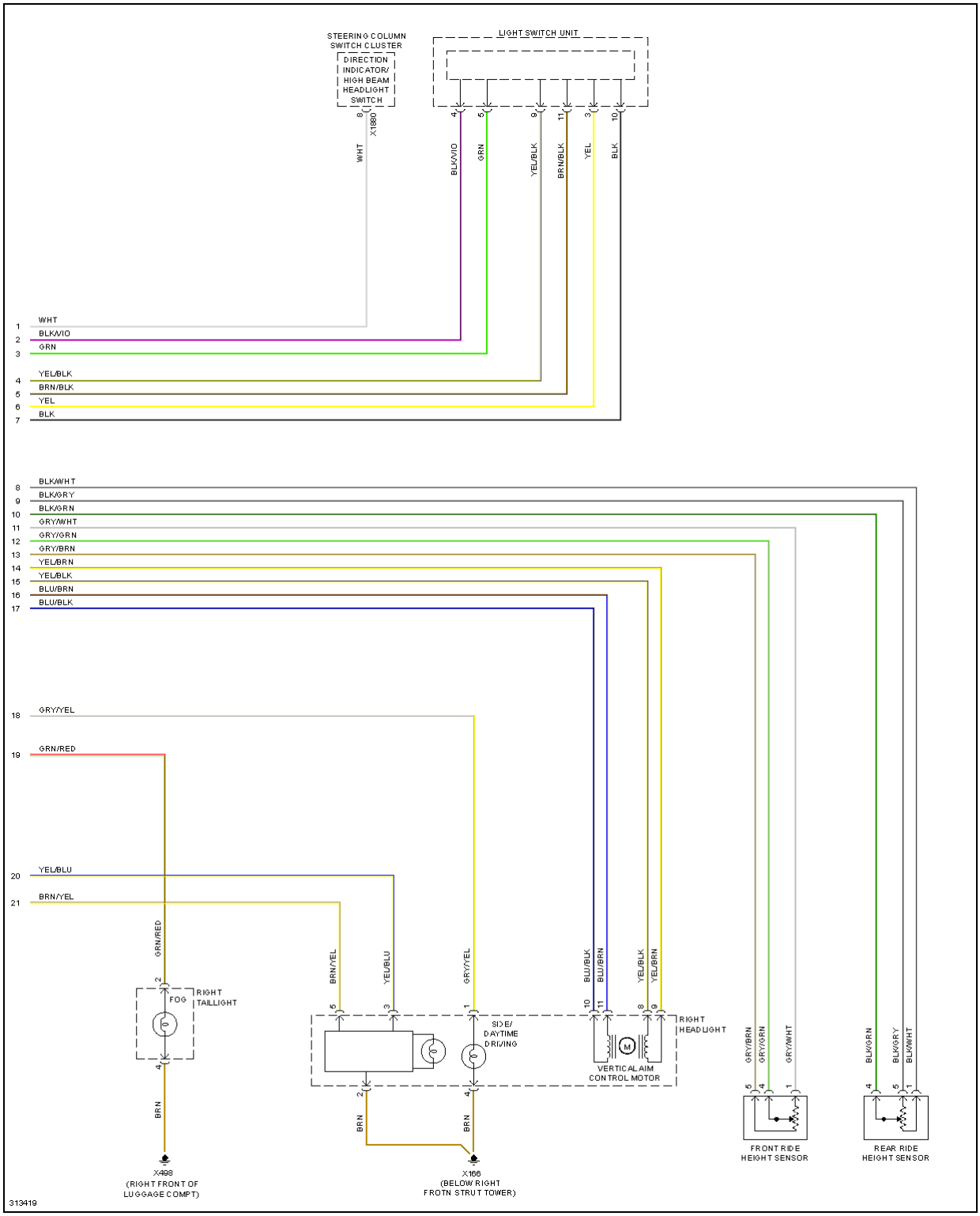

Fig. 39: Headlamps Circuit (2 of 2)

HORN

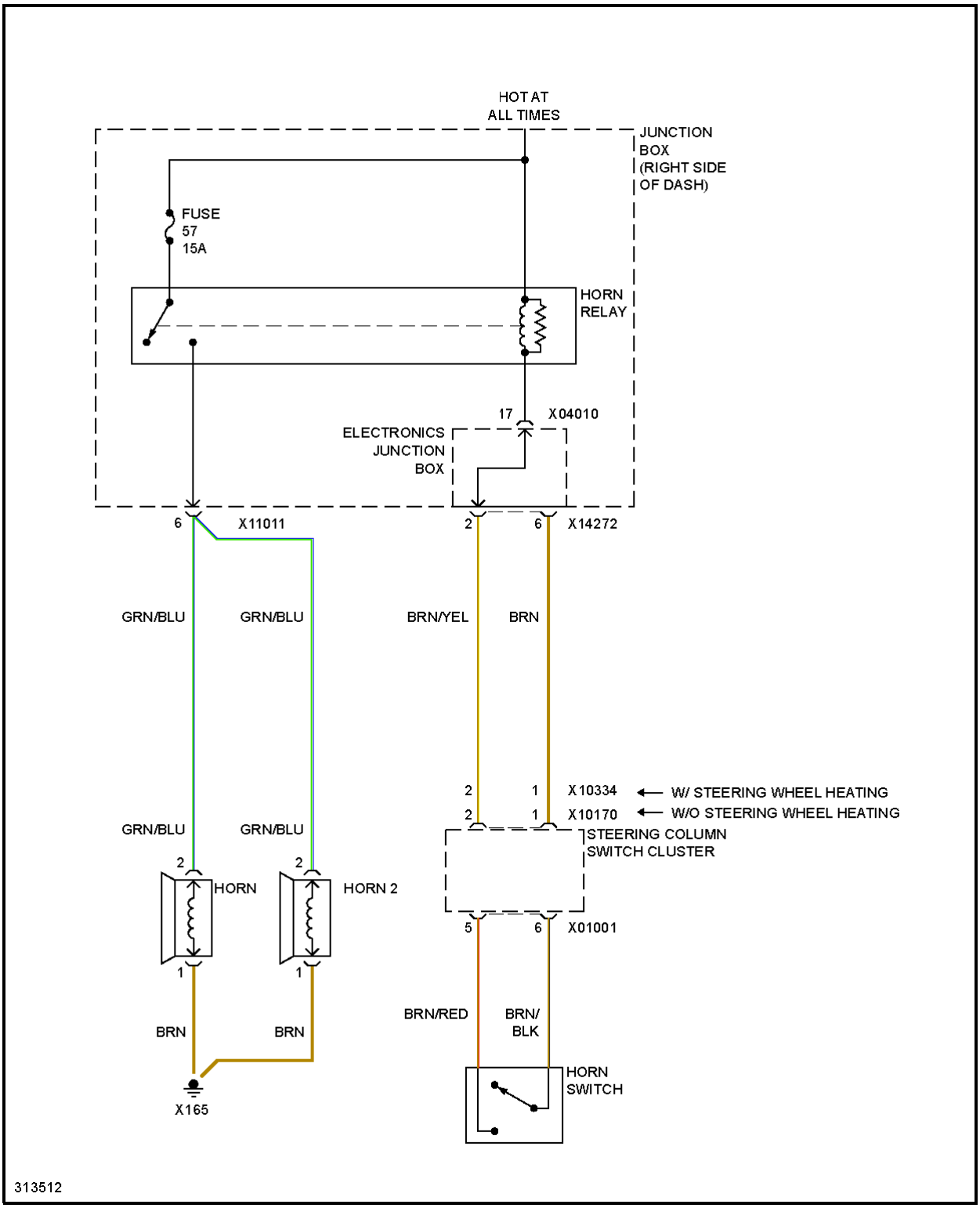

Fig. 40: Horn Circuit

INSTRUMENT CLUSTER

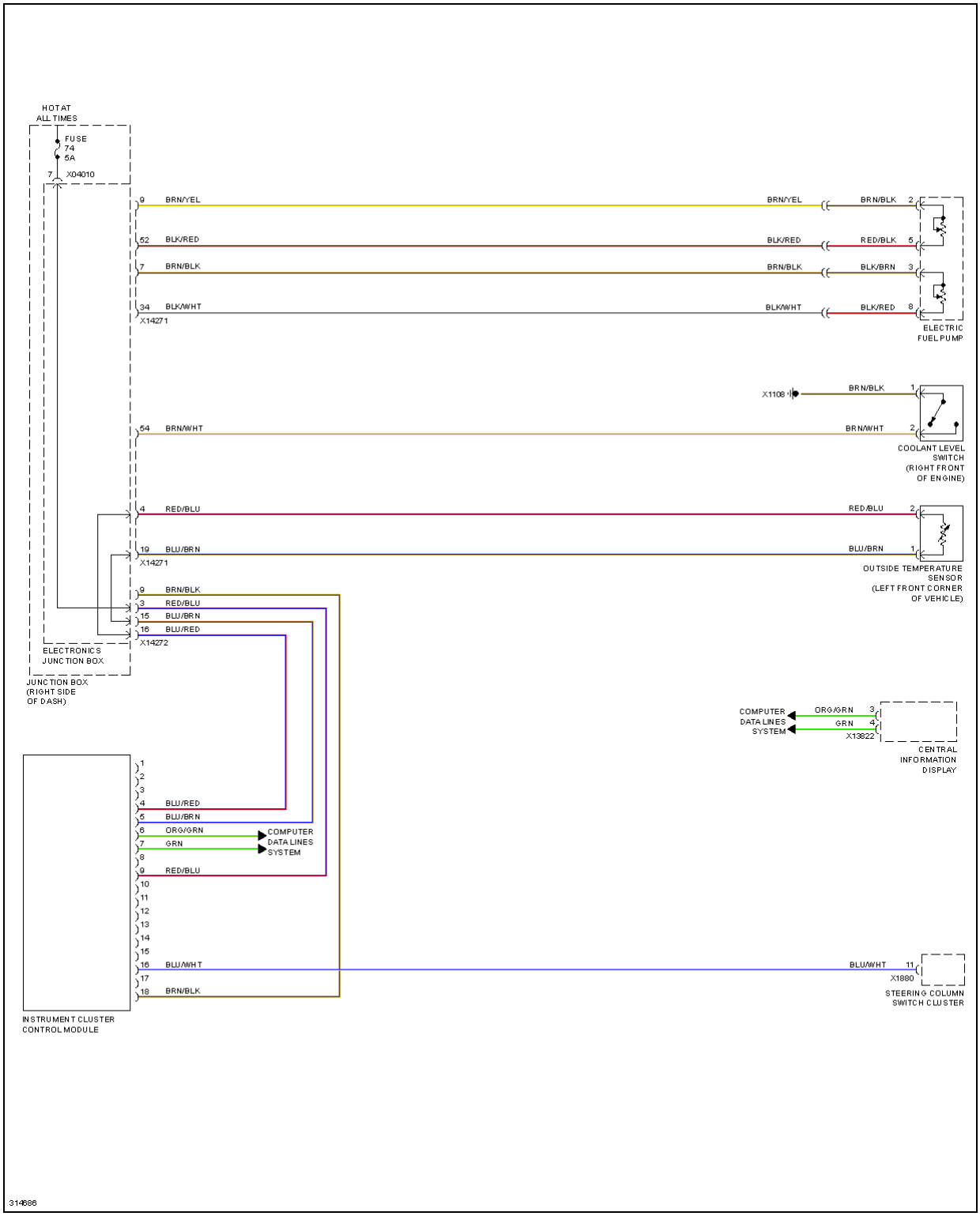

Fig. 41: Instrument Cluster Circuit

INTERIOR LIGHTS

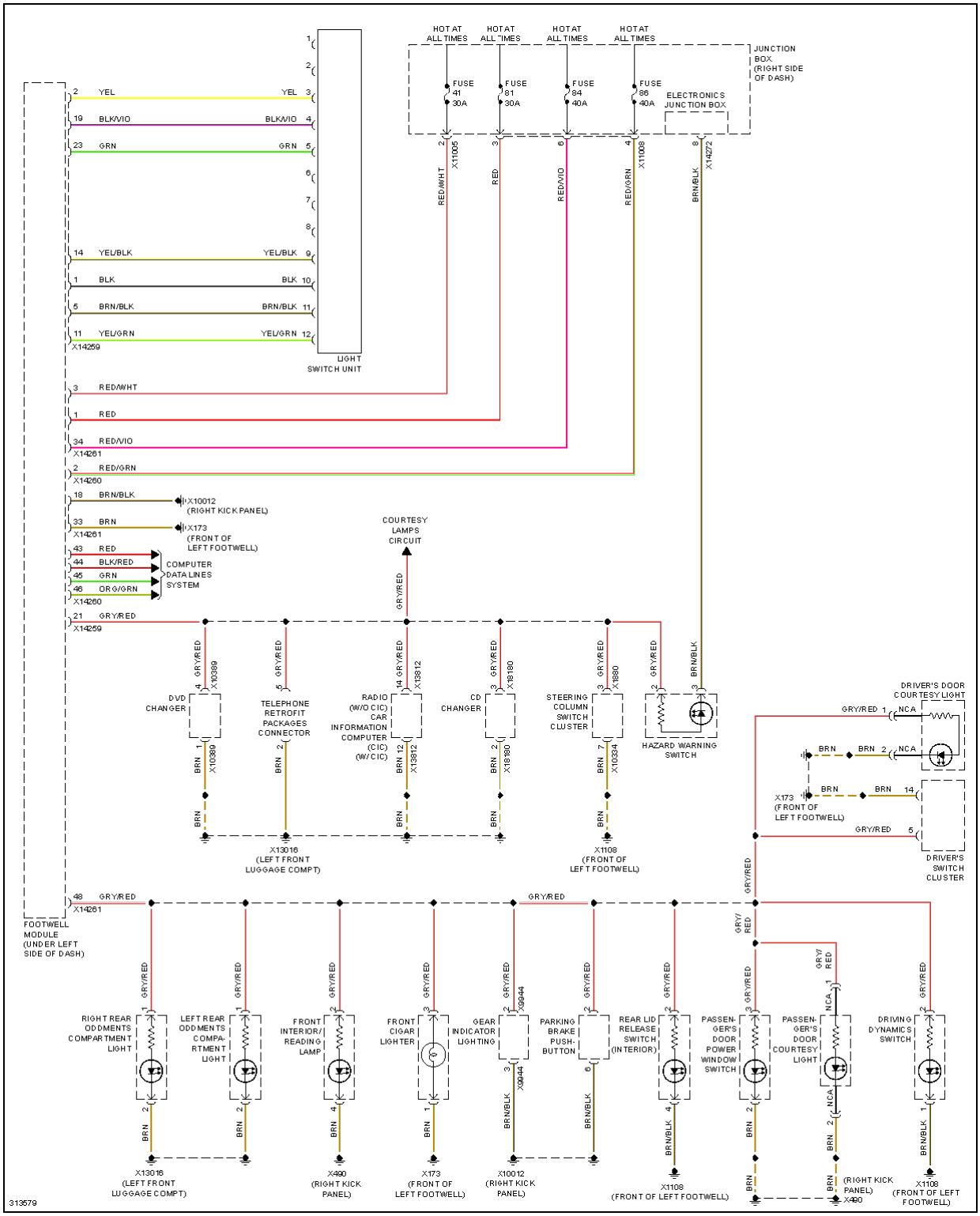

Fig. 42: Courtesy Lamps Circuit

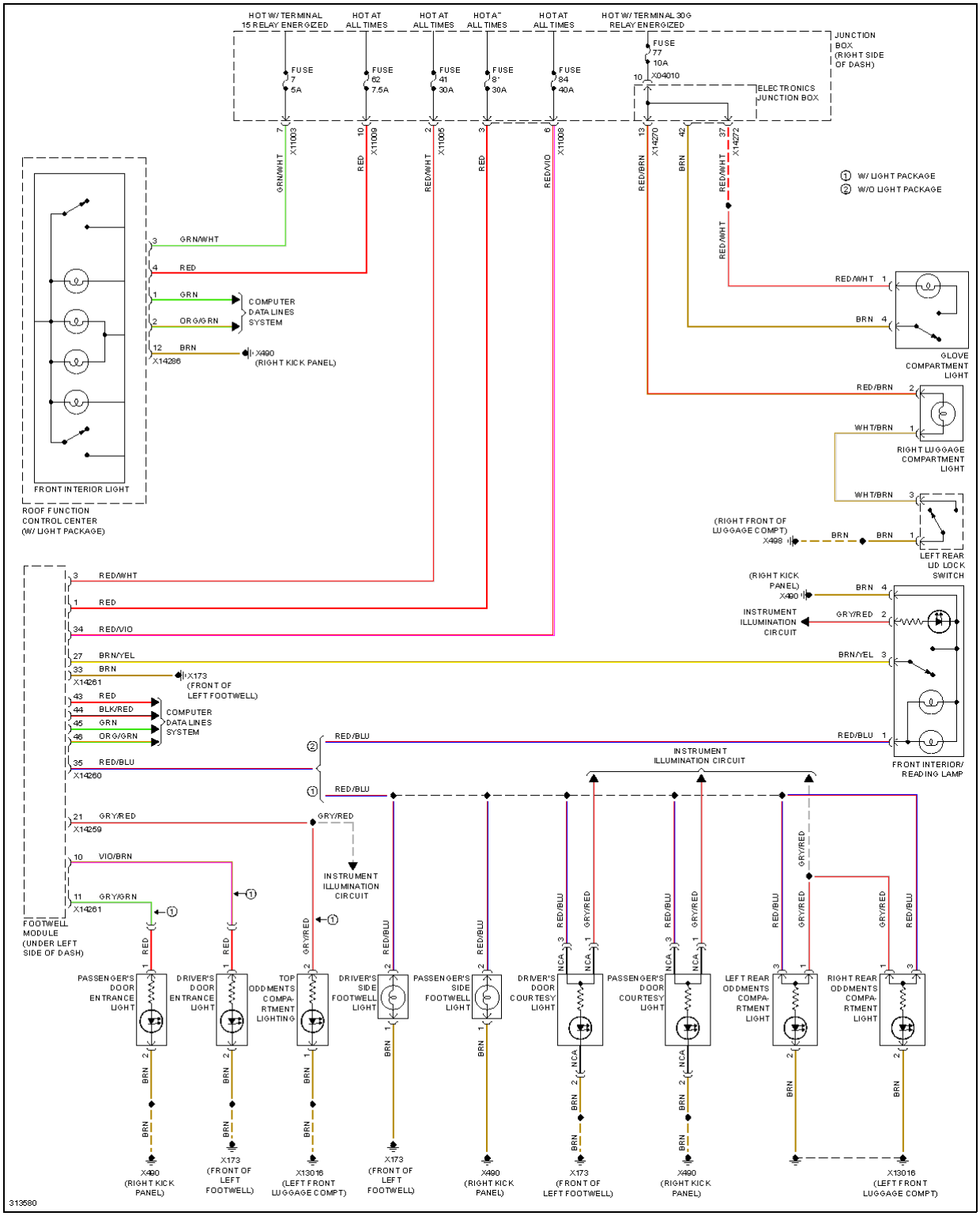

Fig. 43: Instrument Illumination Circuit

MEMORY SYSTEMS

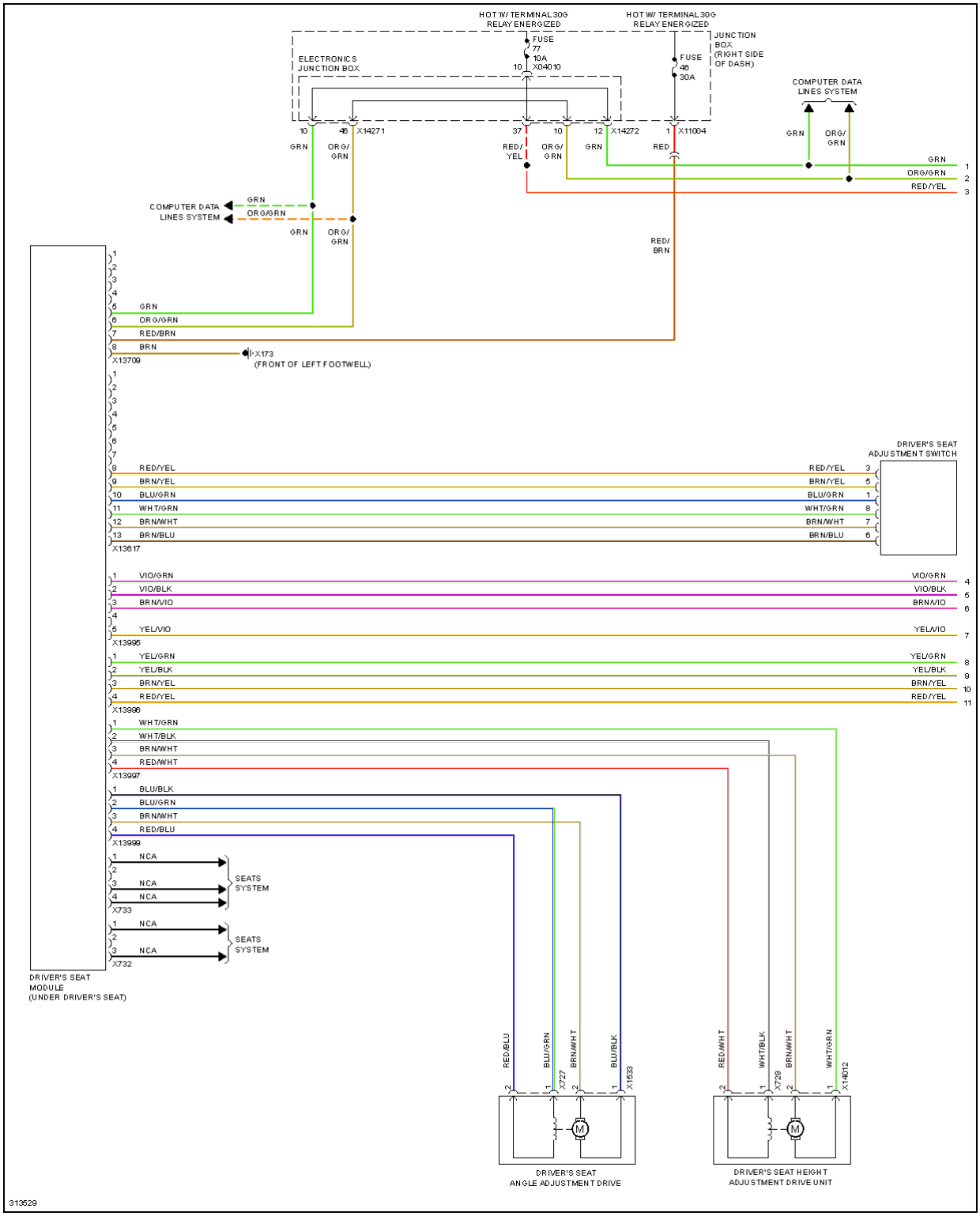

Fig. 44: Memory Systems Circuit (1 of 2)

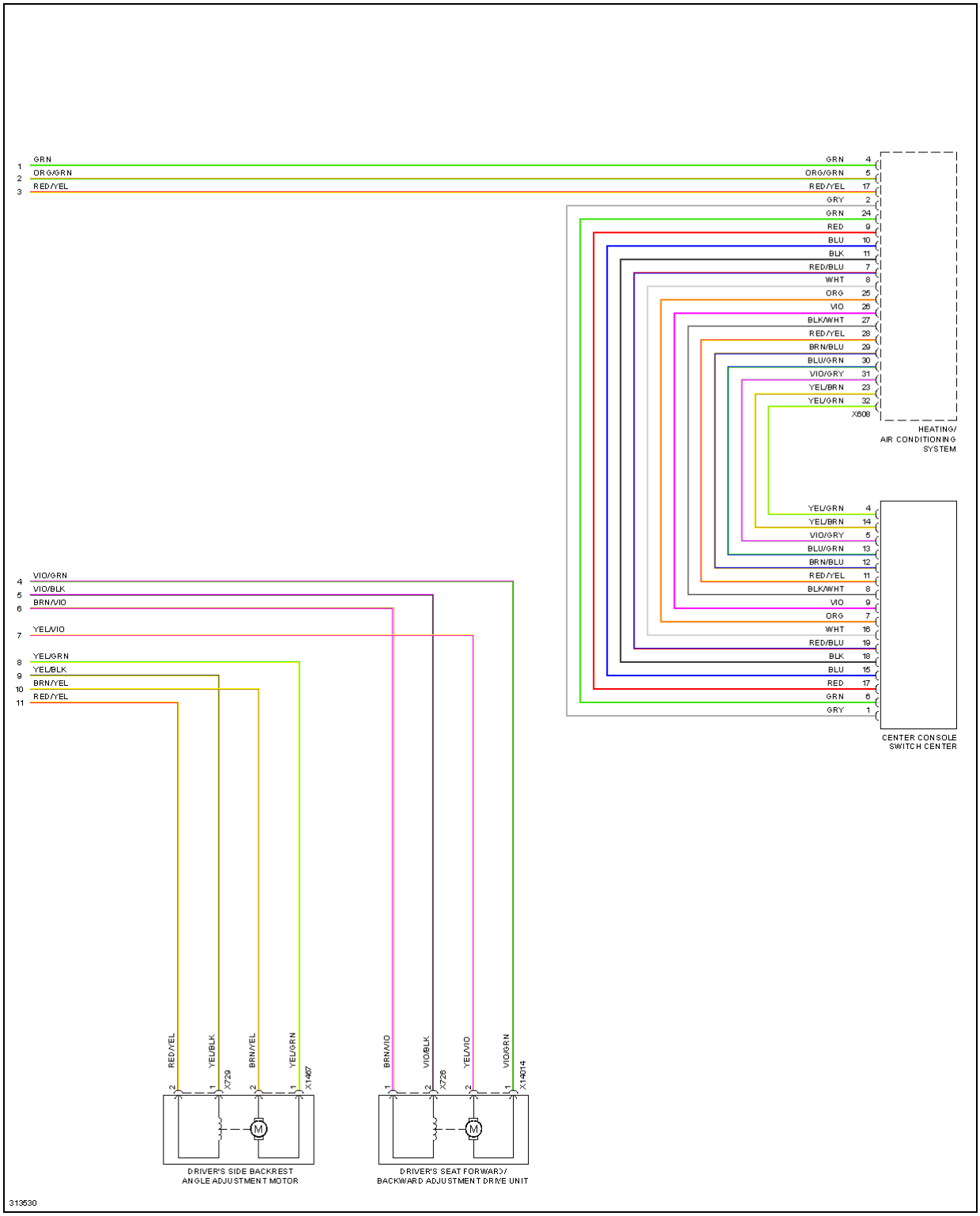

Fig. 45: Memory Systems Circuit (2 of 2)

NAVIGATION

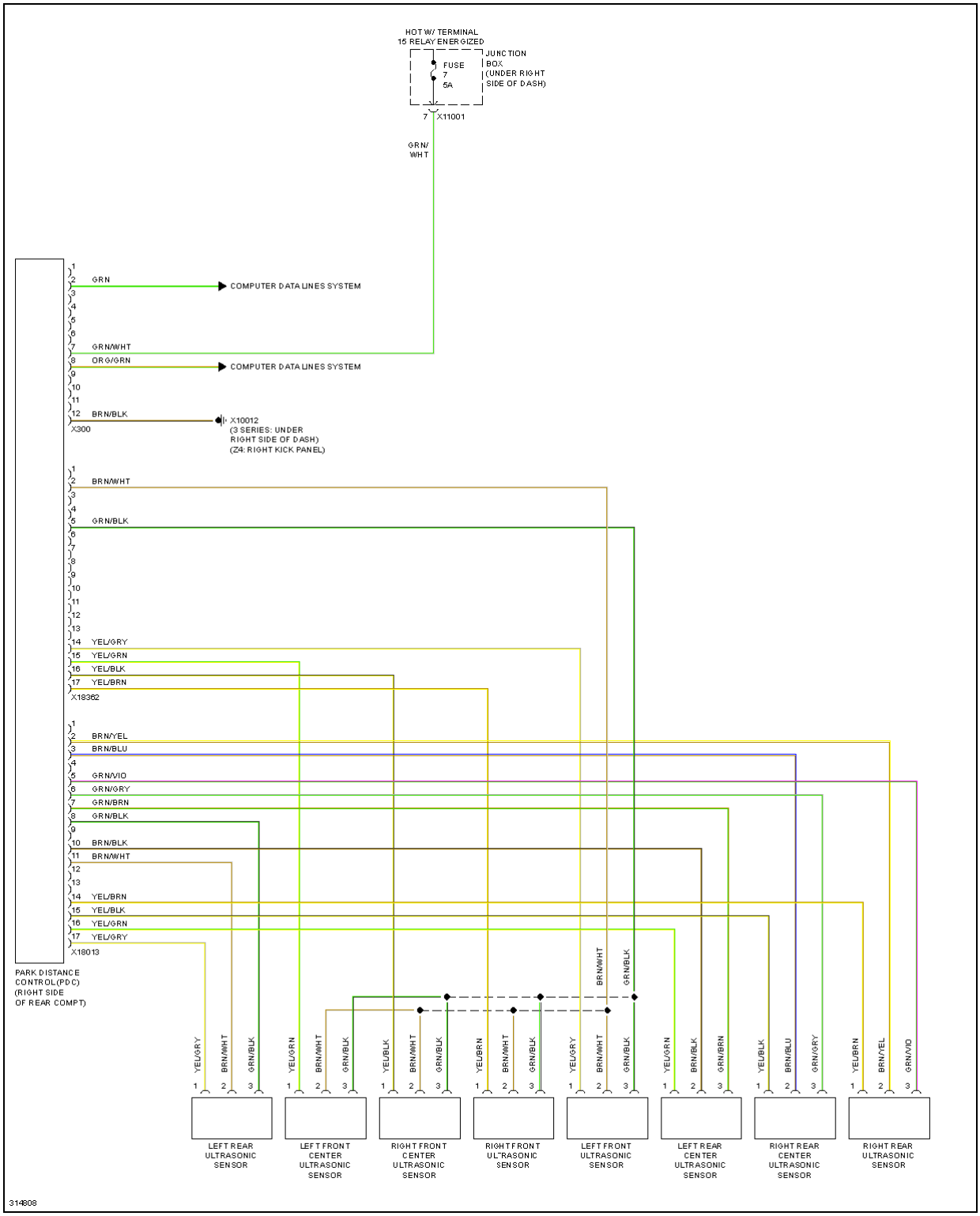

Fig. 46: Parking Assistant Circuit

POWER DISTRIBUTION

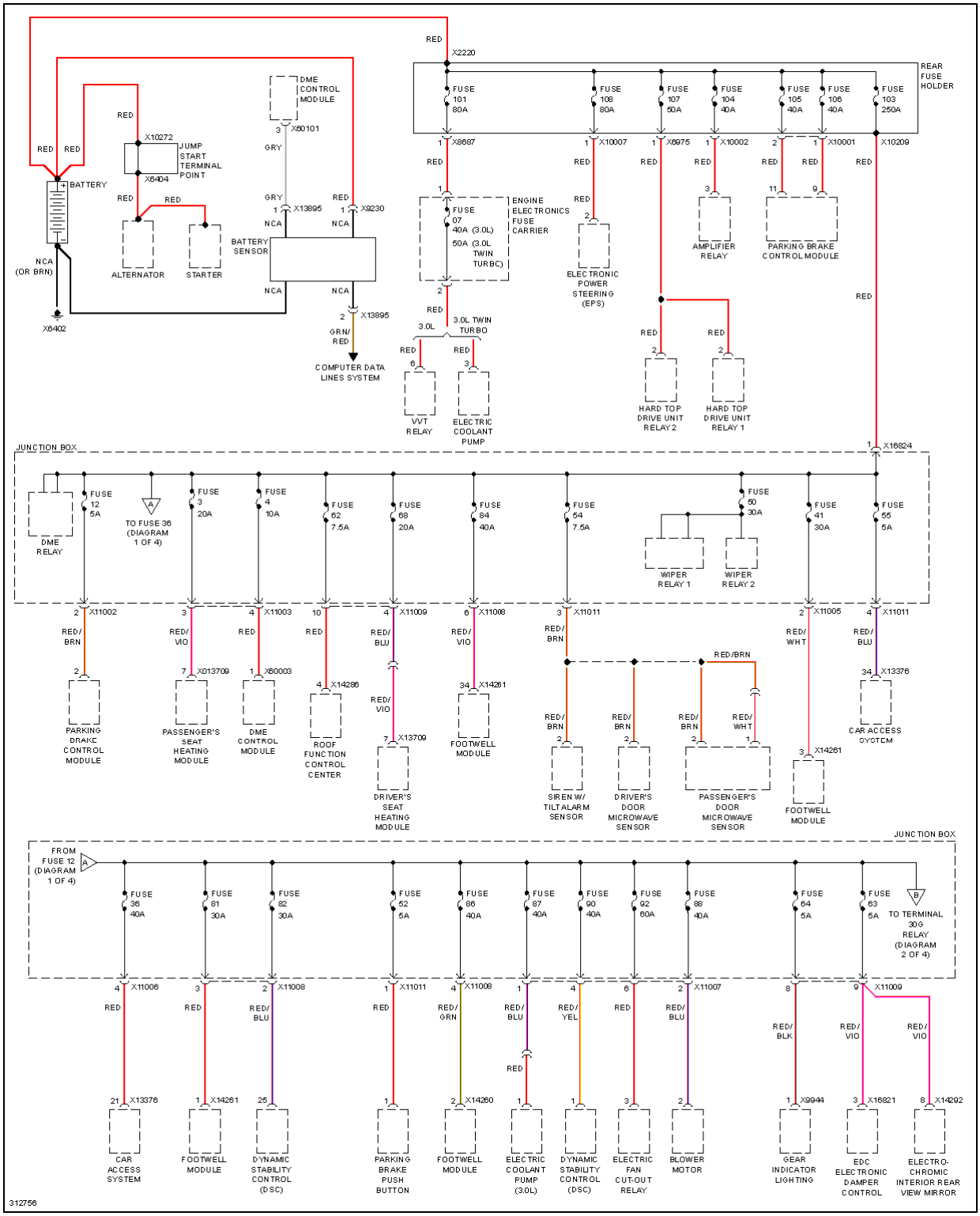

Fig. 47: Power Distribution Circuit (1 of 4)

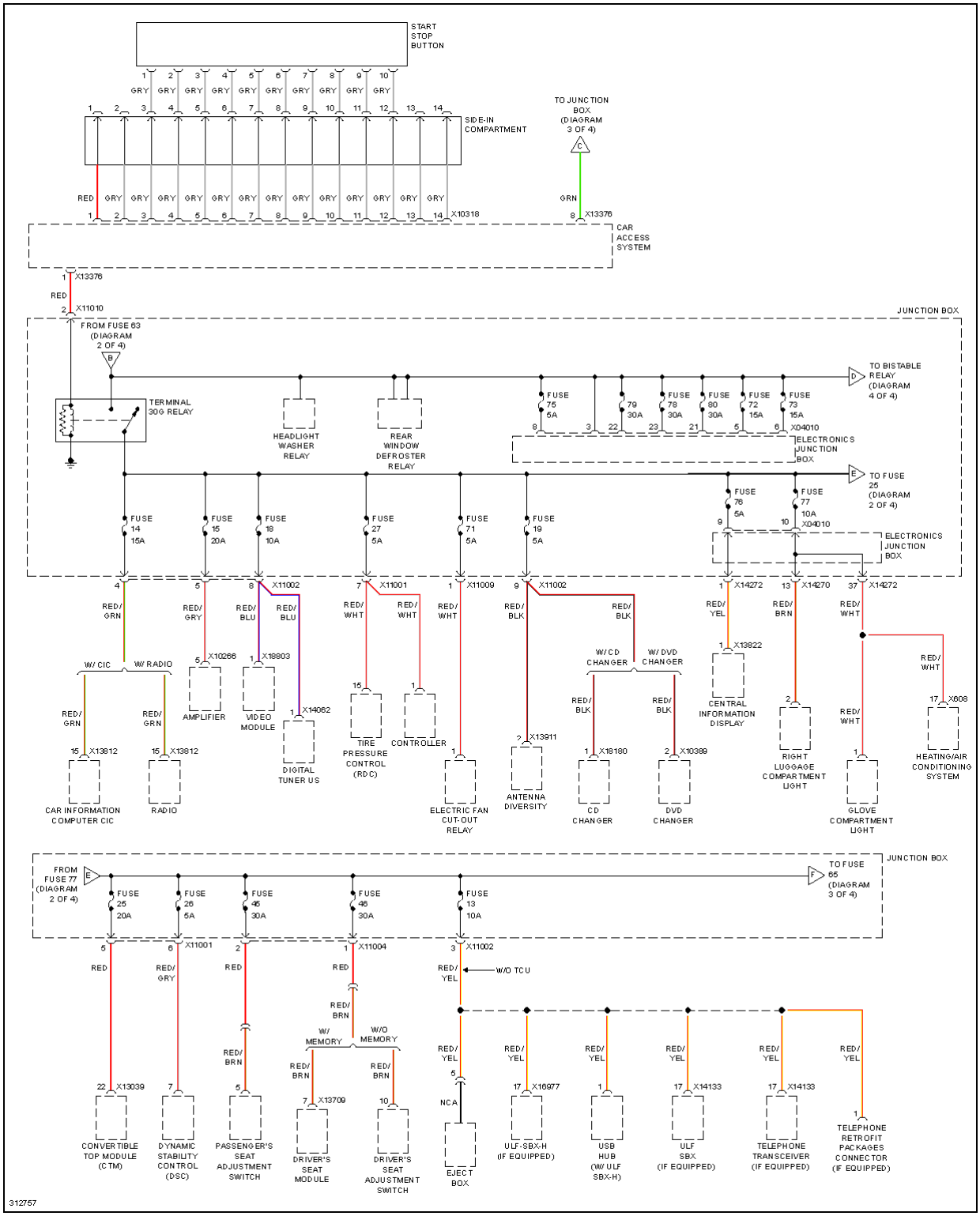

Fig. 48: Power Distribution Circuit (2 of 4)

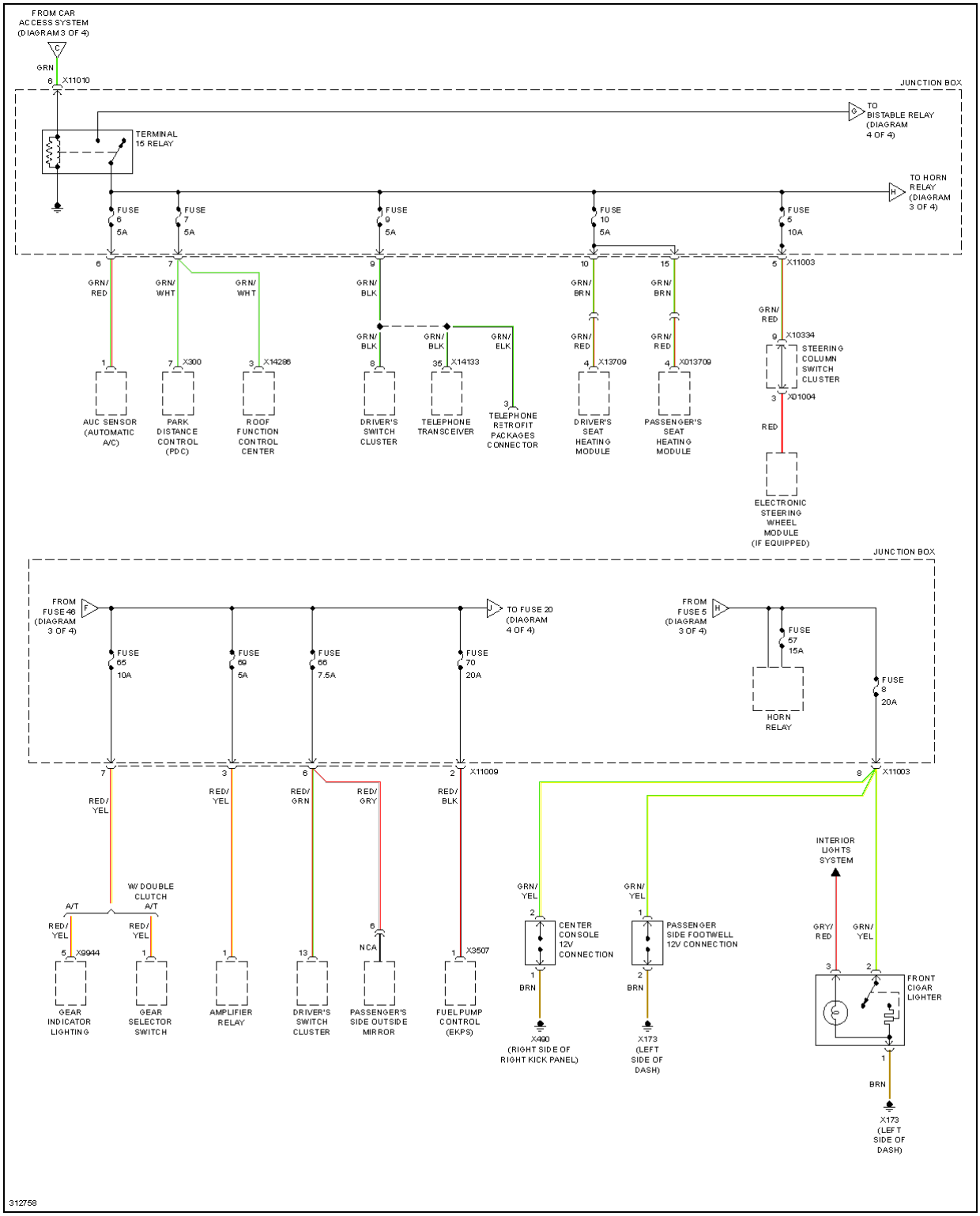

Fig. 49: Power Distribution Circuit (3 of 4)

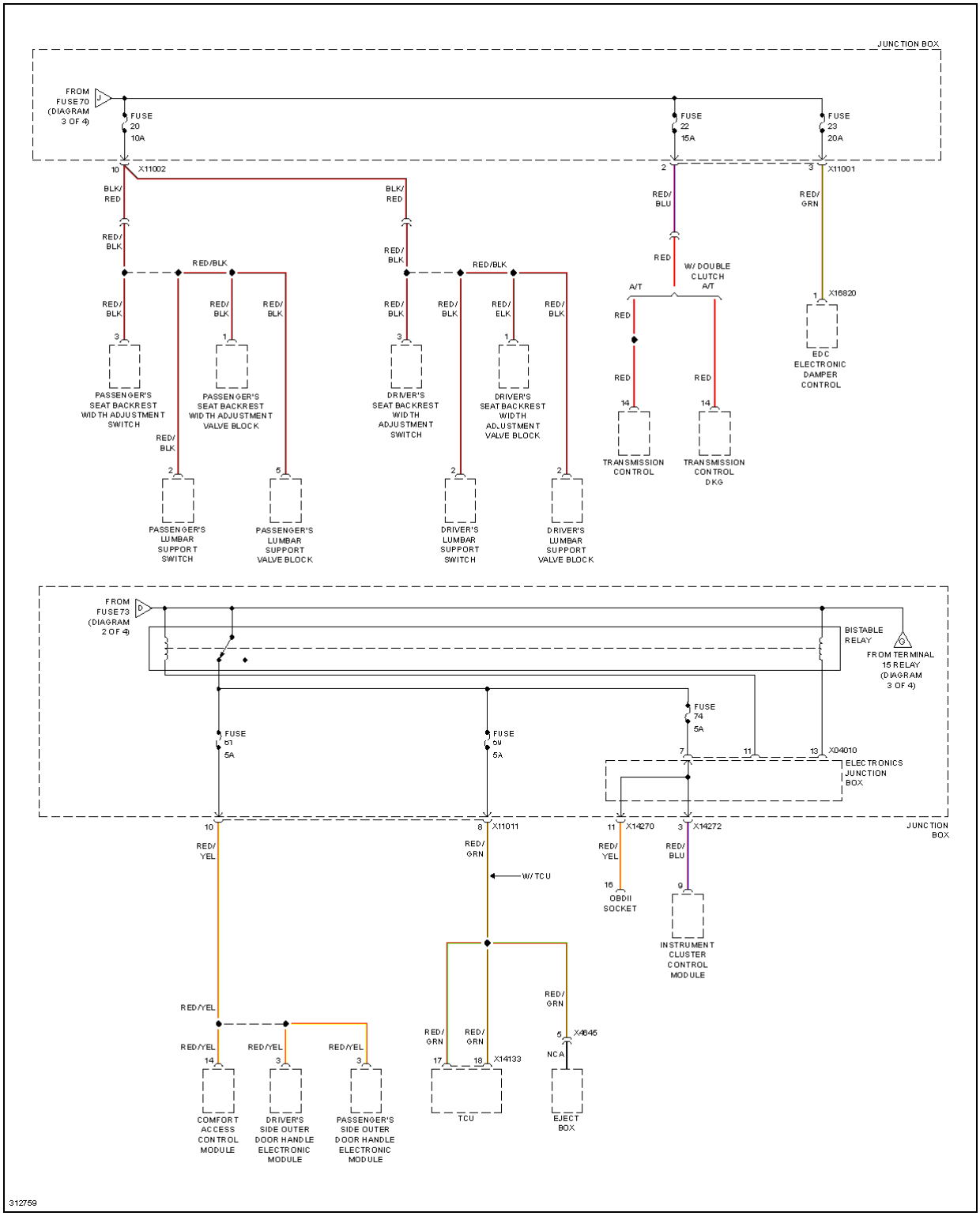

Fig. 50: Power Distribution Circuit (4 of 4)

POWER DOOR LOCKS

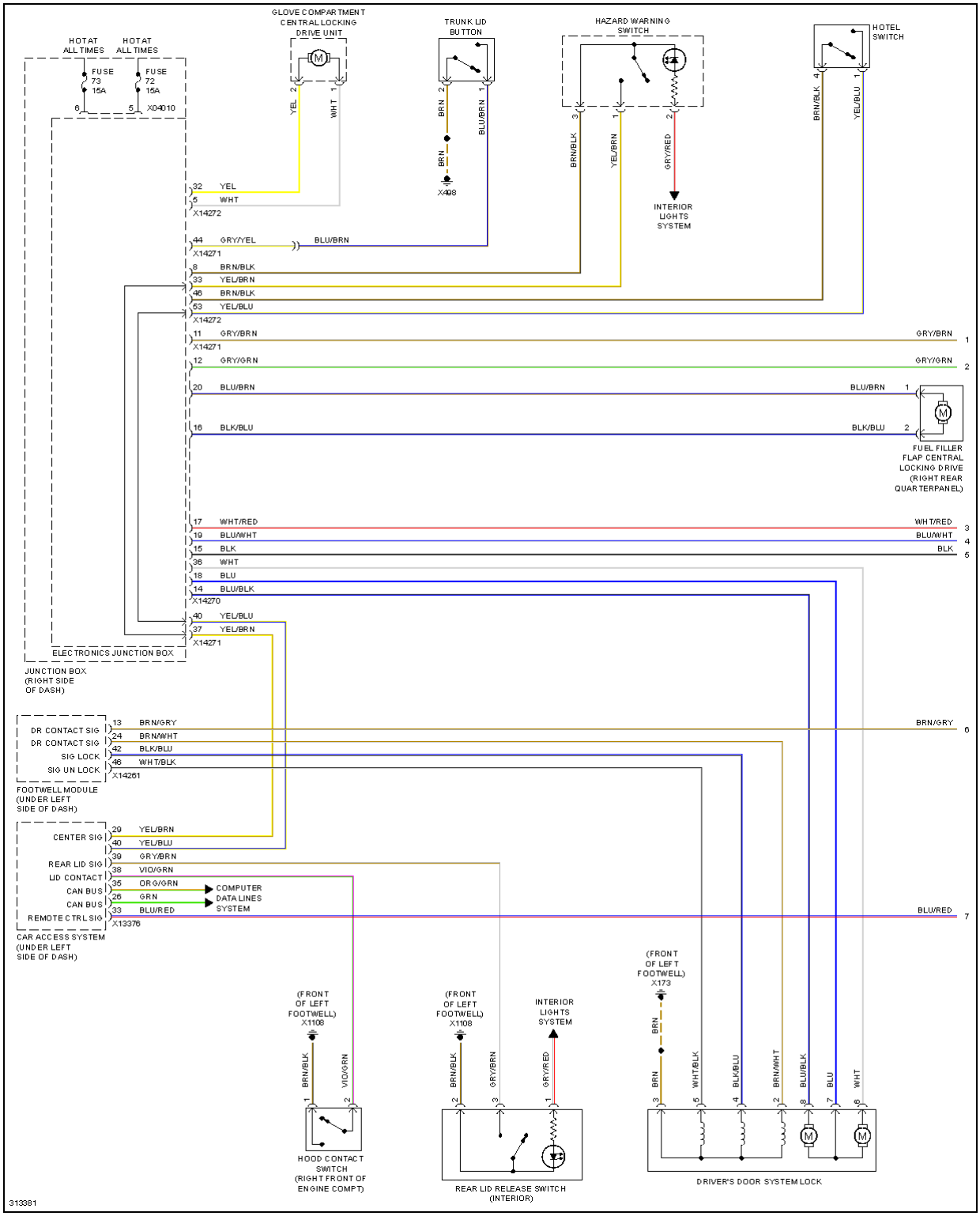

Fig. 51: Power Door Locks Circuit (1 of 2)

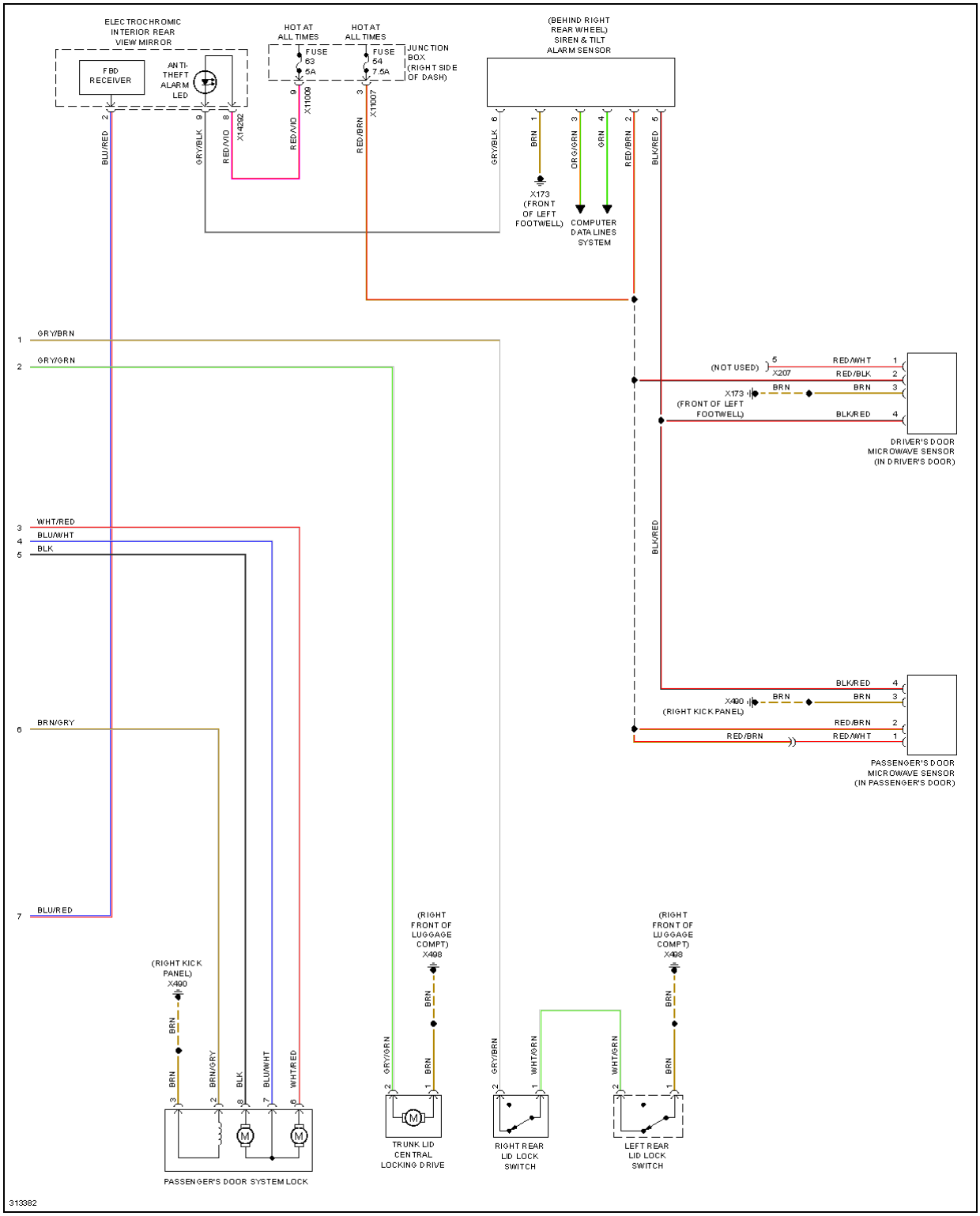

Fig. 52: Power Door Locks Circuit (2 of 2)

POWER MIRRORS

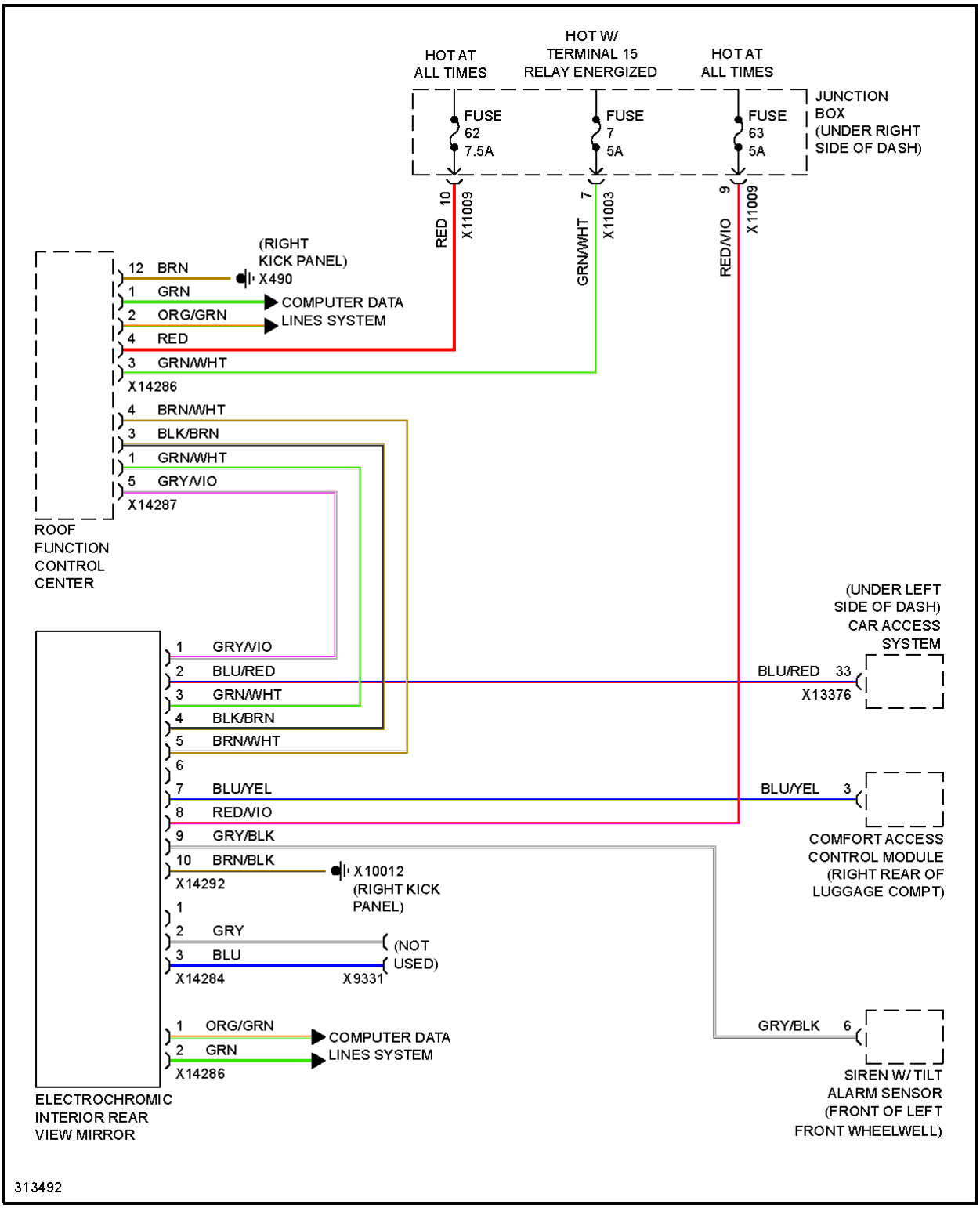

Fig. 53: Electrochromic Mirror Circuit

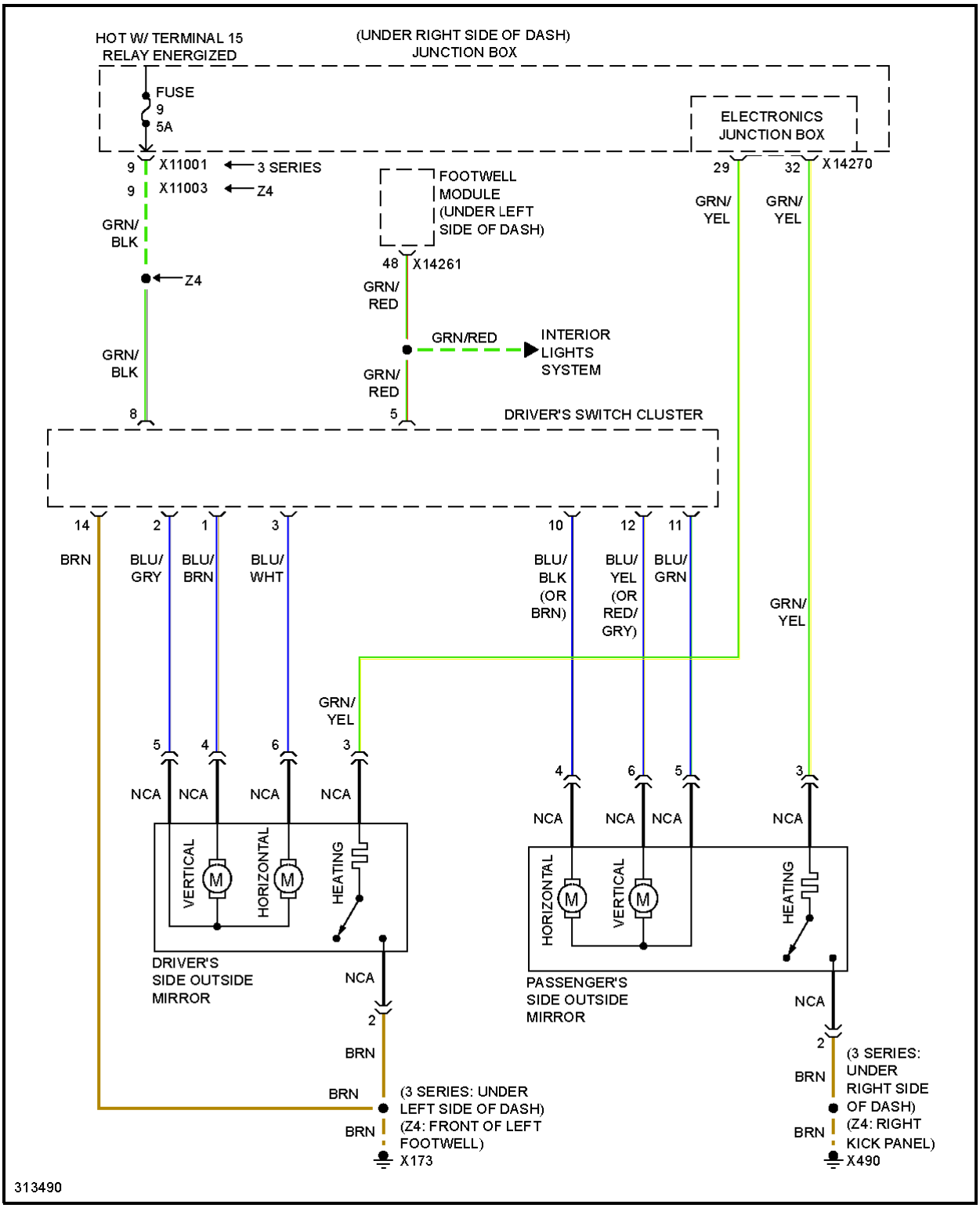

Fig. 54: Power Mirrors Circuit, W/ Heated Mirrors

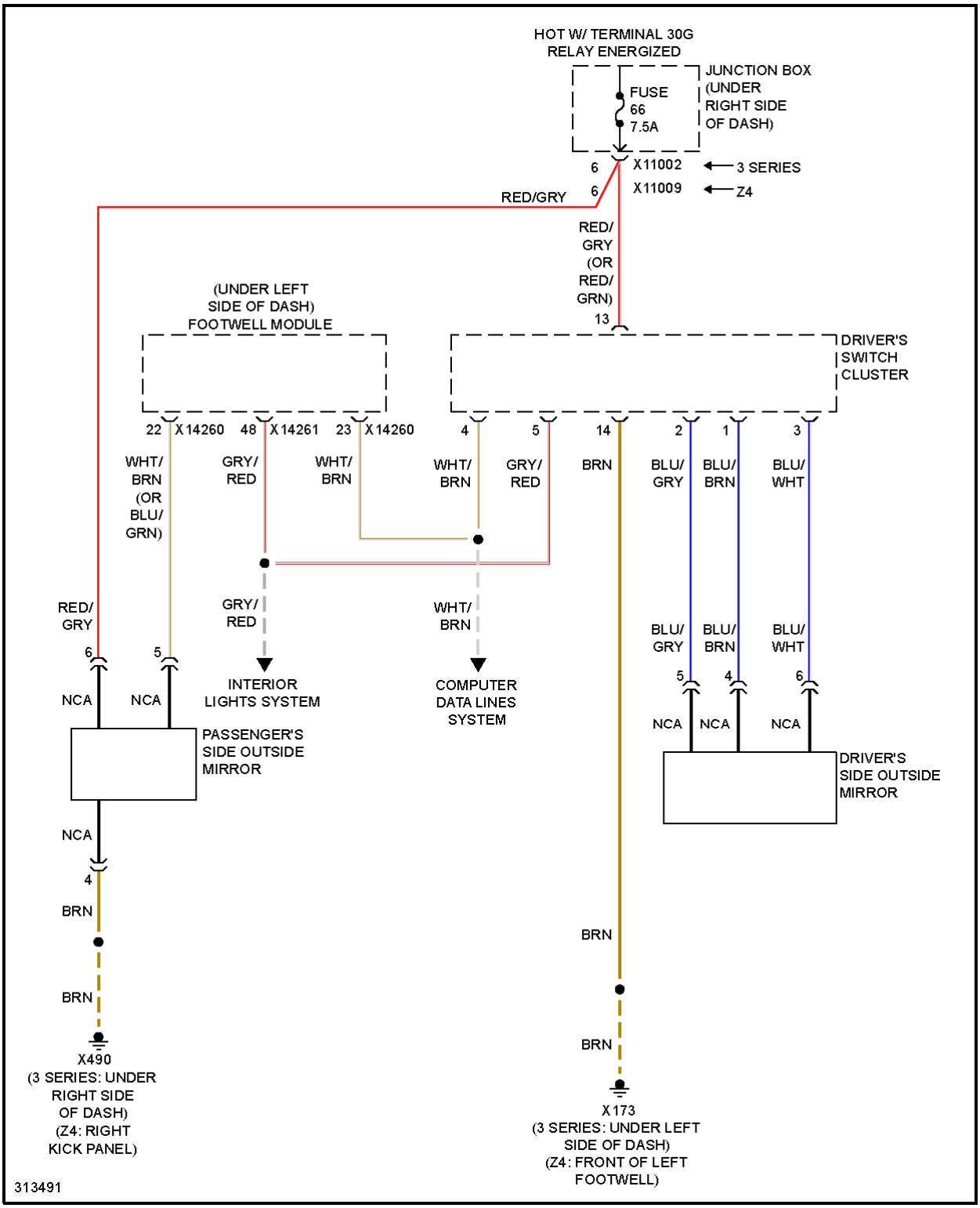

Fig. 55: Power Mirrors Circuit, W/O Heated Mirrors

POWER SEATS

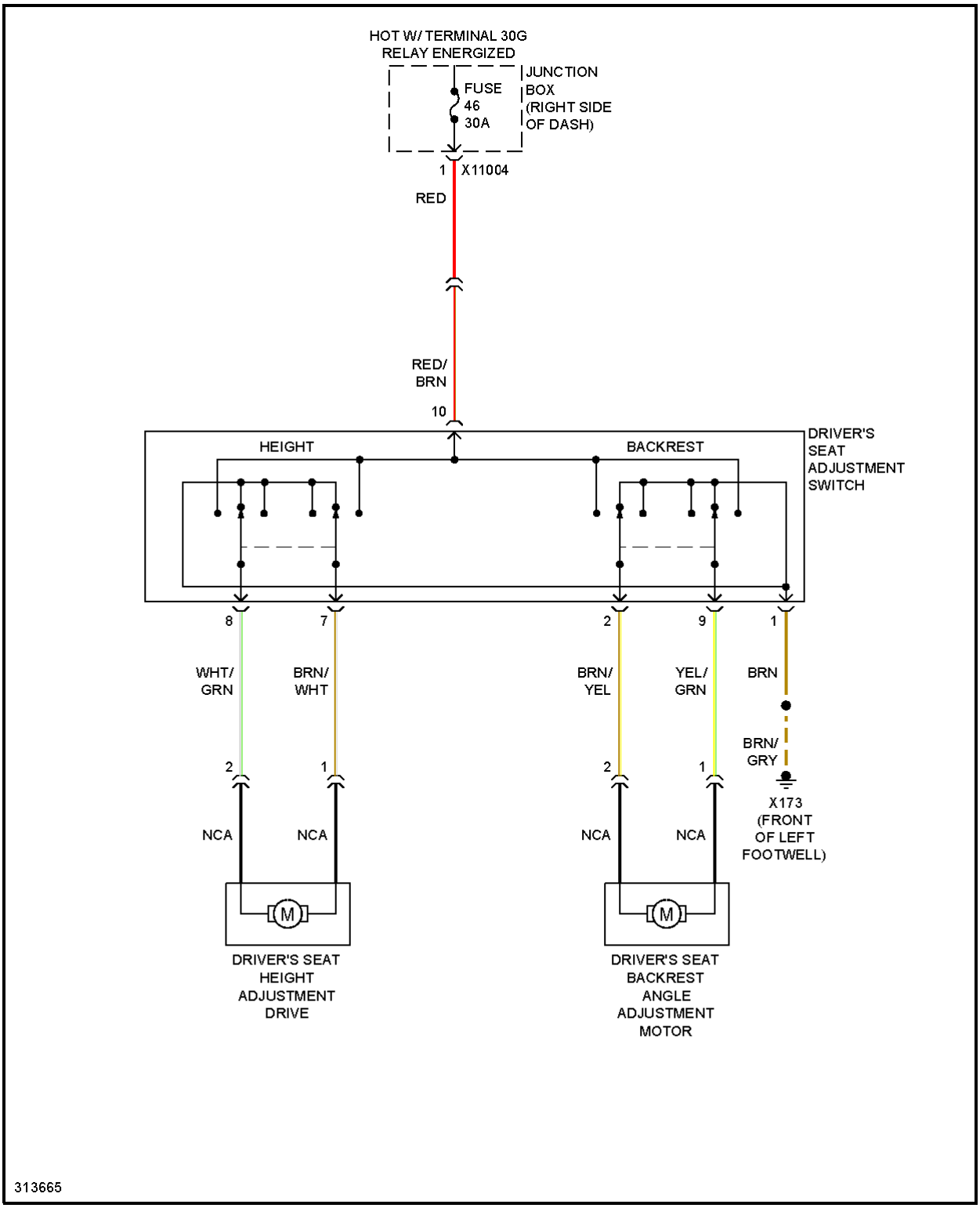

Fig. 56: Driver Power Seat Circuit

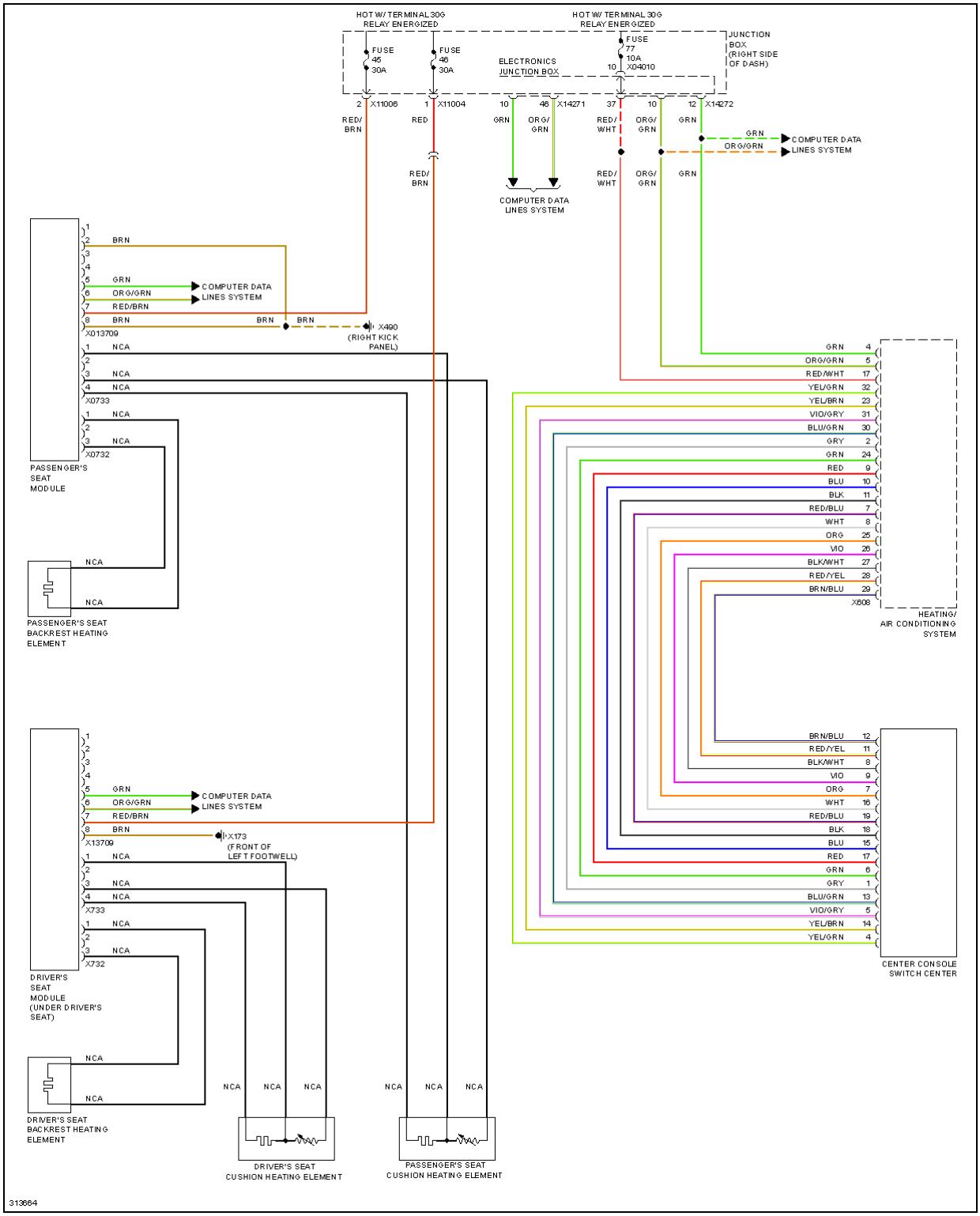

Fig. 57: Heated Seats Circuit, W/ Memory

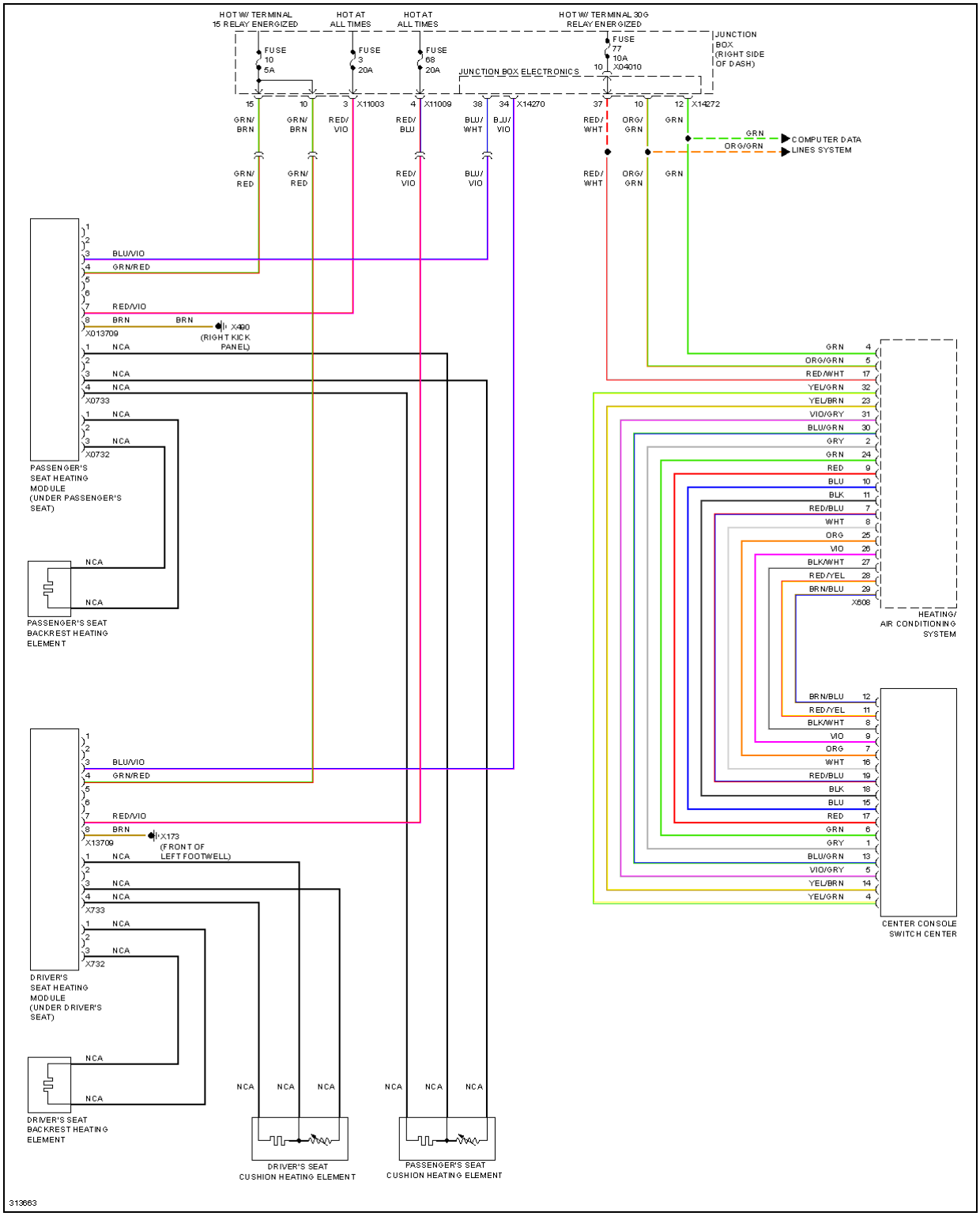

Fig. 58: Heated Seats Circuit, W/O Memory

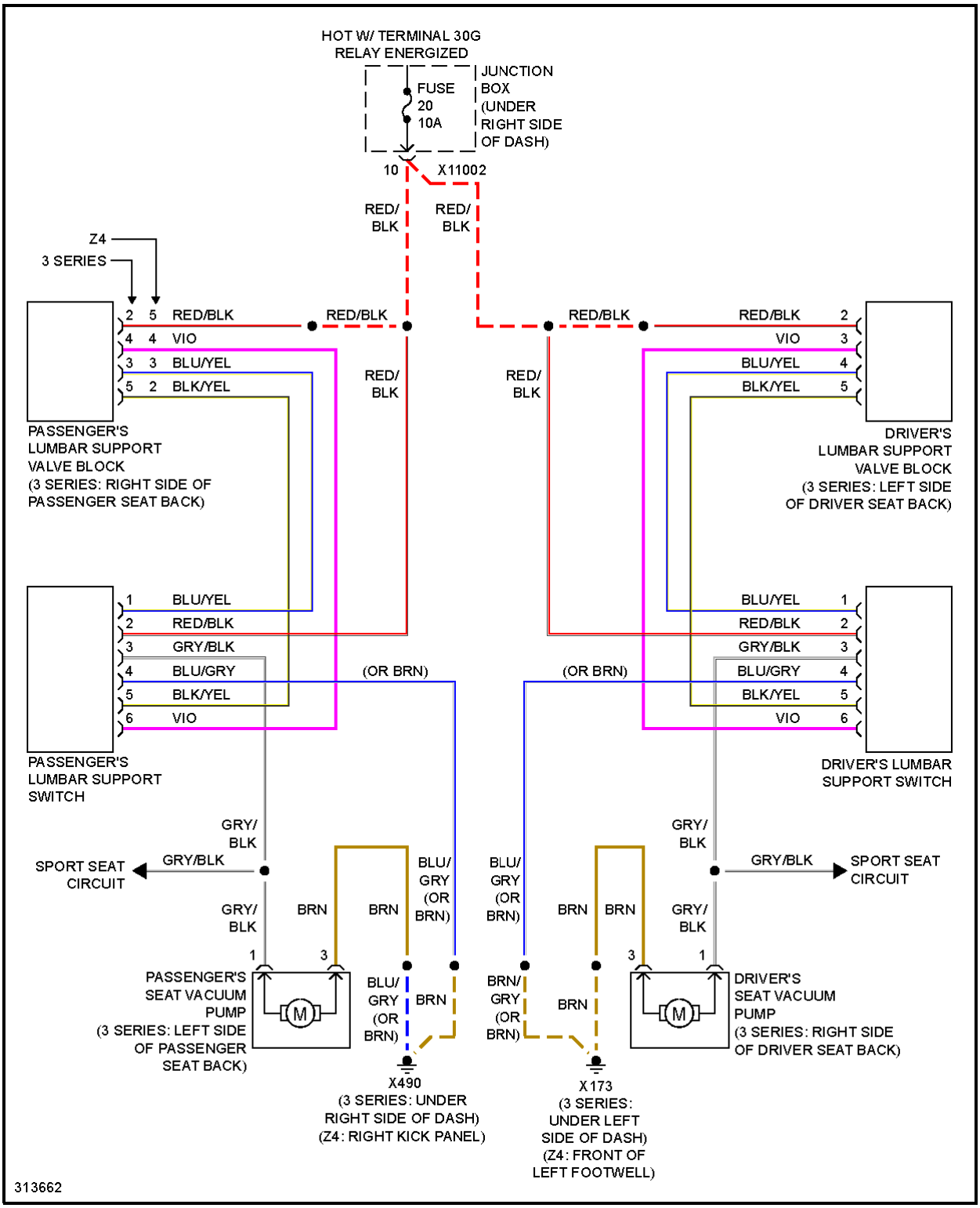

Fig. 59: Lumbar Circuit

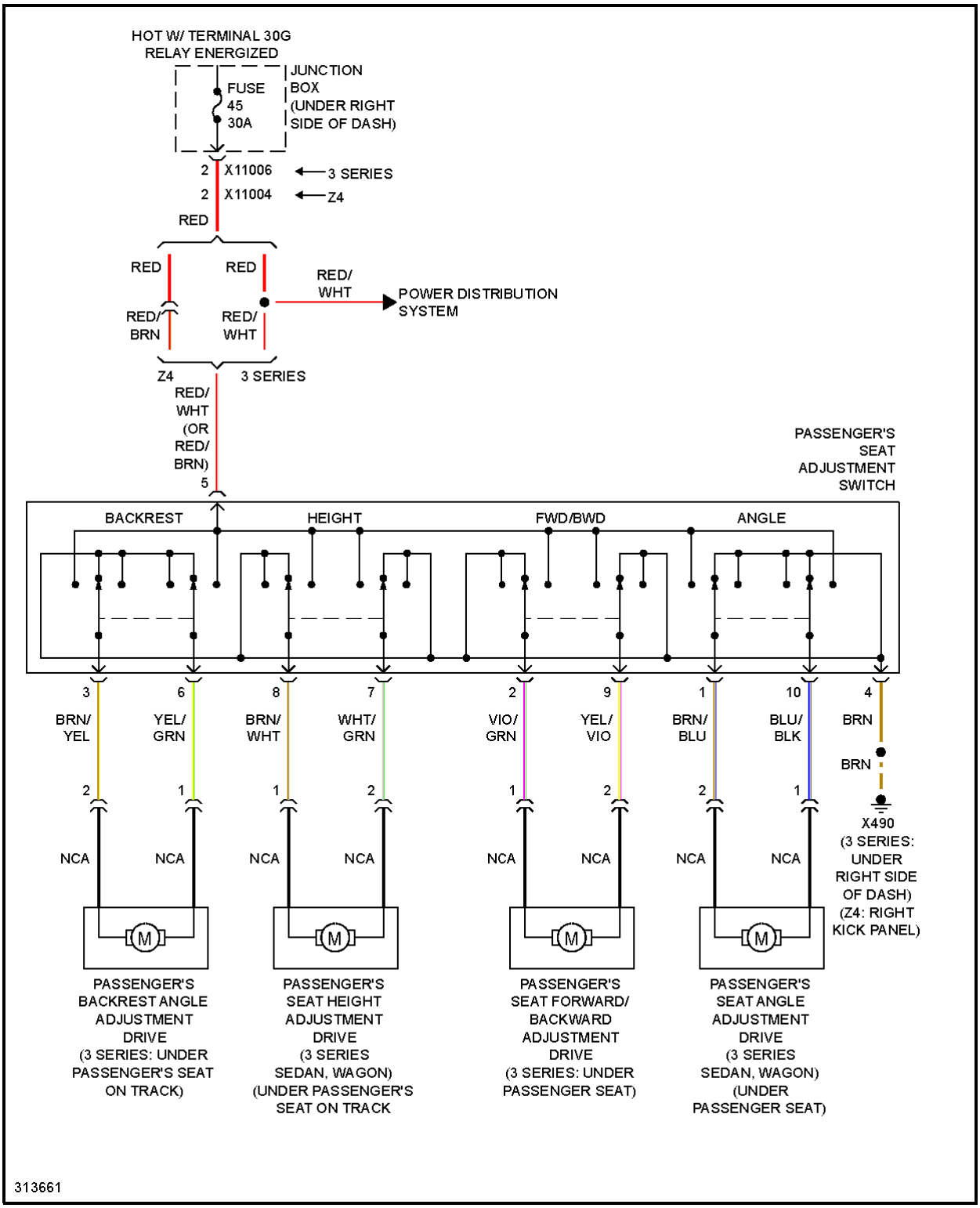

Fig. 60: Passenger Power Seat Circuit

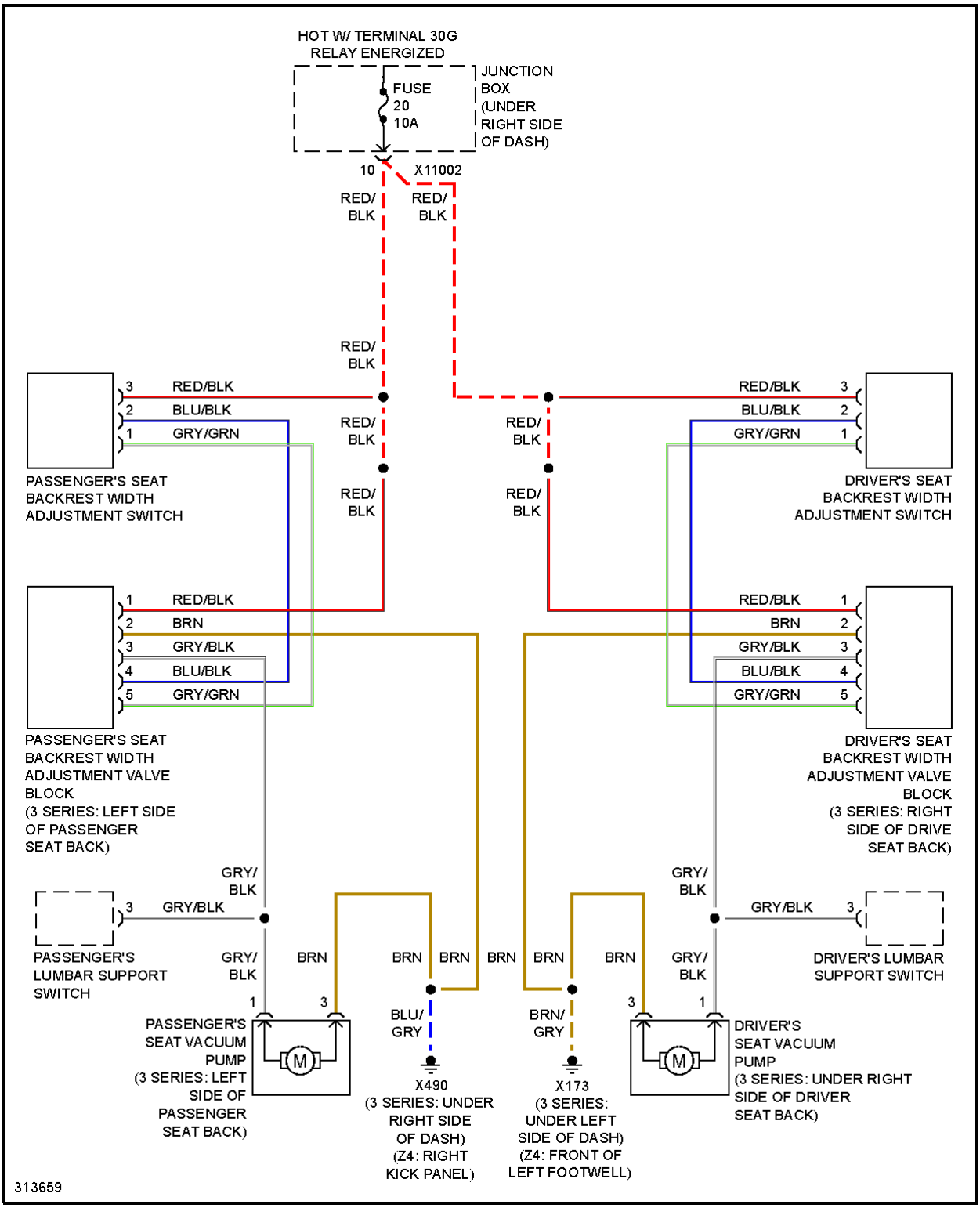

Fig. 61: Sport Seats Circuit

POWER TOP/SUNROOF

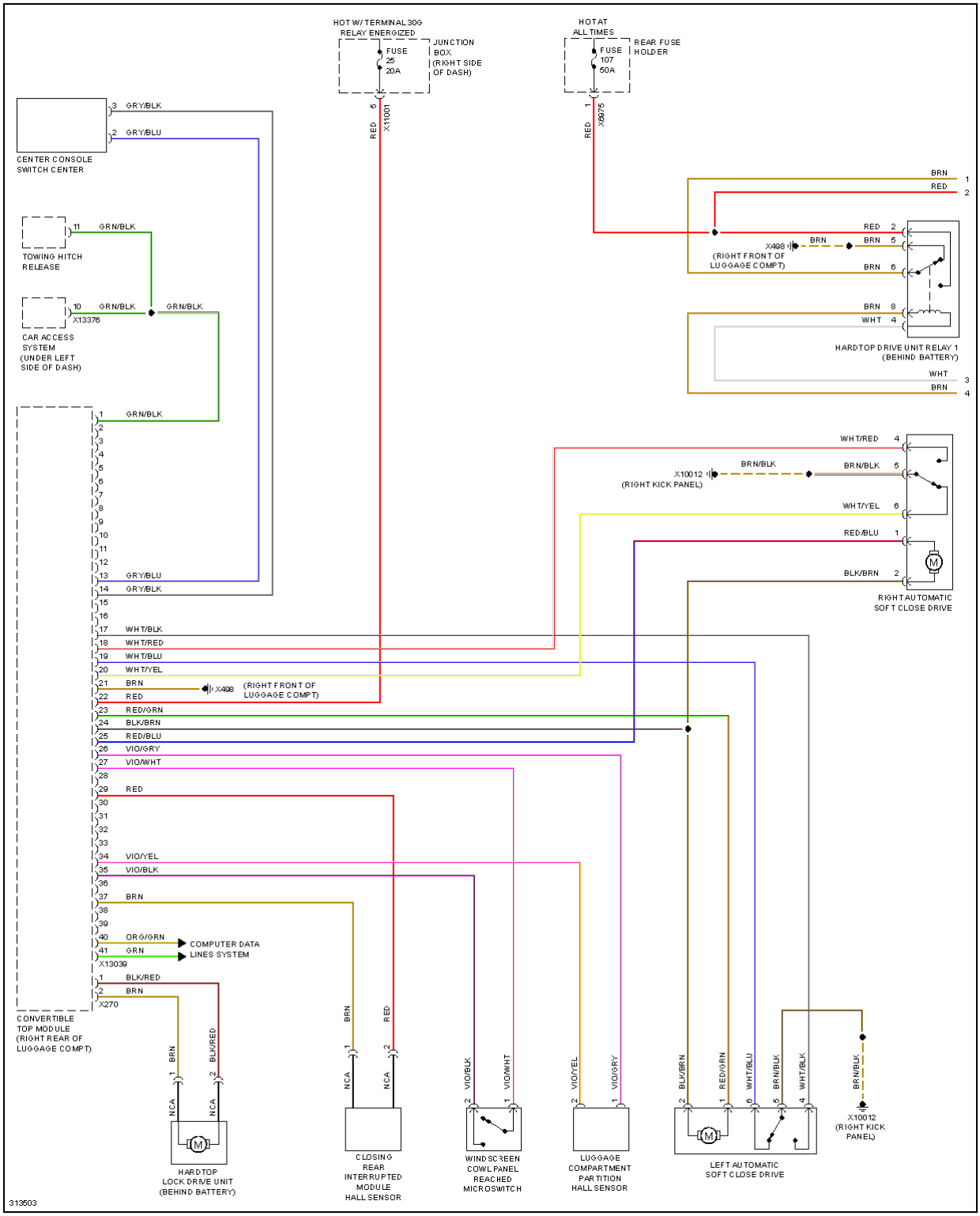

Fig. 62: Power Top/Sunroof Circuit (1 of 2)

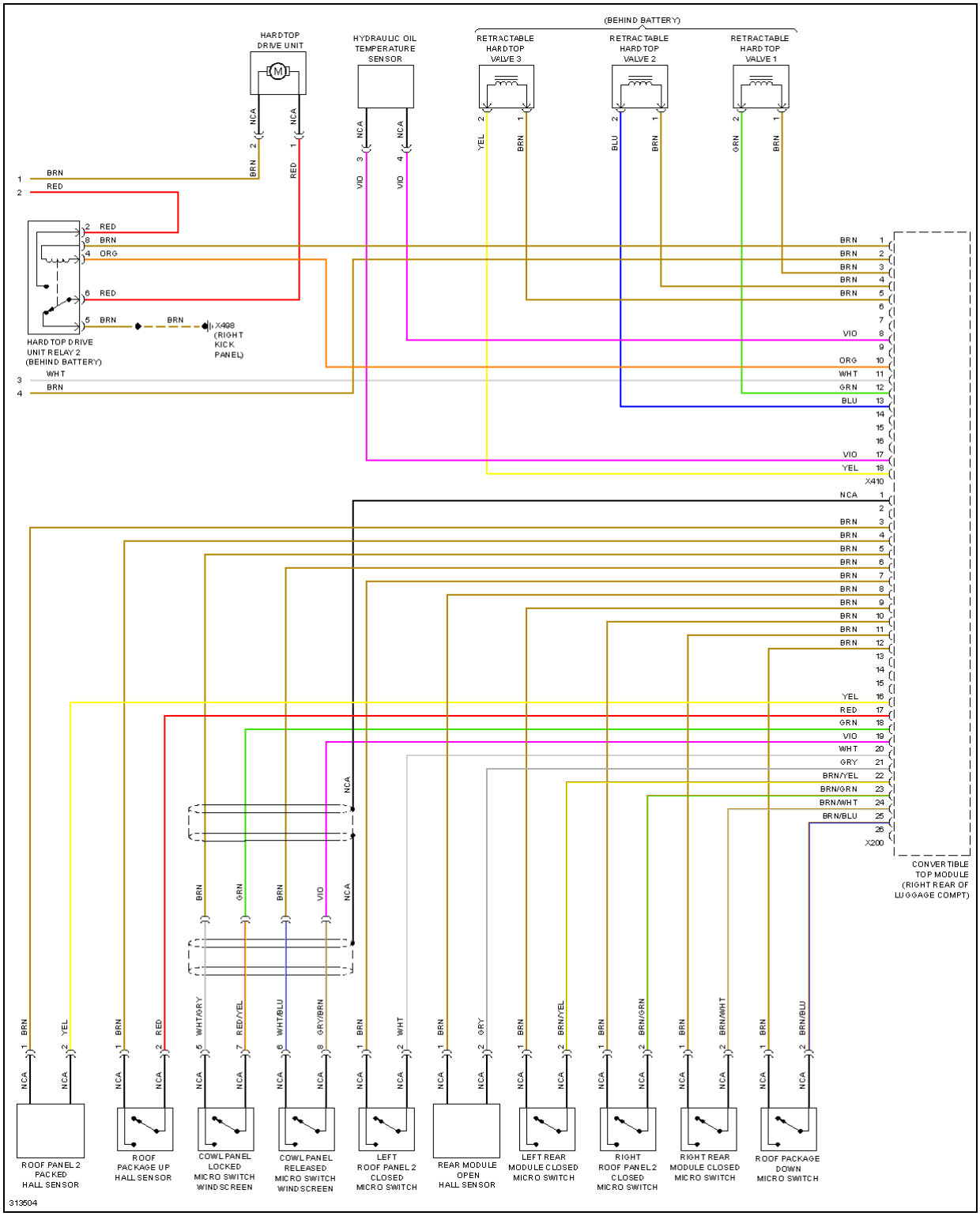

Fig. 63: Power Top/Sunroof Circuit (2 of 2)

POWER WINDOWS

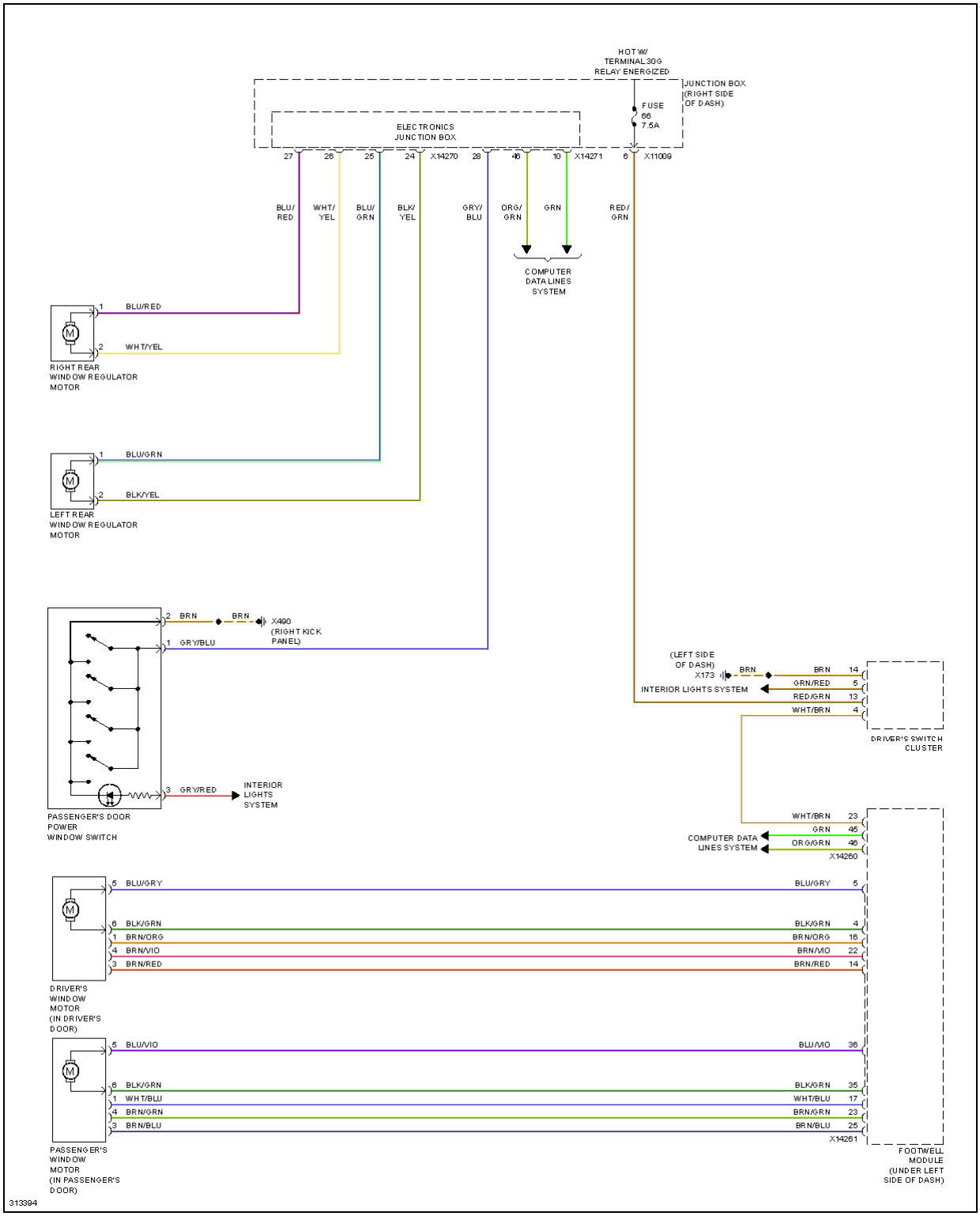

Fig. 64: Power Windows Circuit

RADIO

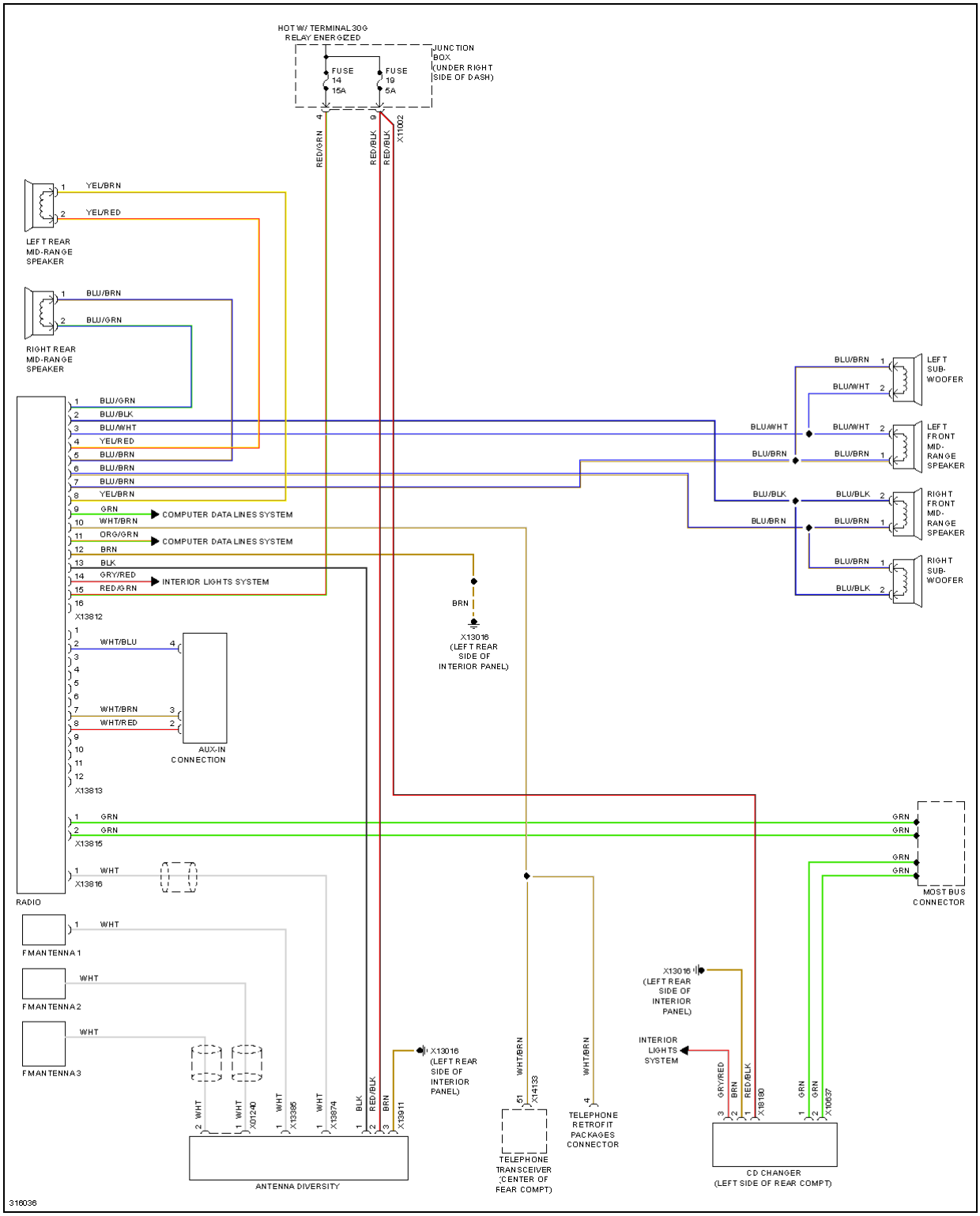

Fig. 65: Base Radio Circuit, W/O CIC

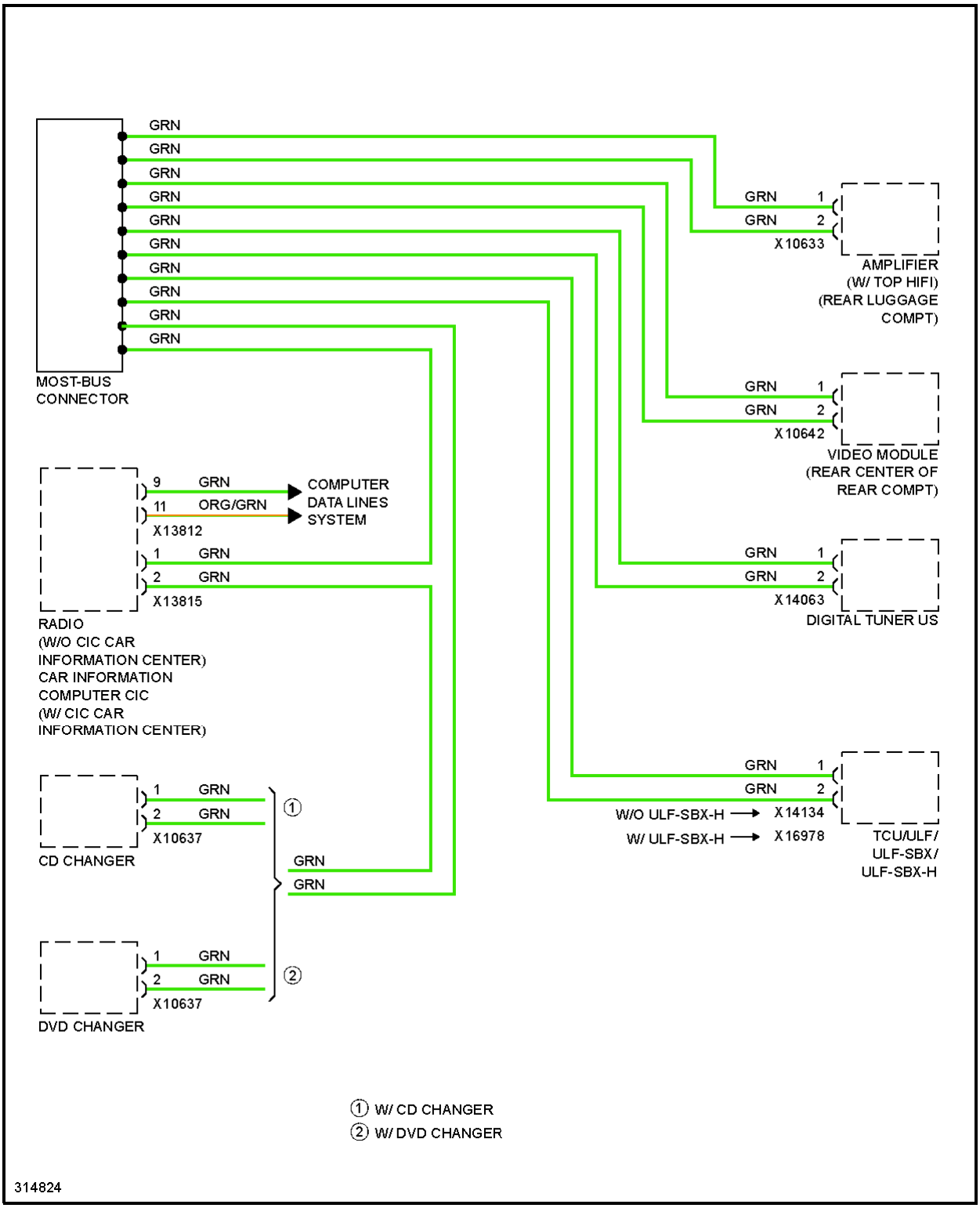

Fig. 66: MOST Data Bus Circuit

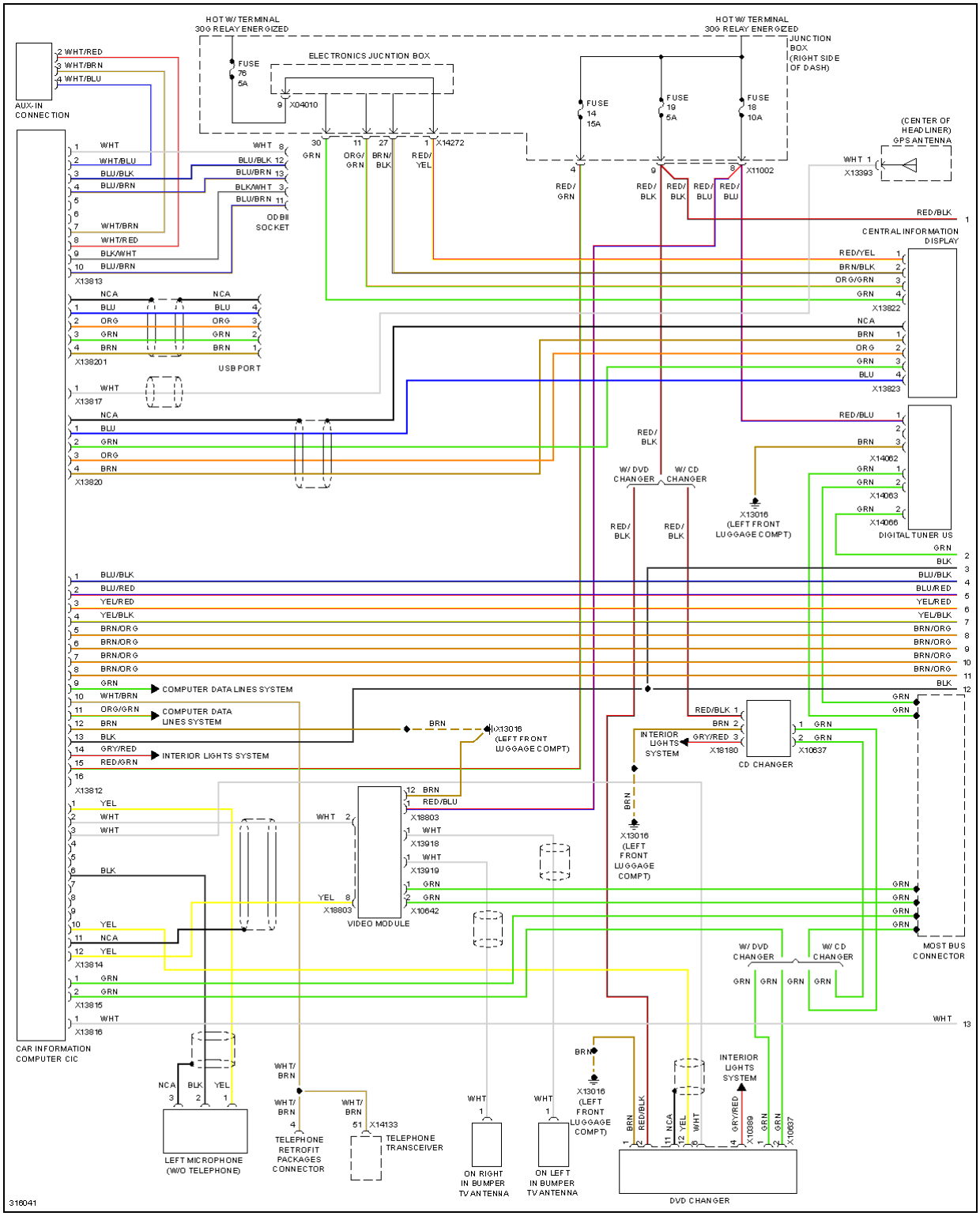

Fig. 67: Premium Radio Circuit, W/ CIC & HIFI Radio (1 of 2)

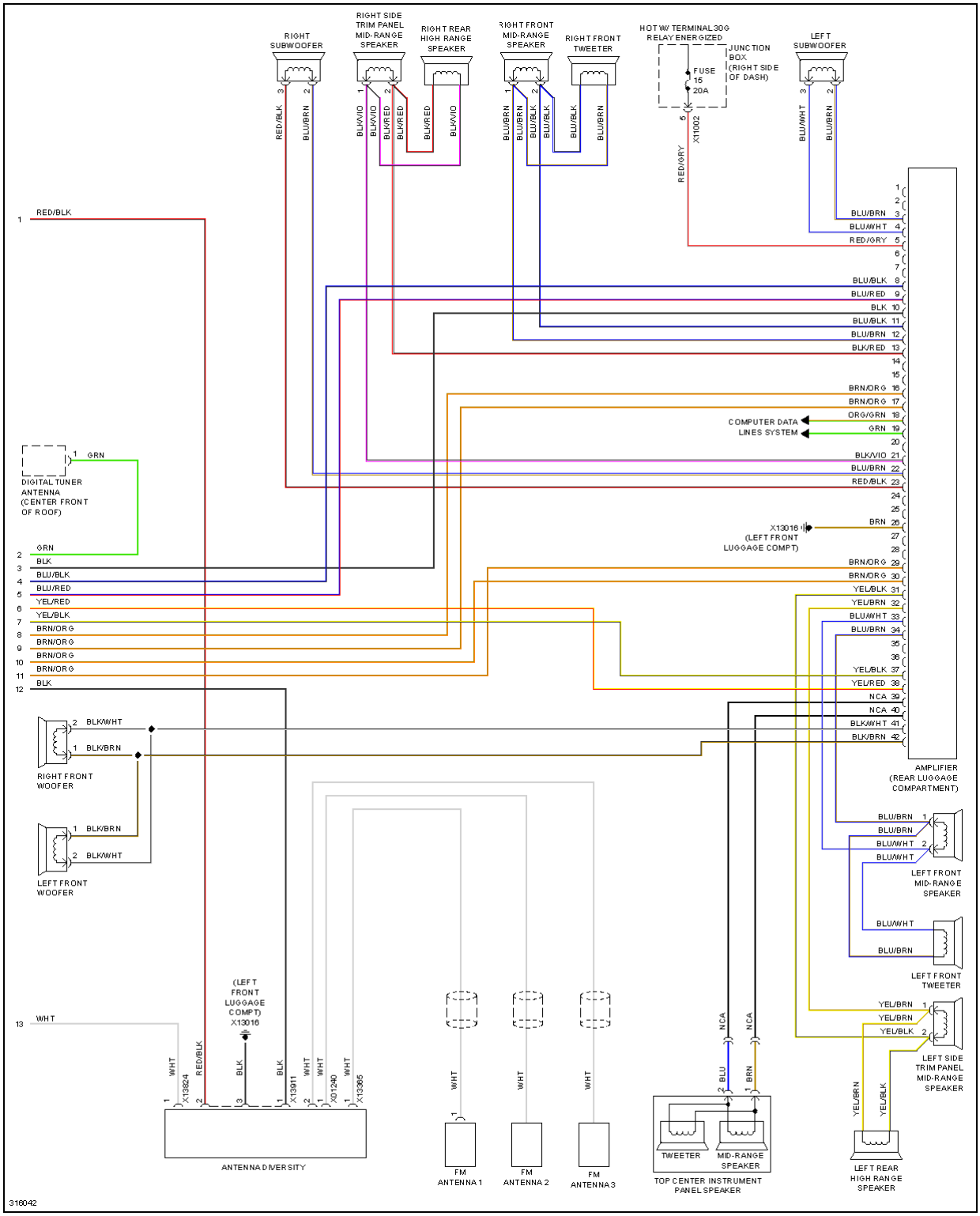

Fig. 68: Premium Radio Circuit, W/ CIC & HIFI Radio (2 of 2)

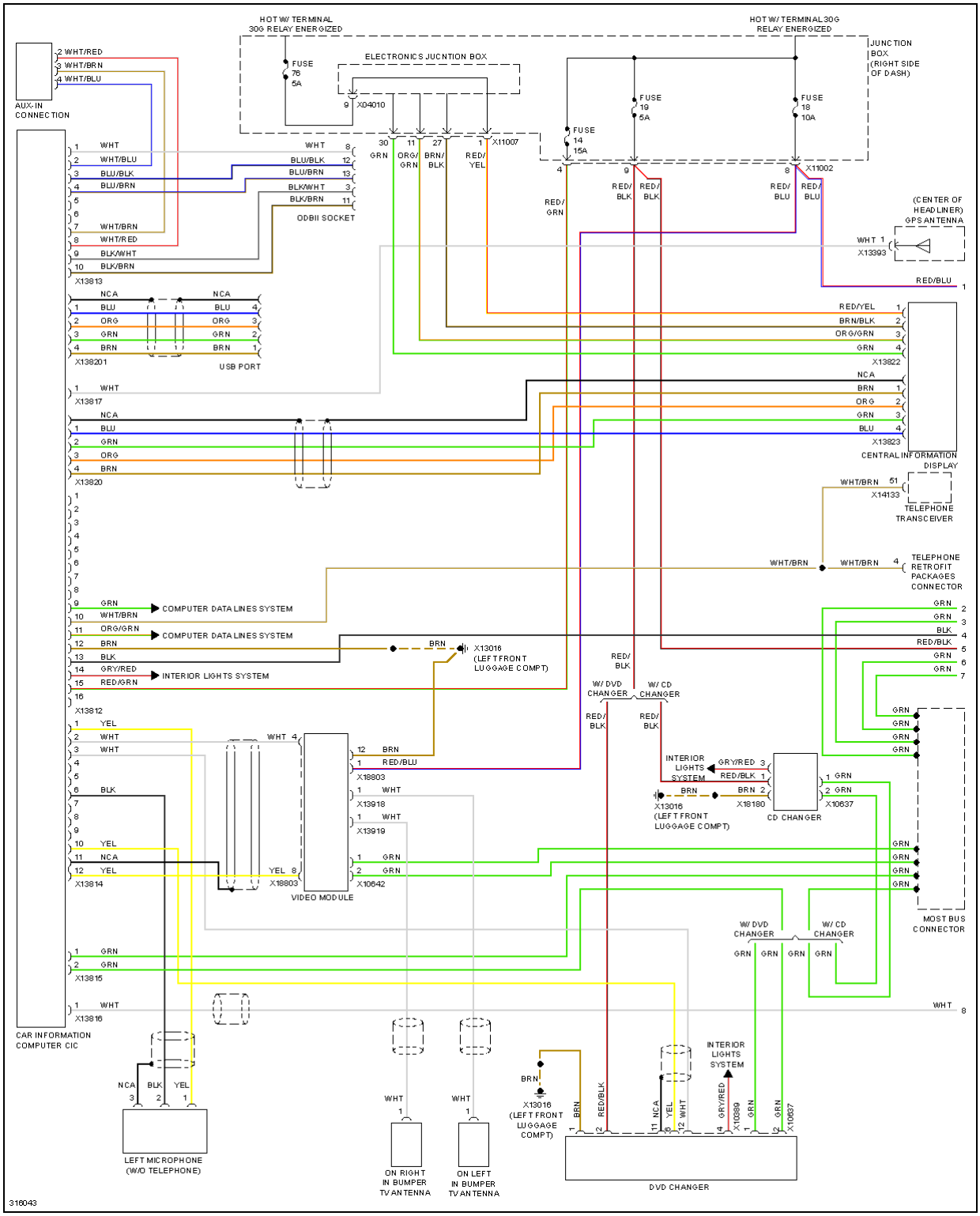

Fig. 69: Premium Radio Circuit, W/ CIC & Top HIFI Radio (1 of 2)

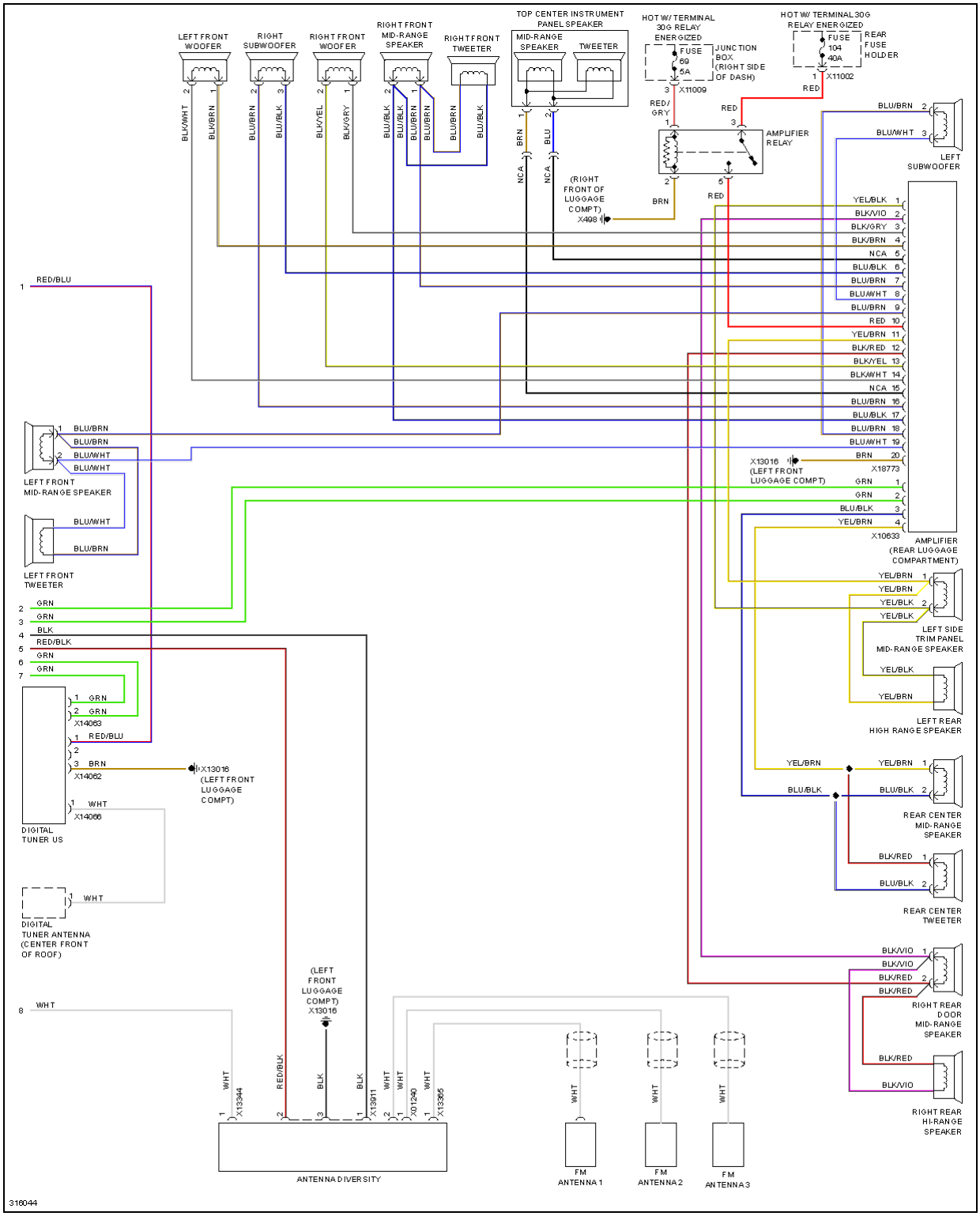

Fig. 70: Premium Radio Circuit, W/ CIC & Top HIFI Radio (2 of 2)

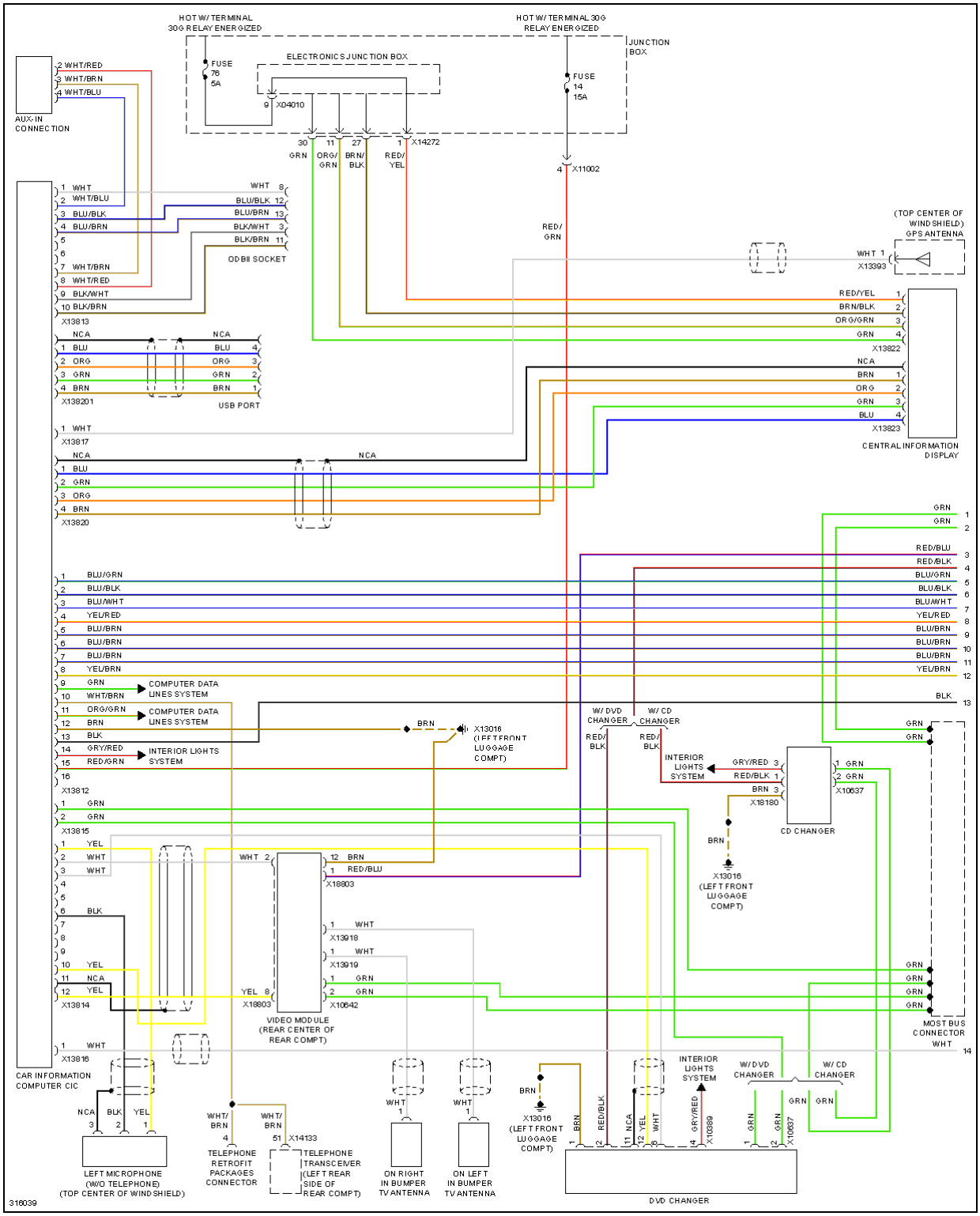

Fig. 71: Premium Radio Circuit, W/ CIC W/O Amplifier (1 of 2)

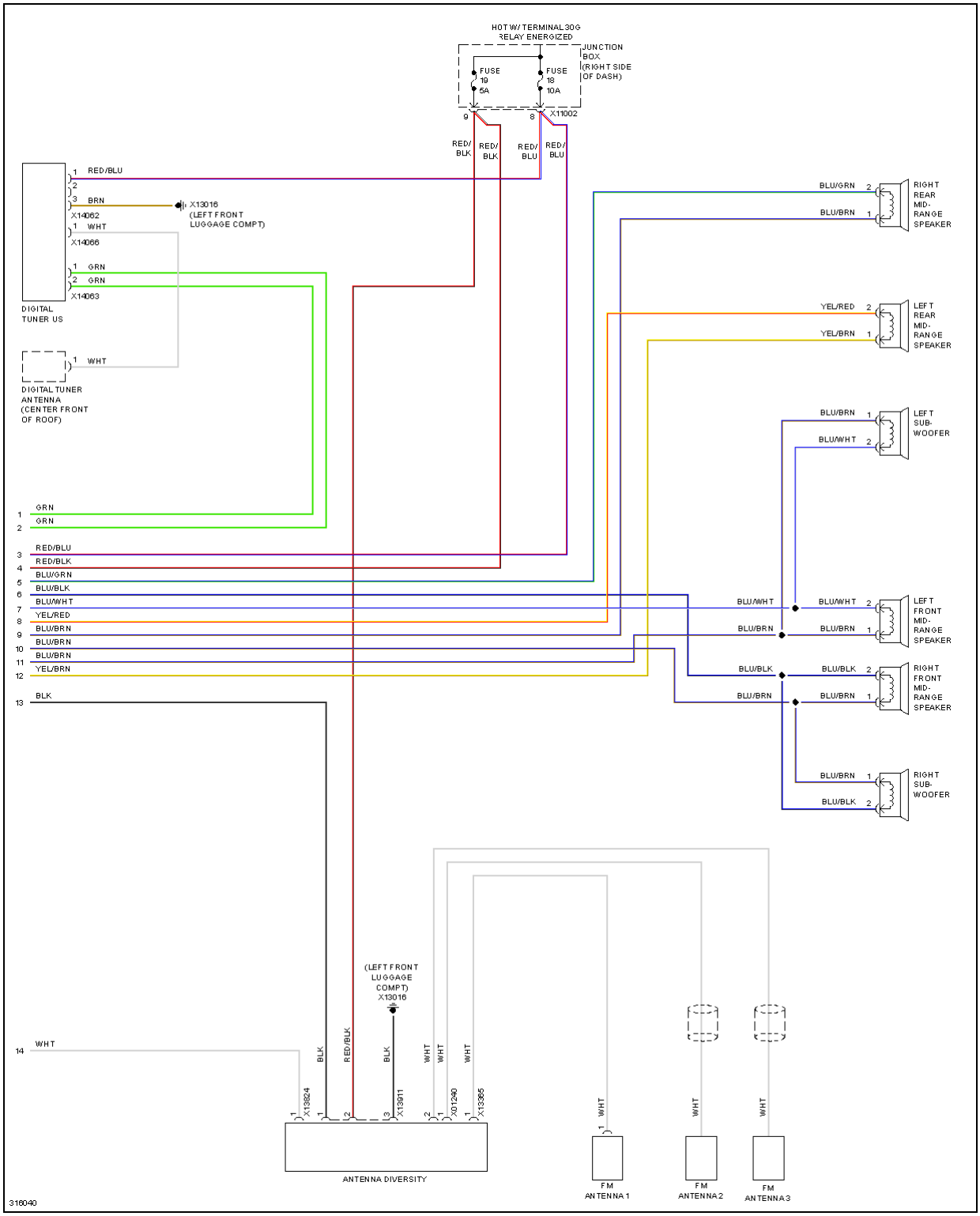

Fig. 72: Premium Radio Circuit, W/ CIC W/O Amplifier (2 of 2)

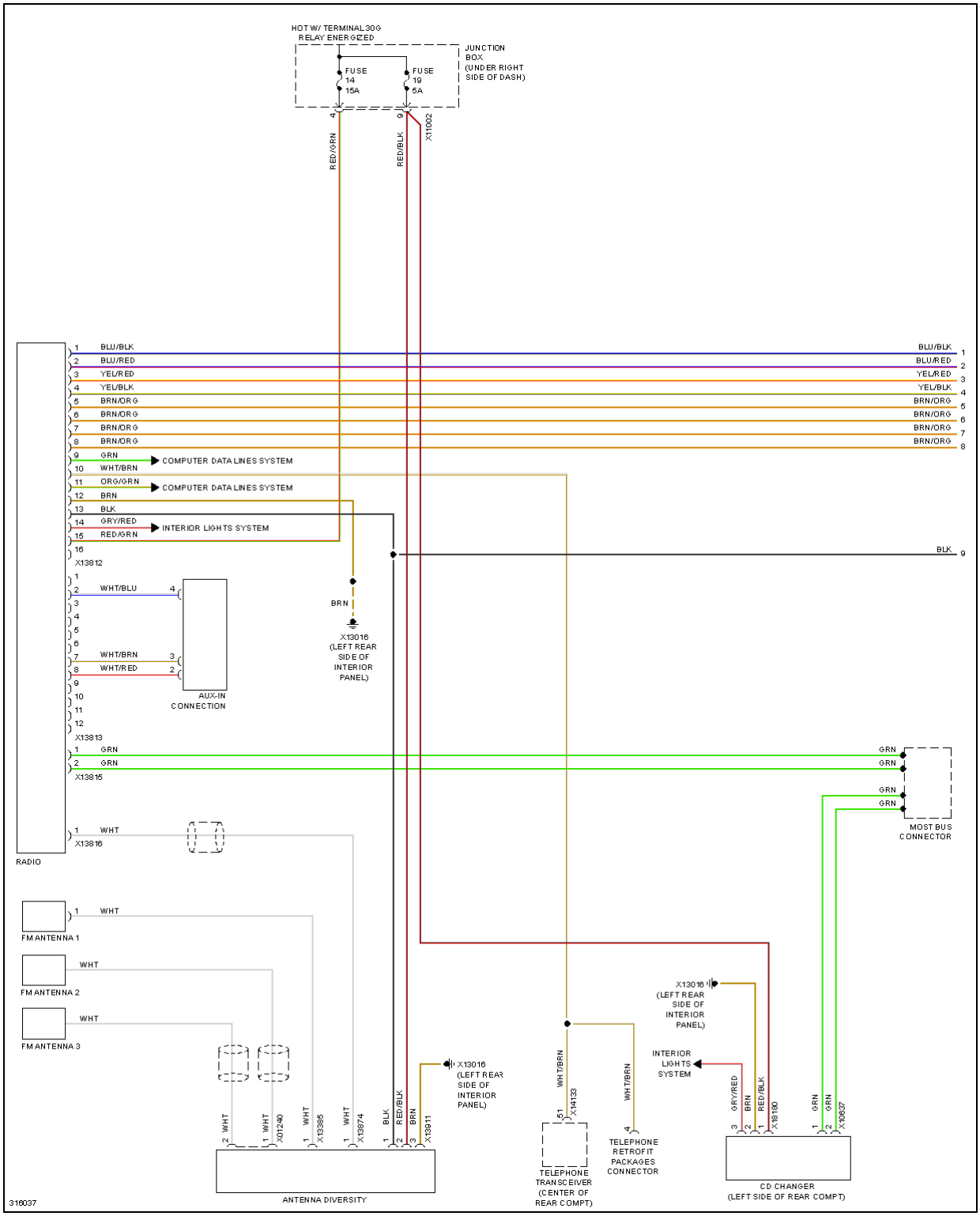

Fig. 73: Premium Radio Circuit, W/O CIC (1 of 2)

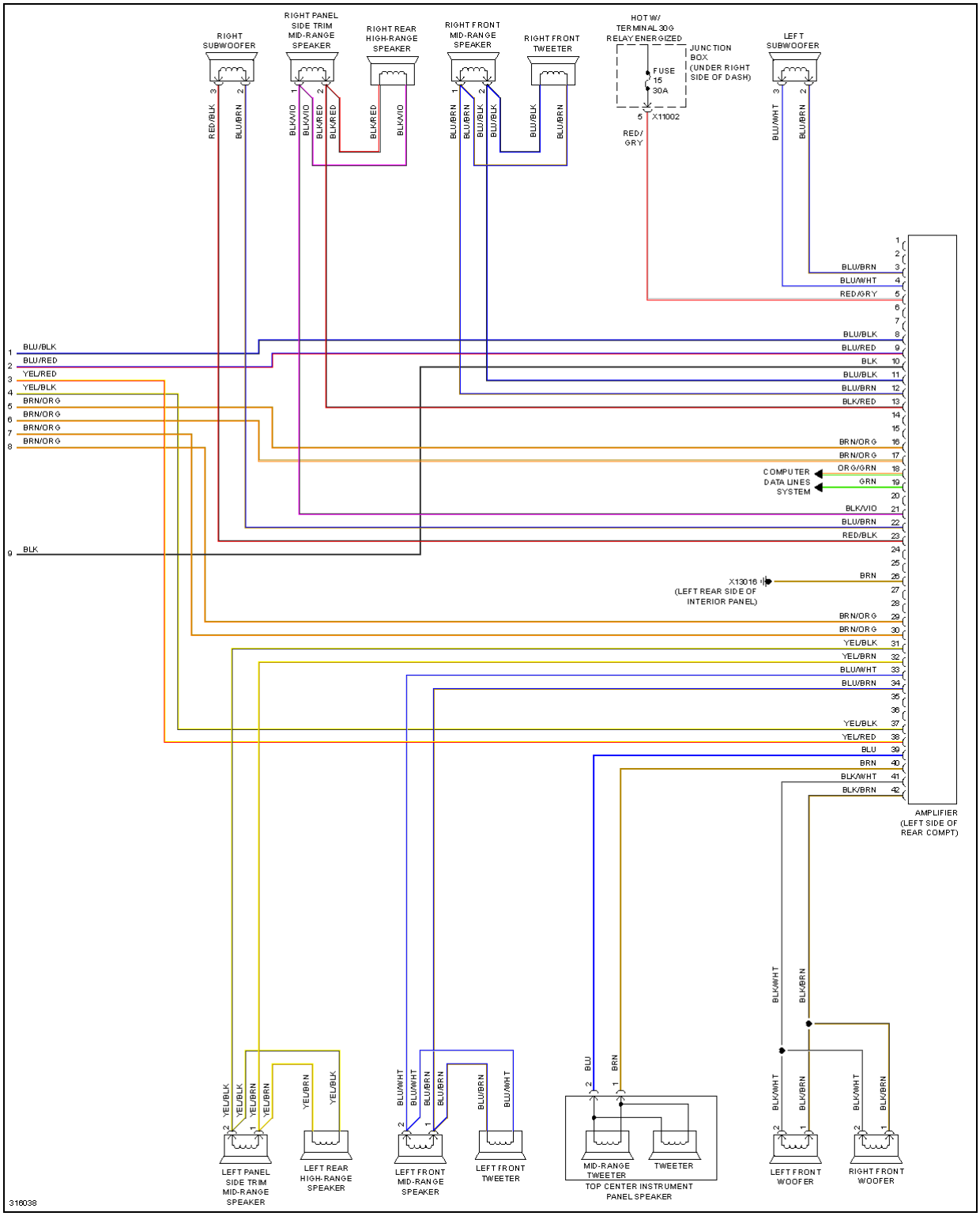

Fig. 74: Premium Radio Circuit, W/O CIC (2 of 2)

SHIFT INTERLOCK

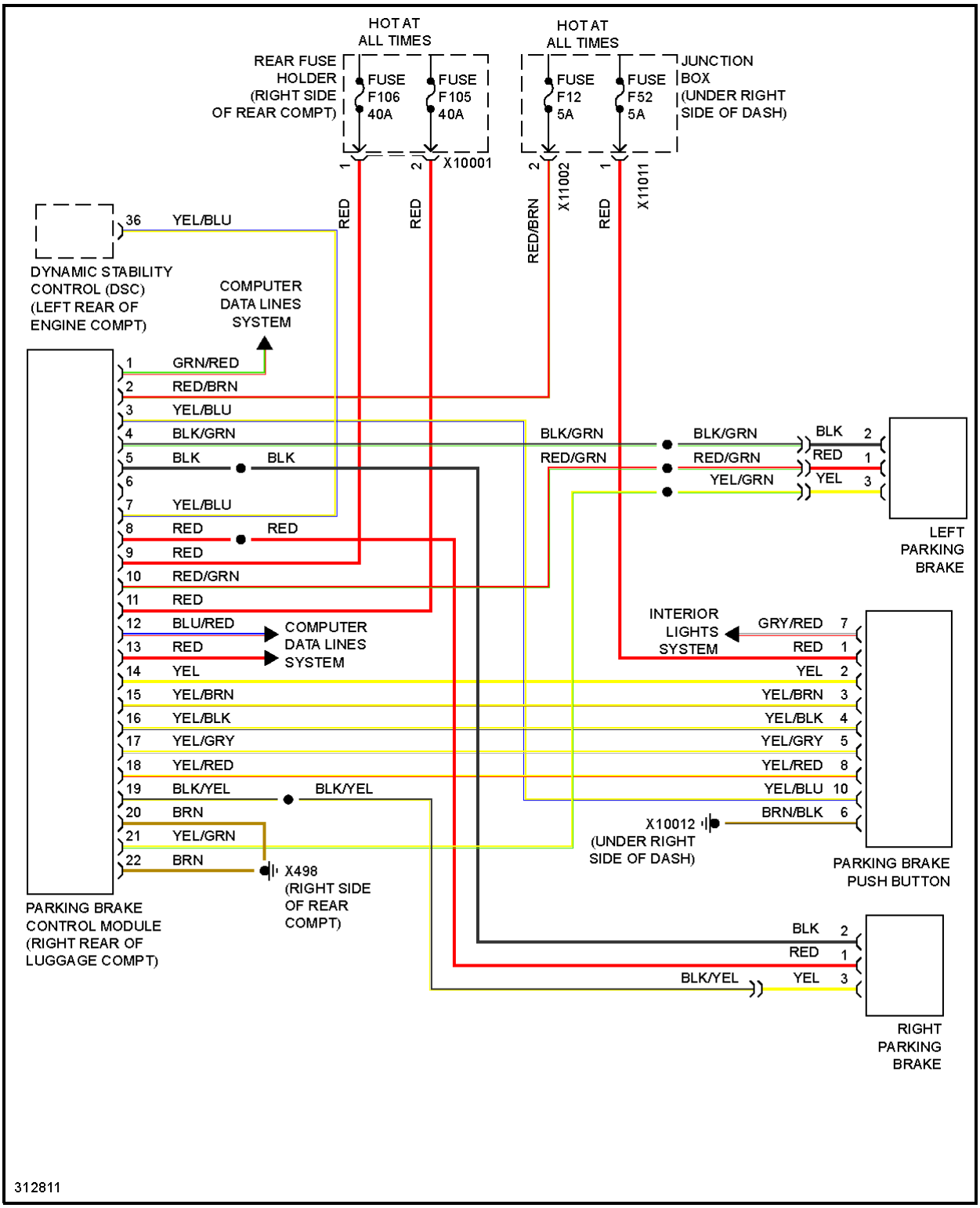

Fig. 75: Shift Interlock Circuit

STARTING/CHARGING

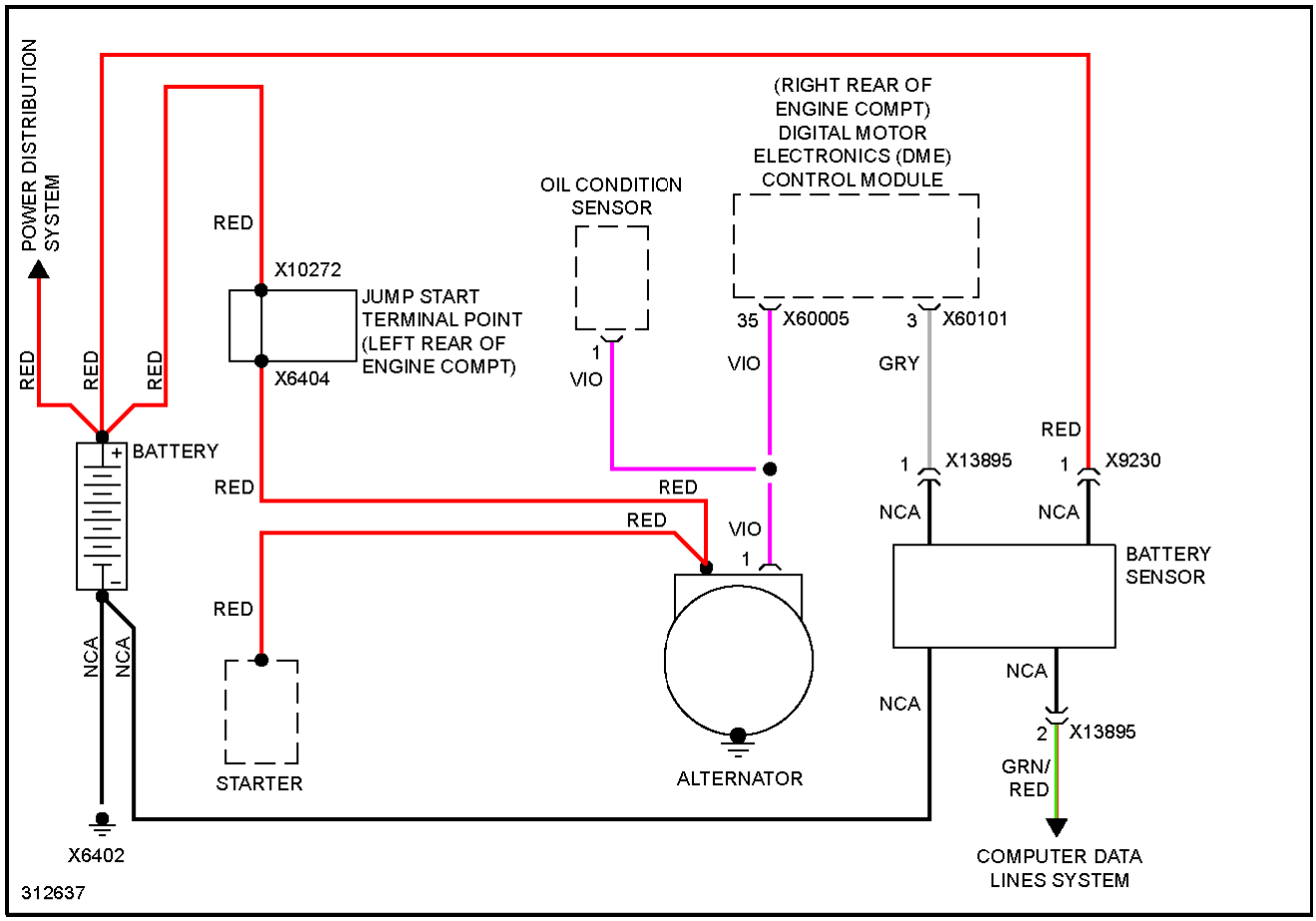

Fig. 76: Charging Circuit

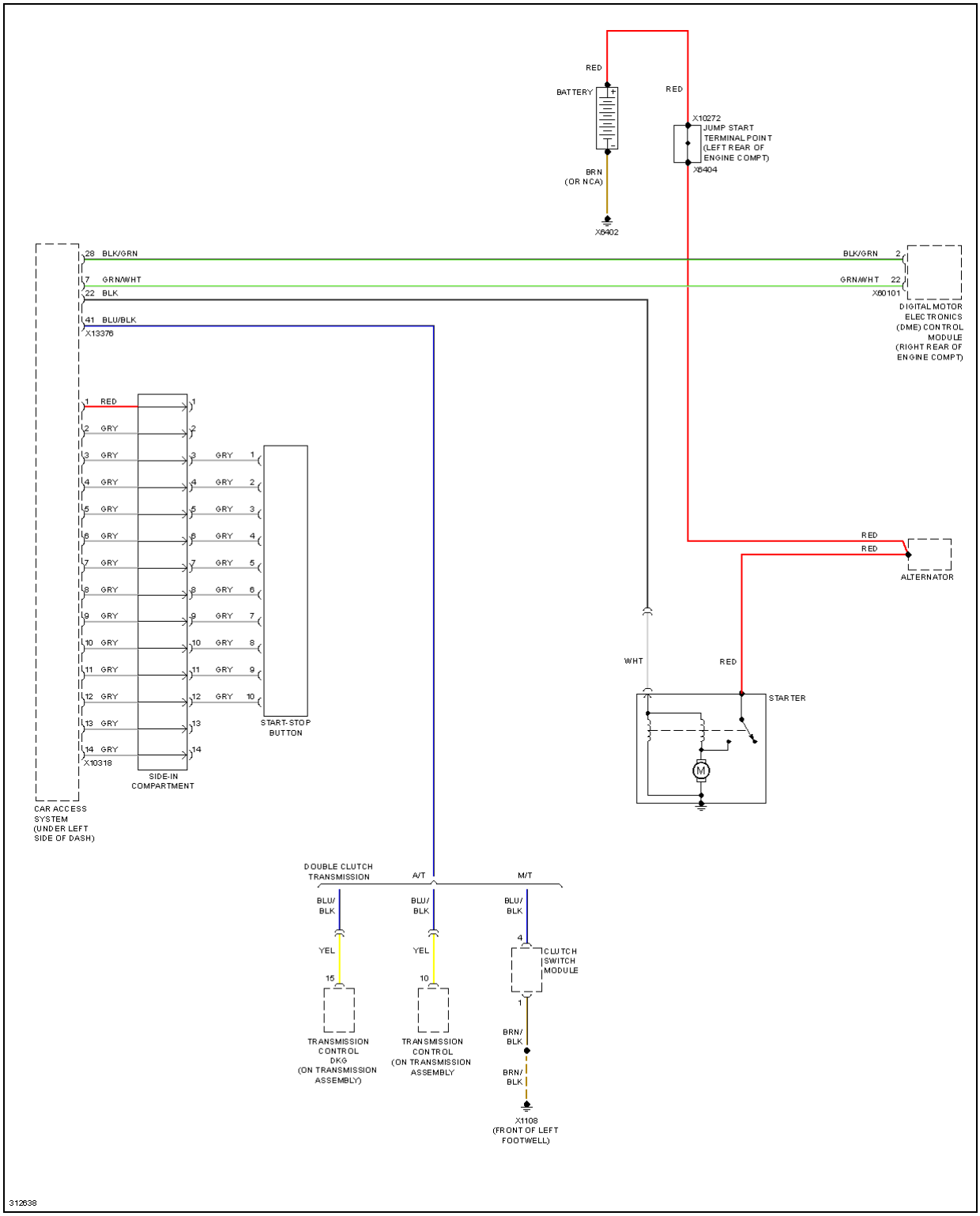

Fig. 77: Starting Circuit

SUPPLEMENTAL RESTRAINTS

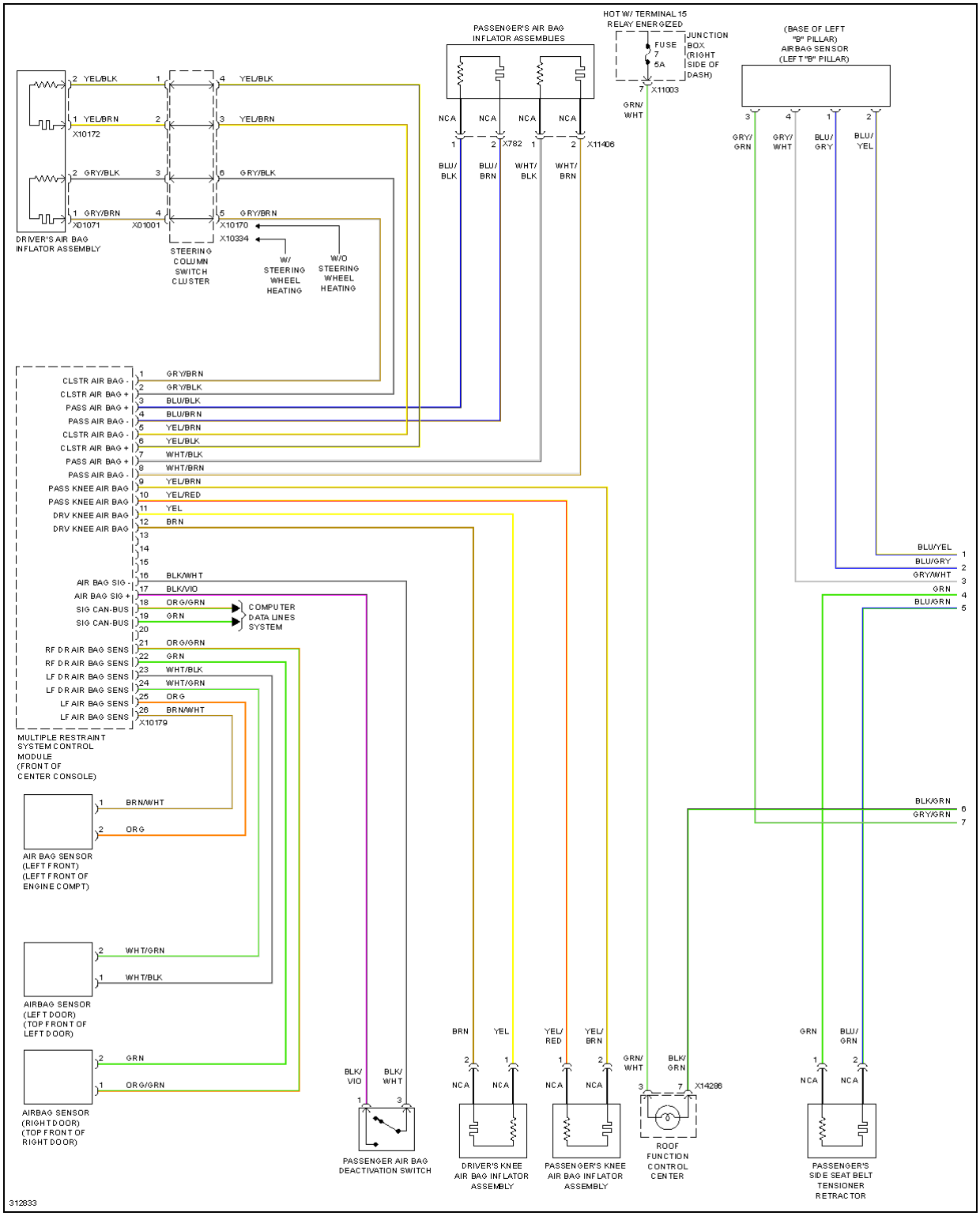

Fig. 78: Supplemental Restraints Circuit (1 of 2)

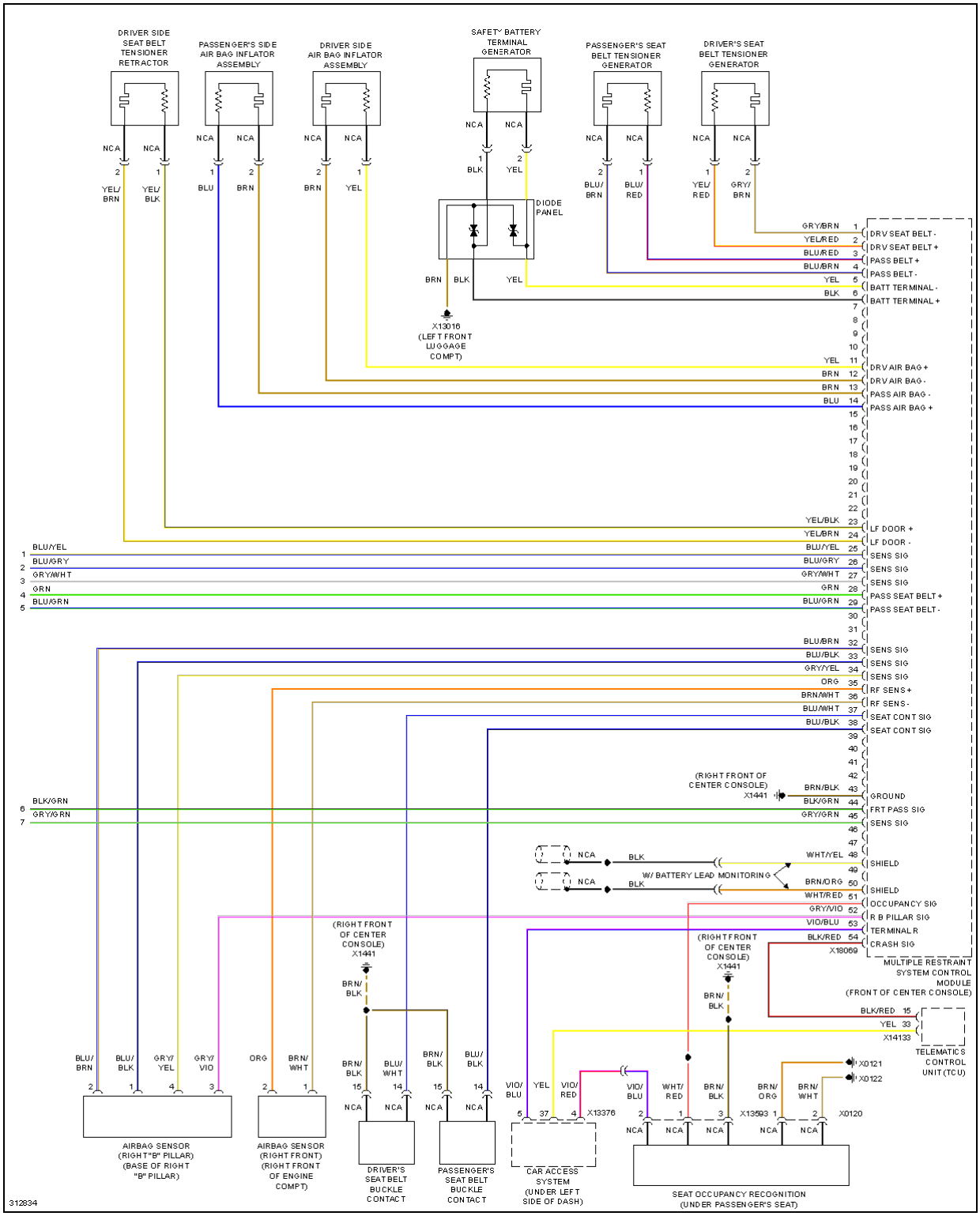

Fig. 79: Supplemental Restraints Circuit (2 of 2)

TRANSMISSION

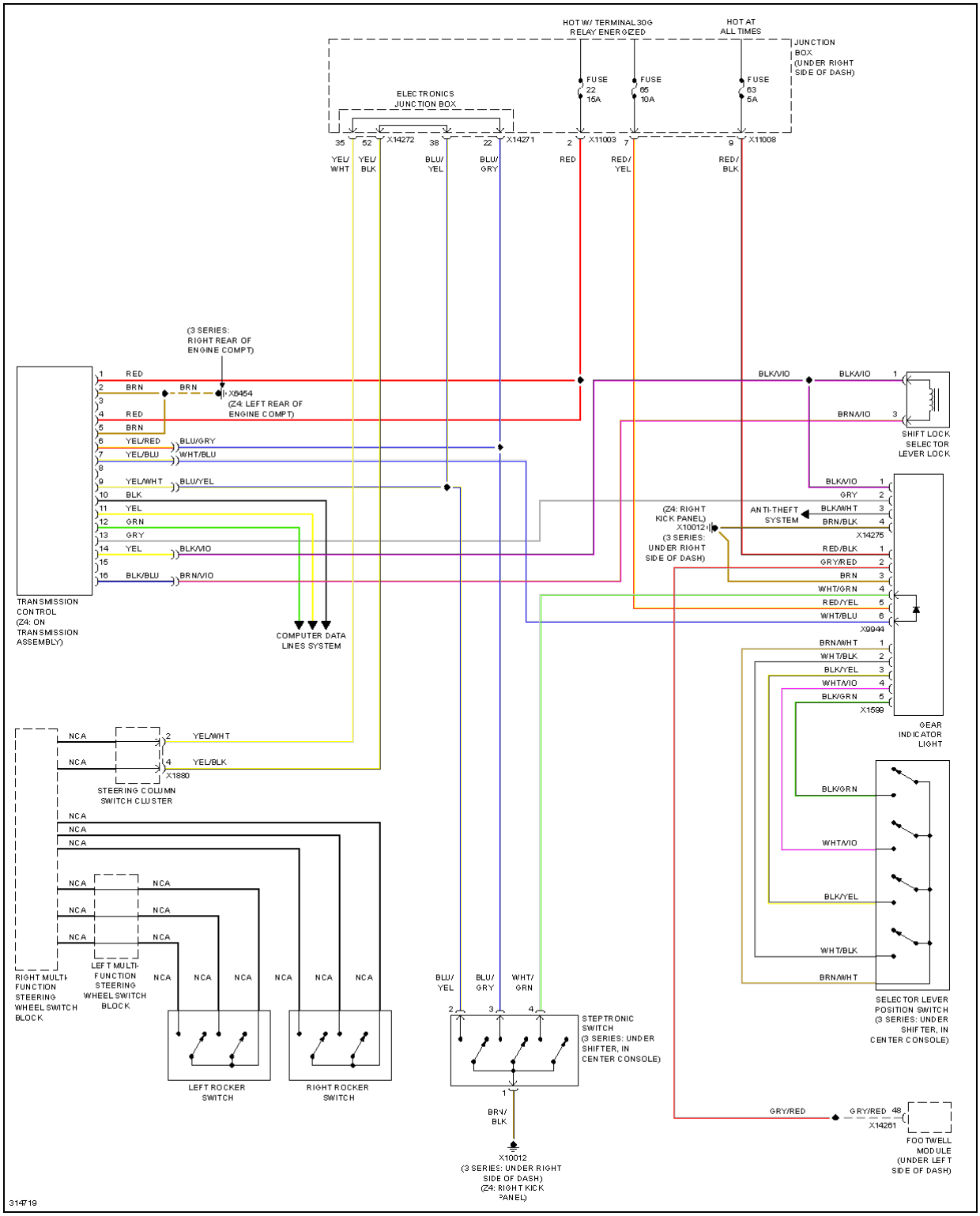

Fig. 80: A/T Circuit, W/ 6 Speed A/T

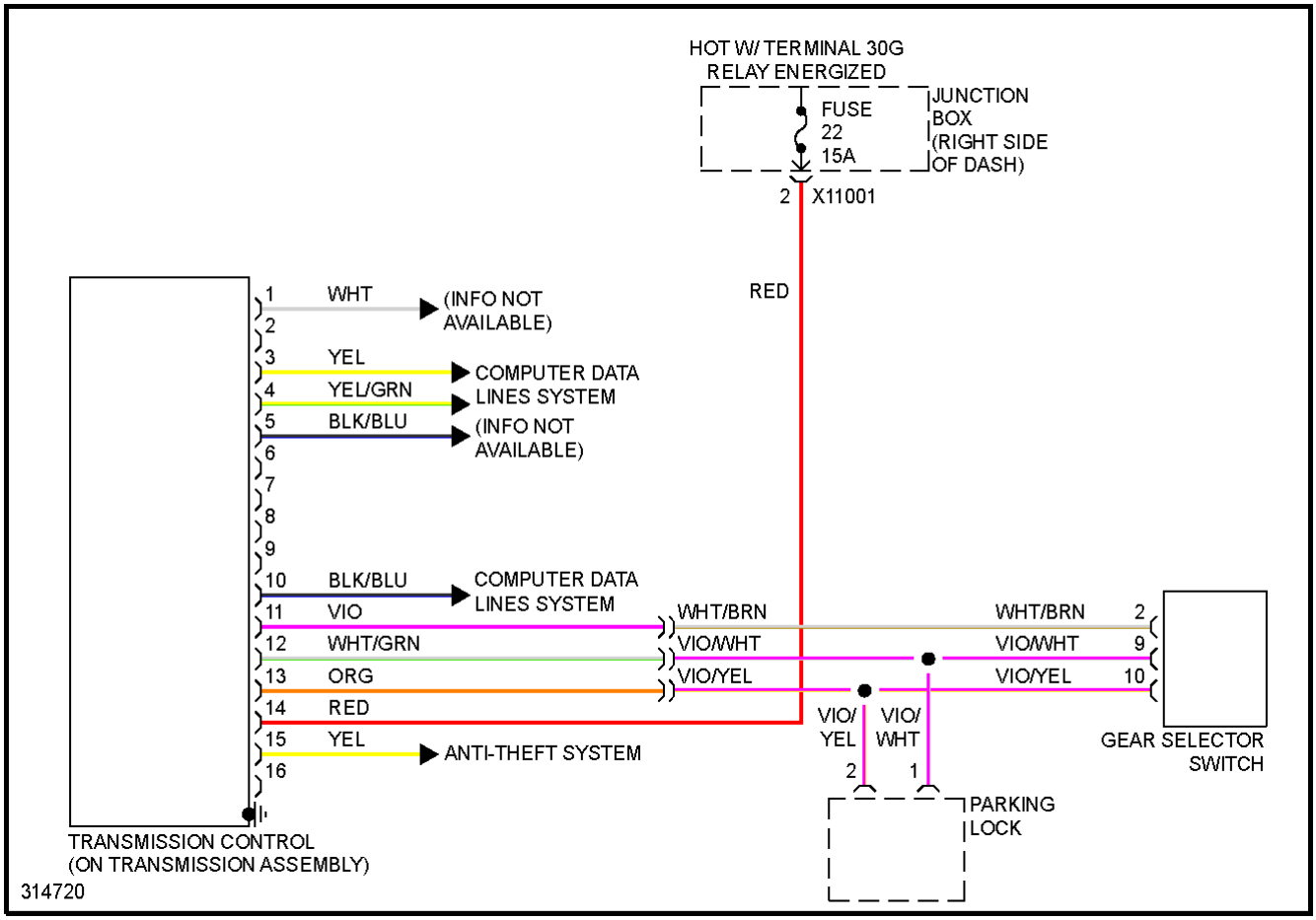

Fig. 81: A/T Circuit, W/ Dual Clutch Transmission

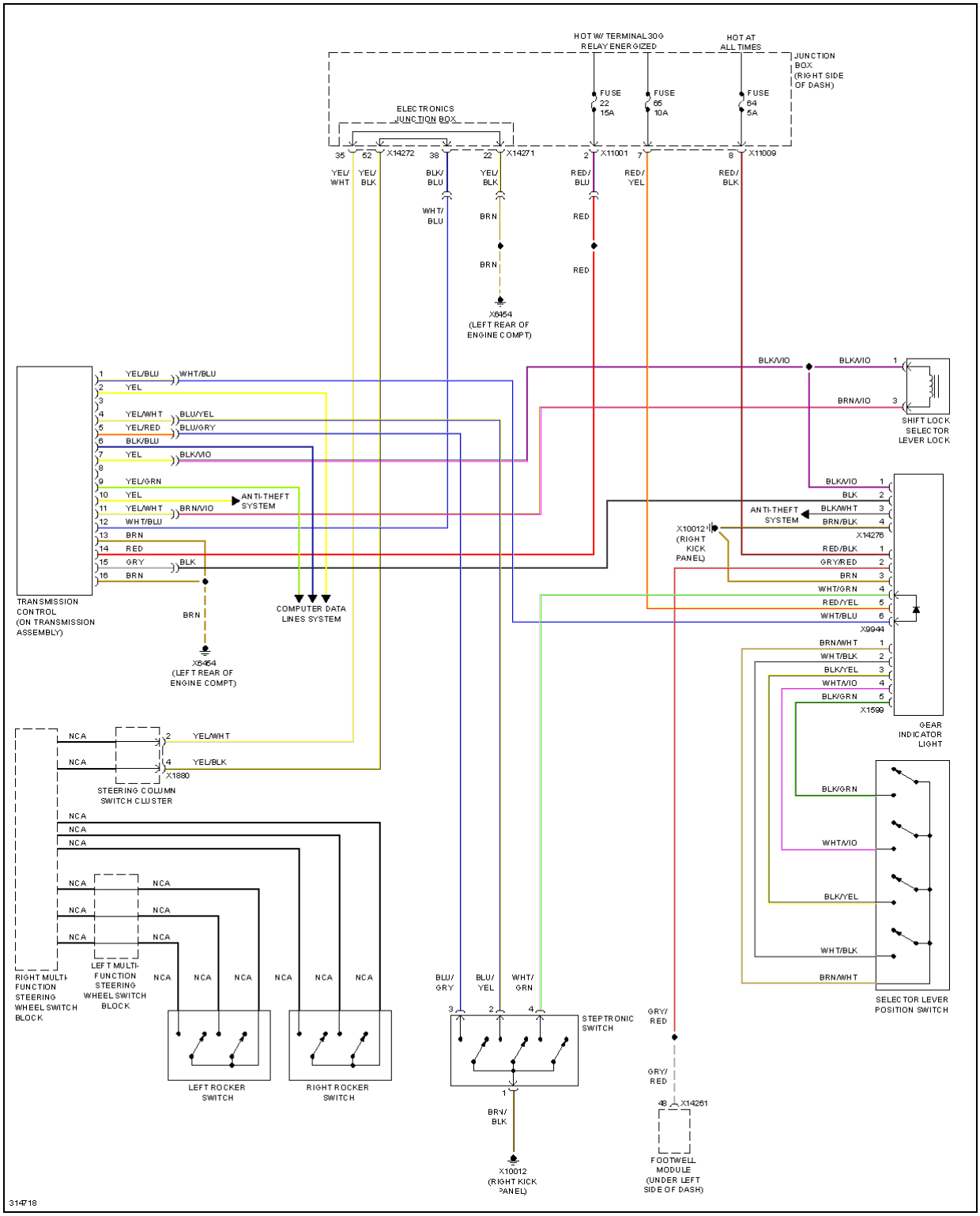

Fig. 82: A/T Circuit, W/ Electronic A/T

TRUNK, TAILGATE, FUEL DOOR

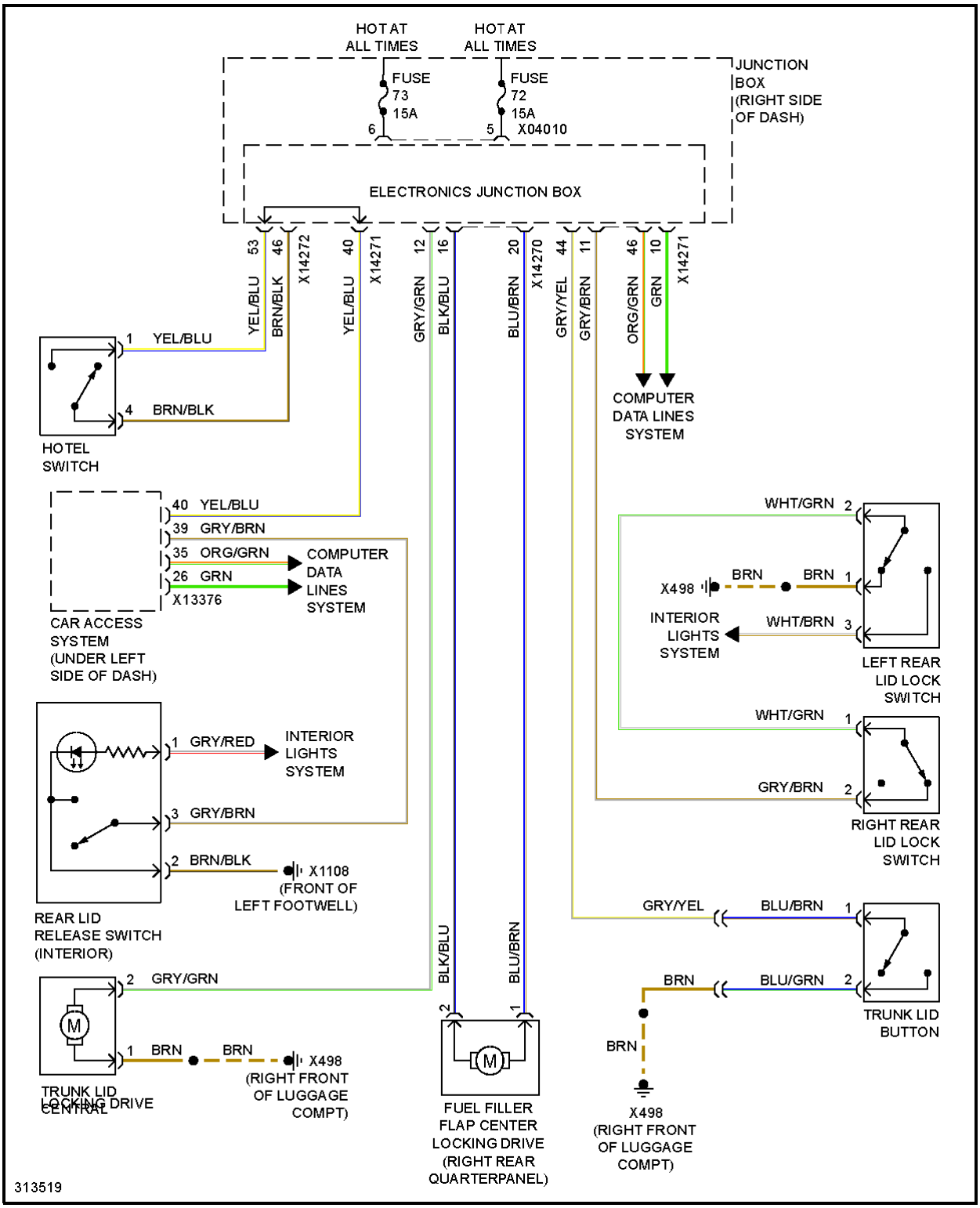

Fig. 83: Trunk & Fuel Door Release Circuit

WARNING SYSTEMS

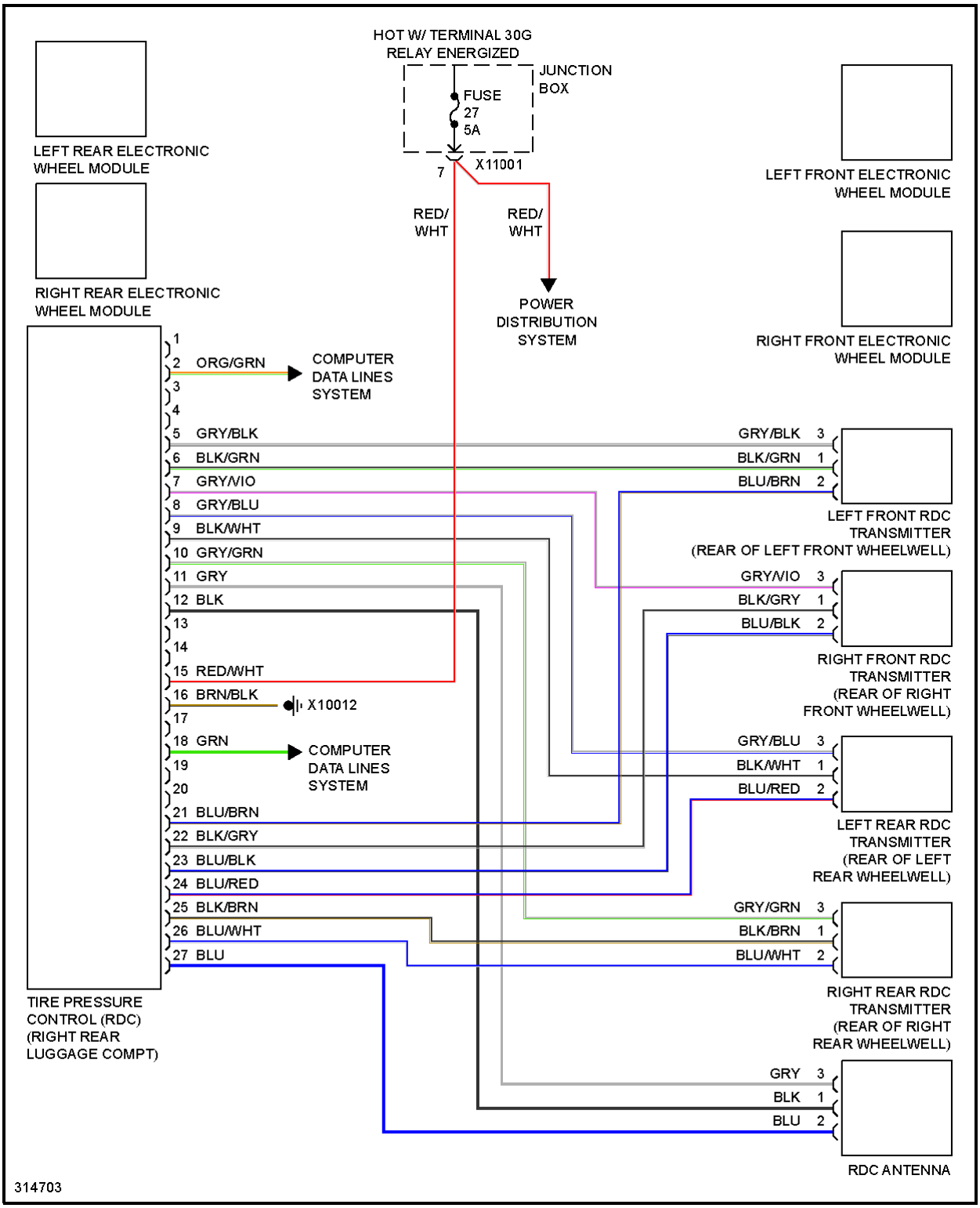

Fig. 84: Warning Systems Circuit

WIPER/WASHER

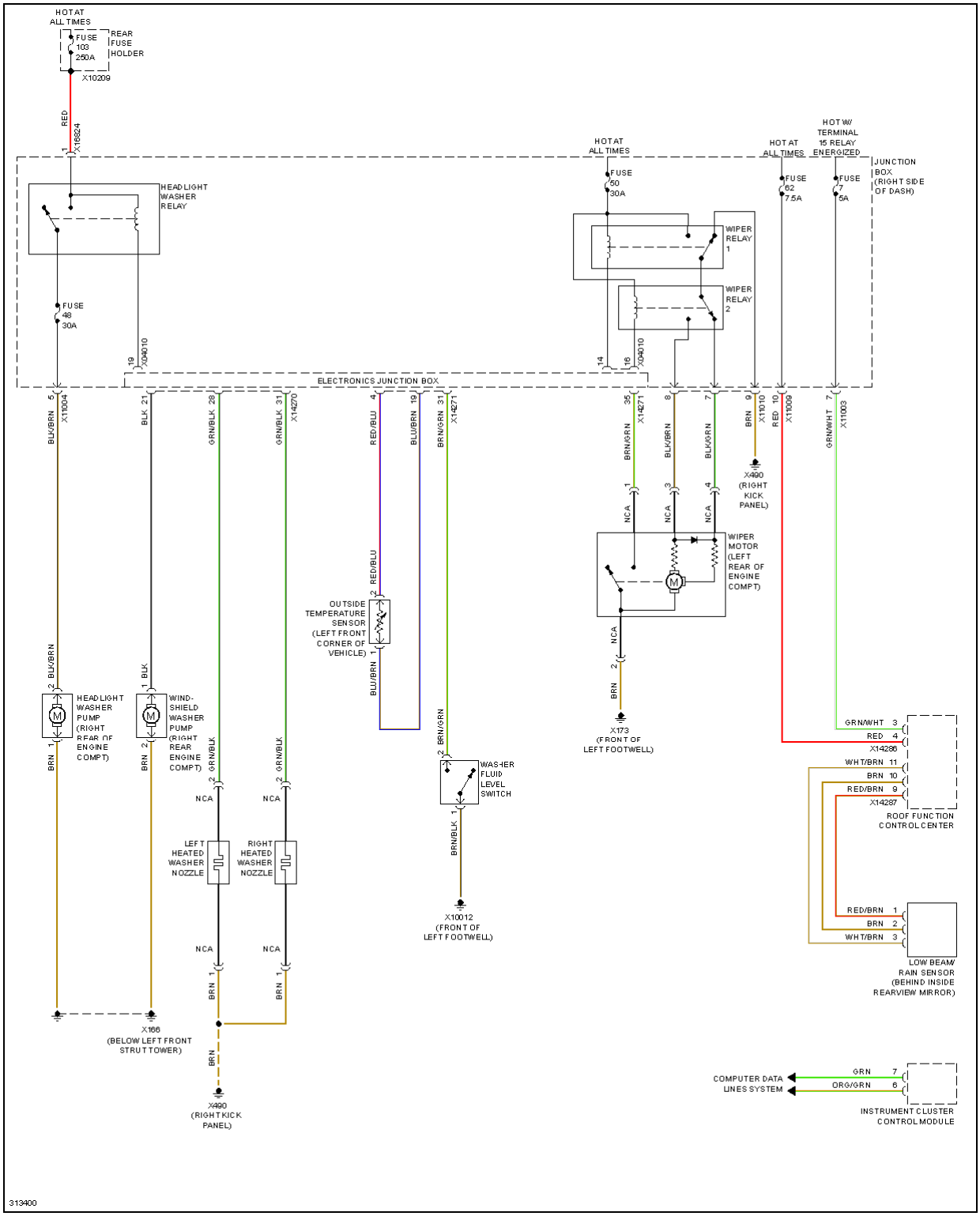

Fig. 85: Wiper/Washer Circuit