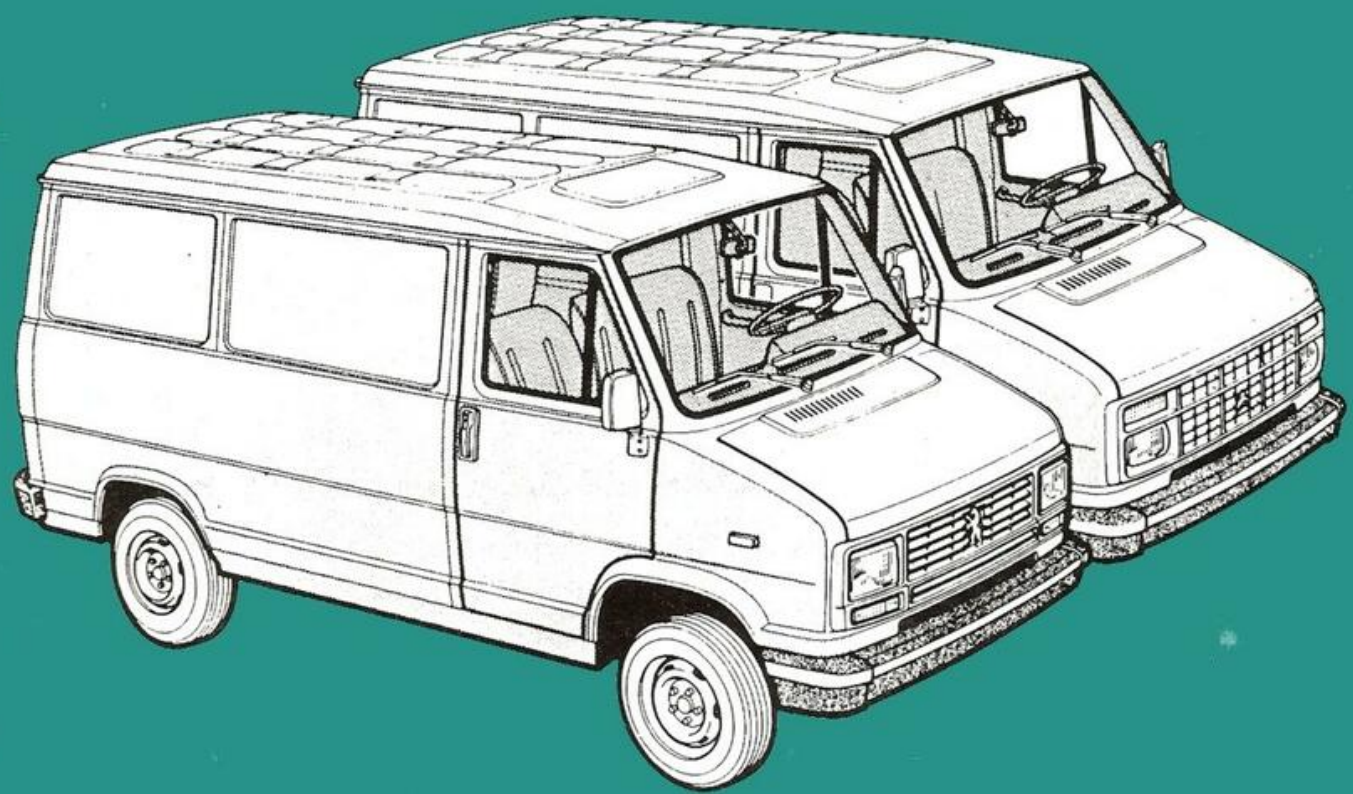
J5



CITROËN C 25 - PEUGEOT J 5

AUTOMOBILES PEUGEOT

direction des pièces et services

J5

01/90

Ref. 2835 GB.

SRWM2835

MECHANICAL

I

AUTOMOBILES PEUGEOT

direction des pièces et services

DESCRIPTION OF PAGE NUMBERING SYSTEM

		Chapter	
(Title) (Unit) (Operation)	ENGINE CYLINDER HEAD REMOVING - REFITTING	1	B4.007

Section number
1 - Engine

Component Unit Deal With

The letter identifies the unit dealt with :

- A - Complete unit
- B - Cylinder head
- C - Cylinder block - Moving parts Flywheel
- D - Sump
- E - Timing Gear
- F - Fuel system (carburettor or injection system)
- G - Ignition system
- H - Exhaust system
- J - Cooling system
- K - Lubrication system

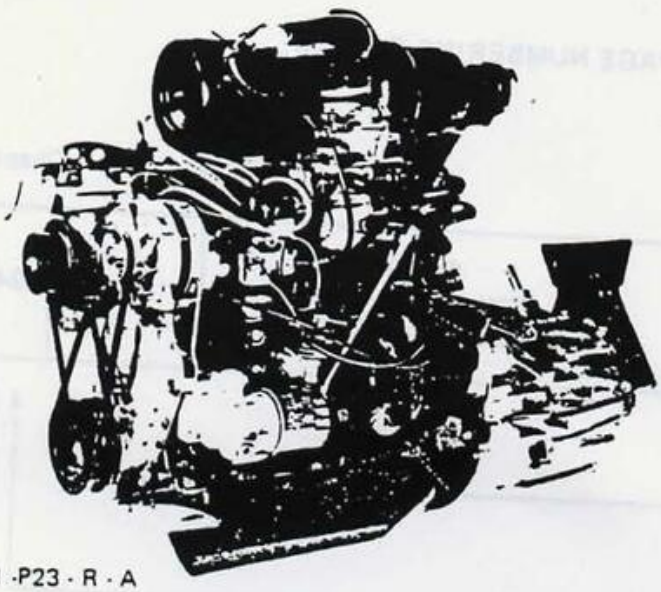
Nature of Operation

The first figure identifies the nature of the operation :

- 1 - General - identification - Specifications
- 2 - Inspection - adjustment
- 3 - Draining - filling - bleeding
- 4 - Removing - refitting
- 5 - Overhauling

The Page Number

The last three figures, within each chapter, are the page sequence number.

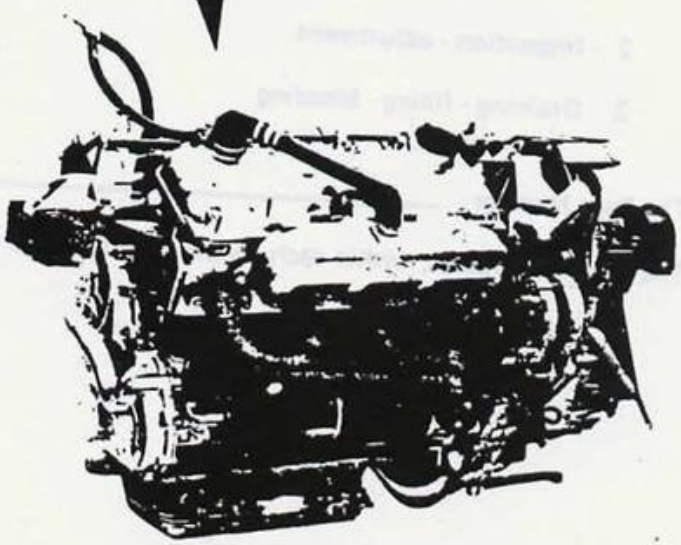


7 · 5 · 81 ·P23 · R · A

MOTEUR ESSENCE

XM7T–XN1T–XN1TA





U25·651 – U25·661 – U25·673
XUD9A

7 · 6 · 81 · P12 · R · A

Pages

A - COMPLETE ENGINE

Identificacion - data
Tuning data, repair data , tightening torques — A1.001 to 011

Removing - refitting
Removing - refitting the engine-gearbox assembly — A4.001 to 011

Overhauling
Overhauling the engine — A5.001 to 041

B - CYLINDER HEAD

Inspection - adjustments
Retightening the cylinder head - adjusting the valve clearances — B2.001 to 005

Removing - refitting
Removing - refitting the cylinder head in situ - Associated operations — B4.001 to 011

E - TMING GEAR

Removing - refitting
Removing - refitting the timing cover in situ — E4.001 to 007

F - FUEL SYSTEM

Identification - data
Carburettor, identification - data — F1.001 to 005

Checks - adjustments
Checking - adjusting the carburettor — F2.001 to 007

Removing - refitting
Removing - refitting the fuel tank - J5 4 x 4 — F4.001 to 003

G - IGNITION SYSTEM

Checks - adjustments
Checking - adjusting the ignition system in situ* — G2.001 to 013

J - COOLING SYSTEM

Identification - data — J1.001 to 003

K - LUBRICATION SYSTEM

Checks - adjustments
Checking the oil pressure — K2.001 to 003

*Refer to section 12 for checking-adjusting the ignition on a test bench.

Page

Identification - general specifications

Construction A1.002 to 003

Tuning specifications

Ignition system - carburation A1.004

Main tightening torques A1.006

Original and repair specifications A1.005 to 011

ENGINE SPECIFICATIONS

IDENTIFICATION

1 - Engine number : 1 figure + 3 letters followed by 5 figures
+ 6 figures (serial no.)
1 ABA → XM7T
1 ABT → XN1T
1 ACU → XN1TA

2 - Engine type : 169 (XM7T) 170A (XN1T) 170C (XN1TA)

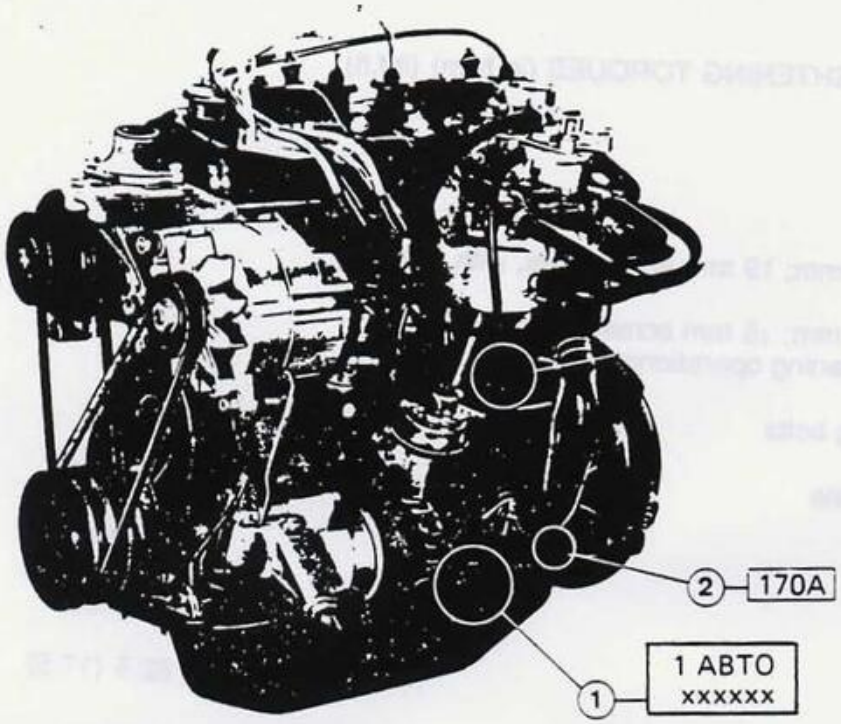
DATA

General data

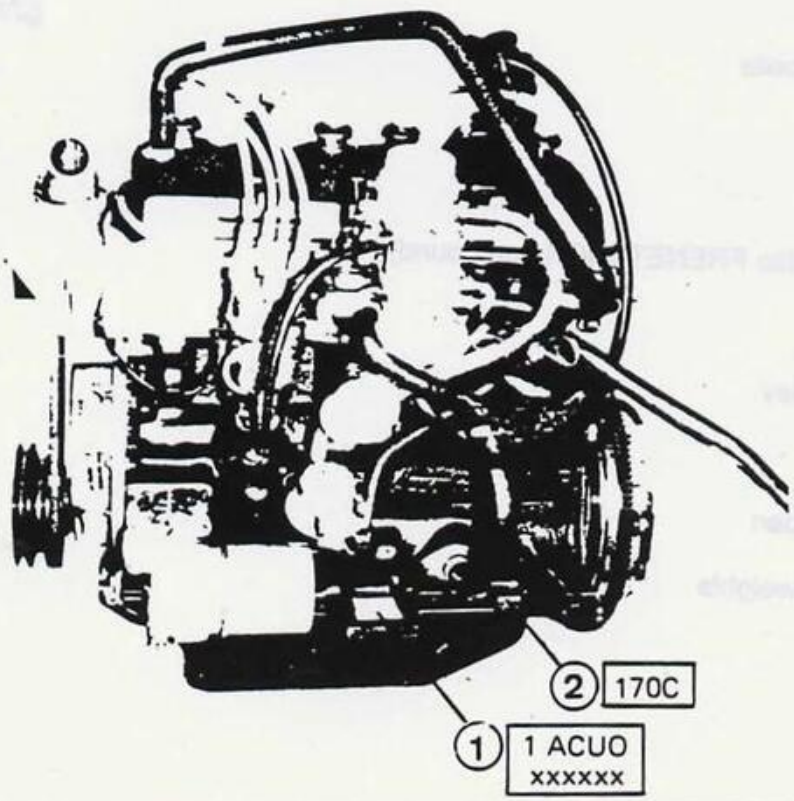
Engine type	169 (XM7-T)	170A (XN1-T)	170C (XN1-TA)
Number of cylinders	4, in line		
Position, in the vehicle	at the front, transversely mounted, inclined, forwards, at 10°30'		
Capacity	1796 cm³	1971 cm³	1971 cm³
Bore x stroke	84 x 81 mm	88 x 81 mm	88 x 81 mm
Compression ratio	7.5/1	8/1	8.8/1
FRENCH taxable horse power	10	11	
Max. power DIN - hp	69	78	85
ISO - kw	50	56.5	56.5
At a speed of	4800 rpm	5000 rpm	4750 rpm
Max. torque DIN - mKg	13.9	15.5	
ISO - m.daN	13.4	15	16
At a speed of	2300 rpm	2500 rpm	2500 rpm
Specific power DIN - hp/lit.	38.42	39.57	
ISO - Kw/lit.	27.83	28.66	

General structure

Cylinder block	cast iron
Liners	cast iron, of the wet, removable type
Pistons	light alloy with 3 piston rings
Connecting rods	forged steel
Crankshaft	forged steel, 5 bearing
Cylinder head	aluminium, with hemispherical combustion chambers
Cylinder head gasket	CURTY
Valves	8, overhead operated by rocker arms
Camshaft	side mounted
Timing gear drive	chain and sprocket



I



II

REPAIR DATA

All dimensions are given in millimetres unless otherwise stated.

CYLINDER HEAD - Aluminium with hemispherical combustion chambers.

NOMINAL HEIGHT	92.5 ± 0.15 mm
Maximum permissible bow	0.10 mm
Min. height after refacing	92.10 mm

Repair : (following removal of the cylinder head or during engine overhaul).

the cylinder head is to be tightened with the ENGINE COLD in the order shown here :

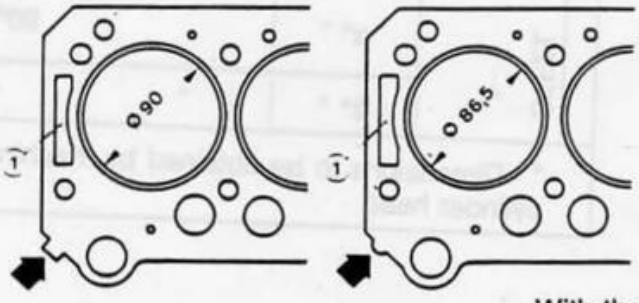
FRONT

Engine Type	Engine No.	INITIAL TIGHTENING	ENGINE WARM-UP	RETIGHTENING	At 1000/1200 mile MAINTENANCE (1500/2000 KM)
XM7-T	→ 012625	In the tightening order shown above - Pretighten to 50 N.m (37 lbf.ft) - Bolt by bolt, in the same order, tighten to 20 N.m (14.7 lbf.ft) then continue to tighten through an angle of 90° Adjust the valve clearances	Warm up the engine until the electric fan cuts in. Leave it to cool for a minimum of 6 hours.	Bolt by bolt, in the same order, with the engine cold - Loosen the bolt - Retighten to 20 N.m (14.7 lbf.ft) then continue to tighten through an angle of 90°. Adjust the valve clearances.	Bolt by bolt, in the same order, (with the engine cold) - Loosen the bolt - Retighten to 20 N.m (14.7 lbf.ft) then continue to tighten through an angle of 90°. Adjust the valve clearances.
XN1-T	→ 021874				
XN1-T	↔ 021875 → 031998				
XM7-T	↔ 012626	In the same order - Pretighten the bolts to 50 N.m (37 lbf.ft) - bolt by bolt, in the same order, loosen each bolt, retighten it to 20 N.m (14.7 lbf.ft) then continue to tighten through an angle of 180°. Ajust the valve clearances.	Warm up the engine until the electric fan cuts in.	Whatever the engine temperature, bolt by bolt, in the same order, tighten each bolt through an additional 35°. Adjust the valve clearances (with the engine cold).	No cylinder head retightening operation. Adjust the valve clearances (with the engine cold).
XN1-T	↔ 031999				
XN1-TA					

CYLINDER HEAD GASKET

Make : CURTY

Identification : XN1-T, XN1-TA — XM7-T



Thickness : 1.3 to 1.5 mm

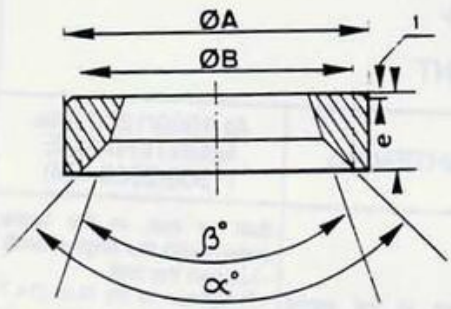
Position : Inscription, on the upper surface, visible
With the rectangular cut-out (1) at the same end as the coolant pump

VALVE SEATS

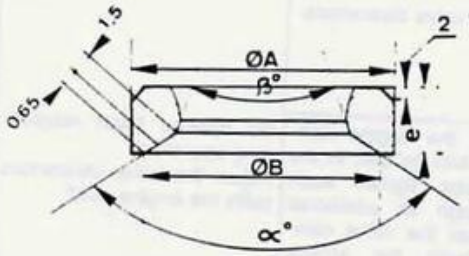
Nominal seat angle

INLET	EXHAUST
120°	90°

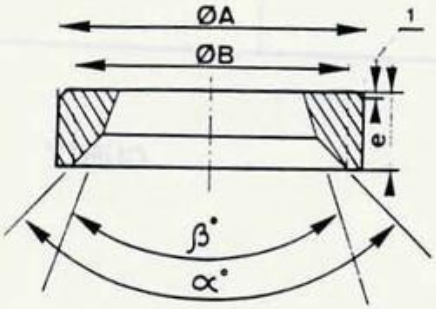
Inlet XM7-T



Inlet XN1-T (venturi seats)



Exhaust



			INITIAL SIZES 1	INITIAL SIZES 2	REPAIR SIZES 1	REPAIR SIZES 2	TOLERANCES FOR FITS
INLET	CAST IRON	Ø A	43.51	43.71	43.85	44.01	+ 0.161 + 0.136
		Ø in cyl. head	43.50	43.70	43.80	44	± 0.025
		✕	engine XM7-T		engine XN1-T XN1-TA		
		Ø B *	41		41		
		e *	7.33 + 0.1 0		10.257 ± 0.05		
		α° *	120° - 15' 0		120° - 15' 0		
		β° *	17°		70°		
EXHAUST	CAST IRON XN1-T ⊣ 11/83 XM7-T ⊣ 4/85	Ø A	37.01	37.21	37.31	37.51	+ 0.137 + 0.112
		Ø in cyl. head	37	37.20	37.30	37.50	± 0.025
		Ø B *	35				
		e *	6.462 + 0.1 0				
		α° *	90° - 15' 0				
		β° *	15°				
	STEEL XN1-T 7/83 ⊣ 11/83	Ø A	38.01	38.21	38.31		+ 0.137 + 0.112
		Ø in cyl. head	38	38.20	38.30		± 0.025
	STEEL XM1-T ⊢ 11/83 XM7-T ⊢ 4/85 XN1-TA	Ø A	37.01	37.21	37.31	37.51	+ 0.137 + 0.112
		Ø in cyl. head	37	37.20	37.30	37.50	± 0.025
		Ø B *	35				
		e *	6.462 + 0.1 0				
		α° *	90° - 15' 0				
		β° *	15°				

* - Dimensions to be obtained by machining after fitting to the cylinder head

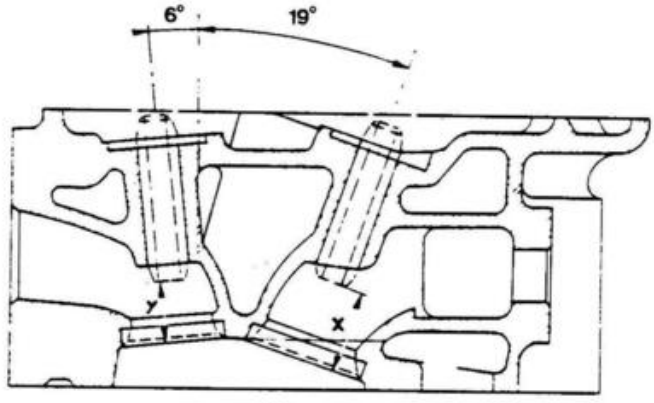
VALVE GUIDES - Cast iron

	INITIAL SIZES		REPAIR SIZES	
	1	2	1	2
Length	58,4 ± 0,3		55,4 ± 0,3	
Outside ø guide	14,02 $^{+0,039}_{+0,029}$	14,035 $^{+0,039}_{+0,029}$	14,29 $^{0}_{-0,011}$	14,59 $^{0}_{-0,011}$
ø location in cyl. head	13,965 $^{+0,032}_{0}$	14,13 $^{+0,032}_{0}$	14,195 $^{+0,032}_{0}$	14,495 $^{+0,032}_{0}$
Inside ø guide	8,02 $^{+0,022}_{0}$		8,02 $^{+0,022*}_{0}$	

* supplied ø 7.4 $^{+0.022}_{0}$ to be reamed-out after fitting to cylinder head

IMPORTANT - If one of the valve guides has to be replaced, one must replace all 8 guides and all 8 valves.

	X : INLET	Y : EXHAUST
Distance from guide to seat	31.5	21.3



EXHAUST INLET

VALVES

	INLET	EXHAUST
Inclination	19° ± 5'	6° ± 5'
Stem ø	8,02 $^{-0,025}_{-0,047}$	8 $^{-0,025}_{-0,040}$
Head ø	42,5 ± 0,2	35,5 ± 0,2
Length	118,25	112
Seat angle	120° $^{+25'}_{0}$	90° $^{+25'}_{0}$

VALVE SPRINGS

Number and position	8 inner		8 outer	
Wire ø	3		4.3	
Identification	Painted white			
Correct way round	either			
Free height	39.6		44	
Direction of winding	left hand		right hand	
Checking height	35.9	26.8	39.8	30.7
- under a load of (Newtons)	8.8	30	17	59

CAMSHAFT

Number of bearings	3, pressure lubricated
End flat	0.05 to 0.14
Max. run-out	0.02

TIMING GEAR DRIVE

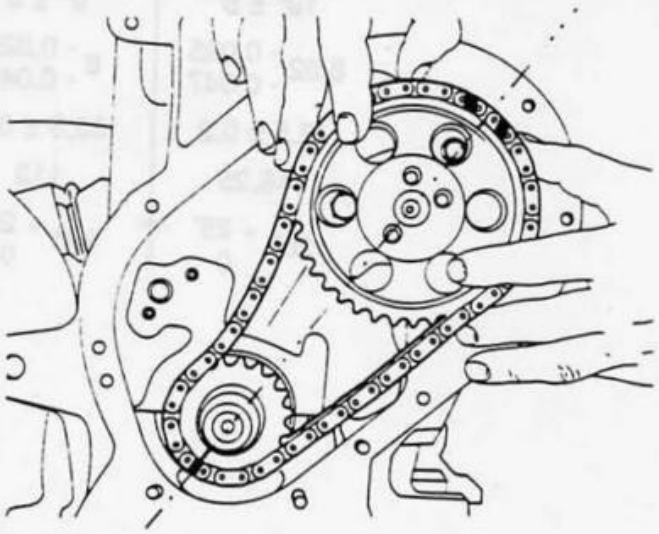
Double roller chain	58 links
Number of teeth on crankshaft sprocket	19
Number of teeth on camshaft sprocket	38
Hydraulic tensioner	RENOLD or SEDIS

Timing diagram (at a theoretical valve clearance of 0.7 mm)

XM7-T/XN1-T	
Inlet opens ATDC	6°
Inlet closes ABDC	33°
Exhaust opens BBDC	21°
Exhaust closes ATDC	6°

XN1-TA	
Inlet opens BTDC	2°
Inlet closes ABDC	35°
Exhaust opens BBDC	34°
Exhaust closes ATDC	4°30'

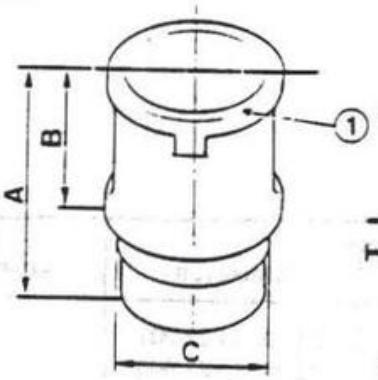
Timing adjusted by timing marks on chain and sprockers.



Actual valve clearances on a cold engine	
inlet	exhaust
0.10 mm	0.25 mm

CYLINDER BLOCK - Cast iron

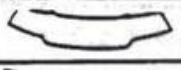
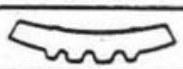
Height of block	285,9 ± 0,15
Height between cylinder head gasket face and liner locating flange	90 $^{+\ 0,045}_{-\ 0,015}$



LINERS - Centrifugally cast iron

Type	(1) wet, removable, compressed
Overall height (dimension A)	136,2 $^{0}_{-1}$
Height to locating flange (dimension B)	⇥ 11/83 90.005 ↦ 11/83 89.985 } ± 0,025
Lower locating ø (dimension C)	93 $^{-\ 9,02}_{-\ 0,08}$
Liner protrusion (above cylinder block)	0.07 to 0.14 as near as possible to 0.14
Difference between any 2 adjacent liners	0,04
Maximum ovality and taper	0,03

Seals made from paper and white synthetic fibre ⇥ 07/85 ; Steel, plated with aluminium.

HIGHEST POINT ON LINER, WITHOUT SEAL	LINER SEAL TO BE FITTED			
	⇥ 07/85 : Paper	Thickness		↦ 07/85 : Steel
+ 0,039 to + 0,045		0,07	0,10	
+ 0,014 to + 0,038		0,085	0,12	
- 0,006 to + 0,018		0,105		
- 0,095 to - 0,007		0,130	0,15	

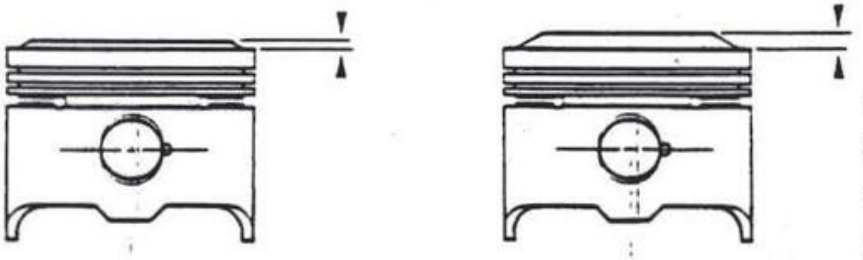
Liner/piston matching

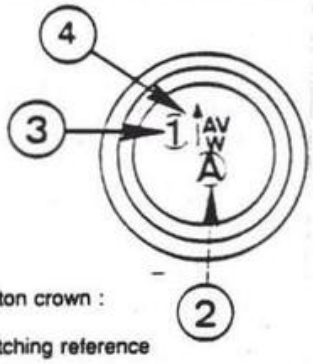
	PISTON ø	PISTON REFERENCE	LINER I.D.	LINER REFERENCE (1)	NOMINAL CLEARANCE
ENGINES XM7-T	83,930 to 83,941	A	84,000 to 84,011	1 line	0,06 to 0,08
	83,942 to 83,952	B	84,012 to 84,022	2 lines	
	83,953 to 83,963	C	84,023 to 84,033	3 lines	
	83,064 to 83,974	D	84,034 to 84,044	4 lines	
ENGINES XN1-T	87,925 to 87,936	A	88,000 to 88,011	1 line	0,06 to 0,08
	87,937 to 87,947	B	88,102 to 88,022	2 lines	
	87,948 to 87,958	C	88,023 to 88,033	3 lines	
	87,959 to 87,969	D	88,034 to 88,044	4 lines	

PISTONS - Light alloy.

	XM7-T	XN1-T - XN1-TA
Nominal ø	84	88

XN1-T 0,51 XN1-TA 2,98





References on piston crown :

(2) liner/piston matching reference

(3) piston/gudgeon pin matching reference

(4) arrow to point towards timing gear

ENGINE
COMPLETE UNIT
IDENTIFICATION - SPECIFICATIONS

GUDGEON PINS - Case hardened, heat treated steel

Nominal diameter	23
Length	74
Fit	Free running in both piston and connecting rod Retained in piston by 2 circlips

Piston and Gudgeon Pin Matching

PIN			PISTON	
REFERENCE		DIAMETER	REFERENCE (3)	DIAMETER
(Dab of paint)	blue	23.005 to 23.001	1	23.009 to 23..005
	white	23.001 to 22.996	2	23.005 to 23.000
	red	22.996 to 22.992	3	23.000 to 22.995

PISTON RINGS

Number : 3

	SPECIFICATIONS	THICKNESS	GAP
1 "firing" ring	barrel section	1.5 mm	0.20 to 0.50 mm
1 "compression" ring	taper*	2.0 mm	0.40 to 0.55 mm supplied to correct fit
1 "scraper" ring	with expander	3.96 mm	0.25 to 0.40 mm

*** Fitted with inscription upwards**

CONNECTING RODS



Material	Forged steel
Between centres dimension	132 ± 0.07
Big-end diameter without shells	$\varnothing\ 53.655\ ^{+0.019}_{0}$

Direction of fitting connecting rod to piston

SMALL-END BUSH

Length	27

Outside Ø

INITIAL SIZE	REPAIR SIZE
$24.408\ ^{+0.068}_{+0.035}$	$24.708\ ^{+0.068}_{+0.065}$

- supplied under size
- to be reamed-out to provide a clearance of 0.04 to 0.08 when the gudgeon pin is fitted

Inside Ø $23.005\ ^{+0.013}_{0}$

BIG-END SHELLS

Material	Steel plus antifriction metal facing
Width	$23.40\ ^{0}_{-0.25}$
Thickness	1.815 ± 0.003

For repair size shells (see section dealing with crankshaft).

CRANKSHAFT

Material: forged steel

Number of bearings: 5

MAIN BEARING JOURNALS

		CLUTCH END I	LH INTER. II	CENTRE III	RH INTER. IV	TIMING GEAR END V
INITIAL SIZE	ø	54,92 $^{-0}_{-0,015}$	56,165 $^{-0}_{-0,025}$	57,189 $^{-0}_{-0,015}$	58,573 $^{-0}_{-0,025}$	59,416 $^{-0}_{-0,015}$
	Width	37 + 0,07	30 $^{+0,3}_{-3}$	38 $^{+0,3}_{-0}$	30 $^{+0,3}_{-0}$	38 ± 0,35
REPAIR SIZE	ø	54,62 $^{-0}_{-0,015}$	55,865 $^{-0}_{-0,025}$	56,889 $^{-0}_{-0,015}$	58,273 $^{-0}_{-0,025}$	59,116 $^{-0}_{-0,015}$

MAIN BEARING SHELLS

	Material	aluminium - tin				
	Width	29,35 $^{-0}_{-0,25}$	21,50 $^{-0}_{-0,25}$	29,5 $^{-0}_{-0,25}$	21,5 $^{-0}_{-0,25}$	29,5 $^{-0}_{-0,25}$
INIT. SIZE	Thickness	1,885 ± 0,003				
REP. SIZE		2,035 ± 0,003				

Arrangement	Earlier assembly (crankshaft with plugs)	Later assembly (crankshaft without plugs)
	Grooved shells on bearings I, III, V Ungrooved shells on bearings II and IV	Grooved 1/2 shells on block side Ungrooved 1/2 shells on cap side

CRANK PINS

	INITIAL SIZE		REPAIR SIZE	
Width	ø	Thickness of big-end shells	ø	Thickness of big-end shells
30,05 $^{+0,2}_{-0}$	50 $^{-0}_{-0,016}$	1,815 ± 0,003	49,7 $^{-0}_{-0,016}$	1,965 - 0,003

Journal at clutch end	INITIAL	REPAIR 1	REPAIR 2	REPAIR 3
Width	37 + 0,07	37,10 $^{+0,007}_{+0,002}$	37,15 $^{+0,007}_{+0,002}$	37,20 $^{+0,007}_{+0,002}$

Crankshaft end float

The end float of 0.08 to 0.20 mm is obtained by varying the thickness of 4 half flanges fitted on either side of the bearing journal at the clutch end.

- on the inner side : 2 half flanges 2.30 mm thick.
- on the outer side : select 2 half flanges from amongst the following thicknesses : 2.30 - 2.35 - 2.40 - 2.45 - 2.50 mm.

When fitting, place the lubrication grooves against the crankshaft.

SPECIAL TOOLS

SPECIAL TOOLS

Fig. A :

Engine lifting fixture 8.0102 Y comprising :

D - Sling bar

F - Long hook (clutch end)

G - Short hook (water pump end).

Fig. B :

From petrol engine tool kit 8.0110 :

T - Power unit assembly lifting lug, to be fitted at water pump end.

U - Lug to be fitted at clutch end.

Figs. C and D :

Power unit assembly support fixture 8.0151 comprising :

A - Diesel or petrol engine cradle.

B - Intermediate support for petrol engines.

TIGHTENING TORQUES

4 bolts securing left hand engine mounting bracket to intermediate
5 mdaN 50 Nm 37 lbf ft

1 nut securing right hand engine mounting bracket to rubber pad
5.5 mdaN 55 Nm 40 lbf ft

3 bolts securing right hand engine mounting bracket to water pump
5 mdaN 50 Nm 37 lbf ft

1 rear lower mounting pin
5.5 mdaN 55 Nm 40 lbf ft

1 engine to gearbox securing bolt
9 mdaN 90 Nm 66 lbf ft

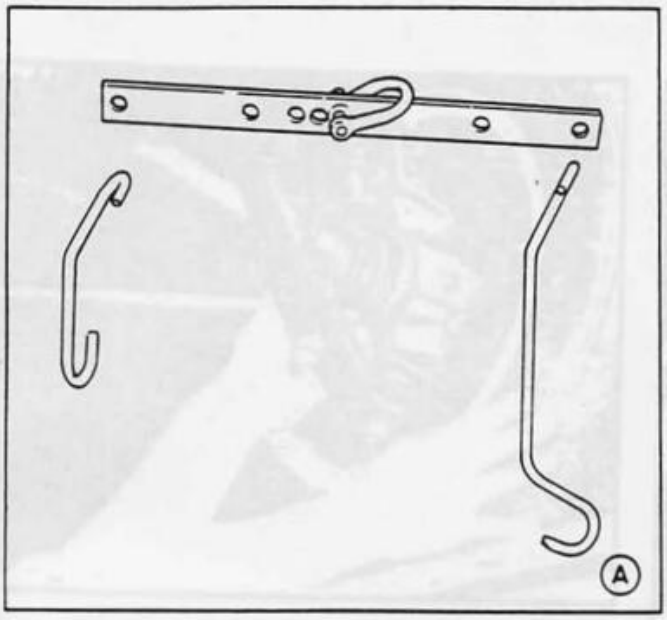
4 bolts securing the lower ball joint casing to the swivel 5 mdaN 50 Nm 37 lbf ft

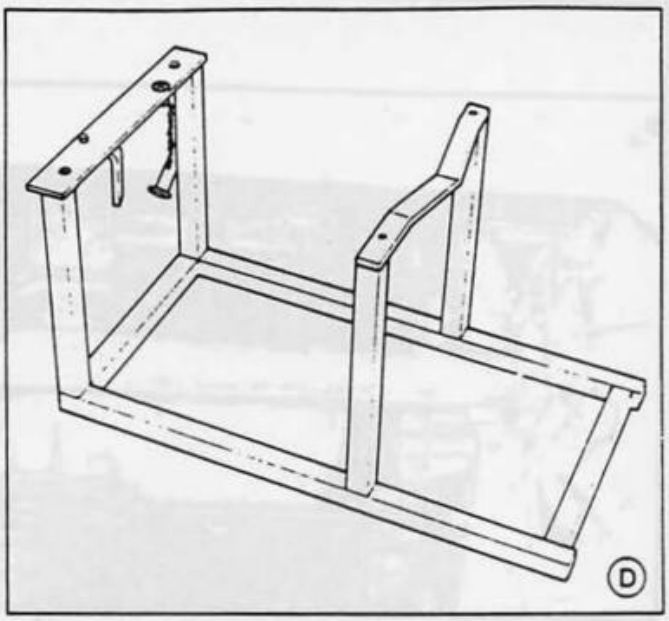
2 bolts securing the track rod arm to the swivel 12.5 mdaN 125 Nm 92 lbf ft

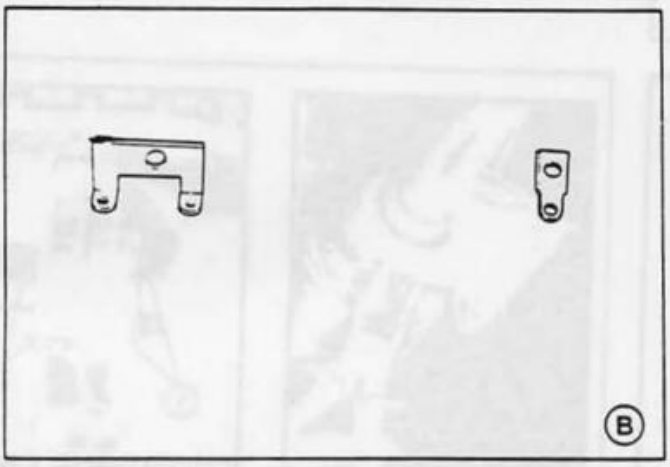
3 bolts securing the drive shaft bearing to the cylinder block
3 mdaN 3 Nm 22 lbf ft

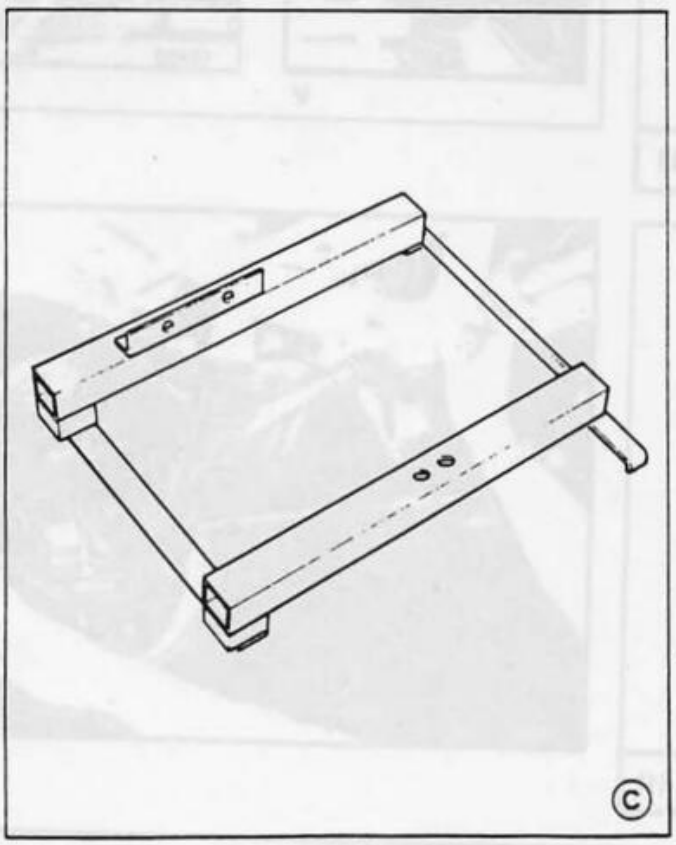
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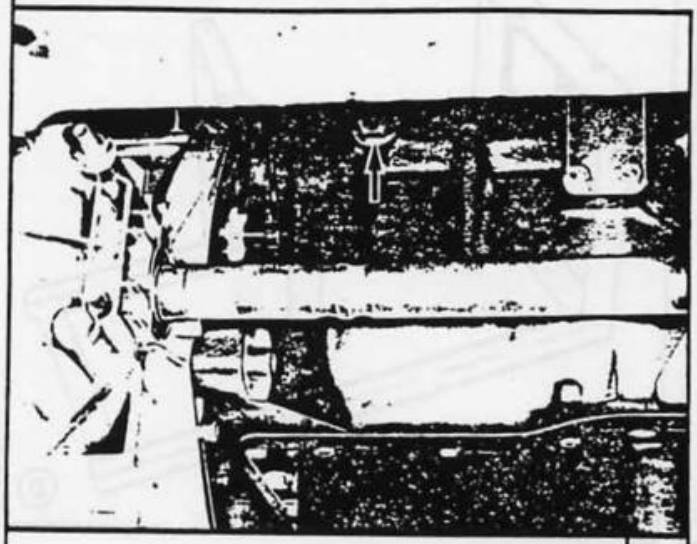
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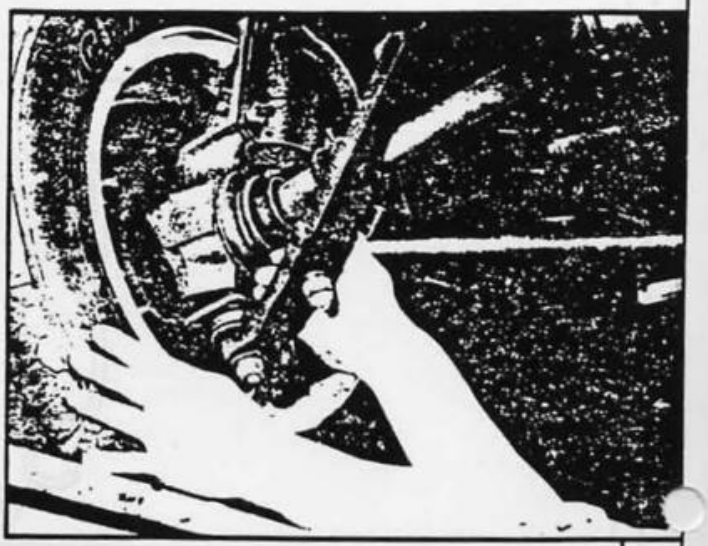




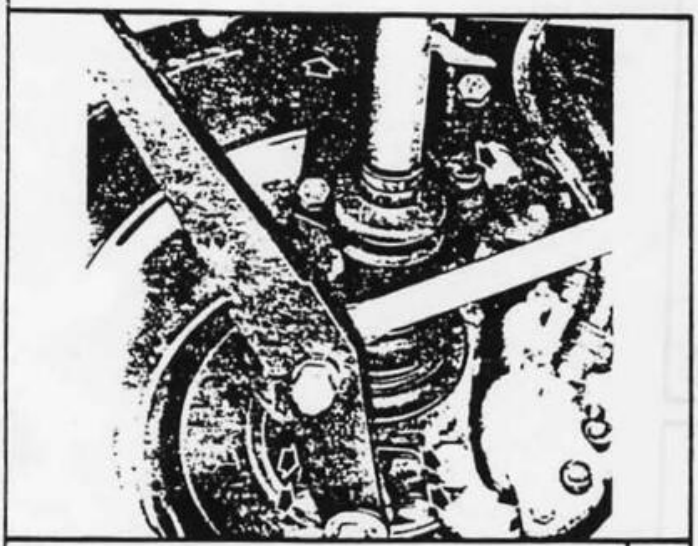




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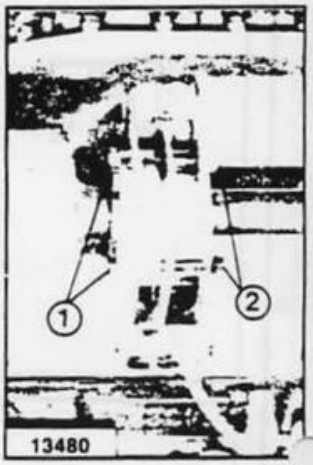
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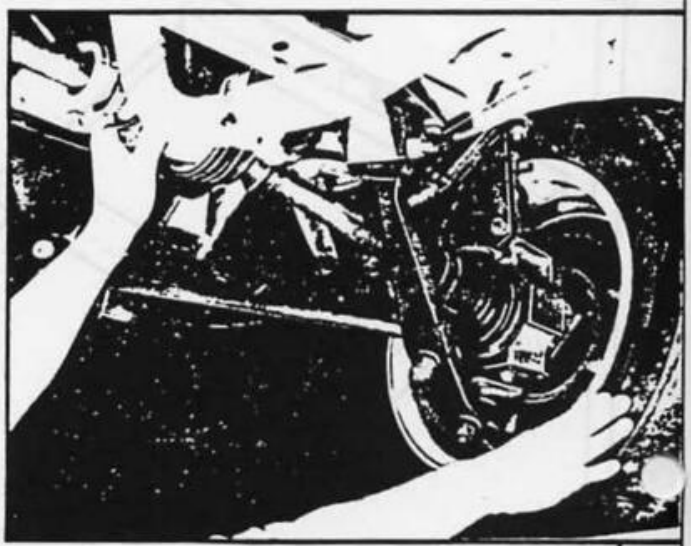
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VI



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VII

SPECIAL POINTS TO BE NOTED DURING REMOVAL

- The power unit assembly is to be removed with the wheels hanging free, preferably on a lift.
- It is not necessary to drain the unit (engine or gearbox) not affected by the repair operations.
- Do not disconnect either the track rod lever ball joint or the lower ball joint. It is preferable to remove the bolts that secure them to the stub axle carrier.
- To left hand drive shaft is retained in the sun wheel by a circlip (use a tapered tool such as panel beater's drift or a thick cold chisel).
- The right hand drive shaft is retained, transversely, by a bearing mounted on a support on the cylinder block and secured by a circlip (pinch the cirlip together to remove the drive shaft then remove the bearing assembly).

IMPORTANT - The cooling system is to be filled, permanently, in all seasons with a RECOMMENDED type coolant. See maintenance literature.

- Disconnect the battery.
- Drain the cooling system :
  - at the tap on the radiator,
  - at the plug on the cylinder block, fig. I.

OPERATIONS UNDER THE VEHICLE

RELEASING THE DRIVE SHAFTS

- Remove, from each side as shown in fig. II :
  - the 4 bolts that secure the ball joint housing to the swivel,
  - the 2 bolts that secure the track rod arm to the swivel.

Left hand side

- Insert a taper drif between the drive shaft yoke and one of the bolts on the final drive casing, fig. III.
- Drive the drift against the yoke by tapping lightly on its end (see arrow).
- Then release the drive shaft by tapping the side of the drift.
- Pull down the lower suspension arm, fig. IV, to release the ball joint housing whilst pushing the wheel upwards.
- Completely free the left hand drive shaft from the sun wheel and allow it to rest on the lower suspension arm.

On the right hand side

- Squeeze in the circlip, fig. V, and remove the drive shaft sideways.

↦ 3/83

- Loosen (Fig. VI) the nuts (2) on the drive shaft support bearing.
- Swing the tie rods (1) through half a turn to free the bearing outer track ring.
- Remove the 3 bolts that secure the bearing assembly to the cylinder block.
- Lower the lower suspension arm and free the ball joint casing.
- Pull the suspension leg fig. VII to one side accompanied by the inner spider joint bell casing.
- Retrieve the aluminium bearing.
- Rest the drive shaft on the lower suspension arm.

ON THE GEARBOX (Fig. I)

- Disconnect :
  - the clutch cable at the two clutch clearance adjusting nuts,
  - the speedometer drive at the worm wheel.
- Remove the power unit assembly rear mounting pin.

AT THE REAR OF THE CYLINDER BLOCK (Fig. II)

- Disconnect :
  - the exhaust clamp,
  - the hose from the rear water pipe.

OPERATIONS UNDER THE BONNET

- Disconnect the prop from the right hand side of the bonnet and tie it the right hand rear view mirror, with a piece of string.
- Remove the various parts shown in Fig. III.

REMOVING THE FRONT PANEL

- Disconnect, fig. IV, the wires and plugs from :
  - the headlamps and direction indicators,
  - the electric cooling fan,
  - the temperature switch on the radiator,
  - the coil.
- Remove the 2 lower fastenings from the electric fan unit to free the wiring clips.
- Disconnect, fig. V :
  - the upper and lower radiator hoses, engine end,
  - the degassing hose, degassing tank end,
  - the bonnet latch : remove its 2 securing nuts.
- Remove, fig. VI :
  - the upper bolts,
  - the 2 front panel lower securing nuts,
  - the front panel with the radiator and the electric fan.

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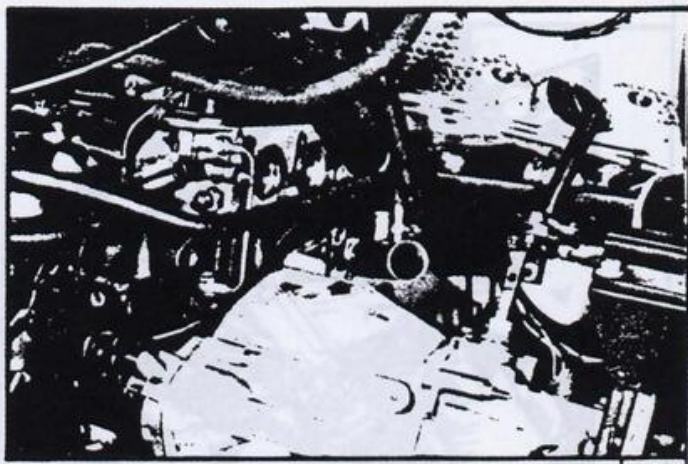
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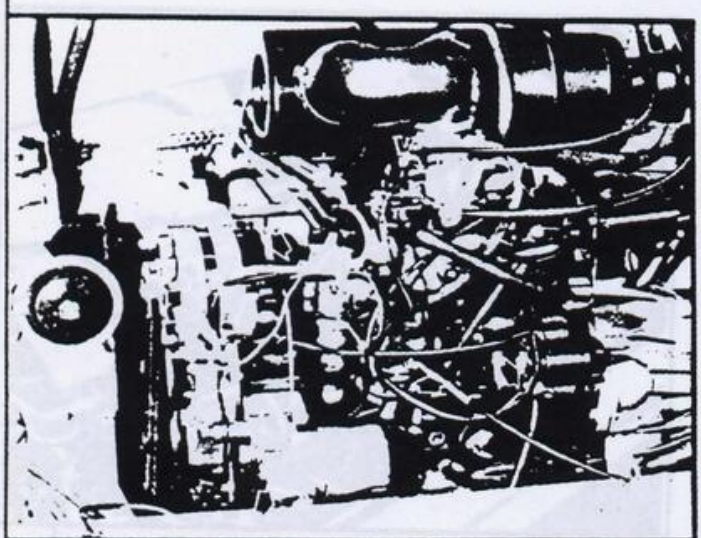
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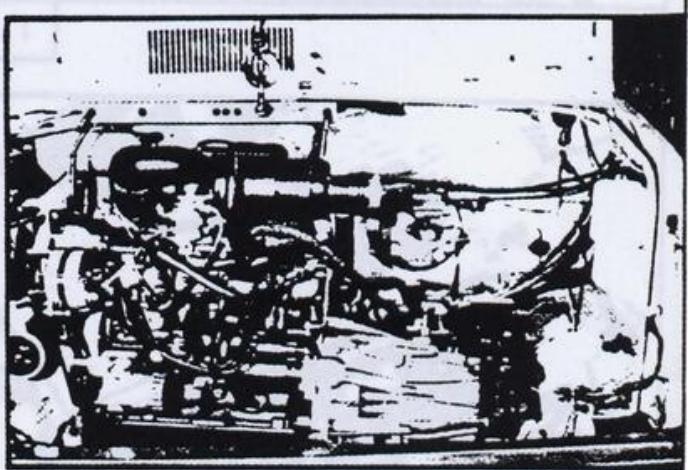
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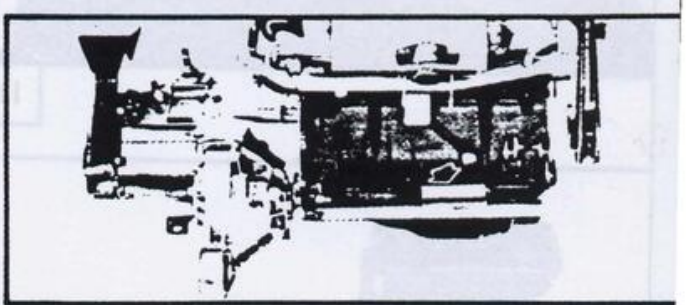
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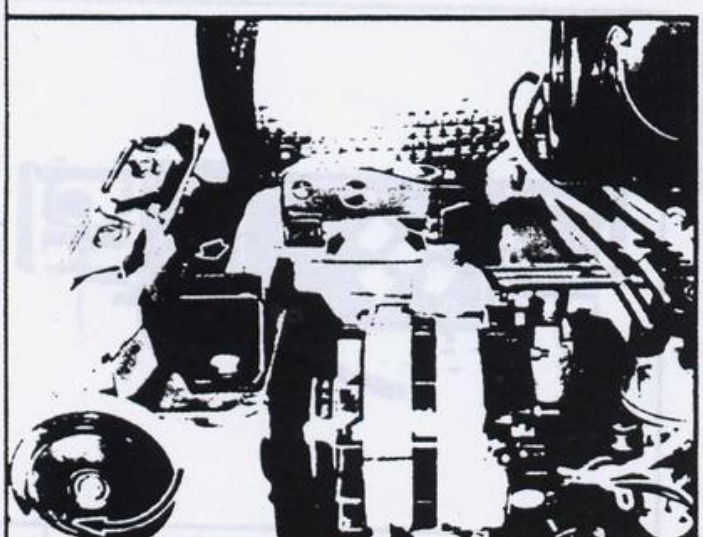
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VI



III



VII

– Disconnect, fig. I :
  - the gear shift control, (lower pin),
  - the following hoses :
    - heater input and output,
    - brake servo vacuum,
  - the following wires :
    - geabox earth,
    - reversing light switch petrol,
    - temperaturc switch and thermistor on cylinder head.

– Disconnect, fig. II :
  - the fuel line from the fuel pump,
  - the wires from the following engine accessories :
    - starter motor,
    - alternator,
    - oil pressure switch,
    - idling jet solenoid.

LIFTING THE ENGINE

Right hand side, fig. III

NOTE - Work one bolt at a time.

– Remove the 2 front securing bolts from the engine mounting.

- Retighten these two bolts after fitting the lifting lug 8.0110 T.

– Swing the horn as far as it will go towards the outside of the vehicle.

Left hand side, fig. IV :

– Remove the clutch housing upper securing bolt.

– Insert lifting lug 8.0110 U.

– Remove the upper nut from the rubber pad.

– Fit, as shown in fig. V :
  - short hook 8.0102 G, at the water pump end,
  - long hook 8.0102 F, at the clutch end,
  - sling bar 8.0102 D.

– Take the weight on the hoist.

– Remove the 4 upper bolts from the intermediate mounting at the gearbox end.

– Release and lift out the power unit assembly.

LOWERING THE POWER UNIT ASSEMBLY ONTO ITS CRADLE.

– Secure the petrol intermediate support 8.0151 B under the cylinder block as shown in figs. VI and VII.

– Lower the assembly onto cradle 8.0151 A as shown in fig. VII.

REFITTING

Carry out the removing operations in reverse.

For the tightening torques see the « special tools » page.

SPECIAL POINTS

Left hand drive shaft :

- Check that the circlip that retains it, in the sun gear, is correctly engaged.

Exhaust pipe joint Fig. I :

- Lubricate the taper areas with MOLYKOMBIN paste Part no. 9730.95 (100 g tube).
- Compress the springs to dimension :

x = 22 mm

Clutch free travel fig. II and III :

- Turn the nuts at the end of the clutch cable until the clutch pedal is level with the brake pedal.

Cooling system

- System capacity : 9 litres.
- Only coolant made up with permanent anti-freeze of an officially approved type (see the current literature) is to be used.
- If necessary see the section entitled : « Filling and bleeding the cooling system ».

Electrical connections

- Connect them by following Figs IV, V and VI.

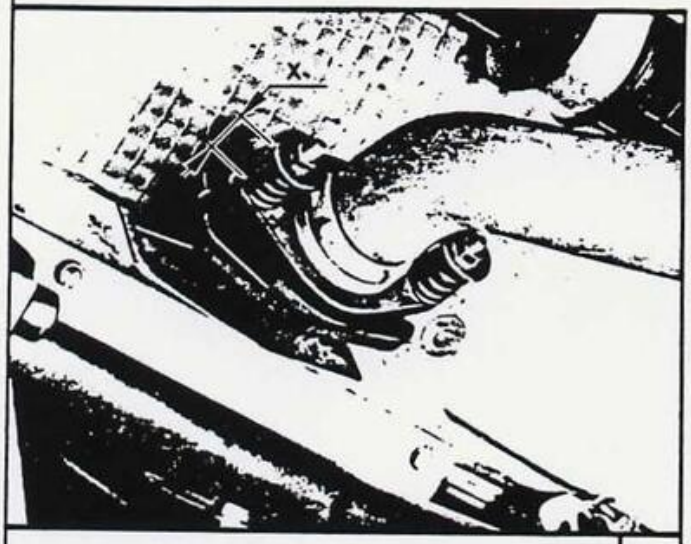
COLOUR CODES			
- White	Bc	- Red	R
- Blue	Bl	- Brown	M
- Light blue	B	- Green	V
- Yellow	J	- Grey	G
- Orange	O	- Black	N
- Pink	Ro	- Violet	Vi

	Non-electronic ignition		Electronic ignition		DESCRIPTION REFERENCE	
	Wire	Ter.end	Wire	Ter.end		
ENGINE (Fig. IV)	0		0		Strangler	1
	V-Bc		V-Bc		Temperature sensor	2
	0		0	Bc	Reversing light	3
	Bc		BC	BC	Reversing light	3
	Bl		Bl		Coolant temp. switch	4
	R	N	R	N	Starter field	5
	M		V		Alternator cable	6
	G		G	Bc	Oil pressure switch	7
	N-Vi				Alternator field	8
FAN (Fig. V)				N	Direction indicators	9
	N		N	Bc	Fan temperature	10
	N		N		Switch	10
				N	Electric fan	11
COIL (Fig. VI)	M		J	Bc	- Coil	12
	N				- Coil	12
	G		M-Bc		+ Coil	13
	M-Bc		M-Bc	Bl	+ Coil	13

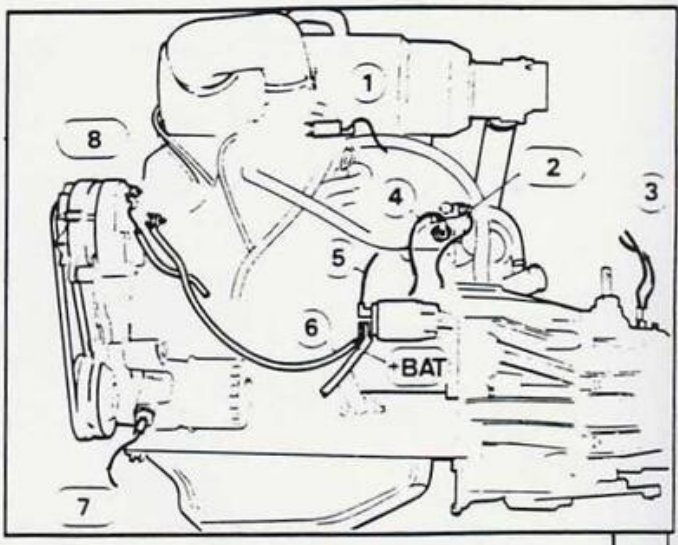
IMPORTANT. Carry out the additional essential operations :

OPERATION	OVERHAULED ENGINE
RETIGHTEN CYLINDER HEAD ADJUST VALVE CLEARANCES	1) Before returning to customer - After first warm-up 2) After 1000/1500 miles depending on engine No.
	NEW, OVERHAULED OR STANDARD EXCHANGE ENGINE
DRAIN ENGINE OIL REPLACE FILTER CARTRIDGE ADJUST VALVE CLEARANCES	After 1000 to 1500 miles

NOTE : See the section entitled « Retightening the cylinder head ».



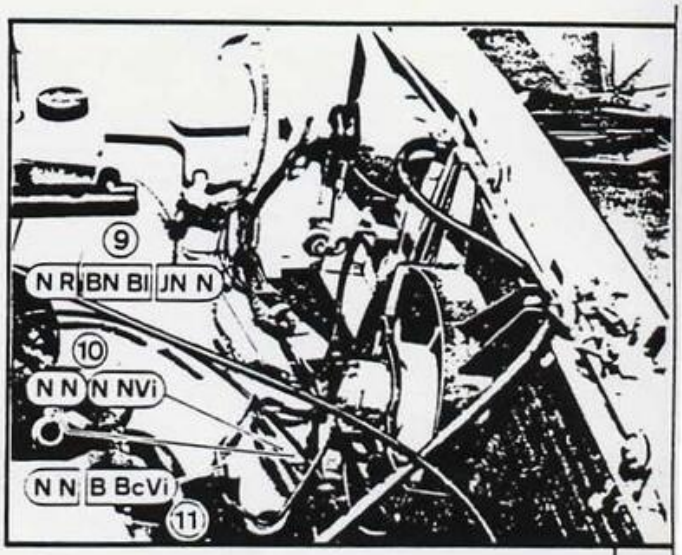
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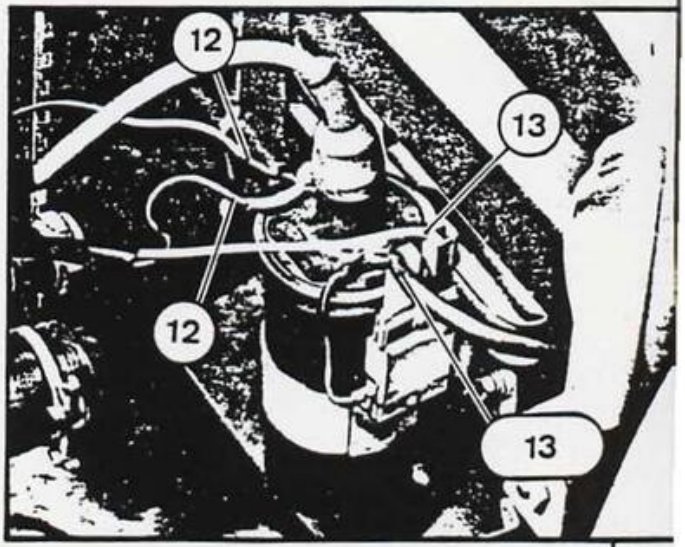
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VI

	Page
Special tools	A5.002 and 003
Dismantling	A5.004 and 013
Requirements prior to dismantling	A5.014
Reassembling	A5.014 to 041
Comprising :	
Checking the connecting rods	A5.014
Preparing the crankshaft	A5.014 to 018
Crankshaft end float	A5.018 and 019
Fitting the rear main bearing	A5.018 to 021
Flywheel and clutch	A5.021 and 022
Liner protrusion	A5.022 to 025
Assembling the pistons, piston rings and connecting rods	A5.026
Camshaft - timing gear	A5.028 to 033
Crankshaft pulley	A5.033
Adjusting the graduated timing plate	A5.033
Cylinder head - adjusting the valve clearances	A5.037 and 038

SPECIAL TOOLS

From kit 8.0110 ZW :
(fig. A, B, C and D)

Fig. A :

BZ - Tool for fitting the rear main bearing side seals.

C1 - Set of 2 shims.

D2 - Spacer for cutting off the side seals.

Fig. B :

GY - Dial indicator fixture comprising :
G1 - support
G2 - end fitting

H - Dial indicator support

8.0118 FZ

— Adjustable dial indicator holder.

Fig. C :

8.0132 A1Z

— Set of 2 liner retaining clamps.

M - Set of 4 bolts M12 x 150 (yellow)

R - Plug for fitting the seal and centralising the timing cover.

8.0144 R

— Liner extractor plate.

Fig. D :

8.0132 K

— Crankshaft spigot bush extractor comprising
K1 - body
K4 - claws
K5 - long bolt

S - Drift for fitting the spigot bush.

Fig. E :

8.0115 Y

— Cylinder head guides.

8.0129 ZZ

— Tool for tightening cylinder head bolts by the angular method.

(-).0158

— Tool for tightening cylinder head bolts by the angular method.

Fig. F :

8.0128

— Liner compression tool.

8.0212

— Clutch plate centralising mandrel.

TOOLING TO BE MADE LOCALLY

Fig. G :

0.0149

— Set of 2 cylinder head releasing levers. (material : 16 mm Ø drawn steel bar).

TIGHTENING TORQUES (Torque wrench)

Crankshaft plugs 5.5 mdaN (55 Nm. 40 lbf ft)

Crankshaft couterbalance weights 6.75 mdaN (67.5 Nm, 50 lbf ft)

Crankshaft main bearings 7.5 mdaN (75 Nm, 55 lbf ft)

Flywheel 6.75 mdaN (67.5 Nm, 50 lbf ft)

Big-end caps (4 mdaN (40 Nm, 30 lbf ft)

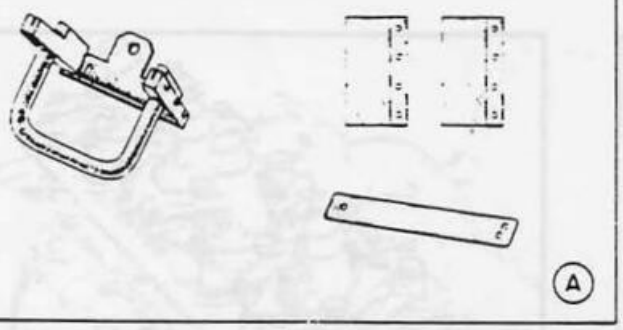
Crankshaft pulley 17 mdaN (17 Nm, 125 lbf ft)

Oil filter base (thread coated with Loctite) 1.3 mdaN (13 Nm, 10 lbf ft)

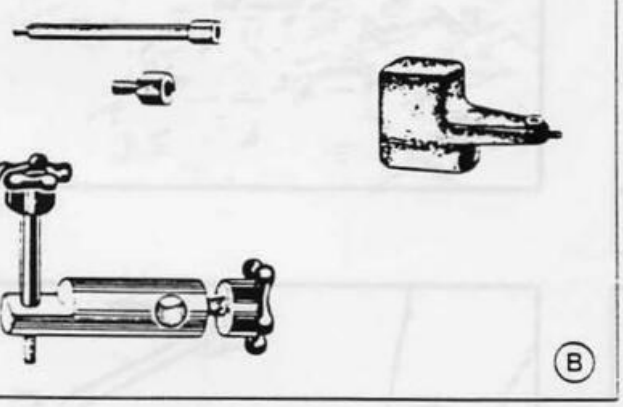
Cylinder head (angular tightening method) See method

Water pump fastenings :

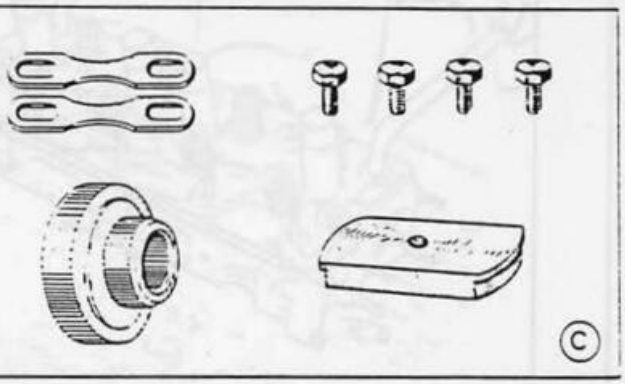
- 8 mm nuts 2.25 mdaN (22.5 Nm, 17 lbf ft)
- 10 mm nuts 4,25 mdaN (42.5 Nm, 31 lbf ft)
- 10 mm bolts 2.75 mdaN (27.5 Nm, 20 blf ft)



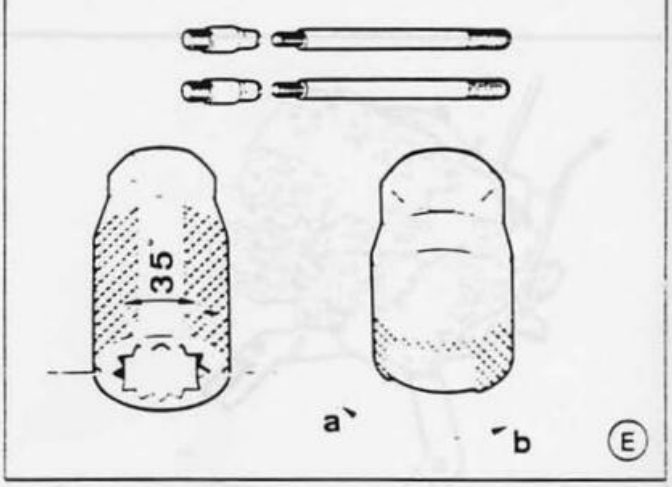
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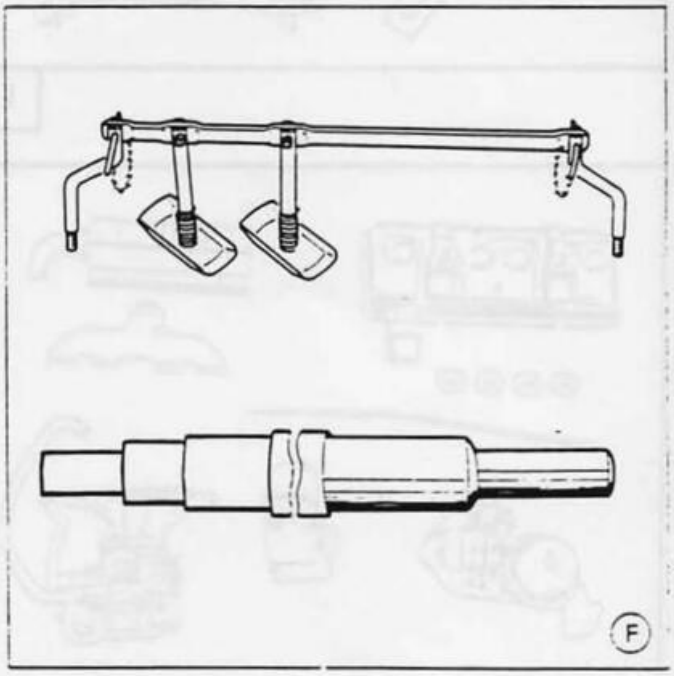
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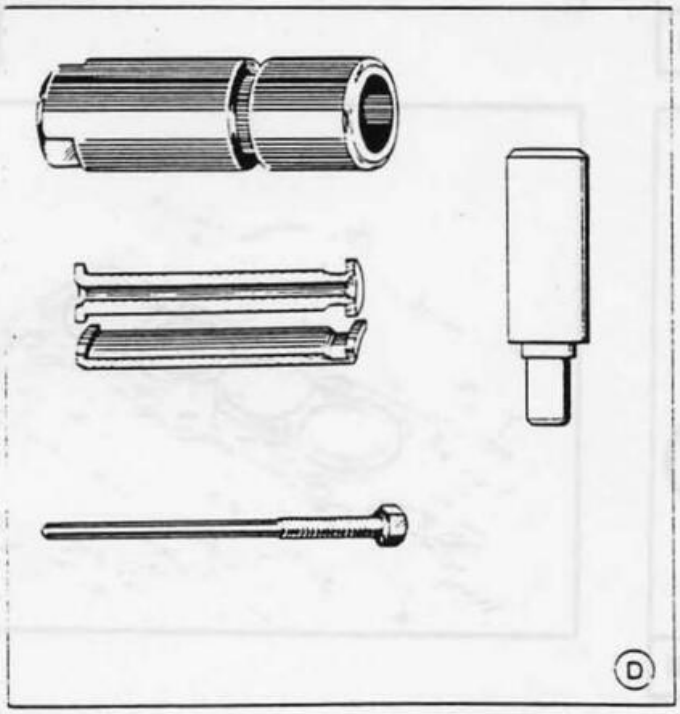
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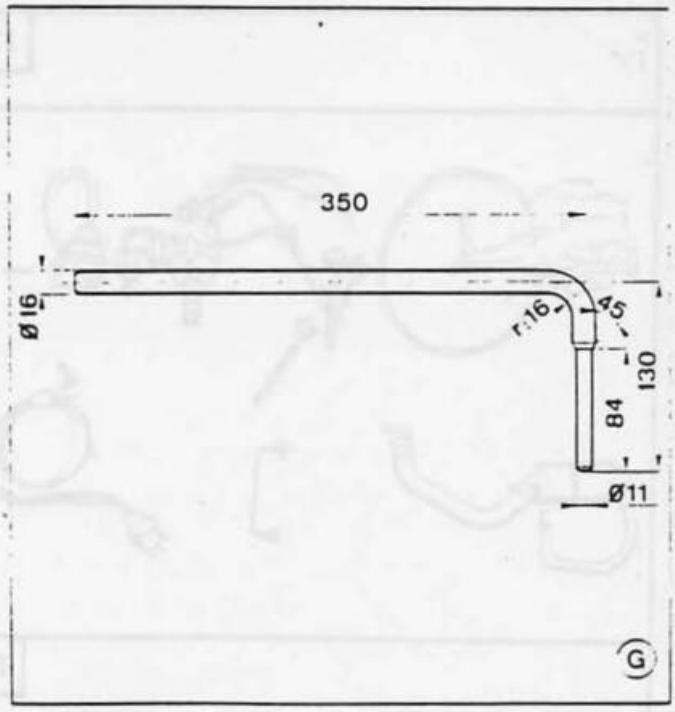
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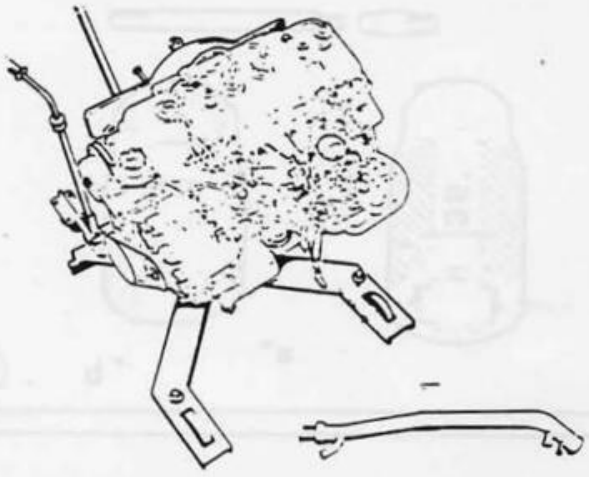
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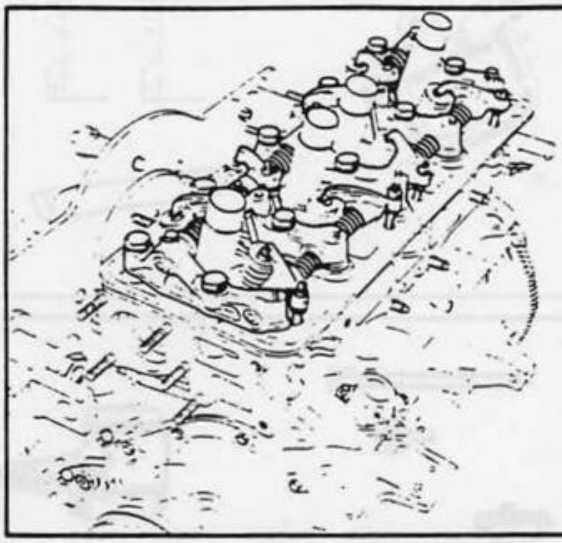
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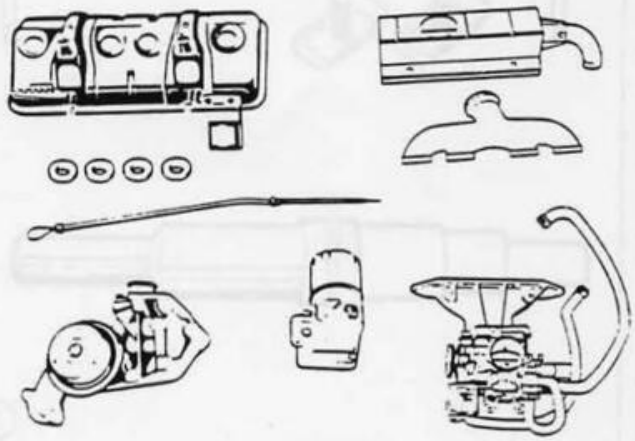
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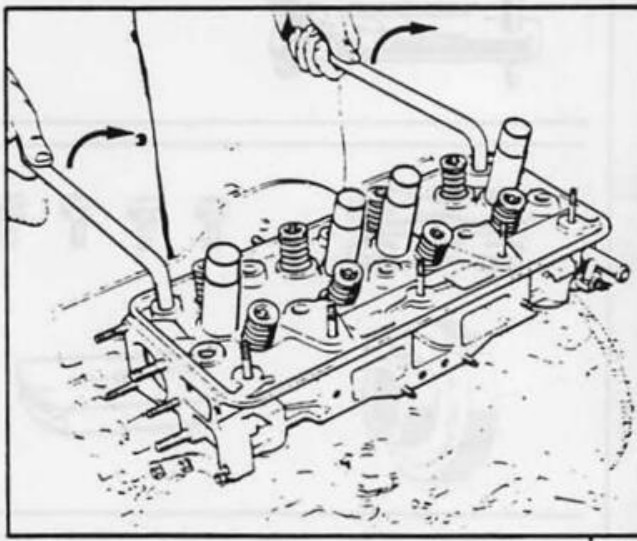
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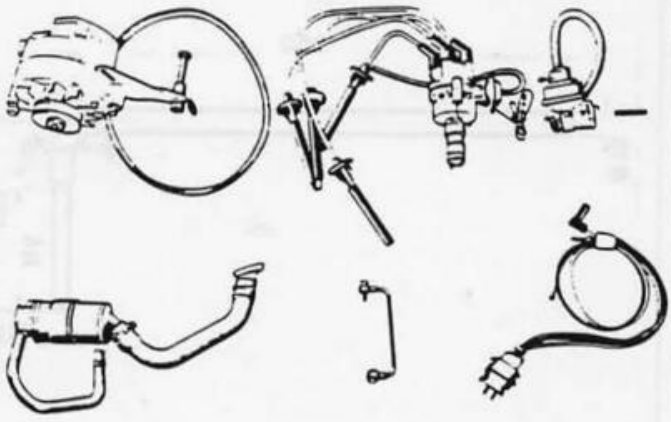
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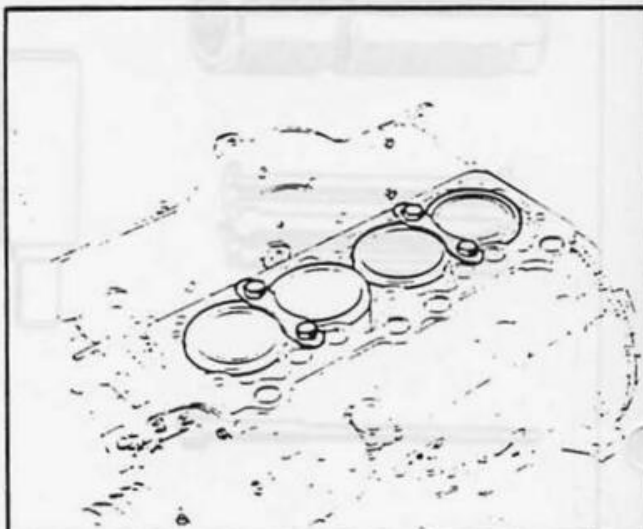
II



V



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VI

Mount the engine on the DESVIL stand, fig. I, after having first removed the rear water hose.

Remove the components parts as shown in fig. II and III.

Remove, as shown in fig. IV

- the 5 nuts that secure the rocker shaft,
- the 10 cylinder head bolts,
- the rocker shaft assembly,
- the push rods (mark their respective positions as they are removed).

Free the cylinder head, fit V, using levers 0.0149 to tilt it.

Retain the liners fig. VI, using clamps 8.0132 A1Z.

Remove, fig. I :

- the tappets (marking their respective positions),
- the distributor support,
- the distributor drive shaft.

Remove the sump, fig. II.

Remove the oil pump, fig. III.

Remove, fig. IV :

- the clutch mechanism, retrieving the friction disc,
- the flywheel,

(lock the crankshaft with a wood block).

Remove, figs. V and VI

- the crankshaft pulley.
- the timing cover.

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Locking the chain tensioner

SEDIS type tensioner, fig. I

- release the rack by positioning the ratchet as shown in the illustration,
- press the pad,
- lock the rack by turning the ratchet to the left.

RENOLD type tensioner, fig. II :

- secure the pad with a length of wire.

Fig. III – remove the 2 tensioner securing bolts and remove the tensioner.

Put aside the filter, fig. IV :

Remove, figs. V and VI

- the camshaft chain wheel,
- the chain,
- the crankshaft chain wheel,
- the camshaft.

(If there are no timing marks on the chain, mark the links as shown in fig. V).

- the timing cover back plate.

The big-end c-ps, fig. I :

Ensure that the big-end caps are marked with identification marks.

IF THEY ARE NOT, mark them.

The main bearing caps, fig. II :

Check that the caps have been marked with identification marks as follows :

a) Dabs of paint :

BEARING	No.	COLOUR
REAR	1	NONE
INTER. REAR	2	RED
CENTRE	3	GREEN
INTER. FRONT	4	WHITE
FRONT	5	BLUE

b) Cast-in reference marks
(on the flywheel end).
1 reference mark on caps 4 and 5,
2 reference mark on caps 2 and 3

IF THERE ARE NO REFERENCE MARKS, apply them.

Remove, figs. III and IV :

- the crankshaft,
- The crankshaft end float thrust washers.
- the bearing half-shells.

Extract the piston and connecting rod assembly, fig. V :

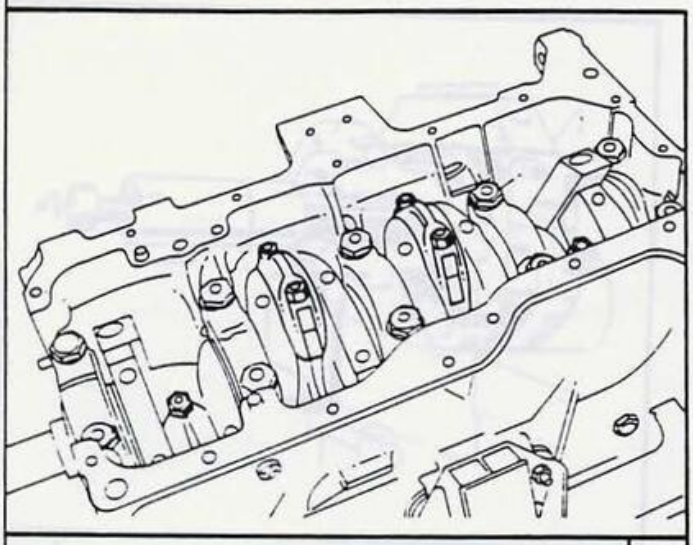
Refit the big-end caps to their respective connecting rods.

Number the connecting rods 1 to 4.

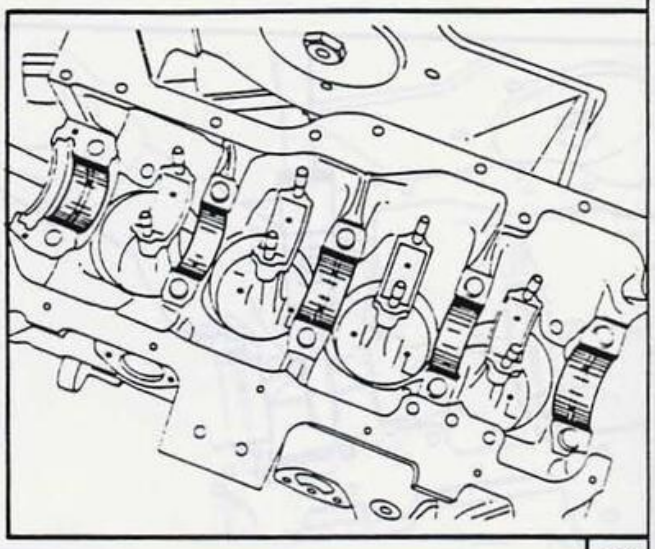
Disconnect, the connecting rods from the pistons, fig. VI.

Remove the gudgeon pin retaining circlips with the end of a scriber.

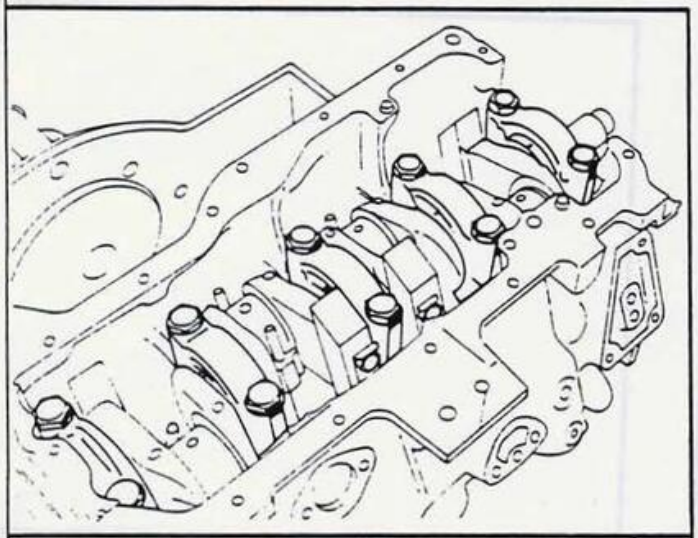
Push out the gudgeon pins by and.



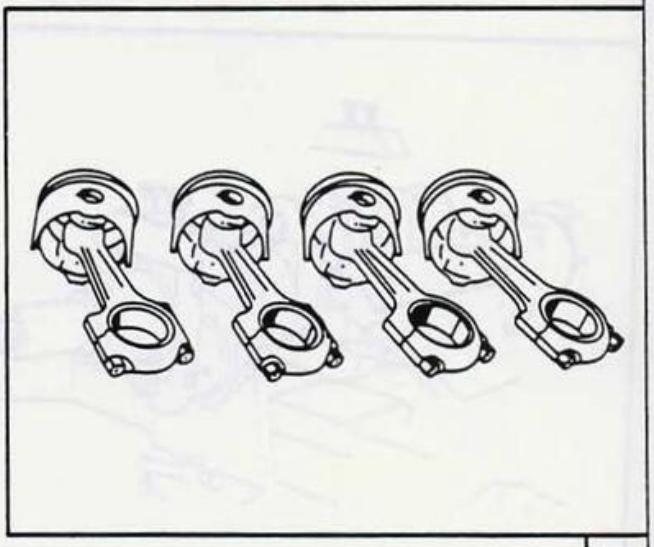
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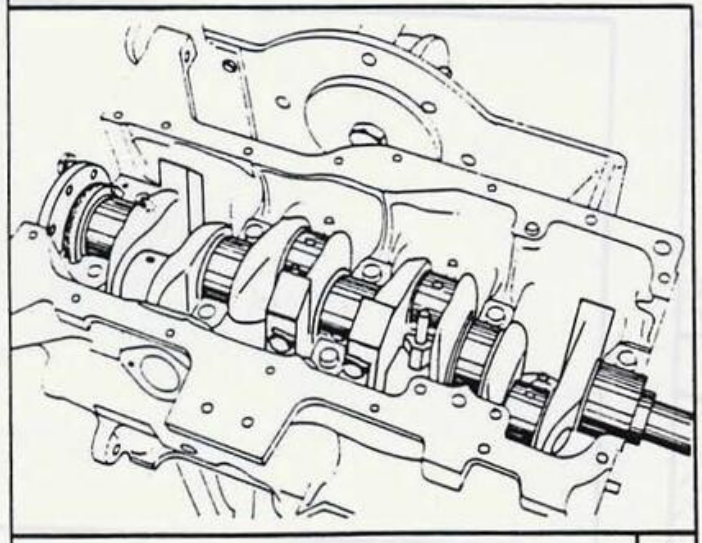
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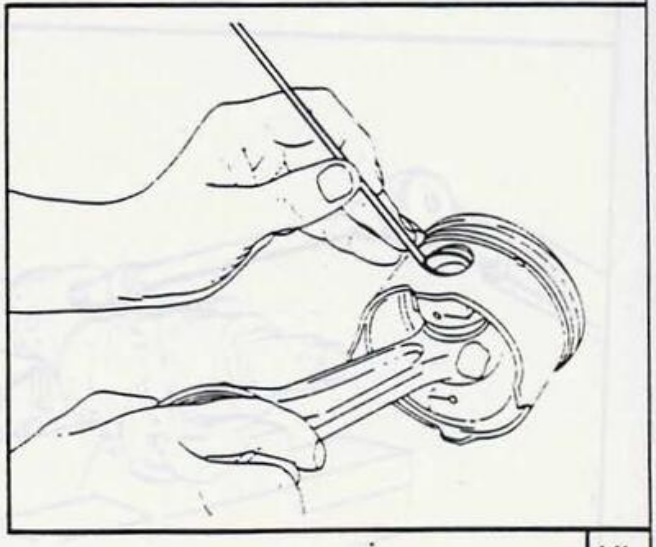
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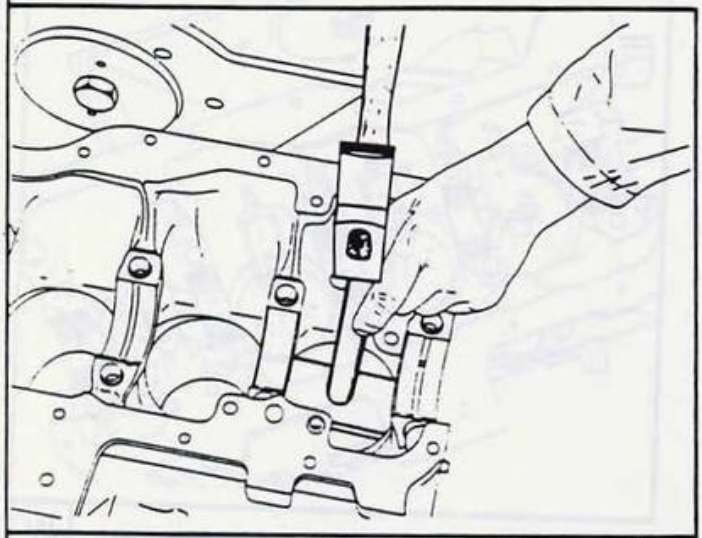
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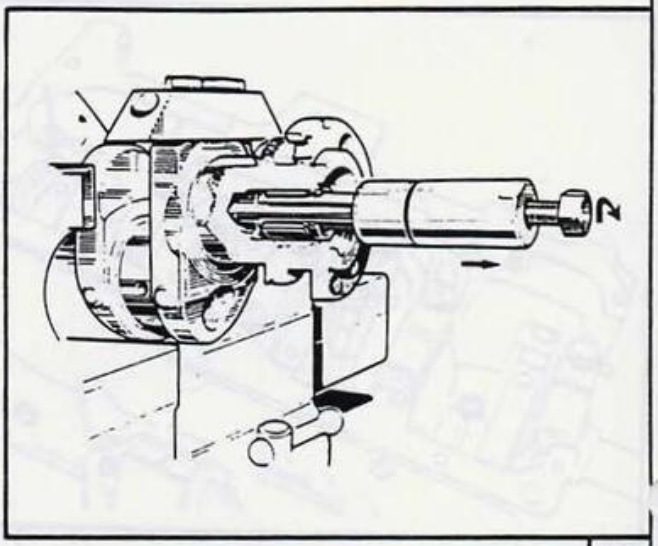
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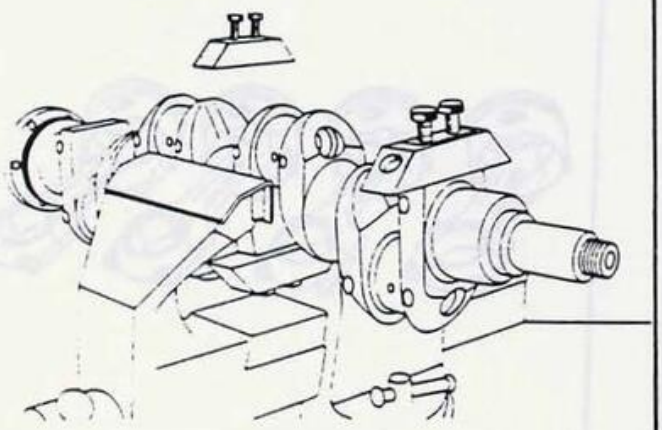
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I

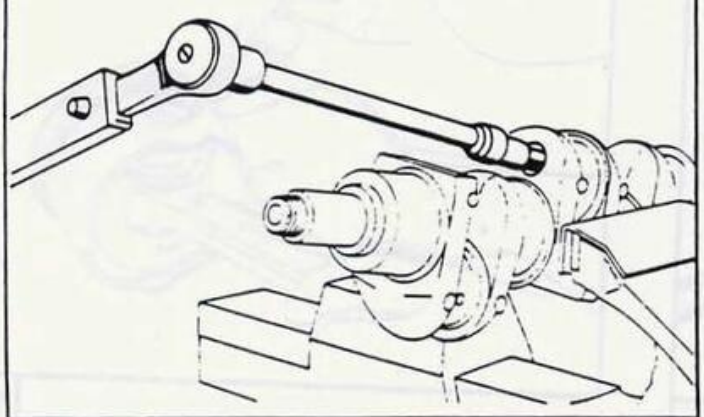


IV



II

V



III

VI

Remove the liners, by hand or by using plate 8.0144 R, fig. I.

Mark and remove the counterbalance weights, fig. II.

Remove the sludge trap plugs, fig. III.

Clean out the sludge traps and the oil galleries

Remove the drive gear locating bush, fig. IV.

Use special tool assembly 8.0132 K which consists of parts K1, K4 and K5.

REFITTING

PRIOR REQUIREMENTS

Cleaning the gasket and joint faces

- Never clean these faces with an abrasive or a sharp eged tool. There should be no impact marks, scores or burrs on the gasket and joint faces.
- Use the special stripper (pt. no. 9731.25), scrupulously observing the instructions for use.

Lubricate the various engine components with engine oil as they are fitted.

Consult the relevant sections for information on refacing the cylinder head, recutting the valve seats, regrinding the crankshaft, etc.

Preparation :

- Use only parts that are clean and free from defect.
- When refitting original components, retain the same matched assemblies and follow the position and direction marks made during dismantling.
- Retain new components in their correct matched assemblies.
- Automatically replace all seals and locking washers.

Checking the connecting rods, figs. I and II :

- Check the condition of the big-end bolts.
- There should be no signs of overheating.
- There should be no signs of picking-up in the small end and big-end bores.

NOTE - The big-end bolts should not be replaced.

They can, however, be replaced individually if the threads is damaged.

- Ensure that the oil jet is not blocked.

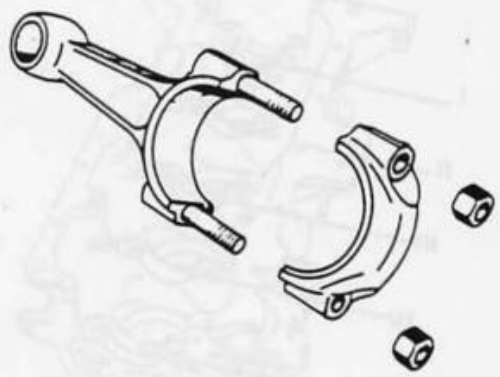
Preparing the crankshaft

Sludge trap plugs

- Clean the thread, fig. III, by screwing and M24 x 1,50 plug tap down the thread (depth 10 mm).
- Screw-in a new plug as shown in fig. IV and tighten it to a torque of 5.5 m.daN (55 Nm. 40 lbf ft).
- Lock it fig. V by marking a punch mark half on the plug and half.

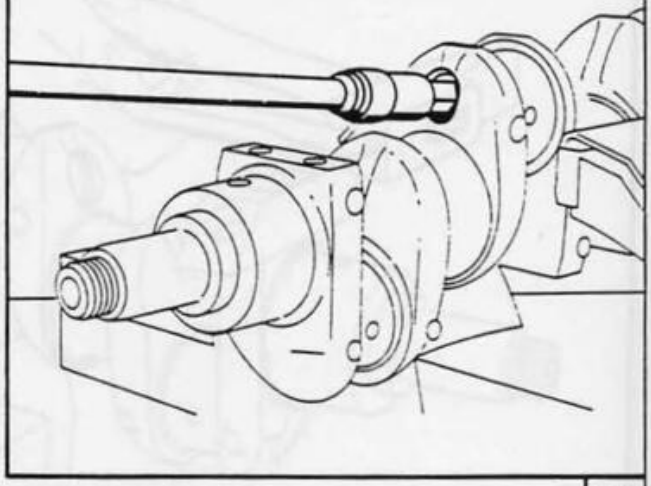
Counterbalance weights

- Fit the counterbalance weights, fig. VI, following the marks made during dismantling.
- Tighten the bolts to a torque of 6.75 m.daN. (67.5 Nm, 50 lbf ft).



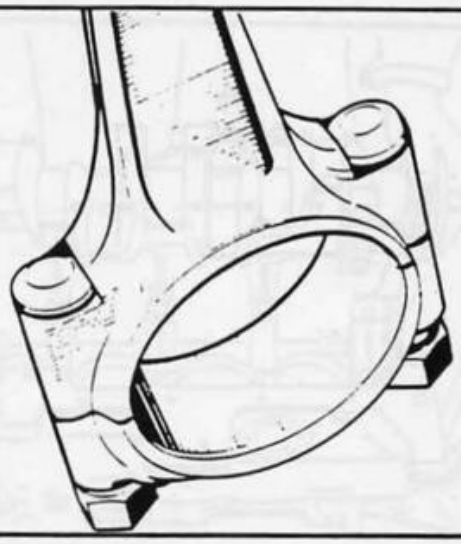
26 - 06 - 76 - C84 - L - A

I



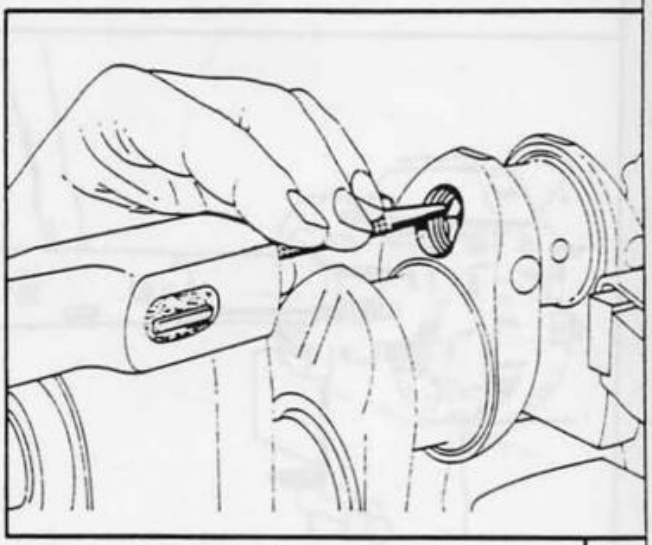
26 - 06 - 76 - C43 - L - A

IV



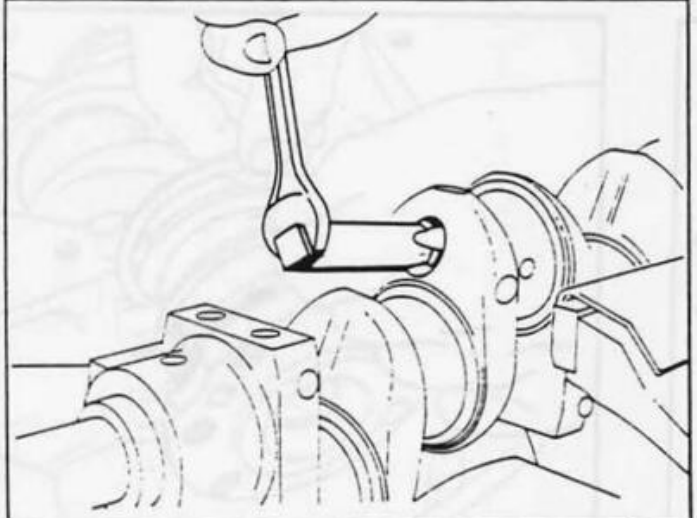
11 - 05 - 81 - 3 - A

II



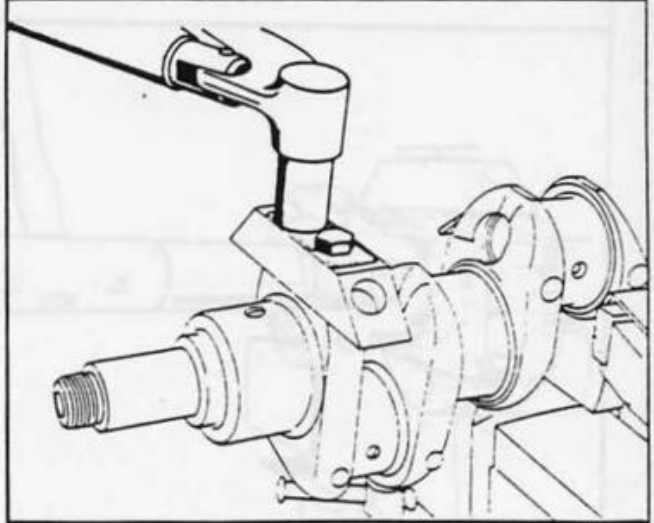
26 - 06 - 76 - C70 - L - A

V



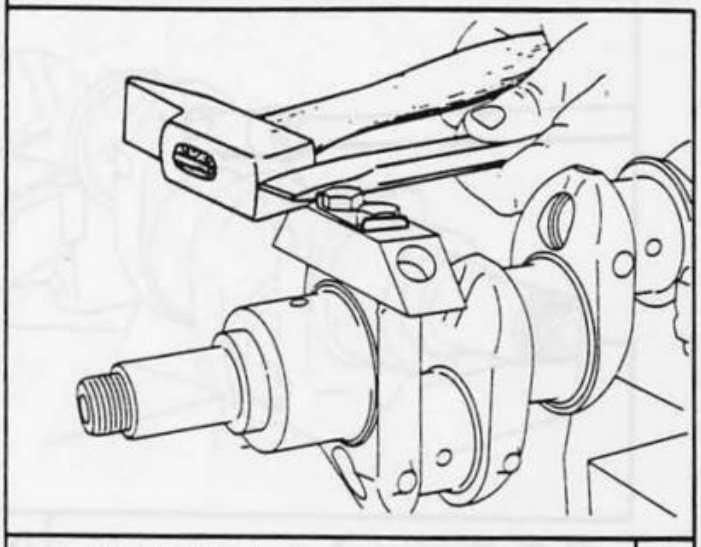
26 - 06 - 76 - C60 - L - A

III



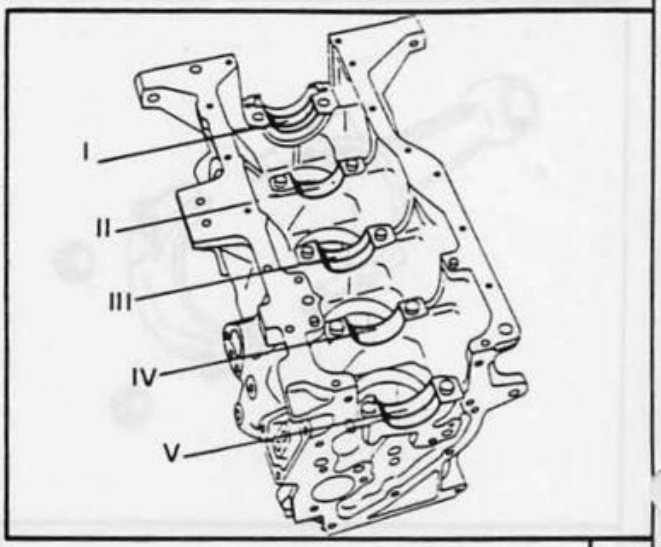
26 - 06 - 76 - C75 - L - A

VI



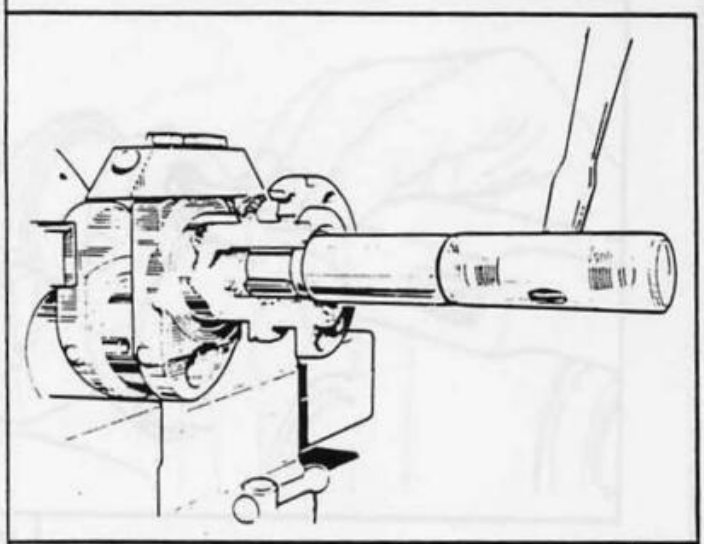
26 - 06 - 75 - C72 - L - A

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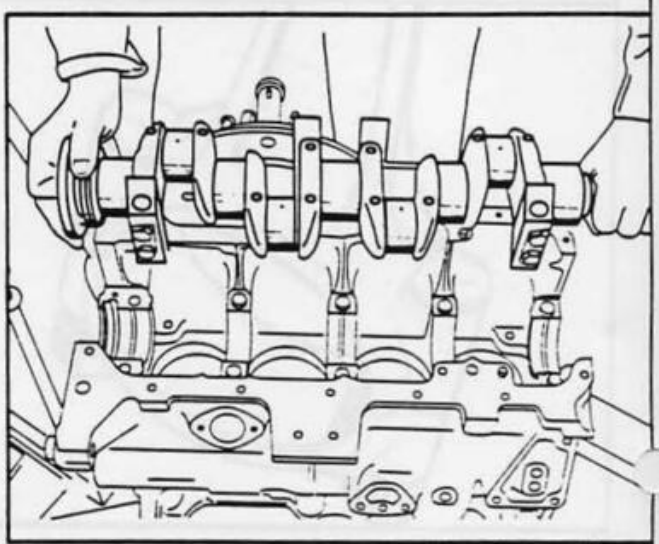
21 - 05 - 80 - C97 - L - A

IV



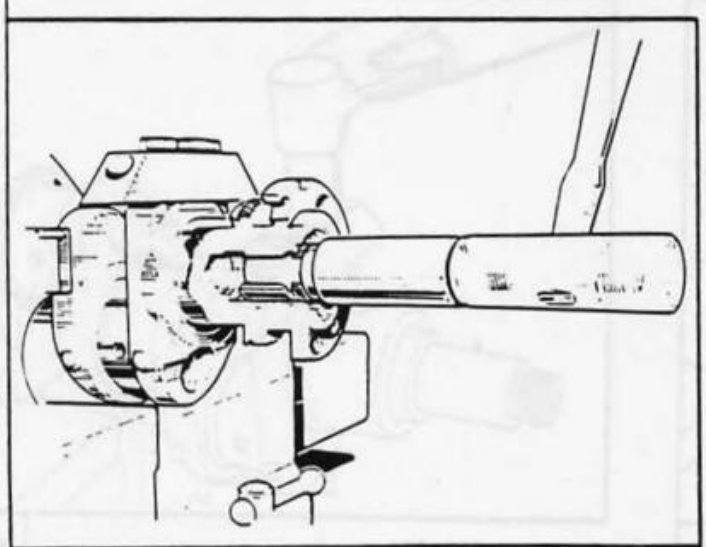
11 - 05 - 81 - 4 - A

II



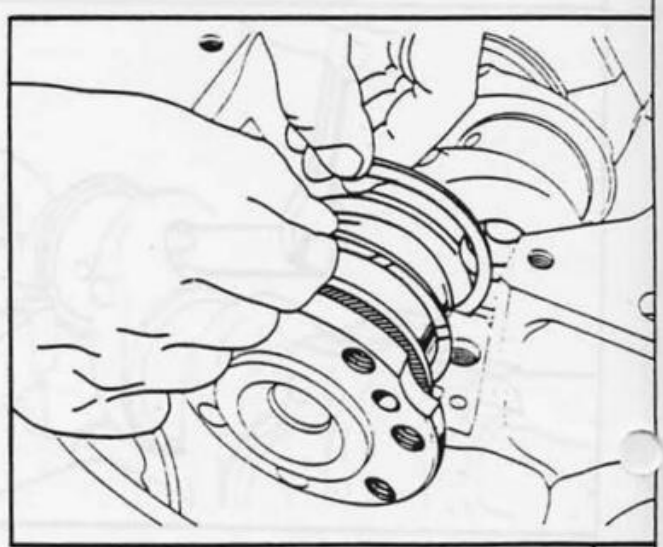
21 - 05 - 80 - C99 - L - A

V



11 - 05 - 81 - 5 - A

III



21 - 05 - 80 - C83 - L - A

VI

Preparing the crankshaft (continued)

Fold up the locking plate fig. I.

Refit, using tool 8.0110.S.

– The clutch spigot bush, fig, II, with its chamfer towards the outside.

– the lip seal, fig. III as illustrated.

– Moderately oil the bush and seal.

Fit :

– Fig. IV the main bearing half-shells.

– 1st type crankshafts WITH sludge plugs :

2 GROOVED shells to bearings (I), (III) and (V)

2 PLAIN shells to bearings (III) and (IV).

– 2nd type crankshafts WITHOUT sludge plugs :

5 GROOVED shells in the cylinder block,

5 PLAIN shells in the bearing caps.

– Fig. V the crankshaft, taking great care when lowering it into place.

– Fig. VI crankshaft end float thrust wadhers, initial thickness of 2,30 mm.

The LUBRICATION GROOVES must be towards the crankshaft.

Fit the main bearing caps and their half-shells, fig. I.

Follow the identification and marks made during dismantling.

Refit the rear main bearing cap fig. II, without its side seals but end float thrust washers, initial thickness of 2.30 mm.

THE LUBRICATION GROOVES must be against the crankshaft.

Tighten the bearing caps to torque of 7.5 m.daN (55 lbf ft), fig. III.

Crankshaft end float

- Fit the dial indicator supports 8.0100 GY and 8.0118 FZ, fig. IV, then fit dial indicator 8.1504.

- Measure the crankshaft end float it should be between 0.08 mm and 0.20 mm.

Thrust washers of the following thicknesses are available : 2,30, 2,35, 2.40, 2,45 and 2.50 mm.

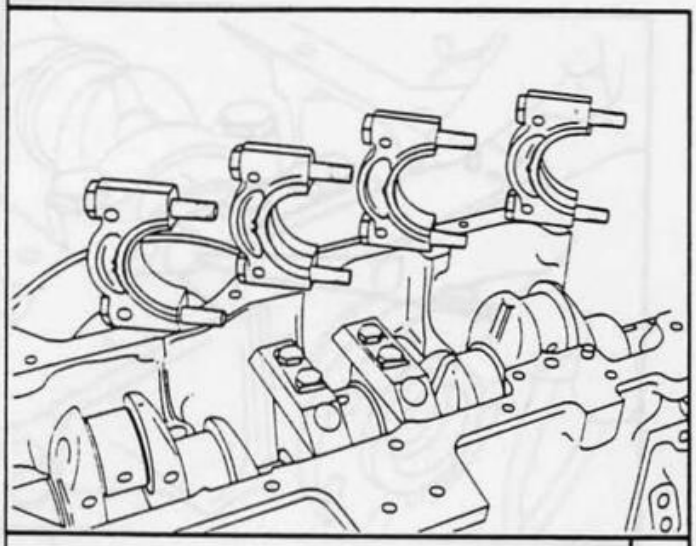
IMPORTANT - If the end float is greater than 0.20 mm REPLACE THE THRUST WASHERS which are behind the bearing, as shown in fig. V.

If the end float is less than 0.08 mm, LOOK FOR THE CAUSE. There could be a foreign body between a bearing cap and the cylinder block, a burr or an impact mark or a distorted end float thrust washer.

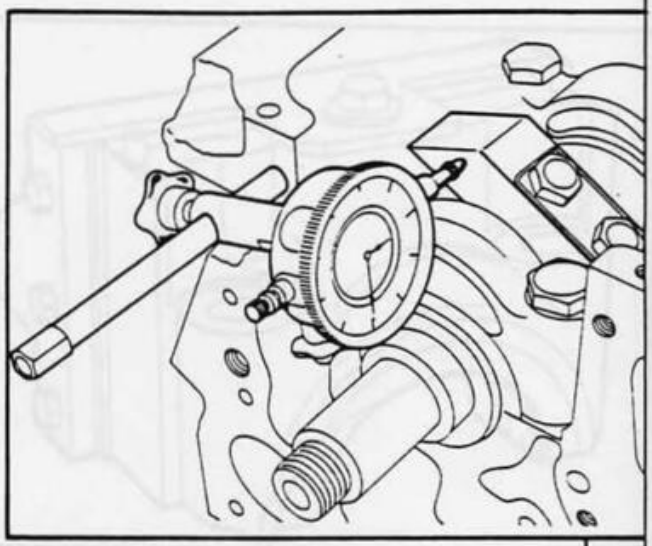
Fitting the rear main bearing and side seals.

- Remove the rear main bearing cap.

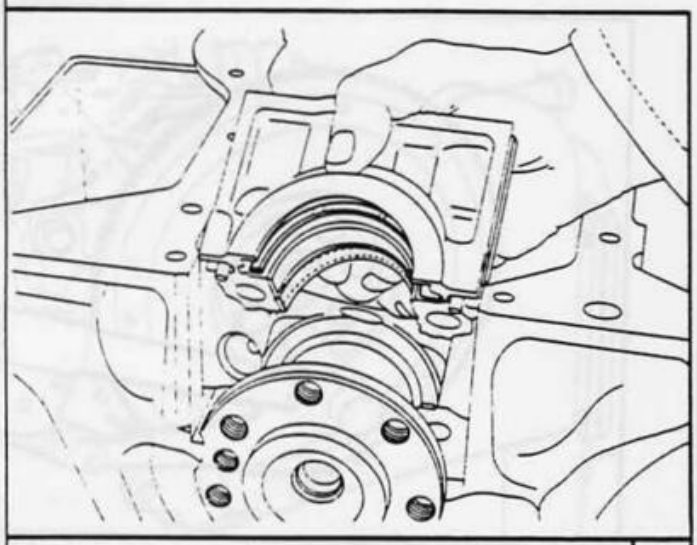
Fit shims 8.0110 C1 as shown in fig. VI to tool BZ, to obtain the minimum spacing.



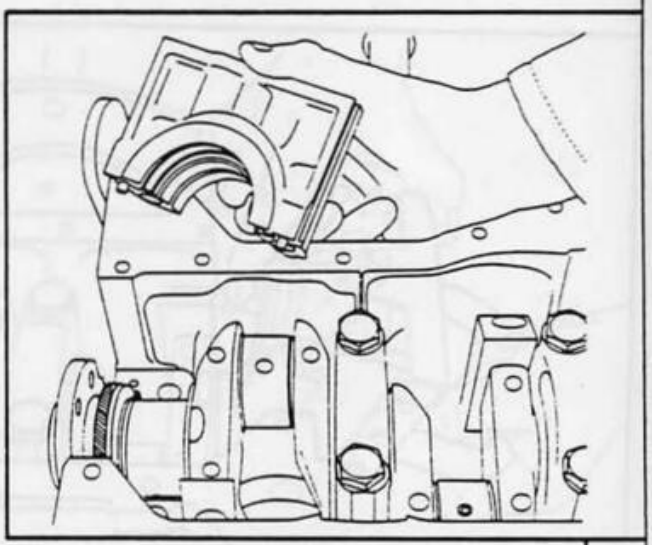
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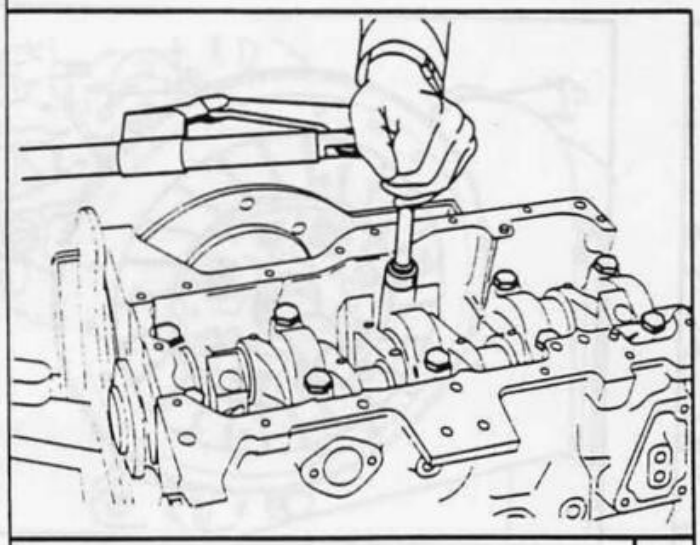
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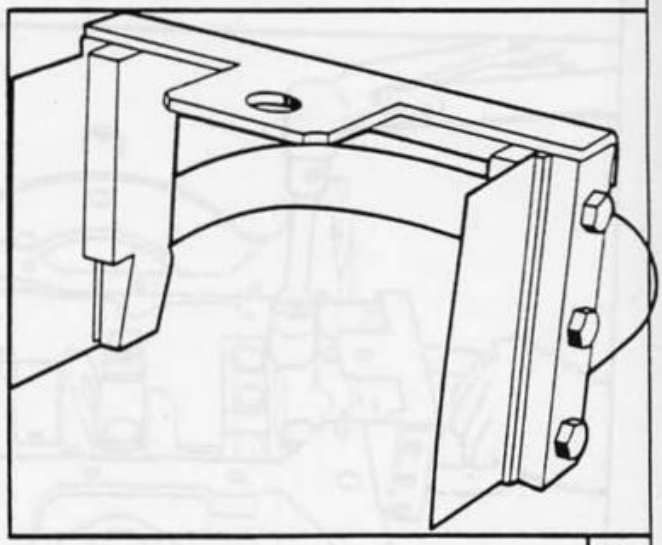
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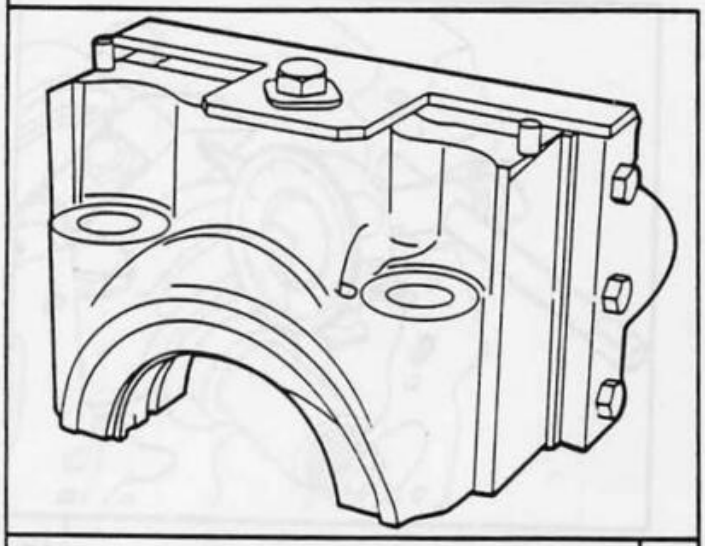
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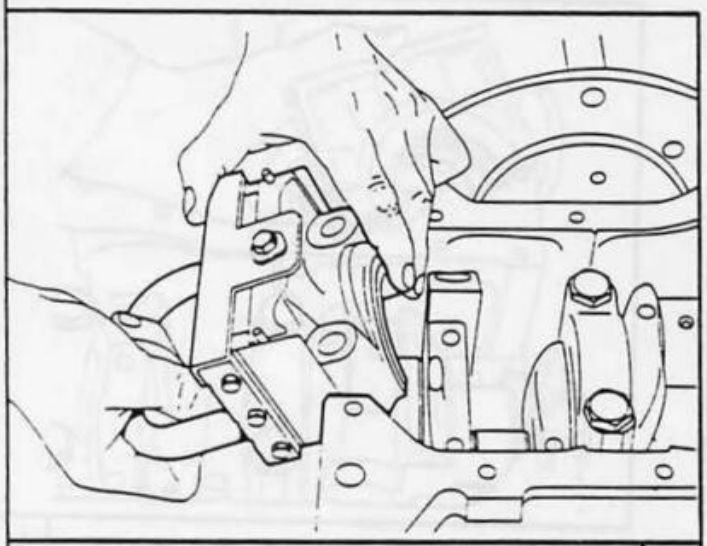
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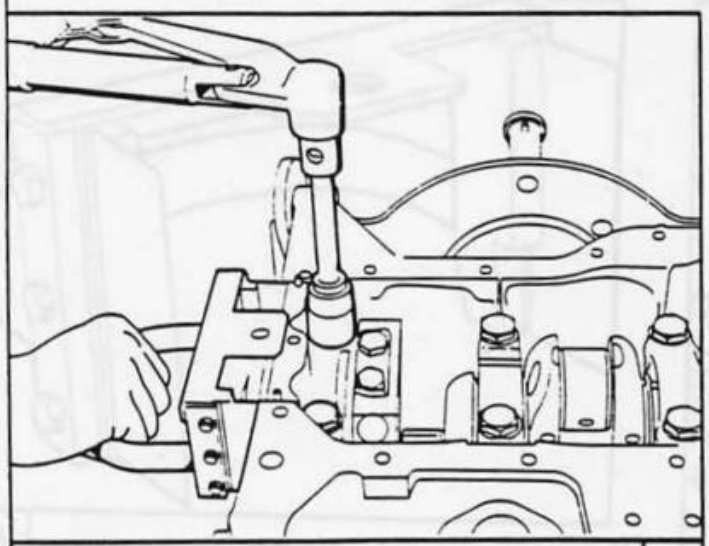
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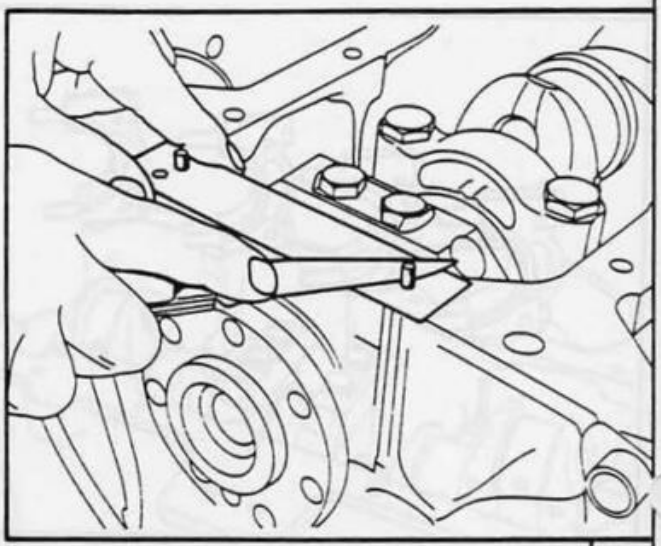
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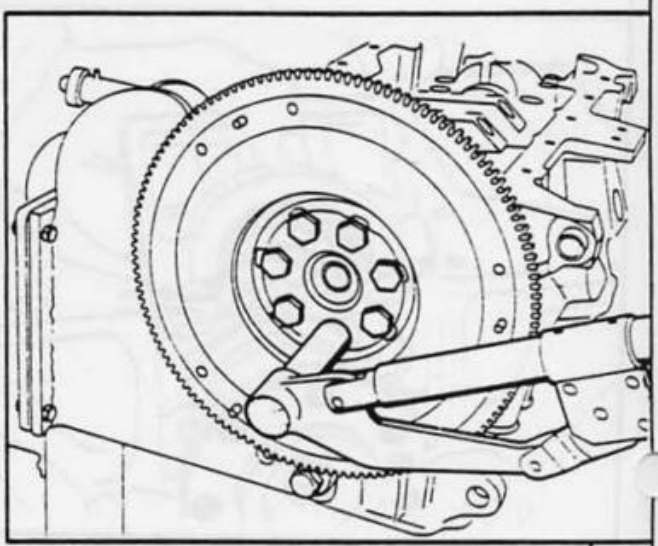
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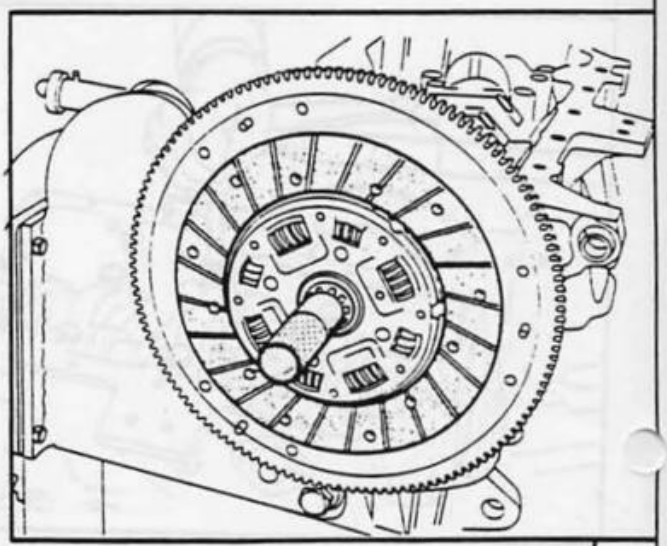
III



IV



V



VI

Fitting the rear main bearing and side seals (contd.).

Hold new rubber seals against the bearing cap, fig. I.

Cut off the side seals, fig. IV, using the 2 mm spacer, Pt. No. 8.0110 D2

Lubricate the shims, retighten the shims, tilt the assembly, fig. II and insert it into the cylinder block.

Fit the flywheel, fig. V.

Fit a new locking plate.

Coat the bolts with Loctite ordinary thread locking compound.

Tighten the bolts to a torque of 6.75 m.daN (67,5 Nm, 50 lbf ft).

Fit the bolts, fig. III.

Remove tool 8.0110 BZ.

Tighten the bolts to a torque of 7.5 m.daN (75 Nm, 55 lbf ft).

Centralise the clutch friction disc using mandrel 8.0207 fig. VI.

Fit the clutch mechanism, fig. I.

Tighten the bolts (fitted with new locking washers) to a torque of 1.5 m.daN (15 Nm, 11 lbf ft).

Fit the liners, fig. II, without their seals, positioning the flats as shown in the illustration.

IMPORTANT - Ensure that the pistons and liners are retained in their original matched assemblies.

Zero the dial indicator on the cylinder block, fig. III and measure the height of each of the liners at points (A), (B), (C) and (D) as shown in fig. IV.

NOTE the highest liner protrusion.

The maximum difference between (A), (B), (C) and (D) should be less than 0.07 mm.

If the difference is greater than 0.07 mm.

Look for the cause and if necessary change the position occupied by the liner.

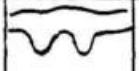
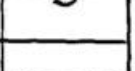
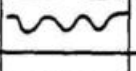
Mark the liners 1 to 4, fig. V.

Liner protrusion

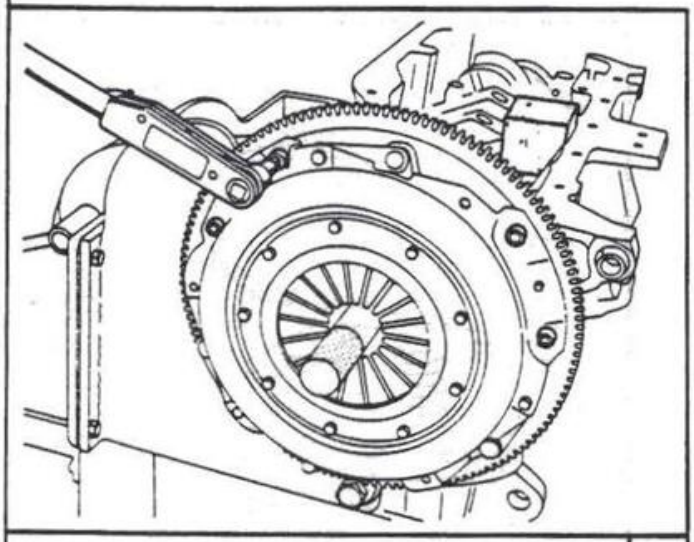
Select a seal so that the liner protrusion, at the highest point, is between 0.07 and 0.14 mm, as near 0.14 mm as possible :

Liner seals

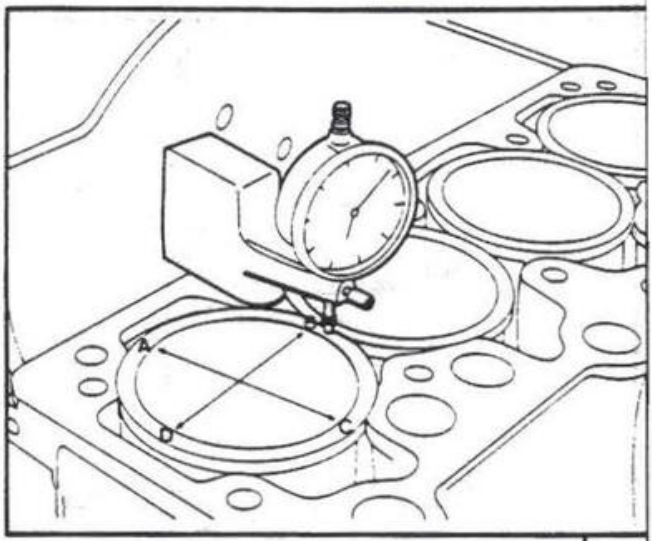
paper and white synthetic fibre → 07/85,
steel plated with aluminium.

The highest point on the liner, without the seal (mm)	LINER SEAL TO BE FITTED			
	→ 07/85 paper	Thick-ness		→ 07/85 steel
from + 0.039 to + 0.045		0.07	0.10	
from + 0.019 to + 0.038		0.085	0.12	
from - 0.006 to + 0.018		0.105		
from - 0.095 to - 0.007		0.130	0.15	

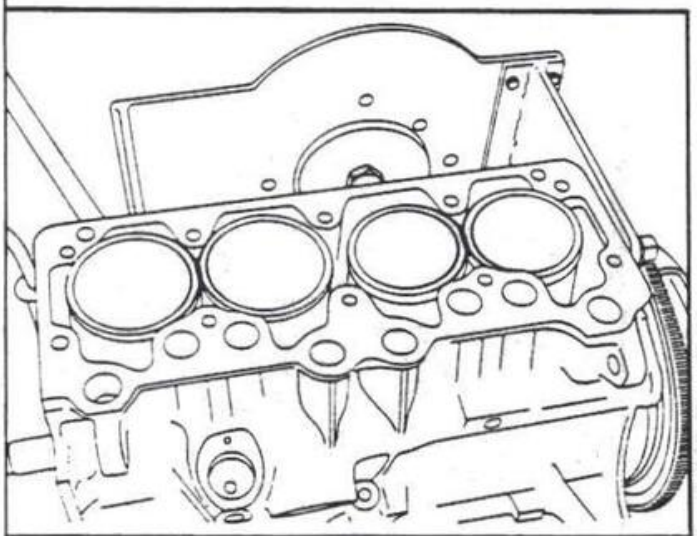
IMPORTANT - Use only one seal per liner.



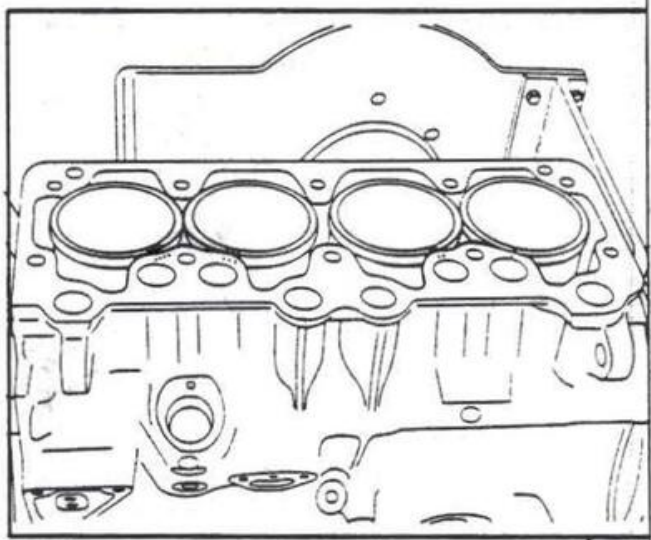
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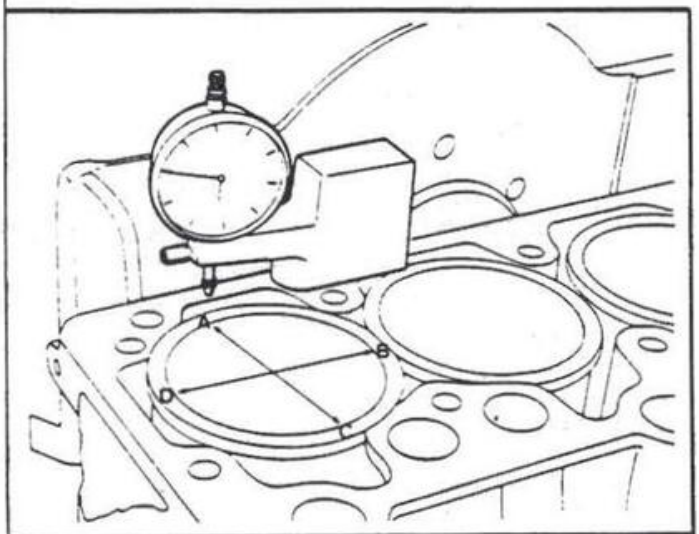
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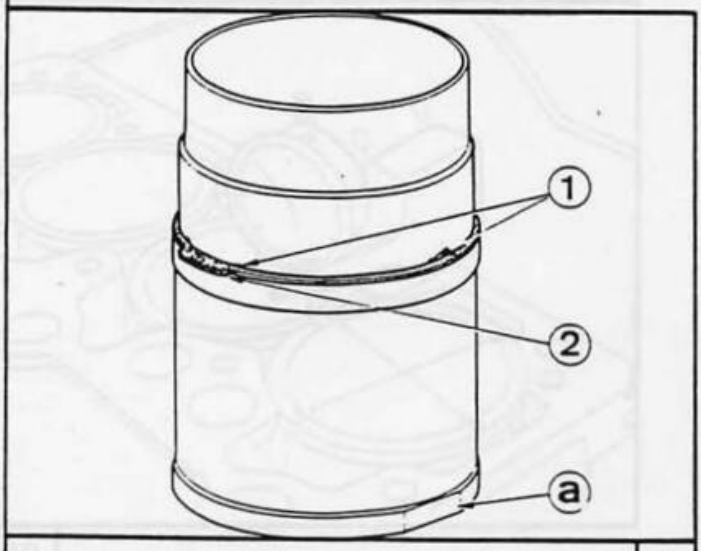


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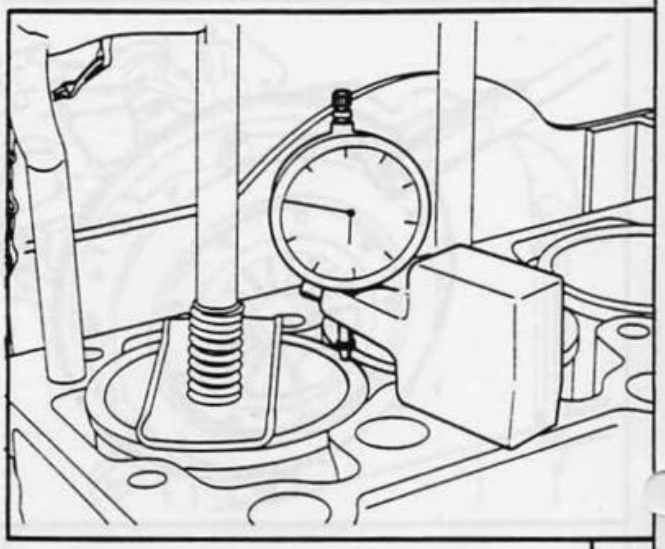


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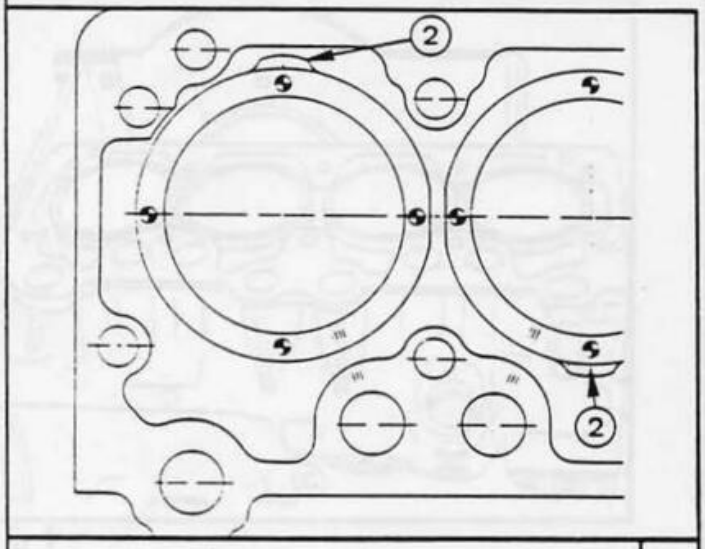
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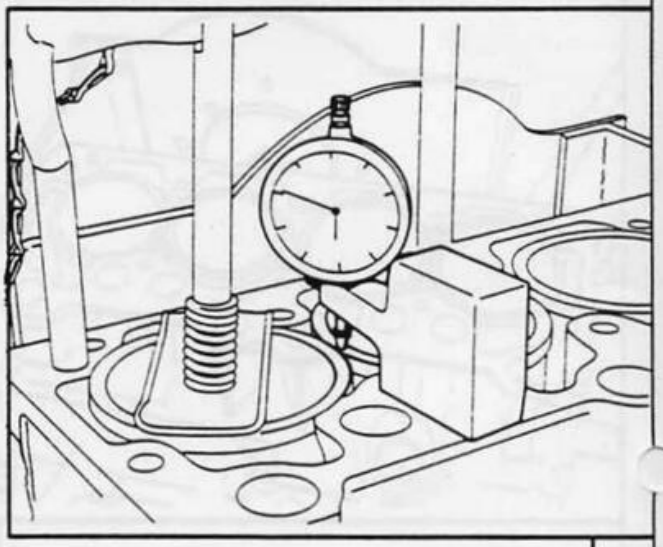
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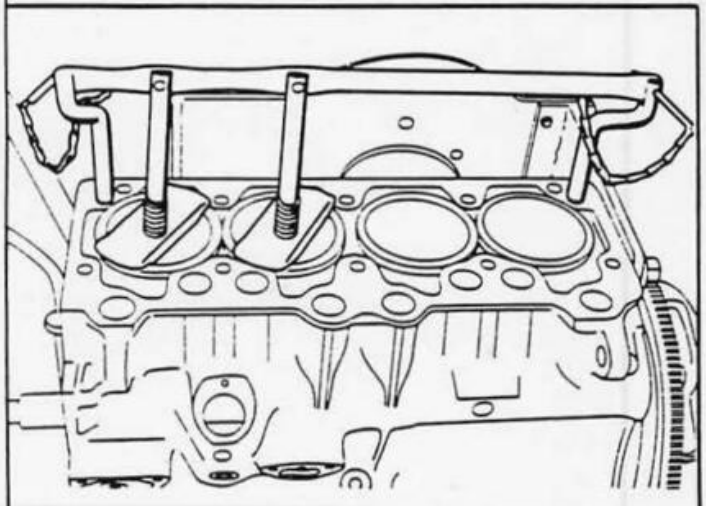
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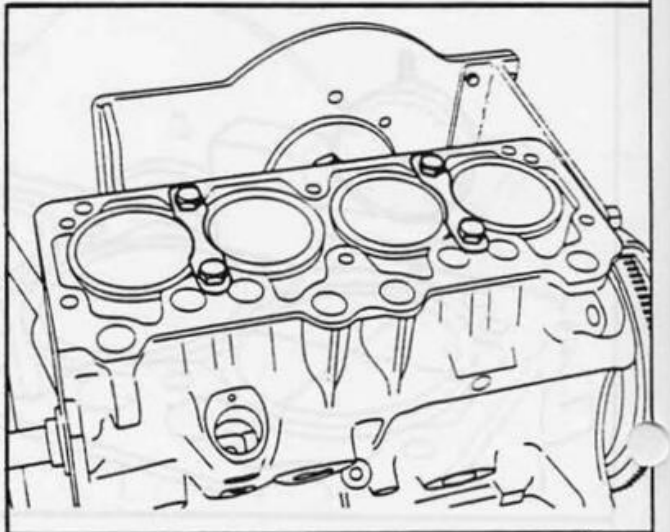
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III



VI

Fit the liner seals, the thickness of which have just been determined, fig. I.

Carefully fold the tags (1) on the seal into the locating remove.

Position the identification tabs (2) so that they are perpendicular to flat (a).

Place the liners in their respective locations as shown in fig. II, positioning the identification tabs (2) as shown in the illustration.

Compress liners 3 and 4, fig. III, using tool 8.0128.

Measure the liner protrusion, above the cylinder block, at four points, fig. IV.

The highest point should be in the region of 0.14 mm.

Measure the maximum height difference between any two adjacent liners, fig. V.

– the height difference should not exceed 0.04 mm.

If the difference is greater than 0.04 mm.

– Replace the liner seal on the highest of the liners.

Reverse the position of toll 8.0128.

Repeat these reading on liners 1 and 2.

Lock the liners, in fig. VI using clamps 8.0132 A1Z.

Place the connecting rods and pistons in position, ensuring that :

- the piston and liner matching is maintained,
- that the connecting rod sequence 1, 2, 3, and 4, as identified during removal, is correct.

Fit the piston with the arrow marked "AV" (front) and the oil jet in the connecting rods positioned as shown in the illustration.

Fit the gudgeon pin, by hand, to secure the connecting rod to the piston, fig. II.

NOTE - Depending on the fit, it may be necessary to warm up the piston, before fitting the pin, by immersing it for a few minutes in boiling water.

Carefully fit the circlips to their grooves, fig. III.

Position the oil control ring gap as shown in fig. IV.

Stagger the gaps in the compression rings with reference to gap (a) on the oil control ring.

The mark engraved on the piston rings must face towards the piston crown.

Tighten a piston ring sleeve round the rings, fig. V.

Insert the piston/connecting rod assemblies into their liners, without turning them :

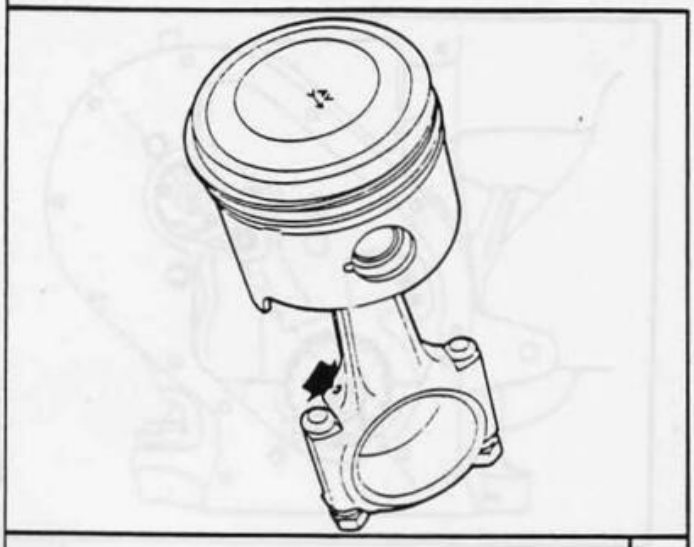
- with the arrows marked "AV" (front) on the piston crowns pointing towards the timing gear end,
- ensuring that the pistons and liners are in their correct matched assemblies.

Check that the sequence 1, 2, 3, 4 is correct.

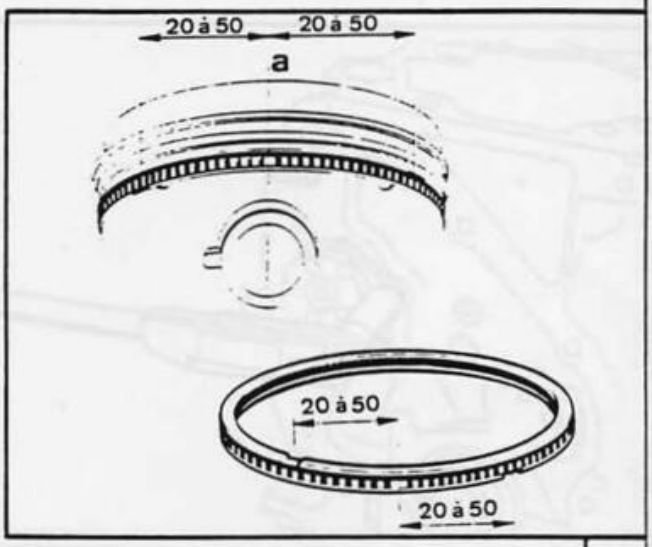
Guide each connecting rod big-end on to its crank pin, fig. VI.

Fit the big-end caps to the correct respective connecting rods.

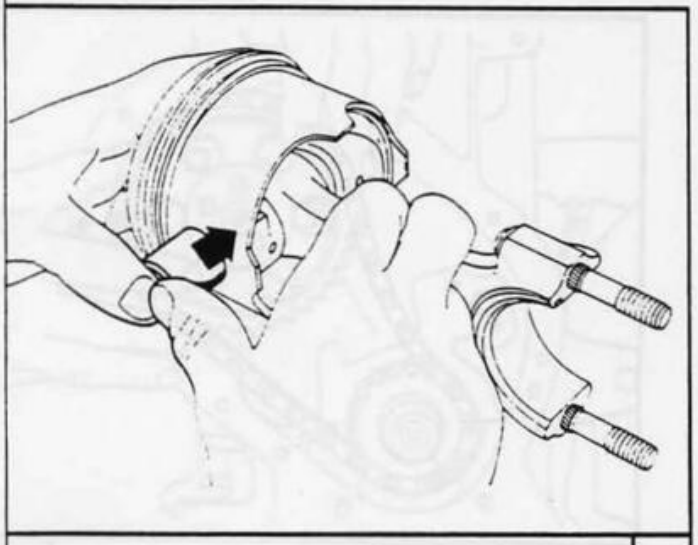
Tightening torque : 4 m.daN (40 Nm, 30 lbf ft).



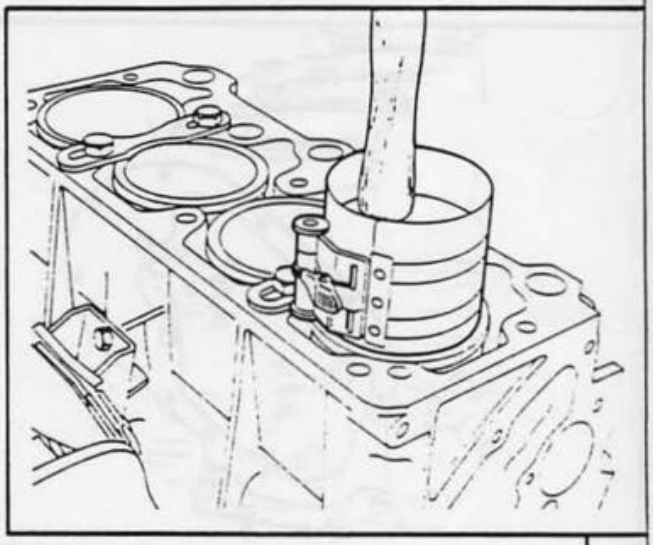
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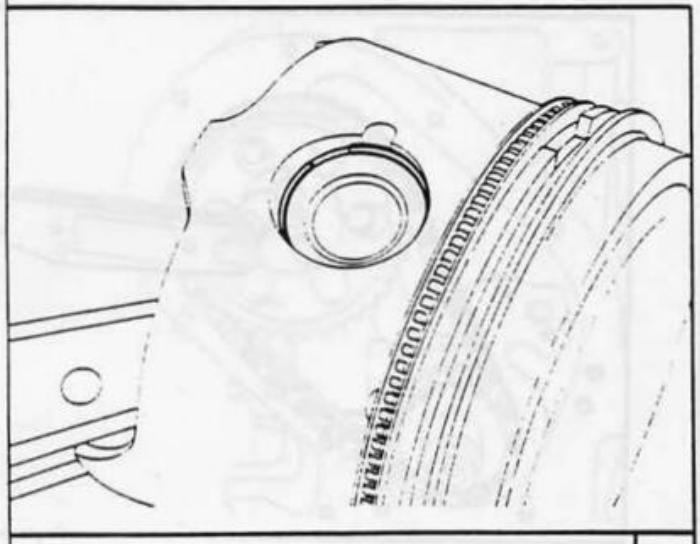
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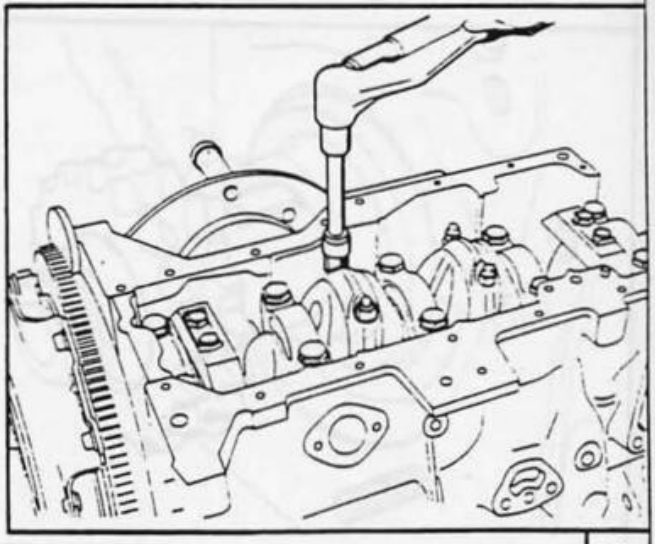
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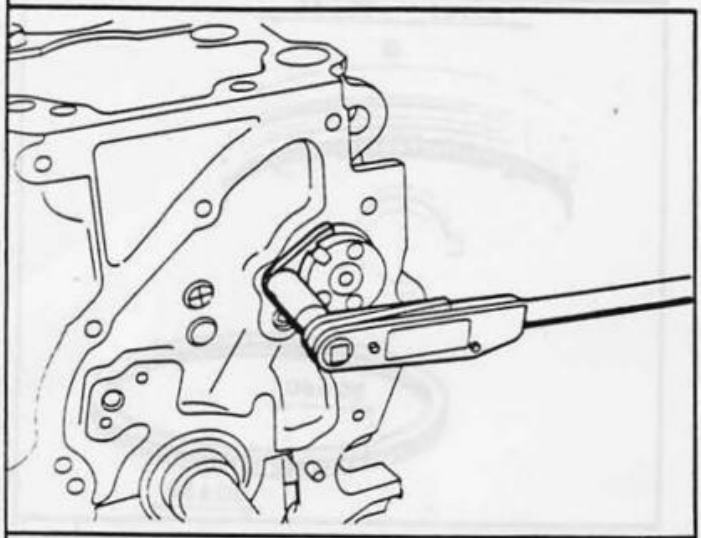
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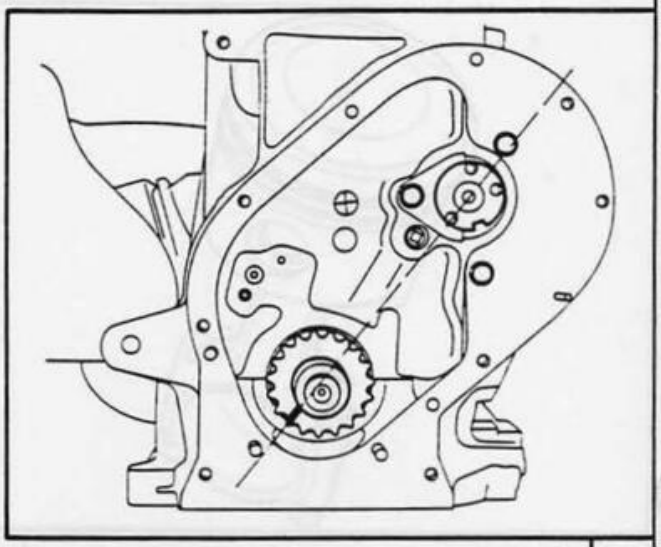
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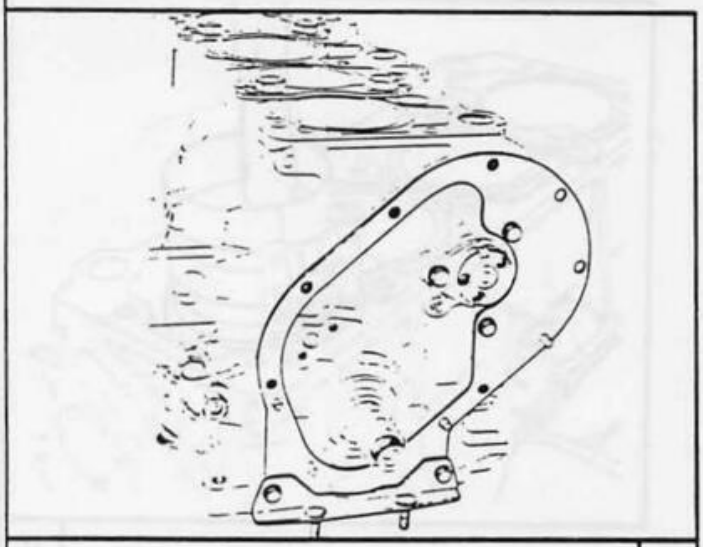
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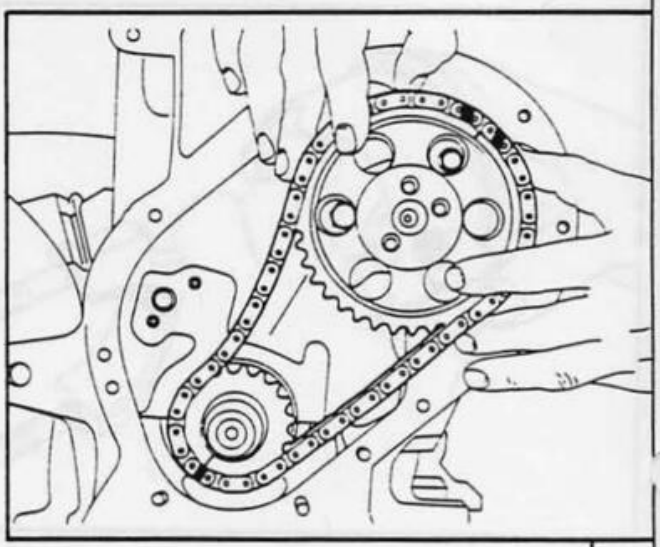
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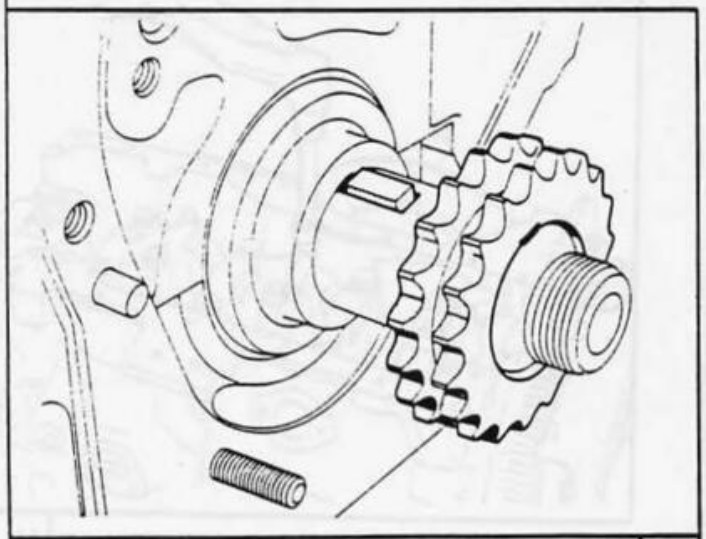
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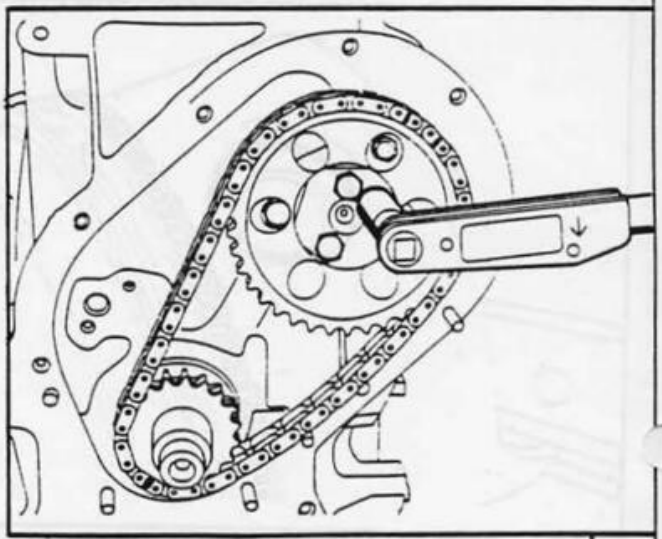
II



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III



VI

Fit, fig. I :

- the camshaft,
- its thrust washer.

Tightening torque : 1.7 m.daN (17 Nm, 12 lbf ft).

Position the camshaft and the crankshaft, shown in fig. IV.

Fit, fig. II :

- a new paper gasket,
- the timing cover backplate.

Tighten the bolts to 1 m.daN (10 Nm, 7 lbf ft).

Fit the timing chain, fig. V with the timing marks :

- on either side of the timing mark on the camshaft wheel,
- in line with the timing mark on the crankshaft wheel.

If there are no timing marks on the chain, carry out the operation described in the dismantling section.

Fit to the crankshaft, fig. III :

- the key,
- the chain wheel, with its timing mark outwards.

Fit a new locking plate to the camshaft wheel, fig. VI.

Tighten the bolts to a torque of 2.25 m.daN (22,5 Nm, 17 lbf ft).

FOLD UP the locking plate.

Dismantling and Reassembling the chain tensioner.

IMPORTANT - Ensure, when reassembling the various component parts :

- that they slide freely in their locations,
- that the oil holes are all clean.

SEDIS type tensioner, fig. I :

- Set the ratchet as shown in detail (1) and take out the pad, the rack and the spring, in one movement.

Warning : do not remove the ratchet (a) from its location (its return system would prevent it being refitted).

- Reassemble by carrying out the removing operations in reverse.
- Lock the tensioner by moving the ratchet as shown in detail (2).

RENOLD type tensioner, fig. II :

- Lock the tensioner using a 3 mm Allen key.
- Fit the pad to the tensioner body.
- Place, fig. III, a length of steel wire 2 mm in diameter, between the tensioner body and the pad to prevent it being reset by accident.

New tensioners are supplied fitted with a plastic tab for this purpose.

Place the GAUZE FILTER in position, fig. IV.

Fit the tensioner.

Tighten the bolts, fig. V to a torque of 0.6 m.daN (6 Nm, 4,5 lbf ft).

Setting the tensioner.

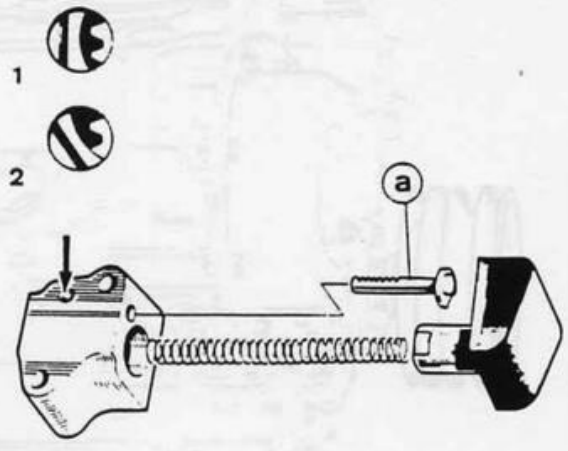
SEDIS type tensioner, fig. V.

Set the tentioner by turning the ratchet to the right.

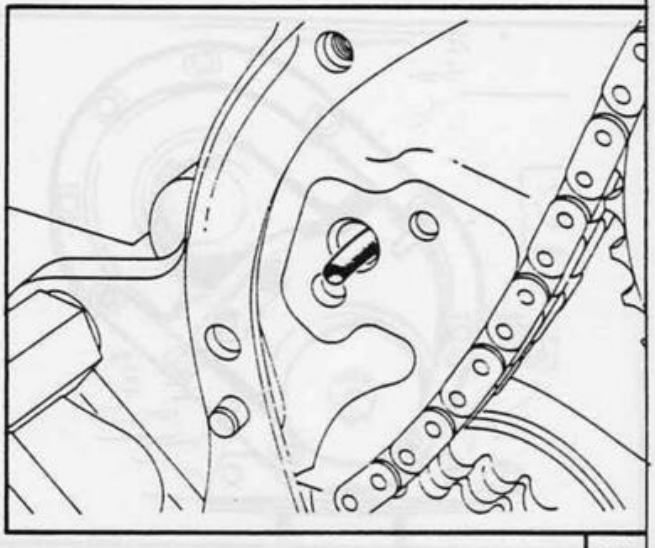
RENOLD type tensioner, fig. VI :

- Remove the length of wire or the plastic tab (new tensioner) and push in the pad until it makes contact with the bottom of the bore in the tensioner body.
- Release the pad.

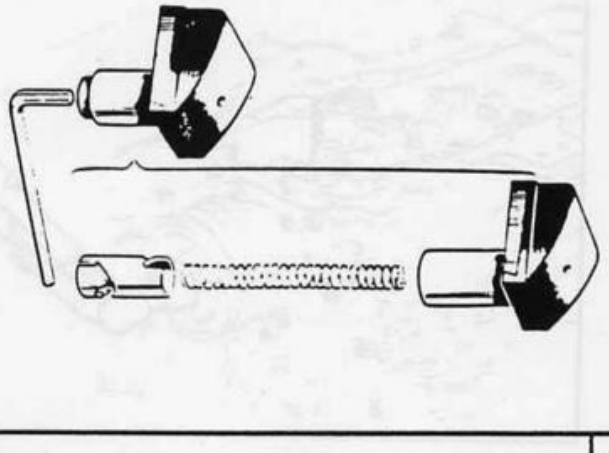
IMPORTANT - On neither of these types of tensioner should the movement of the pad be assisted.



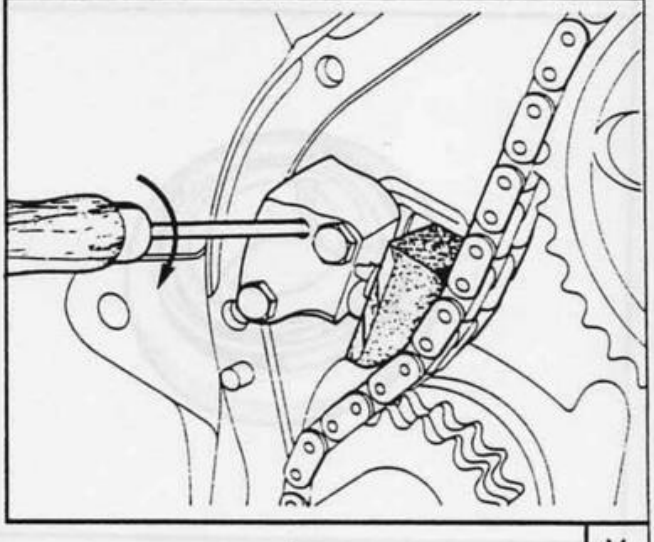
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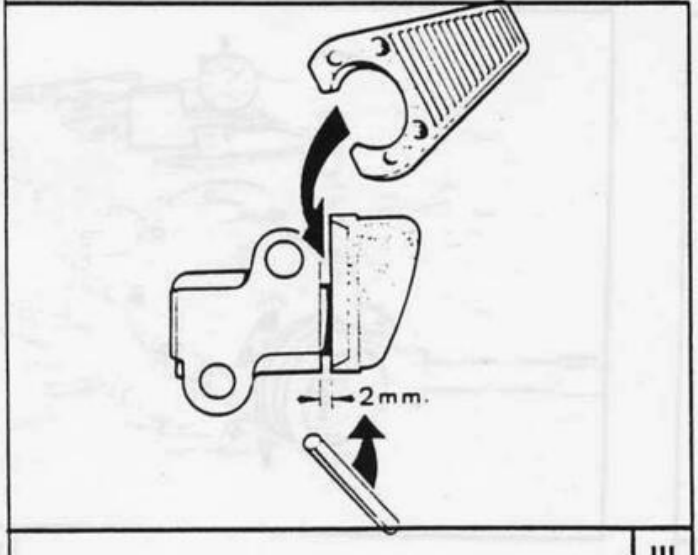
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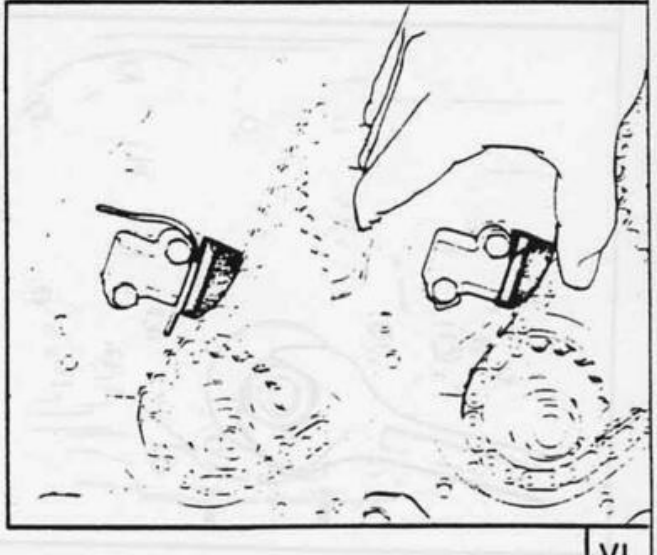
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Refit the timing cover, fig. I, using a new gasket.

Centralise the timing cover using adaptor 8.0110 R.

Tighten the bolts to a torque of 1.25 m.daN (12,5 Nm, 9 lbf ft).

Fit the seal, to adaptor 8.0110 R, fig. II.

Fit the seal, fig. III by screwing on the crankshaft nut as far as it will go without forcing it.

Refit, fig. IV :

– the key,

– the crankshaft pulley.

Tighten the nut to a torque of 17 m.daN (170 Nm, 125 lbf ft).

(Lock the crankshaft with a wood block as shown in the illustration).

Adjusting the timing plate, fig. VI.

Bring pistons No. 1 and No. 4 to top dead centre (TDC), with the cams on No. 4 cylinder "rocking".

The zero on the timing plate should be in line with the timing mark on the pulley.

Adjust it if necessary.

Apply a dab of paint to one of the nuts.

Distributor and Oil Pump Drive Shaft.

(With the piston of No. 1 cylinder at TDC on the firing stroke).

Place the drive shaft in position, fig. I :

- With its slot parallel with the engine centre line,
- with the smallest side of the offset towards the cylinder block.

When the shaft is fully engaged, the slot should be in the position shown in fig. II.

Refit the distributor support, fig. III.

Oil pump, fig. IV.

Ensure that the locating dowel is in position on the cylinder block.

Fit a new "0" ring.

Fit the oil pump, moving the drive shaft to the correct position to do so.

Tighten the bolts to a torque of 1 m.daN (10 Nm, 7 lbf ft).

Refit the sump, fig. V, using a new gasket.

Tighten the bolts to 1 m.daN (10 Nm, 7 lbf ft).

Insert the tappets in their respective locations, fig. VI.

Remove the liner retaining clamps 8.0132 A1Z.

Ensure that the flats on the end flanges of liners 1 and 2 and 3 and 4 are parallel.

I

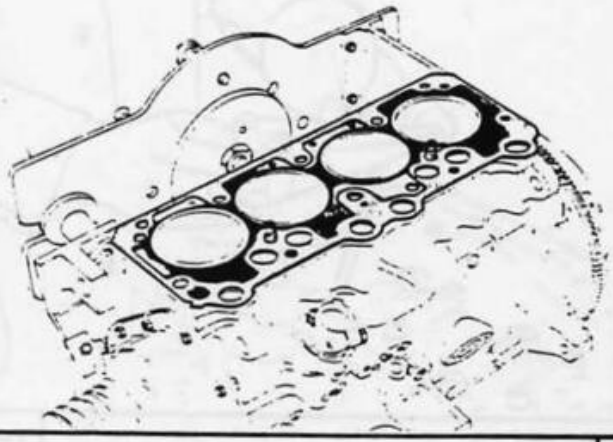
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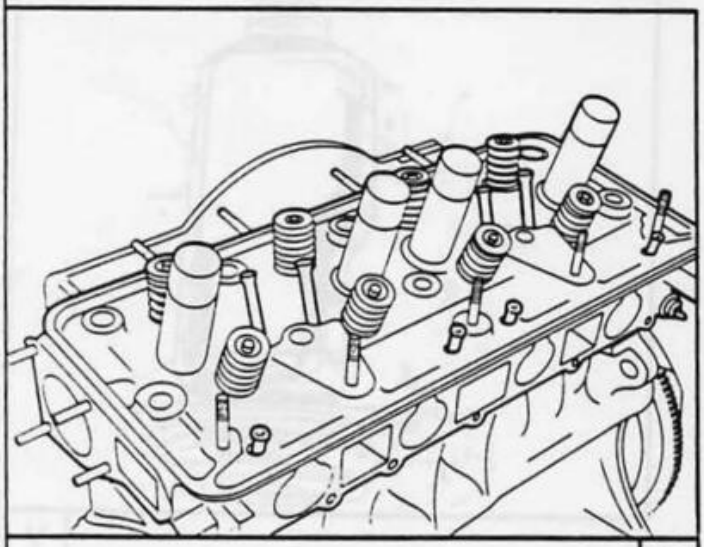
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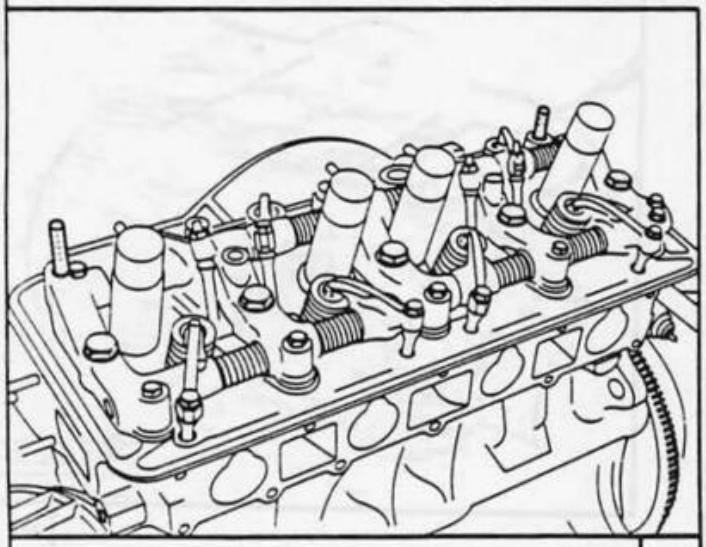
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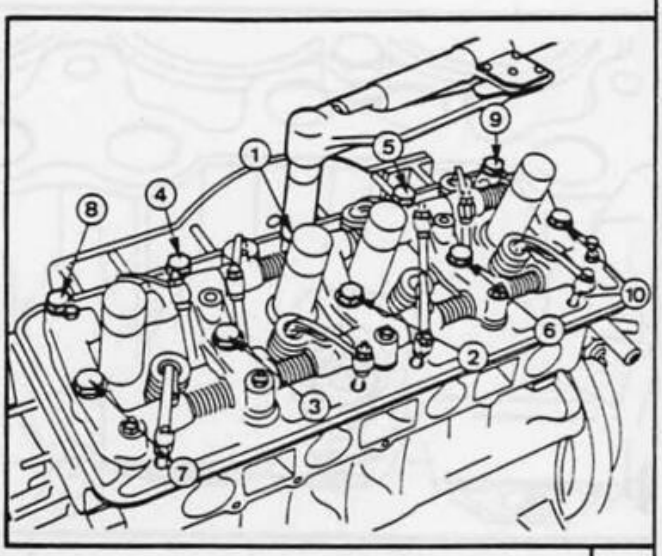
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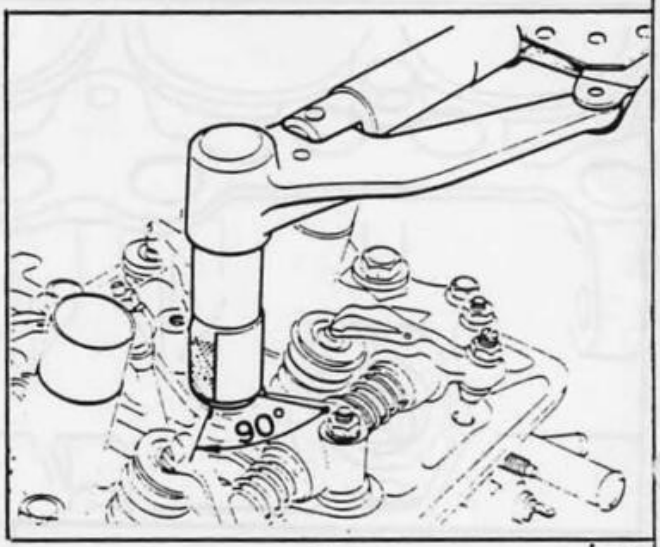
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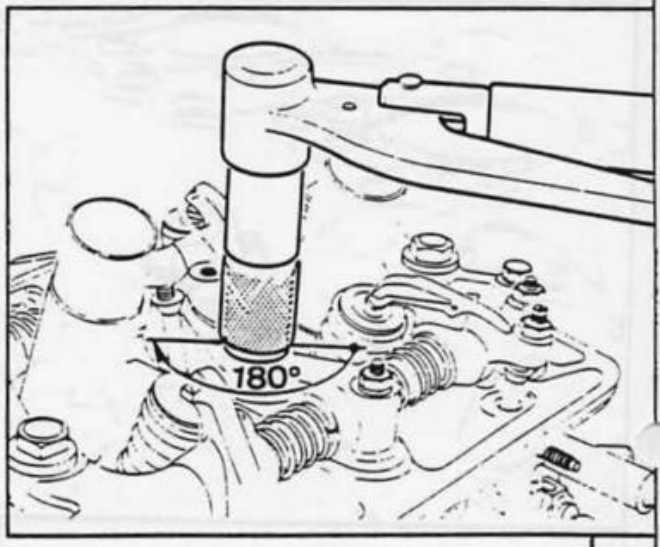
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IV



V



VI

Refitting the cylinder head.

Fit guides 8.0115 BZ, fig. 1.

Fit the correct type of cylinder head gasket for the engine in question so that :

- the inscription "DESSUS" (top) is visible,
- the rectangular water aperture is at the water pump end.

Fit, figs. II and III :

- the cylinder head,
- the push rods.

- the rocker shaft assembly,
- the cylinder head bolts, fitted with flat washers, after lubricating the bolts,
- the rocker shaft securing nuts.

RETRIEVE the 2 guides 8.0115 BZ using their extensions 8.0115 A.

Tighten the cylinder head.

a) In the order shown in fig. IV.

Tighten :

- the cylinder head bolts to a torque of 5 m.daN (50 Nm, 37 lbf ft),
- the rocker shaft securing nuts to a torque of 1.5 m.daN (15 Nm, 11 lbf ft).

1°) → 1986 MY

Method Fig. V

In the correct tightening order, bolt by bolt.

- 1 Loosen and retighten to 20 N.m (14.7 lbf.ft.).
- 2 Tighten through a further 90° using socket (-).0129 ZZ.

2°) → 1986 MY

Method Fig. VI

In the correct tightening order, bolt by bolt.

- 1 Loosen and retighten to 20 N.m (14.7 lbf.ft.).
- 2 Tighten through a further 180° using socket (-).0158.

NOTE - If there is any doubt on the tightness of one of the bolts, recommence the operation from the very beginning.

IMPORTANT - The cylinder head is to be re-tightened after a first warm-up of the engine carried out as follows :

1) Run the engine at 2000 rpm until the electric fan cuts in.
2) Retighten the cylinder head.

Adjusting the valve clearances fig. I.

Valve clearances

Inlet ● : 0.10 mm

Exhaust ⊗ : 0.25 mm

Fully open exhaust valve	Adjust valves	
Exhaust	Inlet	Exhaust
⊗ 1	● 3	⊗ 4
⊗ 3	● 4	⊗ 2
⊗ 4	● 2	⊗ 1
⊗ 2	● 1	⊗ 3

Refit the rocker arm cover fig. II :

- Place the cups and new rubber seals on the spark plug tubes.
- Bond the new rubber gasket to the rocker arm cover.
- Secure the rocker arm cover in place with 2 bolts, not forgetting to fit new rubber tubes.

Refit the rocker arm assembly lubrication pipe fig. III.

Fit the unions with new seals.

Refit the oil filter support fig. IV.

Coat the 3 bolts with Loctite Thread Locking Compound and tighten them to 13 N.m (9.6 lbf.ft.).

Refit the filter cartridge fig. V :

- Oil between the seal and the cartridge.
- Degrease the upper face of the seal and its locating area on the support.
- Screw in the cartridge until the joint makes contact with its face.
- Tighten the cartridge by a further 3/4 turn.

Preset the distributor timing.

Bring the slot in the pulley in line with the mark on the timing plate fig. VI.

I

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IV

V

VI

J5

I

II

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VI

– The largest offset on the drive dog, fig. I, should then be towards the rear of the engine and No. 1 cylinder should be at its firing point.

If not, turn the crankshaft through a complete turn and re-align the notch in the pulley with the index on the timing plate.

– Push the distributor fully in, fig. II.

– Find the point at which the contact breaker points open.

– Lock the distributor in this position.

Refit the water pump, fig. III

Fit new rubber seals.

Tightening torques :

– 8 mm nuts : 2.25 m.daN (22.5 Nm, 17 lbf ft).
– 10 mm nuts : 4.25 m.daN (42,5 Nm, 31 lbf ft).
– 10 mm bolts : 2.75 m.daN (27,5 Nm, 20 lbf ft).

Refit the various engine accessories as shown in fig. IV.

	Page
Special tools	B2.002 and 003
Retightening the cylinder head-Adjusting the valve clearances	B2.004 and 005

RETIGHTENING THE CYLINDER HEAD
ADJUSTING THE VALVE CLEARANCES

TOOLS REQUIRED

Fig. A

- 8.0129 ZZ - Socket for angular tightening operations (90°)

Fig. B

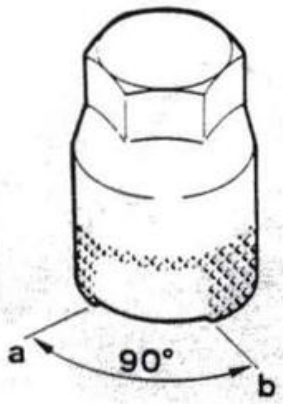
- ( ).0158 Socket for angular tightening operations (180° and 35°)

Fig. C

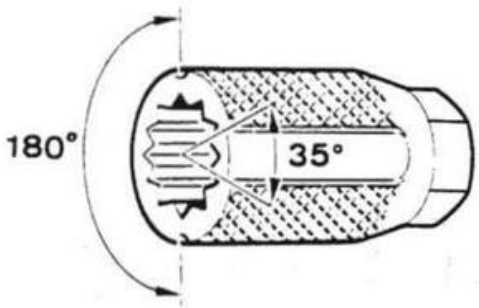
- 8.0118 P1 - Socket for crankshaft pulley nut

APPROVED TOOLS

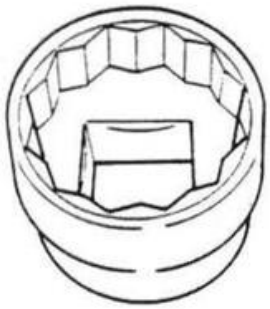
- Torque wrench.
- FACOM reducer S 232.
- FACOM ratchet spanner S 151.


a
90°
b

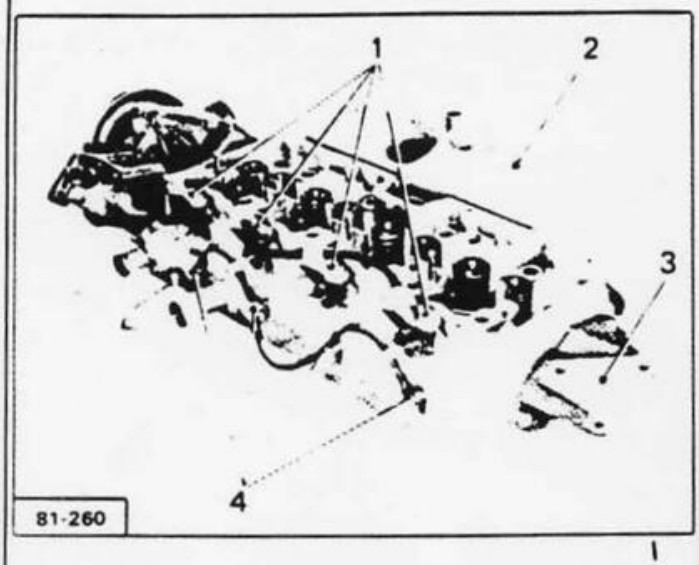
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180°
35°

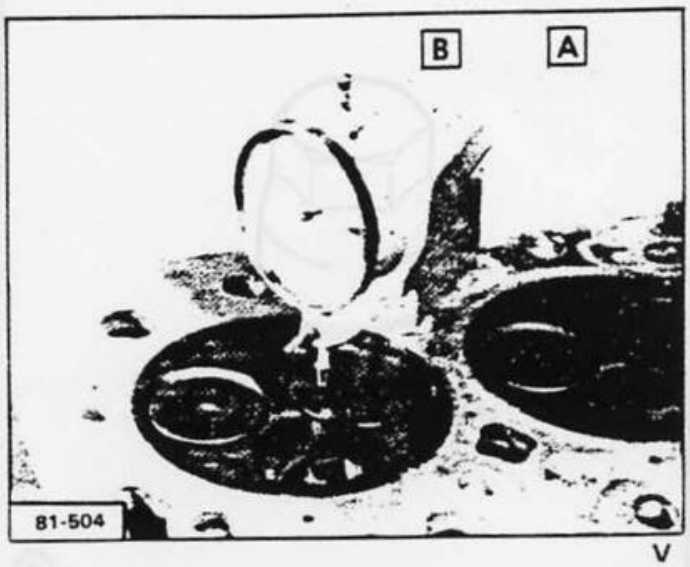
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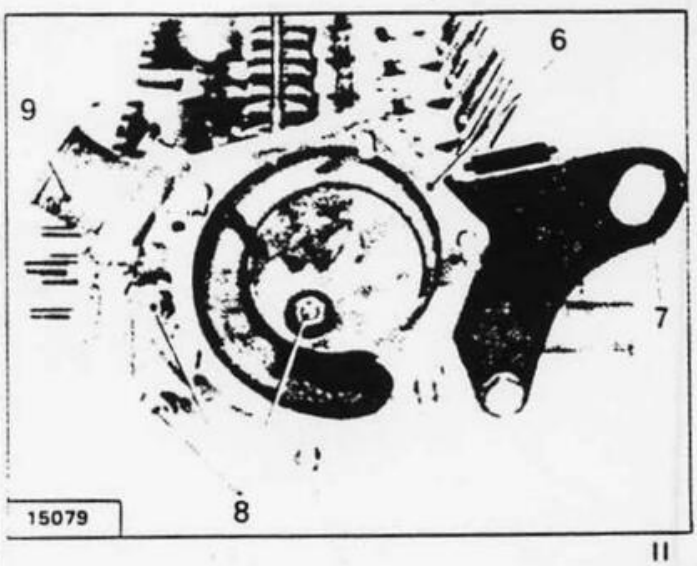
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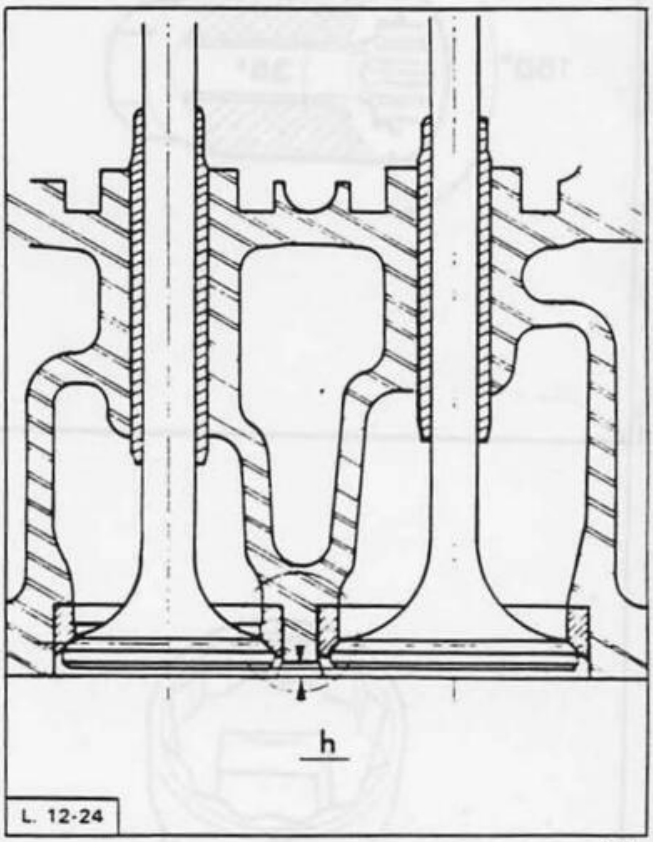
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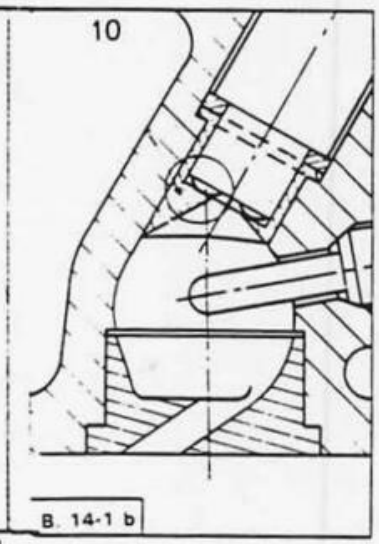
II



VI



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IV

J5	ENGINE CYLINDER HEAD RETIGHTENING	1	B2.005

Engine Type	Engine No.	INITIAL TIGHTENING	ENGINE WARM-UP	RETIGHTENING	At 1000/1200 mile MAINTENANCE (1500/2000 KM)
XM7-T	→| 012625	In the tightening order shown above - Pretighten to 50 N.m (37 lbf.ft) - Bolt by bolt, in the same order, tighten to 20 N.m (14.7 lbf.ft) then continue to tighten through an angle of 90° Adjust the valve clearances	Warm up the engine until the electric fan cuts in. Leave it to cool for a minimum of 6 hours.	Bolt by bolt, in the same order, - Loosen the bolt - Retighten to 20 N.m (14.7 lbf.ft) then continue to tighten through an angle of 90°. Adjust the valve clearances.	Bolt by bolt, in the same order, (with the engine cold) - Loosen the bolt - Retighten to 20 N.m (14.7 lbf.ft) then continue to tighten through an angle of 90°. Adjust the valve clearances.
XN1-T	→| 021874				
XN1-T	↦ 021875 →| 031998				
XM7-T	↦ 012626	In the same order - Pretighten the bolts to 50 N.m (37 lbf.ft) - bolt by bolt, in the same order, loosen each bolt, retighten it to 20 N.m (14.7 lbf.ft) then continue to tighten through an angle of 180°.		Whatever the engine temperature, bolt by bolt, in the same order, tighten each bolt through an additional 35°. Adjust the valve clearances (with the engine cold).	No cylinder head retightening operation. Adjust the valve clearances (with the engine cold).
XN1-T	↦ 031999				
XN1-TA			Warm up the engine until the electric fan cuts in.		

This operation, followed by adjusting the valves, is to be carried out, on a cold engine, that is to say after it has cooled down for 6 hours.

- Remove the components shown in fig. I.

RETIGHTENING THE CYLINDER HEAD

1 - Tighten bolt no. 1 fig. II :

- Fully loosen bolt no. 1, then retighten it to 20 N.m (14.7 lbf.ft.).
  (The illustration actually shows bolt no. 2).

2 - Tighten bolt no. 1 through the specified angle fig. III :

- Place socket 8.0129 ZZ or (-).0158 on bolt no. 1 to mark a line on the rocker arm support in line with position mark (a).
- Tighten the socket until position mark (b) comes opposite this line (a rotation of 90° or 180°).
- Mark the bolt that has just been tightened in this way.

3 - REPEAT operations 1 and 2 BOLT BY BOLT on all 10 bolts in the order shown in fig. IV.

IMPORTANT - If there is any doubt on the tightening of one of the bolts, repeat operations 1 and 2 on the said bolts.

ADJUSTING THE VALVE CLEARANCES fig. V :

- Clearances, on a cold engine
  Inlet ● : 0.10 mm
  Exhaust ⊗ : 0.25 mm
- Turn the crankshaft to FULLY OPEN the following exhaust valves :

Exhaust		Inlet	Exhaust
⊗ 1	To adjust	● 3	⊗ 4
⊗ 3		● 4	⊗ 2
⊗ 4		● 2	⊗ 1
⊗ 2		● 1	⊗ 3

- Refit all the components removed.
- Check the condition of the belts and their tensions.
- Test the operation of the cooling system.

SPECIAL TOOLS

From petrol engine tool kit 8.0110 :

Fig. A :

H - Dial indicator holder.

M - Set of four M12 x 150 bolts (yellow).

8.0132 A1Z

– Liner retaining clamps.

Fig. B :

8.0115 Y

– Cylinder head locating guides.

8.0118 P1

– Crankshaft pulley nut socket.

8.0129 ZZ

– Socket for tightening the cylinder head bolts by the angular method.

- (-).0158 Socket for angular tightening operations on the cylinder head (180° and 35°)

8.0150

– Engine support equipment comprising :

Fig. C :

A - Cross piece

B - Thrust Rod.

TOOLING TO BE MADE LOCALLY

0.0149

– Cylinder head releasing levers (material : 16 mm Ø drawn steel bar).

RECOMMENDED TOOLING

– KRIKIT tension meter for checking the alternator drive belt tension.

– FACOM adaptor S 232.

– FACOM ratchet spanner S 151.

TIGHTENING TORQUES

– Nut on left hand engine mounting rubber pad 5.5 m.daN (55 Nm, 40 lbf ft)

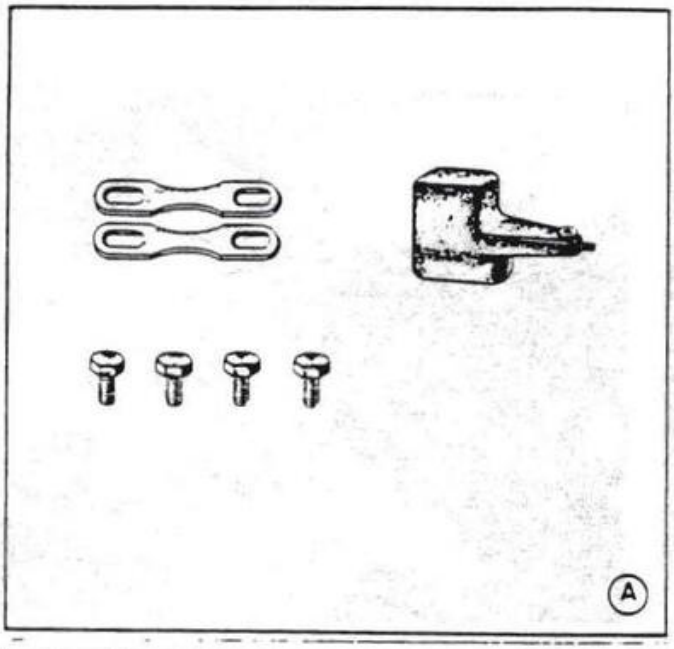
– Bolt securing engine mounting bracket to water pump 5 m.daN (50 Nm, 37 lbf ft)

– Cylinder head tightening sequence :

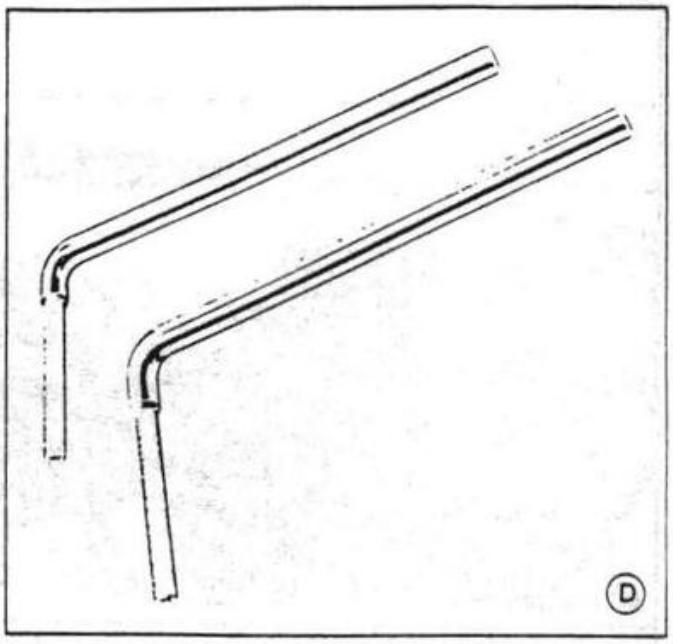
- initial tightening to 5 m.daN (50 Nm, 37 lbf ft)

- tightening by the angular method : up to 2 m.daN (20 Nm, 15 lbf ft)

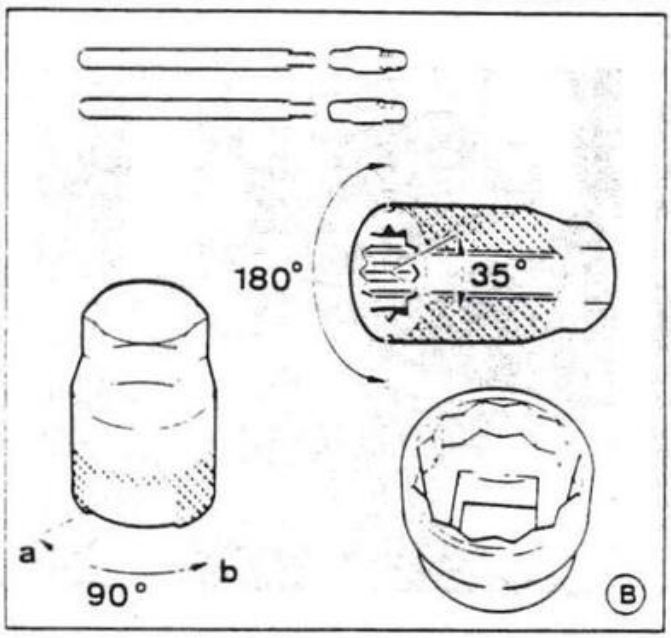
+ 90° or 180° and, in certain cases, 35°



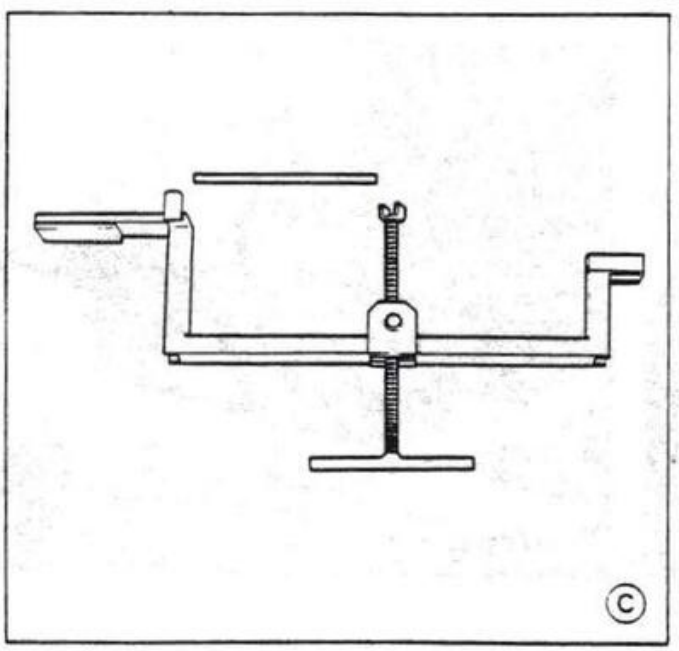
A



D



B



C

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J5

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This operation is carried out with the engine in the vehicle and supported by equipment 8.0150.

REMOVING

– Drain the cooling system (there are drain points on the radiator and on the cylinder block).

Operations under the bonnet

– Remove, fig. I :
- the spare wheel,
- the air intake,
- the air filter.

– Disconnect the upper hose from the water pump.

– Disconnect, fig. II :
- the following hoses :
  - heater input,
  - manifold heating at the cylinder head outlet pipe,
  - manifold heating outlet at the manifold end,
  - vacuum, at the brake servo unit,
- the wires :
  - from the thermistor and warning light temperature switch,
  - from the idling solenoid valve,
  - the accelerator and choke cables,
- the rocker shaft oil pipe.

– Unhook the diagnostic socket and move it away from its support.

– Remove, fig. III :
- the rocker cover,
- the seals and pins from the spark plug tubes,
- the alternator and its drive belt.

Operations under the vehicle.

– Remove the water pump drive belt, fig. IV, by levering it off the pulley.

Turn the engine crankshaft using :
- socket 8.0118 P1,
- FACOM adaptor S 232,
- FACOM ratchet spanner S 151.

– Remove the two bolts that secure the rear pipe assembly to the water pump, fig. V.

– Remove the nuts from the exhaust pipe clamp.

Fitting engine support equipment 8.0150, fig. VI.

– Place the thrust rod (B) in the "lugs" on the cylinder block.

– Place the cross piece (A) in position :
- at the front on the front suspension arm support,
- at the rear over the welded nut.

– Turn the screw until the fixture is under tension.

REMOVING (contd.)

Operations under the bonnet :

– Remove, fig. I :

- the three engine mounting bolts on the water pump,
- the nut from the rubber mounting pad,
- the aluminium support bracket.

– Remove, fig. II :

- the ten cylinder head securing bolts,
- the five rocker shaft securing nuts,
- the rocker shaft,
- the push rods.

– Fit the cylinder head releasing levers 0.0149 as shown in fig. III.

Lever the cylinder head free.

– Remove the cylinder head.

– Fit liner retaining clamps 8.0132 A1Z and bolts 8.0110 M.

CLEANING

– Clean the cylinder head and cylinder block gasket faces with DECAP-LOC 88 stripping compound.

Plug the tappet locations, fig. IV with screwed up balls of paper.

– Clean and bush the cylinder head bolts and blow out the tappings in the block.

– Never decarbonise the piston crowns or tops of the cylinders.

INSPECTION

Check the cylinder head for bow, fig. V.

MAXIMUM permissible bow c = 0.10 mm

Refacing (fig. V)

Nominal height : 92.5 mm ± 0.15
Minimum height after refacing : 91.85 mm

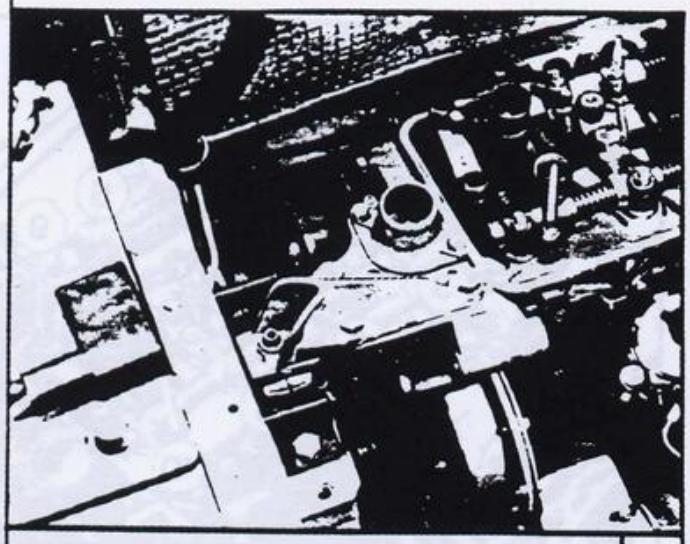
Liner protrusion, fig. VI

– Measure the protrusion, on the cylinder centre line, using support 8.0110 H and dial indicator 8.1505.

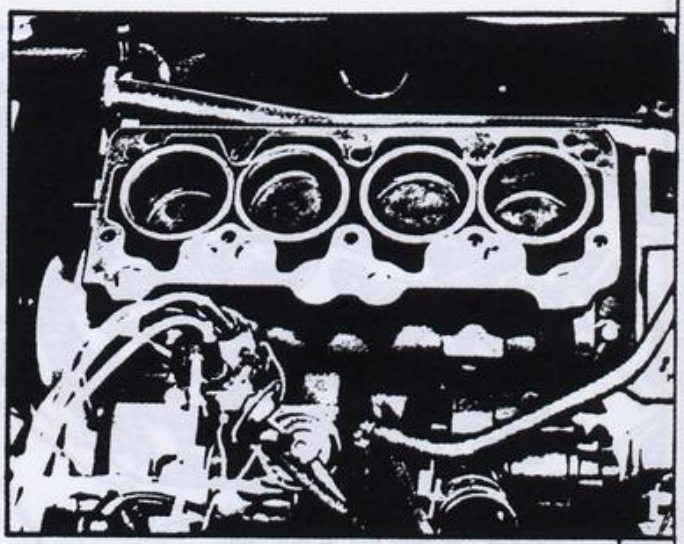
a) measure the height above the cylinder block :
- Max. : 0.14 mm
- Min. : 0.07 mm

b) between any two adjacent liners :
- maximum difference : 0.04 mm.

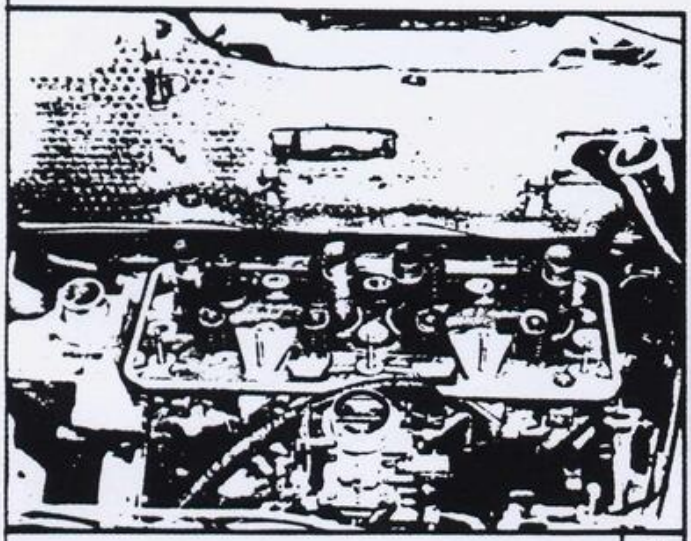
IMPORTANT - If the dimensions are outside these tolerances, remove the engine from the vehicle so that the liner seals can be replaced.



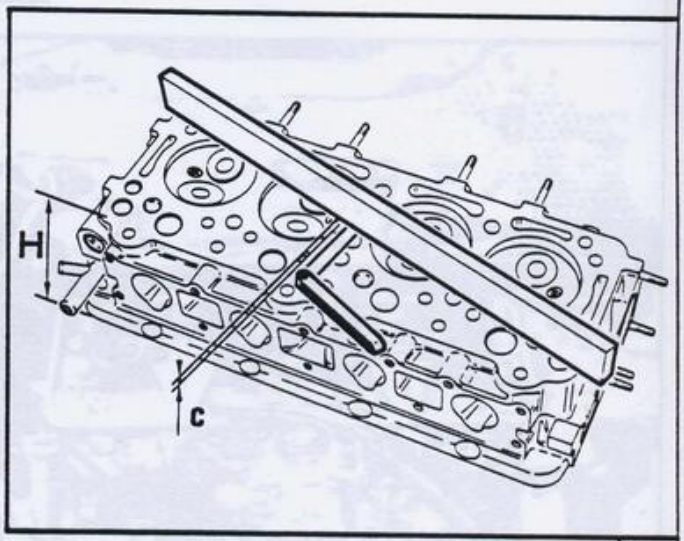
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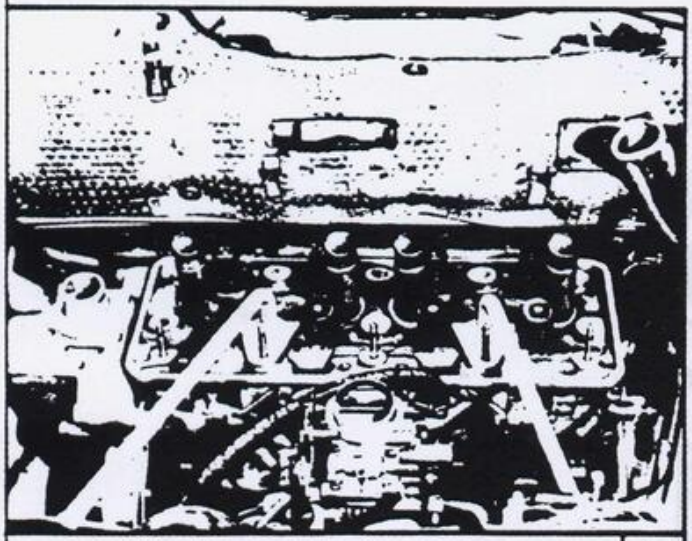
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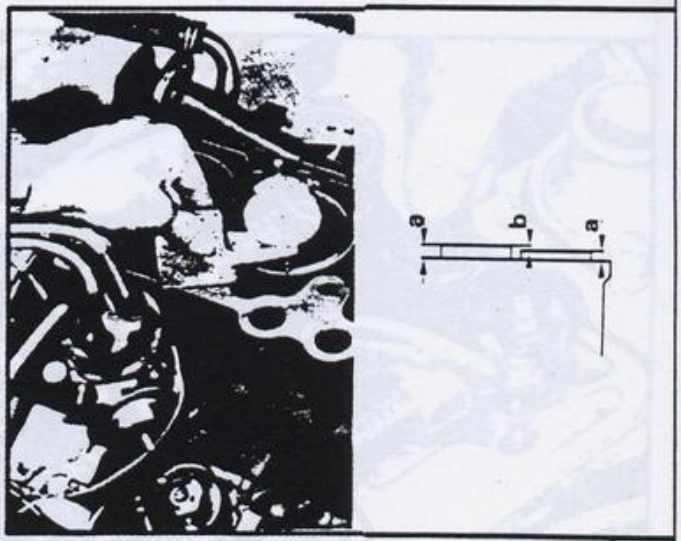
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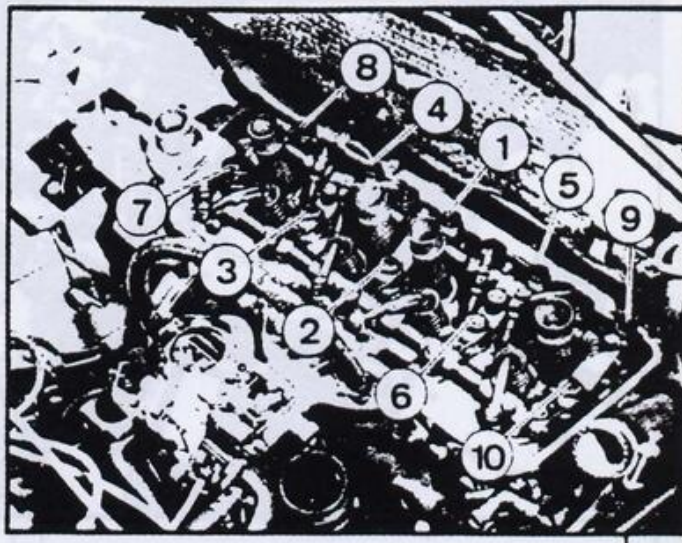
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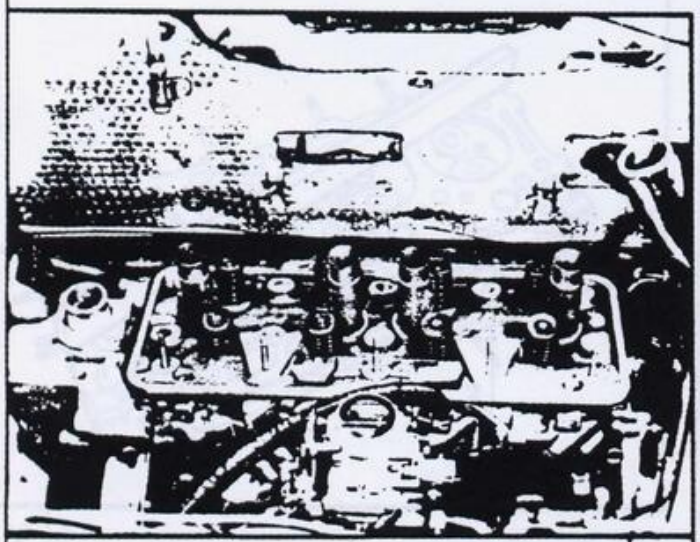
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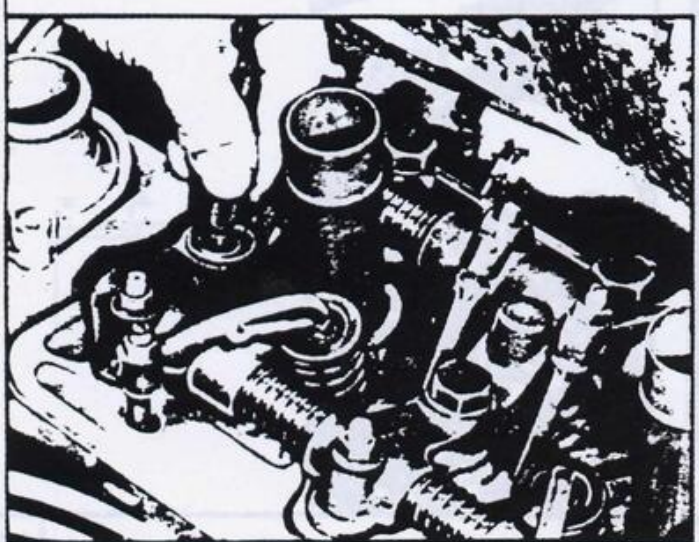
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REFITTING

– Fit fig. I :

- the cylinder head locating guides 8.0115 BZ,
- a new cylinder head gasket.

> - the rectangular aperture is to be towards the front,
> - and the inscription "DESSUS" (top) should be visible.

– Fit, fig. II :

- the cylinder head,
- the push rods.

> - the four short rods are the inlet push rods,
> - the four long rods are the exhaust push rods.

– Place the rocker shaft assembly in position.

– Lightly tighten :

- the cylinder head bolts after first greasing them and placing flat washers on them,
- the rocker shaft nuts.

– Take out the two locating guides 8.0115 BZ, using extensions 8.0115 A.

– Fit the two bolts to the tappings from which the guides have been removed.

– Tighten in the order shown in fig. IV :

- the ten cylinder head bolts to a torque of 5 m.daN, 50 Nm, 37 lbf ft),
- the rocker arm assembly nut to a torque of 1.5 m.daN (15 Nm, 11 lbf ft).

TIGHTENING THE CYLINDER HEAD

See section B2.001 to 005

REFITTING (contd.)

ADJUSTING THE VALVE CLEARANCES, FIG. I.

- Valve clearance, on a cold engine :
  Inlet : 0.10 mm
  Exhaust : 0.25 mm
- Turn the crankshaft to FULLY OPEN the exhaust valves, in the order shown below :

Exhaust		Exhaust	Inlet
⊗ 1 →	To adjust	● 3	⊗ 4
⊗ 3 →		● 4	⊗ 2
⊗ 4 →		● 2	⊗ 1
⊗ 2 →		● 1	⊗ 3

SPECIAL POINTS TO BE NOTED DURING REFITTING

- Engine mounting tightening torques, fig. II
  - Nut on rubber pad :
    5.5 m.daN (55 Nm, 40 lbf ft)
  - 3 bolts on water pump :
    5 m.daN (50 Nm, 37 lbf ft)
  - Support cross piece 8.0150 A,
  - Thrust rod 8.0150 B.
- Reconnect the exhaust downpipe clamp, fig. III.
- Lubricate the cones with MOKYKOMBIN paste, Pt. No. 9730.95 (100 g tube).
- Compress the springs to a length :
  x = 22 mm
- Refit the drive belts (see Removing).
- Tension the alternator drive belt, fig. IV, using the KRIKIT tension meter :
  - New belt : 30/40 kg/span. (66/88 lb)
  - Used belt : 25/30 kg/span. (55/66 lb).
- Cooling system :
  - Cooling system capacity : 9 liters.
  - only a Peugeot recommended antifreeze is to be used in the system (see current maintenance literature),
  - if necessary, consult the section entitled "Filling the Cooling System".

ASSOCIATED OPERATIONS

1 - Before handing the vehicle back to the customer :

- Warm up the engine :
  - by running it at 2 000 rpm until the electric fan cuts-in,
  - and then continuing to run it for a further five minutes at 1 200 rpm.
- Adjust the carburation.
- Allow the engine to cool down for a period 6 hours.
- Retighten the cylinder head, bolt by bolt.
- Adjust the valve clearances.

2 - After 1 000 to 1 500 miles (1 500 to 2 500 km)

- Allow the engine to cool down for 6 hours.
- Retighten the cylinder head.
- Adjust the valve clearances.
- Adjust the carburation if necessary.
- Change the engine oil.
- Change the oil filter cartridge.

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This operation requires the removal of the engine (see this section) and the removal of the timing gear drive belts (see engine overhaul).

REMOVAL

Pierce two diametrically opposite holes with a punch or similar tool. Fig. I.

Position tool F from kit (-).0157, screw the two drive screws into the body of the seal and extract the seal by turning the centre bolt. Fig. II.

FITTING

Clean the seal housing and the bearing surface on the crankcase.

Lubricate the housing and the seal lips to assist fitting.

Mount the seal on tool (-).0157 B. Fig. III.

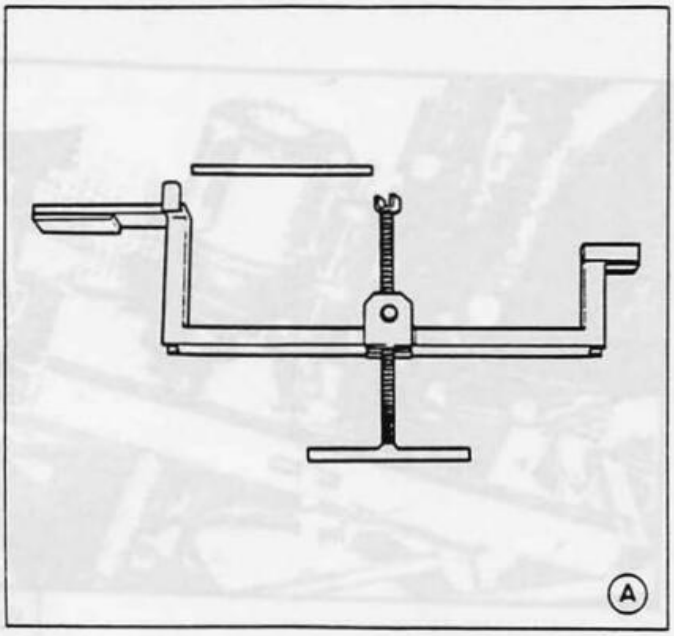
Position the seal so as to centralise the oil reserve groove in relation to the studs of the damper. Fig. IV.

Fit the seal. Fig. V.

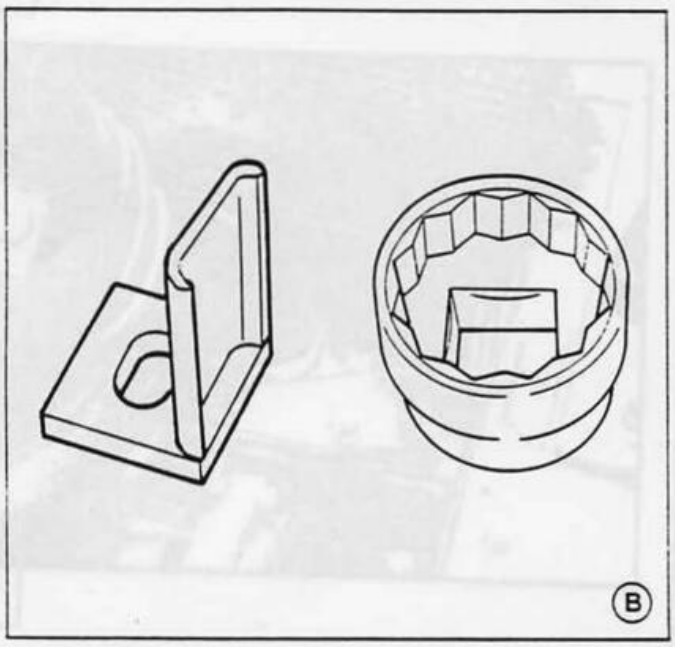
Withdraw the tool and check that the outer dust excluding lip is correctly positioned. If necessary, pull it out with a paper clip. Fig. VI.

> Note - Take same precautions when changing oil pump and camshaft seals, but these do not need to be positioned in the same way.

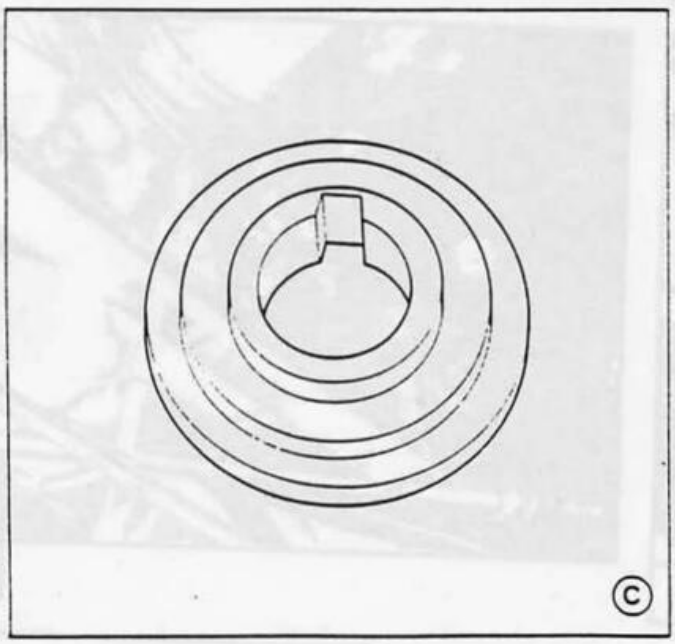
Refit the drive belts and the timing covers (see engine overhaul).



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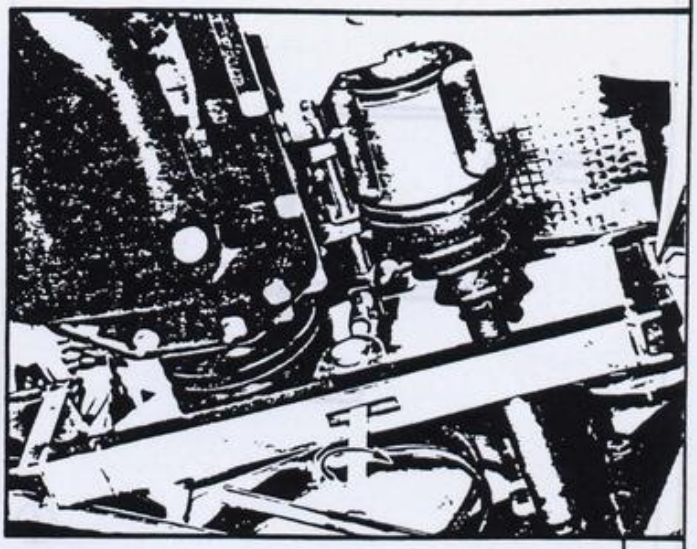
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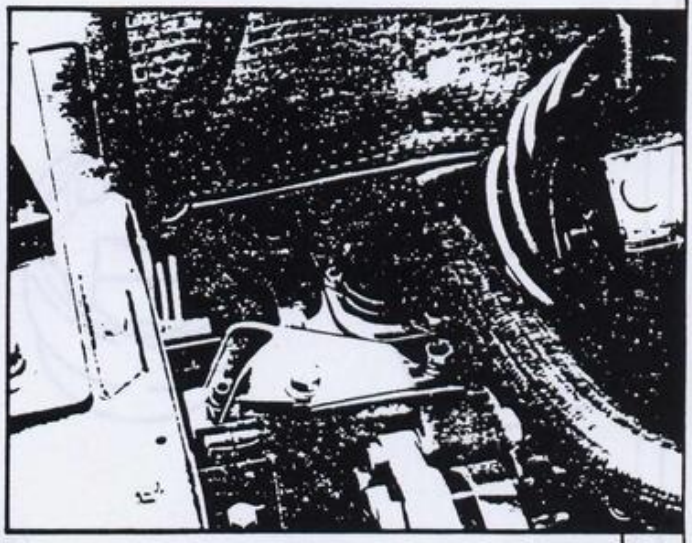
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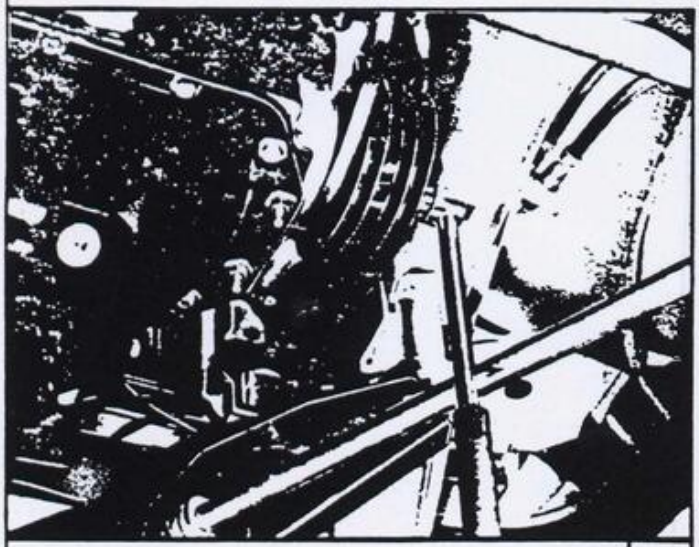
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This operation is carried out with the engine in the vehicle, preferably on a lift.

NOTE - 1 - For the operations involved in overhauling the timing gear, see the section entitled "Engine Overhauling".
2 - Replacing the pulley seal does not involve removing the timing cover. Simply remove the pulley by the method described below.

REMOVING

- Disconnect the battery.
- Remove the alternator drive belt.

OPERATIONS UNDER THE VEHICLE

- Remove the water pump drive belt, fig. I, by levering it out of its pulley groove.

> - To do so, turn the crankshaft with :
> - spanner 8.0118 P1,
> - FACOM adaptor S 232.
> - FACOM spanner S 151.

- Remove the clutch housing lower cover plate.

- Fit the retainer into the flywheel ring gear, fig. II.

- Tighten the original securing bolt.

- Loosen the pulley nut, fig. III, using spanner 8.0118 P1.

- Support the engine, fig. IV by fitting support equipment 8.0150 :
  A - cross piece.
  B - thrust rod which has already been passed through the lugs on the cylinder block.

- Tighten the screw to place the equipment under tension.

Operations under the bonnet :

- Remove the aluminium engine mounting bracket from the water pump, fig. V.

- Loosen the lifting equipment screw, fig. VI, so as to be able to remove the pulley.

- Remove the pulley.

– Remove, fig. I :
  - the bolts from the cover,
  - the timing cover.

NOTE - To overhaul the timing gear :

– Remove the sump.

– Remove flywheel retainer 8.0110 J.

– Consult the section entitled "Engine Overhaul".

– Tighten the screw on the fixture so that the aluminium engine mounting bracket can be fitted.

Tightening torques, fig. IV :

– 3 bolts on water pump : 5 m.daN (50 Nm, 37 lbf ft).

– 1 nut on rubber mounting pad : 5,5 m.daN (55 Nm, 40 lbf ft).

REFITTING

– Refit the timing cover, using a new gasket.

– Centralise the cover, fig. II using adaptor 8.0110 R.

– Fit the bolts and tighten them to 1.25 m.daN (12.5 Nm, 9 lbf ft).

– Refit the flywheel retainer 8.0110 J.

– Tighten the nut on the pulley fig. V, to a torque of 17 m.daN (170 Nm, 125 lbf ft).

– Remove the flywheel retainer 8.0110 J.

– Refit the clutch housing cover plate.

– Fit the seal to adaptor 8.0110 R.

– Fit the seal, fig. III by screwing on the crankshaft nut as far as it will go without forcing it.

– Refit :
  - the key,
  - the crankshaft pulley, passing the bolt behind it.

– Refit the belts (see the section on removing them).

– Tension the alternator drive belt, fig. VI, using the KRIKIT tension meter.

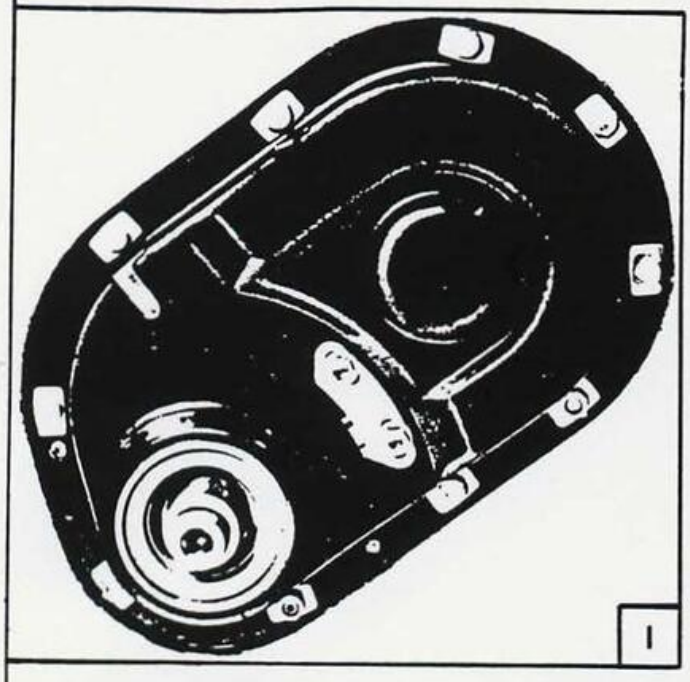
Tension on a new belt :
30/40 kg/span (66/88 lb)

Tension on a used belt :
25/30 kg/span (55/66 lb)

J5

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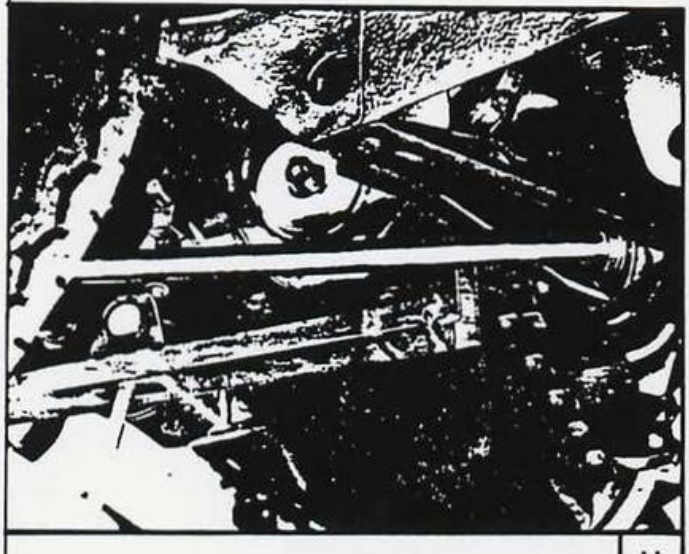
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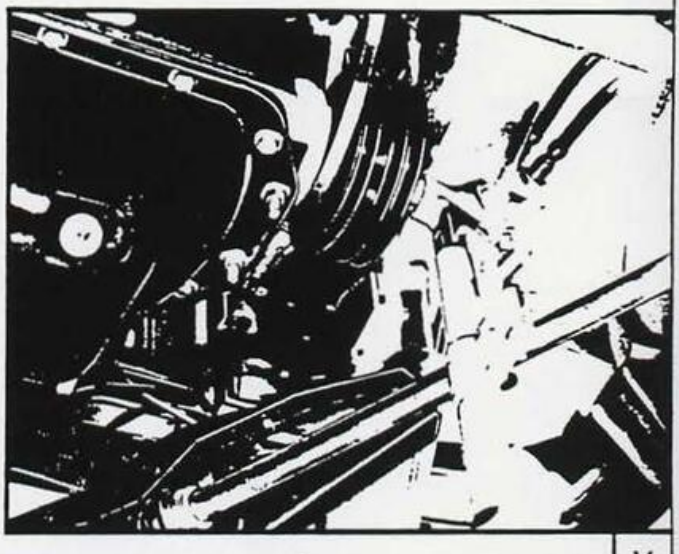
I



IV



II



V



III

VI

	Pages
Identification	F1.002
Data :	
– Specifications	F1.005
– Adjustments with the carburettor removed	
– Idling - mixture adjustments on the vehicle	
– Carburettor assembly specifications	

CARBURETTOR IDENTIFICATION
AND DATA

SOLEX CARBURETTOR 34 PBISA 16

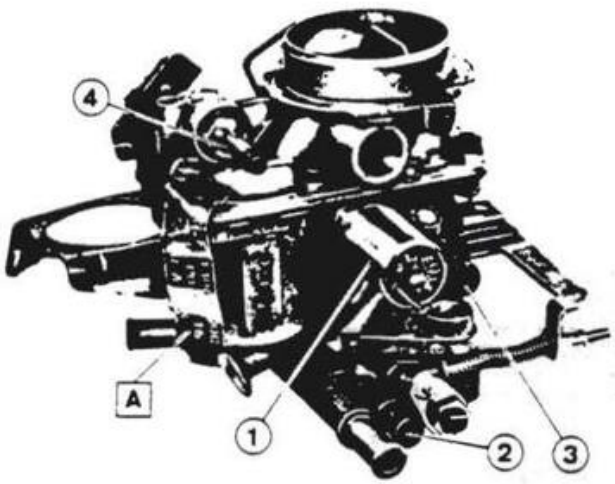
Single barrel downdraught carburettor with :

- manual cold start control, strangler flap type,
- carburettor base heated by coolant circulation,
- constant CO idling device.

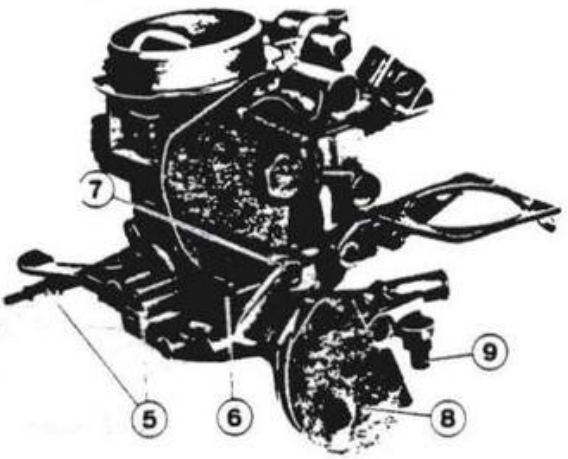
IDENTIFICATION Fig. I, II and III.

A - Carburettor reference number (identification and modifications page F1.005)

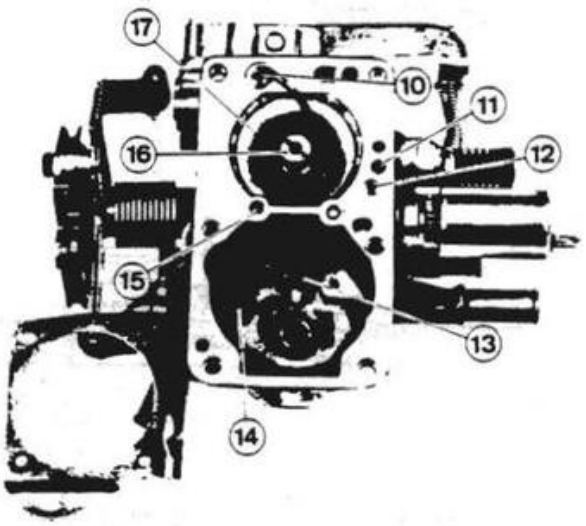
1	- Solenoid - idling fuel jet	g
2	- Mixture screw (W) with tamper-proof cap	W
3	- Constant CO screw (Va)	Va
4	- Fuel inlet (with filter screen)	
5	- Pump stroke adjustment	
6	- Adjusting screw, Positive Throttle Opening	
7	- Choke flap control	
8	- Throttle control	
9	- Throttle stop screw (for adjusting the Normal idling Position)	
10	- Pump injector (with discharge valve)	i
11	- Constant CO fuel jet	gCo
12	- Air calibration, constant CO circuit	
13	- Main jet	Gg
14	- Non-return valve, acceleration pump	
15	- Econostat calibration	Ce
16	- Air correction jet with emulsion tube	a
17	- Choke tube (venturi)	K



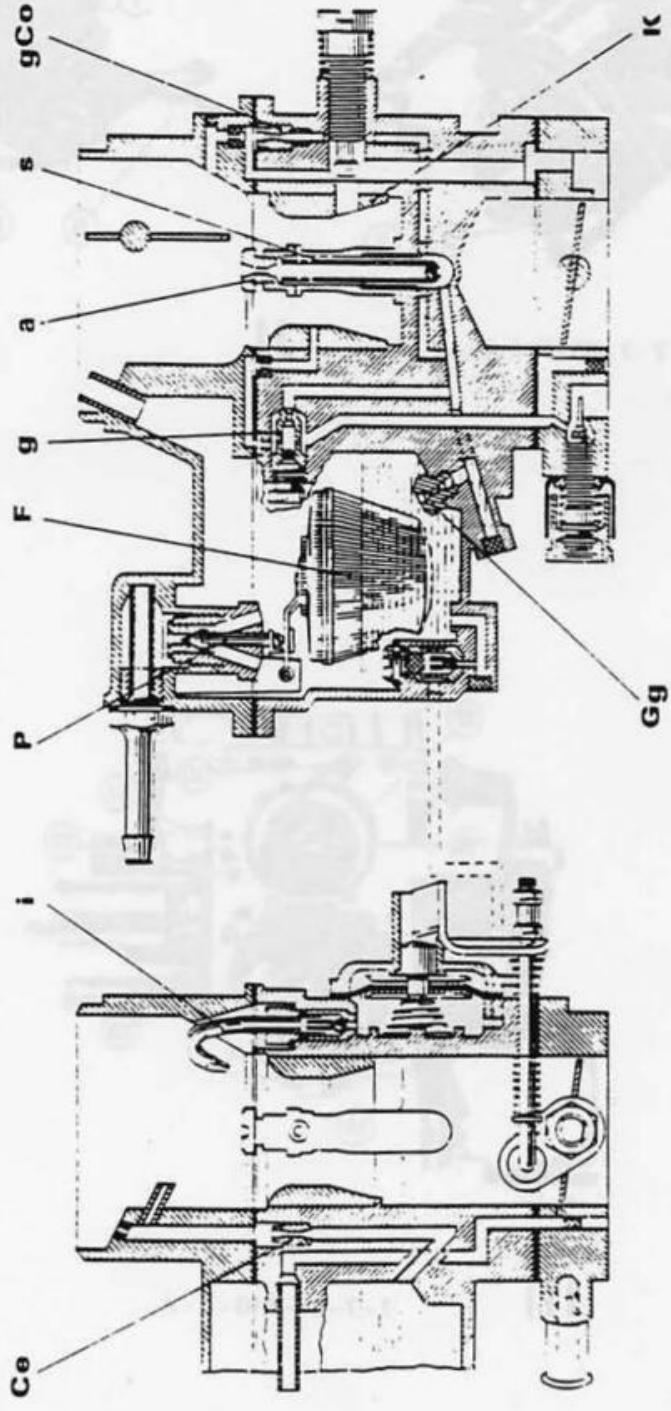
I 7-7-81-P14-R-A



II 7-7-81-P7-R-A



III 7-7-81-P10-R-A


gCo
s
a
g
F
P
i
Ce
K
Gg

DATA

Settings

CARBURETTOR REFERENCE		PEU A 315 XM7-T and XN1-T	PSA 425 XN1-TA
Choke tube	K	25	25
Main jet	Gg	130	127,5
Air correction jet	a	170	155
Idling jet	g	46 (strangler)	45 (strangler)
Constant CO jet	gCO	35	35
Econostat jet	Ce	70	50
Accelerator pump injector	i	50	50
Needle valve	P	ø 1,6mm (ball type)	1,6mm (ball type)
Float	F	5,7 g	5,7 g

Adjustments to be carried out after removal of the carburettor

CARBURETTOR REFERENCE		PEU A 315 XM7-T and XN1-T	PSA 425 XN1-TA
Positive throttle opening	OP	0,9 mm	1 mm
Pump travel ends at a throttle opening of		4 mm	4 mm

Idling speed adjustment to be carried out on the vehicle

CARBURETTOR REFERENCE		PEU A 315 XM7-T and XN1-T	PSA 425 XN1-TA
Idling speed - screw	Va	$800\ ^{+\ 50}_{\ 0}$ rpm	$900\ ^{+\ 50}_{\ 0}$ rpm
CO% - screw	W	1 to 2 %	1.5 to 2 %
CO_2%		10 % mini	10 % mini

Carburettor applications

REF	ENGINE	VEHICLE		SPECIAL FEATURES
		TYPE	FITTED	
PEU A 315	169 (XM7-T) and 170 (XN1-T)	All types	→ introduction	Solenoid valve on idling jet
PSA 425	170 C (XN1-TA)	All types	→ introduction	Solenoid valve on idling jet

F2.002	1	ENGINE CARBURETTOR CHECKS - ADJUSTMENTS

TOOLS REQUIRED

RECOMMENDED TOOLS

Fig. A : SOLEX angle measuring gauge : Tachometer

Fig. B : SOLEX tool kit, tamperproof caps : Exhaust gas analyser

OPERATIONS TO BE CARRIED OUT

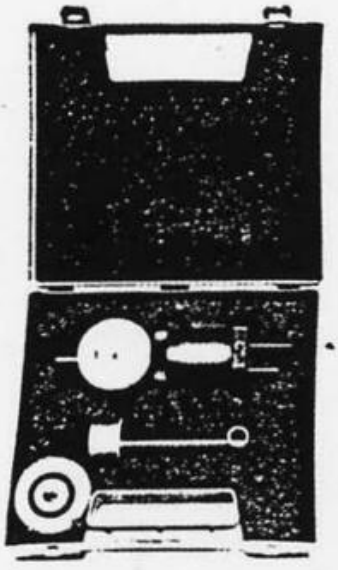
SYMPTOM	OPERATIONS				
	OVERHAUL CLEANING *	NORMAL IDLING POSITION (NIP)	POSITIVE THROTTLE OPENING (PTO)	ACCELE-RATOR PUMP STROKE	IDLING SPEED, MIXTURE (1)
Faulty carburation	X	X	X	X	X
Replacement carburettor			X		X
Faulty starting from cold; speed too high or too low			X		X (2)
Incorrect hot idling speed		X	X		X

Prior requirements

(1) - Ignition in good condition and correctly adjusted.
- Engine warm, after electric fan has cut in.
- Choke control correctly adjusted and fully pushed in.
- Air filter in place and in good condition.
- Accelerator control system correctly adjusted.

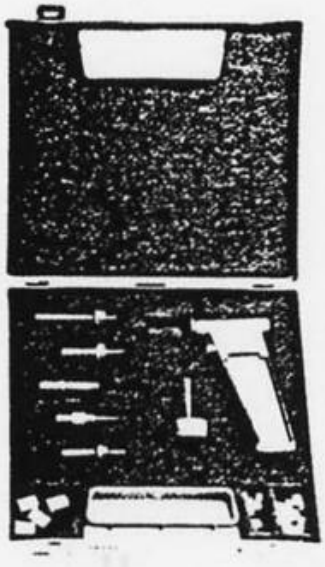
(2) - Idling speed adjusted, when the engine is warm to

XM7-T - XN1-T	XN1-T
$800\ ^{50}_{0}$ rpm	$900\ ^{50}_{0}$ rpm



A

5 - 11 - 76 - C50 - R - A



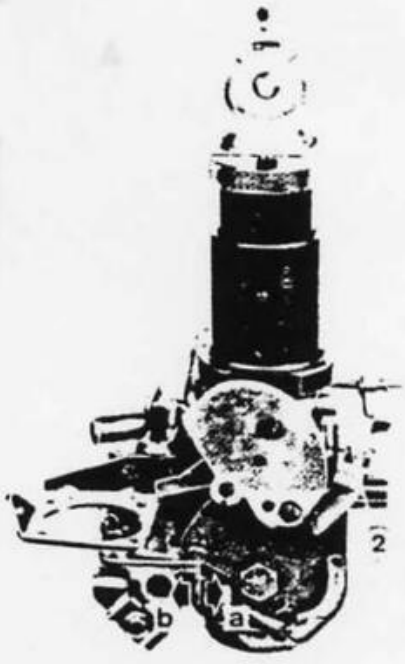
B

6383 R - A



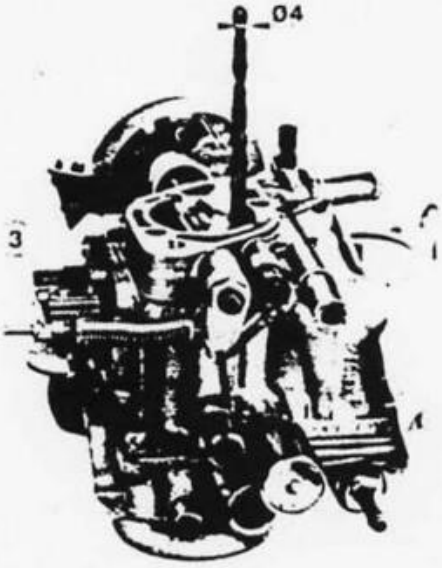
7-7-81-P12-R-A

I



7-7-81-P11-R-A

II



7-7-81-P16-R-A

III

ADJUSTMENTS WITH THE CARBURETTOR REMOVED

NORMAL IDLING POSITION (NIP) Fig. I

- Remove the tamperproof cap from screw (1).
- Place the choke flap control at 0, with the choke flap open ➧ (a)
- Place the SOLEX gauge on the butterfly and centralise it, without the removable dial.
- Move the screw (1) so as to read the NIP on the gauge :
  - carburettor reference PEU A315 : 9^{o}.

ADJUSTING THE POSITIVE THROTTLE OPENING (PTO) Fig. II

Requirement - NIP correctly adjusted

- place the choke flap control at 0, with the choke flap open ➧ (a)
- Place the removable dial on the SOLEX gauge and adjust it to 0 (the minute scale, then the degree scale).
- Close the choke flap smoothly ➧ (b)
- The dial gauge needles must indicate : carb. ref. PEU A315 : 16^{o} 15′ ± 1^{o}.
- Adjust if necessary by means of the screw (2)

To check : Open, then close the choke flap. The gauge needle readings must be within the tolerance given above.

ACCELERATOR PUMP STROKE Fig. III

- Fit a gauge rod : carb. ref. PEU A315 : 4 mm diameter
- Loosen the locknut, unscrew the nut (3) a few turns
- Turn the nut (3) inward until it just touches the pump operation lever.
- Retighten the locknut.

ADJUSTING THE CARBURETTOR ON THE VEHICLE

REMINDER : Prior requirements : The ignition must be in good condition and correctly adjusted. The engine must be warm. The choke must be correctly adjusted and pushed fully in. The air filter must be in position and the accelerator control correctly adjusted.

ADJUSTING THE IDLING SPEED

1

Adjust the idling speed, by turning the idling screw Va tc :	
PEU A 315	PSA 425
800 $^{+50}_{0}$ rpm	900 $^{+50}_{0}$ rpm

2

The CO% must be :	
PEU A 315	PSA 425
1 to 2 %	1,5 to 2 %

ADJUSTING THE MIXTURE WITHOUT AN EXHAUST GAS ANALYSER

1

Turn screw Va to obtain a speed of :	
PEU A 315	PSA 425
850 $^{+50}_{0}$ rpm	950 $^{+50}_{0}$ rpm

2

Find the maximum speed obtainable by turning the mixture screw W.

3

Recommence operations 1 and 2 until the maximum speed obtained by turning screw W is :	
PEU A 315	PSA 425
800 rpm	950 rpm

4

Screw in screw W to obtain a speed of :	
PEU A 315	PSA 425
800 rpm	900 rpm

Fit the tamperproof cap.

ADJUSTING THE MIXTURE USING AN EXHAUST GAS ANALYSER

1

Adjust the idling speed, at screw Va, to :	
PEU A 315	PSA 425
800 $^{+50}_{0}$ rpm	900 $^{+50}_{0}$ rpm

2

Adjust the CO% by turning screw W to :	
PEU A 315	PSA 425
1 to 2 %	1,5 to 2 %

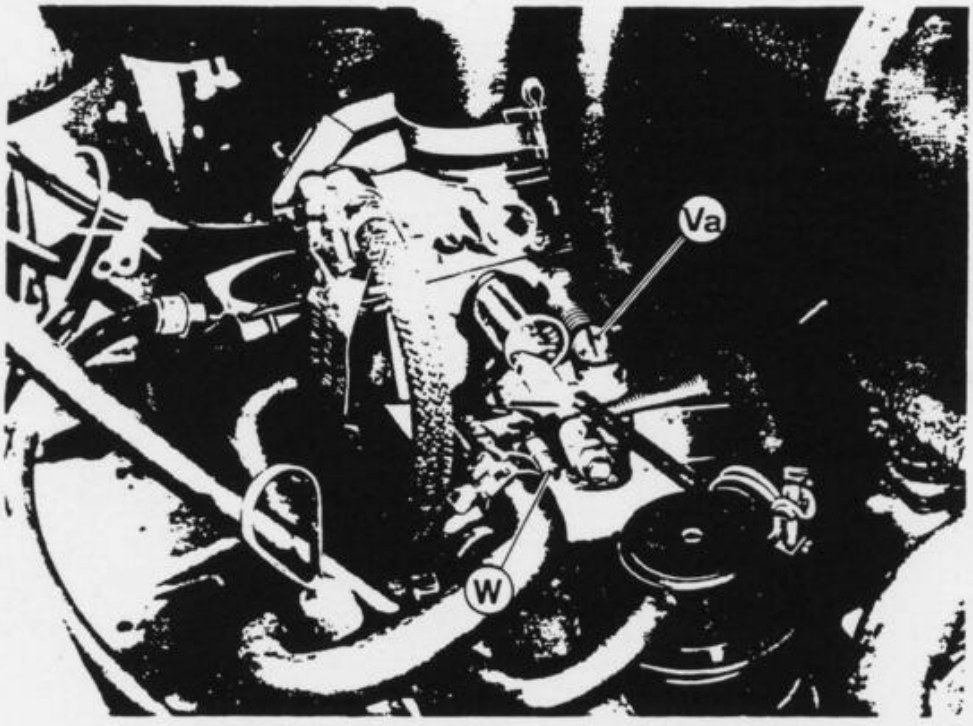
3

Turn screw Va to bring the speed to :	
PEU A 315	PSA 425
800 $^{+50}_{0}$ rpm	900 $^{+50}_{0}$ rpm

4

Check the CO% and, if necessary, repeat operations 2 and 3.

IMPORTANT : The CO% must not be less than 10%. If it is, check the exhaust system for leaks or check the operating condition of the engine.



I

24 - 6 - 81 - P14 - R - A

F4.002	1	4 x 4	FUEL SYSTEM FUEL TANK REMOVING - REFITTING	J5

I

Raise the vehicle on a lift

Empty the tank with a pump through the filler neck

Loosen the clip (1)

Free the hose (2) from the tank

II

Loosen the 2 bolts, at the rear, that secure the viscous coupling support frame, without removing them

Remove the 2 bolts (3)

Lower the assembly formed by the viscous coupling and the propellor shafts

Remove the screws (4) that secure the tank in place.

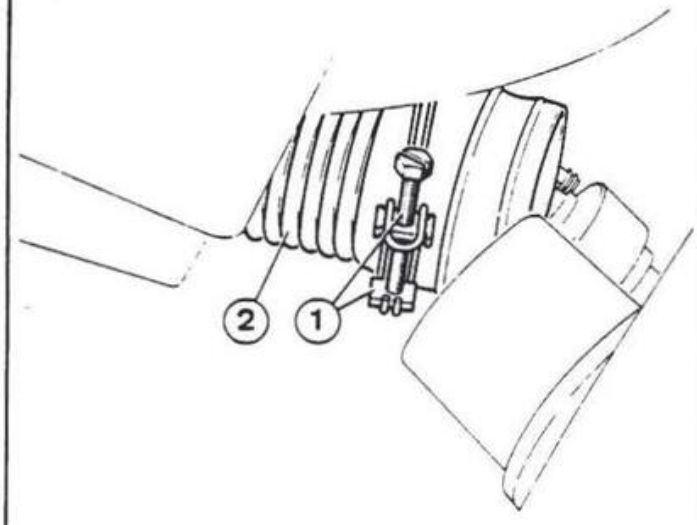
III

Tilt the tank assembly → towards the left of the vehicle taking care to disconnect the fuel gauge wires and the fuel input and output pipes →

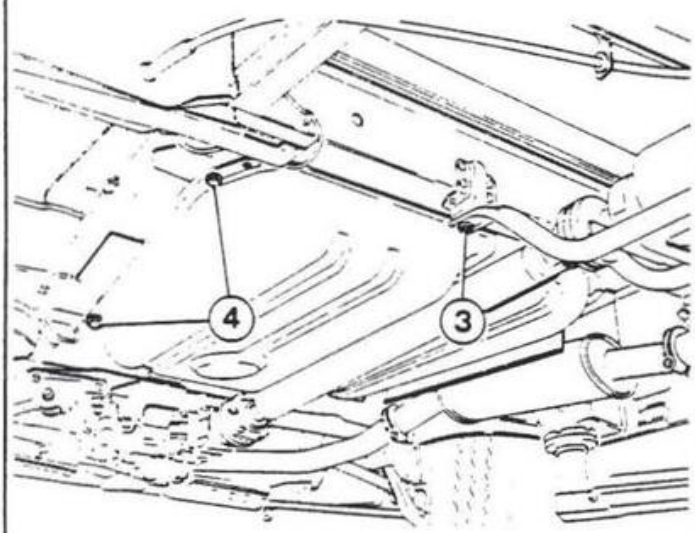
IV

To refit the tank, carry out the removing operations in reverse.

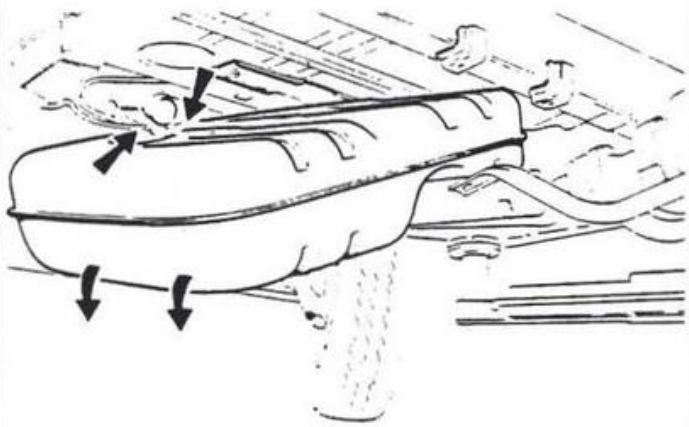
J5		4 x 4	1	F4.003



09-11-88 CAR 5



09-11-88 CAR 7



09-11-88 CAR 6

TOOLS REQUIRED

SPECIAL TOOLS

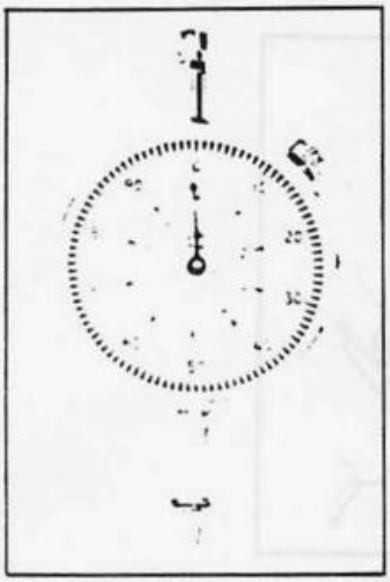
- Dial gauge Fig. A reference 8.1504.
- Throttle control tool Fig. C reference 8.0148.
- T.D.C. gauge Fig. B reference 8.0126.
- Socket for crankshaft pulley bolt Fig. D reference 8.0118 P1.

  Used with (recommended tools)
  - adaptor FACOM S232
  - ratchet FACOM S151

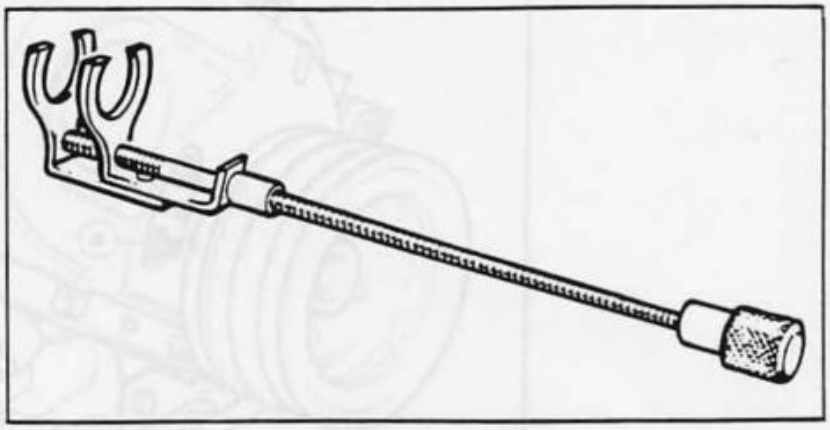
  for turning the crankshaft

RECOMMENDED TOOLS

- Tachometer
- Dwell meter
- Stroboscopic timing lamp with advance control.
- Engine tester (for use with the diagnostic socket).
- Manual vacuum pump.



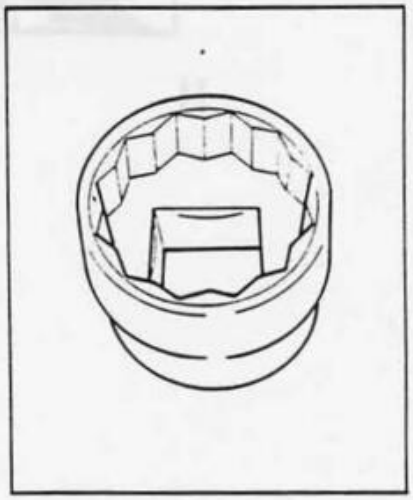
A



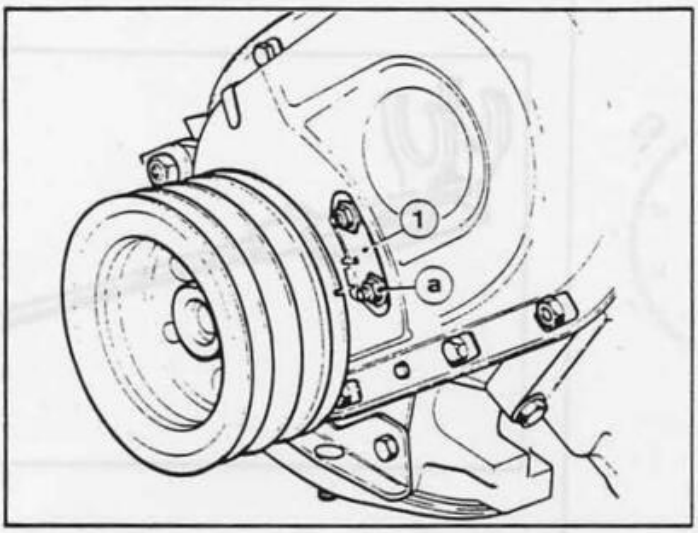
C



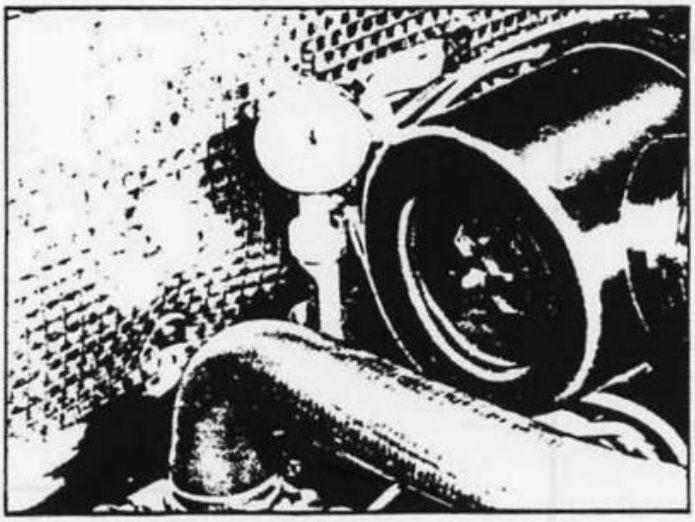
B



D



I 7-7-81-P9-L-A



II 24-6-81-P10-R-A

CHECKING THE POSITION OF THE TIMING PLATE

The adjustment of the ignition timing (initial setting) requires an exact setting of the timing plate (1) Fig. I on the timing cover.

When in doubt - flaking of the paint seal (a) - or after work involving the timing, it is essential to check the position of the timing plate.

– Remove the spark plug from No. 1 or No. 4 cylinder and fit Fig. II.

- T.D.C. gauge 8.0126,
- the dial gauge 8.1504.

– Turn the crankshaft slowly clockwise and note the point of the maximum reading on the dial gauge.

Turn the crankshaft using tools :
- socket 8.0118 P1
- adaptor FACOM S232
- ratchet FACOM S151

– Set the dial gauge the zero (millimetres and hundredths).

The mark on the pulley must be opposite the 0 on the timing plate

– If it is not, move the timing plate so that the 0 mark is opposite the mark on the pulley.

– Remove all traces of the original paint and put a new paint mark (a) on one of the nuts.

– Refit and tighten the spark plug to 2,5 m.daN (18 lbf ft).

ADJUSTING THE AIR GAP, T.D.C. SENSOR Fig. I and II

The setting of the T.D.C. sensor must be checked when replacing the flywheel or the steel closing plate on which the sensor is mounted, or if faulty readings of the initial ignition timing are found when using the diagnostic socket.

New T.D.C. sensor

- Plastic mounting (1) in place.
- Insert the sensor until the pins (2) fig. II just touch the flywheel face, without using force.
- Tighten the bolt (3) to retain the sensor.

Used sensor

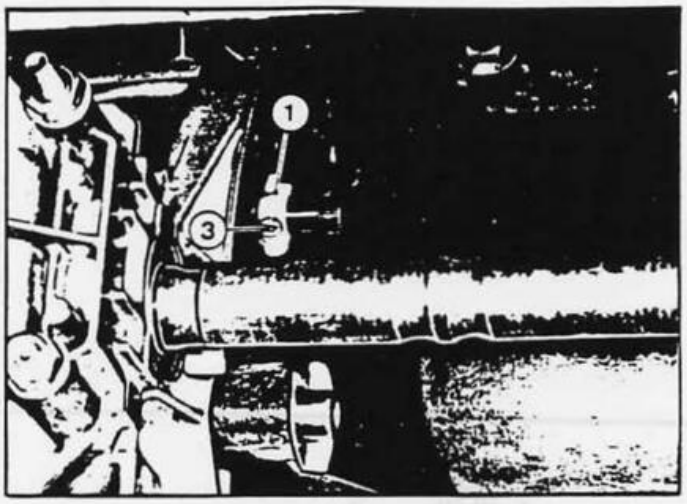
- Plastic mounting (1) in place.
- File or cut off the pins (2) Fig. II.
- Insert the sensor until it just touches the flywheel face, without using force.
- Tighten the bolt (3) to retain the sensor.

- Measure the distance X - Loosen the bolt (3) and withdraw the sensor so that : X – 1,7 mm.

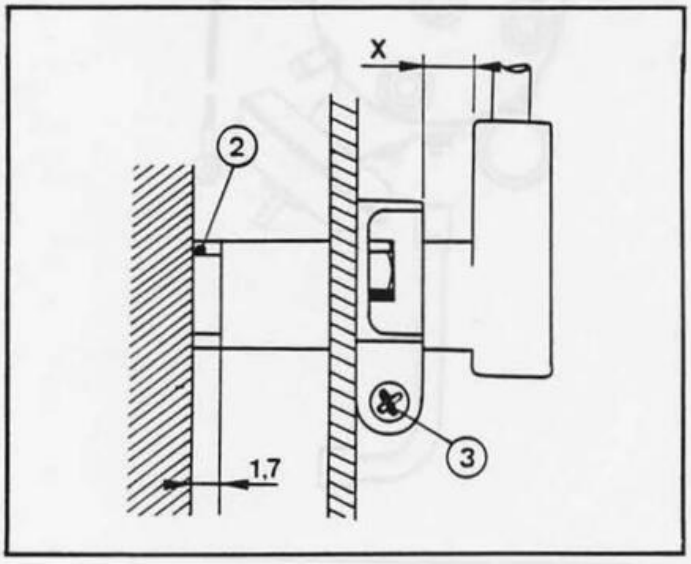
- Retighten the bolt (3).

NOTE - The diagnostic socket enables the following checks to be made in situ (using the appropriate equipment - see Workshop Materials and Equipment Brochure ref. 2396) :

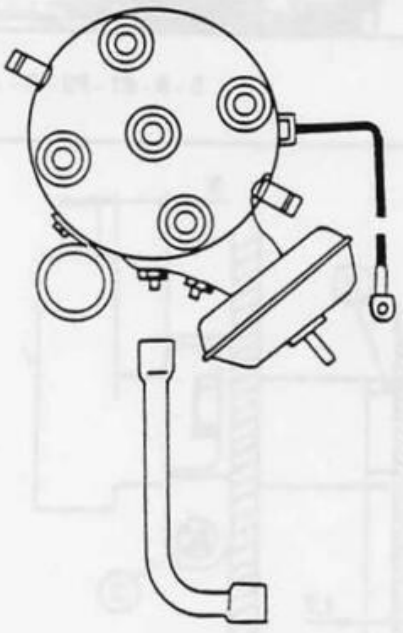
- the ignition primary circuit
- the condition of the contact breaker } contact breaker ignition
- the contact breaker gap
- the tinitial ignition timing
- the centrifugal and vacuum advance curves
- the engine rpm.



5 - 5 - 81 - P2 - R - A



26 - 5 - 82 - 1A



DUCELLIER

26 - 5 - 82 - 2A

ADJUSTING THE DWELL ANGLE IN SITU (contact breaker ignition).

– Engine at idling speed (800 rpm).

– Adjust the dwell angle to :

- $57^{o} \pm 2^{o}$
- 63% ± 3^{o} Dwells

} according to the equipment being used

This adjustment is carried out externally on the distributor using :

Fig. I Ducellier distributor : box wrench 7 mm.

To check

– Raise the engine speed to 3 000 rpm.

– The dwell angle must be within the tolerance given above.

– If not, remove the distributor and check it on a distributor test bench (see section 12).

IMPORTANT : Check the initial timing.

NOTE : With the appropriate equipment, the dwell angle can be checked by using the diagnostic socket.

INITIAL IGNITION TIMING

Requirements

- Dwell angle adjusted.
- Timing plate correctly positioned (paint seal (a) Fig. II not flaked or chipped.
- Disconnect and plug the vacuum advance union at the carburettor end.

The crankshaft pulley has 2 grooves diametrically opposite, corresponding to the cylinders 1-4 and 2-3, so that the initial timing can be done on the four cylinders.

Proceed as follows :

- Connect the stroboscopic timing lamp to the H.T. cable on the ignition coil.
- Set the advance control on the timing lamp to 0.
- Run the engine at a speed not exceeding 800 rpm.
- Illuminate the crankshaft pulley by aiming the lamp through the opening above the front bumper Fig. I.
- 2 situations can arise :

  Fig. II - the two grooves in the pulley merge into one (distributor is in good mechanical order) :

  → adjust the groove in the pulley with the 10^{o} mark on the timing plate.

  Fig. III - the 2 pulley grooves are separated by a certain distance (α^{o}) (the cam profiles are not in good condition)

  → adjust the mean centre of this ignition "zone" (α') with the 10^{o} mark on the timing plate.

- Reconnect the vacuum unit at the carburettor.
- Adjust the idling speed.

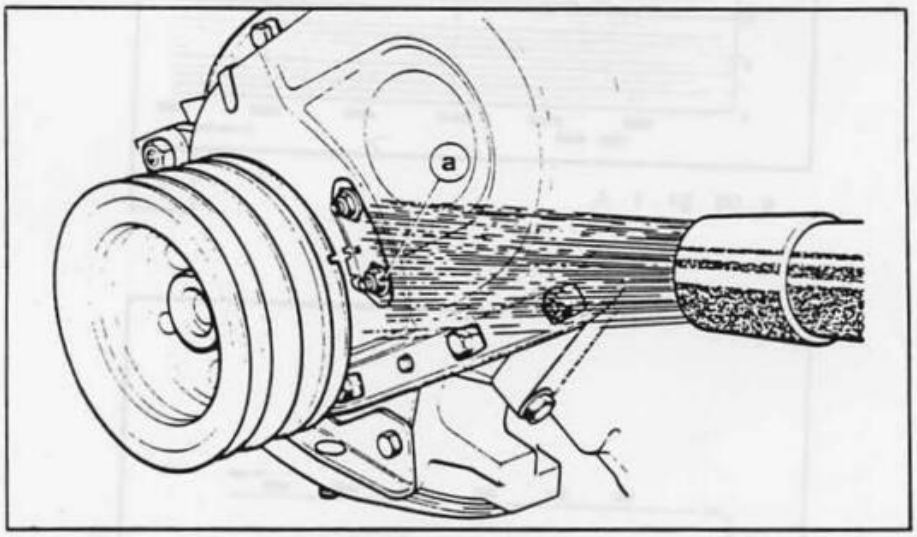
IMPORTANT - The ingition zone (α^{o}) must not exceed $4^{o}30'$. If it does, replace the distributor.

NOTE - With the appropriate equipment the ignition timing can be checked by using the diagnostic socket.



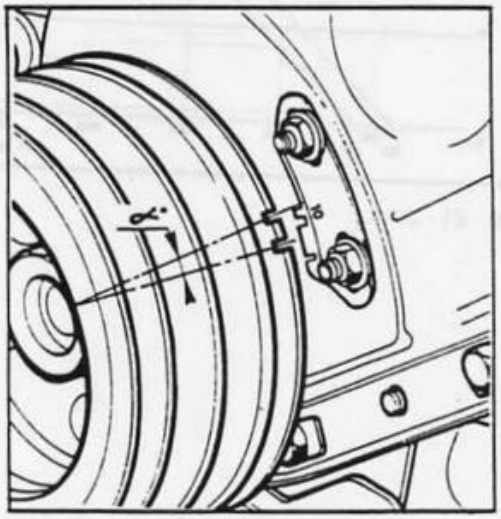
I

14 - 4 - 81 - P27 - R - A



II

7 - 7 - 81 - P9 - L - B



III

7 - 7 - 81 - P9 - L - C

CHECKING THE ADVANCE CURVES IN SITU

Use the throttle control tool 8.0148 to hold the engine rpm steady at the required speeds (see special tools page).

CENTRIFUGAL ADVANCE

- Initial timing set.
- Disconnect the vacuum advance pipe on the distributor.
- Connect the timing lamp to cylinder No. 1 (clutch end)
- Use the "0" on the timing plate as a reference.
- Check according to following table :

Engine rpm	1 500	2 200	3 000	4 000	5 000
Centrifugal advance (engine degrees)	10 - 11°30′	16° - 19°15′	24°30′ - 28°	29°15′ - 33°	34 - 38°

- If the readings are outside these tolerances it is advisable to remove the distributor and adjust it on a test bench.

VACUUM ADVANCE

- Centrifugal advance checked and within the tolerances.
- Connect a vacuum pump to the distributor advance capsule.
- Use the "0" on the timing plate as a reference.
- Raise the engine speed to 2 500 rpm and note the centrifugal advance reading.
- Apply the vacuum given in the table.
- Reset the engine speed to 2 500 rpm.
- Read the total advance (centrifugal + vacuum) and note it.

  → Total advance - centrifugal advance = VACUUM ADVANCE

Vacuum mm Hg	100	200	300 et +
Degrees of vacuum advance (engine degrees)	0 - 2°	8 - 12°	19 - 22°

- If the readings are outside these tolerances, it is advisable to remove the distributor and adjust it on test bench.

NOTE - With the appropriate equipment, these checks can be done with the diagnostic connector.

Cooling system

Coolant circuit :

Of the « auto-degaz » type with an expansion bottle.

- Filling ..... through expansion bottle cap
- Level ... (cold engine with circuit fully bled) ... up to the position mark in the expansion bottle
- Coolant (water + anti-freeze) ..... 9 litres
- Circuit frost protection (as stated on the label) ..... - 30°C - 50% anti-freeze solution

	XM7-T - XN1-T	XN1-TA
Aluminium radiator mady by	VALEO	IPRA
- Pitch of radiator fins	1.15 mm	1.7 mm
- Dimensions of radiator	414 x 663 mm	
- Radiator surface area	27.5 dm²	
Type	Horizontal, with input and output on the same side - PO (heavy duty)	

- Filler cap pressure setting ..... 0.9 bar

Thermostat

		DAUPHINOISE
- Make	VERNET	THOMSON
- Reference or colour code	V28 Ref. V6697	Tawny beige
- Starts to open at		
- Fully open at	95°C	
- Lift	7.5 mm min.	

Coolant temperature switch (on cylinder head) :

- The warning light (on the instrument panel) switches on at a temp. of ..... 105° ± 3°C
- Tightening torque (ø 18 x 150) ..... 28 N.m (20.6 lbf.ft)

Temperature sensor on cylinder head coolant output pipe ..... TORRIX (red code)

Multi-stage temperature switch on radiator :

	1 electric fan
Electric fan cuts in : temperature increasing	92° ± 2°C
Electric fan cuts out : temperature falling	87° ± 2°C

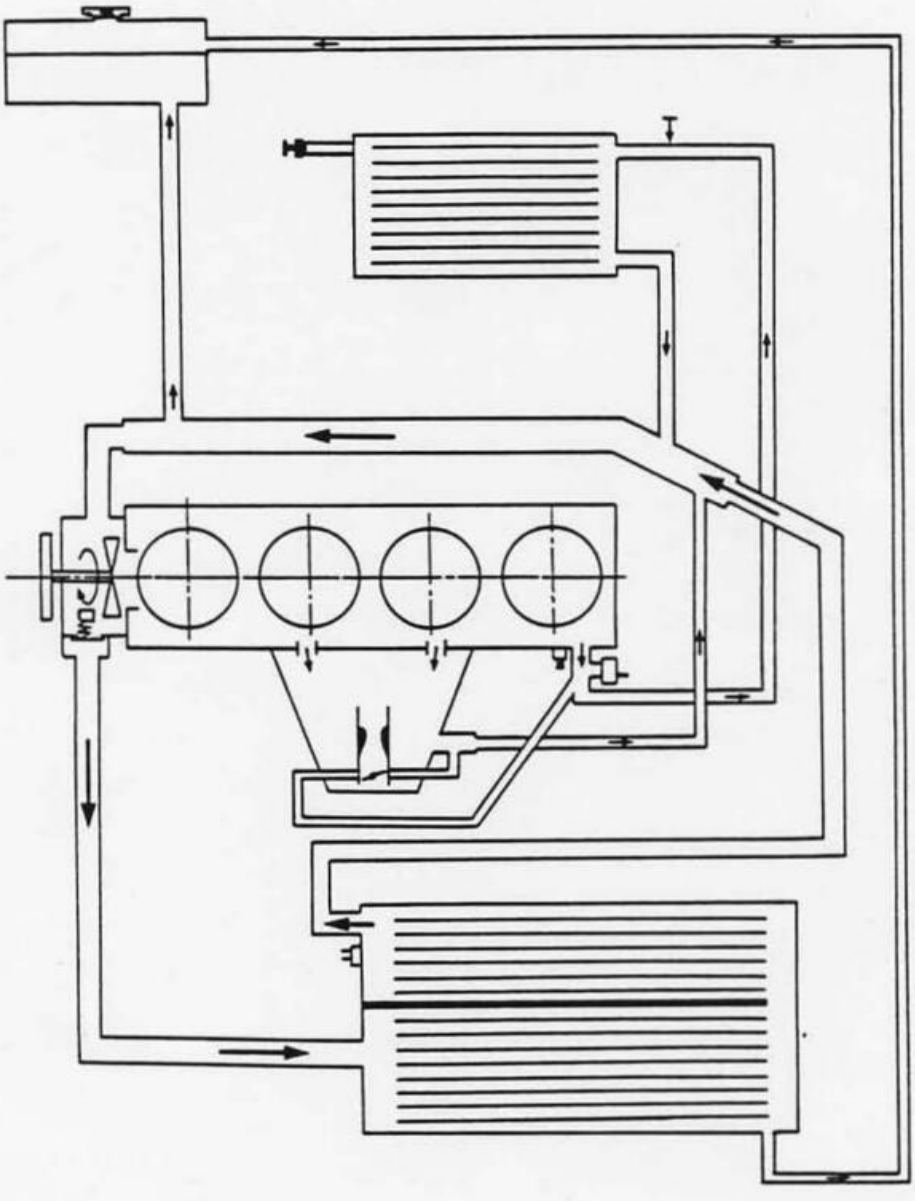
Multi-stage temperature switch tightening torque (coated with LOCTITE FRENETANCH ..... 19 N.m (14 lbf.ft)

Cooling fan :

- 1 electric fan unit - 4 bladed (operated by a multi-stage temperature switch) :
- Power of electric fan unit ..... 80 W
- Speed ..... 2300 rpm
- Diameter across blades ..... 280 mm
- Direction of rotation (seen from electric motor end) ..... C.W. (clockwise)

WARNING : Aluminium radiator

- The circuit must be kept permanently filled with an officially approved coolant solution (see current literature).
- It is to be renewed every 2 years.
- If the radiator is to be stored for more than 48 hours, flush it with clean water and blow it out with compressed air.



K2.002	1	ENGINE LUBRICATION SYSTEM CHECKING - ADJUSTMENT

SPECIAL TOOLS

Fig. A : 8.1503

Pressure and vacuum checking kit comprising :

A - Pressure gauge.

B - Hose

C - Union

1 - Retaining clip.

RECOMMENDED TOOLS

– Tachometer.

CHECKING THE OIL PRESSURE

– Remove the oil pressure switch from the oil filter base.

– Screw union 8.1503 C in its place.

– Fit hose 8.1503 B, fig. I, together with its retaining clip (1).

IMPORTANT – The temperature of the oil in the sump is to be 90°C during the test.

– To obtain this temperature from cold (ambient temperature of 20°C), run the engine at 3 500 rpm and measure the pressure five minutes after the electric fan first cuts in.

Oil pressures at approximately 90°C :

– at 850 rpm : 2.7 ± 0.8 bars
– at 2 000 rpm : 3.3 ± 0.7 bars
– at 4 000 rpm : 3.8 ± 0.7 bars.

NOTE - On high mileage vehicles these figures may be lower by between 0.2 and 0.4 bars.

	Page
Engine specifications	A1.002
Tightening torques	A1.003
Specifications :	
– cylinder block	A1.005
– pistons	A1.005 and 6
– connecting rods	A1.006
– crankshaft	A1.009
– camshaft - timing gear - flywheel	A1.010
– cylinder head - swirl chambers	A1.013
– valves - guides - seats	A1.014
– lubrication system	A1.017
– oil pump - pressure relief valve	A1.018

ENGINE SPECIFICATIONS AND SPECIAL FEATURES

DIESEL ENGINE

1 - SPECIFICATIONS

Engine :
- Type (as stated on engine number plate) U25/651
- Configuration : ..... Mounted transversely, inclined at 23 towards the front
- French taxable horse power : ..... 10 CV
- Number of cylinders : 4
- Direction of rotation : ..... Left hand (anticlockwise as seen from flywheel end)
- Bore : ..... 93 mm
- Stroke : ..... 92 mm
- Cubic capacity : ..... 2 500 litres
- Compression ratio : 22,25/1
- Injection order : ..... 1 - 3 - 4 - 2
- Maximum power : ..... ISO : 54.4 KW at 4 100 rpm / DIN : 75 ch at 4 100 rpm
- Maximum torque : ..... ISO : 15,1 m.daN at 2 000 rpm / DIN : 15.3 m.kg at 2 000 rpm
- Idling speed : ..... 725 to 775 rpm
- Off-load governed speed : ..... 4 450 ± 75 rpm
- Minimum cut-off speed wheen on load : ..... 4 100 rpm

Cooling system : water plus antifreeze.

Lubrication system :
- Pressure lubricated by an externally mounted gear pump driven from the crankshaft.
- Externally mounted PURFLUX or MAN cartridge type oil filter.

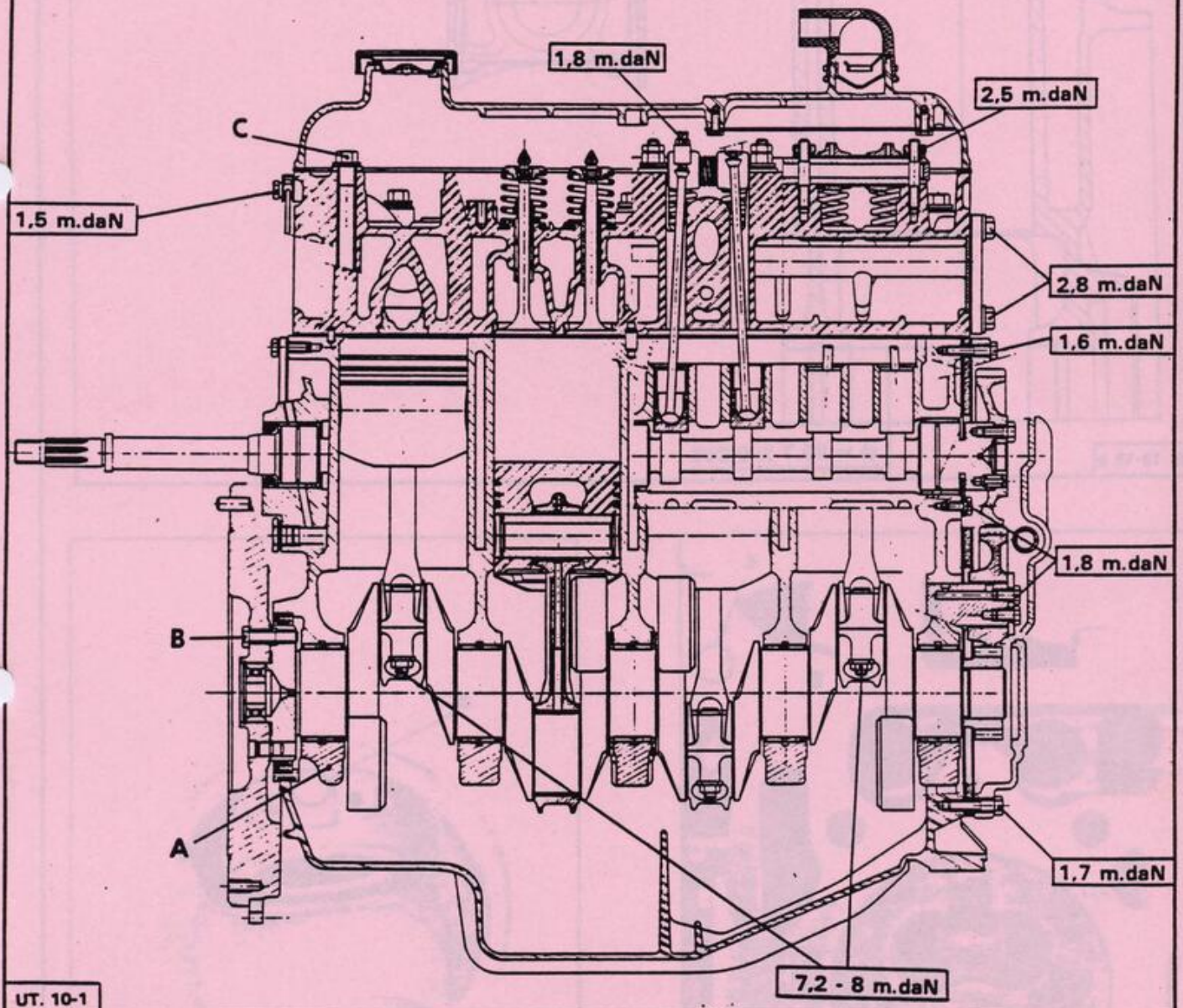
Fuel system :
- Injection pump : ROTO-DIESEL Type UT 100
  Reference : R 3443 F 900
- Direction of rotation : left hand (as seen from drive end).
- Pintle type injectors.
- Fuel : Diesel oil
- Replaceable element dry air filter
- Replaceable element fuel filter and priming pump.

Timing gear :
Side mounted camshaft, in the cylinder block.

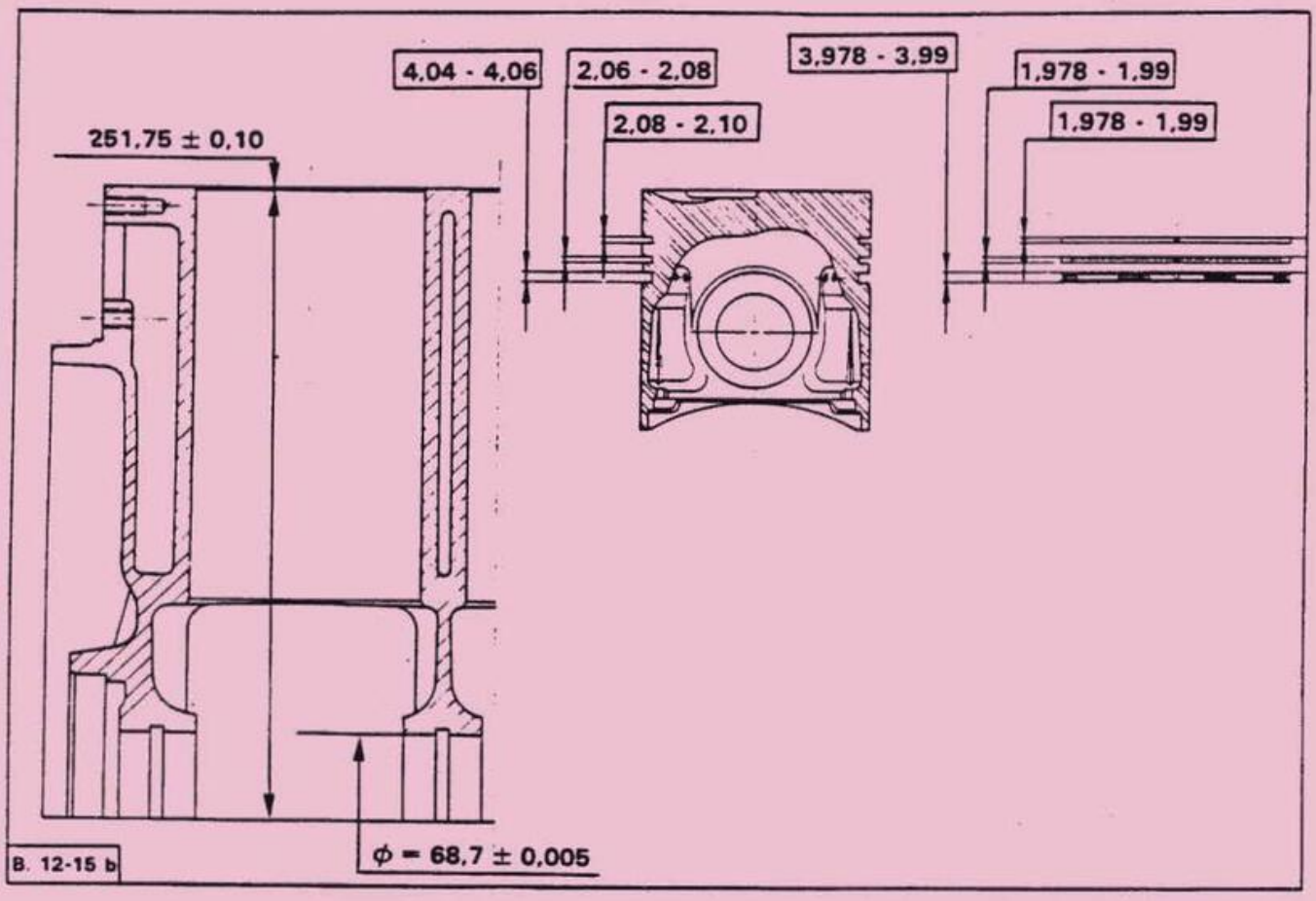
Tightening torques :	mdaN	Nm	lbf ft
A : main bearing bolts	9,5	95	70
B : flywheel securing bolts (bolts to be replaced by new ones every time they are removed and to be fitted coated with LOCTITE FRENETANCH compound).	9	90	66
C : cylinder head bolts : Initial tightening torque	6	90	66
Final tightening torque	10,5	105	77

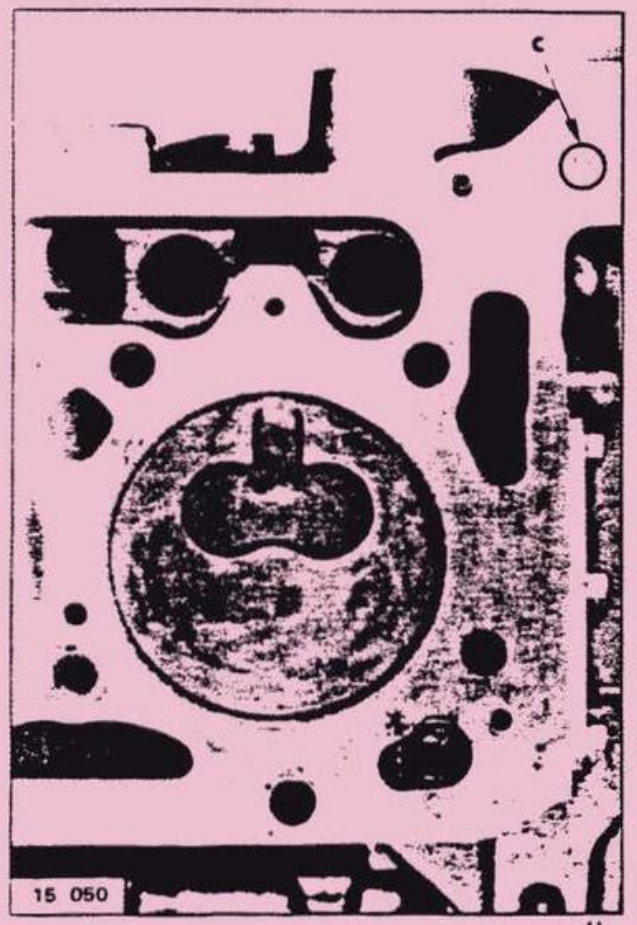
Special requirements : Before fitting the flange under the head and the threads on each bolt are to be lubricated with gearbox oil.
The washers are to be fitted, without being lubricated, with the tags against the cylinder head.

At 1 000/1 500 mile (1 500 to 2 500 km) inspection : Loosen the bolts			
by a 1/4 of a turn and tighten them to	10,5	105	77
Engine mounting bolts	2,7	27	20

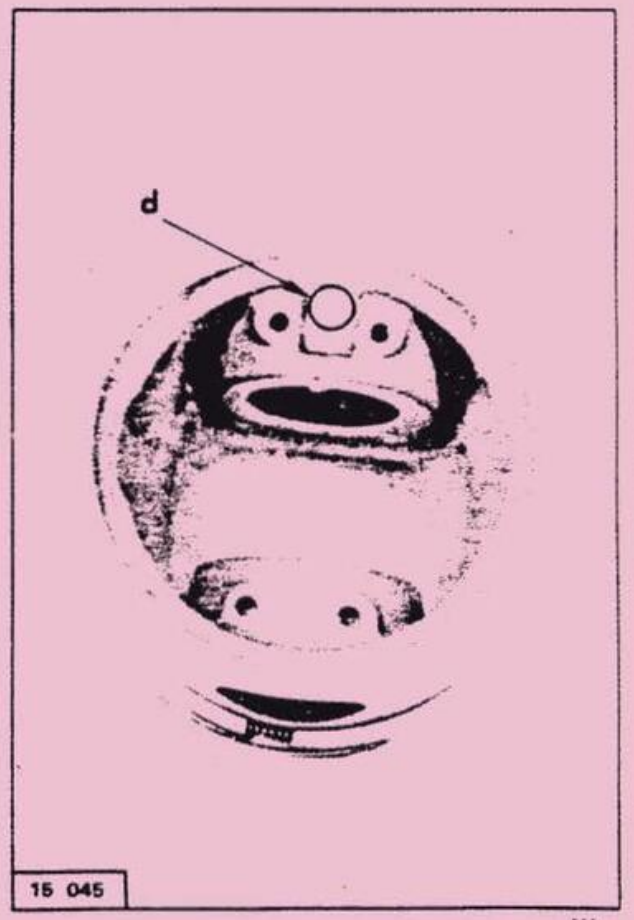

1,8 m.daN
2,5 m.daN
C
1,5 m.daN
2,8 m.daN
1,6 m.daN
1,8 m.daN
B
A
1,7 m.daN
7,2 - 8 m.daN

UT. 10-1


4,04 - 4,06
2,06 - 2,08
2,08 - 2,10
3,978 - 3,99
1,978 - 1,99
1,978 - 1,99
251,75 ± 0,10
B. 12-15 b
ϕ = 68,7 ± 0,005


c
15 050

II


d
15 045

III

II - SPECIAL FEATURES

Cylinder block : Fig. I
The cylinders are machined directly in the cast iron block.

(c) : Cylinder block class reference, Fig. II.

If the cylinder block is ever re-bored, this reference mark is to be effaced and the letter that corresponds to the new cylinder diameter is to be stamped in its place.

Permissible bow in cylinder head gasket face on cylinder block :

a) Overall bow..... 0.05 mm max.
b) Bow between cylinder head bolt holes 0.02 mm max.

Pistons : Fig. II
Made by P.d.C. (piston de Colmar)
Made from aluminium lead alloy, with a graphite treated skirt.

Made by A.E.F. (Associated Engineering France).
Made from aluminium lead alloy,. tinned.

The gudgeon pin is not off-set.
Operating clearance at the skirt, P.d.C. pistons.....0.98 mm to 0.123 mm
Operating clearance at the skirt, A.E.F. pistons.....0.10 mm to 0.12 mm

Class reference with the letter "n" marked on the boss at "d", Fig. III
Piston protrusion above cylinder block upper face (the correct protrusion is to be obtained by the person carrying out the repair whenever a piston is replaced), to suit the nominal diameter.

The Parts Department sells piston gudgeons pin and piston ring assemblies in sets of four.

		Cylinder			Pistons		
	Nominal diameter	Reference mark	Cylinder diameter	Diameter of P.d.C. piston	Diameter of A.E.F. piston	Reference Mark	Piston protrusion
Production	93	A1	93.00 to 93.01	92.887 to 92.902	92.890 to 92.900	1 n	0.50 to 0.55
		A2	93.01 to 93.02	92.897 to 92.912	92.900 to 92.910	2 n	
		A3	93.02 to 93.03	92.907 to 92.922	92.910 to 92.920	3 n	
Service	93.25	B1	93.25 to 93.26	93.137 to 93.152	93.150 to 93.160	B1 n	0.47 to 0.52
		B2	93.26 to 93.27	93.147 to 93.162	93.160 to 93.170	B2 n	
	93.50	C1	93.50 to 93.51	93.387 to 93.402	93.400 to 93.410	C1 n	0.44 to 0.49
		C2	93.51 to 93.52	93.397 to 93.412	93.410 to 93.420	C2 n	
	93.75	D1	93.75 to 93.76	93.637 to 93.652	93.650 to 93.660	D1 n	0.41 to 0.46
		D2	93.76 to 93.77	93.647 to 93.662	93.660 to 93.670	D2 n	

Outside diameter of gudgeon pin.....29.995 mm to 29.999 mm
Diameter of gudgeon pin bore in piston .....30.005 mm to 30.011 mm
Maximum difference between the weights of the piston and gudgeon pin assemblies on any given engine..... 5 grammes

Piston rings : Fig. I
– Made by GOETZE
– The inscription marked on one face of the piston ring is to point towards the piston crown.
(1) Molybdenumbearing area compression ring.
(2) Scraper ring (with torsion chamfer "b" pointing towards the piston crown).
(3) Oil control ring (the gap in the expander (4) is to be set a 180° to the gap (3) in the oil control ring).

(a) : There is a dab of paint on each ring identifiying the nominal piston diameter to which it corresponds.

Nominal diameter	Paint colour code
93	yellow
93.25	green
93.50	white
93.75	purple

Gaps
– Compression ring. . . . . 0.20 mm to 0.45 mm
– Scrapers ring . . . . . 0.15 mm to 0.40 mm
– Oil control ring . . . . . 0.10 mm to 0.30 mm

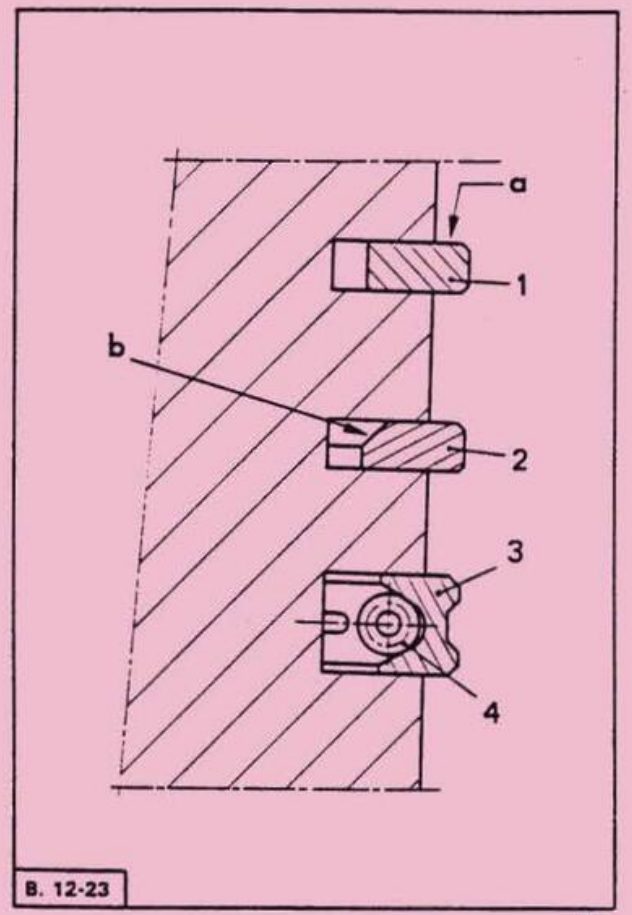
Connecting rods :
– Side clearance (not adjustable) . . . . . 0.037 to 0.247 mm
– c : Small end bush diameter . . . . . 30.014 to 30.020 mm
– e : Big-end diameter . . . . . { Class 1 : 57.675 mm to 57.685 mm / Class 2 : 57.685 mm to 57.695 mm
X : Connecting rod class reference (1 or 2)
d : Big-end bore to small-end bore between centres dimension 154 ± 0.05 mm . . . . . 154 ± 0.05 mm
– Maximum weight difference between any two connecting rods on a given engine. . . . . 7 grammes
– The Parts Department supplies connecting rods in sets of four (they are class 1).

Big-end shells (crank pins) :
– Big-end shell clearance. . . . . 0,29 mm to 0,066mm

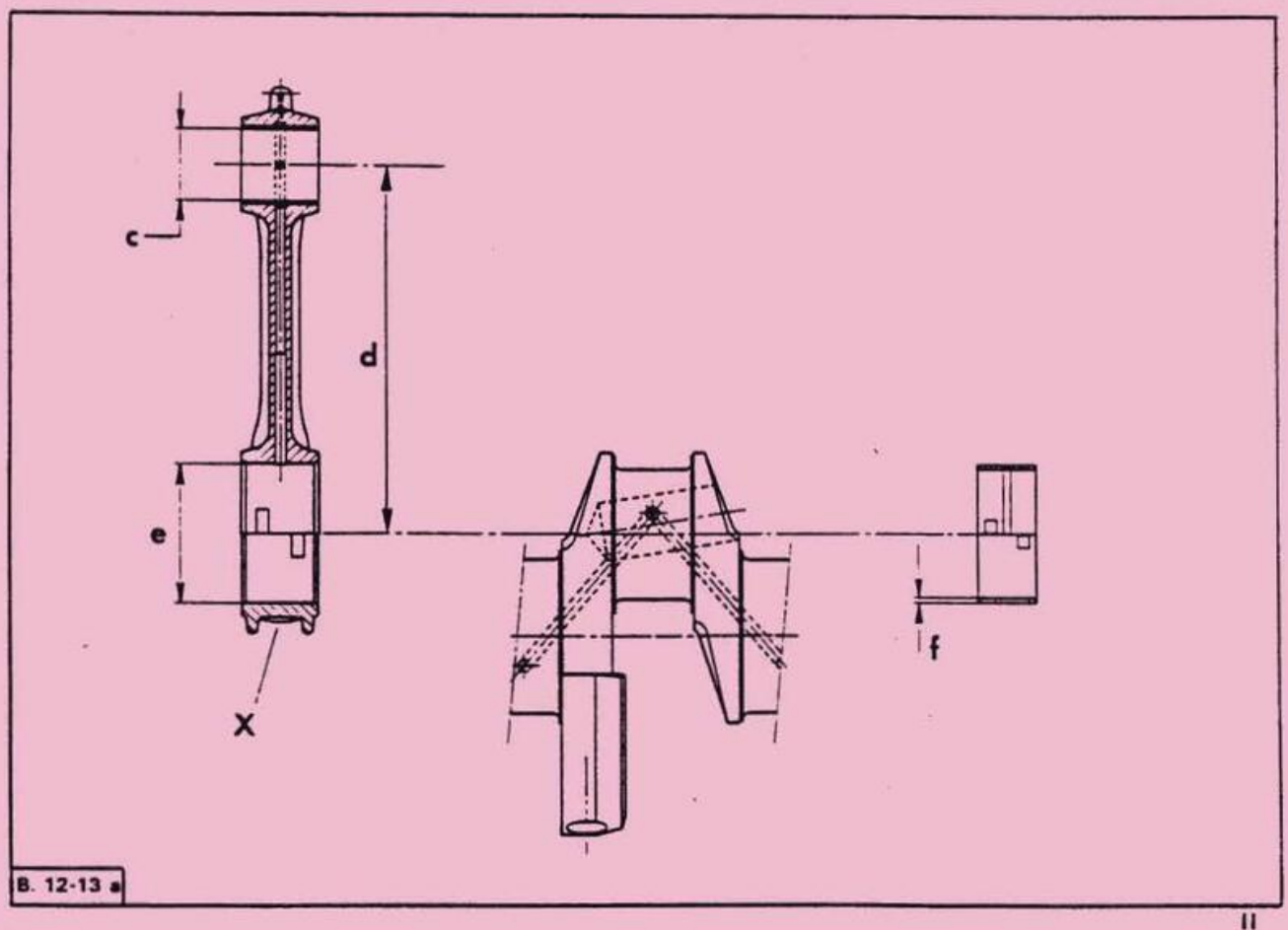
f : Big-end shell thicknesses.

Crankshaft	Connecting rods	Thickness in mm
Class A	Class I	1.820 to 1.826
	Class II	1.825 to 1.831
Class B	Class I	1.945 to 1.951
	Class II	1.950 to 1.956
Repair size	Class I	2.070 to 2.076
	Class II	20.075 to 2.081

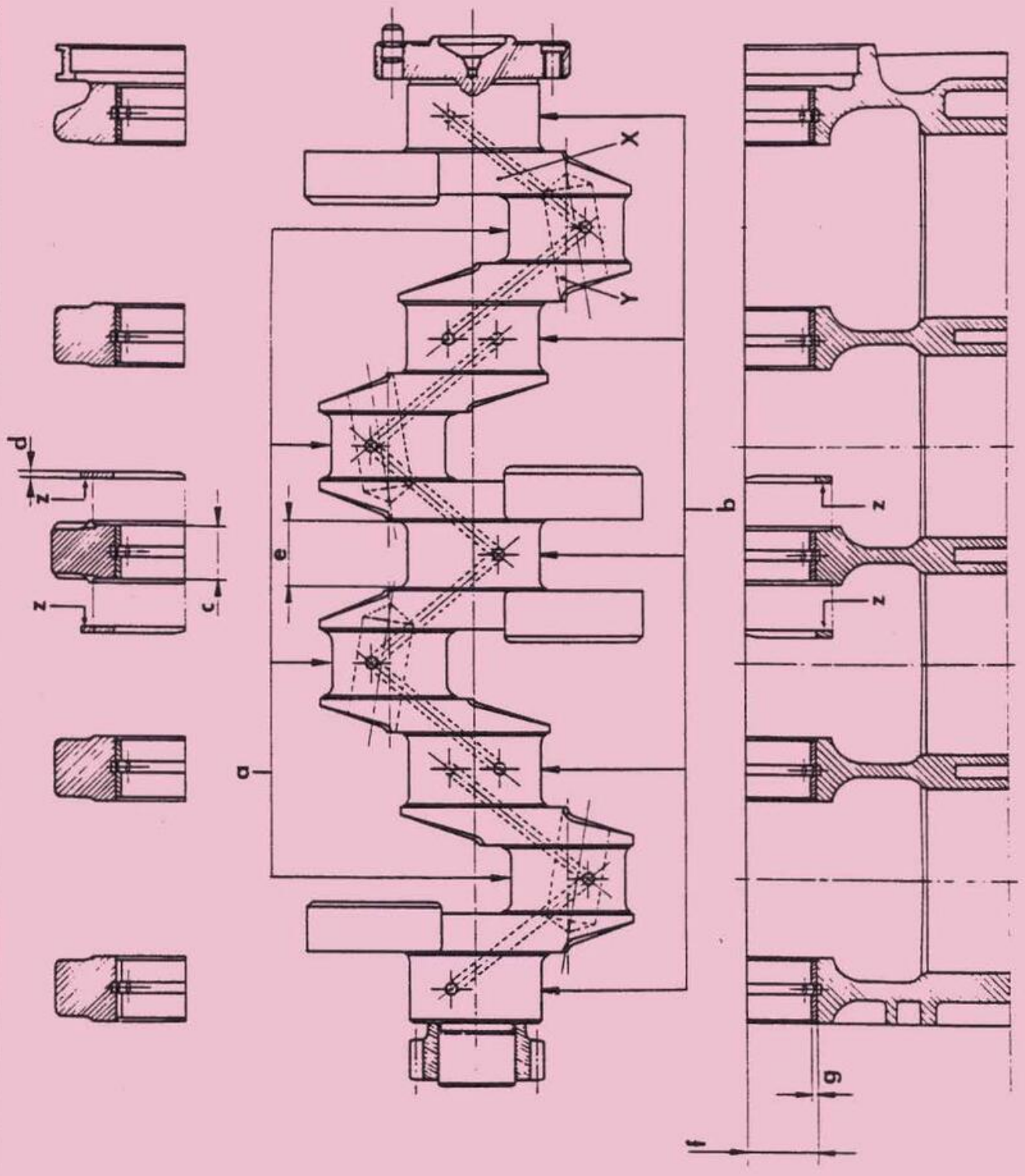
Connecting rod-Piston position in engine :
With the lubrication hole in the connecting rod big-end on the same side as the clover leaf recess in the piston crown.
with the clover leaf recess in the piston crown on the camshaft side.



I



II


X
Y
d
z
c
z
e
a
b
z
z
g
f

Crankshaft : Fig. I

a : Crank pins

Standard	Class A : Ø 54.005 mm to 53.990 mm
	Class B : Ø 53.755 mm to 53.740 mm
Regrind	Ø 53.505 mm to 53.490 mm

b : Journals

Standard	Class A : Ø 64.050 mm to 64.035 mm
	Class B : Ø 63.800 mm to 63.785 mm
Regrind	Ø 63.550 mm to 63.535 mm

e : Width of centre main bearing ..... 33.995 mm to 34.10 mm
X : Journal class reference
Y : Crank pin class reference
Crankshaft type classes fitted to engines on the production line - AA
- AB
- BA
- BB

Crankshaft end float (adjustable) ..... 0.045 mm to 0.16 mm
The oil seal arrangement at the flywheel end of the crankshaft consists of :
– an oil throw impeller on the crankshaft
– a ridged lip seal (red in colour)
The Parts Department only supplies class AA crankshafts.

Main bearing shells :
c : Width of shell ..... 27.62 mm to 27.67 mm
f : outside dia. of shell, fitted. ..... 68.695 mm to 68.705 mm
g : Thickness of bearing shell ..... Class A : 2.306 mm to 2.312 mm; Class B : 2.431 mm to 2.437 mm; Regrind : 2.556 mm to 2.562 mm
Clearance between bearing shells and crankshaft. ..... 0.21 to 0.058 mm

Crankshaft thrust washers

d : Thrust washer thicknesses (the two washers on the same side must be the same thickness)

Class I	3.10 mm to 3.14 mm
Class II	3.14 mm to 3.18 mm
Class III	3.18 mm to 3.22 mm
Class IV	3.22 mm to 3.26 mm

Z : Class reference
The friction metal facing is to be against the crankshaft.

Camshaft :

End float (not adjustable) ..... 0.05 mm to 0.36 mm

Cam lift :

– Inlet and exhaust. ..... 6.83 ± 0.02 mm

Timing gear :

Intermediate wheel hub

– The hub projects past the housing face by. ..... $27.2 \begin{smallmatrix} +0.1 \\ +0.03 \end{smallmatrix}$ mm

The clearance between valves and rocker arm (when checking the timing diagram)

– Inlet and end exhaust ..... 1 mm

Timing diagram (as seen from flywheel end) : Fig. I

A : Top dead centre (T.D.C.)

B : Inlet open ..... $2^{\circ}52'$ after T.D.C.

C : Exaust closes. ..... $4^{\circ}12'$ before T.D.C.

D : Inlet closes ..... $33^{\circ}08'$ after B.D.C.

E : Exhaust opens. ..... $37^{\circ}48'$ before B.D.C.

F : Bottoms dead centre (B.D.C.)

Flywheel : Fig. II

a ..... 1.5 mm maxi

b ..... $0.5 \begin{smallmatrix} +0 \\ +0.15 \end{smallmatrix}$ mm

c ..... $28 \begin{smallmatrix} +0.2 \\ 0 \end{smallmatrix}$ mm

After refacing ..... 27.7 mm mini

d ..... $230 \begin{smallmatrix} +3 \\ 0 \end{smallmatrix}$ mm

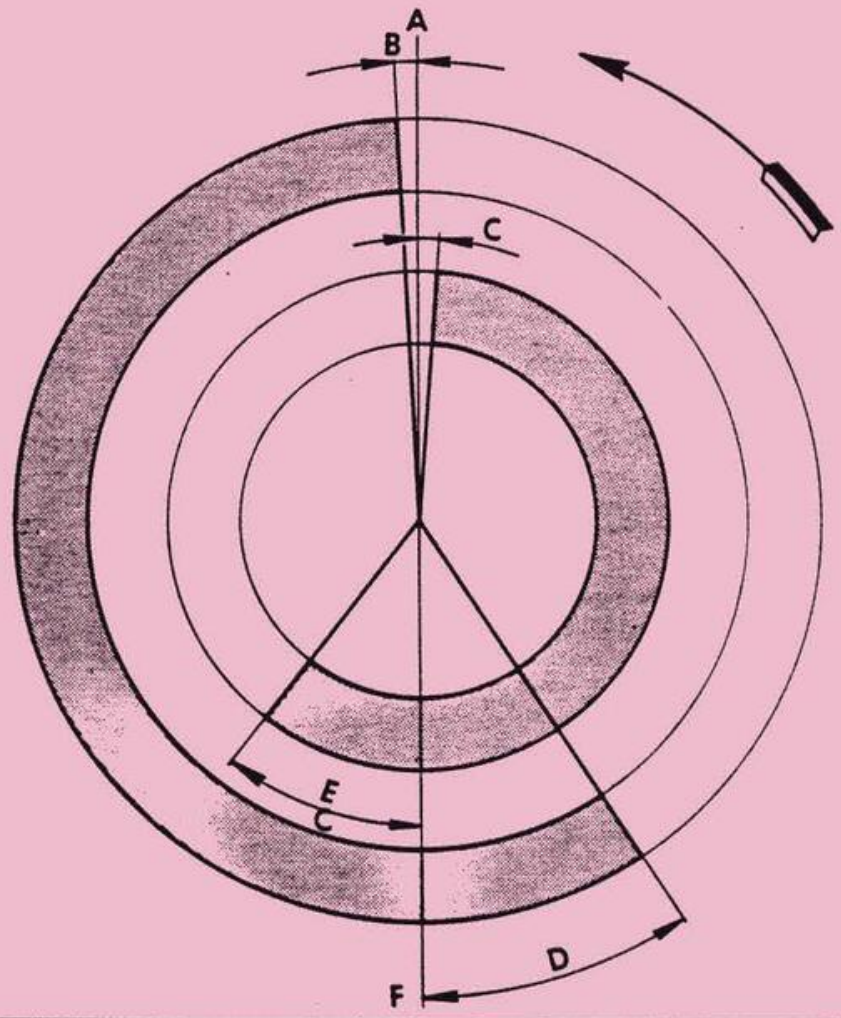
e ..... 236.5 mm maxi

– Starter ring gear with 120 teeth (no lead) (unmachined face against flywheel face).

Push rods

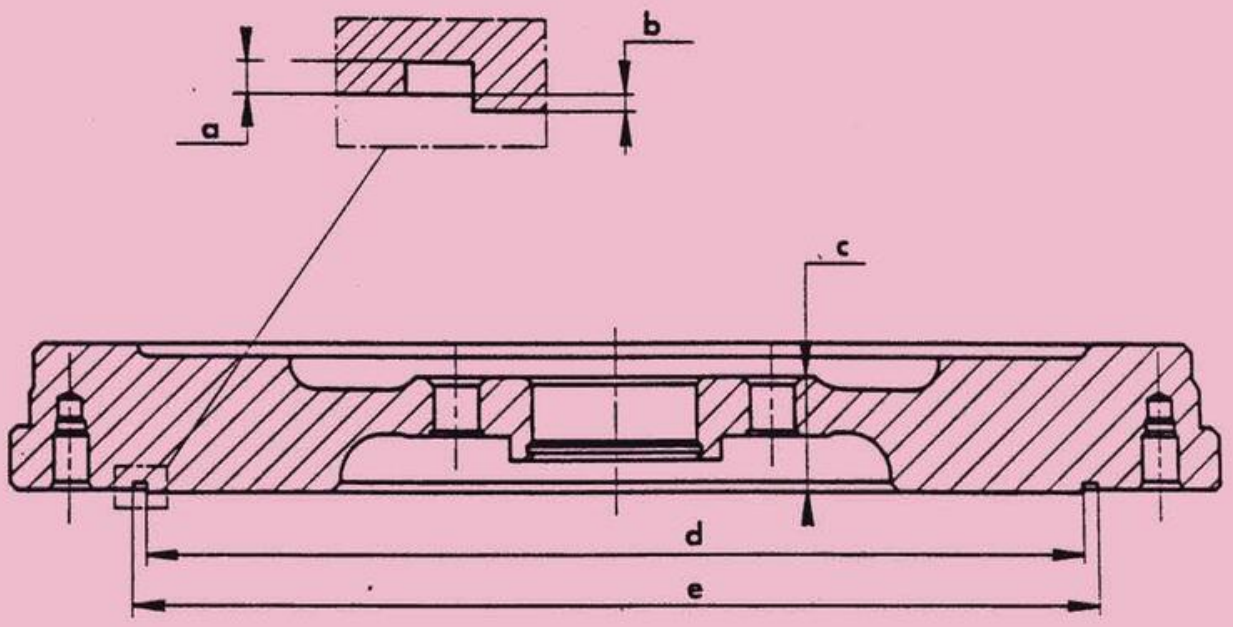
Length of push rods (inlet and exhaust are identical) ..... $183.85 \begin{smallmatrix} +0.3 \\ -0.75 \end{smallmatrix}$ mm

Maximum push rod bow ..... 1 mm



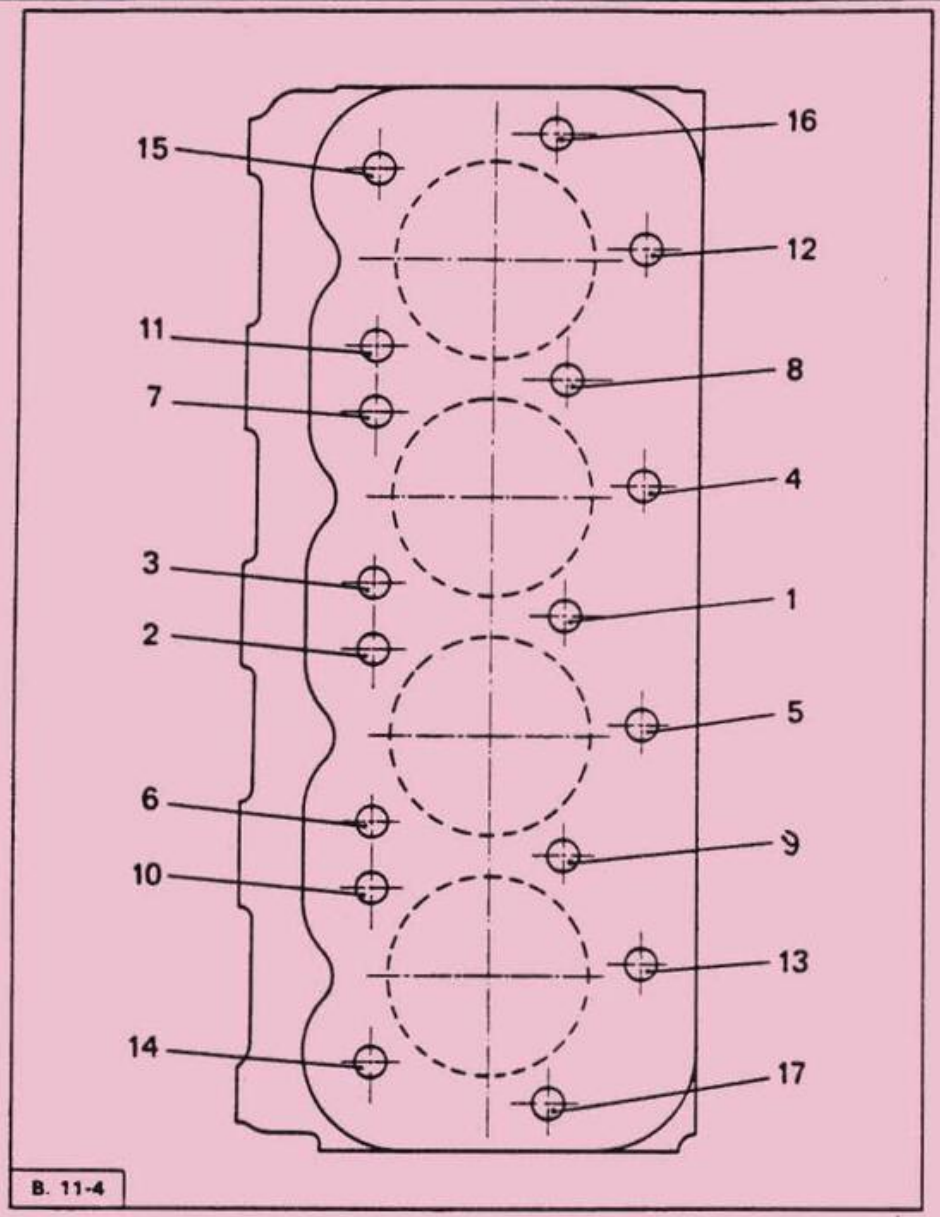
L 12-8

I

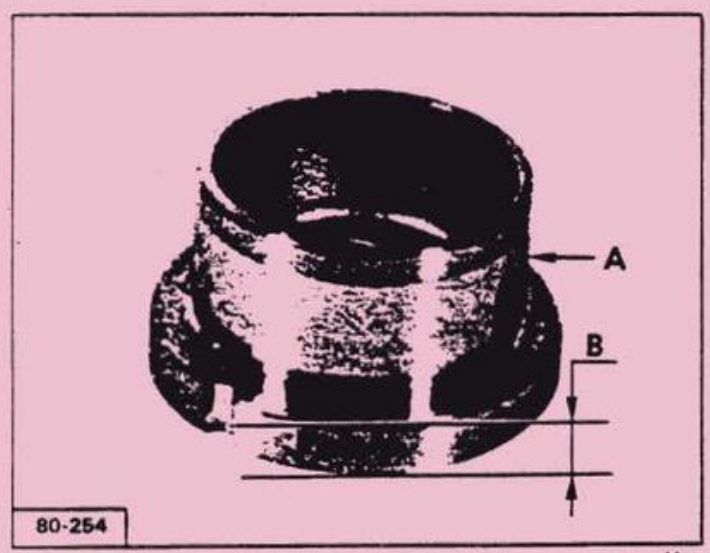


L 12-25

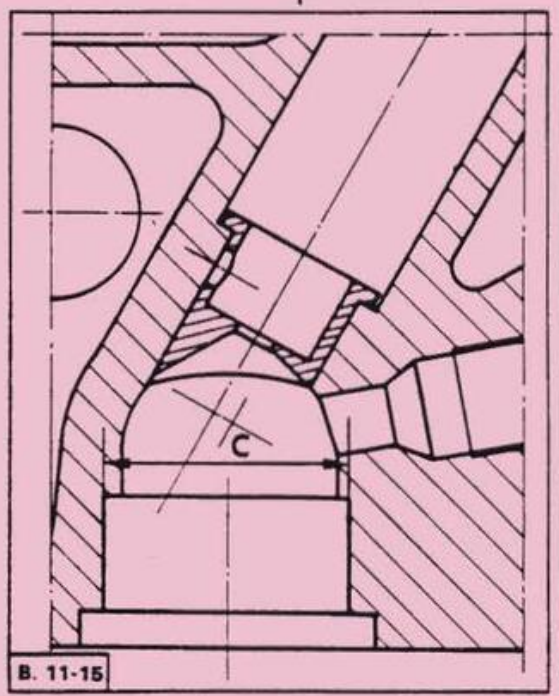
II



I



II



III

Cylinder head :		mdaN	Nm	lft ft
Cylinder head tightening order Fig. I	Initial tightening torque	6	60	44
	Final tightening torque	10.5	105	77

Initial height of cylinder head ..... $117 \begin{smallmatrix} +0.5 \\ -0 \end{smallmatrix}$ mm

Minimum height after refacing ..... 116.3 mm

Maximum overall permissible bow on cylinder head ..... 0.1 mm

Maximum permissible bow between cylinder head bolt holes ..... 0.025 mm

Swirl chambers, Figs. II and III

	A : Ø of Swirl Chamber ± 0.05 ± 0.005	B : Thickness of Flange ± 0.05	C : Ø of chamber locating bore + 0.025
Standard	35.950 36.065 36.365	4.5	35.9 36 36.3
1st repair size	36.365	4.85	36.3
2nd repair size	36.465	5.05	36.4

The swirl chambers are fitted to an interference fit of between 0.02 mm and 0.065 mm.

They project past the cylinder head gasket face by : ..... 0 to 0.03 mm

Pre-heater plug thread ..... M12 x 1.25

– The cylinder head is provided with an aperture for the fast idling control thermostatic pick-up.

– Cylinder head gasket : made by REINZ

The gasket is fitted dry (no linseed oil is to be applied)

Identification (number engraved on a tab on the gasket). L25

– Rocker cover

The crankcase oil vapour is re-cycled through the rocker cover.

Valves guides seats, Figs. I and II

	A : Inlet	B : Exhaust
a : Ø valve stem	7,960 mm to 7.975 mm	8.940 mm to 8.955 mm
b : valve head Ø	41.85 mm to 42.15 mm	34.85 mm to 35.15 mm
c : valve guide Ø	7.990 mm to 8.015 mm	8.980 mm to 9.005 mm
d : length of valve guide	53.75 mm to 54.25 mm	56.75 mm to 57.25 mm

e : outside Ø of valve guide

Standard
- Condition 1 ..... 13.055 mm to 13.075 mm
- Condition 2 ..... 13.305 mm to 13.325 mm
- Repair size ..... 13.555 mm to 13.675 mm

f : valve guide projection	11.9 mm to 13.4 mm	9.9 mm to 11.4 mm

g : valve guide locating bore in cylinder head

Standard
- Condition 1 ..... 13.003 mm to 13.023 mm
- Condition 2 ..... 13.253 mm to 13.273 mm
- Repair size ..... 13.503 mm to 13.523 mm

h : valve seat locating bores

Standard	Condition 1	45 mm to 45.039 mm	38 mm to 38.039 mm
	Condition 2	45.3 mm to 45.339 mm	38.3 mm to 38.339 mm
	Repair size	45.6 mm to 45.639 mm	38.6 mm to 38.639 mm

J : outside Ø of valve seats

Standard	Condition 1	45.154 mm to 45.179 mm	38.160 mm to 38.185 mm
	Condition 2	45.454 mm to 45.479 mm	38.460 mm to 38.485 mm
	Repair size	45.754 mm to 45.779 mm	38.760 mm to 38.785 mm

- Width of valve seats : ..... 2.5 mm
- Valves recessed below cylinder head gasket face by : ..... 0.7 mm to 0.9 mm
- The valve seats and guides are a shrink fit in production

Valve springs :

One spring per valve

Direction of coils ..... right hand

Wire diameter ..... 4.5 mm

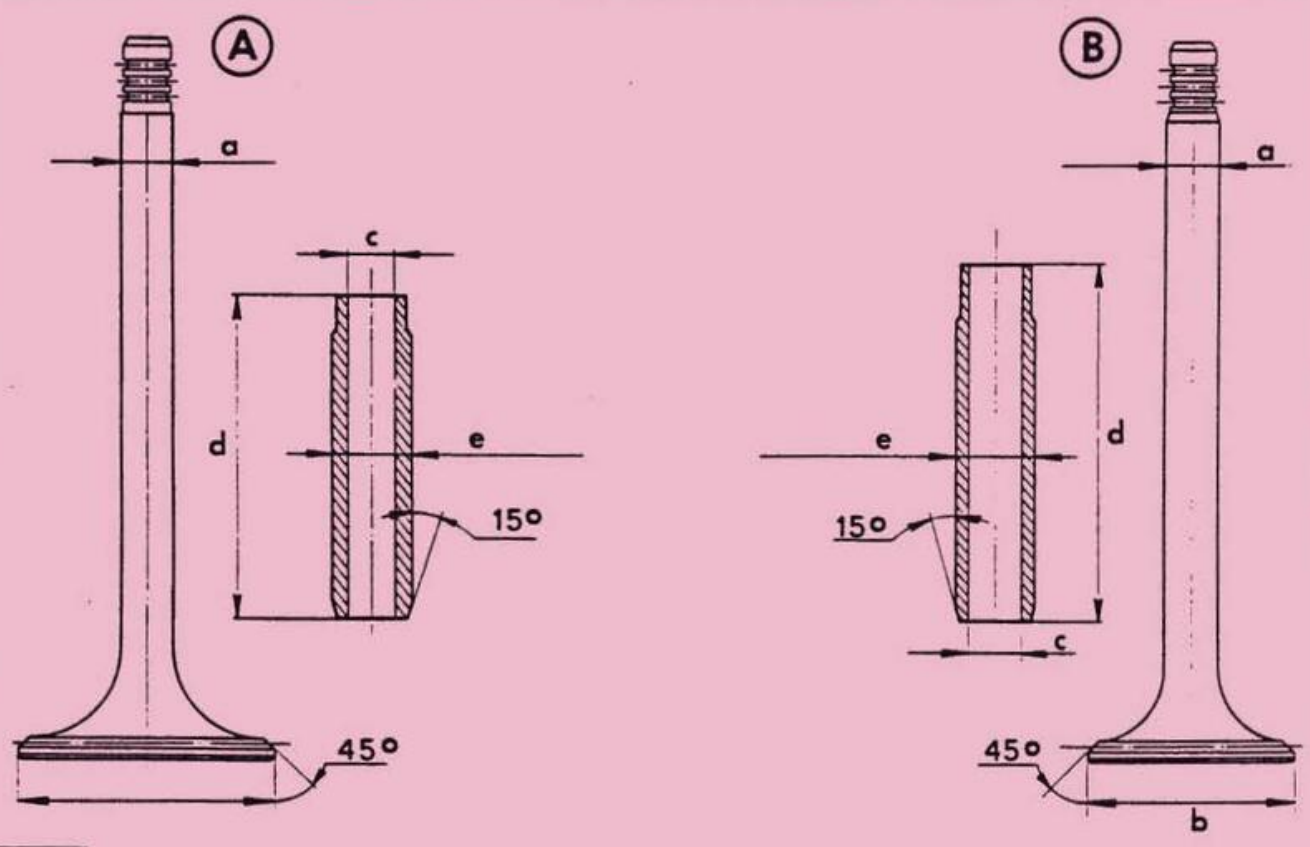
Inside diameter ..... 25.2 mm ± 0.2 mm

Total number of coils 6.5

Free length ..... 49.4 mm

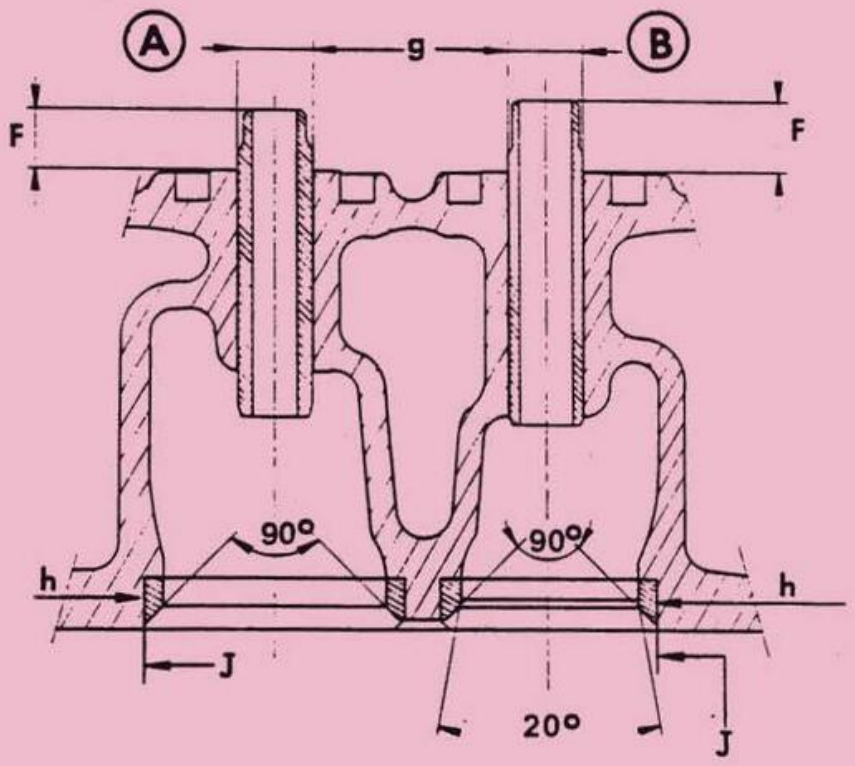
Length under a load of :

at
- 29 ± 2.1 daN ..... 40.9 mm
- 71 ± 4.2 daN ..... 30.9 mm



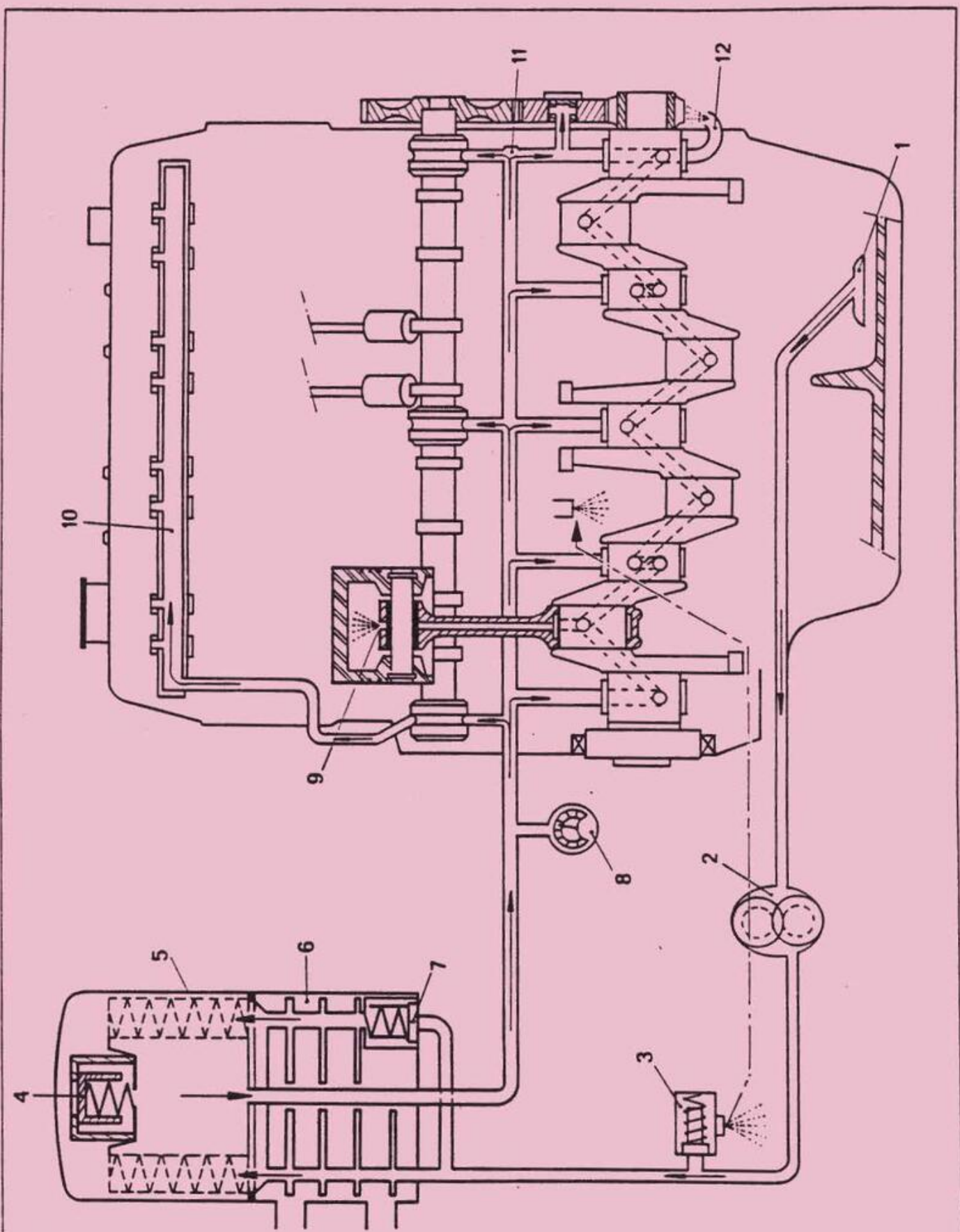
B. 12-5

I



B. 11-8

II



UT. 22-1

Lubrication system : Fig. I

1 - Suction trainer
2 - Oil pump
3 - Pressure relief valve
4 - By-pass (in filter cartridge)
5 - Filter cartridge
6 - Heat exchanger
7 - By-pass (in oil cooler)
8 - Oil pressure switch
9 - Piston head cooling spray
10 - Rocker shaft
11 - Oil gallery
12 - Oil jet (to lubricate the timing gears).

– Oil grade

All season : ESSOLUBE XD3 15 W 40

For ambient temperatures of less than –10°C : ESSOLUBE XD3 10 W 30.

– Capacities

After dismantling (dry engine)	5.8 litres (10.2 pints)
After oil change involving replacing the filter cartridge	4.7 litres (8.3 pints)
After simple oil change	4.4 litres (7.75 pints)
Difference between maximum and minimum marks on dipstick	1 litre (1.75 pints)

Oil pump (1) : Figs. I and III

"a" : Joint face coated with jointing compound.

Pressure relief valve : Figs. II and IV

(2) - Pressure relief valve support positioning screw.

– Filter cartridge :
  - PURFLUX or MAN or GUYOT
  - By-pass valve setting 550 ± 50 m.bars.
  - Cold start safety valve setting 0.3 bars.

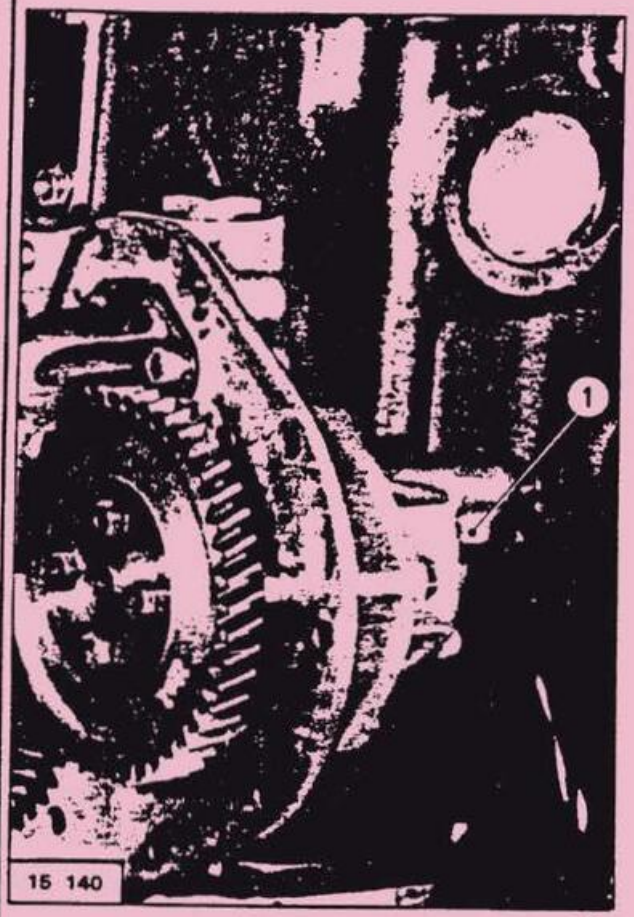
REMARK : Whenever replacing the filter cartridge, ensure that the face of the seal and the locating face on the support are both clean.

For replacing the filter cartridge use spanner 8.1404.

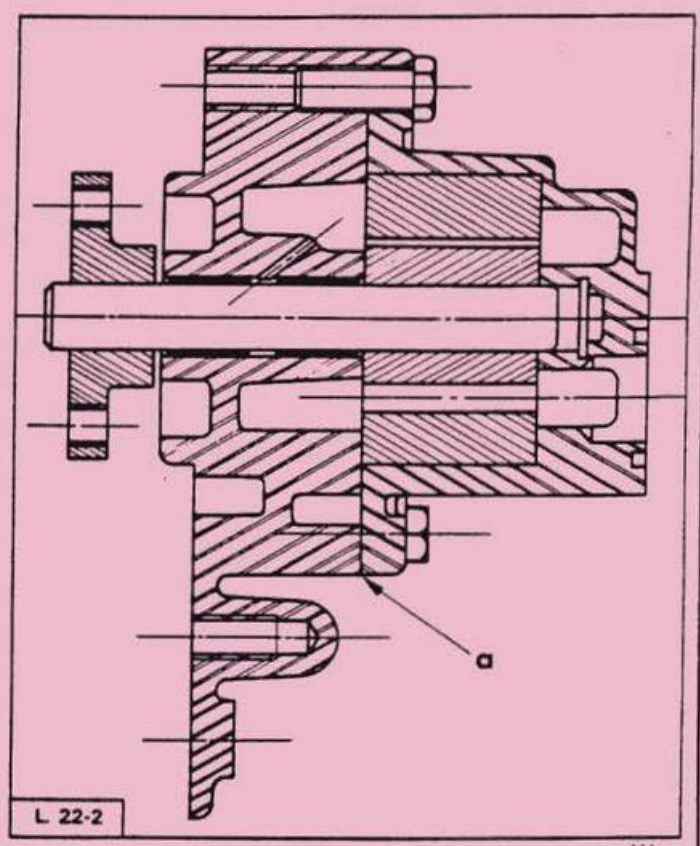
– Oil pressure (at an oil temperature of 95°C) : measured at the oil filter support.
  - at 1 000 rpm : 1 bar min.
  - at 3 500 rpm : 3.7 to 4.5 bars

– Pressure relief valve spring rate :
  coil bound : 31 mm
  length under a load of 10.9 kg : 42 mm.

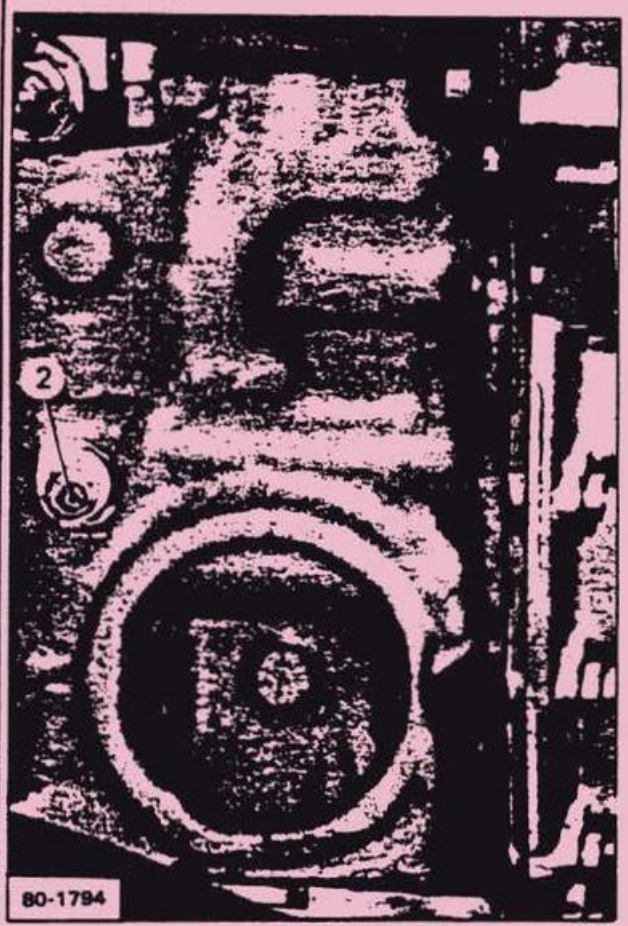
– Oil pressure switch settings :
  When the pressure is rising : the warning light goes out when the pressure exceeds 0.800 bars.
  When the pressure is falling : the warning light switches on at between 0.675 and 0.475 bars.



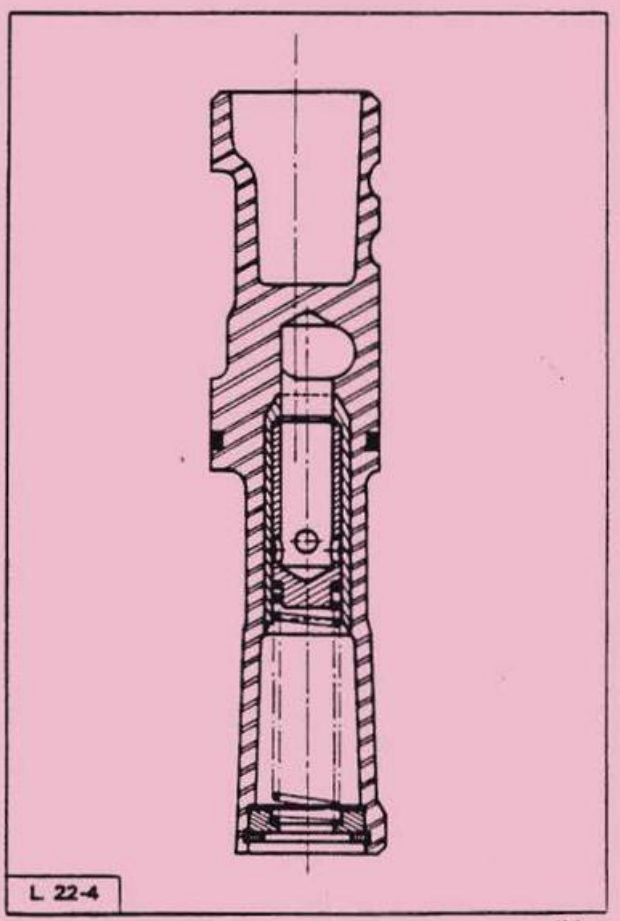
I



III



II



IV

	Pages
Engine data	A1.102
Tightening torques	A1.103
Data :	
– cylinder block	A1.105
– pistons	A1.105 and 106
– connecting rods	A1.106
– crankshaft	A1.109
– camshaft - timing gear - flywheel	A1.110
– cylinder head - pre-combustion chambers	A1.113
– valves - guides - seats	A1.114
– lubrication system	A1.117
– oil pump - pressure relief valve	

DATA AND SPECIAL FEATURES
OF THE U25/661 ENGINE
(Timing gear drive by toothed belt)

Engine

- Type (as marked on number plate) U25/661
- Configuration ..... Transverse, inclined forward at 23°
- French taxable horse power ..... 10 HP
- Direction of rotation ..... Left hand (anti-clockwise as seen from flywheel)
- Bore ..... 93 mm
- Stroke ..... 92 mm
- Capacity ..... 2.5 litres
- Compression ratio 22.25/1
- Injection order 1-3-4-2
- Max. power ..... ISO : 54 kW at 4,250 rpm
  DIN : 75 hp at 4,250 rpm
- Max. torque ..... ISO : 149 N.m (110 lbf.ft) at 2,250 rpm
  DIN : 15.7 mkg at 2,250 rpm
- Idling speed ..... 800 ± 25 rpm
- Governed speed empty ..... 4,625 ± 125 rpm
- Min. cut-off speed, under load ..... 4,250 ± 50 rpm

Lubrication

- Pressure lubrication system fed by an « Eaton » type pump driven by a toothed belt.
- External cartridge type filter (bypass valve set at 1.5 bars).
- Coolant/oil heat exchanger type oil cooler (valve set at 1 bar).

- ROTO-DIESEL injection pump type MA 300 Reference R 3449 F 010 → 5/87
  type MA 260 Reference R 8443 B 111 → 5/87
- Direction of rotation : left hand (Seen from timing gear).
- Injectors : ROTO-Diesel pintle type.
- Fuel : diesel oil.
- Fuel filter of the replaceable element type with priming pump. From 87 my water detector.
- Air filter of the replaceable dry element type.

Timing gear

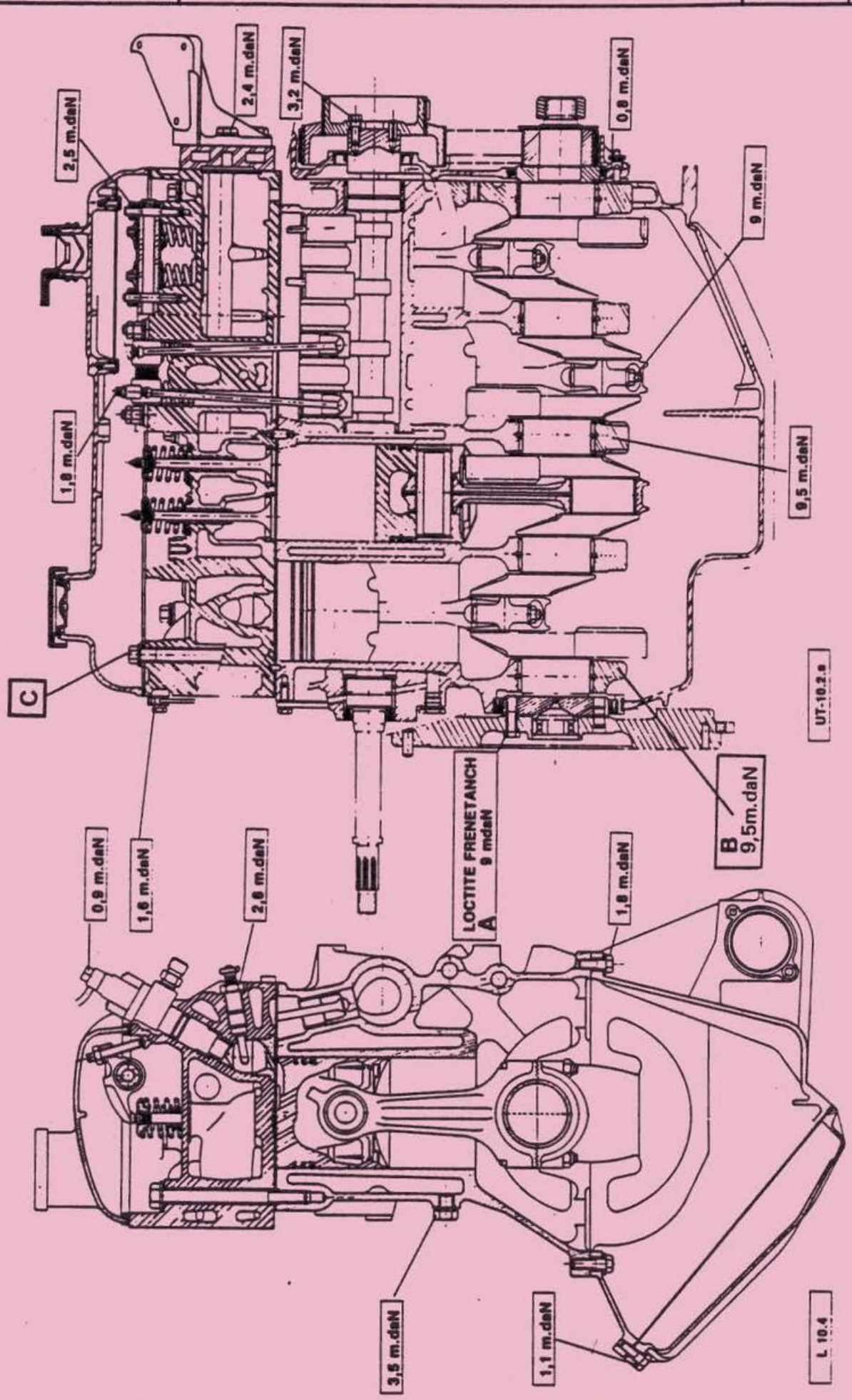
Side mounted camshaft driven by a toothed belt.

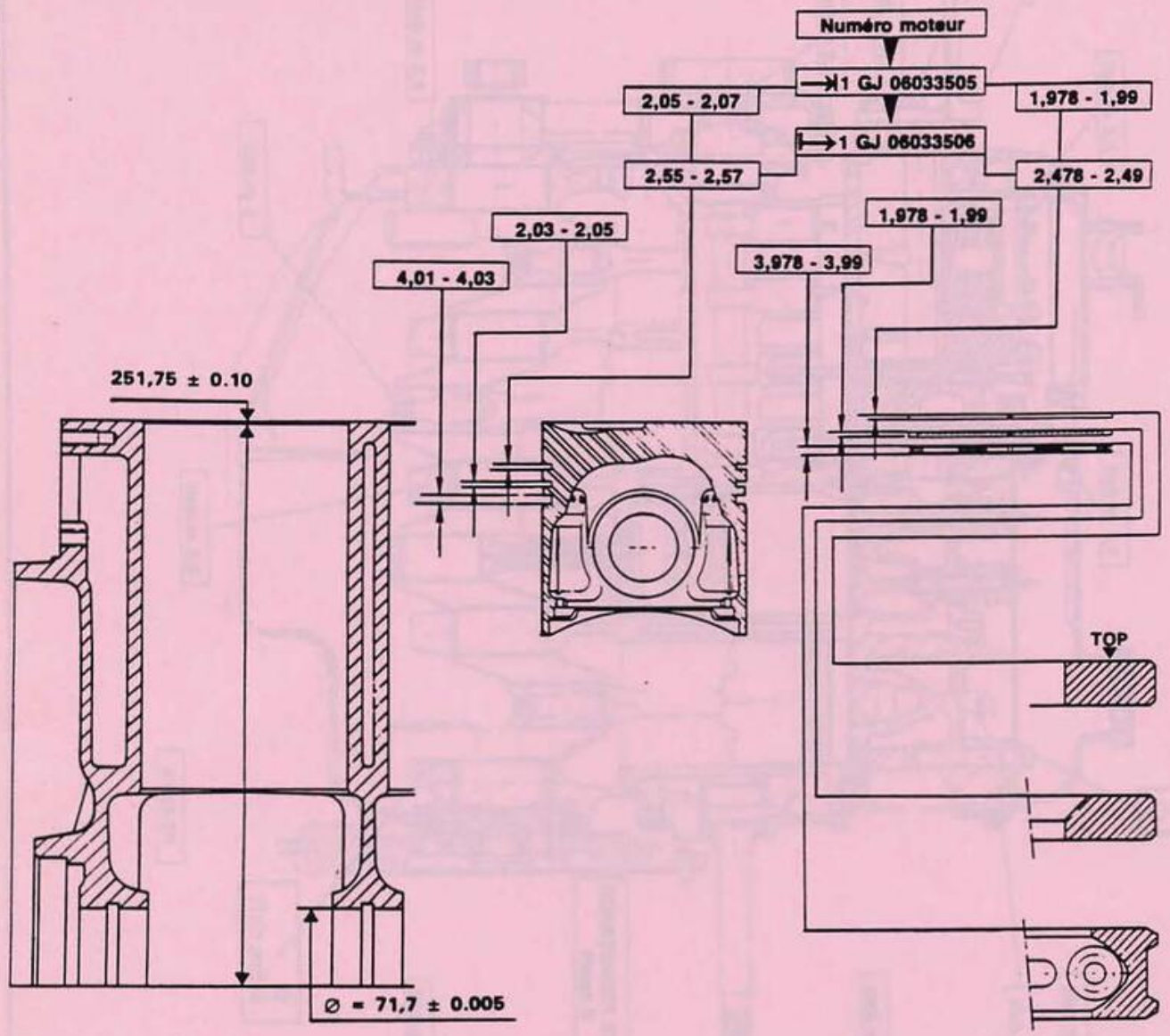
Tightening torques — Torques in N.m (lbf.ft)

A - Flywheel securing bolts (to be replaced each time they are removed) and coated with LOCTITE FRENETANCH compound before fitting ..... 90 N.m (66.4 lbf.ft)

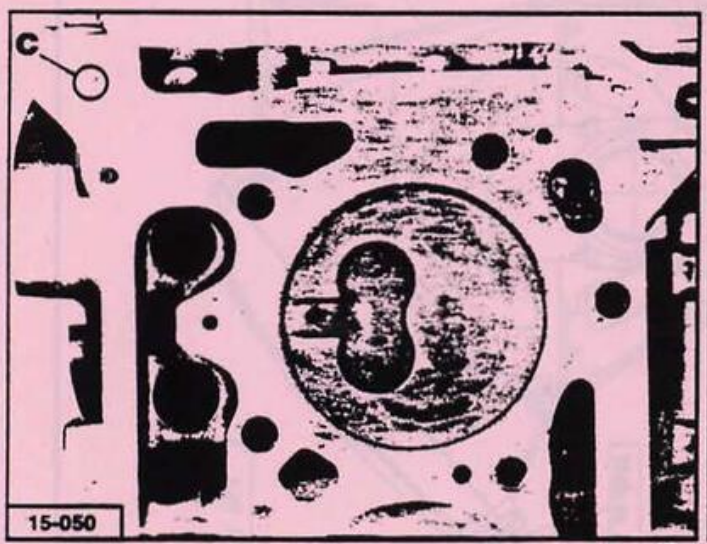
B - Bearing cap bolts (to be replaced each time they are removed) ..... 95 N.m (70.1 lbf.ft)

C - Cylinder head securing bolts : These bolts, together with the toothed washers, must be replaced by new ones each time the cylinder head is removed (for tightening operations see page A1.113).

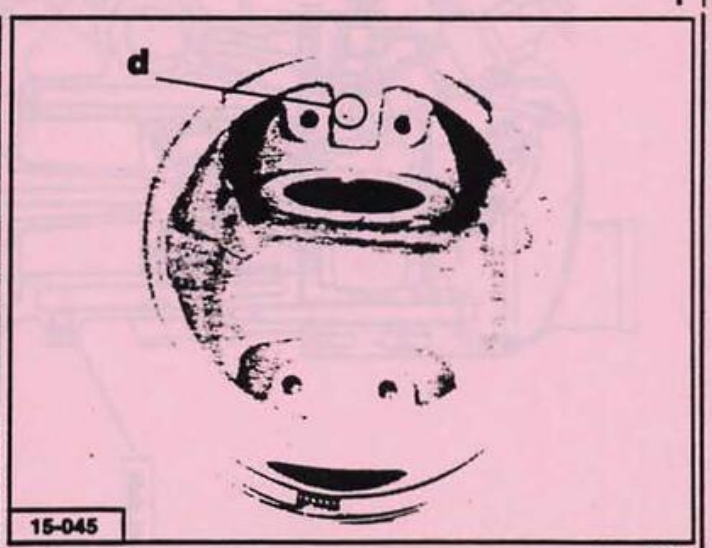

2,5 m.daN
2,4 m.daN
3,2 m.daN
0,8 m.daN
9 m.daN
1,8 m.daN
9,5 m.daN
C
UT-10.2.e
B
9,5m.daN
LOCTITE FRENETANCH
A
9 mdaN
0,9 m.daN
1,6 m.daN
2,6 m.daN
1,8 m.daN
3,5 m.daN
1,1 m.daN
L 10.4


Numéro moteur
1 GJ 06033505
1 GJ 06033506
2,05 - 2,07
2,55 - 2,57
1,978 - 1,99
2,478 - 2,49
2,03 - 2,05
4,01 - 4,03
1,978 - 1,99
3,978 - 3,99
251,75 ± 0.10
TOP
Ø = 71,7 ± 0.005
B 12-15 b

I


c
15-050

II


d
15-045

III

Cylinder block : Fig. I

– Bores machined in a cast iron block.

(c) - Cylinder block grade reference Fig. II.

If the block is rebored, this reference must be deleted and the letter corresponding to the new bore diameter stamped in its place.

Permissible distortion of cylinder block top face.

a) Overall distortion : .....0.05 maximum

b) Distortion between two head fixing holes : 0.02 mm maximum.

Pistons : Fig. III

Manufacturer : A.E.F. (Associated Engineering France).

Lead and tin coated aluminium.

Gudgeon pin is not offset.

Running clearance at the skirt, "N" reference : A.E.F.....0.10 mm to 0.12 mm

Running clearance, "U" reference.....0.0975 mm to 0.1305 mm

Grade reference with letter "n" or "u" on the boss "d" Fig. III.

Height of piston crown above cylinder block top face : (to be achieved whenever a piston is changed) according to nominal diameter.

The Parts Division supplies piston/gudgeon pin/ring assemblies in sets of four.

		Cylinder block		Piston		
	Nominal diameter	Ref. « c » Fig. II	Bore diameter	A.E.F. piston diameter	Reference	Piston height
Std.	93	A	93,007 - 93,022	92,890 - 92,910	U	0,50 - 0,55
	93,25	B1	93,25 - 93,26	93,140 - 93,150	B1n	0,47 - 0,52
		B2	93,26 - 93,27	93,150 - 93,160	B2n	
	93,50	C1	93,50 - 93,51	93,390 - 93,400	C1n	0,44 - 0,49
		C2	93,51 - 93,52	93,400 - 93,410	C2n	
	93,75	D1	93,75 - 93,76	93,640 - 93,650	D1n	0,41 - 0,46
		D2	93,76 - 93,77	93,650 - 93,660	D2n	

Diameter of gudgeon pin bore in piston .....30.004 mm to 30.014 mm

Maximum weight difference between piston/gudgeon pin assemblies (in one engine) .. 15 g. maximum

Piston rings : Fig. I

– GOETZE manufacture.

– The marking engraved on the face of the ring must be towards the piston crown.

1 - Molybdenum coated upper compression ring.

2 - Lower compression ring (the torsional chamfer "b" towards the piston crown).

3 - Oil control ring with expander (the gap in the expander (4) must be at 180° to the gap in the oil control ring (3)).

a - Paint reference on the ring according to nominal piston diameter.

Nominal diameter	Paint reference
93	Yellow
93.25	Green
93,50	White
93.75	Purple

Ring gap :

– Upper compression ring. . . . . 0,20 mm to 0.45 mm

– Lower compression ring . . . . . 0.15 mm to 0.40 mm

– Oil control ring : . . . . . 0,10 mm to 0.30 mm

Connecting rods : Fig. II

– Side clearance (non-adjustable) : . . . . . 0.037 to 0.247 mm

– c : Small en bush diameter : . . . . . 30.014 mm to 30.020 mm

– e : Big end diameter : . . . . . Grade 1 : 57.675 mm to 57.685 mm
Grade 2 : 57.685 mm to 57.695 mm

X - Connecting rod grade reference (1 or 2)

d - Distance between centres : . . . . . 154 ± 0.05 mm

– Maximum weight variation between connecting rods in one engine : . . . . . 7 grammes maxi.
The Parts Department supplies connecting rods in sets of four (grade 1).

Big end bearing shells (crank pin) :

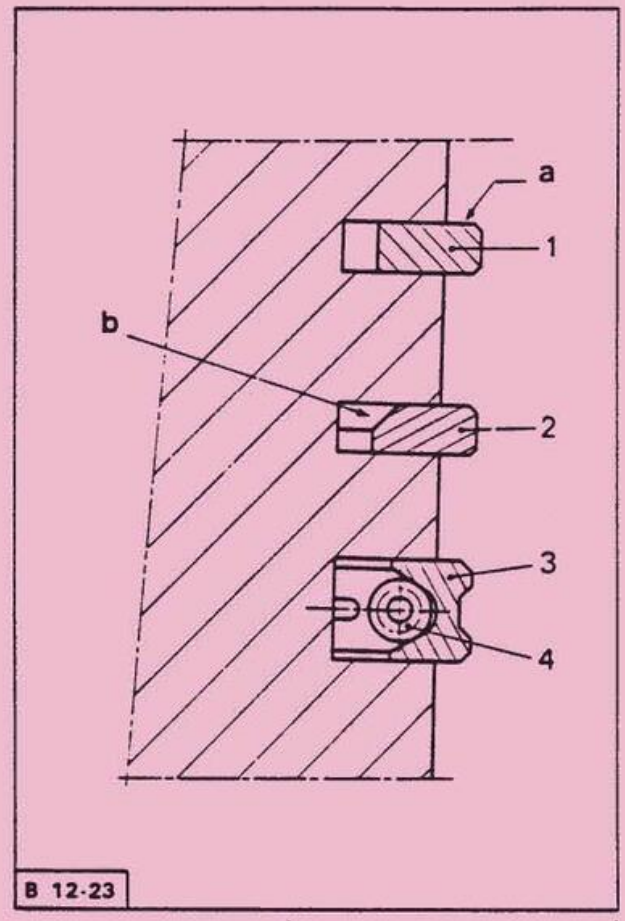
– Running clerance, big end to crankshaft . . . . . 0.029 mm to 0.074 mm

f - Width of big-end shell 24.4 mm → 12/86
22.6 mm ↦ 01/87

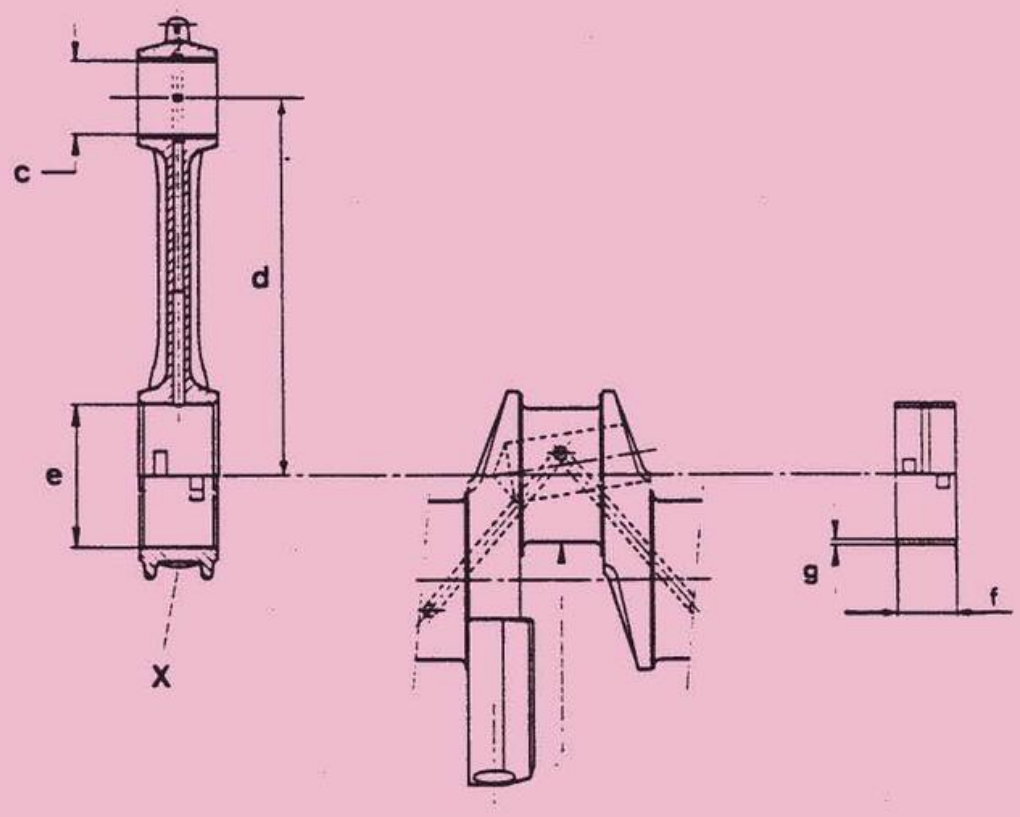
g - Thickness of big-end shell.

- Position of connecting rod-piston assembly on engine :
oil hole in connecting rod small-end pointing towards recess (clover leaf) in piston.
Recess (clover leaf) in piston : on camshaft side.

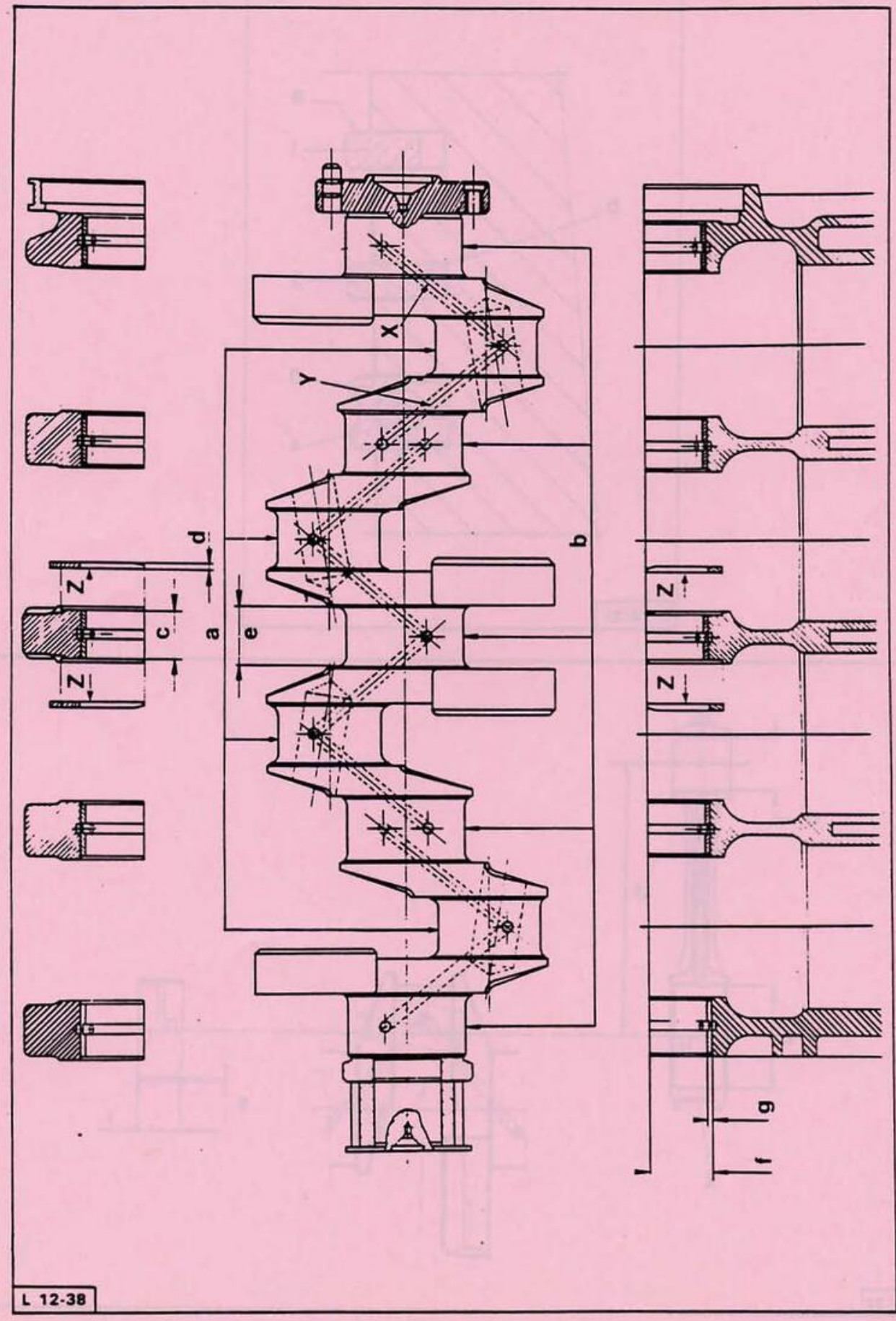
Crankshaft	Con. rod	Thickness in mm
Grade A	Grade I	1.820 - 1.826
	Grade II	1.825 - 1.831
Grade B	Grade I	1.945 - 1.951
	Grade II	1.950 - 1.956
Overhaul	Grade I	2.070 - 2.076
	Grade II	2.075 - 2.081



I



II


X
Y
d
z
c
a
e
b
z
z
g
f
L 12-38

Crankshaft : Fig. I

a - Crankpins

Standard	Grade A : Ø = 53,990 mm to 54,005 mm
	Grade B : Ø = 53,740 mm to 53,755 mm
Undersize	: Ø = 53,490 mm to 53,505 mm

b - Journals

Standard	Grade A : Ø = 67.035 mm to 67.05 mm
	Grade B : Ø = 66.785 mm to 66.8 mm
Undersize	: Ø = 66,535mm to 66,55 mm

e - Centre journal width : 33.995 mm to 34.10 mm.

X - Journal grade reference

Y - Crankpin grade reference

Possible crankshaft grades fitted in production :

- AA
- AB
- BA
- BB

Example on a crankshaft :
- Crankpin grade = A
- Journal grade = B

Reference stamped on crankshaft :
- at y = A
- at x = B

= AB

Crankshaft end float (adjustable) : ..... 0.045 mm to 0.16 mm

At the flywheel end, the crankshaft is sealed by :

– a helical-toothed thrower on the crankshaft

– a ribbed lip oil seal (red).

The Parts Division supplies crankshafts only to grades AA.

Main bearing shells :

c - Width of shell ..... 28.45 mm to 28.7 mm

f - ø in block ..... 71.695 mm to 71.705 mm

g - Thickness of bearing shell .....
(Class A ..... 2.306 mm to 2.312 mm
(Class B ..... 2.431 mm to 2.437 mm
(Repair size ..... 2.555 mm to 2.563 mm

Clearance between bearing shells and crankshaft ..... 0.021 to 0.058 mm

End float flanges :

d - Thickness of flanges (the flanges on any given side of the bearing must be of the same thickness)
(. . 3.10 mm
(. . 3.14 mm
(. . 3.18 mm
(. . 3.22 mm

Z - Class reference

- Antifriction face against the crankshaft.

Camshaft :
End float (non-adjustable) ..... 0.05 mm to 0.36 mm
Thickness of flange ..... 5.41 mm

Cam lift :
- Inlet and exhaust : ..... 6.83 ± 0.02 mm

Timing gear : toothed belt drive
The belt is tensioned by a tensioner roller
(To adjust the tension, use special tool (-).0157 K

Clearance between rocker arm and valve (when checking the timing diagram)
- Inlet and exhaust : ..... 1 mm

Timing diagram (as seen from flywheel) : Fig. I
A - Top dead centre (T.D.C.)
B - Inlet opens after T.D.C. : ..... 2°52'
C - Exhaust closes before T.D.C. : ..... 4°12'
D - Inlet closes after B.D.C. : ..... 33°08'
E - Exhaust opens before B.D.C. : ..... 37°48'
F - Bottom dead centre (B.D.C.)

Actual valve clearances (on a cold engine)

Inlet	Exhaust
0.30 mm	0.20 mm

Flywheel
Injection point timing mark engraved on flywheel (Fig. II)
Since 3/87 a lighter flywheel has been fitted (Fig. III) at Engine No. 1 G J 06 09 45 04

Fig. IV

a - ..... 1.5 mm max.

b - Essential difference between locating faces on the disc and clutch unit ..... $0.5\ ^{+\ 0}_{-\ 0.15}$ mm

c - ..... $28\ ^{+\ 0.2}_{-\ 0}$ mm

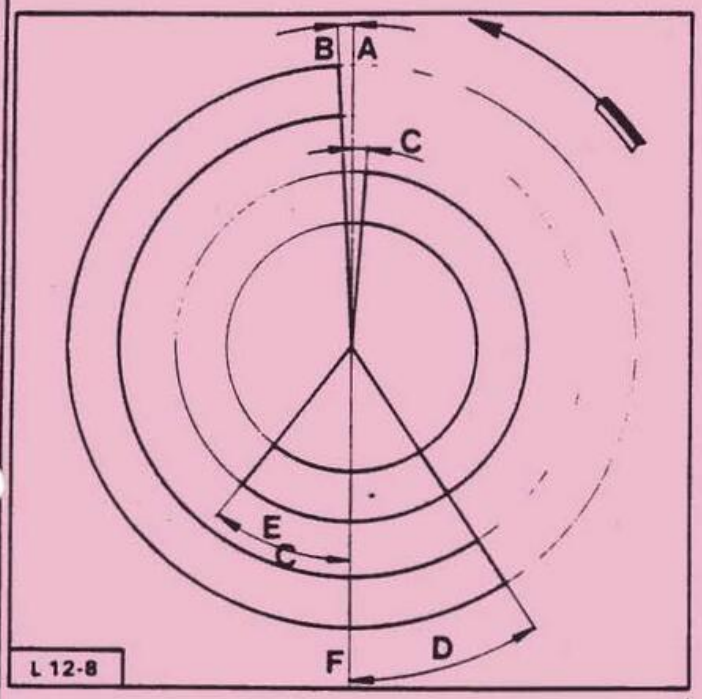
after refacing ..... 27.7 mm min.

d - ..... $243\ ^{+\ 1}_{-\ 0}$ mm

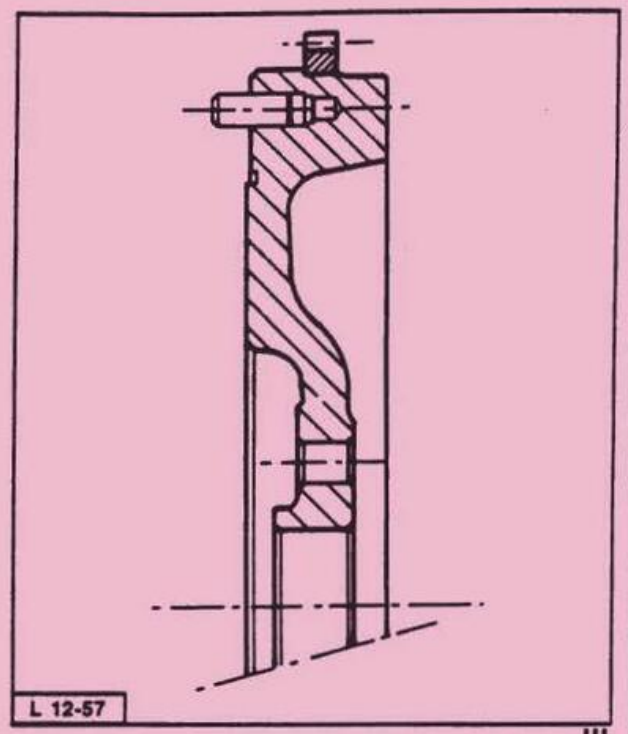
e - ..... 248 mm max.

- Starter ring gear with 120 teeth (no lead) (the unmachined side against the flywheel face)

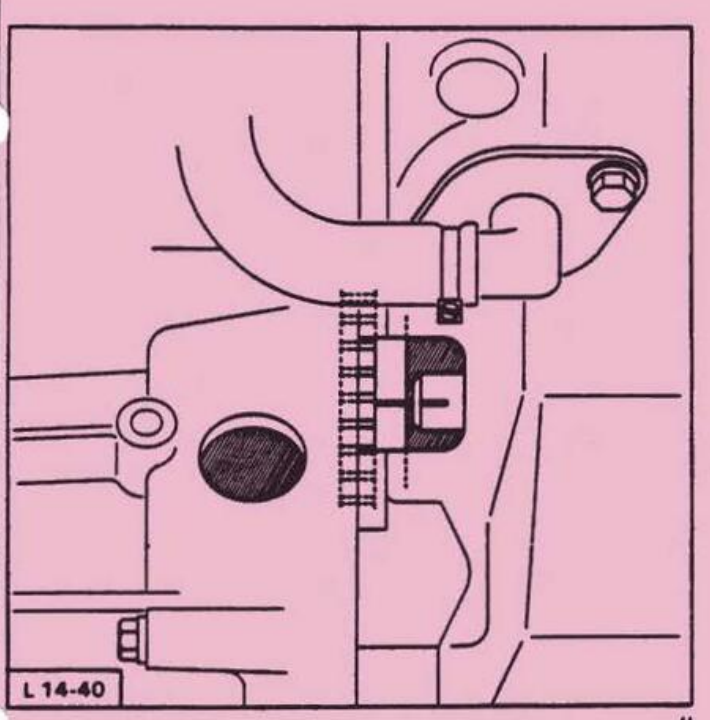
Push rods :
- Length of push rods (inlet and exhaust identical) ..... 180 ± 0.3 mm
- Max. push rod run-out ..... 1 mm



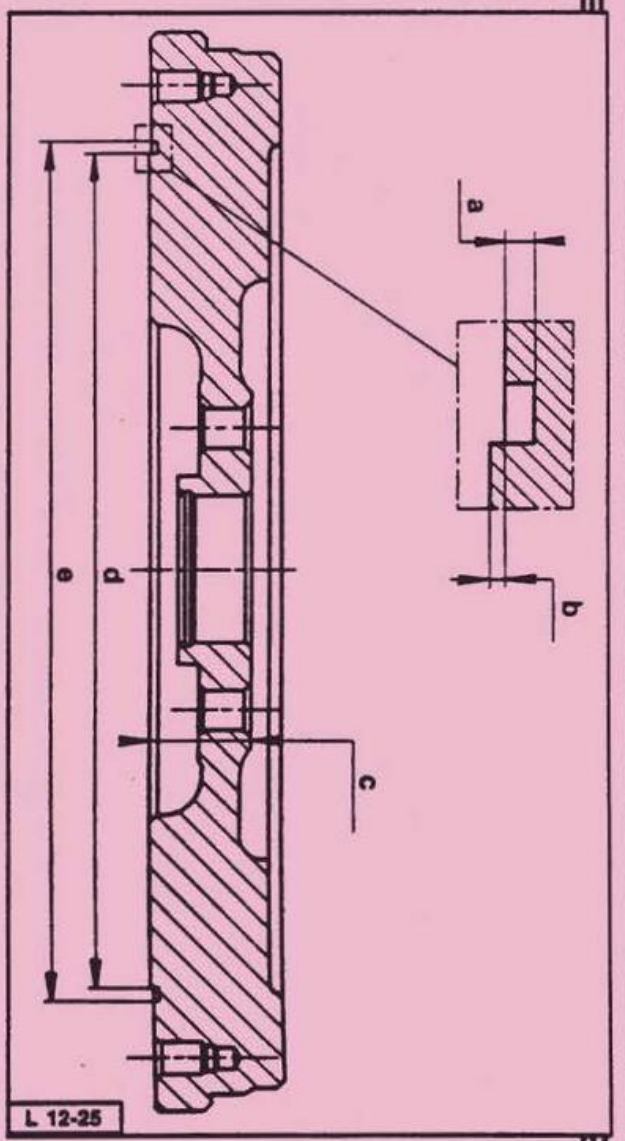
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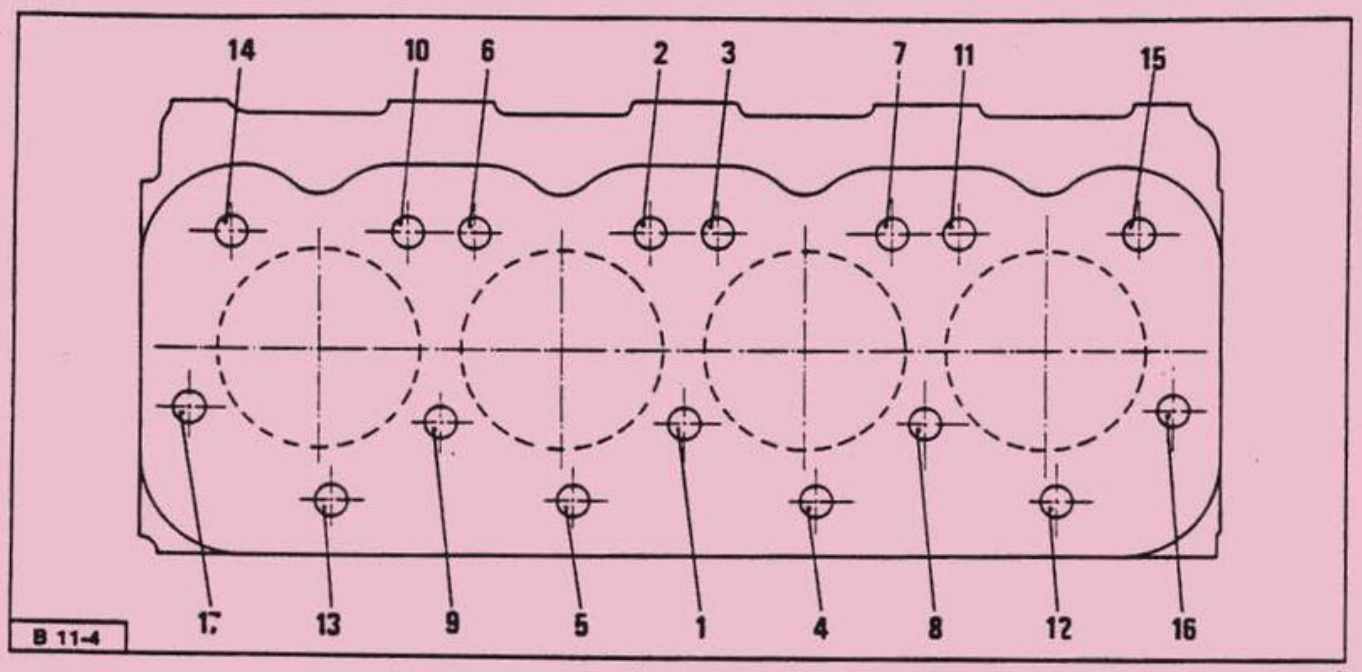
III



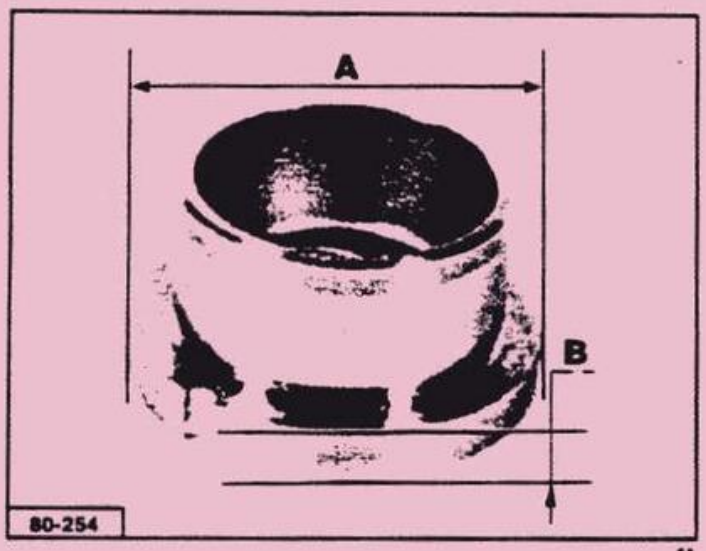
II



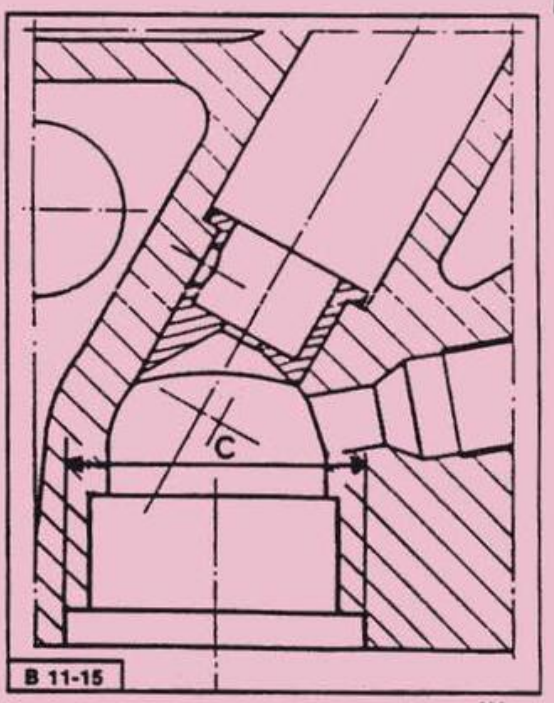
IV


14
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6
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B 11-4

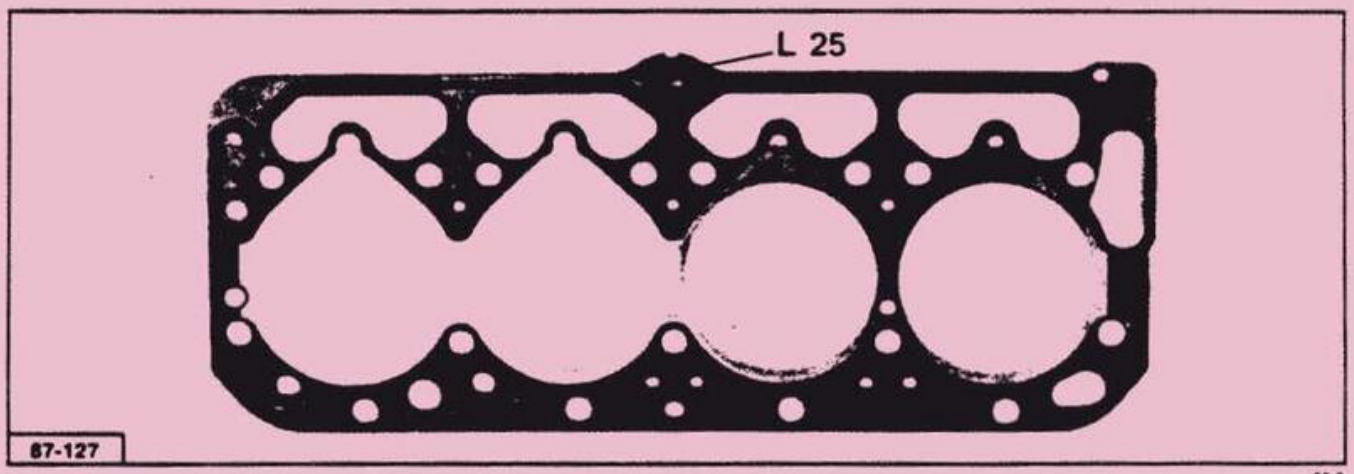
I


A
B
80-254

II


C
B 11-15

III

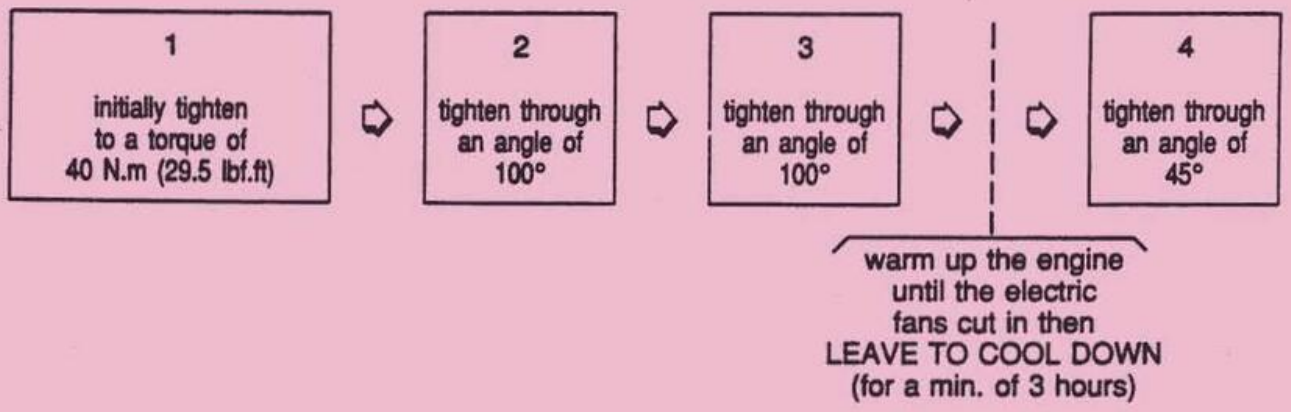

L 25
87-127

IV

Cylinder head

For cylinder head tightening order see Fig. I.

Tightening : (follow the conventional tightening order). The underhead faces and the threads of the bolts are to be oiled.
The teeth on the washers are to be against the cylinder head.



There is no cylinder head retightening operation at 1000/1500 miles (1500/2500 km)

Original height ..... $117 \begin{smallmatrix} +0.5 \\ -0 \end{smallmatrix}$ mm

Minimum height after refacing ..... 116.3 mm

Maximum permissible cylinder head bow ..... 0.1 mm

Maximum permissible bow between securing holes ..... 0.025 mm

Precombustion chambers Fig. II and III.

	A : Precombustion chamber ø 0 - 0,02	B : Thickness of flange ± 0,05	C : ø of cylinder head location + 0,025 0
Standard	35,950 36,065 36,365	4,5	35,885 36 36,3
1st possibility	36,365	4,85	36,3
2nd possibility	36,465	5,05	36,4

The precombustion chambers are fitted with an interference fit of between 0.02 mm and 0.065 mm.
The precombustion chambers protrude above the cylinder head gasket face by : 0 to 0.03 mm.
After replacing the precombustion chambers, measure the protrusion after a load of 3000 mdaN has been applied per combustion chamber.
The combustion chamber positioning pins are recessed below the surface by 0 to 1 mm.
Preheater plug screw thread ..... M 12 x 1.25

- Cylinder head with a tapping for a temperature sensor which controls the fast idling.
- Cylinder head gasket : made by REINZ.
  The gasket is fitted dry.

Identification mark (engraved on the gasket tab) : Fig. IV ..... L 25

- Rocker arm cover :
  The oil vapour is recycled via the rocker arm cover.

Valves-guides-seats : Fig. I and II

Height of valves ..... 121.3 ± 0.35 mm

	A : Inlet	B : Exhaust
a: valve stem ø	7.960 to 7.975 mm	8.940 to 8.955 mm
b: valve head ø	41.85 to 42.15 mm	34.85 to 35.15 mm
c: valve guide inside ø	7.990 to 8.015 mm	8.980 to 9.005 mm
d: height of valve guide	53.75 to 54.25 mm	56.75 to 57.25 mm

e: outside ø of valve guide

Initial
- 1st possibility ..... 13.055 mm to 13.075 mm
- 2nd possibility ..... 13.305 mm to 13.325 mm

Repair size ..... 13.555 mm to 13.575 mm

f: height by which the guide projects	9.9 mm to 11.4 mm	11.9 mm to 13.4 mm

g: guide locating bore in cylinder head

Initial
- 1st possibility ..... 13.003 mm to 13.023 mm
- 2nd possibility ..... 13.253 mm to 13.273 mm

Repair size ..... 13.503 mm to 13.523 mm

h: valve seat bore

Initial	1st possibility	45 mm to 45.039 mm	38 mm to 38.039 mm
	2nd possibility	45.3 mm to 45.339 mm	38.3 mm to 38.339 mm
	Repair size	45.6 mm to 45.639 mm	38.6 mm to 38.639 mm

J: outside ø of valve seats

Initial	1st possibility	45.154 mm to 45.179 mm	38.160 mm to 38.185 mm
	2nd possibility	45.454 mm to 45.479 mm	38.460 mm to 38.485 mm
	Repair size	45.754 mm to 45.779 mm	38.760 mm to 38.785 mm

- Width of valve seat area ..... 2.5 mm
- Valves recessed below the cylinder head gasket face by ..... 0.7 mm to 0.9 mm
- K, recessed depth with reference to cylinder head gasket face ..... 1.4 mm to 1.7 mm
- The valve seats and guides are a shrink fit.

Valve springs :

Only one valve spring per valve

Direction of winding ..... right hand

Wire diameter ..... 4.5 mm

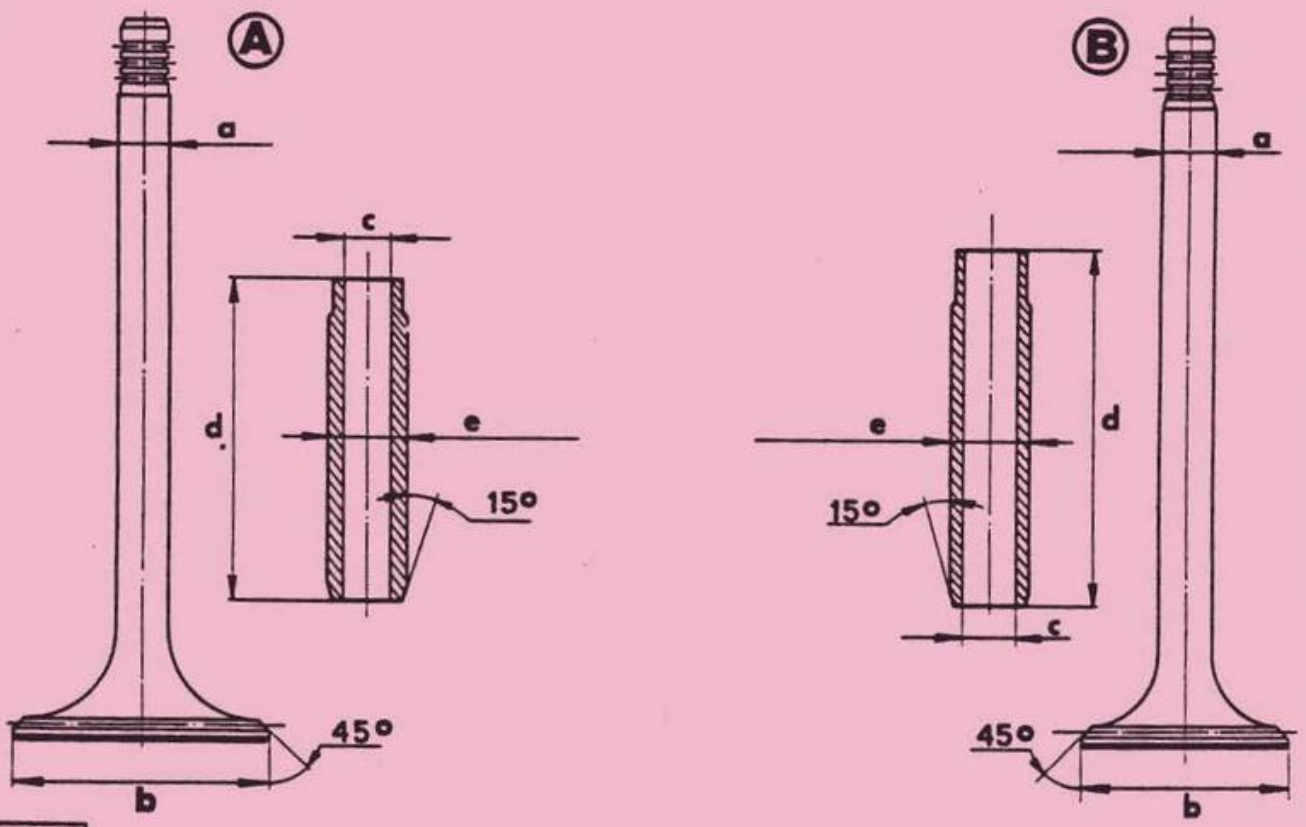
Inside diameter ..... 25.2 ± 0.2 mm

Total number of coils 6.5

Free height ..... 49.4 mm

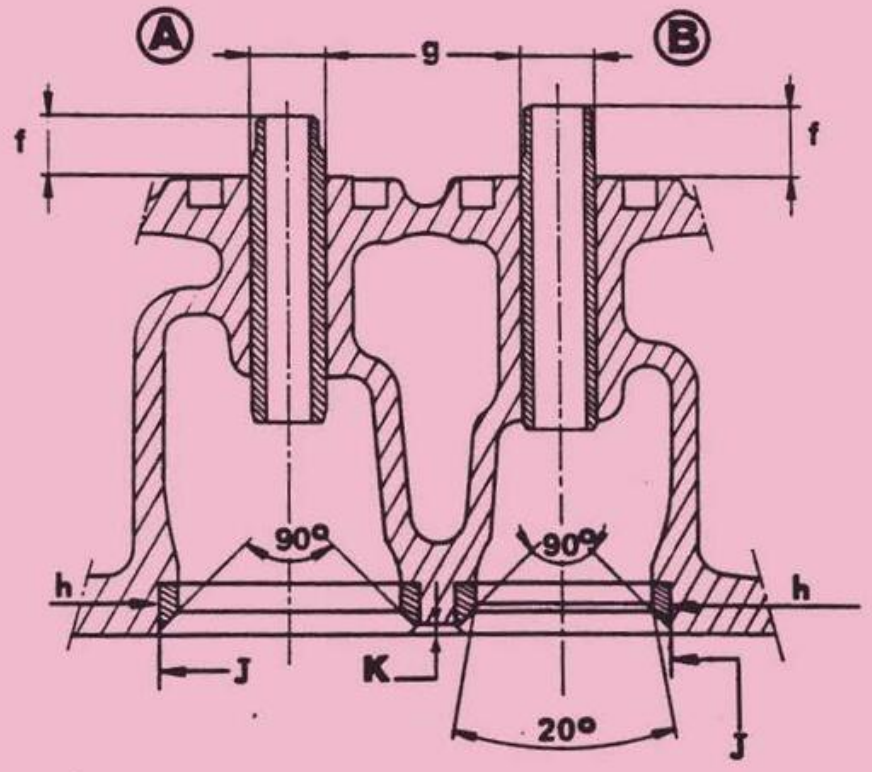
Height under a load of :

for
- 290 ± 21 Nm ..... 40.9 mm
- 710 ± 42 Nm ..... 30.9 mm



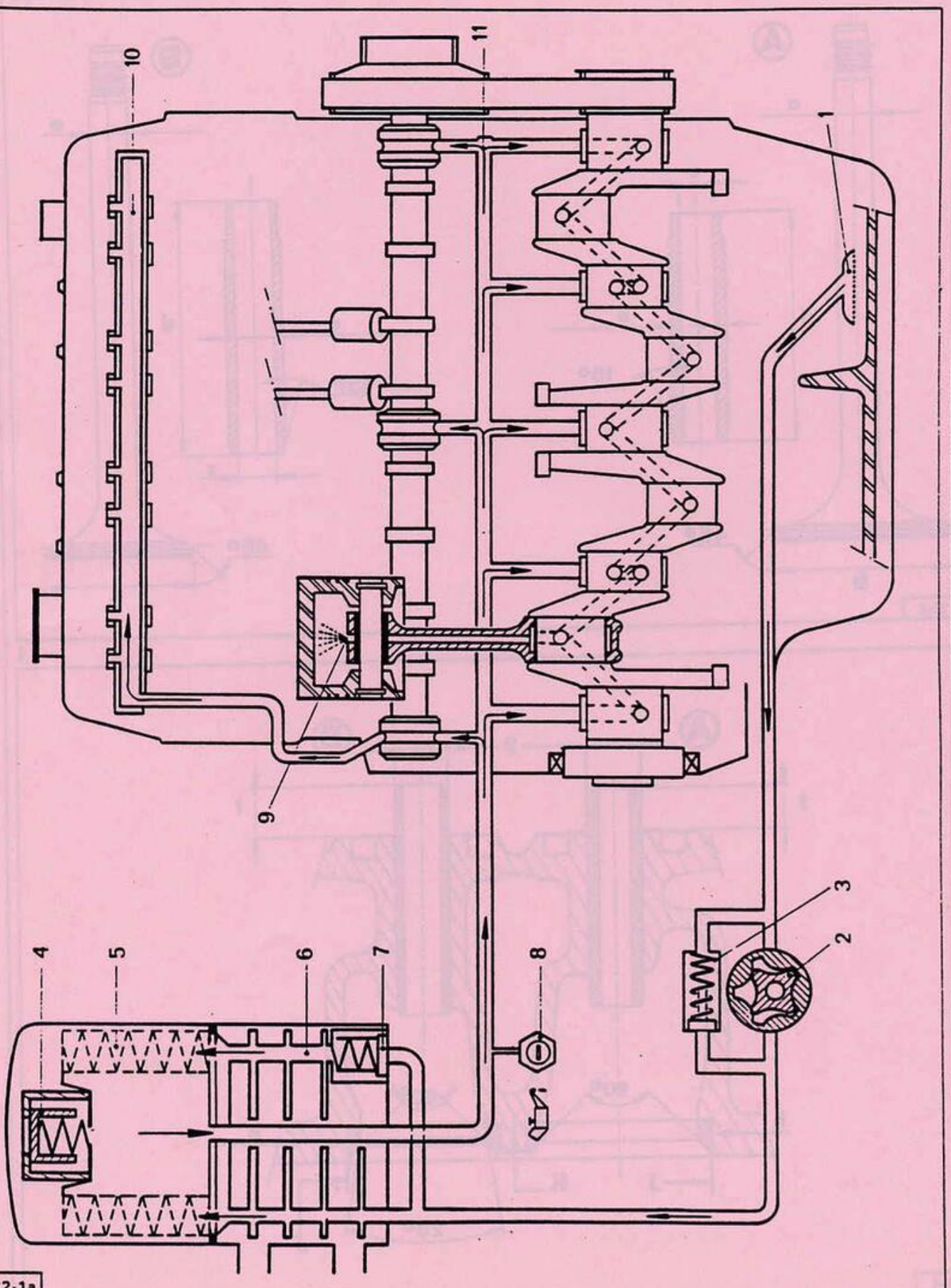
B. 12-5

I



B. 11-8

II



UT 22-1a

Lubrication system : Fig. I

1 - Suction strainer
2 - Oil pump ..... Driven by toothed belt
3 - Pressure relief valve ..... Integral with oil pump
4 - By-pass valve forming part of filter cartridge ..... 1.5 bars
5 - Filter cartridge ..... Purflux LS 483
6 - Oil cooler (heat exchanger) ..... Oil/water (Modine)
7 - By-pass (forming part of oil cooler) ..... 1 bar
8 - Oil pressure switch.
Oil pressure switch pressure setting :
When the pressure is rising : the warning light switches off when the pressure rises above 0.8 bars.
When the pressure is falling : the warning light switches on at between 0.6 and 0.4 bars.
9 - Cooling sprays for undersides of pistons.
10 - Rocker arm assembly.
11 - Oil distribution gallery.

Sump capacity	Engine no. date	→⇥ 1 GJ 06 06 18 61 →⇥ 7/86	⇤→ 1 GJ 06 06 18 62 ⇤→ 7/86
- After dismantling		5.8 L	6 L
- After draining and replacing the filter cartridge		4.7 L	5.6 L
- After draining		4.4 L	4.9 L
- Difference between min. and max. levels on dipstick		1 L	2.2 L

Oil pump

Driven by a toothed belt.

Pressure relief valve

An integral part of the oil pump

Oil pressures (oil at 95°C)

- at 1000 rpm : 2.5 bars
- at 3500 rpm : 4.5 to 5 bars

	Page
Engine data	A1.202
Tightening torques	A1.203
Data :	
- cylinder block	A1.205
- pistons	A1.205 - 206
- connecting rods	A1.206
- crankshaft	A1.209
- camshaft - timing gear - flywheel	A1.210
- cylinder head - precombustion chamber	A1.213
- valves - guides - seats	A1.214
- lubrication system	A1.217

DATA AND SPECIAL FEATURES
OF THE TYPE U25/673
(Toothed belt timing gear drive)

Engine

- Type (as marked on number plate) U25/673
- Configuration ..... Transverse, inclined forward at 23°
- French taxable horse power ..... 10 HP
- Direction of rotation ..... Left hand (anti-clockwise as seen from flywheel)
- Bore ..... 93 mm
- Stroke ..... 92 mm
- Capacity ..... 2.5 litres
- Compression ratio 21/1
- Injection order 1-3-4-2
- Max. power ..... ISO : 70 kW at 3,700 rpm
  DIN : 95 hp at 3,700 rpm
- Max. torque ..... ISO : 216 N.m (159 lbf.ft) at 2,000 rpm
  DIN : 22 mkg at 2,000 rpm
- Idling speed ..... 800 ± 25 rpm
- Governed speed empty ..... 4,600 ± 150 rpm
- Min. cut-off speed, under load ..... 3,900 rpm

Lubrication

- Pressure lubrication system fed by an « Eaton » type pump driven by a toothed belt.
- External cartridge type filter (bypass valve set at 1.5 bars).
- Coolant/oil heat exchanger type oil cooler (valve set at 1 bar).

- ROTO-DIESEL injection pump type MAS 100 Reference R 8443 B 123 B
- Direction of rotation : right hand (Seen from timing gear).
- Injectors : ROTO-Diesel pintle type.
- Fuel : diesel oil.
- Fuel filter of the replaceable element type with priming pump. From 87 model water detector.
- Air filter of the replaceable dry element type.
- Diesel oil heater : on engine cooling system at end of cylinder head right hand side.

Timing gear

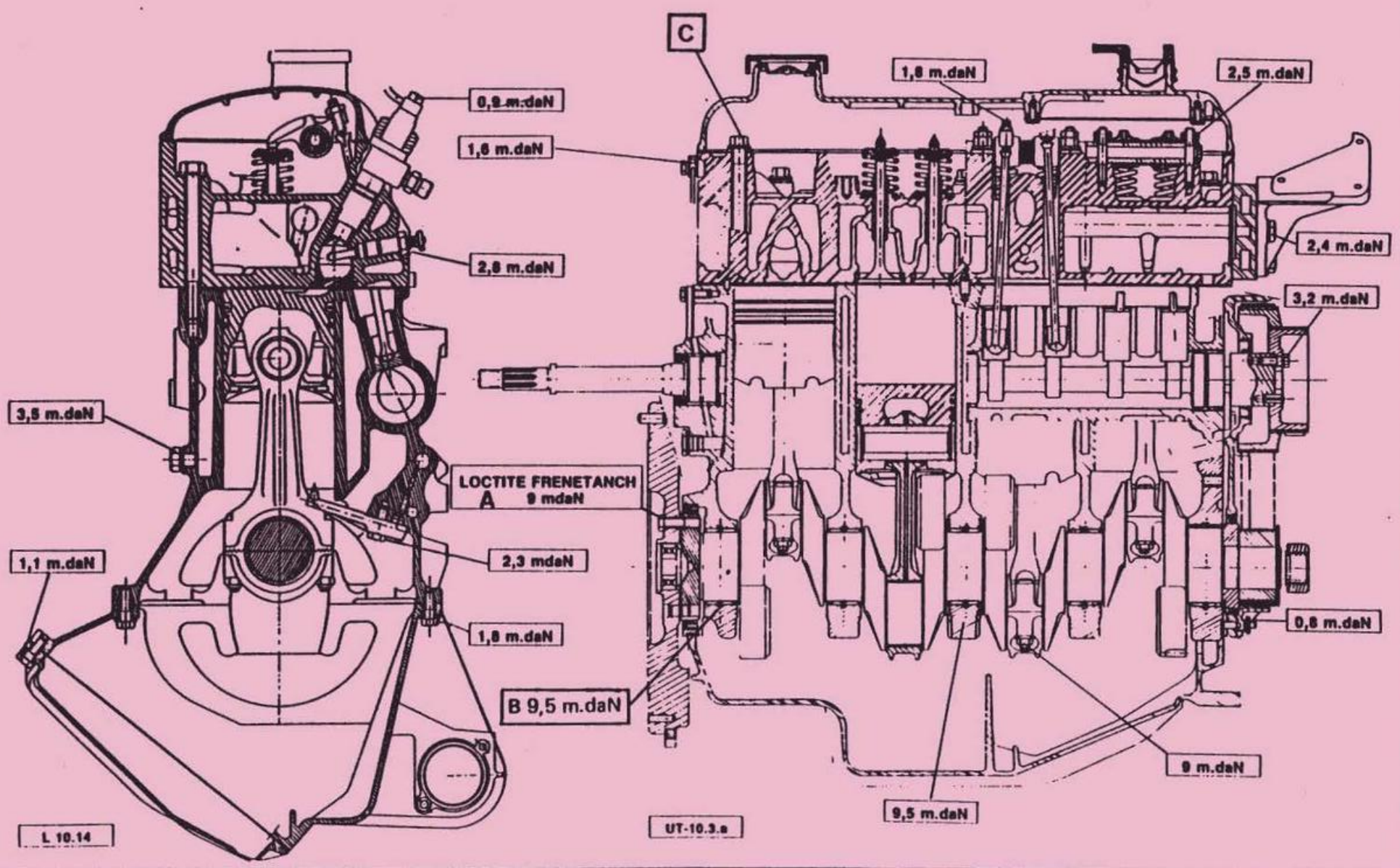
Side mounted camshaft driven by a toothed belt.

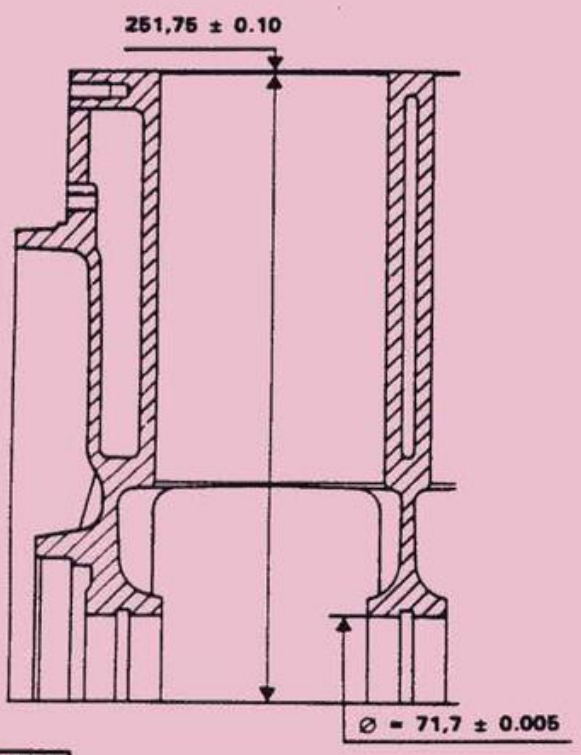
Tightening torques — Torques in N.m (lbf.ft)

A - Flywheel securing bolts (to be replaced each time they are removed) and coated with LOCTITE FRENETANCH compound before fitting ..... 90 N.m (66.4 lbf.ft)

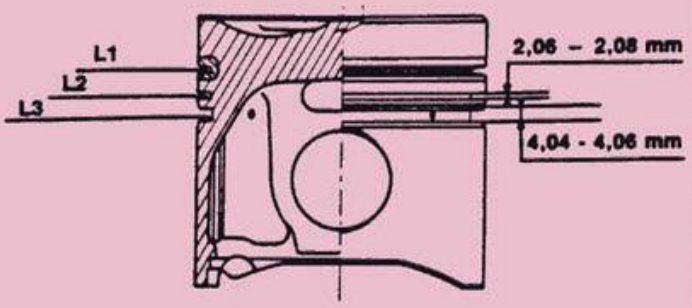
B - Bearing cap bolts (to be replaced each time they are removed) ..... 95 N.m (70.1 lbf.ft)

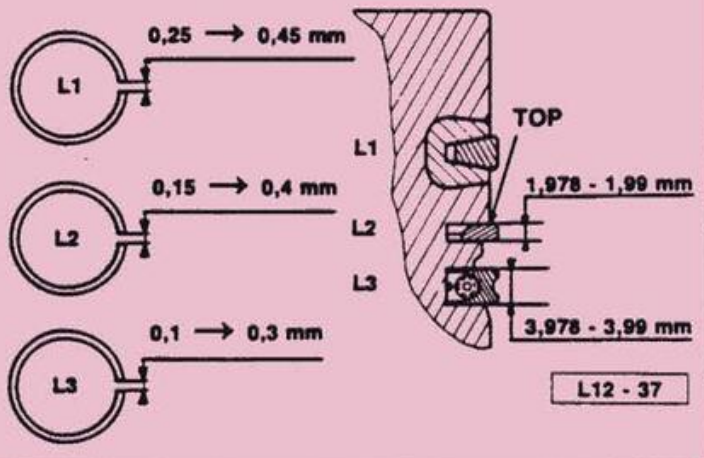
C - Cylinder head securing bolts : These bolts, together with the toothed washers, must be replaced by new ones each time the cylinder head is removed (for tightening operations see page A1.213).


C
0,9 m.daN
1,6 m.daN
2,8 m.daN
3,5 m.daN
LOCTITE FRENETANCH
A 9 mdaN
2,3 mdaN
1,1 m.daN
1,8 m.daN
B 9,5 m.daN
L 10.14
1,8 m.daN
2,5 m.daN
2,4 m.daN
3,2 m.daN
0,8 m.daN
9 m.daN
9,5 m.daN
UT-10.3.a



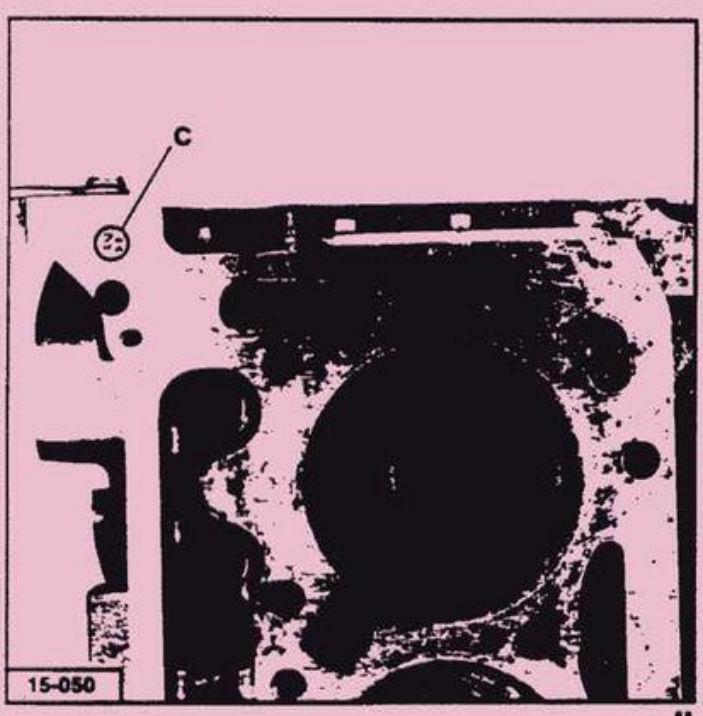
B 12-15 b





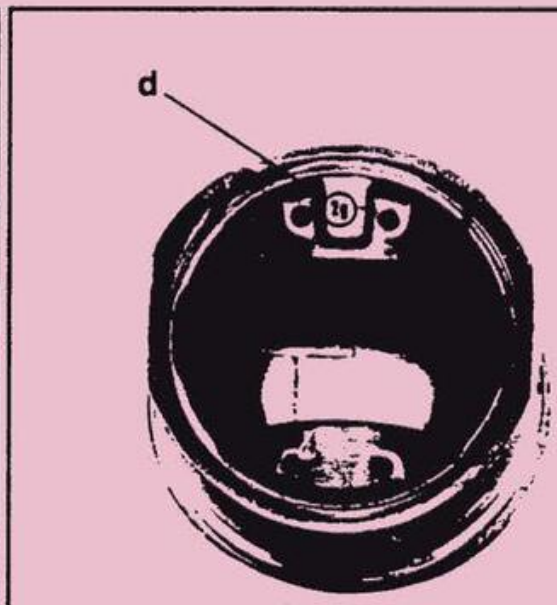
L12 - 37

I



15-050

II



15-045

III

Piston rings : Fig. I
- Make GOETZE.
- The inscription engraved on the upper face of the ring must point towards the piston crown.

1 - Upper compression ring made from cast iron coated with molybdenum.
2 - Compression/scraper ring (reference TOP « a » and chamfer « b » pointing towards the piston crown).
3 - Oil control ring (the gap in the expander (4) must be at 180° to the gap in the oil control ring (3)).
Nominal diameter 93 mm.

Ring gaps :
- Upper compression ring ..... 0.20 mm to 0.45 mm
- Compression/scraper ring ..... 0.15 mm to 0.40 mm
- Oil control ring ..... 0.10 mm to 0.30 mm

Connecting rods Fig. II
- End float (non-adjustable) ..... 0.037 mm to 2.47 mm
- c : small-end ø ..... 32.014 mm to 32.020 mm
- e : big-end ø ..... Class 1 : 57.675 mm to 57.685 mm
  Class 2 : 57.685 mm to 57.695 mm

X - Connecting rod class reference (1 or 2)
d - Big-end to small-end between centres dimension ..... 154 ± 0.05 mm
- Maximum weight difference between any two connecting rods one given engine ..... 7 g

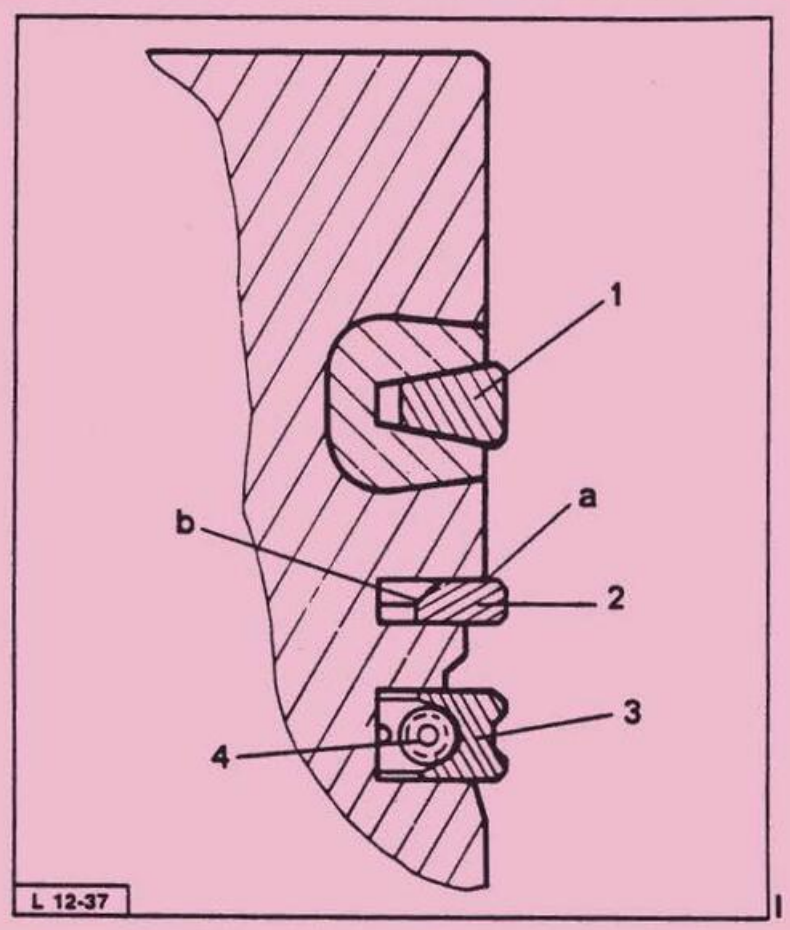
The parts Department supplies connecting rods in sets of four (class 1).

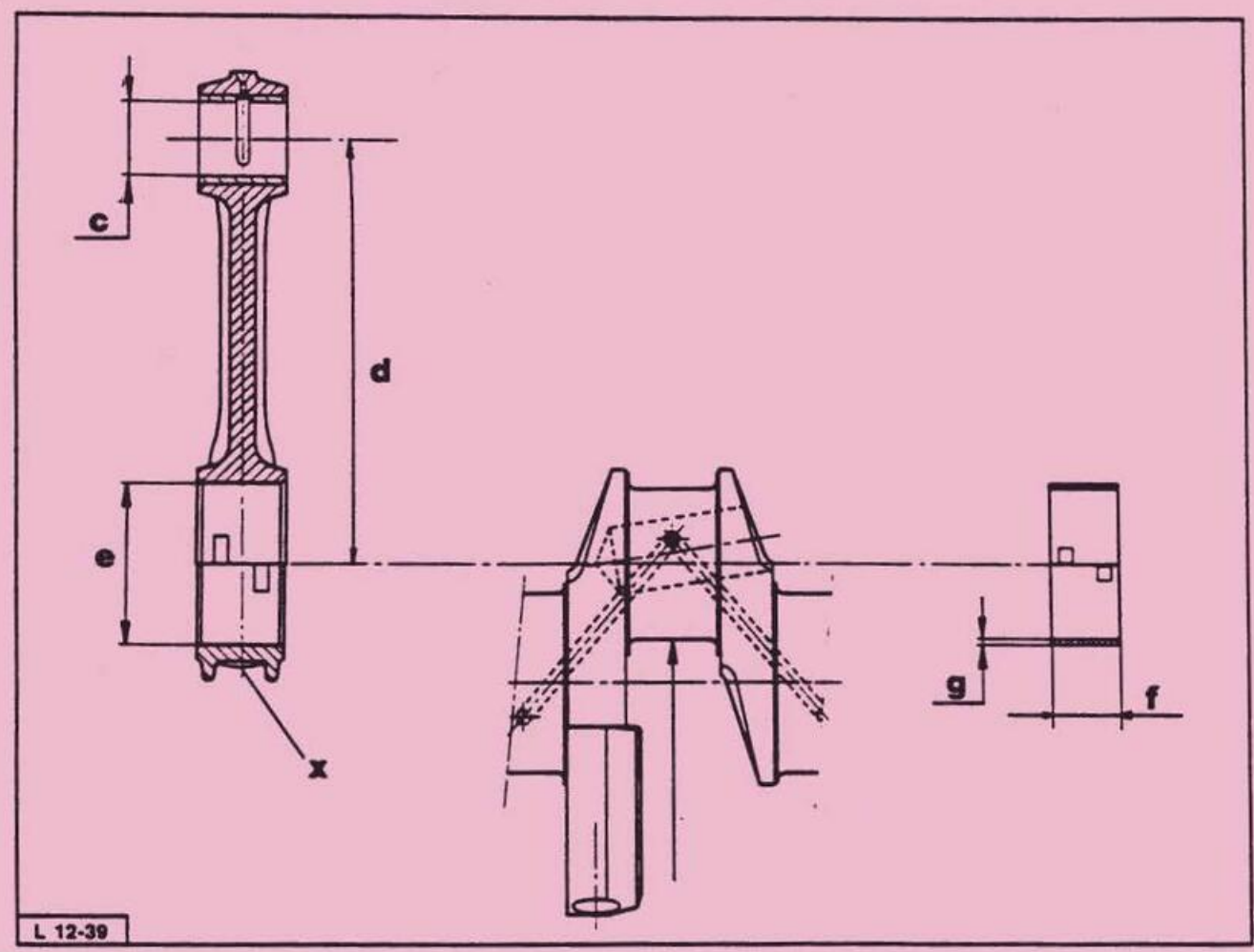
Big-end shells (big-end bearings) :
- Connecting rod big-end-crankshaft operating clearance ..... 0.029 mm to 0.074 mm

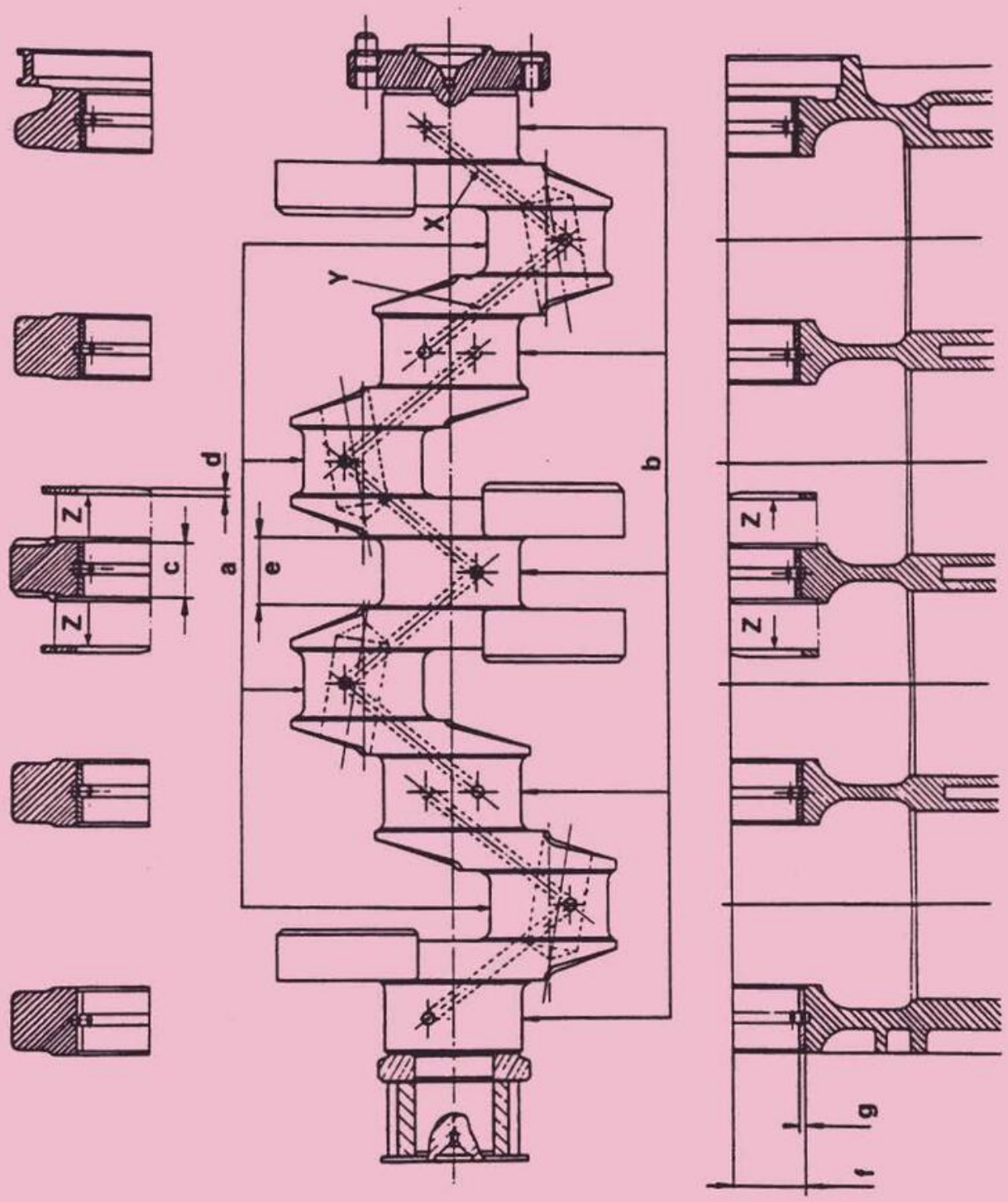
f - Width of big-end shell
g - Thickness of big-end shell
- Position of piston-connecting rod assembly on engine :

Recess (clover leaf) in piston : on camshaft side.

Crankshaft	Connecting rods	Thickness in mm
Initial Class A	Class I	1.816 to 1.826
	Class II	1.821 to 1.831
Initial Class B Repair size	Class I	1.941 to 1.951
	Class II	1.946 to 1.956


1
a
b
2
3
4
L 12-37
I


c
d
e
x
g
f
L 12-39
II


X
Y
d
b
z
c
z
a
e
z
z
g
f

Crankshaft : Fig. I

a - Crank pins

Initial	Class A : ø = 53.99 mm to 54.005 mm
	Class B : ø = 53.740 mm to 53.755 mm

b - Main bearing journals

Initial	Class A : ø = 67.035 mm to 67.05 mm
	Class B : ø = 66.785 mm to 66.8 mm
Repair size	: ø = 66.535 mm to 66.55 mm

e - Width of centre main bearing journal :
33.995 mm to 34.10 mm
X - Journal class reference
Y - Crank pin class reference
Possible initial size class arrangements :

- AA
- AB
- BA
- BB

Example on a given crankshaft :
- Crank pin class = A
- Main bearing class = B

References stamped on crankshaft :
- at y = A
- at x = B

= AB

Crankshaft end float (adjustable) : ..... 0.045 mm to 0.16 mm
The main bearing at the flywheel end is sealed by :
- an oil throw-back ring on the crankshaft
- a seal (red) with a grooved lip.

The Parts Department only supplies one type of crankshaft, class AA.

Main bearing shells :

c - Width of shell ..... 28.45 mm to 28.7 mm

f - ø in block ..... 71.695 mm to 71.705 mm

g - Thickness of bearing shell .....
- Class A ..... 2.306 mm to 2.312 mm
- Class B ..... 2.431 mm to 2.437 mm
- Repair size ..... 2.555 mm to 2.563 mm

Clearance between bearing shells and crankshaft ..... 0.021 to 0.058 mm

End float flanges :

d - Thickness of flanges
(the flanges on any given side of the bearing must be of the same thickness) ..
- . . 3.10 mm
- . . 3.14 mm
- . . 3.18 mm
- . . 3.22 mm

Z - Class reference
- Antifriction face against the crankshaft.

Camshaft :
End float (non-adjustable) ..... 0.05 mm to 0.36 mm
Thickness of flange ..... 5.41 mm

Cam lift :
- Inlet and exhaust ..... 6.83 ± 0.02 mm

Timing gear : toothed belt drive
The belt is tensioned by a tensioner roller
(To adjust the tension, use special tool (-).0157)

Clearance between rocker arm and valve (when checking the timing diagram)
- Inlet and exhaust : ..... 1 mm

Timing diagram (as seen from flywheel) : Fig. I
A - Top dead centre (T.D.C.)
B - Inlet opens after T.D.C. : ..... 2°52'
C - Exhaust closes before T.D.C. : ..... 4°12'
D - Inlet closes after B.D.C. : ..... 33°08'
E - Exhaust opens before B.D.C. : ..... 37°48'
F - Bottom dead centre (B.D.C.)

Actual valve clearances (on a cold engine)

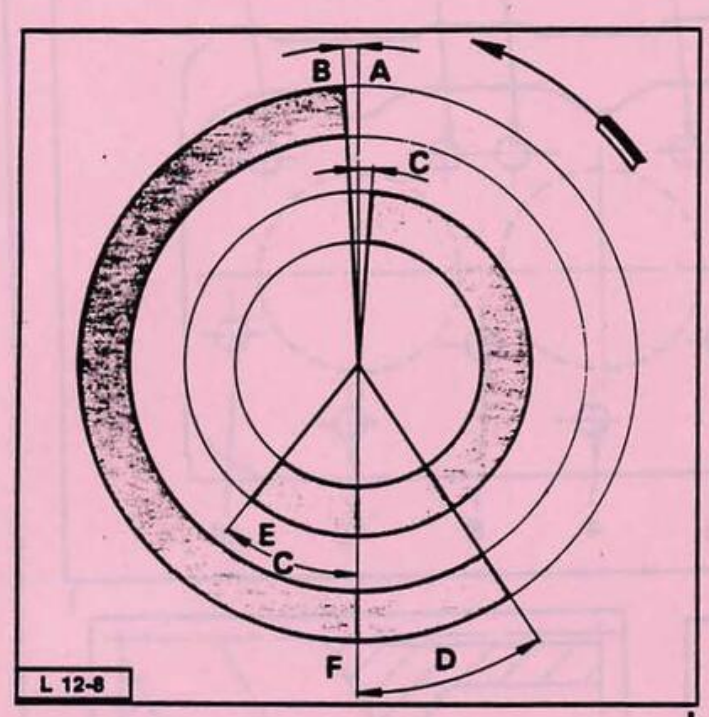
Inlet	Exhaust
0.30 mm	0.20 mm

Flywheel
Injection point timing mark engraved on flywheel (Fig. II)

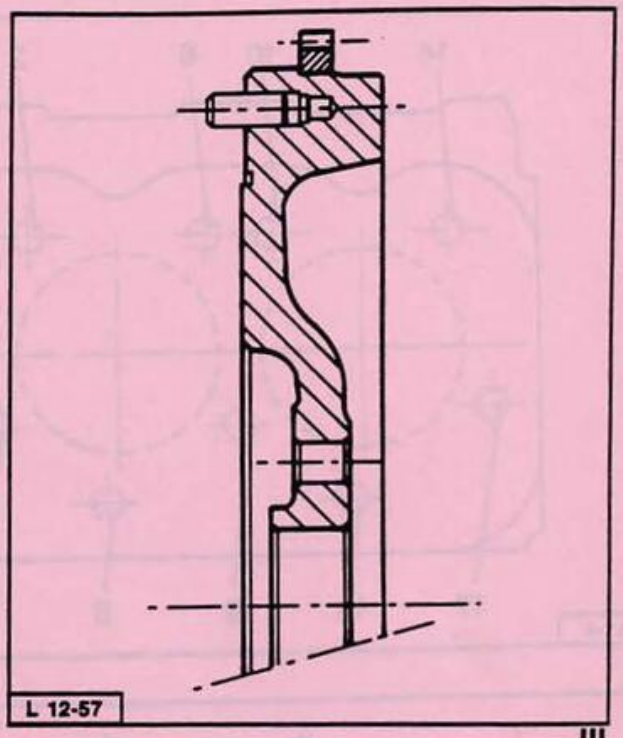
Fig. IV
a - ..... 1.5 mm max.
b - Essential difference between locating faces on the disc and clutch unit . $0.5 \begin{smallmatrix}+0\\-0.15\end{smallmatrix}$ mm
c - ..... $28 \begin{smallmatrix}+0.2\\-0\end{smallmatrix}$ mm
after refacing ..... 27.7 mm mini
d - ..... $243 \begin{smallmatrix}+1\\-0\end{smallmatrix}$ mm
e - ..... 248 mm max.

- Starter ring gear with 120 teeth (no lead) (the unmachined side against the flywheel face)

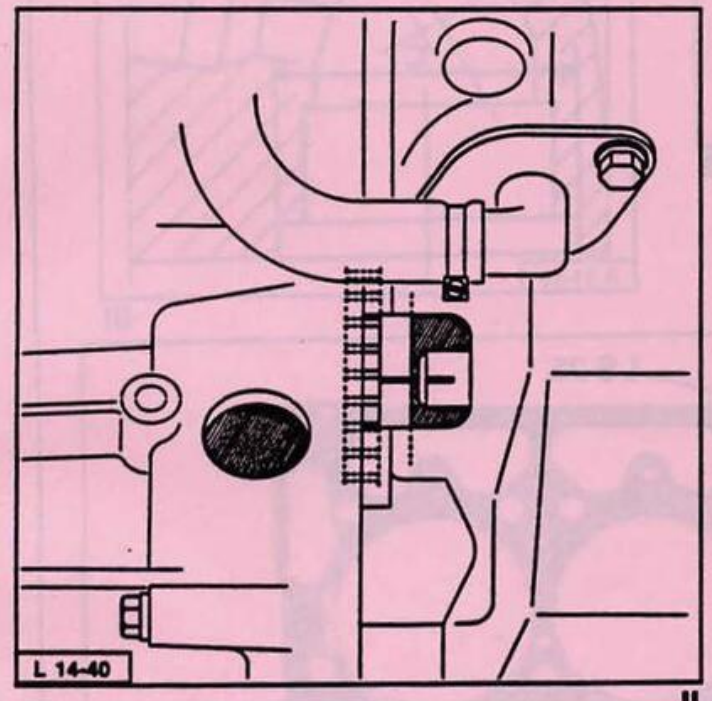
Push rods :
- Length of push rods (inlet and exhaust identical) ..... 180 ± 0.3 mm
- Max. push rod run-out ..... 1 mm



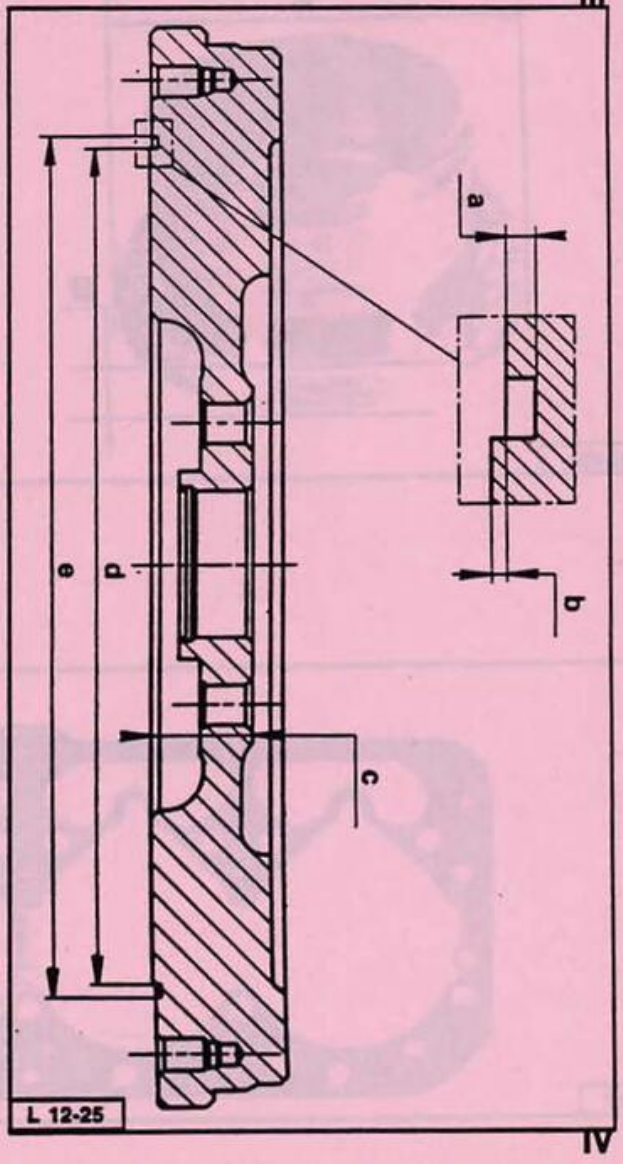
I



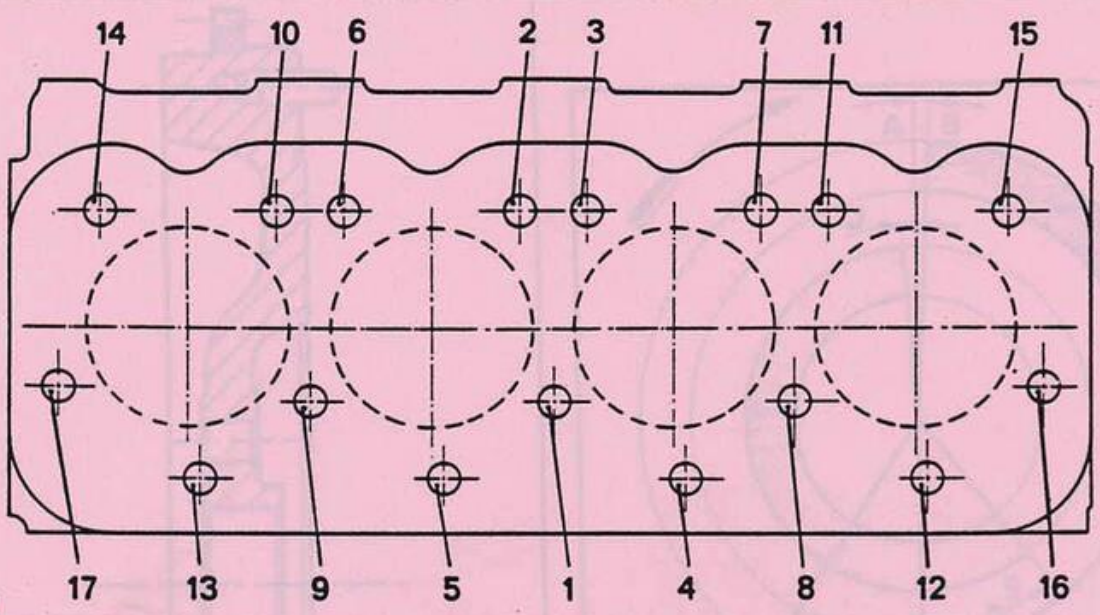
III



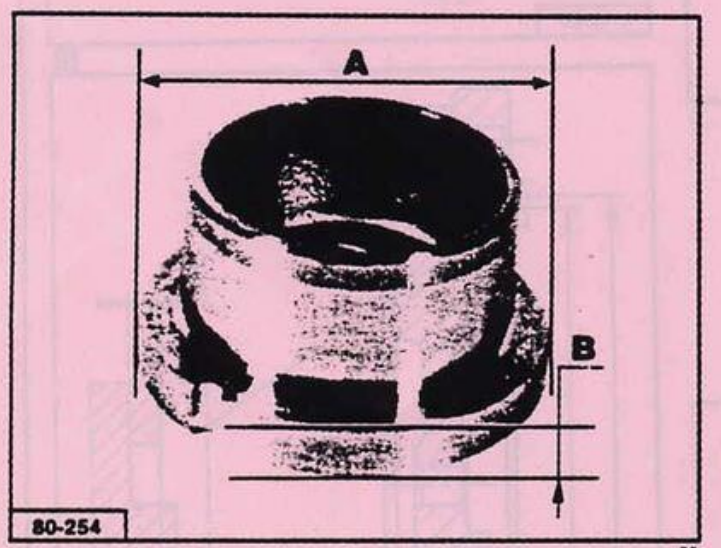
II



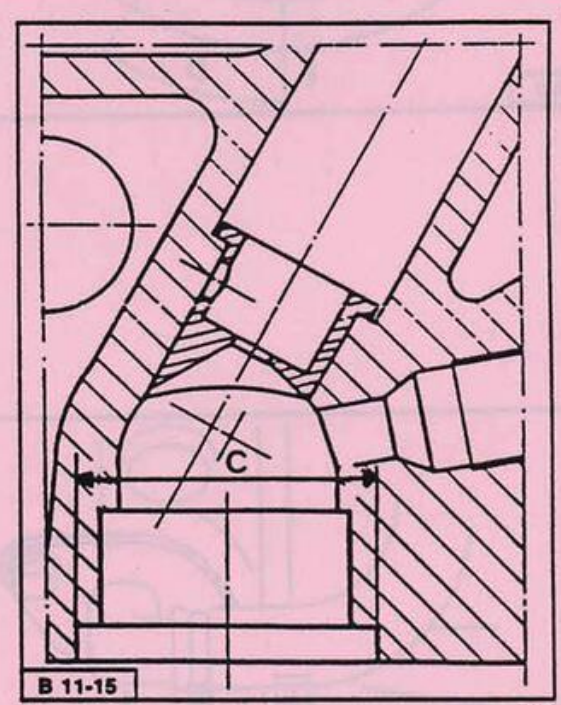
IV


14
10
6
2
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7
11
15
17
13
9
5
1
4
8
12
16
B 11-4

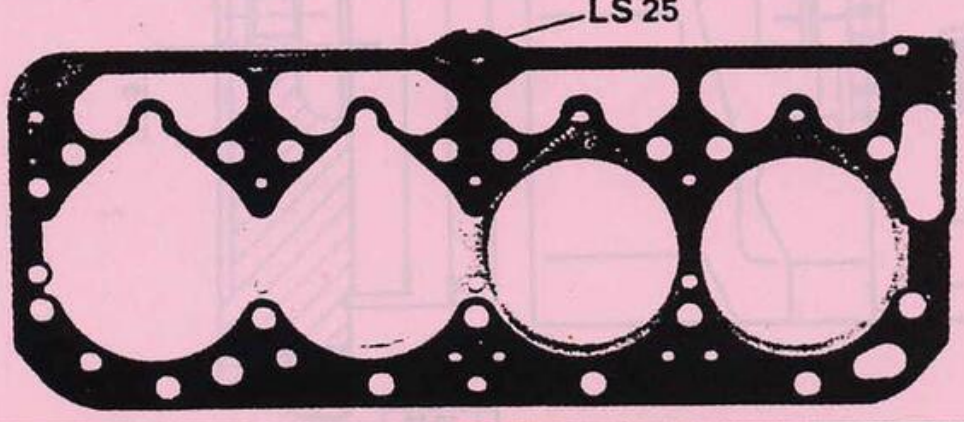
I


A
B
80-254

II


C
B 11-15

III


LS 25
87-127

IV

Cylinder head

For cylinder head tightening order see Fig. I.

Tightening : (follow the conventional tightening order). The underhead faces and the threads of the bolts are to be oiled.
The teeth on the washers are to be against the cylinder head.

1	⇨	2	⇨	3	⇨	⇨	4
initially tighten to a torque of 40 N.m (29.5 lbf.ft)		tighten through an angle of 100°		tighten through an angle of 100°			tighten through an angle of 45°

warm up the engine until the electric fans cut in then LEAVE TO COOL DOWN (for a min. of 3 hours)

There is no cylinder head retightening operation at 1000/1500 miles (1500/2500 km)

Original height ..... $117 \begin{smallmatrix}+0.5\\-0\end{smallmatrix}$ mm
Minimum height after refacing ..... 116.3 mm
Maximum permissible cylinder head bow ..... 0.1 mm
Maximum permissible bow between securing holes ..... 0.025 mm

Precombustion chambers Fig. II and III.

	A : Precombustion chamber ø $\begin{smallmatrix}0\\-0,02\end{smallmatrix}$	B : Thickness of flange ± 0,05	C : ø of cylinder head location $\begin{smallmatrix}+0,025\\0\end{smallmatrix}$
Initial	35,950 36,065 36,365	4,5	35,885 36 36,3
1st possibility	36,365	4,85	36,3
2nd possibility	36,465	5,05	36,4

The precombustion chambers are fitted with an interference fit of between 0.02 mm and 0.065 mm.
The precombustion chambers protrude above the cylinder head gasket face by : 0 to 0.03 mm.
After replacing the precombustion chambers, measure the protrusion after a load of 3000 mdaN has been applied per combustion chamber.
The combustion chamber positioning pins are recessed below the surface by 0 to 1 mm.
Preheater plug screw thread ..... M 12 x 1.25
- Cylinder head with a tapping for a temperature sensor which controls the fast idling.
- Cylinder head gasket : made by REINZ with a viton ring Fig. IV.
  The gasket is fitted dry.

Identification mark (engraved on the gasket tab) : Fig. IV ..... LS 25
- Rocker arm cover :
  The oil vapour is recycled via the rocker arm cover.

Valves-guides-seats : Fig. I and II

Height of valves ..... 121.3 ± 0.35 mm

	A : Inlet	B : Exhaust
a: valve stem ø	7.960 to 7.975 mm	8.940 to 8.955 mm
b: valve head ø	41.85 to 42.15 mm	34.85 to 35.15 mm
c: valve guide inside ø	7.990 to 8.015 mm	8.980 to 9.005 mm
d: height of valve guide	53.75 to 54.25 mm	56.75 to 57.25 mm

e: outside ø of valve guide

Initial
- 1st possibility ..... 13.055 mm to 13.075 mm
- 2nd possibility ..... 13.305 mm to 13.325 mm

Repair size ..... 13.555 mm to 13.575 mm

f: height by which the guide projects	9.9 mm to 11.4 mm	11.9 mm to 13.4 mm

g: guide locating bore in cylinder head

Initial
- 1st possibility ..... 13.003 mm to 13.023 mm
- 2nd possibility ..... 13.253 mm to 13.273 mm

Repair size ..... 13.503 mm to 13.523 mm

h: valve seat bore

		A : Inlet	B : Exhaust
Initial	1st possibility	45 mm to 45.039 mm	38 mm to 38.039 mm
	2nd possibility	45.3 mm to 45.339 mm	38.3 mm to 38.339 mm
Repair size		45.6 mm to 45.639 mm	38.6 mm to 38.639 mm

J: outside ø of valve seats

		A : Inlet	B : Exhaust
Initial	1st possibility	45.154 mm to 45.179 mm	38.160 mm to 38.185 mm
	2nd possibility	45.454 mm to 45.479 mm	38.460 mm to 38.485 mm
Repair size		45.754 mm to 45.779 mm	38.760 mm to 38.785 mm

- Width of valve seat area ..... 2.5 mm
- Valves recessed below the cylinder head gasket face by ..... 0.7 mm to 0.9 mm
- K, recessed depth with reference to cylinder head gasket face ..... 1.4 mm to 1.7 mm
- The valve seats and guides are a shrink fit.

Valve springs :

Only one valve spring per valve

Direction of winding ..... right hand

Wire diameter ..... 4.5 mm

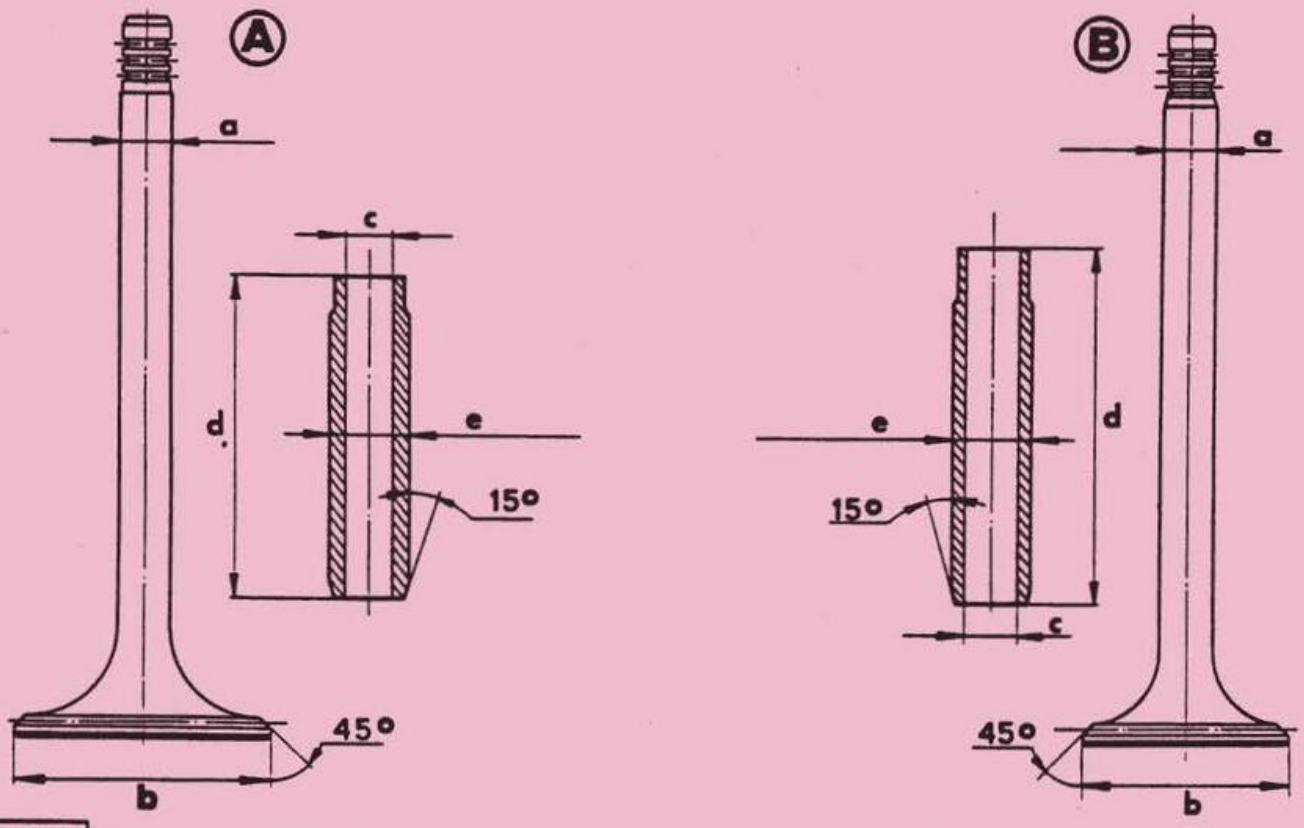
Inside diameter ..... 25.2 ± 0.2 mm

Total number of coils 6.5

Free height ..... 49.4 mm

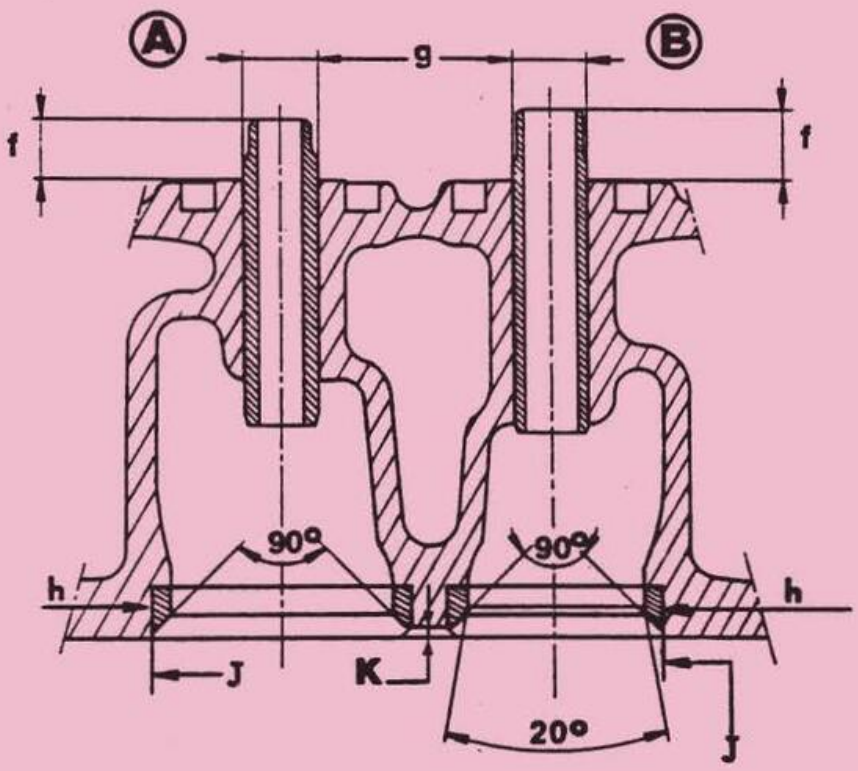
Height under a load of :

for
- 290 ± 21 Nm ..... 40.9 mm
- 710 ± 42 Nm ..... 30.9 mm



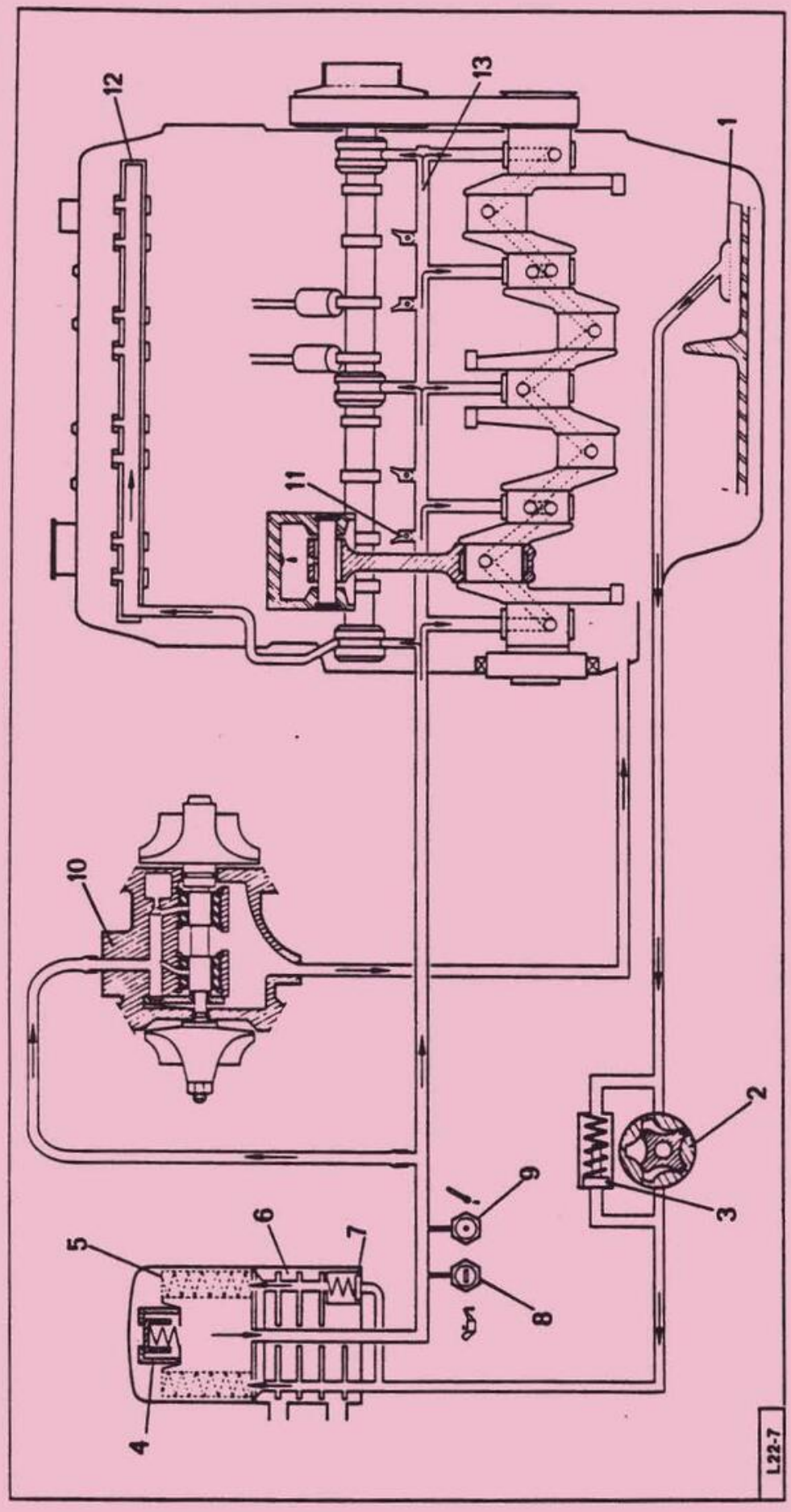
B. 12-5

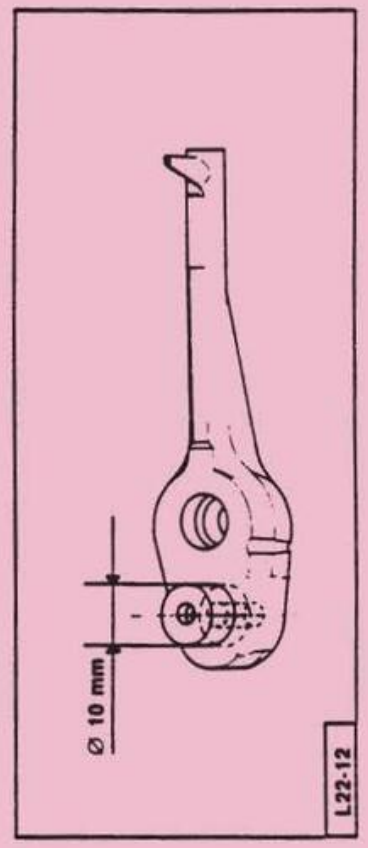
I



B. 11-8

II


12
13
1
11
10
2
3
9
6
5
7
8
4
L22-7


Ø 10 mm
L22-12

Lubrication system : Fig. I

1 - Suction strainer
2 - Oil pump, driven by toothed belt
3 - Pressure relief valve, integral with oil pump
4 - By-pass valve forming part of filter cartridge ..... 1.5 bars
5 - Filter cartridge ..... PURFLUX LS 520 C
6 - Oil cooler (heat exchanger) ..... Oil/water (Modine)
7 - By-pass, forming part of oil cooler ..... 1 bar
8 - Oil pressure switch.
Oil pressure switch pressure setting :
When the pressure is rising : the warning light switches off when the pressure rises above 0.8 bars.
When the pressure is falling : the warning light switches on at between 0.6 and 0.4 bars.
9 - Oil temperature warning light switch
10 - Turbo, bearing lubrication
11 - Cooling sprays for undersides of pistons Fig. II
12 - Rocker arm assembly.
13 - Oil distribution gallery.

SUMP CAPACITY

After dismantling ..... 6 lit.

After draining and replacing the filter cartridge ..... 5.6 lit.

After draining ..... 4.9 lit.

Difference between min. and max. levels on dipstick ..... 2.2 lit.

OIL PUMP (oil at 95°)

At idling speed ..... 2.5 bars min.

At 3700 rpm ..... 4.2 to 5 bars

Engine code (official type no.)	XUD9A (D9B)	
Configuration	Transverse, inclined at 30° towards the rear	
Number of cylinders	4 in line	
Bore x stroke	83 x 88 mm	
Capacity	1905 cm³	
Compression ratio	23/1	
Maximum power	51 kw EEC/70 hp DIN	
At a speed of	4600 rpm	
Maximum torque :	120 N.m (88.5 lbf.ft) EEC/12.2 m.kg DIN	
At a speed of	2000 rpm	
Maximum speed :		
no load	5150 rpm	
under load	4600 rpm	
Idling speed	800 rpm	
Lubrication :		
Capacity (with filter)	5 litres	
Oil filter	LS468	
Injection equipment	ROTO DIESEL	BOSCH
Injection pump	R8443B380A R8443B381B	VE4/9F2300R272
Injector holders	LCR67307	KCA17S42
Injector nozzles	RDN0SDC6751C	DN0SD287 +
Opening pressure	110/120 bars	130/135 bars

Valve timing

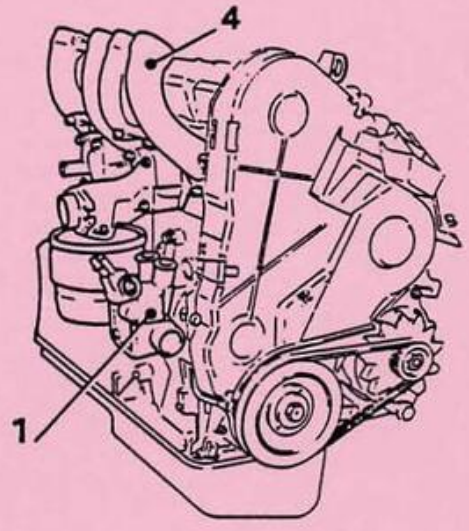
Overhead camshaft driven by a toothed belt

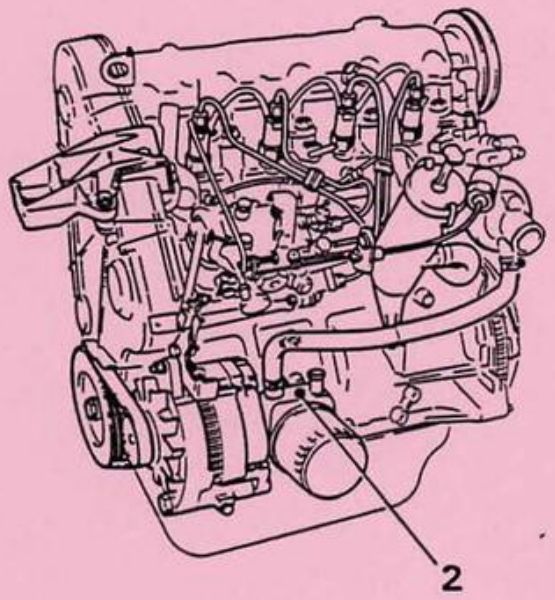
Timing diagram without initial clearance :

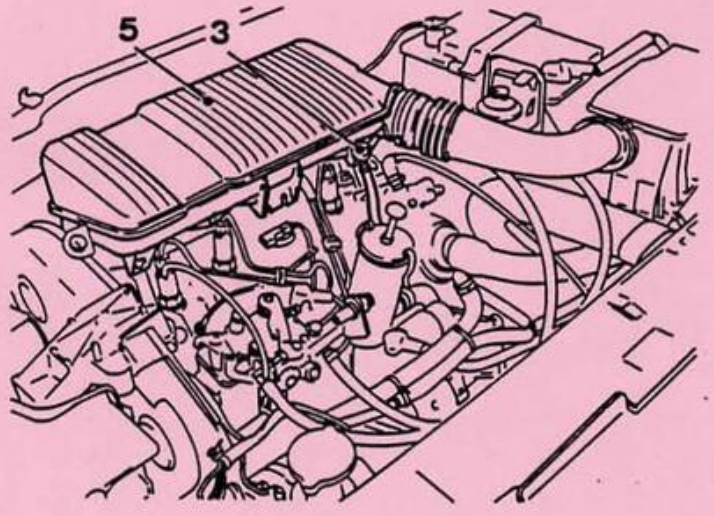
Advance on inlet opening	44°30'
Retard on inlet closing	83°30'
Advance on exhaust opening	89°30'
Retard on exhaust closing	46°30'

SPECIAL POINTS

- A fuel heater (1) with a thermostatic element integral with the water inlet casing.
- Oil cooler (modine) (2) under the oil filter.
- Crank case gas reintake system with a vacuum regulator unit (3).
- Air intake system comprising an inlet manifold (4) with separate ducting and air distributor (5).


4
1


2


5
3

SPECIAL TOOLS

[A] Sling for removing and refitting the engine-gearbox assembly
Reference : (-).0102 ZX + (-).0102 G

[B] Hub locking tool
Reference : (-).0606 AY

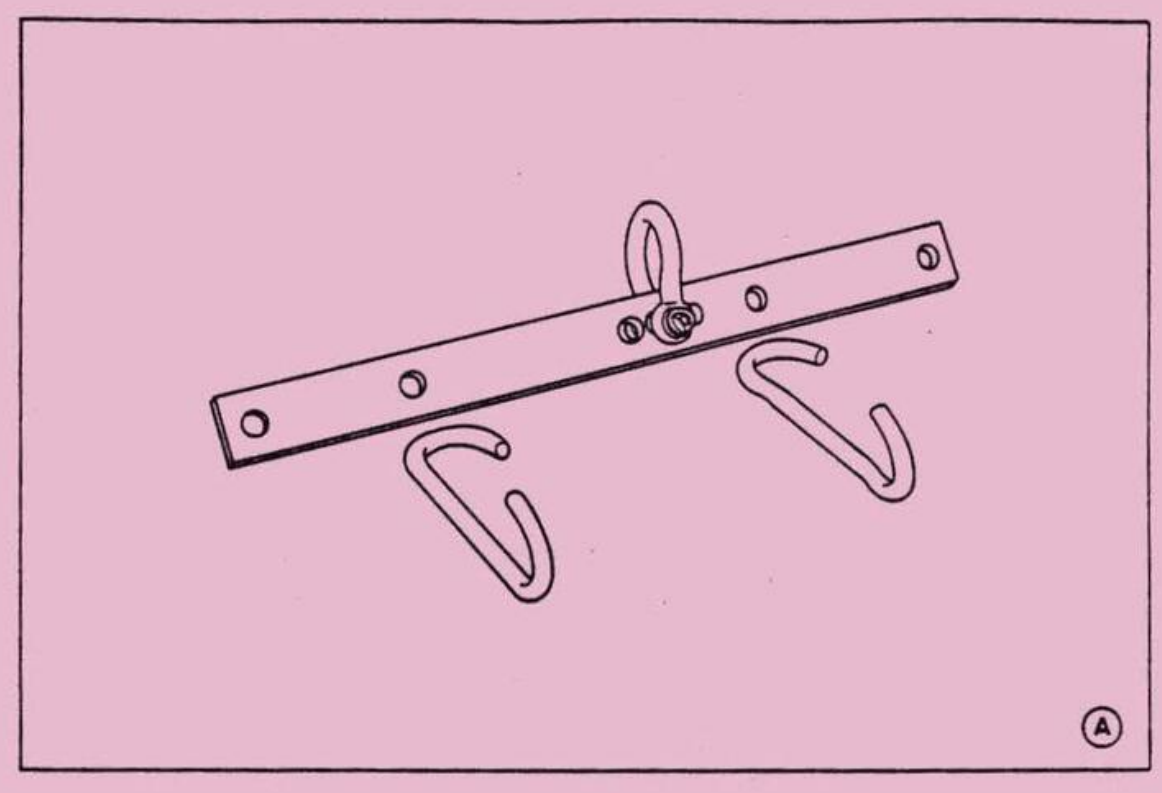
[C] FACOM extractor
Reference : U53 S2 + T2

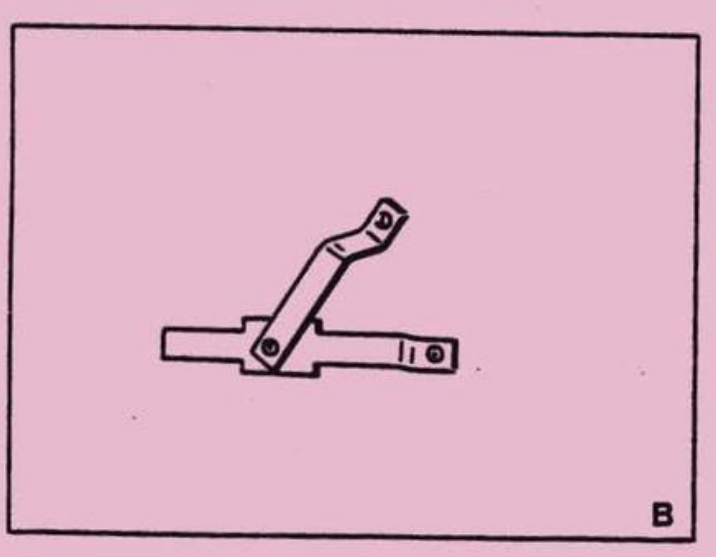
TIGHTENING TORQUES

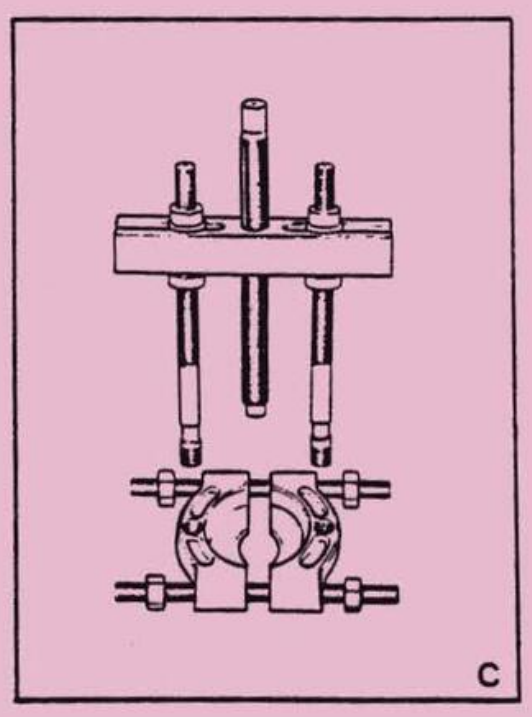
Tightening torque that must be observed (using a torque wrench) :	Torque in N.m (lbf.ft)
Nut securing the drive shaft to the stub axle carrier (LOCTITE FRENBLOC)	500 (369)

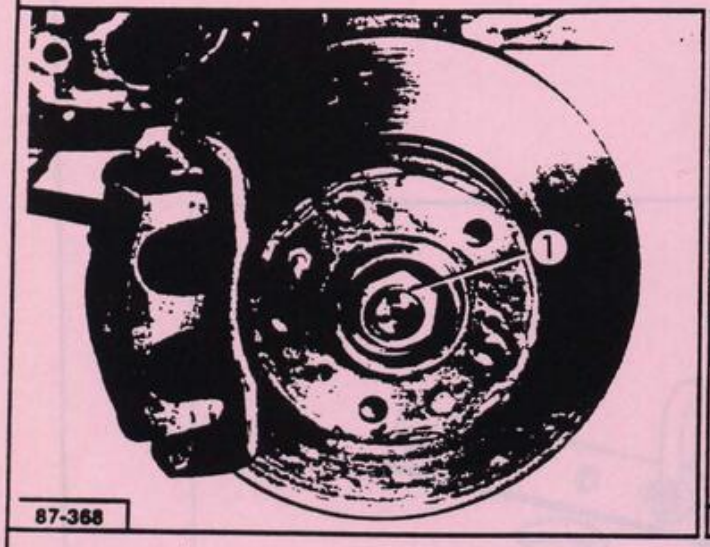
Recommended tightening torques :

Engine mounting flange securing bolts (cylinder block side)	50 (36.9)
Engine mounting securing bolts (gearbox side)	50 (36.9)
NYLSTOP nuts on engine - gearbox flexible mounting	55 (40.6)
Flexible block securing bolts (differential side)	55 (40.6)


A


B


C



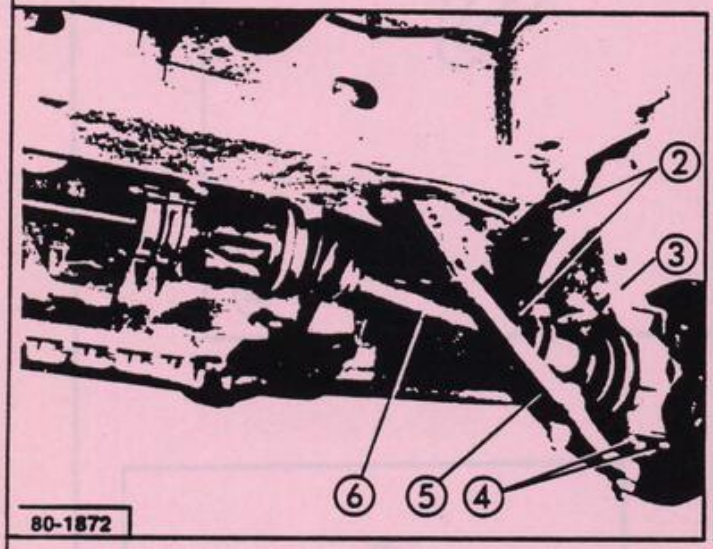
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V



VI



II



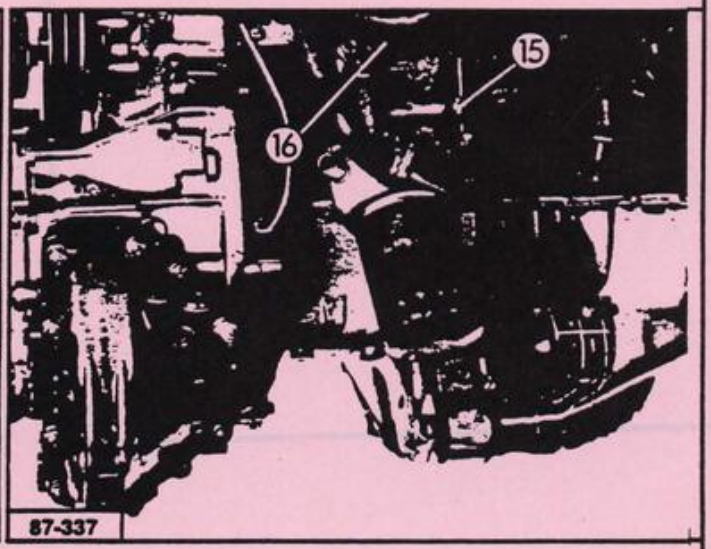
VII



III



IV



VIII

REMOVING

Disconnect

- The negative and positive battery cables
- Remove the spare wheel.

Support the front of the vehicle (with the wheels hanging free)

- Remove the wheels if necessary.

Remove the drive shaft on the right hand side (fig. I)

- Remove the protective cap which covers the nut (1) (nut 41 mm across flats).

> If the protective cap is to be refitted to the hub, the wheel will have to be removed to extract it using tool FACOM U 53 T2 (see section entitled : working on the rear hubs).

- Unlock the drive shaft nut (1) and remove it (lock the hub using the tool (-).0606 AY.
- Remove the bolts (4) from the lower ball joint (Fig. II and III) together with the bolts (2) on the steering lever.
- Free the ball joint from the stub axle carrier by pressing down the suspension arm (5).
- Tilt the suspension leg assembly (3) outwards.
- Free the drive shaft (6) from the hub.
- Loosen the nuts (7) and swing the two tie rods (8) out of the way Fig. III and IV.

Remove, Fig. IV

- The drive shaft
- The 0 ring (9)
- The teflon ring (10)
- The anti-dust seal (11)

Free the left hand drive shaft.

> It is not necessary to free the drive shaft from the hub to disconnect it from the gearbox.

Remove, Fig. V

The bolts (13) from the lower ball joint and the bolts (12) from the steering lever.

Free the ball joint from the stub axle carrier by pressing on the suspension arm.

Tilt the suspension leg assembly outwards.

Extract the drive shaft from the differential housing using a panel beaters drift (the drive shaft is retained, in the differential side wheel by a circlip (14)) Fig. VI.
Place the panel beaters drift between one of the differential housing bolts and the drive shaft casing then strike it, on the side, with a hammer, Fig. VII.

Free the drive shaft from the gearbox end.

Disconnect, Fig. VIII

- The oil temperature switch (15).
- The oil pressure switch (16).

Remove the gearbox dipstick.

Free

- The speedometer drive cable at the gearbox end.
- The clutch control cable.
- The exhaust pipe, under the body (Turbo version).

REMOVING (continued)

Drain off the coolant Fig. I and II (remove the cylinder block drain plug (7) and the radiator cap (10). Recover the anti-freeze solution).

Remove :

- The spare wheel carrier.
- The air filter assembly.

  The air intake casing.
- The coolant expansion bottle.

Disconnect Fig. I

- The lighting and direction indicator wires.
- The electric fan wires.
- The wires from the temperature switch on the radiator.
- The coolant temperature switch wire (1).
- The coolant temperature sensor on the cylinder head (2).
- The hose (3) from the air filter fouling indicator.
- Remove the two clips that retain the harness on the radiator grille.

TURBO ENGINED VERSIONS

Disconnect Fig. I and II

- The fuel filter pipes (8).
- The water indicator sensor (9) on the filter.
- Disconnect the excess pressure switch (6) from the turbo.

Disconnect Fig. III

- The bonnet latch cable.
- The coolant hoses from the radiator.

Loosen the nuts (→), remove the two bolts (11 and 12) and retrieve the pads.

Remove : Fig. I

- The radiator grille.
- The screens (5) that protect the alternator and the starter motor.
- Disconnect the wires from the alternator and the starter motor.
- Free the wiring harnesses.

Disconnect Fig. IV

- The exhauster vacuum pipe (13).
- The gear shift assembly (15).
- The heater pipes from the coolant casing, the heater unit and the cylinder block.
- The oil cooler hose.
- The accelerator cable.
- The hoses from the fuel filter.
- The hose which returns fuel to the fuel tank and the hose from the fuel heater.

Disconnect

- The electrical shut-off unit wire.
- The wire that supplies the heater plugs.
- The reversing light switch wires.
- The earthing cable on the gearbox.
- Fit the sling and take the weight of the assembly on it Fig. V.

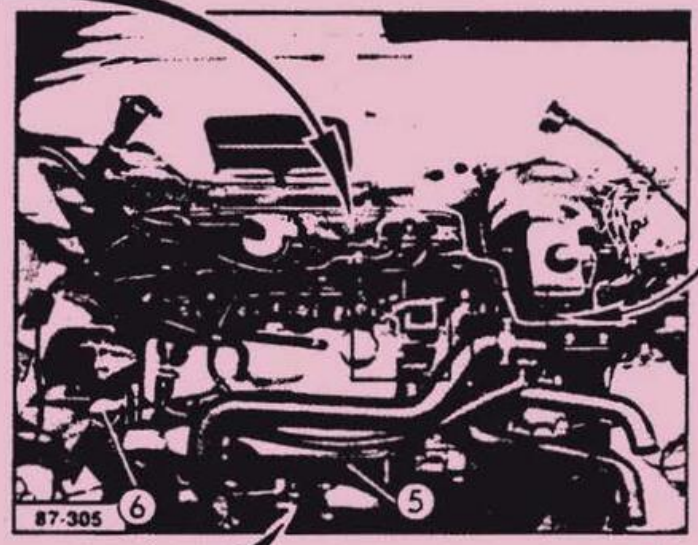
Remove : Fig. IV and V

- The two bolts (4) that secure the gearbox rear lower mounting.
- The gearbox securing bolts (14), nuts « a » and « b » on the flexible mountings and the mounting at the gearbox end.

Take out the engine - gearbox assembly.


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2
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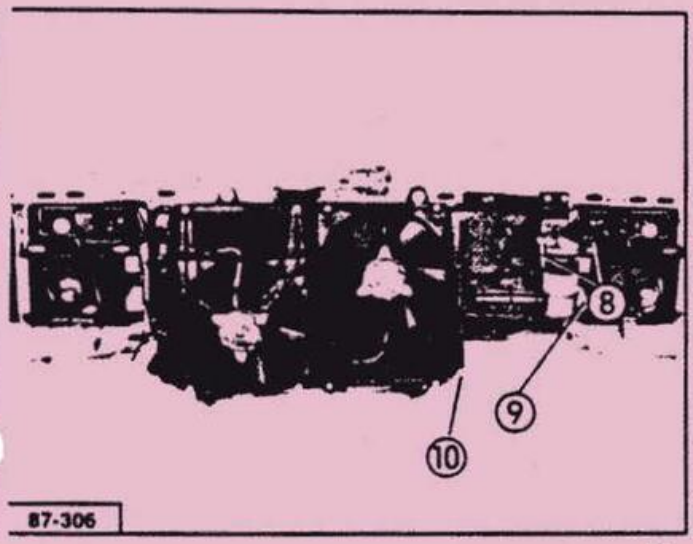

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87-305
6
5

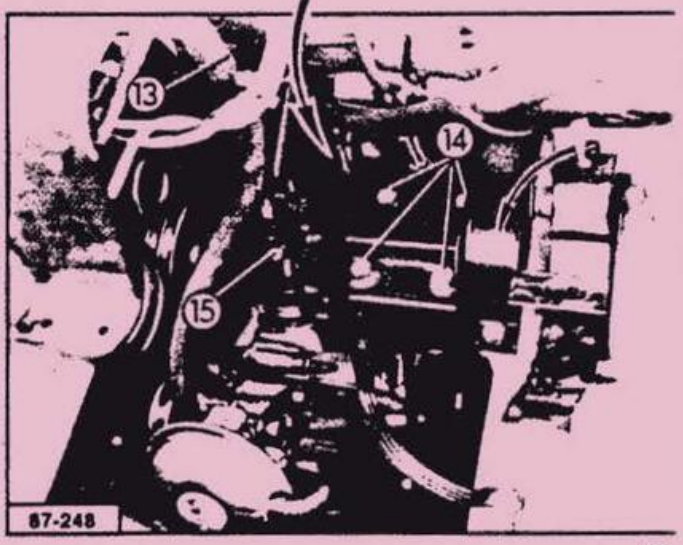
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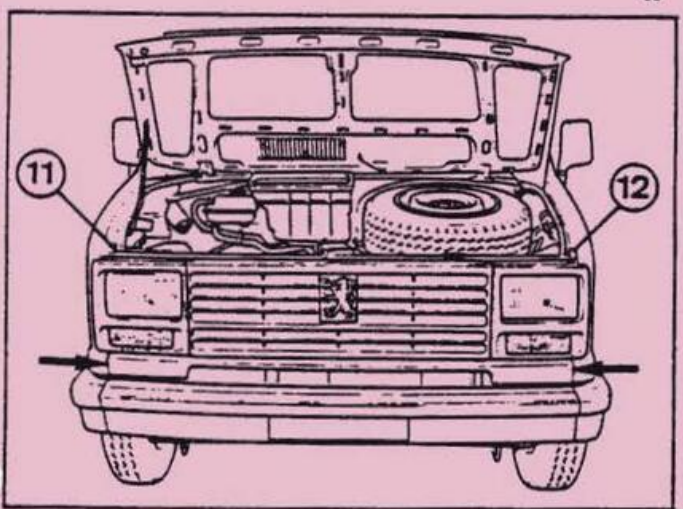

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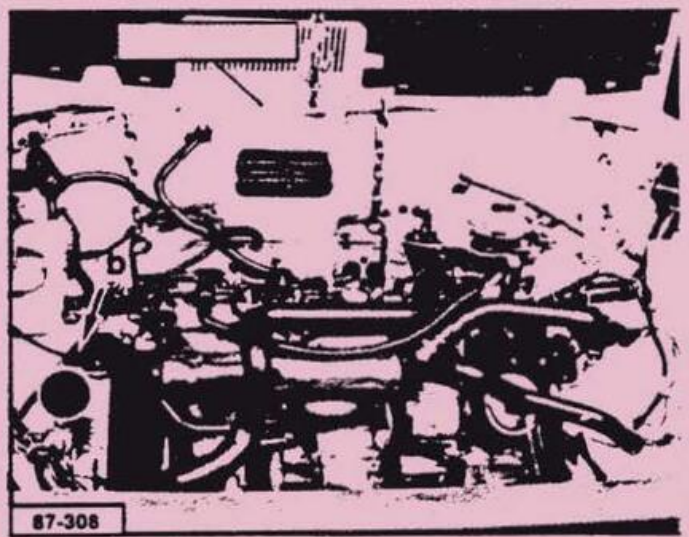
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15
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IV


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12

III


b
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V



I



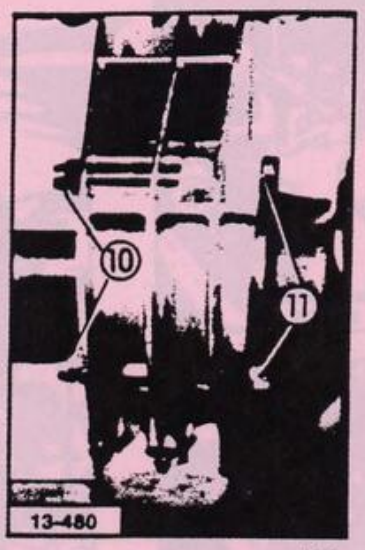
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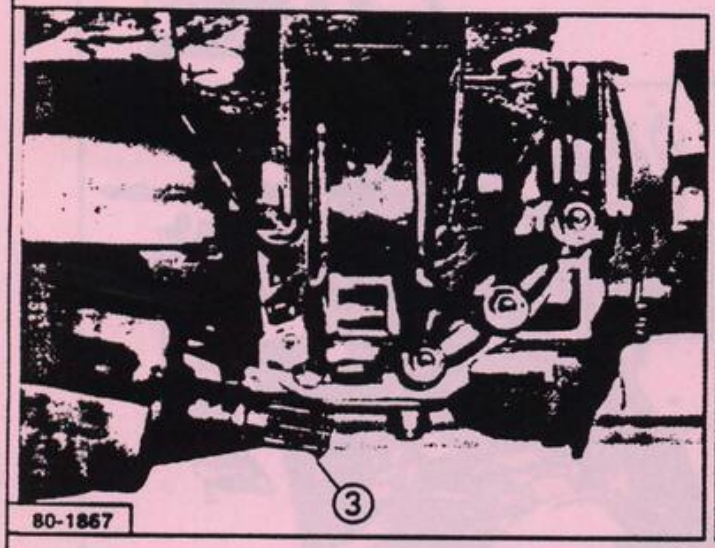
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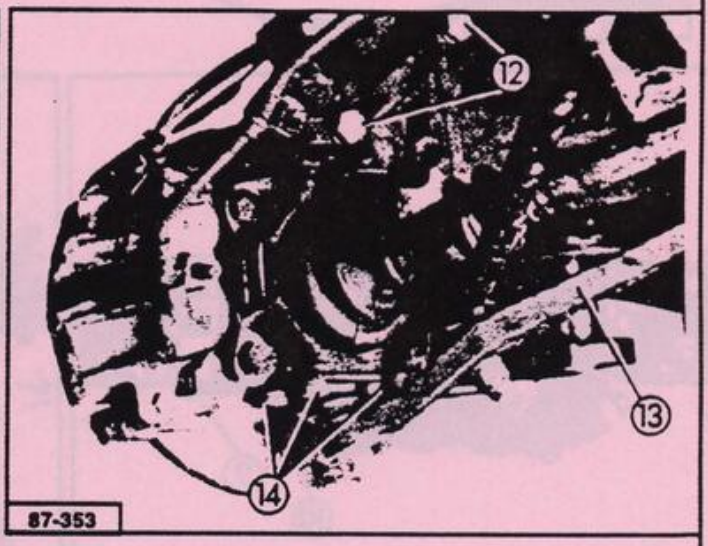
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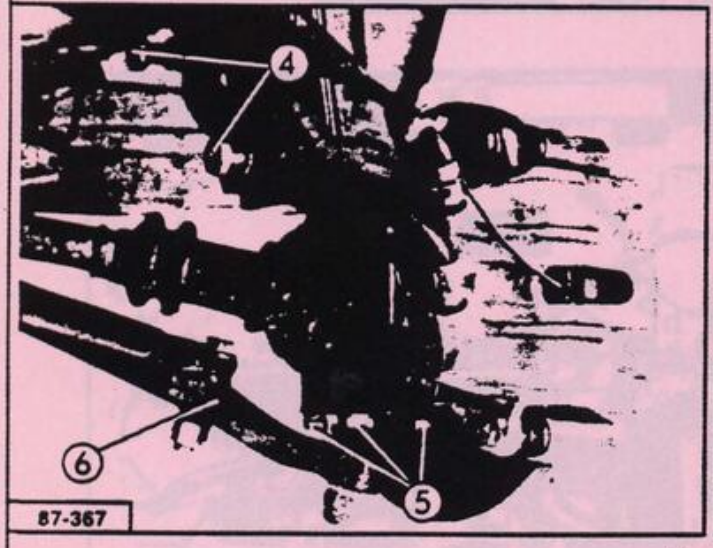
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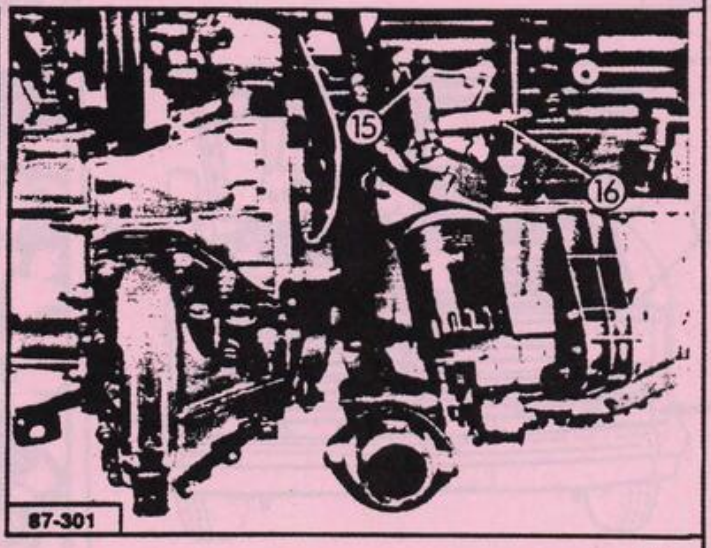
IV



VIII



V



IX

REFITTING

Lower the engine - gearbox assembly into position (sling (-).0102 ZX + (-).0102 G).

Fit, Fig. I, II and III

- The nuts « a » and « b » to the upper flexible mountings and the gearbox securing bolts (1).
  Tighten them to 50 N.m (36.9 lbf.ft)

The two bolts (2) that secure the gearbox lower rear flexible mounting.
Tighten them to 50 N.m (36.9 lbf.ft)

Remove the sling.

Connect up the left hand drive shaft (Fig. IV)

- Check that the 0 ring is in place on the drive shaft end and fit a NEW circlip (3).
- Insert the drive shaft end into the sun gear.
- Ensure that the circlip (3) has fully entered the sun gear.
- Engage the other end of the drive shaft into the hub.
  (Lubricate the area on which the antidust seal locates).
- Engage the ball joint in the stub axle carrier by pressing the suspension arm (6).

Fit : Fig. V

- The bolts (5) securing the lower ball joint
  Tightening torque 50 N.m (36.9 lbf.ft)
- The bolts (4) to the steering lever
  Tightening torque 125 N.m (92.2 lbf.ft)

Fit the right hand drive shaft Fig. VI

- Turn the steering to the left.
- Engage the drive shaft end into the bearing assembly.

Fit the following to the drive shaft

- The anti-dust seal (9).
- The ring (8).
- The 0 ring (7).

Push the bearing into the bearing assembly

- Swing the tie rods (11) through half a turn to bring them against the bearing outer track ring Fig. VII.

Tighten the self-locking nuts (10)
Tightening torque 7 N.m (5.2 lbf.ft).

- Engage the clutch shaft into the hub (lubricate the area on which the antidust seal locates).
- Engage the ball joint into the stub axle carrier assembly by pressing on the suspension arm (13) Fig. VIII.

Fit :

- The bolts (14) securing the lower ball joint
  Tightening torque 50 N.m (36.9 lbf.ft)
- The bolts (12) to the steering lever
  Tightening torque 125 N.m (92.2 lbf.ft)

Connect, Fig. IX

- The oil temperature switch (16).
- The oil pressure switch (15).

Fit the gearbox dipstick.

Connect the speedometer drive cable to the gearbox.

Connect up Fig. I and II
- The exhaust pipe (with the part that forms the ball joint previously coated with high temperature grease).
  Tighten the springs (1) until they are coil bound and then loosen them by one turn on each side.
- Fit the exhaust pipe (ensure that there is a clearance of at least 5 mm between it and the sump).
- The clutch cable.
- Adjust the height of the clutch pedal. See the section concerned. There is to be no clutch free travel.
- The gear shift control (2)
  Tightening torque 28 N.m (20.6 lbf.ft).

Connect Fig. V
- The earth cable to the gearbox.
- The wires to the reversing light switch.
- The wires supplying the preheater plugs.
- The electric shut-off unit wire.
- The alternator and the starter motor supply wires.
- The wire to the coolant temperature switch (coolant pump).
- The cylinder head water temperature sensor (14).
- The accelerator cable to the injection pump.

Fit Fig. V
- The cylinder block drain plug (fitting a NEW seal)
  Tightening torque 30 N.m (22.1 lbf.ft)
- The alternator and starter motor protection screens.
- The expansion bottle (10).

Connect up Fig. II
- The vacuum pipe (3) to the exhauster.
- The heater hoses to the expansion bottle, the heater unit and the cylinder block.
- The oil cooler hose (Modine).
- The fuel return pipe to the tank and the fuel heater hose.

Fit Fig. III and IV
- The radiator drain plug (8).
- The radiator grille.
- Tighten the nuts (→).
- Place the pads in position and tighten the two bolts (4 and 5).

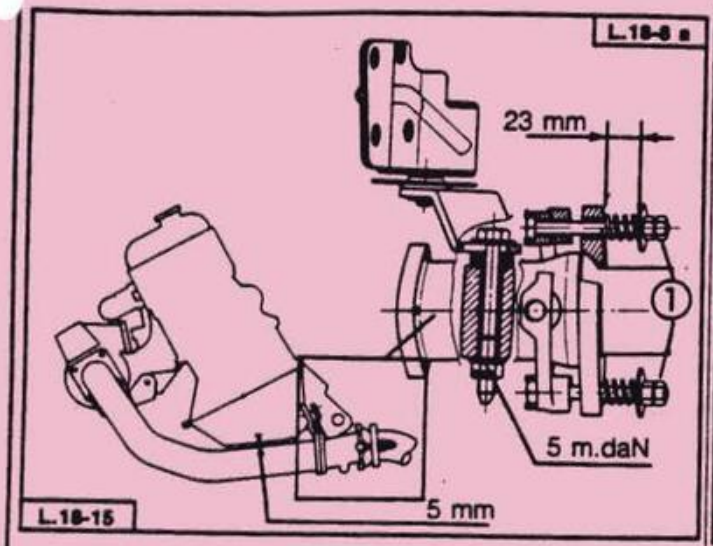
Connect up Fig. IV
- The fuel filter hoses (6).
- The radiator hoses.
- The bonnet latch cable and adjust it.

Connect up Fig. IV and V
- The turbocharger high pressure switch (16) (2 wires).
- The water indicator (7) on the fuel filter (3 wires).
- The lighting and direction indicator wires.
- The electric fan wires.
- The wires (9) to the temperature switch on the radiator.
- The hose (12) to the air filter fouling indicator.
- Fit the two clips that retain the wiring harness to the radiator grille.

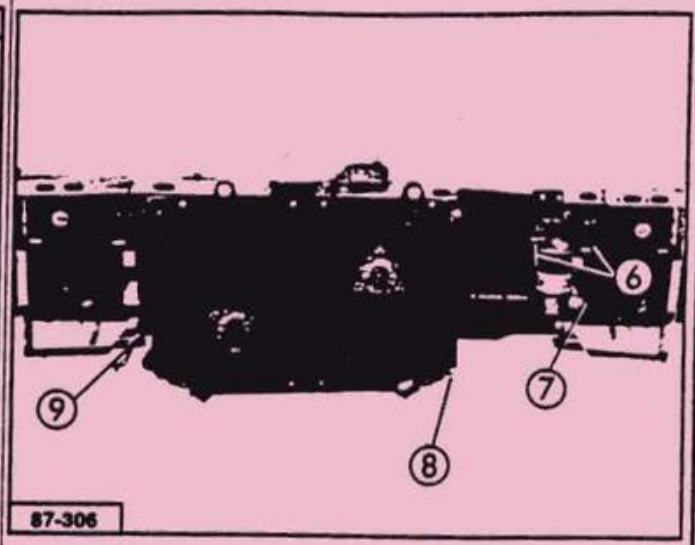
Fit Fig. V
- The air intake casing (11).
- The air filter assembly (13).
- The spare wheel carrier.

Connect up
- The battery positive and negative cables.
- Fill and bleed the cooling system.
  See the section concerned.
- Bleed the fuel filter.
- Fit the spare wheel.
- Fit the washer and tighten the drive shaft nuts (17).
  Tightening torque 500 N.m (369 lbf.ft)

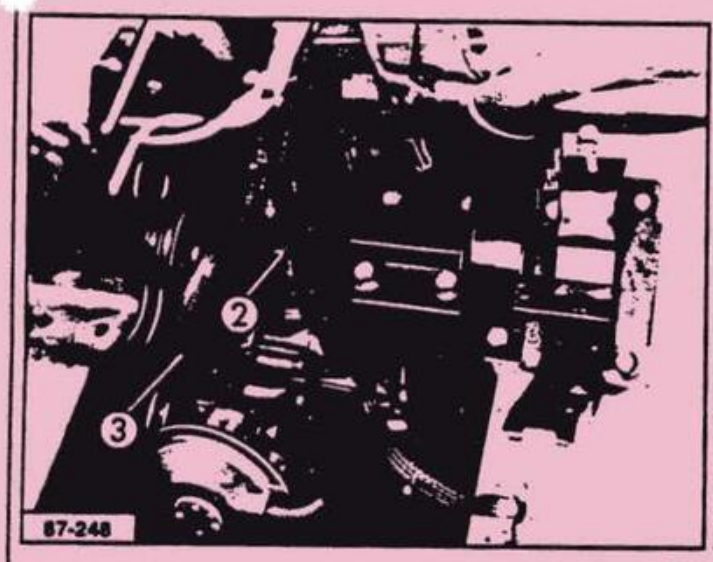
(Apply LOCTITE FRENBLOC) to lock the nut at two points (18).
- Fit the protective cap over the nut.
- Lower the vehicle to the ground.


L.18-8 a
23 mm
1
5 m.daN
5 mm
L.18-15

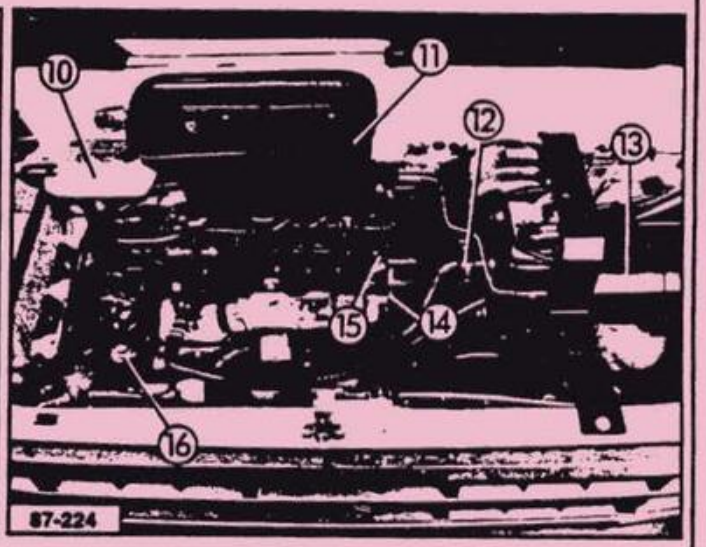
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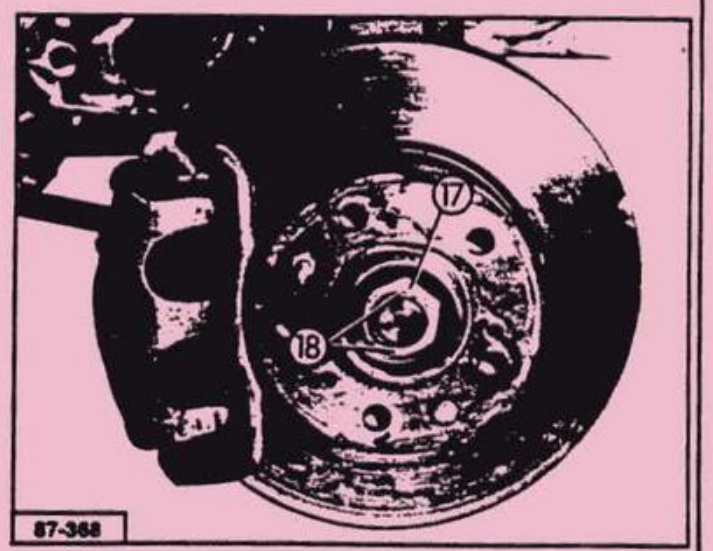

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VI

SPECIAL TOOLS

A : Sling for removing and refitting the engine-gearbox assembly 8.0102 Y comprising :

D - Cross piece

H - Short hooks

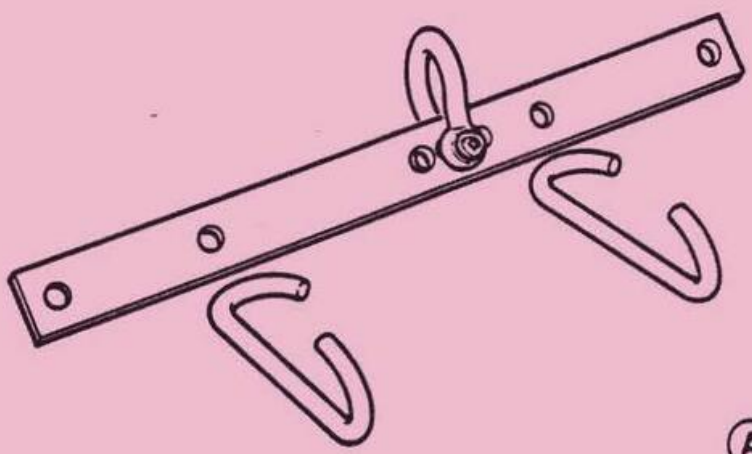
B : (-).0316N Thrust plate for removing the right hand drive shaft

TIGHTENING TORQUES

Tightening torque that must be adhered to (torque wrench) :	Torque in N.m (lbf.ft)
Nut securing drive shaft to stub axle carrier :	500 N.m (369 lbf.ft)

Recommended tightening torques :

Engine mounting flange securing bolts (on the cylinder head side)	50 (36.9)
Engine mounting securing bolts (on the gearbox side)	50 (36.9)
NYLSTOP nuts on engine - gearbox flexible mounting	55 (40.6)
Flexible mounting securing bolts (on the differential side)	55 (40.6)
Bolts securing the lower ball joints to the stub axle carriers	50 (36.9)

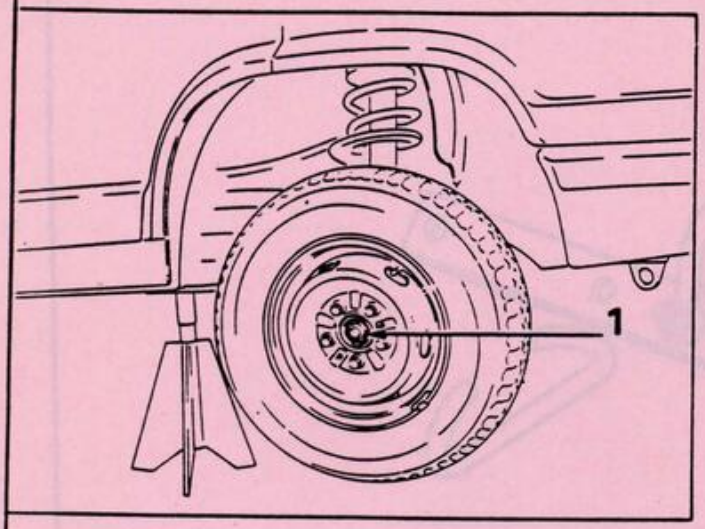


(A)

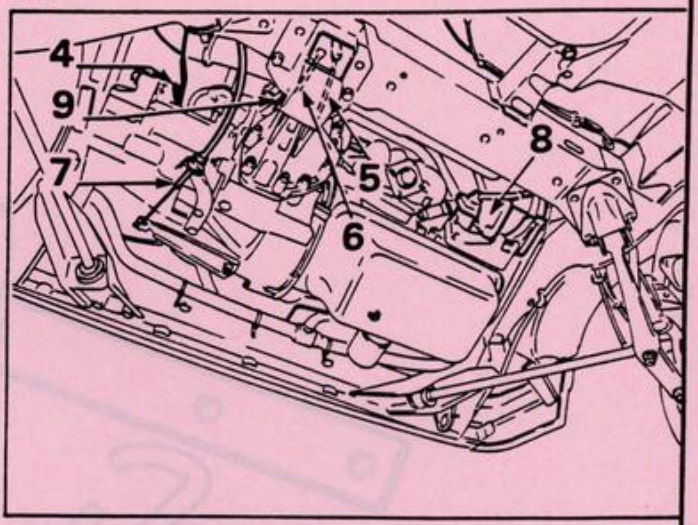


(B)

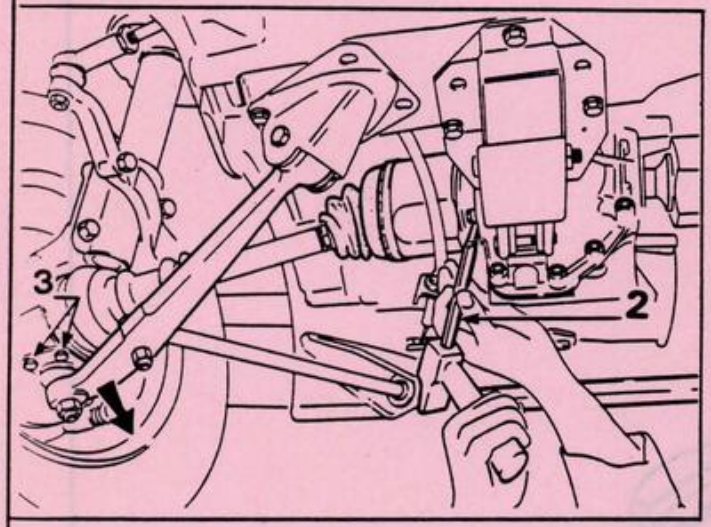
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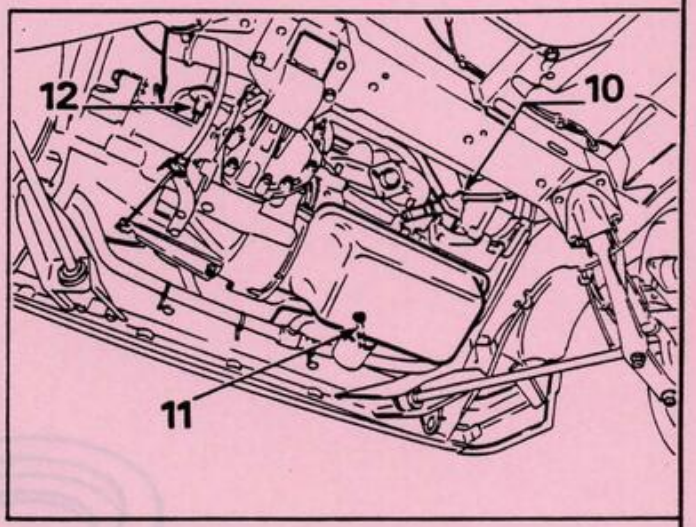
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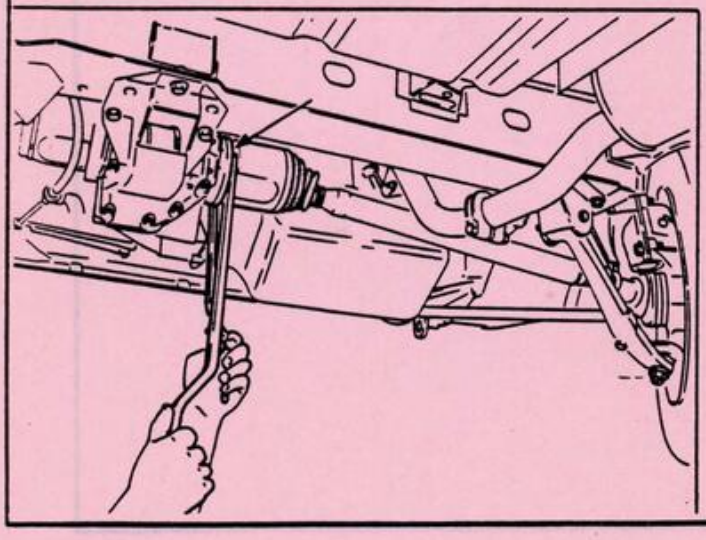
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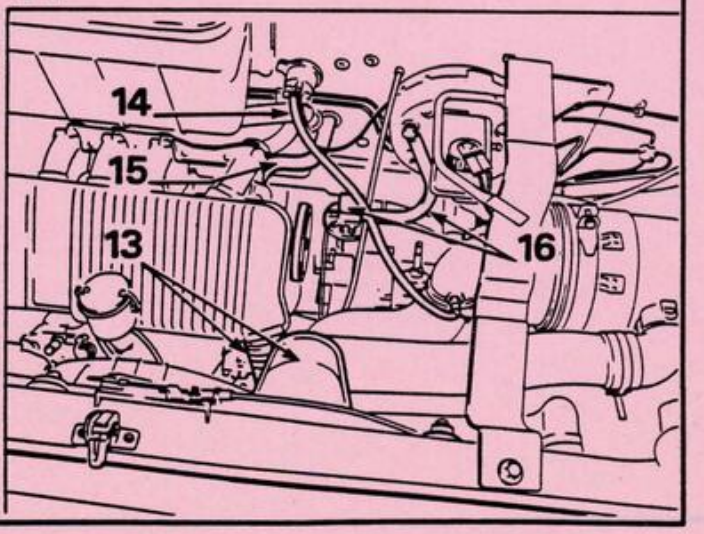
V



III



VI



I

- Place the vehicle on a lift
- Disconnect the battery
- Remove the bonnet
- Remove the protective caps from the drive shaft nuts
- Remove the drive shaft nuts (1)
- Raise the front of the vehicle and support it on stands.

II

- Remove the 4 bolts (3) that secure the stub axle carrier lower ball joints in place
- Free the lower suspension arms →
- Extract the left hand drive shaft from the differential housing using panel beaters' drifts (2).

NOTE : The drive shaft is retained in the sun gear by a circlip.

III

- Remove the alternator drive belt protector
- Free the right hand drive shaft using tool (-).0316N and two levers, then remove it.

IV

- Disconnect the exhaust pipe from the manifold
- Remove the retaining rings and pull back the assembly
- Disconnect :
  - the reversing light switch (4)
  - the speedometer drive cable (5)
  - the clutch cable (7)
- Remove the dipstick (6) from the differential
- Disconnect the alternator (8)
- Free the differential from the cross member (9)
- Drain :
  - the engine, gearbox, final drive unit
  - the cooling system
- Put aside the oil and coolant if they are in fit condition to be re-used.

V

- Disconnect the hoses from :
  - the bottom of the fuel heater (10)
  - the oil cooler (11)
  - the heater
  - the coolant output casing
- Disconnect the gear shift control (12)
- Disconnect :
  - the starter motor
  - the wire from the oil pressure sensor
  - the earthing braid on the gearbox
  - the wires from the coolant output casing, after having first identified them (thermistor and temperature switch).

VI

- Remove the spare wheel
- Disconnect :
  - the air hoses (13) from the radiator upper cross member and the intake distributor casing
  - the foul filter indicator hose (14)
  - the heater hose (15)
  - the pipes from the exhauster (16).

A4.106	1	XUD9A	ENGINE COMPLETE UNIT - REMOVING-REFITTING THE POWER UNIT ASSEMBLY	J5 DIESEL

I

- Remove the heater air intake casing (17)
- Disconnect :
  - the degassing pipe (18) and the coolant feed hose (19) from the expansion bottle
  - the fuel input and output pipes (20) from the fuel heater
- Disconnect the pre-heater plug supply wire (21)
- Disconnect the accelerator cable from the pump

II

- Place the cross piece (22) in position and take the load on it
- Remove the nut (23), the 3 bolts (24) and the right hand engine mounting (25).

III

- Remove the 4 bolts (26) from the left hand engine mounting.

IV

- Remove the engine from below

V

REFITTING

- Carry out the removing operations in reverse

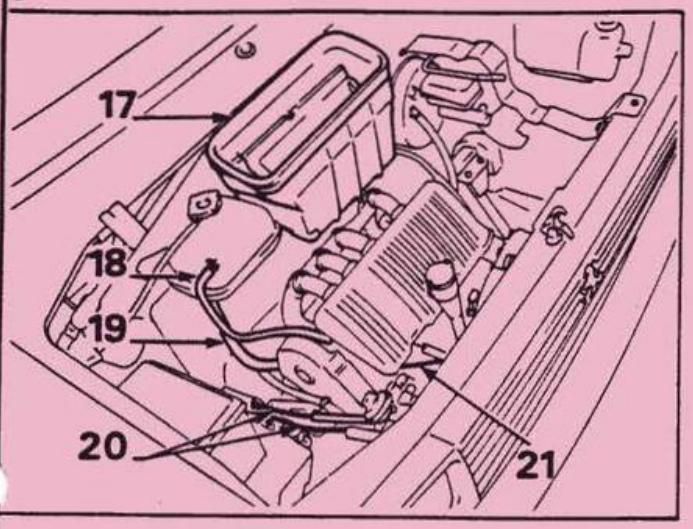
IMPORTANT

- Fit each of the drive shafts with a new circlip (27) and a new 0 ring (28) and copiously grease the splines.
- Make sure that the retaining circlip fully enters the differential side gear.

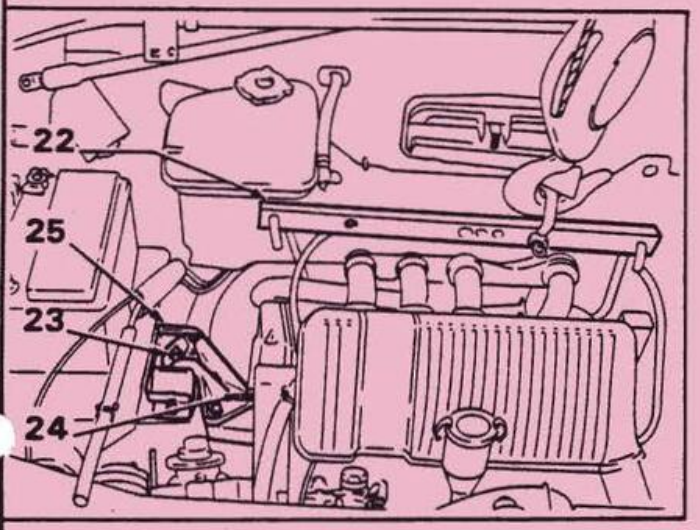
CAPACITIES

- Engine : 5 litres
- Gearbox - final drive unit : 1.25 litres
- Cooling system : 9.5 litres

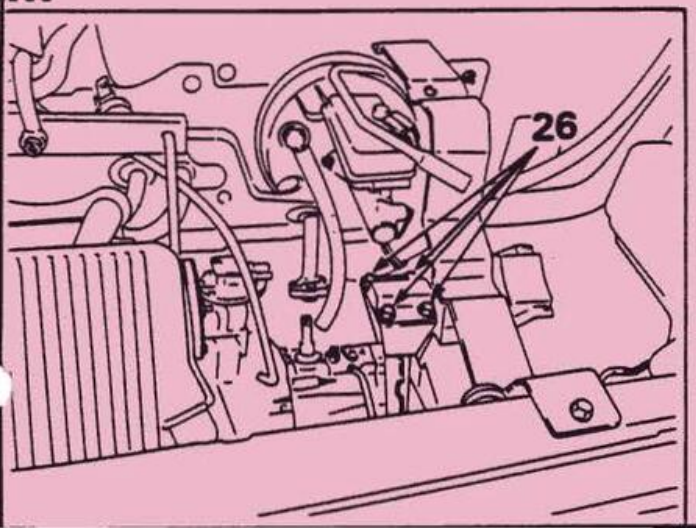
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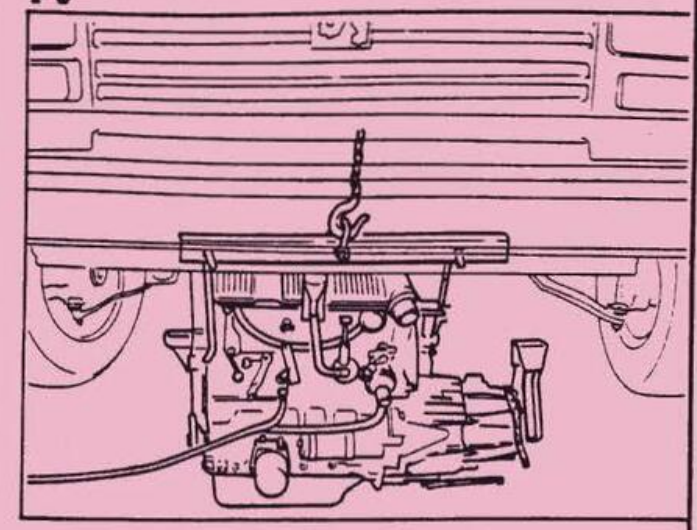
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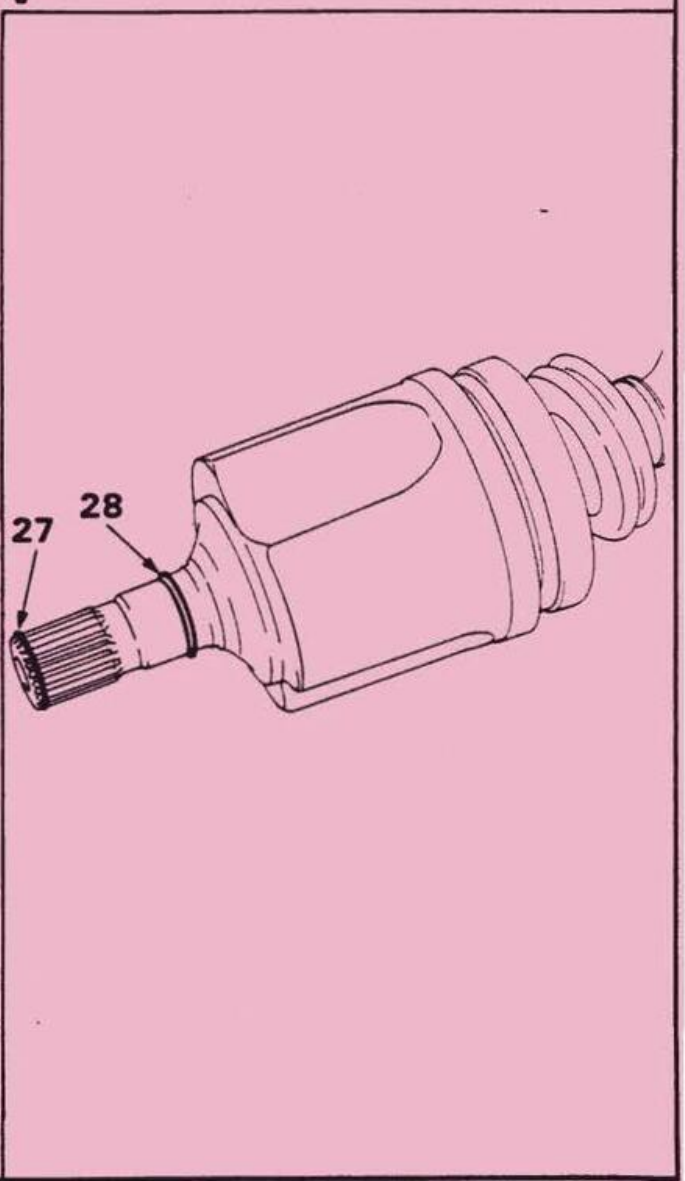
III



IV



V



SPECIAL TOOLS

A : Sling for removing and refitting the power unit assembly 8.0102 Y,comprising :

D - Cross piece

H - Short hooks

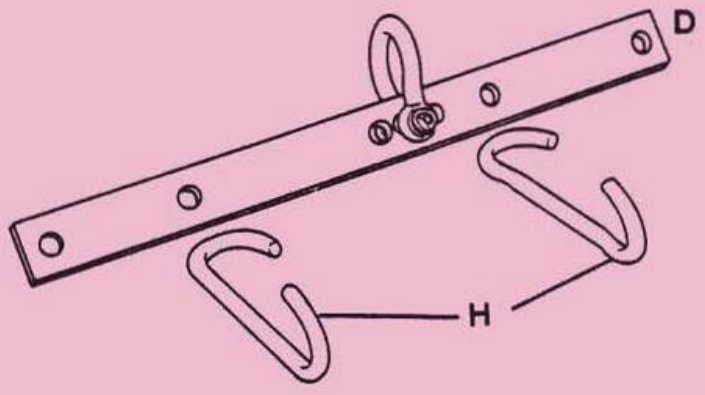
B : Mandrel for centralising the suspension arm tie rod : 4062T

TIGHTENING TORQUES

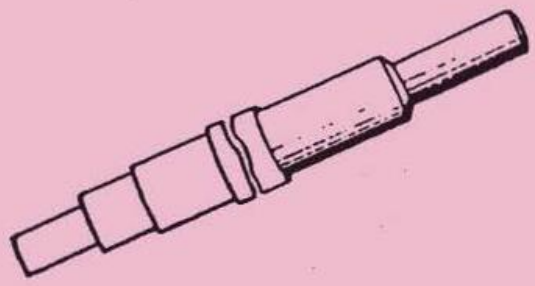
Tightening torque which must be adhered to (torque wrench) :	Torque in N.m (lbf.ft)
Nut securing drive shaft to stub axle carrier :	500 (369)

Recommended tightening torques :

Engine mounting flange securing bolts (on cylinder head side)	50 (36.9)
Engine mounting securing bolts (on gearbox side)	50 (36.9)
NYLSTOP nuts on engine-gearbox flexible mounting	55 (40.6)
Flexible block securing bolts (on differential side)	55 (40.6)
Bolts securing tie rod clamp and suspension arm	50 (36.9)
Nut securing tie rod to lower suspension arm	140 (103)

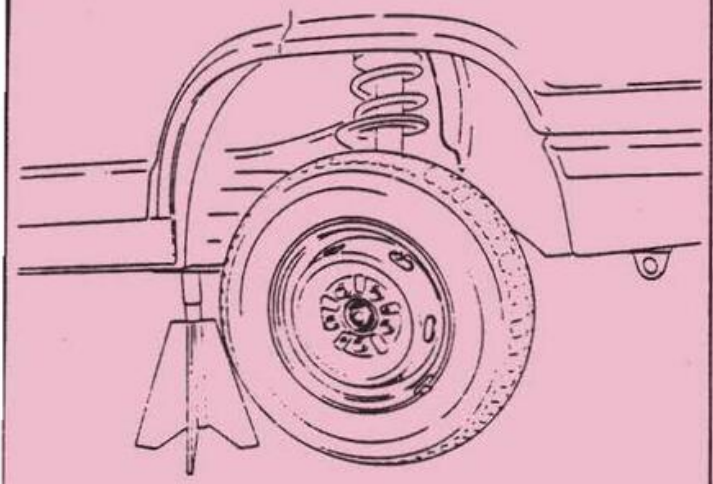


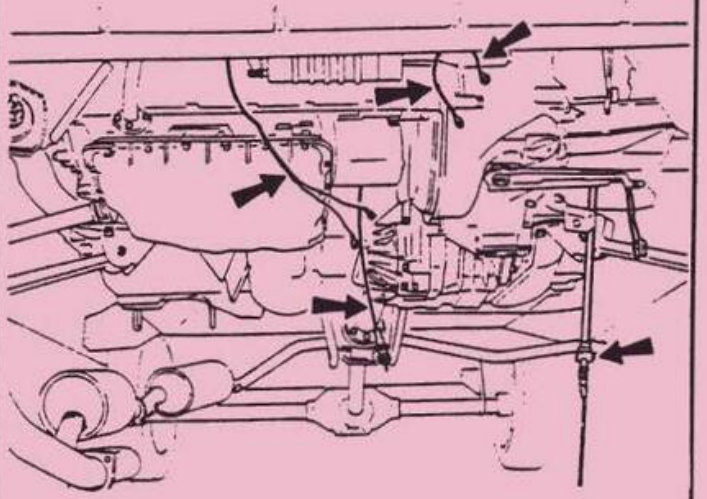
A

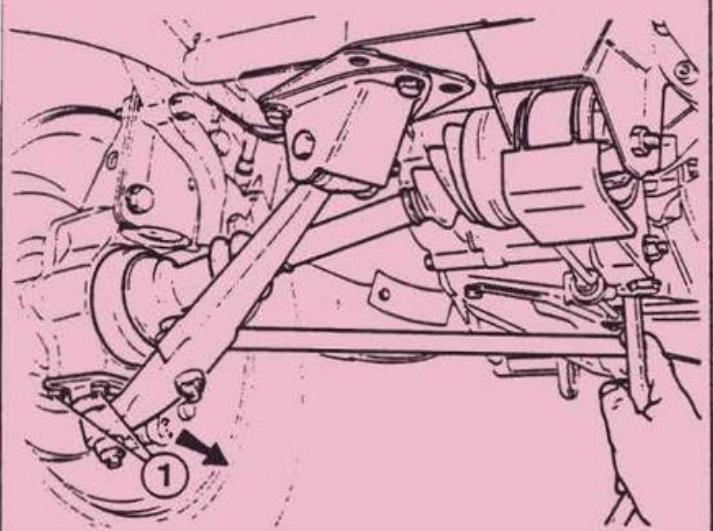


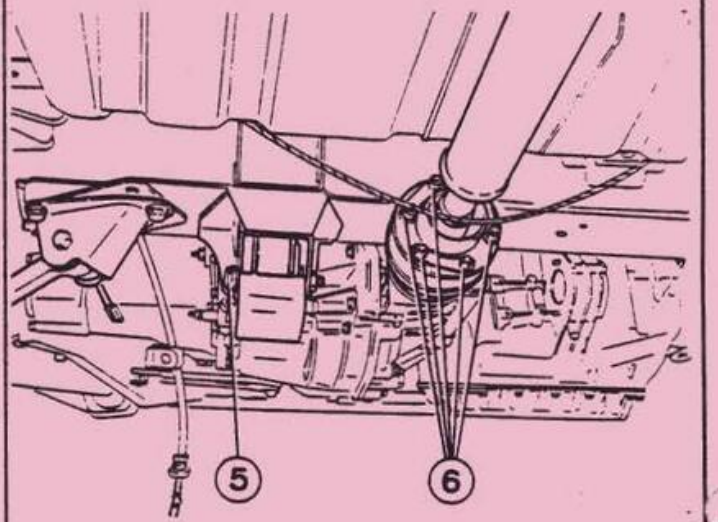
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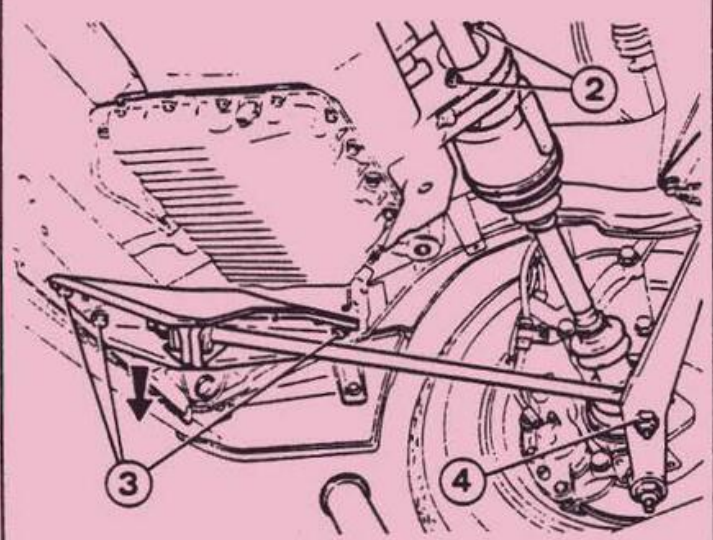
A4.204	1	4 x 4		J5 DIESEL

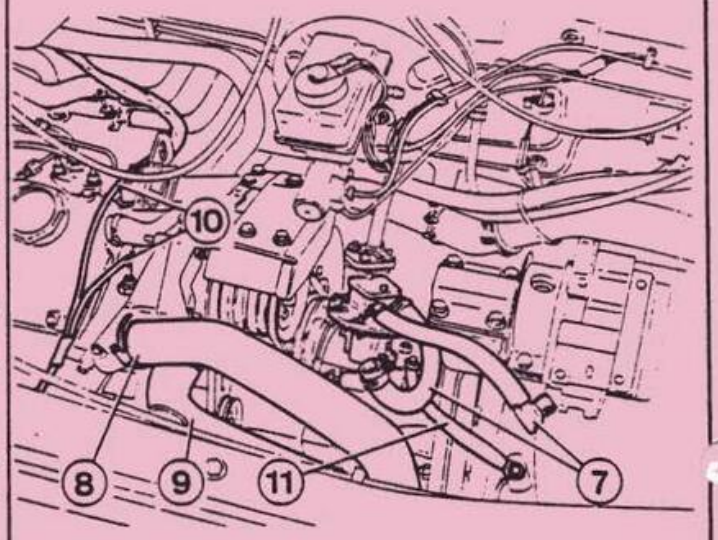












I

Raise the vehicle on a lift.

Disconnect the battery negative cable.

Remove :
- the bonnet
- the spare wheel and its carrier
- the caps that protect the drive shaft nuts and the nuts (41 mm across flats)

Raise the front of the vehicle and support it on stands, with its wheels hanging free.

II

Remove :
- the engine compartment sound proofing
- the four bolts (1) that secure the lower ball joints

Free the lower suspension arms →

Extract the left hand drive shaft from the differential housing, using a panel beater's drift or a lever.

NOTE : The drive shaft is retained, in the sun gear, by a circlip.

III

Disconnect the exhaust pipe from the manifold.

Remove the retaining rings and pull back the exhaust pipe assembly.

Loosen the two nuts (2) and swing the two tie rods out of the way.

Remove the right hand drive shaft and retrieve the teflon ring and the dust cover.

Remove the three bolts (3) from the suspension arm front support and loosen the rear securing nut (4).

Free the suspension arm towards the outside of the vehicle →

IV

Disconnect :
- the alternator
- the starter motor and the lug that secures its wiring harness on the timing gear casing.

Remove :
- the clutch cable
- the speedometer drive cable.

V

Remove the bolt (5) from the gearbox mounting.

Remove the bolts (6) that secure the transmission shaft front section to the output on the gearbox-final drive unit.

Free the transmission shaft by pushing the power unit assembly towards the front of the vehicle and secure the shaft assembly to the underside of the body.

VI

Remove :
- the air filter and its hoses
- the foul filter indicator (secured to the air intake casing).

Disconnect :
- the exhauster hoses (7)
- the radiator coolant input (8) and manifold cooland output (9) hoses.

Disconnect the wires from :
- the reversing light switch
- the coolant casing (thermistor and temperature switch) (10)
- the oil pressure switch
- the wire that supplies the preheater plugs
- the gearbox earthing braid (11)

A4.206	1	4 x 4	ENGINE COMPLETE UNIT - REMOVING-REFITTING THE POWER UNIT ASSEMBLY	J5 DIESEL

I

Remove :
- the heater air intake casing
- the four nuts that secure the cooling system expansion bottle and secure it well away from the engine

Disconnect the hoses (12) from the fuel heater, the injection pump supply hose (13) and the coolant hose (14).

Disconnect the accelerator cable (15) from the injection pump.

Disconnect the electric shut-off unit supply wire.

II

Place the cross piece (-).0102 Y in position and take up the weight of the engine.

Remove the bolts (16) from the left hand engine mounting.

III

Remove the bolts (17) from the right hand engine mounting.

Remove the engine from under the vehicle.

IV

REFITTING

Carry out the removing operations in reverse.

IMPORTANT

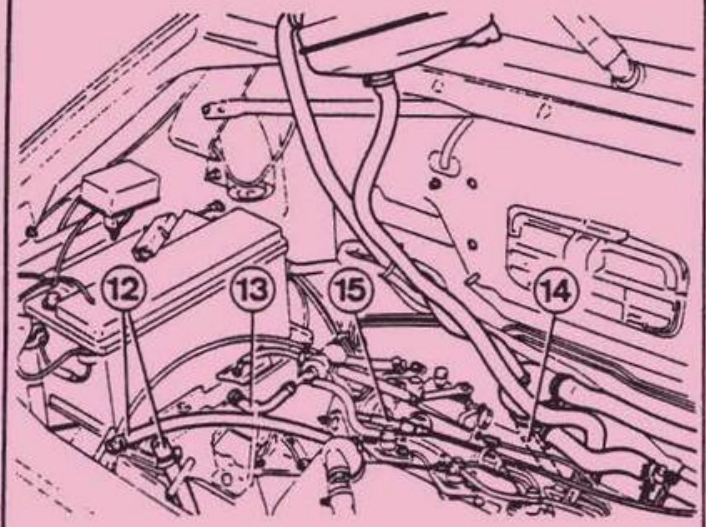
When refitting the front suspension arm, centralise the tie rod clamp with tool 4062T and tighten :
- the bolts (18) to 50 N.m (36.9 lbf.ft)
- the rear nut to 140 N.m (103 lbf.ft).

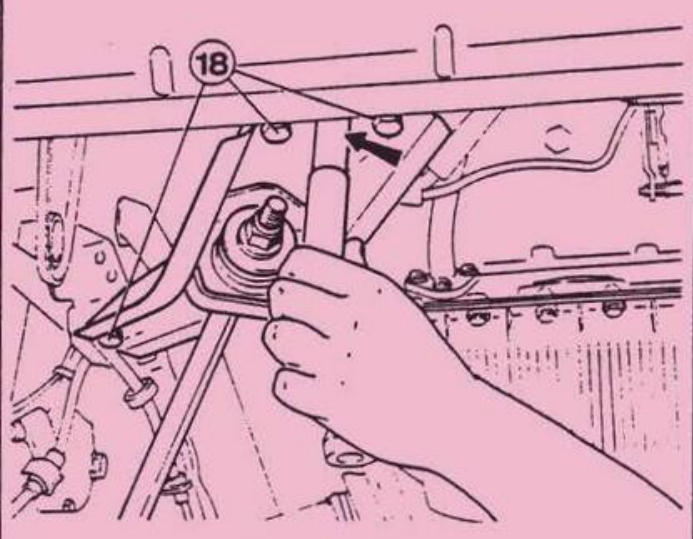
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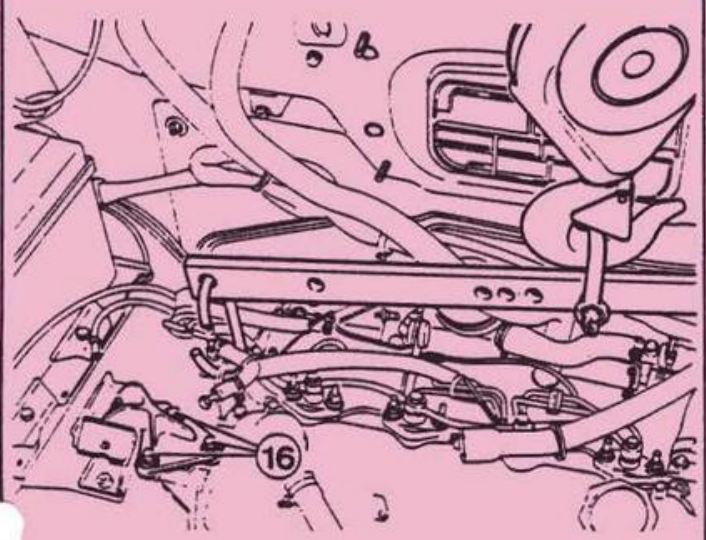
PRECAUTIONS

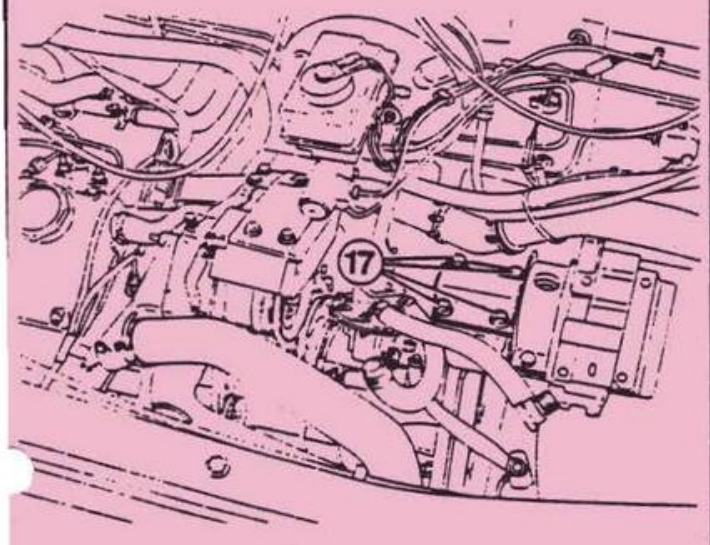
Always fit a new circlip to the left hand drive shaft and copiously grease its splines.

Ensure that the circlip fully enters the differential gear.


12
13
15
14


18


16


17

SPECIAL TOOLS

SPECIAL TOOLS

From kit 8.0117 ZW :

AF - Support for securing dial indicator to pump Fig. A (used with AG).

AG - Angle adaptor Fig. B.

AH - Support for mounting dial indicator on cylinder head Fig. C.

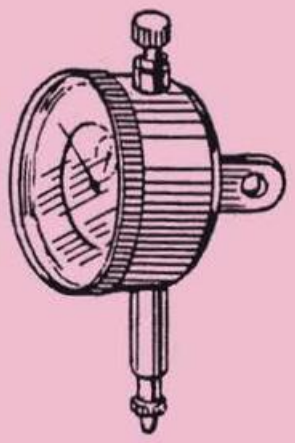
F - Pump dial indicator Fig. D.

H - Pump dial indicator extension Fig. E.

L - Nut and bolt for securing dial indicator to pump Fig. F.



(A)



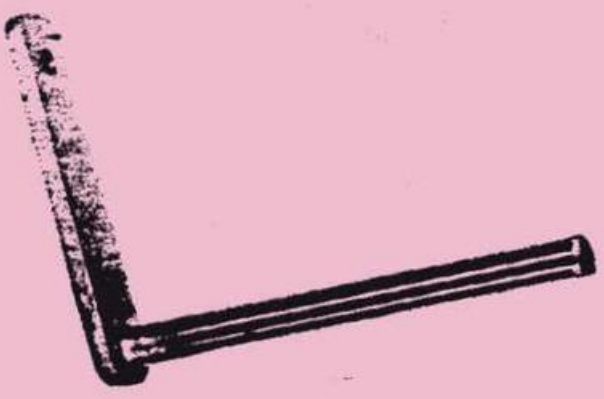
(D)



(B)



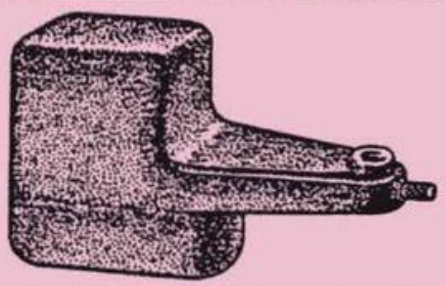
(E)



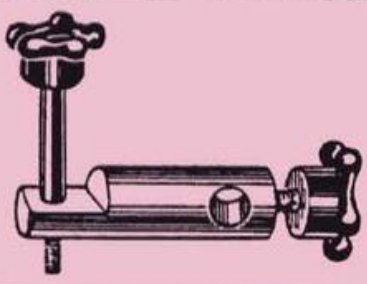
(C)



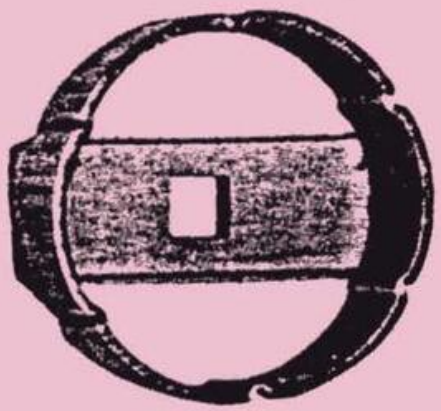
(F)



G



H



81-334

L



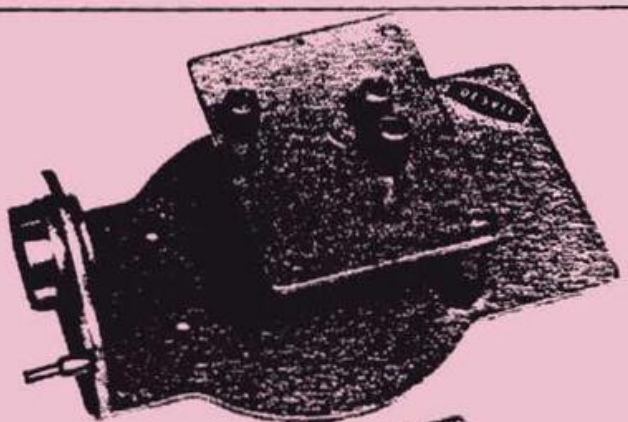
81-813

M





I





N



12827

J



12834

K

SPECIAL TOOLS

SPECIAL TOOLS (continued)

From kit 8.0110 Z.

H - Dial indicator support bracket Fig. G.

8.0118 FZ

— Adjustable dial indicator support Fig. H.

AB - Ring for fitting the crankshaft seal, at the clutch end Fig. I.

AC - Plate for fitting the crankshaft seal, Fig. I (used in conjonction with AB).

8.1504

— Dial indicator, with lug Fig. J.

From gearbox kit 8.0316 :

M - Dial indicator extension L — 20 mm Fig. K.

8.1404

— Oil filter cartridge spanner Fig. L.

8.0212

— Reversible mandrel for centralising the clutch friction disc Fig. M.

RECOMMENDED TOOLS

— Desvil dismantling stand.

— Support for U25/651 Diesel engine Fig. N, ref. 153/3 (see garage equipment brochure)

— Standard fixture Fig. N
ref. 126 (see garage equipment brochure).

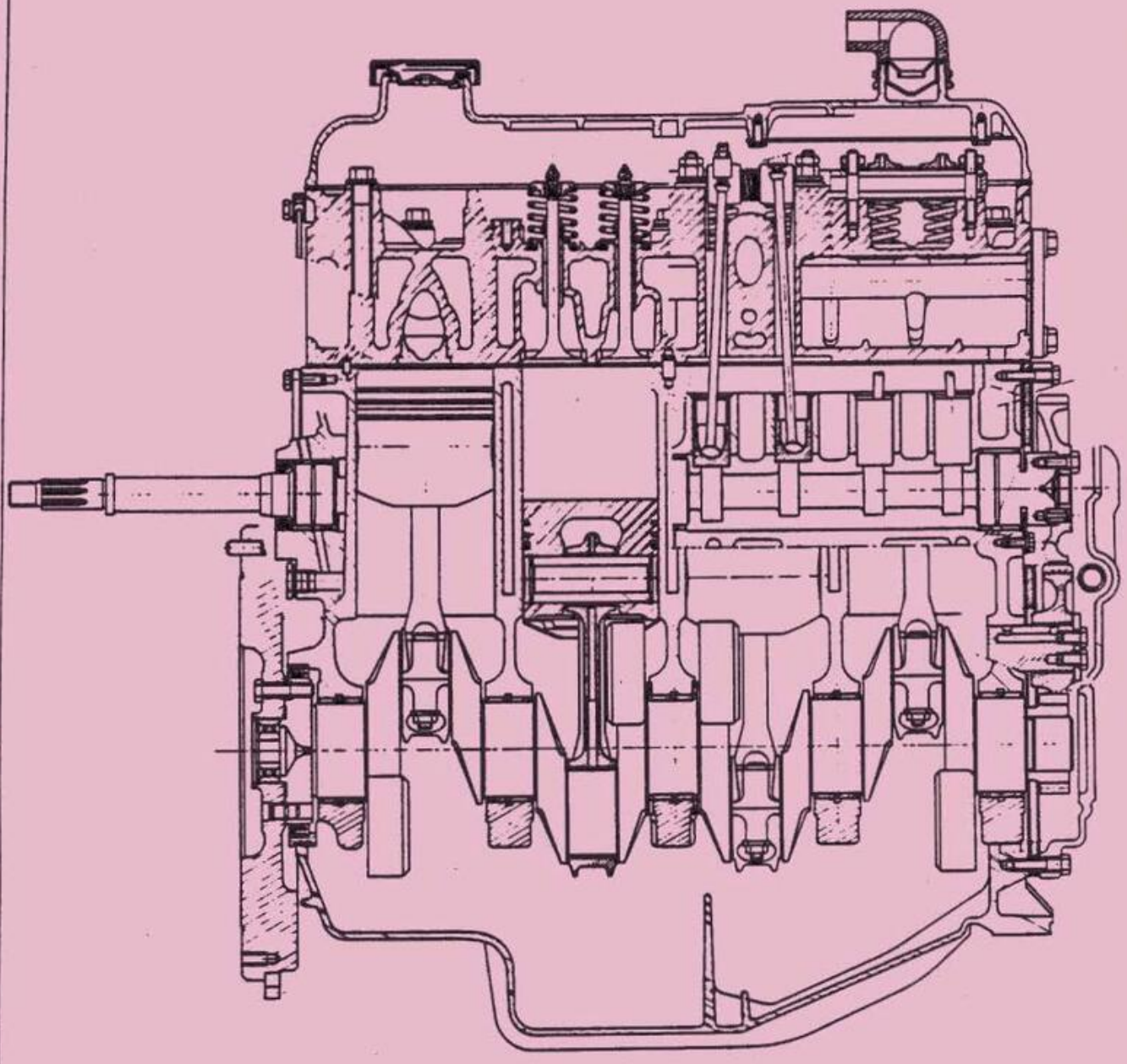
TIGHTENING TORQUES

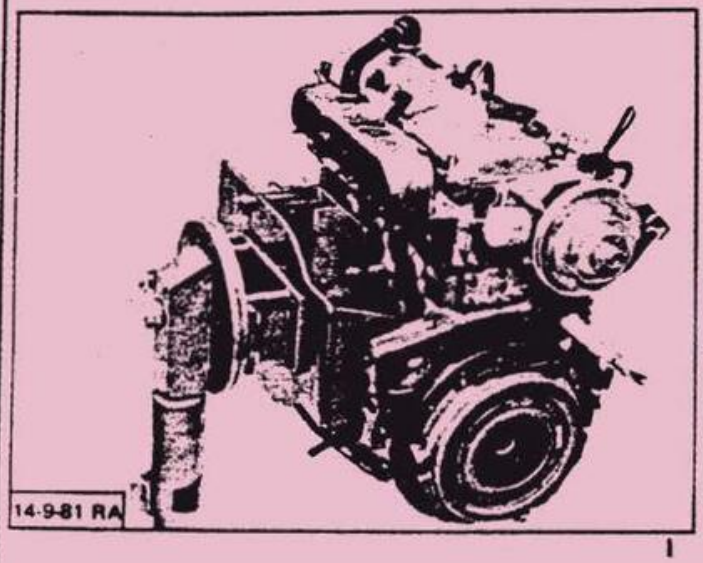
ESSENTIAL tightening torques (use torque spanner) :

Fastening to be tightened	m.daN	Nm	lbf ft	Remarks
Big-end bolts	7,6	76	56	To be replaced by new ones each time they are removed
Main bearing bolts	9,5	95	70	To be replaced by new ones each time they are removed
Fly wheel securing bolts	9	90	66	To be replaced by new ones each time they are removed and to be coated with LOCTITE on fitting
Cylinder head securing bolts (tagged washer)	Initial tightening torque : 6	60	44	Both faces and threads oiled (tags on washers against cylinder head)
	Final tightening torque 10,5	105	77	
Fast idling control thermostatic pick-up (copper washer)	4,5	45	33	PEUGEOT jointing compound

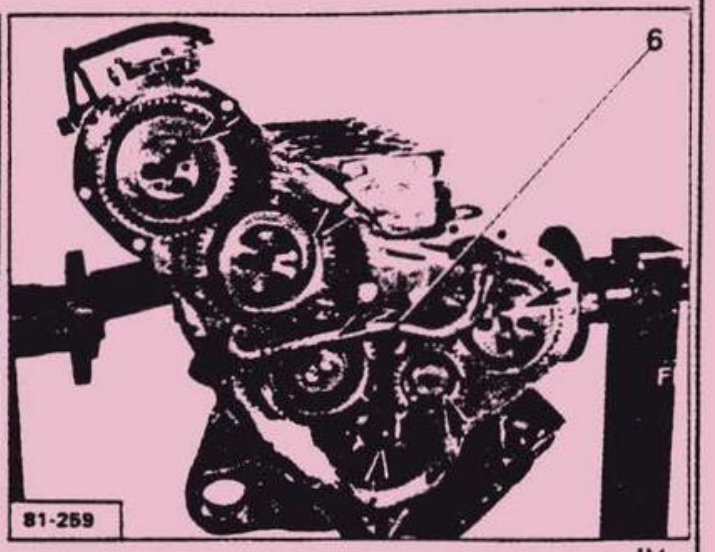
Recommended tightening torques :

Fastening to be tightened	m.daN	Nm	lbf ft	Remarks
Camshaft drive gear securing bolts	3,2	32	24	Flanged bolts
Camshaft thrust bearing securing bolts (serrated washers)	1,7	17	12	
Plugs on front plate	1,5	15	11	To be coated with LOCTITE
Injection pump securing stud lock nuts	1,7	17	12	To be coated with LOCTITE
Sump securing bolts	1,7	17	12	
Sump cover plate securing bolts	1,1	11	8	
Oil drain plug (copper washer)	4	40	30	
Rocker cover securing nuts (copper washer)	0,5-0,8	5-8	4-6	
Cylinder block water drain plug (copper washer)	3,5	35	26	
Cylinder head oil pipe union screw (double copper washer)	1,1	11	8	
Filter cartridge insert	1,1	11	8	To be coated with LOCTITE
Injection pipe nuts	2,4	24	18	
Injector leak-off union screw	1	10	7	
Pre-heat plugs	2,8	28	21	
Injector securing nuts (flat washers and contact washers)	2,4	24	18	
Injection pump drive gear securing bolts	2,5	25	18	
Injection pump securing nuts	3	30	22	Load distribution plates
Studs screwed into cylinder head	0,5	5	4	
Engine mounting bolts (on cylinder head)	2,7	27	20	

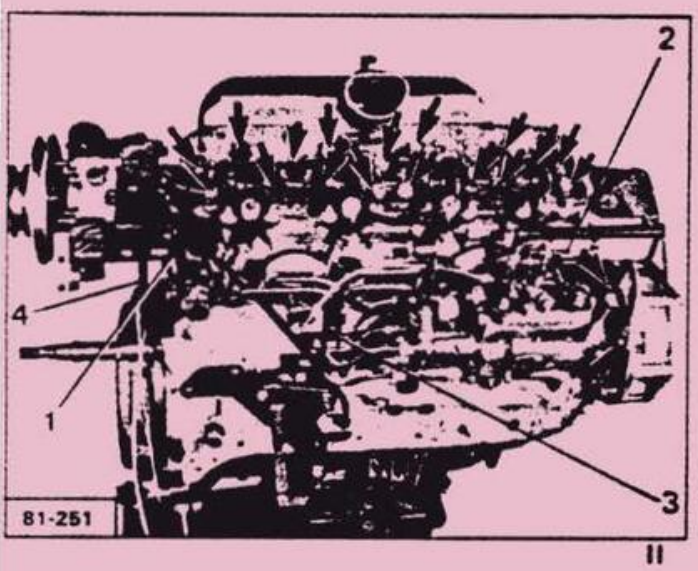




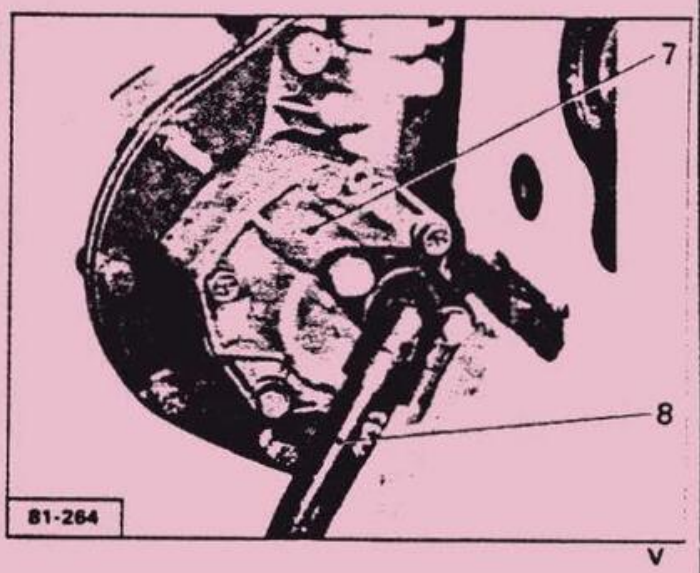
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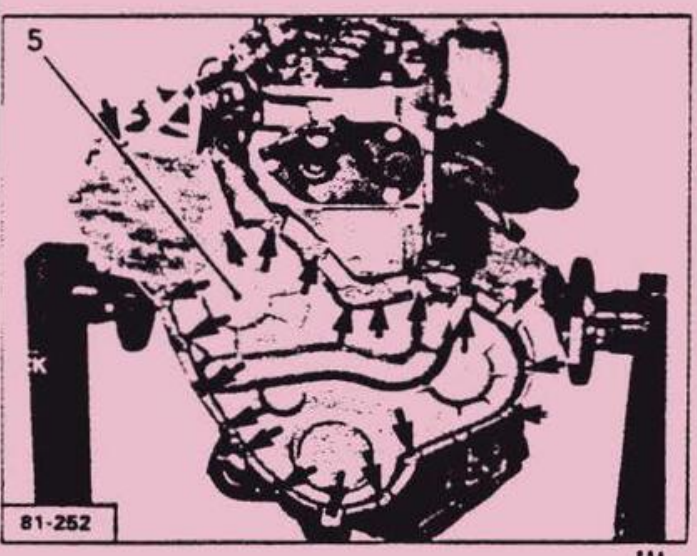
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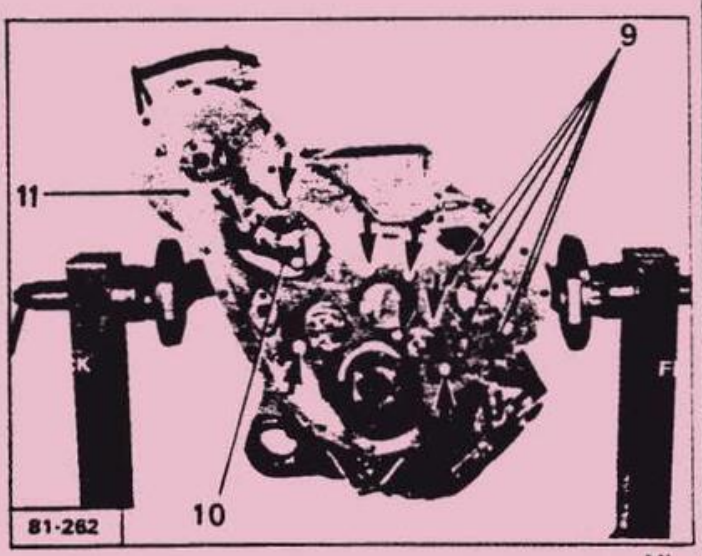
II



V



III



VI

The method described here is illustrated using a non-standard dismantling support.

Use the DESVIL stand equipped with the fixture the reference of which is given on the page entitled "special tools".

DIMANTLING

Remove :

- the starter motor,
- the exhaust manifold,
- the cylinder block water drain plug,
- the dowel shown ⟶ Fig. I,
- the oil pump suction pipe (8) Fig. V.

Secure the engine cylinder block to the DESVIL stand using three bolts :

- one M12 x 1,75 x 70,
- one M 7 x 1,00 x 60,
- one M 7 x 1.00 x 25.

Secure the assembly to the base fitted with the standard fixture, Fig. I.

Drain the engine.

Remove : Fig. II

- the cable clamp (2)
- the injection pipes assembly (3),
- the diagnostic harness (4),
- the rocker shaft lubrication pipe (1),
- the rocker shaft assembly,
- the bolts (⟶).

Remove the cylinder head and its gasket.

Remove the push rods and the tappets.
(Mark their respective positions).

Remove the timing cover (5) (⟶) :
Fig. III.

Remove : Fig. IV, V, VI.

- the timing gears (⟶),
- pipes (6),
- bolts (9).

Remove the oil pump (7).

Remove the injection pump.

Remove the bolts (⟶) Fig. VI and take off the timing cover back plate (11).

Remove the camshaft thrust plate (10) and withdraw the camshaft from the cylinder block.

Remove :

- the clutch,
- the flywheel,
- the sump cover plate,
- the sump (1) (bolt : ⟶) : Fig. I.

Remove the connecting rod-piston assemblies: Fig.

Ensure that the big-end caps remain with the connecting rods from which they have been removed. Mark the positions of the pistons relative to the cylinder block.

Remove the big-end caps (2).
Take out each connecting rod-piston assembly from the T.D.C. position.

Remove the crankshaft : Fig. II

Remove the main bearing caps (3).
Take out the crankshaft.
Remove the main bearing shells.

Stripping the cylinder block : Fig. III

Remove :

- bolt (5) and take out the pressure relief valve body (4),
- the dipstick guide,
- the front and rear cylinder block water circulation plates (6).

Remove the pistons from the connecting rods : Fig. IV.

Remove the piston rings.
Remove the circlips (with a scriber).
Push out the gudgeon pin.

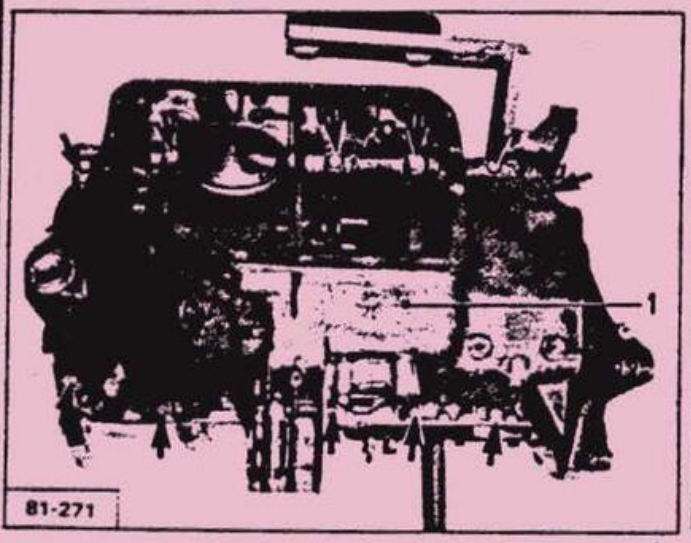
Dismantling the pressure relief valve : Fig. V.

Remove from the valve body (7) :
- the O ring seal (8),
- the circlip (12),
- the washer (11),
- the spring (10),
- the piston (9).

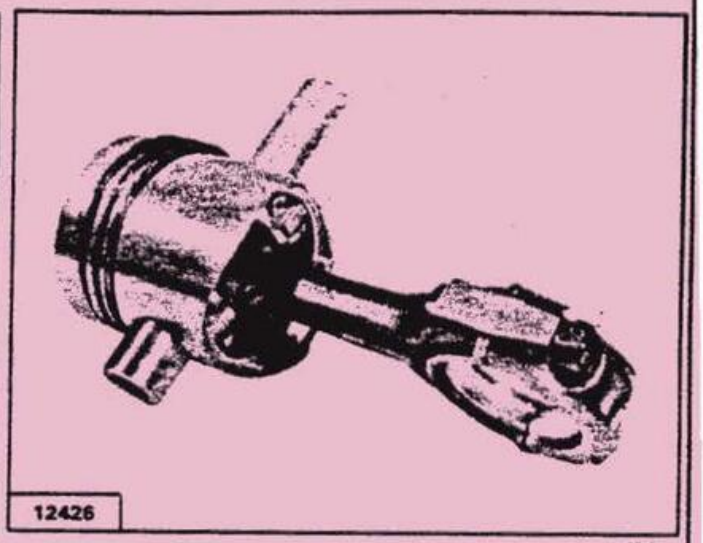
Dismantle the oil pump : Fig. VI.

Remove :
- the bolts (⟶),
- the cover (13),
- the seal (14).

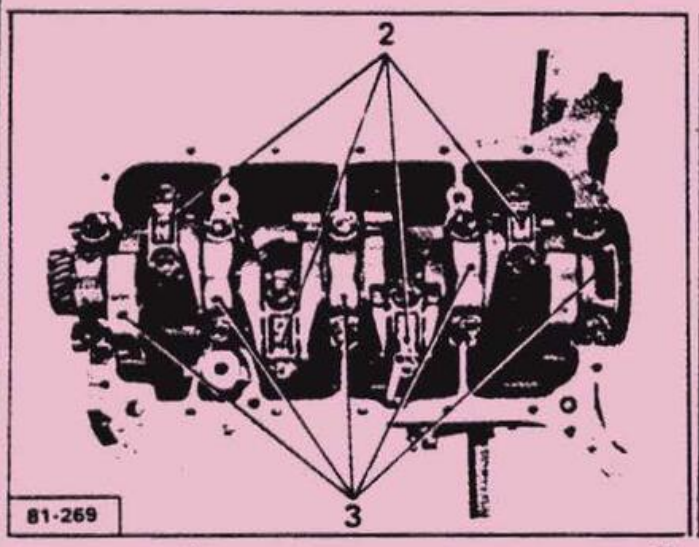
CLEAN ALL THE PARTS.



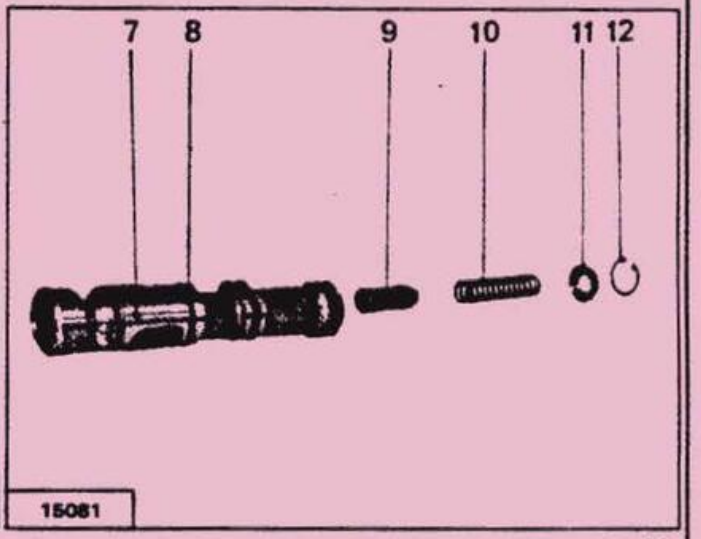
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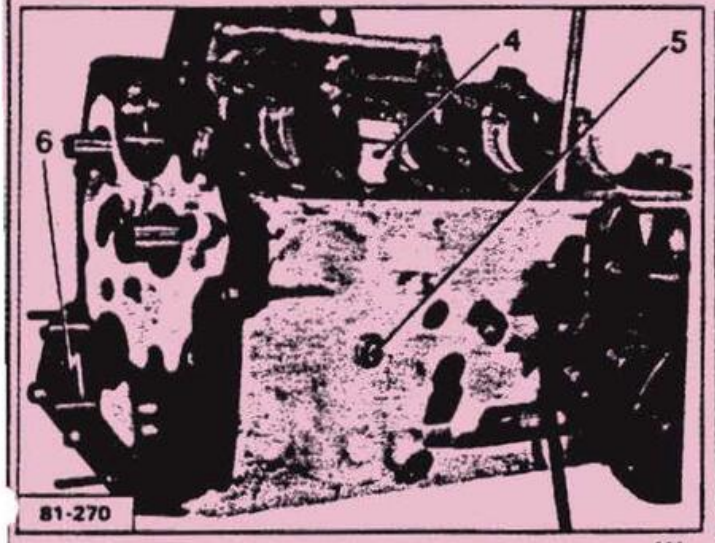
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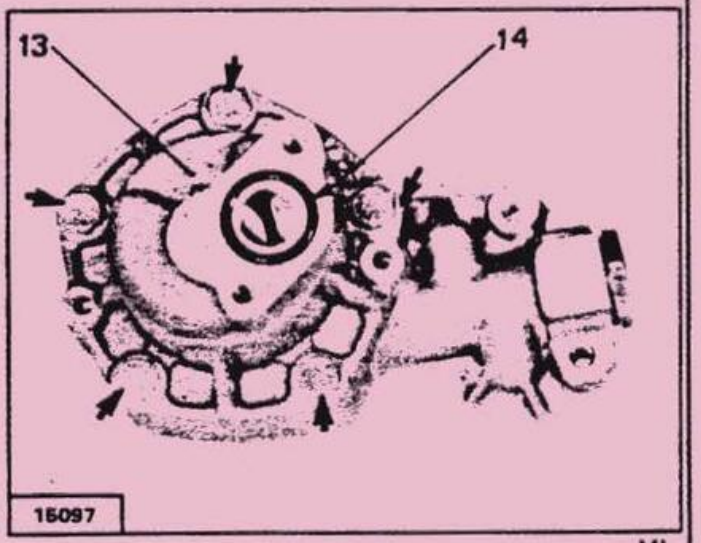
II



V



III



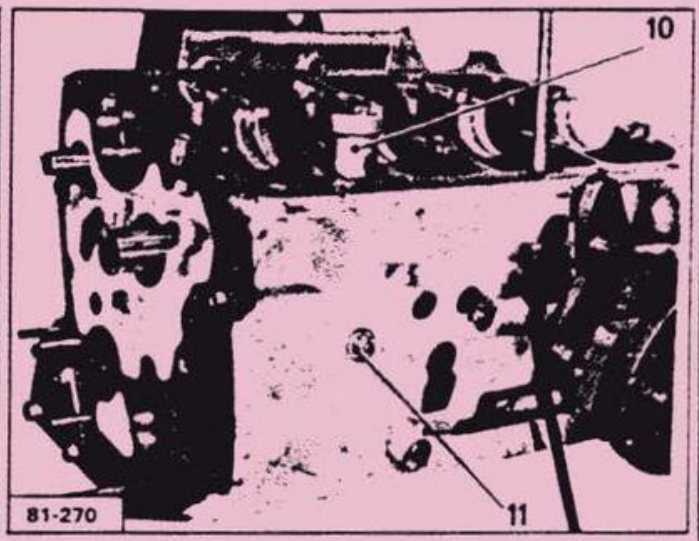
VI



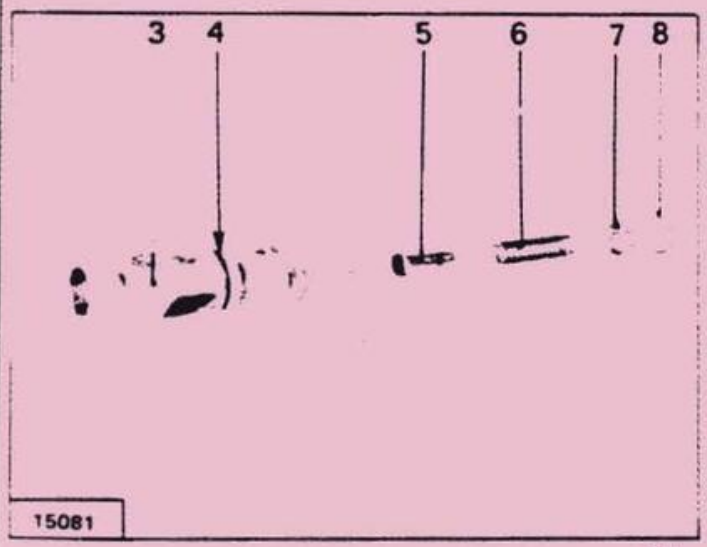
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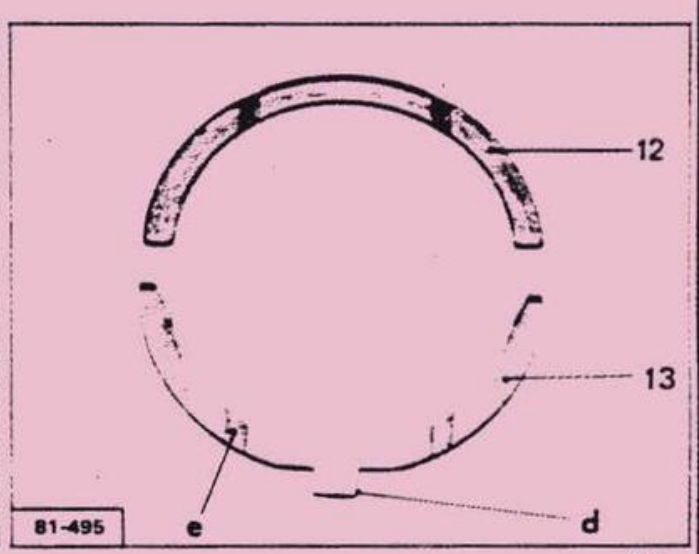
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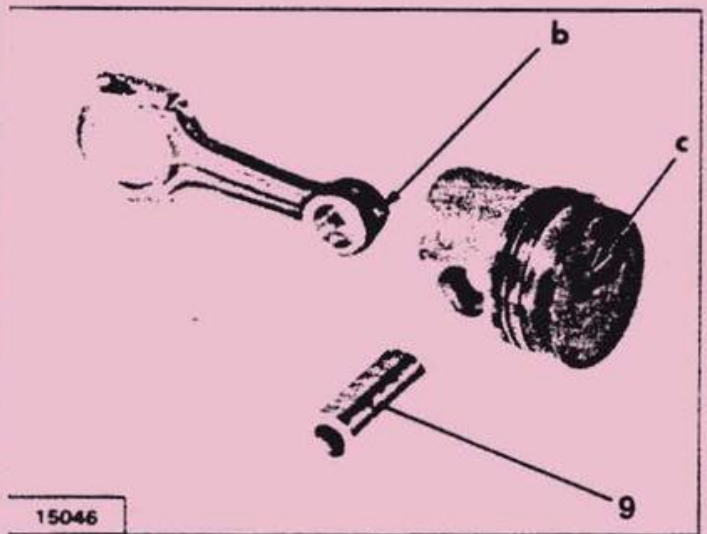
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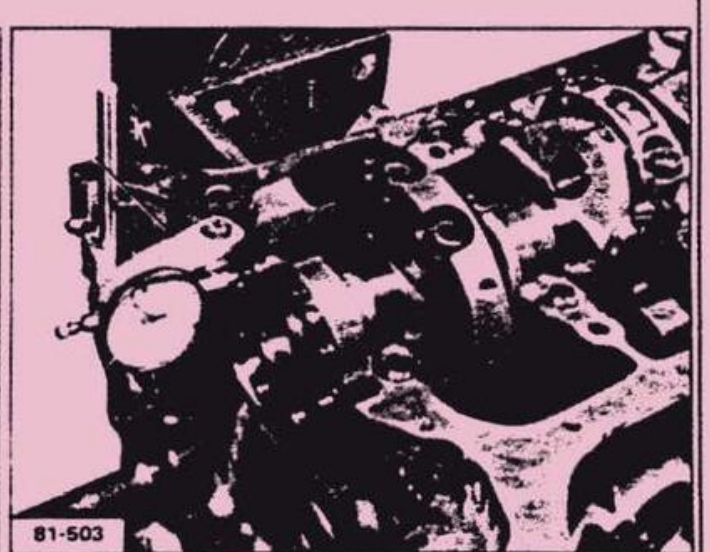
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VI



IV



VII

REASSEMBLY

Prepare the flywheel

Replace the fly wheel bearing (if necessary).

Replace the starter ring gear (if necessary).
Drive off the starter ring gear with a drift.
Clean the ring gear locating area.
Heat the new ring gear with a torch whilst continually moving it round to ensure that it expands evenly (heat it to between 200 and 250°C, that is to say until it is a light straw colour).
Fit the ring gear with the unmachined face against the shoulder on the flywheel.
Carry out this operation quickly. Drive the ring gear fully into place with a drift if necessary.

Check the ring gear run-out (max. 0.3 mm).

Prepare the oil pump : Fig. I and II.
Coat the edge of the oil pump body "a" with PEUGEOT jointing compound :
Fit the following to the oil pump body :
- the drive shaft,
- the two oil pump gears,
- the cover (2) tightening the bolts (➡).
- the seal (1) coated with grease.

Prepare the pressure relief valve : Fig. III
Fit in the valve body (3) :
- the piston (5),
- the spring (6),
- the washer (7),
- the circlip (8).

Fit the O-ring seal (4).

Fit the pistons to the connecting rods : Fig. IV.
Position the connecting rod so that the oil hole "b" is on the same side as the recess "c" on the piston.
Fit a circlip
Fit a gudgeon pin (9).
Fit the other circlip.

Whenever replacing a piston, ensure that the new piston fitted is of the same class as the cylinder diameter.

Fit the accessory components to the cylinder block : as shown in Fig. V.

Fit the cylinder block water circulation plates :

Fit :
- the pressure relief valve body (10).
- tighten the cone ended grub screw and nut (11).
- The dipstick guide (with the dipstick parallel to the block and pointing towards the flywheel).

Fit the crankshaft : Fig. V.

Lubricate the various components parts with engine oil just before each is fitted.

Fit :
- the bearing half shells to the cylinder block and the main bearing caps, LUBRICATING them as they are fitted,
- the crankshaft,
- the upper half thrust washers (12) on either side of the centre main bearing, to obtain an end float of :
  0.07 to 0.17 mm : Fig. VII.

The lower thrust washers (13) which are fitted to the centre main bearing cap and which have a locating stud "d" : Fig. VI.

The two thrust washers placed on one SIDE of the bearing MUST BE the same tickness. The thrust washers fitted to one side of the bearing may BE OF A DIFFERENT THICKNESS to those fitted on the other side.
The white metal face and the lubrication grooves "e" on the washers must be against the crankshaft : see Fig. VI.

Fit the main bearing caps : Fig. I and II.

REMARK : Before fitting the main bearing cap on the flywheel side coat the face shown shaded and identified as "a", on Fig. I, with PEUGEOT jointing compound.

The main bearing cap numbers appear on the camshaft side. No. 1 bearing is at the flywheel end.

IMPORTANT - The main bearing cap bolts are to be replaced by new ones whenever they are removed.

Fit the lower thrust washers at "b" and fit the main bearing caps.

Tighten the bolts (➡) to a torque of 9.5 m.daN (95 Nm, 70 lbf ft).

Fit seal (1) into the groove on the No. 1 main bearing cap (at the fly wheel end).

Before fitting seal (2) (which is red in colour), check that it is fact the correct type for the engine to which it is to be fitted. The arrow should be in the same direction as the rotation of the engine (to the left as seen from the fly wheel end).

Oil the lip on the seal and assembly sleeve 8.0110 AB.

Fit the seal to sleeve AB.

Place the assembly in front of the seal location, place fitting plate AC over the entire arrangement and tighten 2 of the flywheel securing bolts as far as they will go.

Take off the fitting sleeve AB by turning it.

Fit a new seal (3) to the camshaft aperture. Ensure that the lubrication gallery plugs (4) are fitted.
Fit the connecting rod-piston assemblies.
Fit the bearing shells to the connecting rod big-ends and big-end caps. Oil them.

The upper haft shell has a lubrication groove and hole in it.

Place the connecting rod-piston assembly in the cylinder block when the crank pin is at TDC.
The piston protrusion, which is dependent on the nominal diameter is as follows :

Diameter	Protrusion
93 mm	+ 0.5 mm
93.25 mm	+ 0.47 mm
93.50 mm	+ 0.44 mm
93.75 mm	+ 0.41 mm

+ 0.05 / 0 mm

(dial indicator 8.01504 and support 8.0110 H : Fig. V.

If it does not, reface the piston crown to obtain the correct height.
Fit the piston rings to the piston with the gap in the expander ring (6) set at 180° to the gap in the ring itself (5) : Fig. VI.
NOTE - There is an inscription mark on one face of each piston ring near the gap.
When they are fitted, this inscription must be towards the crown of the piston.

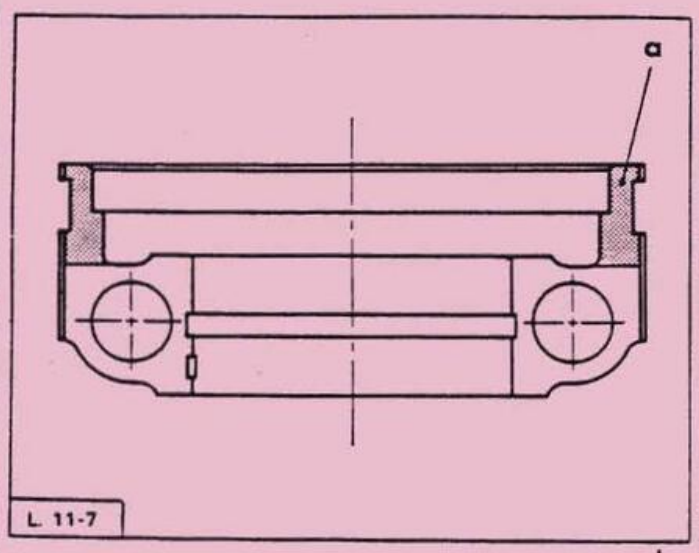
Stagger the gaps.

Fit each connecting rod-piston assembly when its crank pin is at TDC, with the clover leaf saped recess in the piston crown on the camshaft side.
Use a piston assembly sleeve.

IMPORTANT - The big-end bolts are to be replaced by new ones each they are removed.

Tighten the big-end nuts to a torque of 7.6 m.daN (76 Nm, 56 lbf ft).

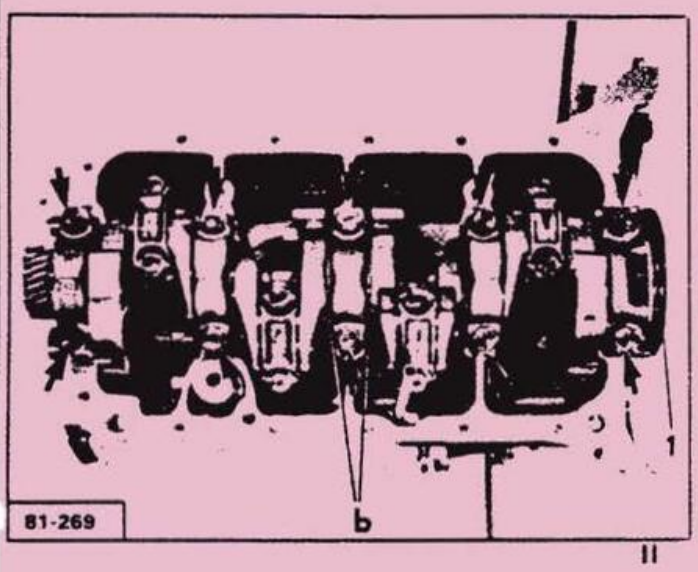
The connecting rod side float should be between 0.04 and 0.25 mm (it is not adjustable).



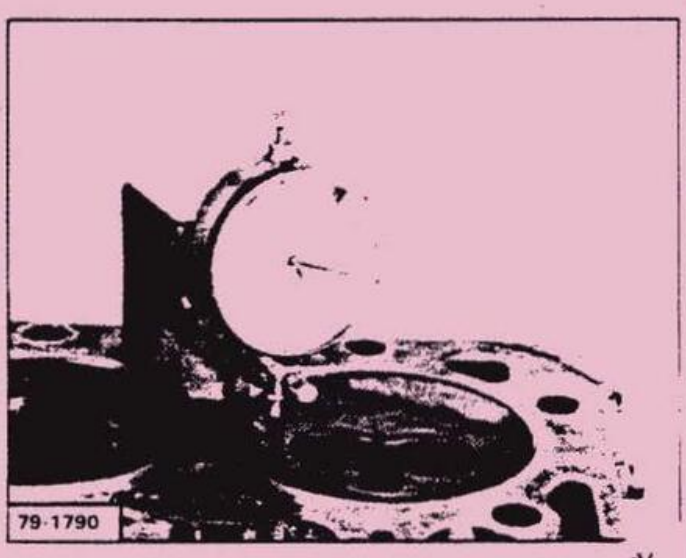
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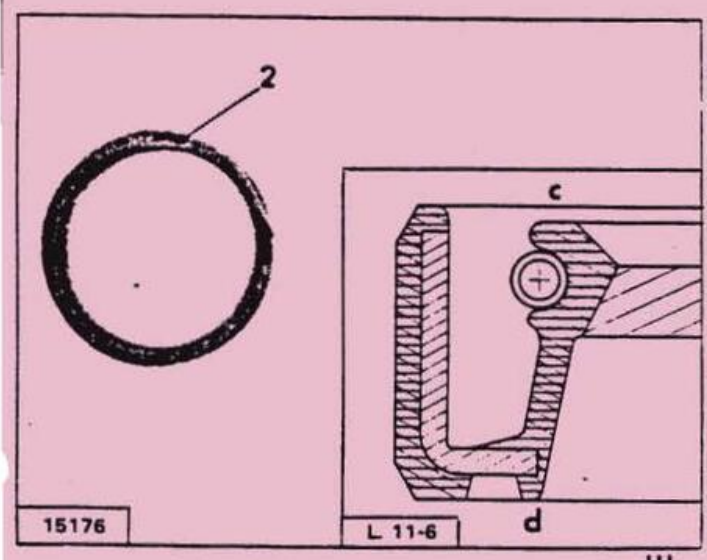
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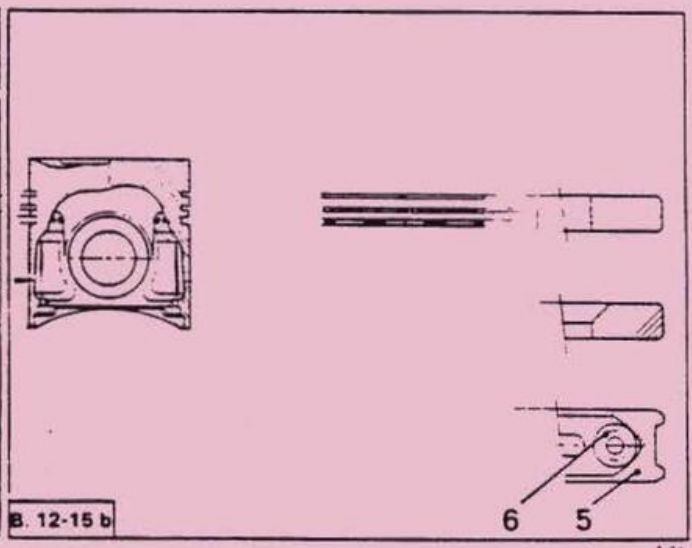
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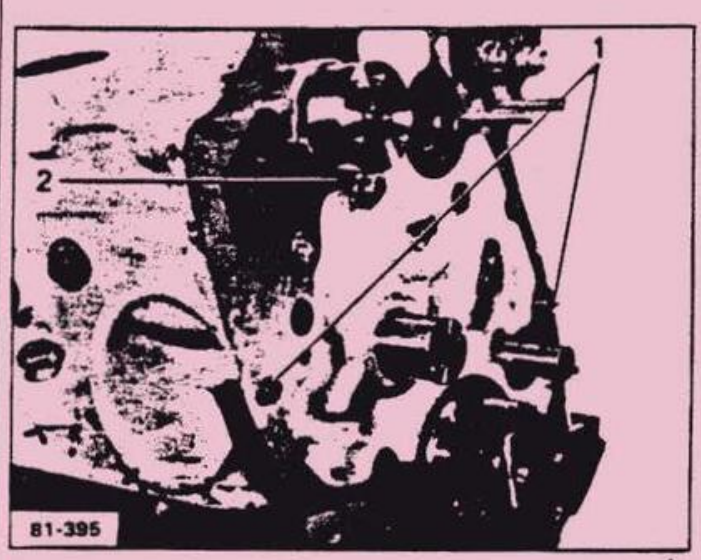
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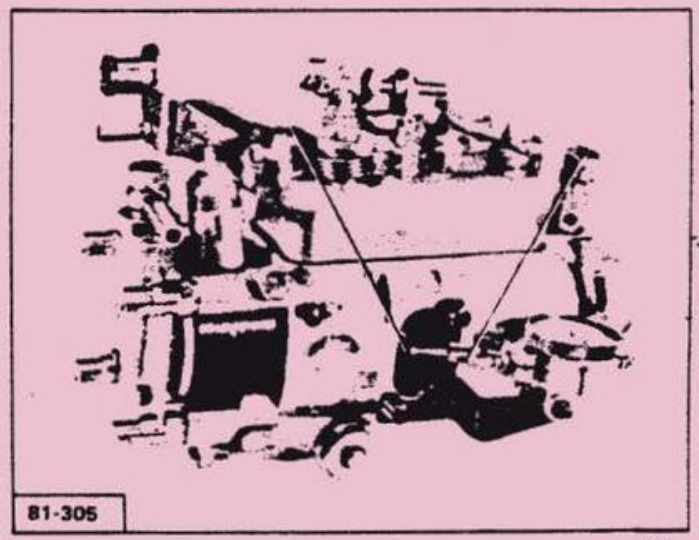
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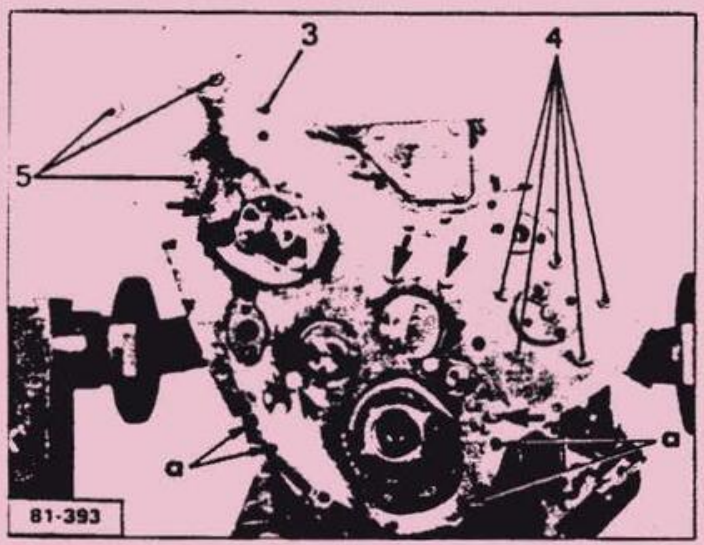
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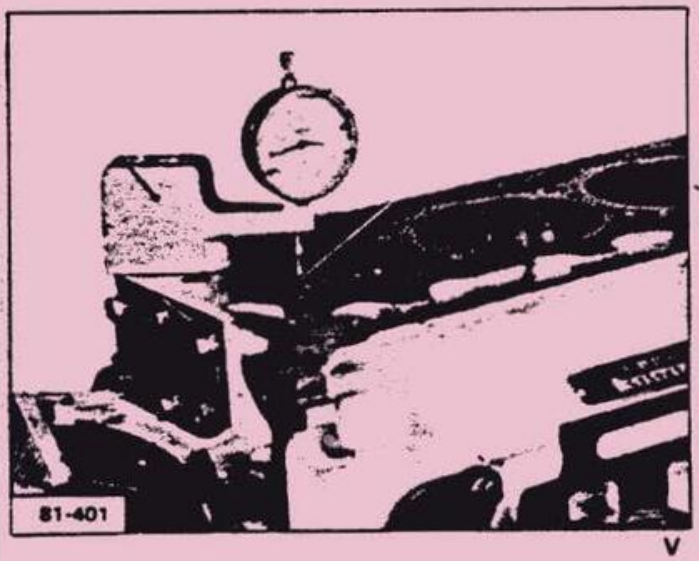
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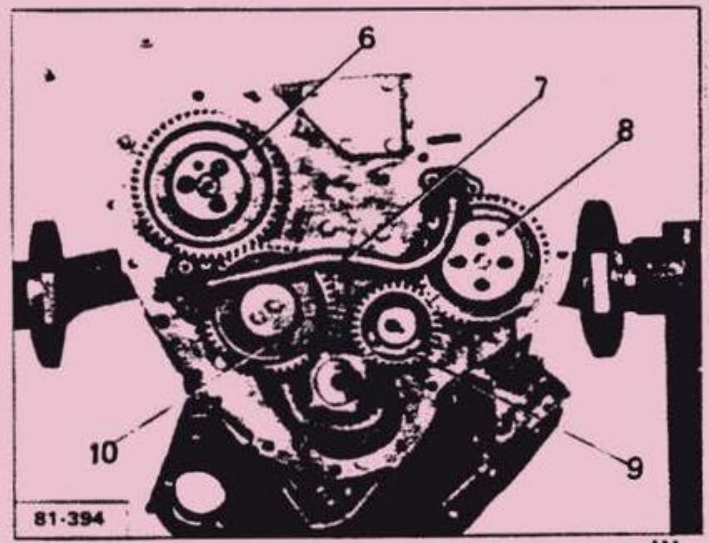
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II



V



III

Fitting the camshaft : Fig. I

Insert the camshaft into the cylinder block. Fit the thrust washer (2), of which there is only one thickness (5.41 mm) into the groove in the camshaft.

The camshaft end float should be between 0.05 mm and 0.36 mm (it is not adjustable).

Ensure that the locating dowels (1) are fitted to the cylinder block.

Fit :
- the sump, without tightening its bolts, after first having coated its locating faces and the bearing rubber seal with jointing compound,
- the front plate (3) equipped with a NEW gasket.

Fit the four housing aligning bolts at "a". Tighten the bolts (⟶) on the sump front plate to a torque of 1.7 m.daN (17 Nm, 12 lbf ft).
Remove the four bolts "a".
NOTE - If the lock nuts (5) on the injection pump securing studs have been removed, refit them with LOCTITE (two drops on the thread lead-in of each) and tighten them to a torque of 1.7 m.daN (17 Nm, 12 lbf ft).

Fitting the oil pump : Fig. II

Fit the oil pump, using a NEW gasket.
Tighten the bolts (4) to a torque of 1.7 m.daN.

Fit the timing gears : Fig. III

(It is essential that the timing gear should be fitted before the cylinder head.

Fit the idler wheel (10) and the camshaft wheel (6).
Position the gear so that the timing marks are aligned.
Coat the base bolts with LOCTITE and tighten them to a torque of 3.2 m.daN (32 Nm, 24 lbf ft).
Fit the oil pipe (7) and the gears (8) and (9).

Fitting the ROTO-DIESEL injection pump and setting the timing Fig. IV and V.

NOTE - The pump is supplied by the Parts Department filled with a corrosion inhibiting fluid.
Drain the pump before fitting it to the engine.

Find the pump internal timing point
Remove the plate.
Fit from kit 8.0117 :
- dial indicator support AF,
- extension H,
- dial indicator F,
- dial indicator angle adaptor AG.

Turn the rotor in the normal direction of rotation of the pump (as shown by the arrow on the manufacturer's number plate) to bring the timing "V" groove in line with the dial indicator extension. Stop when the dial indicator pointer starts to move in the opposite direction (this means that the plunger is at its lowest point and corresponds to the No. 1 cylinder timing point).

Find the initial timing position :
Place the piston on No. 1 cylinder at the flywheel end) in roughy the TDC position by turning the crankshaft in the normal direction of rotation of the engine.
Check that the timing marks are in line, this means that No. 1 cylinder is on the compression stroke.
Place support 8.0110 H, fitted with dial indicator 8.1504 and extension 8.0316 M on the cylinder block with the dial indicator plunger against the piston of No. 1 cylinder (at the flywheel end). Find the piston TDC position.
Place the 0 on the dial indicator dial in line with the large pointer on the dial, at the exact moment when the pointer starts to change direction and note the position of the small pointer.
Turn the crankshaft back by approximately a quarter turn and set No. 1 cylinder on its injection point, which is :

5.12 mm or 24° } before TDC

Fitting the injection pump and setting the timing : Fig. I

Place the injection pump in position on the engine front plate, using a NEW gasket and moving it as far as it will go in an outward direction, as shown by the arrow (➡).
Tighten the nuts finger tight (against the load distribution plates).
Place the connecting lug (2) between the pump rear mounting point and the engine mounting point (tighten the bolts finger tight).
Check that the pump is on its internal timing position.
Fit the pump drive gear.
Tighten the bolts to a torque of 2.5 m.daN (25 Nm, 18 lbf ft).
Move the pump towards the engine until the dial indicator pointer starts to move in the opposite direction (which shows that the dial indicator extension has reached its lowest point).
Tighten the pump securing nuts (1) to 3 m.daN.
Tighten the bolts that secure the rear mounting connecting lug (2).

The dial indicator pointer should not move when the bolts are tightened.

Check the pump timing : Fig. II

Return the piston to T.D.C. and check that the dial indicator 8.1504 is still on its correct setting.
Move the crankshaft back through one quarter of a turn then turn it in its normal direction of rotation until the pump internal timing point is reached.
In this position, the dial indicator 8.1504 should indicate the initial timing figure of :
5.12 ± 0.03 mm before T.D.C.
If it does not, check the injection pump timing.

REMARK : If the pump is as far as it will go on its slots and the correct timing still cannot be obtained, the pump is to be refitted.

Remove the dial indicator and its support and also the dial indicator extension.
Fit the cover plate to the injection pump and seal its bolts.

Fit the timing cover : Fig. III

Fit :
- a NEW timing cover gasket,
- the timing cover,
- the shakerproof washers under the nuts (5),
- the copper washer under bolt (4),
- the lifting eye (3).

Tighten the cover securing nuts and bolts to a torque of 1.7 m.daN (17 Nm, 12 lbf.ft).

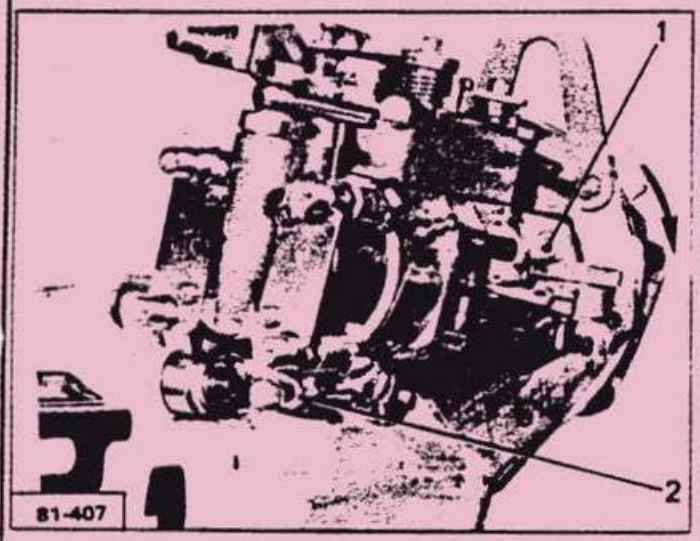
Fit the oil suction pipe : Fig. IV and V

Fit to the pipe (6) :
- flange (9),
- O-ring seal (8),
- plate (7),
- paper gasket (a).

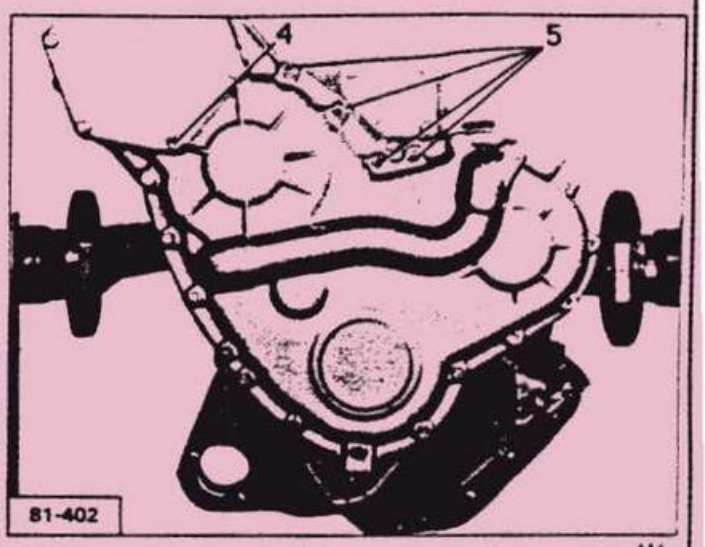
Fit the suction pipe and tighten the bolts (➡).

Fit the oil strainer : Fig. VI

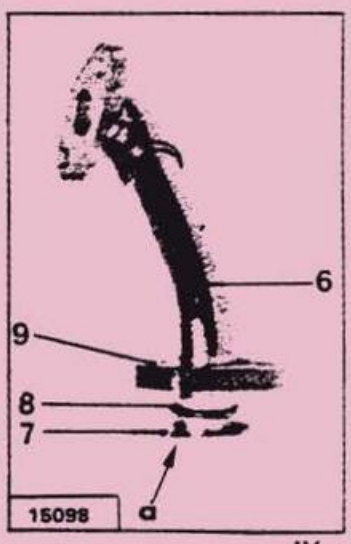
Fit the anti-frothing plate (10).
Fit the strainer (11) and its O ring seal.
Fit and tighten the bolts (12).
Fit the sump cover, using a NEW gasket.
Tighten the bolt.



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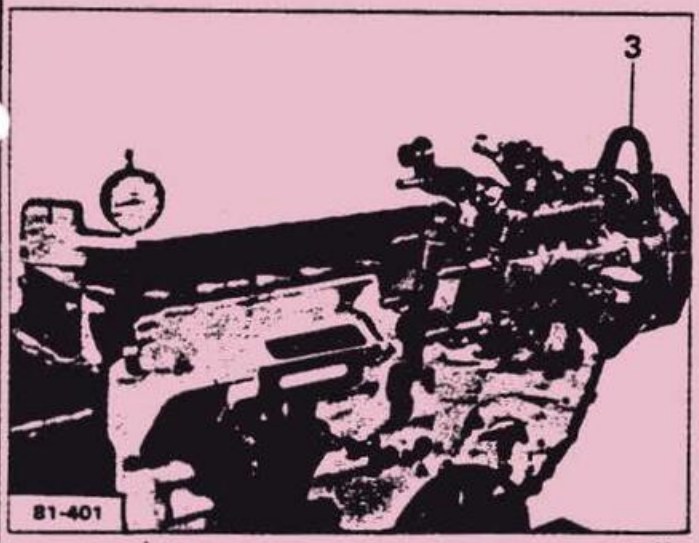
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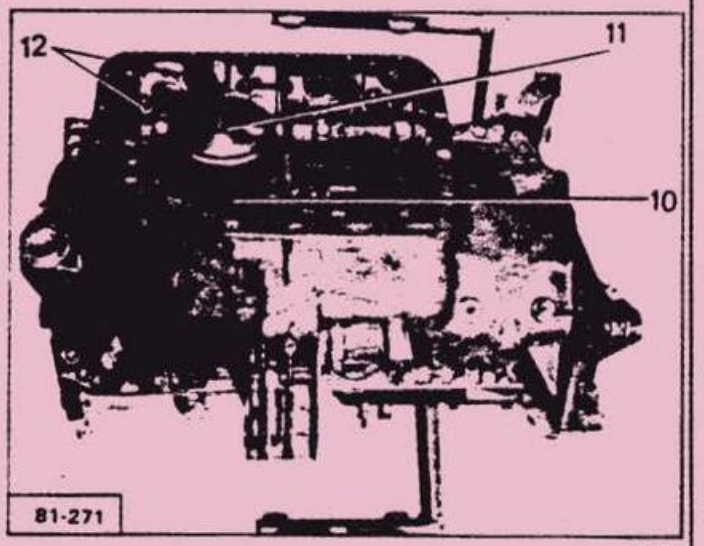
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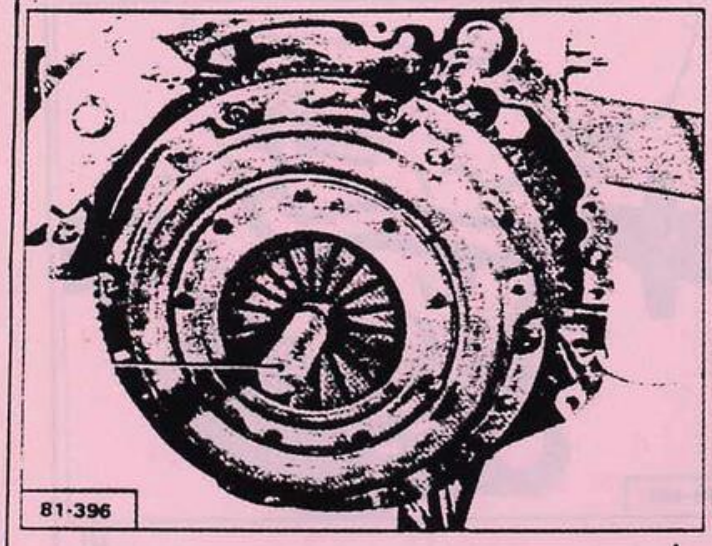
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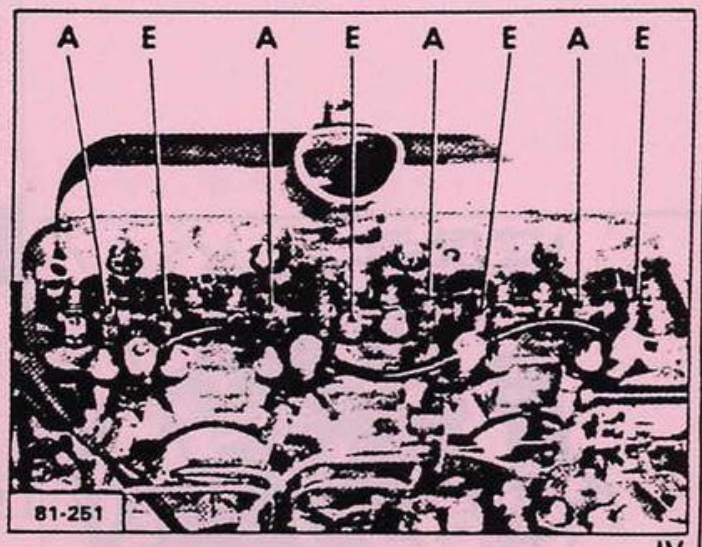
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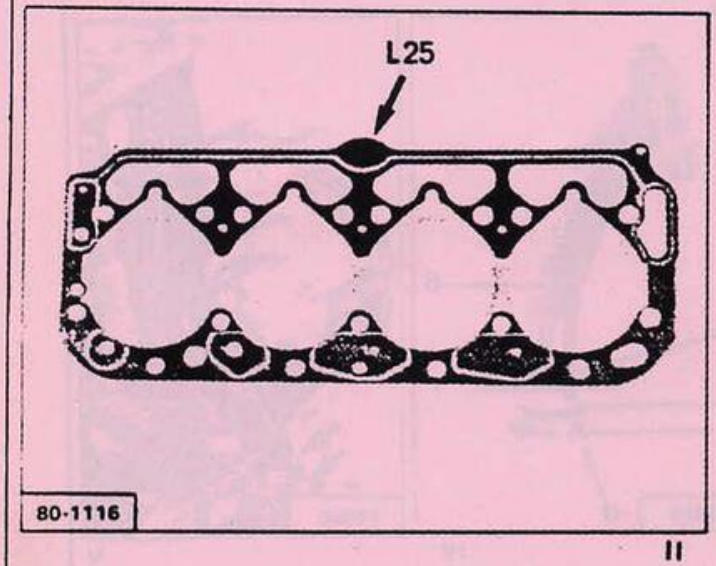
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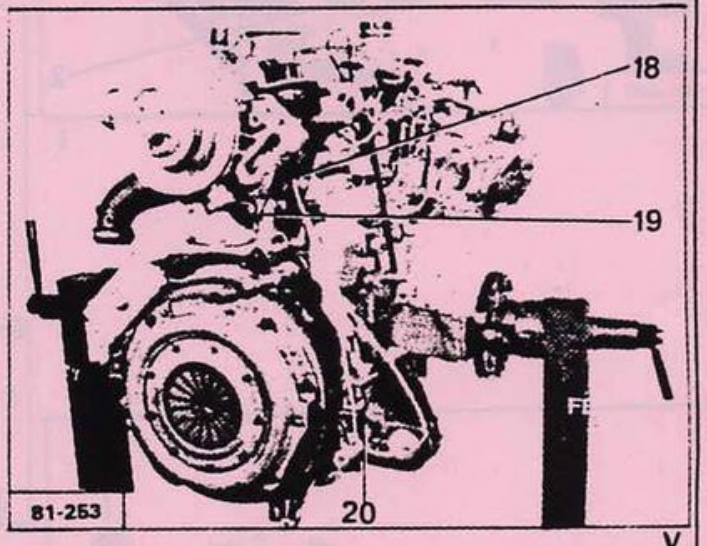
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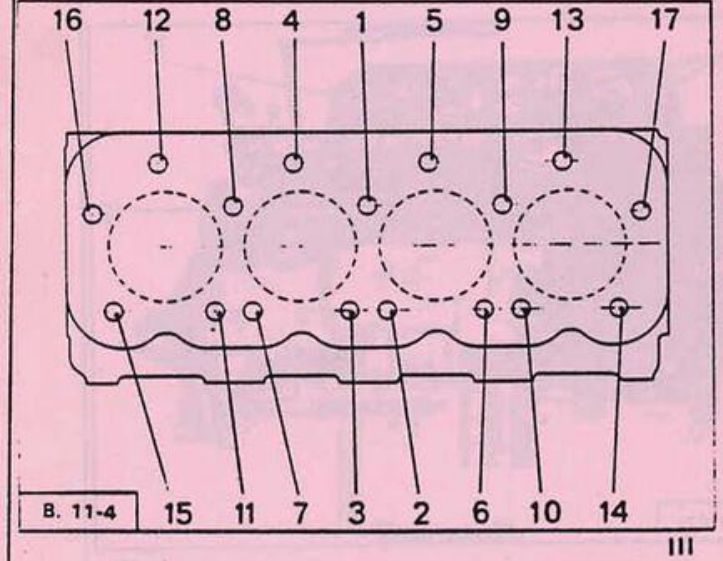
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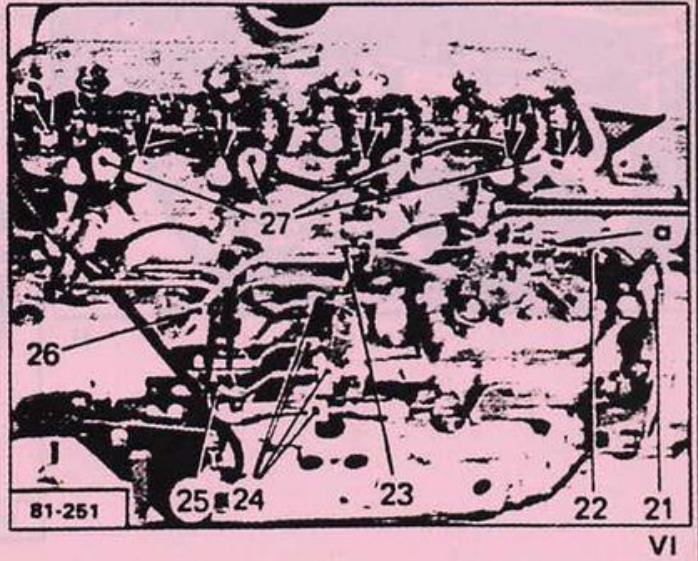
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V



III



VI

Fitting the flywheel : Fig. I

Fit the new bolts, coated with LOCTITE and tighten them to a torque of 9 m.daN (90 Nm, 66 lbf ft).

Fit the clutch friction disc and mechanism using mandrel 8.0212.
Tighten the bolts to 3.5 m.daN (35 Nm, 26 lbf ft).

Fit the cylinder head : Fig. II and III

Fit the tappets and push rods.
Fit the cylinder head gasket.

Check that the cylinder head gasket is marked with the reference L25 on its tab.
This gasket is to be fitted dry (it must not be coated with linseed oil) : Fig. II.

Fit the cylinder head :

Before fitting it :
- Clean out the threads in the block.
- Lubricate the bolt thrust faces and threads with gear oil.
- The washers are to be fitted, unlubricated, with their tags on the cylinder head side.

Initially tighten the bolts to a torque of 6 m.daN (60 Nm, 55 lbf ft).

Finally tighten them to a torque of 10.5 m.daN (105 Nm, 77 lbf ft).

For the bolt tightening order : see Fig. IV.

Adjust the valves clearances : in Fig. IV.

A = Inlet = 0.30 mm
B = Exhaust = 0.20 mm

Fit : as shown in Fig. V

- the oil pipe (19),
- the diagnostic wiring harness (18),
- the T.D.C. pick-up (20).

Connect up the fast idle cable : Fig. VI.

Fit the cable cover (26) and the cable cover end clamp (23).
Pass the cable through the idling speed stop and fit the cable clamp (22).
Push the cable clamp as far as it will go in direction (a) and tighten its nut whilst holding the cable tight.
Fit lug (21) and the idling return spring.

Fit the injection assembly : Fig. VI

Fit the injection pipes assembly (25) and position the injectors so that the pipes are not under stress.

Tighten the nuts (➡) to a torque of 2.4 m.daN (24 Nm, 18 lbf ft).
Tighten the union screws (27) to a torque of 1 m.daN (10 Nm, 7 lbf ft).
Tighten the unions (24) on the injection pipes to a torque of 2.4 m.daN (24 Nm, 18 lbf ft).

Remove the engine from its cradle using lifting sling 8.0102 X and hooks G.

Fit :
- the oil filter cartridge support,
- the oil filter cartridge (spanner 8.1404).

Fill the engine with oil.

TOOLS REQUIRED

SPECIAL TOOLS

I

From engine overhaul kit (-).0157 :

A - Mandrel for fitting camshaft double lip seal.

B - Mandrel for fitting crankshaft double lip seal.

C - Mandrel for fitting oil pump double lip seal.

D and E - Centralising rings for timing gear plate.

H and J - Extractor, injection pump gear.

K - Balance weight, adjusting belt tension.

II

From engine kit (-).0132.

III

(-).1504 - Dial indicator gauge.

IV

From engine kit (-).0110 :

H - Dial gauge support.

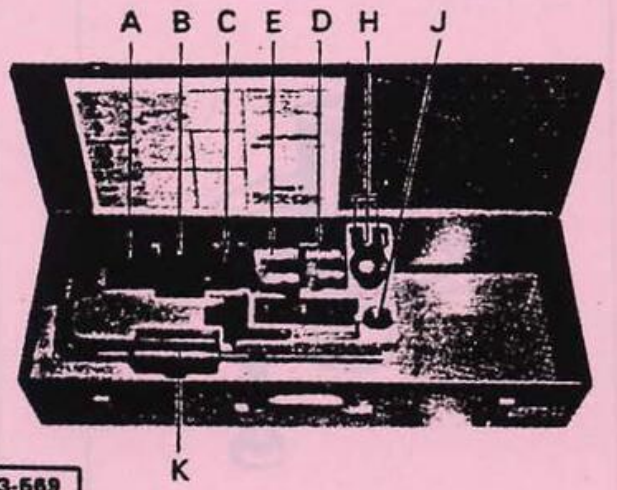
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AB - Fitting ring to crankshaft oil seal, flywheel end.

AC - Seal fitting plate.
(used with AB and 2 flywheel bolts).

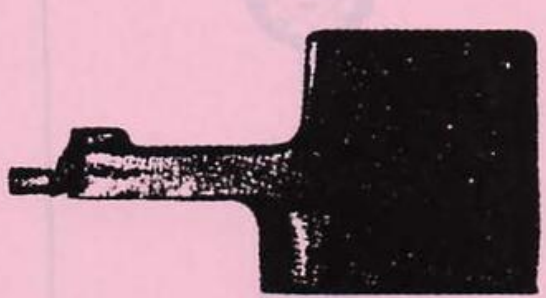
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(-).0212 - Reversible mandrel, for centralising the clutch plate.



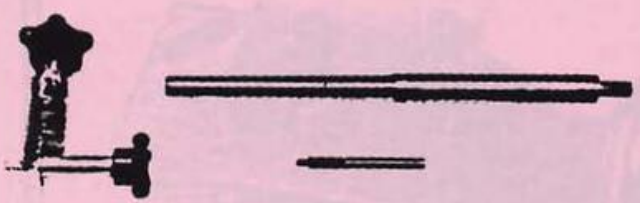
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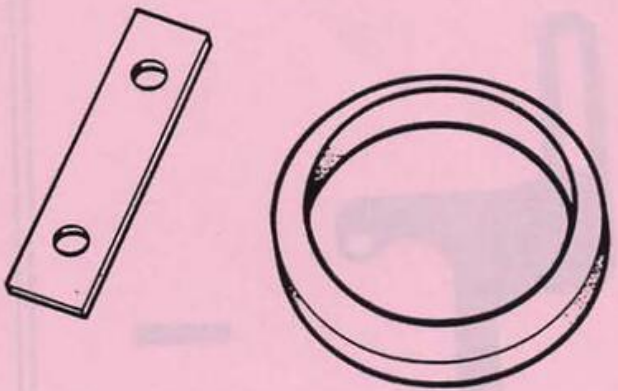
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IV

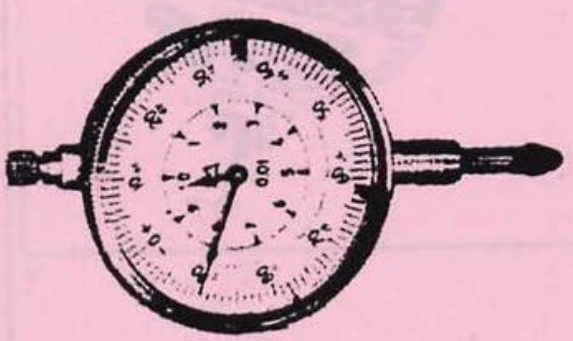


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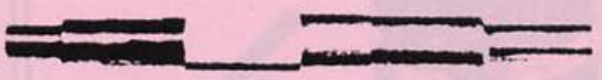


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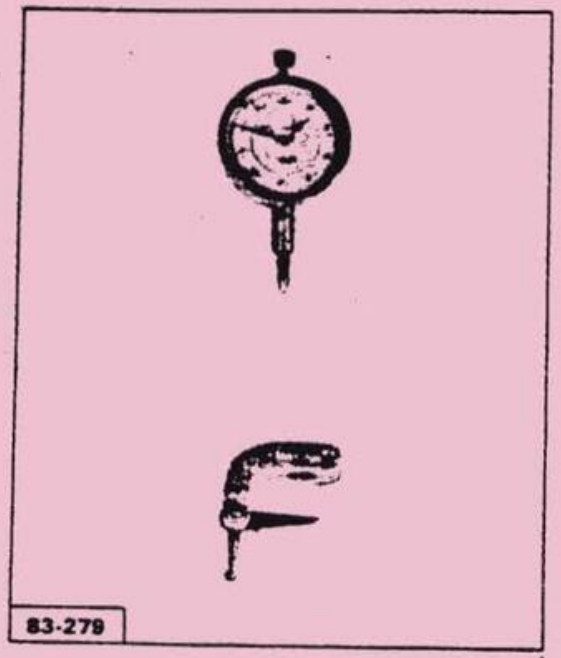
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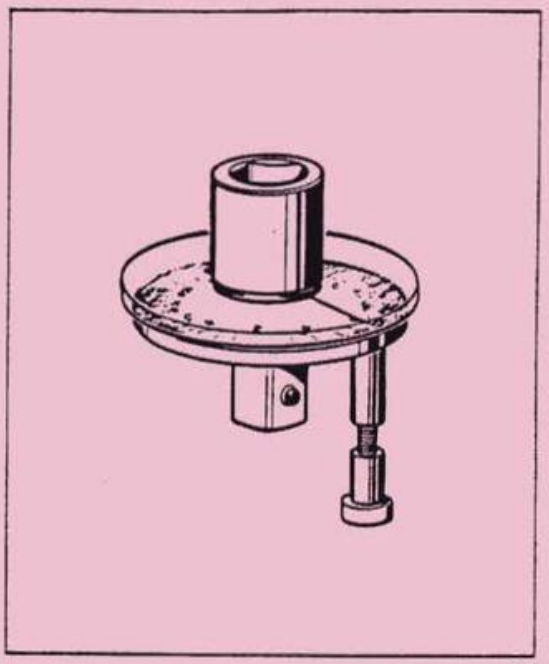


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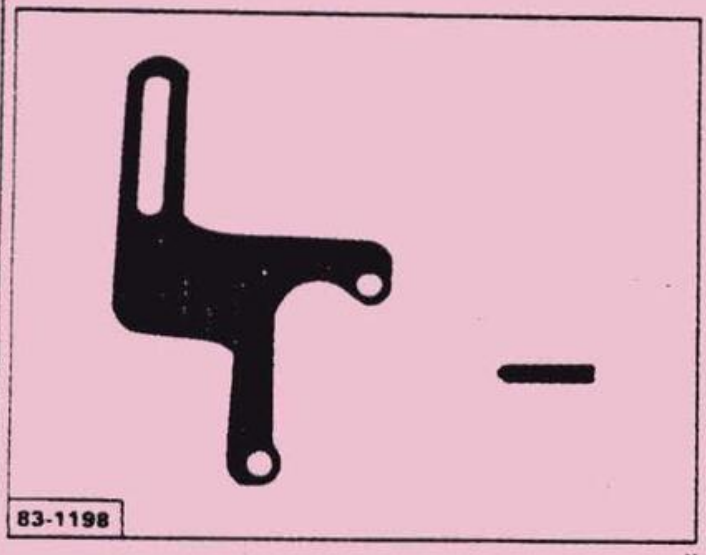
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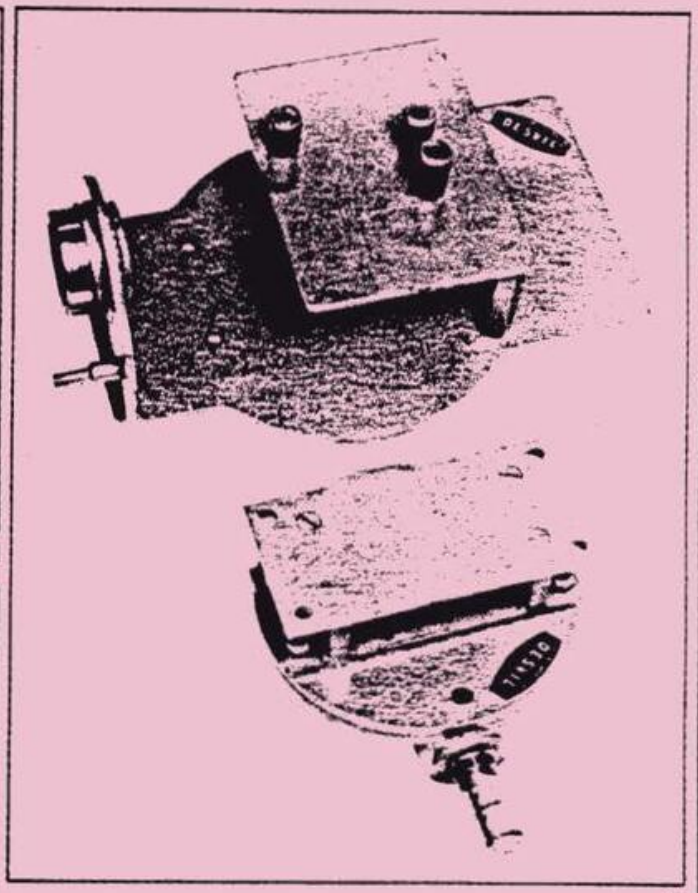
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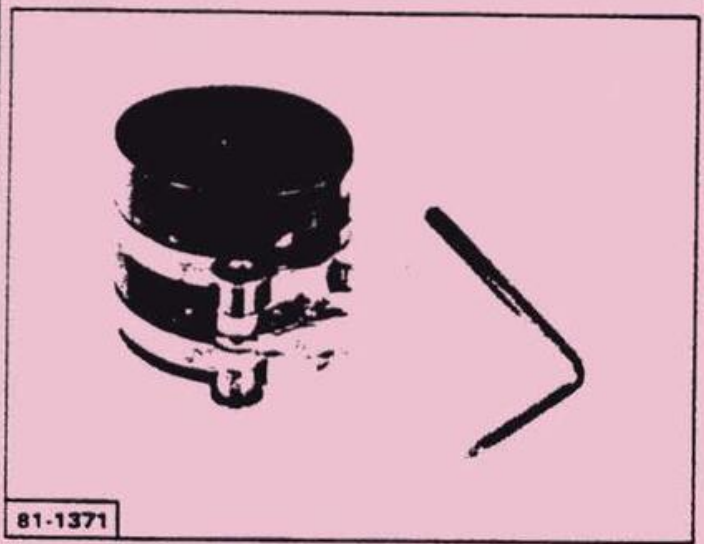
IV



II



V



III

TOOLS REQUIRED

SPECIAL TOOLS (continued)

I

From injection pump calibration kit (-).0117:

F - Dial gauge for pump.

AG - Bell crank for pump.

II

AL - Dial gauge support for pump (special for U25/661 engine).

H - Plunger for ROTO-DIESEL pump.

III

RECOMMENDED TOOLS

Piston ring compressor.

IV

Angular tightening tool for cylinder head bolts. FACOM D 360 (Part Number 9770.42).

V

DESVIL engine overhaul fixtures.

Support for U25/651 and 661 diesel engine ref. 153/3 (see Workshop Materials and Equipment Brochure).

Standard support ref. 126 (see Workshop materials and Equipment Brochure).

TIGHTENING TORQUES

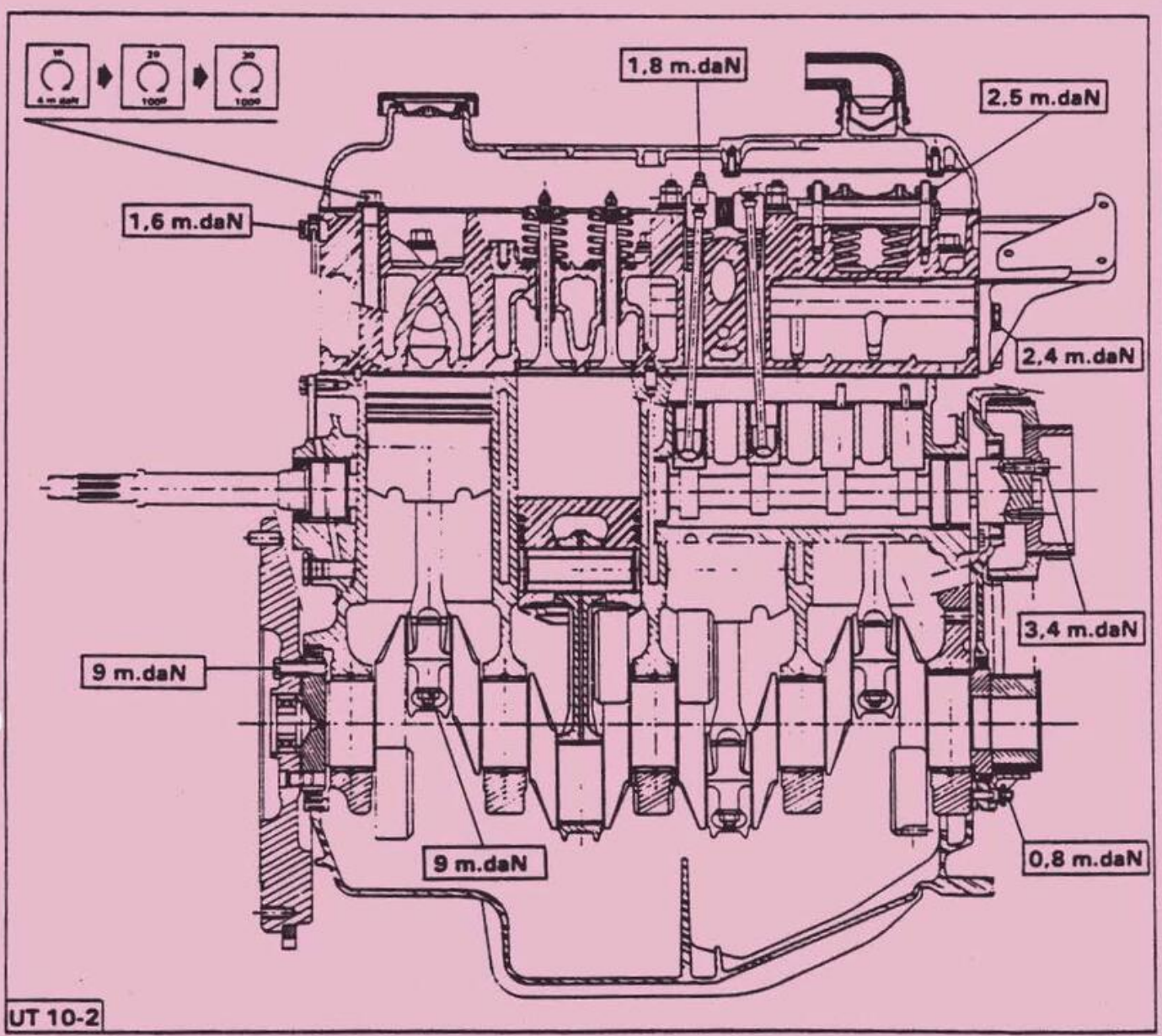
ESSENTIAL tightening torques (use a torque spanner) 

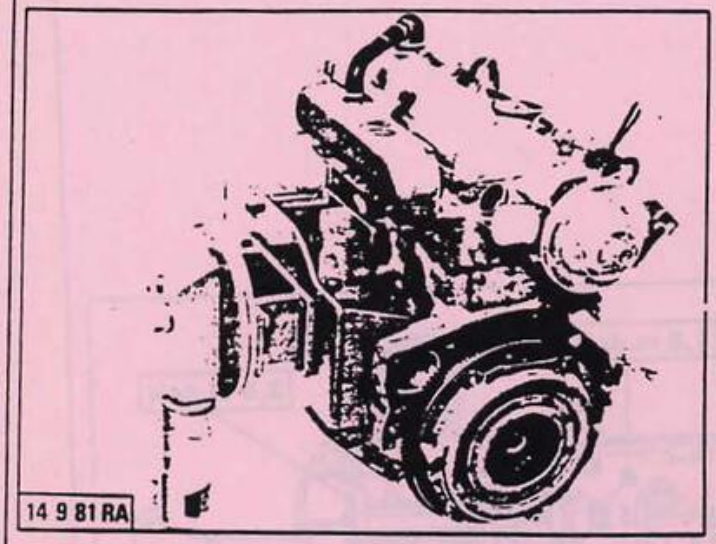
Item	Torque		Remarks
	m.daN	lbf ft	
Main bearing cap bolts	9.5	70	Fit new bolts on re-assembly
Fast idle control thermostatic pick-up	1.75	13	Assemble with LOCTITE SEAL

Recommended tightening torques :

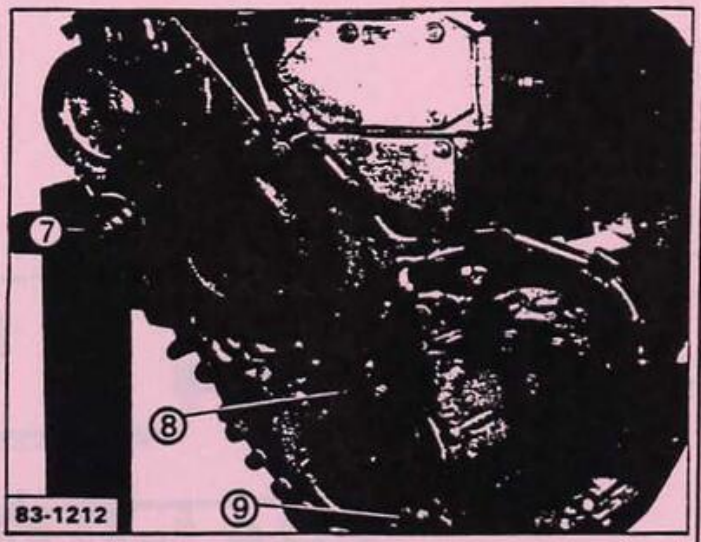
Item	Torque		Comments
	m.daN	lbf ft	
Camshaft gear securing bolt	34	250	
Oil pump gear securing bolt	2.1	15	
Injection pump gear securing nut	6	44	
Lower crankcase bolts	1.6	12	
Sump plate bolts	1.1	8	
Timing gear plate bolts and nuts	1.5	11	
Bolt, camshaft thrust plate	1.6	12	
Injection pump fixing bolt and nut	2.2	16	Fit with THREADLOCKING LOCTITE
Injection pipe retaining nuts	2.3	17	
Banjo bolts, injector leak-off pipes	0.9	7	
Injector clamp nuts	2.35	17	
Pre-heater plugs	2	15	
Cylinder head lubrication pipe union	1.6	12	Copper washer
Oil drain plug	4	30	Copper washer
Cylinder block coolant drain plug	3.5	26	Copper washer
Bolt, engine mounting to cyl. head	2.4	18	Copper washer

The figures illustrated are the tightening torques in m.daN.
1 m.daN = 7.38 lbf ft.

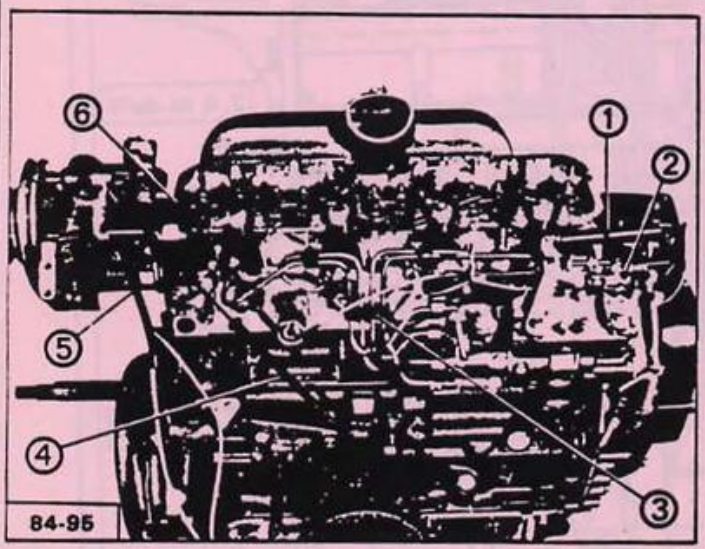

1,8 m.daN
2,5 m.daN
1,6 m.daN
2,4 m.daN
3,4 m.daN
9 m.daN
9 m.daN
0,8 m.daN
UT 10-2



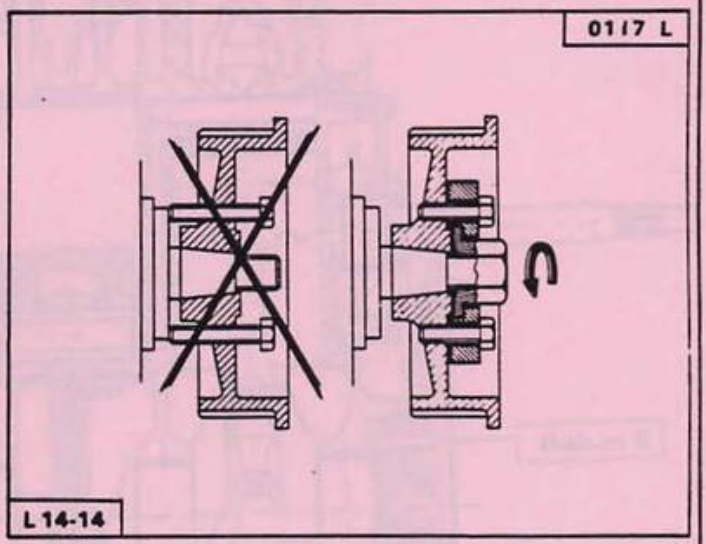
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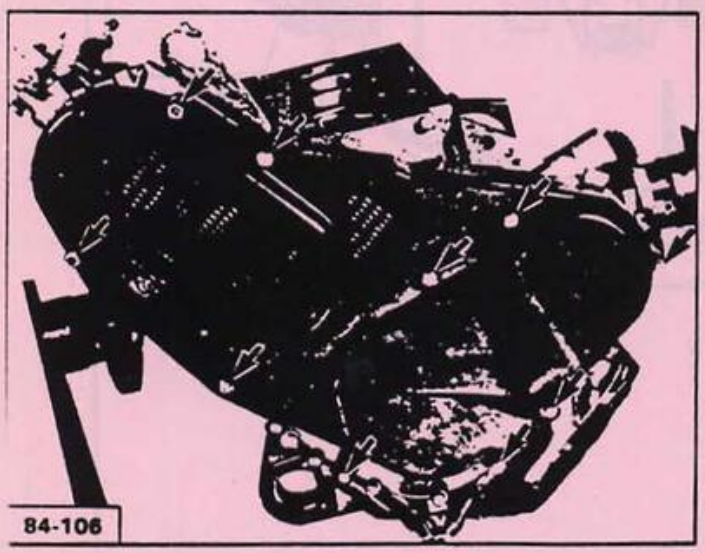
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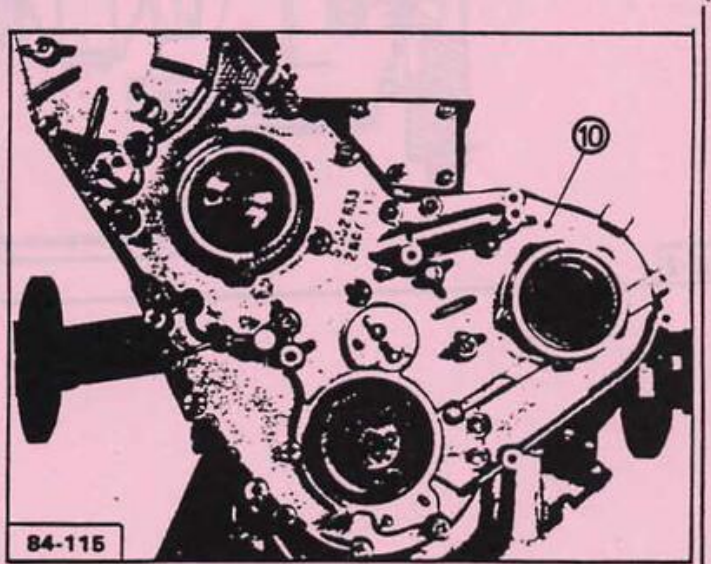
II



V



III



VI

The method described here has been carried out on an unapproved fixture.

Use the DESVIL fixture fitted with supports referred to on the "Special Tools" page.

DISMANTLING

Remove :
- the starter motor,
- the exhaust manifold,
- the cylinder block coolant drain plug,
- the dowel pin located at → Fig. I,
- the oil pump inlet pipe.

Attach the DESVIL engine support to the cylinder block using two bolts :
- on M 12 x 1,75 x 70,
- one M 7 x 1,00 x 60.

Mount the assembly to the stand fitted with the standard support Fig. I.

Drain the engine.

Remove : Fig. II
- the cylinder head cover,
- the fast idle control (2) and the spring (1),
- the injector pipes assembly,
- the diagnostic harness (5),
- the dipstick tube (4),
- the cylinder head lubrication pipe (6),
- the rocker shaft assembly,
- the push rods (mark their positions),
- the cylinder head bolts.

Lift off the cylinder head and its gasket.

Remove the tappets (mark their positions).

Remove the upper and lower timing covers Fig. III.

Remove : Fig. IV and V :
- the damper (9),
- the belt tensioners (7) and (8),
- the pump and timing gear belts,
- the camshaft and oil pump gears.
- the injection pump gear Fig. V, using tool (-).0117 H and J,
- the oil supply pipe,
- the oil pump and the injection pump.

Remove the nuts and bolts and lift off the timing gear plate (10).

Remove : Fig. I

The camshaft thrust plate (1).

Remove the camshaft.

Remove :

- the clutch assembly,
- the flywheel,
- the sum plate,
- the lower crankcase (2) (bolt) Fig. II.

Remove the piston/connecting rod assemblies: Fig. III.

Mark the positions of the pistons in relation to their bores.

DO NOT INTERCHANGE BIG END CAPS

- remove the big end caps (3),
- remove each piston/connecting rod assembly when it is at T.D.C.

Remove the crankshaft Fig. III

- remove the main bearing caps (4),
- lift out the crankshaft,
- remove the bearing shells and the thrust washers.

Strip the cylinder block : Fig. IV.

Remove :

- the dipstick guide,
- the front and rear (5) coolant circulation plates,
- the oil gallery plugs (6).

Clean the threads in the cylinder block.

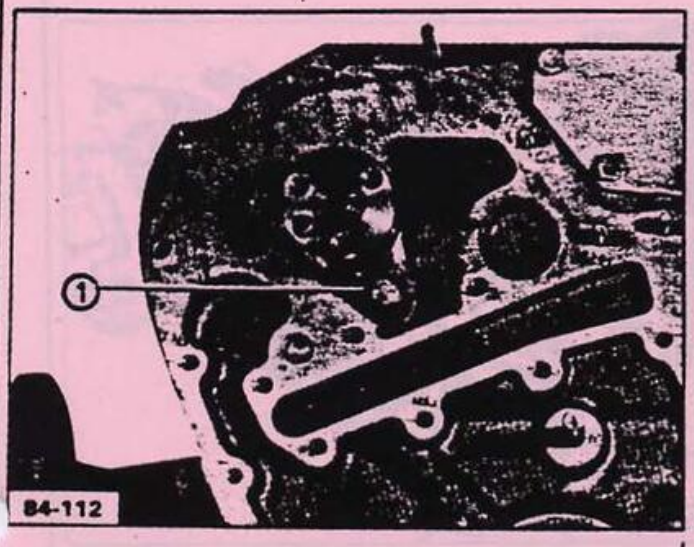
Dismantle the piston/connecting rod assemblies, Fig. V.

- remove the piston rings,
- remove the gudgeon pin circlips,
- remove the gudgeon pins.

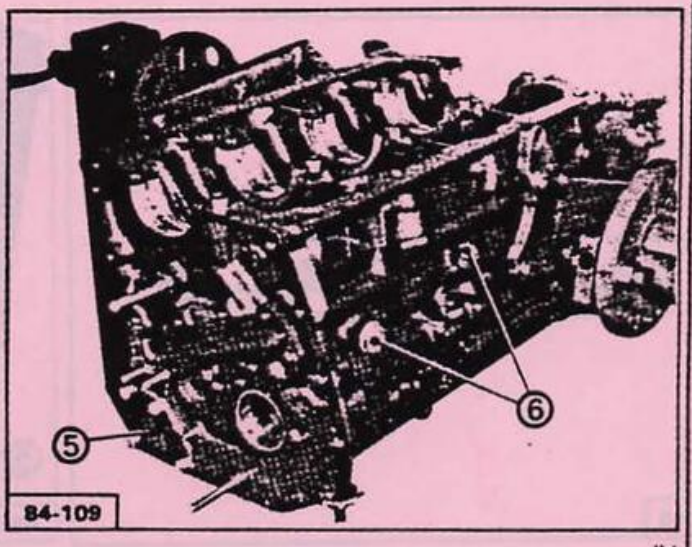
Dismantle the oil pump Fig. VI.

- remove the circlip and withdraw the relief valve,
- separate the pump body.

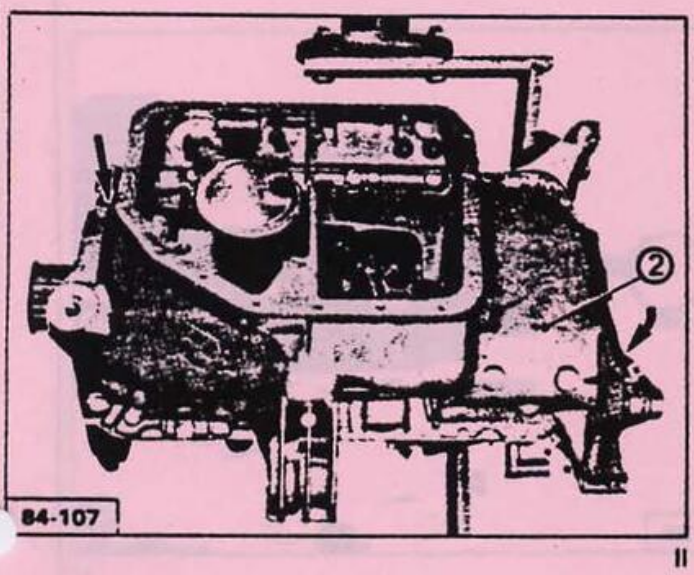
CLEAN THE PARTS AND CHECK THEIR CONDITION TEST IF NECESSARY



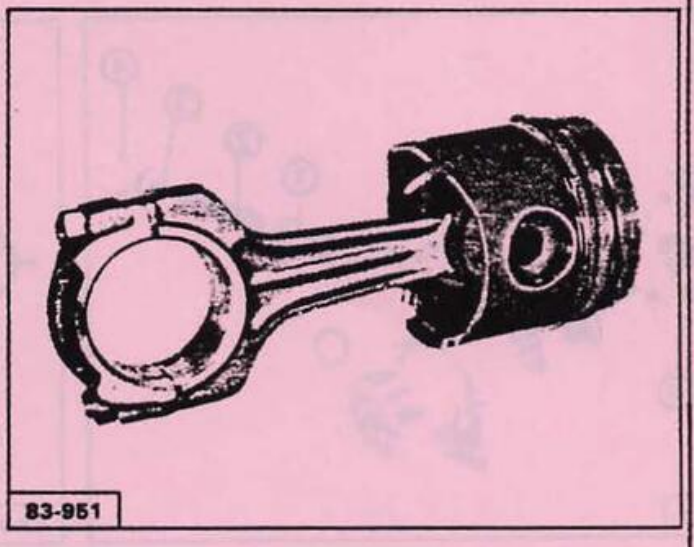
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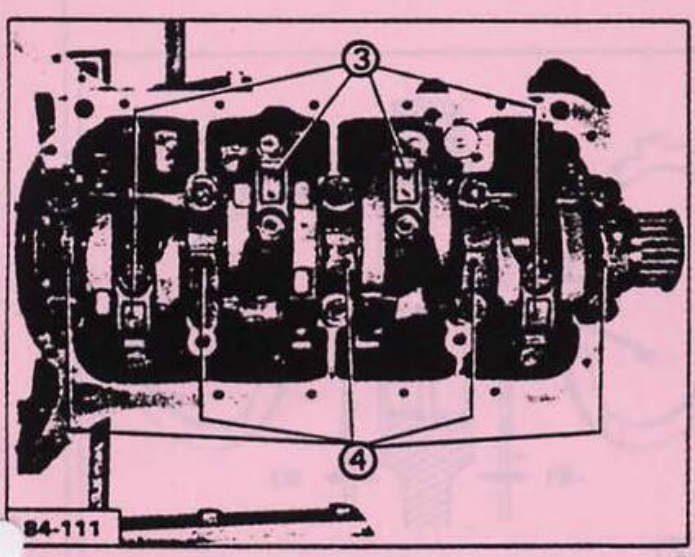


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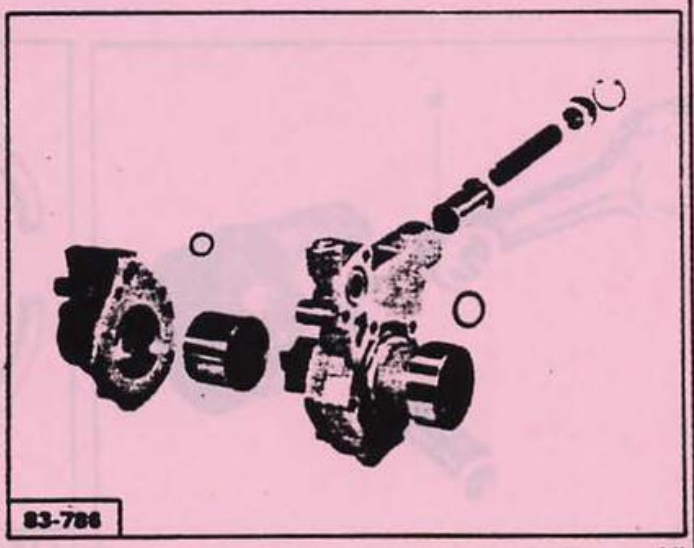


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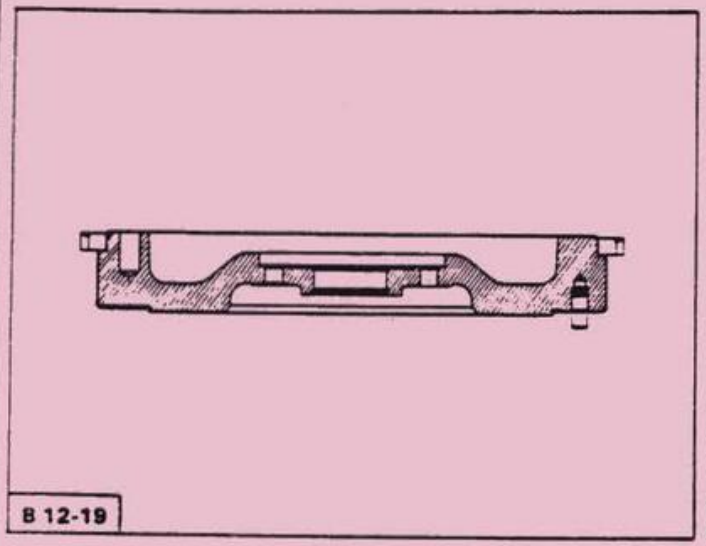




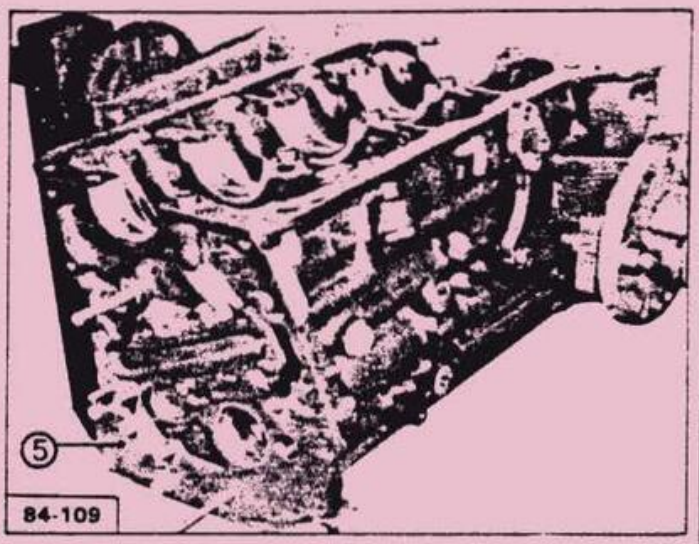
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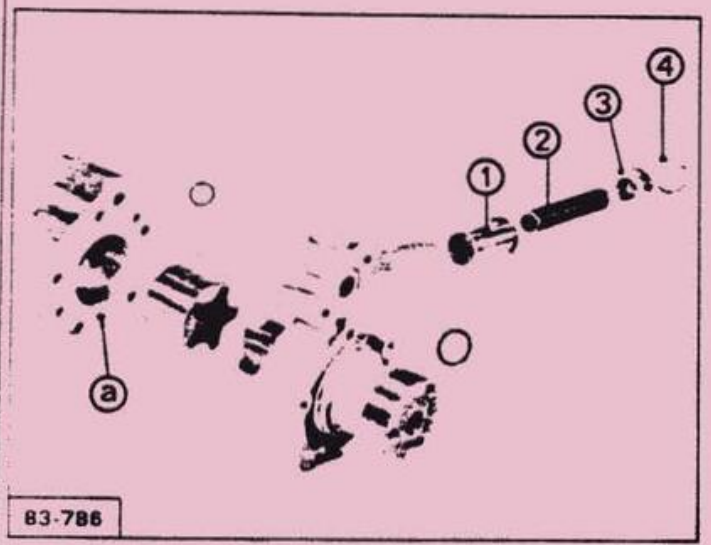
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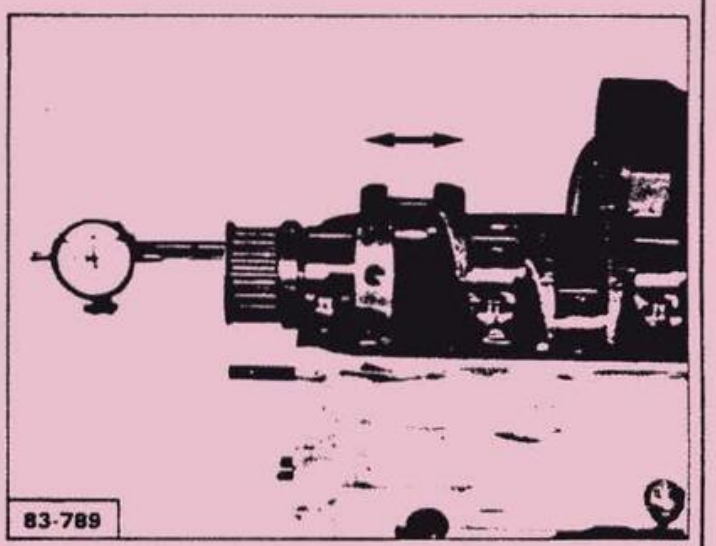
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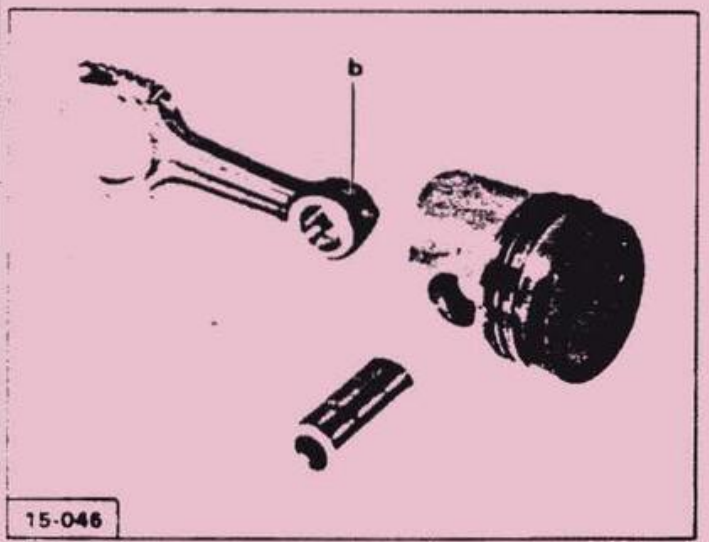
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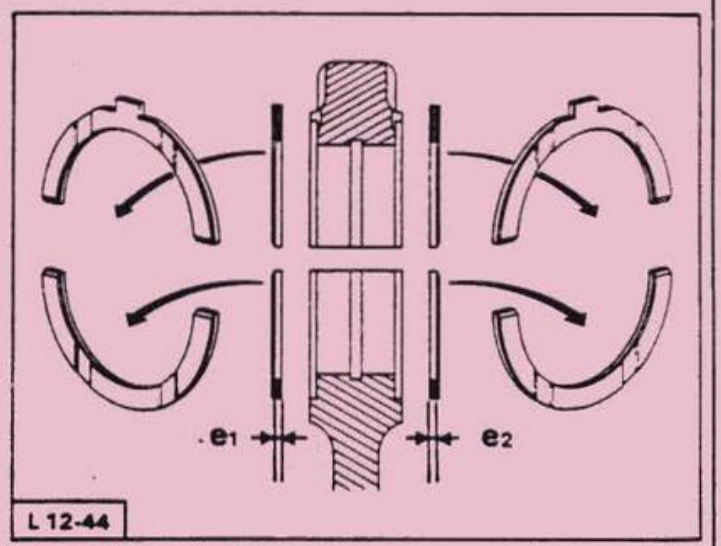
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V



III



VI

RE-ASSEMBLY

DURING THIS OPERATION ALL THE MOVING PARTS MUST BE OILED

Prepare the flywheel Fig. I.

Change the spigot bearing (if necessary).

Replace the starter ring gear (if necessary).

Check the ring gear run-out : 0.3 mm max.

Prepare the oil pump : Fig. II.

Coat the edge "a" of the pump body with LOCTITE SEAL :

Position in the pump body :

- the drive shaft,
- the oil pump gears,
- assemble the pump.

Assemble the pressure relief valve :

- the piston (1),
- the spring (2),
- the plug (3) with its washer,
- the circlip (4).

Assemble the pistons to the connecting rods Fig. III

Position the connecting rod so that the spray hole "b" is towards the cut-out in the piston crown.

Fit one of the gudgeon pin circlips.

Offer up the connecting rod and fit the gudgeon pin.

Fit the circlip.

Dress the cylinder block : Fig. IV.

Fit the oil gallery plugs.

Fit the coolant circulation plates (5).

Fit the dipstick guide parallel to the axis of the block and directed towards the flywheel.

Fit the crankshaft Fig. IV.

Fit :

- the bearing shells to the block and to the main bearing caps,
- the crankshaft,
- the upper half thrust washers to each side of the centre main bearing to obtain an end float of :

0.045 to 0.16 mm.

This end float is checked using tool (-).0132. E1, E2, E3 see Fig. V.

End float is adjusted by fitting thrust washers.

These washers have a grooved anti-friction face which MUST be towards the crankshaft Fig. VI.

Grades of thrust washers :

Thickness (e) :	I	- 3.10 to 3.14
	II	- 3.14 to 3.18
	III	- 3.18 to 3.22
	IV	- 3.22 to 3.26

The thrust washers on the same side of the centre bearing must be the same thickness, but the two sides can be different. ($e1 \neq e2$).

Fit the main bearing caps : Fig. I and II.

NOTE : Before fitting No. a (flywheel end) main bearing cap, coat the shaded face "a" with LOCTITE SEAL. Do not use too much, as it must not form runs.

IMPORTANT - The main bearing cap bolts must be renewed on re-assembly.

Fit the lower thrust washers at "b" and fit the main bearing caps.

Tighten the bolts ( ), with the threads oiled, to 9.5 m.daN (70 lbf ft).

Fit the seal (1) to the channel in No. 1 (flywheel end) bearing cap.

Before fitting the oil seal (2), oil the lips and the seal housing. The arrow must correspond to the direction of engine rotation (anti-clockwise, viewed from the flywheel end).

Oil the entry cone of tool (-).0110 AB and fit the seal over it.

Using 2 flywheel bolts, fit the seal into its housing as shown in Fig. III.

Withdraw the ring AB with a turning movement.

Fit a new camshaft oil seal (3) using a socket or tube with an outside diameter of 35 mm.

Fit the piston/connecting rod assemblies without piston rings.

Fit the bearing shells to the connecting rods and caps.

The upper shell has a groove and a lubrication hole.

Fit the piston/connecting rod assembly in the bore with the crankpin at T.D.C.

According to its nominal diameter the piston must be proud of the block face by :

Diameter (mm)	Protusion (mm)	
93	0.5	+ 0.05 – 0
93.25	+ 0.47	
93.50	0.44	
93.75	0.41	

Check using dial gauge (-).1504 and support (-).0110 H.

If incorrect, rectify the piston height.

Fit the rings to the pistons. The gap in the oil control ring (6) must be at 180° to the gap in the expander (5) Fig. V.

Note - The rings have an inscription engraved on a face near the gap. This face must be fitted towards the top.

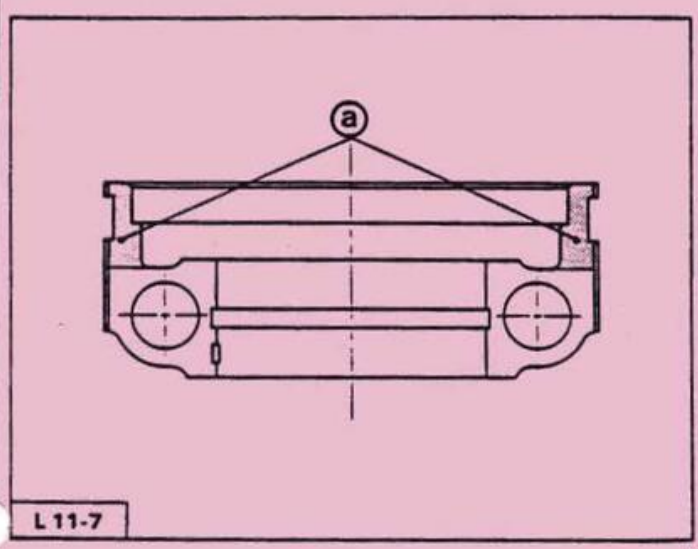
Stagger the gaps at 120° to each other.

Fit the piston/connecting rod assembly with the crankpin at T.D.C., with the cut-out in the piston crown towards the camshaft. Use a piston ring compressor.

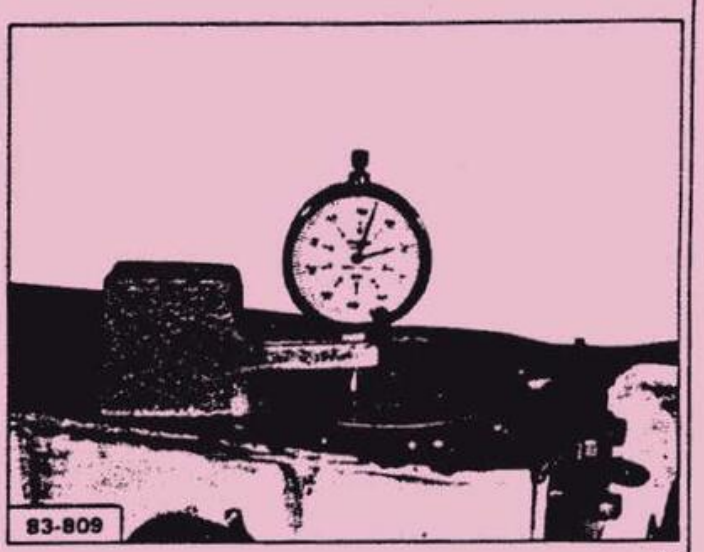
Important - New big end bolts must be fitted on re-assembly.

Tighten the big end bolts to 7.6 m.daN (56 lbf ft).

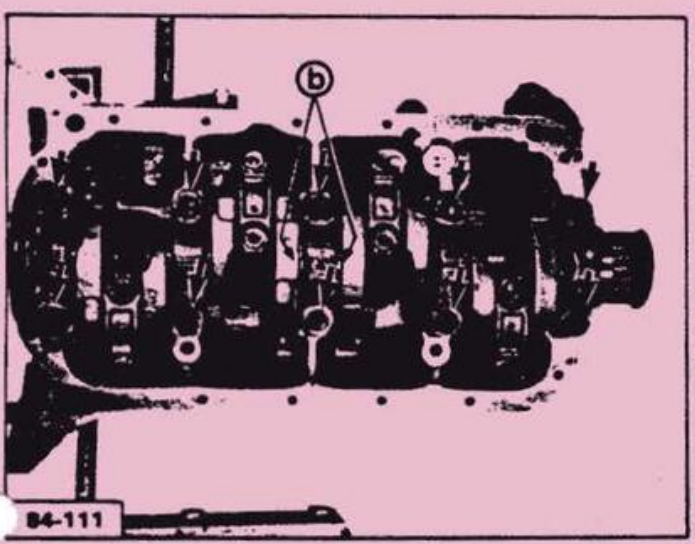
The side clearance of the connecting rods must be between 0.04 and 0.25 mm (non adjustable).



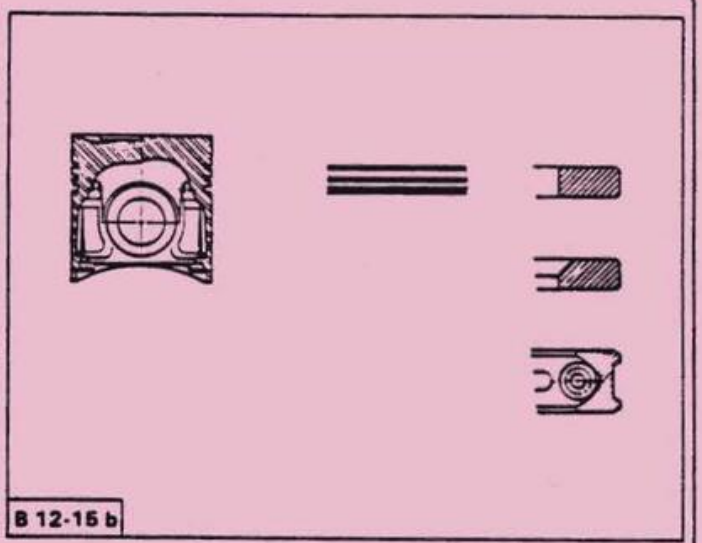
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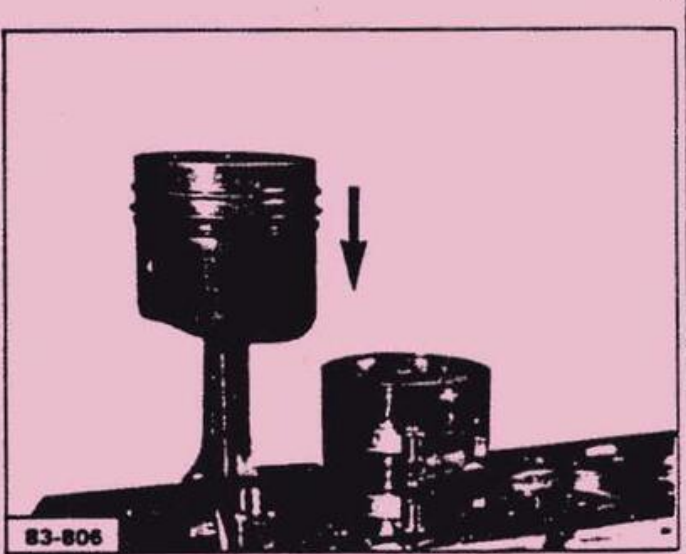
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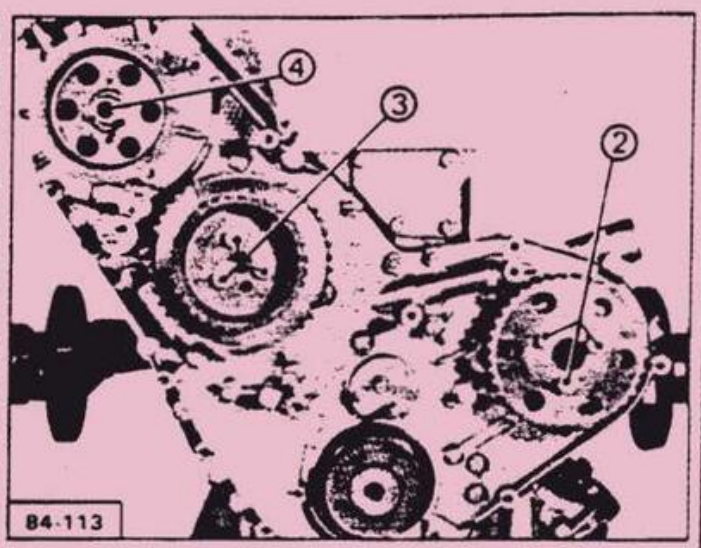
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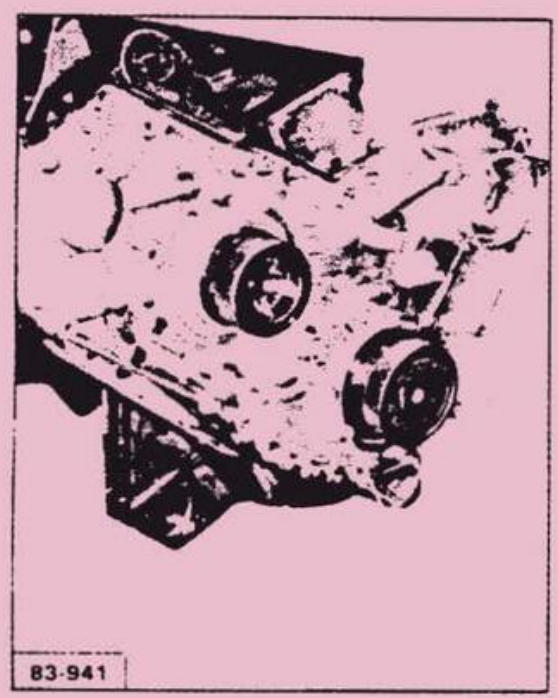
VI



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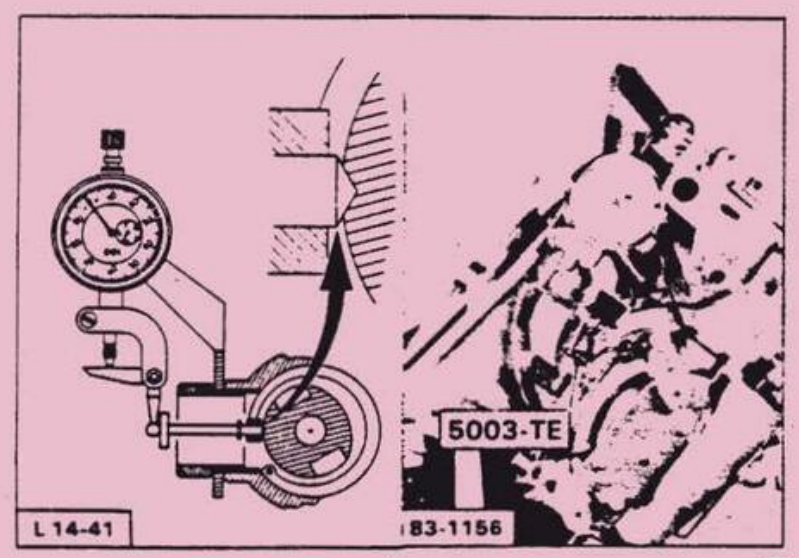
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III

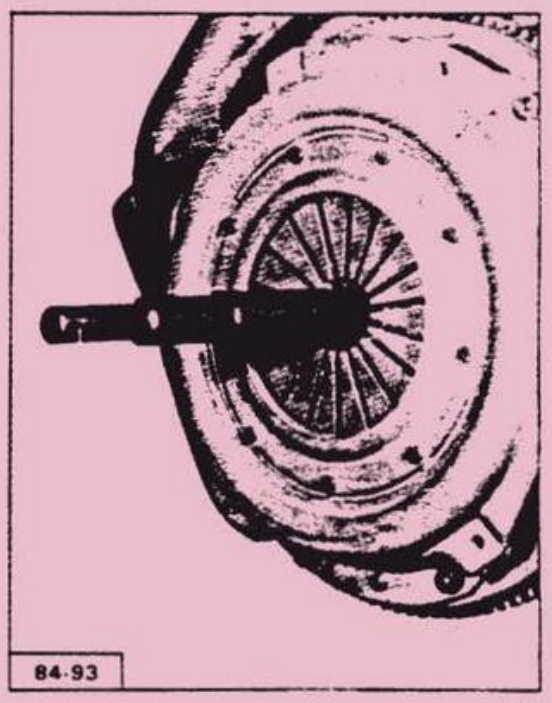


IV



V

VI



VII

Fit the camshaft : Fig. I.

Insert the camshaft into the block.

Locate the thrust plate (1) in the groove in the canshaft.

The camshaft end float must be between 0.05 and 0.36 mm (non adjustable).

Fit : Fig. II

- the lower crankcase, without tightening the bolts, after coating the contact faces and the main bearing rubber seal with sealant,
- the front plate, using a new joint,
- position it with the centralising rings : (-).0157 D and E,
- fit and tighten the front plate bolts to 1.5 m.daN (11 lbf ft).

Fit the oil pump :

Use a NEW joint.

Tighten the bolts to 1.5 m.daN (11 lbf ft).

Fitting the timing gear seals - see this section.

Fitting the injection pump : Fig. III.

Prepare the injection pump.

Remove the inspection plate and position :

- the dial gauge support (-).0117 AE,
- the plunger (-).0117 H,
- the bell crank (-).0117 AG.

Set the pump to the internal timing point : the plunger must be fully engaged in the rotor groove. Fig. V.

Note - Turn the pump in its direction of rotation as shown by the arrow on the manufacturer's plate.

Position the pump centrally in the slots.

Fit the timing gears Fig. II.

- Oil pump gear : the 3 bolts (2) tightened to 2.1 m.daN (15 lbf ft).
- Camshaft gear : the 3 bolts (3) tightened to 3.4 m.daN (25 lbf ft).
- Injection pump gear (4) : 6 m.daN (44 lbf ft).

Fit the flywheel Fig. IV.

Fit 8 new bolts using LOCTITE SEAL.

Tighten the bolts to 9 m.daN (66 lbf ft).

Fit the clutch Fig. VII

Fit the plate and mechanism.

Centralise the plate with mandrel (-).0212 Pull up the mechanism progressively and tighten the bolts to 3.3 m.daN (24 lbf ft).

Setting the timing Fig. I and II.

Set the engine to the initial timing position. To do so :

Bring the mark A on the flywheel opposite the mark B on the block Fig. I.

This correspond to :

4.32 mm or 22° B.T.D.C.

Bring the mark C on the camshaft opposite bolt (1) Fig. II.

Position the belt, lining up the marks (→) with the marks on the crankshaft D and the camshaft C.

Fit the belt.

Fit the tensioner roller.

Adjust the belt tension with tool (-).0157 K Fig. III, with the weight on the mark "2" on the rod.

Tighten the nuts :

(2) Ø 8 mm to 2 m.daN (15 lbf ft),

(3) Ø 10 mm to 3.2 m.daN (24 lbf ft).

Fit the damper E with a clearance of 0.5 to 1 mm to the belt.

Timing the injection pump Fig. IV.

Turn the crankshaft in its direction of rotation to bring the marks A and B opposite each other Fig. I.

With the pump at the point of injection, fit the belt (keeping the bolt run (→) tight).

Fit the tensioner (4).

Tighten the nut.

Rotate the crankshaft two turns in its direction of rotation and check the timing.

Fit the timing covers Fig. V.

Position the lower cover.

Tighten the 4 bolts (5).

Fit the upper cover and tighten all the bolts to 1 m.daN (7 lbf ft).

Assemble the oil pump intake pipe Fig. VI and VII.

Place on the pipe (6) Fig. VI.

- the clamp plate (7),
- a new O-ring (8),
- the plate (9),
- the paper joint "j".

Fit the intake pipe.

Tighten the bolts (→) Fig. VII.
(This can only be done after the engine has been removed from the DESVIL fixture).

Assemble the oil intake screen Fig. VIII.

Fit the anti-surge plate (10).

Fit the intake screen (11) with its O-ring.

Tighten and lock the bolts (12).

Fit the sump plate using a NEW joint.

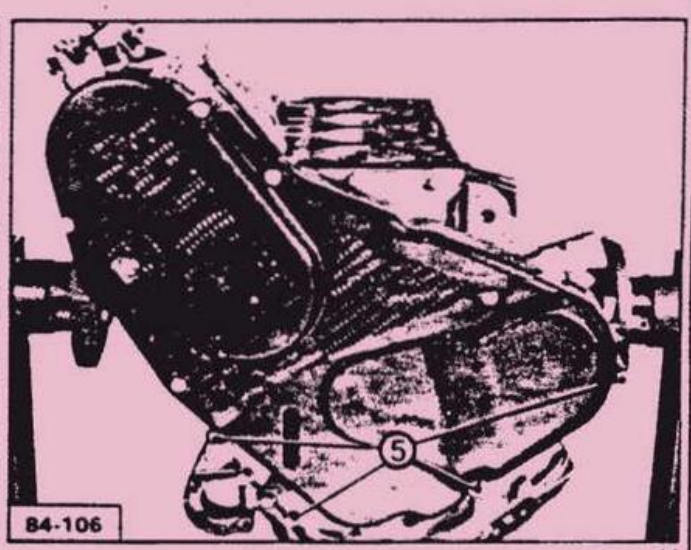
Tighten the bolts to 1.1 m.daN (8 lbf ft).



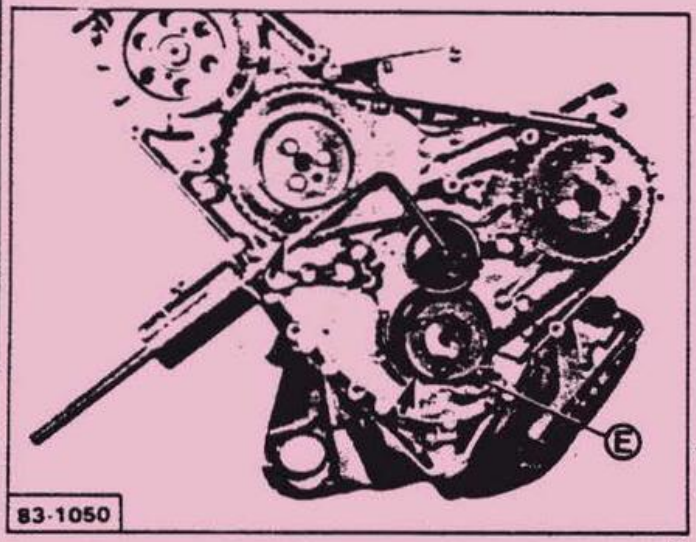
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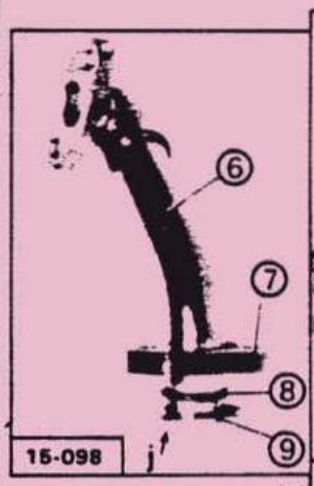
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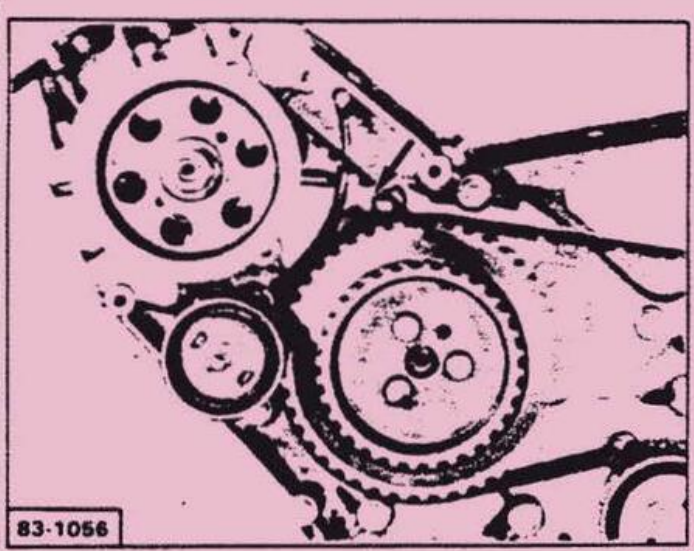
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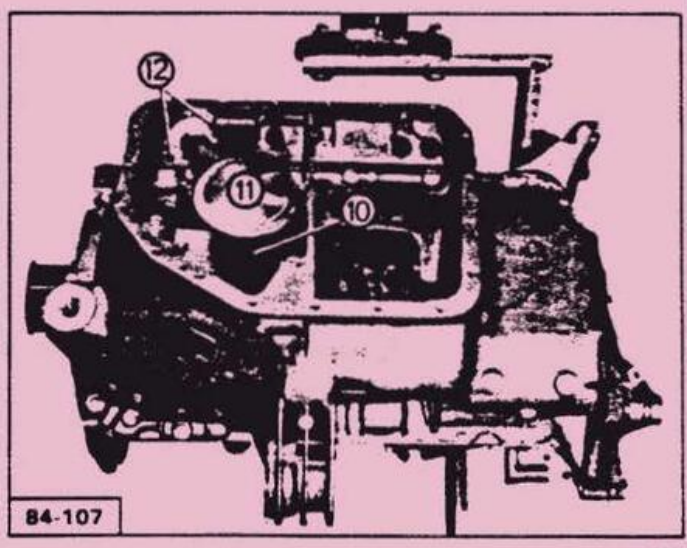
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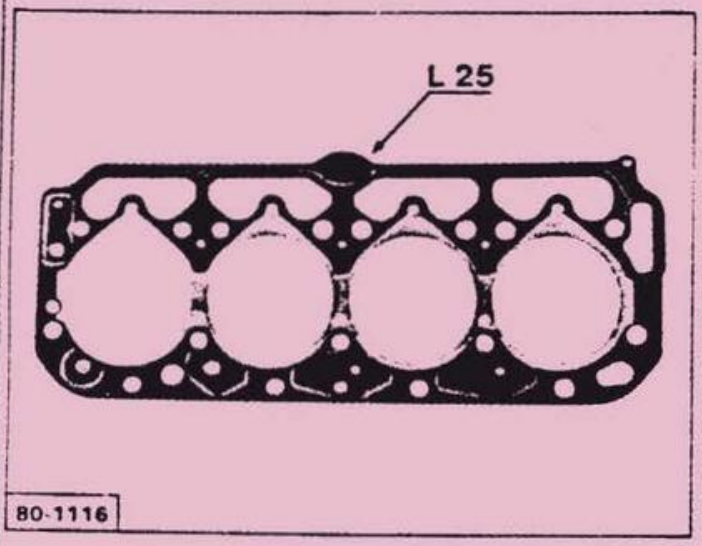
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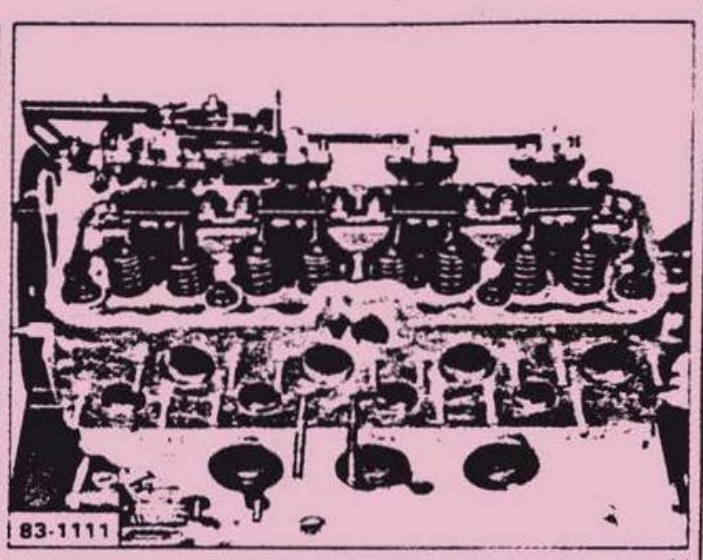
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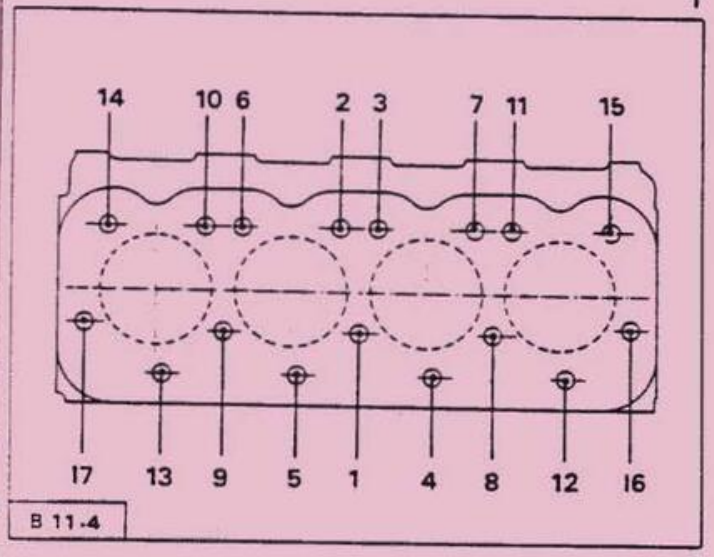
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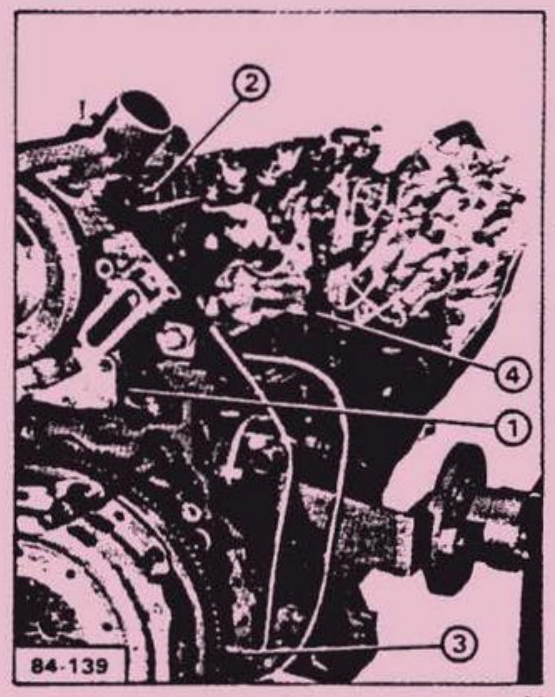
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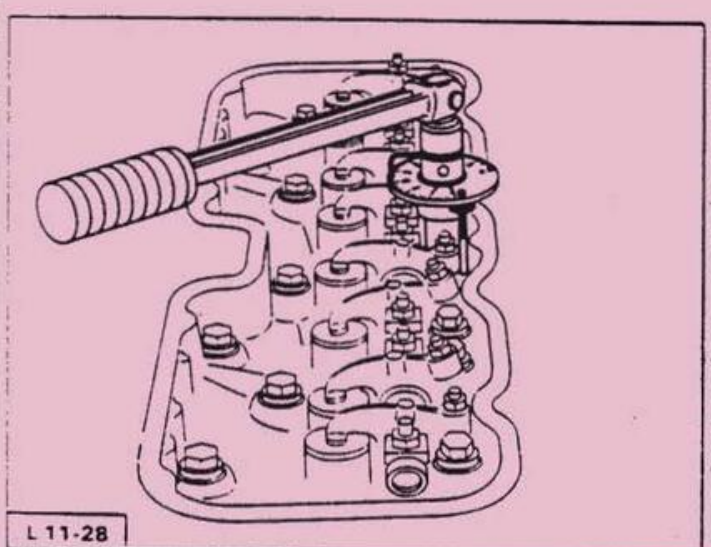
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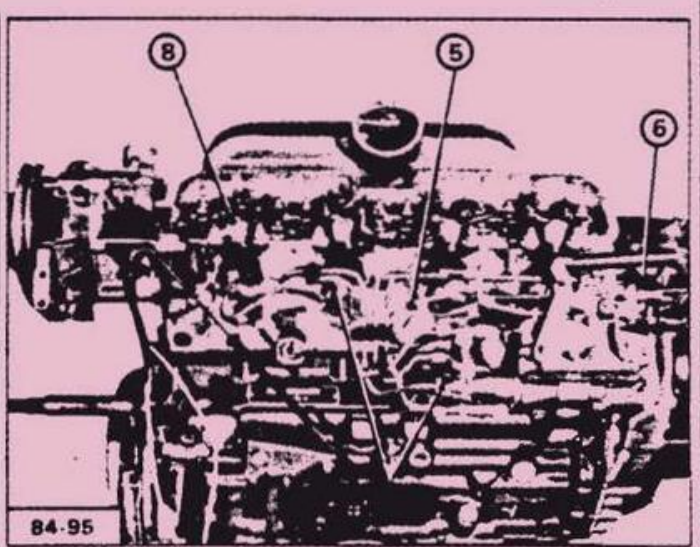
II



V



III



VI

Fitting the cylinder head Fig. I.

Lubricate and fit the tappets.

Position the pistons at mid-stroke.

Check that the cylinder head gasket has the reference L25 engraved on the tongue. Fig. I . The gasket is fitted dry.

NEW cylinder head bolts and serrated washers must be fitted, lubricated with gearbox oil.

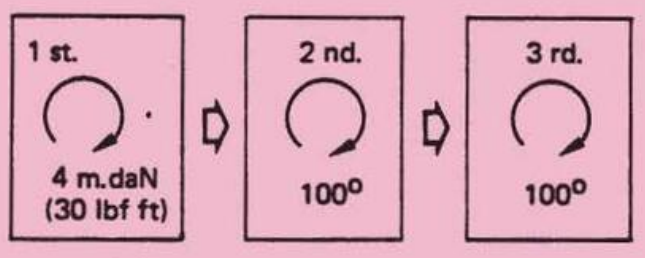
The serrated side of the washer must be fitted towards the cylinder head.

Fit the gasket.

Fit the cylinder head.

Fit the push rods.

Tighten the cylinder head : tightening order Fig. II.



For the angular tightening, use FACOM D360 adaptor, Part Number 9770.42.

Fit the rocker shaft assembly :

Retain the rockers by means of clamps 0.0162.

Ensure that the rocker shaft is correctly positioned with the lubrication holes downward and the with the larger hole towards the coolant pump.

Adjust the valve clearances Fig. IV.

Inlet : 0.30 mm.

Exhaust : 0.20 mm.

Fit Fig. V
- the cylinder head lubrication pipe (1),
- the diagnostic harness (2),
- the T.D.C. sensor (3),
- the dipstick tube (4).

Attach the fast idle cable Fig. VI.

Fit the cable sleeve (5) and the sleeve stop.

Pass the cable through the idle stop and fit the cable stop (6).

Push the fast idle lever to "a" and tighten the cable stop. The lever must rest against the stop at "a" - if not, adjust by means of the tensioner.

Fit the spring.

Fit the injector pipes assembly Fig. VI.

Position the pipes and the injectors so that the pipes are not under strain :

Tighten the nuts to 2.25 m.daN (17 lbf ft).

Tighten the banjo bolts (8) to 1 m.daN (7 lbf ft).

Tighten the unions (9) to 2.4 m.daN (18 lbf ft).

Fit the cylinder head cover with a new joint.

Use a sling to remove the engine from the cradle.

Fit the oil filter bracket, the oil cooler connector and the cartridge (wrench (-).1404).

Fill the engine with oil to the correct level.

After fitting the engine and warming it up, followed by cooling for 3 hours :

TIGHTEN THE CYLINDER HEAD BOLTS A FURTHER 45° (without slackening) and adjust the valve clearances.

SPECIAL TOOLS

A : Dial indicator support extension.

Tool no. 8.0110 H.

B : Dial indicator

Tool no. 8.1504.

RECOMMENDED TOOLS

C : Universal spring compressor

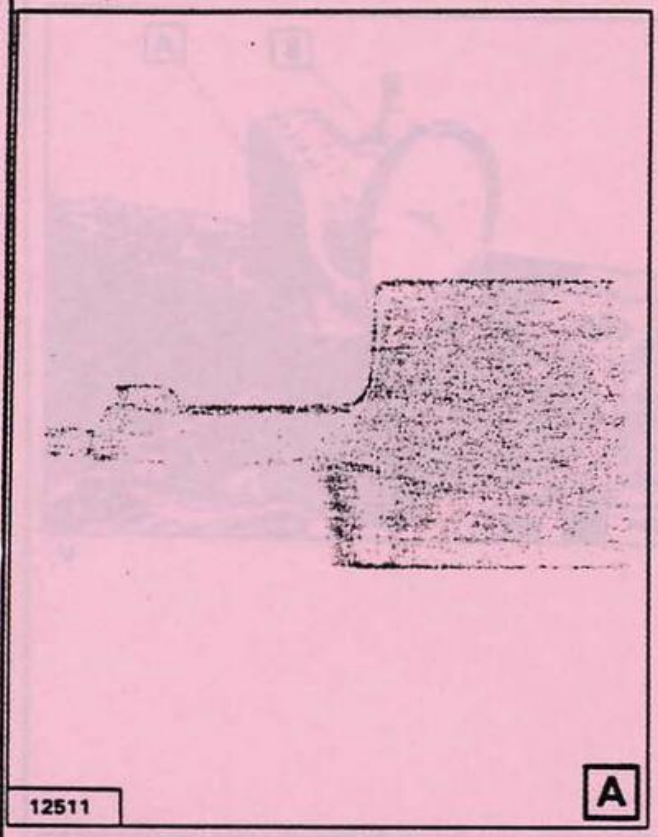
TOOLS TO BE MADE LOCALLY

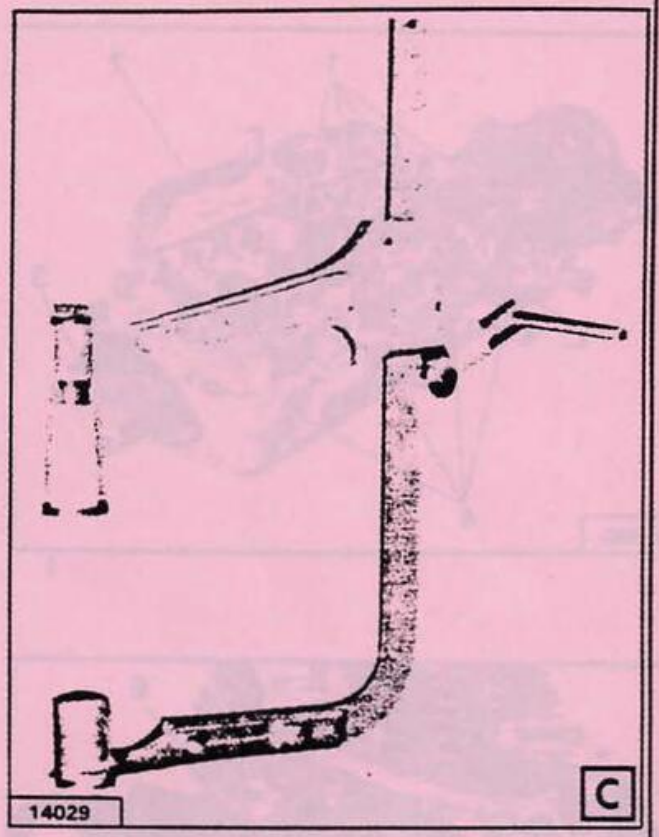
D : Set of four retaining clips for fitting the rocker shaft assembly.

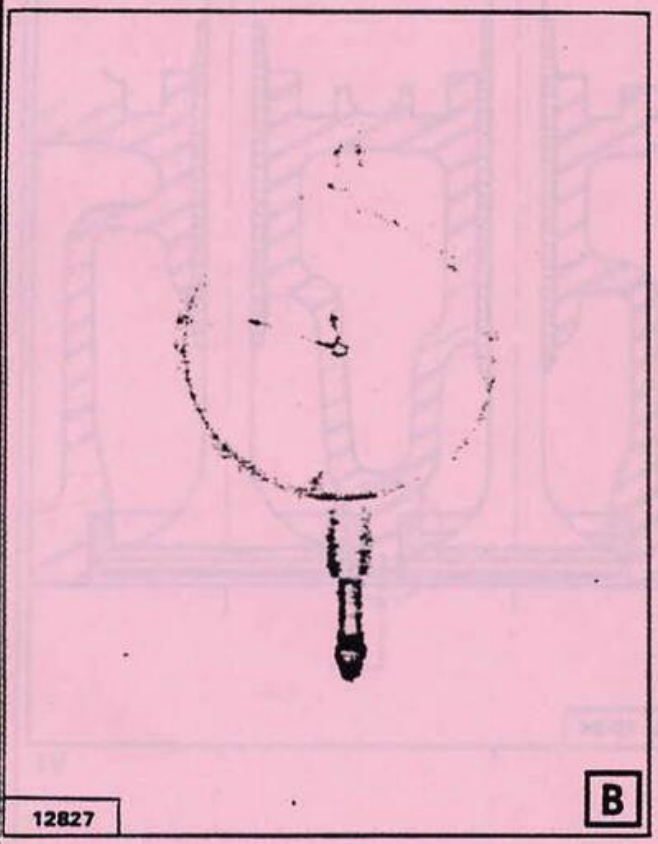
Tool no. 0.0612.

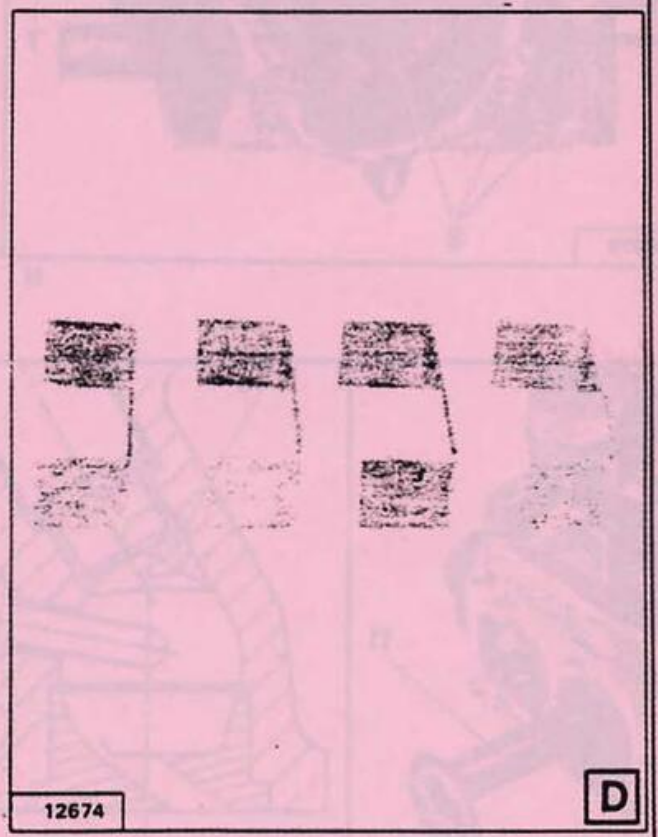
TIGHTENING TORQUES

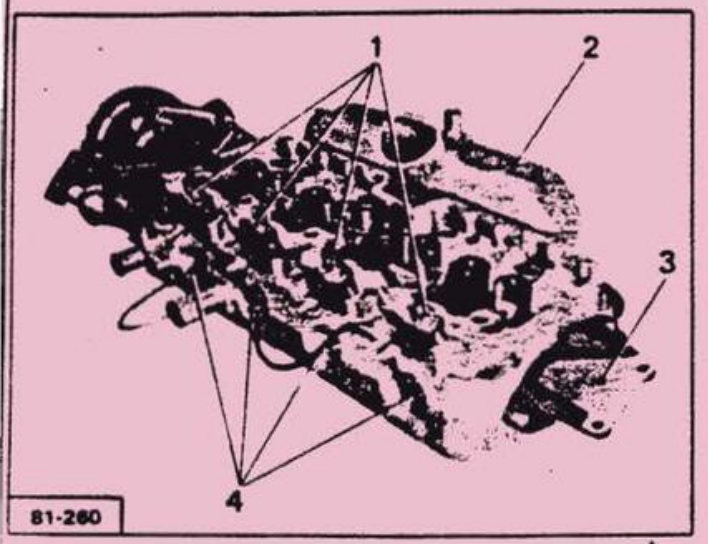
Essential tightening torques (use a torque spanner) :	m.daN	Nm	lbf ft
Fast idling control thermostatic pick-up, copper washer (apply PEUGEOT jointing compound) :	4,5	45	33
Recommended tightening torques :			
Injector securing nuts (flat washers and contact washers)	2,4	24	18
Injector leak-off union screw	1	10	7
Pre-heat plugs	2,8	28	21
Rocker shaft securing nuts	2,8	28	21
Engine mounting bolt on cylinder head	2,7	27	20


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A

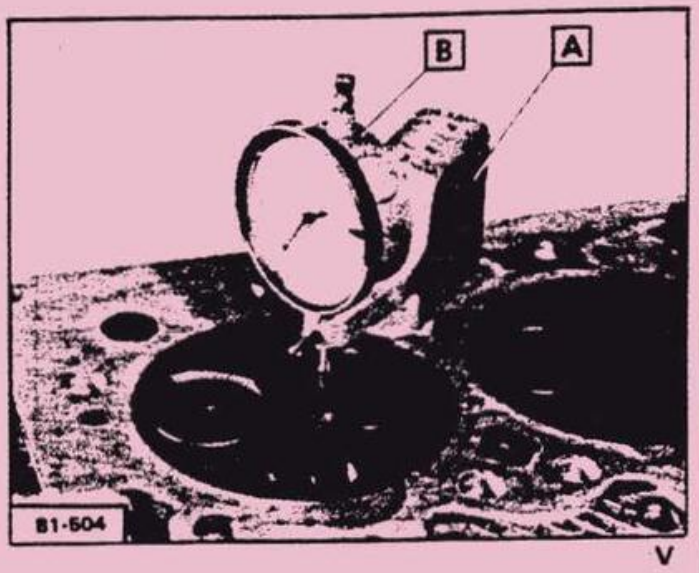

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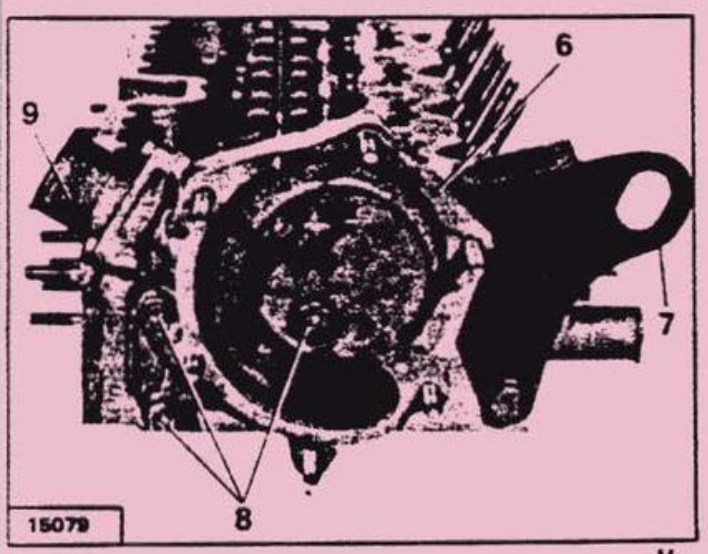

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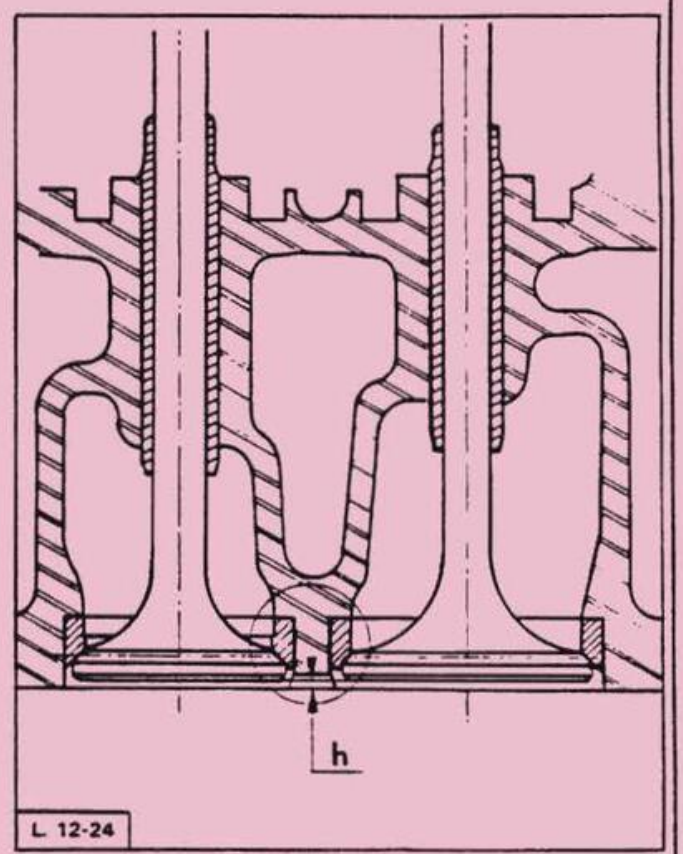
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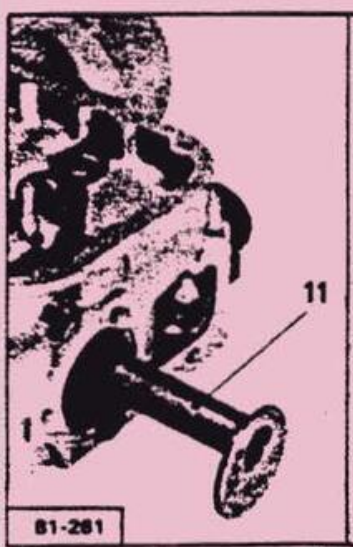
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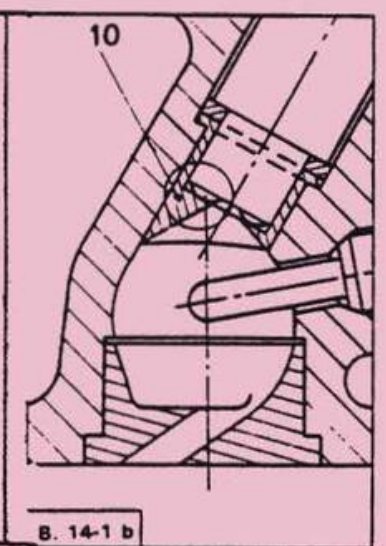
II



VI



III



IV

This schedule of operations does not deal with refacing the gasket face or replacing the swirl chamber.

These two operations can only be carried out by workshops that specialise in regrinding operations.

Reminder :

Height of cylinder head before refacing = 117 mm.
Height of cylinder head after refacing = 116.30 mm.
General bow tolerance = 0.1 mm max.

Strip the cylinder head : Fig. I, II, III and IV.

Remove (if necessary) :
- the complete rocker shaft,
- the inlet manifold (2) and the exhaust manifold,
- the water pump body,
- the water pump nuts (8) and back plate (6),
- the water outlet (9) and thermostat,
- the injectors (1).

Under no circumstances are the injector protectors (10) to be removed.

- the preheat plugs (4),
- the fast idling control thermostatic element (5),
- the lifting eye (7),
- the right hand engine mounting (3) and the water gallery (11),
- the valves, using the spring compressor.

Preparing the cylinder head :

Check the amount by which the valves are recessed : as shown in Fig. V and VI.

Fit the valves and measure their depth below the cylinder head gasket face.

Both the inlet and exhaust valve should be recessed below the gasket face by : Fig. VI.

h = 0.7 to 0.9 mm

To carry out this check use extension [A] 8.0110 H and dial indicator [B] 8.1504.

If the valve is recessed too far back from the gasket face the compression ratio will be lowered and this will cause cold starting and excessive exhaust smoke.
If the valves are not sufficiently recessed with reference to the gasket face they may come into contact with the piston crowns at TDC.

Grind in the valves :
After the valves are ground in, carefully remove all traces of grinding paste from the cylinder head and the valves. Use a small test tube brush to clean the inside of the valve guides.

Fitting the valves :
Fit the valves and their seals.

NOTE - Use the plastic assembly cap, supplied with each seal, and tool VSIT (FLOQUET REFERENCE) to fit the seals to the valves. To make fitting the seal easier, coat the and the fitting cap with grease. If a seal is worn or badly fitted, it is to be replaced by a new one. Never attempt to refit a seal that has already been fitted to a valve.

Fit the following on the valves :
- the valve spring seat,
- the spring,
- the spring cup,
- the collets.

Use the universal spring compressor for this operation.

Fit : Fig. I, and III

- the water gallery (1) after first checking its condition,
- the right hand engine mounting (3), together with its gasket (tighten the bolts to a torque of 2.7 m.daN (27 Nm, 21 lbf ft),
- the engine lifting eye,
- the water pump back plate (6),
- the water pump,
- the inlet and exhaust manifolds and their gaskets,
- the idling control thermostatic element (4) (apply PEUGEOT jointing compound to it) tightening it to a torque of 4.5 m.daN (45 Nm, 33 lbf ft),
- the water pump thermostatic element and flange (5).

Fit the injectors : Fig. IV

The copper washer (7) and the ridged washer (8) are to be replaced by new ones each time they are moved.
Ensure that the washer (8) is fitted the correct way round (see detail illustration).
Lightly grease the copper washer (7) and the ridged washer (8) with ESSO MULTIPURPOSE grease 4746 before fitting them to the injector holder.
Tighten the injector holder nuts evenly (they are fitted with flat washers and contact washers, (to a torque of 2.4 m.daN (24 Nm, 18 lbf ft).
Fit the leak-back piping (2) and tighten the unions to a torque of 1 m.daN.
Fit the pre-heat plugs and tighten them to 2.8 m.daN (28 Nm, 21 lbf ft).

Prepare the rocker shaft assembly : Fig. IV

Use the large oil supply oil (a) as a position reference.
Place on the shaft :
- a washer,
- an inlet rocker arm (A),
- a washer,
- a spring,
- an exhaust valve rocker arm (E),
- a washer.

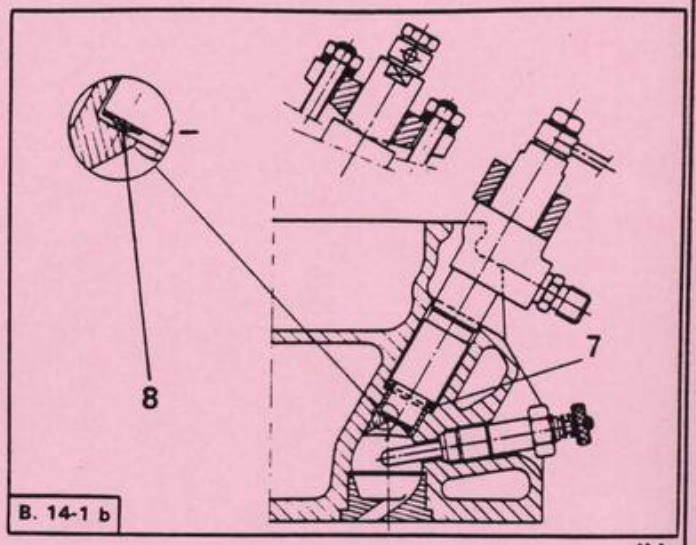
Hold the assembly together with one of the clips 0.0162.

Repeat this operation four times.

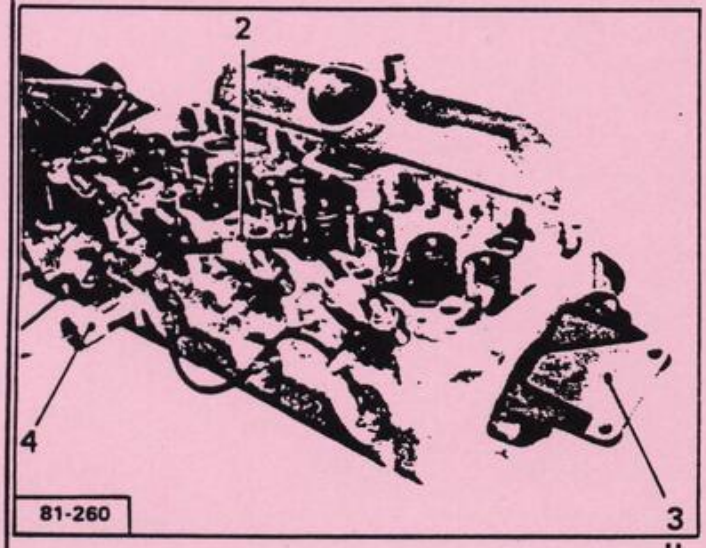
Place this pre-prepared assembly on the cylinder head with the large oil supply hole (a) at the water pump end and the oil holes towards the cylinder head.
Fit the clamps and tighten their nuts (9).
Tightening torque : 2.8 m.daN (28 Nm, 21 lbf ft).
Remove clips 0.0612.



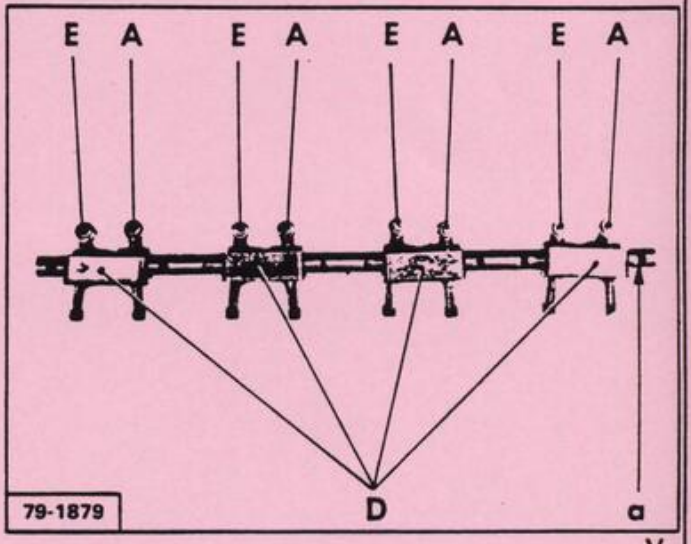
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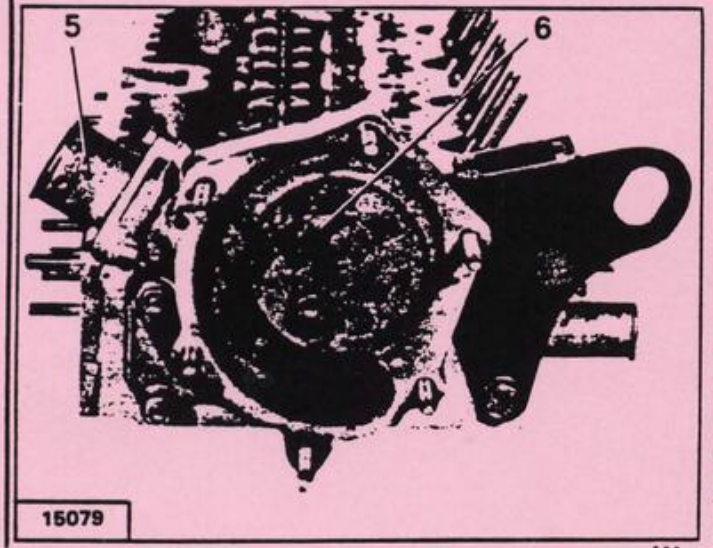
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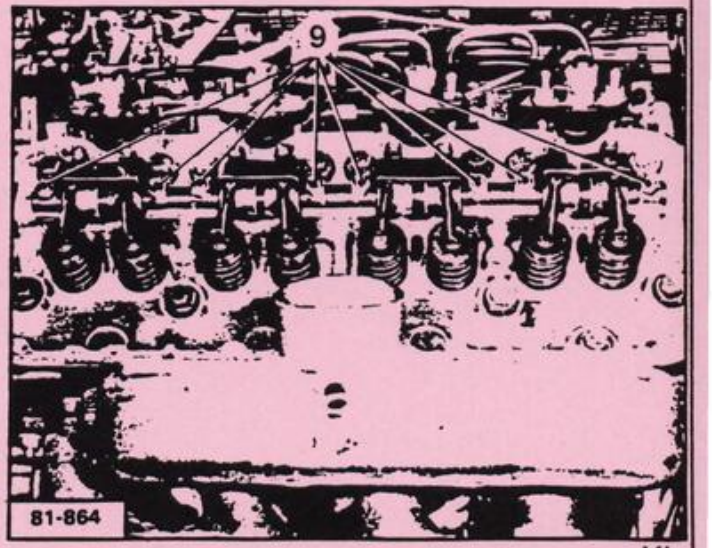
II



V



III



VI

SPECIAL TOOLS

I - Dial gauge support

Reference (-).0110 H.

II - Dial gauge

Reference (-).1504.

RECOMMENDED TOOLS

III - Universal spring compressor.

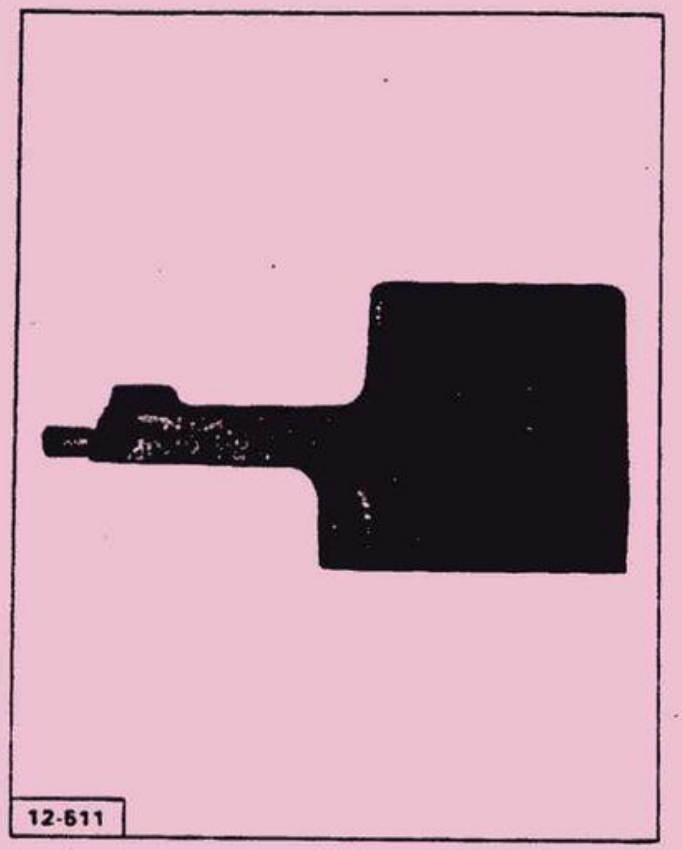
TOOLS TO BE MADE LOCALLY

IV - Set of four slips for fitting the rocker shaft assembly.

Reference 0.0162.

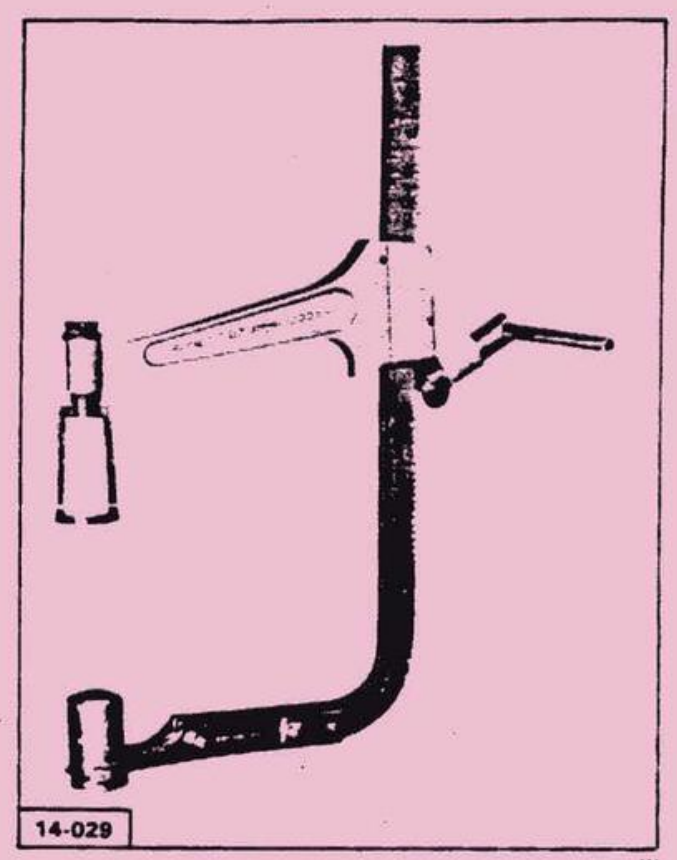
TIGHTENING TORQUES

Tightening torques that must be adhered to (torque wrench) :	Torque in N.m (lbf.ft.)
The thermostatic sensor that controls the fast idling speed. Fit a copper washer (apply LOCTITE FORMETANCH) :	45 (33.2)
Recommended tightening torques :	
Injector securing nuts (flat washers and contact washers) :	24 (17.7)
Injector leak-back unions :	10 (7.4)
Preheater plugs :	28 (20.6)
Rocker arm assembly securing nuts :	28 (20.6)
Bolts securing engine mounting to cylinder head :	27 (19.9)



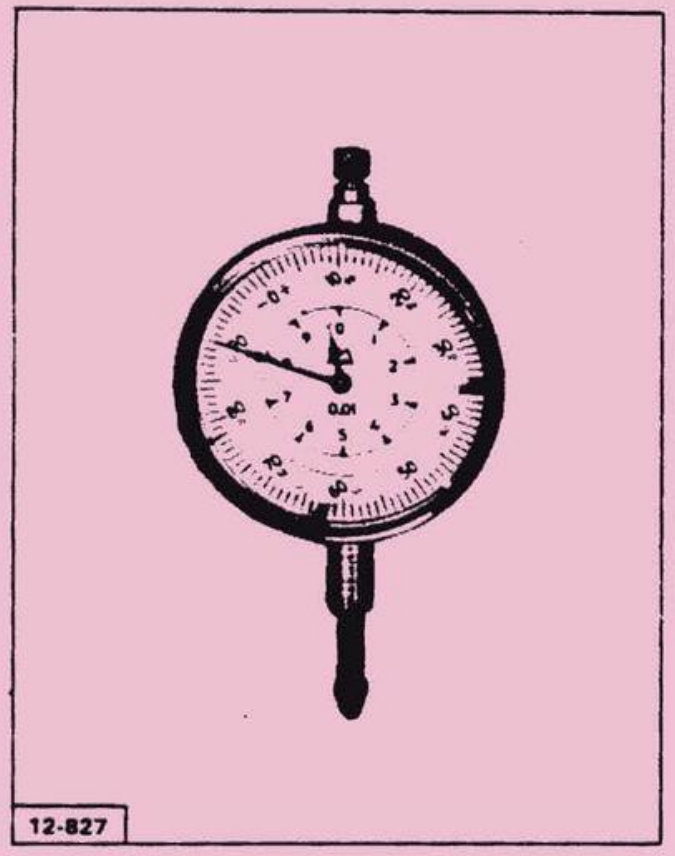
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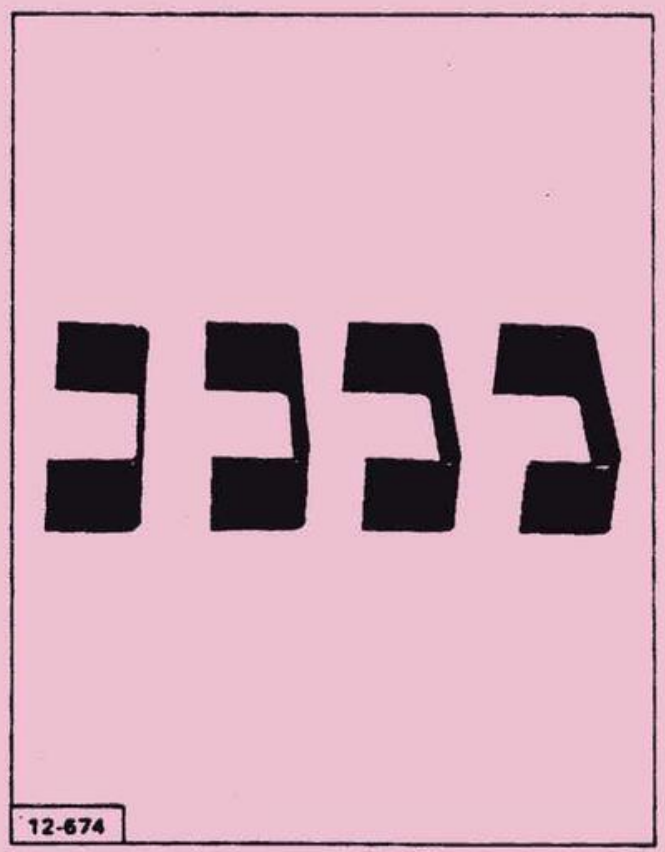


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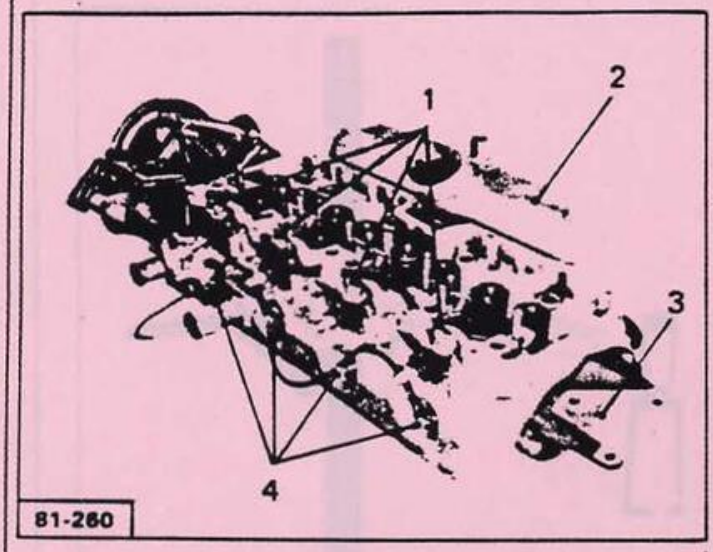


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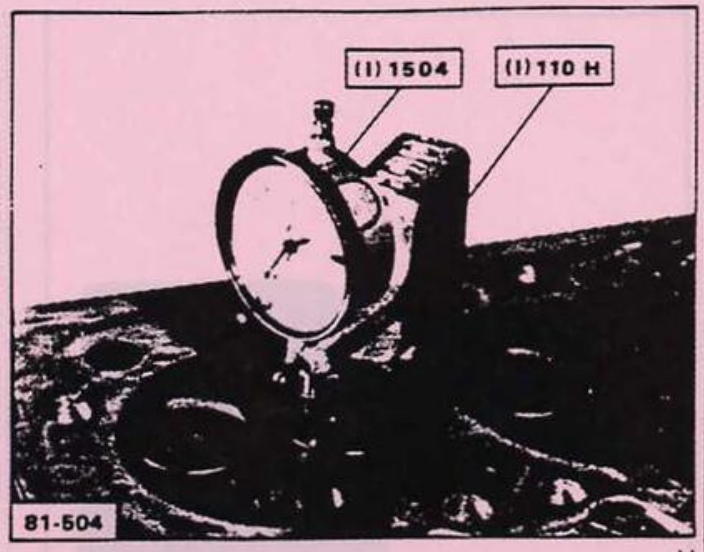


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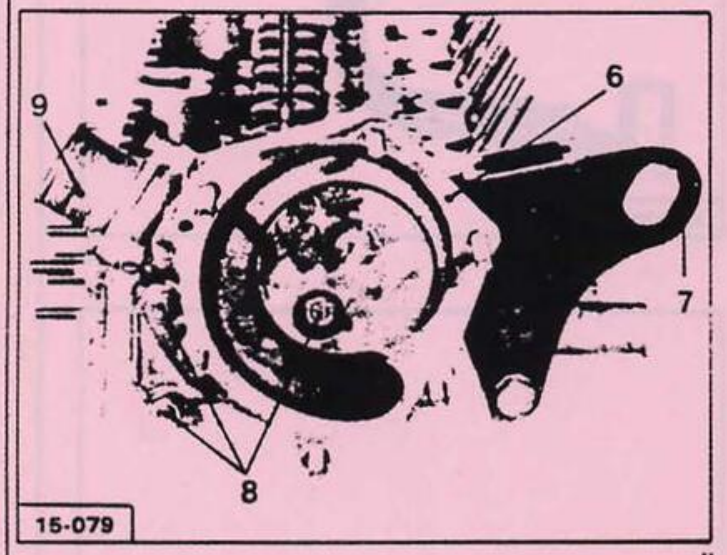
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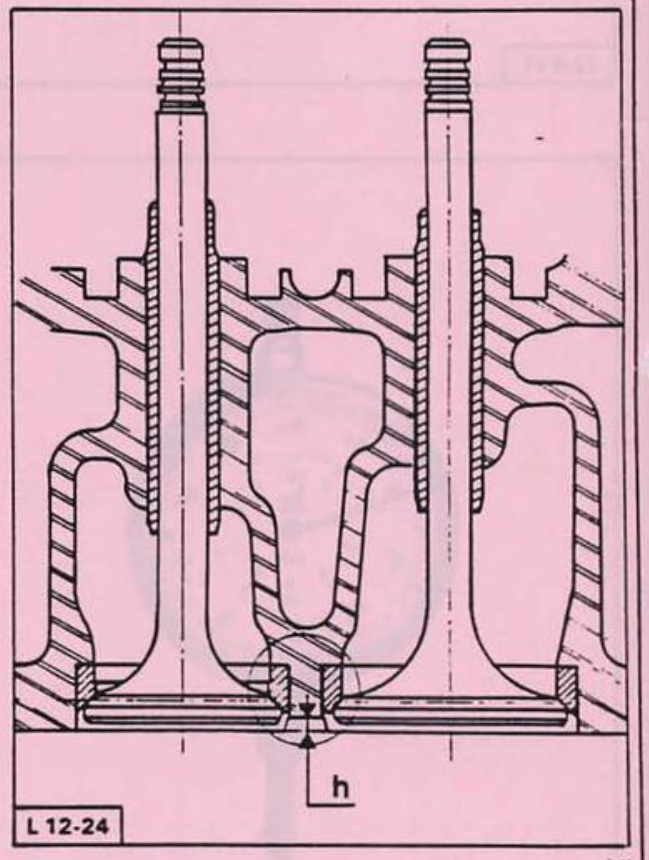
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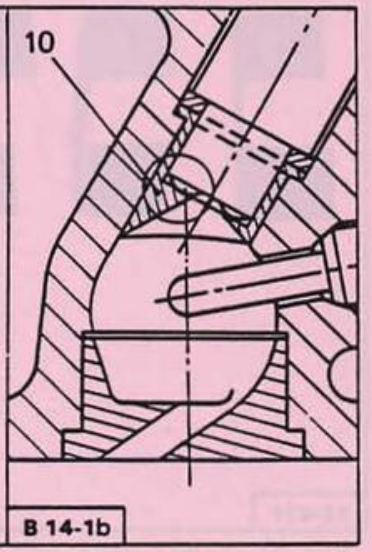
II



VI



III



IV

This section does not cover machining the cylinder head face or replacing the pre-combustion chambers.

These operations are only possible in a specialist workshop.

As a reminder :

Cylinder head height before machining
= 117 mm

Cylinder head height after machining
= 116.30 mm

Maximum distortion = 0.1 mm.

Strip the cylinder head : Fig. I, II, III and IV.

Remove (if necessary) :

- the inlet manifold (2) and the exhaust manifold,
- the coolant pump body,
- the coolant pump nuts (8) and back plate (6),
- the flange (9) and the thermostat element,
- the injectors (1).

The injector protectors (10) must never be removed.

- the pre-heater plugs (4),
- the fast idle control thermostatic element (5),
- the lifting eye (7),
- the right-hand engine mounting (3) and the coolant spray tube (11),
- the valves, using a spring compressor.

Prepare the cylinder head :

Check the valve recess dimension : Fig. V and VI.

Put the valves in place and check how far they are recessed in relation to the cylinder head face.

Both inlet and exhaust valves must be recessed : Fig. VI.

"h" = 0.7 to 0.9 mm.

For this check, use the support (-).0110 H and the dial gauge (-).1504.

If the valves are recessed too far, the compression ratio will be reduced - a cause of difficult cold starting and excessive exhaust smoke.

If the valves are not recessed sufficiently, they may contact the pistons at T.D.C.

Lap in the valves :

When they are lapped, carefully clean all traces of lapping paste from the cylinder head and the valves.

Use a small brush to clean the valve guide bores.

Fit the valves :

Fit the valves and their seals.

Note - To fit the seals, use the plastic fitting cap supplied with each seal and the VSIT tool (FLOQUET).

To aid fitting, coat the seal and the fitting cap with grease. When a seal is worn or badly fitted, it must be replaced.

Never re-use a seal which has been fitted previously.

Fit to the valves :

- the valve spring seat,
- the spring,
- the spring cup,
- the cotters.

Use a universal spring compressor.

Fit : Fig. I, II and III.

- the coolant gallery (1), after checking it,
- the rigt-hand engine mounting (3) fitted with its joint (tighten the bolts to 2.7 m.daN (20 lbf ft),
- the lifting eye,
- the coolant pump back plate (6),
- the coolant pump,
- the inlet and exhaust manifolds with their joints,
- the idle control thermostatic element (4) and tighten it to 1.8 m.daN (13 lbf ft) (fit with LOCTITE SEAL),
- the coolant thermostat and the flange (5). plate (5).

Fit the injectors : Fig. IV.

New cooper washers (7) and corrugated washers must always be fitted on re-assembly.

Ensure the washer (8) is fitted the right way up (see detail).

Lightly lubricate the copper washer (7) and the corrugated washer (8) with ESSO MULTI-PURPOSE 4746 GREASE before fitting them to the nozzle holder.

Tighten the nozzle holder securing nuts (flat washer and contact washer) to 2.4 m.daN (18 lbf ft).

Fit the leak-off pipes (2) and tighten the banjo bolts to 1 m.daN (7 lbf ft).

Fit the pre-heater plugs and tighten them to 2 m.daN (15 lbf ft).

Prepare the rocker shaft assembly : Fig. V.

Take as a reference the large oil inlet hole "a"

Fit on :

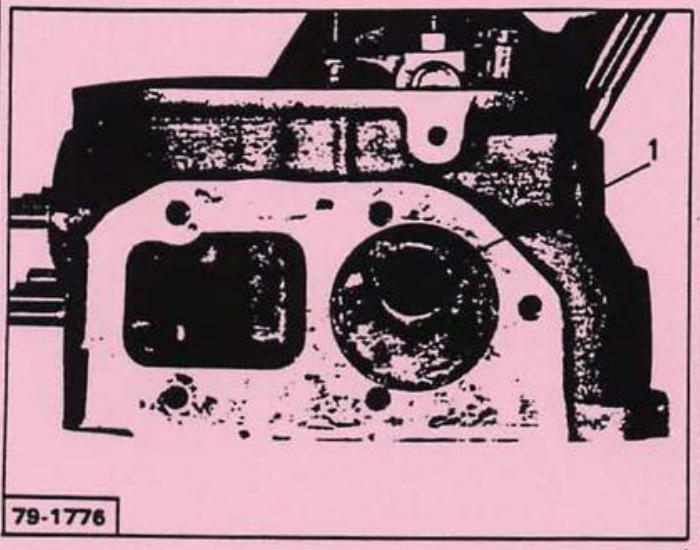
- a washer,
- an inlet rocker A,
- a washer,
- a spring,
- an exhaust rocker E,
- a washer.

Retain the assembly with a clip 0.0162.

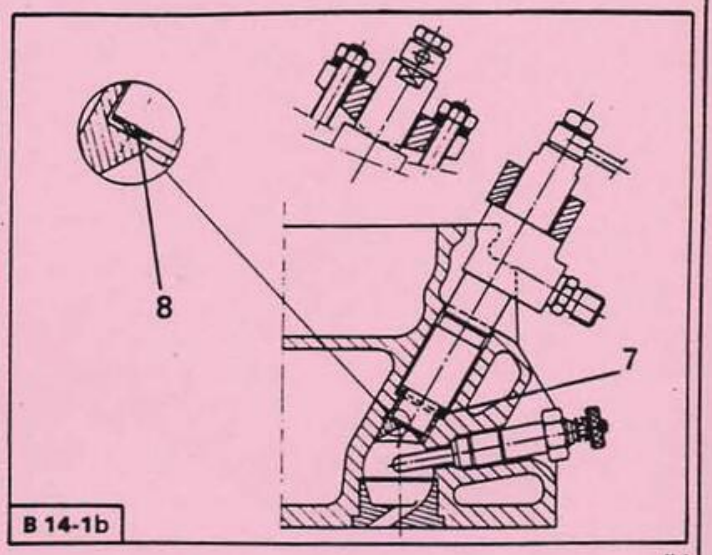
Repeat the operation three more times.

Fit the assembly, made up in this way, to the cylinder head with the large oil input hole « a » towards the coolant pump and the lubrication holes towards the cylinder head.

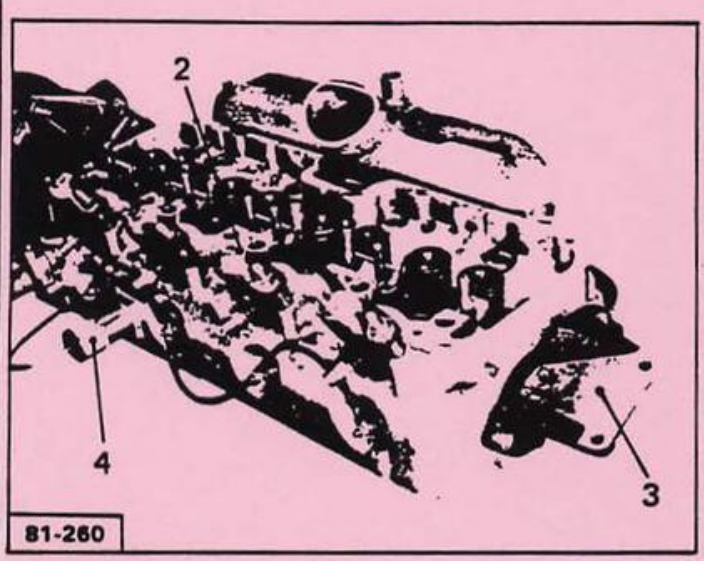
Fit the caps and tighten the nuts (9).
Tightening torque : 28 N.m (20.6 lbf.ft.)
Remove the clamp 0.0162.



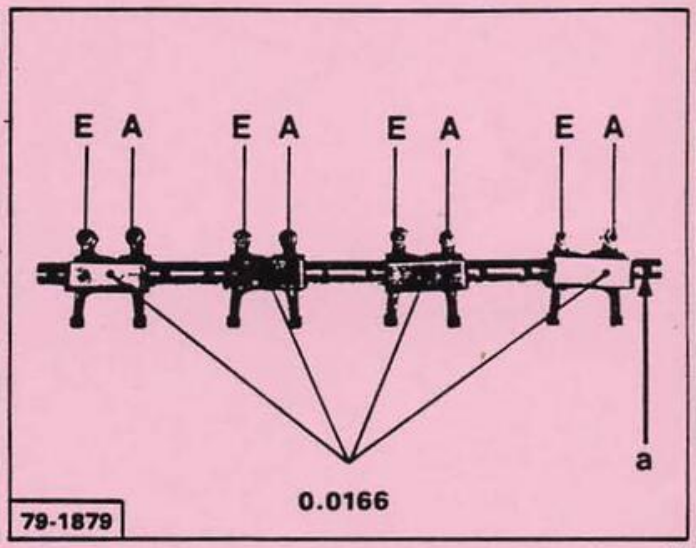
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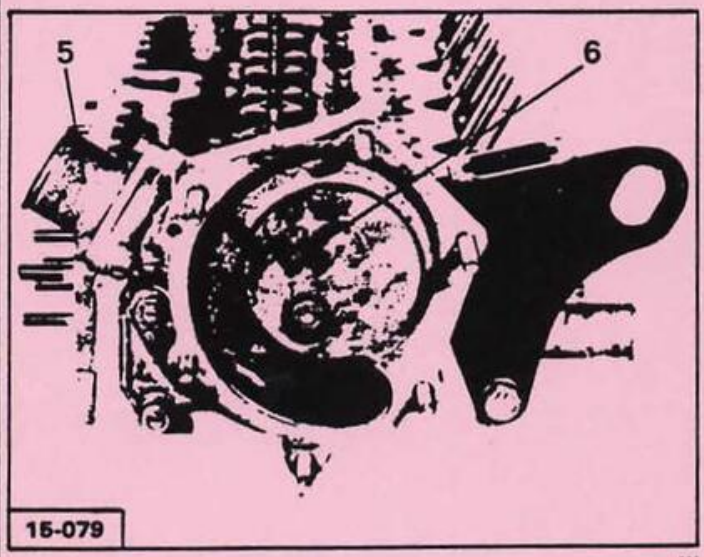
IV



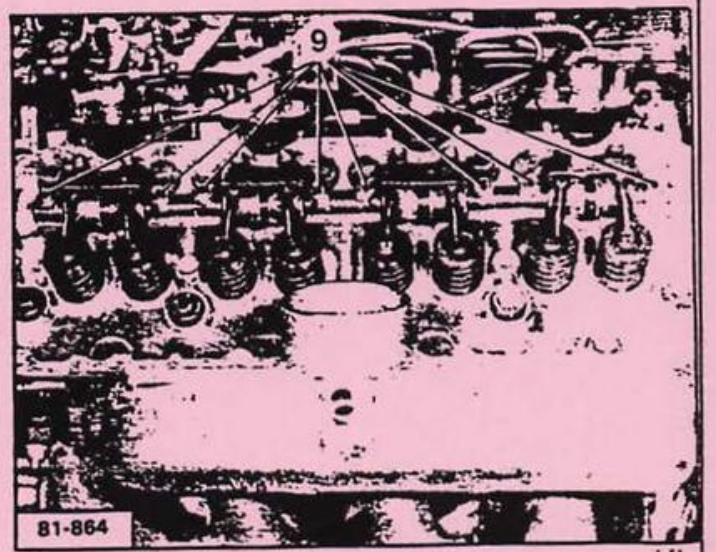
II



V



III



VI

SPECIAL TOOLS

A : Set of four rocker shaft retaining clips.

Tool no. : 0.0612.

B : Engine support cross piece.

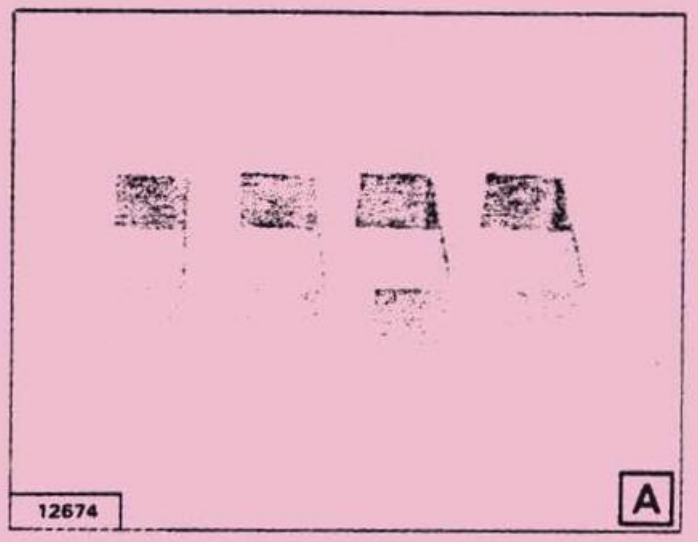
Tool no. : 8.0150 A.

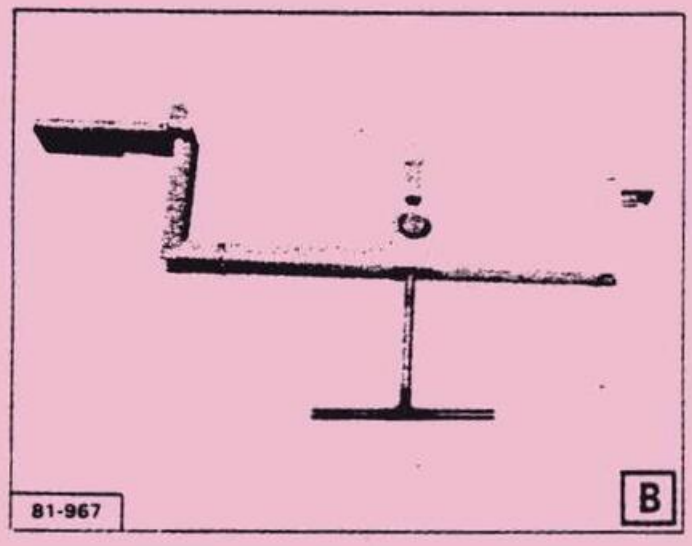
C : Set of two cylinder head freeing levers.

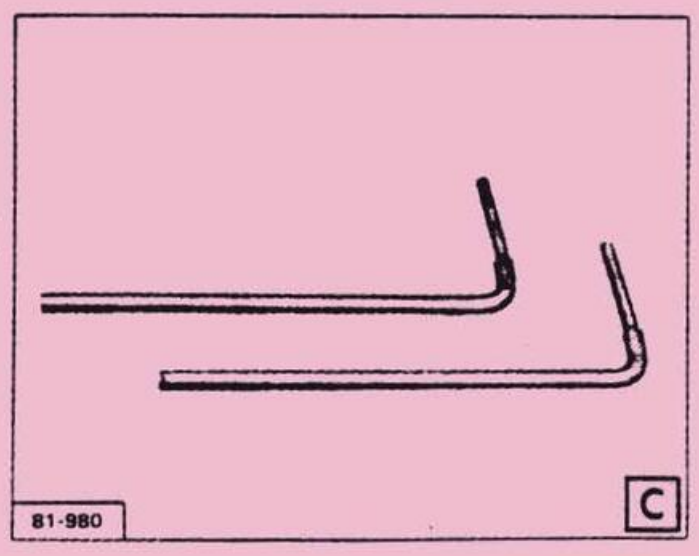
Tool no. : 0.0149

TIGHTENING TORQUES

		m.daN	Nm	lbf ft
Essential tightening torques (use torque spanner)				
Cylinder head securing bolts (faces and threads oiled, washer with tags against cylinder head)	initial tightening torque	6	60	44
	final tightening torque	10,5	105	77
Recommended tightening torques :				
Rocker shaft securing nuts		2,8	28	21
Injector pipe nuts		2,4	24	18
Engine mounting securing bolts (on cylinder head side).		5	50	40


12674
A


81-967
B

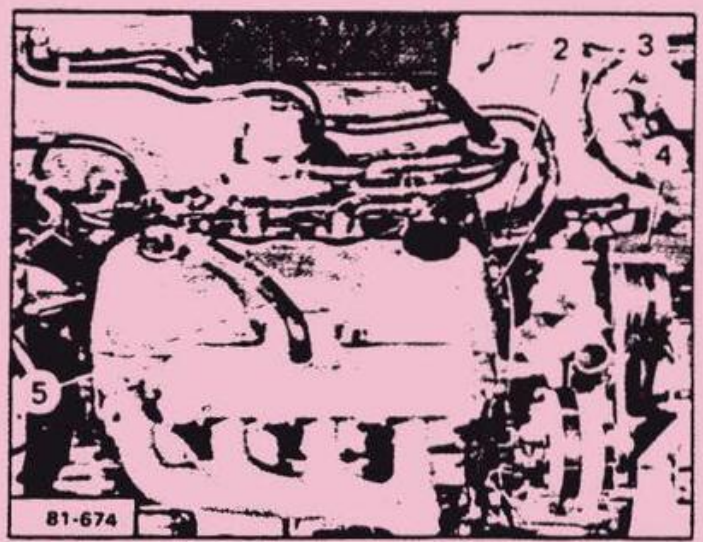

81-980
C



I



II



III

REMOVING

Place a trolley jack under the engine so that it remains in its original position.
Remove the right hand engine mounting.
Fit engine support B 8.0150 A and allow it to take the weight of the engine.

Remove :
- the spare wheel.

- the wires from the temperature switch on the radiator,

Disconnect :
- the battery negative and positive cables,
- the lighting and signalling supply wires,
- the electric cooling fan wires,
- the water pump temperatures switch wires,
- the wires from the temperature switch on the radiator,
- the wires from the temperature switch on the water casing,
- the pre-heat plug supply wires,
- the electric shut-off solenoid wire,
- the diagnostic harness earth wire.

Free :
- the bonnet latch mechanism from the radiator grille,
- the spare wheel carrier rear securing point from the scuttle,
- the radiator hoses from the radiator,
- the accelerator and fast idling cables,
- the those from the tank leak-off line,
- the water hoses from the cylinder head,
- the exhaust downpipe from the exhaust pipes.

Loosen the nuts (➡) and remove the two bolts (1) : Fig. II.

Remove :
- the radiator grille,
- the air duct from the intake casing,
- the belt protector (4),
- the water pump, alternator and vacuum pump belts,
- pipe (5).

Free the diagnostic socket (2) from its support.

Loosen the pipe unions on the injectors.

Disconnect the cylinder head oil supply pipe (3).

Remove :
- the rocket cover and its gasket,
- the rocker shaft,
- the cylinder head bolts.

Free the cylinder head and its gasket using lifting levers 0.0149.

Remove the push rods.
(Mark the positions from which they are taken).

PREPARATION

Clean the cylinder block and cylinder head gasket faces.

> It is very important not to scrape the gasket faces of aluminium components.
> Use a stripper to dissolve those parts of the gasket that are still sticking to the faces. Be particularly carefull over this operation to prevent foreign bodies entering the oil input ducts.

REFITTING

Fitting the cylinder head :
Position the pistons haft way up the bores.
Fit the cylinder had gasket.

Check that the cylinder head gasket has the reference L25 marked on its tab.
This gasket is to be fitted dry (without linseed oil).

Fit the cylinder head.
Before fitting the cylinder head :
- Clean out the threads in the block.
- Oil the under head flanges and threads on the bolts.
- The washers do not require lubrication and are to be fitted with their taqs against the cylinder head.

Pretighten the bolts to a torque of 6 m.daN (60 Nm, 44 lbf ft).
Finally tighten them to 10.5 m.daN (65 Nm. 77 lbf ft).
For the tightenihg order : see Fig. I.

Prepare the rocker shaft :

Use the large oil supply hole (a) as a position reference : Fig. I
Fit :
- a washer,
- an inlet valve rocker arm A,
- a washer,
- a spring,
- an exhaust valve rocker arm E,
- a washer.

Hold the assembly together with a clip 0.0612

Repeat this operation four times.

Fit the push rods.
Fit the assembly prepared in this way to the cylinder head with the large oil input hole (a) at the water pump end and the oil output holes pointing towards the cylinder head.
Fit the clamps and tighten their nuts (18).
Tightening torque : 2.8 m.daN (28 Nm, 21 lbft ft).
Remove clips : 0.0612.

Adjust the valve clearances :
A = Inlet = 0.30 mm
B = Exhaust = 0.20 mm

Fit the rocker cover and its gasket.
Reconnect :
- the cylinder head oil pipe (2),
- the diagnostic socket (19) with its support,

Tighten the injector unions to a torque of 2.4 m.daN (24 Nm, 18 lbf ft).

Fit :
- pipe (22),
- the water pump, alternator and vacuum pump drive belts,
- the belts protector (21),
- the air ducting to the air intake casing,

Connect up :
- the exhaust downpipe (the ball joint section is to be greased with high temperature MOLYKOMBIN grease, tighten the springs until they are coil bound then loosen them by one turn on each side,
- the hose to the fuel tank lead-off line,
- the water hoses to the cylinder head,
- the accelerator hand fast idling cables.

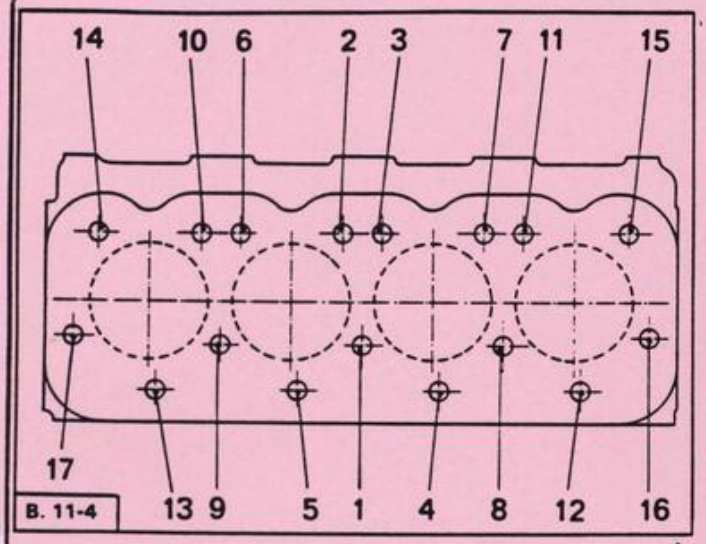
Fit the radiator grille and secure it with the two bolts (23).
Tighten the nuts (➡).

Connect :
- the radiator hoses to the radiator,
- the spare wheel carrier rear securing points to the scuttle,
- the bonnet latch mechanism to the radiator grille and adjust it.

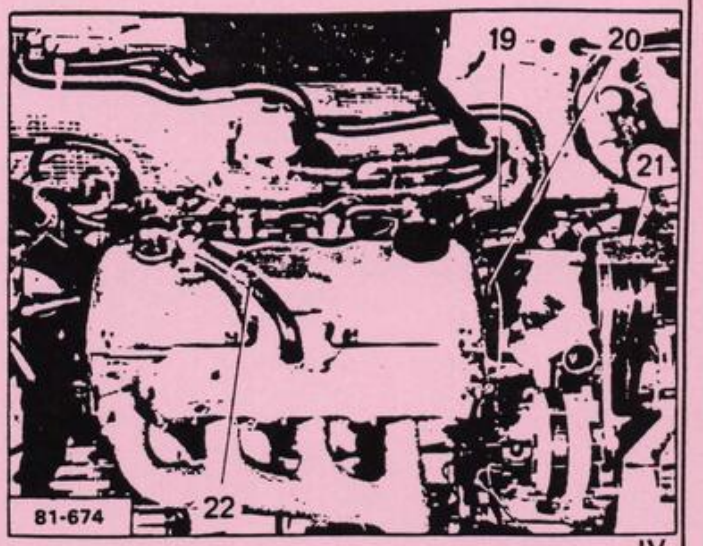
Connect :
- the wires to the temperature switch on the radiator,
- the wires to the temperature switch on the water pump,
- the electric cooling fan wires,
- the lighting and signalling supply wires,
- the pre-heat plug supply wire,
- the electric shut-off wire,
- the diagnostic harness earth wire,
- the battery positive and negative cables.

Place a trolley jack under the engine to hold it whilst the right hand engine mounting is fitted.
Tighten the engine mounting bolts to a torque of 5 m.daN (50 Nm, 37 lbf ft).
Remove the engine support [B] 8.0150 A.
Take out the trolley jack.
Fill and bleed the cooling system.

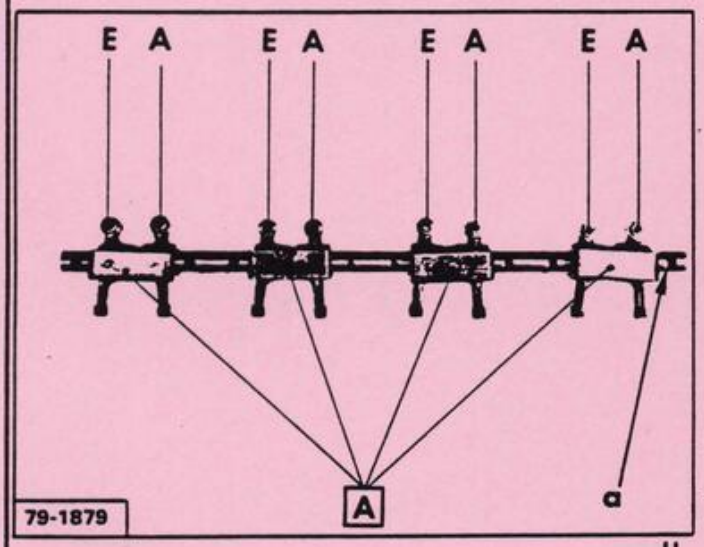
Refit the spare wheel.



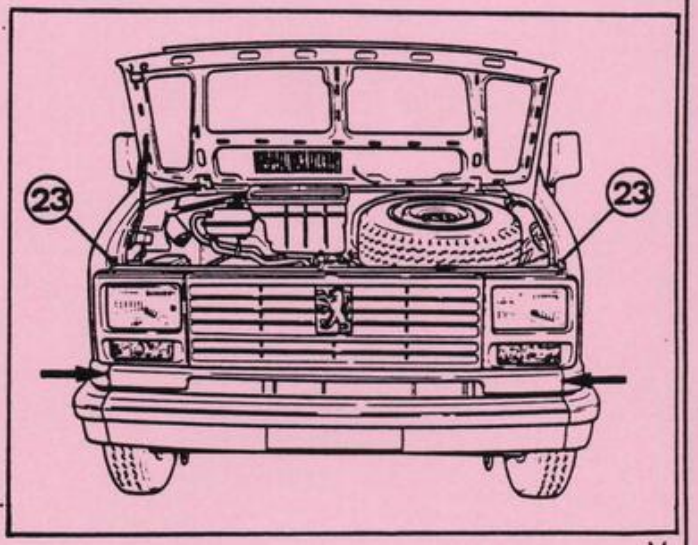
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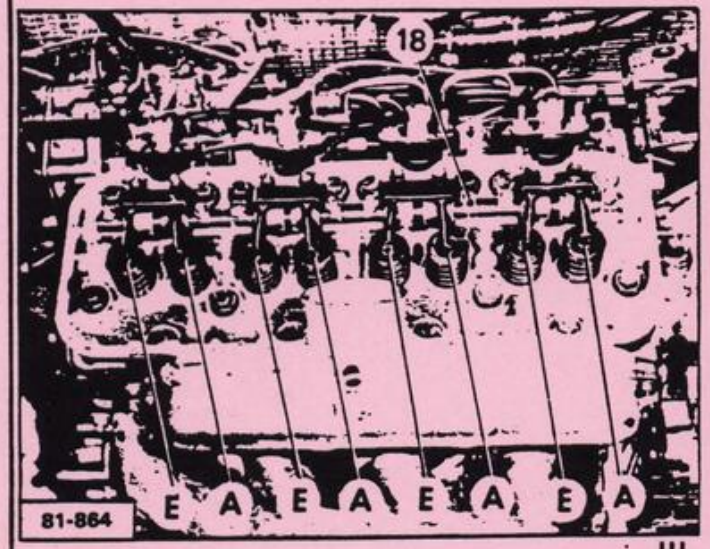
IV



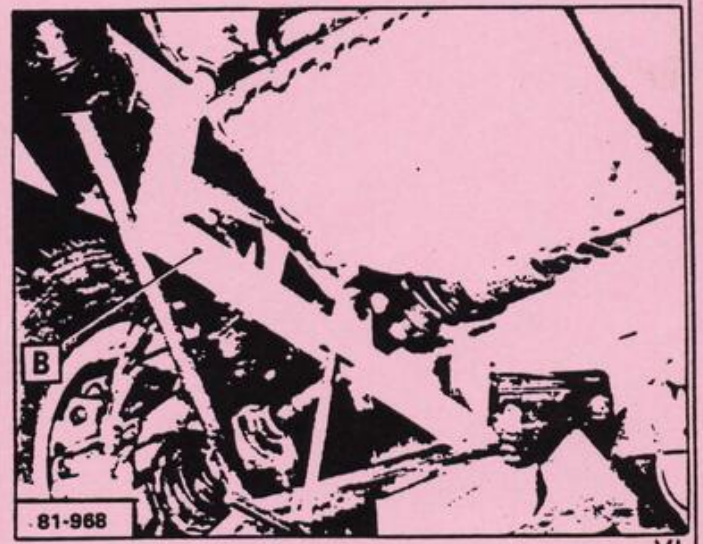
II



V



III



VI

SPECIAL TOOLS

[A] Set of four retaining clamps for fitting to the rocker arm assembly
Reference : (-).0162

[B] Engine support
Reference : 8.0150 A
B1 : Pin, petrol engine support
B2 : Items additional to Diesel engine support (to be made locally).

[C] Set of two levers for freeing the cylinder head forming part of kit (-).0149.

TIGHTENING TORQUES

Engine types U 25/661 and U 25/673

1	⇨	2	⇨	3	⇨	⇨	4
Initially tighten to a torque of 40 N.m (29.5 lbf.ft)		Tighten through an angle of 100°		Tighten through an angle of 100°			Tighten through an angle of 45°

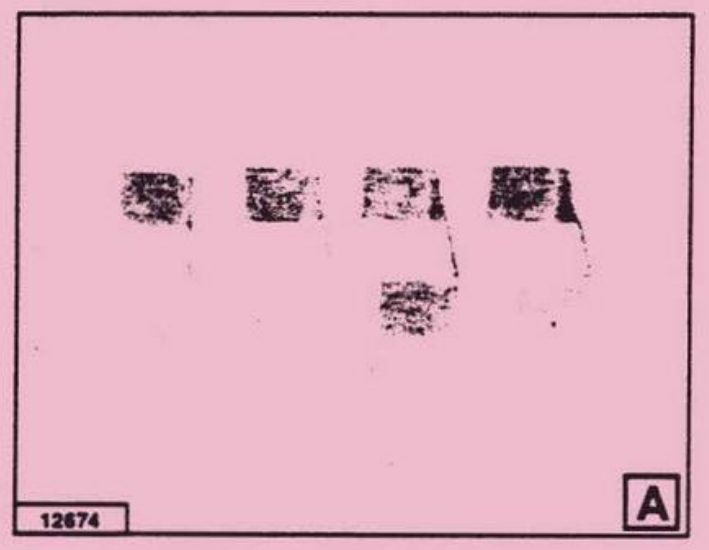
warm up the engine until the electric fans cut in and leave it to COOL (for a min. of 3 hours)

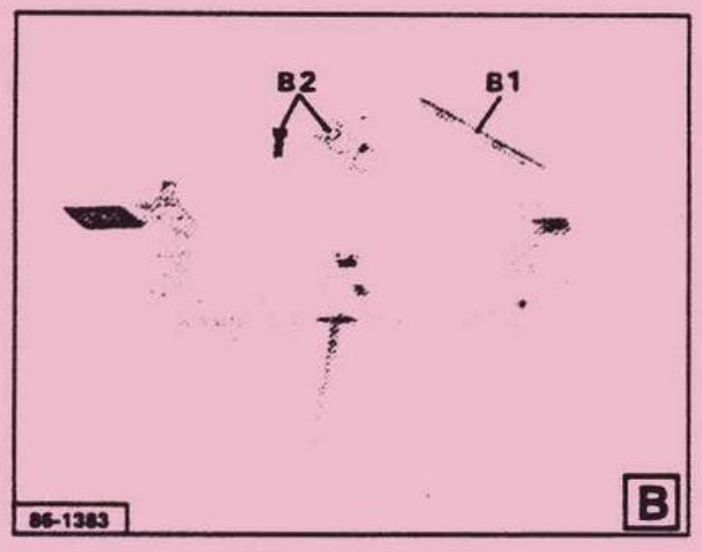
THERE IS NO CYLINDER HEAD RETIGHTENING OPERATION AT 600 MILES (1000 km)

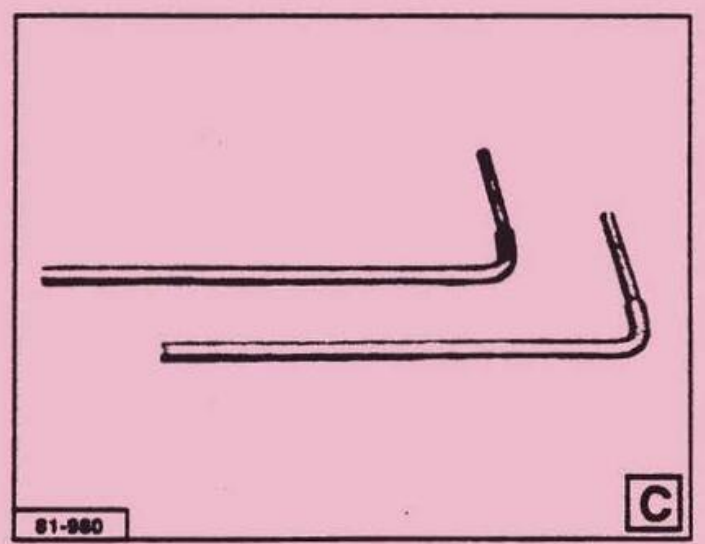
Torques in N.m (lbf.ft)

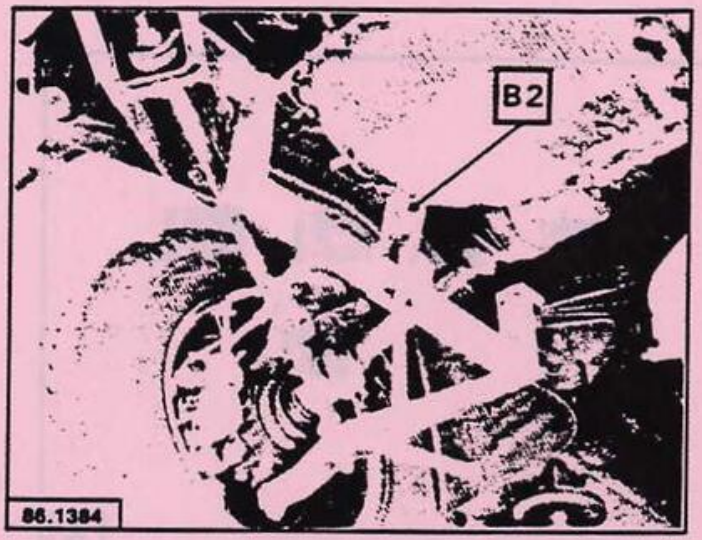
Recommended tightening torques :

Rocker arm assembly securing nuts	25 (18.4)
Nuts on injector pipes	25 (18.4)
Bolts securing the engine mounting (on the cylinder head side)	50 (36.9)

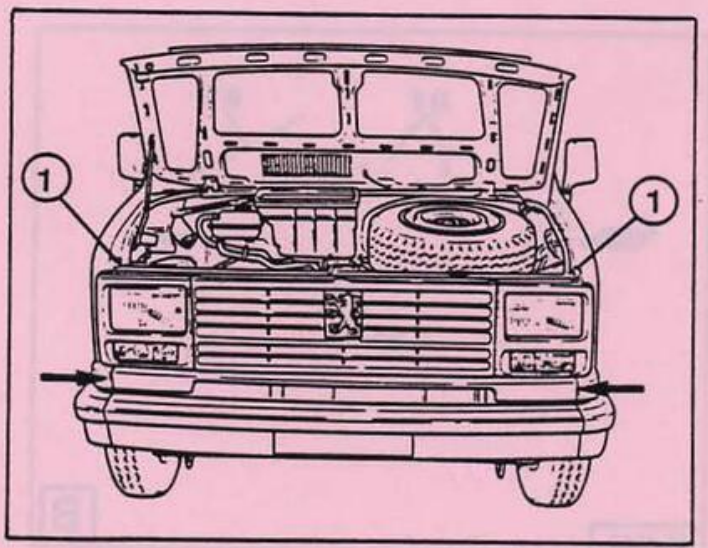

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A


B2
B1
86-1383
B

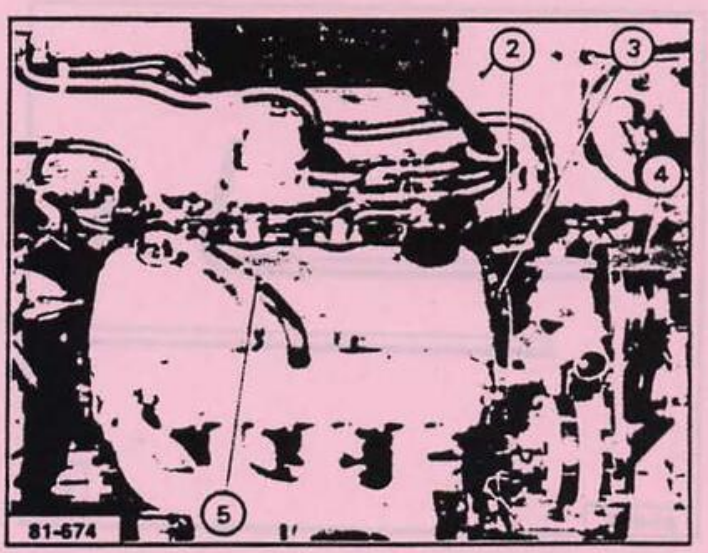

81-980
C



I



II



III

REMOVING

Place a trolley jack under the engine to retain it in its original position.
Remove the right hand engine mounting.
Place the engine support (-).0150 A and (B2) in position. Allow the engine to rest on the support (Fig. I).

Remove :
- the spare wheel.

Drain off the coolant and put it to one side (anti-freeze solution).

Disconnect :
- the battery negative and positive cables,
- the lighting and direction indicator wires,
- the electric fan wires,
- the wire from the temperature switch on the coolant pump,
- the wires from the temperature switch on the radiator,
- the wires from the temperature switch on the coolant casing,
- the wire that supplies the preheater plugs,
- the wire from the electric shut-off unit,
- the diagnostic harness earth wire.

Disconnect :
- the bonnet latch mechanism from the radiator grille,
- the rear spare wheel fastening from the scuttle,
- the coolant hoses from the radiator,
- the accelerator and fast idling cables,
- the fuel return to tank hose,
- the coolant hoses from the cylinder head,
- the exhaust pipes.

Loosen the nuts (→) and remove the two bolts (1) : Fig. II

Remove :
- the radiator grille,
- the air filter ducting from the intake casing,
- the belt protector (4),
- the coolant pump, alternator and exhauster belts,
- the ducting (5).

Free the diagnostic plug (2) from its support.

Loosen the injector pipe unions.

Disconnect the oil pipe (3) from the cylinder head.

Remove :
- the rocker arm cover and its gasket,
- the rocker arm assembly,
- the cylinder head bolts.

Release the cylinder head and gasket using the special freeing levers.

Remove the push rods.
(Note their respective positions).

PREPARATION

Clean the cylinder clock and the cylinder head gasket faces.

> It is very important not to scrape the joint or gasket faces of aluminium components.
> Use a chemical stripper to dissolve those parts of the gasket remaining sticking to the component. Take particular care during this operation to avoid any foreign bodies entering the oil input ducts.

REFITTING

Fit the cylinder head :
Position the pistons half way up their stroke.
Fit the cylinder head gasket.

> Check that the cylinder head gasket has the identification inscription L 25 engraved on its tab.
> This gasket is to be fitted dry (without linseed oil).

Fit the cylinder head. Before placing the cylinder head in position :
- Clean out the tappings in the block.

Tightening : (follow the conventional tightening order). The under head areas and threads on the bolts are to be oiled. Place the teeth on the washers against the cylinder head.

Each time the cylinder head is removed it is essential to replace the bolts and toothed washers by new ones.

1	→	2	→	3
Prefighten to a torque of 40 N.m (29.5 lbf.ft)		Tighten through an angle of 100°		Tighten through an angle of 100°

Prepare the rocker arm assembly :

> Use the large oil input hole « a » as a reference : Fig. I
> Fit :
> - one washer,
> - one inlet rocker arm A,
> - one washer,
> - one spring,
> - one exhaust rocker arm E,
> - one washer.
>
> Hold the assembly together using a clamp (-).0162. Repeat this operation four times.

Fit the push rods.
Fit the assembly prepared in this way to the cylinder head with the large oil input hole « a » pointing towards the coolant pump and the lubrication holes pointing towards the cylinder head.
Fit the caps and tighten the nuts (18).
Tightening torque 25 N.m (18.4 lbf.ft.)
Remove the clamp (-).0162
Adjust the valve clearances :
A = Inlet = 0.30 mm
B = Exhaust = 0.20 mm
Fit the rocker arm cover and its gasket.
Connect :
- the lubrication pipe (20) to the cylinder head,
- the diagnostic plug (19) to its support.

Tighten the injector unions to 25 N.m (18.4 lbf.ft.).

Fit :
- duct (22),
- the coolant pump, alternator and exhauster drive belts,
- the belt protector (21),
- the air filter duct to the intake casing.

Connect :
- the exhaust pipe (with the part that acts as a ball joint coated with high temperature grease). Tighten the springs until they are coil-bound and then loosen them by one turn on each side,
- the fuel return to tank hose,
- the coolant hoses to the cylinder head,
- the accelerator and fast idling cables.

Fit the radiator grille and secure it with the two screws (23).
Tighten the nuts (→).

Reconnect :
- the coolant hoses to the radiator,
- the fastening securing the spare wheel assembly to the scuttle.
- the bonnet latch mechanism to the radiator grille and adjust it.

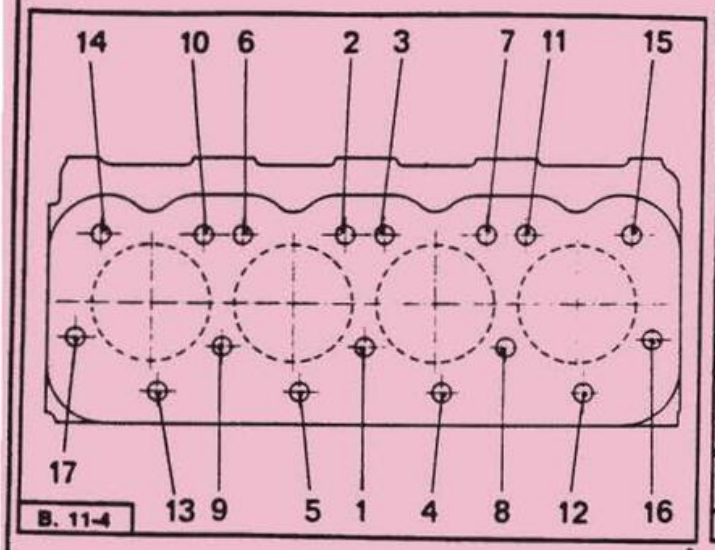
Connect up :
- the wires to the temperature switch on the radiator,
- the wires to the temperature switch on the coolant pump,
- the wires to the electric fan units,
- the lighting and direction indicator wires,
- the wire that supplies the preheater plugs,
- the electric shut-off unit wire,
- the diagnostic harness earth wire,
- the positive and negative cables to the battery.

Place a trolley jack under the engine, to position it so that the right hand engine mounting can be refitted. Tighten the engine mounting bolts to 50 N.m (36.9 lbf.ft.).
Remove the engine support (-).0150 A and B2.
Remove the trolley jack (Fig. VI).
Fill and bleed the cooling system.

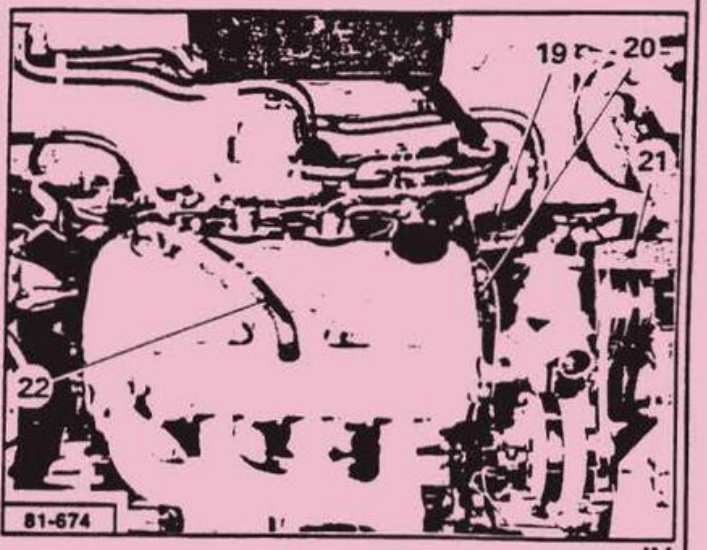
4
Tighten through an angle of 45°

Warm up the engine until the electric fans cut in then : leave it to COOL (for a min. of 3 hours)
- Adjust the valve clearances.

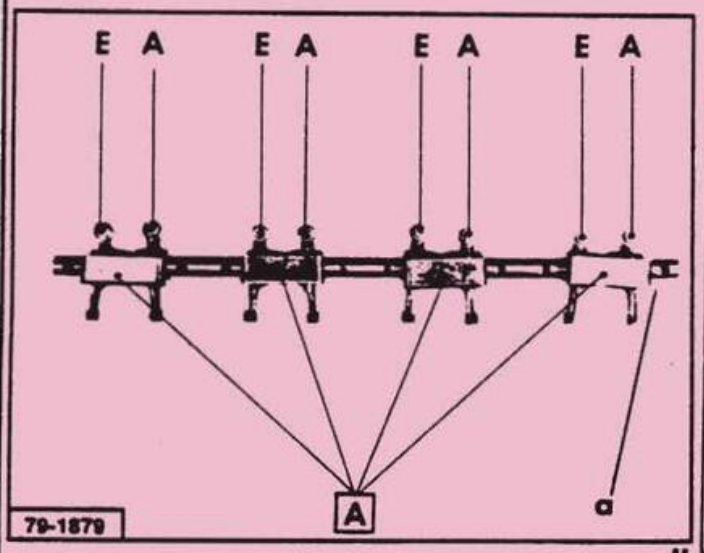
THERE IS NO CYLINDER HEAD RETIGHTENING OPERATION at 600 miles (1000 km)
Fit the spare wheel.



I



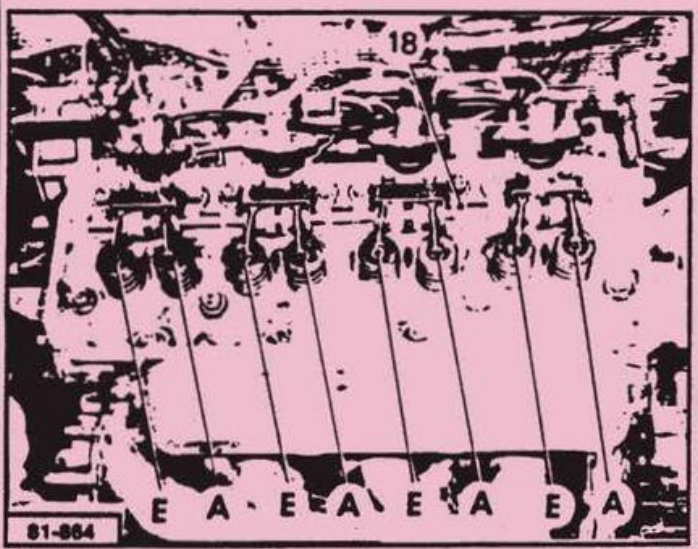
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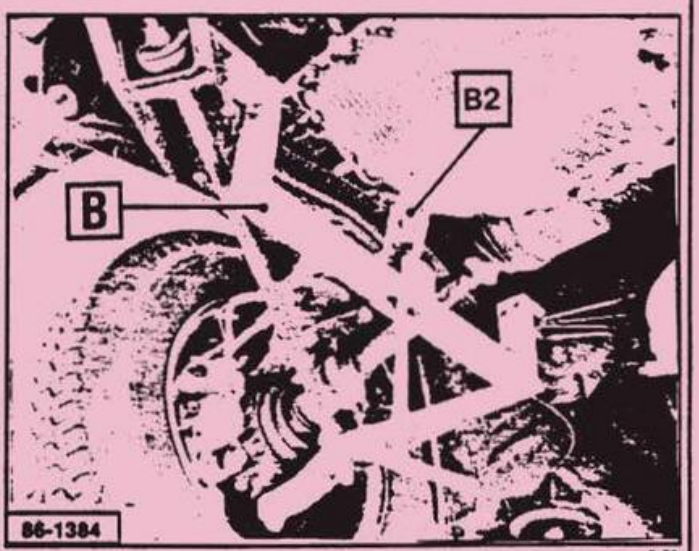
II



V



III



VI

B4.202	01	XUD9A	CYLINDER HEAD REMOVING - REFITTING	J5

I

SPECIAL TOOLS

Dial indicator (-).1504

Tools, in kits

Kit (-).0110 Tripod P
Support H

Kit (-).0117 Dial indicator plunger T
Support P
Crankshaft spanner EZ

Kit (-).0153 Pinning tool N

II

REMOVING

- Disconnect the battery
- Drain the cooling system
- Remove the air intake distributor (1)
- Partially remove the timing gear drive belt (see corresponding section)
- Disconnect, unclip and pull to one side the wiring harnesses and pipes and cables attached to the cylinder head
- Remove the injector pipes
- Remove :
  - the exhauster drive belt
  - the lifting ring (3)
- Disconnect the exhaust downpipe from the manifold

III

- Loosen the bolt that secures the timing sprocket (4)
- Remove the pinning bolt (5) and the sprocket (4)
- Tighten the nut (6) on the tensioner roller shaft-stud
- Remove :
  - the tensioner roller upper bolt
  - bolt (7) from the engine mounting

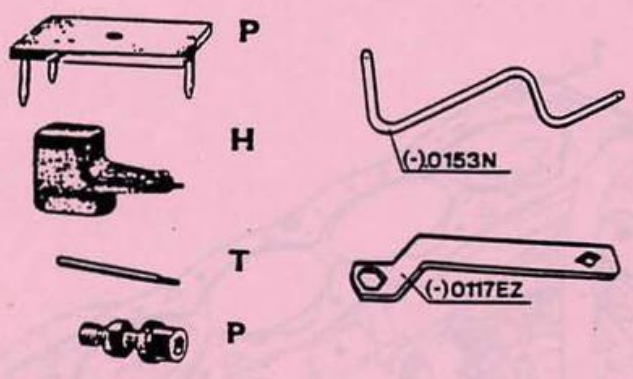
IV

- Remove the rocker arm cover
- Loosen the cylinder head bolts, evenly and progressively, in a spiral sequence starting from the outside
- Remove the cylinder head bolts
- Free the cylinder head using levers 0.0149 (see section 15)
- Remove the cylinder head and its gasket

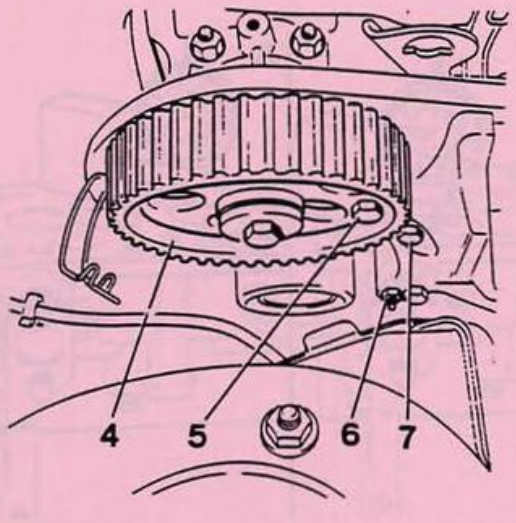
V

- Clean the gasket faces with officially approved stripping compound. Do not use abrasive or sharp edged tools to do so. There must be no impact marks or scores on the gasket and joint faces
- Clean the tappings in the cylinder block by running an m12 x 150 tap down them.

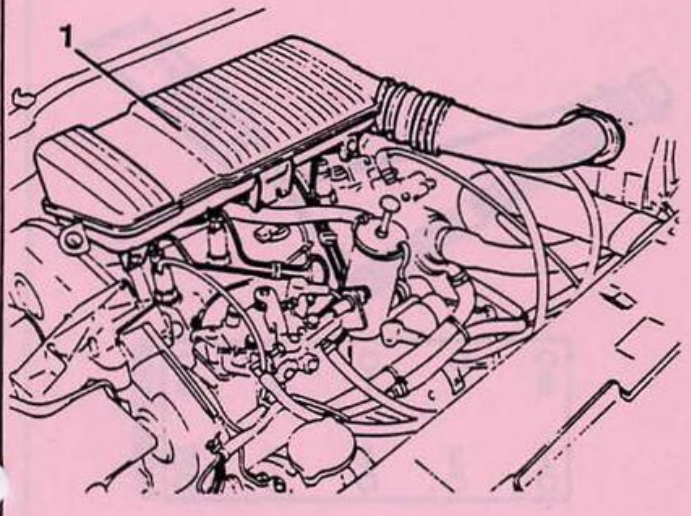
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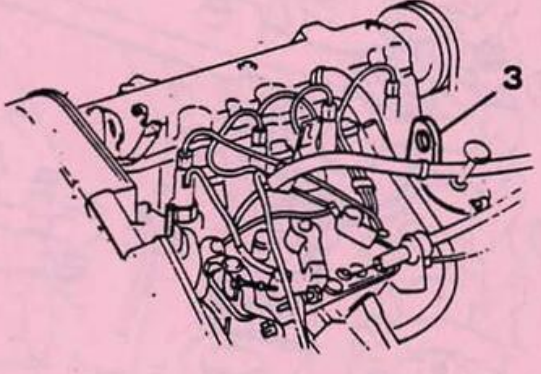


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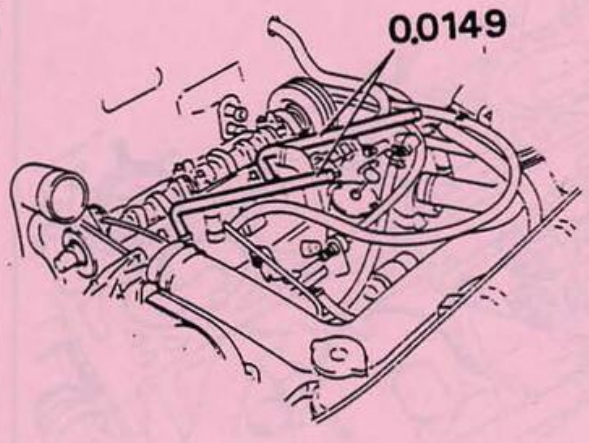


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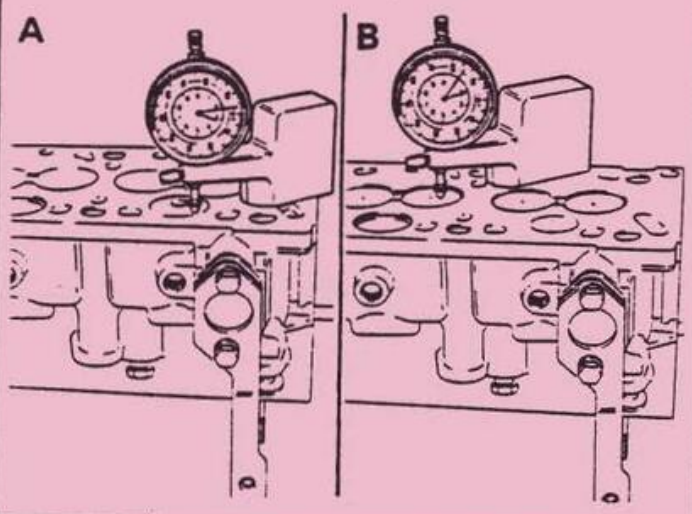




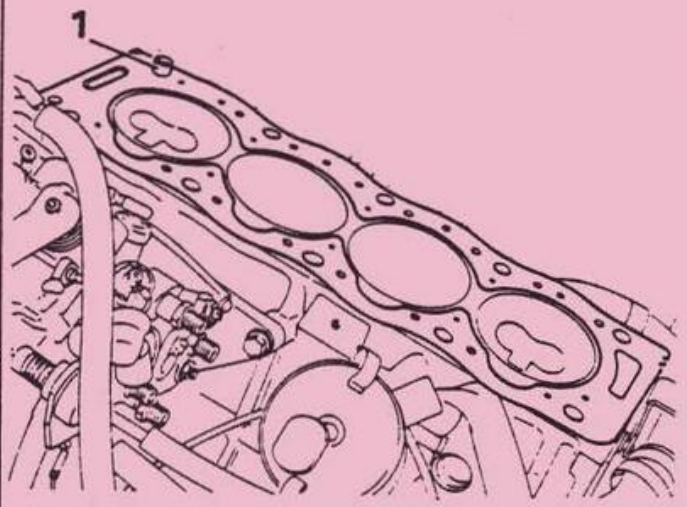
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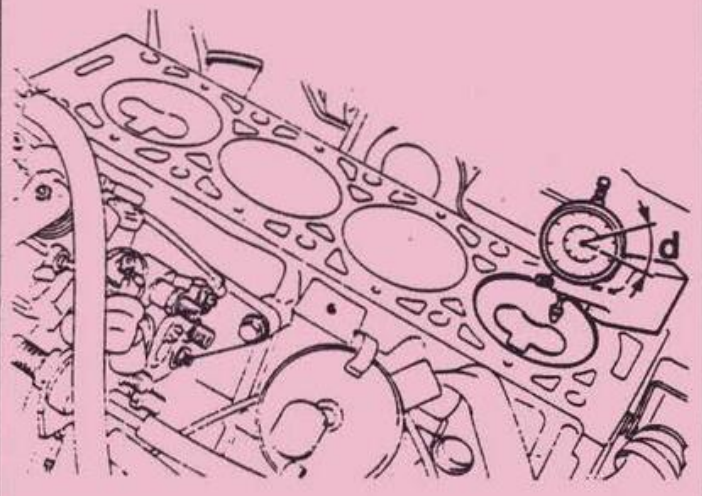
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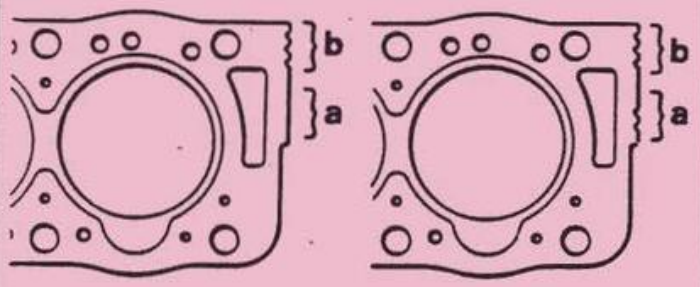


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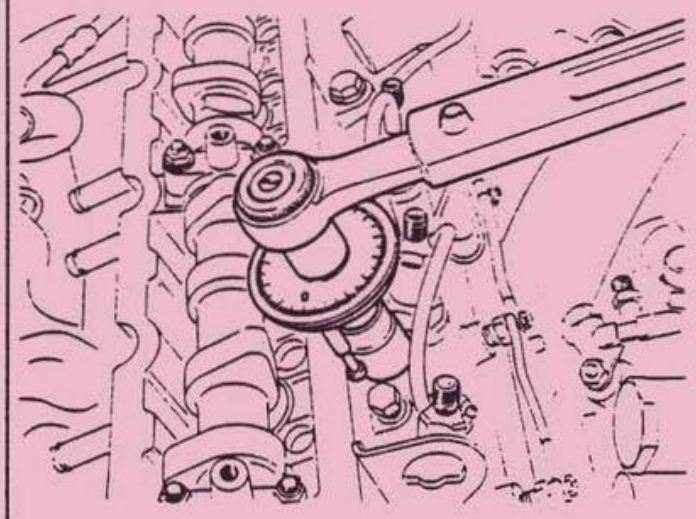
II





IV





I

CHECKING

- Check the flatness of the gasket face. The max. permissible bow : 0.07 mm (the camshaft must remain free to rotate)
- If necessary, reface the gasket face (see data sheets)
- Check the precombustion chamber protrusion (A)
  Protrusion : 0 to 0.03 mm
- Check the amount by which the valves are recessed below the surface (B) :
  Recess : ⊗ 0.9 to 1.45 mm
  ● 0.5 to 1.05 mm

II

SELECTING THE CYLINDER HEAD GASKET

- Remove the locating pin (-).0153 N from the flywheel
- Mount the dial indicator on the support (-).0110 H and zero it on a surface plate
- Turn the crankshaft and measure the amount by which each piston protrudes at TDC
- Note down the max. protrusion (d)
- Select the thickness of the gasket to suit this protrusion

Protrusion (d)	Reference (b)
0.54 to 0.77 mm	2 notches
0.77 to 0.82 mm	3 notches

Cylinder head gasket identification

- Engine reference (a)
- Thickness reference (b)

Engine	Reference (a)	Reference (b)	Thickness
XUD9A	No notches	2 notches	1.61 mm
		3 notches	1.73 mm

III

REFITTING

- Turn the crankshaft using spanner (-).0117 EZ and pin the flywheel in position using tool (-).0153 N
- Refit :
  - the locating dowel (1)
  - the cylinder head gasket, dry
- Ensure that the camshaft is in the correct position for insertion of the timing pin by fitting the timing sprocket.
- Refit the cylinder head

IV

- Before refitting the cylinder head bolts :
  - carefully brush the screw threads
  - coat the screw threads and the locating faces on the washers with MOLYKOTE G RAPID

TIGHTENING THE CYLINDER HEAD

- Refit the bolts, using new washers

In the order shown :

- pretighten to 30 N.m (22.1 lbf.ft.)
- tighten to 70 N.m (51.6 lbf.ft.)
- retighten through an angle of 120° using a tool of the FACOM D360 type

IMPORTANT

There is no retightening operation after the first warm-up.

I

- Refit :
  - bolt (2) to the engine mounting
  - the upper bolt (3) to the tensioner roller
  - the camshaft sprocket (4), pinning it with a bolt (5) and tightening the bolt (6) to 50 N.m (36.9 lbf.ft)
  - the rocker arm cover (1)
  - the timing gear drive belt (see corresponding section)

- Reconnect, clip in place and secure the wiring harnesses, connections, cables and pipes associated with the cylinder head.

II

- Refit :

  - the exhauster drive belt (see corresponding section)

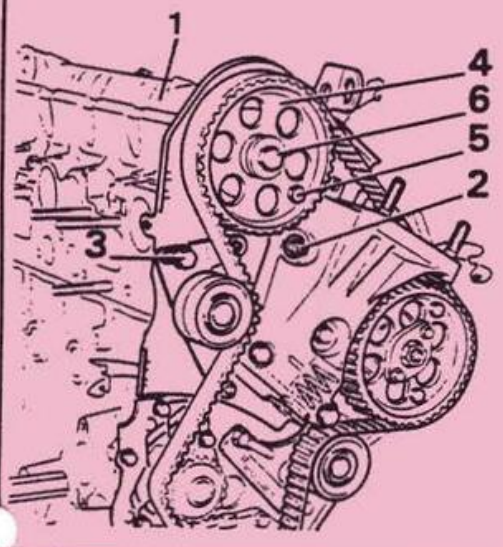
  - the air intake distributor

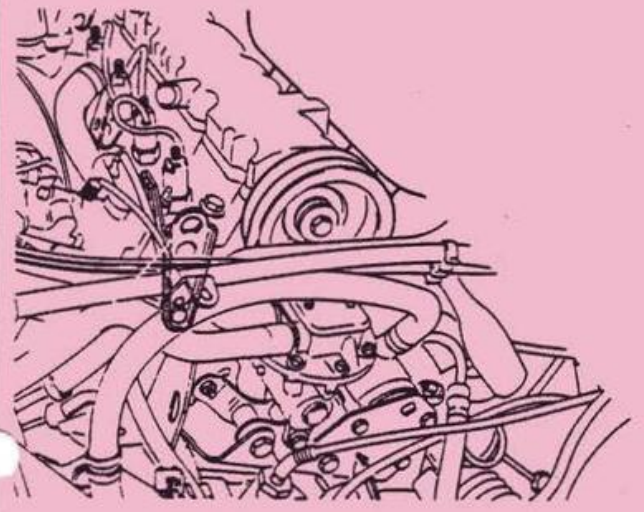
III

- Adjust the fast idling control (see corresponding section)

- Fill and bleed the cooling system (see corresponding section).

I





SPECIAL TOOLS

A : Dial indicator :

Tool no. : 8.1504.

B : Valve spring compressor

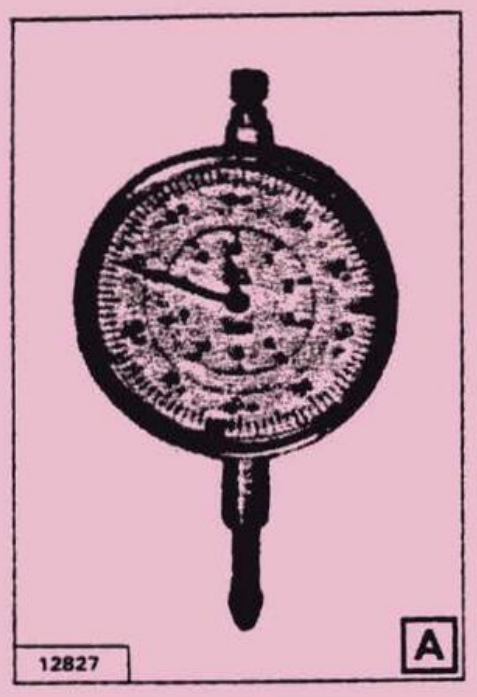
Tool no. : 8.1505 Y

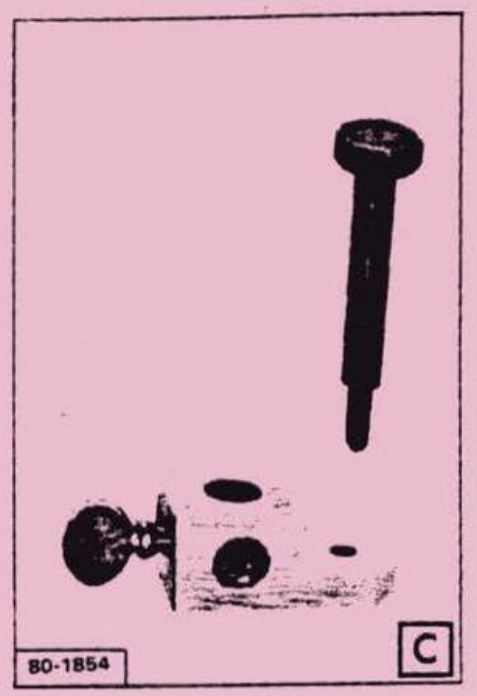
C : Disal indicator support adjustable section :

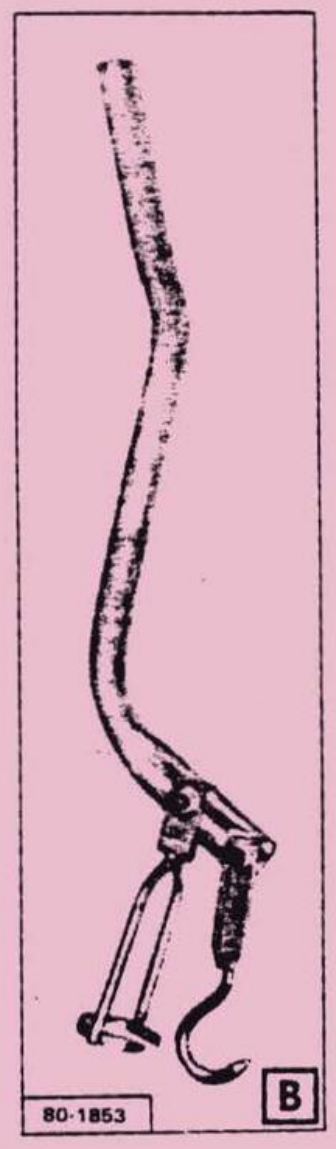
Tool no. : 8.1504 A2

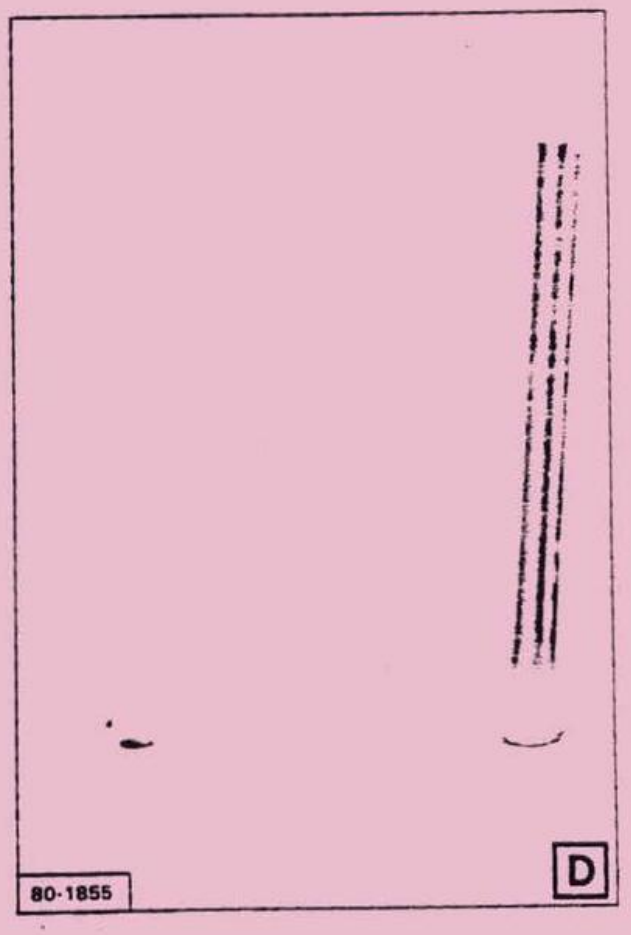
D : Support for mounting the dial indicator on the cylinder head :

Tool no. : 8.0117 AH.


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A

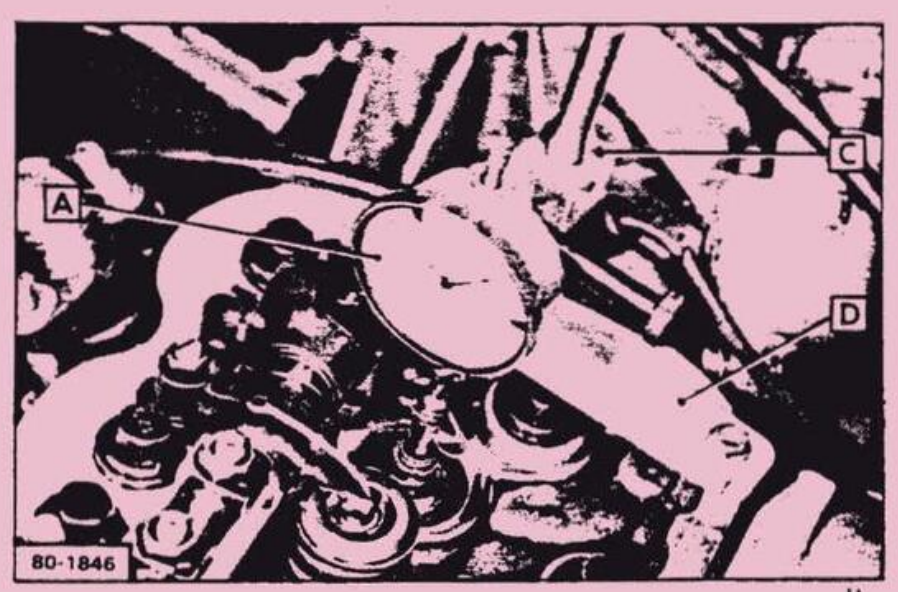

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C


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B

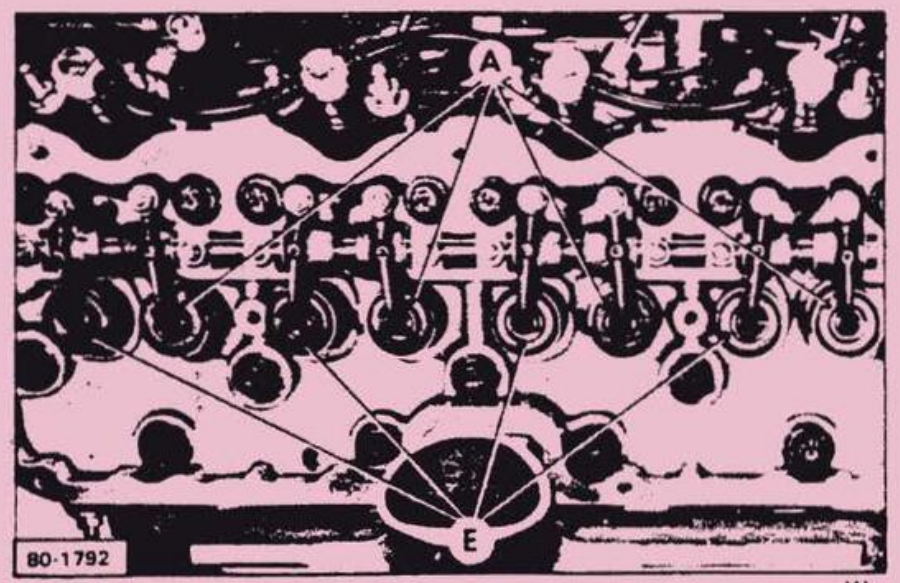

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I



II



III

VALVE CLEARANCES (on a cold engine) Fig. III

To turn the crankshaft :
Raise one of the front wheels, select the highest gear and turn the wheel to move the crankshaft.

Remove the rocker cover.
Bring the piston on no. 1 cylinder to somewhere near TDC, with the valves "rocking".

From the no. 1 cylinder inlet valve assembly remove : Fig. I :
- lock-nut (2),
- the push-rod.

Screw in the inlet valve rocker arm adjusting screw and move the rocker arm into the vertical position.
Fit valve spring compressor [B] 8.1505 Y to the inlet valve on no. 1 cylinder.
Remove :
- the collets and the spring cup,
- the spring.

Find TDC on No. 1 cylinder : Fig. II

Place a paper clip on the inlet valve stem to prevent the valve falling into the cylinder.

Fit support [D] 8.0117 AH.
and dial indicator support adjustable section. [C] 8.0504 A2, fitted with dial indicator, [A] 8.1504.

Turn the crankshaft through a quarter of a turn in the opposite direction to the normal direction of rotation of the engine and then return it in the normal direction of rotation until the large pointer on the dial indicator changes its direction of movement, showing that the piston TDC has been reached.
Set the "0" on the dial indicator face in line with the large pointer and note the position of the small pointer.

Adjust the inlet valve clearance on no. 4 cylinder to 1 mm (the theoretical valve clearance).

Turn the crankshaft through one complete turn in the normal direction of rotation, until it comes back to the TDC "rocking" position (where the dial indicator pointers are in the same position as was previously noted).

Measure the clearance on no. 4 cylinder inlet valve which should be between 0.05 and 0.45 mm.

Remove the dial indicator and refit the valve spring, the spring cup and the collets using spring compressor [B] 8.0105 Y.

Refit the inlet valve push rod and lock nut (2)

VALVE CLEARANCES (on a cold engine) Fig. III

Adjust the valves to the following clearances :
On a cold engine : Inlet : (A) 0.30 mm
Exhaust : (E) 0.20 mm

Fit the rocker cover and its gasket.
Tighten its securing nuts to 0,7 m.daN (copper washer).

ONE OF TWO METHODS CAN BE USED :

1 - With the valves "rocking" :

(inlet valve starting to open and the exhaust valve just closing)

Position No. 1 cyl. "rocking" and adjust the valves on No. 4 cyl.

No. 3 cyl.	No. 2 cyl.
No. 4 cyl.	No. 1 cyl.
No. 2 cyl.	No. 3 cyl.

II - By fully opening the exhaust valves :

Valve to be fully open :	Adjust the following valves : Inlet	Exhaust
Exhaust No. 1 cyl.	No. 3 cyl.	No. 4 cyl.
" No. 3 cyl.	No. 4 cyl.	No. 2 cyl.
" No. 4 cyl.	No. 2 cyl.	No. 1 cyl.
" No. 2 cyl.	No. 1 cyl.	No. 3 cyl.

Support the right hand side of the vehicle on axle stands.
Disconnect the battery negative cable.
Engage the highest gear.

Remove, Fig. I
- the protector from under the engine (turbo)
- the crankshaft protection nut (1) (36 mm across flats)
- the drive belt protectors
- the engine oil filler cap.

Place, Fig. II
- the valves on no. 1 cylinder « in balance » (looking at them through the oil filler hole).
- the timing mark « A » on the camshaft in line with the bowl (2).

Check, Fig. II
- the number of belt pitches (teeth) between timing marks A and B, via the tensioner roller (1). There should be 35 pitches.

If this condition is not fulfilled, recheck the timing (see the corresponding section).

To make it easier to count the number of belt pitches, make chalk marks in line with the timing marks on the camshaft and the crankshaft and turn the engine to bring the mark on the belt that corresponds to the crankshaft mark into a more readily visible area « C ».

Fit, Fig. I

- the oil filler cap
- the belt protectors
- the crankshaft protection nut
- the protector under the engine (turbo).

ADJUSTING THE VALVE CLEARANCES (on a cold engine)

Valve clearances :	
On a cold engine	Inlet: (A) ..... 0.30 mm Exhaust: (E) . 0.20 mm

Refit the rocker arm cover and its gasket.

Tighten the securing nuts (7 mN - 5 lbf.ft) (fit copper washers).

POSSIBLE METHODS :

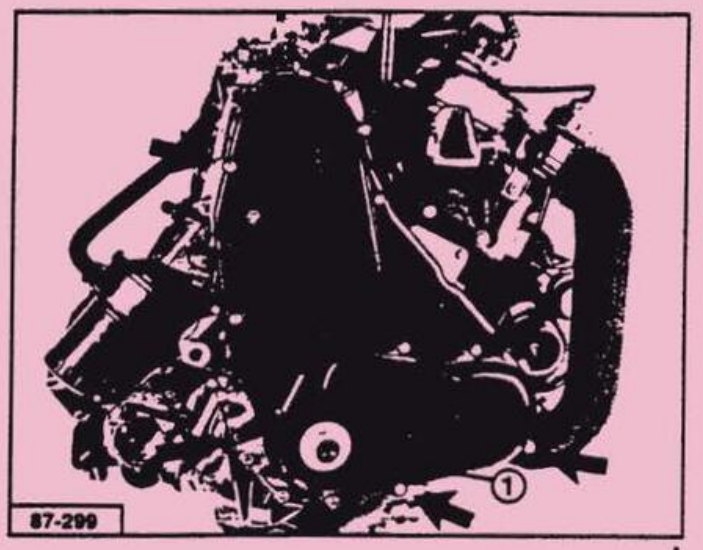
1. With the valves « in balance » :

(Inlet valve at beginning of inlet movement and exhaust valve at end of exhaust movement).

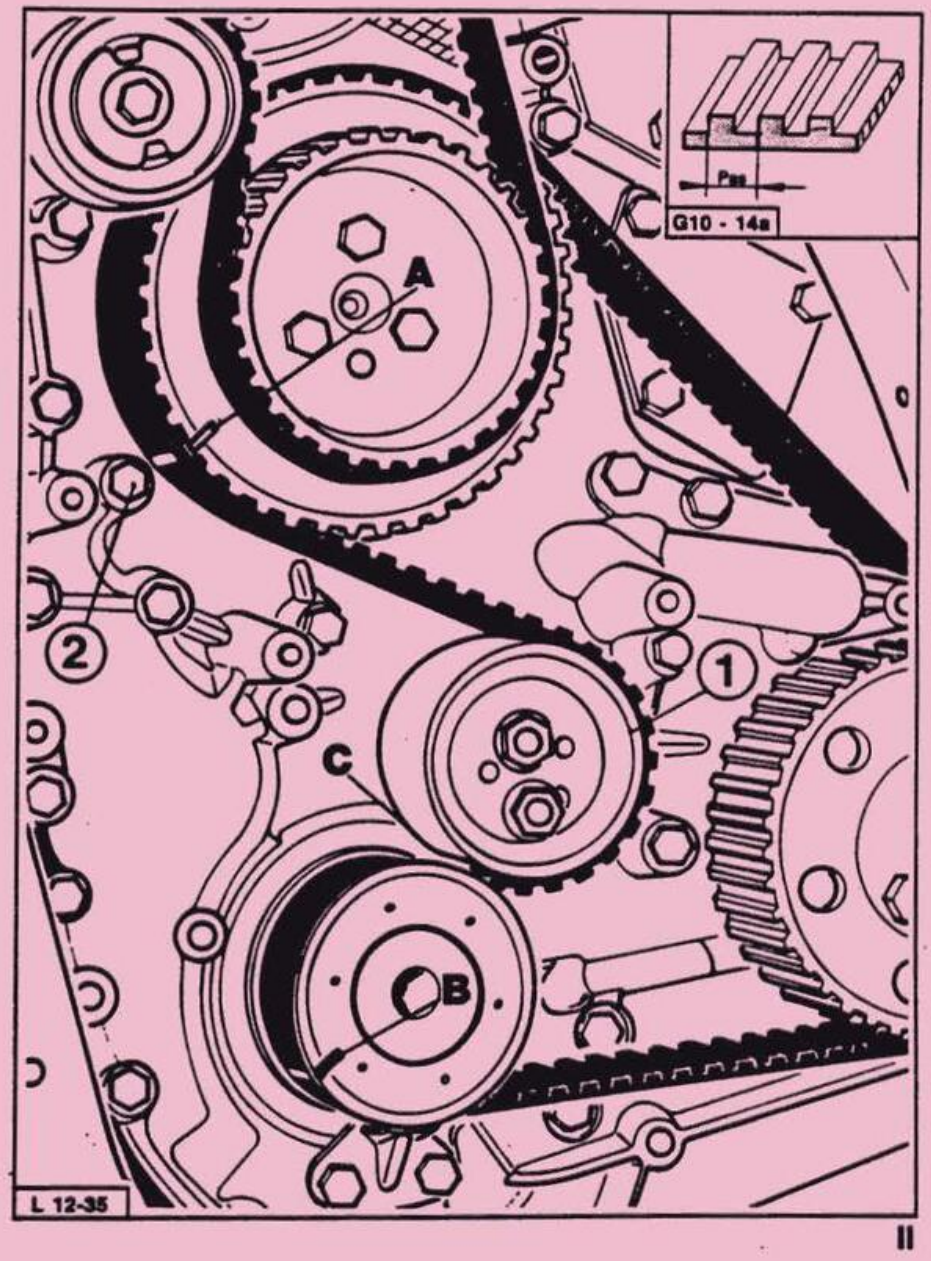
Place No.1 cyl in balance and adjust No.4 cyl
Place No.3 cyl in balance and adjust No.2 cyl
Place No.4 cyl in balance and adjust No.1 cyl
Place No.2 cyl in balance and adjust No.3 cyl

II. With the exhaust valve fully open

Valve to be fully opened :	Valve to be adjusted :	
	Inlet	Exhaust
No.1 cyl exhaust	no.3 cyl	no.4 cyl
No.3 cyl exhaust	no.3 cyl	no.2 cyl
No.4 cyl exhaust	no.2 cyl	no.1 cyl
No.2 cyl exhaust	no.1 cyl	no.3 cyl



I



II

I

CHECKING THE VALVE CLEARANCES

- The clearances are to be checked when the engine is cold

- Remove :
  - the air intake distributor
  - the rocker arm cover
  - the pre-heater plugs

Method of checking

Valve clearances :

Inlet : ● 0.15 mm
Exhaust : ⊗ 0.30 mm
Tolerance : ± 0.07 mm

Place the following valves in balance	● 4	4	● 1	⊗ 1
Check	● 1 ● 2	1 3	● 4 ● 3	⊗ 4 ⊗ 2

- Note down the clearances

II

ADJUSTING THE VALVE CLEARANCES

CASE A

If the clearances noted during this check are incorrect

- Remove the camshaft (see corresponding section)

- Marking their positions :
  - take out the tappets
  - remove the adjusting pads

- Measure the thickness (e) of the pads

- Determine the thickness of the pad to be fitted to each (see III, column a or b)

- Fit the pads, the thickness of which has just been determined, and the tappets.

- Refit the camshaft (see the corresponding section)

III

EXAMPLE

	a	b	c
Nominal clearance	0.15	0.30	0.15
Clearance measured	0.25	0.20	0.45
Difference	+ 0.10	- 0.10	+ 0.30
e	2.35	2.725	2.425
Pad to be fitted	2.450	2.625	2.725
Clearance obtained	0.15	0.30	0.15

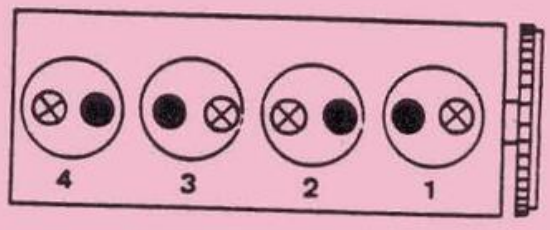
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CASE B

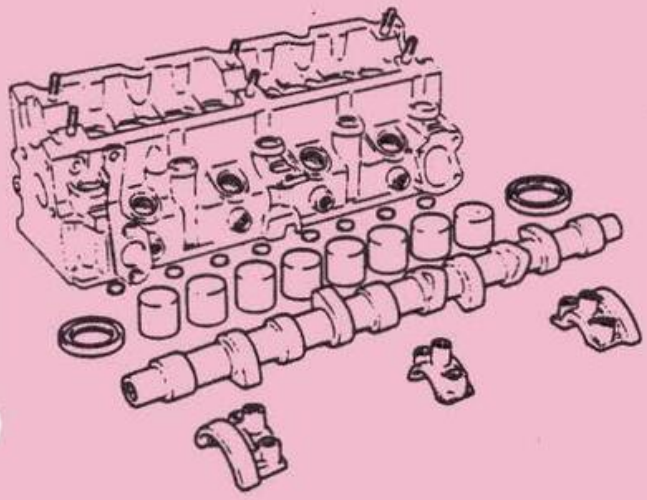
Adjusting the clearances after carrying out work on the cylinder head such as replacing the camshaft, the tappets or the valves or grinding-in the valves.

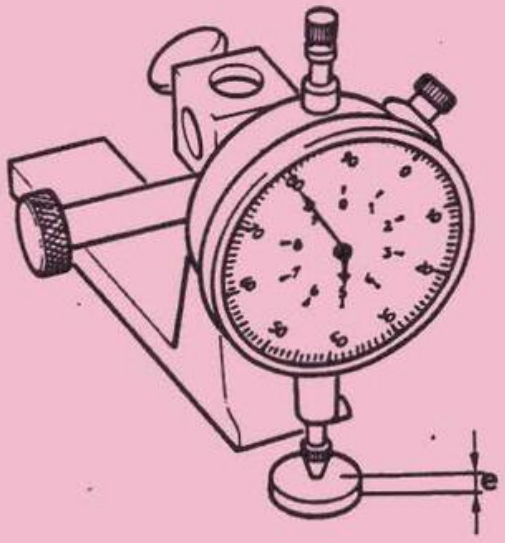
- Fit pads of the basic thickness (1)
  e = 2.425 mm
- Check that they project past the cup (2)
- Refit the tappets
- Turn the engine through 1/4 of a turn in the opposite to the normal direction of rotation, from the timing position (piston at mid-stroke)
- Refit the camshaft and tighten its bearing caps to 17.5 Nm (13 lbf.ft)
- Check the valve clearances by turning the camshaft and note them down.
- Remove the camshaft
- Take out the tappets, marking their positions.
- Remove the pads of the basic thickness (1)
- Determine the thicknesses of the pads to be fitted (see III, column c)
- Fit the pads, the thickness of which has just been determined, and the tappets
- Refit the camshaft (see the corresponding section).

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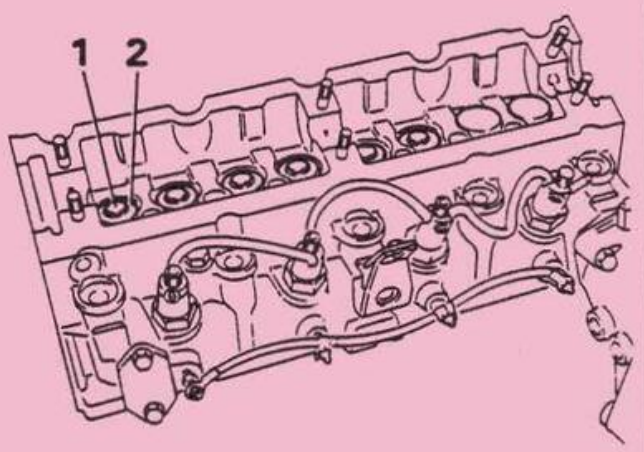
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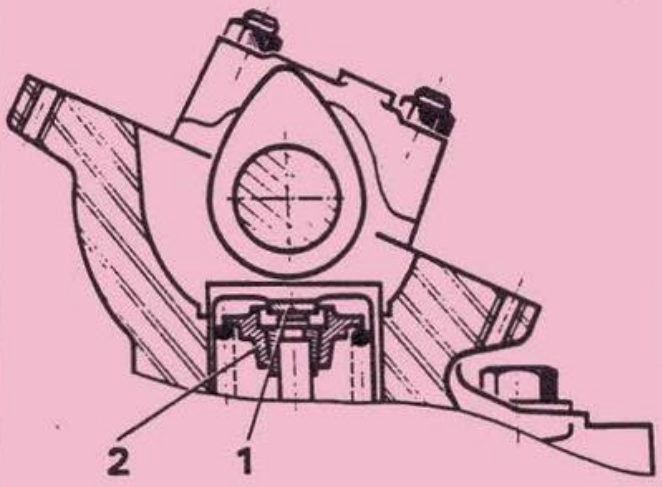




III

IV





This operation requires the removal of the engine (see this section) and the removal of the timing gear drive belts (see engine overhaul).

REMOVAL

Pierce two diametrically opposite holes with a punch or similar tool. Fig. I.

Position tool F from kit (-).0157, screw the two drive screws into the body of the seal and extract the seal by turning the centre bolt. Fig. II.

FITTING

Clean the seal housing and the bearing surface on the crankcase.

Lubricate the housing and the seal lips to assist fitting.

Mount the seal on tool (-).0157 B. Fig. III.

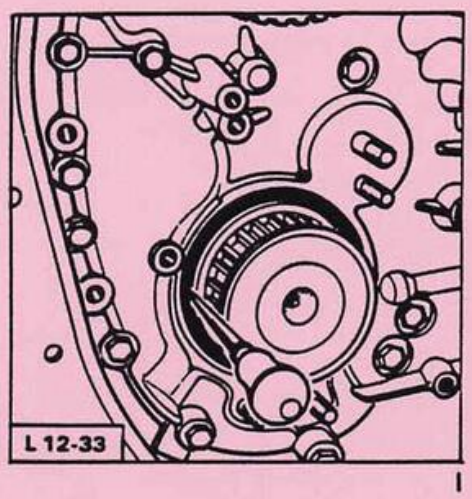
Position the seal so as to centralise the oil reserve groove in relation to the studs of the damper. Fig. IV.

Fit the seal. Fig. V.

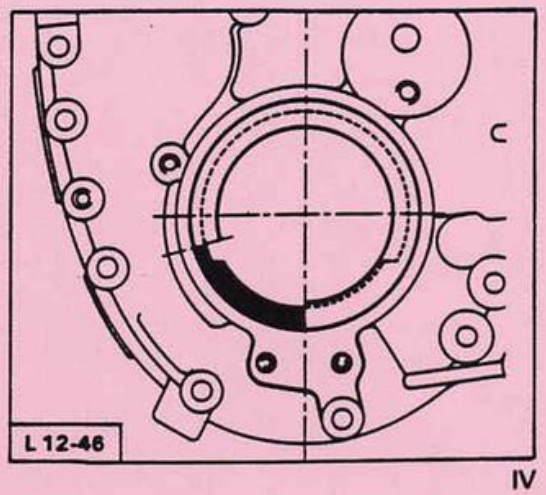
Withdraw the tool and check that the outer dust excluding lip is correctly positioned. If necessary, pull it out with a paper clip. Fig. VI.

> Note - Take same precautions when changing oil pump and camshaft seals, but these do not need to be positioned in the same way.

Refit the drive belts and the timing covers (see engine overhaul).



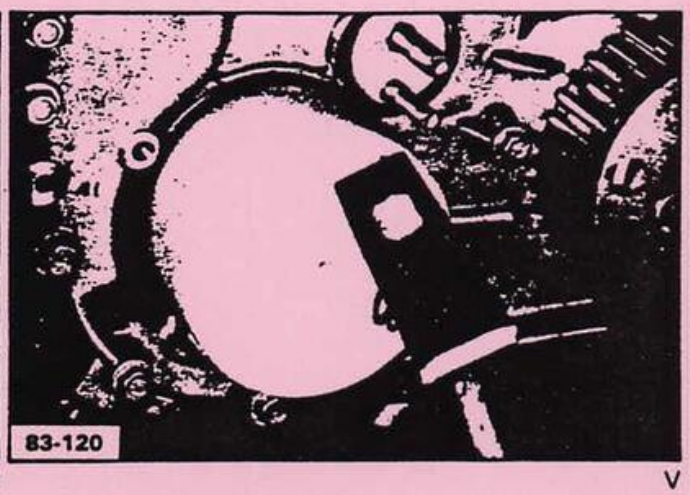
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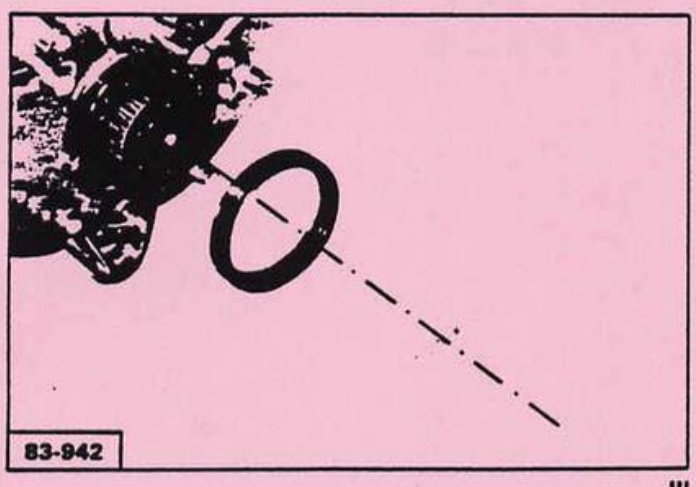
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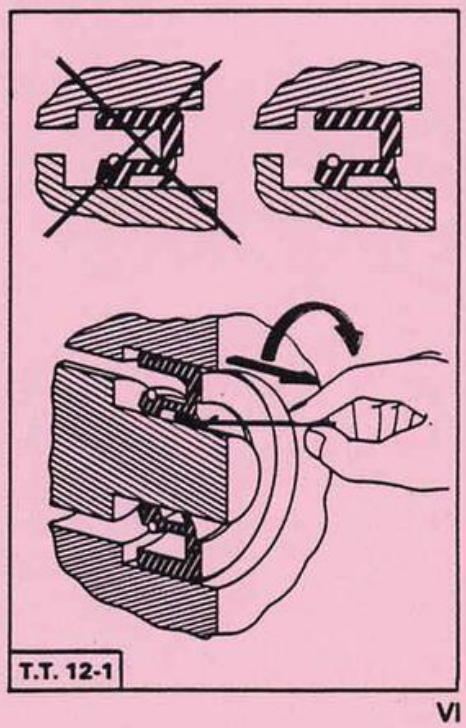
II



V



III



VI

SPECIAL TOOLS

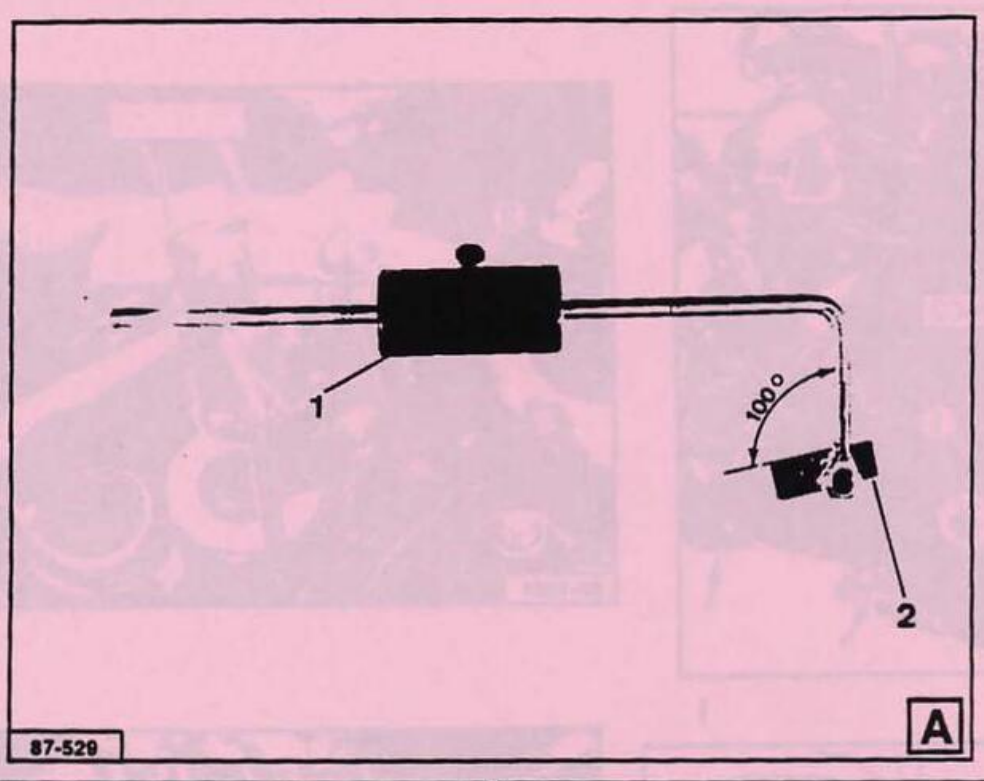
[A] From the Diesel engine tool kit
Reference : (-).0157
K : Timing gear drive belt tensioner
NOTE : Position the tool (2) at 100° from (1) (see photo)

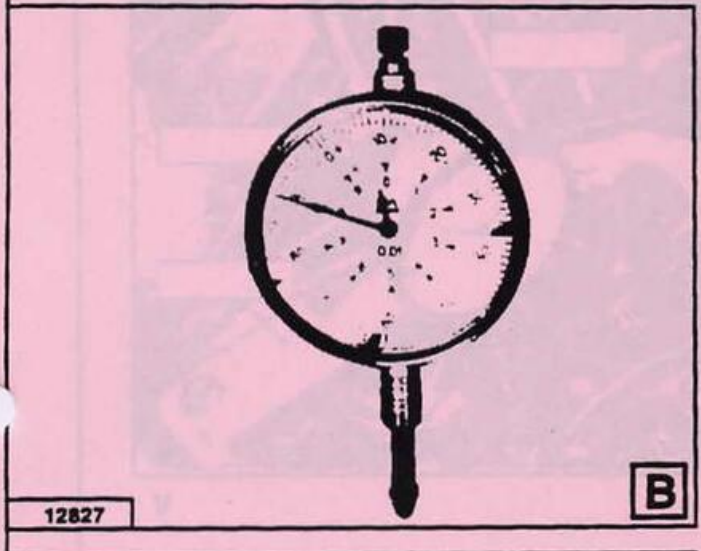
[B] Dial indicator
Reference : (-).1504

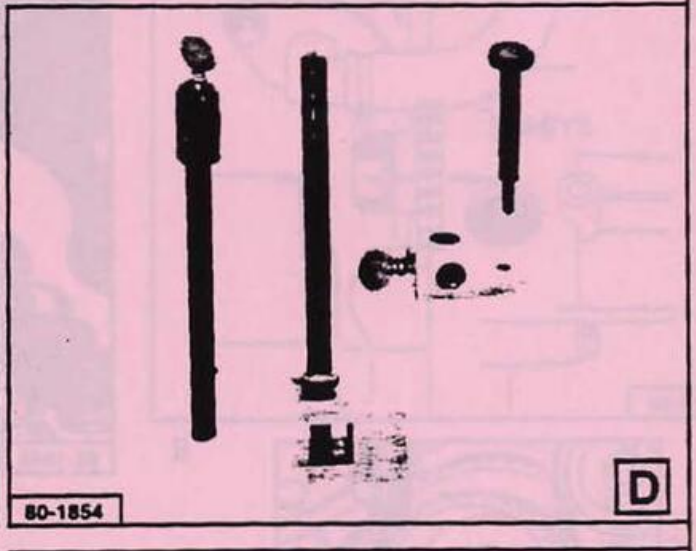
[C] Valve spring compressor
Reference : (-).0150 Y

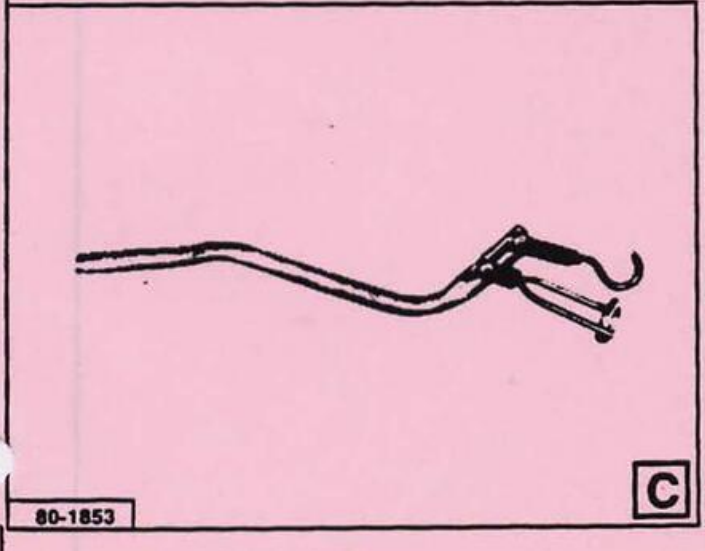
[D] Adjustable component for dial indicator support
Reference : (-).0504 A2

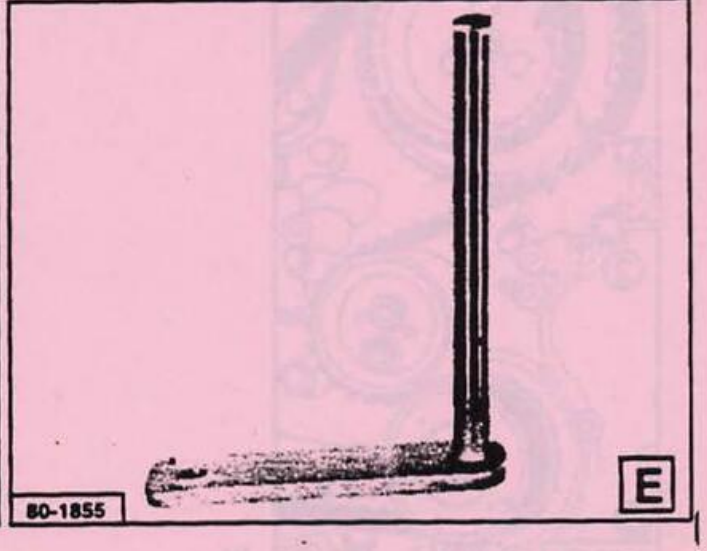
[E] Support for securing dial indicator to cylinder head
Reference : (-).0117 AH

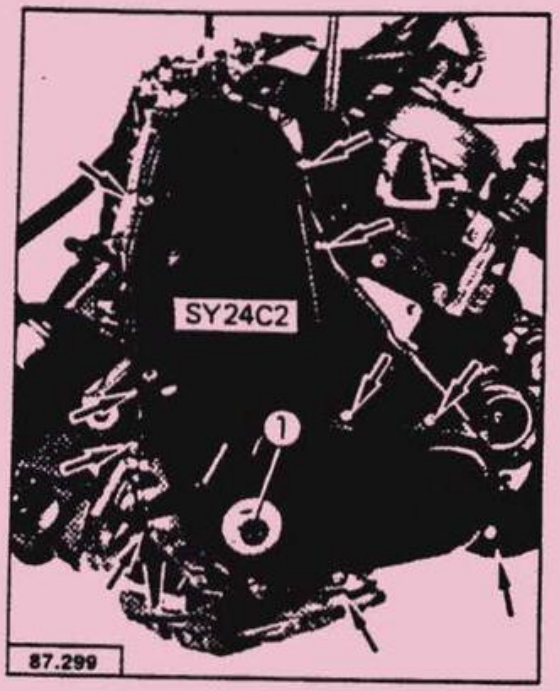

1
100°
2
87-529
A


12827
B


80-1854
D


80-1853
C

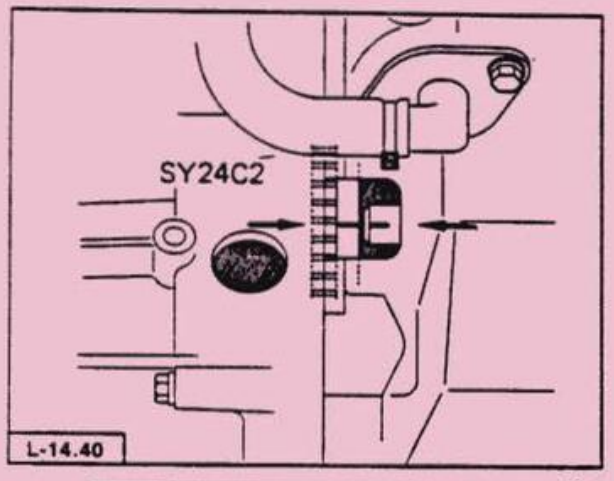

80-1855
E



I



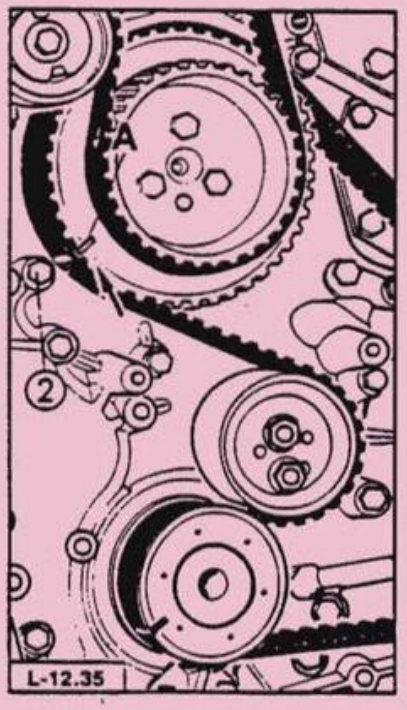
IV



II



V



III

REMOVING

Support the front right hand side of the vehicle.

Disconnect the battery negative terminal.

Engage the highest gear to permit the engine to be turned over.

Remove, Fig. 1

- The protector under the engine
- The crankshaft protection nut (1) (36mm across flats)
- The drive belt protectors.

Place No. 1 cylinder « in balance » by looking through the oil filler hole.

1 Method shown in Figs. I and III (when there is a mark on the flywheel)

- Position marks —> and <— are to be in line.

- The timing mark « A » on the camshaft sprocket is to be in line with the bolt (2).

2 Method shown in Figs. IV and V (when there is no mark on the flywheel)

- Remove the rocker arm cover. Bring the valves on No. 1 cylinder « in balance » (No. 1 piston will be almost at TDC)

- Remove the locking nut (3) and screw back the adjusting screw on No. 1 cylinder inlet rocker arm.

- Using the valve spring compressor (C) Fig. IV, compress the spring and move the rocker arm sideways to swing it into a vertical position.

- Take out the push rod.

- Remove :
  - The valve collets
  - The valve spring

To prevent the inlet valve dropping down into the cylinder, only turn the crankshaft by a quarter of a turn in each direction. Another method is to place a paperclip on the inlet valve stem.

ENGINE	BEFORE T.D.C.	PUMP	
U25/661	4.32 mm ± 0.05	MA 300	DPA
	4.71 mm ± 0.05	MA 260	DPC
U25/673	3.24 mm ± 0.05	MAS 100	

Find T.D.C. on No. 1 cylinder, Fig. V

- Fit the support brackets (E) together with the adjustable component (D) fitted with the dial indicator (B).

- Turn the crankshaft forwards and backwards to obtain the exact point at which the large pointer on the dial indicator changes direction (T.D.C.).

- Set the dial indicator moving dial on 0 in line with the large pointer and place the total pointer on 8 on the dial.

Find the timing point.

- Turn back the crankshaft (by a quarter of a turn) in the opposite direction to its normal direction of rotation and then in the normal direction of rotation to bring the piston to :

EG: 4.32 mm before T.D.C., that is to say 8 mm - 4.32 = a reading of 3.68 on the dial indicator.

Loosen, Fig. 1
- The nuts (1) and (4) on the belt tensioners and compress the spring in each of the tensioners. Retighten the nuts.

Remove
- The injection pump drive belt (2)
- The timing gear drive belt (3)

REFITTING

Fit, Figs. I and II
- The timing gear drive belt :

Align the timing marks —> and —> on the belt with the timing marks A and B on the sprockets (there should be 35 belt pitches between these two, measured via the roller (6).

Loosen the nuts (4) on the tensioner roller (6).

Fit, Fig. III
- The weight, from the tool, on mark 2 on the rod.
- The tool (-).0157 to the roller.

Tensioning the belt, Fig. II
- Apply pressure to the tool (-).0157, in the tensioning direction and when the span (5) on the opposite side to the roller is under tension, release the pressure and allow the weight on the tool to act on the belt.
- Tighten the 10 mm diameter nut (9) on the tensioner roller.
  To a torque of 32 N.m (23.6 lbf.ft), Fig. V
- Tighten the 8 mm diameter nut (10) on the tensioner roller.
  To a torque of 20 N.m (14.7 lbf.ft), Fig. V

NOTE : To avoid variations in the tensioning torque, it is essential to immobilise the tensioner roller during the tightening phase.

Remove the tool (-).0157.

Fit the injection pump drive belt.
Turn the engine through one turn in its normal direction of rotation to align timing marks —> and <—, Fig. IV.

No. 1 cylinder is then at its initial timing point (Mark —> on the camshaft pulley Fig. V).

Place the pump on its injection point. See the section concerned.

Fit, Fig. V

The injection pump drive belt with the span (2) on the opposite side of the roller under tension.

Loosen

The nut (8) on the roller and allow the pressure to act on the belt.

Tighten the nut (8)

Tightening torque 20 Nm
(14.7 lbf.ft)

Turn the engine through 2 turns in its normal direction of rotation and check the pump timing.

Remove the tooling.

Fit
- The valve spring, the cup and the collets
- The push rod and the rocker arm (adjust the valve clearance)

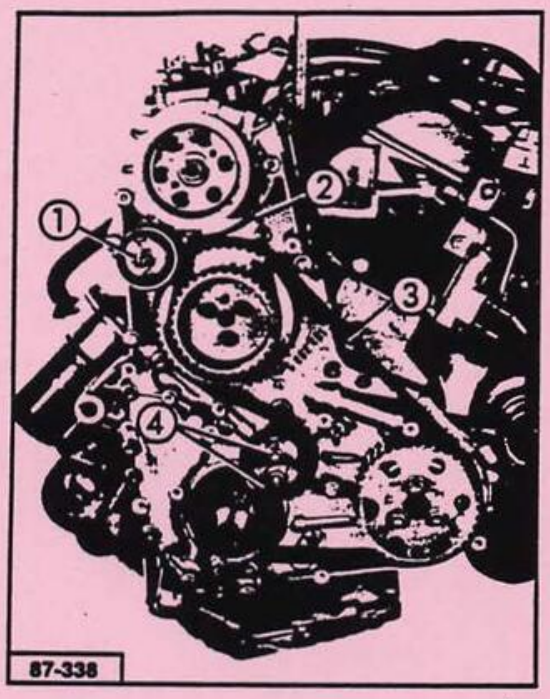
Connect up the battery negative cable.

Start the engine and warm it up until the electric fans cut in.

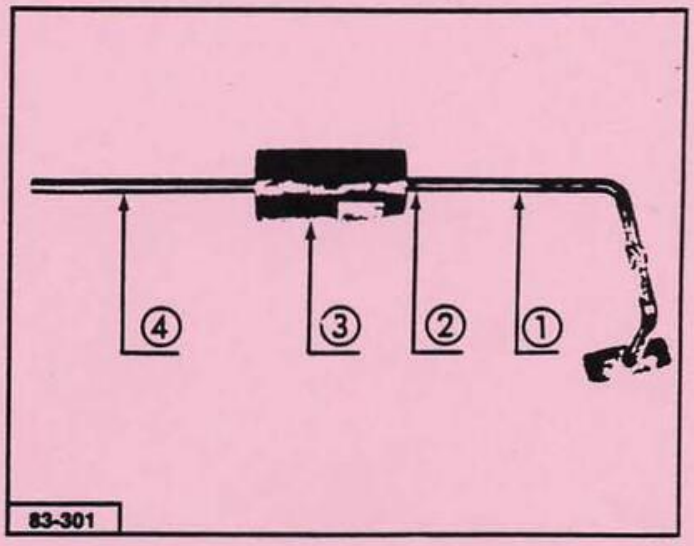
Re-tension the belts at this temperature.

Fit :
- The belt protectors
- The crankshaft protective nut (36 mm across flats)
- The protector under the engine.

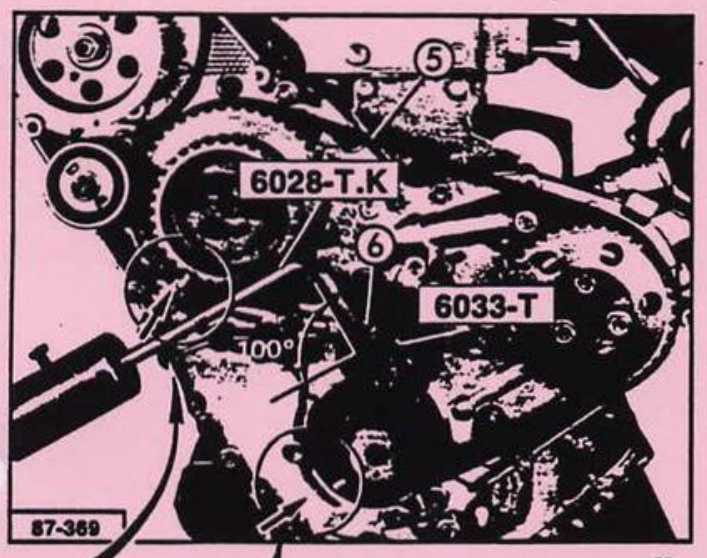
Lower the vehicle to the ground.


1
2
3
4
87-338

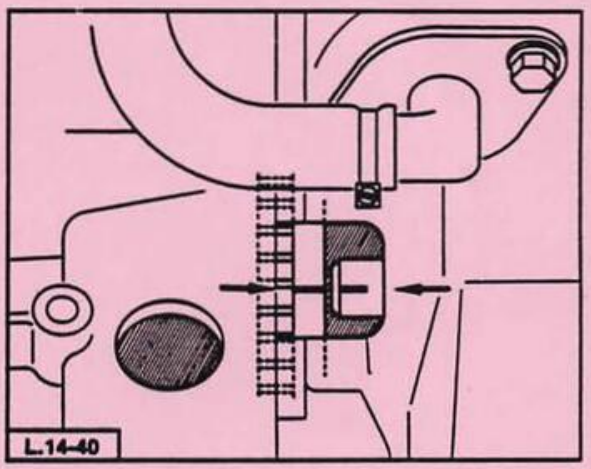
I


4
3
2
1
83-301

III


5
6028-T.K
6
6033-T
100°
87-369

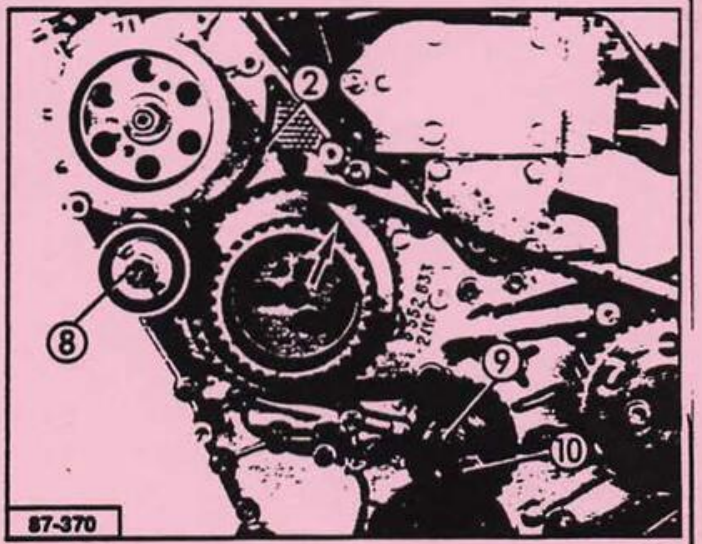
II


L.14-40

IV


7
L.12-35


B
L.12-35


2
8
9
10
87-370

V

I

TIMING GEAR DRIVE BELT

NOTE

1/ Carry out the partial removing operations involved in the following removing-refitting operations :
- cylinder head
- camshaft
- camshaft lip seal

2/ Carry out the complete removing operations involved in the following - removing-refitting operations :
- crankshaft lip seal
- cover plate
- oil pump drive sprocket and chain
- coolant pump

II

SPECIAL TOOLS

(-).0117
E2 - Crankshaft spanner

(-).0153
N - Pinning tool

(-).0316
P - Sling

III

PARTIAL REMOVAL

- Remove :
  - the lug (1) that secures the electrical wiring harness
  - the pre-heater plugs

IV

- Remove :
  - the front timing gear casing (3), removing it forwards and then upwards
  - the rear timing gear casing (4), freeing it from its securing studs.
- Retrieve the rubber spacer.

V

- Turn the crankshaft using tool (-).0117 EZ until the point at which the camshaft sprocket (5) and the injection pump sprocket (6) can be pinned.
- Pin :
  - the camshaft sprocket (5) using a M8 x 125 x 40 bolt
  - the injection pump sprocket (6)
    - ROTO DIESEL using an M8 x 125 x 30 bolt
    - BOSCH using an M8 x 125 x 35 bolt

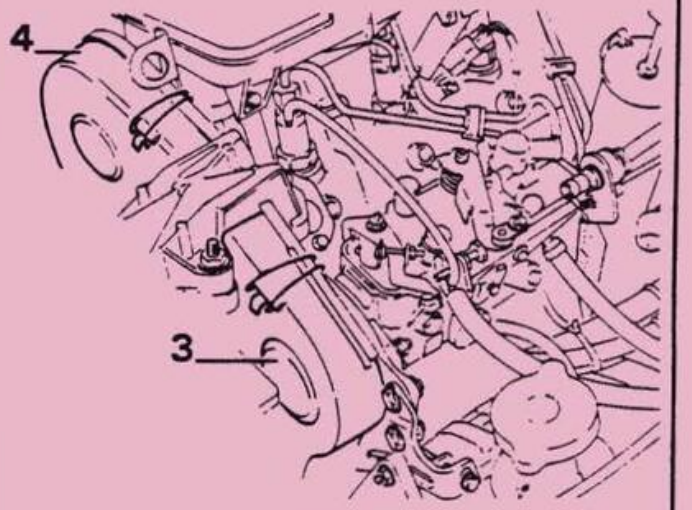
IMPORTANT
These bolts, used for the pinning operations, are only to be finger tight.

VI

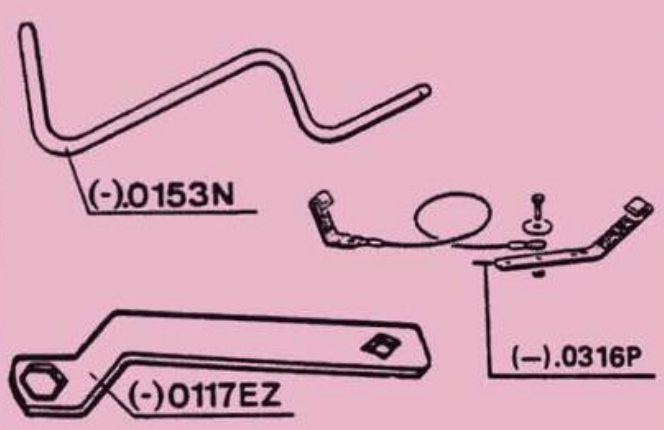
- Pin the flywheel using tool (-).0153N

I

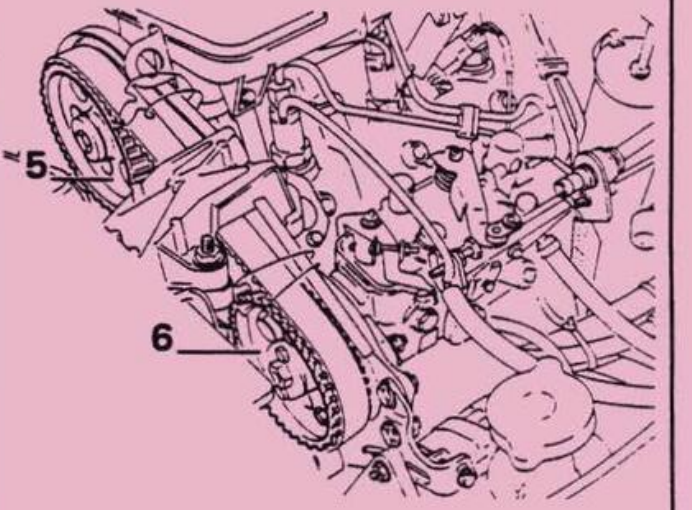
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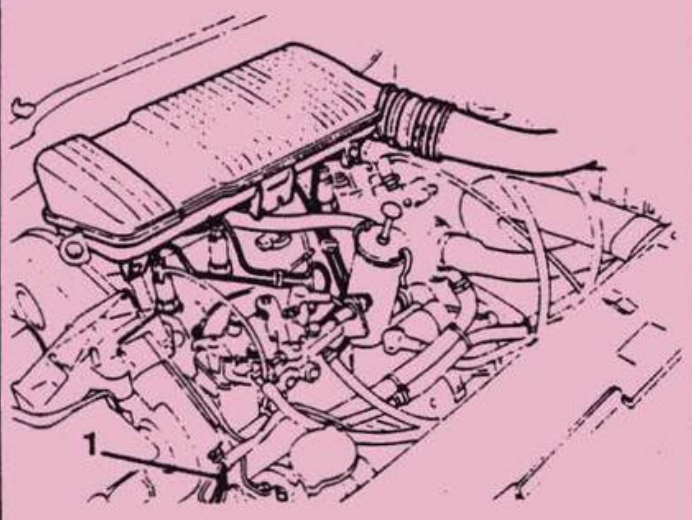
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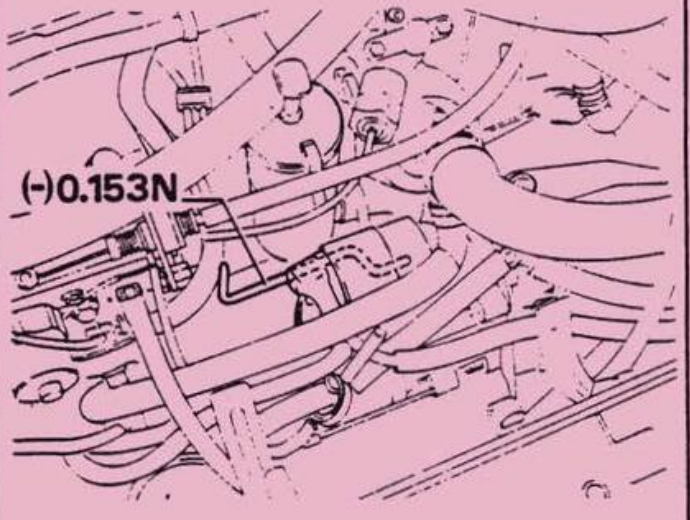
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III

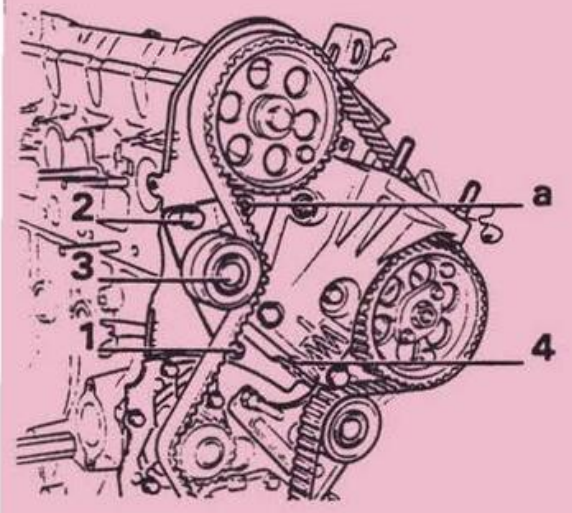


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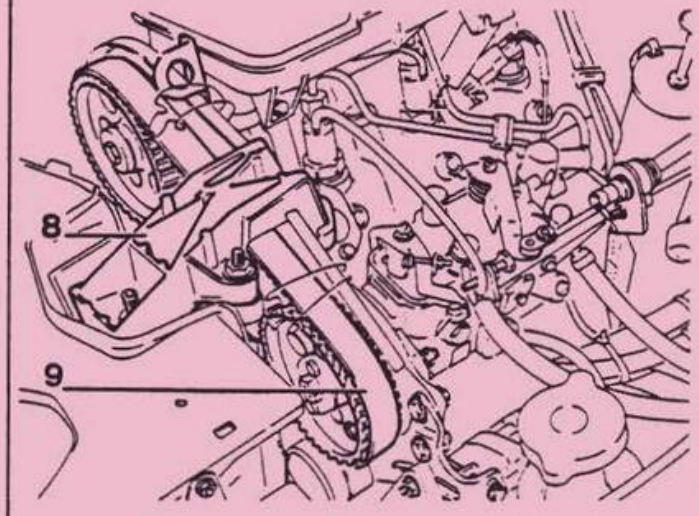


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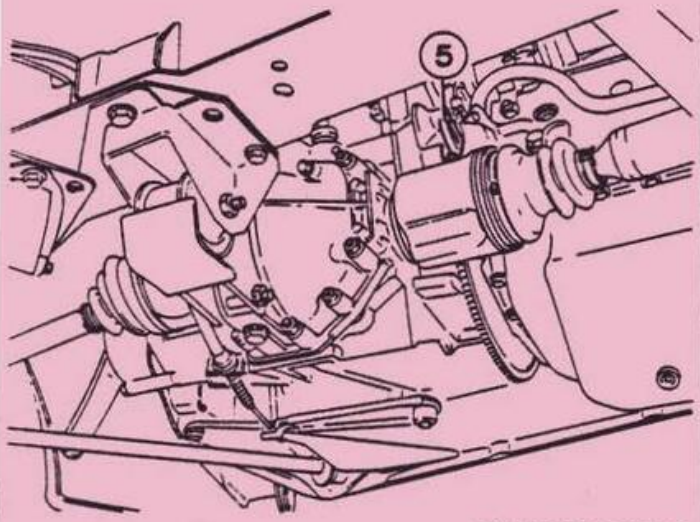
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IV

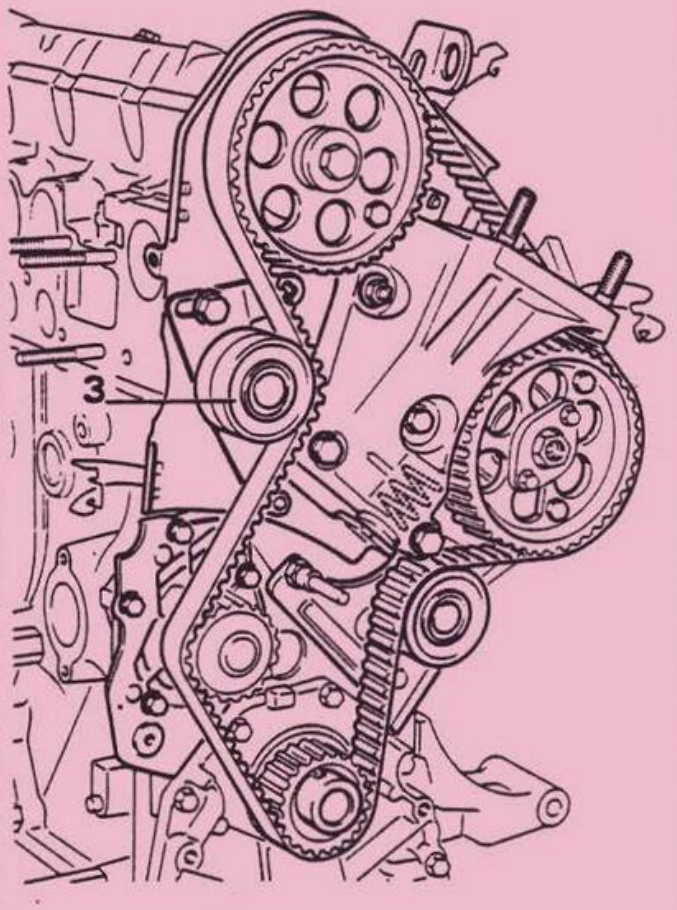


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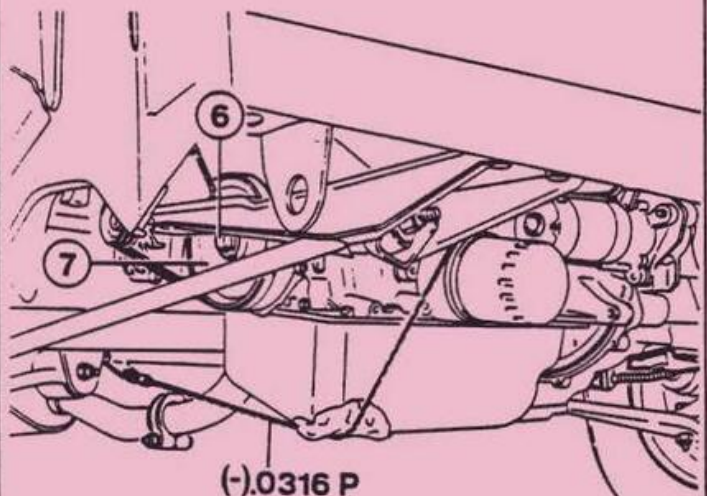


02-01-89 CAR 1

V



III



02-01-89 CAR 2

I

- Loosen the nut (1) and the bolt (2) on the tensioner roller support (3).
- Turn the square (a) on the tensioner roller support to compress the spring (4).
- Re-tighten the bolt (2).
- Free the timing gear belt from the camshaft sprocket, without kinking it.

II

COMPLETE REMOVAL

- Carry out the partial removing operations
- Remove the cover plate from the clutch housing
- Fit a tool of the FACOM D86 type (5) to lock the flywheel.

III

- Place the sling (-).0316P in position
- Remove :
  - bolt (6)
  - pulley (7)
  - tool (5)

IV

- Remove :
  - the upper engine mounting (8)
  - the timing gear drive belt (9)

V

REFITTING

- Ensure that :
  - the flywheel, the injection pump sprocket and camshaft sprocket are all pinned
  - that the tensioner roller (3) is locked in the « plunger compressed » position
- Fit the timing gear drive belt with the spans fully tensioned, in the following order :
  - crankshaft sprocket*
  - fixed roller
  - injection pump sprocket
  - camshaft sprocket
  - tensioner roller
  - coolant pump sprocket

* If only partial removing operations have been carried out, ensure that the belt is fully engaged on the crankshaft sprocket.

I

- Loosen the bolt (1) and the nut (2) to free the tensioner roller

- Re-tighten the bolt (1) and the nut (2) when the correct tension has been obtained.

II

CHECKING THE TIMING

- Remove the three pins

- Refit the bolt (3) and the washer (4)

- Turn the engine through two turns

- Refit the two timing bolts and the pin (-).0153N

IMPORTANT

If it is impossible to fit either of the bolts or the pin, recommence the operations involved in refitting the belt from the beginning.

- Loosen the tensioner roller and re-tighten the bolt, and then the nut to 17.5 nm (12.9 lbf.ft)

- Remove the four timing pins

III

- Remove the bolt (3) and washer (4)

- Refit, in the following order :
  - the rubber spacer (5)
  - the protectors (6) and (7)
  - the pulley

IV

- Lock the flywheel using a tool of the FACOM D86 type

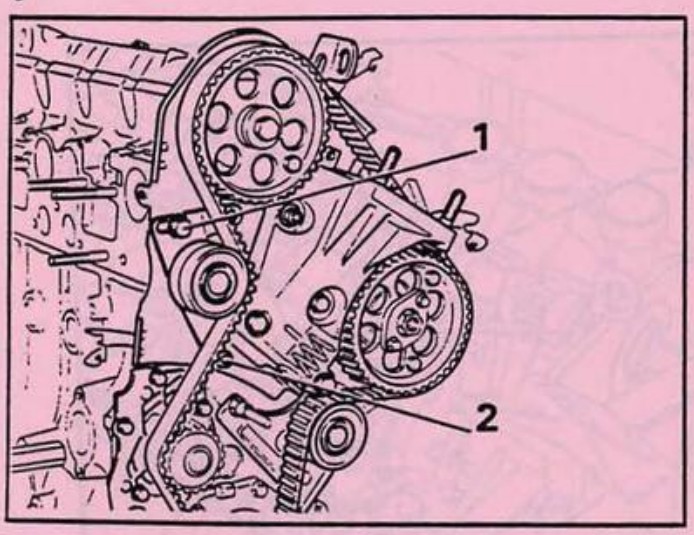
- Brush and de-grease :
  - the thread on the bolt
  - the locating faces of the washer (4) and the bolt head

- Refit the washer (4) and the bolt (3) after coating it with LOCTITE FRENETANCH and tightening it to a torque of 40 Nm (29.5 lbf.ft)

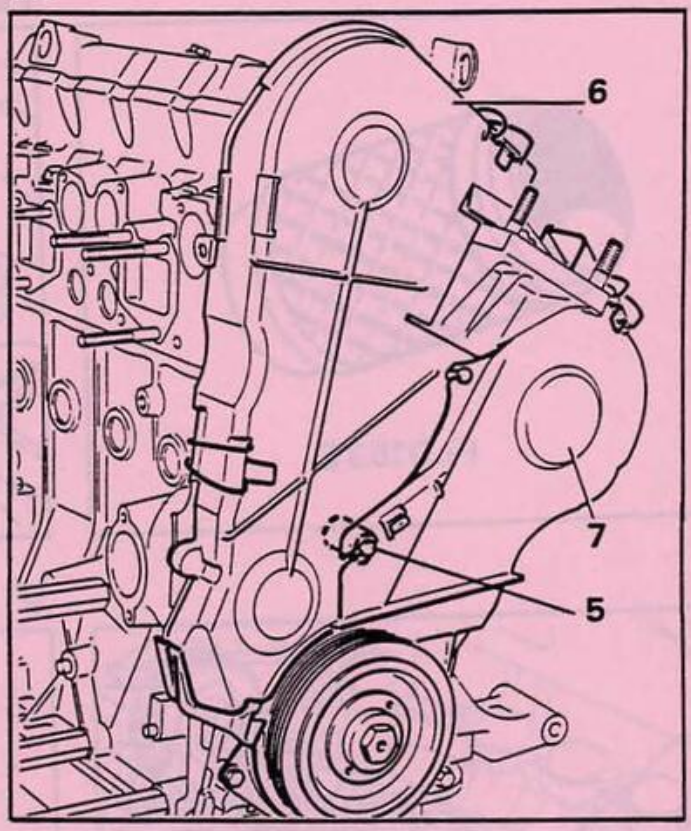
- Re-tighten the bolt through 60°, that is to say one of the flats on the bolt head

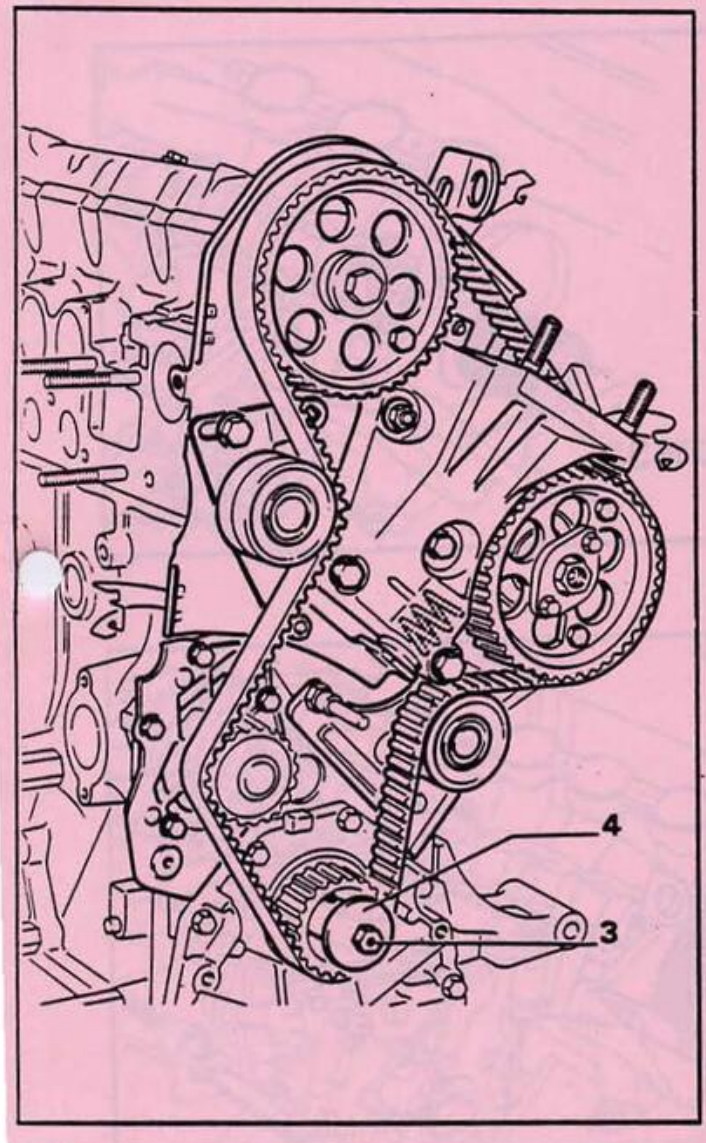
- The rest of the operations consist of the removing operations carried out in reverse

- Engine mounting tightening torque : 45 Nm (33.2 lbf.ft)

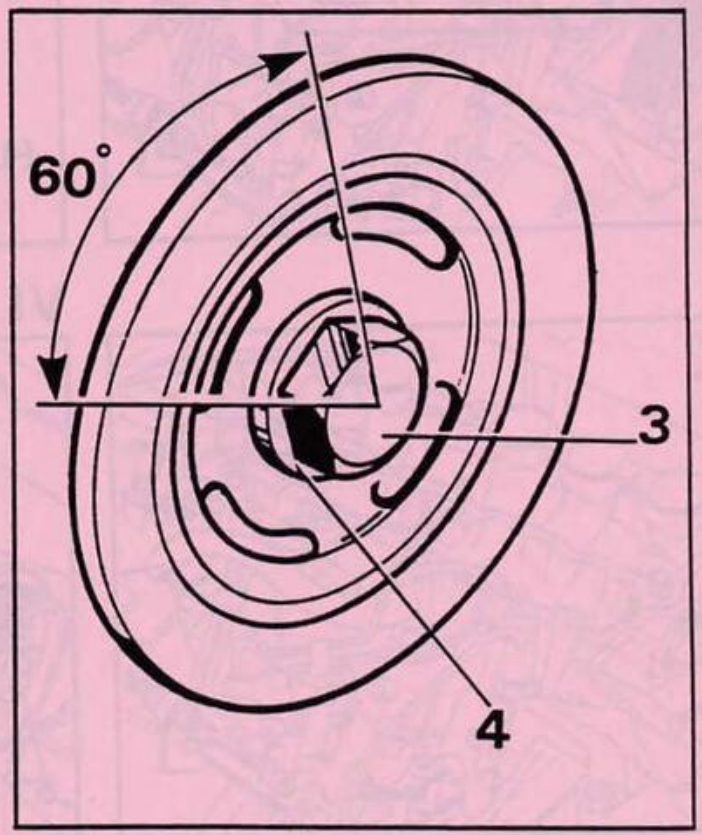


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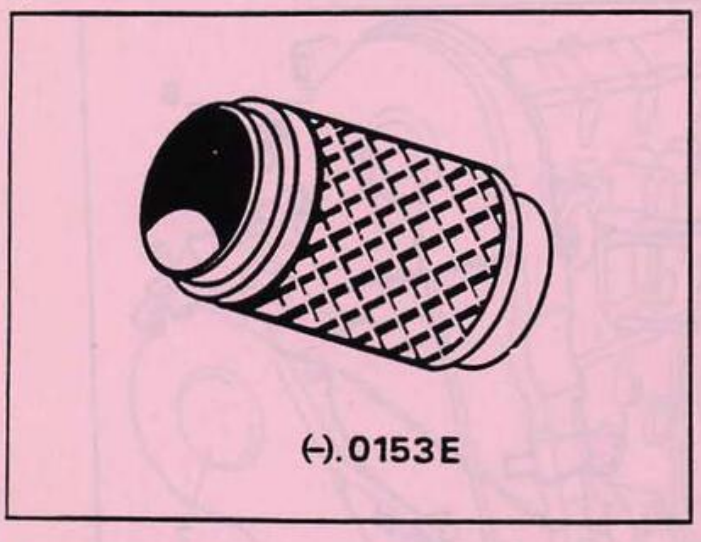




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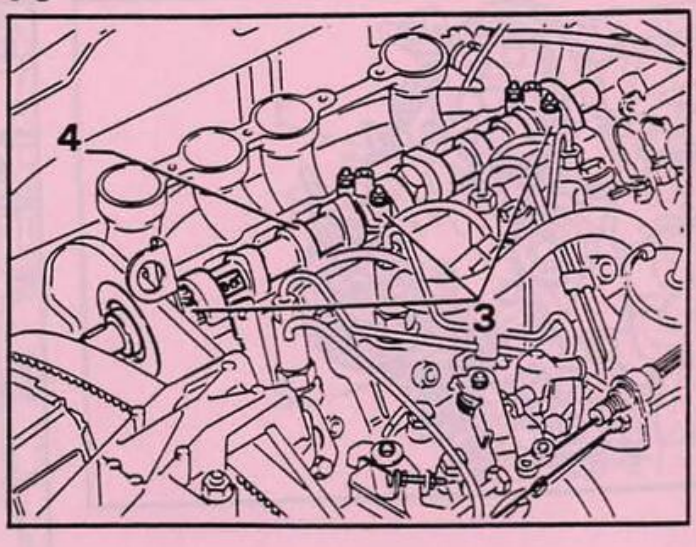


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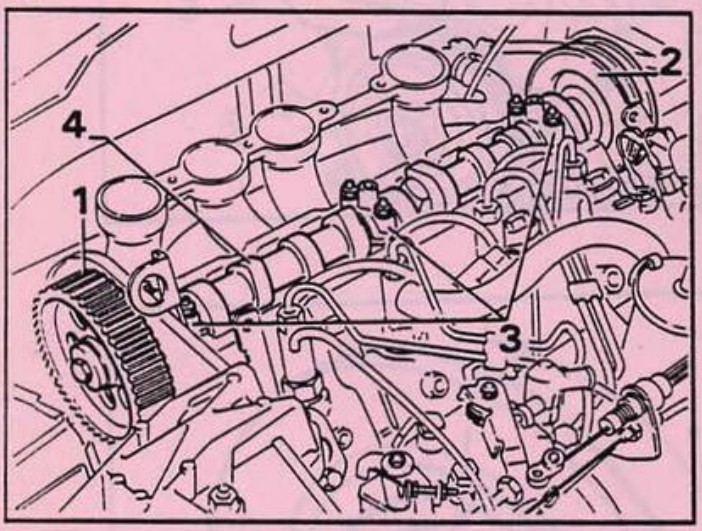


(-).0153E

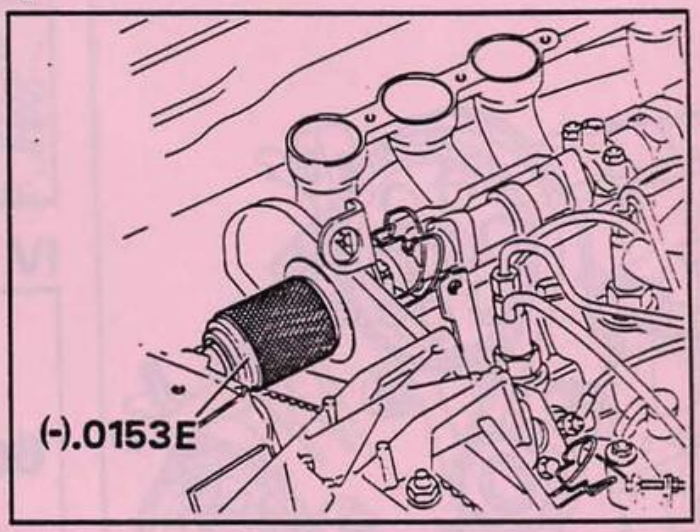
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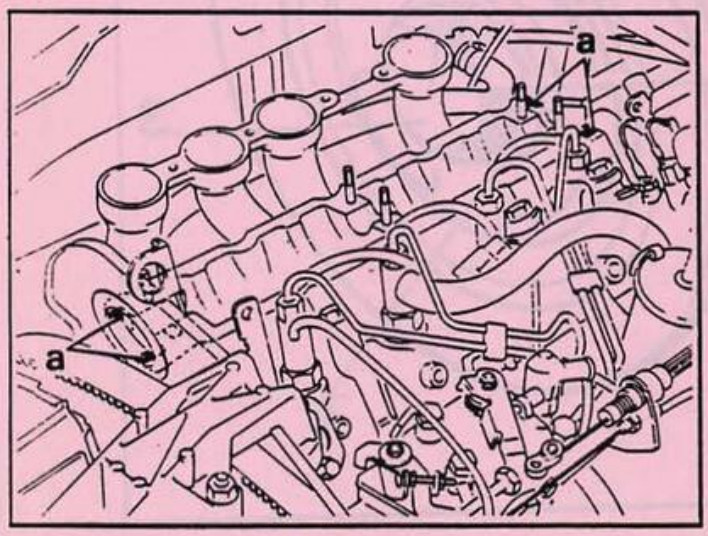
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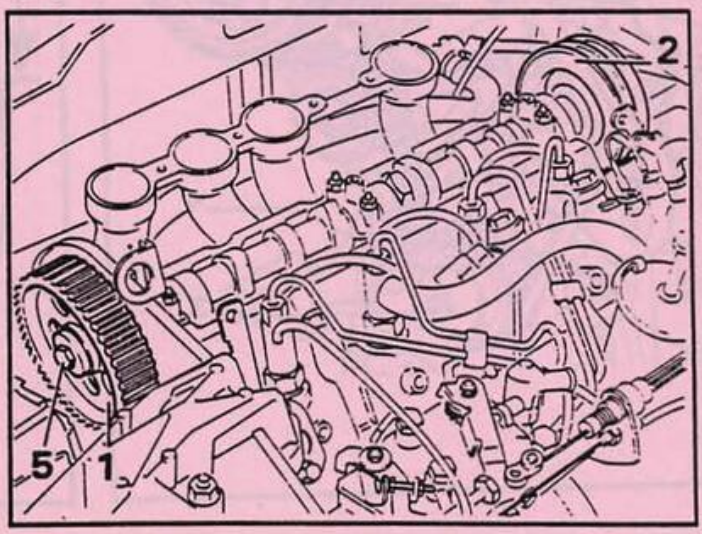
V



III



VI



I

CAMSHAFT

SPECIAL TOOLS

(-).0153

E - Plug for fitting lip seal

II

REMOVING

- Remove :
  - partially, the timing gear drive belt (see the corresponding section)
  - the air intake distributor
  - the rocker arm cover
  - the drive belts
- Loosen the sprocket (1) and the pulley (2)
- Remove the sprocket (1) and the pulley (2)
- Retrieve the keys
- Loosen, evenly and remove the bearing caps (3) (cast-in references)
- Remove the camshaft (4)

III

REFITTING

- Remove the locating pin (-).0153N from the flywheel
- Turn the crankshaft through a quarter of a turn in the opposite direction to its normal direction of rotation (piston at half stroke)
- Adjust the valve clearances (see corresponding section)
- Apply :
  - a thin coat of FORMETANCH sealing compound to (a), at each end
  - MOLYKOTE G RAPID compound to the camshaft bearing areas

IV

- Refit :
  - the camshaft (4) with the reference mark DIST at the timing gear end
  - the bearing caps (3) (their position references are cast-in)
- Tighten the bearing caps, evenly, to a torque of 17.5 nm (12.9 lbf.ft)

V

- Fit, to that side of tool (-).0153E, on which the internal flange is farthest inwards, a new lip seal
- Refit the two camshaft lip seals using one of the sprocket or pulley securing bolts.

VI

Refit :

- the sprocket (1), pinning it with an M8 bolt and tighten the bolt (5) to a torque of 50 Nm (36.9 lbf.ft)
- the pulley (2), tightening it to 40 Nm (29.5 lbf.ft)
- the rocker arm cover, tightening it to 10 Nm (7.4 lbf.ft)
- Turn the crankshaft in the normal direction of rotation of the engine and pin the flywheel using tool (-).0153N.
- Refit the timing gear drive belt (see corresponding section)

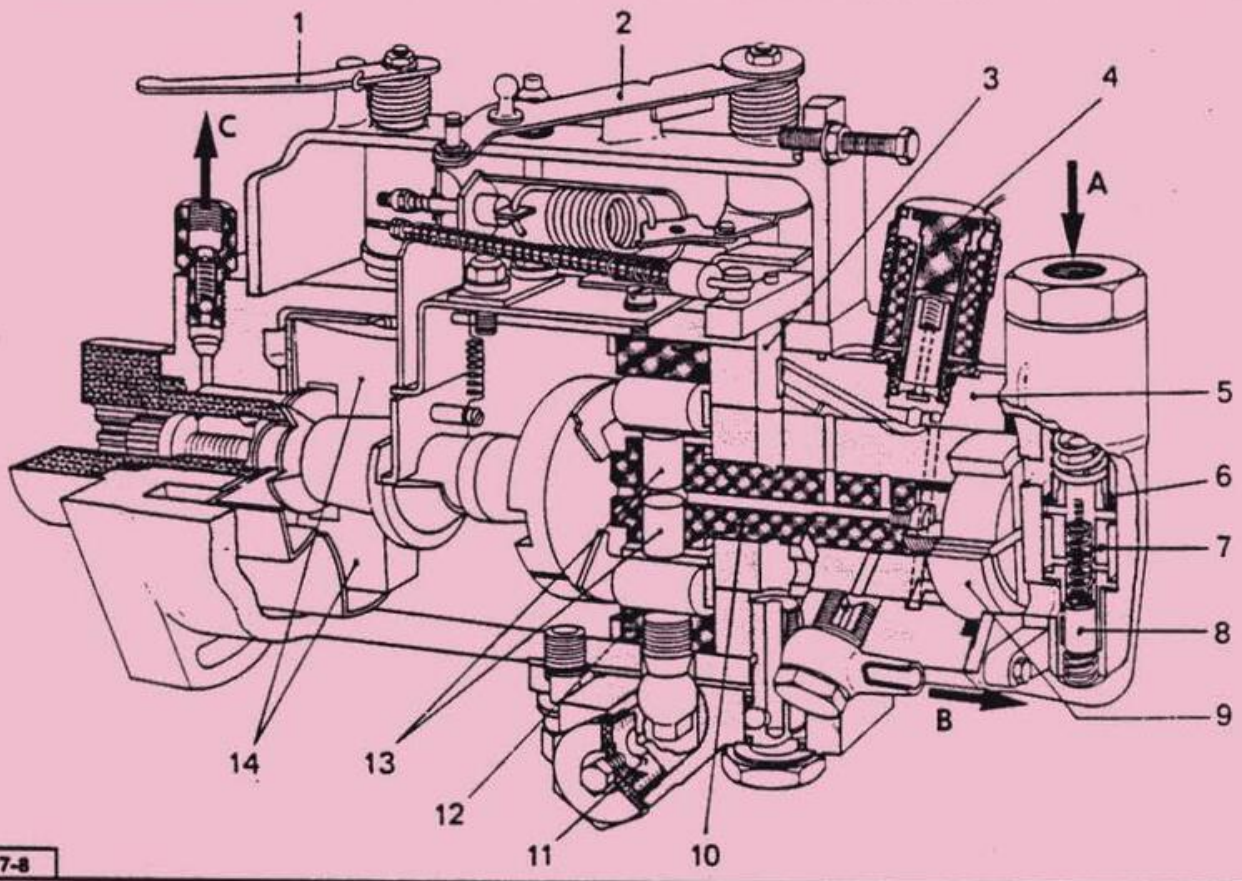
Injection pump

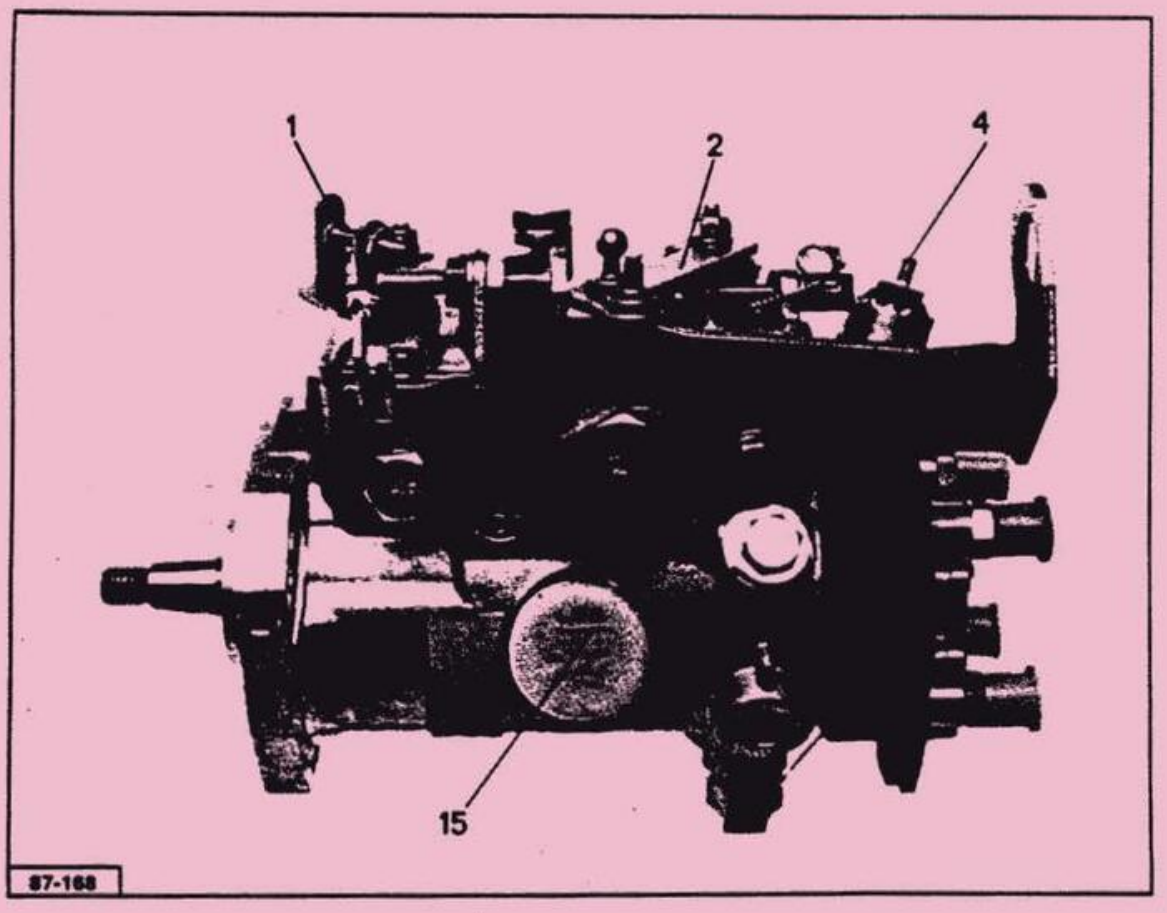
Engine	U25/651	U25/661		U25/673
Make	-	ROTO-DIESEL		
	(11/81 → 12/83) DPA (12/83 → 87)		DPC (→ 7/87)	
Type	UT 100	MA 300	MA 260	MAS 100
Reference number	R 3443 F 900	R 3449 F 010	R 8443 B 111 A	R 8443 B 123 B
Direction of rotation of pump (as seen from drive end)	left hand (anti-clock)	right hand (clock)		
Initial advance, before TDC (pump timing)	24° or 5,12 mm ± 0.05	22° or 4,32 mm ± 0.05	4,71 mm ± 0.05	19° or 3,24 mm ± 0.05
Timing test at idling speed	12.5° ± 1	11° ± 1		
Idling speed	-	800 ± 25 rpm		
Residual delivery speed (anti-stall)	800 ± 50 rpm	800 ± 25 rpm	800 ± 50 rpm	800 ± 50 rpm
No-load governed speed	4450 ± 75 rpm	4625 ± 150 rpm		4600 ± 150 rpm
Minimum shut-off speed, under load	4100 rpm	4250 ± 50 rpm		3900 rpm
Supercharging corrector	-			*

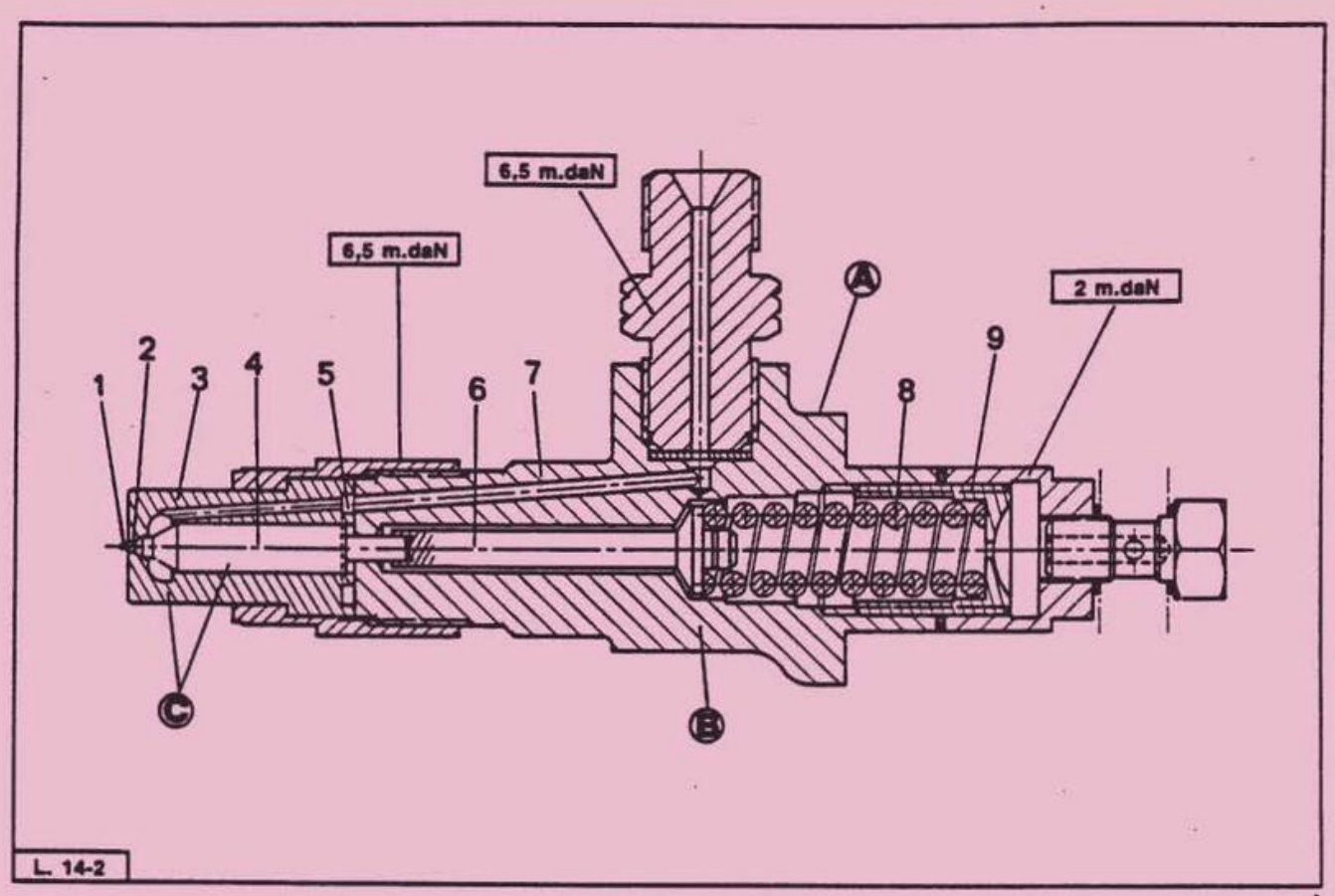
REFERENCE	DESCRIPTION
1	Idling speed control
2	Throttle control
3	Metering valve
4	Electric shut-off
5	Hydraulic head
6	Nylon filter
7	Governor valve liner
8	Governor piston
9	Transfer pump
10	Rotor
11	Automatic advance system
12	Cam ring
13	Pistons
14	Centrifugal governor bob weights
15	Commencement of injection/pump timing position (engraved on plastic label)
A	Fuel input
B	Injector supply
C	Return to tank

Pre-heater plugs

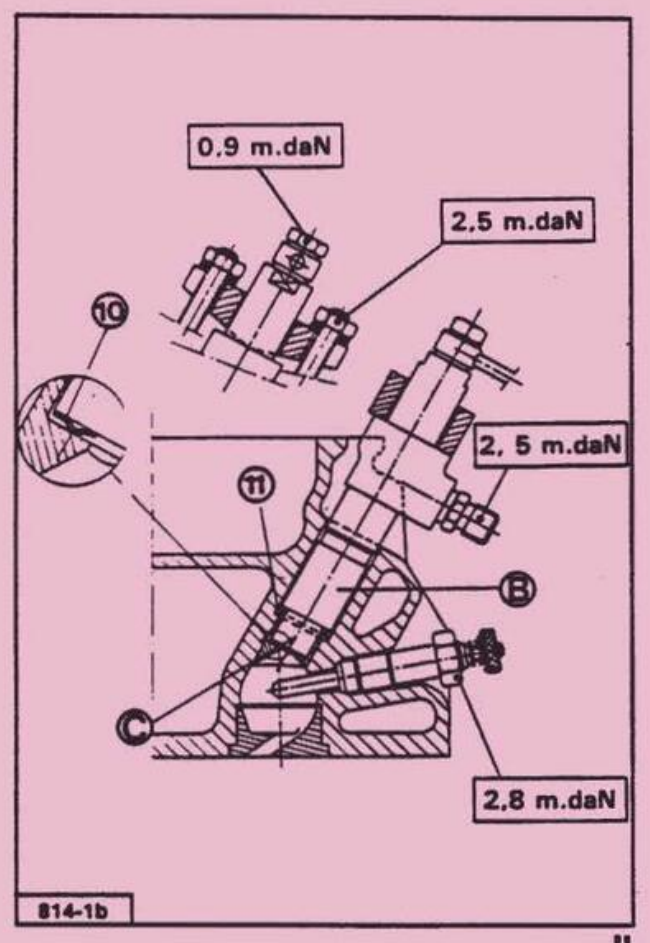
	Engine	U25/651 - U25/661 - U25/673
Plugs	BERU	0 100 221 106
	BOSCH	0 250 200 059


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L.17-8

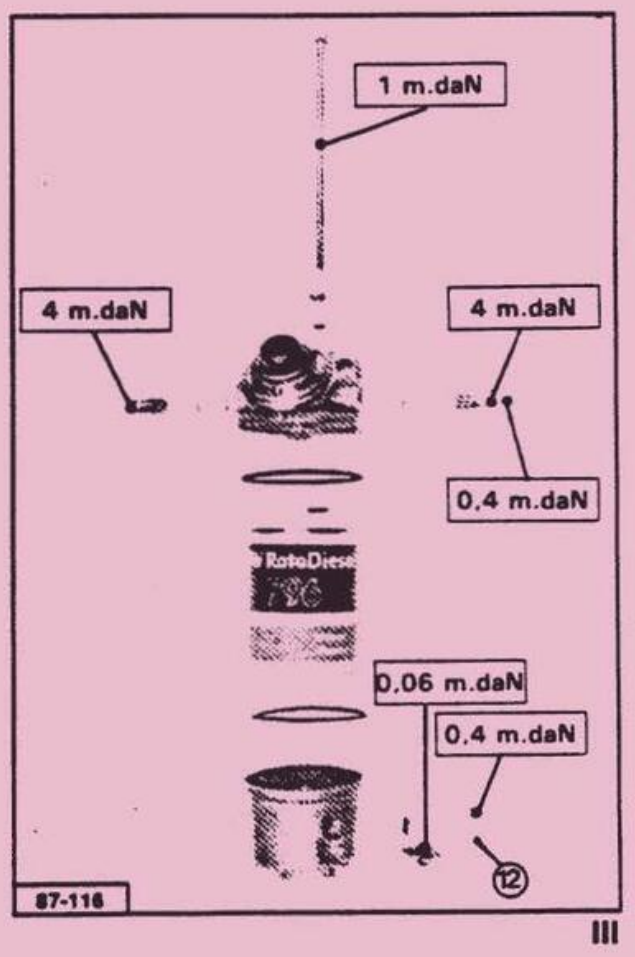

1
2
4
15
87-168


6,5 m.daN
6,5 m.daN
2 m.daN
1
2
3
4
5
6
7
8
9
A
B
C
L. 14-2

I


0,9 m.daN
2,5 m.daN
10
2, 5 m.daN
11
B
C
2,8 m.daN
814-1b

II


1 m.daN
4 m.daN
4 m.daN
0,4 m.daN
0,06 m.daN
0,4 m.daN
12
87-116

III

Injector nozzle and injector holder Fig. 1

REF				
	Engine	U25/651	U25/661	U25/673
	Make	ROTO-DIESEL		
B	Injector holder	RKB 45 SD 5422		
C	Injector nozzle (pintle type)	RDNO SDC 6577 B		RDNO SDC 6751
C + B	Injector holder + nozzle	R 53 56 501 B		R 53 56 502
A	Paint colour code	ORANGE		WHITE
	Opening pressure when new	$122 \,^{+5}_{-0}$ bars		$137 \,^{+5}_{-0}$ bars
	Opening pressure (after operating)	$112 \,^{+5}_{-0}$ bars		$127 \,^{+5}_{-0}$ bars

Injector nozzle and injector holder assembly, Figs. I and II

REF	DESCRIPTION
1	Injector hole
2	Seat
3	Injector body
4	Injector needle
5	Injector plate
6	Thrust rod
7	Injector holder
8	Spring
9	Adjusting screw

The copper washer (11) and the corrugated washer (10) must be replaced by new ones each time this item is removed.

Ensure that the washer (10) is the correct way round. See detail on Fig. II.

Fuel filter, Fig. III

Make ROTO-DIESEL 296 ⇥ 10/83 796 ↦ 10/83
- Hand pump forming part of filter ⇥ 1/85
- Diaphragm type priming pump ↦ 1/85
  Water detector (12) ↦ 7/86

Fuel heater Fig 1 ↦ 7/85

- Fuel filter (1)
- Injection pump (2)
- Engine (3)
- Heater (4)
- Fuel input (5)

Description of heater Fig. II

- Filter return (A)
- Fuel input (B)
- Return spring (6)
- Sealing plug (7)
- Thermostatic element (8)
- Fuel circuit (C)
- Governor spool (9)

Principle of operation, Figs. II, III and IV

1. Position Fig. II (Temperature < 15° C)

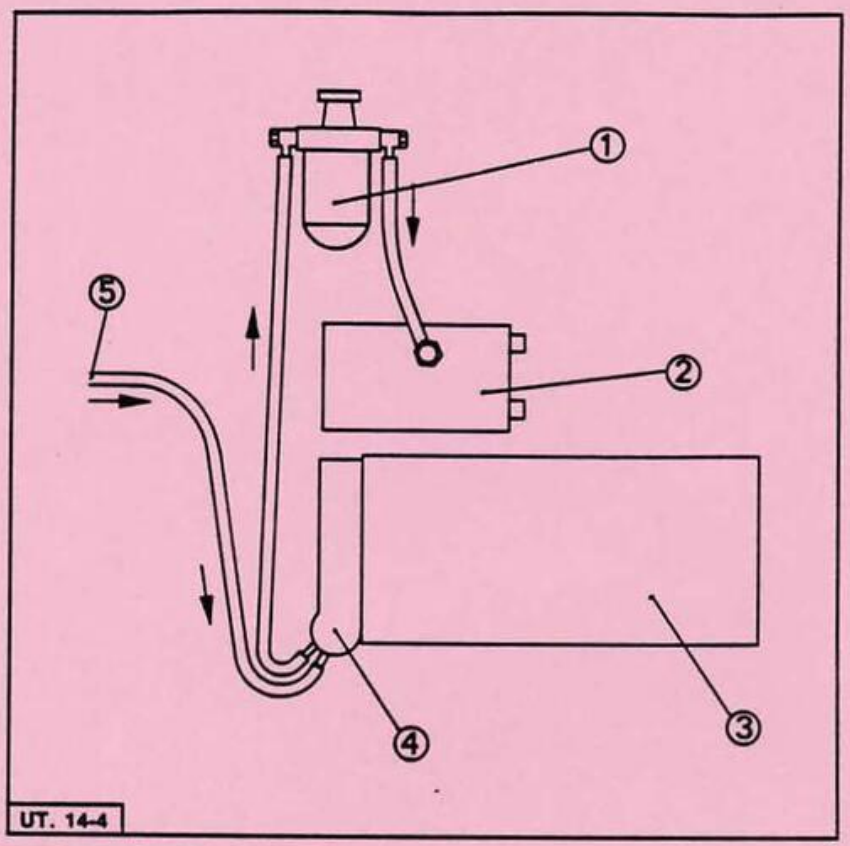
When the rod on the thermostatic element (8) is no longer expanded, the spool (9) allows fuel to enter, from the tank, into circuit (C) leading to the fuel filter.
(The entire output passes through the preheat circuit).

2. Position Fig. III (Temperature 15° to 30°C)

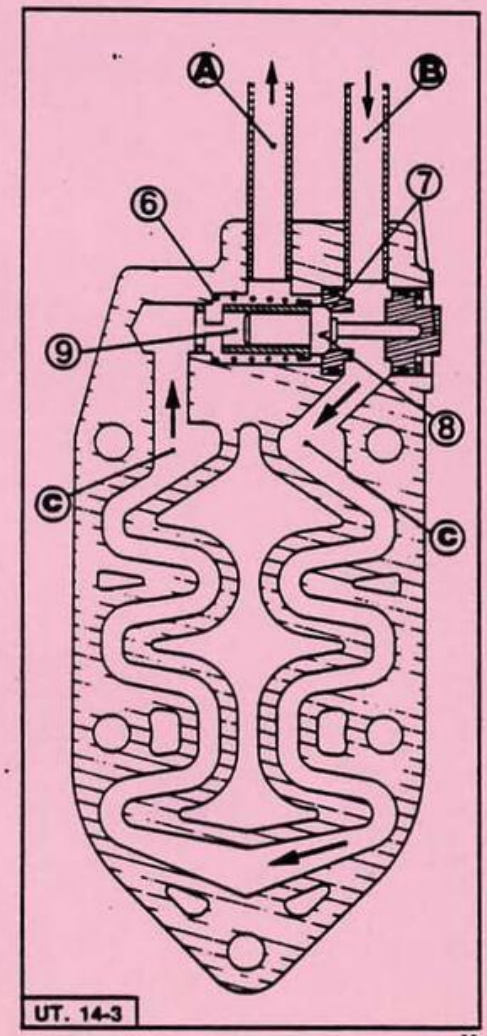
Once the rod on the thermostatic element (8) extends by a certain amount, the spool (9), pushed by the thermostatic element (8) partially blocks off duct (E) and fully blocks off duct (D).
(Fully closing off the preheat circuit).

3. Position Fig. IV (Temperature > 35°C)

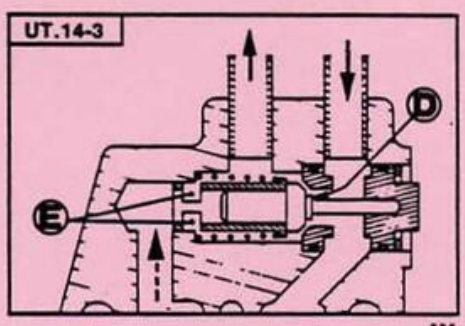
As the rod on the thermostatic element (8) extends as far as it will go, the spool (9), is pushed by thermostatic element (8), completely blocking off duct (E) and completely opening up duct (D).
(Total closing down of preheat circuit).



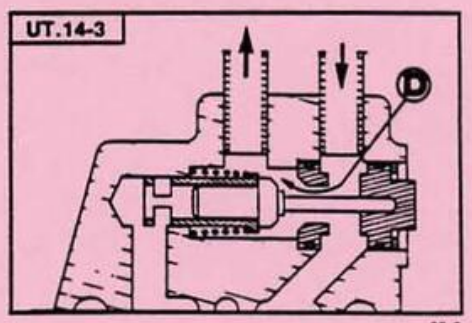
I



II

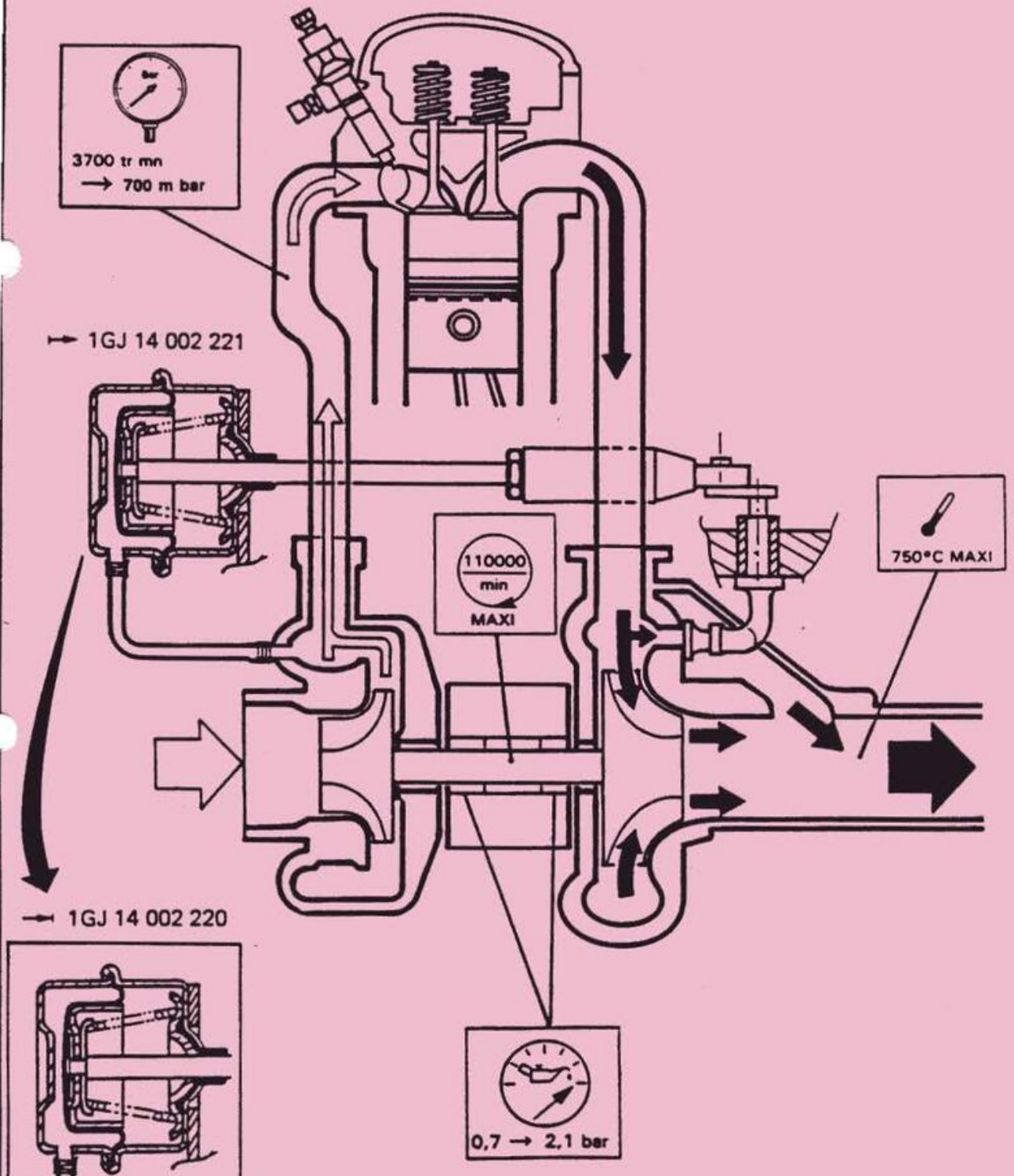


III



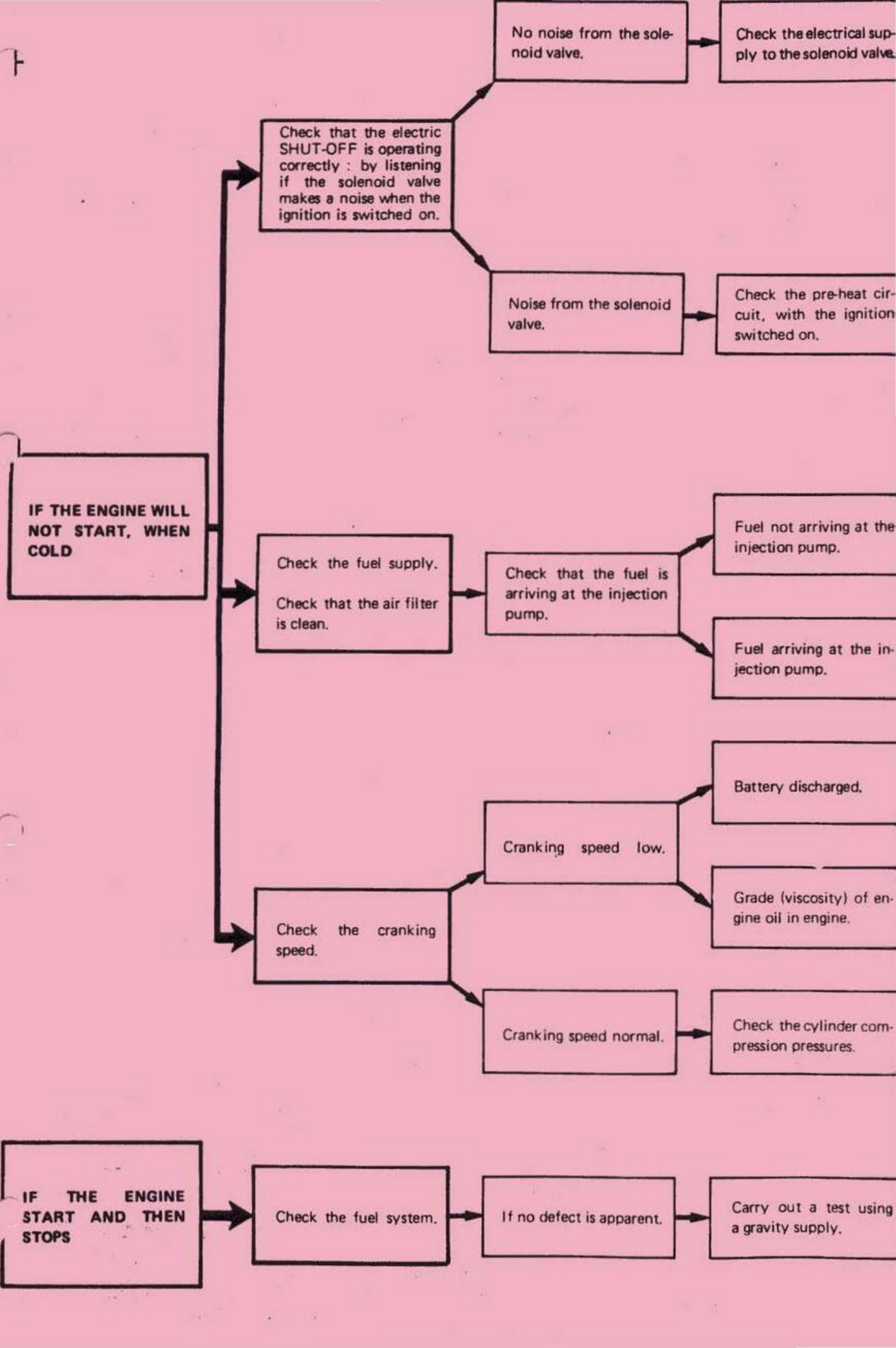
IV

GARRETT TD 25



L-14.59.a

L-14.59.b


IF THE ENGINE WILL NOT START, WHEN COLD
Check that the electric SHUT-OFF is operating correctly : by listening if the solenoid valve makes a noise when the ignition is switched on.
No noise from the solenoid valve.
Check the electrical supply to the solenoid valve.
Noise from the solenoid valve.
Check the pre-heat circuit, with the ignition switched on.
Check the fuel supply.
Check that the air filter is clean.
Check that the fuel is arriving at the injection pump.
Fuel not arriving at the injection pump.
Fuel arriving at the injection pump.
Check the cranking speed.
Cranking speed low.
Battery discharged.
Grade (viscosity) of engine oil in engine.
Cranking speed normal.
Check the cylinder compression pressures.
IF THE ENGINE START AND THEN STOPS
Check the fuel system.
If no defect is apparent.
Carry out a test using a gravity supply.

If the current supply to the solenoid valve is correct : Replace the solenoid valve.

If the warning light does not switch on.

- Connections discontinued → Warning light bult blown.
- Check the pre-heat plugs current supply to the warning light. → Starter pre-heat unit not operating.

If the warning light switches off after a brief period → Pre-heat plug (or plugs) short circuiting.

Fuel filter dirty or air entering at filter. → Pipe blocked (by foreing body or frozen fuel) or air entering the system. → Check that the priming pump is operating correctly (valves). → Check the suction strainer in the tank.

Check that the fuel is reaching the injectors. → If there is no flow from the injectors. → **Remove the injection pump and have it checked.**

Starter or electrical system defective.

If the engine operates normally air is entering the fuel system. → Check the unions (their conditions and tightness) → Bleed off AIR and WATER → Check the fuel tank air vent.

If the result is the same. → **Remove the injection pump and have it checked.**

ROTO-DIESEL INJECTION SYSTEM : FAULT FINDING

GENERAL

Should an operating defect or an actual breakdown of a DIESEL engine occur,

DO NOT IMMEDIATELY BLAME THE PUMP

The injection system consists of several components and each of them could be the cause of the trouble.

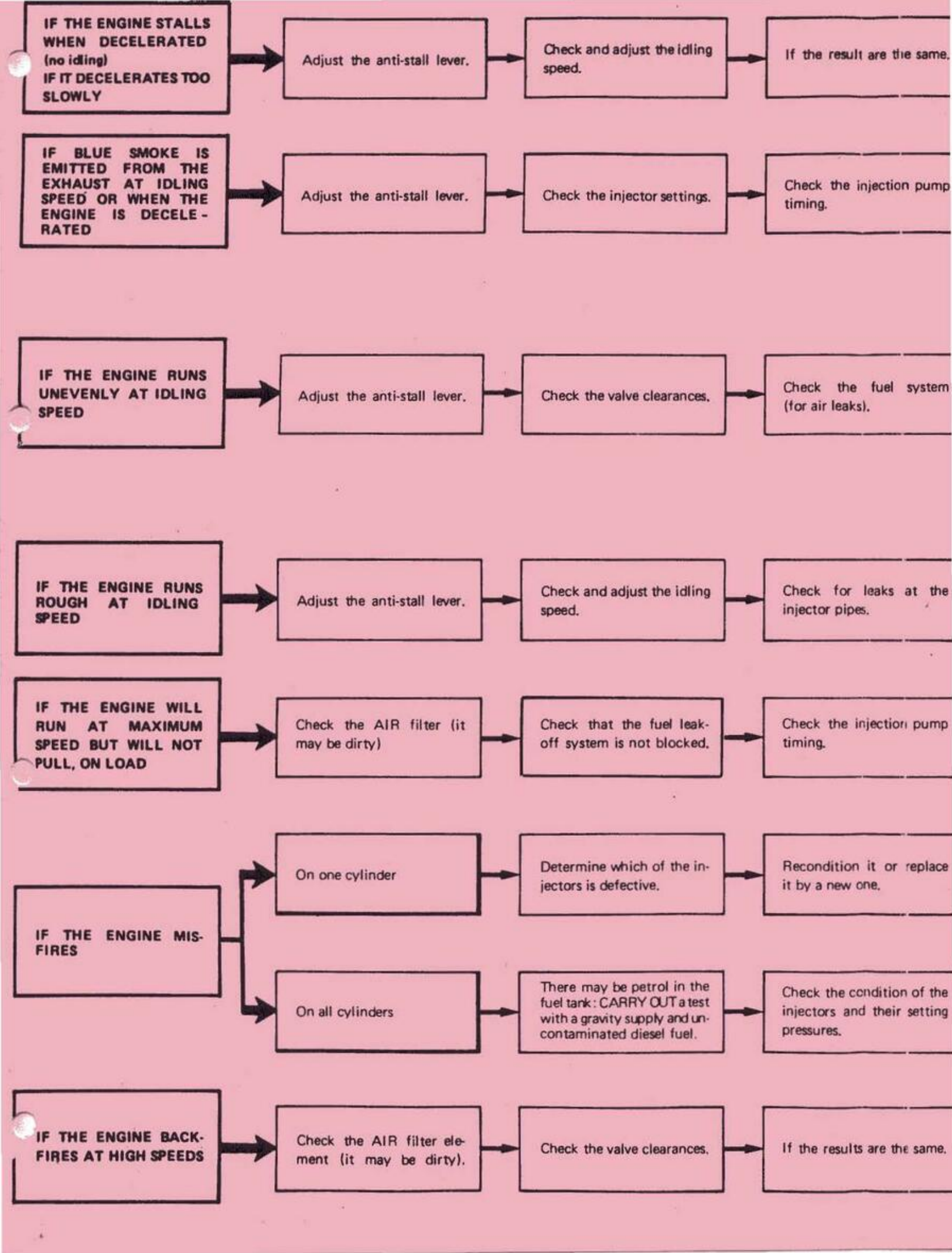
– The fuel itself, the tank, the pump supply or leak-off pipes, the filter element or the pump accessory controls (shut-off, anti-stall etc.), any one of them could be defective.

Furthermore, one should never forget the basic and fundamental principle of operation of a DIESEL engine : the fuel injected into the combustion chamber is ignited by the rise in temperature that occurs on the compression stroke and any factor that interferes with this compression could be the cause of an operating defect.

– Defective or incorrectly set injectors, incorrect injection timing, incorrect valve timing or clearances, low compression or excessive oil consumption can all of them cause smokey exhaust or knocking.

Finally, when starting the engine in cold weather, it is to be remembered that a DIESEL engine must be turned ower at a high enough speed by the starter motor, even when pre-heat is used and this means that the starter should be operating at full efficiency and there should be no excessive friction or drag in the engine, such as could be caused by using the incorrect type of engine oil for example.

The diagnostic method described overleaf, is, in fact, only based on the general information stated above, listed in greater detail.


IF THE ENGINE STALLS WHEN DECELERATED (no idling) IF IT DECELERATES TOO SLOWLY
Adjust the anti-stall lever.
Check and adjust the idling speed.
If the result are the same.
IF BLUE SMOKE IS EMITTED FROM THE EXHAUST AT IDLING SPEED OR WHEN THE ENGINE IS DECELE-RATED
Adjust the anti-stall lever.
Check the injector settings.
Check the injection pump timing.
IF THE ENGINE RUNS UNEVENLY AT IDLING SPEED
Adjust the anti-stall lever.
Check the valve clearances.
Check the fuel system (for air leaks).
IF THE ENGINE RUNS ROUGH AT IDLING SPEED
Adjust the anti-stall lever.
Check and adjust the idling speed.
Check for leaks at the injector pipes.
IF THE ENGINE WILL RUN AT MAXIMUM SPEED BUT WILL NOT PULL, ON LOAD
Check the AIR filter (it may be dirty)
Check that the fuel leak-off system is not blocked.
Check the injection pump timing.
IF THE ENGINE MIS-FIRES
On one cylinder
Determine which of the in-jectors is defective.
Recondition it or replace it by a new one.
On all cylinders
There may be petrol in the fuel tank: CARRY OUT a test with a gravity supply and un-contaminated diesel fuel.
Check the condition of the injectors and their setting pressures.
IF THE ENGINE BACK-FIRES AT HIGH SPEEDS
Check the AIR filter ele-ment (it may be dirty).
Check the valve clearances.
If the results are the same.

Remove the injection pump and have it checked.

Check the engine oil consumption.

If the engine is in good condition.

Remove the injection pump and have it checked.

Carry out a test with a gravity supply.

If the engine runs normally, air is enterring the system.

Check the unions and seals (their condition and to ensure that they are tight).

If the results are the same.

Remove the injection pump and have it checked.

Check the injector setting pressures and check them for leaks.

Check the valve clearances.

If the result are the same.

Remove the injection pump and have it checked.

Check the injection pump timing.

If the results are the same.

Remove the injection pump and have it checked.

Remove the injection pump and have it checked.

CARRYING OUT WORK ON THE INJECTION SYSTEM

FUEL

The main factor that determines the operating life of an injection pump or an injector is the cleanliness of the fuel on which it operates.
One must therefore take every necessary precaution to prevent dirt contaminating the fuel and, in particular, avoid water getting into the system.
The filter cartridge must be replaced at the mileage stated in the driver's handbook.

INJECTORS

General :
The power output of a Diesel engine depends to a large extent, on the correct operation of the injection system. To obtain maximum efficiency, each shot of fuel must be injected under conditions such that all of it is burned without producing excessive smoke at the exhaust. The function of the injector is therefore essential and it must be carefully checked and tested because of the high speed at which it carries out its operations.
Under no circumstances should any work other than cleaning and adjusting the pressure settings be carried out on the injectors.

Cleaning an injector :
Never use an abrasive to grind-in or reface the injector body seats, or the needle itself. Any such operation would change the injector characteristics and result in poor combustion, smoke, falling off in power and engine overheating.

An injector is to be cleaned only by washing it in filtered diesel fuel. Petrol is never to be used nor is it to be wiped with a rag or blown out with compressed air.

Injectors supplied from stores :
New injectors are supplied coated with vaseline to protect them against corrosion.
They are to be carefully cleaned before being fitted to the engine.

INJECTION PUMP :

All work involving adjusting or replacing any of the pump internal components is the exclusive fiels or specialists authorised for this purpose by the pump manufacturer.
Such specialists have available technical literature produced in conjunction with the vehicle manufacturer and are equipped with the special tools that are essential to the rapid execution of the work required.
In case of damage to an injection pump, or inefficient operation, one should therefore consult the nearest authorised dealer fo the pump manufacturer in question.

INJECTION PIPES :

Injection pipes SHOULD NEVER BE welded, brazed or heated as this would cause oxides to form which would result almost inevitably in damage to the injectors.
All the injection pipes are of the same length. This is essential to the efficient operation of the engine.
Clean them in diesel oil and blow them out with compressed air before fitting.

SPECIAL TOOLS

A : Dial indicator :
Reference : 8.1504

B : Valve spring compressor :
Reference : 8.0105 Y

C : Timing kit for BOSCH or ROTO-DIESEL pumps
Reference : 8.0117 ZR
From this kit, use the following tools

C2 : Dial indicator :
Reference : 8.0117 F

C6 : Nut and bolt for securing dial indicator C2
Reference : 8.0117 L

C9 : Plunger for dial indicator C2
Reference : 8.0117 H

D : Adjustable component for dial indicator support :
Reference : 8.0504 A2

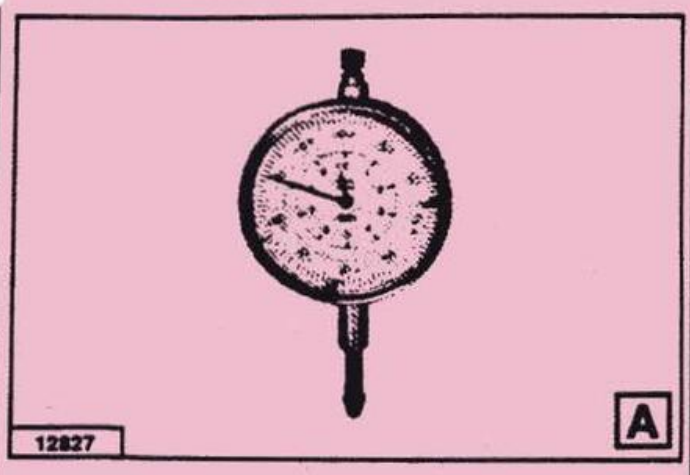
E : Support for mounting dial indicator on cylinder head :
Reference : 8.0117 AH

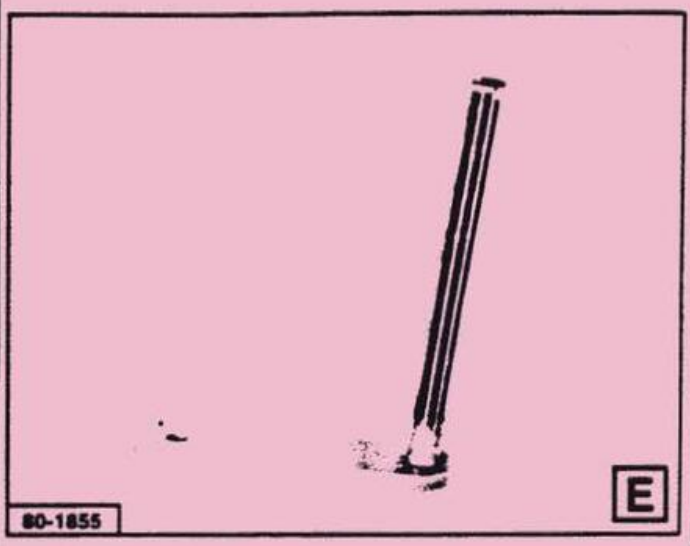
F : Dial indicator angle adaptor for ROTO-DIESEL pump
Reference : 8.0117 AG

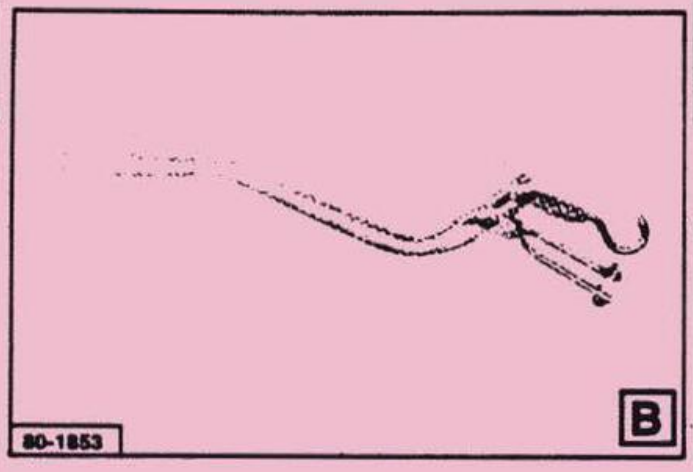
G : Dial indicator support for ROTO-DIESEL injection pump
Reference : 8.0117 AF

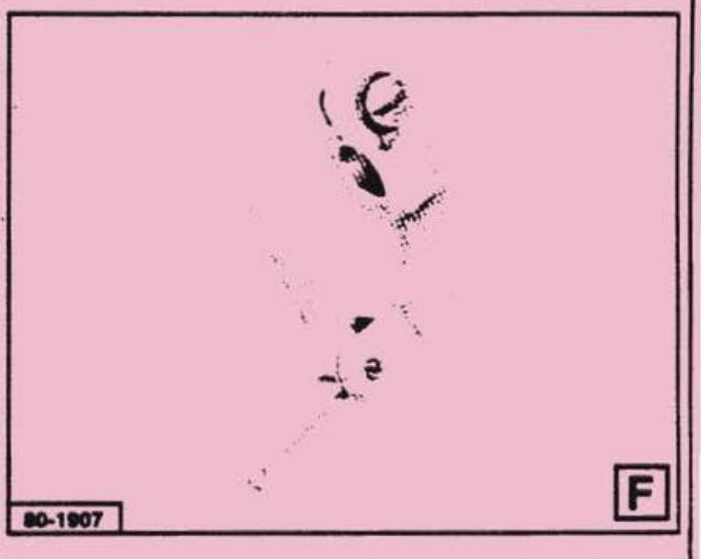
TIGHTENING TORQUES

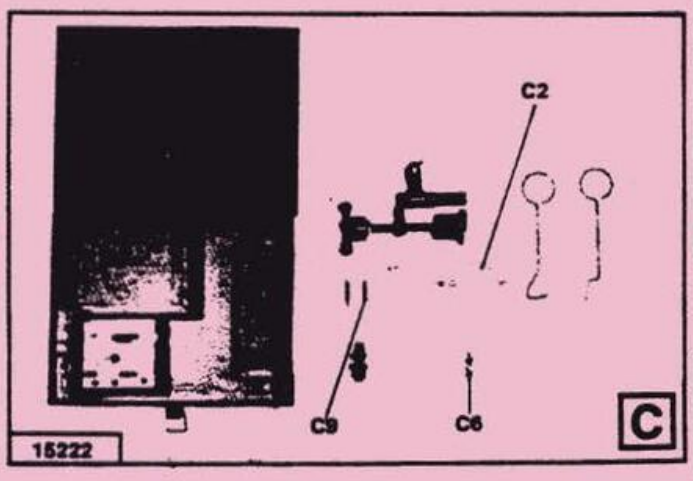
Recommended tightening torque :	Torque in N.m (lbf.ft.)
Injection pump sprocket securing bolts :	23 (16.9)
Nuts securing injection pump to timing gear casing :	30 (22.1)
Injection pump pipe unions :	29 (21.4)

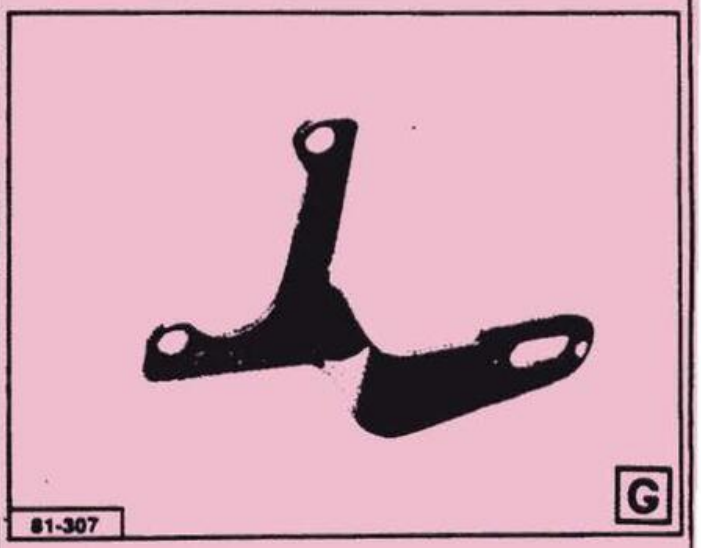

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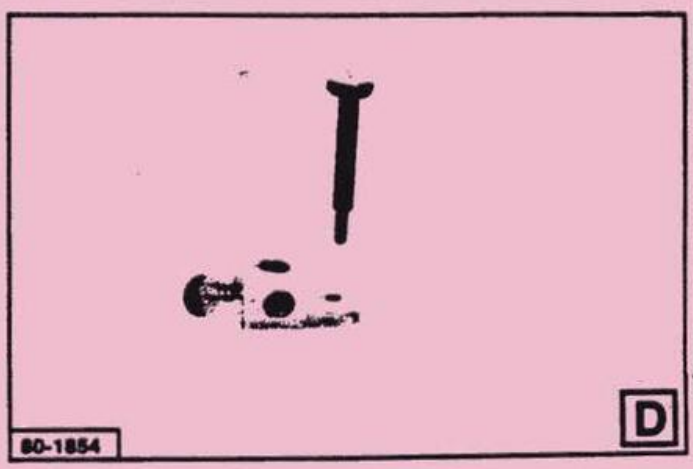

80-1855
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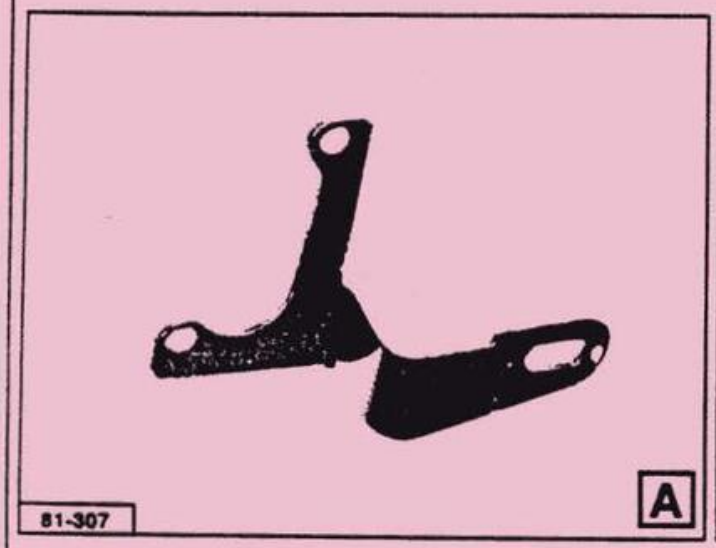

80-1853
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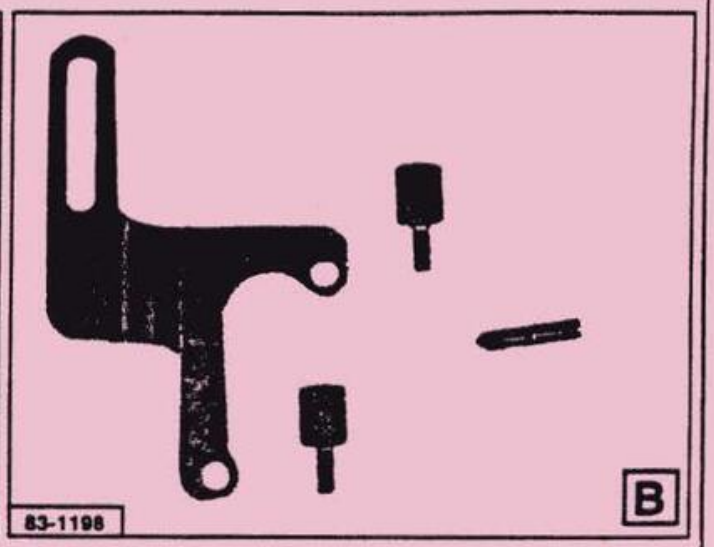

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C9
C6
15222
C

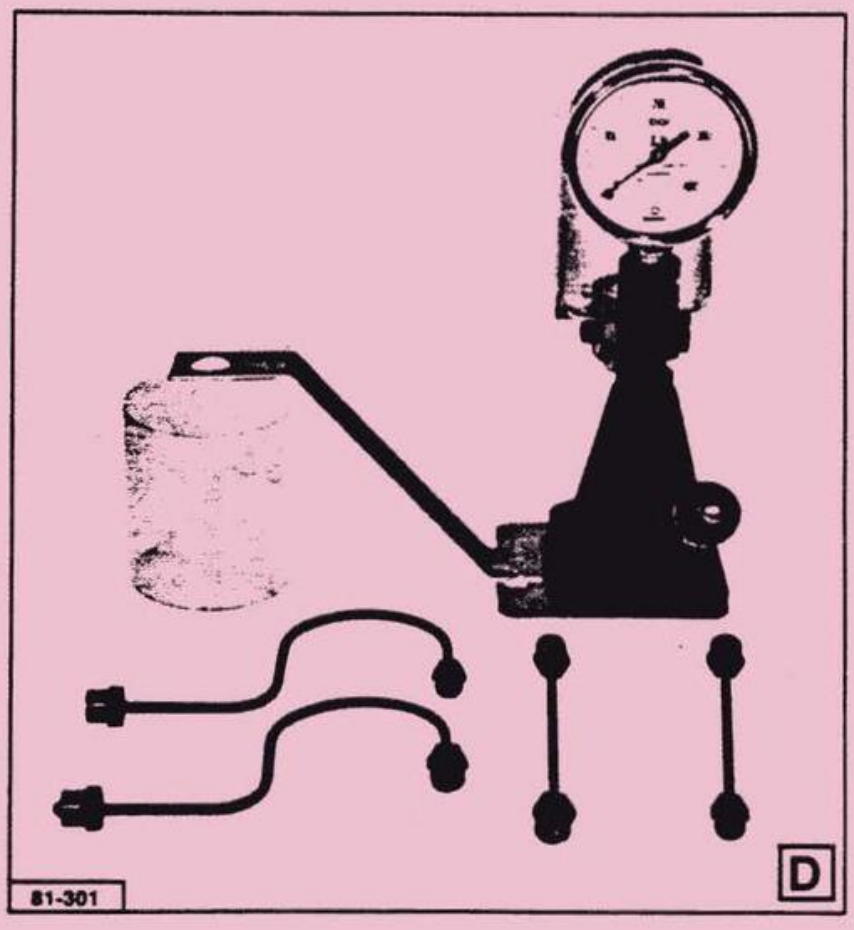

81-307
G


80-1854
D


81-307
A


83-1198
B


87-164
C


81-301
D

SPECIAL TOOLS

[A] Dial indicator support for « ROTO DIESEL » DPA pumps
Reference : (-).0117 AF

[B] Dial indicator support for « ROTO DIESEL » DPA pumps
Reference : (-).0117 AL

[C] Tool for setting the timing of ROTO DIESEL pumps (1988 model year)
Reference : (-).0117 AM

[D] Pump and connecting pipe work for adjusting the injector settings
Reference : Part no. 9786.10

ADJUSTING THE OPENING PRESSURE OF AN INJECTOR

Test fluid:

Kerdanne or dilutine de-odourised paraffin viscosity : 1 to 2.5 centistokes at 20° centigrade.
Specific gravity 0.770 to 0.810 at 20° centigrade.

> Precautions to be taken :
> The sprayed fluid ignites very easily. It is essential to take all the necessary precautions and ensure that the fire regulations are adhered to.
> Never expose the hands or any other part of the body to the test fluid spray. The penetrating force of the spray is such that it could cause serious injury and blood poisoning.

Checking the opening pressure Fig. I.

Operate the pump lever slowly and note the pressure at which the injector opens (the setting pressure). Write down this figure. The opening pressure is adjusted by turning screw 7 Fig. II.

> The injector setting adjustment screw (7) is only to be screwed in or out on the test bench. The pump lever must be kept moving during the operation to ensure that the seat and needle are continually lubricated and cleaned.

Dismantling

To loosen an injector holder, grip it in a vice fitted with soft jaws made from lead.

> Never grip an injector holder directly in a vice.

The component is to be reassembled under conditions of absolute cleanliness. Lubricate the parts before reassembly them. Fit the injector nozzle (2) and its nut (3) to the injector holder body (1) Fig. II.

Tighten to a torque of 65 N.m (47.9 lbf.ft).

Place, in the injector holder body (1), the plunger rod (4), the spring (5) and the adjusting screw (7). Adjust the opening pressure (Fig. II).

REF	Engine	U25/651	U25/661	U25/673
	Make	ROTO-DIESEL		
2	Injector nozzle	RDNO SDC 6577 B		RDNO SDC 6751
1	Injector holder	RKB 45 SD 5422		
2 + 1	Holder + nozzle	R 53 56 501 B		R 53 56 502
A	Colour code	ORANGE		WHITE
	Setting, new component	122^{+5}_{-0} bars		137^{+5}_{-0} bars
	Setting, used component	112^{+5}_{-0} bars		127^{+5}_{-0} bars

Fit the seal (6) and the cap nut (7).

Tighten them to a torque of 20 N.m (14.7 lbf.ft).

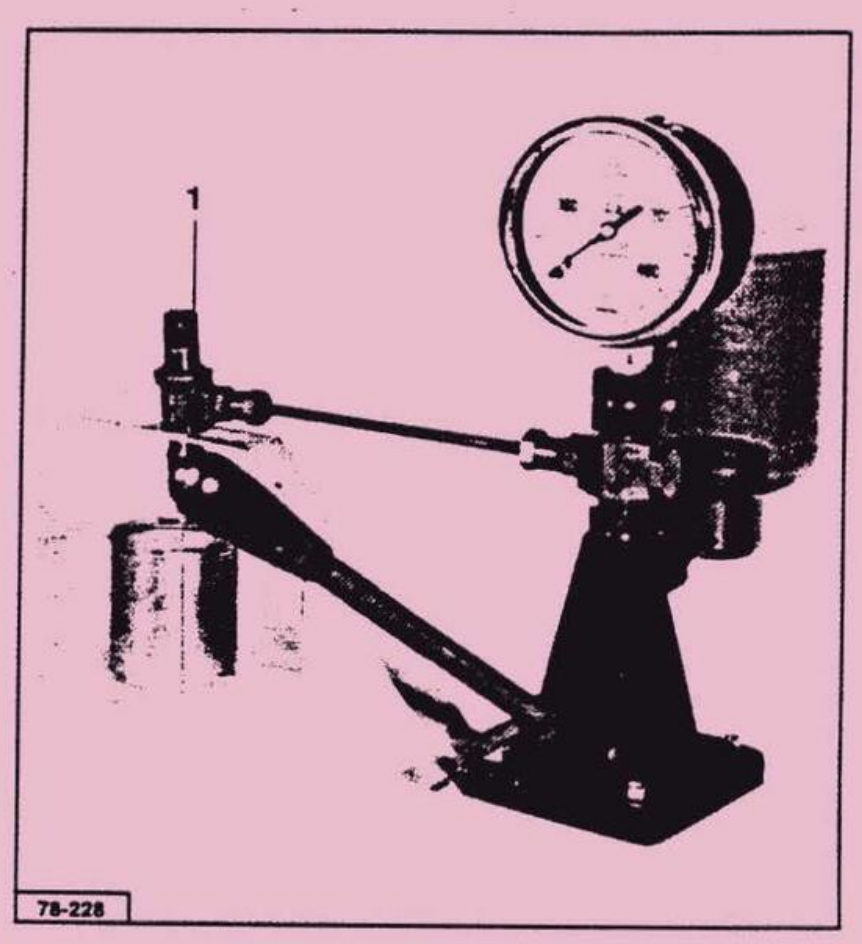
Check the spray pattern Fig. I

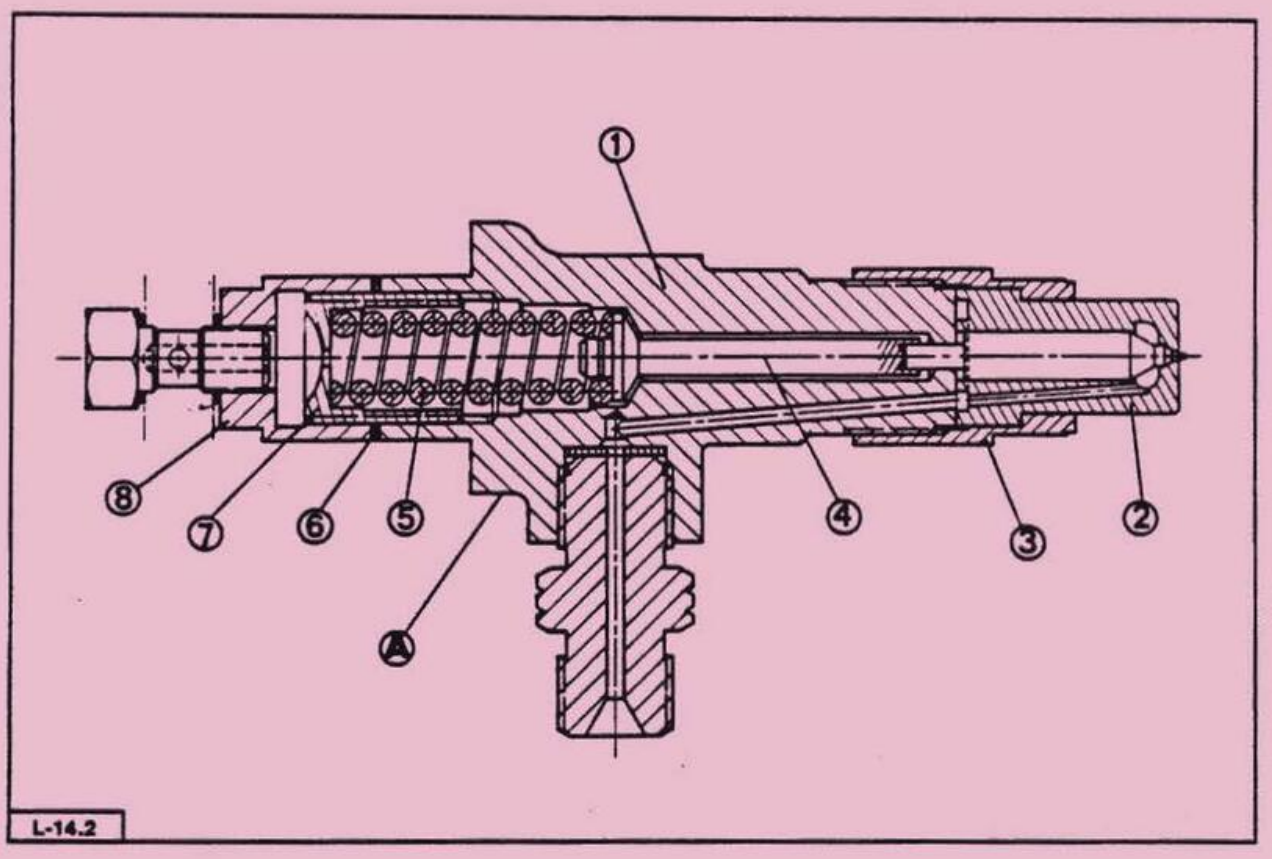
Operate the pump lever in sharp jerks.
The injector spray pattern should be very fine and homogeneous.

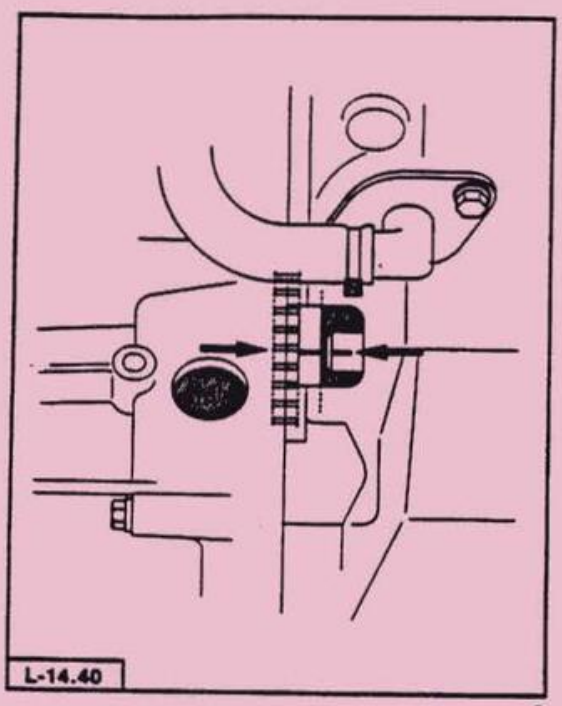
Check the needle seat for leaks.

This check should be carried out with the injector held vertical. Wipe dry the end of the injector.

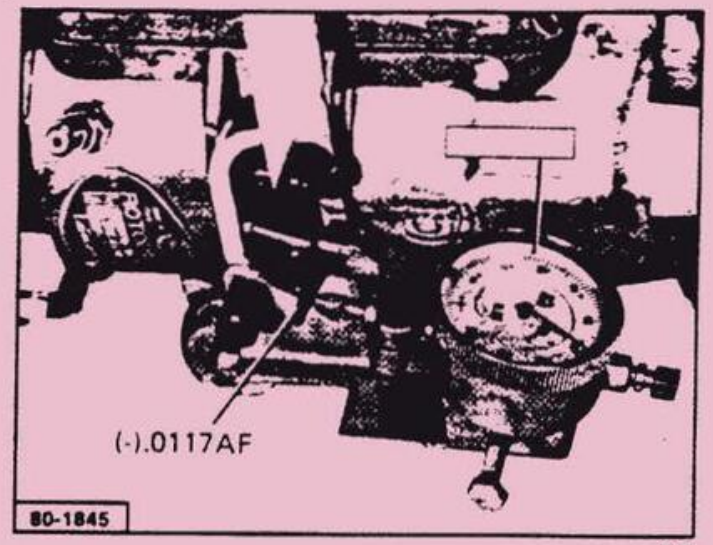
Pull down the pump lever to maintain a pressure of 10 bars lower than the opening pressure. No drop should fall from the injector within 30 seconds. Light wetting of the injector nozzle is acceptable.


1
78-228

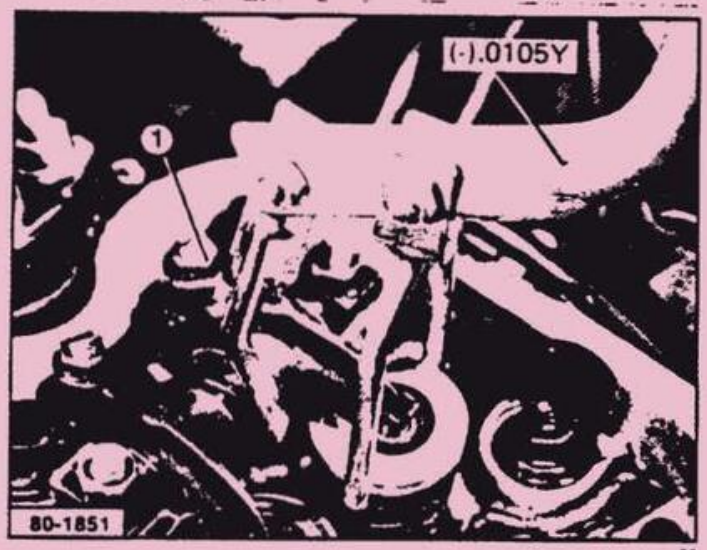

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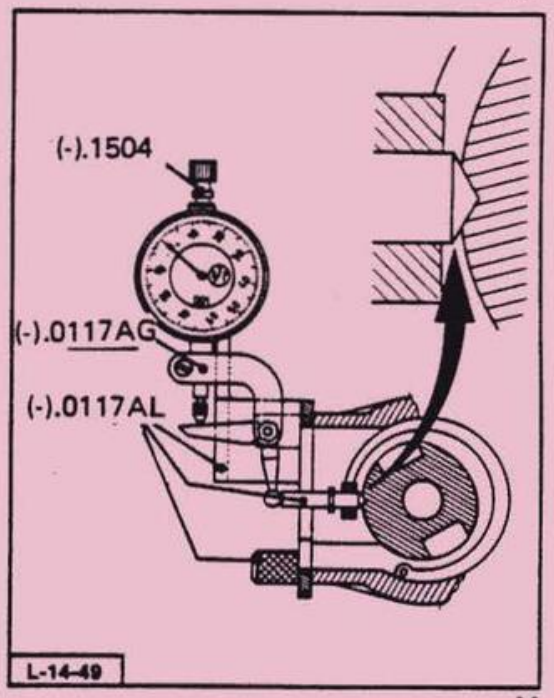
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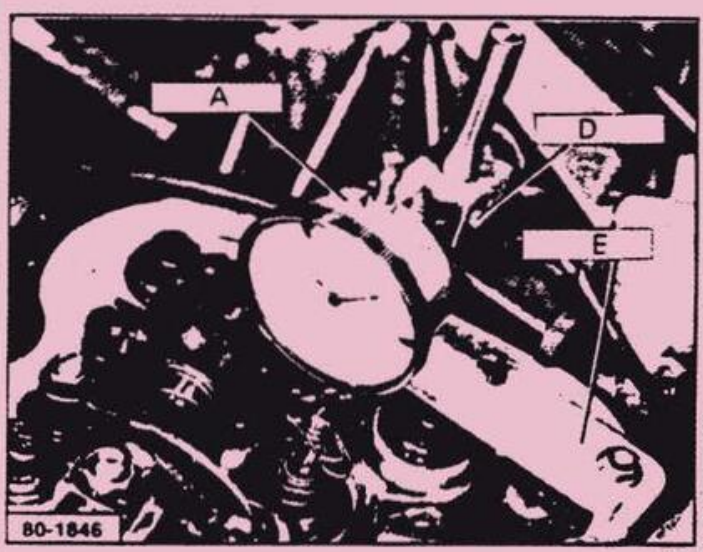
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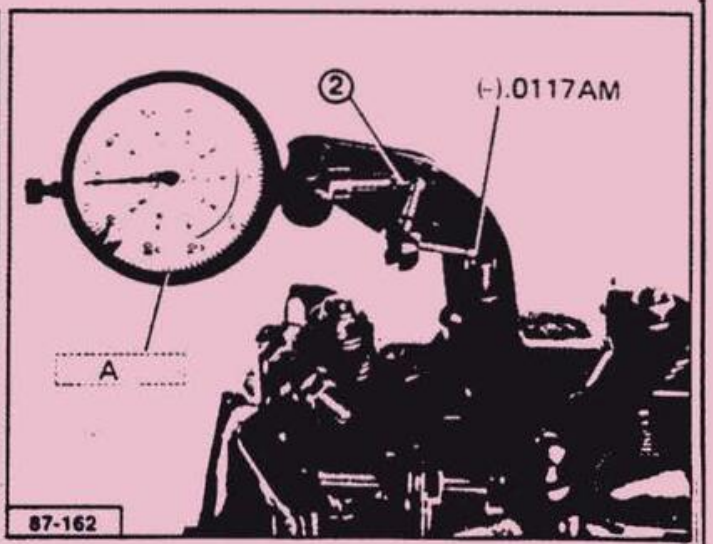
II



V



III



VI

CHECKING AND ADJUSTING THE « ROTO DIESEL » INJECTION PUMP

Support the left hand side of the vehicle on axle stands.
Disconnect the battery negative cable.
Engage the highest gear.
Turn the engine over by turning a wheel.

Set No. 1 timing at the initial timing point.

ENGINE	BEFORE TDC	PUMP	
U25/651	5.12 mm ± 0.05	UT 100	DPA
U25/661	4.32 mm ± 0.05	MA 300	DPA
	4.71 mm ± 0.05	MA 260	DPC
U25/673	3.24 mm ± 0.05	MAS 100	DPC

1° Method Fig. I
(when there is a timing mark on the flywheel)

Look down through the oil filler hole in the rocker arm cover.
Bring the valves on No. 1 cylinder « into balance », turn the engine through one turn (in its normal direction of rotation). Turn the engine, by turning the wheel, to bring the timing marks on the cylinder block and flywheel —> [<— in line with one another.
Check their positions with a mirror.

2° Method Fig. II and III
(when there is no mark on the flywheel)

Remove the rocker arm cover.
Bring the valves on No. 4 cylinder into balance (with the piston on No. 1 cylinder near TDC on the compression stroke (Fig. II).
Remove the lock nut (1) and screw back the screw on the No. 1 cylinder inlet rocker arm. With the valve spring compressor (B) (Fig. II), compress the spring and move the rocker arm sideways to swing it vertically.
Take out the push rod.
Remove - the valve collets
- the valve spring

To avoid the inlet valve falling into the cylinder, only turn the crankshaft through a quarter of a turn in either direction or place a paper clip on the inlet valve stem.

Find TDC on No. 1 cylinder (Fig. III)

Fit the support (E) together with the adjustable component (D) to which the dial indicator (A) has been fitted. Turn the crankshaft backwards and forwards to find the exact point at which the large pointer on the dial indicator changes direction (TDC).
Set the dial indicator moving dial to place the « 0 » in line with the large pointer and set the total pointer on 8.

Find the engine timing point

Turn back the crankshaft (by a quarter of a turn) and then turn it in the normal direction of rotation of the engine to bring the piston to : EG : 4.32 mm before TDC, that is to say a reading of :
8 mm - 4.32 mm = 3.68 mm on the dial indicator.

Remove

The injection pump inspection plate or plug.

Fit, Fig. IV, V and VI

The timing tools to suit the pump.

NOTE : Fig. VI

Fit the dial indicator A with the flat plunger (2) that forms part of the kit.

Find the pump timing point.

PUMP		BEFORE TDC	ENGINE	
D P A	U 100	5.12 mm ± 0.05	U25/651	SLOT (Fig. I)
	MA 300	4.32 mm ± 0.05	U25/661	

Turn the engine in the normal direction of rotation until the dial indicator pointer changes direction. Set the dial indicator zero in line with the large pointer.

PUMP		BEFORE TDC	ENGINE	
D P C	MA 260	4.71 mm ± 0.05	U25/661	STUD (Fig. II)
	MAS 100	3.24 mm ± 0.05	U25/673	

Place the angle adaptor against the pin and set the dial indicator on zero.
Check that the pin is not resting on the rotor timing stud (1), Fig. II.
Turn in the normal direction of rotation to find the injection point.
The amount by which the piston must lift, dimension X ± 0.04 mm, is engraved on the plastic cap (2) Fig. III.

Checking the injection pump

Turn back the engine against its normal direction of rotation.

D.P.A. pump

Slowly return in the normal direction of rotation to the zero point on the dial indicator.

D.P.C. pump

Slowly return in the normal direction of rotation until the pin lifts by a dial indicator reading of dimension « x » ± 0.04. (As engraved on the plastic cap (2) Fig. III).

1° Method where there is a timing mark on the flywheel

The timing marks —> and <— must be in line.

2° Method when there is no timing mark on the flywheel

The dial indicator should show the required readings before TDC (as specified in the above chart). If it does not, check the pump timing.

Setting the pump timing

Place the engine on its timing point.
Turn back the engine against its normal direction of rotation and then return in the normal direction of rotation to bring the timing marks —> and <— in line with one another.
Loosen the injection pipe unions and the four fastenings (3) Fig. IV.
Place the pump on its timing point.
Turn the body of the pump sharply towards the engine.
Slowly come back to the timing point by turning the body of the pump outwards, away from the engine.
D.P.A. until the dial indicator pointer is on the « 0 ».
D.P.C. until the dial indicator pointer is in line with the figure that represents « dimension X ».

Tighten the four fastenings (3) Fig. IV. The dial indicator pointer must not move as the fastenings are being tightened. Tightening torque 24 N.m (17.7 lbf.ft).

Check the pump timing.

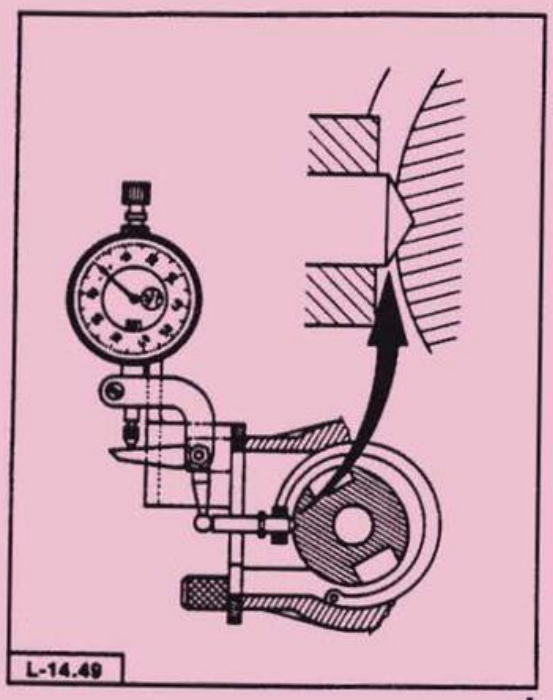
Remove the timing equipment.

Fit the inspection plate.

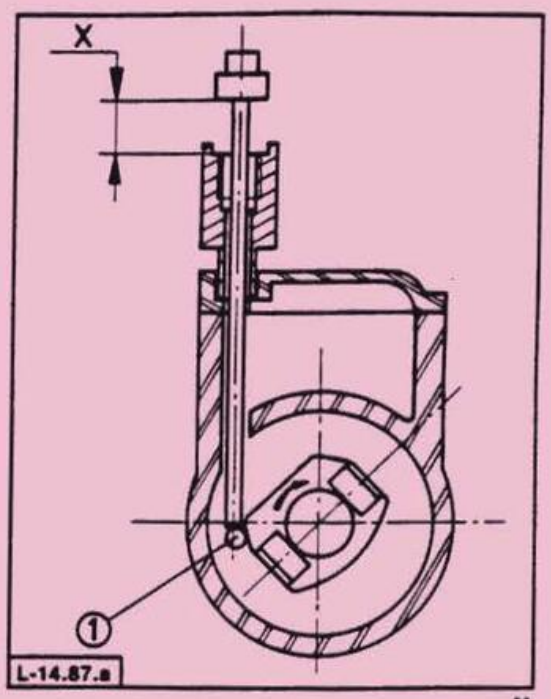
Fit the plug, together with its seal (D.P.C.).
Tightening torque 10 N.m (7.4 lbf.ft).

Tighten the pipe unions.
Tightening torque 25 N.m (18.4 lbf.ft).

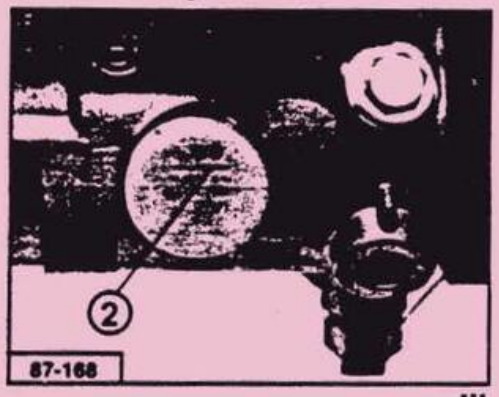
Connect up :
- The electric shut-off unit wire
- The battery negative cable.



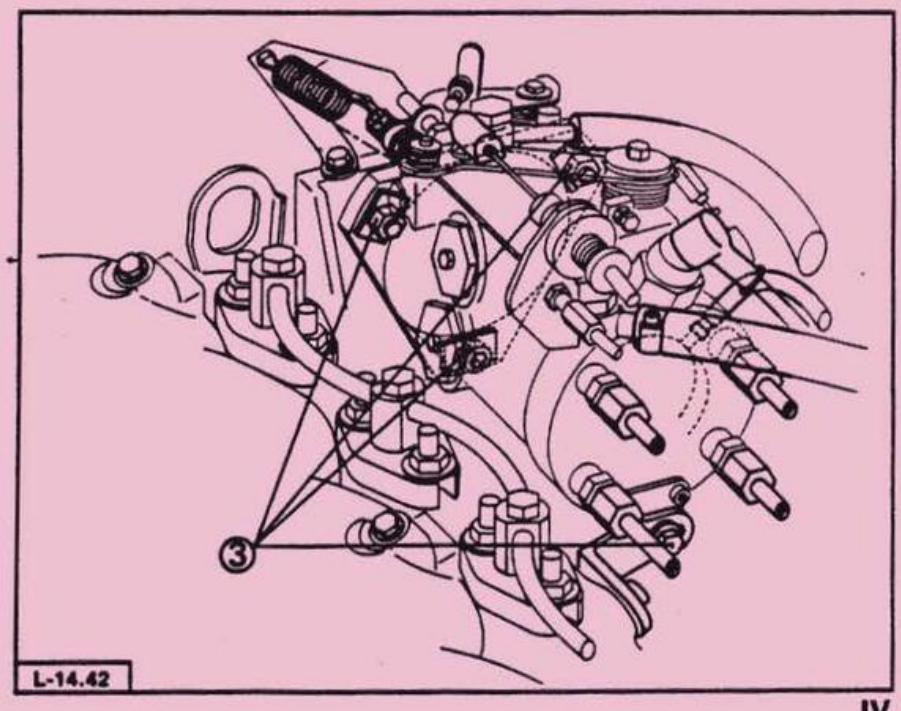
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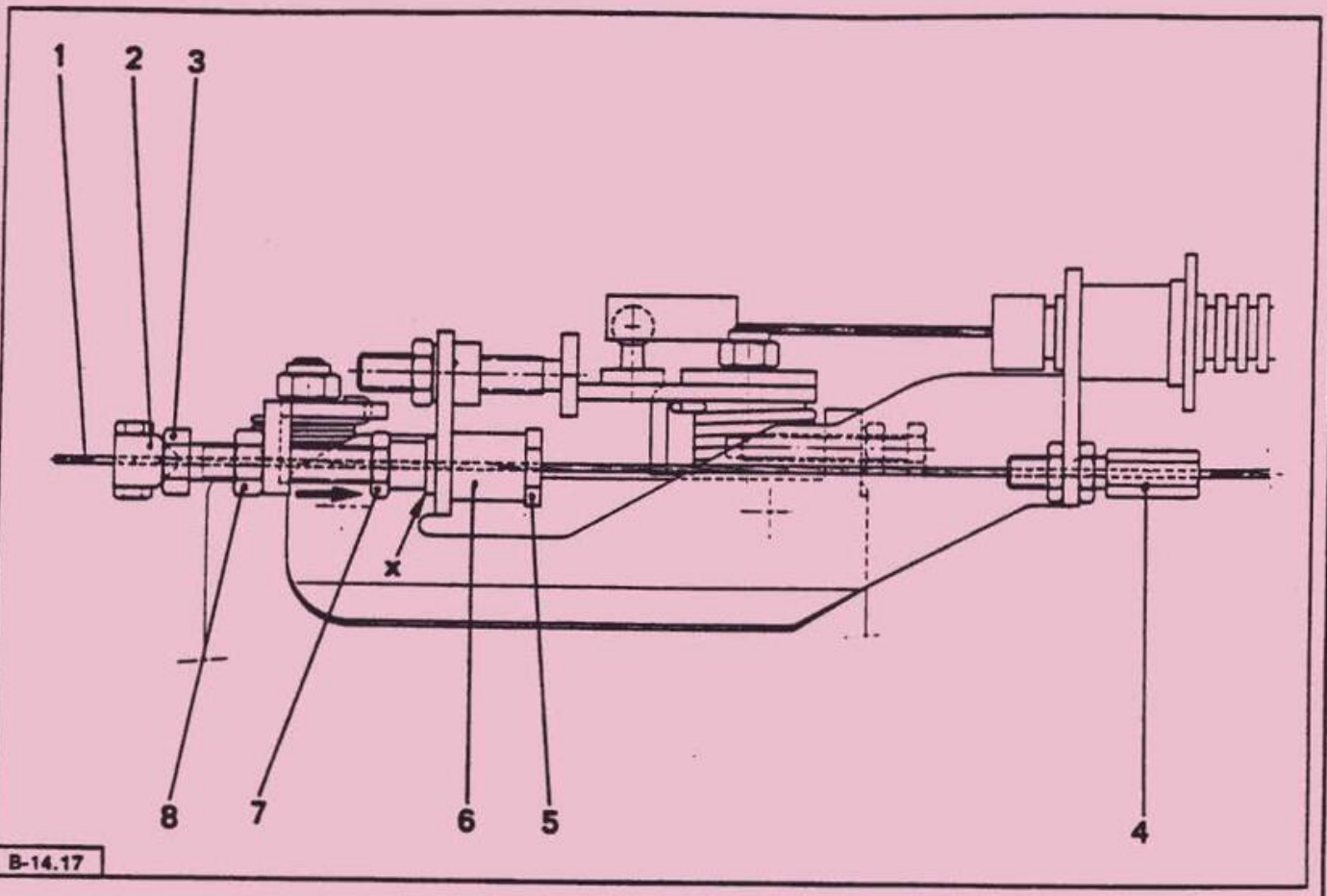
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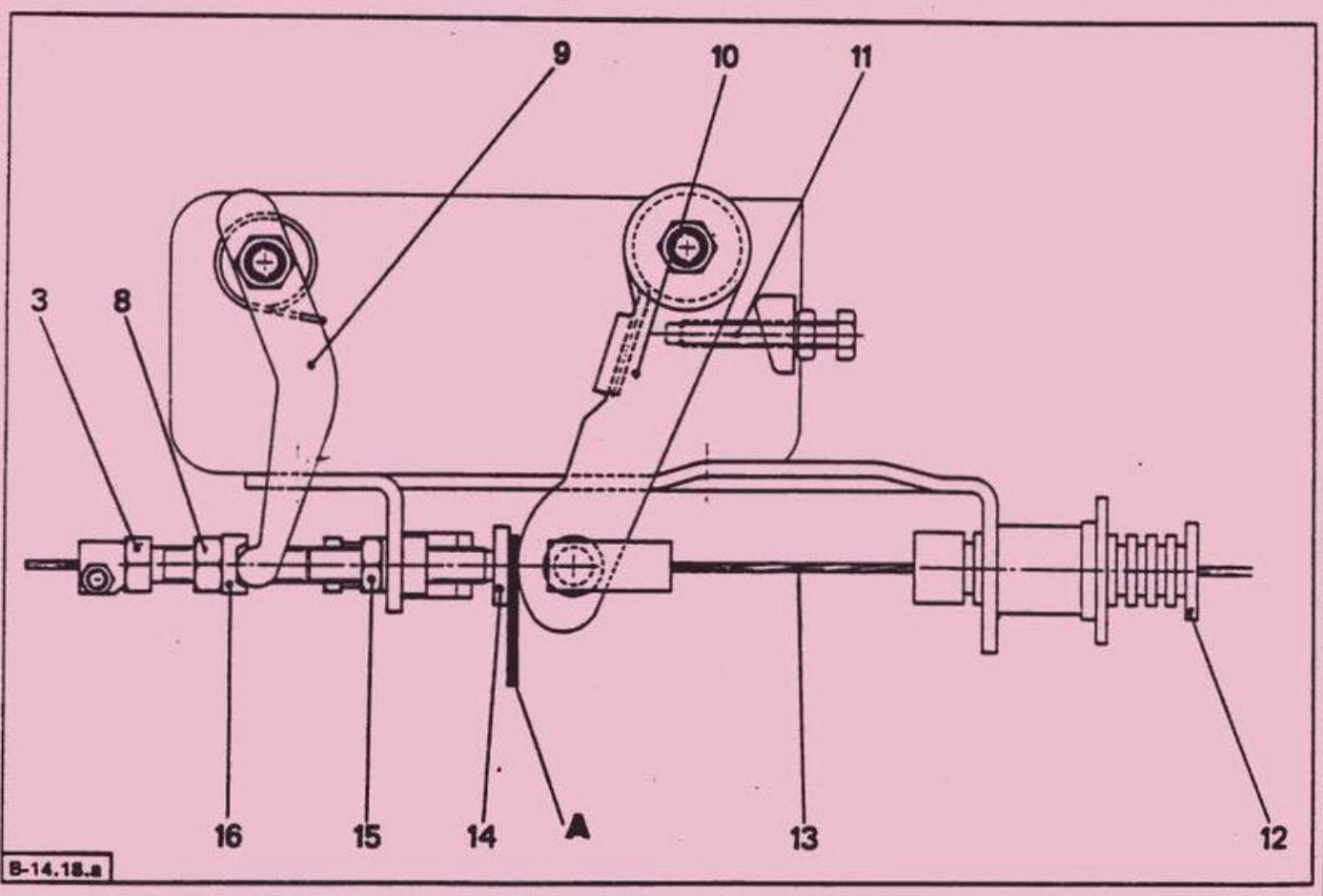


III



IV


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B-14.18.a

ADJUSTING THE ROTO DIESEL INJECTION PUMP CONTROLS

PUMP		ENGINE
D P A	UT-100	U25/651

Adjusting the fast idling control : Fig. I

ON A COLD ENGINE

Check that the idling control cable (1) is fully tensioned and that the piston (7) is against its stop at « X ».

If not, push the piston (7) in the direction shown (→) : tension the cable (1) and tighten the cable clamp (2) against its stop (3). Complete the tensioning operation by applying tension to the cable at the tensioner (4).

ON A WARM ENGINE

Check that there is no tension on the control cable (1) and that the piston (5) is against its support (6). If it is not, replace the fast idling sensor.

Adjusting the idling speed : Fig.II
Loosen the lock nut (15) and screw the stop (14) fully in. (Check that there is no tension on cable (13).
Loosen the lock nut (8) on the stop (16) that limits the movement of the idling lever (9).
Adjust the idling speed to 750 ± 25 rpm by turning screw (3). Tighten the lock nut (8).

Adjust the throttle control stop : Fig. II.
Bring the stop screw (14) into contact with the lever (10) and insert a feeler A, 2 mm thick, between the stop (14) and the throttle lever (10).
Turn the stop screw (14) to increase the engine speed by approximately 100 rpm.
Tighten the nut (15).
Remove the 2 mm feeler gauge.
The engine should return to its normal idling speed.
- If the engine tends to stall, re-insert the feeler and slightly increase the speed.
- If the engine does not return positively to idling speed, slightly reduce the speed.

Adjust the throttle travel (with the engine stopped) : Fig. II
Fully depress the accelerator pedal and ensure that the lever (10) is against its screw (11).
If not, move the clip that retains the adjusting sleeve (12).
Release the pedal and check that the lever (10) comes against its stop (14) and that there is no tension on the accelerator cable (13).

Checking the shut-off controls :
Check that the engine stops when the ignition key is turned off. If not, check the operation of the electric shut-off control (solenoid valve).
Check the operation of the mechanical shut-off by turning the lever (9) after first moving the stop (16) out of the way.

ADJUSTING THE ROTO DIESEL INJECTION PUMP CONTROLS

PUMP		ENGINE	Thickness of feeler
DPA	MA 300	U25/661	2 mm
DPC	MA 260	U25/661	1,5 mm
	MAS 100	U25/673	

ON A COLD ENGINE

Adjusting the fast idling control : Fig. I

Check that the control cable (2) is fully tensioned and that the lever (3) is in the « MAX » position (by pushing it in direction →). If it is not, push the lever (3) as far as it will go in direction → and tension the cable (2) by turning the nut and the lock nut on the cable cover end stop (1).

ON A WARM ENGINE

Check that there is no tension on the control cable and that the lever (3) is against the cross piece (4) Fig. II. If it is not, check the operation of the thermostatic sensor (on the cylinder head) that controls the fast idling speed. With the cable disconnected there should be a cable movement between this position and the « cold engine » position of more then 6 mm.

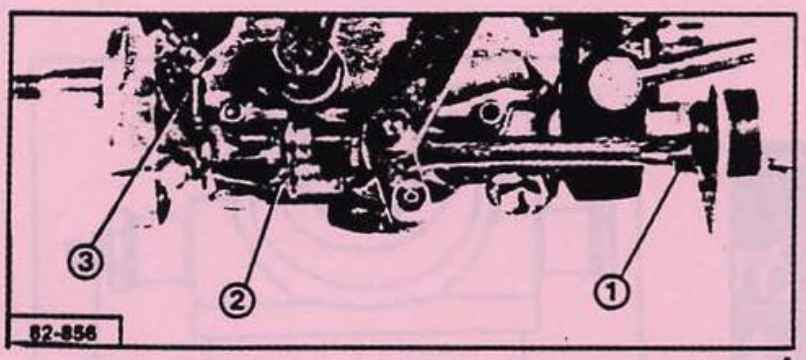
Adjust the throttle control (with the engine stopped) Fig. III.

Fully depress the accelerator pedal and ensure that the lever (6) is against the screw (5). If it is not, move the clip on the accelerator cable cover end stop.

Check that the lever (6) is against the stop (7) and that there is no tension on the cable.
If there is, adjust the accelerator pedal stop screw.

Adjusting the residual delivery (anti-stall) Fig. IV and V.
Push the shut-off lever (10) to be able to insert the 3 mm ø pin into the hole.
Insert the special feeler between the lever (6) and the screw (7).
NOTE : The special feeler can be replaced by a standard feeler gauge : see above chart.
Loosen the lock nut (11).
Adjust the speed to 800 ± 50 rpm by turning the special feeler or the screw (7).
Tighten the lock nut (11).
Remove the 3 mm ø pin.
Remove the special feeler or the feeler gauge.

Adjusting the idling speed Fig. III
Loosen the lock nut (9).
Adjust the idling speed to 800 ± 25 rpm by turning the stop screw (8).
Tighten the lock nut (9).
Test the engine deceleration : accelerate to approximately 3000 rpm and then release the throttle lever.
If the fall in the engine speed overruns the specified idling speed, after this adjustment, turn the stop screw (7) that restrains lever (6).
If the fall in the engine speed tends to overrun, unscrew it by 1/4 turn.
If the fall in the engine speed is too sluggish, screw it in by 1/4 turn.
In each of these two cases, recheck the idling speed and readjust it if necessary.



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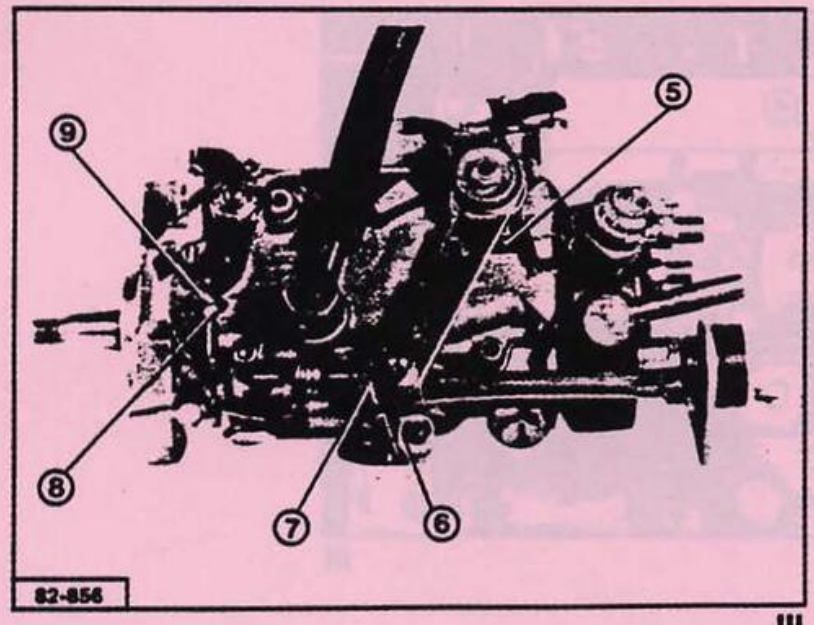
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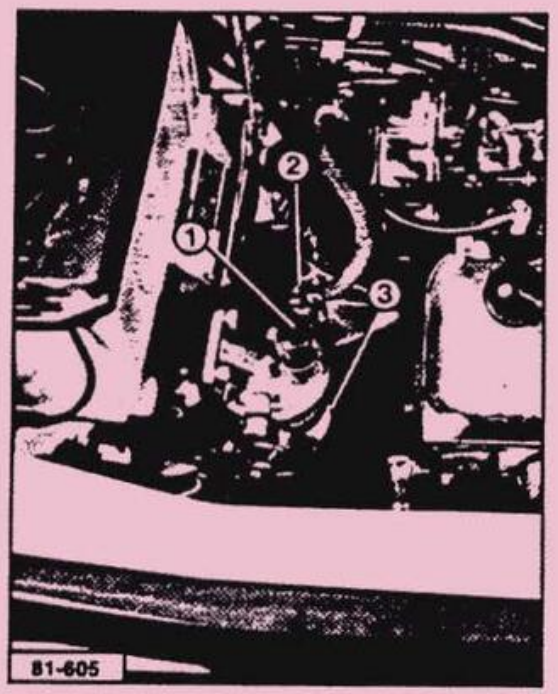
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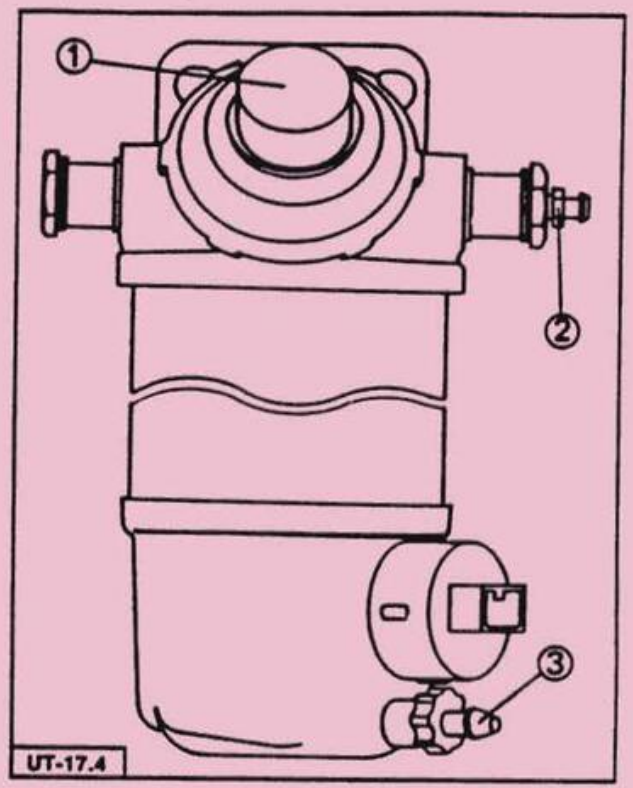
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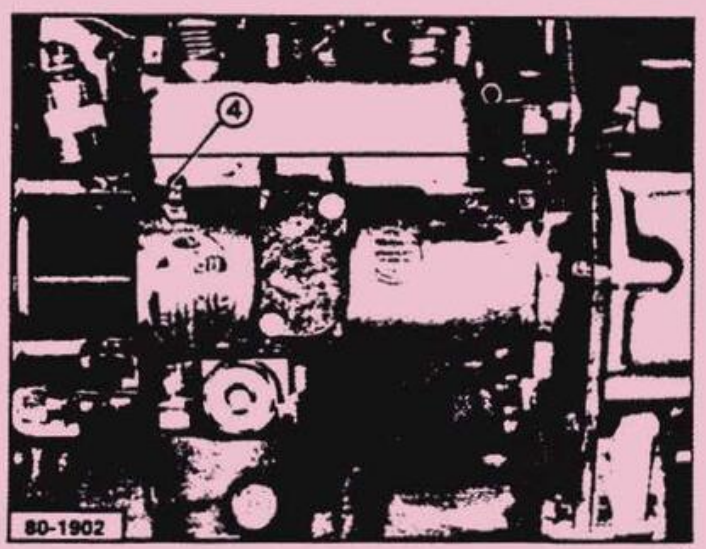
III



I



II



III

BLEEDING THE FUEL SYSTEM

Bleeding the fuel filter Fig. I and II.

Loosen the water drain screw (3) under the filter settling bowl (after draining off the water, and retighten the screw).

Loosen the bleed screw (2).

Unscrew the priming pump handle (1) ⇥ 1/85 Fig. I.

Bleed the air from the system by operating :
- either the handle (1) Fig. I
- or the piston (1) Fig. II ↦ 1/85

} that operates the priming pump

Tighten the bleed screw (2) to 4 N.m (3 lbf.ft)

Screw in the handle (1)

Bleeding the ROTO DIESEL - D.P.A. pump Fig. I and III

IT IS ESSENTIAL to bleed the filter before bleeding the pump

REMARK : One must follow the order stated below.

Loosen : Fig. I and III. The screw (4) on the injection pump hydraulic head.

Unscrew the priming pump handle (1).

Operate the handle (1) until there are no traces of air in the fuel flowing from the bleed screw (4) on the hydraulic head.

Tighten the bleed screw (4).

Screw in the handle (1).

NOTE : With this type of pump, the injectors are automatically bled.

Start the engine, pressurise the circuit with the hand priming pump whilst operating the starter motor.

The accelerator pedal must be fully depressed until the engine starts.

F4.002	1	REMOVING AND REFITTING THE INJECTION PUMP (on the vehicle)

SPECIAL TOOLS

A : Dial indicator
Tool no. : 8.1504

B : Valve spring compressor :
Tool no. : 8.0105 Y

C : BOSCH or ROTO-DIESEL pump timing kit :
Tool no. : 8.0117
Use the following tools from this kit.

C2 : Dial indicator
Tool no. : 8.0117 F

C6 : Dial indicator securing nut and bolt C2
Tool no. : 8.0117 L

C9 : Dial indicator extension C2
Tool no. : 8.0117 H

D : Dial indicator adjustable support :
Tool no. : 8.0504 A2

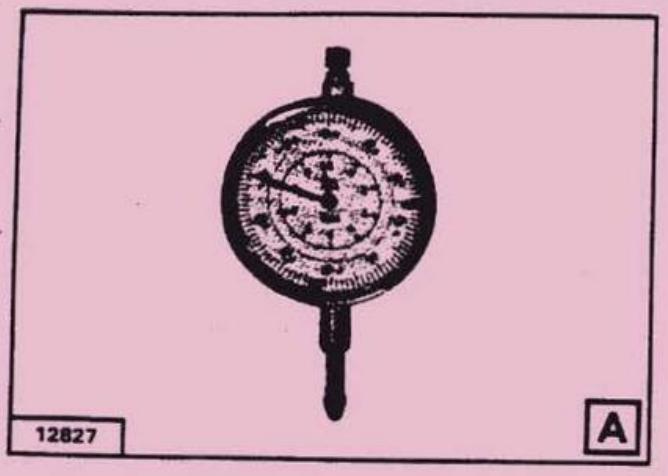
E : Support for mounting the dial indicator on the cylinder head :
Tool no. : 8.0117 AH

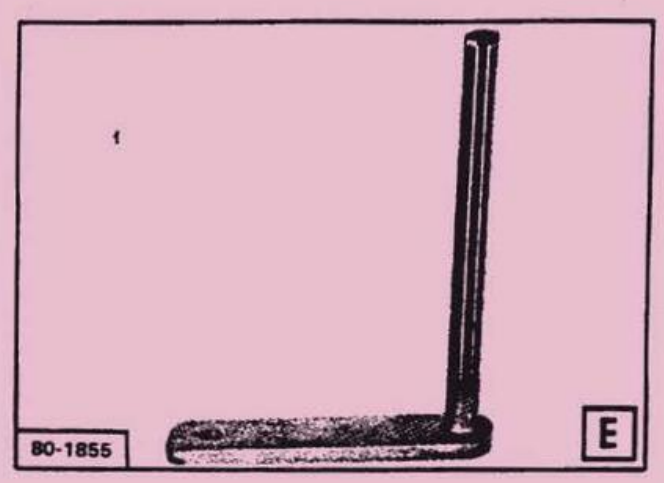
F : Dial indicator angle extension for ROTO-DIESEL pump :
Tool no. : 8.0117 AG

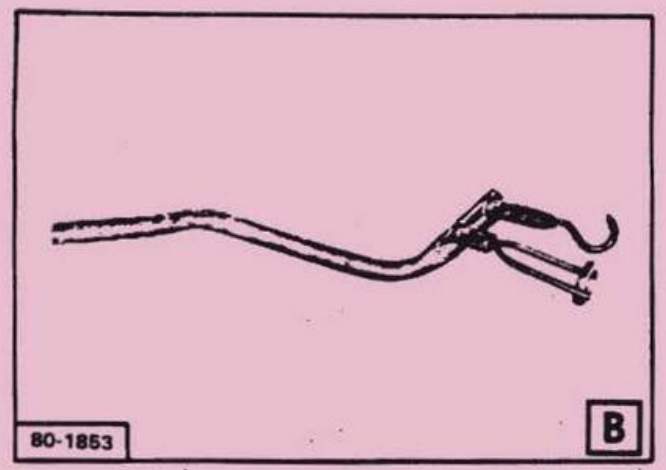
G : Dial indicator support for ROTO-DIESEL injection pump :
Tool no. : 8.0117 AF

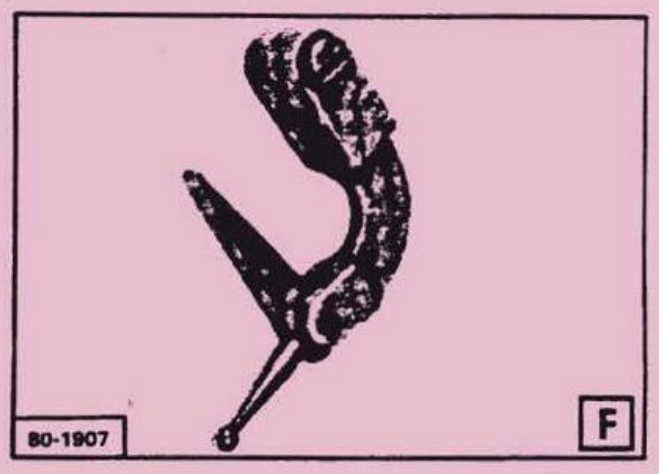
TIGHTENING TORQUES

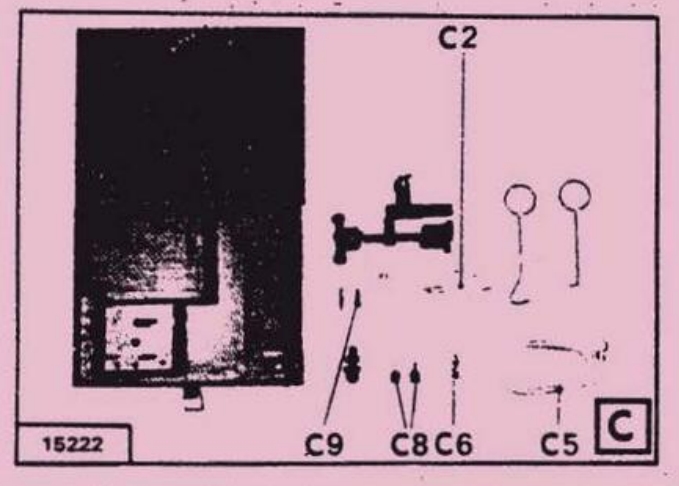
Recommended tightening torque :	m.daN	Nm	lbf ft
Injection pump gear securing bolts	2,3	23	17
Bolts securing injection pump to timing cover	3	30	22
Injector pipe unions	2,9	29	21

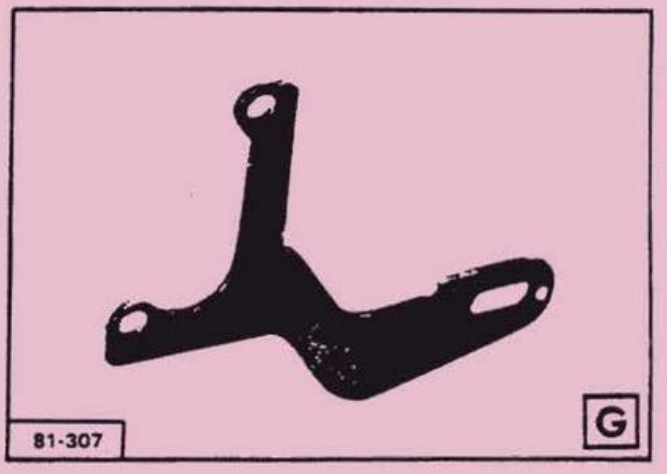

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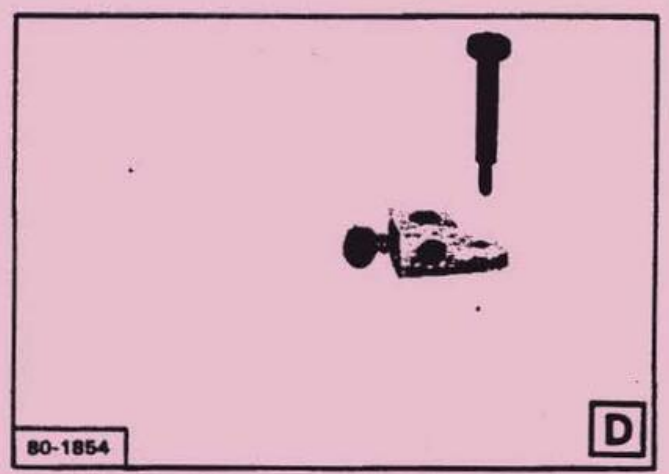

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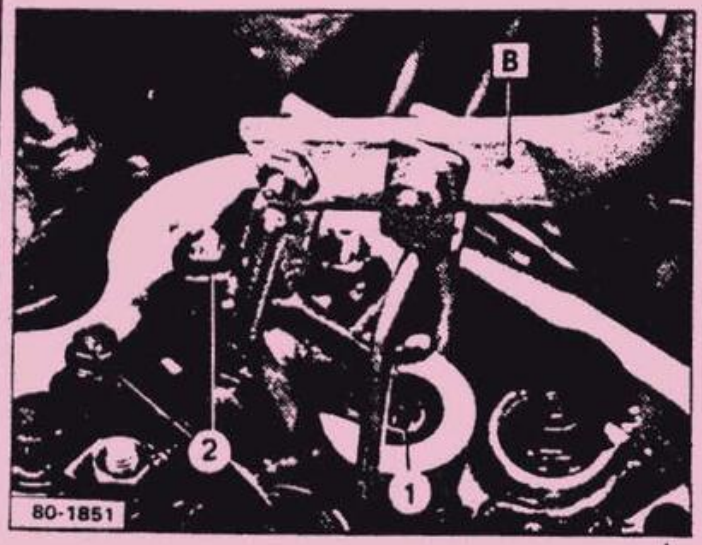

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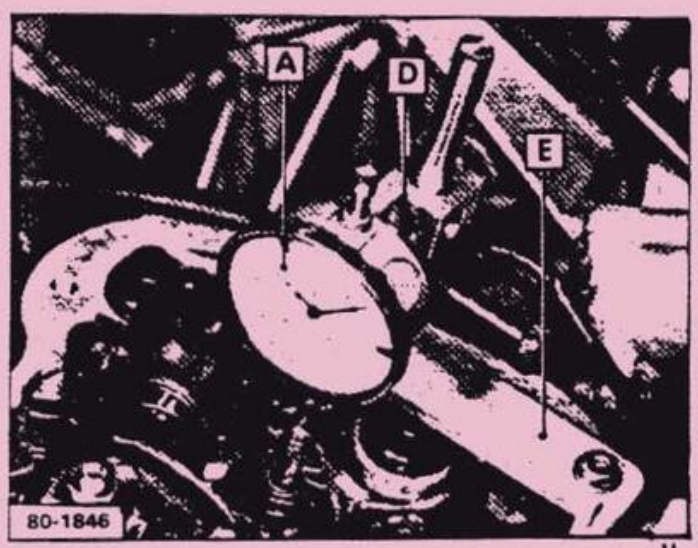

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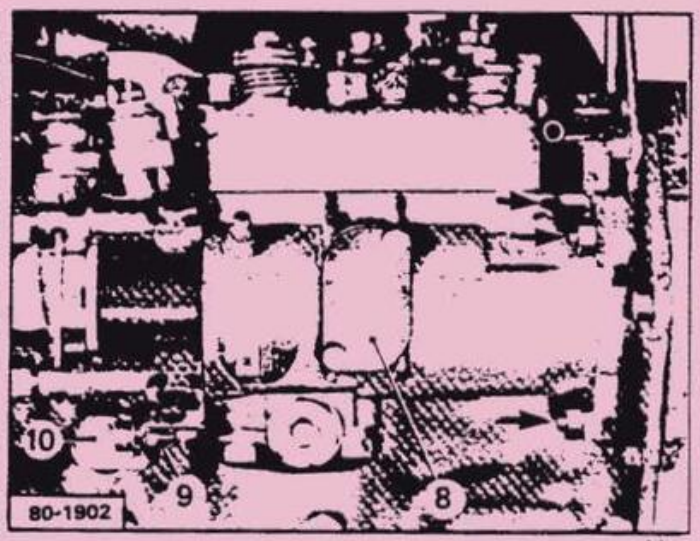
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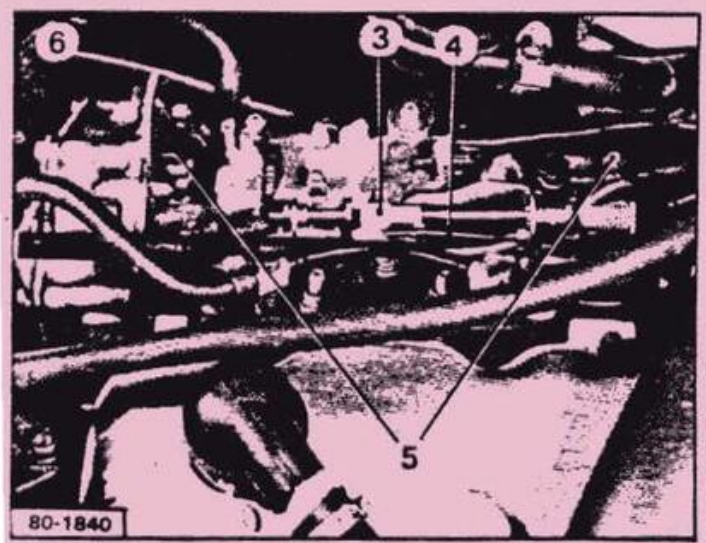
IV



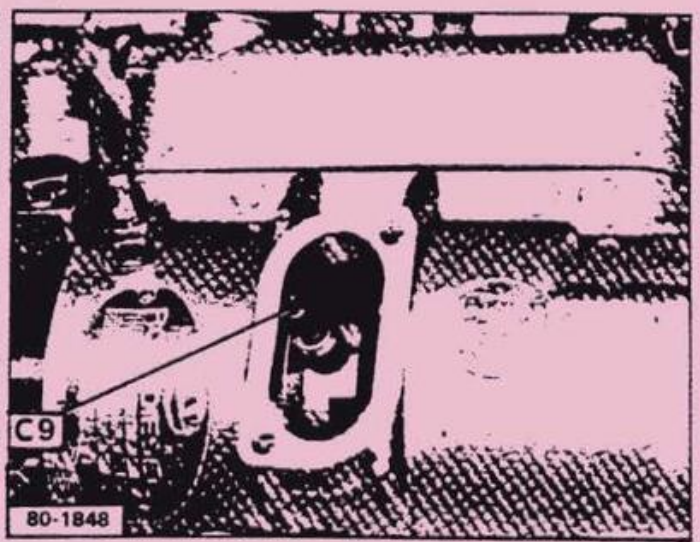
II



V



III



VI

REMOVING AND REFITTING THE INJECTION PUMP (ROTO-DIESEL)

REMOVING

Disconnect :
- the battery negative cable,
- the injection pump electric shut-off supply wire.

Raise the front right hand side of the vehicle and support it with an axle stand.

Remove the rocker cover.

Remove lock nut (2) and screw back the adjusting screw on the No. 1 cylinder inlet rocker arm.
- Using valve spring compressor [B] 8.0105 Y compress the spring, move the rocker arm to one side and swing it into the vertical position.
- Take out the push rod.
- Bring the valves on No. 4 cylinder into the "rocking" position (to place the piston of No. 1 cylinder near TDC on the "compression" stroke).
- Using valve spring compressor [B] 8.0105 Y, compress the inlet valve spring (1) :

Fig. :
Remove :
- the collets and spring cup,
- the valve spring.

Finding the engine initial timing point : Fig. II

To prevent the inlet valve falling into the cylinder , only turn the crankshaft through one quarter of a turn in either direction, or place a paper clip on the inlet valve stem to prevent it falling into the cylinder.

Finding TDC on No. 1 cylinder.
Fit support [E] 8.0117 AH equipped with dial indicator adjustable section [D] 8.0504 A2 fitted with dial indicator [A] 8.1504.

Turn the crankshaft through a quarter turn in the opposite direction to its normal direction of rotation and then bring it back in the normal direction of rotation until exactly the point at which the large pointer on the dial indicator starts to move back in the opposite direction. This is the TDC position.
Set the "0" on the moving dial on the dial indicator in line with the large pointer and bring the small pointer in line with the 8 on the dial.
Turn the crankshaft through a quarter of a turn in the opposite direction to its normal direction of rotation and then back in its normal direction of rotation to bring the piston to : 5.12 mm before TDC, that is to say : 8 mm – 5.12 mm = a reading of 2.88 mm on the dial indicator.

Disconnect the following from the injection pump : Fig. III :
- the fuel supply and leak-off hoses (5),
- the throttle control (3),
- the fast idling control (4).

Remove :
- the injection pipes assembly,
- the dipstick.

Remove the injection pump : as shown in Fig. III, IV and V.

Remove :
- the cover plate (6).
- the pump drive gear (7).

Remove the connecting lug securing bolt (10).

Loosen nut (9) (hold the bolt head with a 6 mm allen key).

Remove the pump securing nuts (➡) (use a 13 mm open ended spanner).

Take off the injection pump.
If necessary, remove the injector pipes assembly.
Prepare the pump.

Find the pump internal timing point : as shown in Fig. VI.
Remove inspection plate (8).
Turn the rotor in the normal direction of rotation of the pump (as shown by an arrow on the manufacturer's number plate).

Bring the "V" shaped timing groove opposite the inspection plate (injection point for No. 1 cylinder).
Fit extension C9 to the pump and bring the "V" section timing groove up to the extension.

Fit the injector pipes assembly to the pump, without tightening the unions.

REMOVING AND REFITTING THE INJECTION PUMP

(on the vehicle)

SPECIAL TOOLS

A : Dial indicator
Tool no. : 8.1504

B : Valve spring compressor :
Tool no. : 8.0105 Y

C : BOSCH or ROTO-DIESEL pump timing kit :
Tool no. : 8.0117 ZR
Use the following tools from this kit.

C2 : Dial indicator
Tool no. : 8.0117 F

C6 : Dial indicator securing nut and bolt C2
Tool no. : 8.0117 L

C9 : Dial indicator extension C2
Tool no. : 8.0117 H

D : Dial indicator adjustable support :
Tool no. : 8.0504 A2

E : Support for mounting the dial indicator on the cylinder head :
Tool no. : 8.0117 AH

F : Dial indicator angle extension for ROTO-DIESEL pump :
Tool no. : 8.0117 AG

G : Dial indicator support for ROTO-DIESEL injection pump :
Tool no. : 8.0117 AF

TIGHTENING TORQUES

Recommended tightening torque :	m.daN	Nm	lbf ft
Injection pump gear securing bolts	2,3	23	17
Bolts securing injection pump to timing cover	3	30	22
Injector pipe unions	2,9	29	21



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A

80-1853

B



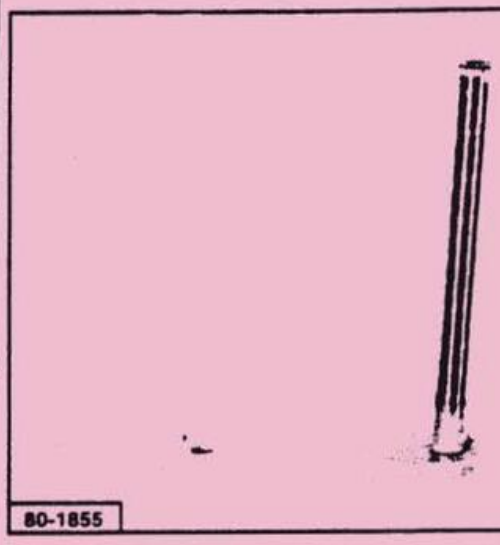
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C



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D



80-1855

E



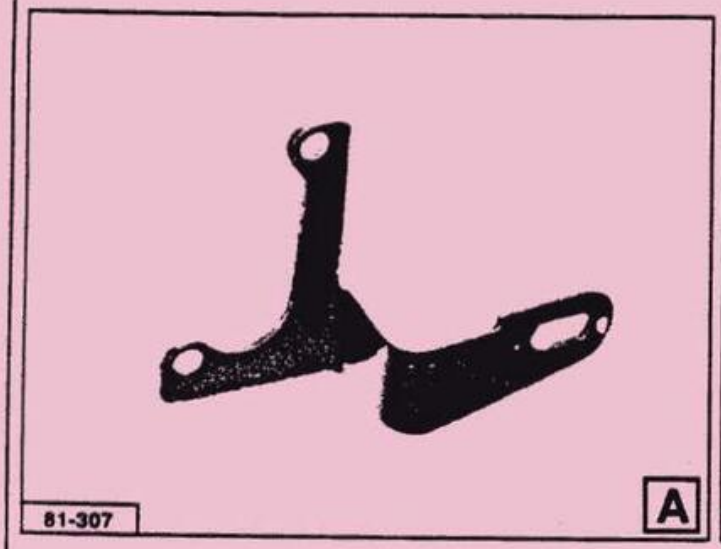
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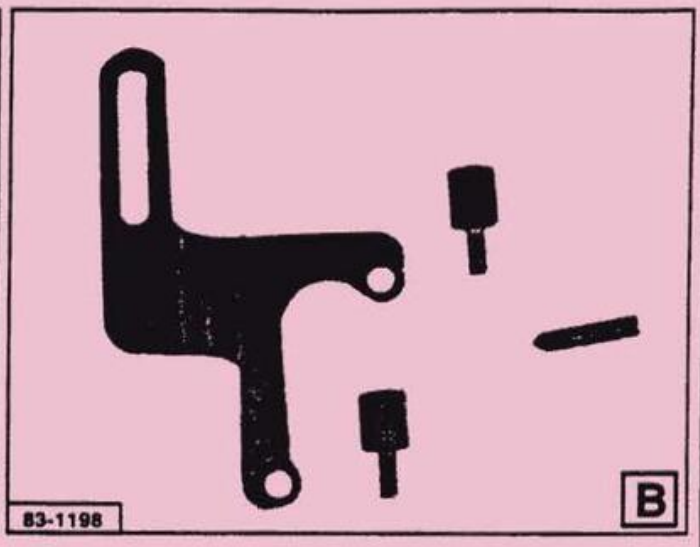
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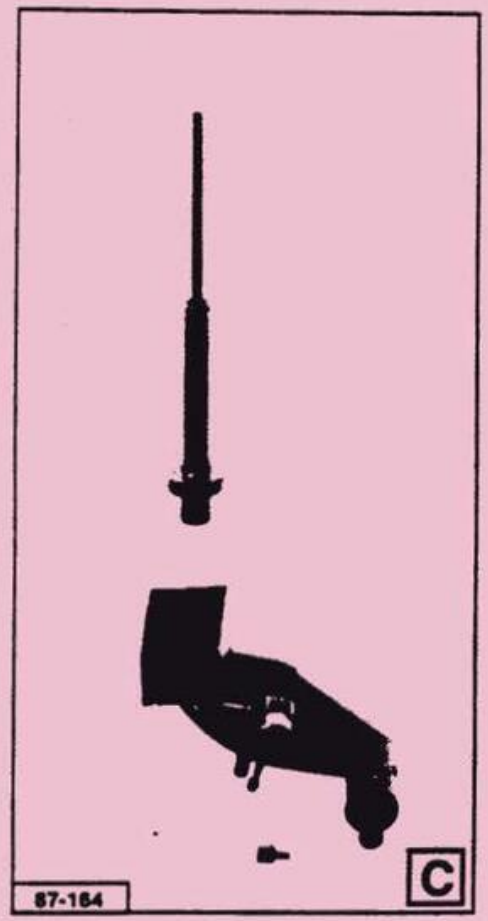


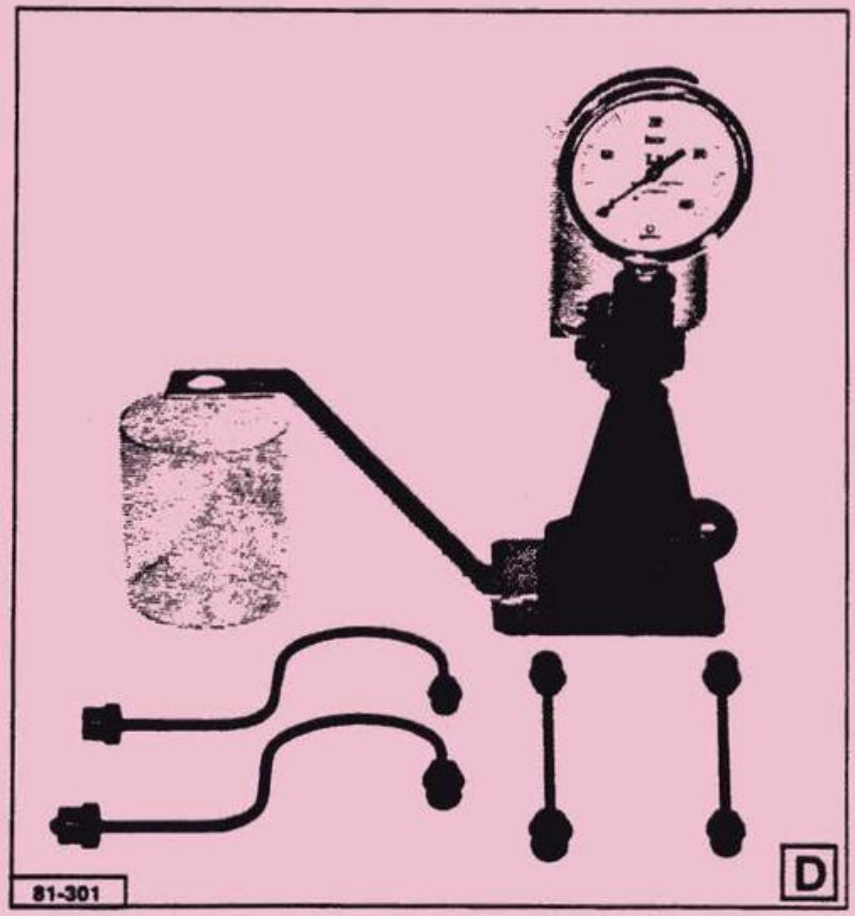
81-307

G


81-307
A


83-1198
B


87-164
C


81-301
D

SPECIAL TOOLS

[A] Dial indicator support for « ROTO DIESEL » DPA pumps
Reference : (-).0117 AF

[B] Dial indicator support for « ROTO DIESEL » DPA pumps
Reference : (-).0117 AL

[C] Tool for adjusting the ROTO DIESEL pump timing (1988 model year)
Reference : (-).0117 AM

[D] Pump and connecting pipework for adjusting injectors
Reference : Part no. 9786.10

REMOVING

Support the right hand side of the vehicle on stands.

Disconnect the battery negative cable.

Engage the highest gear to turn the engine by turning the wheel.

Place No. 1 cylinder at its initial timing point.

PUMP		BEFORE TDC	ENGINE	
DPA	MA 300	4.32 mm ± 0.05	U25/661	SLOT
DPA	MA 260	4.71 mm ± 0.05	U25/651	STUD
DPA	MAS 100	3.24 mm ± 0.05	U25/673	STUD

1° Method Fig. I
(When there is a timing mark on the flywheel)
Look down through the oil filler hole.

- Place the valves of No. 1 cylinder « in balance » and turn the engine through one turn (in the normal direction of rotation).
- The timing marks → and ← should be in line.

2° Method
(When there is no timing mark on the flywheel)
See section F2.051 to F2.057

Disconnect Fig. II

- The accelerator cable (1)
- The fast idling cable (2)
- The fuel input pipe
- The fuel return pipe

Turbocharged engines

Disconnect, from the turbocharging correction unit Fig. III

- The fuel return pipe (4).
- The air pipe (3).

Remove

- The spring
- The injection pipe assembly
- The upper belt protector.

Loosen Fig. IV

- The nut (5) on the injection pump drive sprocket.
- The nut (6) on the belt tensioner and compress ← the tensioner spring.

Remove

- The nut from the sprocket.
- The injection pump drive belt.

ESSENTIAL : TO AVOID INTERNAL DAMAGE TO THE PUMP WHEN REMOVING THE INJECTION PUMP DRIVE SPROCKET, ENSURE THAT THE EXTRACTOR IS USED FOR THIS OPERATION (ITEMS H AND ITS NUT J).

Fit, Fig. V, the nut (J) and the flange (H).

Unscrew the nut (J) until the sprocket is freed from the pump shaft.

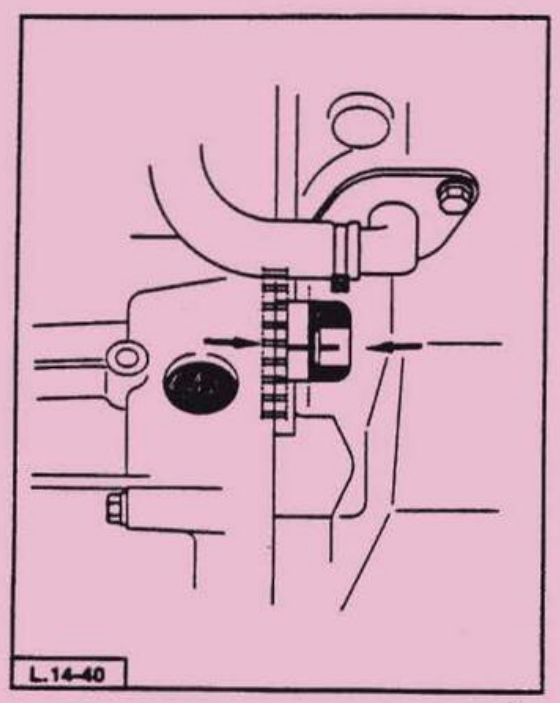
Disconnect the electric shut-off unit.

Remove, Fig. VI

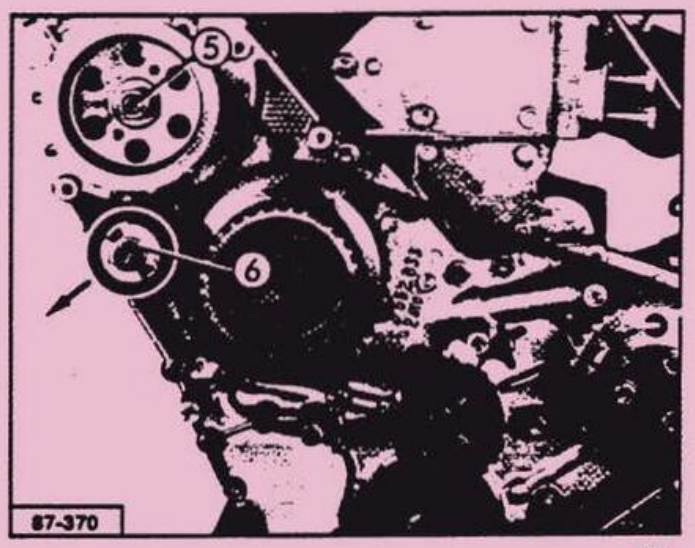
- The pump fastenings (7).

(Using a 13 mm open ended spanner and a 6 mm allen key).

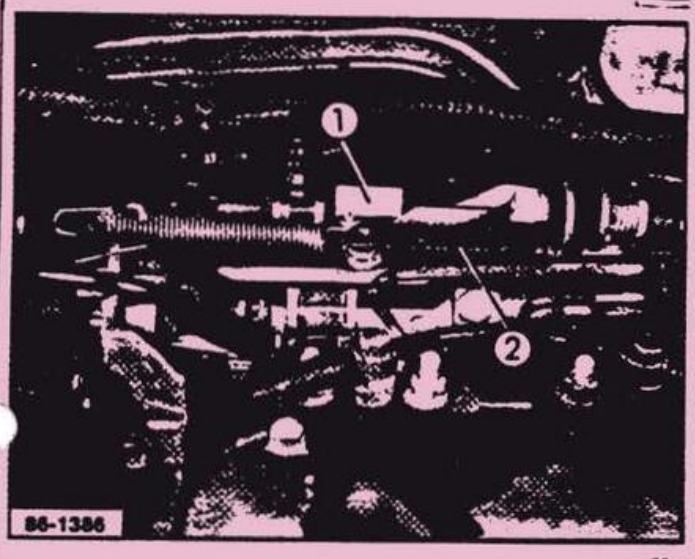
Remove the pump.



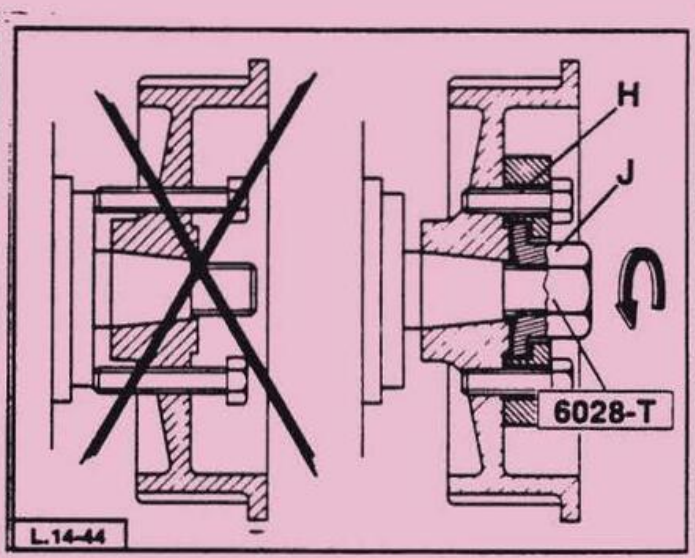
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IV



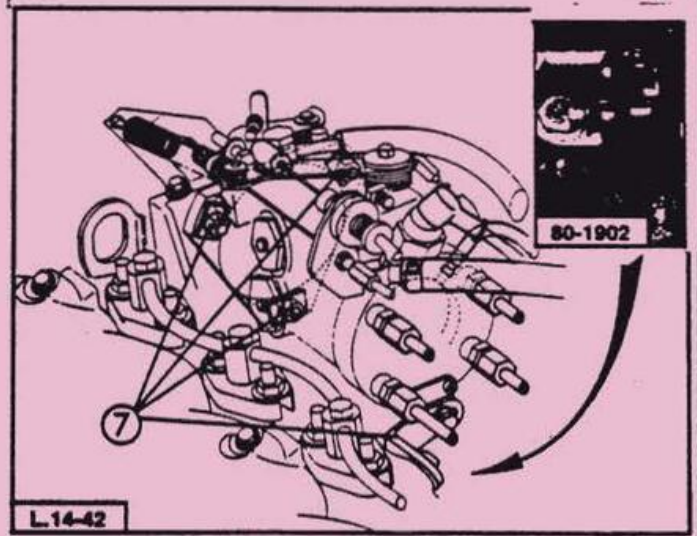
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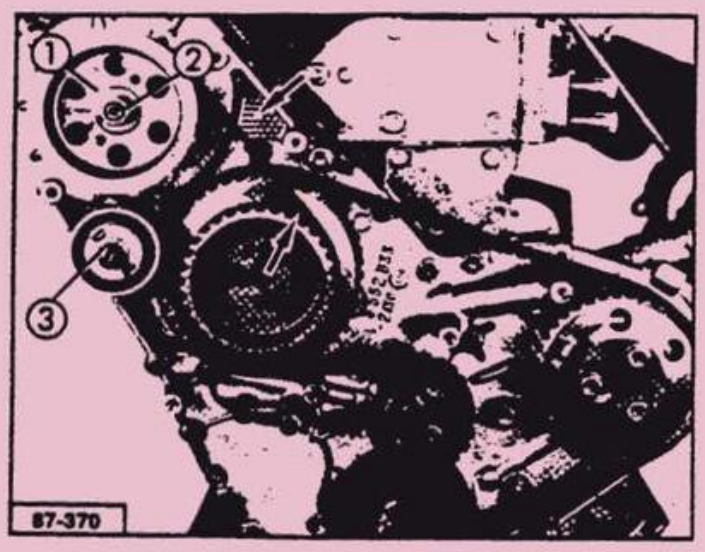
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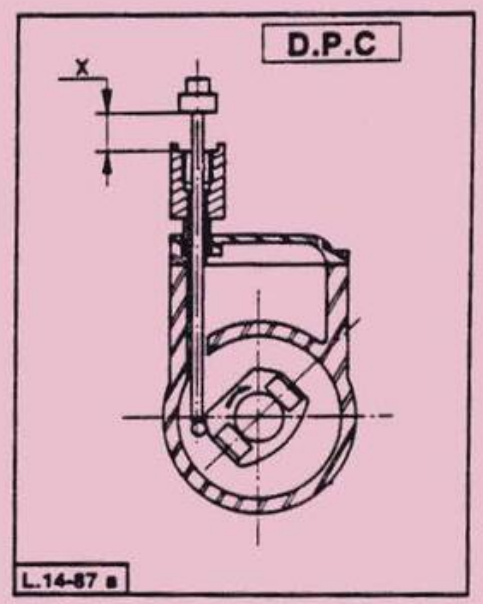
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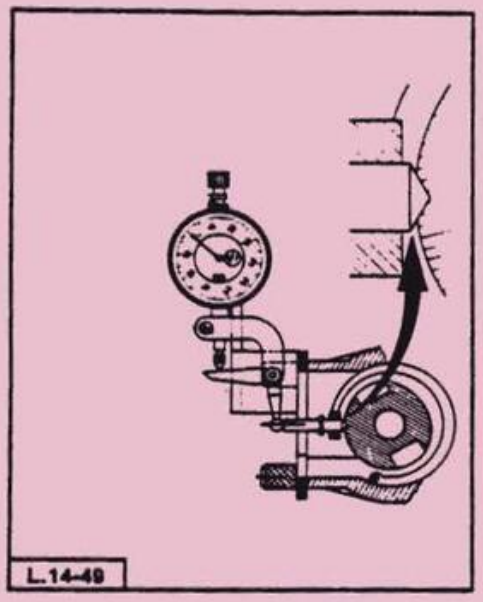
VI



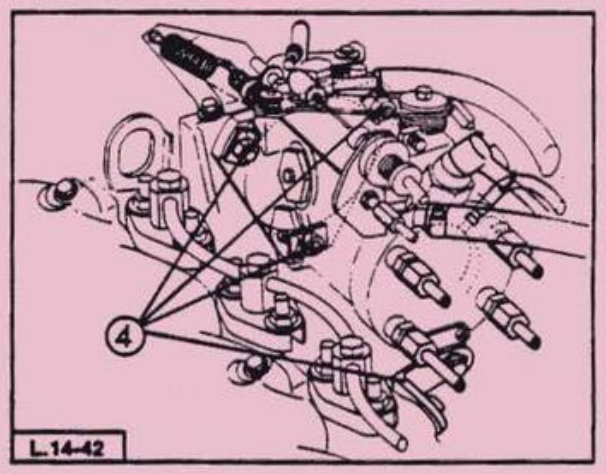
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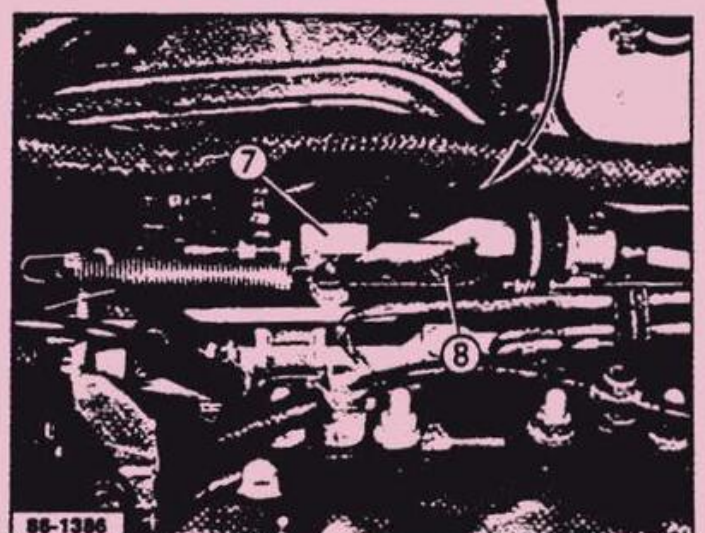
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VI



III



VII

FITTING

Prepare
- The pump (see Section F2.021 to 027).

Fit
- The pump, positioning it in the centre of its adjusting slots.
- Its fastenings, without tightening them.

Place No. 1 cylinder at TDC on the compression stroke (timing mark → on the camshaft sprocket Fig. I)

Fit, Fig. I
- The sprocket (1), tightening the nut (2) finger tight.
- The pump drive belt, with the span → on the opposite side to the roller under tension (Take care not to turn the pump).

Loosen, Fig. I
- The nut (3) on the tensioner, and allow the tensioner spring to act on the belt.

Tighten, Fig. I
- Nut (3)
  To a torque of 20 N.m (14.7 lbf.ft)
- Nut (2)
  To a torque of 50 N.m (36.9 lbf.ft)

Set the injection pump timing Fig. II, III and IV

Turn the injection pump body outwards, away from the engine, to the pump timing point :
- DPA with the dial indicator pointer in line with the « 0 » Fig. II.
- DPC with the dial indicator pointer at dial indicator reading « x ± 0.04 mm »
  (dimension x is engraved on the plastic cap Fig. III).

Tighten Fig. V
- The fastenings (4) : the dial indicator pointer must not move during the tightening operation.
  Tightening torque 24 N.m (17.7 lbf.ft)

Check the pump timing
(See corresponding section)

Remove the special tools

Fit :

D.P.A. - The inspection plate

D.P.C. - The plug, together with its seal.
Tightening torque 10 N.m (7.4 lbf.ft)

Fit :
- The drive belt protector.
- The accelerator return spring.
- The injector pipes.
  Tightening torque 25 N.m (18.4 lbf.ft)

On turbocharged engines Fig. VI

Connect, to the turbocharger corrector unit
- The air pipe (5).
- The fuel return pipe (6).

Connect Fig. VII
- The accelerator cable (7).
- The fast idling cable (8).
- The fuel supply pipe.
- The fuel return pipe.

Connect up
- The electric shut-off unit.
- The battery negative cable.

Prime the fuel system using the manual pump on the filter.

Adjust the controls and the idling speed (See section F2.021 to 2.087).

DATA

Cooling system :
Of the « auto-degaz » type, with an expansion bottle.
- Filled ..... through the expansion bottle cap
- Level check (when the system is cold and degassed) ..... by means of the level mark in the expansion bottle
- Coolant (water + anti-freeze solution) ..... 10.6 litres
- Frost protection (as shown by the label) ..... - 15°C with 28 % anti-freeze
- 30°C with 50 % anti-freeze

	U25/651 - U25/661	U25/673
- Radiator - Copper matrix		Heavy duty radiator
- Pitch of radiator fins	1.7 mm	1.5 mm
- Radiator dimensions	414 x 663 mm	
- Radiator surface area	27.5 dm²	

Termostat

- Type	CALORSTAT
- Reference	V26 - Ref. V 6755
- Starts to open at	86 $^{+1°C}_{-3°}$
- Fully open at	98°C
- Valve lift	7.5 mm mini

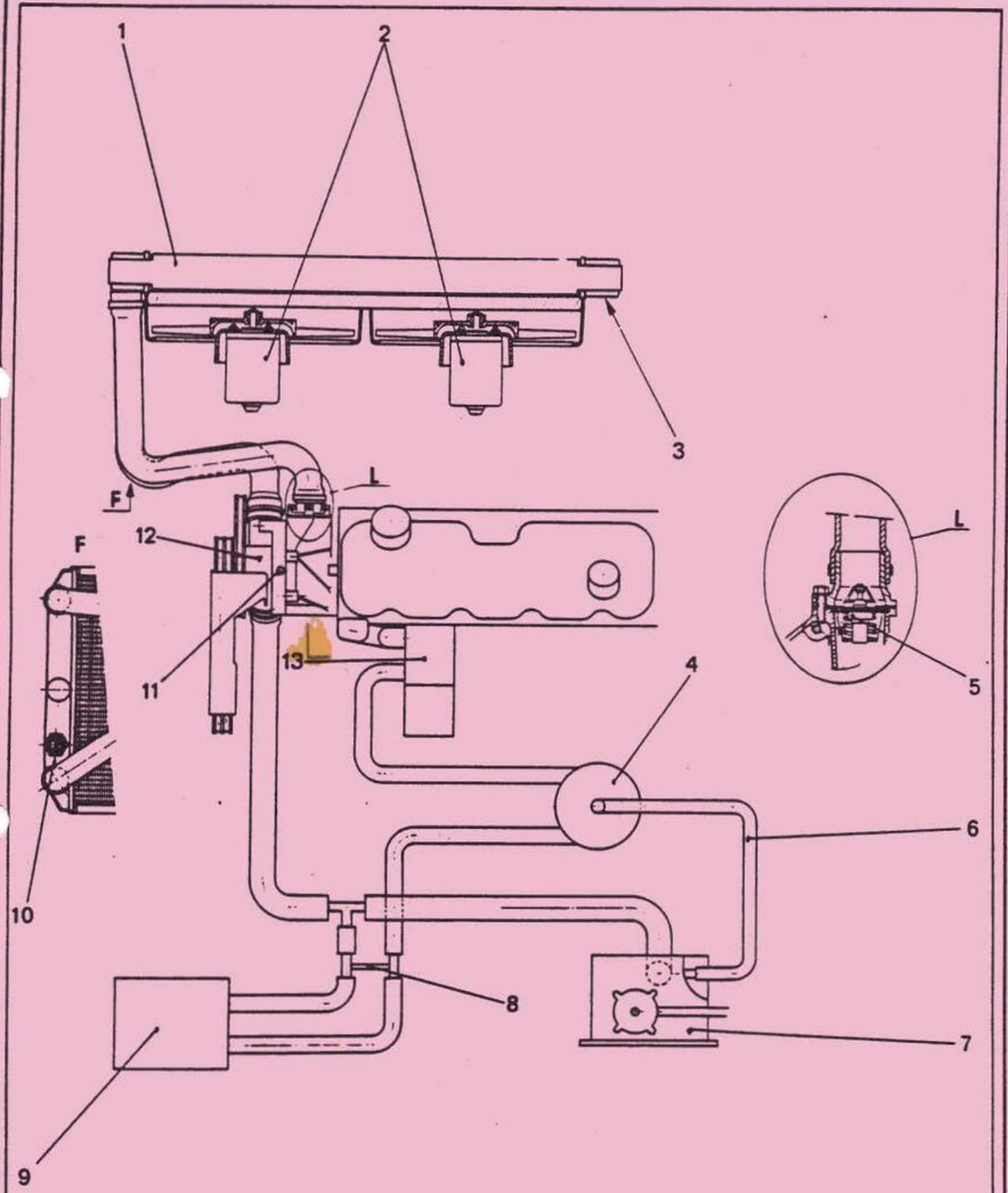
Coolant temperature switch (on cylinder head output casing) :
- Warning light on instrument panel switches on at a critical temperature of ..... 106° ± 2°C
- Tightening torque ..... 28 N.m (20.6 lbf.ft)

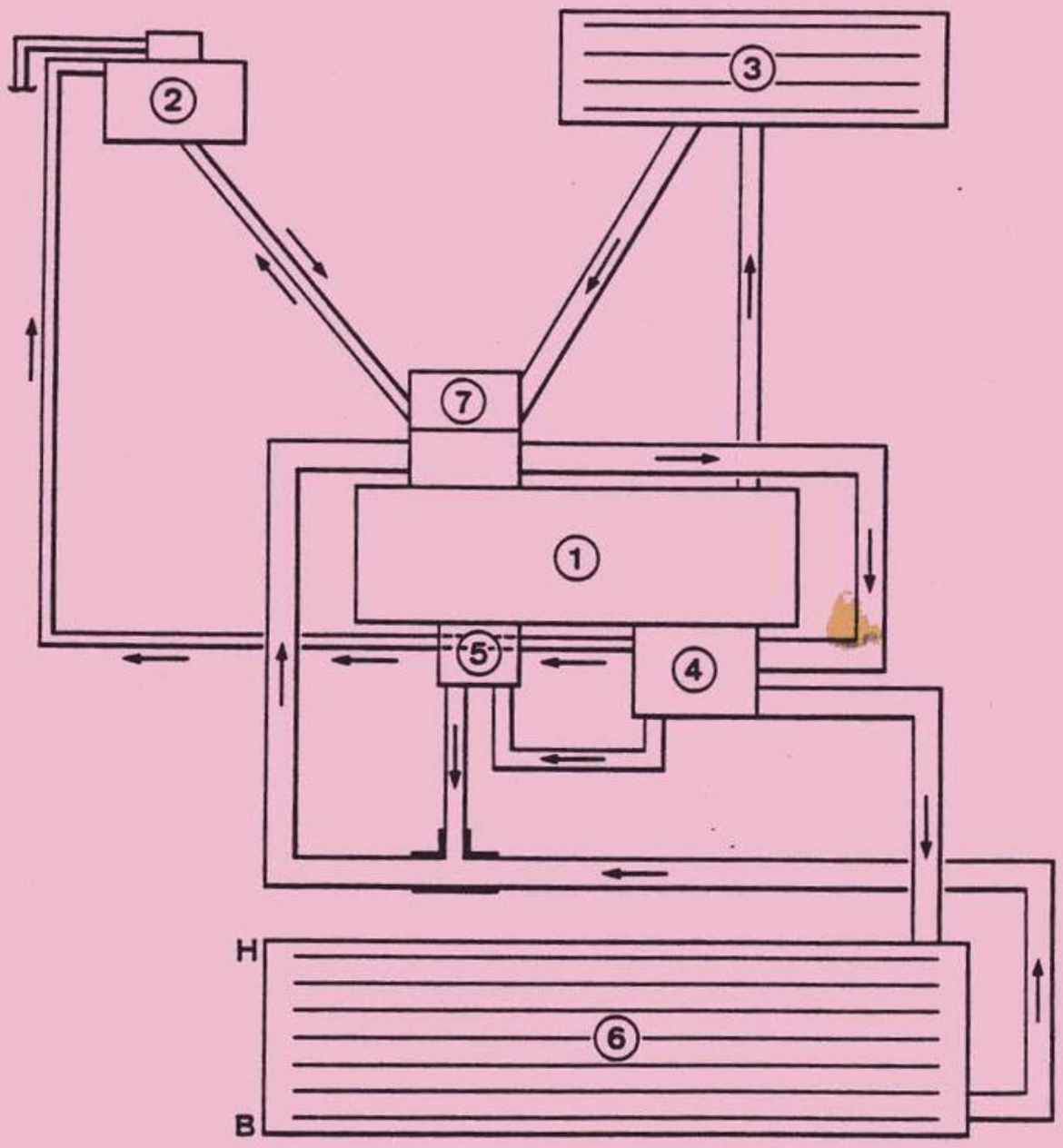
Cooling fans :
- 2 electric fans - 6 bladed (operated by a phased temperature switch)
- Power of electric fan ..... 150 W
- Speed ..... 2700 rpm
- Diameter across blades ..... 305 mm
- Direction of rotation (as seen from electric motor end) ..... C.W. (clockwise)

Phased temperature switch on radiator :	1st fan	2nd fan
Fan cuts in, temperature rising, at	88° ± 2°C	92° ± 2°C
Fan cuts out, temperature falling, at	83° ± 2°C	87° ± 2°C

Phased temperature switch tightening torque (apply LOCTITE FRENETANCH) ... 19 N.m (14 lbf.ft)

Drawing key :
1. Radiator
2. Electric fan units
4. Degassing tank
5. Thermostat
6. Degassing pipe
7. Expansion bottle
8. Four way union
9. Heater unit
10. Phased temperature switch that controls the electric fans
11. Bleed screw
12. Coolant pump
13. Oil cooler (water/oil heat exchanger)


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6
B

Cooling system

Coolant flow:

Of the 'auto-degaz' type with expansion tank
- Filling ..... by cap on expansion tank
- Level (cold with circuit degased) ..... to the level of the mark on the expansion tank

Coolant liquid (water + antifreeze) ..... 9 litres
Circuit protection indicated by label ..... 50 % antifreeze

Radiator in proprietary aluminium
Distance between fins on radiator
Dimensions of radiator
Surface of radiator

Type ..... Horizontal, inlet and outlet on same side
PO (reinforced)

Opening pressure of radiator cap ..... 0,9 bar
Thermostat

Make	VERNET	DAUPHINOISE THOMSON
- Reference or identification	V28 Ref. V6697	fawn
- Start of opening		
- Max. opening at	95°C	
- Travel	7,6 mm min.	

Coolant temperature switch (on cylinder head)
- Warning light lights up (on instrument panel): Temperature ..... 105° ± 3°C
- Tightening torque (dia. 18 x 150) ..... 2,8 m.daN

Temperature sensor on coolant outlet pipe on cylinder head ..... TORRIX (marked red)

Stepped temperature switch on radiator:

	1 fan
Fan engages: increasing temperature	92° ± 2°C
Fan cuts out: decreasing temperature	87° ± 2°C

Tightening torque for stepped temperature switch (assemble with LOCTITE THREADLOCK) ..... 1,9 m.daN

Ventilation:
- 1 fan - 6 blades (driven by stepped temperature switch):
- Power of one fan ..... 150 W
- Speed of rotation ..... 2200 rpm
- Diameter of blades ..... 305 mm
- Direction of rotation (seen from the electric motor side of the fan) ..... clockwise

WARNING: aluminium radiator
- there must always be a homologated coolant in the system (refer to documents currently in force)
- Must be renewed every 2 years
- Storage: after 48 hours, rinse with clear water only, then blow out with compressed air

Key to drawing:
1 - ENGINE BLOCK-CYLINDER HEAD
2 - EXPANSION BOTTLE
3 - HEATER MATRIX
4 - COOLANT PIPE-CALORSTAT
5 - OIL COOLER ADAPTOR
6 - RADIATOR
7 - DIESEL OIL HEATER

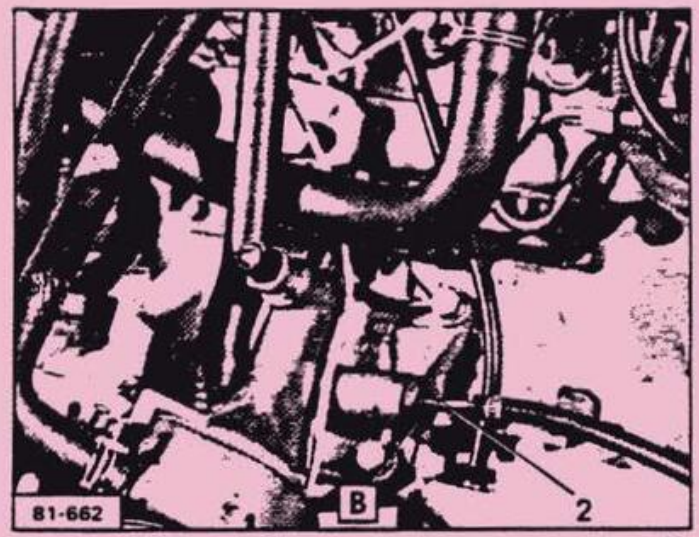
SPECIAL TOOLS

[A] Pressure gauge
Reference : A (-).1503 A

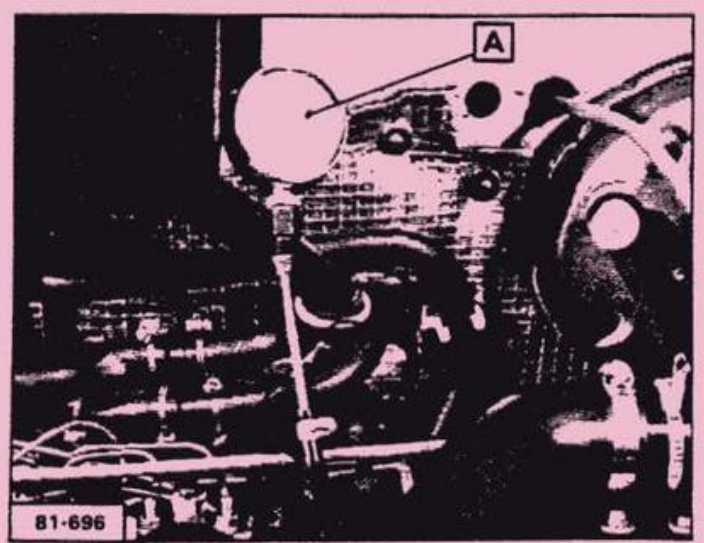
[B] Oil pressure test union
Reference : B (-).1503 C



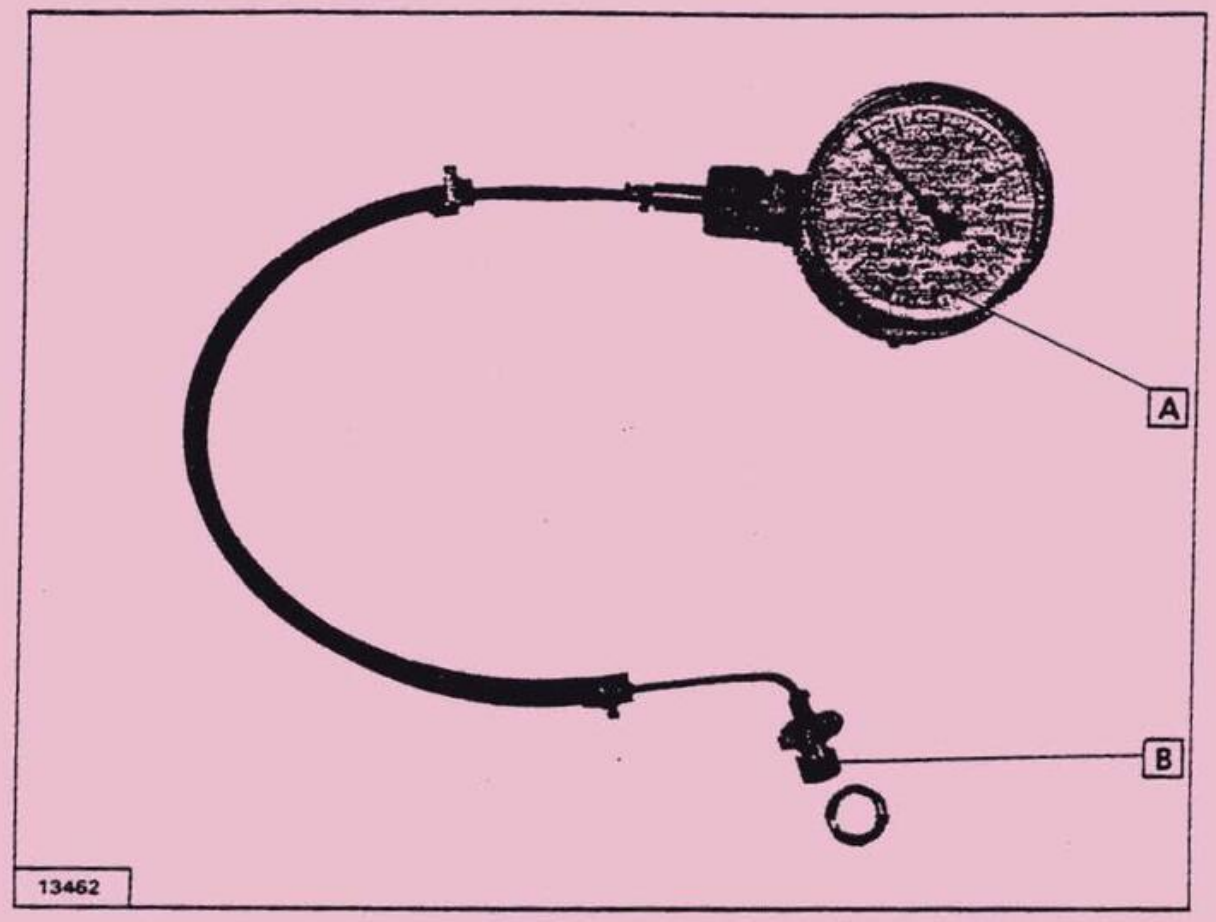
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III


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Top up the oil level if necessary.

Remove the plug (1), Fig. I, or the oil temperature switch that occupies the same tapping.

Prepare the oil pressure test equipment.

Connect the pressure gauge (A) (-).1503 A to the union (B) (-).1503 C.

Screw the union (B) (-).1503 C into the tapping formerly occupied by the plug (1) or the temperature switch (with a copper washer under its head).

Tighten the union (2).

Run the engine.

When the oil pressure is between 95°C and 105°C, the pressure should be :

	ENGINE TYPE		
	U25/651	U25/661	U25/673
at 1,000 rpm	1 bar min	2.5 bars min	2.5 bars min
at 3,500 rpm	3.7 to 4.5 bars	4.5 to 5 bars	4.2 to 5 bars

Remove the union (B) (-).1503 C and the pressure gauge.

Refit the plug (1) or the temperature switch (copper washer).

Tighten the plug or the temperature switch to a torque of 35 nm (25.8 lbf.ft)

This operation can also be carried out using the MULLER test kit reference 451.

Page

A - MECHANISM AND FRICTION DISC.

Identification and specifications A1.001 to 003

C - RELEASE BEARING AND CONTROL

Checking - adjustment.

Checking and adjusting the clutch control C2.001 to 003

DATA

	1.8 l and 2 l petrol engines	2.5 l Diesel engines	XUD9a engines
Diaphragm clutch unit	→| 7/84 215 DBR 450 |→ 7/84 →| 10/85 215 DBR 510 |→ 10/85 215 CP 485 ON	→| 7/82 235 DBR 450 |→ 7/82 →| 10/84 235 DBR 490 |→ 10/84 235 DBR 525	215 CP 4850 N
Travel	8 to 9 mm		
Disc	single disc operating dry		
	→| 10/82 |→ 10/82 |→ 1/88	→| 3/87 |→ 3/87	
Damper hub	G12A	M (D62Y) 33 AX / M (D73Y) 33 AX	M (D93Y) 33 CX
Spring colour codes	6 pale green / 6 green & white	2 yellow, 2 azure blue, 4 grey / 2 green & white, 2 grey blue, 4 ruby red	2 olive green, 4 black, 2 grey blue
Lining grade	F 755 / F 202	F 755 / F 202	F 202
Outside diameter of linings	215 mm	228.6 mm	215
Inside diameter of linings	145 mm	155 mm	145
Release bearing	Self centering		

This clutch has no free travel

Tightening torques

Flywheel securing bolts	68 nm (1) (50 lbf.ft)	90 nm (1) (66.4 lbf.ft)	50 nm (36.9 lbf.ft)
Clutch unit securing bolts	15 nm (2) (11 lbf.ft)	35 nm (25.8 lbf.ft)	25 nm (18.4 lbf.ft)

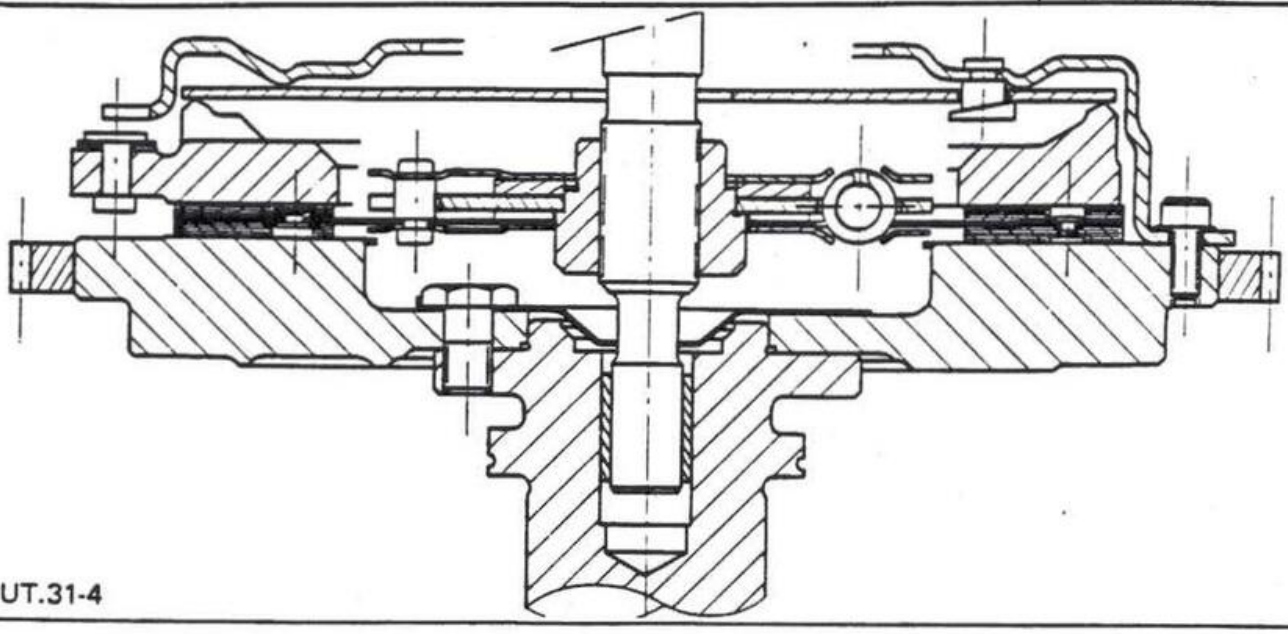
(1) to be replaced each time removed LOCTITE FRENETANCH to be applied to new bolts

(2) to be replaced each time removed

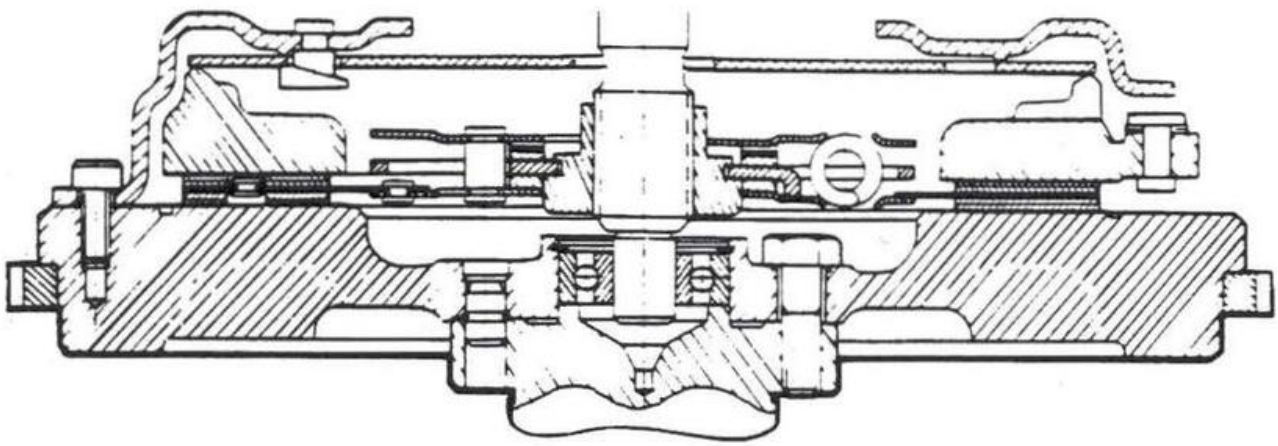
Fig. I : 1.8 l and 2 l petrol engine clutch

Fig. II : 2.5 l diesel engine clutch

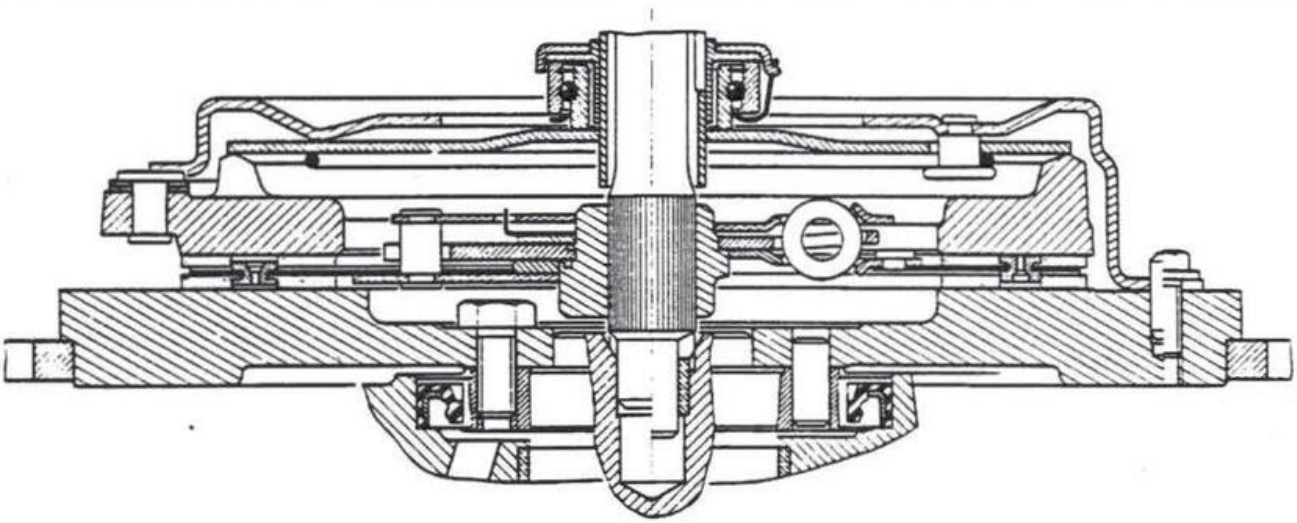
Fig. III : Engine XUD9A clutch



UT.31-4



UT.33-1



CHECKING AND ADJUSTING THE CLUTCH PEDAL HEIGHT

This clutch has no free travel.

The release bearing is kept in contact with the diaphragm by the pedal return spring.

Checking the pedal height : Fig. II.

The clutch pedal (4) is to be at the same height as the brake pedal (3).

Adjusting the height of the clutch pedal : Figs. I and II.

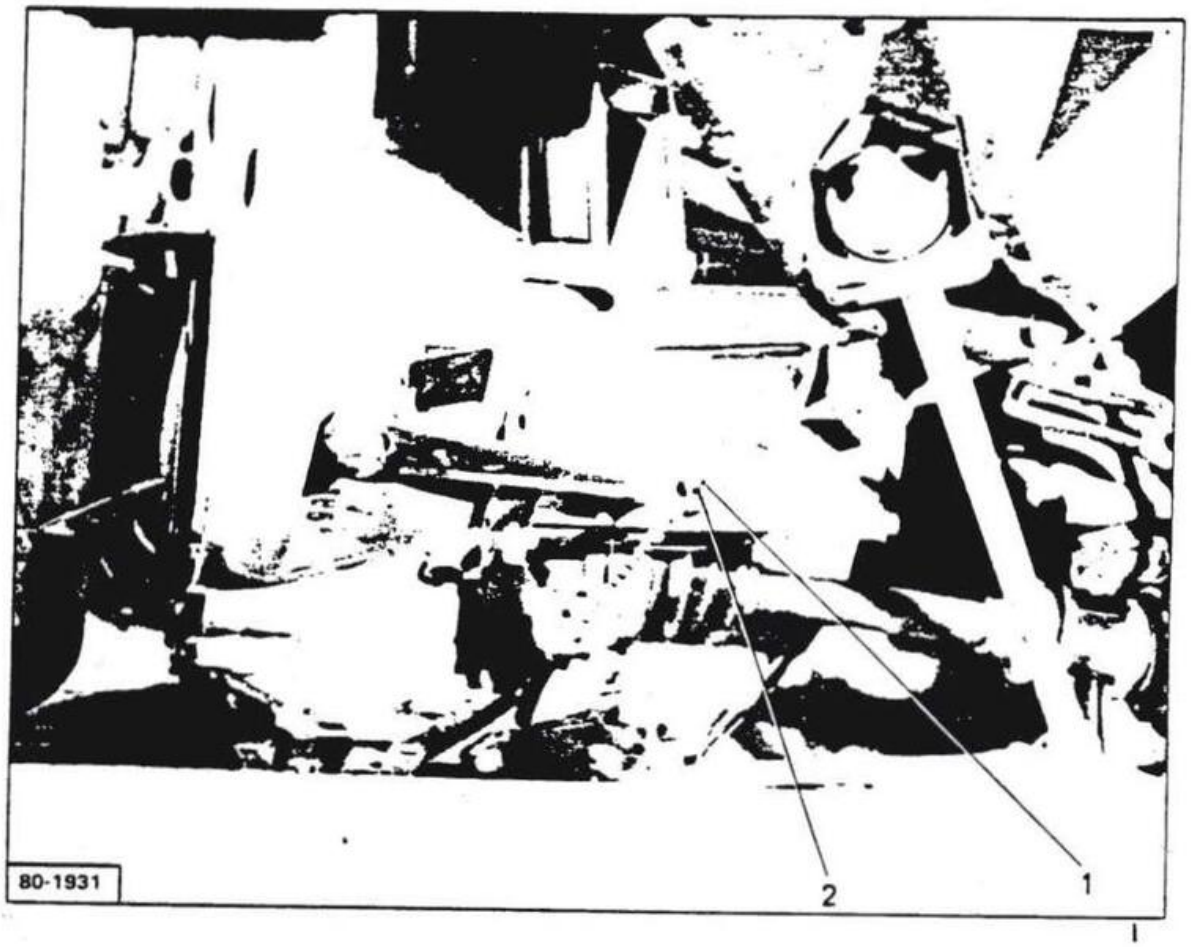
Loosen the lock nut (1) and turn the nut (2) to set the clutch pedal at the same height as the brake pedal.

Screw in nut (2) to raise the clutch pedal.

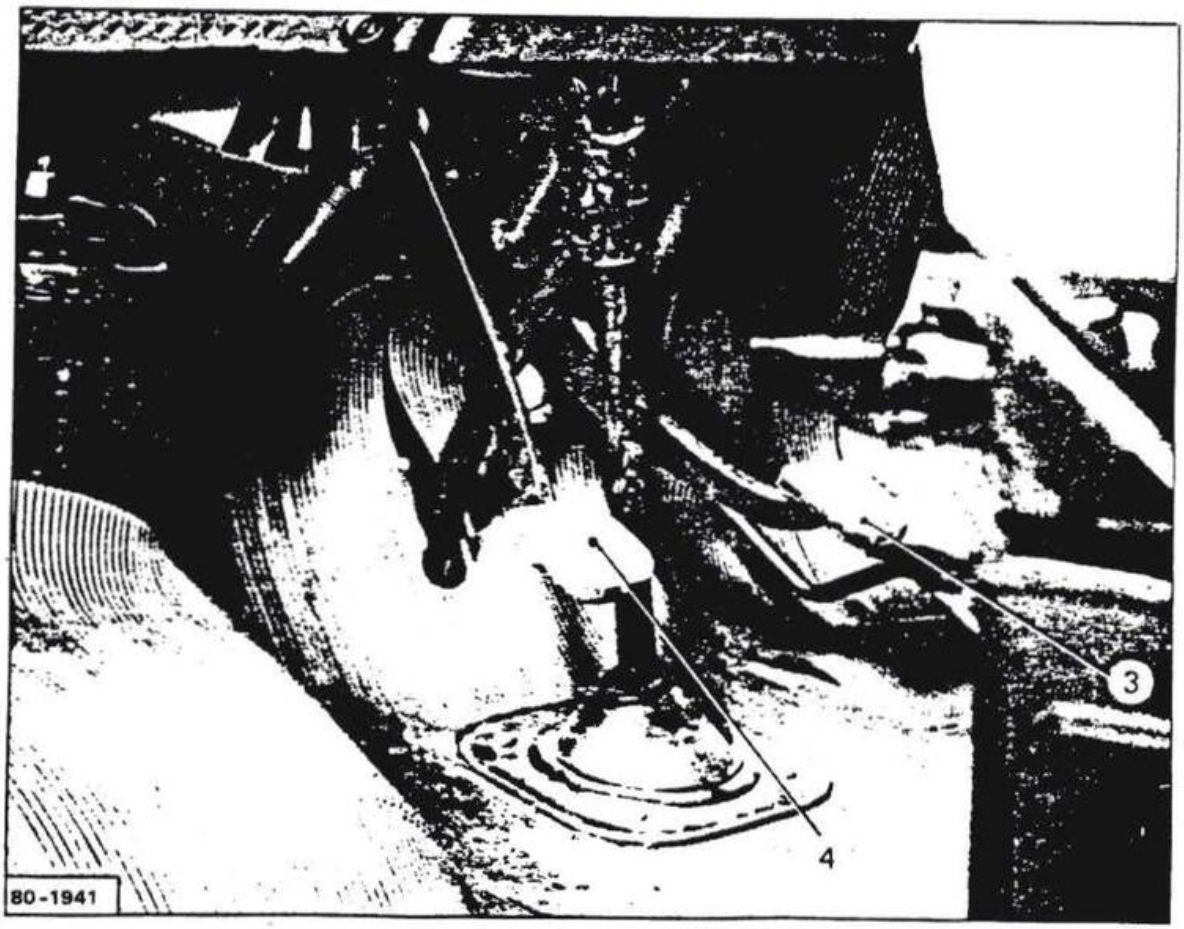
Screw out nut (2) to lower the clutch pedal.

Tighten the lock nut (1).

After completing the adjustment, check the pedal travel which should be approximately 180 mm



I



II

	Page
Four speed gearbox	A1.002
Five speed gearbox	A1.005
Lubrication Gear shift gate Adjusting the shift fork stops	A1.006

GEARBOX SPECIFICATIONS AND
SPECIAL FEATURES

FOUR SPEED GEARBOX

SPECIFICATIONS

Ratios

NOTE : The speeds stated are for vehicles equipped with 165 R 14 XCA tyres, the developed tread-band length of which, under load, is 1.89 metres.

Gearbox for type XM7-T engine = BV : 2 GE 05 ⊣ 10/81

Gear	Gearbox ratio	Final drive ratio	Overall reduction ratio	Speed in km/h (mph) per 1 000 engine rpm
1	(11/41) 0,2683	(12/62) 0.1935	0.0519	5.89 (3.7)
2	(18/35) 0.5143		0.0995	11.28 (7.0)
3	(28/35) 0.800		0.1548	17,55 (10.9)
4	(35/29) 1.206		0.2336	26,48 (16.4)
R	(13/41) 0.3170		0.0613	6,96 (4.3)

Speedometer drive ratio : 15 x 29

Gearbox for type XM7-T = B.V. : 2GE 12 ⊣ 1/86 - 2GE 81 ↦ 1/8 ⊣ 7/86
engines U25/651 and U25/661 = B.V. : 2GE 03 → 1/86 and 2GE 82 ↦ 7/86

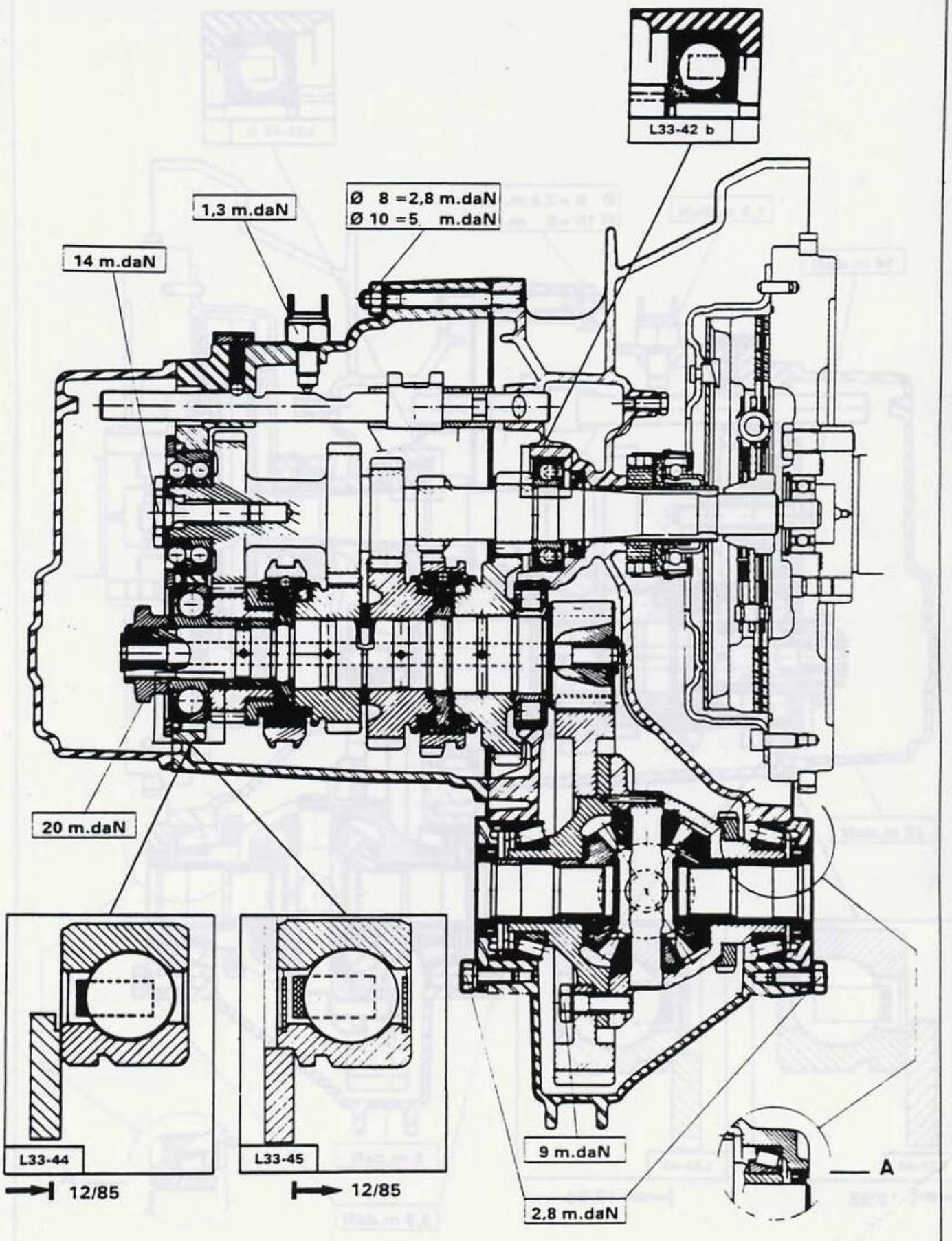
Gear	Gearbox ratio	Final drive ratio	Overall reduction ratio	Speed in km/h (mph) per 1 000 engine rpm
1	(11/41) 0.2683	(13/62) 0.2096	0.0562	6,38 (4.0)
2	(18/35) 0.5143		0.1078	12,22 (7.6)
3	(28/35) 0,800		0.1677	19.09 (11.9)
4	(35/29) 1.206		0.2530	28,69 (17.8)
R	(13/41) 0.3170		0.0665	7,54 (4.7)

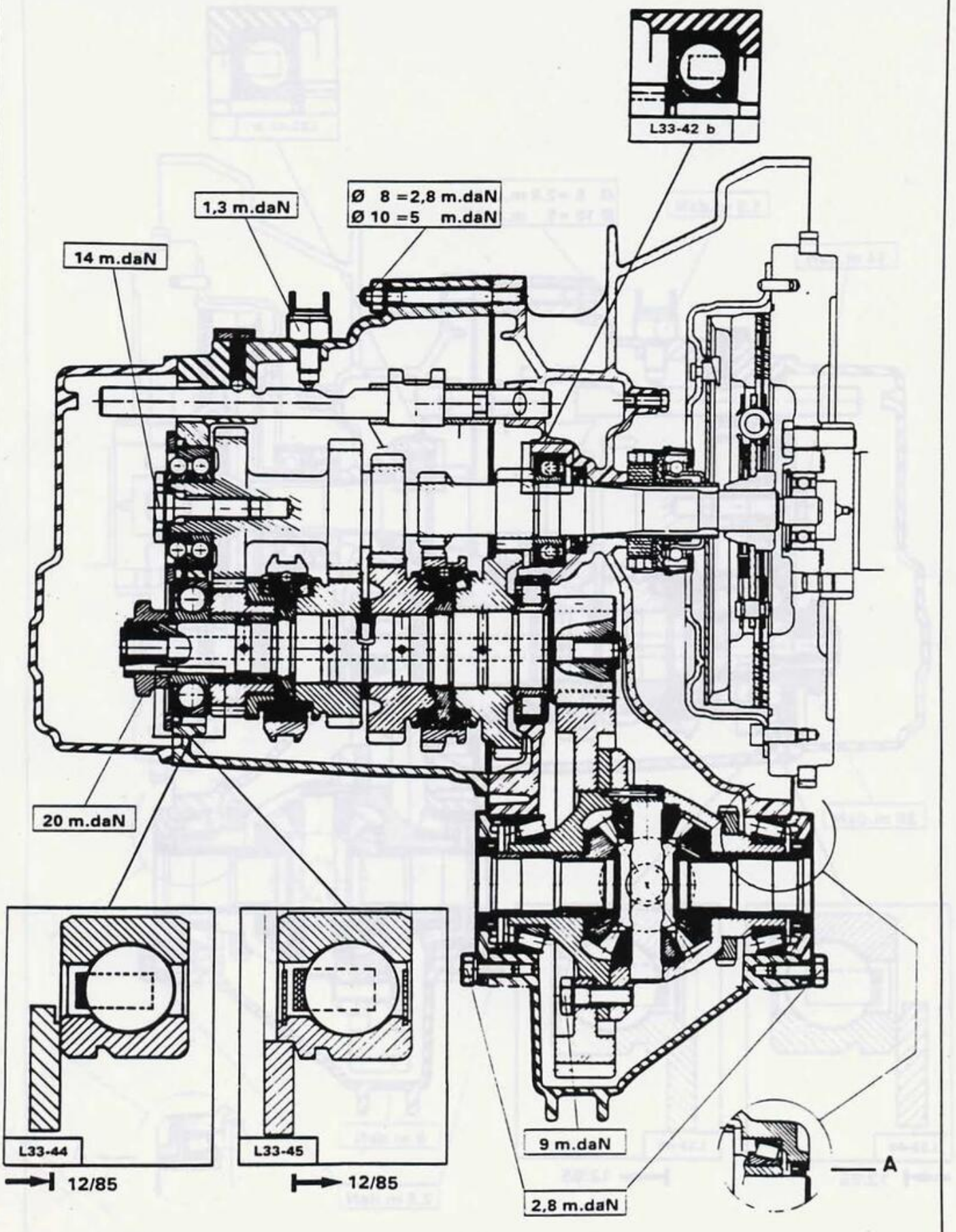
Speedometer drive ratio : 15 x 29

1 A : Possible variation of differential bearing retaining system.

Assembling the gearbox housing sections :
Sealing : Coat the final drive housing joint faces with jointing compound.

Recommended tightening torques (identical on five speed gearbox).	Torque m.daN	Nm	lbf ft
Drain and filler plugs	4	40	30
Final drive housing assembly nuts (Ø = 8 mm)	2,8	28	21
Final drive housing assembly nuts (Ø = 10 mm)	5	50	37
Gear selector shaft ring nut	12	120	88
Shift fork shaft bolts	2,8	28	21


L33-42 b
1,3 m.daN
Ø 8 =2,8 m.daN
Ø 10 =5 m.daN
14 m.daN
20 m.daN
L33-44
12/85
L33-45
12/85
9 m.daN
2,8 m.daN
A


L33-42 b
Ø 8 =2,8 m.daN
Ø 10 =5 m.daN
1,3 m.daN
14 m.daN
20 m.daN
L33-44
12/85
L33-45
12/85
9 m.daN
2,8 m.daN
A
UT.33.2a

FOUR SPEED GEARBOX

DATA

Gear ratios :

NOTE : The speeds given are for vehicles equipped with 185 SR 14 tyres, the developed tread-band length of which, under load, is 1.97 metres.

Gearbox for type XM7-T engine = B.V. : 2 HE 07 ↦ 7/86

Gear	Gearbox ratio	Final drive ratio	Overall reduction ratio	Speed, in km/h per 1000 rpm, engine
1	(11/41) 0.2683	(12/62) 0.1935	0.0519	6.13
2	(18/35) 0.5143		0.0995	11.76
3	(28/35) 0.800		0.1548	18.29
4	(35/29) 1.206		0.2336	27.61
REVERSE	(13/41) 0.3170		0.0613	7.24

Speedometer drive ratio : 10 x 20

Gearbox for engine type U25/661 = B.V. : 2GE 87 ↦ 7/86

Gear	Gearbox ratio	Final drive ratio	Overall reduction ratio	Speed, in km/h per 1000 rpm, engine
1	(11/41) 0.2683	(13/62) 0.2096	0.0	6.64
2	(18/35) 0.5143		0.1078	12.74
3	(28/35) 0.800		0.1677	19.82
4	(35/29) 1.206		0.2530	29.9
REVERSE	(13/41) 0.3170		0.0665	7.85

Speedometer drive ratio : 10 x 20

A : Possibility of retaining the differential bearing

Assembling the gearbox housings :
Sealing : Coat the differential casing joint faces with sealing compound.

Recommended tightening torques (identical to 5 speed gearbox)	Torque in Nm (lbf.ft)
Drain and filler plug	40 (29.5)
Differential casing assembly nuts (diameter 8 mm)	28 (20.6)
Differential casing assembly nuts (diameter 10 mm)	50 (36.9)
Gear selector shaft bush - nut	120 (88.5)
Bolts on shift fork shaft	28 (20.6)

5 SPEED GEARBOX

DATA

Gear ratios :

NOTE : The speeds are given for vehicles equipped with 185 SR 14 tyres, the developed tread-band length of which, under load, is 1.97 metres.

Gearbox for engine type XN1-T = B.V. : 2 GE 06 ⇥ 1/84 - 2 GE 31 ↦ 1/84 → 1/86
2 GE 84 ↦ 1/86
engine type U25/661 - U25/673 = B.V. : 2 GE 04 ⇥ 1/84 - 2 GE 30 ↦ 1/8 ⇥ 1/86 -
2 GE 85 ↦ 1/86

Gear	Gearbox ratio	Final drive ratio	Overall reduction ratio	Speed, in km/h per 1000 rpm, engine
1	(11/41) 0.2683	(12/62) 0.1935	0.0519	6.13
2	(18/35) 0.5143		0.0995	11.76
3	(27/37) 0.7297		0.1412	16.69
4	(32/31) 1.032		0.1998	23.62
5	(43/33) 1.303		0.2522	29.81
REVERSE	(13/41) 0.3170		0.0614	7.26

Speedometer drive ratio : 10 x 20

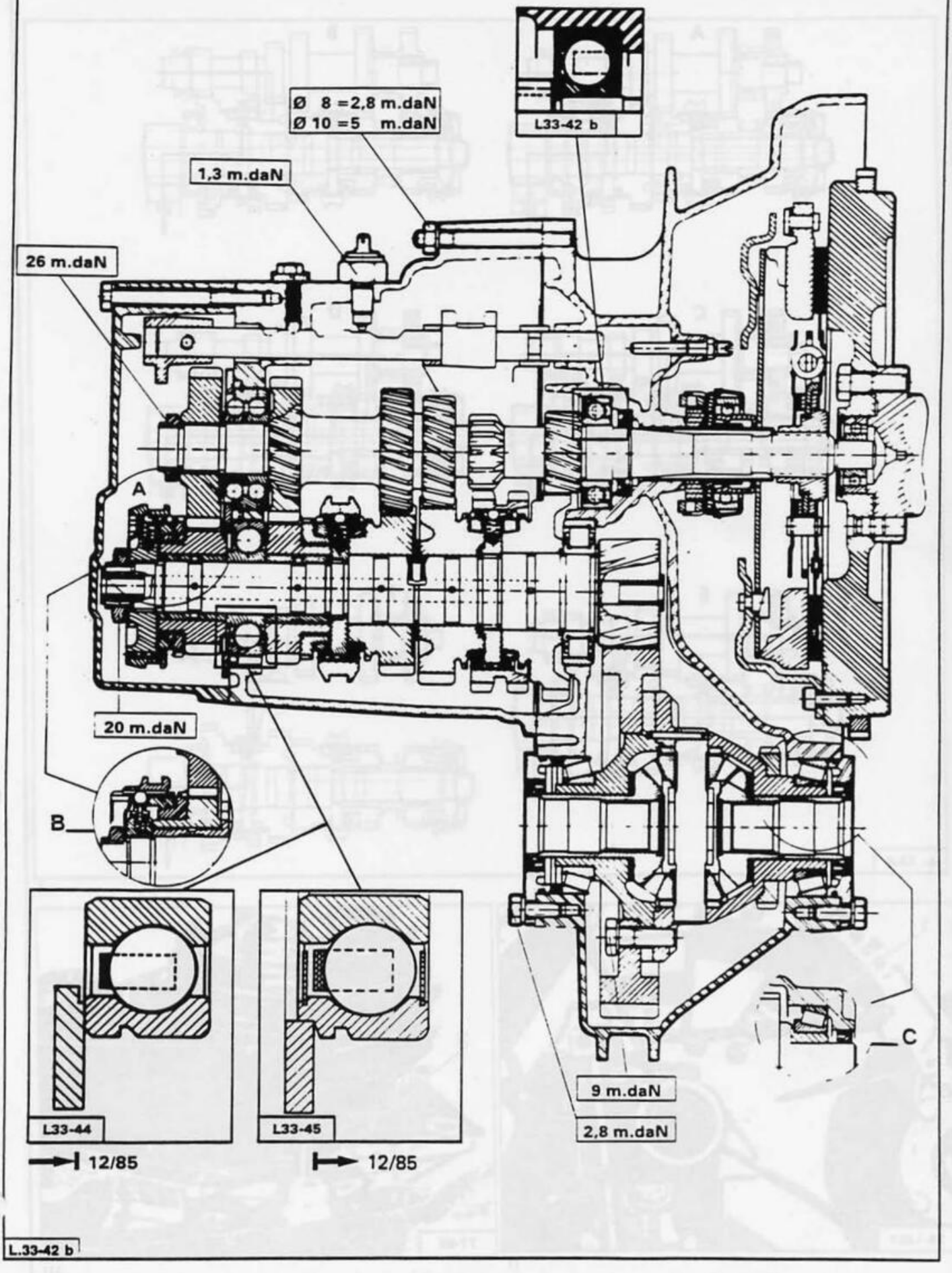
NOTE : The speeds are given for vehicles equipped with 195/75 R 16 tyres, the developed treadband length of which, under load, is 2.145 metres.

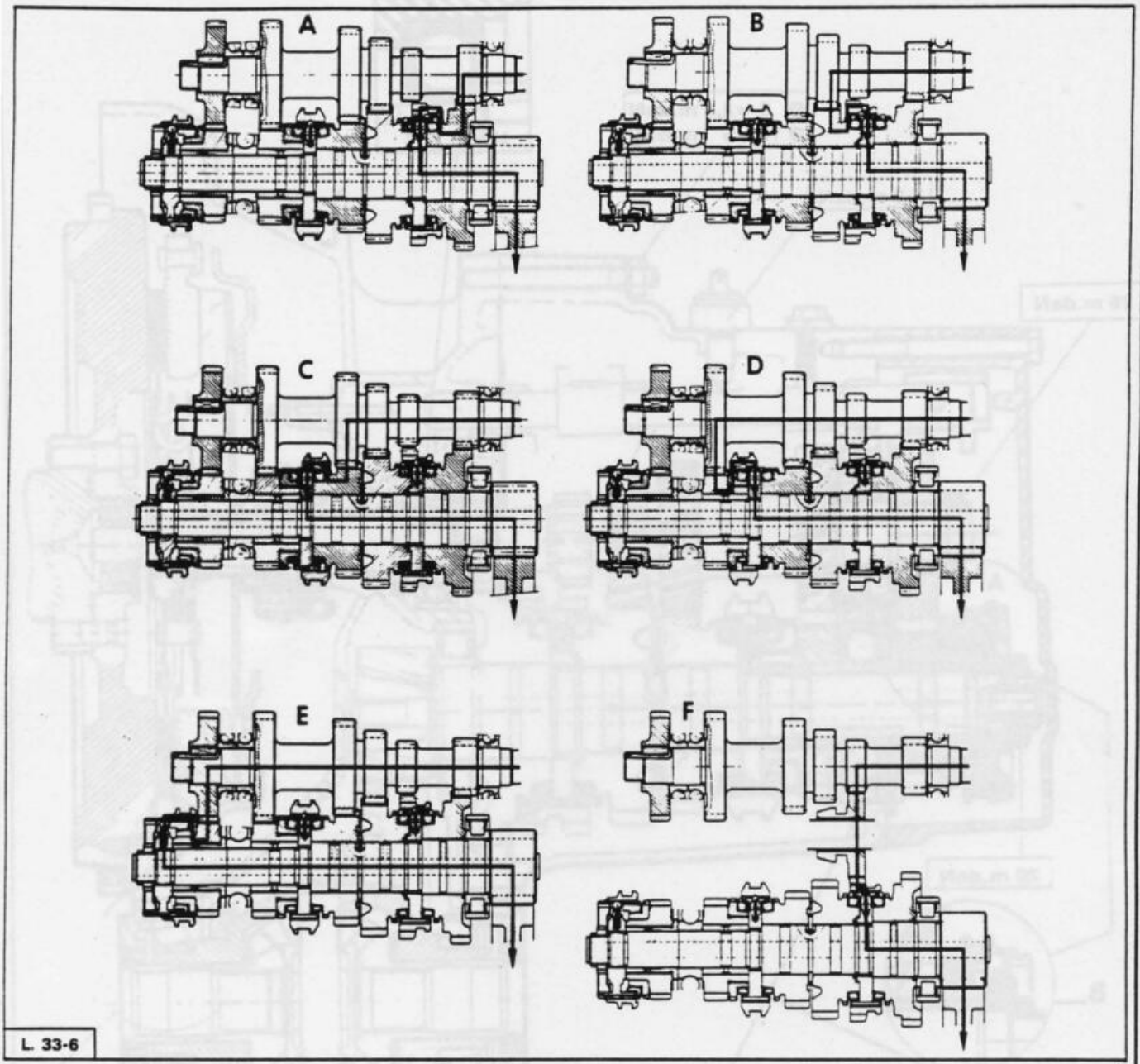
Gearbox for engine type U25/673 = B.V. : 2HE 03

Gear	Gearbox ratio	Final drive ratio	Overall reduction ratio	Speed, in km/h per 1000 rpm, engine
1	(12/41) 0.2927	(12/62) 0.1935	0.0566	7.33
2	(18/35) 0.5143		0.0995	12.89
3	(28/35) 0.8		0.1548	20.05
4	(34/30) 1.1333		0.2193	28.40
5	(46/31) 1.4839		0.2872	37.19
REVERSE	(13/41) 0.3170		0.0613	7.98

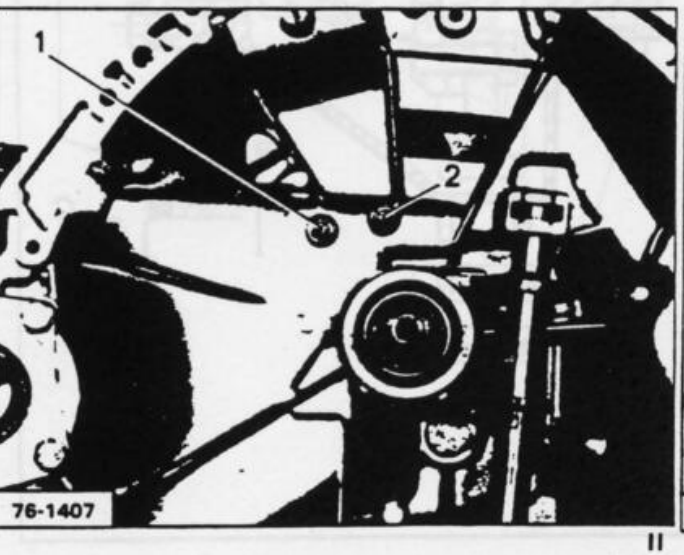
Speedometer drive ratio : 10 x 22

A : 5th speed synchroniser type : CITROEN
B : 5th speed synchroniser type : LANCIA
C : Possibility of retaining the bearing

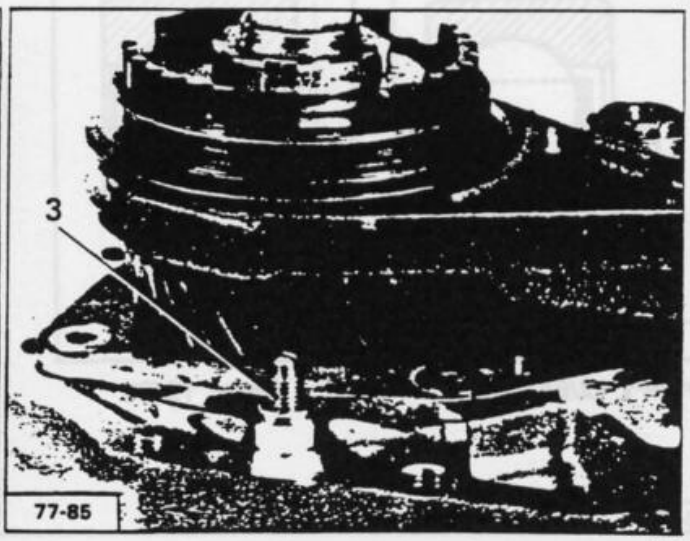

Ø 8 =2,8 m.daN
Ø 10 =5 m.daN
L33-42 b
1,3 m.daN
26 m.daN
A
20 m.daN
B
C
9 m.daN
2,8 m.daN
L33-44
12/85
L33-45
12/85
L.33-42 b



I



II



III

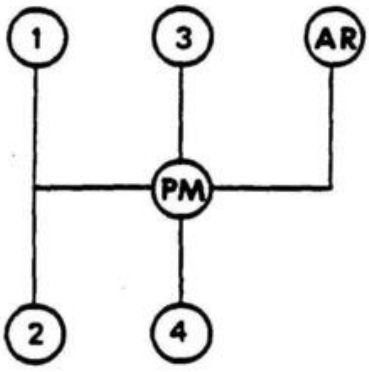
Lubrication :

- Oil grade : ESSO GEAR OIL GX 80 W 90
- Total capacity : 1.25 litres
- Difference between max and min on dipstick : 0.150 litres

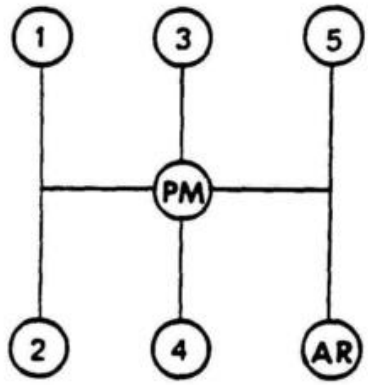
Gearshift control :
Shift lever on steering column

Gearshift gates :

4 speed box



5 speed box



Gearbox drive paths Fig. I

A : 1st speed
B : 2nd speed
C : 3rd speed
D : 4th speed
E : 5th speed
F : Reverse

Adjusting the 4 speed and 5 speed gearbox shift fork stops Figs. II and III.
This operation is carried out with the gearbox removed from the vehicle. The bolts must be coated with jointing compound.

3rd speed engaged	Bring the stop screw (1) into contact with the shift fork shaft	Screw in by one turn to ensure positive contact and tighten the nut
4th speed engaged	Bring the stop screw (3) into contact with the shift fork shaft	Screw in by one turn to ensure positive contact and tighten the nut
5th speed engaged	Bring the stop screw (2) into contact with the shift fork shaft	Screw in by one turn to ensure positive contact and tighten the nut

REMOVING AND REFITTING THE GEARBOX
(on the vehicle)
Engine type XUD9A

I

SPECIAL TOOLS

- (-).0316N - Engine retaining sling.

- (-).0204 - Tool for centralising the tie rod-suspension arm securing points and the gearbox rear mounting.

- (-).0316P - Thrust plate for extracting the right hand drive shaft.

Additional tools :

1 hydraulic stand.

II

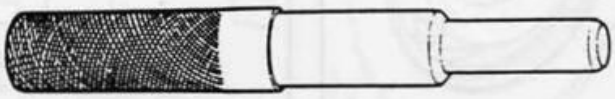
TIGHTENING TORQUES

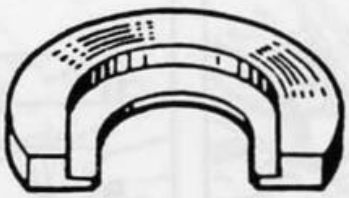
	N.m (lbf.ft.)
- Nut securing drive shaft to stub axle carrier :	500 (369)
- Nut securing engine mounting flange (cylinder head side) :	50 (36.9)
- Nut securing engine mounting flange (gearbox side) :	50 (36.9)
- Nut securing flexible pad (differential side) :	55 (40.6)
- Bolt securing tie rod flange and suspension arm :	50 (36.9)
- Bolt securing gearbox rear mounting flange to cross member :	50 (36.9)
- Suspension ball joint bolts :	50 (36.9)
- Reversing light switch :	13 (9.6)

I



P



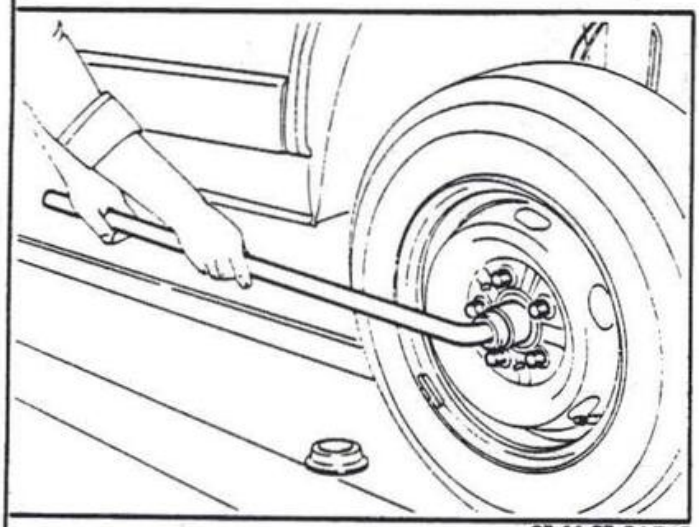


N

II

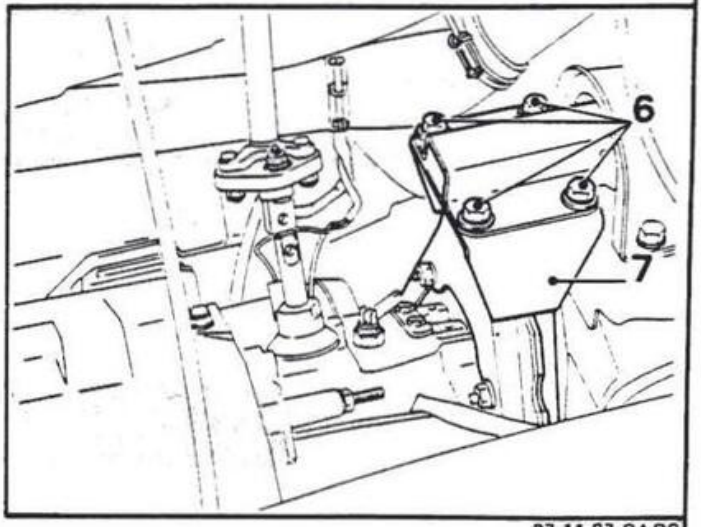
A4.004	3	XUD9A		J5

I



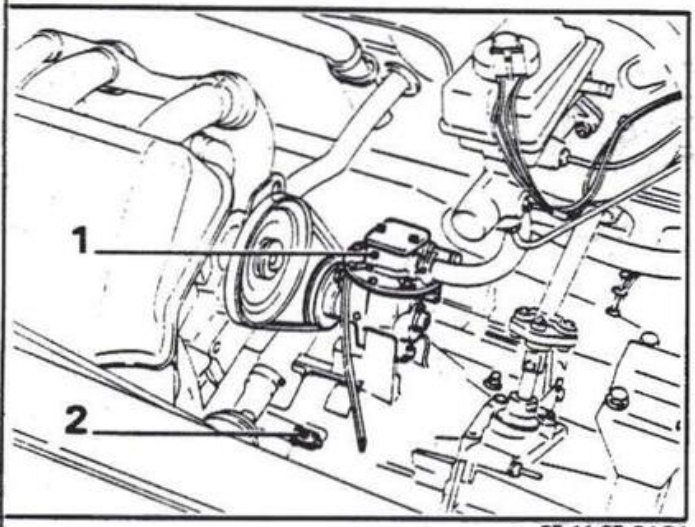
27-11-87 CAR10

IV



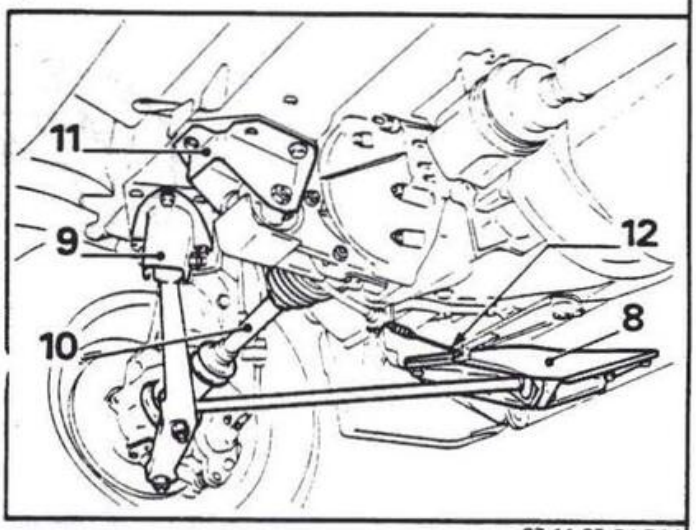
27-11-87 CAR9

II



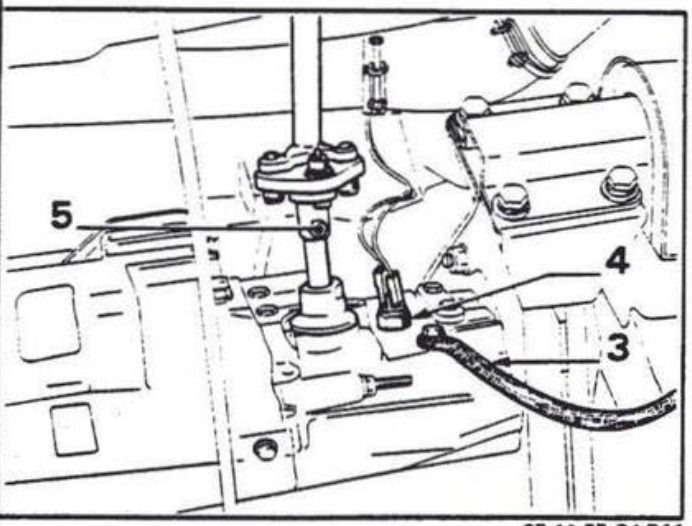
27-11-87 CAR1

V



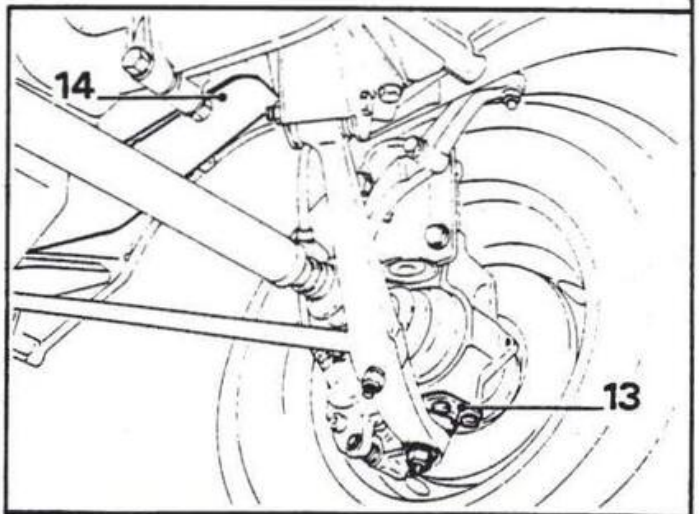
27-11-87 CAR14

III



27-11-87 CAR11

VI



27-11-87 CAR2

I

- With the vehicle on a lift, loosen the front drive shaft nuts.

II

- Disconnect the battery.
- Remove :
  - the spare wheel,
  - the air filter assembly,
  - the exhauster (1),
  - the upper gearbox securing bolts. One of these bolts (2) also retains the exhauster tie rod.

III

- Disconnect :
  - the earth cable (3),
  - the reversing light switch (4),
  - the gear shift control (5).

IV

- Loosen the 4 bolts (6) from the left hand mounting (7) and remove 3.

V

- Support the vehicle on stands.
- Remove :
  - the bolts securing the tie rod flange (8) and the left hand suspension arm flange (9),
  - the left hand drive shaft (10) using 2 levers,
  - the gearbox rear mounting flange (11).
- Disconnect the clutch cable (12).

VI

- Remove :
  - the 4 bolts from the right hand suspension arm ball joint (13),
  - the alternator drive belt protector (14).

I

- Using the thrust plate (15) ref. (-)0.316N and 2 levers remove the right hand drive shaft.

II

- Remove :
  - the protector (16),
  - the starter motor (17).

III

- Fit the engine retaining tool (ref. (-)0.316P),
  - the longest hook (18) to the front cross member,
  - the short hook (19), together with the sling in the hole in the rear cross member.
- Select the best positioned hole in the front hook to which to secure the sling.

IV

- Remove the dipstick (20).
- Disconnect the speedometer drive cable (21).
- Place a hydraulic stand under the gearbox.
- Apply light pressure to it and remove the last bolt from the left hand mounting.

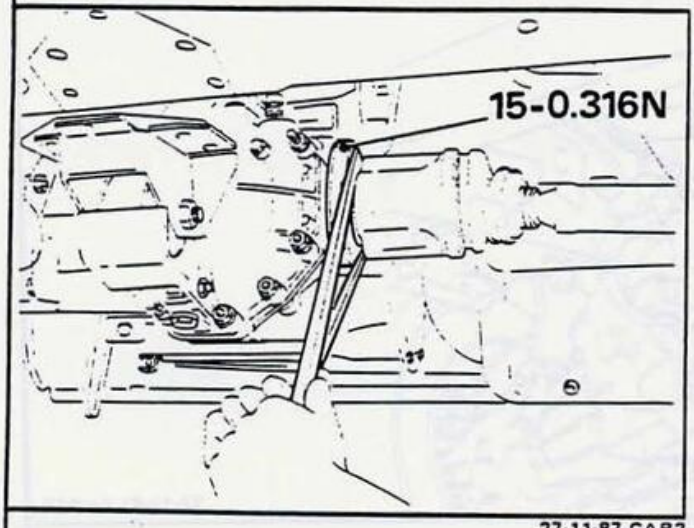
V

- Lower the gearbox so that the weight of the engine is resting on the sling.
- Remove :
  - the TDC sensor (22).

VI

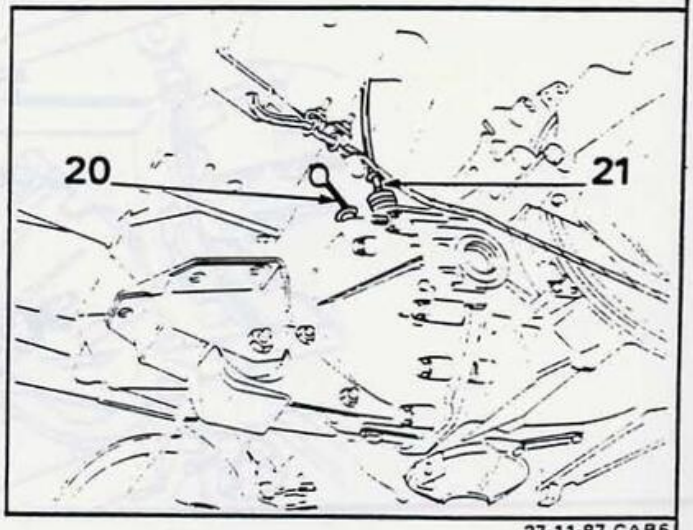
- the left hand mounting (23),
- the lower bolts (24) that secure the gearbox to the engine.

I



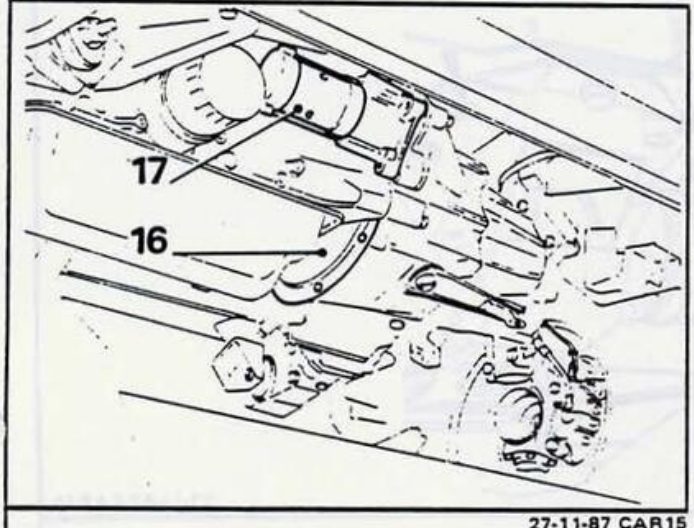
27-11-87 CAR3

IV



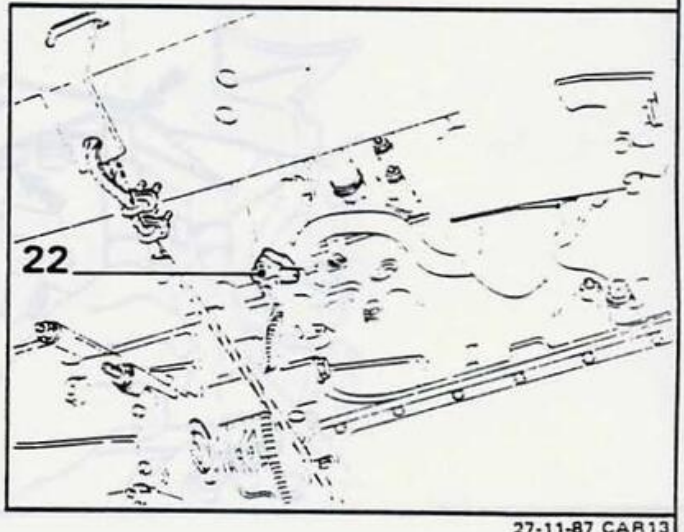
27-11-87 CAR6

II



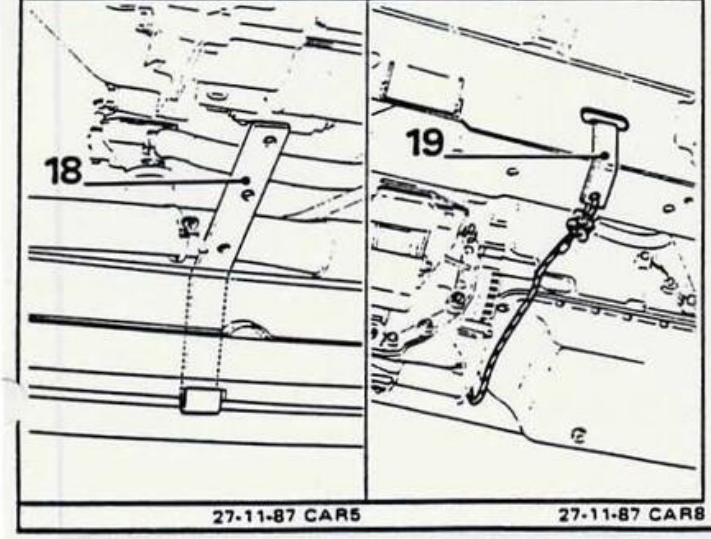
27-11-87 CAR15

V



27-11-87 CAR13

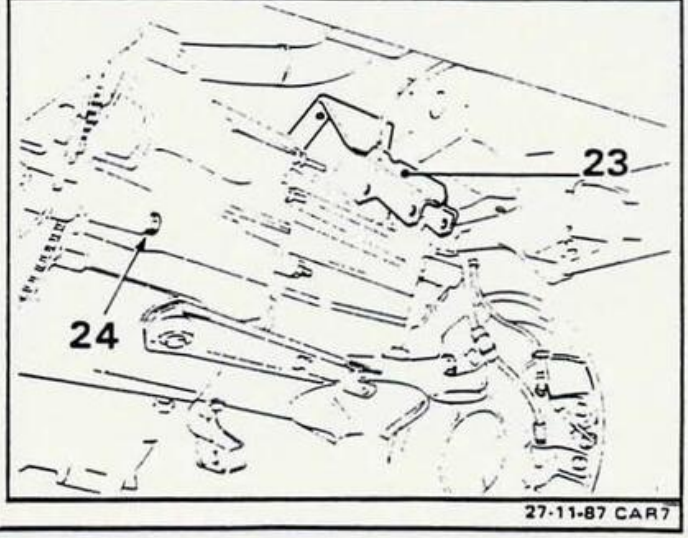
III



27-11-87 CAR5

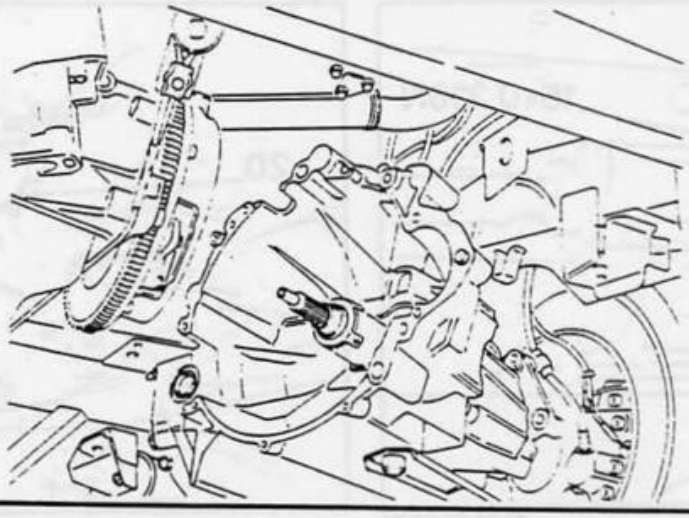
27-11-87 CAR8

VI



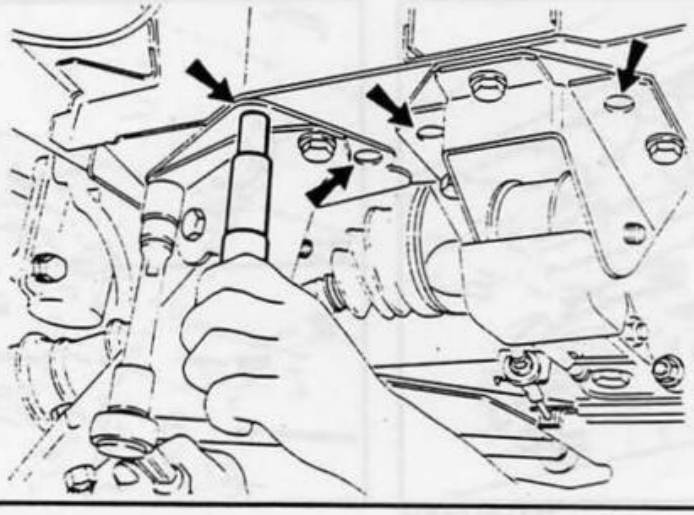
27-11-87 CAR7

I



27-11-87 CAR12

II



27-11-87 CAR16

I

- Remove the gearbox.

II

- The gearbox is refitted by carrying out the removing operations in reverse.

- Grease the following with MOLYKOTE BR 2 PLUS paste :
  - splines on the input shaft
  - the release bearing guide sleeve
  - the clutch shaft thrust arms.

PRECAUTION : Centralise the flanges on the :
- gearbox rear mounting
- tie rods and left hand suspension arm

using tool : 8.0204 ➞

III

- If the gearbox has been drained, fill it with oil of the specified grade.

  Capacity : 1.25 litres.

It is easier to fill the box through the reversing light switch tapping.

Check the level with the dipstick.

A4.102	3	4 x 4	GEARBOX REMOVING - REFITTING THE GEARBOX/FINAL DRIVE ASSEMBLY	J5 DIESEL

I

The gearbox/final drive is removed after taking out the power unit assembly (see corresponding section)

II

Reove :

- the alternator and its tensioner
- the starter motor

Loosen the exhauster centre securing bolt (1).

Remove the belt tensioner, the belt and the exhauster.

III

Remove :

- The bolts (2) that secure the pulley (6) and the plate (3).
- The nut protector and nut (4).

Loosen the drive belt tensioner securing bolt (5).

Remove the pulley (6) and the 3 belts (7).

IV

Remove :

- The bolts (8) that secure the camshaft bearing casing.
- The 7 bolts that secure the clutch housing to the engine.

V

Disconnect the gearbox/final drive assembly from the engine.

VI

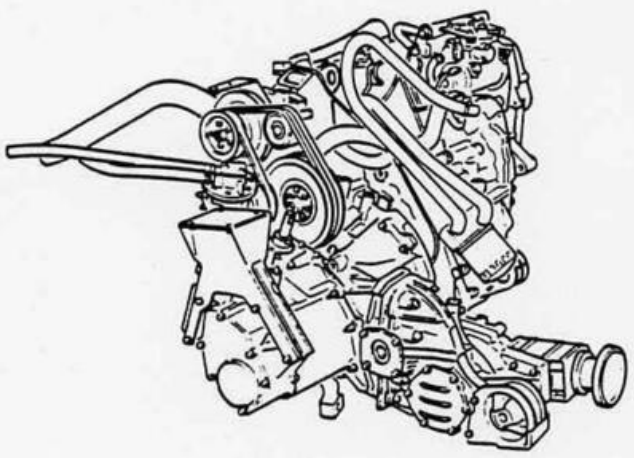
REFITTING

Carry out the removing operations in reverse.

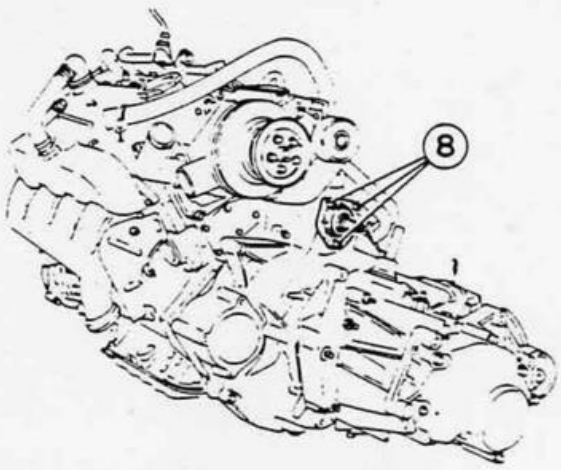
PRECAUTIONS

Ensure that the dust seal is in position and correctly located behind the camshaft bearing casing.

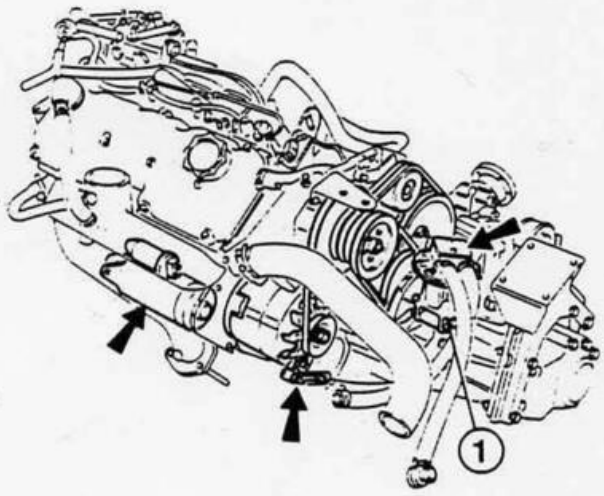
Fit the camshaft nut after applying « Loctite Frenetanch » to it and tighten it to a torque of 90 N.m (66.4 lbf.ft.).



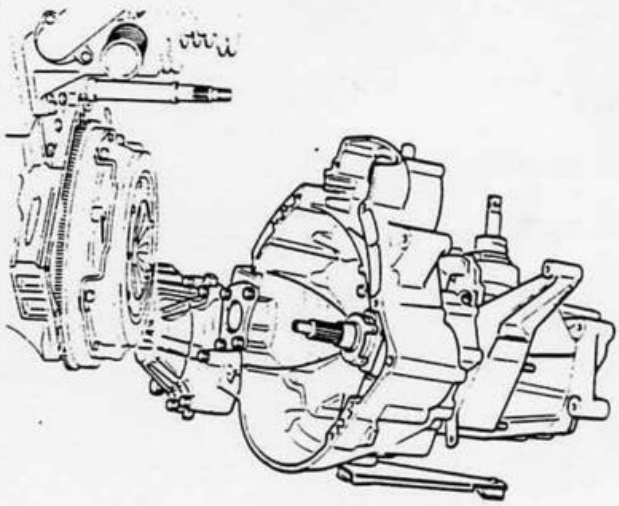
12.10.88 CAR 14



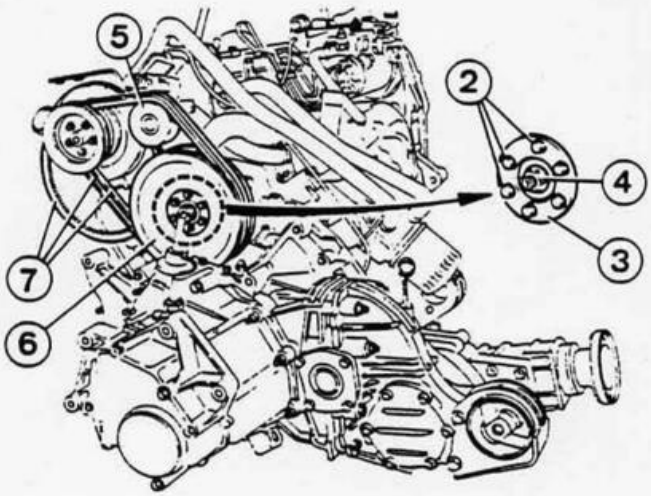
12.10.88 CAR 7



12.10.88 CAR 15



12.10.88 CAR 6



12.10.88 CAR 9

	Page
Special tools	A5.002
Tightening torques	A5.006
Adjusting shims	A5.008
Dismantling	A5.010
Preparing	
— the differential	A5.017
— the input and output shafts	A5.021
Reassembly	A5.025

OVERHAULING THE GEARBOX

SPECIAL TOOLS

A : Impact extractor

Reference 8.0316 A

B : Dial indicator support adaptor

Reference 8.0110 H

C : Extractor - release tool

Reference FACOM U53 T2 plus accessories.

D : Dial indicator.

Reference 8.1504

E : FACOM 36 mm open spanner and fitting for output shaft nut (4 speed gearbox).

F : Retaining ring pliers

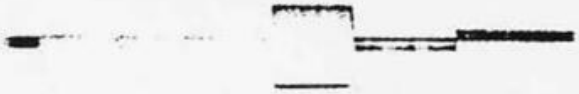
Reference 8.0316 B

G : Adaptor, extracting the bearings from the final drive housing.

Reference 8.0316 K.

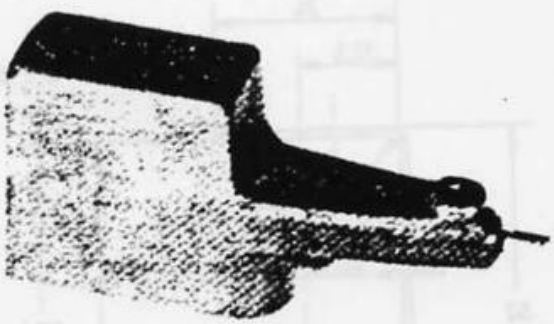
H : Peg spanner for slotted nuts on gearbox shaft (5 speed gearbox)

Reference 8.0316 C.



13551 A

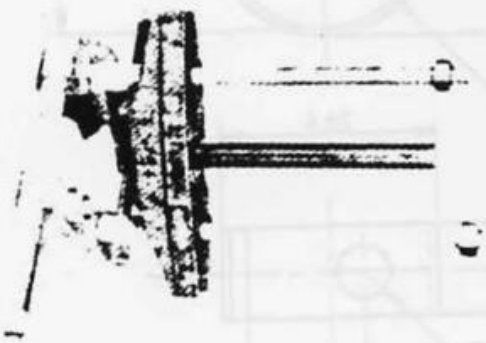
E



14327 B



12763 F



14429 C

12118 G



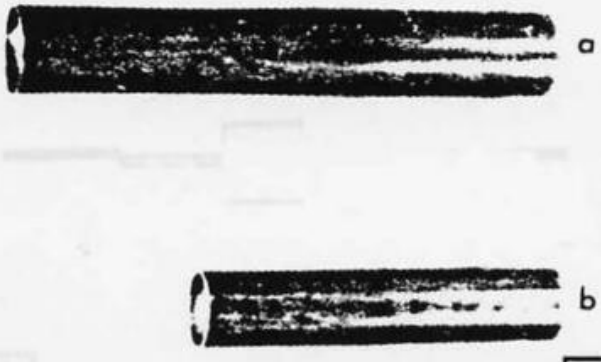
12827 D



77-59 H



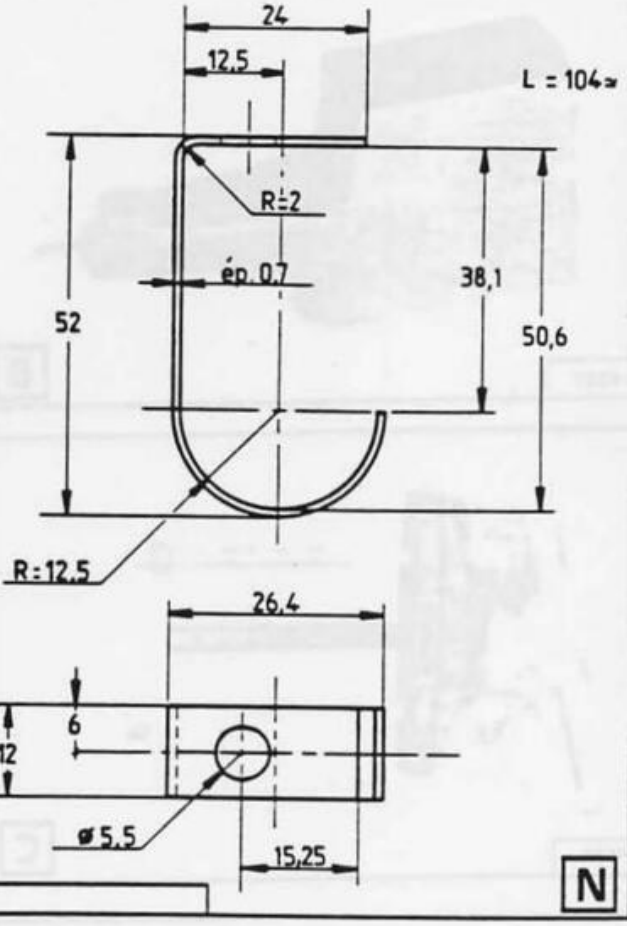
77-332 I



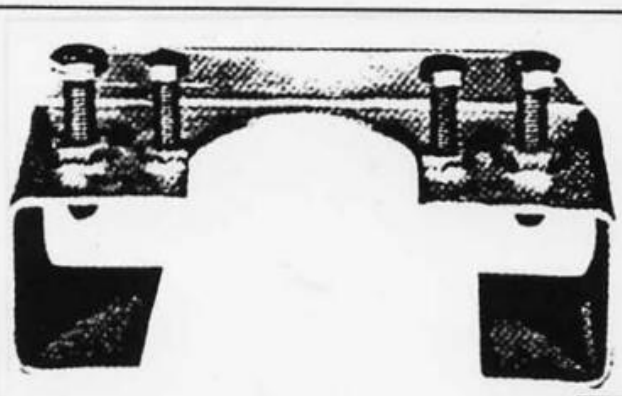
81-3125 M



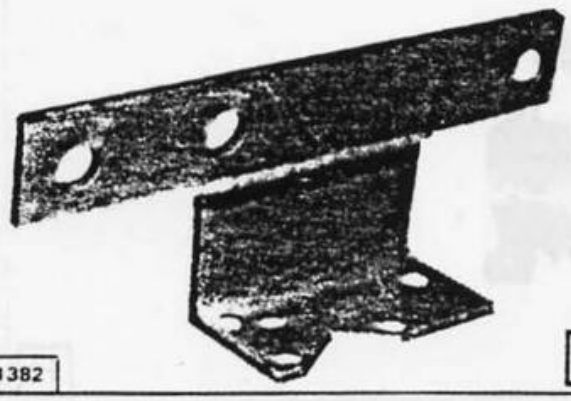
80-1273 J



N



81-29 K



80-1382 L

SPECIAL TOOLS

I : Extractor for removing and refitting the clutch release bearing guide sleeve (used in conjunction with A).

Reference 8.0316 D.

J : Mandrel for fitting the final drive oil seals.

Reference 8.0316 E.

K : Clamp for removing and refitting the fifth speed roller type synchromesh assembly (5 speed gearbox).

Reference 8.0316 F.

L : Gearbox mounting support.

Reference 8.0316 G.

SPECIAL TOOLS

M:a: Drift, ø 42 x 48 mm, length = 280 mm for fitting the output shaft bearing.
Reference : 8.0316 H.

b: Drift, ø 36 x 42 mm, length = 200 mm for fitting the input shaft bearing and the clutch housing lip seal.
Reference : 8.0316 J.

N Clamp for retaining the reverse shift plunger.

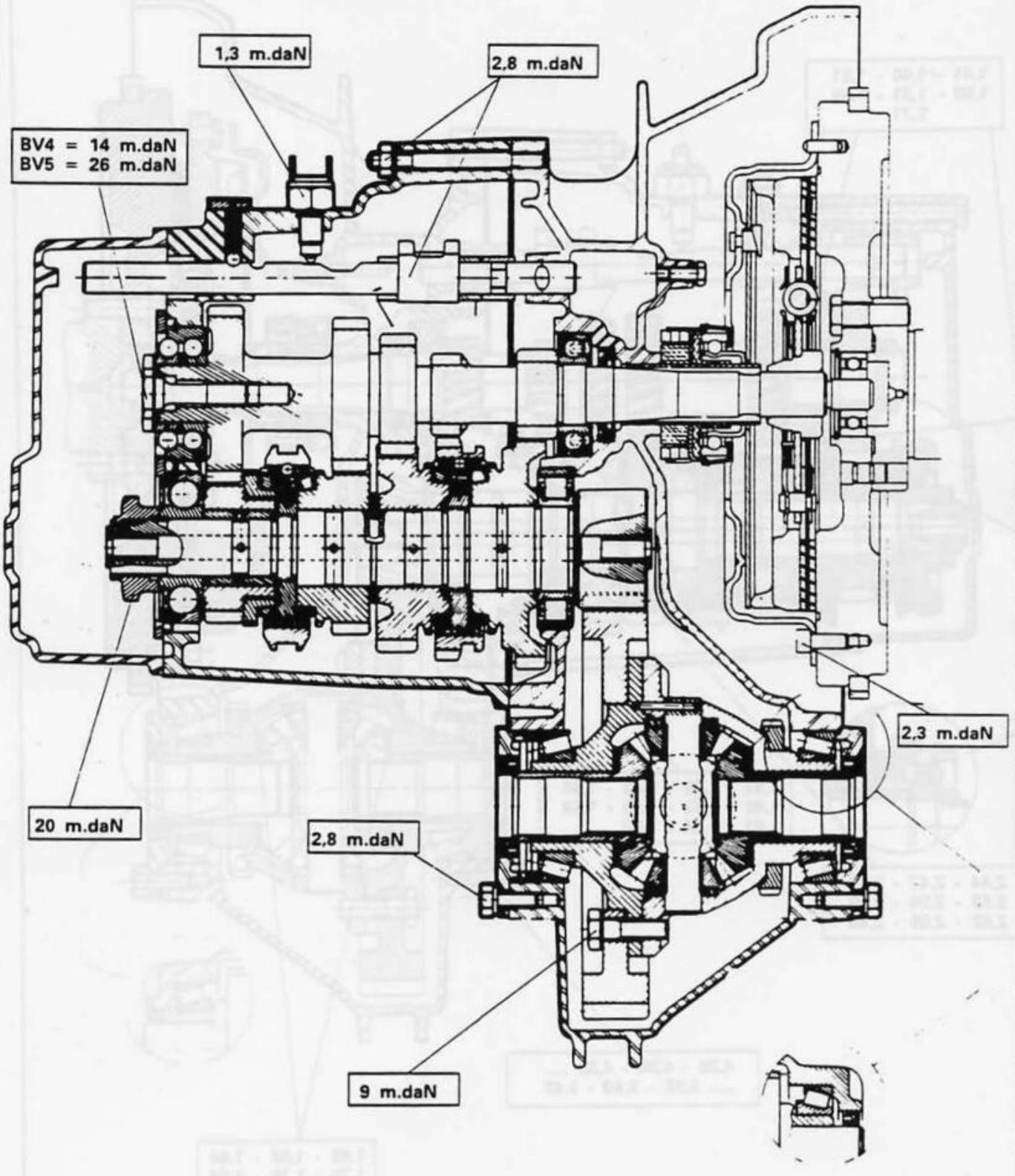
This part can be made from a clip of the « SERFLEX » type, width 12.

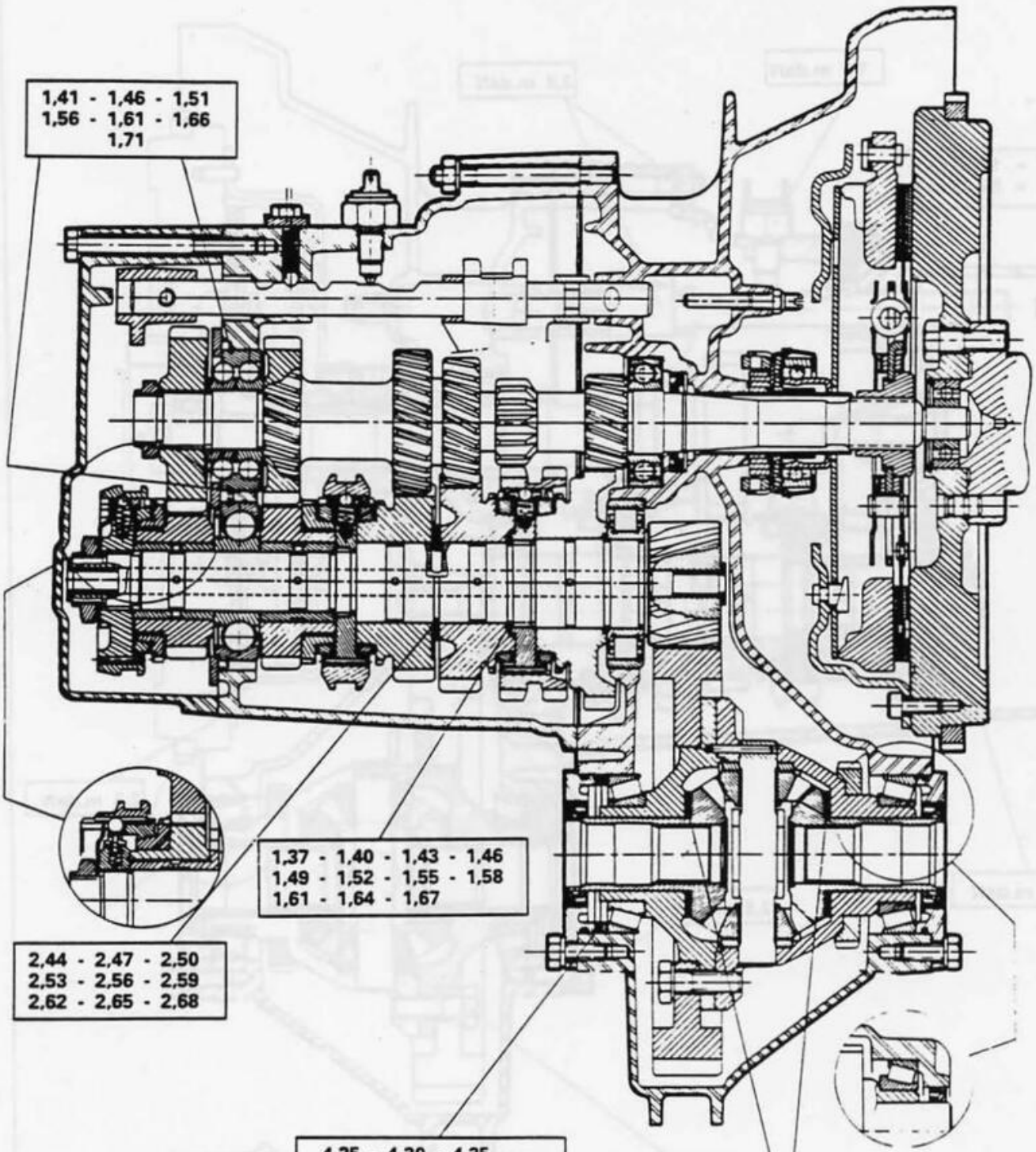
TIGHTENING TORQUES

Recommended tightening torques

Torques

	4 speed GB			5 speed GB		
Input shaft nut	m.daN 14	Nm 140	lbf ft 103	m.daN 20	Nm 200	lbf ft 148
	m.daN		Nm	lbf ft		
Output shaft nut	20		200	148		
Crown wheel securing bolts (Face and thread oiled)	9		90	66		
Gear shift selector ring nut	12		120	88		
Shift fork shaft bolts	2,8		28	21		
Differential bearing cap bolts	2,8		28	21		
8 mm dia. housing bolts	2.8		28	21		
10 mm dia. housing bolts	5		50	37		
Drain and filler plugs (copper washer)	4		40	30		
Reverse lamp switch	1,3		13	10		


1,3 m.daN
2,8 m.daN
BV4 = 14 m.daN
BV5 = 26 m.daN
2,3 m.daN
20 m.daN
2,8 m.daN
9 m.daN


1,41 - 1,46 - 1,51
1,56 - 1,61 - 1,66
1,71
1,37 - 1,40 - 1,43 - 1,46
1,49 - 1,52 - 1,55 - 1,58
1,61 - 1,64 - 1,67
2,44 - 2,47 - 2,50
2,53 - 2,56 - 2,59
2,62 - 2,65 - 2,68
4,25 - 4,30 - 4,35 .....
..... 5,55 - 5,60 - 5,65
1,52 - 1,58 - 1,64
1,70 - 1,76 - 1,82

Dismantling.

Drain the gearbox oil (there are two plugs).

Mount the gearbox upright, avoiding any load on the input shaft.

Remove : Fig. I
- the bolts (➡)
- the cover and its gasket.

5 speed gearbox :

NOTE - One of two different types of synchroniser may be fitted.

First arrangement : Ball type synchroniser, Fig. II.

Second arrangement : Roller type synchroniser, Fig. III.

Remove the 5th gear assembly : Fig. II and Fig. III.

Unlock nuts (2) and (3).

Lock the shafts to unscrew bolt (4) and engage 5th gear by pushing in its shift fork (1).

Loosen nuts (2) and (3).

Use peg spanner 8.0316 C to loosen the slotted nuts.

Second arrangement, Fig. IV.

Roller type synchroniser.

Keep the component parts of the fifth speed synchroniser assembly together by fitting clamp [K] 8.0316 F.

Place the hooks under the synchroniser ring and screw in the four bolts until they make contact with the various parts.

Remove : Fig. II, III and IV
- nuts (2) and (3),
- the synchroniser hub sliding gear assembly together with the shift fork.
- gear (5) and its spacer,
- gear (6).

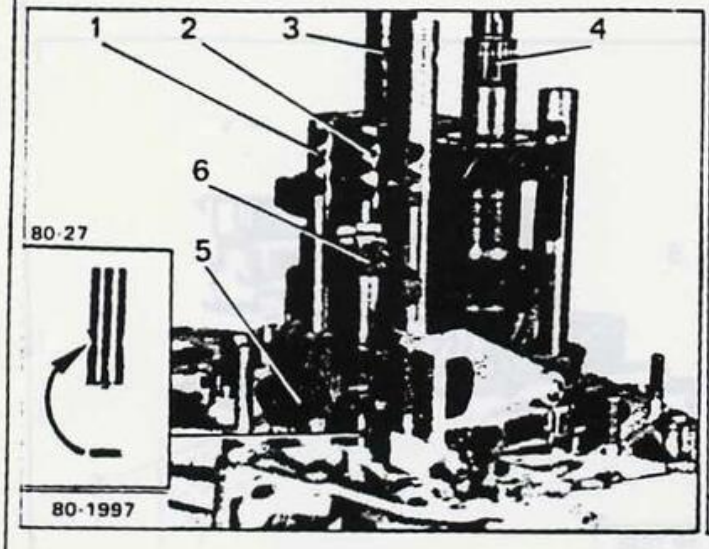
Remove : Figs. V and VI.
- bearing retaining plate (7),
- plate (8) and the locking balls and springs,
- the reverse lamp switch.

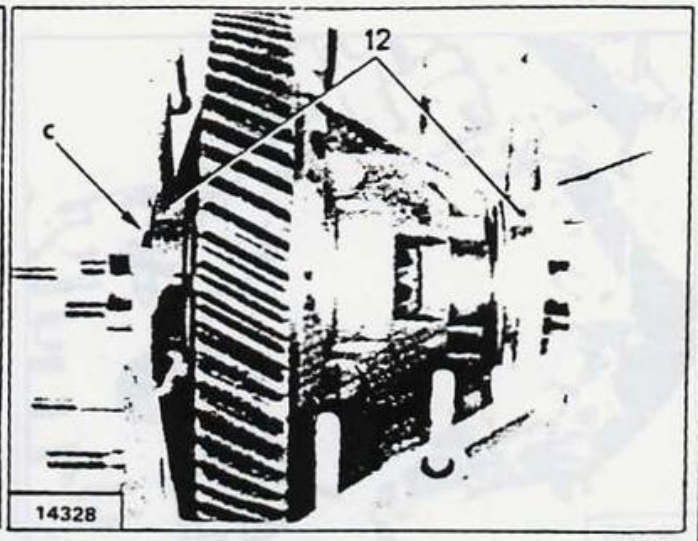
4 speed gearbox : Fig. VI.
- Remove the bearing circlips (9),
- Remove plate (10) that retains the reverse gear shaft.

5 speed gearbox :

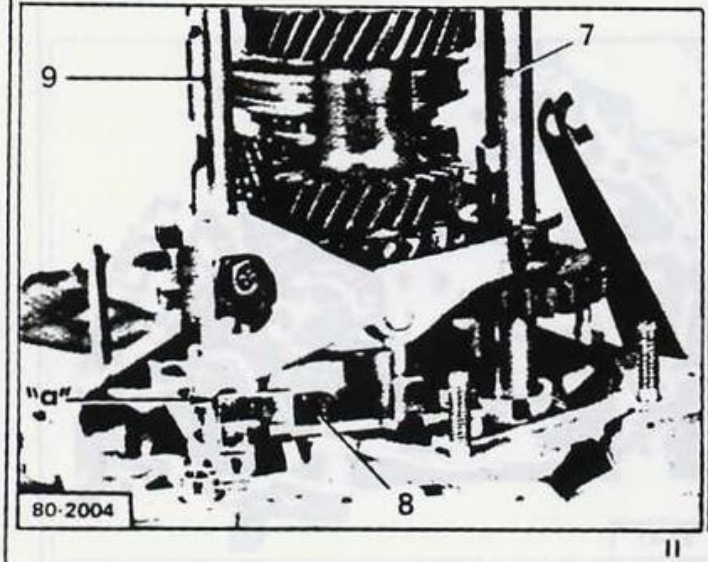
Remove the bearings with their circlips.

REMOVE : Fig. V.
- the housing bolts (➡)
- the housing and its gasket.

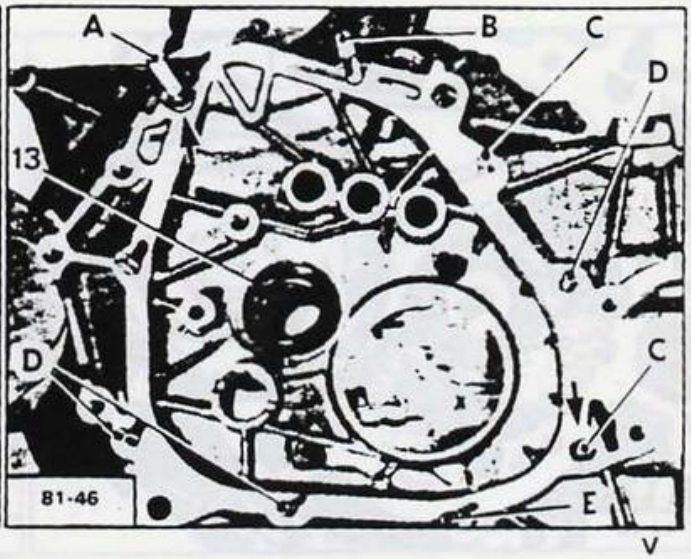

1
2
3
4
6
5
80-27
80-1997


12
c
14328

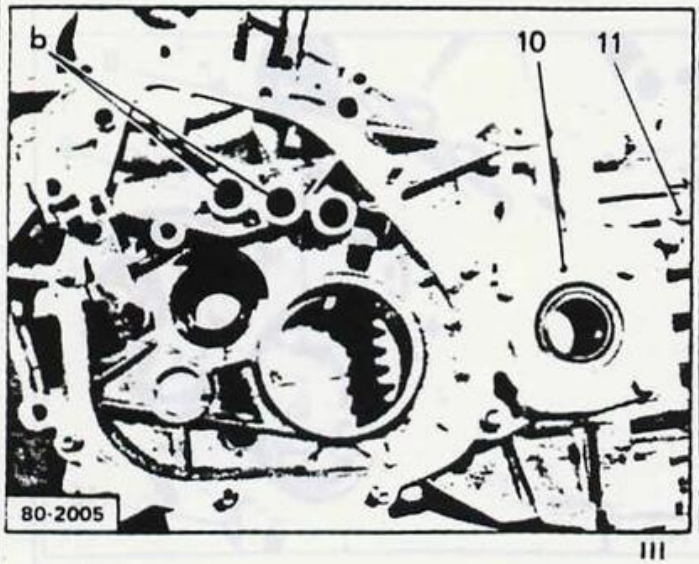
IV


9
7
"a"
8
80-2004

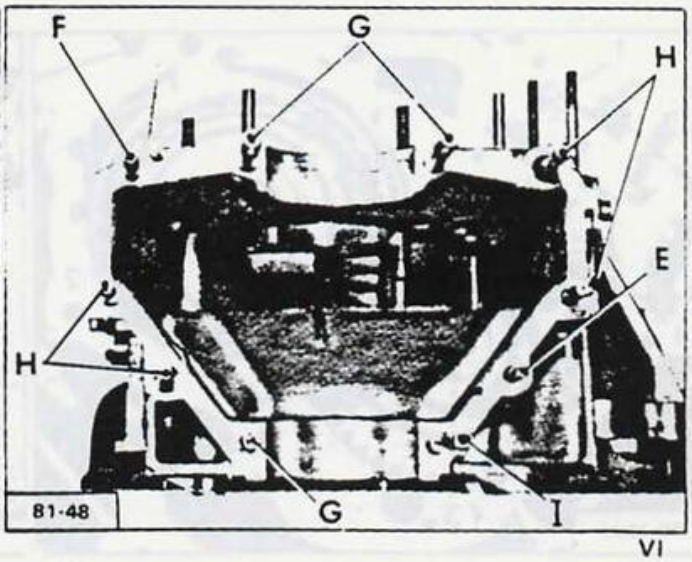
II


A
B
C
D
13
D
C
E
81-46

V


b
10
11
80-2005

III


F
G
H
E
H
G
I
81-48

VI

Remove the shift fork shafts and shift forks, Figs. I and II

Remove :

- bolts (5) and (6),
- shafts (1) and (2) their forks : shaft (2) has a locking plunger on it.

Place the reverse shift control in the reverse position, Fig. II.

Remove, Fig. II.

- shaft (7) and the reverse gear,
- shaft (9) and the control components. (Warning - there is a ball and a spring at (a)),
- bolt (8), and take out the bracket.

Remove, Fig. I : the imput shaft (4) and the output shaft (3), together.

Take out : Fig. III.

- the locking plungers, from points (b), using a magnet.

Remove the crown wheel carrier : Fig. III and IV.

Remove :

- the bearing retainer plates (10),
- the final drive casing (11).

Remove the crown sheel carrier : Fig. IV.

If the bearings are to be reused, mark the positions of their outer track rings (12) and retain the adjusting shims that are fitted at (c).

PREPARING THE HOUSINGS

Prepare the clutch housing : Fig. V.

Replace seal (13), Oil its outer periphery and fit it, using the 36 mm i.d. x 42 mm o.d. tube.

Fit the assembly studs, when applicable, Figs. V and VI.

STUD			
Ref.	Qty	Ø in mm	Length in mm
A	1	8	100
B	1	8	85
C	2	8	60
D	4	8	45
E	2	8	50
F	1	8	65
G	3	10	90
H	4	8	75
I	1	10	115

Check that the two locating dowels (➡) are in position.

Removing the clutch control : Figs. I and II.

Unclip and remove the clutch release bearing and the dust seal (3).

Remove :
- the circlip (5),
- the control (4),
- the bearing (6).

Push the fork (1) downwards to release it from its pivot bearings.

Refitting the clutch control : Figs. I and II.

Lubricate the pivot bearings. * Fit protective sleeve (2) and fork (1).

Fit :
- bearing (6) in its location,
- the control (4),
- the circlip (5).

Impregnate the dust seal (3) with engine oil.

Lubricate the release bearing guide tube* before fitting the seal (3) and the bearing. Clip the release bearing in place.

*Using MOLYKOTE B 21 lubricating varnish.

Prepare the gearbox housing.

Removing the gear shift control : Fig. III.

Loosen the guide nut (7) and remove the control from inside the housing.

Refitting the gear shift control : Figs III and IV.

Fit the spring (9) and its locating ring (8) in place, then fit the roll pin. Fit the spring (10).

Place a new "0" ring seal in position (a) on the guide nut (7) and fit a new copper washer at (11).

Lubricate the bearing and the "0" ring seal. Fit the control.

Tighten the guide nut (7) to a torque of 12 m.daN (120 Nm, 88 lbt ft).

Adjusting the bearing end float : Fig. V.

Fit a circlip (12) into the groove in the bearings and place them in the housing.

Fit dial indicator [D] 8.1504 to extension [B] 8.0110 H hand set the assembly, on zero, on a surface plate.

Place the extension on the housing and measure the distance between the face (c) on the housing and the upper bearing face (b).

The upper face on the bearing (b) is to be between a maximum of 0.05 mm below face (c) on the carter, and a maximum of 0.02 above it. This ensures that there is between a clearance of 0.05 mm and a preload of 0.02 mm at the bearings.

Select a circlip (12) of the correct thickness to obtain these conditions.

Preparing the differential casing : Figs. VI, VII and VIII.

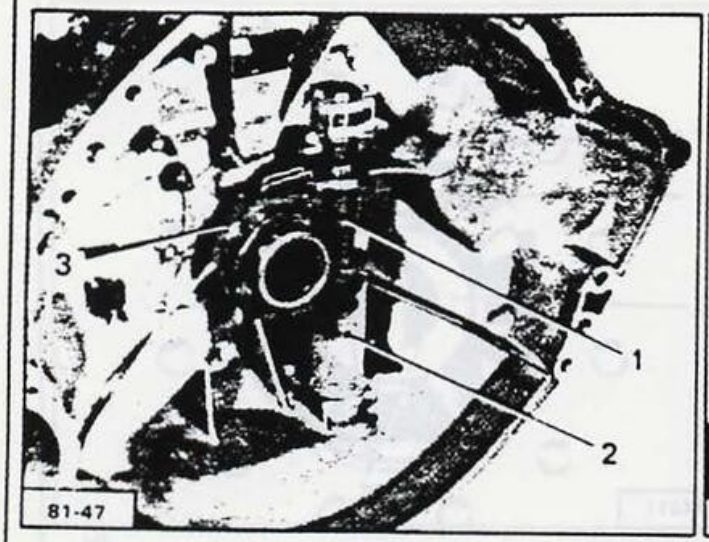
Remove bolt (13) and the speedometer drive assembly (14).

Ensure that the two locating dowels (➡) are in position.

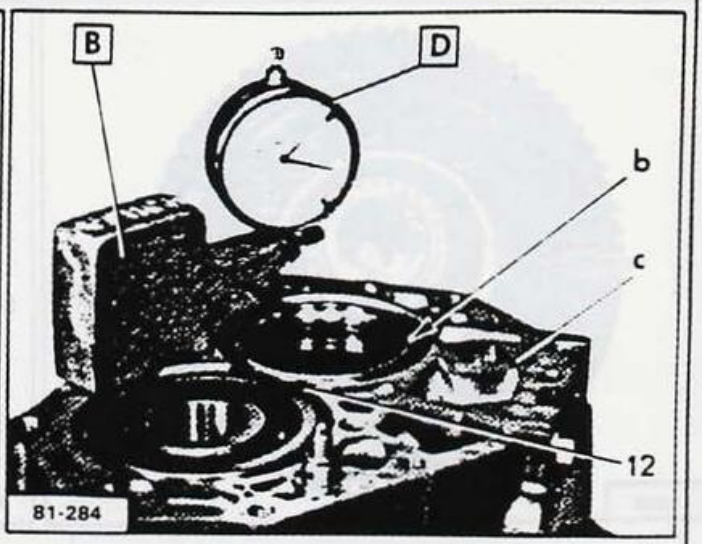
Fit an "0" ring seal at (d).

Lubricate the gear locating area before fitting it.

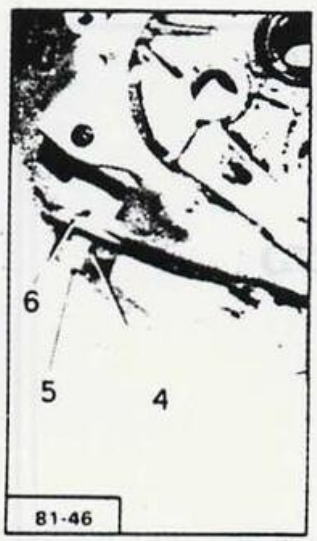
Fit guide (14) and bolt (13) without tightening the bolt.



I



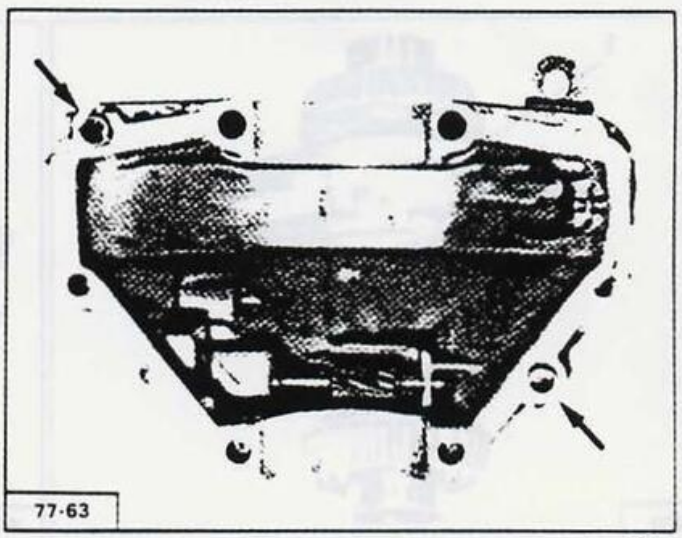
V



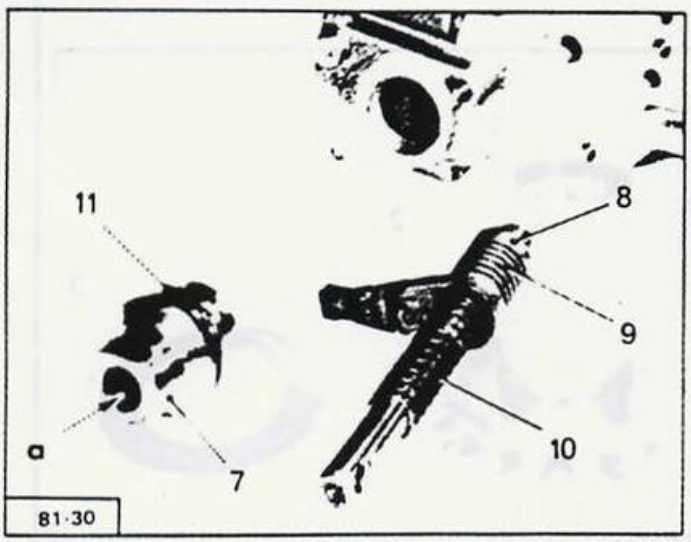
II



III



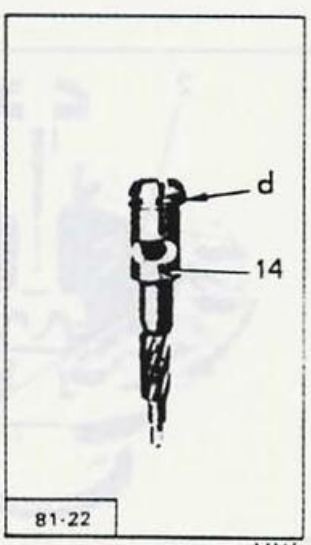
VI



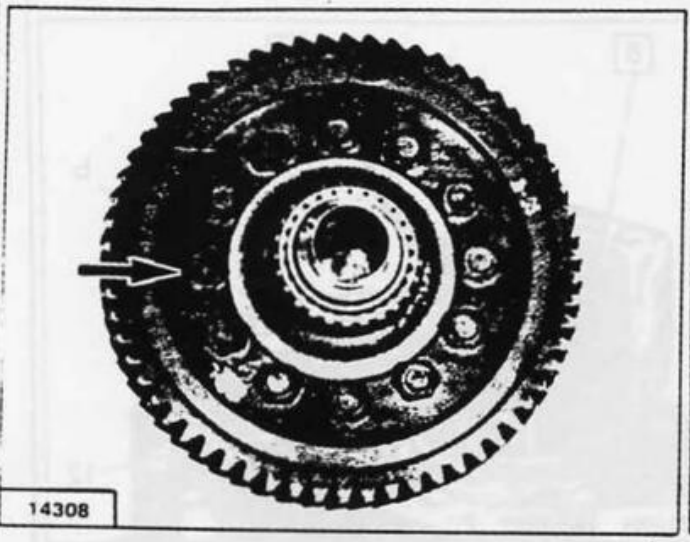
IV



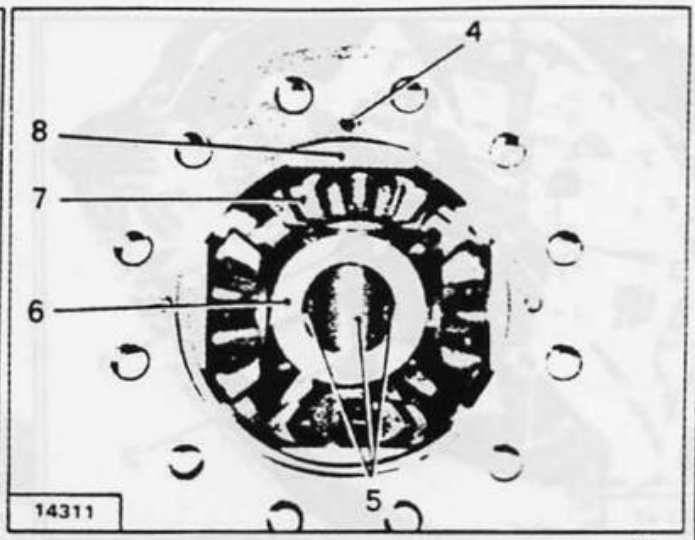
VII



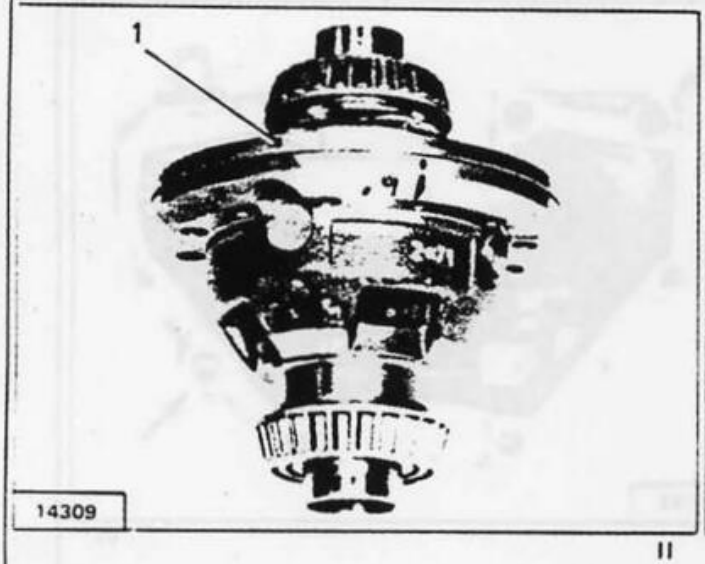
VIII



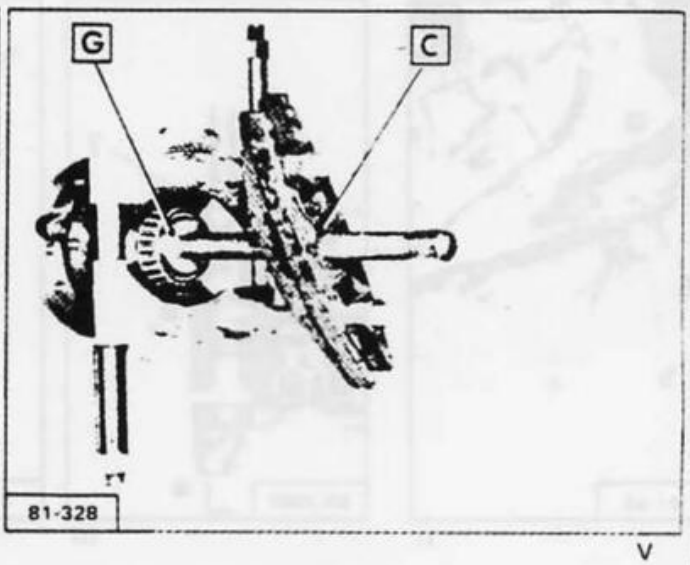
I



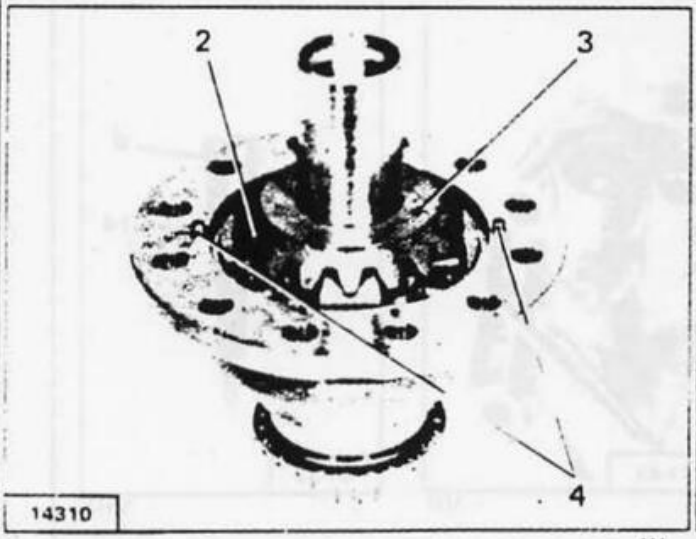
IV



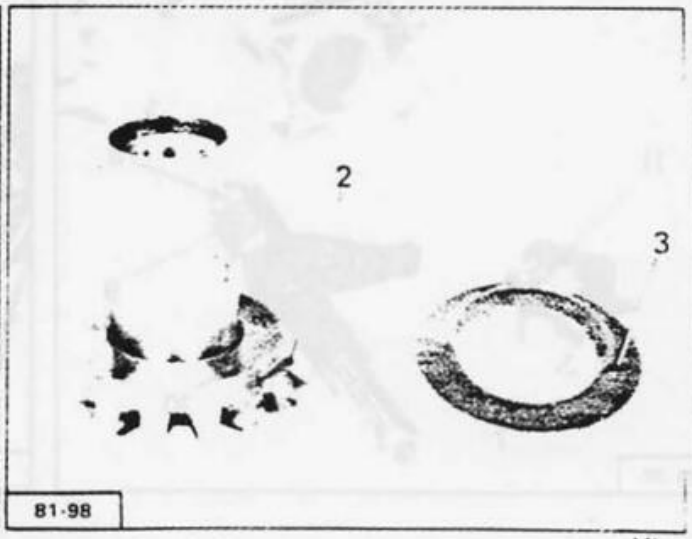
II



V



III



VI

PREPARING THE DIFFERENTIAL

Dismantling the differential.

Remove Figs. I, II, III and IV.

- the crown wheel securing bolts (➡),
- the crown wheel,
- the differential housing flange (1),
- the sun wheel (2) and its adjusting washer (3),
- the three dowel pins (4),
- the three planet gear spindles (5),
- the spider (6),
- the four planet gears (7) and their thrust pads (8),
- the second sun gear and its adjusting washer.

Remove the bearings : Fig. V.

Use extractor-release tool (C) and pad (G) 8.0318 K. to remove the bearings.

Clean all the parts.

Fitting the bearings.

Fit the taper roller bearing inner track rings, using a press and a tube (with a minimum inside diameter of 46 mm).

> Do not interchange the bearing outer track rings.

Place in the housing : Figs. VI and IV.

- one adjusting washer (3), (with the slooth face, in which the lubrication groove is machined, against the sun gear) and one sun gear (2),
- the thrust pads (8) (with the chamfer towards the inside of the housing),
- the planet gears (7),
- the spider (6),
- the spindles (5),

The sun gear (2) must turn freely, without any stiffness, and must be seated against the bottom of the housing.

Adjusting the differential.

Adjust the first of the sun gears : Fig. I and II.

Prepare the assembly shown in figure 1.

Set extension [B] 8.0110 H H, fitted with dial indicator [D] 8.1504 and a 35 mm spacer, on the housing, with the dial indicator plunger against one of the teeth on the sun gear.

Adjust the dial indicator to zero.

Without moving the extension, rest the assembly on the end of the sun gear at (a).

Repeat this operation on several different teeth. The minimum end float should be approximately 0.10 mm.

If it is not, fit an adjusting washer of the thickness necessary to obtain the required end float.

Fit : Fig. IV

- the spindle dowel pins (2).

Fit the second sun gear (3) and the second adjusting washer (4) (with its groove against the wheel).

Adjust the second sun gear : Fig. III and IV.

Place the extension fitted with the dial indicator and a 20 mm adapter against the differential flange (1).

Set the dial indicator on zero.

Place the extension against the adjusting washer (4) with its plunger on the differential housing.

Take this reading at several different point.

The minimum difference should be approximately 0.10 mm.

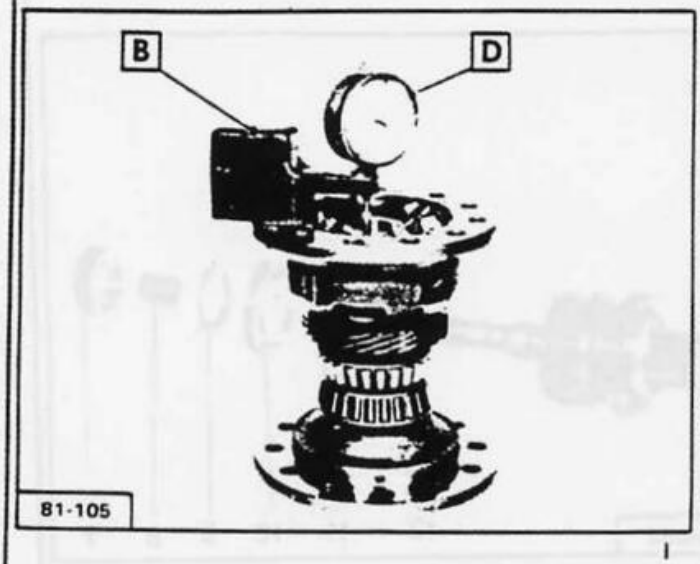
If it is not, fit a washer of the required thickness to obtain this difference.

Fit, to the housing : Fig. V and VI.

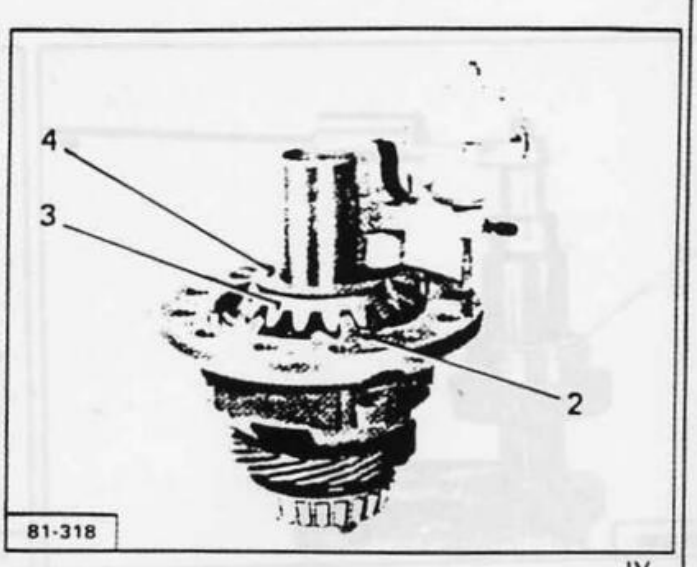
- the flange (1),
- the crown wheel (with groove (b) on the same side as the bolt heads).

Tighten the bolts to 9 m.daN (90 Nm, 66 lbf ft) (faces and threads oiled).

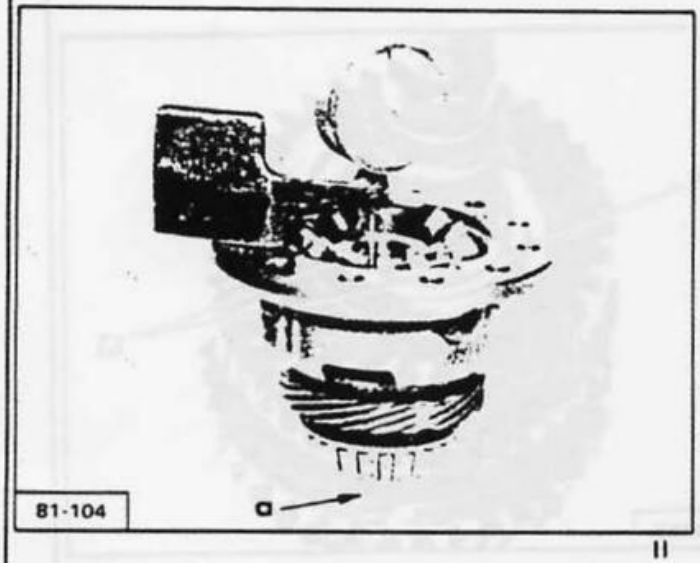
Ensure that the assembly turns freely, without any tight points.



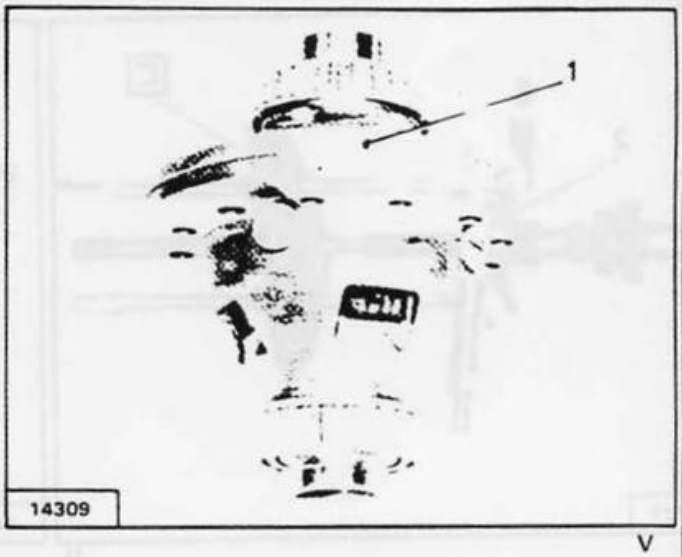
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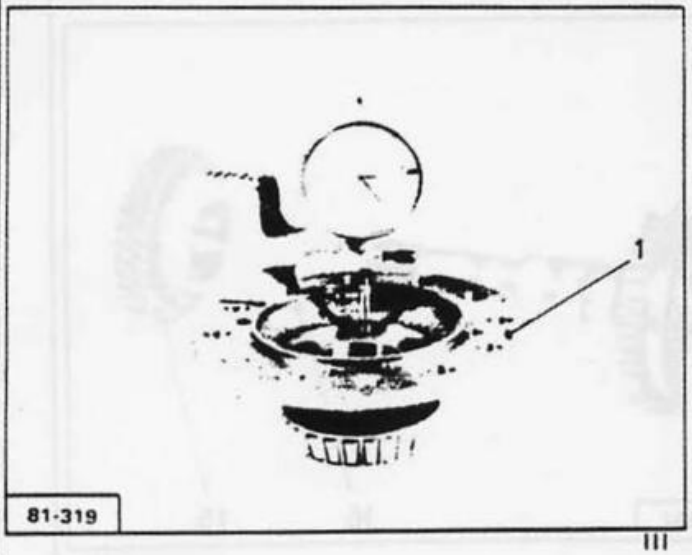
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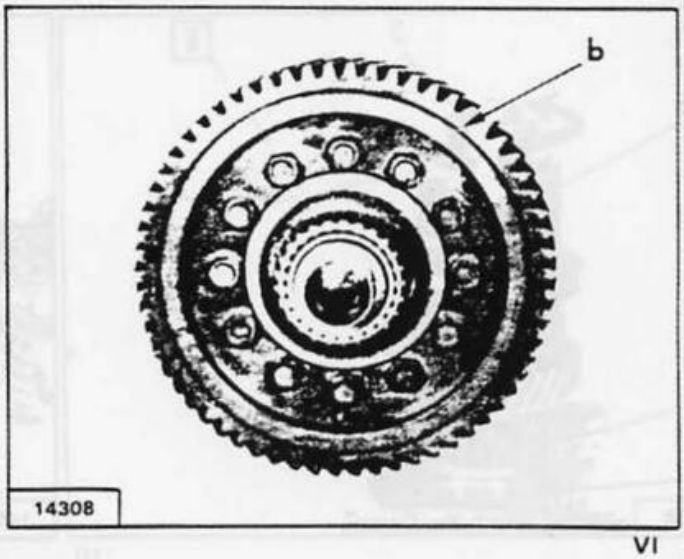
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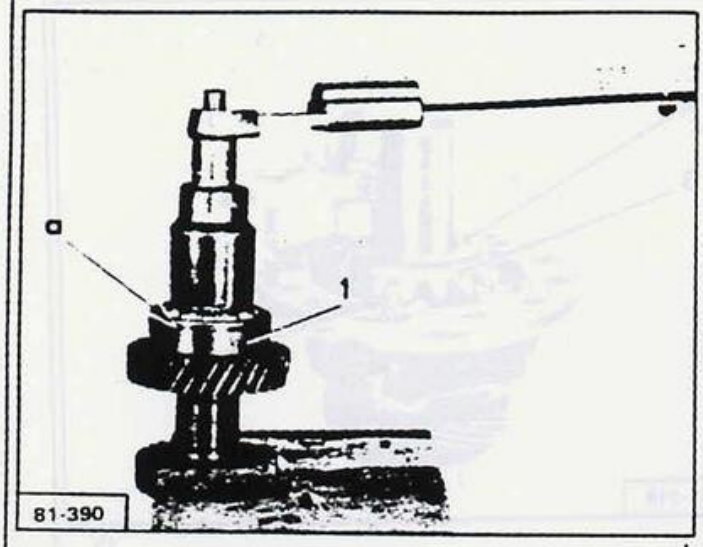
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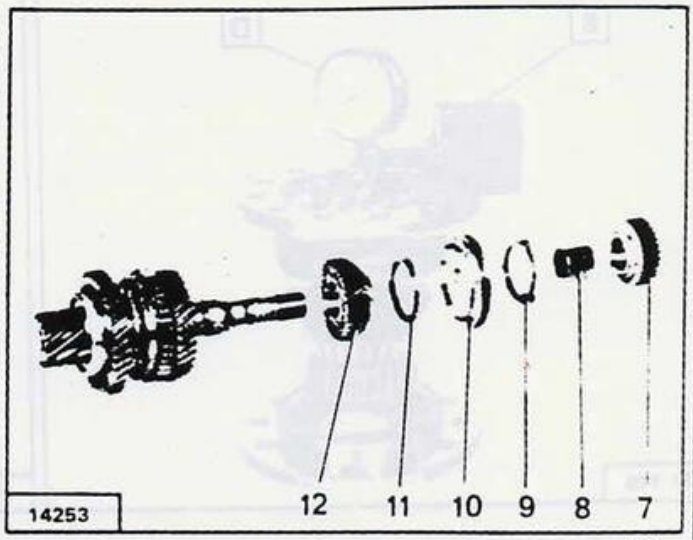
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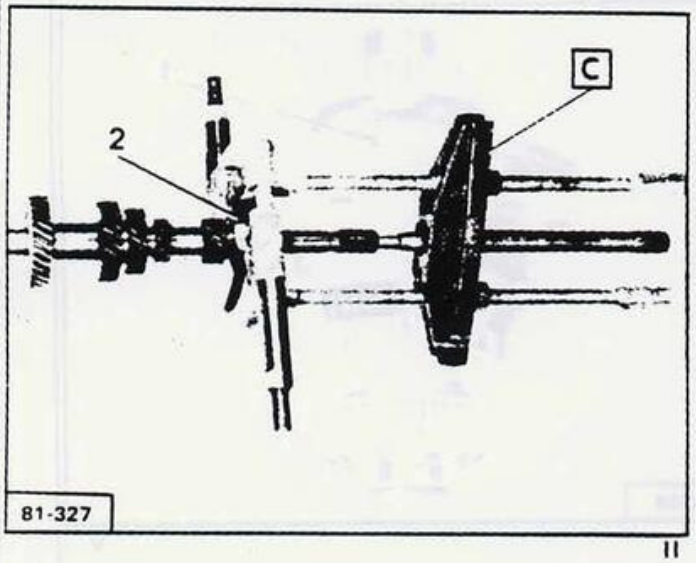
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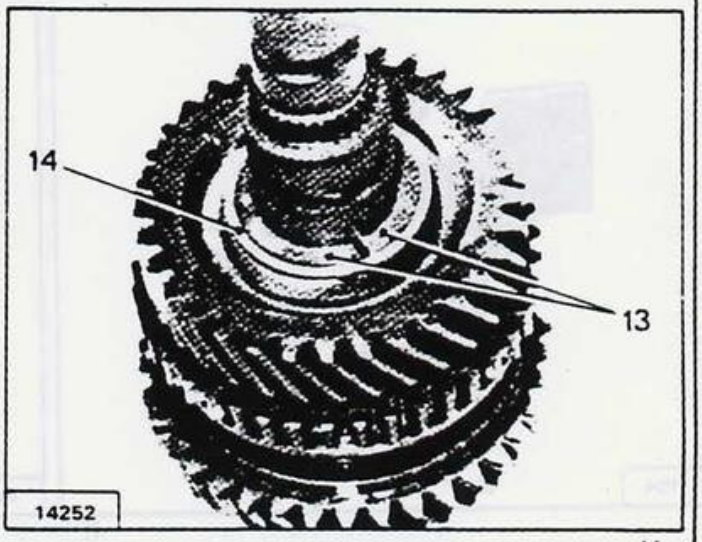
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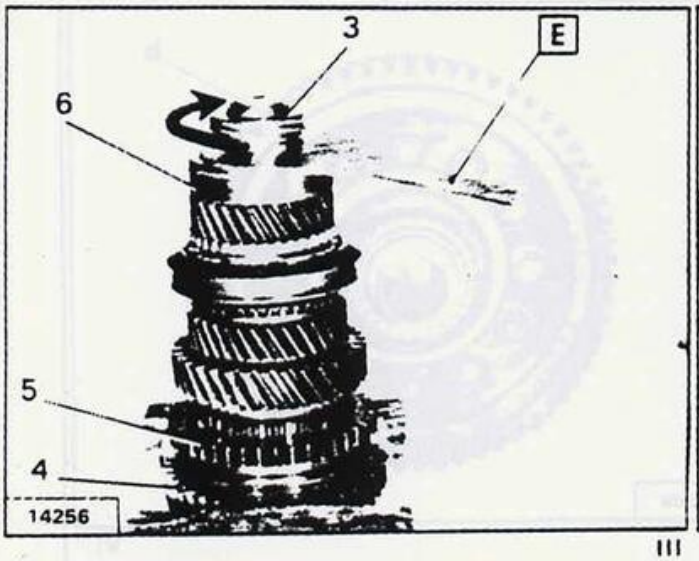
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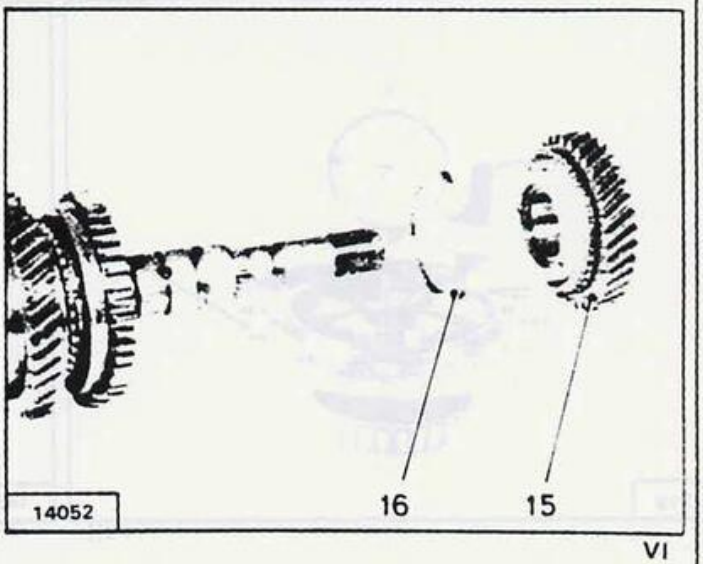
II



V



III



VI

PREPARING THE INPUT SHAFT.

Replace the bearings : Fig. II.

Remove the bearing (2) using extractor [C].

Fit the bearing (2) using a tube 36 mm i.d. x 42 mm o.d. x 200 mm long.

4 speed gearbox : Fig. I.

Remove the bolt by gripping the shaft in a vice fitted with soft jaws.

Fit the bearing (1) (without its circlips) and with groove (a) facing towards the outer end of the shaft.

Tighten the bolt to a torque of 14 m.daN (140 Nm 104 lbf ft).

Remove : Fig. IV.

- the 4th speed gear (7), and its bush (8),
- the 4th speed baulk ring (9).

If the synchroniser assemblies are to be re-used keep the baulk rings with their respective gears.

- the 3rd-4th synchroniser hub assembly (10),
- the 3rd speed baulk ring (11),
- the 3rd speed gear (12).

Remove : Fig. V

- retaining ring
- retaining ring (14),
- the thrust washers (13).

PREPARING THE OUTPUT SHAFT.

Dismantling the output shaft.

4 speed gearbox : Fig. III

Grip the output shaft in a vice fitted with soft jaws, across the first speed gear (4) which is locked to the shaft by sliding gear (5).

Unlock and remove nut (3).

WARNING : It has a left hand thread

Use a 36 mm open ended spanner.

Remove bearing (6).

Remove : Fig. VI

- the 2nd speed gear (15),
- the 2nd speed baulk ring (16).

- Remove : Fig. I
- the circlip (1) using pliers [F] 8.316 B.

Remove : Fig. II.
- The 1st-2nd speed synchroniser hub assembly (2).
- The baulk ring (3).
- The 1st speed gear (4).

Replace the bearing : Fig. III.

Remove the circlip at (a), using pliers [F] 8.0316 B.

Remove the bearing (5) using extractor [C] (Place one contact washer at (c) to protect the pastic end).

> The bearing areas for the various gears on the output shaft must be absolutely free from defect.
>
> Under no circumstances are these areas to be refaced by any means whatsoever.
>
> The output shaft must be fitted with its two plastic ends (6).

Fit the bearing (5) on the press using the tube 42 mm i.d. x 48 mm o.d. 280 mm long and fit the circlip at (a) : Fig. II.

> Place the pointed ends of the circlips on the opposite side to their respective components to facilitate their removal, at a later date, if necessary.

> Oil the gear bearing areas and the baulk rings with gearbox oil before fitting them.

Fit : Fig. II
- the 1st speed gear (4),
- the baulk ring (3),
- the 1st-2nd speed synchroniser hub assembly (2) (with groove (b) towards the 1st speed gear).

Assembling a ball type synchroniser : Fig. IV.

Place the three springs (8) and the three pads (9) in the hub (7).

Place this assembly against the sliding sleeve (11). (The flat face of the hub (7) is to be towards the groove on the sliding gear (11). Fit the three ball (10).

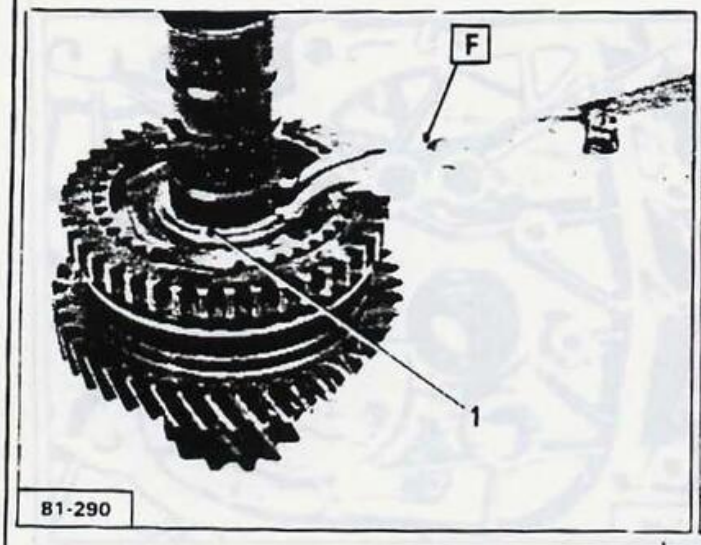
Measure the 1st-2nd speed synchroniser hub end float Fig. I and V.

Select, from the circlips thicknesses available (1) one that will provide a maximum end float of 0.05 mm.

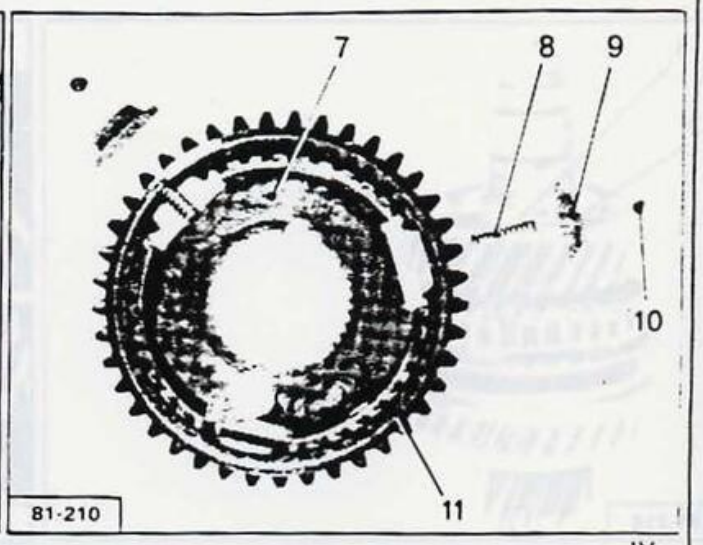
> It should not be possible to insert a 0.05 mm feeler gauge between the retaining ring (1) and the side wall of the groove.

Repeat these operations to determine the thickness of the 2nd and 3rd speed gear thrust washers (maximum clearance 0.05 mm).

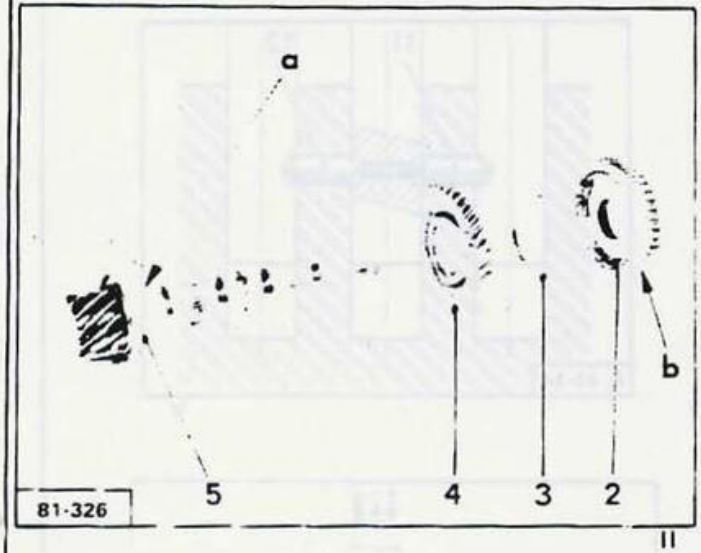
Fit : Fig. VI
- the 2nd speed baulk ring (12),
- the 2nd speed gear (13).



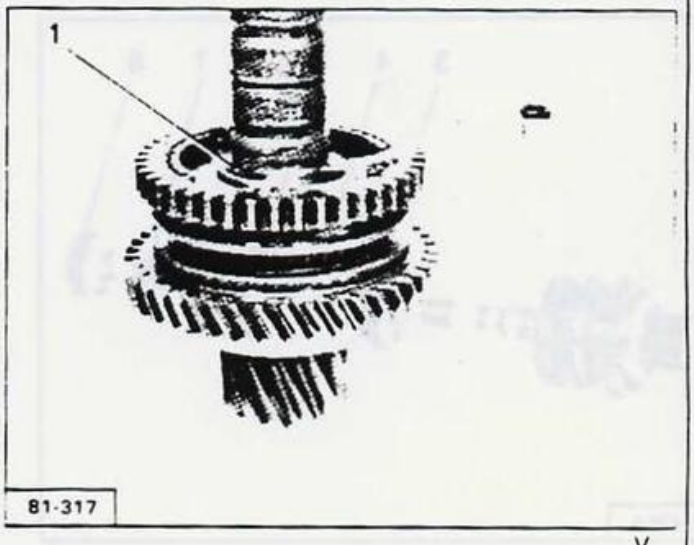
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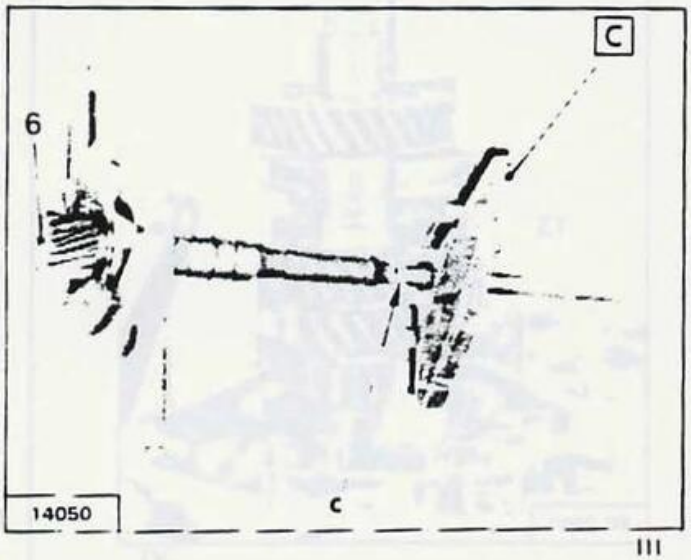
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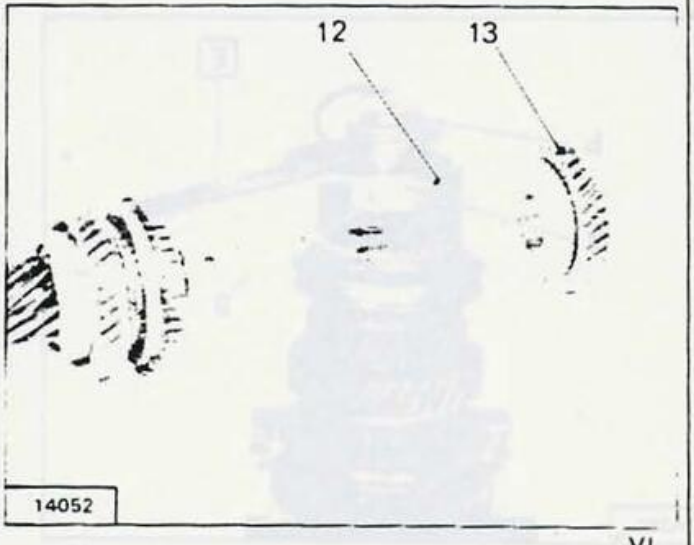
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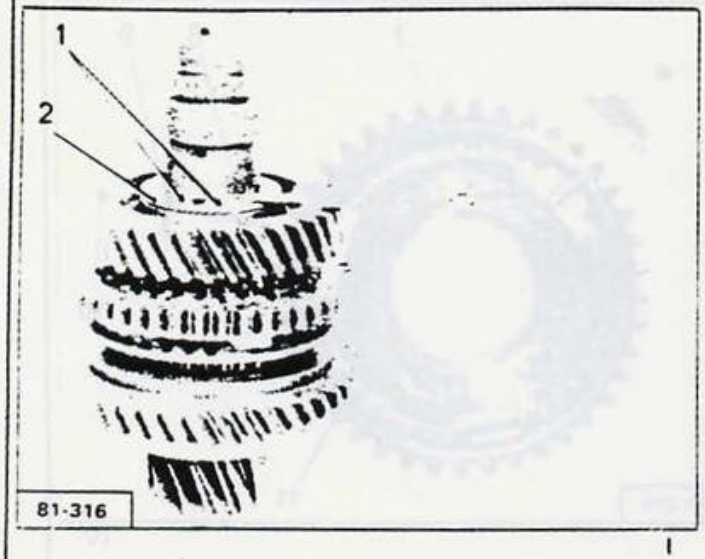
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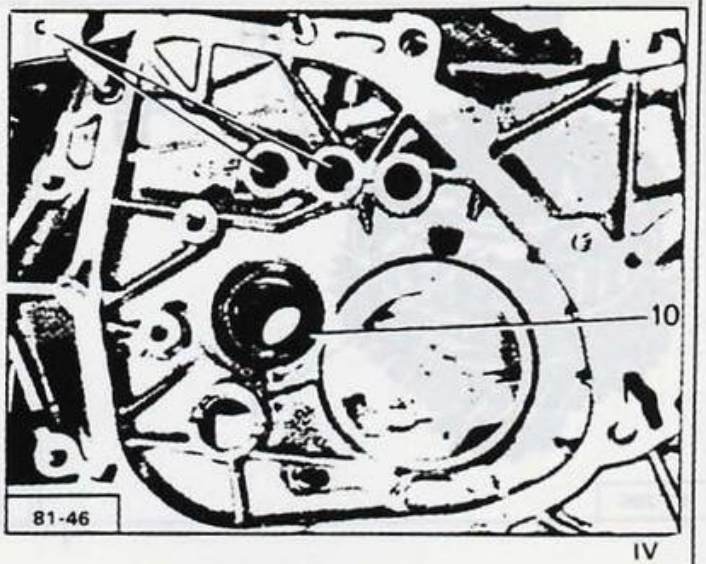
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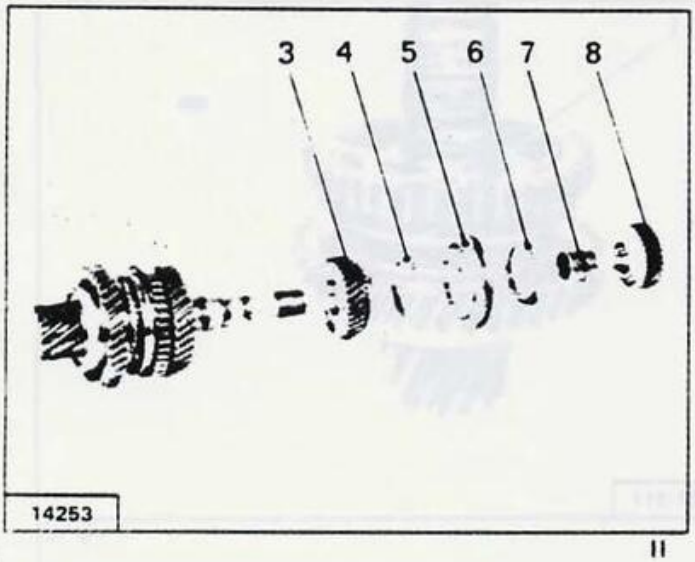
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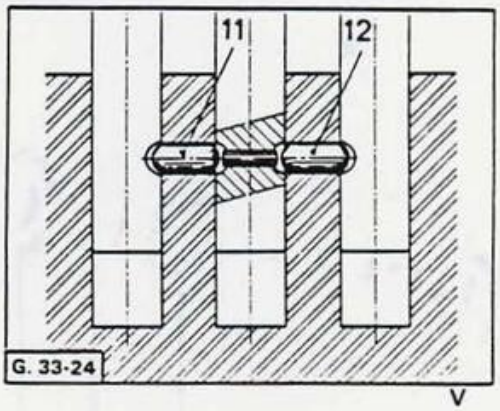
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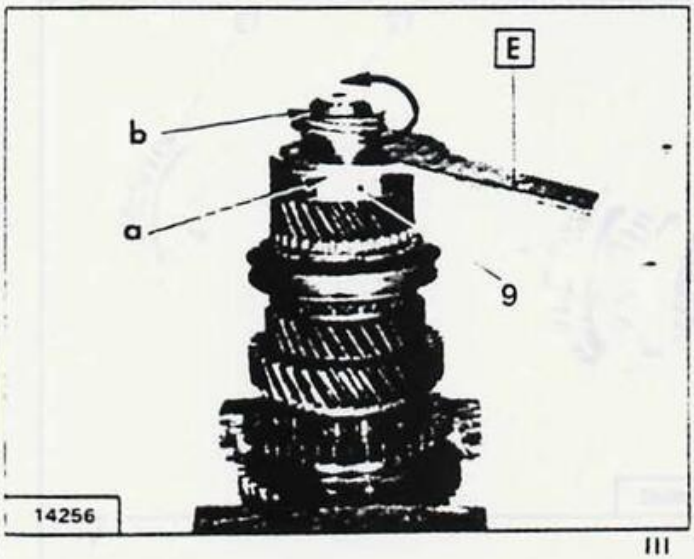
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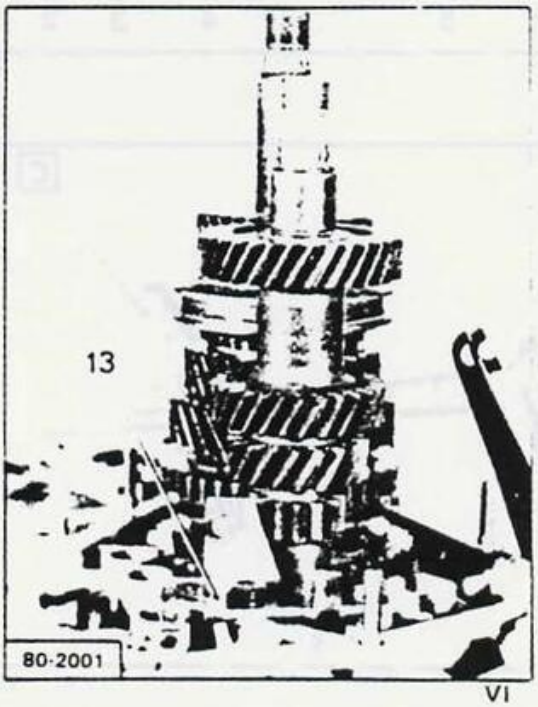
II



V



III



VI

Fit : Fig. I

- the thrust washers (1) (after having adjusted the clearance),
- the retaining washer (2).

Fit : Fig. II

- the 3rd speed gear (3),
- the 3rd speed baulk ring (4),
- the 3rd-4th speed synchroniser hub and sliding sleeve assembly (5),
- 4th speed baulk ring (6),
- the 4th speed gear bush (7),
- the 4th speed gear (8).

4 speed gearbox, Fig. III.

Place the bearing (9) in position (without its circlip) and with the groove (a) towards the outer end of the bearing (it has a left hand thread).

Grip the shaft across the 1st speed gear in a vice equipped with soft jaws. Engage the 1st-2nd speed sliding sleeve with the 1st speed gear to lock the shaft.

Tighten the nut to a torque of 20 m.daN, (200 Nm, 148 lbf ft.

(using the FACOM 36 mm open ended spanner end fitting).

Peen the collar (b) into to the slot in the output shaft.

REASSEMBLING THE GEARBOX

Prepare the clutch housing : Figs. IV and V.

Fit the locking plungers (11) and (12) into their locations marked (c), between two of the shift fork shaft recesses.

Fill the space between the two lips on seal (10) with grease.

Fit the shafts : Fig. VI.

Insert the input and output shaft TOGETHER AS AN ASSEMBLY.

Fit bracket (13).

Tightening torque - 2.8 m.daN (28 Nm, 21 lbf ft).

Identifying the shift fork shafts : Fig. I.

A) 1st-2nd shift fork shaft :
- 3 ball detents at (a),
- 1 detent groove at (g).

B) 3rd-4th shift fork shaft
- 3 ball detents at (b),
- 2 detent slots at (f) plus an interlock pin,

4 speed gearbox :

C) Reverse shift fork shaft (not illustrated)
- 2 ball detents at (c),
- 1 flat at (d).

5 speed gearbox

C) Reverse and 5th speed shift fork shaft :
- 3 ball detents at (c),
- 1 flat at (d),
- 1 groove at (e).

Identifying the shift forks and the reverse selector systems, Figs. II and III.

A) 1st-2nd shift fork,

B) 3rd-4th shift fork and transfer lever,

C) Reverse or 5th speed shift fork.

4 speed gearbox : Fig. II
- assembly (1) and spacer (2).

5 speed gearbox : Fig. III
- assembly (1) and piston (3) with its spring.

Prepare the reverse - 5th shaft Fig. I, II, III and IV

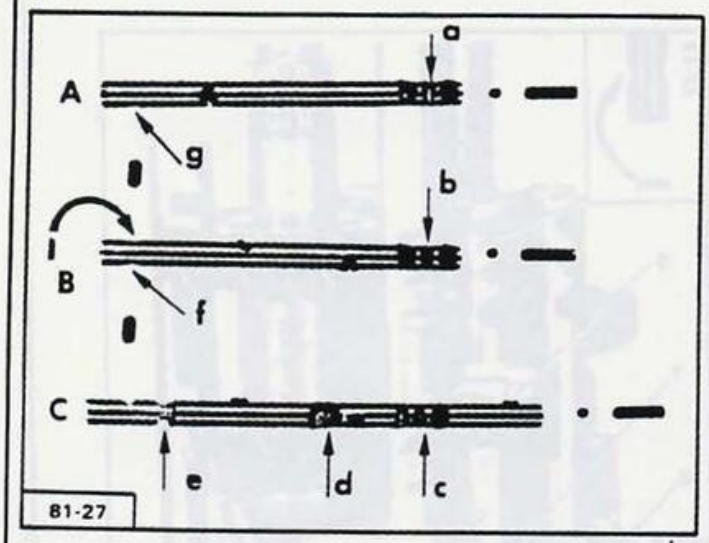
Place the reverse shift shaft C, the clamp (4) and the relay (6) in position (on the 4 speed gearbox, the spacer (2) is to be placed in position « 1 »)

Tighten the relay (6) to 28 N.m (20.6 lbf.ft.)

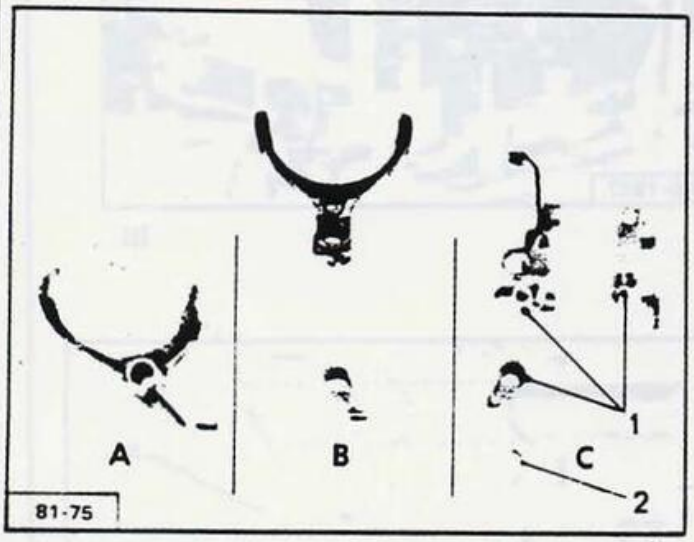
On the 5 speed gearbox, prepare the tool (N) as shown in the drawing. Place the piston (3) and the spring in position « h » (the piston should enter the groove « e » in the shaft).
Fit the tool (N) to retain the piston in its groove.

Place the lever (5) in position

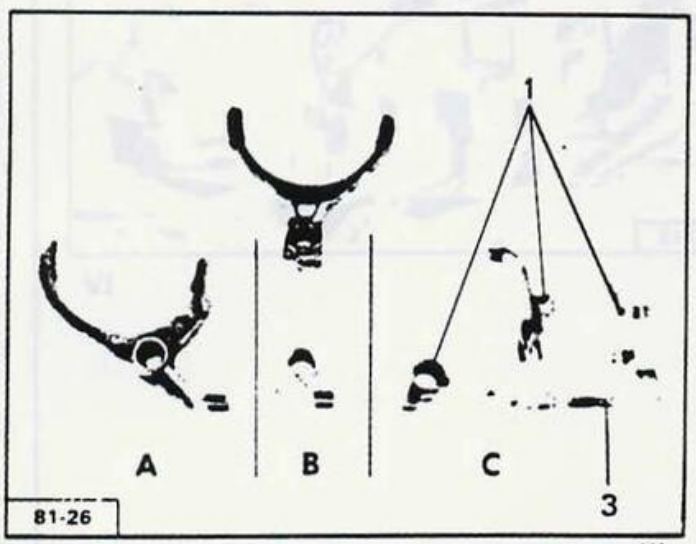
Fit the reverse shift control Fig. V
Ensure that the slot « j » in the lever (5) engages with the support shaft (7).


a
A
g
b
B
f
C
e
d
c
81-27

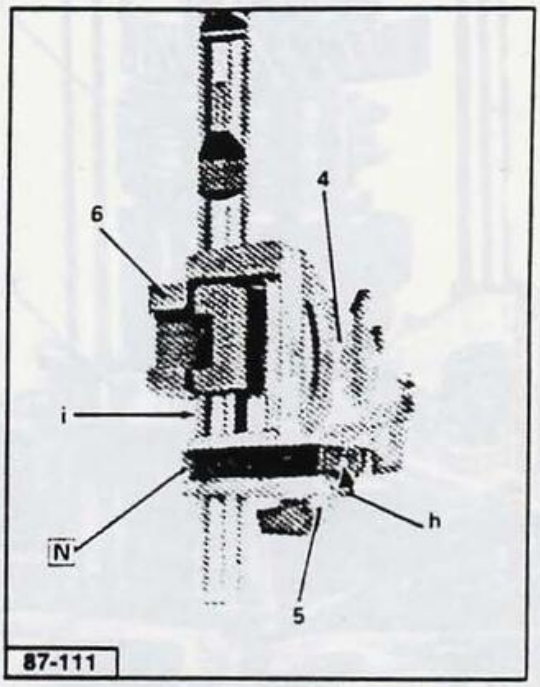
I


A
B
C
1
2
81-75

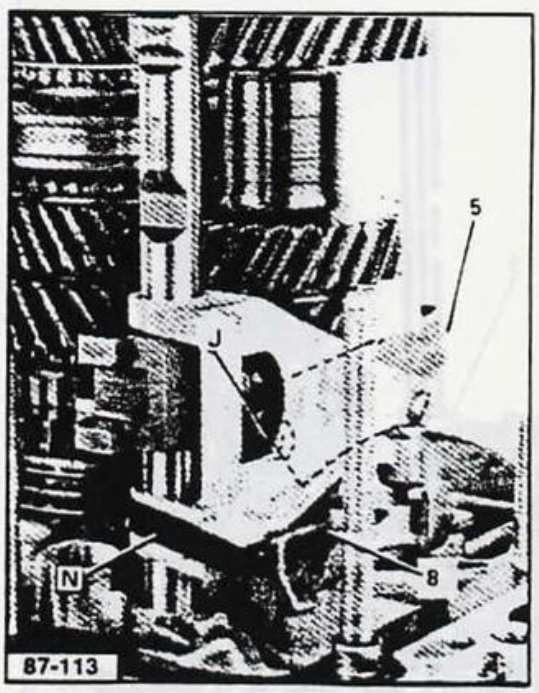
II


A
B
C
1
3
81-26

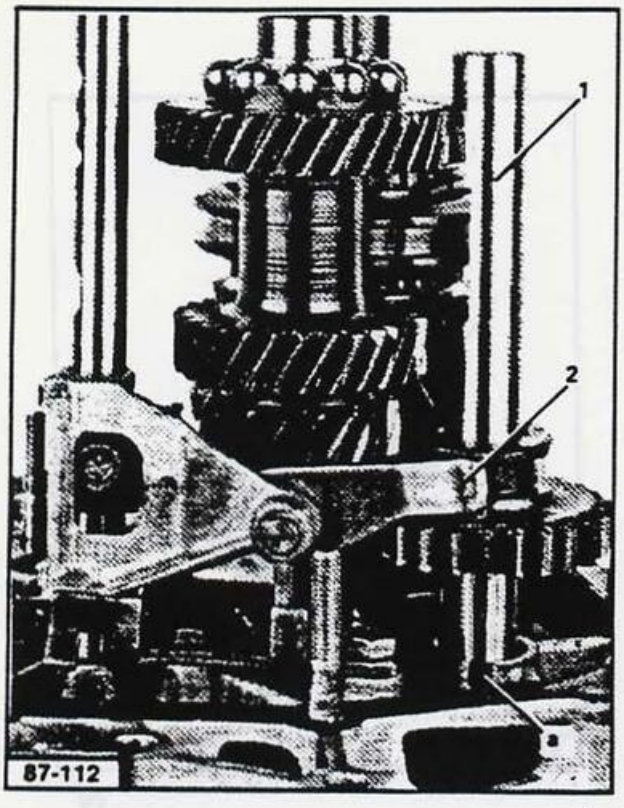
III


6
4
i
h
N
5
87-111

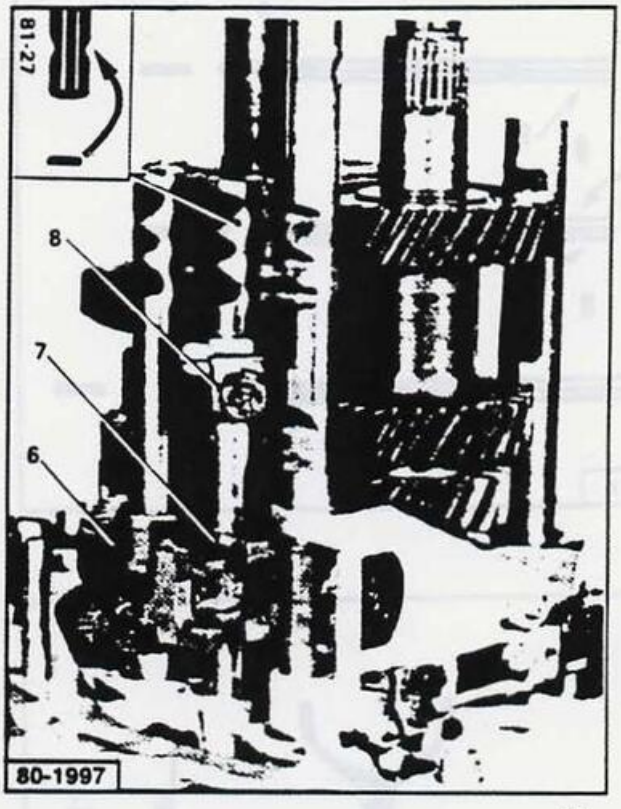
IV


5
J
N
8
87-113

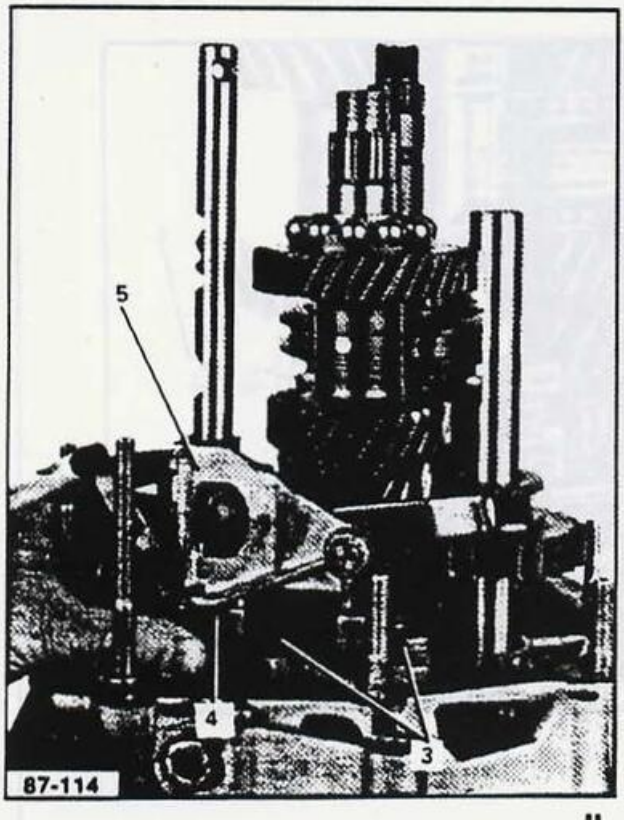
V



I



III



II



IV

With the gear shift in the reverse position

Fit, Fig. I, the shaft (1) together with the reverse gear, engaging the lever (2) in the groove in the reverse gear, until the retaining pin enters its location « a » (grease the shaft 0 ring).

Remove (N)

Fit, Fig. II, between the support (4) and the control (5), a 0.5 mm shim
Tighten the bolts (3) to 28 N.m (20.6 lbf.ft).

Place the reverse shift control in the neutral position.

Fit, Fig. III

- The 1st - 2nd shift fork (6)
- Tighten the control relay (7) on the 3rd - 4th shaft to 28 N.m (20.6 lbf.ft.)
- Place the locking relay finger in its location and fit the shaft and fork assembly (8)
- The 1st - 2nd fork shaft, engaging it in the 1st - 2nd shift fork

Tighten the bolts to 28 N.m (20.6 lbf.ft.) (Spring washers)

Fit the gearbox housing : Fig. IV
Fit the housing gasket.
Ensure that all the gears are in the neutral position (relays in alignment).
Engage the housing (9), ensuring that the selector finger (10) is in exactly the correct position in the control relay (when the selector finger (10) is in position, the selector can only move longitudinally, in both directions ↔).

Tighten the housing nuts. Torque 28 N.m (20.6 lbf.ft.) (flat washers).

Fit the bearing retaining plate : Fig. I and II

4 speed gearbox :
Fit the retaining circlips (2) with the bearings in position.

5 speed gearbox :
Fit the bearings already fitted with the circlips.

Fit the bearing retaining plate (5).
Tighten the bolts to 22 N.m (16.2 lbf.ft.).

Fit the locking balls : Fig. I

Fit the three balls (3) and the three springs (4). Fit the paper gasket and the plate (1).
Tightening torque = 28 N.m (20.6 lbf.ft.).
Ensure that the gears select correctly.

5 speed box :

Synchronisers :

1st possibility : Fig. III
Ball type synchronisers, the same as synchronisers as are fitted to 1st - 2nd and 3rd - 4th (see page 22).

2nd possibility : Fig. V
Roller type synchronisers.

Fit the 5th speed assembly :

1st possibility :

Fit : Fig. III and IV
- To the input shaft (10) :
  - the gear (14),
  - the nut.
- To the output shaft (11) :
  - the bush (12),
  - the gear (13),
  - the synchroniser ring.

  Place the synchroniser hub and sliding gear assembly (7), together with the fork (6), the retaining washer (8) and the nut, in position.

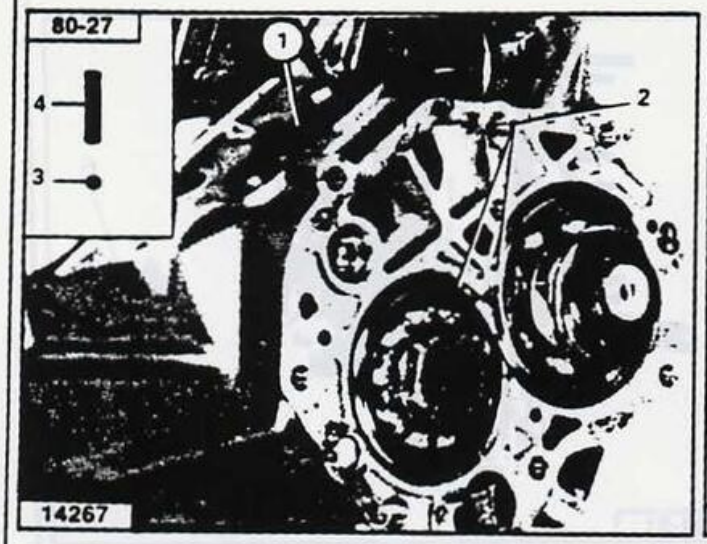
2nd possibility

Assembling a roller type synchroniser :
Fit the gear (13) : the synchroniser ring (16) and the sliding gear (15) (in the gear engaged position). Fit the synchroniser hub (17) together with the three springs (18) and the three plungers (19).
Fit the three rollers (20) at the same time bushing back the plungers (19) with a small screwdriver. Fit the retaining plate (21).
Place the sliding gear in the neutral position.
Fit the clamp (K).

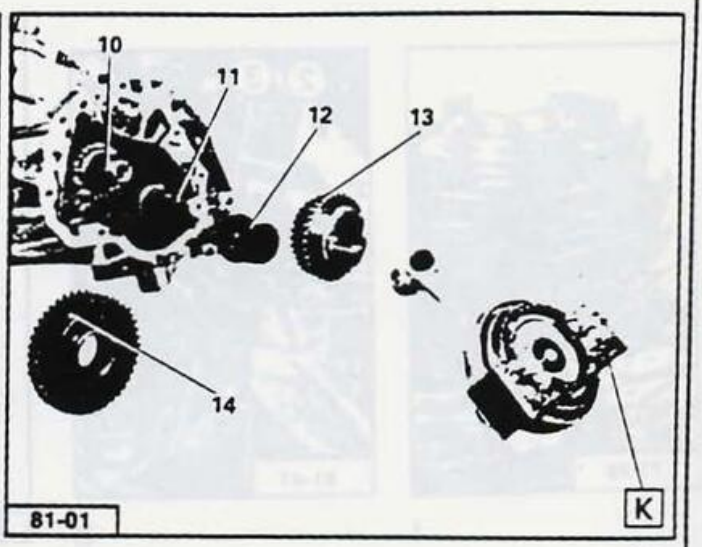
Fit : Fig. V and VI
- To the input shaft (10) :
  - the gear (14),
  - the nut.
- To the output shaft
  - the bush (12),
  - the gear (13),
  - the assembly formed by the synchroniser ring, the synchroniser, and the fork, retained by clamp (K),
  - the nut.

Tightening : input shaft nut = 260 N.m (192 lbf.ft.)
output shaft nut = 200 N.m (147 lbf.ft.)
(Engage 4th speed, using the selector and 5th speed, by pressing on the fork (6) to lock the shafts)
spanner (H)(-).0316 C, if necessary.
Lock the nuts by peening metal into the grooves in the shafts.
Fit the bolt (9) to the shift fork shaft.
Tightening : 28 N.m (20.6 lbf.ft.)

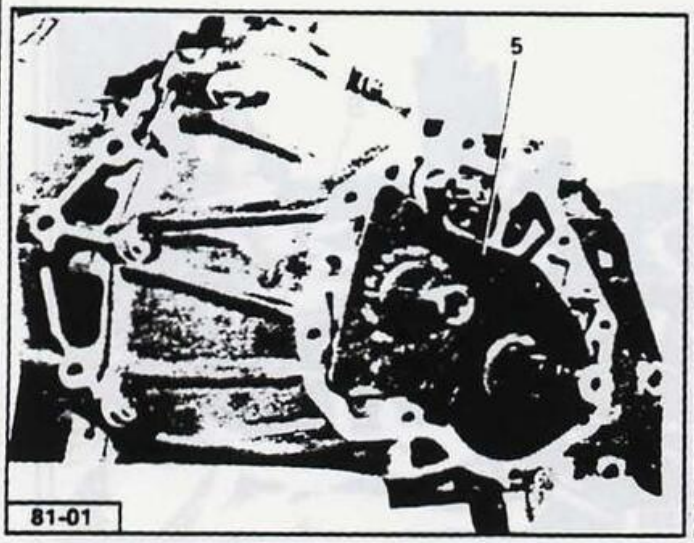
REMARK : it is possible to assemble the synchroniser DIRECTLY on the gearbox.
To do this :
- Fit the following to the output shaft (11) :
  - the bush (12),
  - the gear (13),
  - the synchroniser ring (16),
  - the sliding gear (15) and the fork (6) engaged on the shift fork shaft in an « gear engaged » position.
- Place, on the shaft, the synchroniser hub (17) together with the three springs (18) and the three plungers (19).
- Fit the three rollers (20), whilst pushing back simultaneously, the plungers (19) with a small flat screwdriver.
- Fit the retaining plate (21) and the nut.


80-27
1
2
4
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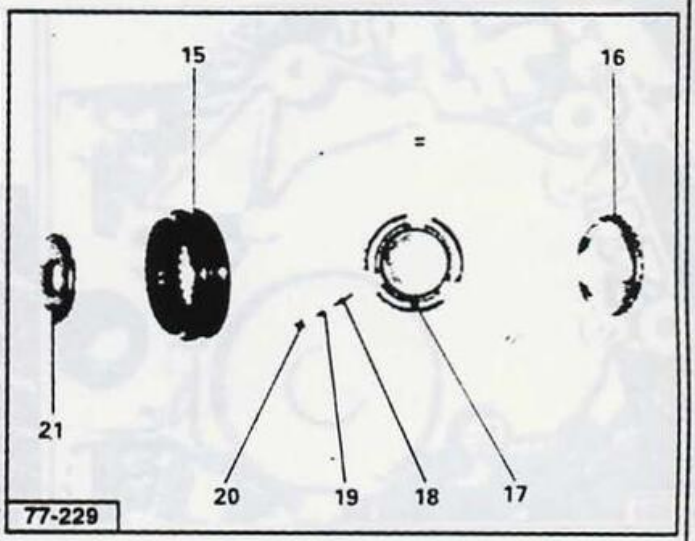
I


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81-01
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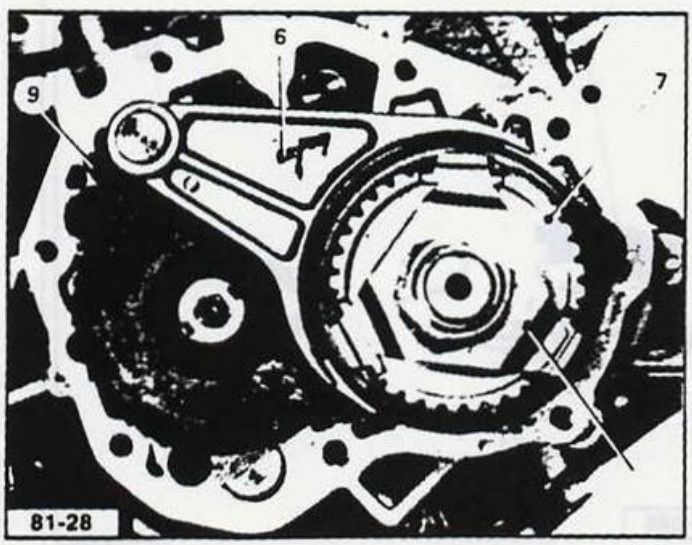
IV


5
81-01

II


15
16
21
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18
17
77-229

V


6
9
7
81-28

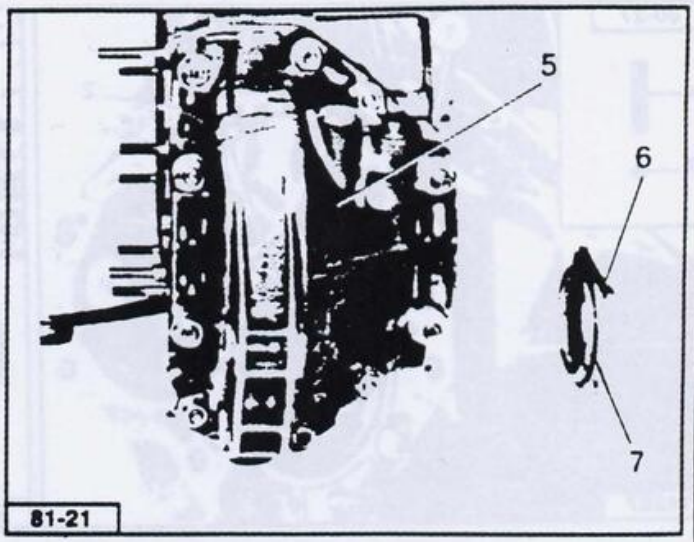
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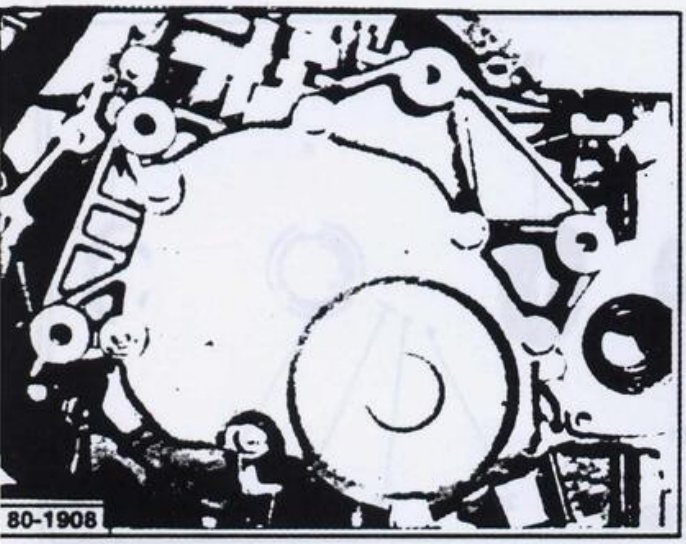
I



II



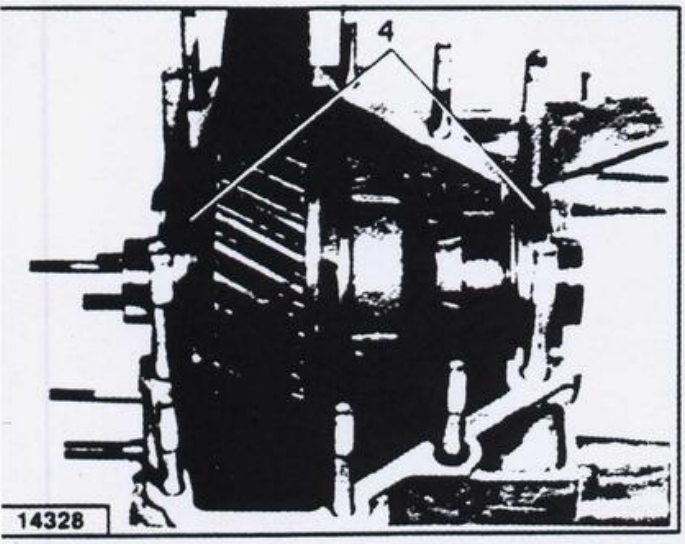
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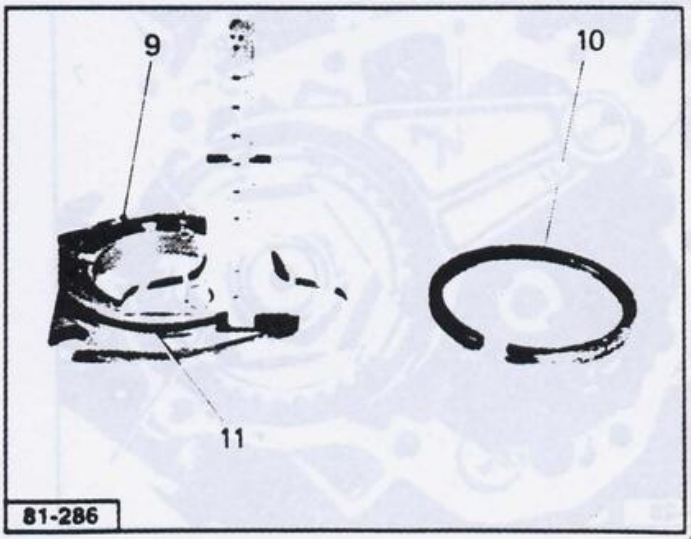
III



VI



IV



VII

Adjust the shift fork stop screws : Fig. I and II

Engage the gear in question. Using the shift fork, hold the sliding gear against the idle gear. Bring the adjusting screw into contact with the shaft, then screw it by an additional turn to make contact positive between the fork and the face of the sliding gear groove.

- screw (1) : 4th speed stop
- screw (2) : 5th speed stop
- screw (3) : 3rd speed stop

Tighten the lock nut.

Screws (2) and (3) are to have jointing compound applied to them before fitting.

Fit the cover : Fig. III

Fit the gasket.
Fit the seal.
Tighten the bolts to 28 N.m (20.6 lbf.ft.) (flat washers).

FIT THE FINAL DRIVE

Fit : Fig. IV

- the final drive gears fitted with their bearings (4).

Coat the joint face with jointing compound.

Fit : Fig. V

- the half housing (5),
- the cap (6), fitted with its 0 ring (7) previously oiled.

Tighten the 8 mm ø bolts to 28 N.m (20.6 lbf.ft) (flat washers)
Tighten the 10 mm ø bolts to 50 N.m (36.9 lbf.ft.) (flat washers)
Knock the bearing outer track rings in position with a mallet.

Adjust the preload on the bearings : Fig. VI and VII

Determine the thickness of the shims with a depth gauge :
Measure the distance between the gasket face and the bearing outer track ring (8) locating face.
Measure the distance between the face on which the bearing cap (9) locates and its gasket face.

To the difference between these two readings :

Add 0.15 mm to obtain the bearing preload.

This dimension is the thickness of the shim (10) to be fitted. Fit the shim and the bearing cap together with its 0 ring seal (11) which has previously been oiled.
Tighten to 28 N.m (20.6 lbf.ft.) (flat washers).

Fit the seals : Fig. I

Grease the lips and the outer part and fit the seal (1) to the mandrel (J).

Fit a seal in a cap :
Fit the flat face « a » of the thrust washer on the opposite side of the seal : Fig. II.

Fit the seal in the housing :
Fit the flat face « a » of the thrust washer on the same side as the seal : Fig. III.

Fill the gearbox with oil :
Tighten the drain plugs (40 N.m (29.5 lbf.ft)
Pour in 1.25 litres of oil.

REPLACING A RELEASE BEARING GUIDE-SLEEVE.

If a guide-sleeve assembly is replaced, it is ESSENTIAL also to fit a new release bearing.

Remove the guide-sleeve : Fig. IV and V

Remove the release bearing.
Place the extractor (1)
fitted with an inertia extractor assembly (a) over the guide-sleeve
Tighten the six bolts (→) on the guide-sleeve and extract it.
Degrease the new guide-sleeve and its location.

Fit the release bearing guide-sleeve :

Coat the end of the guide-sleeve (the end that enters the housing) with LOCTITE FRENBLOC.

Fit the guide-sleeve into the extractor (1)
without tightening the bolts (→).
Using the extractor (A), fit the guide-sleeve into the housing until the tool makes contact with the housing. (The guide-sleeve protrusion provided by the extractor is :
48.5 ± 0.5 mm.

Remove all traces of LOCTITE from the guide-sleeve.

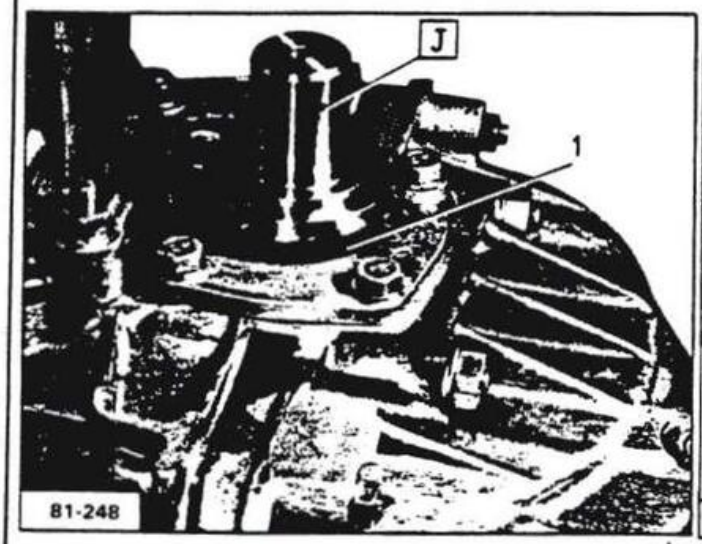
Fit the clutch release bearing : Fig. IV.

Impregnate the seal (2) with oil before fitting it.

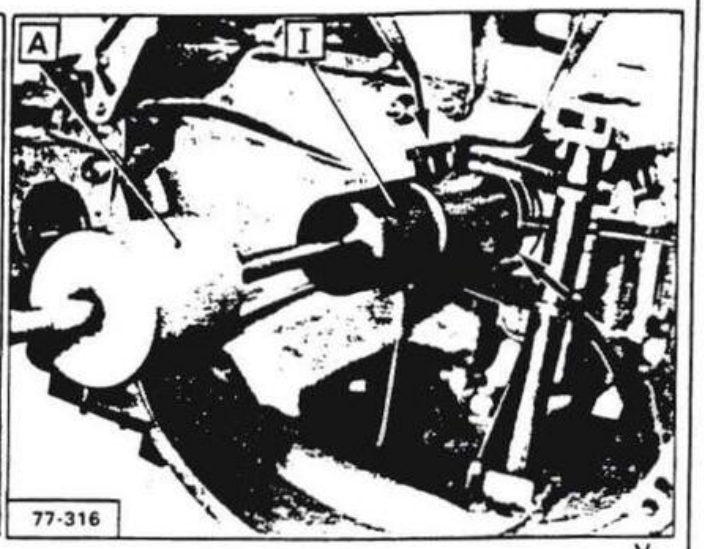
Grease the release bearing guide before fitting the release bearing.

HANDLING

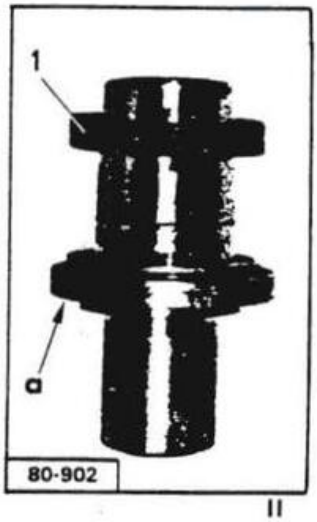
Use the support (L).
Secure it by the bolts (3).



I



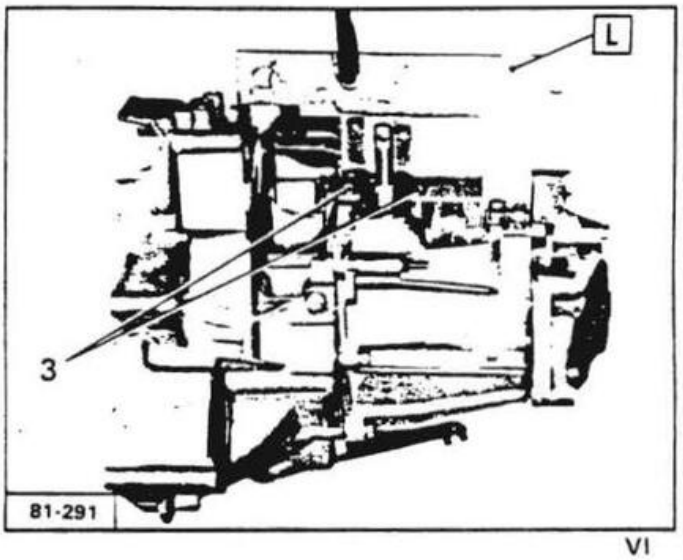
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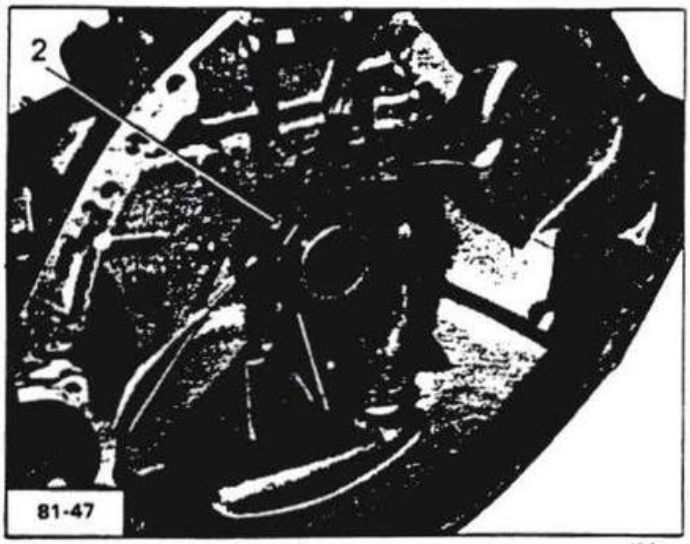
II



III



VI



IV

Earlier assembly : double bar
→ Chassis no. : 367.155

IDENTIFICATION OF THE GEAR CHANGE MECHANISM (Right hand drive)

1 - Gear change lever

2 - Gear change lever, lower section.

3 - Selector cross rod (ball joint centre to centre dimension : (X) = 350 mm.

4 - Selector relay lever.

5 - Selector operating rod.

6 - Coupling sleeve, linkage to gearbox.

7 - Relay rod, gear engagement.

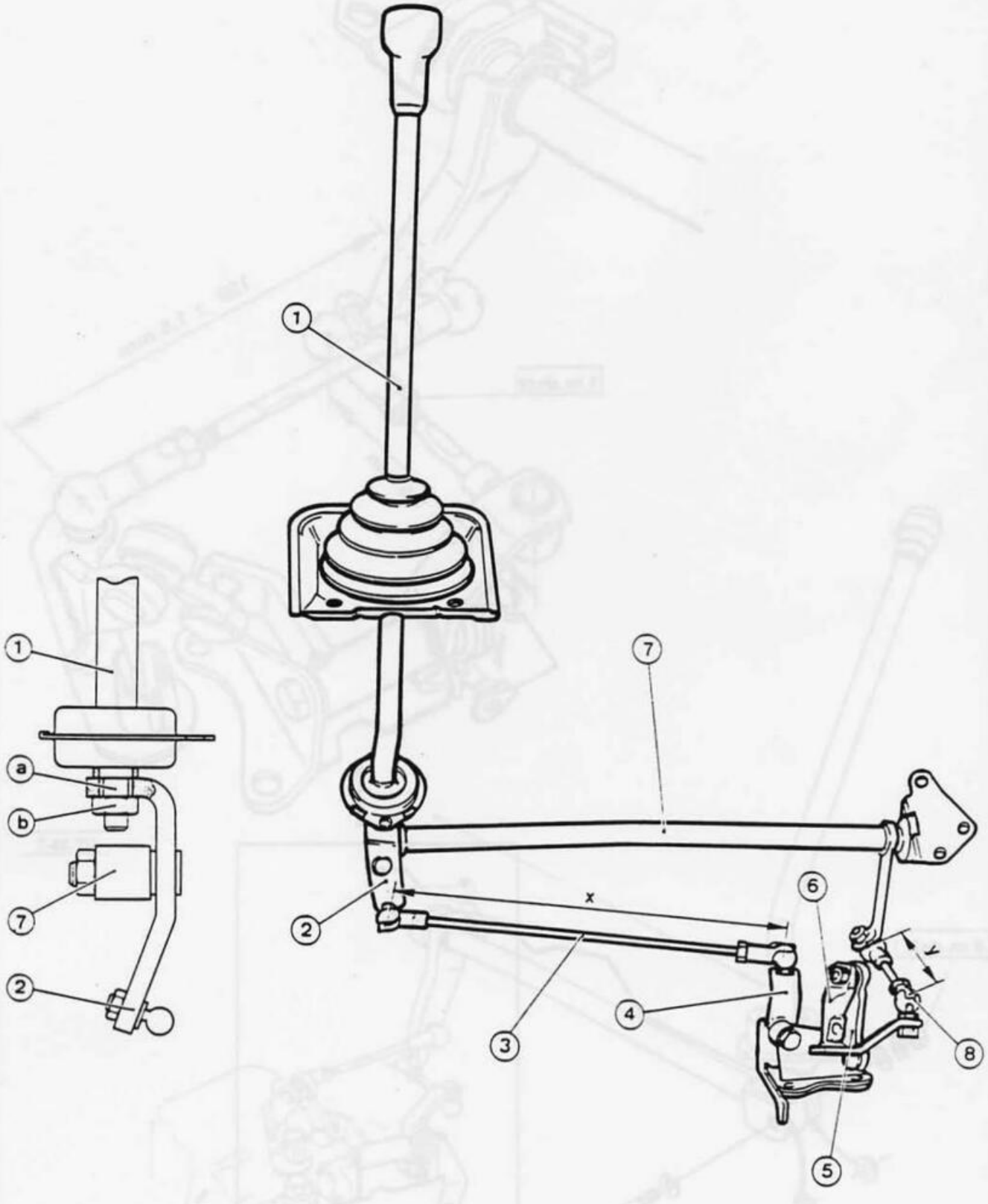
8 - Operating rod, gear engagement (ball joint centre to centre dimension (y) = 155 mm).

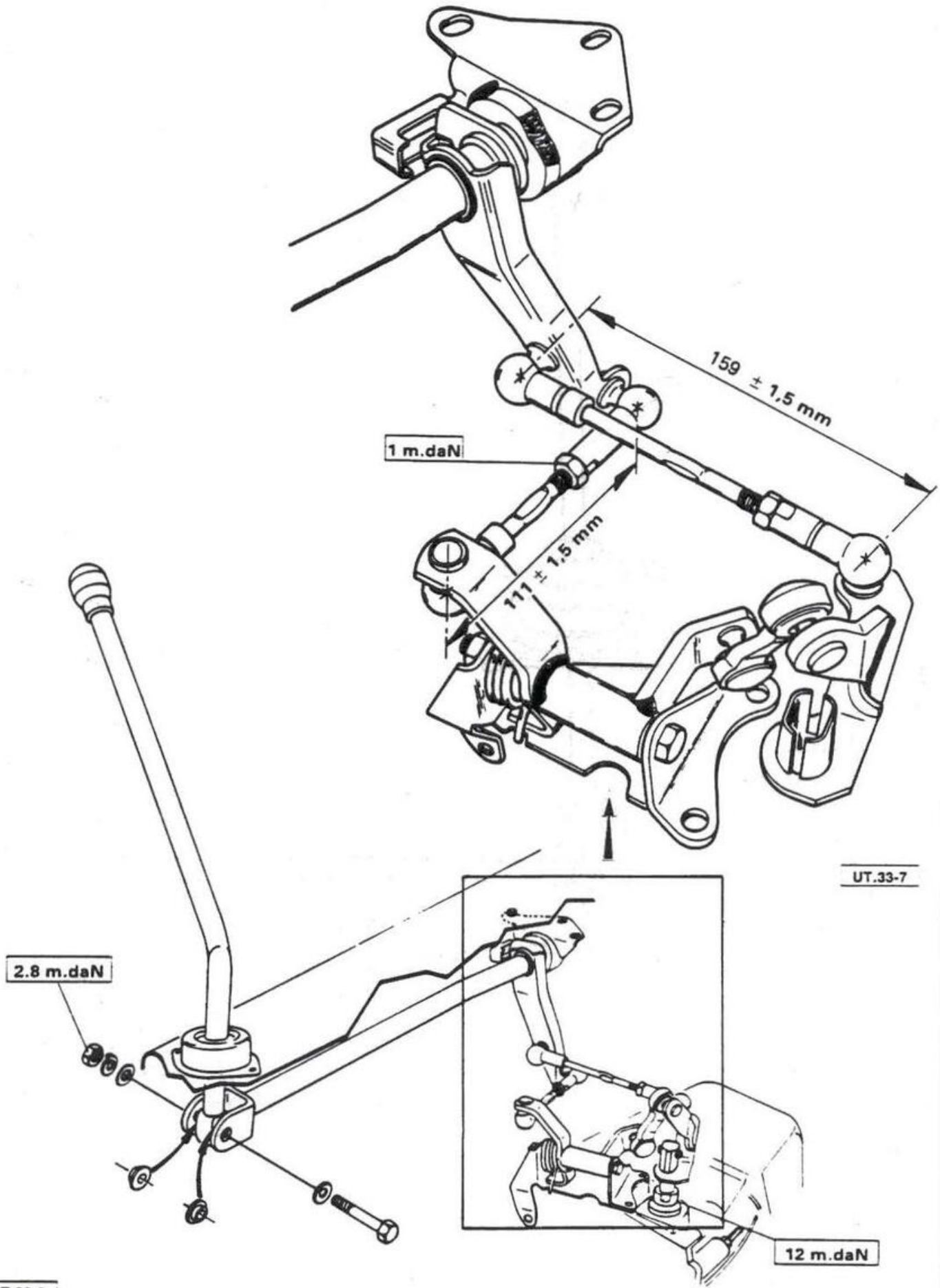
Details of side view :

a - flat for assembling the parts (1) and (2).

b - nut, HT 10 x 1,25 - tightening torque : 3,5 m.daN (26 lbf ft).

Important - These parts, including the main nut, must be assembled with thread locking Loctite.


1
1
a
b
7
2
7
2
x
6
3
4
5
8
y


159 ± 1,5 mm
1 m.daN
111 ± 1,5 mm
UT.33-7
2.8 m.daN
12 m.daN

Pages

B - TORQUE TUBE AND TRANSMISSION SHAFTS

Viscous coupling

Replacing the bearings — B5.001 to 003

C - TRANSVERSE DRIVE SHAFTS

Data

Transverse drive shaft data — C1.001 to 003

Removing - refitting

Removing - refitting the transverse drive shafts — C4.001 to 003

Overhauling

Working on drive shafts — C5.001 to 005

B5.002	4	4 x 4	VISCOUS COUPLING REPLACING THE BEARINGS	J5

Special tools :

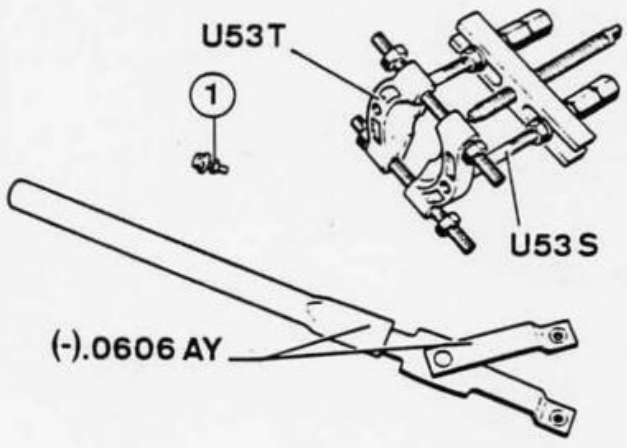
- Hub locking tool (-)0606AY
- (1) items required in addition to tool (-)0606AY : - 2 bolts HRDL 8 x 125 - 40
  - 2 nuts 8 x 125
  - 2 washers 9 x 20 - 4
- Facom extractor U53T
- Cross piece U53S

- Grip the viscous coupling in a vice equipped with soft jaws.
- Fit the tool (-)0606AY to the bell yoke to be extracted, using the bolts, washers and nuts described.
- Remove the bell yoke securing nut.
- Remove the yoke.

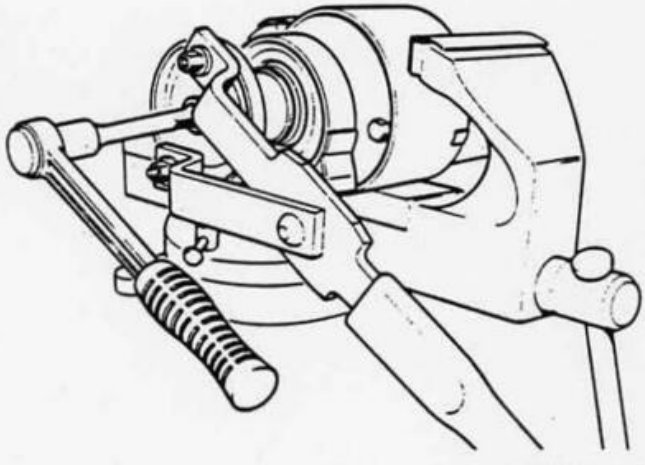
- Fit extractor Facom U53T and cross piece U53S behind the flange and remove it.

- It is not necessary to use a press to refit the flange and the bell yoke.
- After having repositioned all the parts, make up the same assembly as was used to extract the yoke and tighten the nut in the centre until the bearing and the yoke are fully emgaged.
  Nut tightening torque 160 N.m (118 lbf.ft).

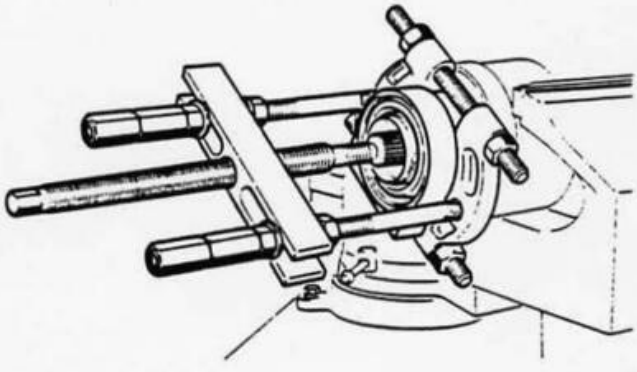
J5		4 x4	4	B5.003



23.11.88 CAR 3



23.11.88 CAR 1



23.11.88 CAR 2

SPECIFICATIONS :

– One ball type constant velocity joint at the wheel end.

– One spider joint at the gearbox end.

Left hand drive shaft Fig. I and right hand drive shaft for engine XUD9A

Right hand drive shaft Fig. II except for engine XUD9A

(1) Vent bush.

SPECIAL FEATURES :

Lubrication :

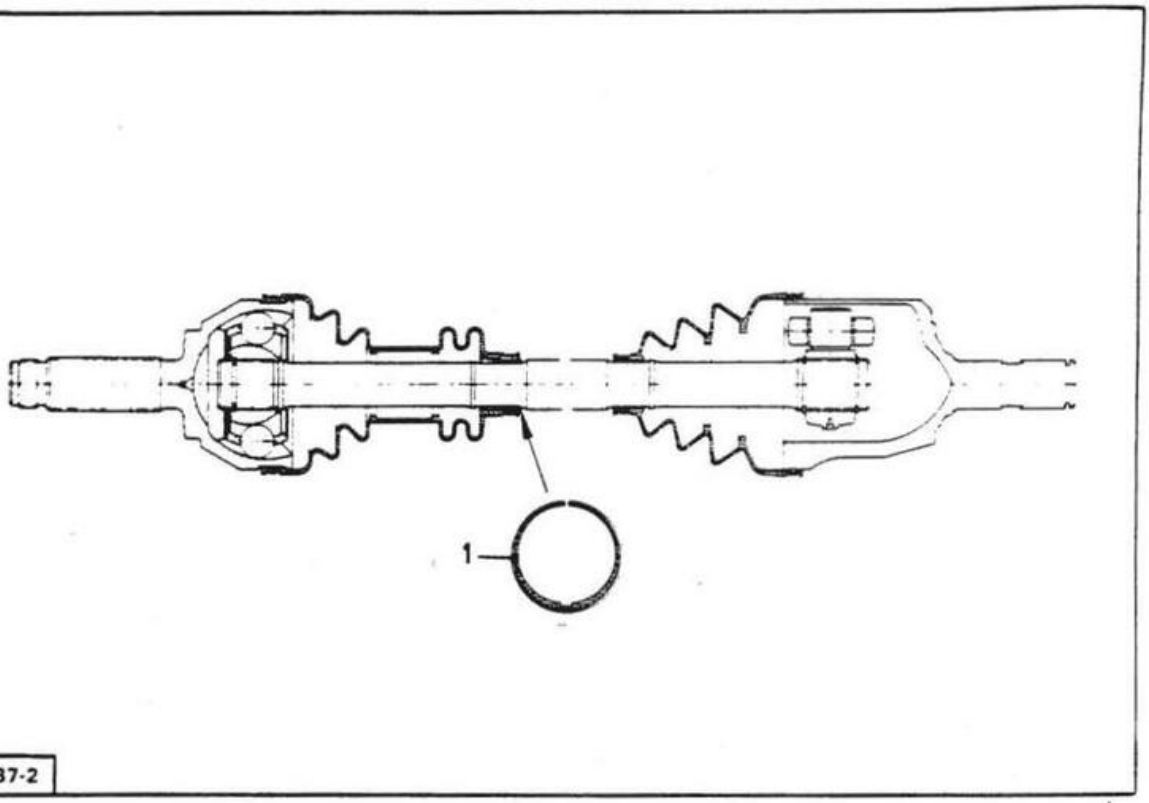
MoS2 grease

MOLYDAL Reference 1495

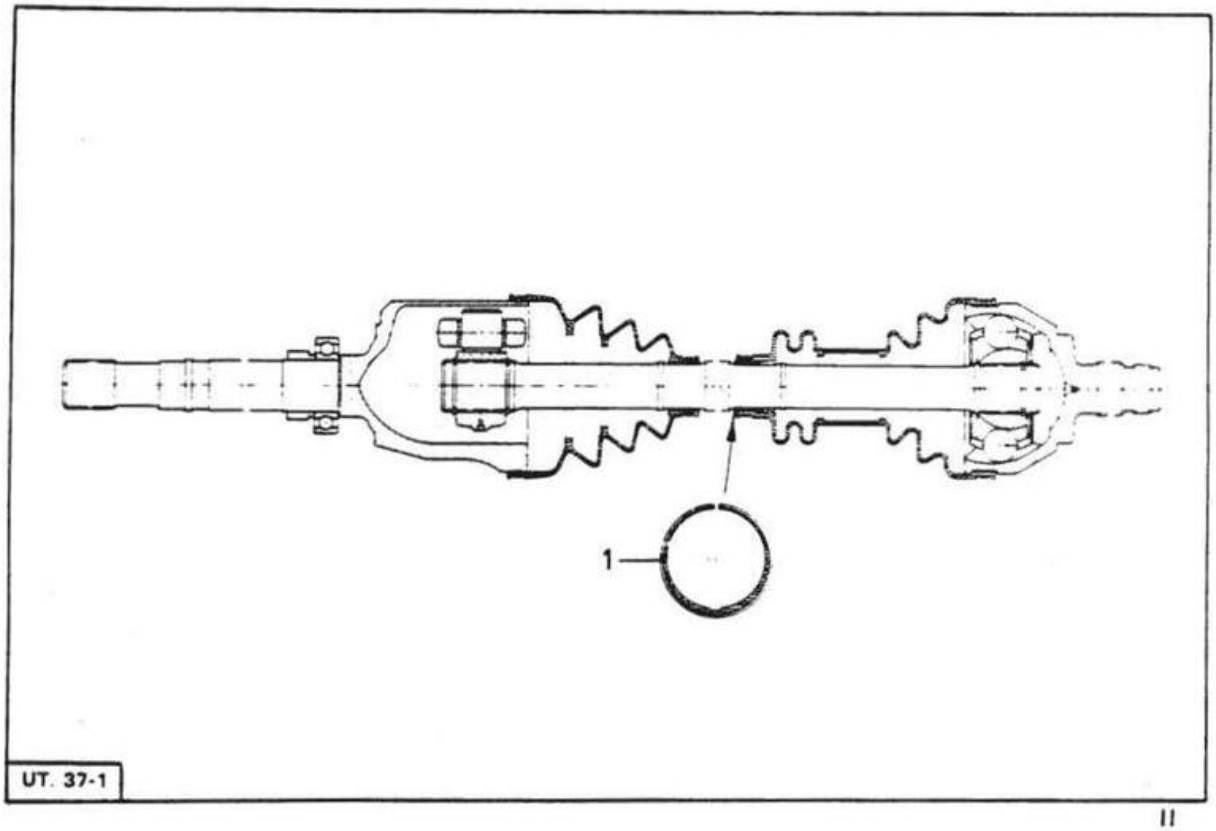
DOW CORNING Reference MOLYKOTE LONGTERM 2.

Tightening torque :	m.daN	Nm	lbf ft
Hub nut (with faces and threads lubricated) :	50	500	370

Damage to the drive shaft boots will cause all the grease to be lost and premature wear on the component parts.



I



II

TIGHTENING TORQUE

	m.daN	Nm	lbf ft
Hub (drive shaft) nut	50	500	370

REMOVING AND REFITTING THE PROTECTIVE HUB CAP

If the protective hub cap is to be re-used, the wheel will have to be removed so that the cap can be extracted using extractor U 53 T2 (for the operations involved in removing and refitting this plug see "Work on the rear hubs".

REMOVING

From the front hubs : figs. I and II

Remove the protective hub cap which covers nut (1).

Unlock the hub nut (1) and remove it.

Raise the vehicle and support it. (so that the wheels are hanging free).

Remove the bolts (4) that secure the lower ball joint and the bolts (2) that secure the steering lever.

Tilt the entire suspension assembly (3) towards the outside.

Free the pivot ball joint by pushing arm (5) : fig. II, downwards.

Withdraw the drive shaft from the hub.

On the right hand side : Fig. III

Loosen the two nuts (6) and swing down the tie rods.

Remove the drive shaft, the "0" ring, the teflon ring and the dust seal.

On the left hand side : Figs. V and VI.

Extract the drive shaft from the differential housing with a panel beater's drift (the drive shaft is retained in the sun gear by a circlip).

Push the drift between one of the differential housing bolts and the drive shaft yoke as shown in fig. V, then strike it, in a sideways direction, as shown in fig. VI.

Withdraw the drive shaft from the final drive.

REFITTING

Left hand side : Fig. IV.

Check that the "0" ring seal is in place on the shaft and fit a new circlip (13).

Ensure that the circlip enters fully into its location within the sun gear.

Right hand side : Fig. III

Insert the drive shaft into the support bearing at (7).

Fit to the shaft :
- the dust seal (1),
- the ring (11),
- the "0" ring (12).

Fit the bearing race (8) to the bearing support (7).

Swing the tie rods (9) through half a turn so that they grip the bearing outer track.

Tighten the self locking nuts (6) to a torque of 0.7 m.daN (7 Nm, 5 lbf ft).

On both front hubs : Fig. II

Pass the drive shaft through the hub (grease the area on which the dust seal will bear).

Engage the ball joint in the stub axel by pushing on the suspension arm.

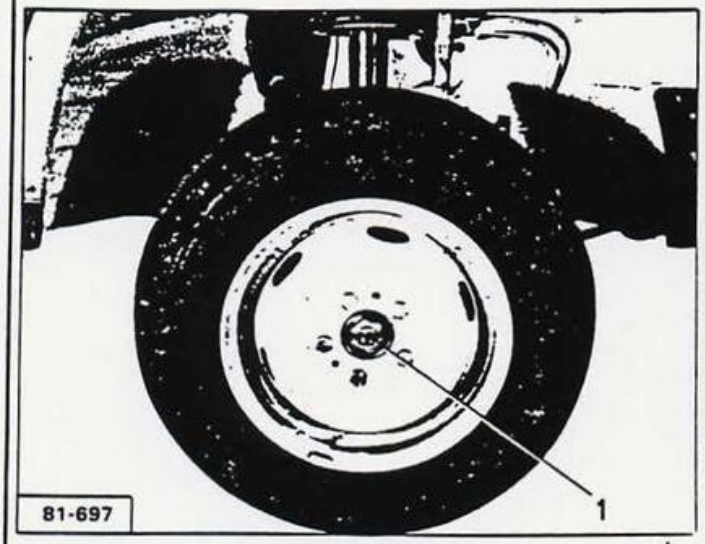
Fit the steering lever holts (2) and the lower ball joint bolts (4).

Lower the vehicle on to its wheels : I.

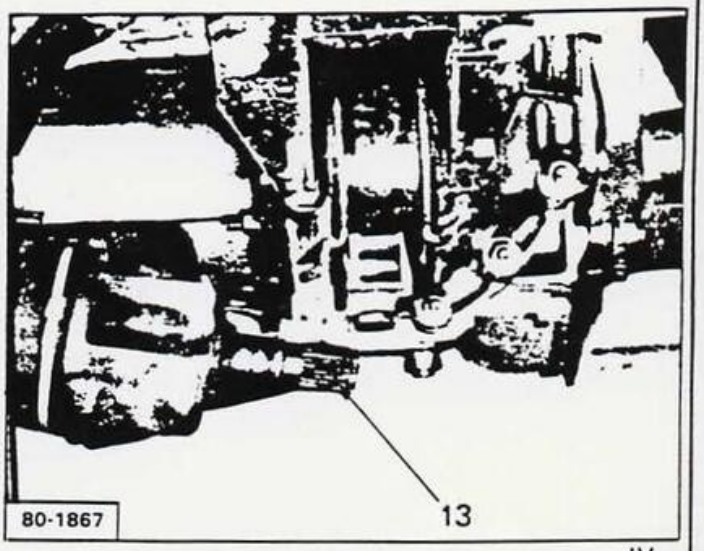
Tighten and lock the hub nut (1). Its tightening torque is 50 m.daN* (500 Nm, 370 lbf ft) with faces and threads greased) and it is to be locked at two points.

Fit the protective hub cap over the hub nut.

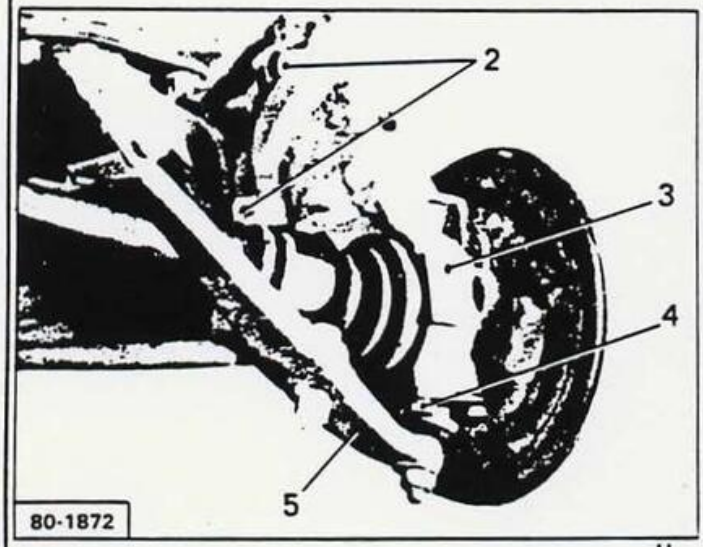
*use FACOM S203 torque wrench and extension K 214.



I



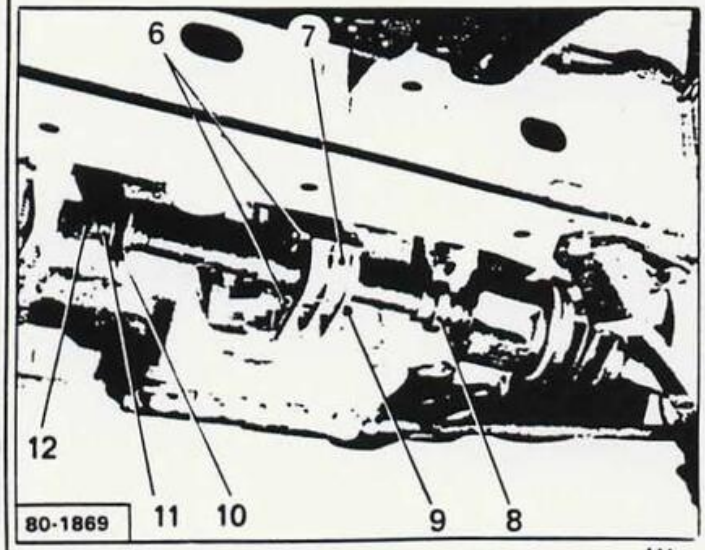
IV



II



V



III



VI

OVERHAULING A DRIVE SHAFT

Damage to the drive shaft boots will involve the loss of all the grease and premature wear on the component parts.

NOTE - All replacement boots supplied by the Parts Department are supplied with a sachet of grease.

NOTA - Only the final drive (inner) end of the shaft can be overhauled.

DISMANTLING

Remove the clips (1), (3) and (5).

Remove the drive shaft drive end : figs. I, II and III.

Pull back the protective boot (4) on the drive end (6) and slide it towards the ball type joint end.

Remove the drive end (6) from the drive shaft assembly.

Remove :
- the rollers (7),
- the circlip (10),
- the spider (9),
- the circlip (8),
- the boots (4) and (2). (Take care with the vent bush : move it aside).

CLEAN ALL THE PARTS

(Remove the old grease from the ball type wiping it with a clean cloth).

Reassembly

Smear the grease over the ball type joint.

Ball joint type end :

Smear the grease over the ball type joint and the protective boot (2).

Fit :
- the boot over the ball type joint,
- the vent bush at "a".

Fit the "LIGAREX" clips (1) and (3).

At the drive end :

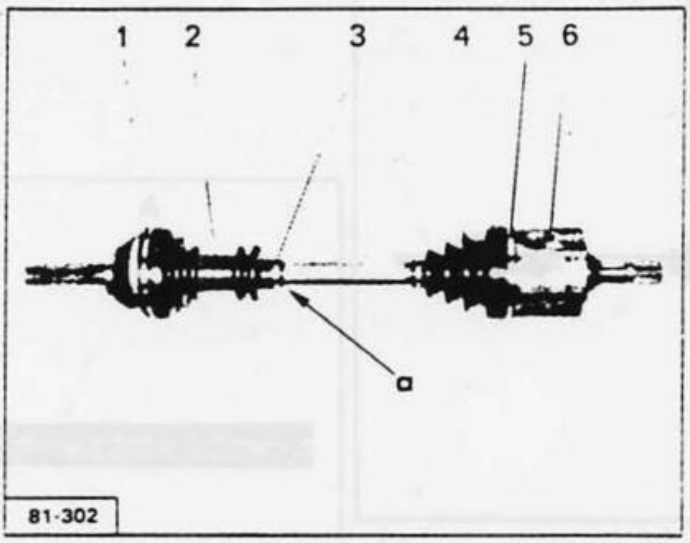
Fit :
- the circlip (8),
- the spider (9),
- the circlip (10).

Coat the rollers (7) with grease and fit them to spider (9).

Spread grease throughout the drive end (6) and inside the protective boot (4).

Fit :
- the drive end (6),
- the boot (4) over the drive end.

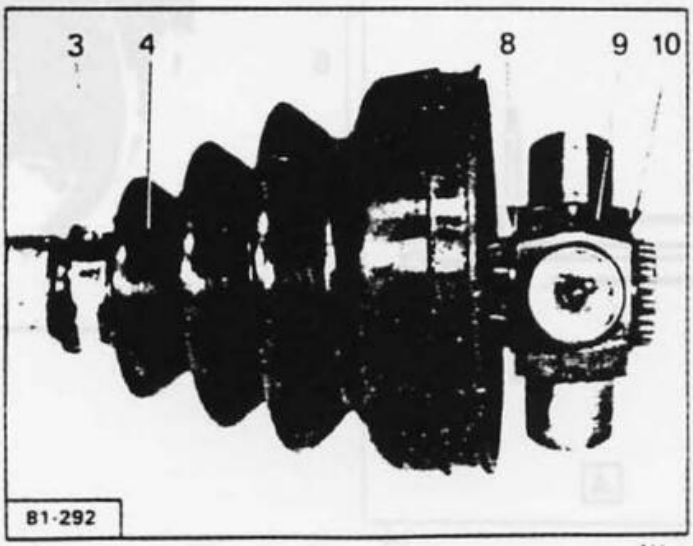
Fit the "LIGAREX" clips (3) and (5).



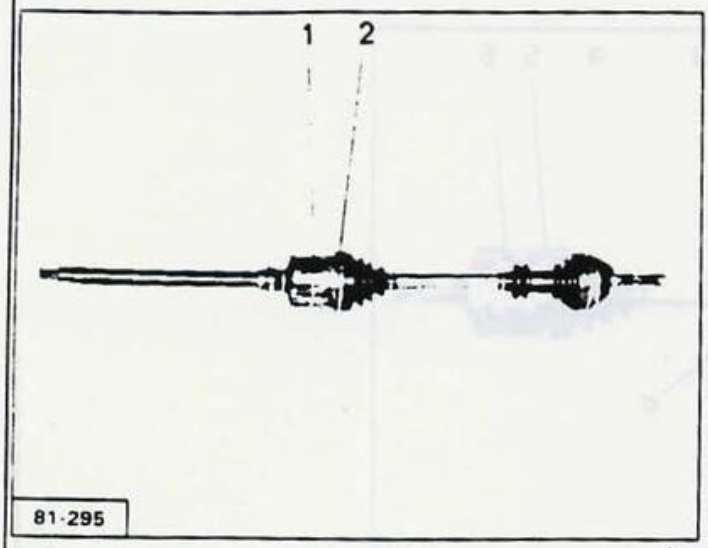
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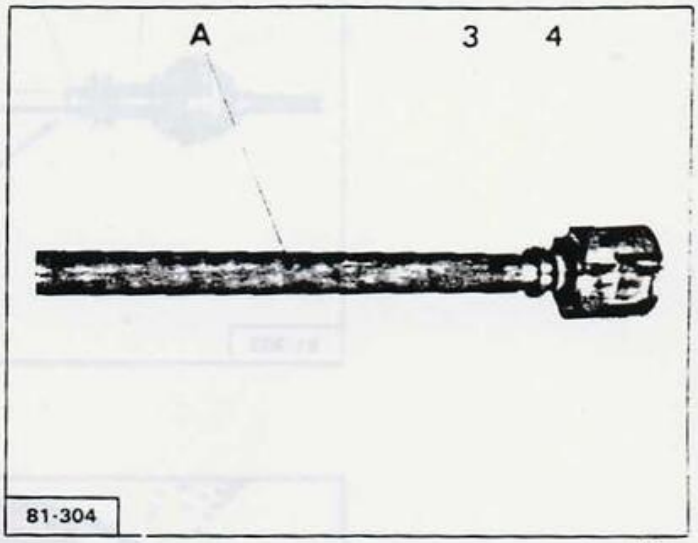
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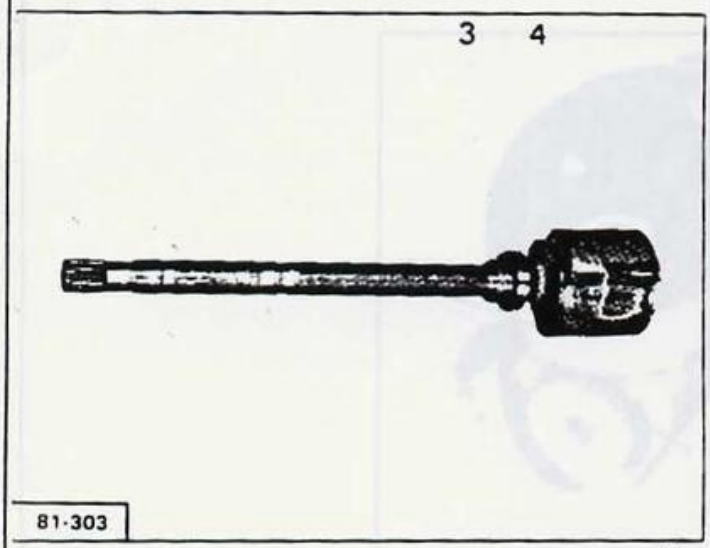
III



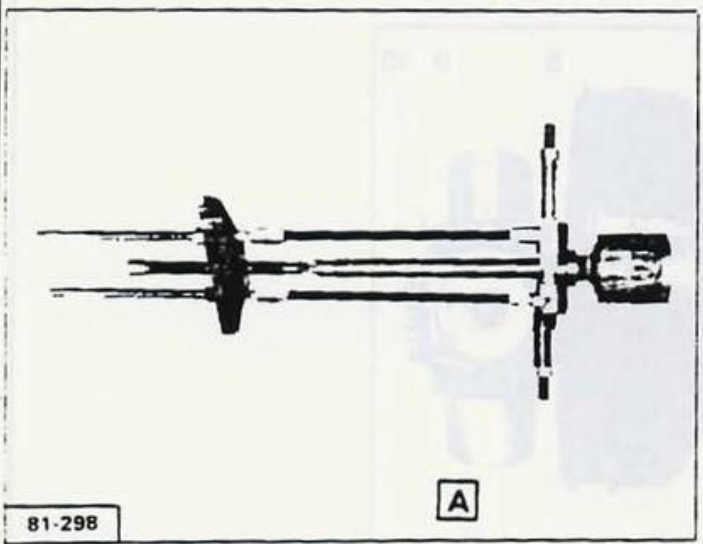
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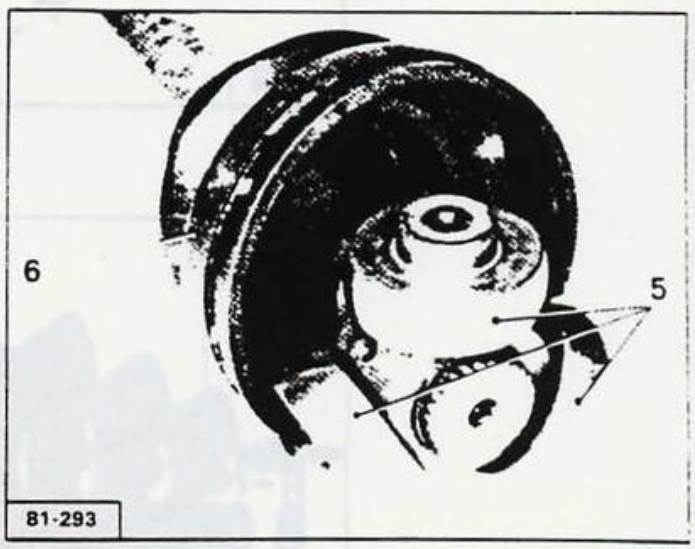
IV



II



III



V

REPLACING THE GUIDE BEARING (right hand drive shaft)

REMOVING

Removing the drive shaft drive end : fig. I

Remove the clip (2) and take off the drive end (1).

Removing the circlip (3) and bearing (4) : figs. II and III.

Carry out these operations with the extractor [A] FACOM U53T2 fitted with its extensions.

CAREFULLY CLEAN ALL THE PARTS.

REASSEMBLY

Fitting the bearing (4) : fig. IV.

Fit the bearing using the tube A (i.d. = 36 mm, length = 450 mm).

Fitting the circlip (3) :

Use tube A.

Coat the roller (5) with grease and fit them to the spider : fig. V.

Spread the grease contained in the sachet inside the drive end and in the protective boot (6). (the grease is supplied with all new boots).

Fit the drive end :

Fit the "LIGAREX" clip (2).

CONTENTS

Pages

A - COMPLETE UNIT

Data

Removing-refitting the complete rear axle A4.001 to 007

B - HUBS

Removing-refitting

Removing-refitting a rear hub E4.001 to 007(1)

Overhauling

Overhauling a rear hub E5.001 to 005

J — HALF SHAFTS AND HALF SHAFT TUBES

Removing - refitting a half shaft

Overhauling

DATA

PRIOR REQUIREMENTS BEFORE CHECKING AND ADJUSTING

The tyre inflation pressures are to be correct.

Toe-in/out (not adjustable) : ..... ± 1 mm

SPECIAL FEATURES

The rear axle is of the lowered type : Fig. I and III

The centreline « A » of the stub axle is higher than the centreline of the axle tube B.

Wheel hubs : Fig. II

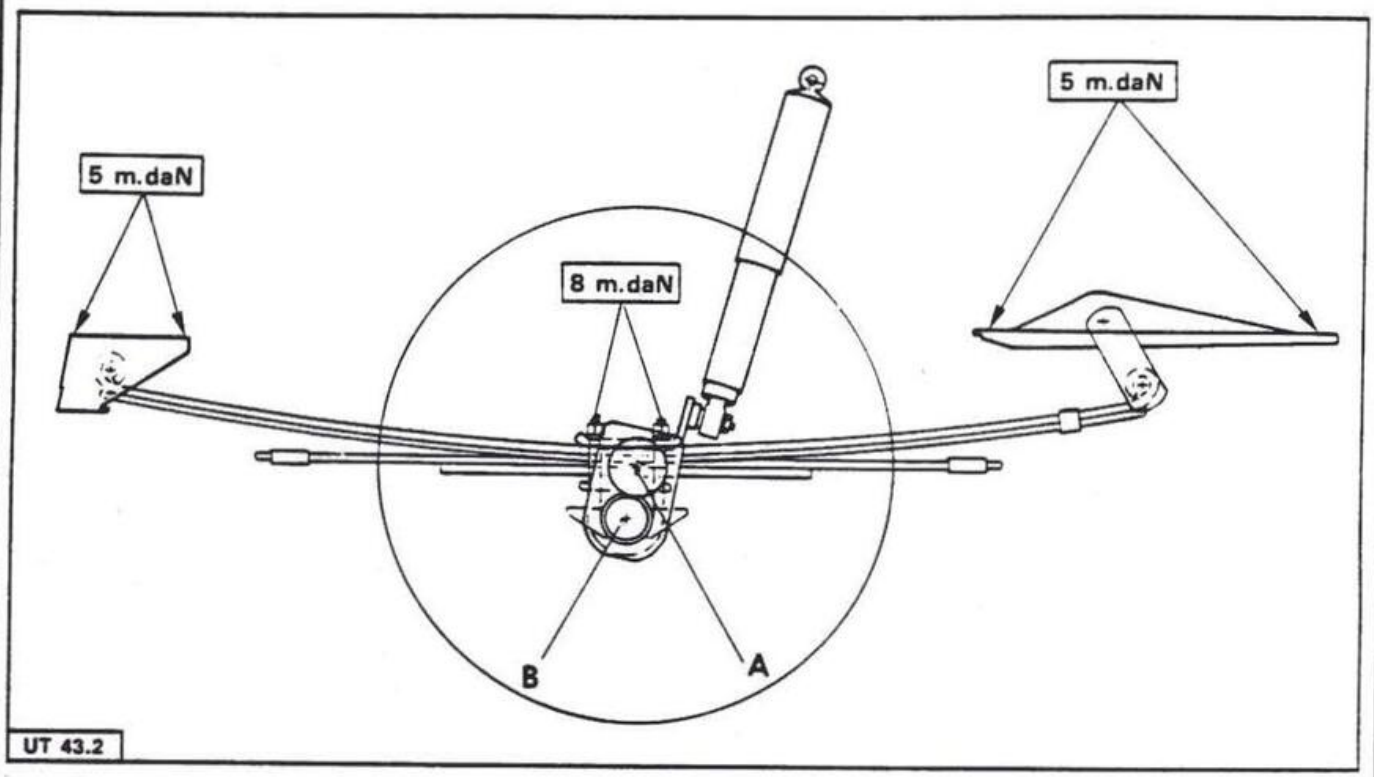
Bearing operating play : ..... 0.025 to 0.10 mm

Tightening the hub nut : See the section concerned.

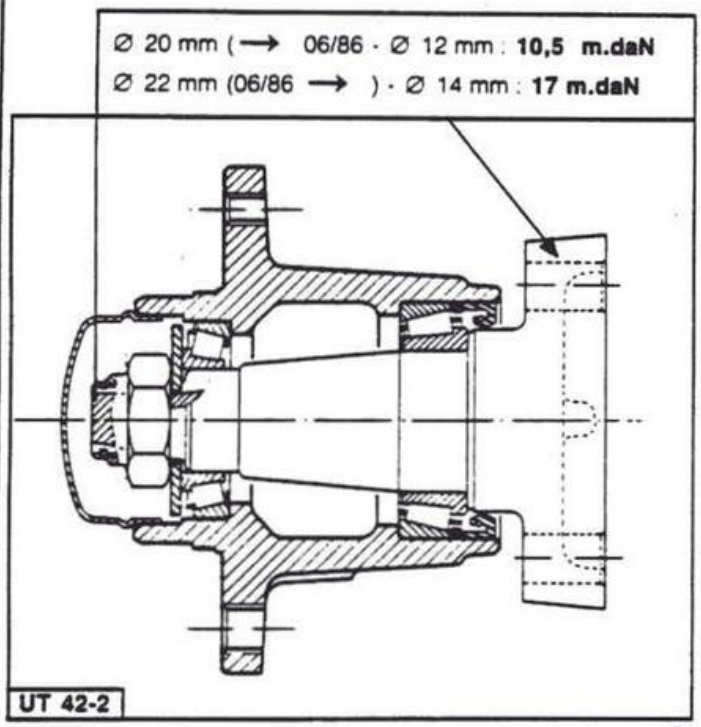
NOTE : the stub axle on the right hand side has a left hand thread and is identified by a drill point mark on one side of the base plate flange.
the stub axle on the left hand side has a right hand thread.

REPLACEMENT : only the stub axle with the right hand thread is available from the Parts Department.

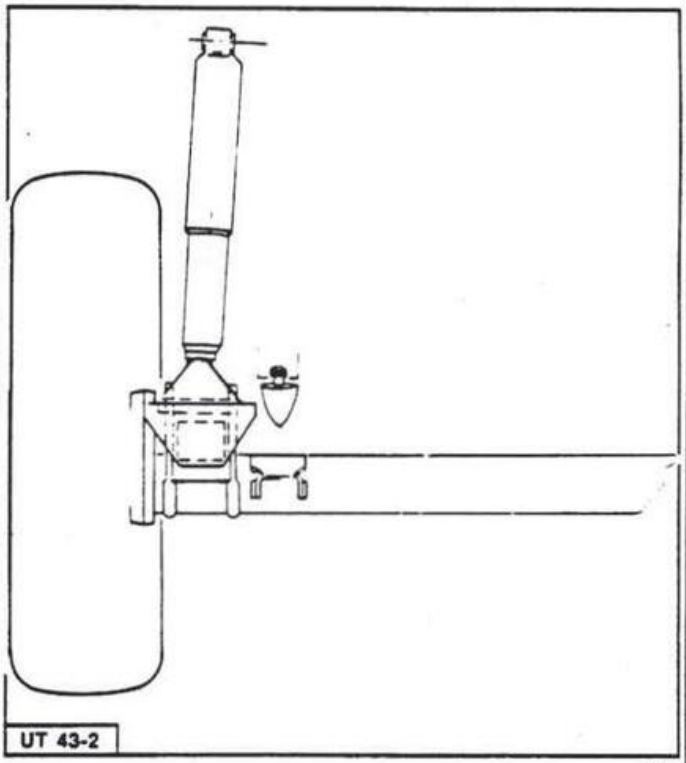
1800 kg vehicles are equipped with hubs and stub axles on which the bearings are wider.


5 m.daN
5 m.daN
8 m.daN
B
A
UT 43.2

I


Ø 20 mm (⟶ 06/86 - Ø 12 mm : 10,5 m.daN
Ø 22 mm (06/86 ⟶) - Ø 14 mm : 17 m.daN
UT 42-2

II


UT 43-2

III

TIGHTENING TORQUES

Essential tightening torques	m.daN	Nm	lbf ft
Front and rear mounting bracket bolts	5	50	37
Shackle nut bolts	12	120	88
Spring pin nut	15	150	110
Damper lower securing nut	5	50	37
Damper upper securing bolt	5	50	37

REMOVING

Raise the rear of the vehicle and support it on stands sufficiently far off the floor for the axle, on its wheels, to be removed from under the rear of the vehicle body.

Place a trolley jack under the axle tube.

Disconnect : figs. I and II

- the brake hose (1) from the brake pipe (2),
- the brake compensator control (4) from the link (5),
- the hand brake cable (6) from swivel lever (7).

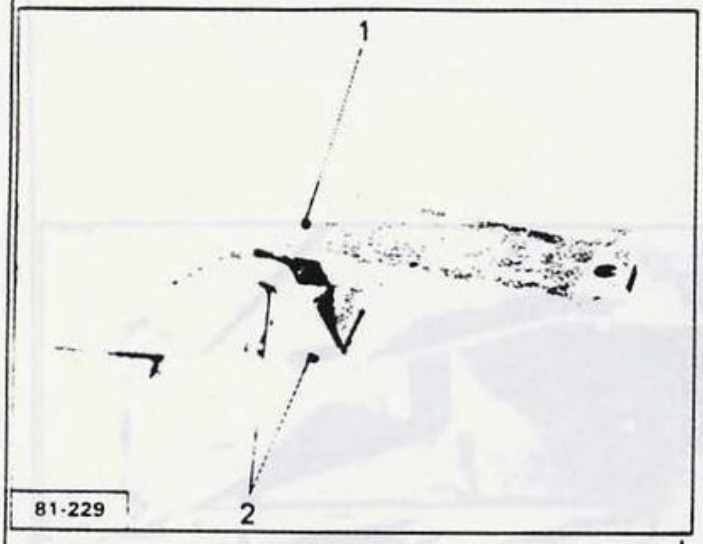
Remove : fig. II

- the clip (3) which secures the hose (1) to the body,
- the dampers.

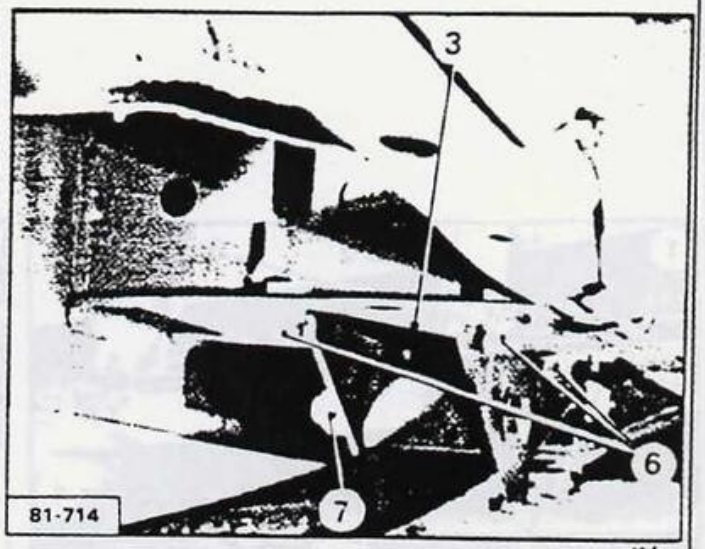
Remove : figs. III and IV

- the front mounting bracket securing bolts (8),
- the rear mounting bracket securing bolts (9).

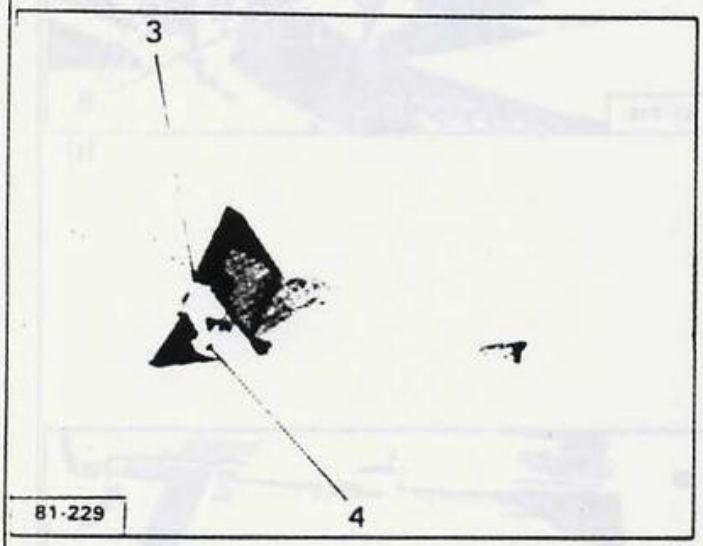
Lower the axle on to its wheels and remove it in a rearward direction from under the vehicle.



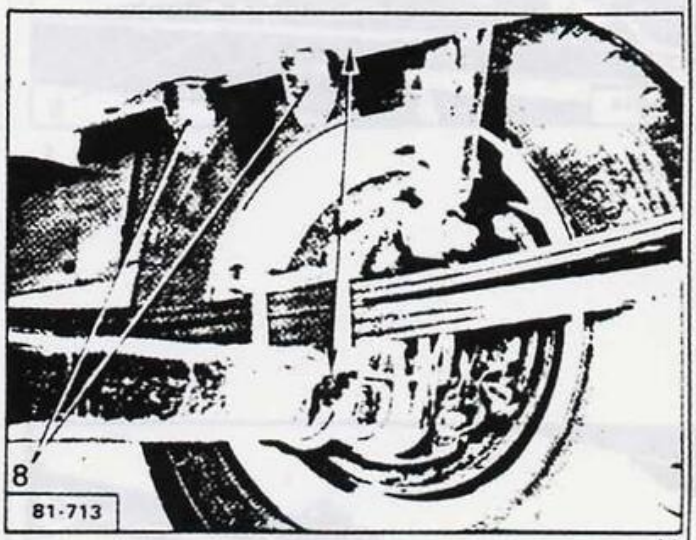
I



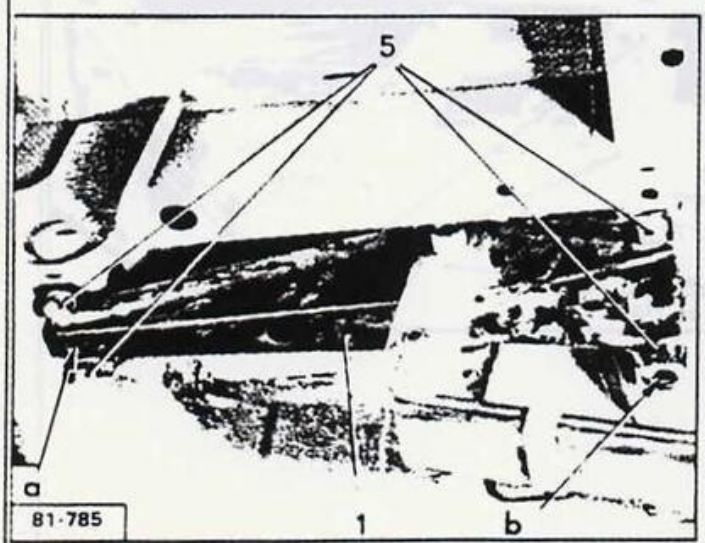
IV



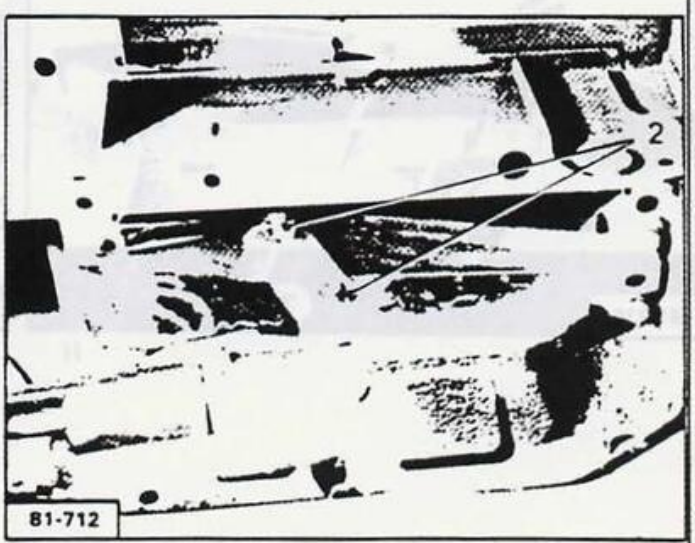
II



V



III



VI

FITTING

Securing the axle to the underside of the body will be easier if the shackle nuts (2) and the pin nuts (4) are loose : figs. I and II.

Push the axle under the body and, with a trolley jack, lift it until its rear mountings (1) make contact with the body.

Fit the bolts (5) : fig. III, which secure the rear mounting brackets (1), without tighening them.

Centralise the rear mounting brackets (1) by inserting : fig. III.

- a 12 mm Ø rod through the holes (a),
- a 16 mm Ø rod through the holes (b).

Tighten the securing bolts (5) to a torque of 5 m.daN (50 Nm, 37 lbf ft).

Raise the axle to bring the front mounting brackets (3) into contact with the body.

Fit the securing bolts (6) fig. IV to the front mounting brackets (3), without tightening them.

Centre the front mounting bracket (3). The bolts (6) must be in the centre of their slots.

Tighten bolt (6) to a torque of 5 m.daN (50 Nm, 37 lbf ft).

Fit the dampers, without tightening their securing nuts and bolts.

Lower the vehicle to the floor.

Essential :

To obtain the required operating life from the rubber bushes, it is essential that the following tightening operations are only carried out after the rear suspension has been compressed so that the distance between the face with which the bump stops (8) make contact on the axle and the face against which they are secured on the body is 107 mm : fig. V.

Tighten : figs. IV and VI :

- the shackle nuts (2) to a torque of 12 m.daN (120 Nm, 88 lbf ft),
- the spring pin nuts (7) to a torque of 15 m.daN (150 Nm, 110 lbf ft).
- the damper securing nuts and bolts to a torque of 5 m.daN (50 Nm, 37 lbf ft).

Release the rear suspension.

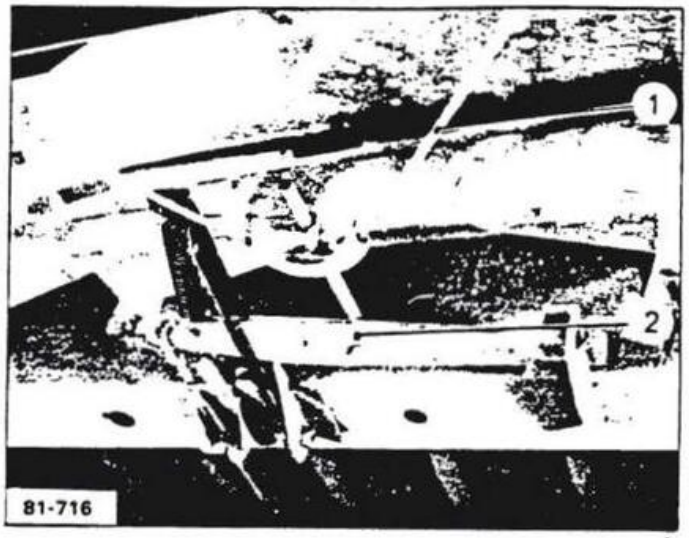
Connect : Fig. I and II

- the hand brake cable (1) to the swivel (2).
- the brake hose (7) to the feed pipe (3).
- the brake compensator control (5) to the link (6).

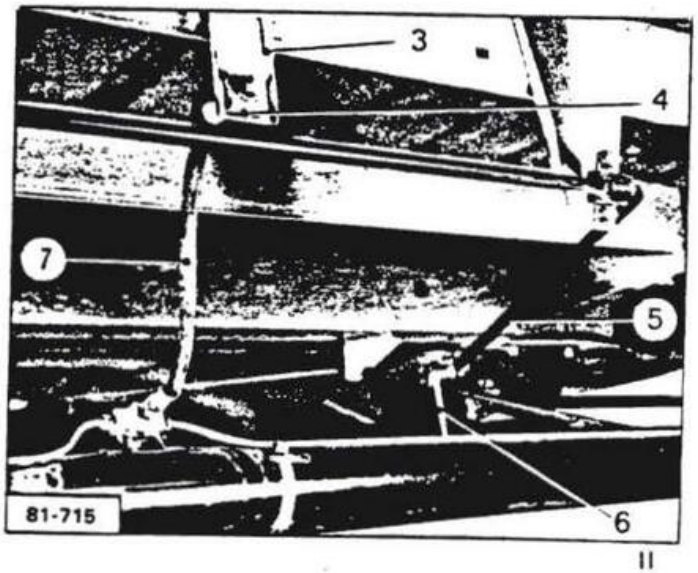
Fit the clip (4) that locks the brake hose (7) to the body : Fig. II.

Bleed the brakes :
(See section concerned).

Adjust the hand brake :
- 4 to 5 notches on the hand brake travel before it locks.



I



II

TOOLING

SPECIAL TOOLS

From kit

Reference : 8.0531 ZZ

USE :

D : Plug for fitting hub plugs

D2 : Plug for fitting hub plugs ↦ Chassis no. 278.758 Fig. I

C : Gauge for adjusting the bearing play Fig. II

E : Gauge for adjusting the bearing play ↦ Chassis no. 278758 Fig. III

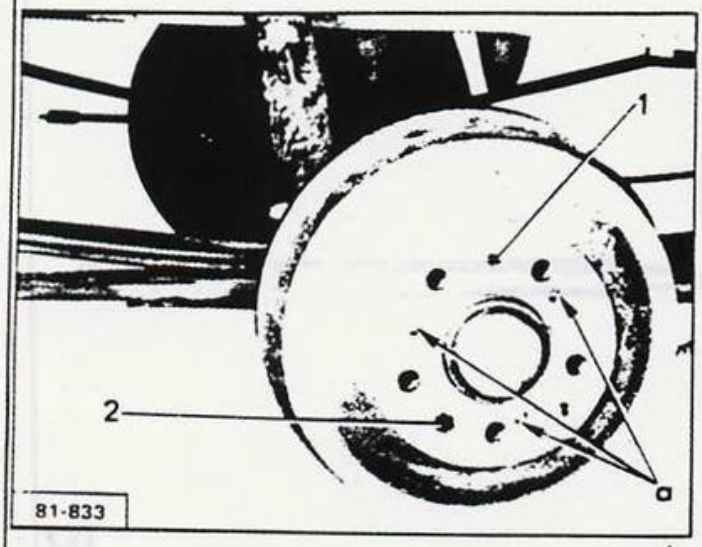
(-).0902 K : Tool for locking the rear hub nut Fig. IV

RECOMMENDED TOOLING

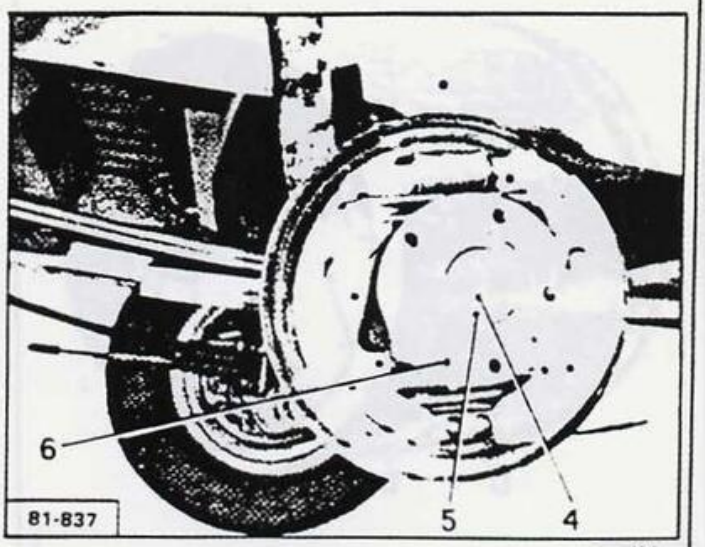
Extractor FACOM U 53 T2 Fig. V

TIGHTENING TORQUES

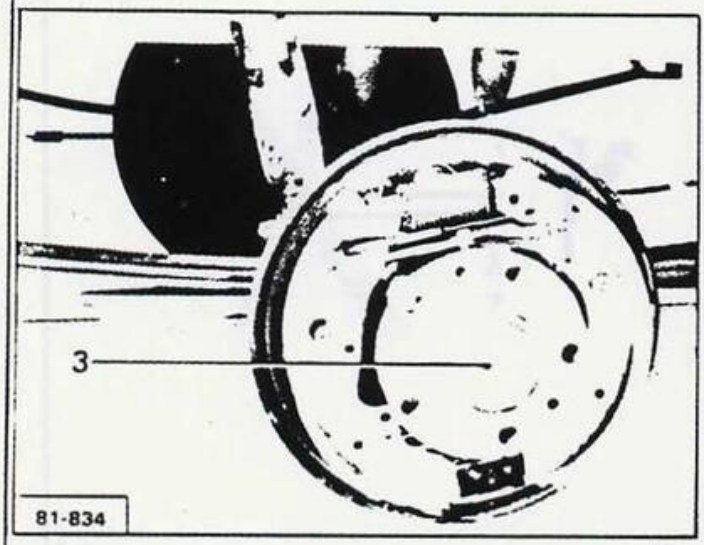
Torques that must be adhered to :	Torque in N.m (lbf.ft.)
Bolt securing the brake back plate and stub axle to the rear axle body :	Bolts ø 12 mm 105 (77.5) Bolts ø 14 mm 170 (125)



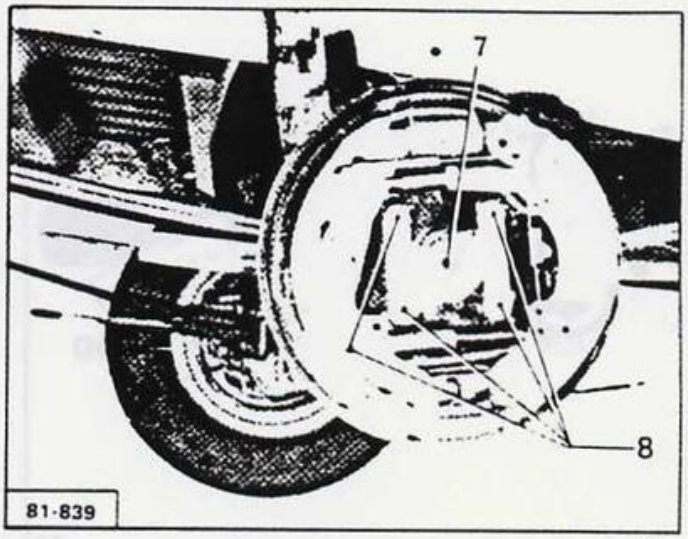
I



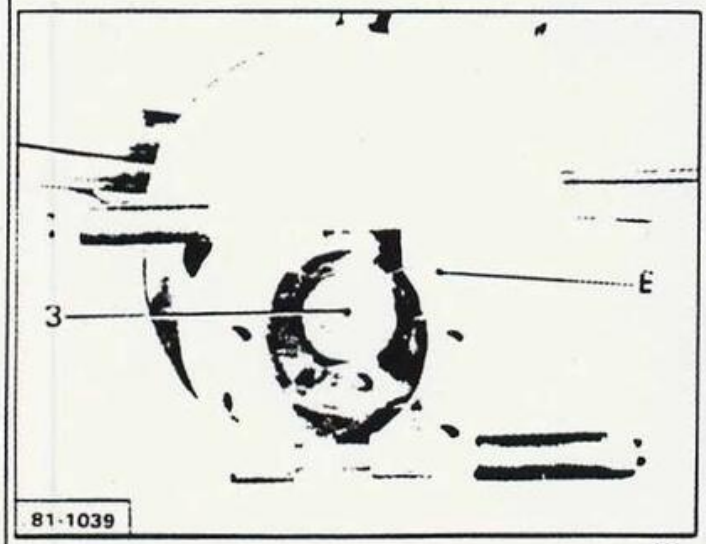
IV



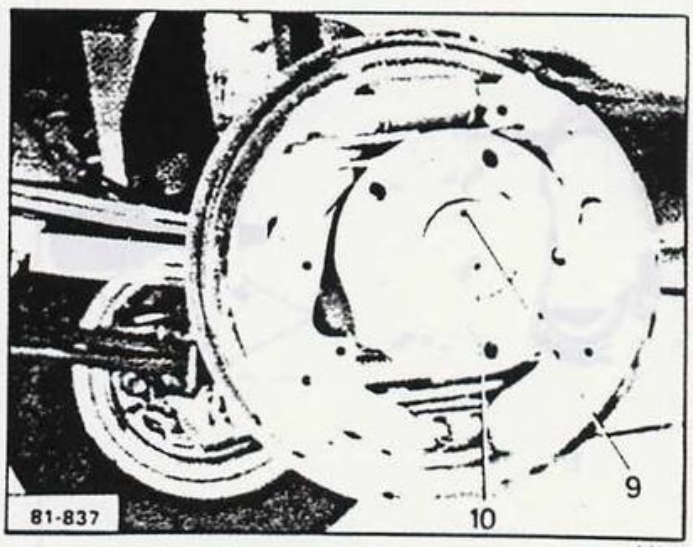
II



V



III



VI

REMOVAL

Slacken the wheel bolts
Support the rear of the vehicle with the wheels suspended
Remove the wheel

- the bolt (2),
- the wheel dog (1),
- the drum, using three bolts (Ø = 10mm, pitch = 1.25) in the holes "a",
- the hub cap (3)

If the hub cap (3) is to be re-used, remove it with the FACOM U 53 T2 extractor, Fig. III

Remove, Fig. IV
- the hub nut (4),
- the abutment washer (5),
- the hub (6) with its bearings.

If necessary, release and remove the bolts (8) to remove the stub axle (7), Fig. V.

REFITTING

Tighten the bolts (8) to 105 Nm (77 lbf ft) (fig.V)

Fit, Fig. VI :
- the hub to the stub axle
- the outer race of the outer bearing,
- the abutment washer (9),
- a new nut (10).

Fit, Fig. I :
- the drum,
- the bolt (3),
- the wheel centraliser (2).

ADJUSTING THE BEARING CLEARANCE

WARNING : The right-hand side stub axle has left-hand threads.

OPERATIONS COMMON TO BOTH SIDES: Fig. I

Tighten the hub nut (1) to 20 Nm (15 lbf ft) while turning the drum in both directions.

Slacken the hub nut then re-tighten it to 7 Nm (5 lbf ft).

Position the gauge C or E on the hub nut.

Turn the drum so that a wheel bolt (4) can be fitted through the slot in gauge C or E.

ADJUSTING THE RIGHT-HAND THREAD STUB AXLE

Bring the bolt (4) (↷) to the left-hand side of the gauge slot: Fig. II

APPLY THE HANDBRAKE

Slacken the hub nut (↷) while pivoting the gauge : Fig. III.

Tighten the bolt (4) to 10 Nm (7 lbf ft)

Lock the hub nut at 2 points (locking tool (-).0902 K) Fig.VI.

ADJUSTING THE LEFT-HAND THREAD STUB AXLE

Bring the bolt (4) (↷) to the right-hand side of the slot in the gauge : Fig.IV.

APPLY THE HANDBRAKE

Slacken the hub nut (↷) while pivoting the gauge : Fig. V.

Tighten the bolt (4) to 10 Nm (7lbf ft).

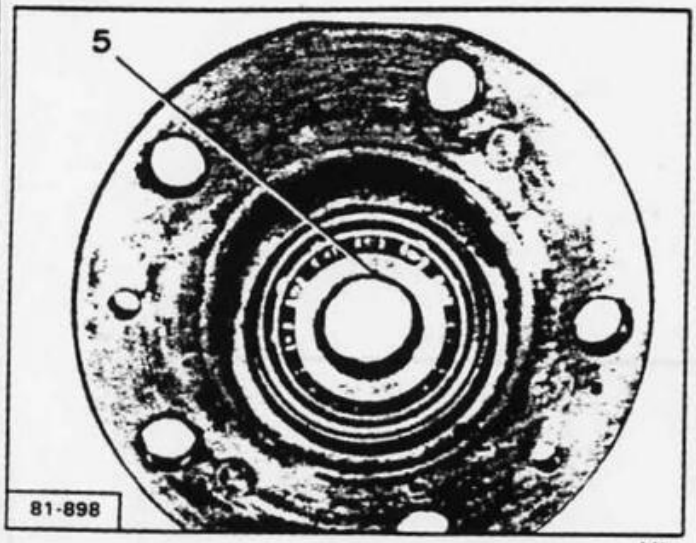
Lock, Fig. VI, the hub nut at 2 points using tool (-).0902 K.

FINAL OPERATIONS

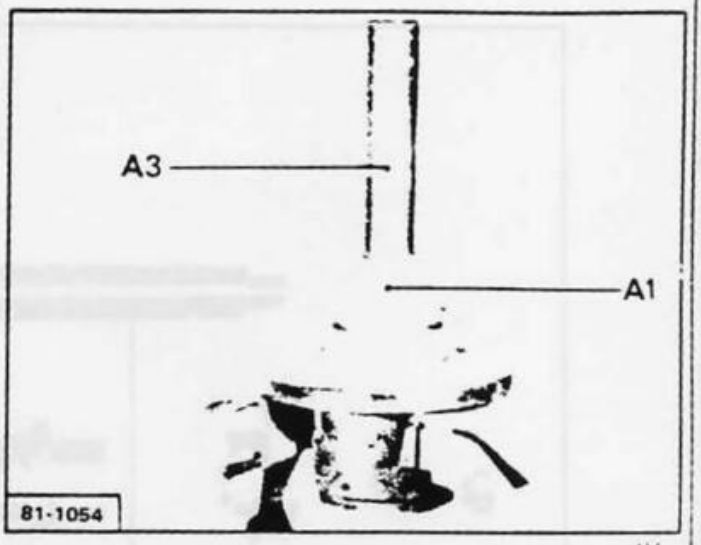
Remove the gauge C or E and release the handbrake.

Fit the hub caps using drift D or D2

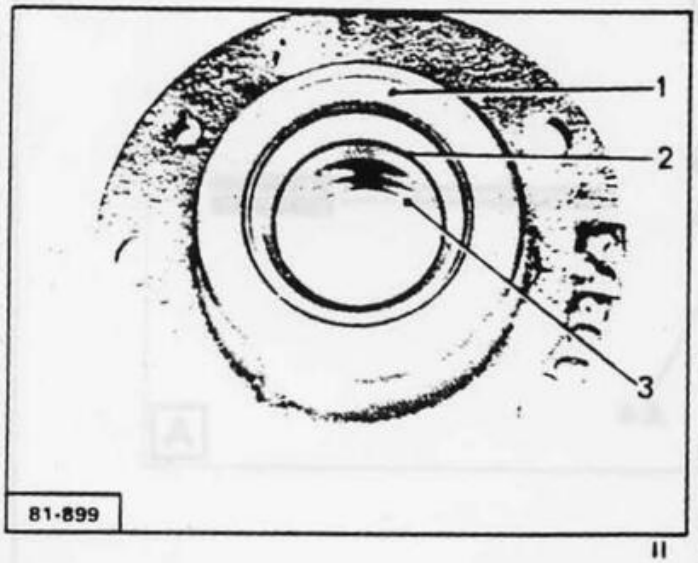
Fit the wheels and tighten to 160 Nm (118 lbf ft).



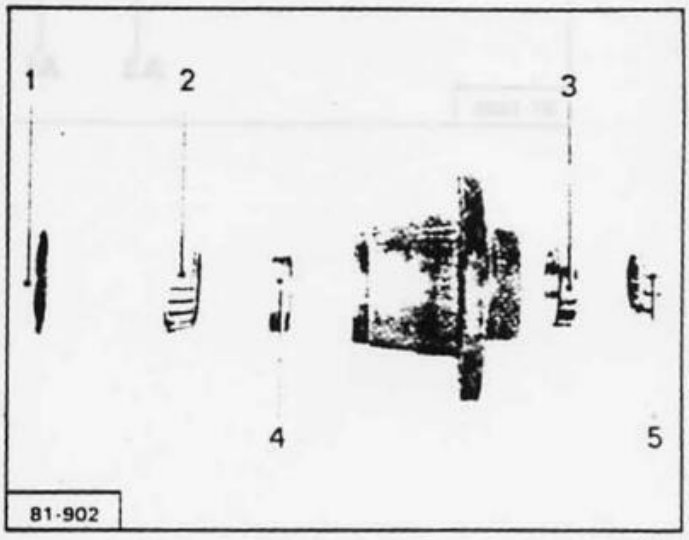
VI



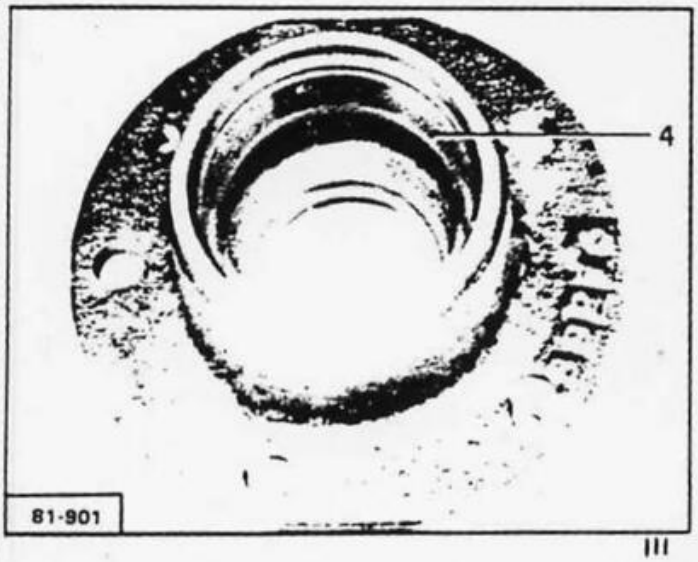
IV



II



V



III

DISMANTLING

Remove, fig. I, the outer bearing inner track (5) and cage.

Remove, figs. II and III

- the seal (1) and inner track (2),
- the outer track (3), by driving it out,
- the outer track (4), by driving it out.

Clean all the parts.

REASSEMBLING

Grease all the parts and partially fill the inside of the hub with ESSO MULTIPURPOSE grease 4746.

Fit, figs. II, III and IV, the outer tracks (3) and (4) using the drift and the mandrel (items A1 and A4 from kit 8.0531 ZZ)

Fit, fig. V :

- the inner track (2),
- a new seal (1).

I

REMOVING

Support the rear of the vehicle on stands.

Remove :

- the wheel
- the 2 wheel locators (1)
- the drum

II

Remove the hand brake cable from its lever and knock out the cable cover end stop from the brake back plate using a pin punch.

Remove the brake fluid pipe and plug it.

III

Remove the 4 bolts (2) that secure the brake back plate.

IV

Fit inertia extractor FACOM U11 to the hub and secure it to the hub with the wheel bolts.

Extract the hub, half shaft and brake back plate assembly.

V

REFITTING

Carry out the removing operations in reverse.

IMPORTANT :

Coat the bearing locating area inside the half shaft tube → with « Autoform 549 » sealing compound.

Bleed the braking system.

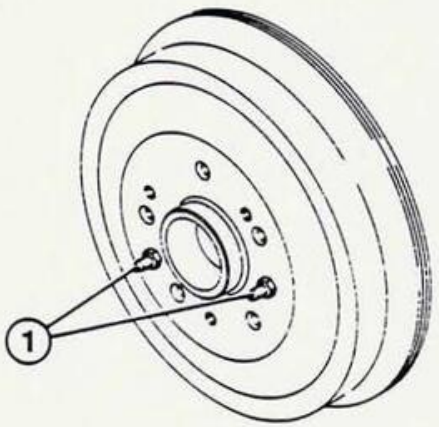
Check the level of the oil in the rear final drive unit.

VI

PRECAUTION

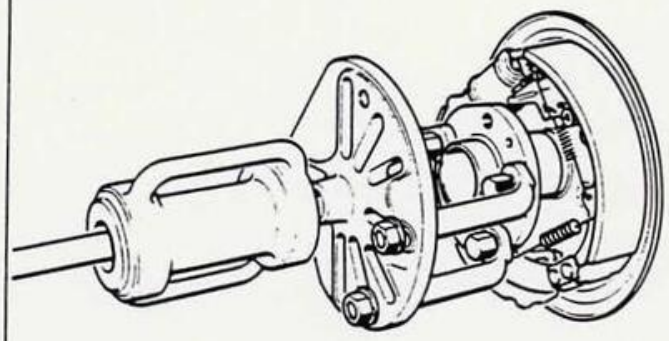
If both rear half shafts have to be removed, we recommend that the operation should be carried out one side at a time as, otherwise, one of the differential gears in the final drive unit may slip out of place.

I



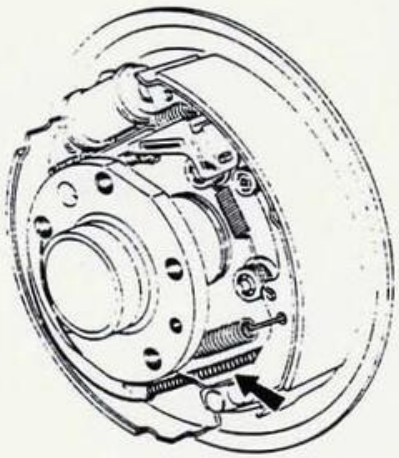
09-11-88 CAR 3

IV



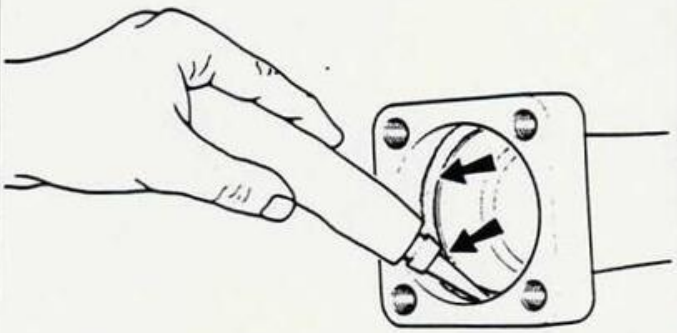
09-11-88 CAR 2

II



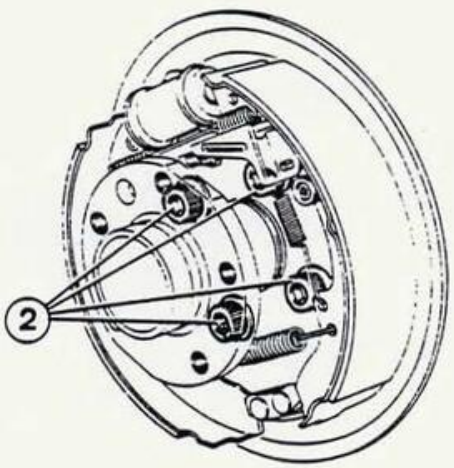
09-11-88 CAR 8

V



09-11-88 CAR 1

III



09-11-88 CAR 4

SPECIAL TOOLS FROM
KIT 8.0521

K - set of 2 extractor shell quarter sections

L - spacer washer

M - thrust pad

N - pad for fitting the bearing and retaining ring

RECOMMENDED TOOLS

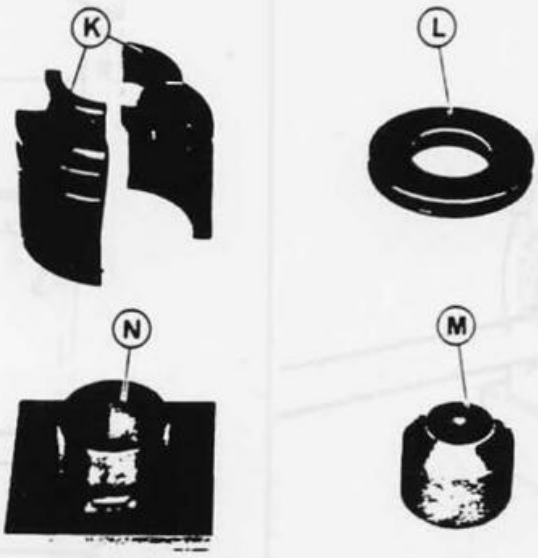
U53 S2 - cross piece for FACOM extractor, with screw.

U53 T2 - FACOM extractor.

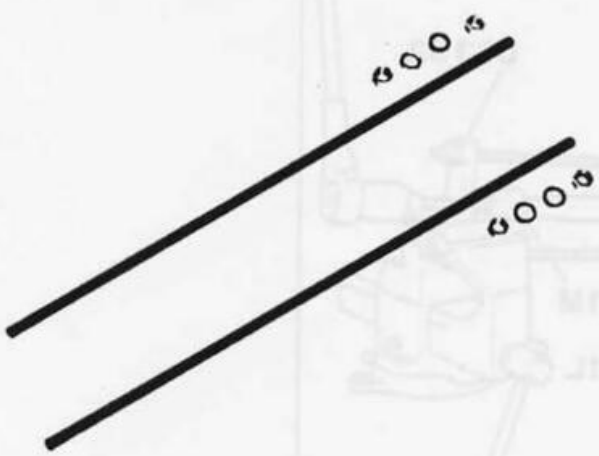
TOOLS TO BE MADE LOCALLY

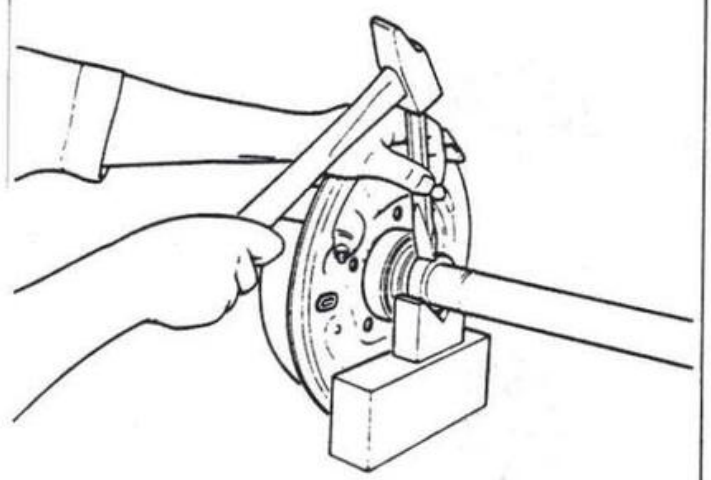
0.0518

- Set of 2 tensioner rods comprising :
  - 2 screwed rods M16 x 2, 860 mm long
  - 4 nuts HM16 x 2,
  - 4 flat washers 17 x 30 x 4

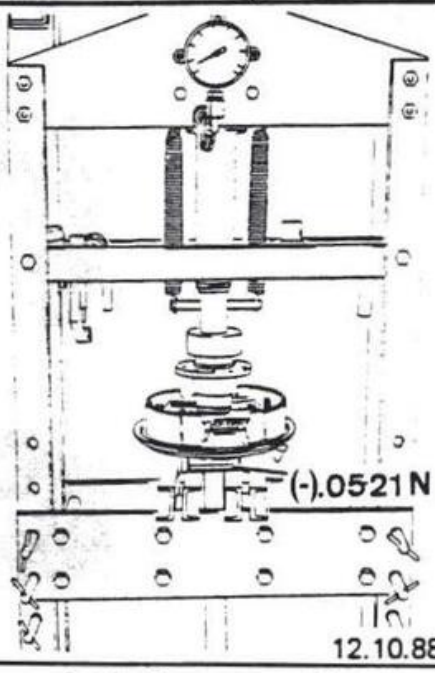

K
L
N
M



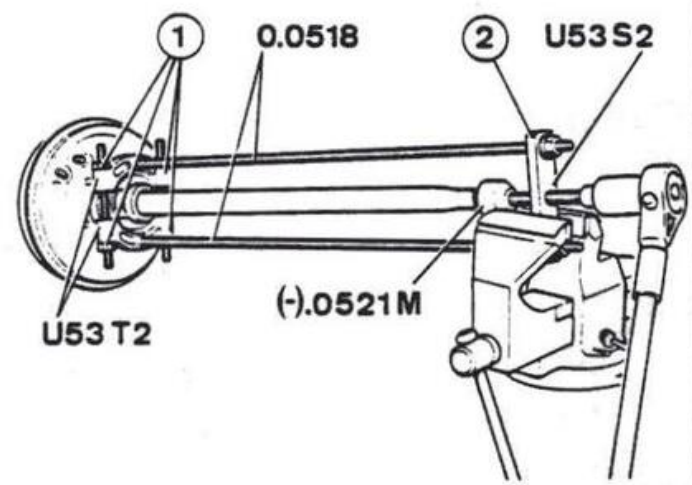




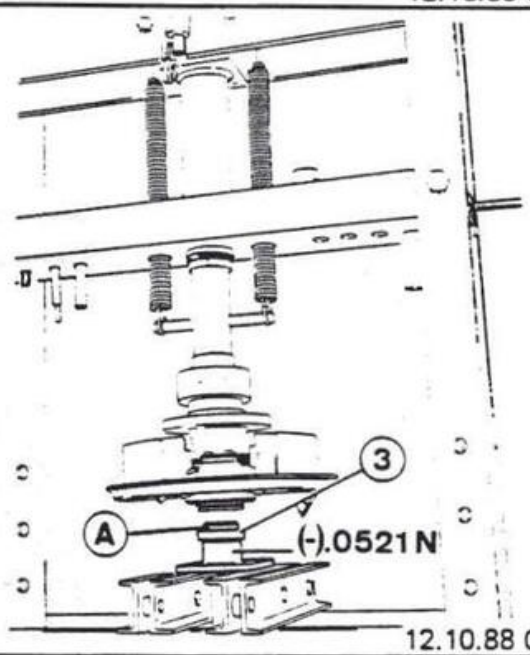
12.10.88 CAR 2



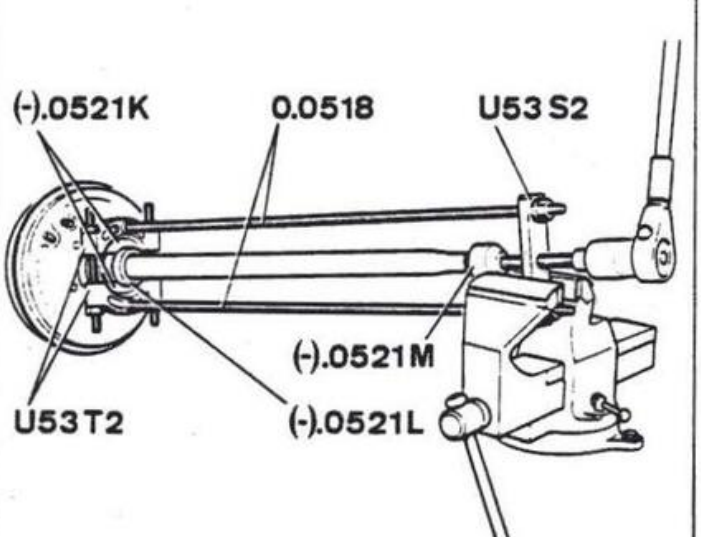
12.10.88 CAR 5



12.10.88 CAR 1



12.10.88 CAR 4



12.10.88 CAR 11

I

After first removing the half shaft to be overhauled (see corresponding section) place it on a bench and grip it in a vice fitted with soft jaws.

To facilitate removing the ring, one must first make notches in it, with a cold chisel, at 3 points approximately 120° from one another.

II

Assemble the set up shown in the illustration

- Tighten :
  - the extractor assembly nuts (1)
  - the nuts and lock nuts (2) on the tensioner rods
- Extract the bearing retaining ring

III

Extract the bearing

Precaution :

Ensure that the two half shells are correctly engaged behind the ball bearing assembly.

IV

Refitting the bearing

Important :

- Position the bearing with its location on the opposite side to the brake back plate
- On the press, using pad (-).0521 N, push the bearing fully in and fit it with a new seal.

V

Refitting the bearing retaining ring

Assemble the same arrangement as before

Fit the ring (3) with its extractor flange (A) on the opposite side to the tool (-).0521 N and push it fully into place.

Refit the half shaft assembly to the vehicle (see corresponding section).

STUB AXLES
CONTENTS

6

Pages

A - COMPLETE UNIT

Identification - data

Front suspension identification - data — A1.001 to 003

Checks - adjustments

Front suspension checks - adjustments — A2.001 to 005

Removing - refitting

Removing - refitting a half-suspension unit — A4.001 to 003

C - FRONT HUBS

Overhaul

Overhauling a front hub — C5.001(1) to 007

DATA

PRIOR REQUIREMENTS FOR CHECKING AND ADJUSTING

The tyre pressures must be correct.

The vehicles must be at kerb weight, with the fuel tank full and the spare wheel in place.

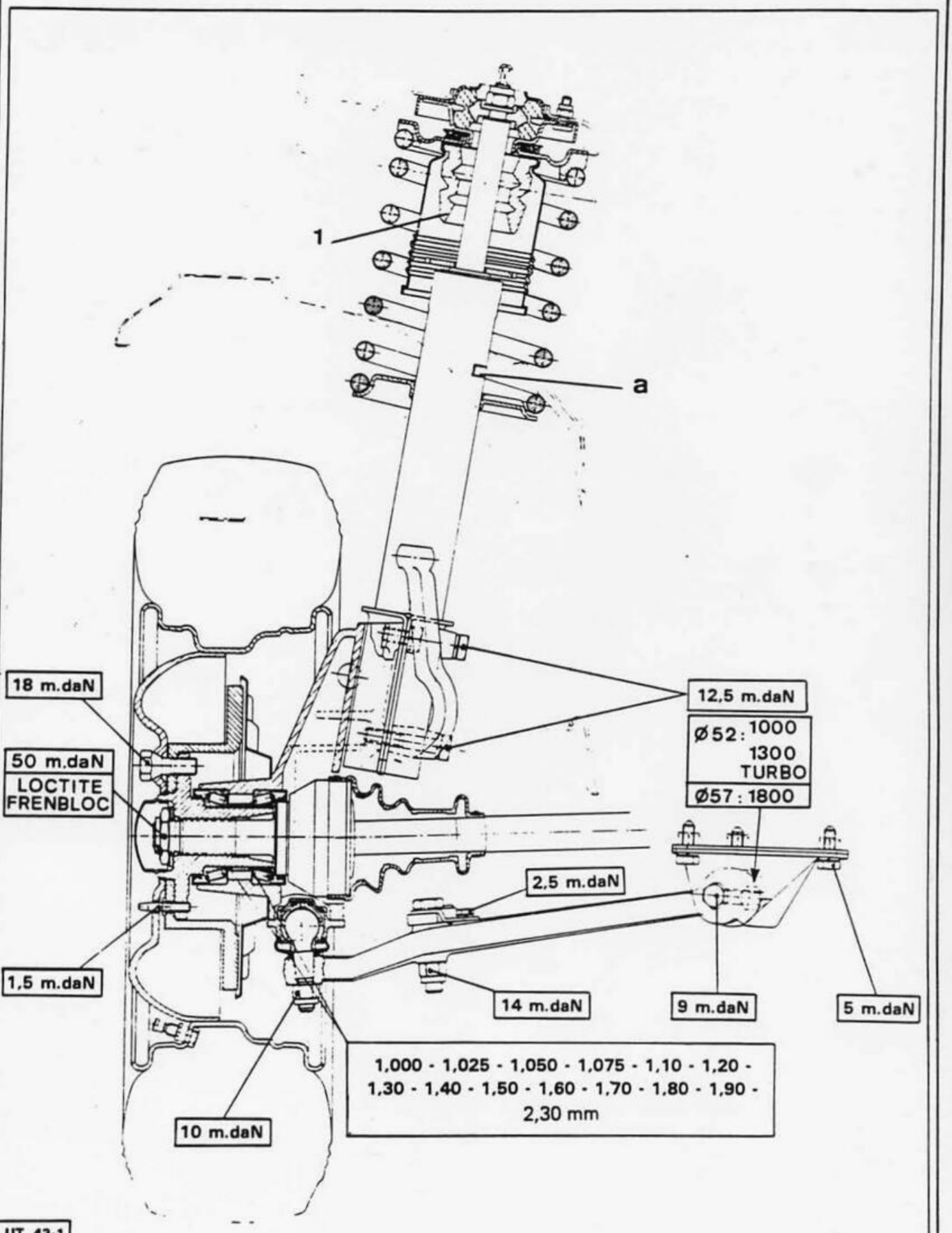
NOTE : On vehicle conversions, check these figures after the conversion has been completed.

Toe-in (adjustable) : ..... 0.5 ± 1 mm
Castor (adjustable) ..... O° to 1°
Camber (not adjustable) : (vehicle empty) : ..... 1°50' to 2°50'
(vehicle loaded) : ..... 1° to 2°

SPECIAL FEATURES

- The toe-in is adjusted at the left and right hand steering links.
- The castor is adjusted at the front end of the thrust bar (on either side).
- Adjusting the bearing play (see figure).

Operating play : ..... 0.025 to 0.10 mm
Adjusted by shims in thicknesses of : ..... 1 to 2.30 mm


1
a
18 m.daN
50 m.daN
LOCTITE FRENBLOC
1,5 m.daN
10 m.daN
12,5 m.daN
Ø52 : 1000
1300
TURBO
Ø57 : 1800
2,5 m.daN
14 m.daN
9 m.daN
5 m.daN
1,000 - 1,025 - 1,050 - 1,075 - 1,10 - 1,20 - 1,30 - 1,40 - 1,50 - 1,60 - 1,70 - 1,80 - 1,90 - 2,30 mm

REQUIREMENTS FOR CHECKING THE FRONT SUSPENSION SPECIFICATIONS

The front suspension specifications are checked with the vehicle at kerb weight, that is, unloaded, with tools, water oil and full fuel tank.

1 - WHEEL ALIGNMENT (TOE-IN)

TO CHECK

The wheel alignment must be :

J5 all models : Toe-in 0,5 ± 1mm

TO ADJUST

1 - Centre the steering (essential when adjusting the toe-in so as to preserve equal turning (Ackermann) angles.

- Release the gaiter collars on the steering rack at each side and pull the gaiters outward.
- The steering is centred when the rack protusion left-hand (x) and right-hand (y) fig. I and II are :

$$x = y = 76 \text{ mm}$$

In this position { the front wheels / the steering wheel } must be straight ahead, Fig. III. Adjust if they are not

2 - TO ADJUST THE TOE-IN

- The adjustment is made by loosening the track rod lock nuts (1) Fig. IV and turning the left and right hand track rods.

Setting :

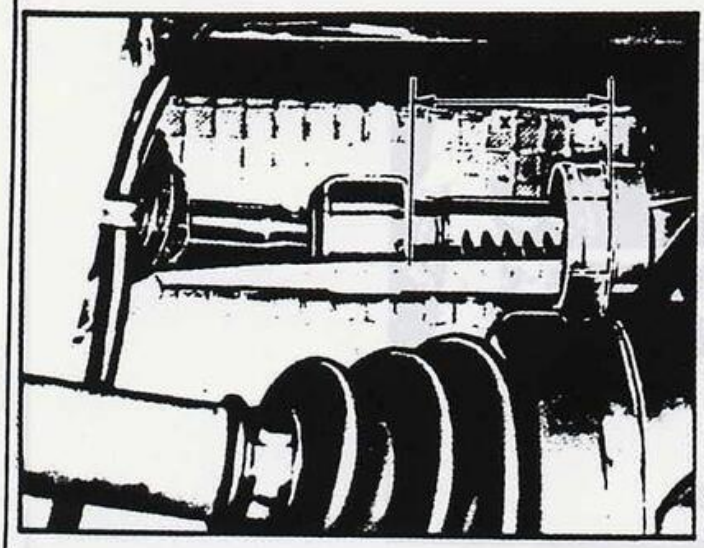
J5 all models : Toe-in 0,5 ± 1mm

1 turn of the track rod = 3 mm total toe-in change.
After adjustment, the visible thread length on the left and right hand sides must be approximately equal.

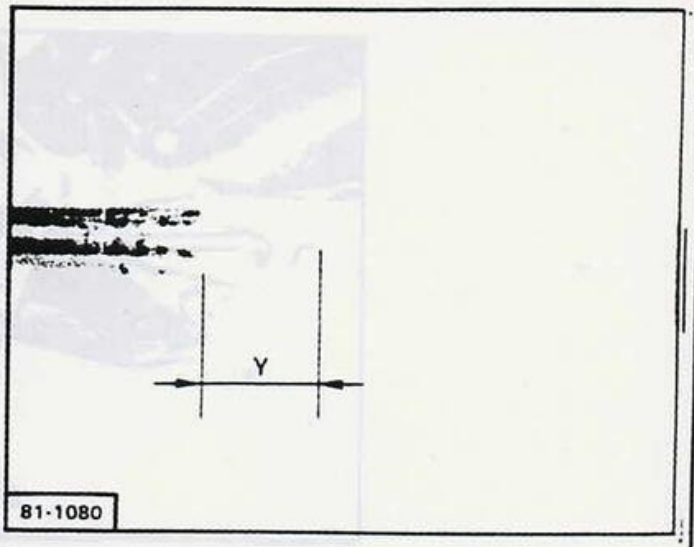
– Tighten the lock nuts (1) to 6 m.daN (44 lbf ft) (prevent the ball joints from turning).

– Hold the ball joints horizontal.

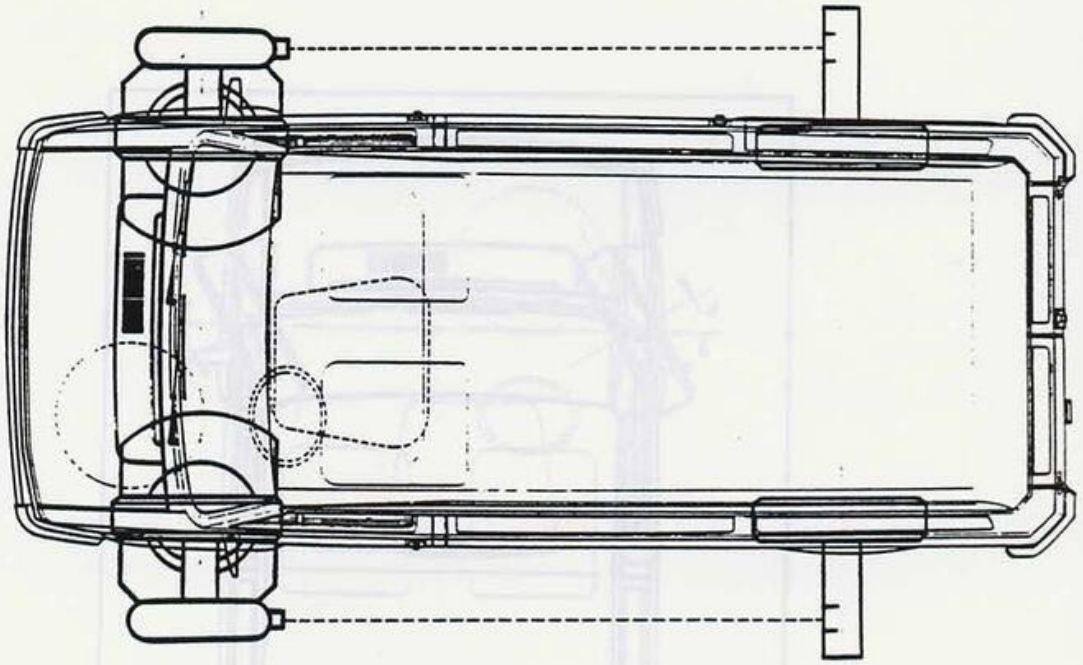
– Tightening torque for steering wheel nut ; 5 m.daN (37 lbf ft).



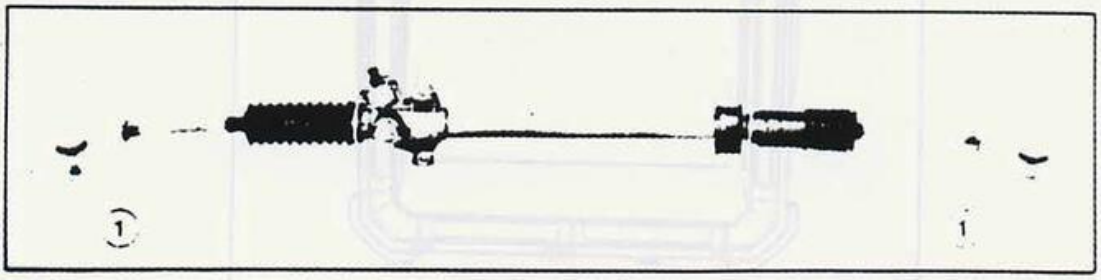
I



II



26 - 5 - 82 - 4A III



IV

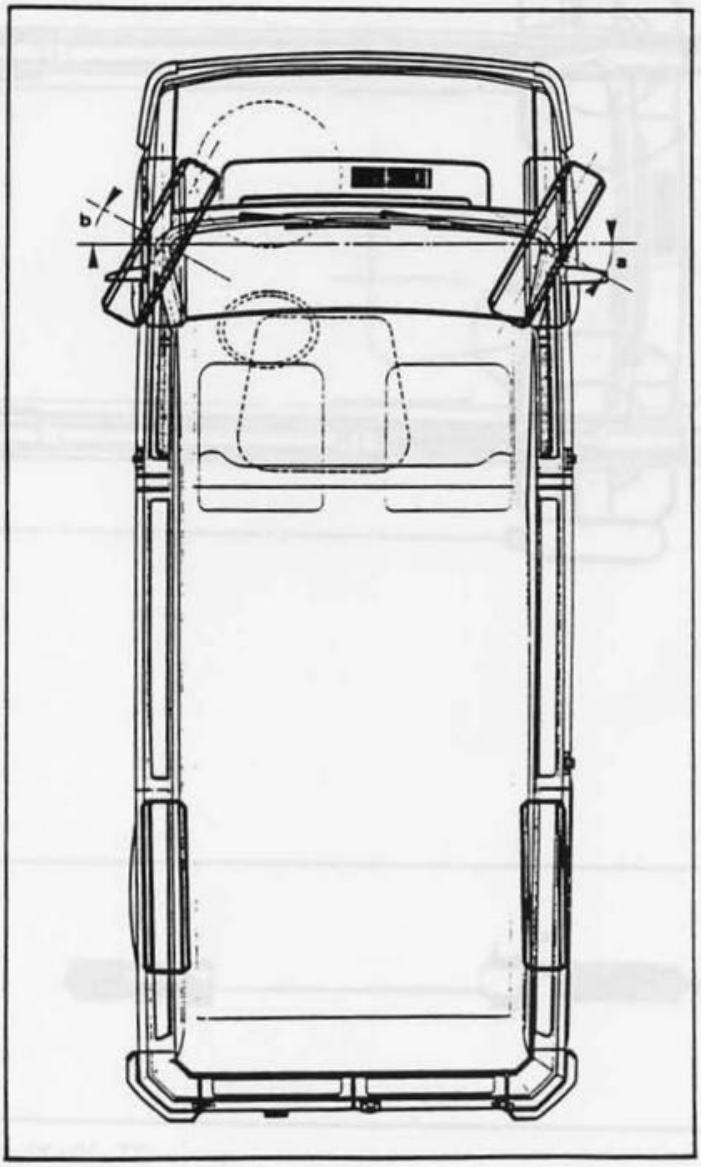
27 - 10 - 81 - P6 - R - A

I



28 - 10 - 81 - P11 - R - A

II



26 - 5 - 82 - 5A

II - CASTER

- Check the castor angle with appropriate equipment (see the brochure listing recommended garage tooling and equipment)

J5 all models : 0^{o} to 1^{o}

— If it is outside the tolerance, remove the brake re-action rod and fit (a) requisite number of washers.

One washer thickness only : 2,5 mm

Tightening torques :

- nut, torque re-action rod to suspension arm	12 m.daN (88 lbf ft)
- bolt, re-action rod anchor to frame	2,5 m.daN (18 lbf ft)
- nut, re-action rod to anchor	10 m.daN (74 lbf ft).

Important : If the caster angle is altered, check the toe-in.

III - TURNING (ACKERMANN) ANGLES Fig. II

— Place the vehicle on turntables at the front and blocks of the same height at the rear.

— Turn the wheels to one side, then the other; the readings should be :

inner wheel (example : a)	outer wheel (example : b)
40^{o} 10′	35^{o} 15′

— If these readings are not obtained :

- ensure there is equal thread protusion of the track rods; if not centre the steering and adjust the toe-in (see previous pages).

- check the steering arms.

If a suspension arm has been replaced, the pin that secures the arm to its support must be tightened with the vehicle loaded.

TIGHTENING TORQUES

Essential tightening torque (torque spanner)	m.daN	lbf ft
Securing nut, drive shaft to hub	50	370
Recommended tightening torques :		
Top securing nuts, suspension unit	1,5	11
Suspension arm bracket to frame	5	37
Steering arm securing bolts	12,5	92
Torque re-action rod to bracket	10	74

REMOVING AND REFITTING A HALF-SUSPENSION UNIT

If the hub cap is to be re-used, it is necessary to remove the wheel so that the FACOM U 53 T2 (see the section "work on the rear hub" for removing and fitting this cap.

REMOVING

Fig. I

Remove the hub cap from the nut (1).

Release and remove the drive shaft nut (1).

Raise and place a stand under the side of the vehicle to be worked on.

Remove the wheel.

Fig. II

Disconnect the brake pipes (2).

Remove :
- the steering lever bolts (3),
- the nut (4) from the brake re-action rod. Retrieve the spacers,
- the securing bolts (5) suspension arm support,
- the three nut (6) : Fig. III.

Do not interfere with the centre nut (7).

Withdraw the drive shaft.

Remove the half-suspension unit.

REFITTING

Fig. III

Fit the suspension unit in position.

Fit and tighten the securing nuts (6) to 1.5 m.daN (11 lbf ft).

Engage the drive shaft.

Fit : Fig. II
- the bolts (5) securing the suspension arm support and tighten them to 5 m.daN them to 5 m.daN (37 lbf ft),
- fit the spacers to the re-action rod, refit and tighten the nut to 10 m.daN (74 lbf ft).
- the bolts (3) securing the steering arms and tighten them to 12,5 m.daN (92 lbf ft).

Reconnect the brake pipes and bleed the system (see the appropriate section).

Fit the wheel, tightening the bolts to 16 m.daN (118 lbf ft).

Lower the vehicle on to its wheels.

Fig. I

With the face and threads lubricated, tighten the drive shaft nut (1) to 50 m.daN (370 lbf ft) and stake it at two points.

Use drift 8.0531 B to fit the hub protector to the nut.

TOOLS TO BE USED

A - From front and rear hub tool kit 8.0531 :

A1 - Adaptor

A2 - Adaptor

A3 - Mandrel

B1 - Threaded rod

B2 - Ring.

B - From tool kit 8.0520 for hypoid final drive :

H2 - Adaptor.

C - Dial gauge 8.1504

D - Dial gauge support

8.0504 ZZ - A1 - Support rod
A2 - Support
A3 - Clamp

Tools recommended :

E - Extractor assembly, comprising :

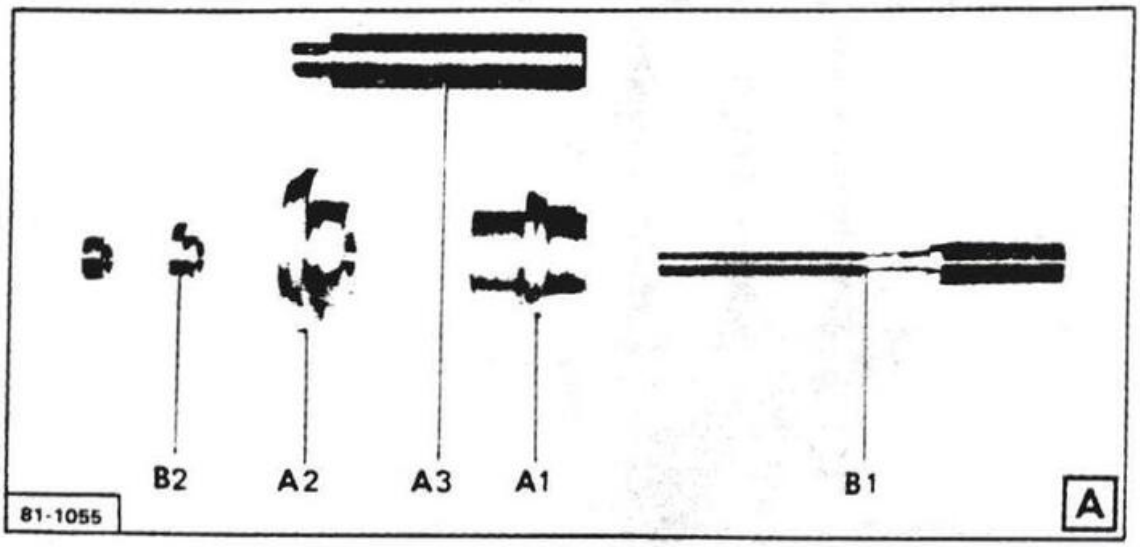
- extractor U53 T2
- bridge U53 S2.

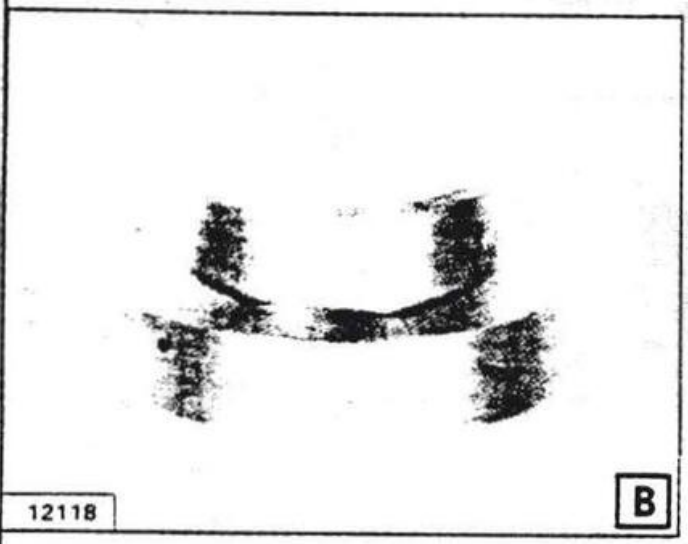
TOOLS TO BE MADE

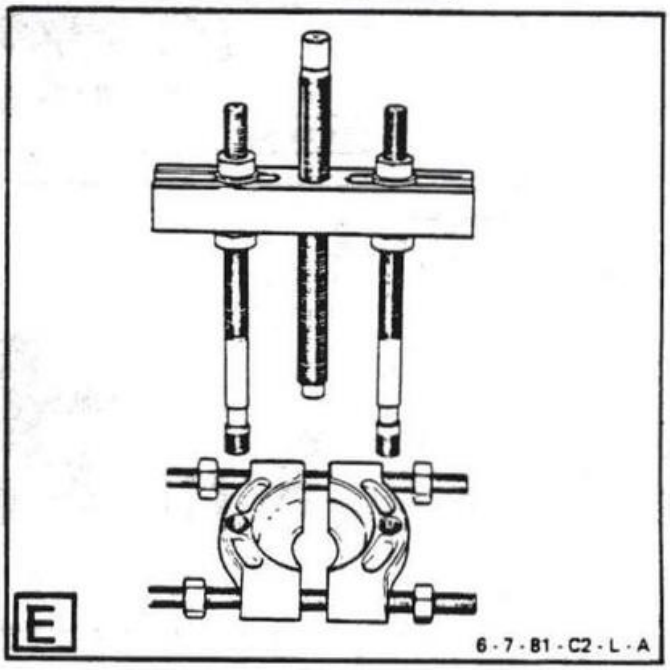
F - Tube for fitting the bearings into the stub axle.

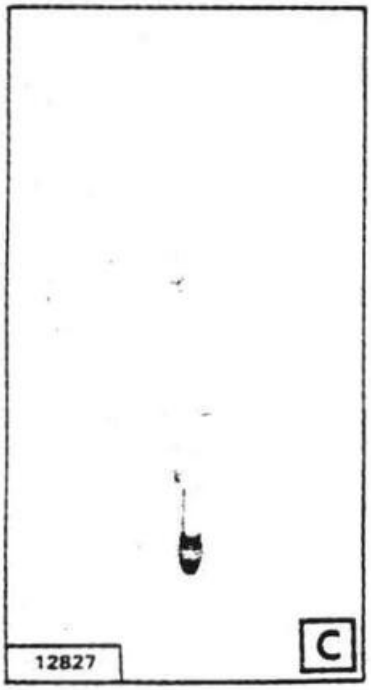
0.0607

(see illustration in section 15)


B2
A2
A3
A1
B1
81-1055
A

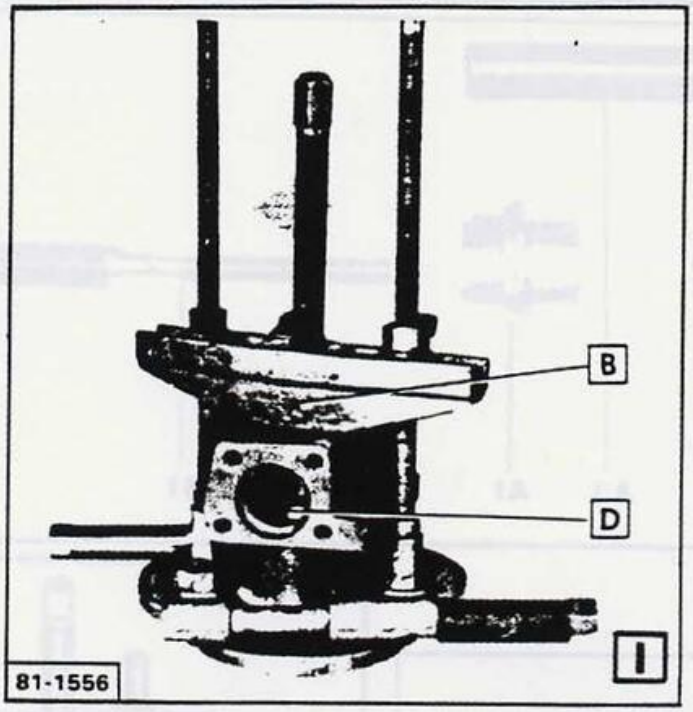

12118
B

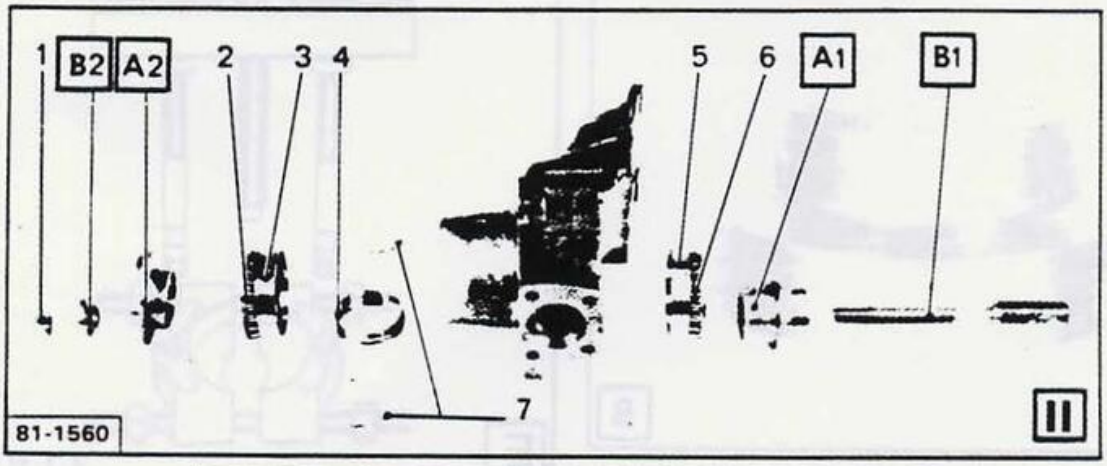

E
6-7-81-C2-L-A

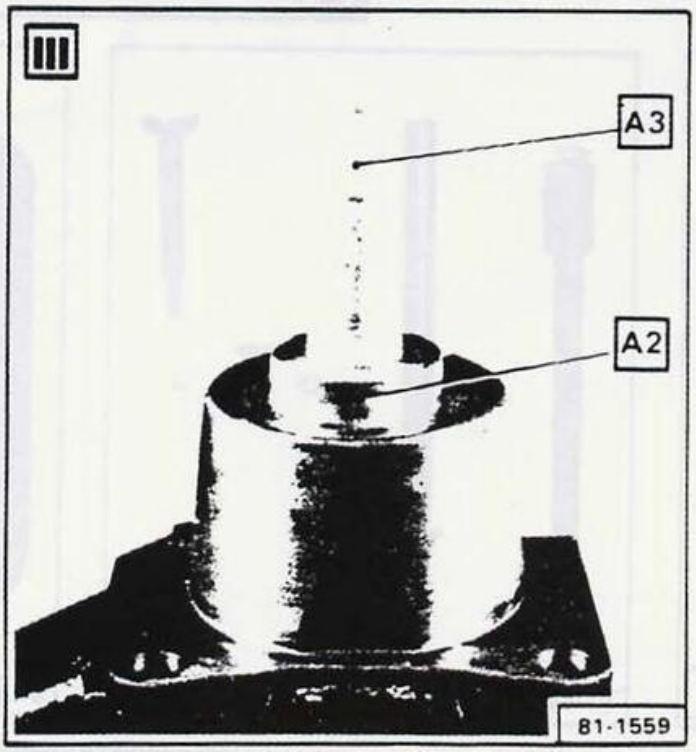

12827
C


81-1854
D


81-1562
F


B
D
81-1556
I


1
B2
A2
2
3
4
5
6
A1
B1
7
81-1560
II


III
A3
A2
81-1559

REMOVING THE BEARINGS

– Separate Fig. I the hub from the stub axle :
  - extractor FACOM U53 T2,
  - bridge FACOM U53 S2,
  - adaptor 8.0520 H2.

– Remove Fig. II, the bearings (3) and (5). The oil seals will be removed at the same time. Whenever the bearings are removed it is essential to renew the bearings and the seals.

– Retrieve the spacer (4) and the adjusting shims (7).

– Clean all the parts.

REFITTING THE BEARINGS

– Fit the outer bearing tracks (3) and (5) Fig. II and III into the stub axle.

> Use the adaptor 8.0531 A2 and the mandrel A3 Fig. III

ADJUSTING THE END FLOAT

> The bearing end float must be 0,025 to 0,10 mm
> Incorrect end float will quickly destroy the bearings.

Preparation

– Place in the inner end of the stub axle :
  the inner bearing assembly (6),
  the adaptor 8.0531 A1 and the threaded rod B1.

– Place in the outer end :
  the spacer (4) between the shims (7) centred by the adaptor 8.0531 A1,
  the inner bearing assembly (2),
  the adaptor 8.0531 A2 and the ring B2.

– Tighten the nut (1) to 1 m.daN (7 lbf ft).

– Rotate the assemvly to settle the bearings.

To adjust

- Assemble Fig. I the dial gauge assembly 8.0504 ZZ comprising :

  A1 - support rod,

  A2 - support,

  A3 - clamp.

- By pushing in each direction (⇄) Fig. I, on the threaded rod B1, check the end float : 0.025 to 0.10 mm.

If necessary, adjust the end float :

INCREASING the shim thickness ⟶ INCREASES the end flot
DECREASING the shim thickness ⟶ DECREASES the end flot
(shims (4) Fig. II and IV).

Shims available : 1,000 - 1,025 - 1,050 - 1,075 - 1,10 - 1,20 - 1,30 - 1,40 - 1,50 - 1,60 - 1,70 - 1,80 1,90 - 2,10 - 2,20 - 2,30 - 2,40 mm.

- Remove the tools and the components.

To assemble

- Lubricate and place in position Fig. III the inner bearing assembly (2) and the new oil seal (1).

- Place the stub axle with these parts on the hub (7) Fig. III and use the tube 0.0607 to drive the inner bearing (2) on the hub until it butts.

- Position centrally on the hub Fig. IV :

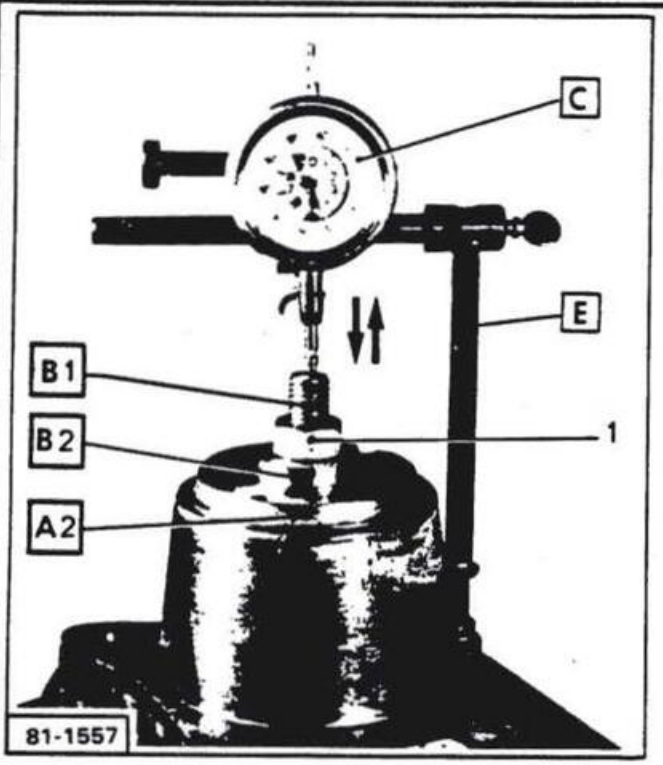
  a shim (4) as previously determined,

  the spacer (3),

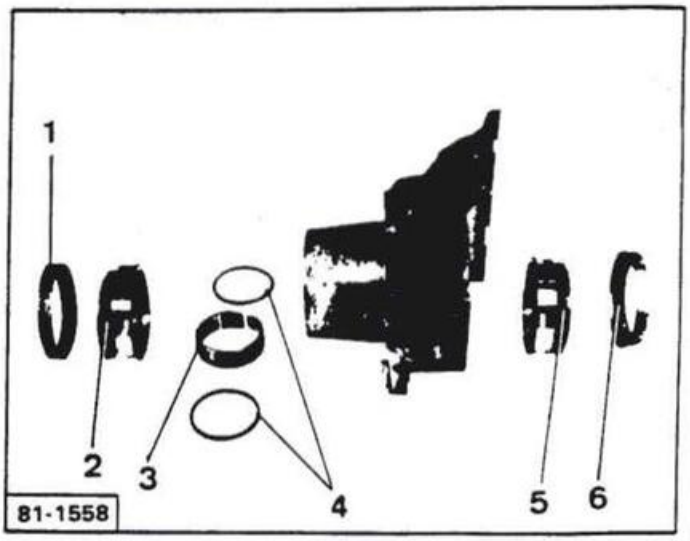
  the second adjusting shim (4).

- Lubricate the inner bearing assembly (5), place it in position and drive it on the hub using tube 0.0607 Fig. IV.

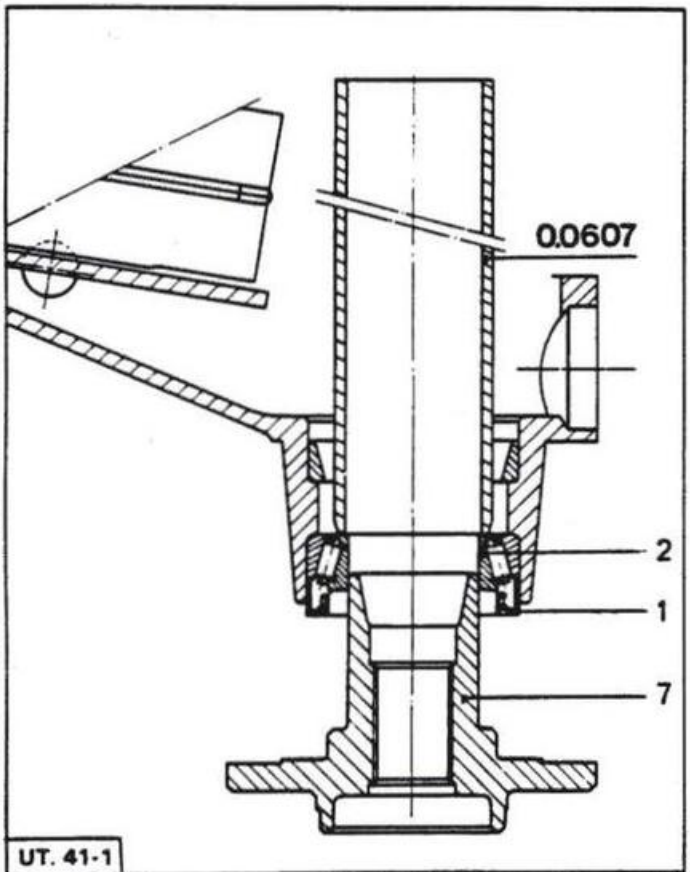
- Lubricate and fit a new oil seal (6).


C
E
B1
B2
A2
1
81-1557

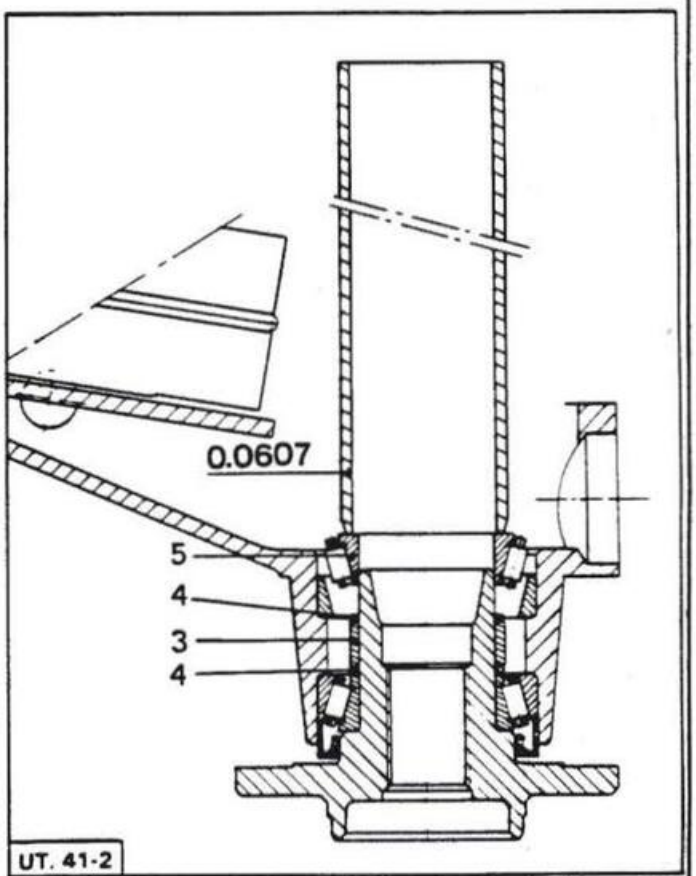
I


1
2
3
4
5
6
81-1558

II


0.0607
2
1
7
UT. 41-1

III


0.0607
5
4
3
4
UT. 41-2

IV

STEERING
CONTENTS

7

Pages

A - COMPLETE UNIT

Identification - data

Steering, identification - data — A1.001 to 003

Removing - refitting

Removing - refitting the steering rack — A4.001 to 007

C - STEERING COLUMN LOCK

Removing - refitting

Removing - refitting the steering column lock — C4.001 to 005

D - STEERING RACK

Overhaul

Overhauling the steering rack — D5.001 to 005

E - STEERING TIE-RODS

Removing - refitting

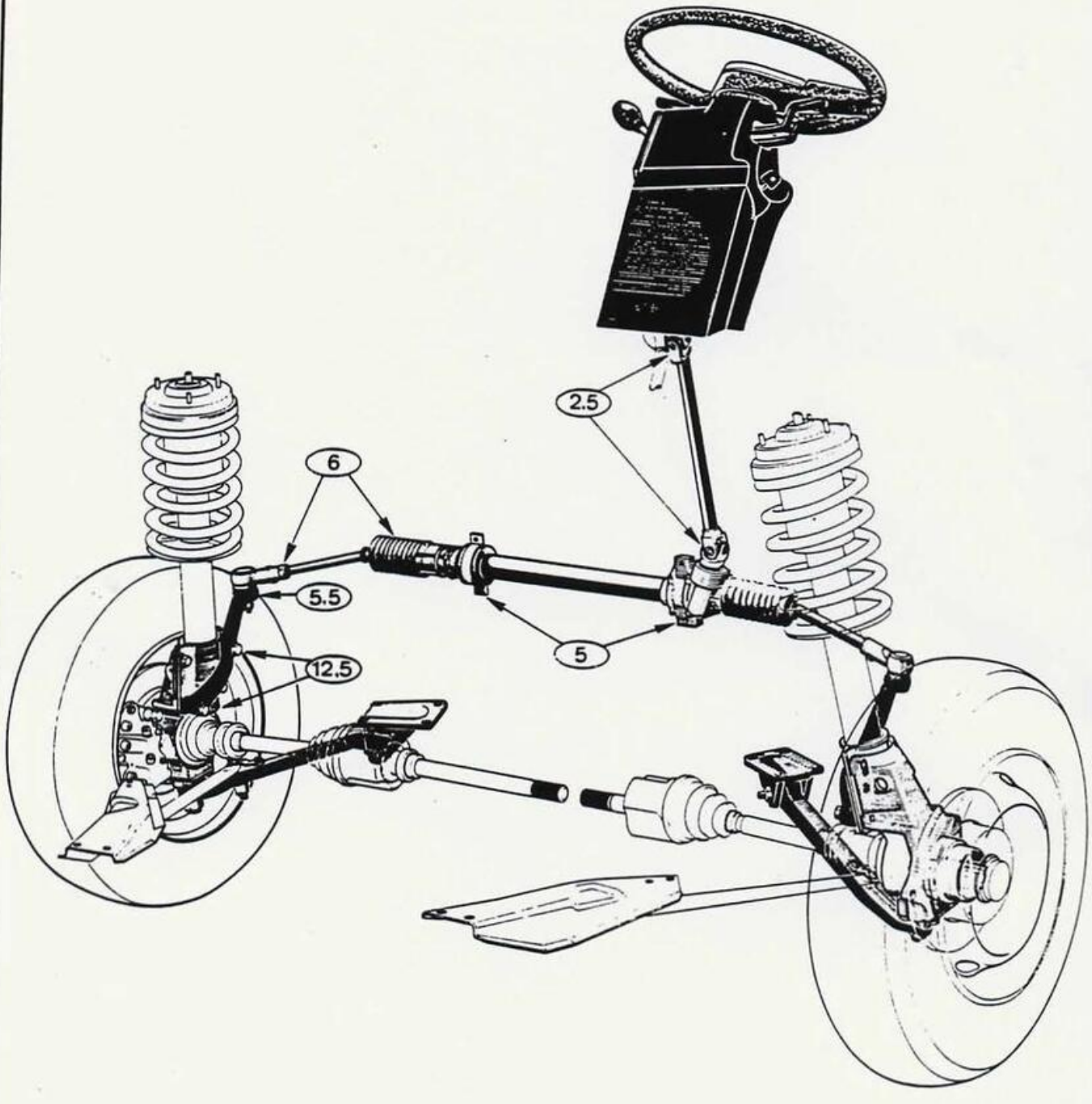
Removing - refitting the steering tie-rods (steering rack removed). — E4.001 to 007

DATA

Diameter of steering wheel	430 mm
Number of turns, stop to stop	4 turns 4/10
Upper universal joint	with double spline
Inner universal joint	54 splines*
Number of pinion teeth	5 ▲▲
Number of rack teeth	25 ▲▲
Damper clearance	see section D2, xxx
Reduction ratio	25,2 : 1
Grease, grade	KLUBER AKCS no routine lubrication

* See removing - refitting the steering rack.

TIGHTENING TORQUES	m.daN	lbf ft
Steering wheel to upper shaft	5	37
Damper lock nut	6	44
Steering column housing to body	4	30
Other torques	see ⬭ fig. 1	
	2,5	18
	12,5	92


2.5
6
5.5
12.5
5

SPECIAL TOOLS

Fig. A :

– 8.0709 :

Extractor for ball joint at the wheel end.

MAIN TIGHTENING TORQUES

Ball joint shank nut on the steering arm :

5.5 m.daN (55 Nm, 41 lbf ft)

Bolt, steering column universal joint :

2.5 m.daN (25 Nm, 18 lbf ft).

I

IV

II

V

III

VI

These operations are to be carried out on a lift.

REMOVING

From one side of the vehicle :

Turn the steering to full right lock.

Remove the nut from the steering arm ball joint.

Use extractor 8.0709 to disconnect the ball joint fig. I.

Repeat the operations on the other side.

Inside the vehicle :

Remove the steering column upper universal joint securing bolt, fig. II.

Lift the column by the steering wheel to disconnect the universal joint.

Remove the steering column lower cover bolts, fig. III.

Lift off the plate and the protective bolt.

Remove the lower universal joint securing bolt, fig. IV.

Remove the column lower shaft together with the plate and the boot.

Under the vehicle :

Remove the bolts, fig. V, securing the steering rack to the body.

Withdraw the steering rack sideways fig. VI.

Refit the steering rack by carrying out the removal operations in reverse.

REFITTING

SPECIAL POINTS

Tightening torque :

Ball joint shank nuts, fig. I : 5,5 m.daN (55 Nm, 41 lbf ft).

NOTE - Even if only one steering link has been replaced, or if its adjustment has been altered, reset its length.

Steering link length initial adjustment :

dimension a = 322 mm.

IMPORTANT - If this operation is carried out, re-adjust the toe-in.

Refer to the relevant section.

Connecting up the lower universal joint.

Remove the boot retaining clip, ont the left hand side.

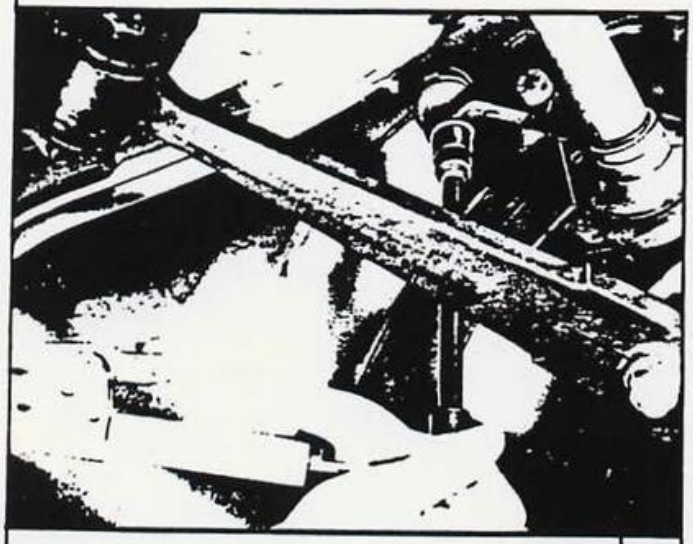
Pull back the boot.

Turn the steering, fig. II, until dimension :
x = 76 mm.

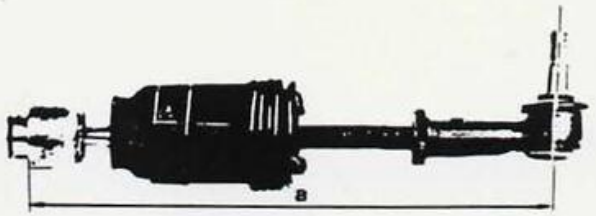
This places the steering rack in the "straight ahead" position.

With the steering wheel and the road wheels in the "straight ahead" position, fig. III, connect up the lower universal joint.

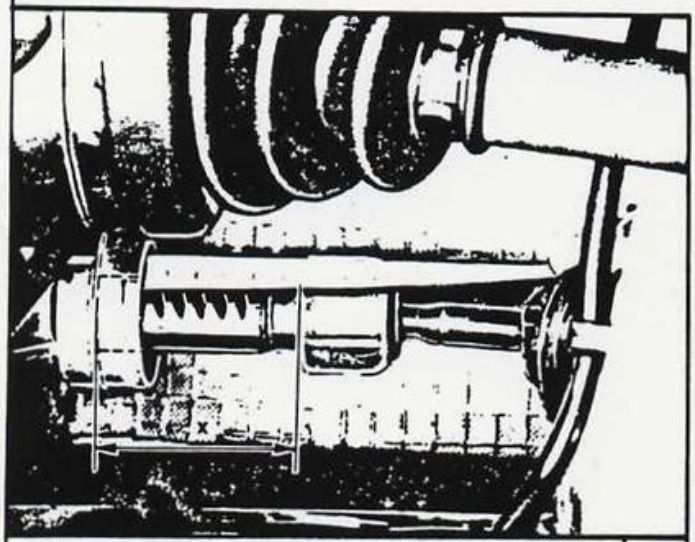
Steering column universal joint tightening torque : 2.5 m.daN (25 Nm, 18 lbf ft).



I



IV



II

V



III

VI

I - If the ignition key is available

REMOVING

Disconnect the battery negative lead.

Remove the lower cowl (5) and lift the upper cowl (6) : fig. I (7 screws (➡)).

Disconnect :

- the wiring from the steering lock unit and remove the connector (11) : fig. (see note),
- the 4 flat plugs on the junction box, figs. II and IV, by depressing the studs (➡).

Remove screw (7) : Fig. III.

Place the ignition key in the on position.

Free the steering lock (8) whilst pressing in the spring loaded stop (9) : fig. III.

Remove the electrical connector (11) (if necessary), fig. V.

Remove the ignition key.

Remove the two securing screws and remove the connector (11) from the mechanical assembly (10).

Place the connector (11) on the lock assembly (10), fig. V.

Place the ignition key in the on position.

Insert the steering lock assembly whilst pressing in the spring loaded stop (9), fig. III.

Secure the steering lock in place (screw (7)).

Insert the flat plugs into the junction box and check that they are correctly connected, fig. II and IV.

CONNECTIONS : fig. II

Line 1 - brown wire lighting switch.

Line 2 - black wire 15 supply from the ignition switch

Line 3 - black wire 30 supply from the battery

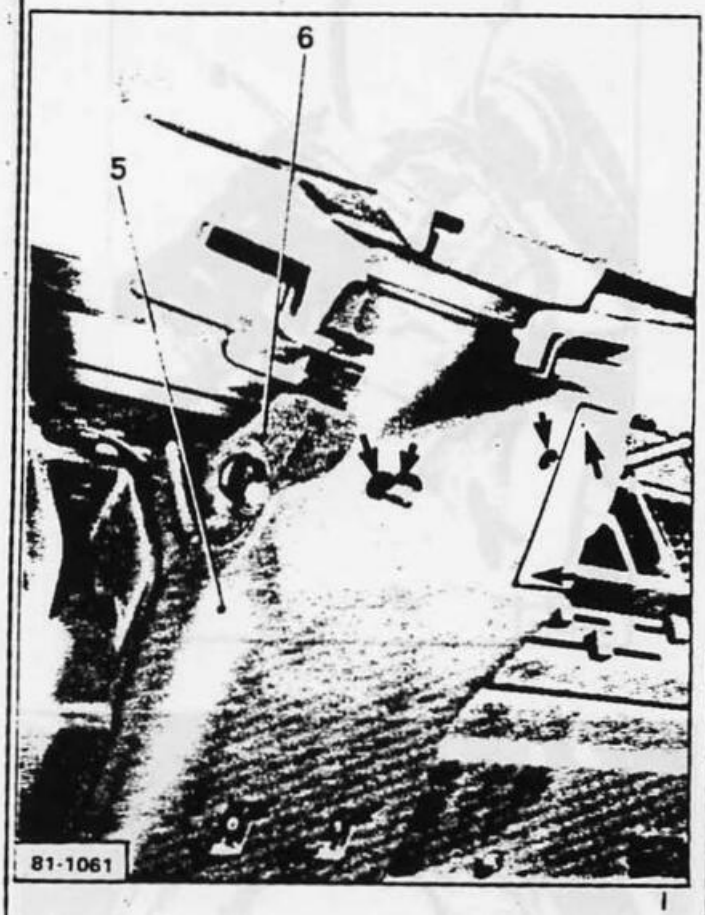
Line 4 - red wire 50 stater solenoid.

Connect the steering lock junction box to the wiring harness (see note).

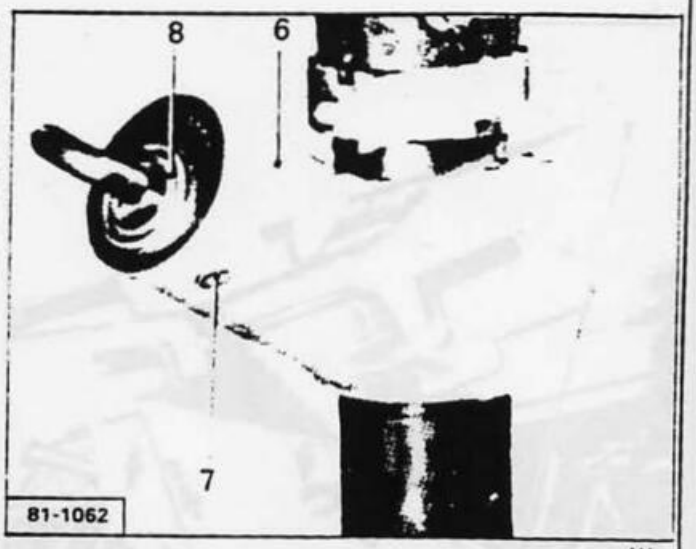
Reposition the upper cowl (6) : fig. I

Refit the lower cowl : fig. I (7 screws (➡)).

Reconnect the battery negative lead.



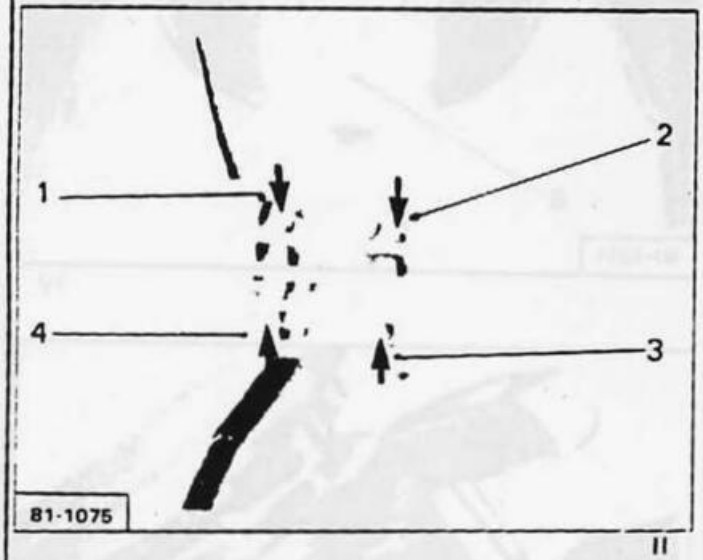
I



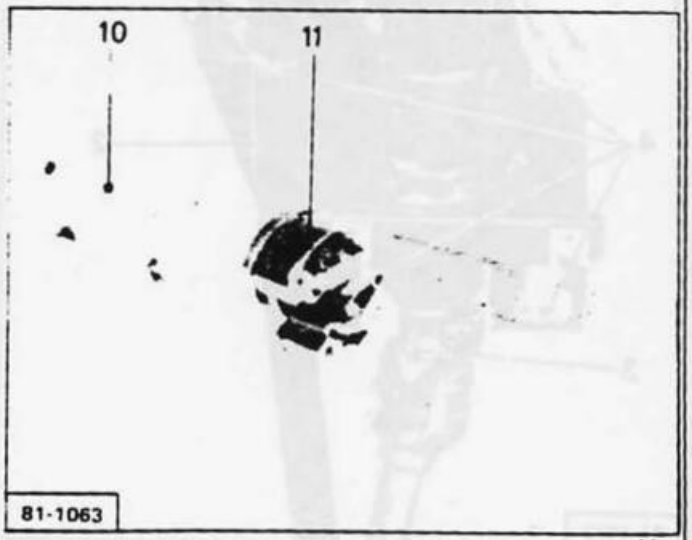
III



IV



II



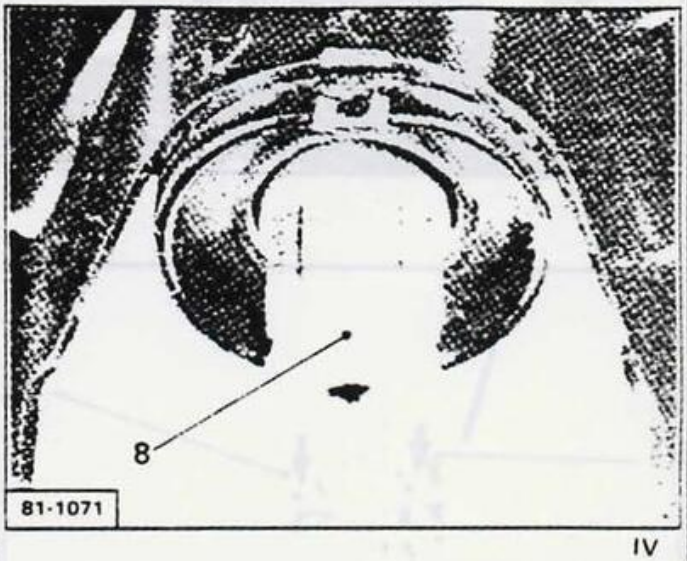
V



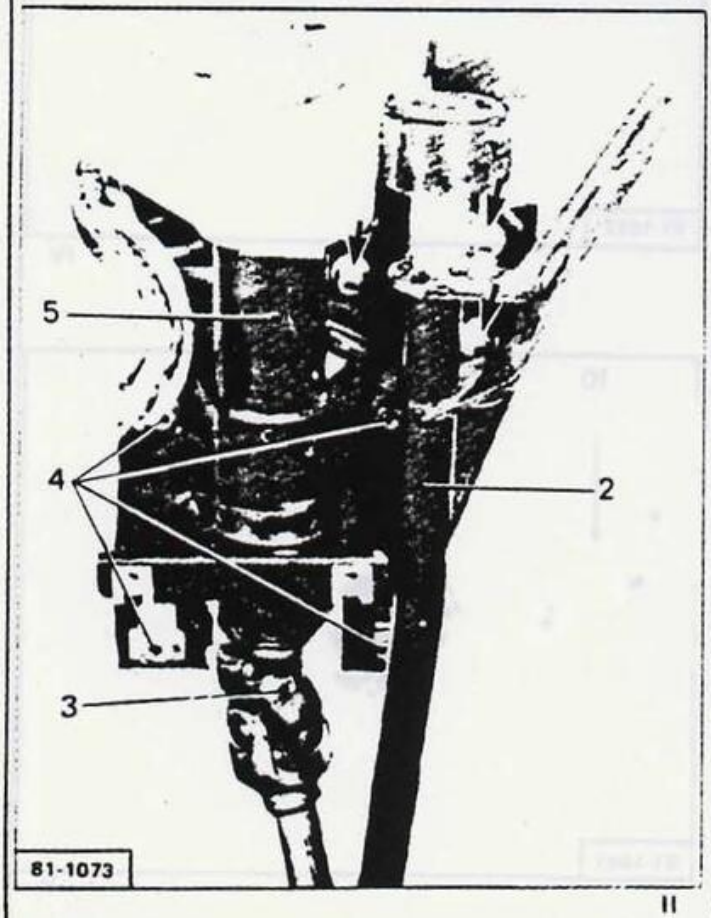
I



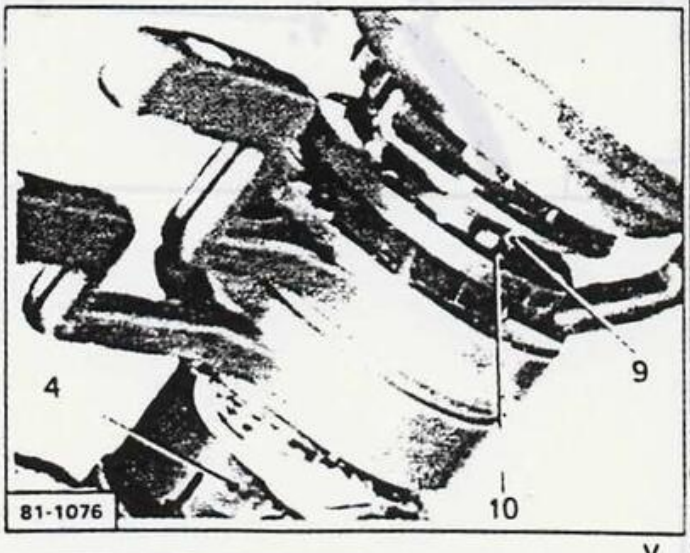
III



IV



II



V

II - If the igniion key is not available

REMOVING

Disconnect the battery negative lead.

Remove the lower cowl (1), fig. I (7 screws (➡)).

Release the gear shift control (2) fig. II (4 nuts (➡)).

Disconnect the wiring harness from the ignition switch and the direction indicator control under the steering wheel.

Remove the bolt (3) : fig. II.

Remove : fig. II :

- the nuts and bolts (4),
- the steering column (5), together with the steering lock.

Remove the heads from the bolts (6), fig. III, on the steering lock support (7) by drilling down their centres (Ø 8 mm).

TO FIT

Place the bracket and the steering lock on the steering column.

Check that the steering lock operates correctly, then shear the bolt heads (6), fig. III.

Fit the steering column (6) to the vehicle and fit the bolts (4) without tightening them, fig. II.

Place the wheels in the "straight ahead" position and set the position of the steering wheel to suit.

Fit the splined shaft into the universal joint (it will only enter in one position) and secure it in place (fig. IV).

Lift the steering column (5) fig. V, so that stud (9) enters hole (10), fig. V (direction indicator switch zeroing system) and tighten the bolts (4), fig. II.

Fit the gear shift control (2) (4 nuts➡), fig. II.

Connect up the wiring harnesses.

Refit the lower cowl (1), fig. I (7 screws➡)).

Reconnect the battery negative lead.

Assemble the components with grease (about 1/5 of a tube of grease as supplied by the Parts Department).

REPLACING THE BEARINGS AND PINION

DIMANTLING

With the rack removed.

- Remove fig. I :
  - the lock nut A and the adjusting plug B,
  - the rack damper C.
- Punch two diemetrically opposite holes in the pinion lip seal, using a fine, tapered punch.
- Use tool 0.0709 (see illustration in section 15) to extract the lip seal fig. II.
- Remove :
  - the circlip retaining the bearing,
  - the adjusting shim.
- Use a press to remove the pinion with the bearings fig. III.

The maximum diameter of the drift to press on the outer race of the needle roller bearing is 15 mm.

ASSEMBLING

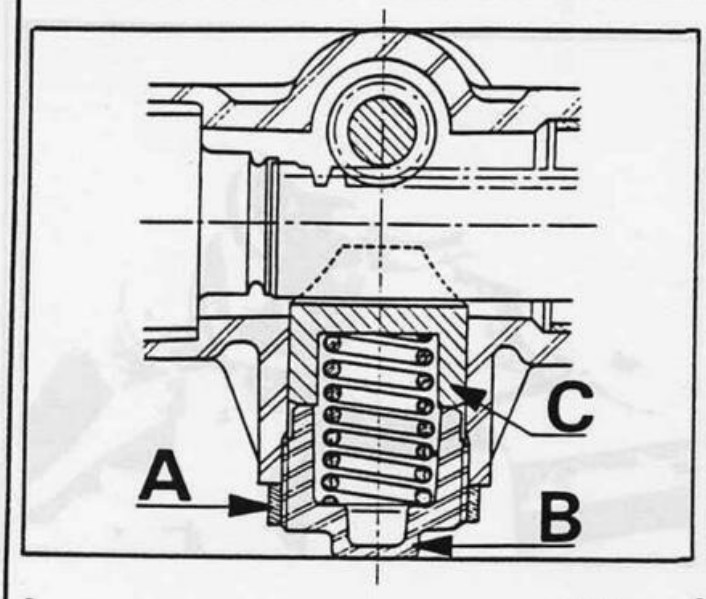
- Position the new needle roller bearing by hand, using a drift, of 22 mm maximum diameter to drive it in fig. IV until it butts.
- Insert 80 cm^3 of grease into the pinion housing (about 4/5 of the tube supplied by the Parts Department).
- Fit the pinion fig. V (supplied pre-assembled with its bearing).

Use a plastic mallet to drive it in until it butts.

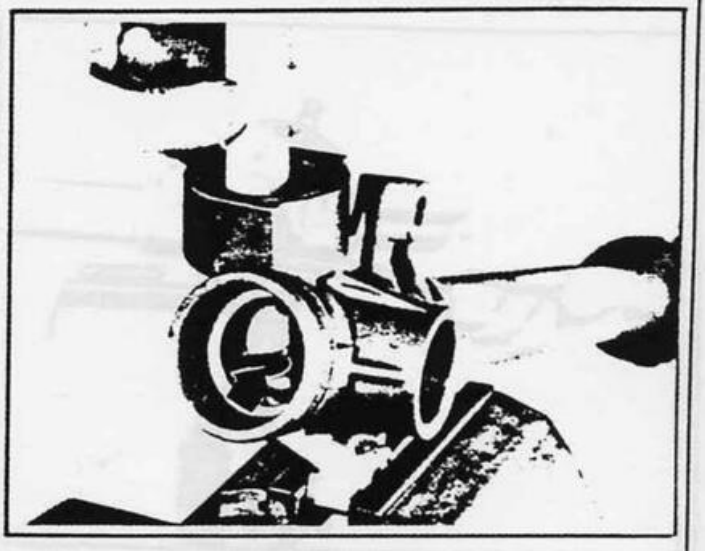
- Determine the thickness of the bearing adjustment shim (supplied in sets of 3 thicknesses : 0,05 - 0,10 and 0,15 mm),
  - fit the thickest shim and fit the circlip, if possible,
  - if not, fit the next thinner shim.
- Fit the circlip.
- Lubricate the seal (exterior and lips) and place it in position fig. VI :

Use a 41 mm diameter tube to drive it in until it is just flush with the housing, or tap it in on its circumference.

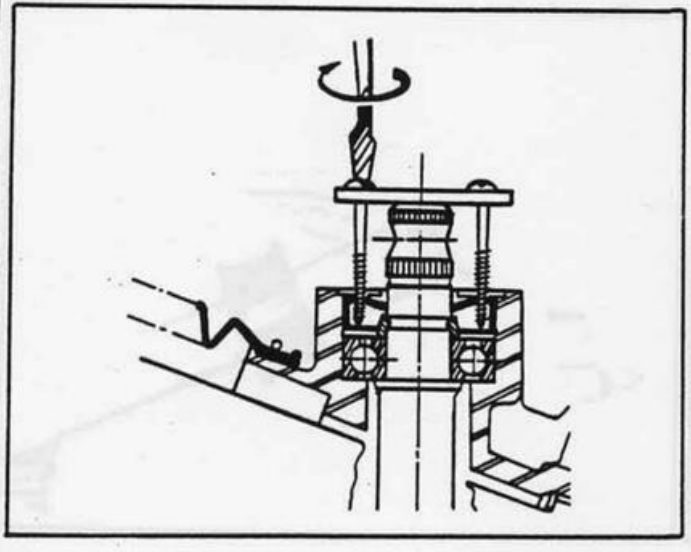
- Adjust the damper, see the following pages.



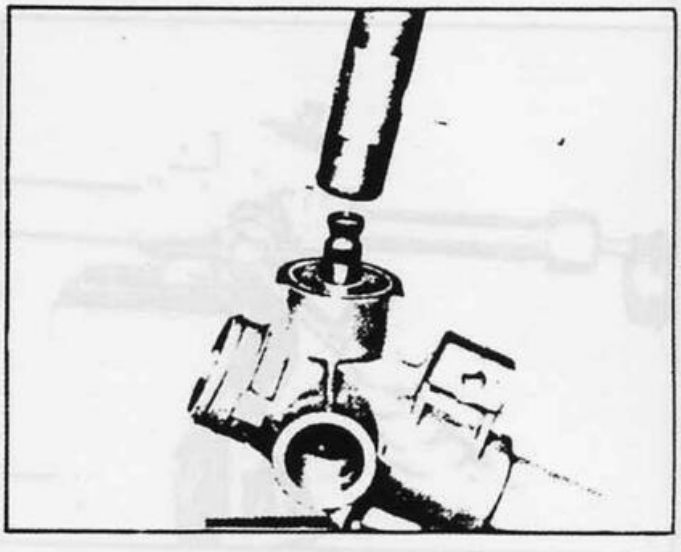
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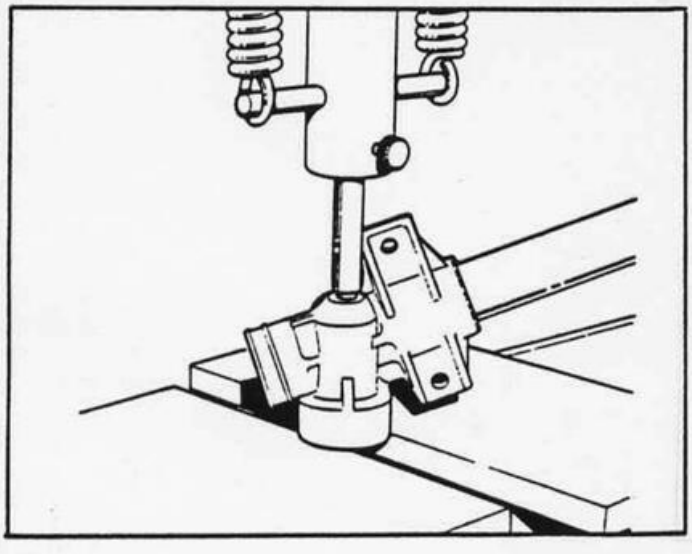
IV 27 - 10 - 81 - P16 - R - A



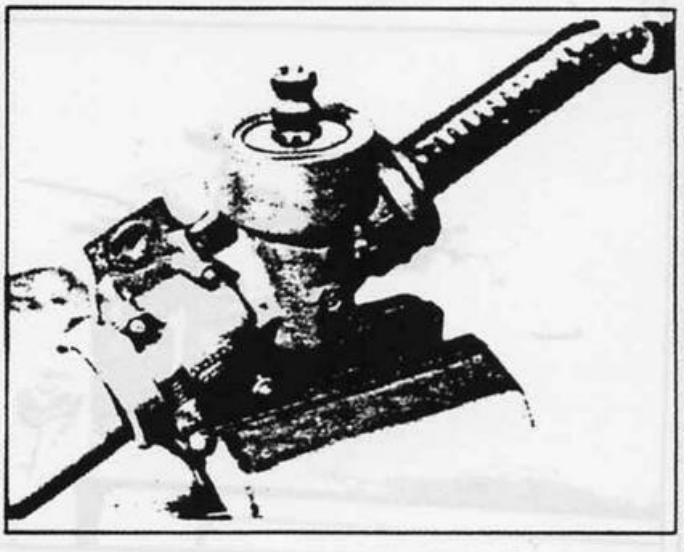
I 26 - 5 - 82 - 6A



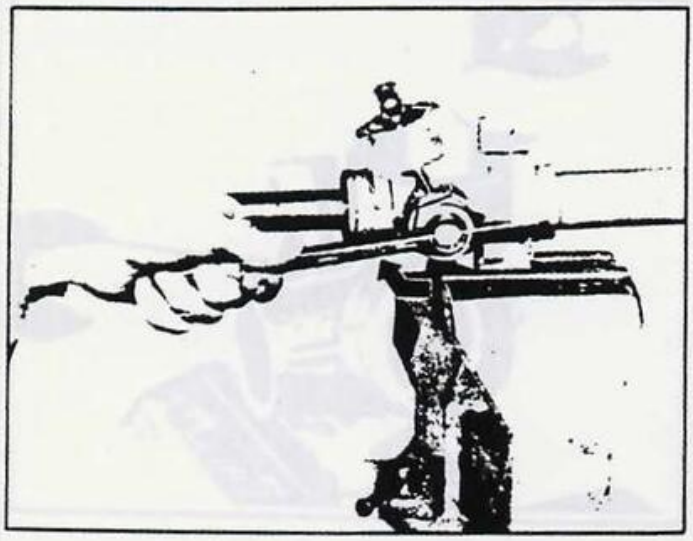
V 27 - 10 - 81 - P13 - R - A



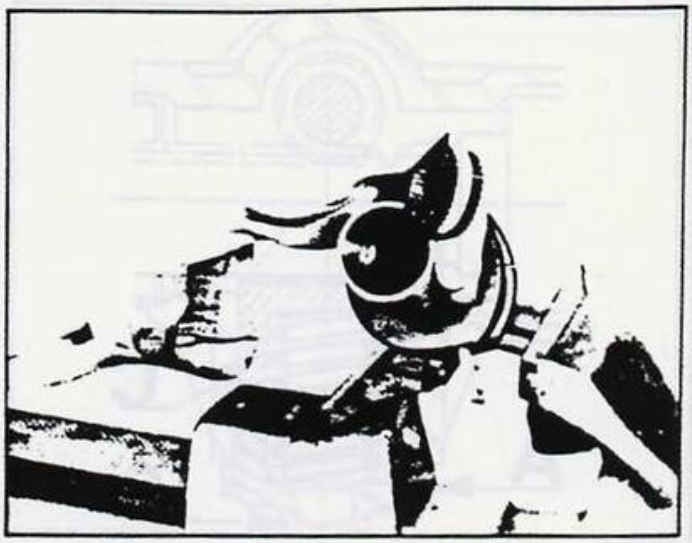
III A 4113



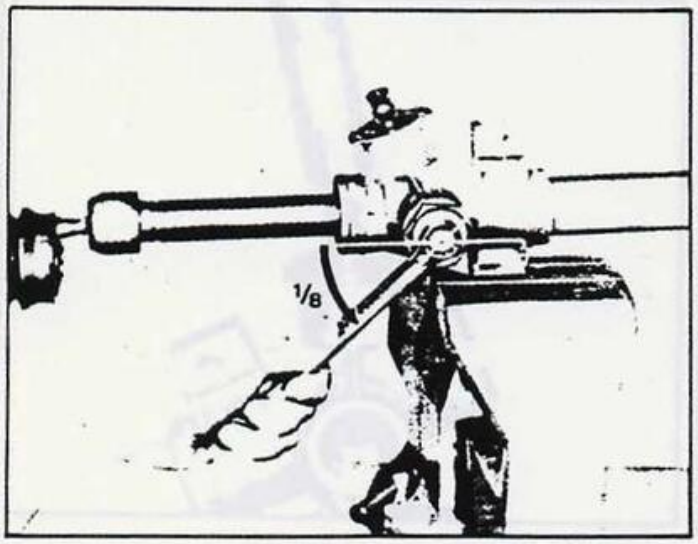
VI 27 - 10 - 81 - P17 - R - A



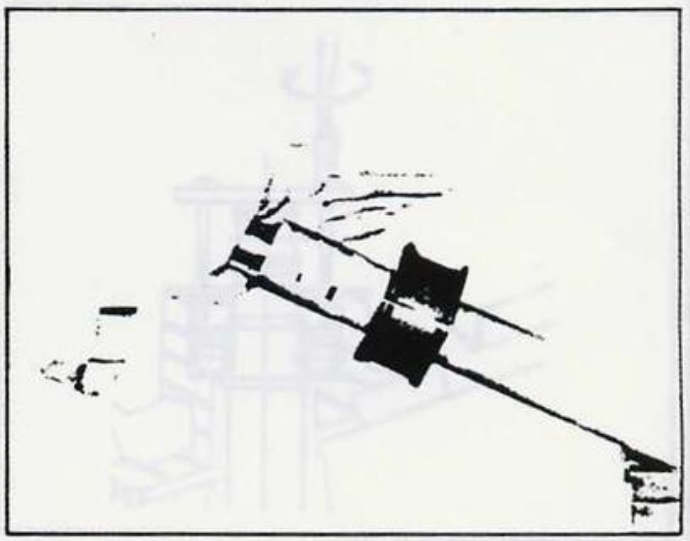
I 27 - 10 - 81 - P5 - R - A



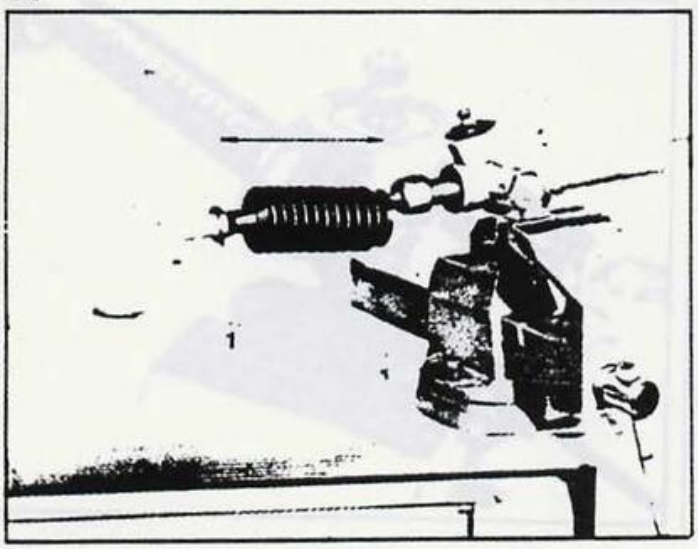
IV 27 - 10 - 81 - P11 - R - A



II 27 - 10 - 81 - P9 - R - A



V 27 - 10 - 81 - P14 - R - A



III 27 - 10 - 81 - P8 - R - A

DAMPER CLEARANCE

With the rack removed.

- Place lubricated damper in its housing.
- Place the spring in the damper.
- Fit the adjusting plug over the spring followed by the lock nut.
- Tighten the plug moderately to fully bed the damper on to the rack fig. I.
- Unscrew the plug by 1/8 turn fig. II.
- Push and pull the rack from stop to stop, as illustrated in fig. III.

> There must not be any hard point during this movement.

- If there is, unscrew the plug 1/8 turn at a time until the hard point disappears.

> Generally, the final adjustment is between 1/4 and 1/2 turn back. If more than 1/2 turn is required, check for foreign bodies between the damper and the rack or between the pinion and rack or replace the rack (distortion).

- Tighten the lock nut (1) to 6 m.daN (44 lbf ft) while holding the adjusting plug (spanner end 41 mm FACOM).

REPLACING THE RACK BEARING

With the rack removed.

- Remove (see previous operations) :
  - the damper,
  - the pinion,
  - the rack.
- Use a screwdriver fig. IV to prise the bearing from the housing.
- Lubricate the new bearing liberally and push it into position fig. V.

> Use a 32 mm drift to position it correctly in the lugs of the rack tube.

- Lubricate and refit (see previous operations) :
  - the rack,
  - the pinion, order immaterial
  - the damper.
- Adjust the damper, see operation in opposite column.

SPECIAL TOOLS

Fig. A

8.0708

– Spanner for steering tie rod ball joints, steering box end.

RECOMMENDED TOOLS

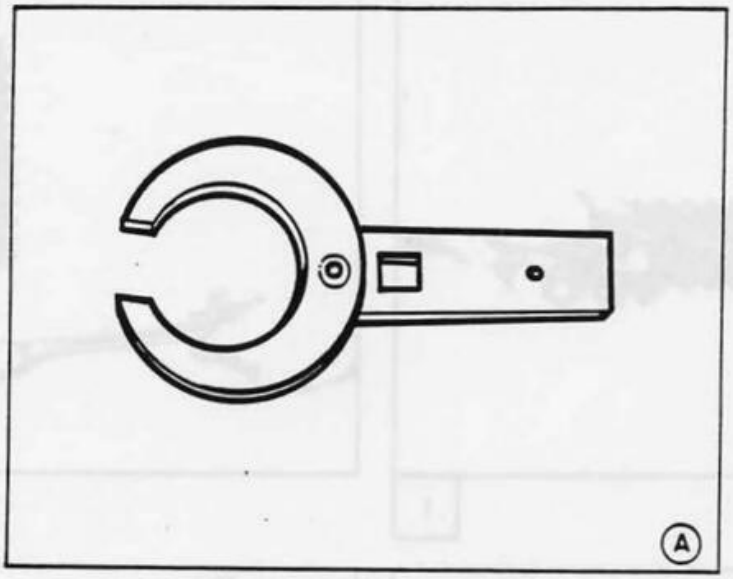
– "Facom S 203" torque wrench.

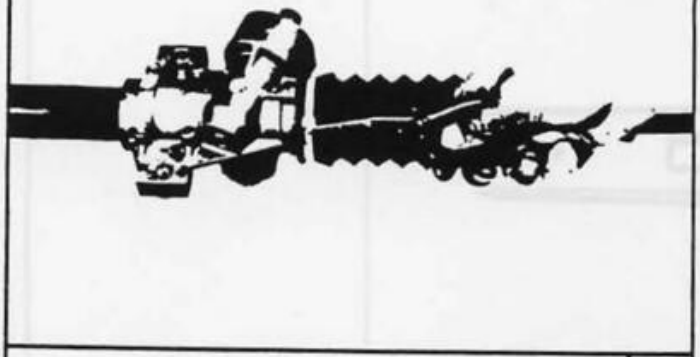
– 32 mm open ended spanner end fitting.

– End fitting extension.

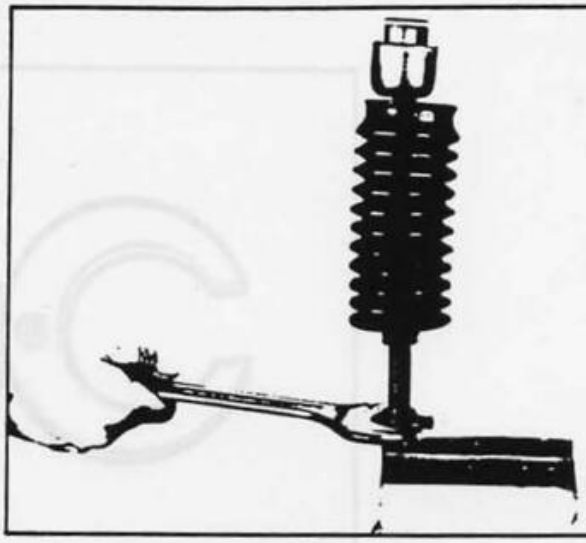
MAIN TIGHTENING TORQUES

Steering tie rod ball joint at rack the end : 6 m.daN (60 Nm, 44 lbf ft).


A



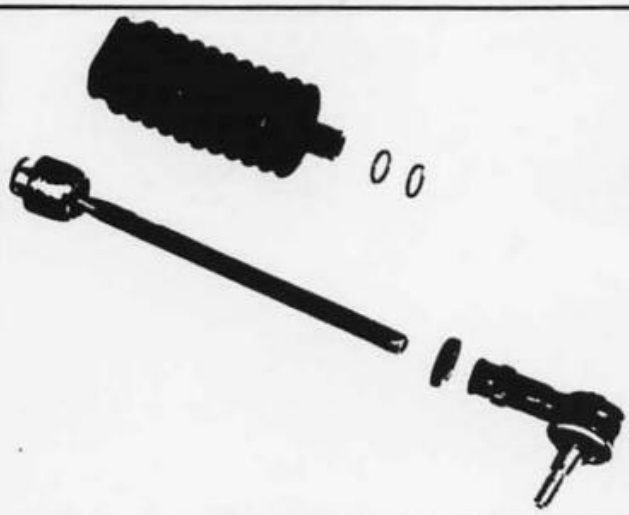
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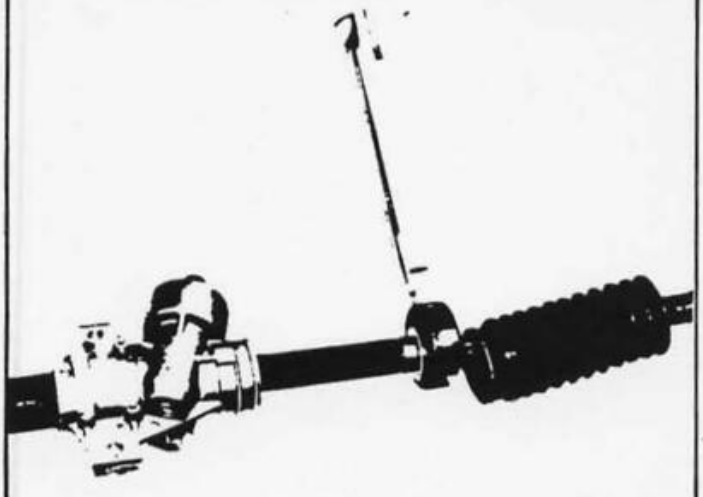
IV



II



V



III

Because it is impossible to correctly lock the ball joint casing at the rack end while it is on the vehicle, the operation of removing and refitting the steering tie rods must be done as a bench operation with the steering rack assembly removed from the vehicle.

As the assembly is locked by folding down the metal tongue of the ball joint casing, the ball joint must be replaced by a new one every time it is removed.

REMOVING

- Grip the rack in a vice.
- Remove the clip that retains the ball joint boot at the steering box end, fig. I.
- Roll bak the two rubber rings, fig. II, that secure the boot the the steering tie rod.
- Pull back the boot.
- Unscrew the ball joint casing at steering box end, fig. III, using spanner 8.0708.
- Remove the steering tie rod.
- Loosen the toe-in adjusting lock nut, fig. IV.
- Remove the components, fig. V.

IMPORTANT - A steering tie rod must be replaced by a new one every time it is removed from the steering rack.

TO FIT

– Assemble the steering tie rod.

– Set the steering tie rod length, fig. I.

Dimension a = 322 mm

WARNING - We recommended that this initial adjustment is carried out to that the steering lock angles are the same on each side.

– Tighten the lock nut finger tight, for the moment.

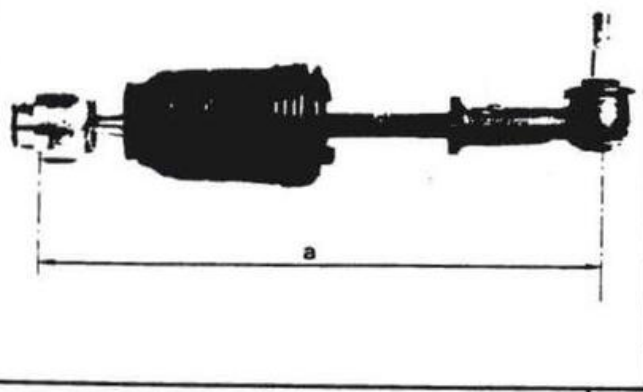
– Fit the steering tie rod to the rack, fig. II.

– Tighten the ball joint casing, fig. III, at the rack end, to torque of 6 m.daN (60 Nm, 44 lbf ft), using spanner 8.0708.

– Lock the ball joint casing, fig. IV, by peening the tab provided for this purpose into the slot machined in the rack.

– Fit the ball joint boot and its two rubber rings at the steering ball joint end.

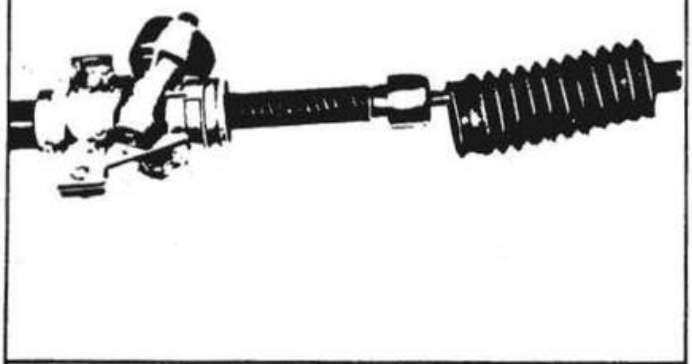
– Fit the boot retaining clip at the steering rack end.



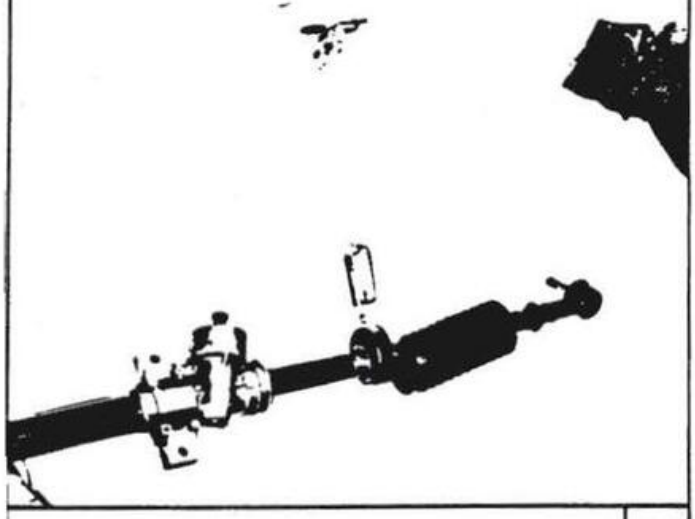
I



IV



II



III

BRAKES

CONTENTS

Pages

A - BRAKE SYSTEM

Identification - data

Brake system identification - data — A1.005 to 009

Checks - adjustments

Brake checks - adjustments — A2.001 to 003
(bleeding, adjustment of hand brake and the brake sevo rod)

Removing and refitting a brake servo — A2.001 to 005

C - FRONT BRAKES

Removing-refitting

Operations on the brakes — C4.001 to 005
(replacing the front brake pads, removing-refitting a caliper or disc)

D - REAR BRAKES

Removing-refitting

Removing-refitting the rear brake shoes — D4.001 to 007

F - COMPENSATOR

Checks - adjustments

Adjusting the compensator — F2.001 to 003

DATA

Braking system : Fig. I
Each front brake caliper has two pistons supplied by independent circuits.
The rear circuit from the master cylinder feeds the front brake upper pistons and the rear brakes.
The front circuit from the master cylinder feeds the front brake lower pistons.

MAIN SERVICE BRAKE

Disc brakes at the front :
GIRLING brakes of the floating caliper type with a wear take-up system (2 pistons per caliper).

Drum brakes at the rear :
GIRLING brakes with floating shoes and an automatic wear take-up system.
Hydraulically operated by a twin circuit master cylinder (I and H circuit pattern).
- Vacuum assistance system (brake servo)
- Brake pressure distributor on the rear brakes.

EMERGENCY BRAKE

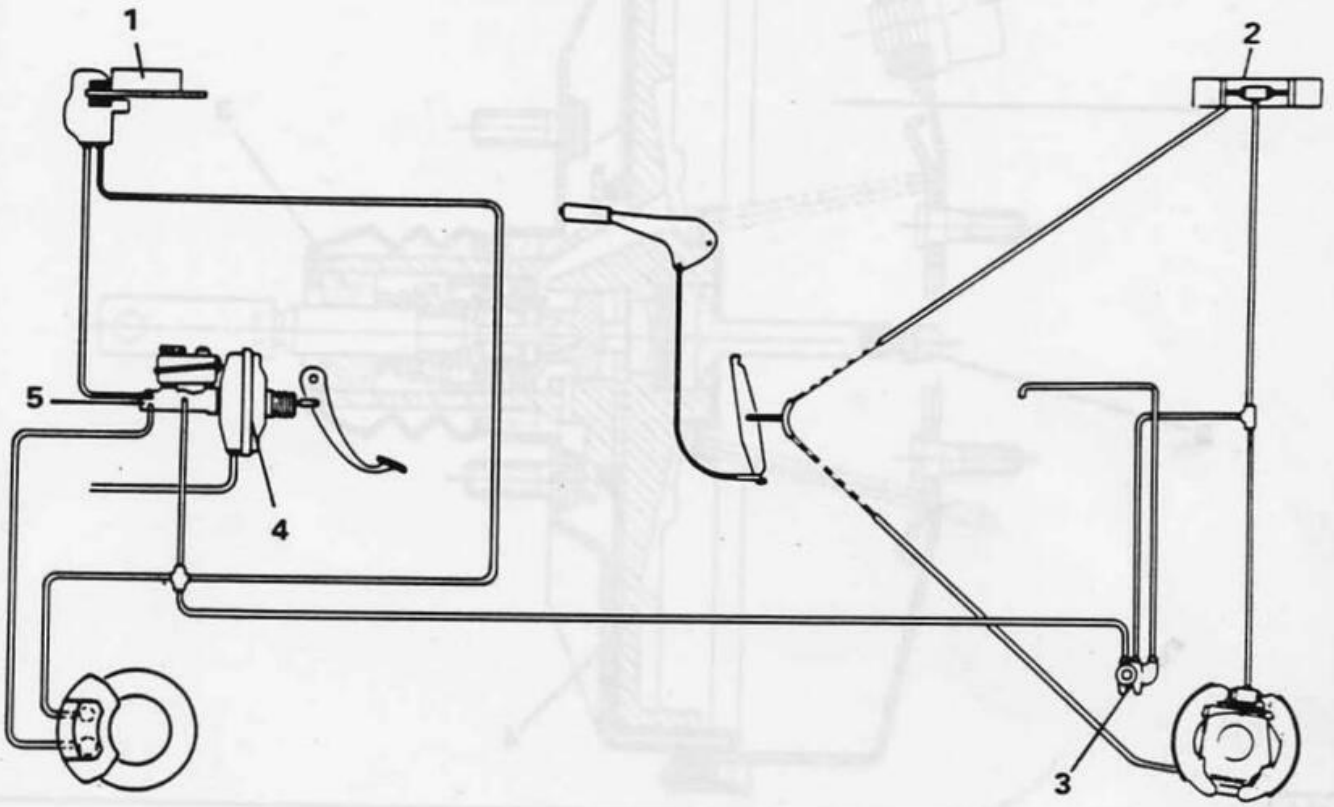
Lever operated acting on the rear brakes through cables.
The vehicle must be immobilised at a brake lever travel of 4 to 5 notches.

MASTER-VAC type servo.
Vacuum source for servo :
On Diesel engines : exhauster connected to the brake servo by a pipe.
On petrol engines : a pipe passing from the inlet manifold to the brake servo.
Braking system (key) :
1 - Front brake
2 - Rear brake
3 - Brake compensator
4 - Vacuum servo
5 - Master cylinder

Master cylinder
- Twin circuit type without a residual pressure valve.

	1000 → 1500	1800 TURBO
Front braking system : master cylinder ø :	22.2 mm	25.4 mm
Master cylinder piston travels	→| 2/83 : 19 + 17 mm |→ 2/83 : 21.5 + 12.5 mm	21.5 + 11.5 mm —

NEVER unscrew screw 1 on the master cylinder body, Fig. II
This screw acts as a piston stop and any loosening and retightening of the screw could jam the piston cup washer if the spigot on the screw does not re-enter the groove (2) in the piston, Fig. III.
The brake fluid must fulfil the standard : N.F.R. 12640 S or ISO 4925 or SAE J1703 or FMV SS 116 DOT 3.
Braking system capacity ..... 0.7 litres



UT. 45-11

I



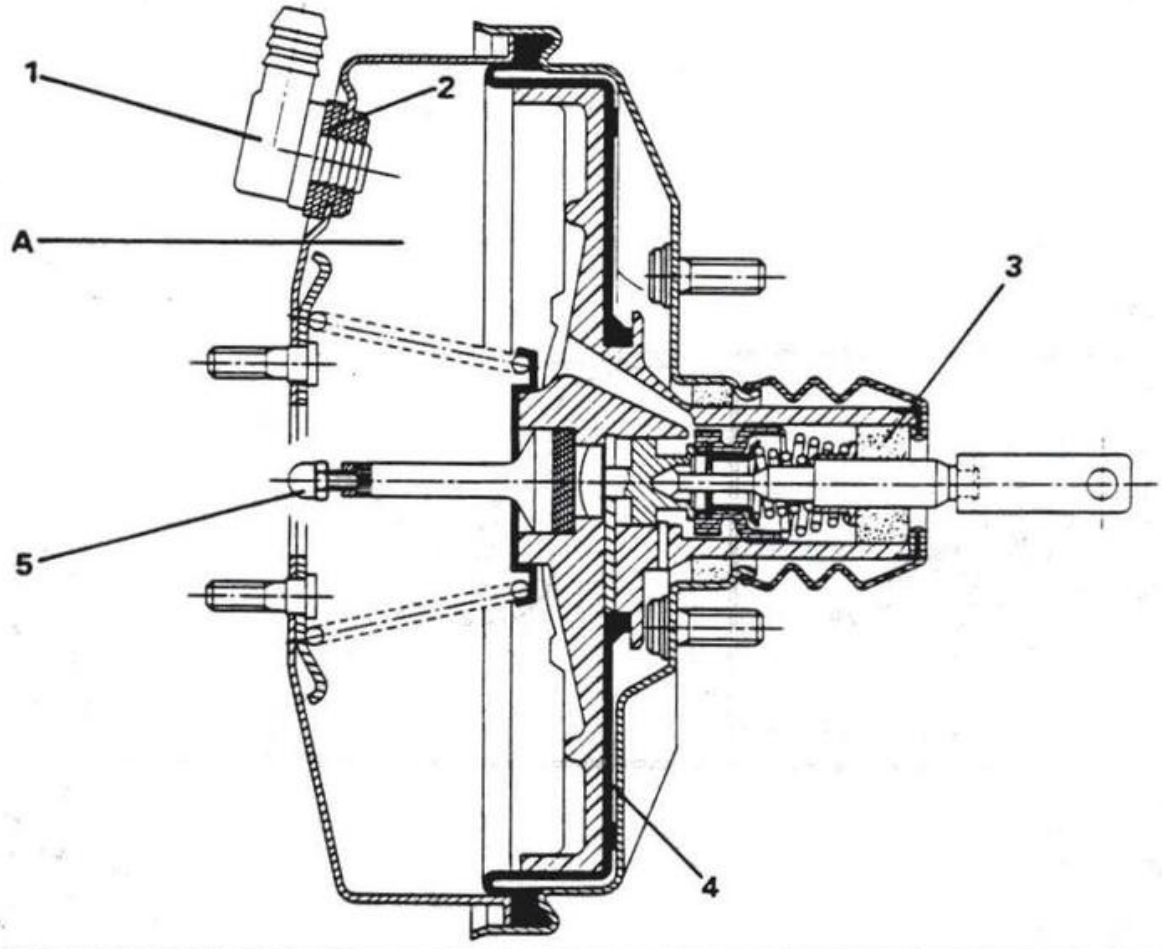
81-1012

II

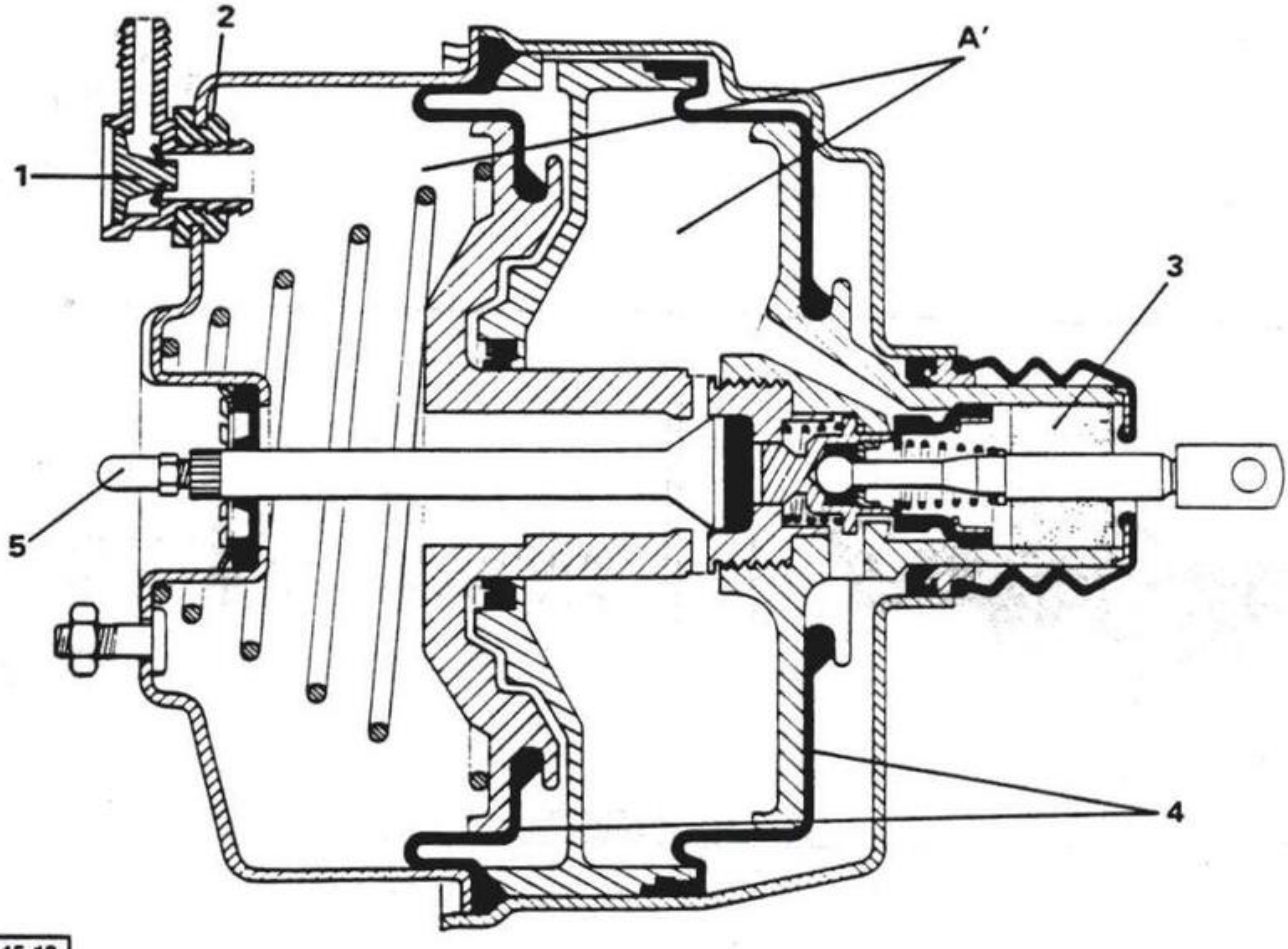


81-1006

III



UT 45-5



UT 45-12

MASTER-VAC brake servo for 1000 - 1500 naturally aspirated engines Fig. I
Conventional brake servo (with one compartment A)
The thrust rod is set back with reference to the master cylinder mounting face by . 0.3 to 0.5 mm
Diameter ..... 8" (203.2 mm)

MASTER-VAC brake servo for 1800 - TURBO vehicles Fig. II
Tandem (two compartments A')
This unit operates on exactly the same principles as those of the conventional MASTER-VAC brake servo.

WARNING : The thrust rod (5) is adjusted at the factory.
It is forbidden to re-adjust it under repair conditions

Diameter ..... 8" (203.2 mm)

Servo braking system defects - Causes :

- Leakage into the vacuum pipe between the inlet manifold (Petrol engines) and the valve (1) or between it and the exhauster (Diesel Engine).
- Leakage at valve (1) or seal (2).
- Fouling up of the filter (3) on the atmospheric pressure input.
- Leaks in the diaphragm or diaphragms (4).

On the J5 Diesel, a PIERBURG exhauster provides vacuum for the brake servo.

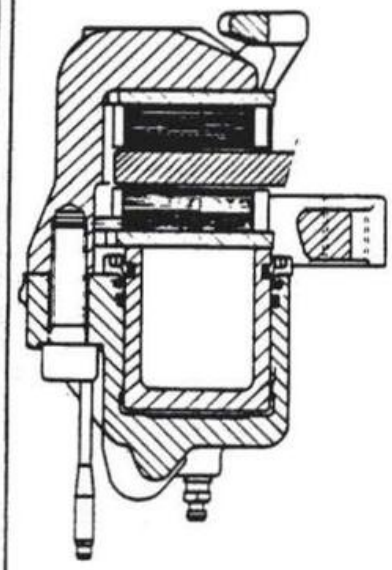
Exhauster oil capacity ..... 40 cm^3
Oil grade ..... SAE 10 W 30

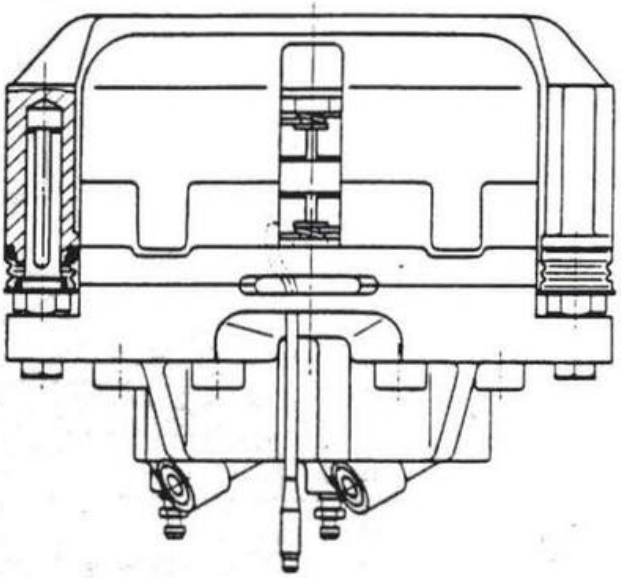
Front brakes Fig. I

	1000 → 1500			1800-TURBO
Caliper type	GIRLING			
Diameters of pistons upper	38 mm			42.8 mm
lower	48 mm			48 mm
Brake pads made by	TEXTAR		ENERGIT	ENERGIT
Type	T252	→1/85 ↦1/85	394	394
Total braking area	194.8 cm³			269.6 cm³
Min. thickness of pads	2 mm			
Wear warning sensor on inner brake pad				
Diameter of disc	255 mm			290 mm
Thickness of disc	13 mm →4/84 ↦4/84 16 mm			16 mm
Min. thickness of disc	11.8 mm →4/84 ↦4/84 13.5 mm			14.8 mm
Max. disc run-out	0.15 mm			
Point at which run-out is measured	approx. 2 mm from the outside diameter			

Rear brakes Fig. II

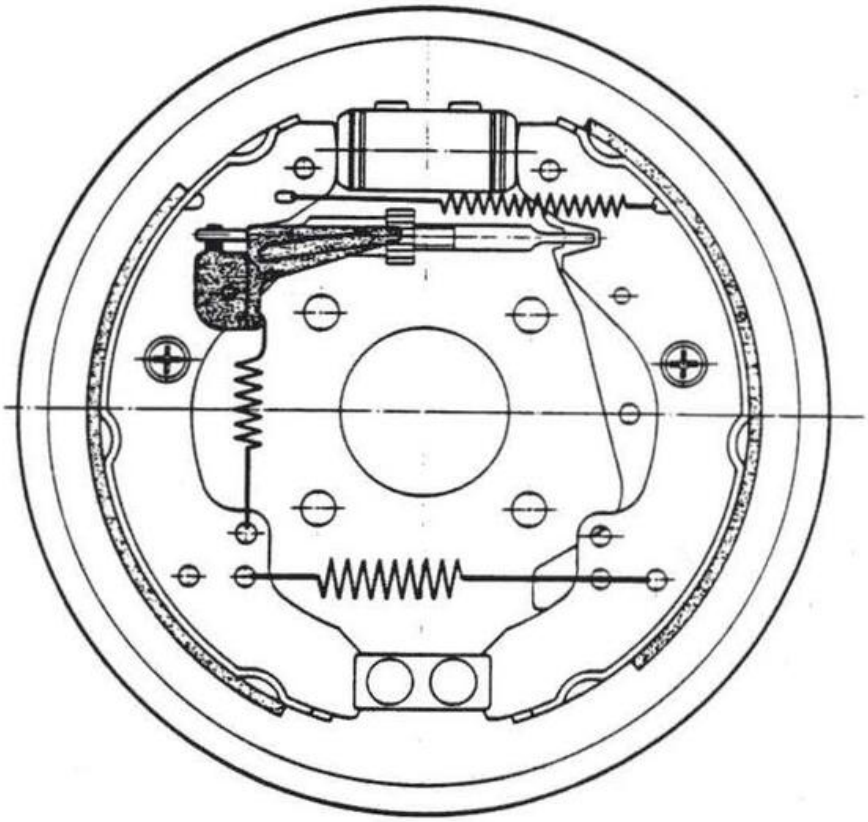
	1000 → 1500 - TURBO			1800
Type	GIRLING			
Diameter of wheel cylinder	22.2 mm →2/83 ↦2/83 25.4 mm			27 mm
Brake linings : Make	FERODO			
Type	AM 14 FF			IL 339
Total braking area	537 cm²			554 cm²
Min. thickness of linings	1 mm			
Diameter of drum	254 mm			
Max. diameter after reworking	254.8 mm			
Max. diameter due to wear	255.6 mm			





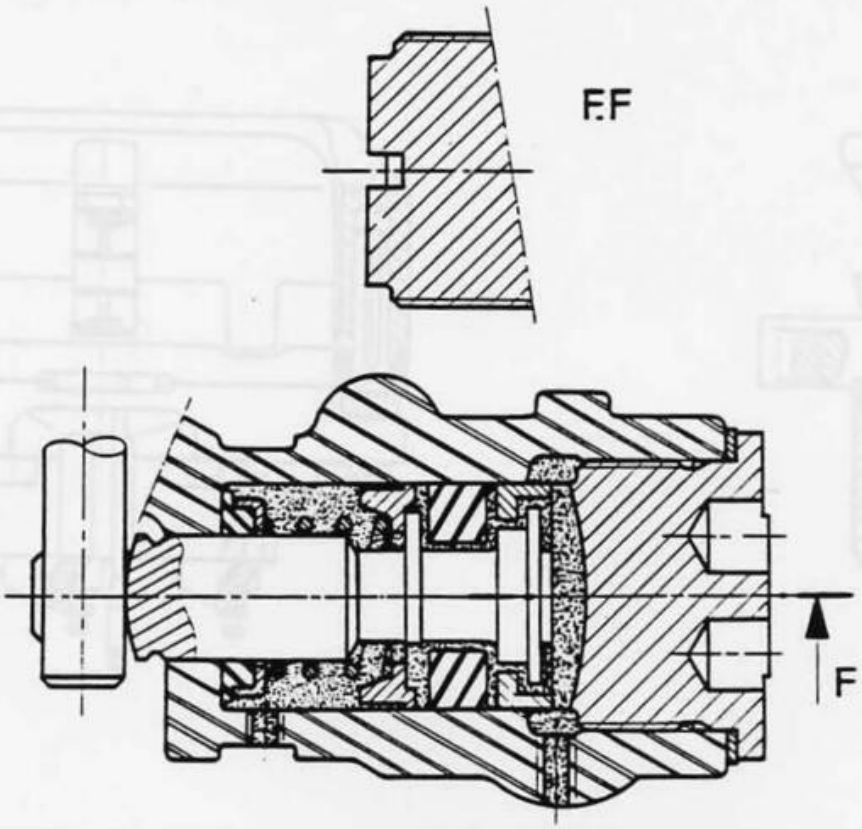
UT. 45-6

I



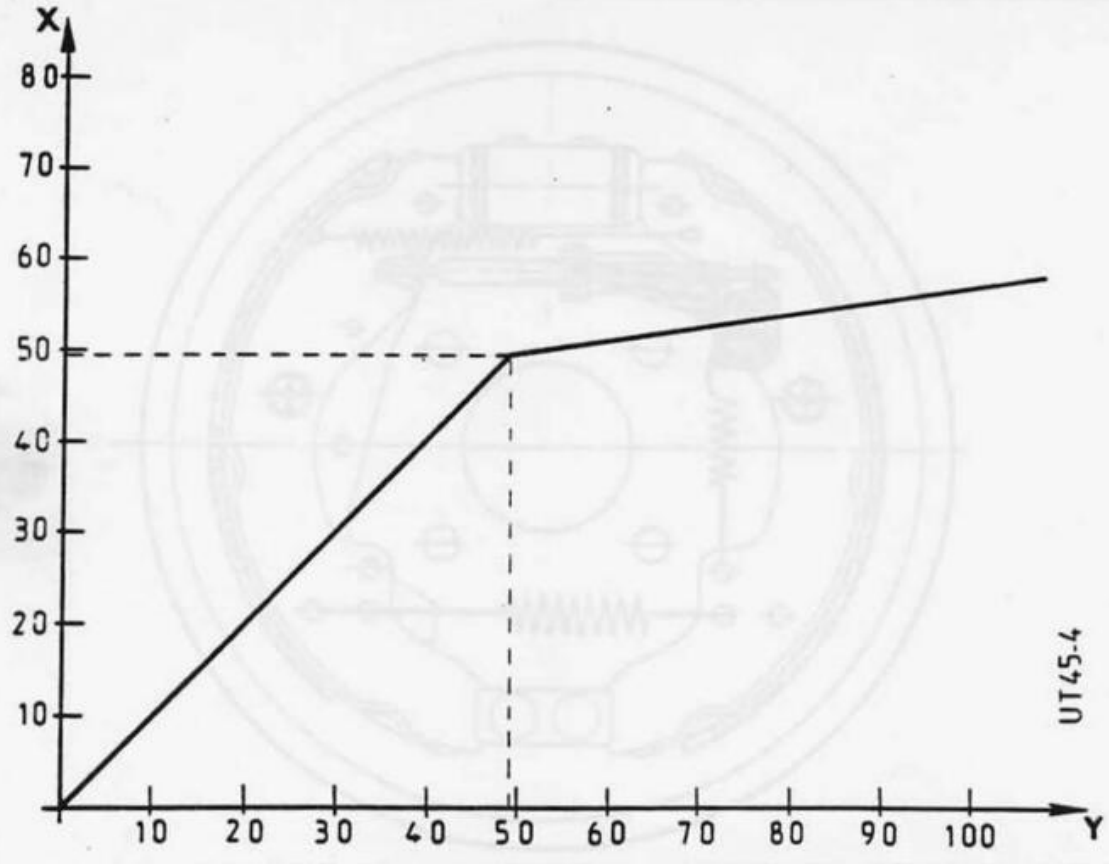
UT. 45-3

II



UT. 45-2

I



UT. 45-4

II

Brake pressure distributor :

The function of this unit is to adjust the ratio between the pressure in the front braking system and the pressure in the rear braking system, to suit the vehicle load.

The brake compensator ratio is 0.34.

Fig. I - Section through brake compensator

Fig. II - Graph showing relationship between pressure in front system and pressure in rear system.
X - pressure acting on front brakes
Y - pressure acting on rear brakes.

I - BLEEDING THE BRAKING SYSTEMS

Ensure that the level in the brake fluid reservoir is maintained during the bleed operations. Use brake fluid Lockheed 55, Nafic FN3, Stop HD 88 or Peugeot.

Engine stopped, without any servo effect.

Bleed each wheel cylinder, starting at the rear of the vehicle and then moving to the front Fig. I, bleeding first the upper cylinders (2) and finishing with the lower cylinders (1).

- Place a transparent tube, on each bleed screw, the other end of which is to be immersed in a clean container.
- Press down the brake pedal.
- Open the bleed screw.
- Hold the brake pedal fully depressed.
- Close the bleed screw.
- Slowly release the pedal against its stop.
- Repeat this operation until there are no more air bubbles in the brake fluid.
- Carry out these same operations on the other wheels.

Bleeding the brakes can be made easier by using equipment designed for this purpose (For example : ARC 50, PRESTOP)

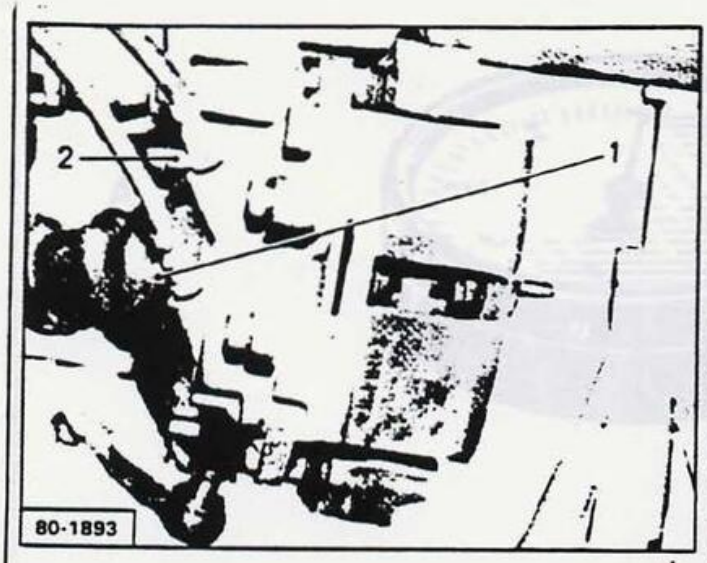
II - ADJUSTING THE EMERGENCY BRAKE

- Press the brake pedal two or three times to operate the hydraulic system.
- Set the hand brake lever on the third notch of its travel.
- Tighten the nut (3), Fig. II, until the rear brakes start to engage.
- Check that when the hand brake lever is on the fifth notch of its travel, the rear wheels are locked.
- Tighten the lock nut.

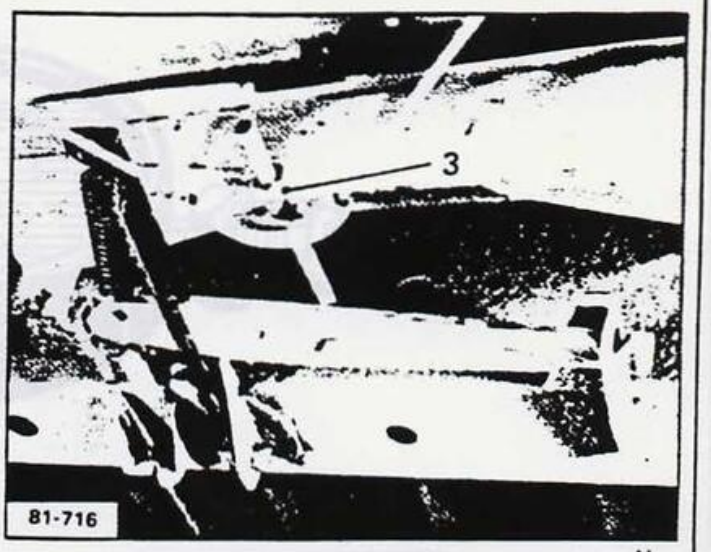
III - ADJUSTING THE BRAKE SERVO THRUST ROD

Only on the conventional MASTER-VAC brake servo (1 compartment) fitted to naturally aspirated engines

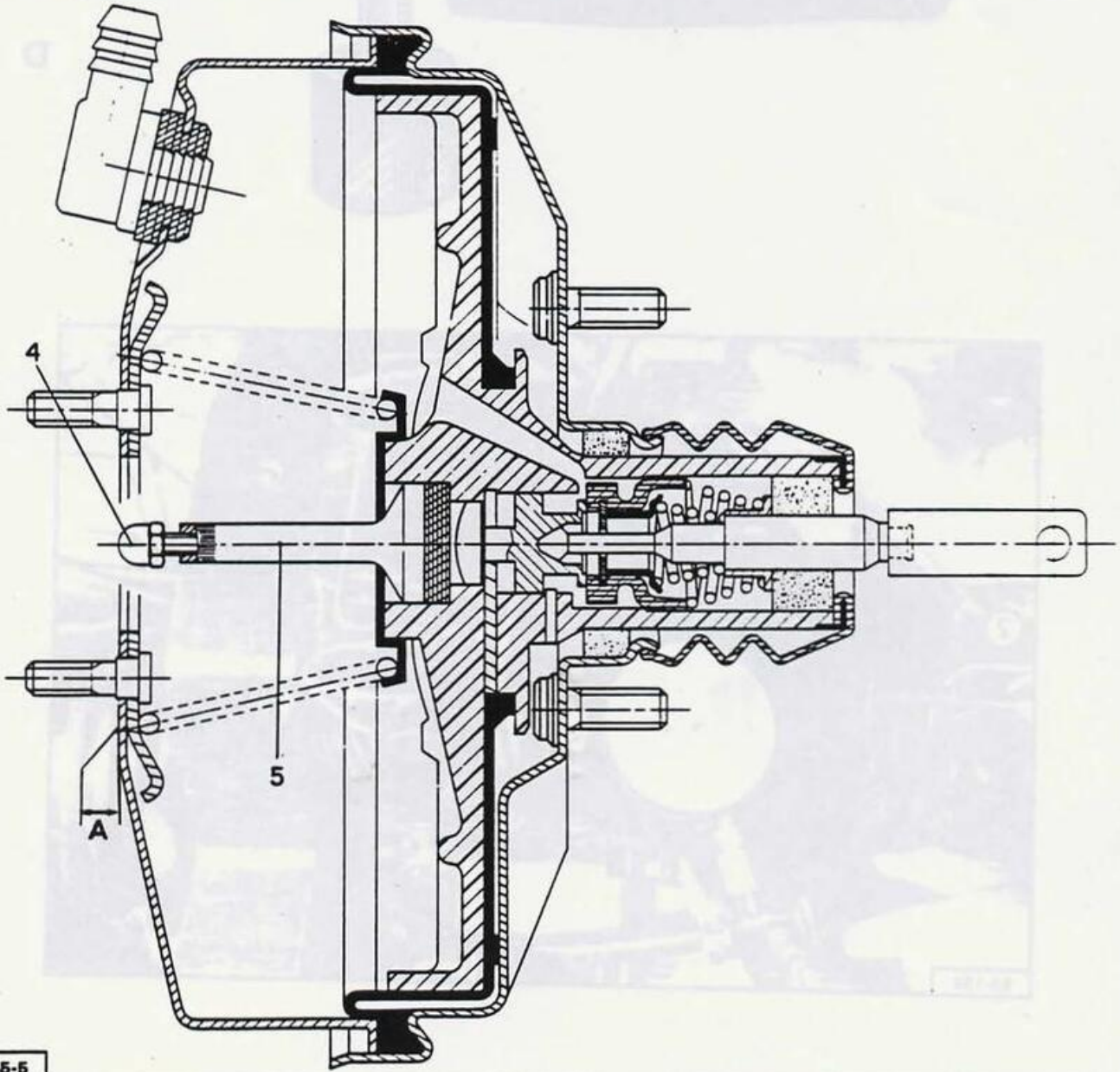
The end of the thrust rod (5) should be recessed below the master cylinder mounting face, in the released position, by A = 0.3 to 0.5 mm. To obtain the recessed depth A = 0.3 to 0.5 mm, turn screw (4).



I

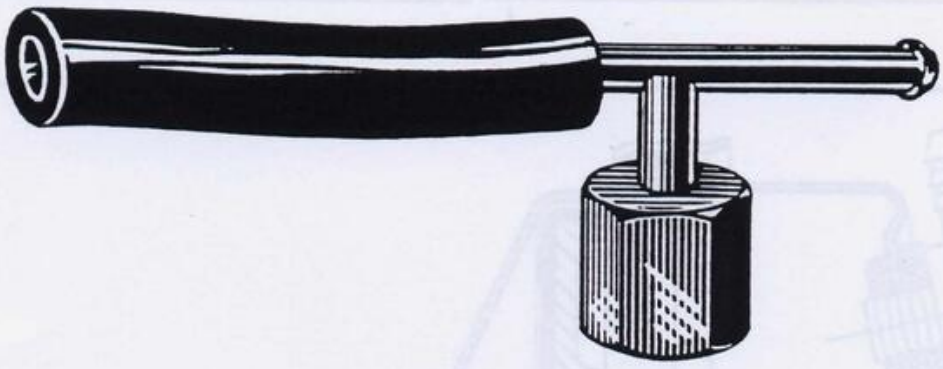


II

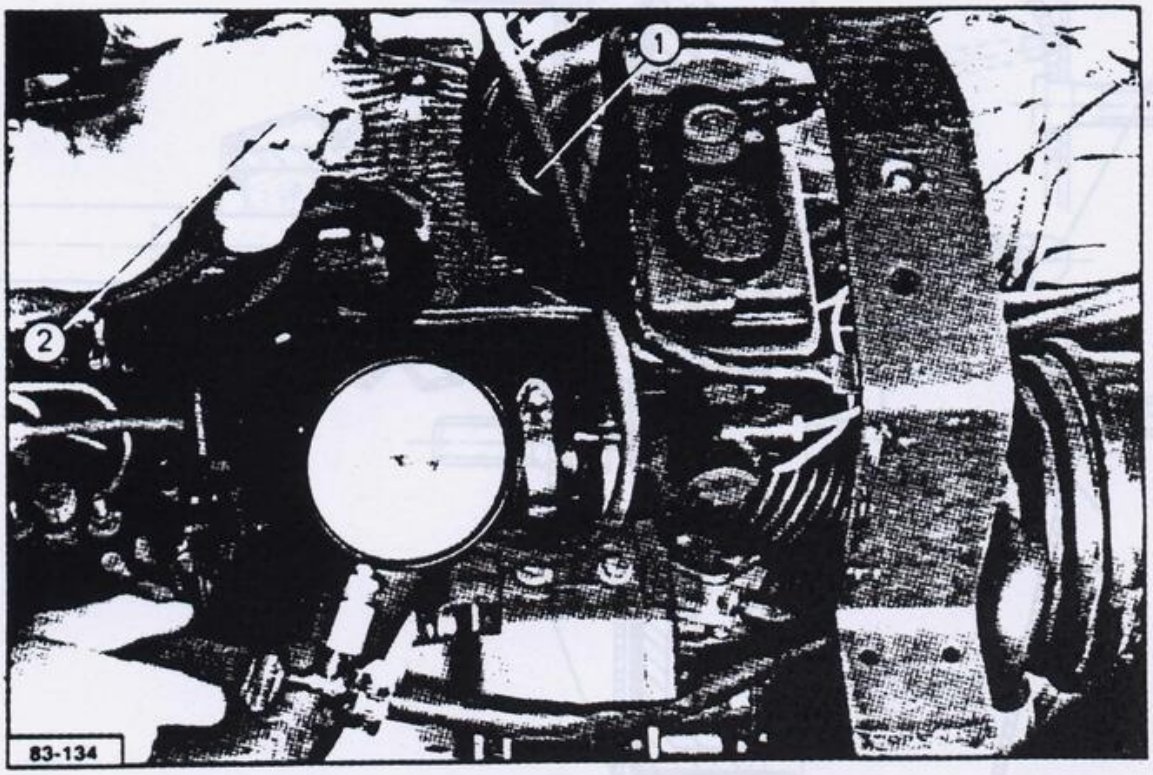




A



D



SPECIAL TOOL

A : Pressure gauge - Vacuum gauge
Reference : 8.1503 A + D

Defect	Cause	Remedy
Heavy pressure required at the pedal	Defect in the vacuum source	Check the vacuum pipes, valves and vacuum source
Heavy pressure required at the pedal and engine speed changes when the brakes are applied	Brake servo diaphragm perforated	Replace the MASTER-VAC brake servo
Heavy pedal pressure from time to time	Non-return valve sticking on its seat	Lubricate the non-return valve with silicone

IV - CHECKING THE SERVO BRAKING SYSTEM

With the engine stopped, depress the brake pedal a number of times to « use up » all the vacuum in the brake servo.
The pedal will become stiff and will remain in the « upper » position. Keep the foot on the brake pedal and start the engine. The pedal should move slowly down.
As, on diesel engined vehicles, the exhauster does not provide sufficient vacuum at idling speed, press down on the brake pedal and accelerate the engine at the same time. The pedal should move slowly down.
Note : If the brake servo is in good condition, there should be no change in the engine speed when the pedal is depressed.

CHECKING THE VACUUM

On petrol engined vehicles :
Connect, to the engine :
- a pressure-vacuum gauge 8.1503A+D
- a tachometer.

Warm up the engine until the fan cuts in.
Accelerate to 4500 rpm.
Cease accelerating the engine.
The maximum pressure indicated during the time that the engine speed is falling should be equal to or greater than 500 mm/Hg or 700 mbars.

On Diesel engined vehicles :
Connect a pressure-vacuum gauge into the system.
Run the engine for at least one minute at fast idling speed. The vacuum shown should be equal to or greater than 500 mm/Hg or 700 mbars.
If a vacuum of 500 mm/Hg is obtained, the servo braking system is not responsible for the defect. Look for the cause in the hydraulic system.

IF A VACUUM OF 500 mm/Hg IS NOT REACHED :
Disconnect the valve (2).
Repeat the test whilst blocking the valve end fitting with the thumb.

1st Case : If the vacuum is less than 500 mm/Hg : Look for the cause on the output side of the valve, that is to say :

On Petrol engined vehicles :
Air leaking into the system : because one of the following is loose or damaged :
- the valve (2).
- the pipes.
- the carburettor securing flange.

The condition of the engine : check the compression pressure or pressures.

On Diesel engined vehicles :
Air leaking into the system : because the valve or the pipes are loose or damaged.

A defect in the exhauster :
Check, initially
- the belt tension
- the exhauster oil lever (too high an oil level reduces the output).

2nd Case : If the vacuum is 500 mm/Hg or more :
Reconnect the valve (2) after fitting a new seal (1).
Repeat the test.
If the vacuum is, again, lower than 500 mm/Hg the brake servo is the cause of the trouble. Check the air filter on the brake servo and clean it.
Repeat the test.
If the vacuum is too low, the brake servo diaphragm is leaking. Replace the brake servo.

REMOVING

Disconnect the earth cable from the battery.

LH drive vehicles, remove the spare wheel carrier.

Disconnect, Fig. I and II, the vacuum pipe (1) from the brake servo.

Disconnect, Fig. I and II, the wires (2) from the brake fluid level sensor.

Remove, Fig. III, the nuts (3) from the master cylinder.

Free, Fig. IV, the master cylinder from the brake servo, and support the servo.

Unclip and remove, Fig. V and VI, the pin (4) that connects the thrust rod to the pedal.

Remove, Fig. V and VI

RH drive : Fig. V, the four bolts (→) that secure the brake servo in place.

LH drive : Fig. VI, the three bolts (→) that secure the brake servo in place.

Remove the brake servo.

RH drive : disconnect the spacer from the brake servo.

REFITTING

LH drive : Fig. VI, place the brake servo in place and tighten the three bolts.

Tightening torque 20 N.m (14.7 lbf.ft.).

RH drive : Fig. V, connect the spacer to the brake servo, fit this assembly in place and tighten the four bolts.

Tightening torque 20 N.m (14.7 lbf.ft.).

Fit, Fig. V and VI, the pin (4) and its clip.

Note : Before refitting the master cylinder, adjust the depth by which the thrust rod is recessed below the master cylinder mounting face. It should be 0.3 to 0.5 mm.

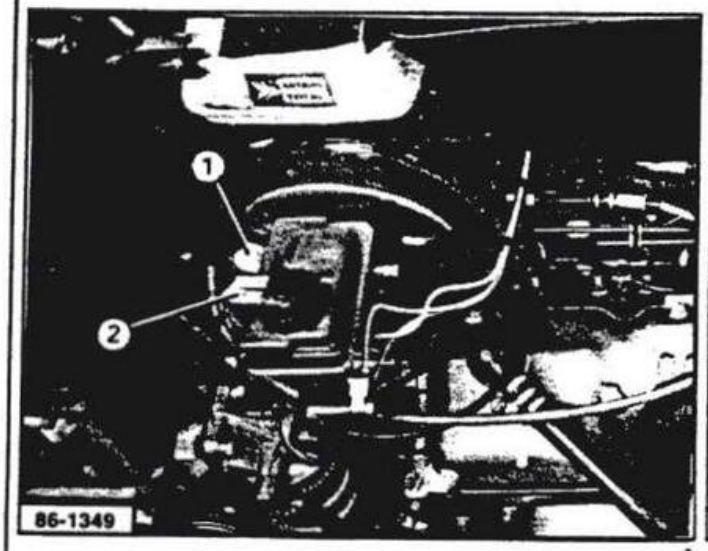
Fit, Fig. III, the master cylinder and the nuts (3).

Tightening torque 20 N.m (14.7 lbf.ft.).

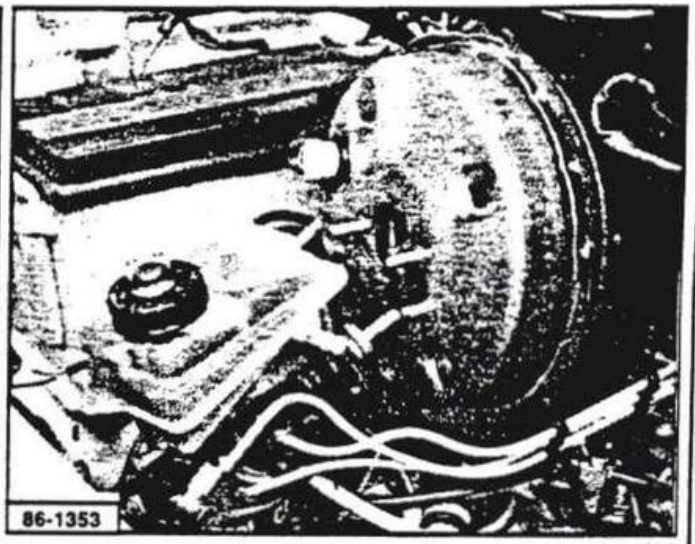
Connect, Fig. I and II, the vacuum pipe (1) to the brake servo.

Connect, Fig. I and II, the wires (2) to the brake fluid level sensor.

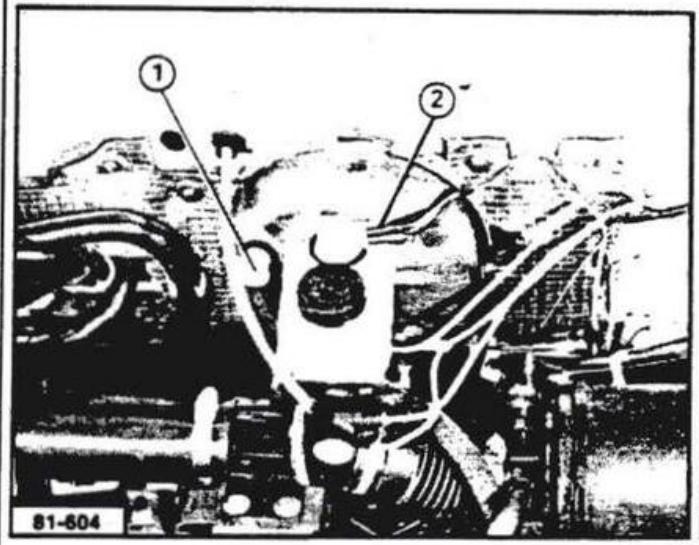
LH drive : refit the spare wheel carrier.



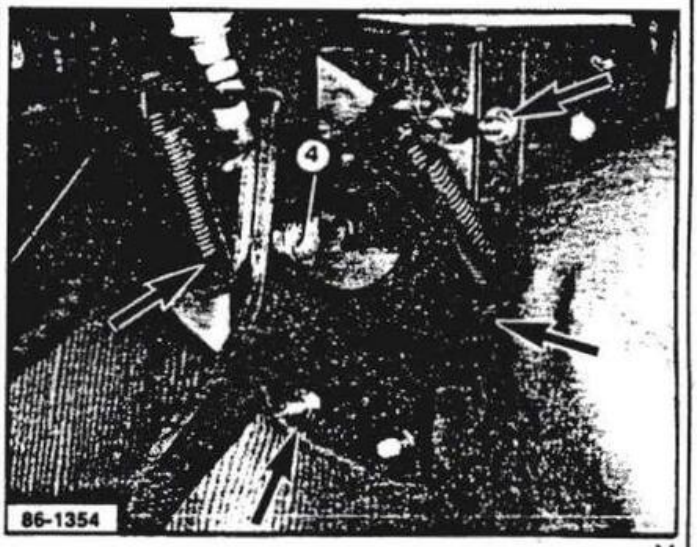
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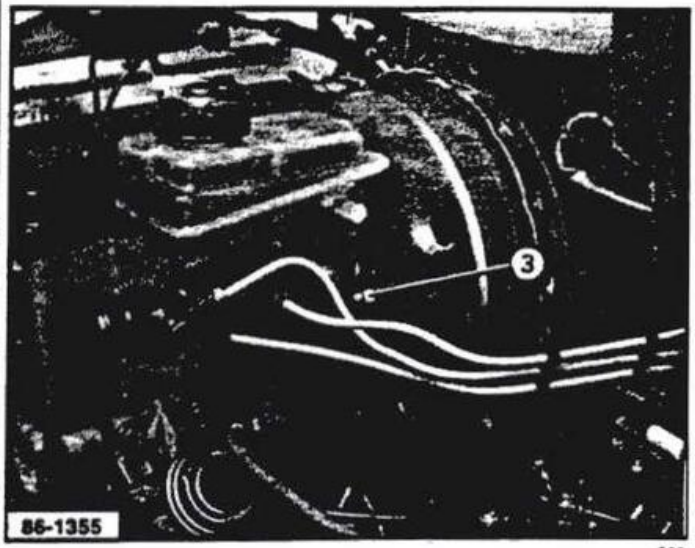
IV



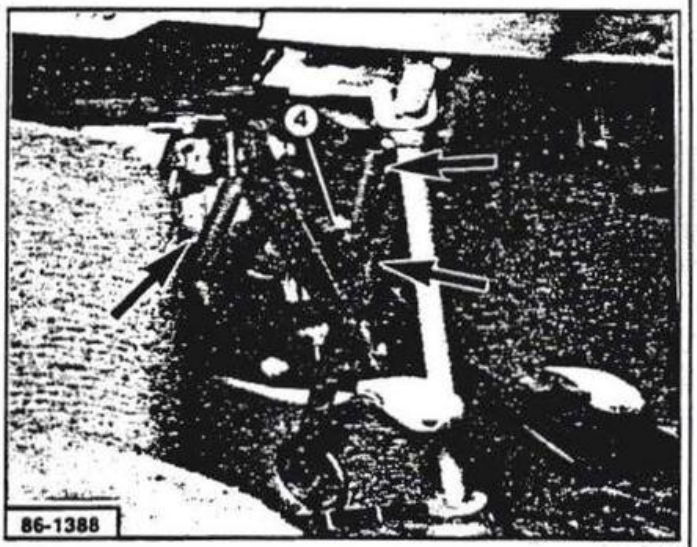
II



V



III



VI

REPLACING THE FRONT BRAKE PADS

NEVER SEPARATE THE TWO FRONT BRAKE CALIPER SECTIONS.

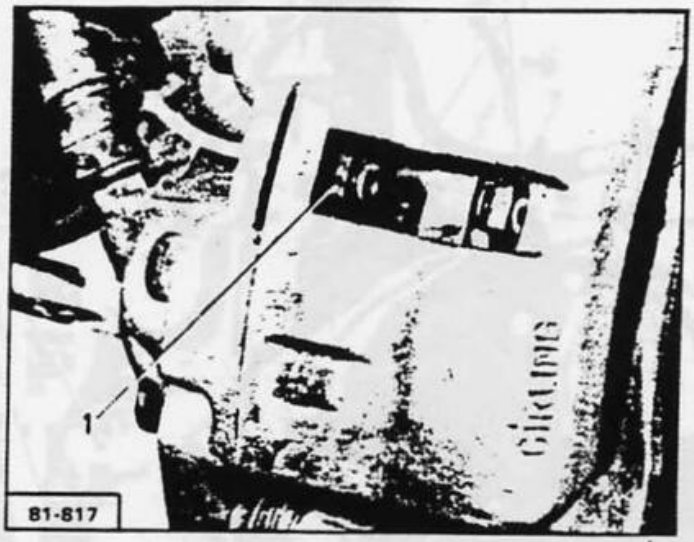
REMOVING

- Loosen the front wheel bolts.
- Raise the front of vehicle and place it on stands with the wheels hanging free.
- Remove the wheels.
- Push back the pistons, fig. I, by applying pressure to them with a pair of grip across the inner pad (1) and the caliper.
- Remove the bolt (2), fig. II. and III, using a second spanner to prevent the guide (3) rotating.
- Swing the caliper yoke downwards, fig. III.
- Remove the brake pads (1) and (5), fig. III.
- Check :
  - the condition of the dust seals (4) on the guides (3), fig. III,
  - the condition and positions of the piston dust seals (6).

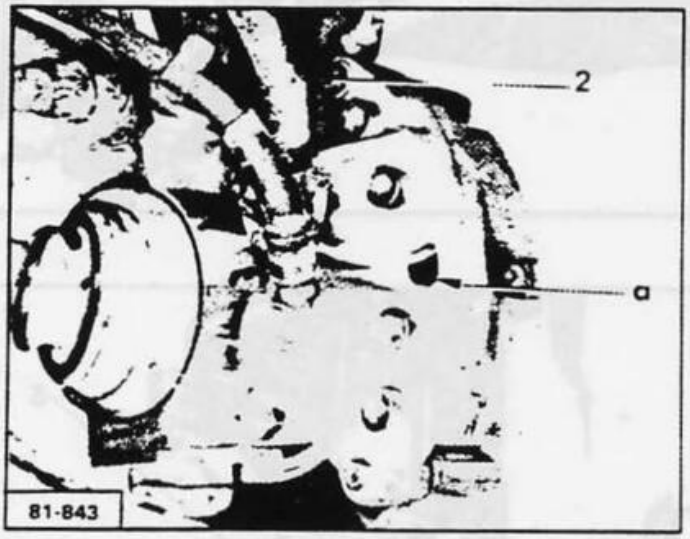
If the dust seals (4) require replacing, remove the guides (3), clean and lubricate them with the special grease supplied by the Parts Department with the new dust seals.

REFITTING

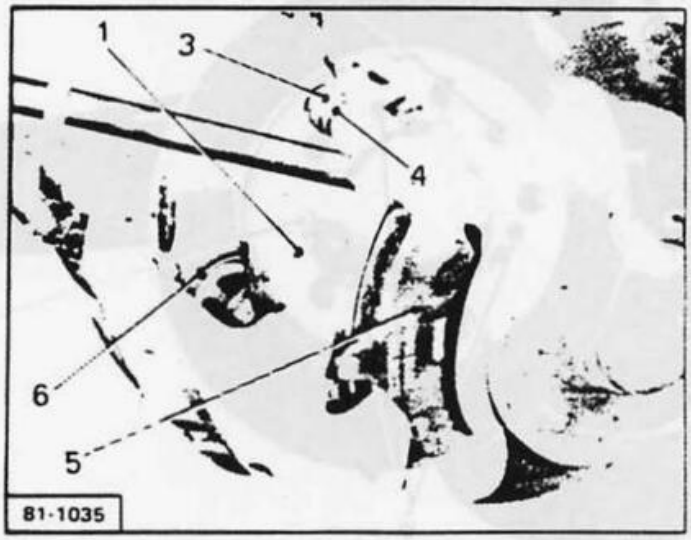
- Push the pistons to the bottoms of their bores.
- Fit the new brakes pads, fig. III.
- Pad (1), with the wear warning light wire is fitted on the INSIDE. The wear warning light wire passes through hole "a", fig. II.
- Swing the caliper yoke back into place, fig. II, and press it down to be able to fit the new bolt (2) supplied with the new brake pads.
- Tighten bolt (2) to a torque of 3.4 m.daN (34 Nm, 25 lbf ft), fig. II, whilst preventing the guide (3) turning with a second spanner.

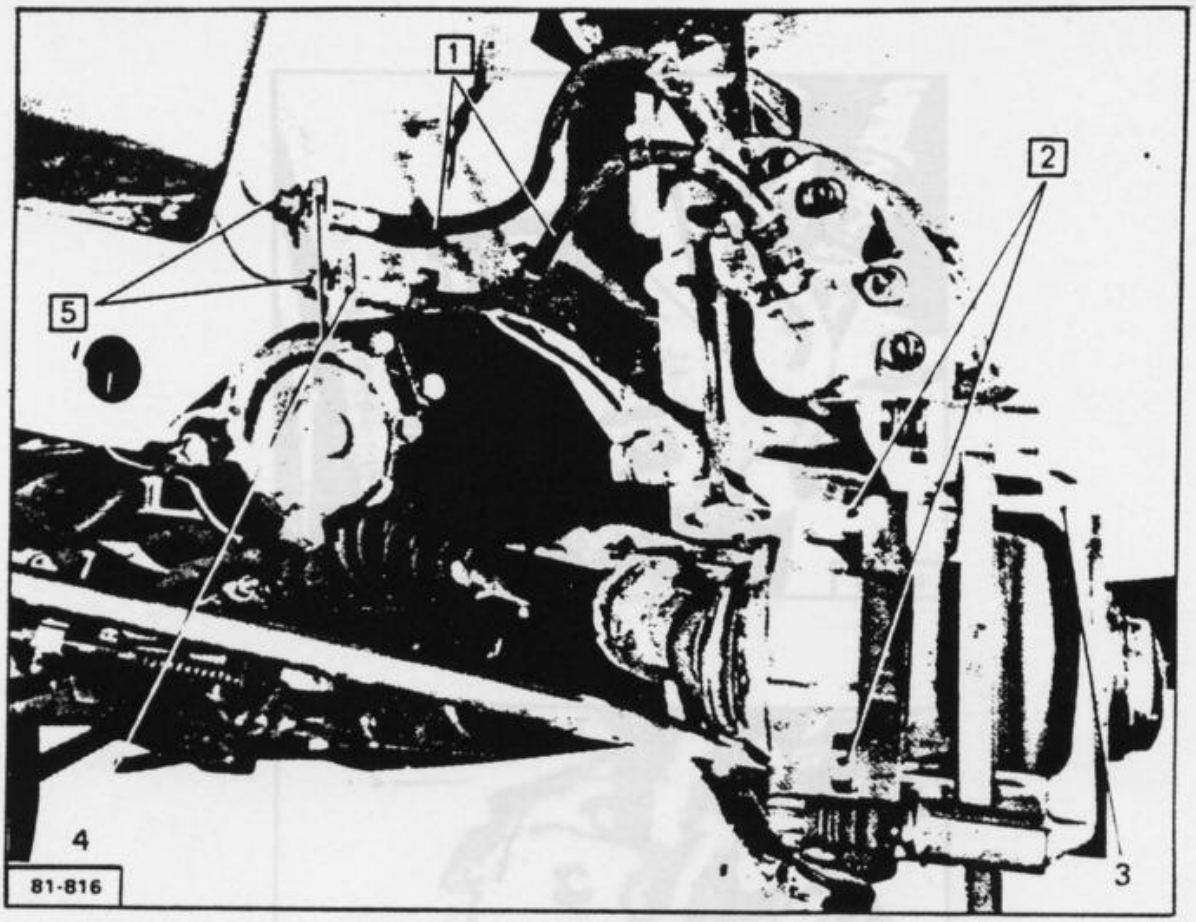


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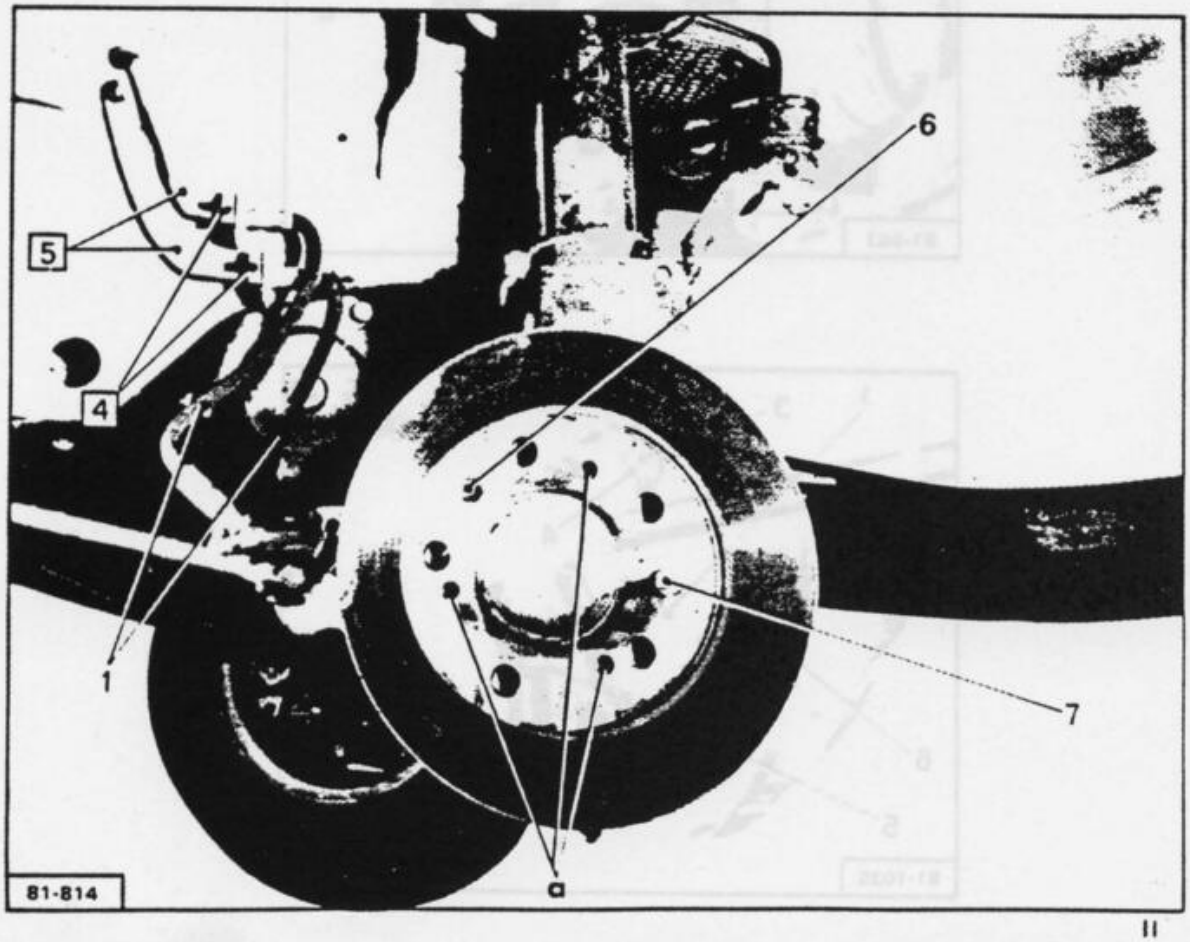


II





I



II

REMOVING AND REFITTING A FRONT BRAKE CALIPER OR DISC

NEVER SEPARATE THE TWO FRONT CALIPER SECTIONS

REMOVING

- Side yoke the caliper from the caliper bracket (see the preceding section : replacing the front brake pads).
- Disconnect, fig. I, the rigid brake pipes (5) from the hoses (1) after having first marked them.
- Remove, fig. I, the clips that secure the hoses to their support brackets.
- Remove, fig. I, the two bolts (2) that secure the caliper bracket (3) to the stub axle carrier.
- Remove, fig. II, the bolt (6) and the wheel locating dowel (7).
- Remove the brake disc, using three extractor bolts (Ø 10 mm, pitch 1.25), screwed into the holes "a", fig. III.

REFITTING

- Fit, fig. I and fig. II :
  - the brake disc,
  - the bolt (6) and the wheel dowel (7),
  - the caliper bracket (3) to the stub axle carrier.
- Tighten the bolts (2) to a torque of 1.42 m.daN (142 Nm, 105 lbf ft).
- Fit the pads and the caliper to the caliper bracket (see preceding operation : replacing the front brake pads).
- Reconnect, fig. I :
  - the hoses (1) to the pipes (5) by following the locating marks made during dismantling.
- Fit, fig. I :
  - the clips (4) that secure the hoses (1) to their support brackets.
- Bleed the brakes (see relevant section).
- Refit the wheels and lower the vehicle to the ground.
- Tighten the wheel bolts to a torque of 16 m.daN (160 Nm, 118 lbf ft).

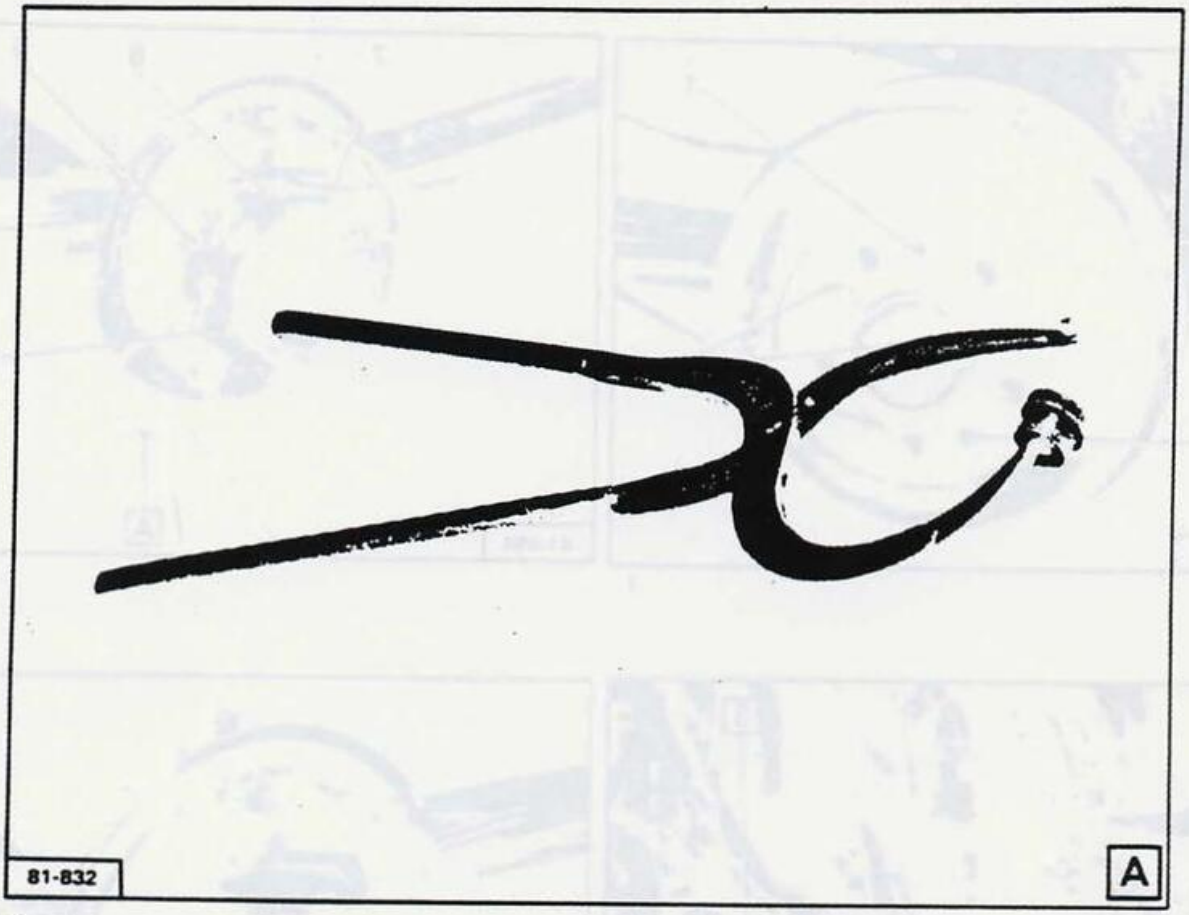
SPECIAL TOOLS

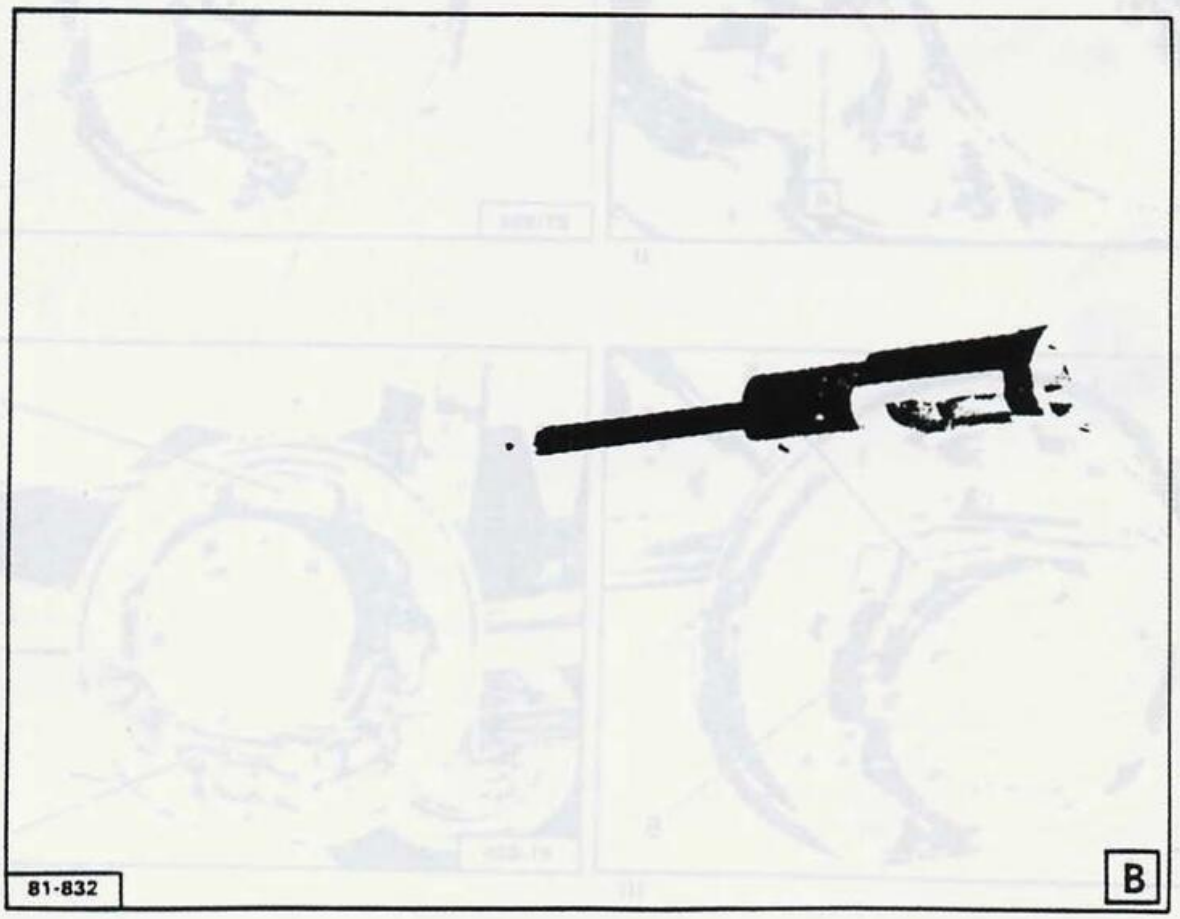
A - Pliers for removing and refitting the rear brake shoe springs.

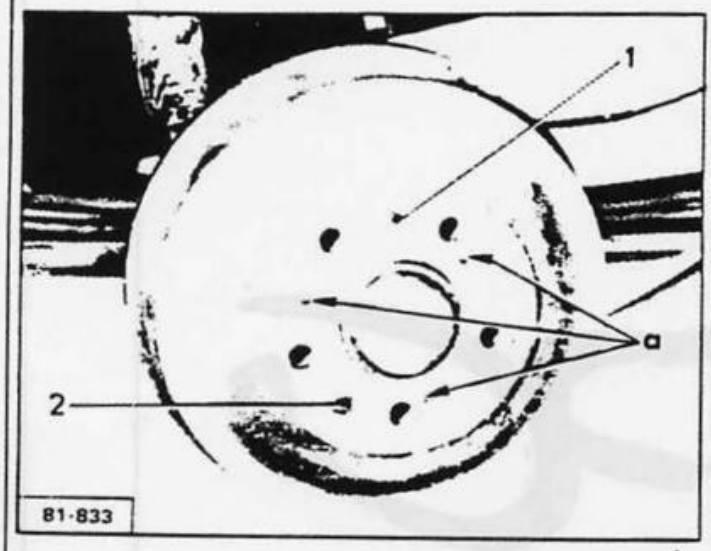
B - Spanner for removing and refitting the rear brake shoe steady spring cups.

TIGHTENING TORQUES

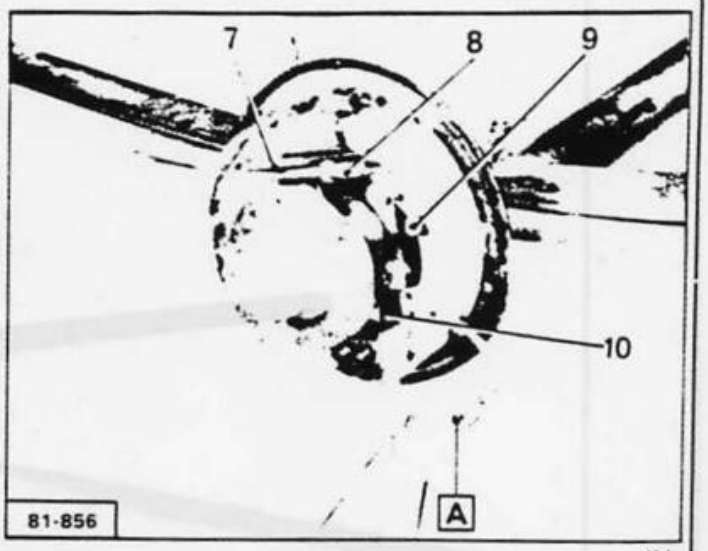
	m.daN	Nm	lbf ft
Rear brake drum securing bolts and wheel and wheel guide dowels	1,5	15	11
Front caliper bracket to stub axle carrier securing bolts	14,2	142	


81-832
A


81-832
B



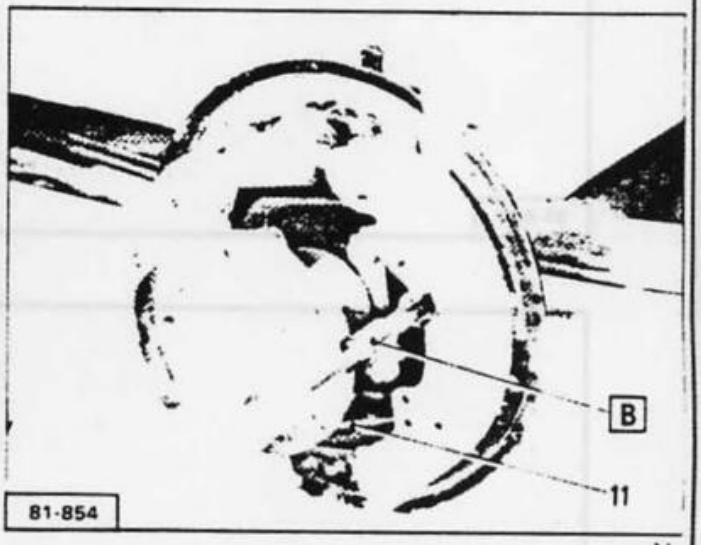
I



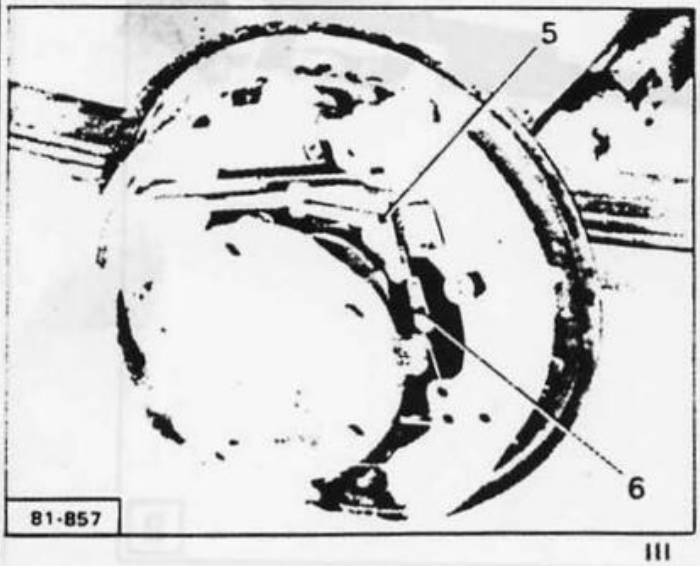
IV



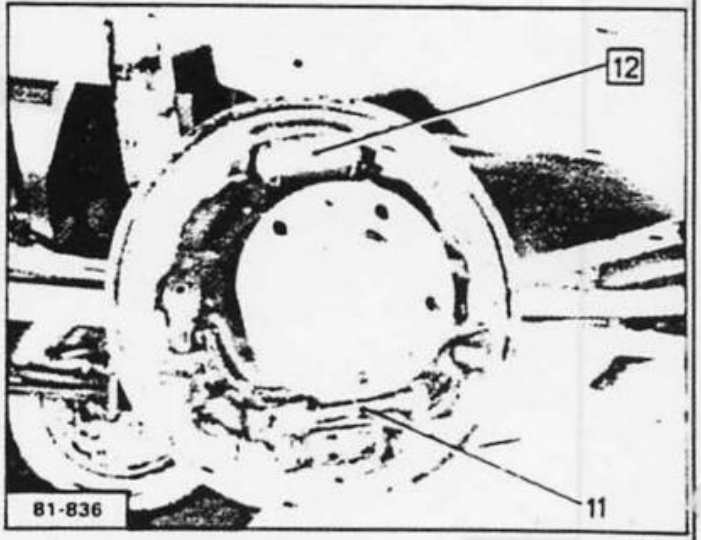
II



V



III



VI

REMOVING AND REFITTING THE REAR BRAKE SHOES

REMOVING

– Loosen the wheels.

– Raise the rear of the vehicle and support it with the wheels hanging free.

– Remove the wheels.

– Remove :

- the wheel locating dowel (1) and bolt (2), fig. I,
- the brake drum, using extractor bolts (Ø 10 mm, pitch 1.25) screwed into the holes "a", fig. I.

If wear has caused a ridge to form on the edge of the drum and it cannot be removed :

– Apply the hand brake.

– Remove the hand brake lever stop, to do this, fig. II.

– Push the centre part (3) towards the inside of the brake assembly,

– Remove the stop by pully the plastic section (4).

– Release the hand brake.

- the automatic adjuster lever (5) and spring (6), fig. III,
- springs (7) and (10) using pliers (A), fig. IV,
- automatic adjuster link (8), fig. IV.
- the steady spring retaining cups (9), figs. IV and V,
- the brake shoes, by unhooking the hand brake cable (11), fig. V, from the lever on the rear shoe,
- the wheel cylinder (12), if necessary, fig. VI.

REFITTING :

– Fit :

- the wheel cylinder (12), if necessary, fig. VI,
- the brake shoes, rehooking the hand brake cable (11), fig. V, to the lever on the rear shoe,
- the guide rods, steady springs and spring cups (9), fig. IV and V,
- the automatic adjuster link (8), fig. IV,
- springs (7) and (10), using the special pliers, fig. IV.

– Hook the spring (3) to the shoe support and to the lever (1), fig. I.

– Fit the automatic adjuster lever (1), engaging end "a" under the link (4), fig. II, and the lever (1) to the pin (5), fig. II.

– Fit, fig. III :

- the brake drum,

- the bolt (7),

- the wheel dowel (6).

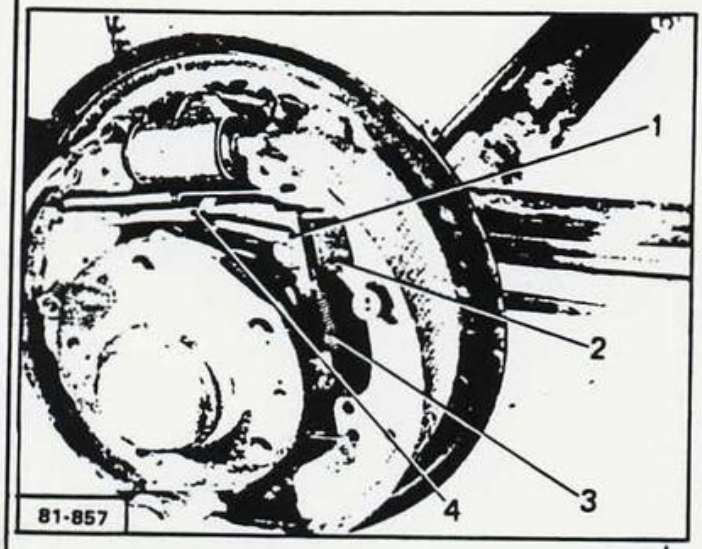
If necessary, apply the hand brake and fit a new stop (8), fig. IV.

– Bleed the brakes, if necessary (see section concerned).

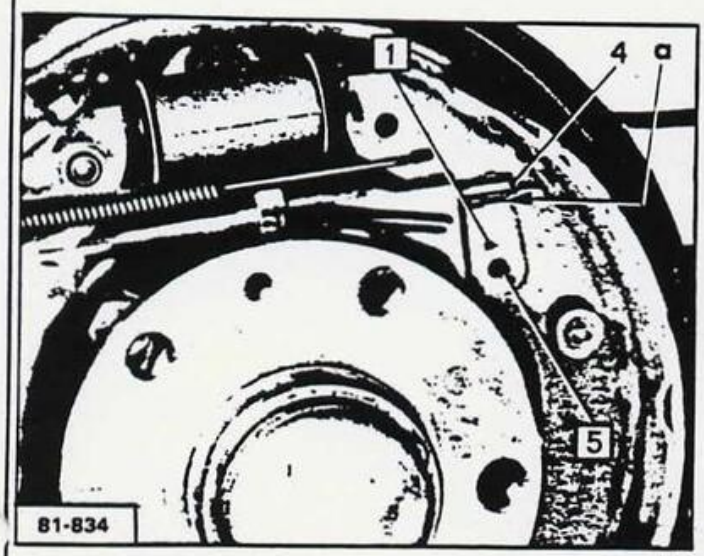
– Fit the wheels.

– Lower the vehicle to the ground.

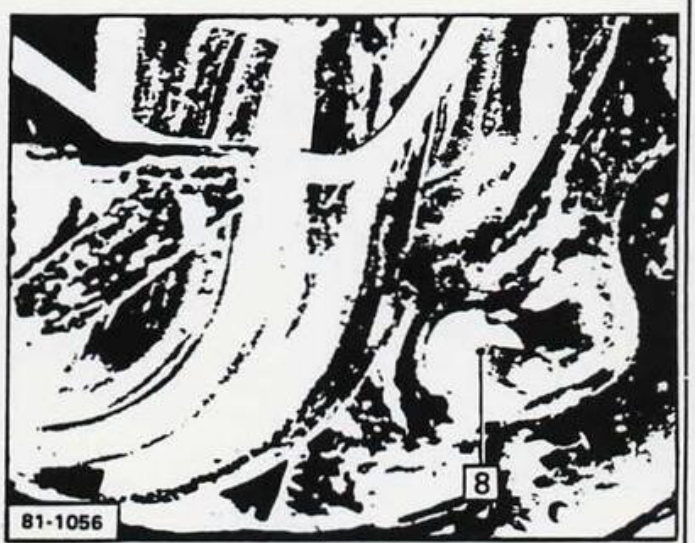
– Tighten the wheel bolts to a torque of 16 m.daN (160 Nm, 105 lbf ft).



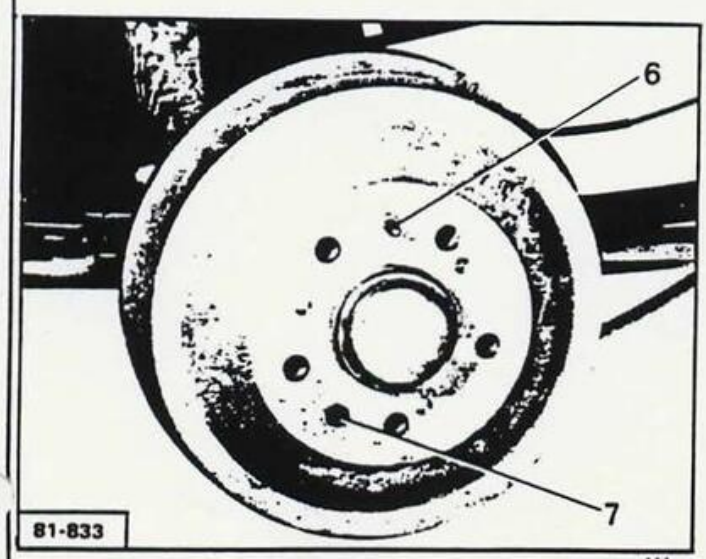
I



II



IV



III

CONDITIONS

Vehicle on a hoist at kerb weight - that is, unladen, with tool kit and with full complement of coolant, oil and fuel.

CHECKING Fig. I

Remove the retaining collar from the protective boot (1).

Pull back the boot (1).

Remove the grease and clean between the piston (2) and the torsion bar (3).

Check Fig. II that there is a clearance X between the piston (2) and the bar (3), using a set of narrow-ended (approximately 4 mm) feelers :

	SHORT	LONG
Vans	0.5 mm	0.2 mm(*)
Bare chassis/cab.	2.3 mm	2.1 mm
Chassis/cab. + shell	0.5 mm	0.2 mm
(*) + Combi and combiluxe		

ADJUSTMENT

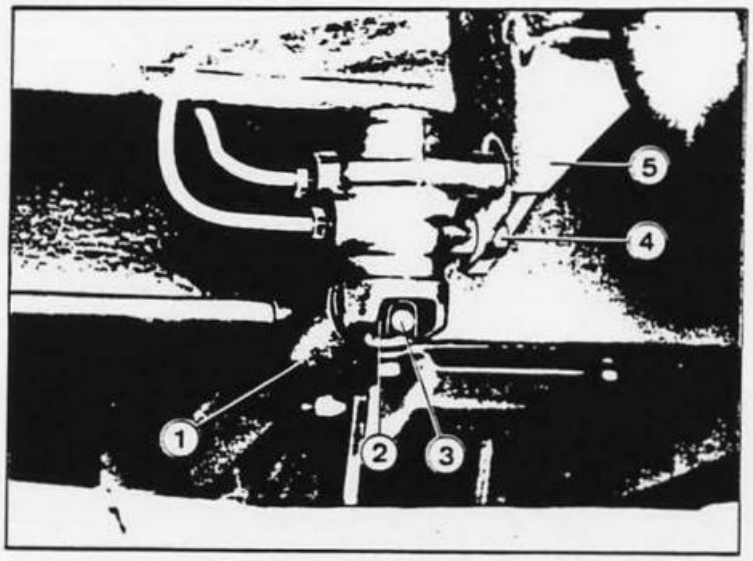
If the clearance X appropriate to the vehicle is not correct :

- loosen the bolts (4) and (5),
- lever the compensator into contact with the feelers and tighten the bolts to 2.4 m.daN in the order :
  4 - at the slot,
  5 - at the pivot.

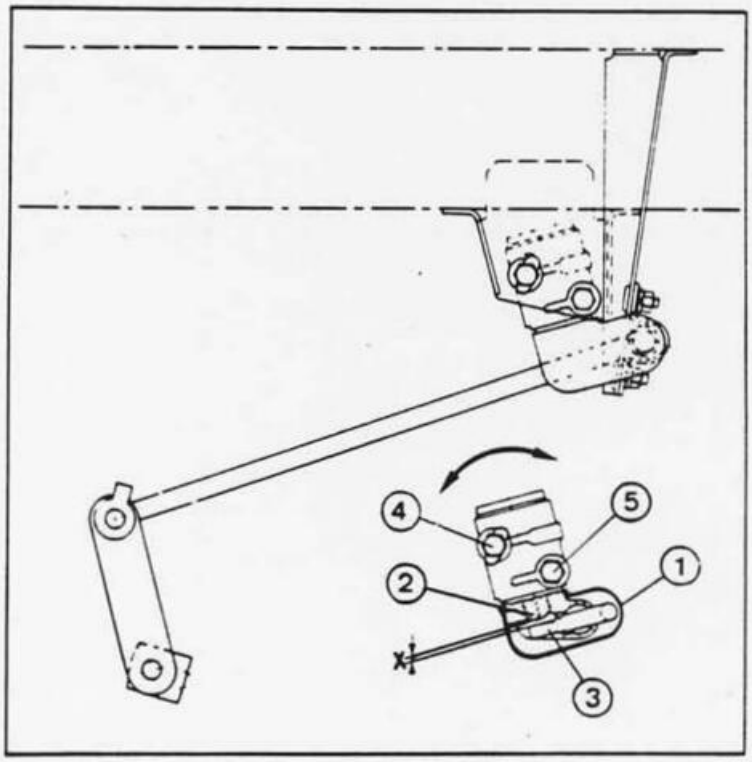
Check that the feelers slide freely - if not, re-adjust.

Replace the grease, the boot (1) and its collar.

Road test.



I



II

Page

A - FRONT SUSPENSION UNITS

Identification - specifications

Suspension identification - specifications A1.001 to 003

Removing - refitting

Removing and refitting a front suspension unit A4.001 to 005

B - FRONT SPRINGS

Removing - refitting

Removing and refitting a front spring B4.001 to 009

E - REAR SUSPENSION

Identification - specifications

Rear suspension specifications E1.001 to 003

Checking - adjusting E2.001 to 003

F - REAR SPRINGS

Removing - refitting

Removing and refitting a rear suspension spring (on the vehicle). F4.001 to 007

DATA

MAC-PHERSON independent suspension comprising, on each side, a stub axle carrier with an integral suspension damper and a concentric coil spring.

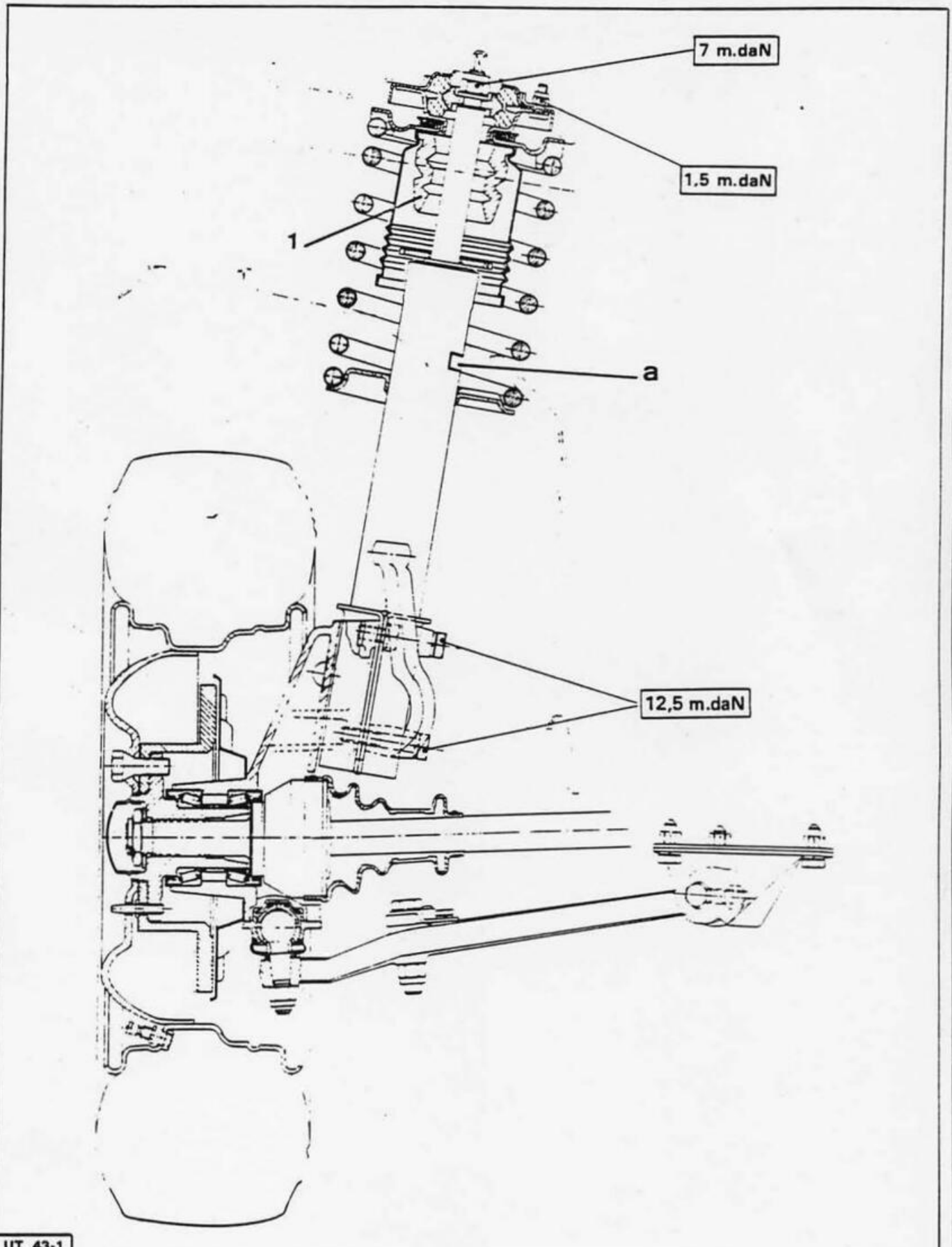
- Lower suspension arm (forged) with a double taper bush (at the body end) and a ball joint.
- Front reaction arm with a rubber bush (at the body end).
- Needle thrust race between the upper end of the coil spring and the body.

Travel limiting systems :

- In compression : a suspension stop (1) secured to the damper protection cup.
- Out stop : an integral stop inside the damper.

SPECIAL FEATURES

VEHICLE	Springs		Damper Ref. « a »
	Wire ø	Free height	
1000-1500 - Petrol engined short	16	≈ 390	7569 730
1000-1500 - Petrol engined long - Di	16.8	≈ 383	
1800 Petrol engined	17.6	≈ 363	5995 829
1800 Di	17.6	≈ 373	



UT. 43-1

	Pages
Special tools - Tightening torques	A4.002 and 003
Removing - refitting	A4.004 and 005

REMOVING AND REFITTING
A FRONT SUSPENSION UNIT

SPECIAL TOOLS

Fig. A :

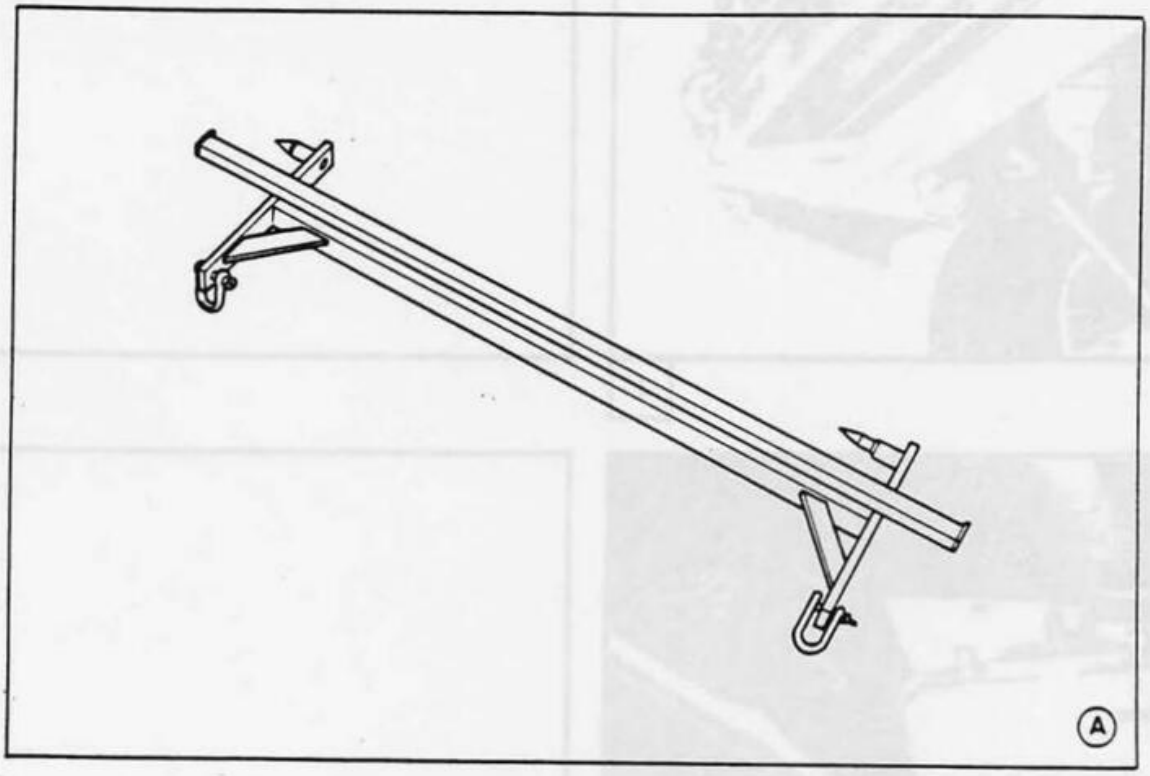
– 8.1514

Front lifting bar.

MAIN TIGHTENING TORQUES

Bolts securing lower end of the damper to the stub axle carrier :

12.5 m.daN (125 Nm, 92 lbf ft).


A

I

IV

II

V

III

VI

The method described below is as carried out on lift.

However, the operation can be undertaken with the vehicle on the ground, with its front end raised on stands, by placing a jack under the wishbone or the hub.

REMOVING

Under the vehicle

- Fit the lifting bar 8.1514.
- Lift the front of the vehicle, fig. I, on the side to be worked on, until the wheel leaves the ground.
- Lower the wheel until it just makes contact with the lift.

Inside the vehicle

- Remove the three upper securing nut, fig. II.

Under the vehicle

- Remove the 4 lower bolts, fig. III, that secure the suspension unit to the stub axle carrier.
- Remove the suspension unit by pulling it towards the rear.

REFITTING

- Refit the suspension unit by carrying out the removal operations in reverse.
- Torque for the lower securing bolts on stub axle carrier : 12.5 m.daN (125 Nm, 92 lbf ft).

	Pages
Special tools - tightening torques	B4.002
Removing and refitting a front spring	B4.005
Prepararing the upper spring cup	B4.006
Refitting a front spring	B4.007

REMOVING AND REFITTING
A FRONT SPRING

SPECIAL TOOLS

Fig. A :

from kit 8.0910 ZV

AZ - Suspension spring compressor

B - Front spring claws.

Fig. B :

(-).0913

A - Spanner, retaining rod.

B - Socket, upper damper nut.

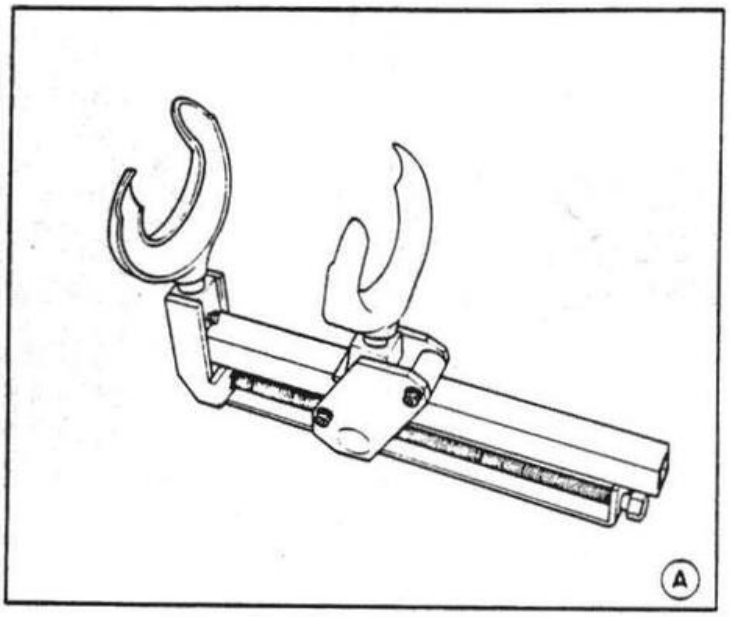
RECOMMENDED TOOLS

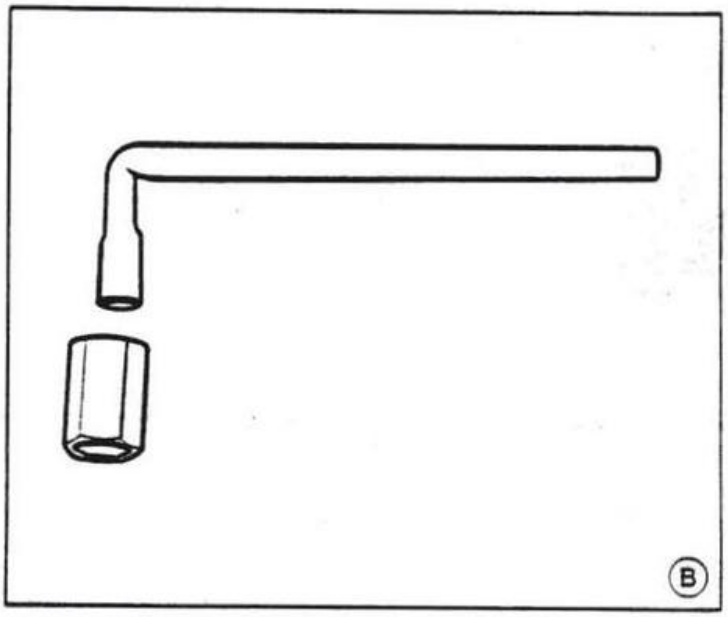
– "Facom S 203" torque wrench.

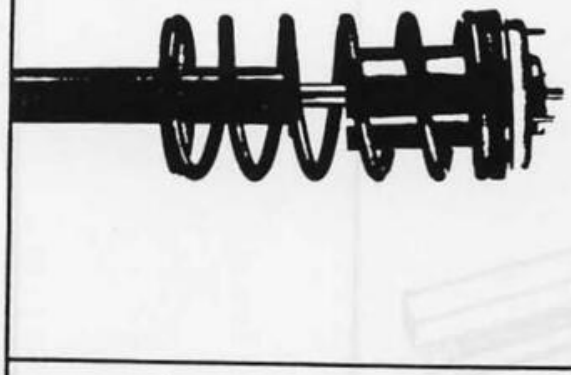
– Adaptor, 27 mm AF spanner.

MAIN TIGHTENING TORQUES

Upper damper nut : 7 m.daN (70 Nm, 52 lbf ft).


A

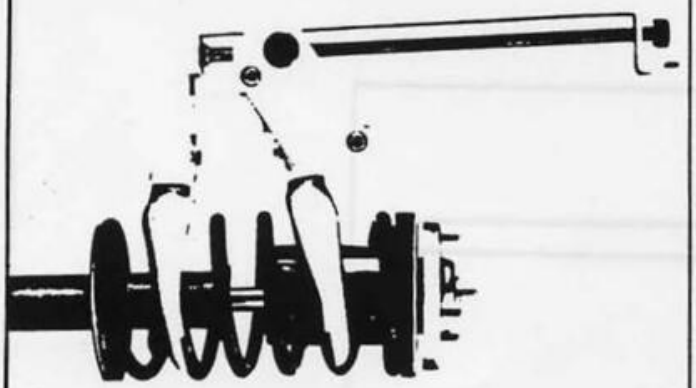

B



I



IV



II

III

REMOVING

- Carefully clean the suspension unit.

- Grip it horizontally in a vice, fig. I.

- Adjust the opening between the claws of the compressor to 160 mm.

- Fit spring compressor 8.0910 ZZ, equipped with its front spring claws, fig. II.

- Compress the spring, to release the pressure on the upper support.

- Use the combination spanner 8.0913 to remove the nut from the damper rod (1) fig. III and remove the washer (2).

- Remove the upper cup, needle thrust bearing and bump stop assembly, fig. IV.

- Retrieve the rubber locating spacer for the spring.

PREPARING THE UPPER CUP

– Details of arrangement, fig. I :

1 - Upper cup,
2 - Locating washer, needle thrust bearing,
3 - Beedle thrust bearing,
4 - Bronze bush, locating the upper cup,
5 - V-ring seal,
6 - Spring upper locating cup,
7 - Bump stop.

NOTE - Parts (2), (3), (4) and (5) must be replaced by new ones every time they are removed.

– Remove the needle thrust bearing (3), fig. II.

– Remove the bronze bush (4), fig. III.

– Lubricate the various locating faces with ESSO MULTIPURPOSE grease 4746.

Refit the bronze bush (4), fig. IV.

– Refit the needle thrust bearing (3), fig. V, by tapping lightly on its inner track.

– Refit the bump stop (7) to the spring locating cup (6).

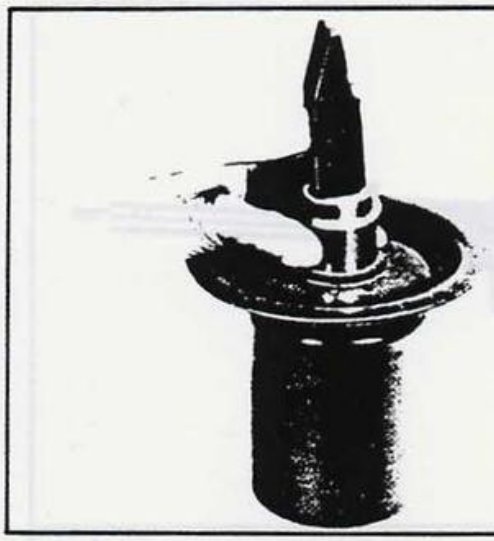
– Refit the V-ring seal (5), fig. VI.

– Fit the needle bearing locating washer (2) after first lubricating the sealing area.

– Refit the upper cup.



I



IV



II



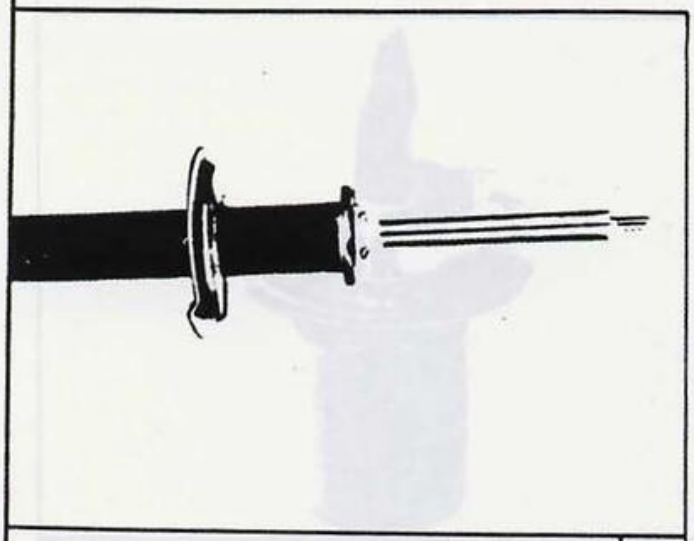
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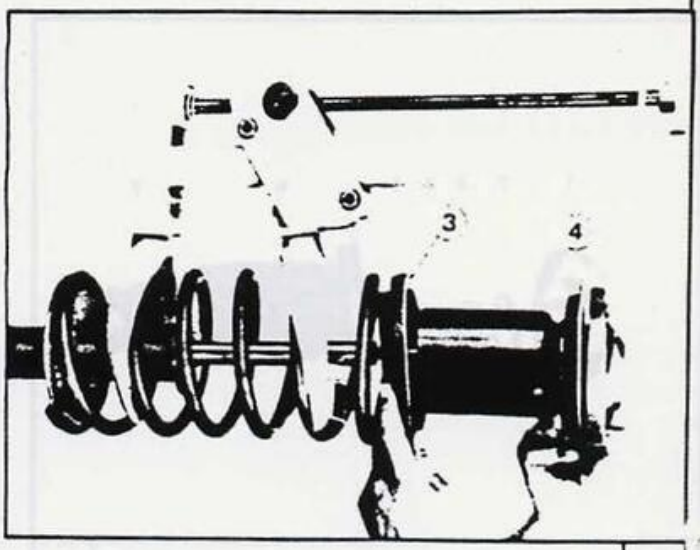
III



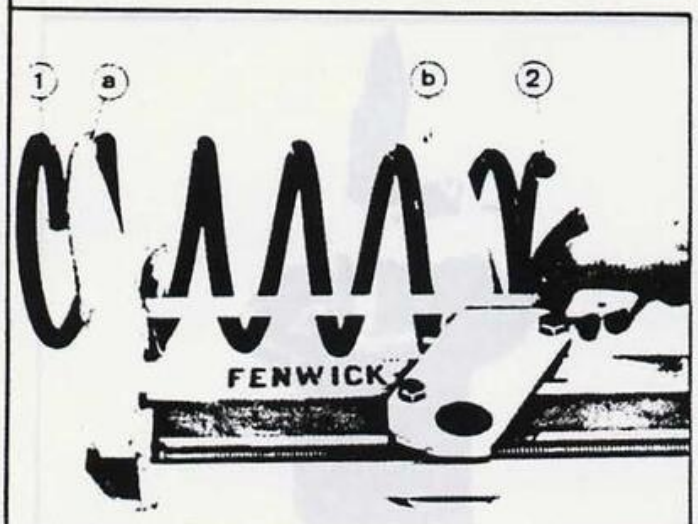
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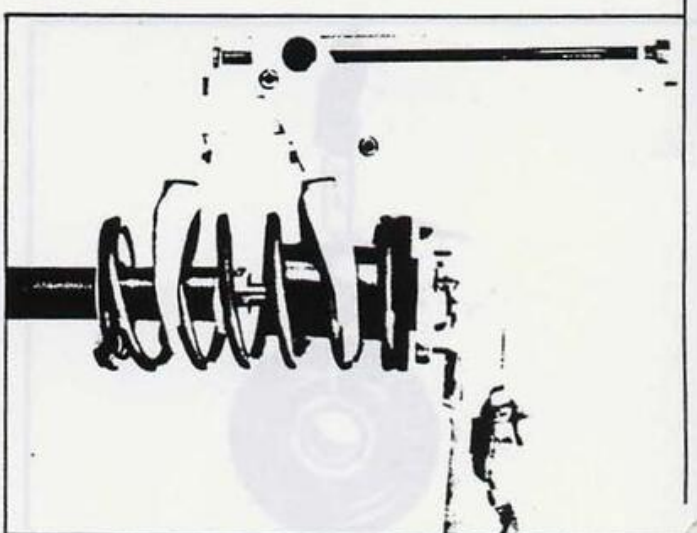
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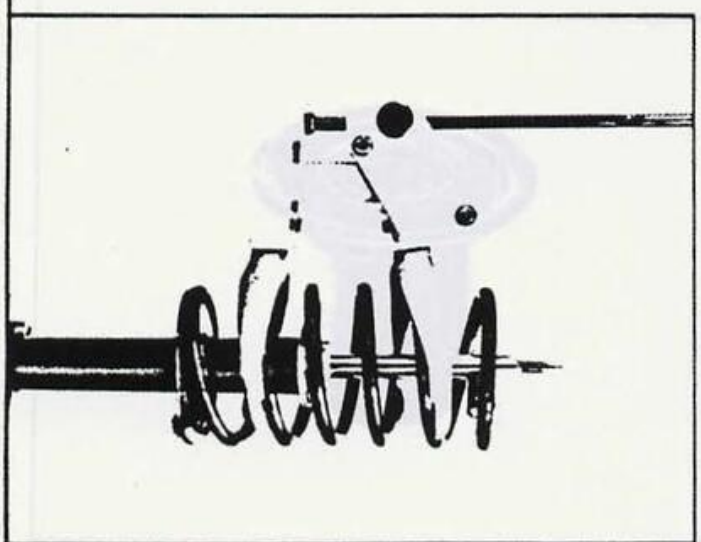
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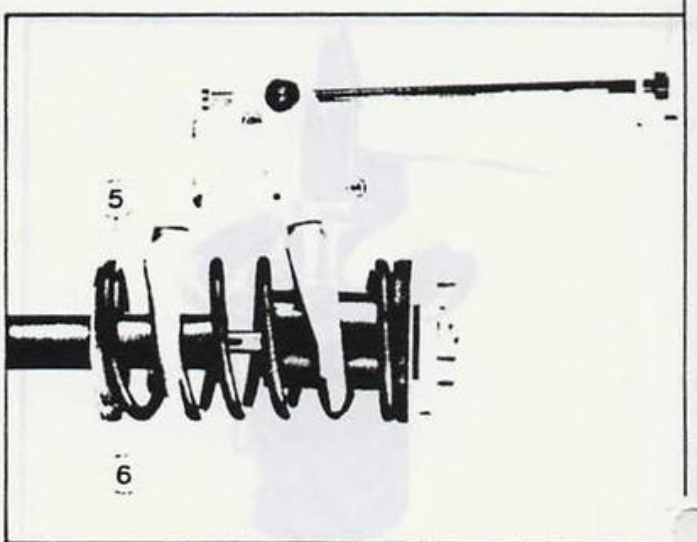
II



V



III



VI

REFITTING

- Support the suspension unit horizontally in a vice, fig. I.
- Pull out the damper rod to its MAXIMUM extent.
- Open the compressor to 210 mm, fig. II.
- Position the spring so that coil ends (1) and (2) are between the arms on the claws (a) and (b).
- Compress the spring, fig. III, until the distance between the compressor jaws is 110 mm.
- Fit the spring - compressor assembly - over the damper rod.
- Fit the locating spacer (3), to the spring fig. IV.
- Place the assembly formed by the upper cup, the needle thrust bearing and the bump stop already prepared (4), on the damper rod.
- Place a washer and a new "NYLSTOP" nut on the damper rod.
- Tighten the damper nut to 7 m.daN (70 Nm, 52 lbf ft).
- Release the spring, fig. VI, taking care :
  - to ensure that its ends (5) are correctly positioned in the locating cups,
  - to bring the spring coils against the shoulder (6).

REAR SUSPENSION

DATA

The rear suspension unit is connected to the body by :
Two longitudinal leaf springs.

Each spring consists of two main leaves and two delayed action leaves.

The spring is secured to the axle by two clamps.

The spring is secured to the body :

- at the front : by a pin and a moving support.
- at the rear : by a shackle with pins welded to it and by a moving support.

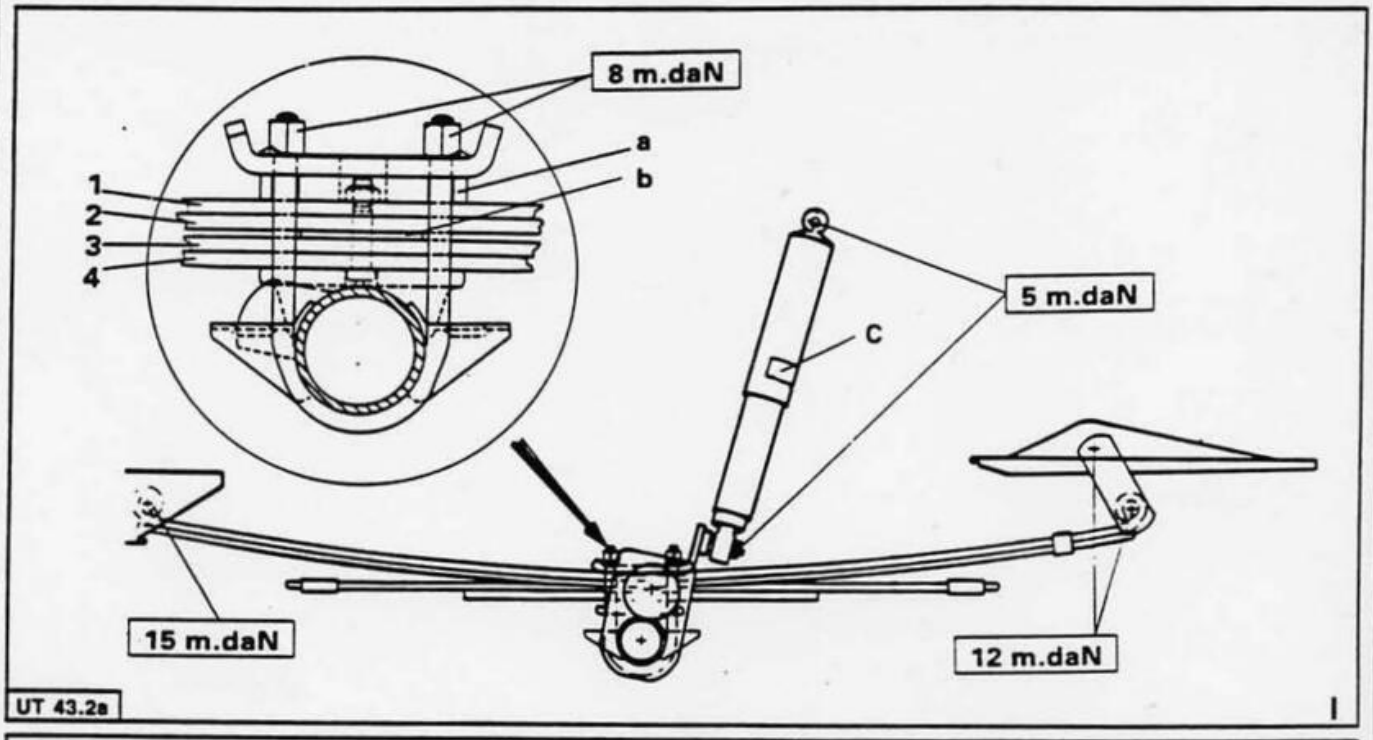
The front bush in the spring and the pins on the rear shackle are covered with a rubber coating that carries out the same functions as a rubber bush.

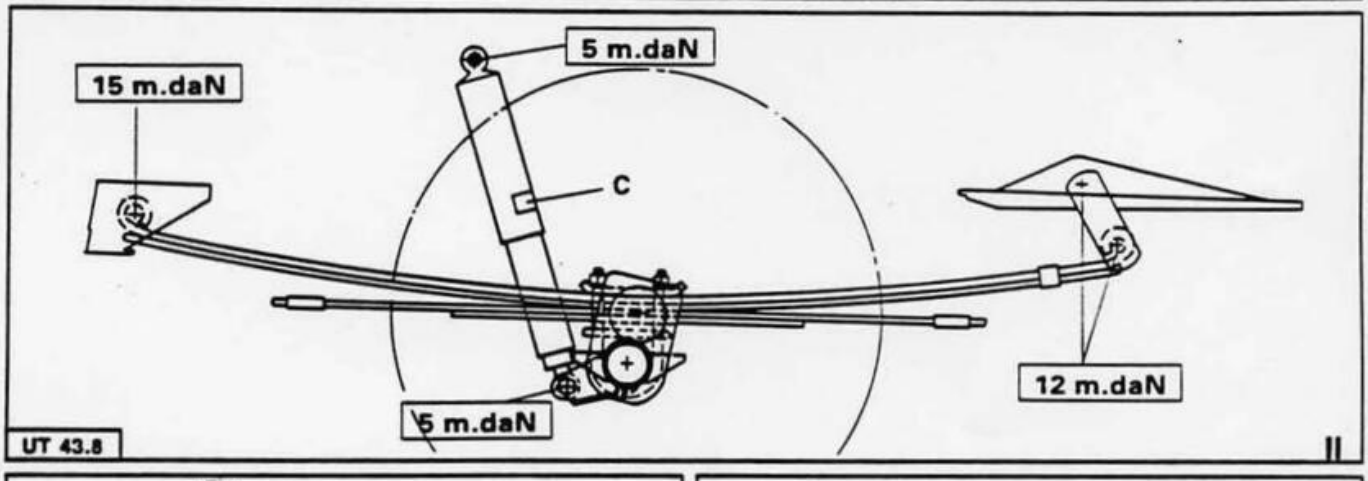
Suspension travel limiting systems :

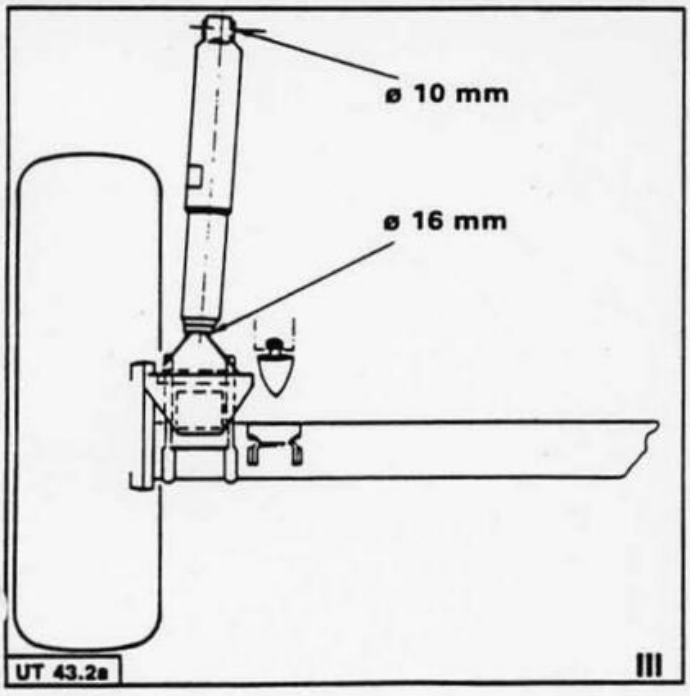
- in compression : two rubber stops on either side.
- out stop : an integral stop inside the damper.

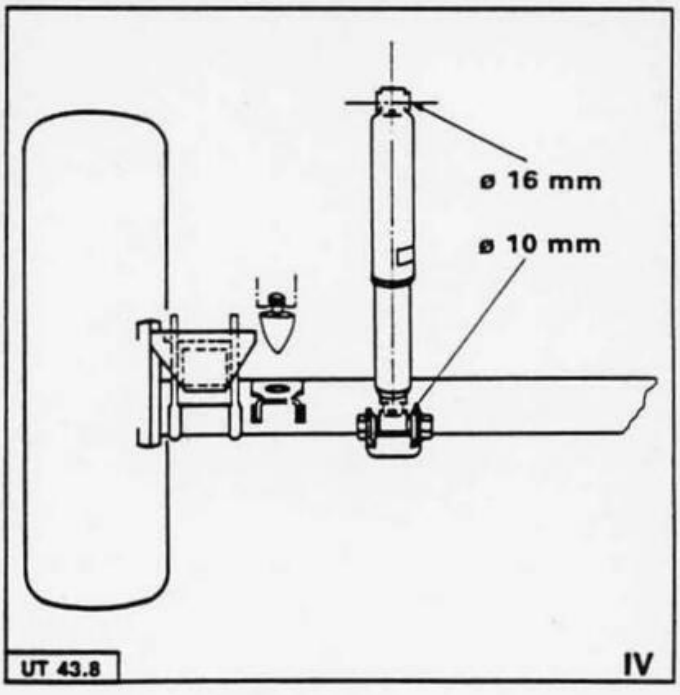
Two double acting telescopic dampers.

Vehicle	Th : Leaf springs Fig. I						Dampers Ref : C
	1	2	space	3	4	Total	
Van 1000 Van, ambulance conversion Combi 1000	8	8	a 14	8	8	32	5965 476 Fig. I - III
Van 1300 to 1500	8	8	b 4	13	13	46	4439 194 Fig. I - III
Platform cab 1300 to 1500	8	8	b 4	13	13	46	7534 624 Fig. I - III
Chassis cab 1300 to 1500 Bare chassis 1300 to 1500						ref. white	7576 729 Fig. II - IV
Van 1800	9	9	b 4	12.5	12.5	47	7562 124 Fig. I - III
Chassis cab 1800							7543 566 Fig. II - IV


8 m.daN
a
b
1
2
3
4
5 m.daN
C
15 m.daN
12 m.daN
UT 43.2a
I


5 m.daN
15 m.daN
C
12 m.daN
5 m.daN
UT 43.8
II


ø 10 mm
ø 16 mm
UT 43.2a
III


ø 16 mm
ø 10 mm
UT 43.8
IV

DATA

PRIOR REQUIREMENTS FOR CHECKING AND ADJUSTING THE SUSPENSION

The tyre pressures are to be correct.

Toe-in/out (not adjustable) : ..... ± 1 mm

SPECIAL FEATURES

The rear axle is of the lower type : Fig. I and III

The centreline « A » of the stub axles is higher than the centre of the axle tube B.

Wheel hubs : Fig. II

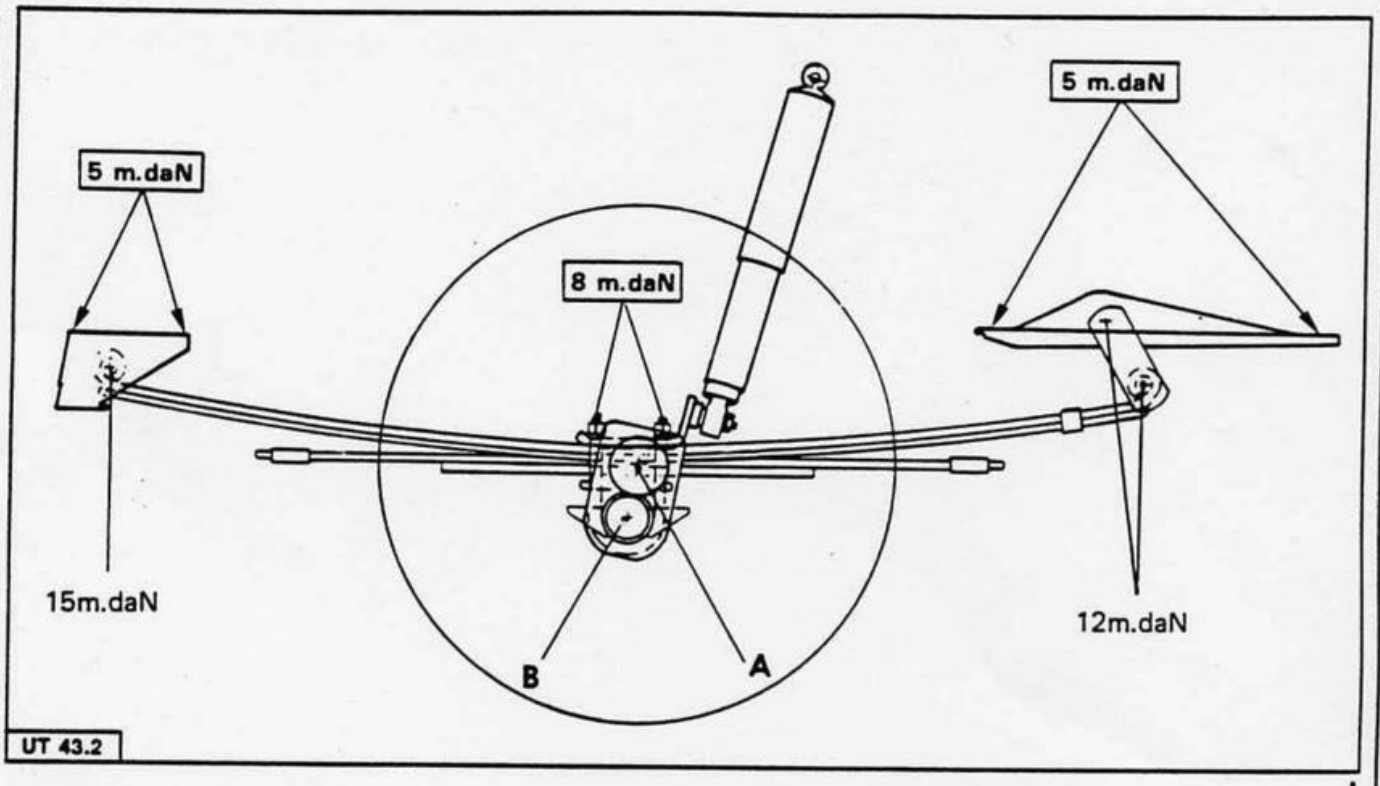
Bearing operating play : ..... 0.025 to 0.10 mm

Tightening the hub nuts : See Operation (5) E4.006 - 4.007

NOTE : the stub axle on the right hand side has a left hand thread on it. It is identified by a drill point mark on the edge of the base plate flange.
the stub axle on the left hand side has a right hand thread.

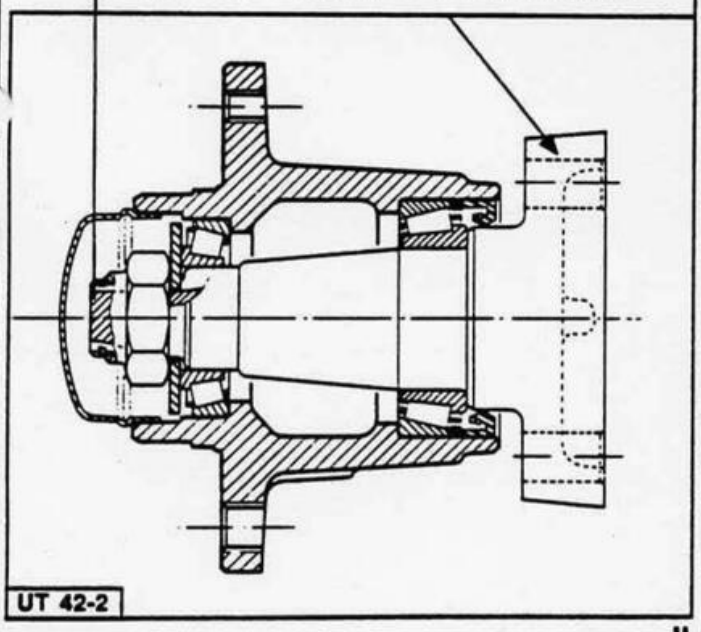
REPLACEMENT : only the stub axle with the right hand thread is supplied as a replacement part.

1800 kg vehicles are equipped with hubs and stub axles on which the bearings are wider.

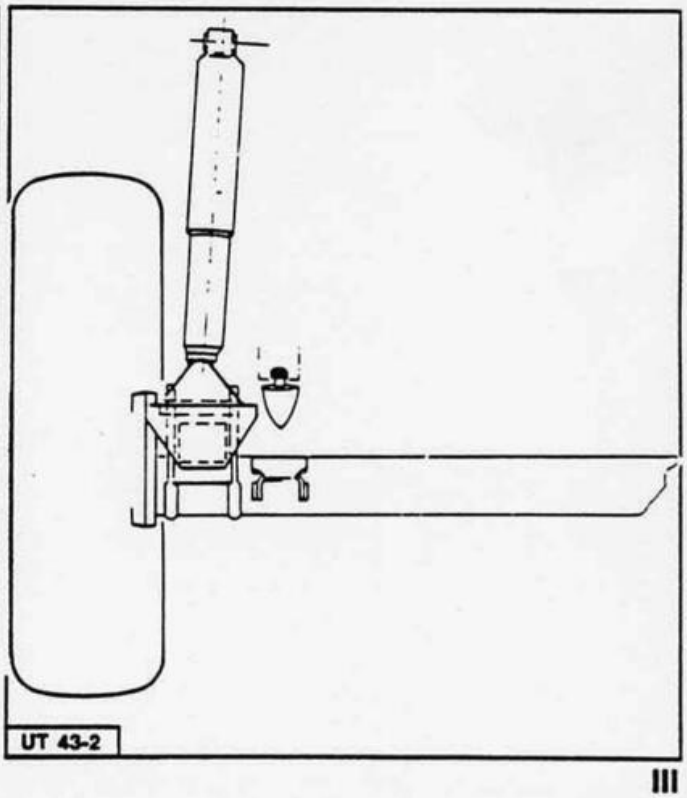


I

Ø 20 mm (⟶| 06/86 - Ø 12 mm : **10,5 m.daN**
Ø 22 mm (|⟶ 06/86) - Ø 14 mm : **17 m.daN**



II



III

TIGHTENING TORQUES

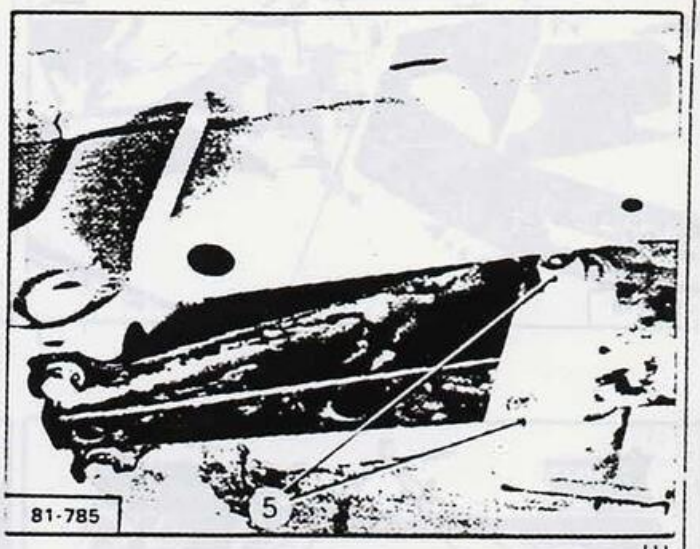
	m.daN	Nm	Lbf ft
Nuts securing spring to axle	8	80	59
Front and rear mounting plate securing bolts	5	50	37
Nut on spring front securing pin.	15	150	111
Shackle nuts	12	120	88

REMOVING

- Loosen the wheel bolts. Raise the rear of the vehicle, and support it on a stand, with the wheel hanging free, on the side on which the operation is to be carried out.
- Remove the wheel.
- Disconnect : fig. I, the rigid brake pipe (1) from the brake hose (3).
- Remove : fig. I, the clip (2) securing the hose (3) to the body.
- Place a trolley jack under the axle tube on the side on which the operation is to be carried out.
- Remove : fig. II, the nuts (4) securing the axle tube to the spring.
- Loosen : fig. III and IV.
  - the shackle nuts (5),
  - the nut (7) on the front securing pin (6).



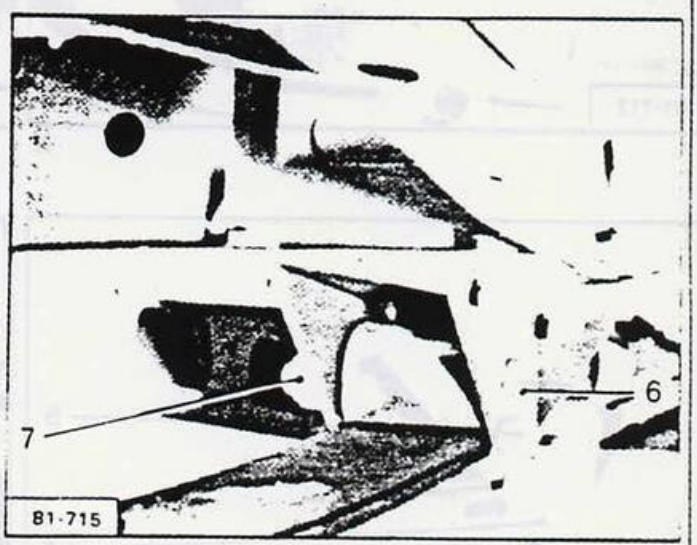
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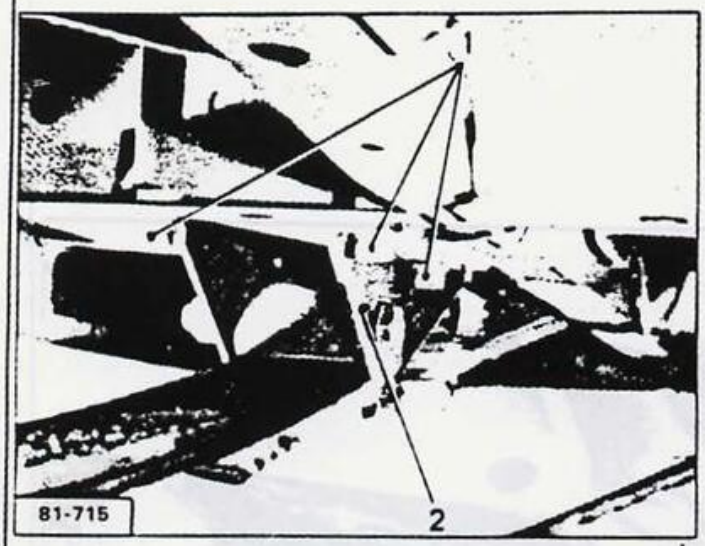
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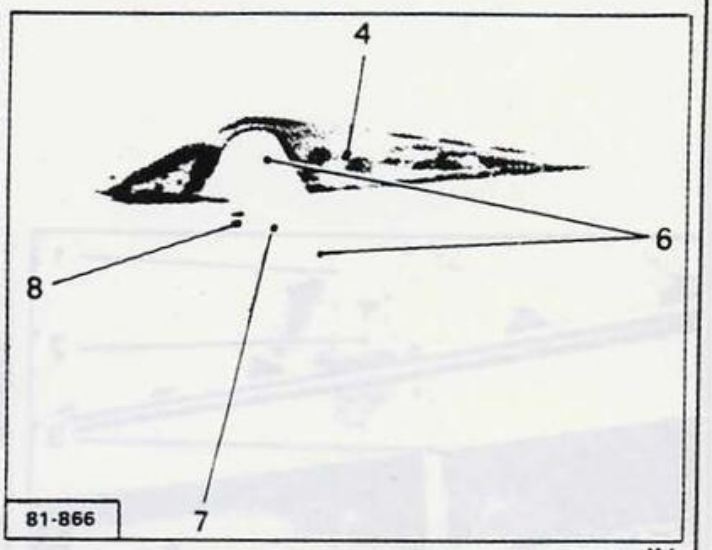
II



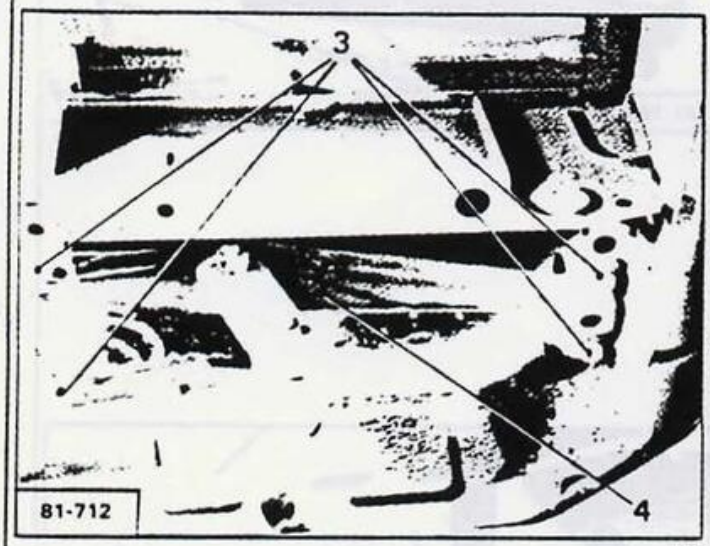
IV



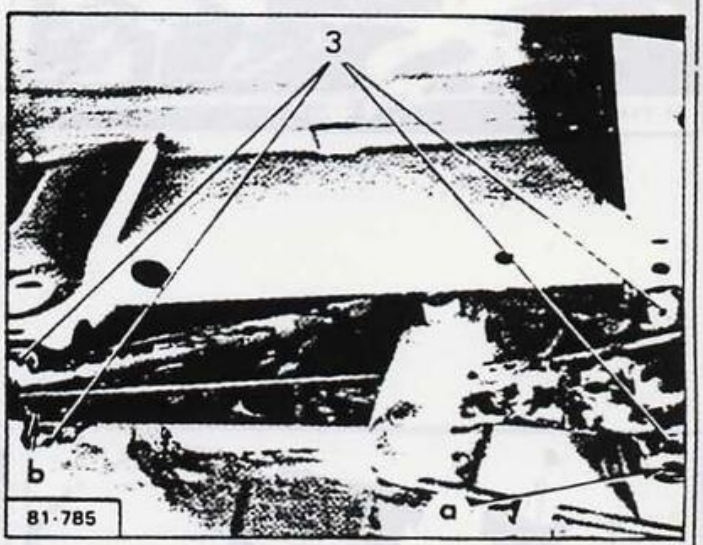
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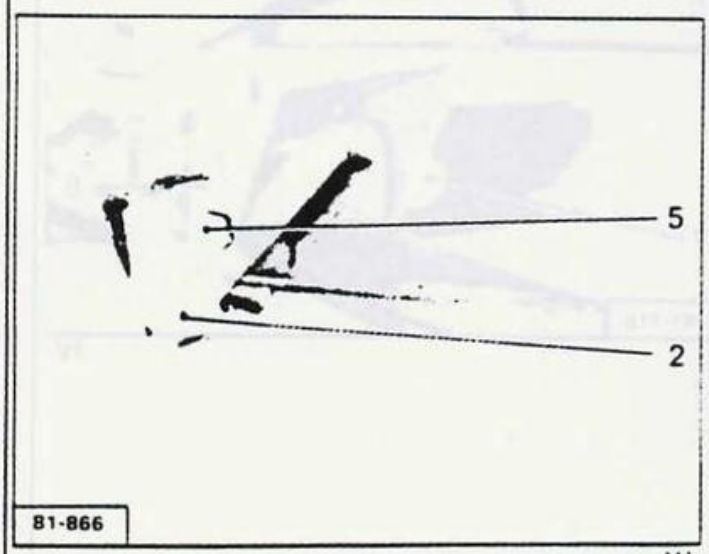
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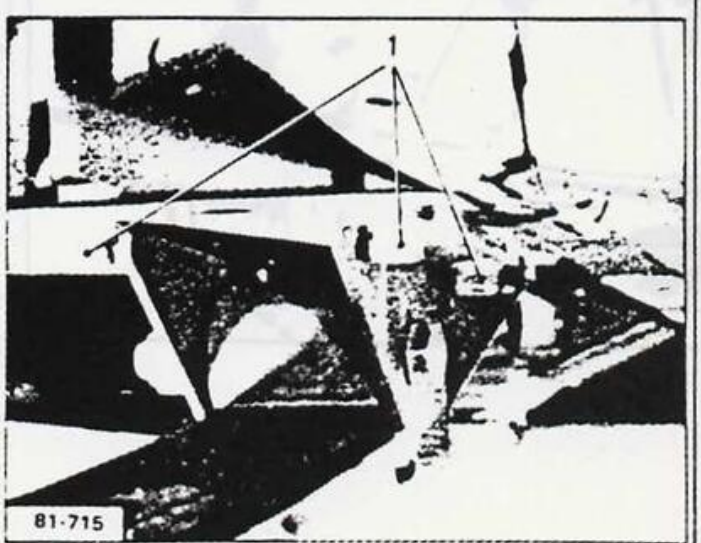
II



V



III



VI

– Remove : fig. I and II.

- the bolts (1) that secure the front plate (2),
- the bolts (3) that secure the rear plate (4).

– Lower the axle tube by a few centimetres.

– Remove the spring, by releasing the spring centre pin from its location on the axle tube.

– Remove : fig. III and IV.

- the nut, front securing pin (5) and the plate (2).
- the nuts (6), plate (7), shackle (8) and the rear securing plate (4).

REFITTING

– Fit : fig. III and IV

- the rear plate (4), the shackle (8), plate (7) and nuts (6), without tightening them,
- front plate (2), pin (5) and its nut, without tightening it.

– Position the spring under the body.

– Fit : fig. V

- the rear plate securing bolts (3).

– Locate : fig. V.

- the rear securing plate by fitting :
  - a locating rod, 16 mm, in a Ø at "a",
  - a locating rod 12 mm, in a Ø at "b".

– Tighten the bolts (3) to a torque of 5 m.daN (50 Nm, 37 lbf ft).

– Fit : fig. VI

- the front plate securing bolts (1), tightening them to 5 m.daN (50 Nm, 37 lbf ft).

– Raise the rear axle tube and engage the spring centre pin into its location on the axle.

– Fit : fig. I.

- the "U" bolts (2),
- NEW locking plates (3),
- the nuts (1).

– Tighten them to a torque of : 8 m.daN (80 Nm, 59 lbf ft).

– Lock the nuts (1).

– Connect : fig. V

- the rigid brake pipe (7) to the brake hose (9) and fit the clip (10) that secure the hose (9) to the body.

– Fit the wheel.

– Lower the vehicle to the ground.

– Compress the rear suspension to obtain a dimension h = 107 mm between the face "a" to which the bump stops (4) are secured and face "b" with which they make contact on the axle : fig. III.

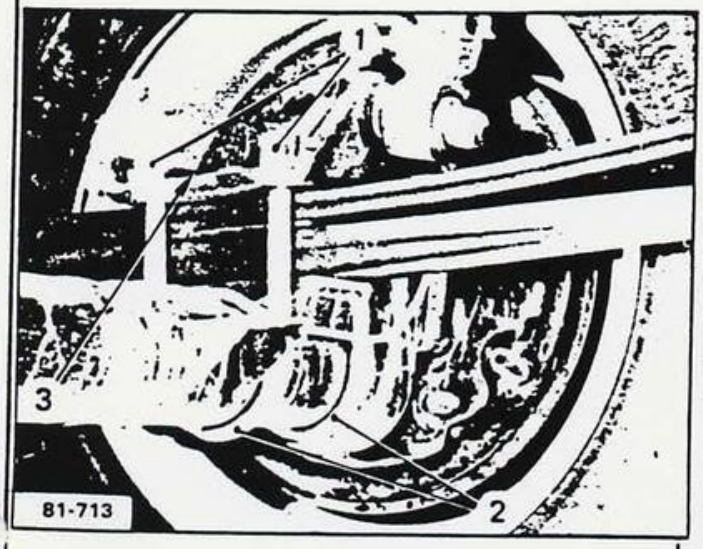
– Tighten : fig. III, the shackle nuts (5) to 12 m.daN (120 Nm, 88 lbf ft).

– Tighten : fig. IV the spring front securing pin nut (6) to 15 m.daN (150 Nm, 111 lbf ft).

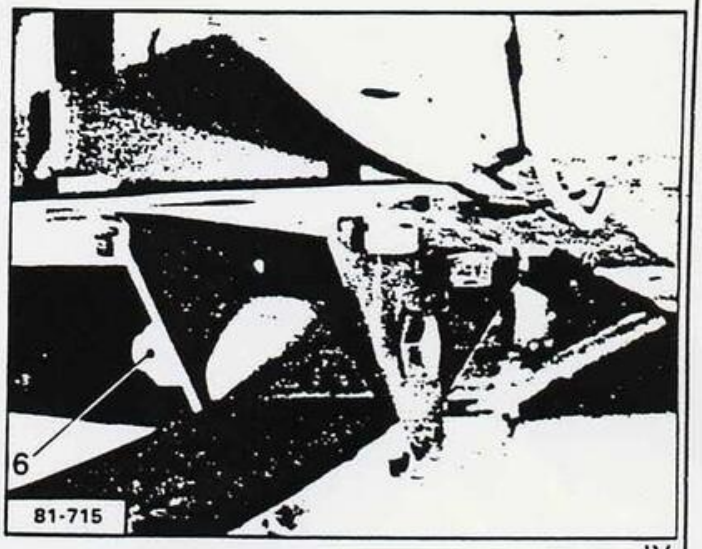
– Release the rear suspension.

– Bleed the brakes (see relevant section).

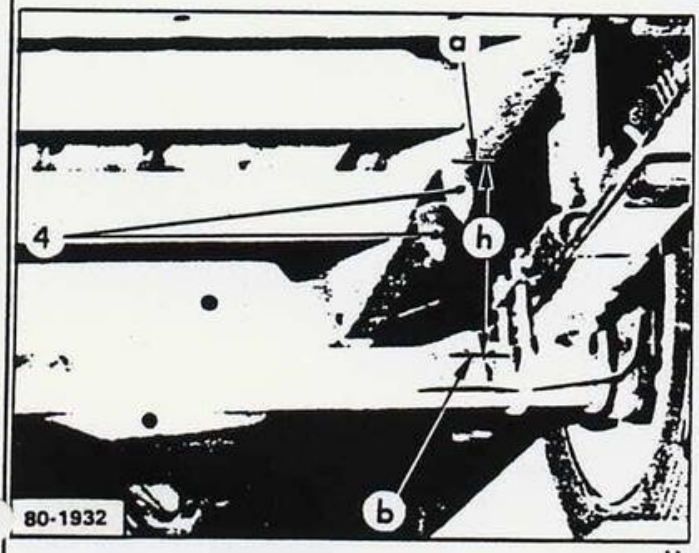
– Tighten the wheel bolts to 16 m.daN (160 Nm, 118 lbf ft).



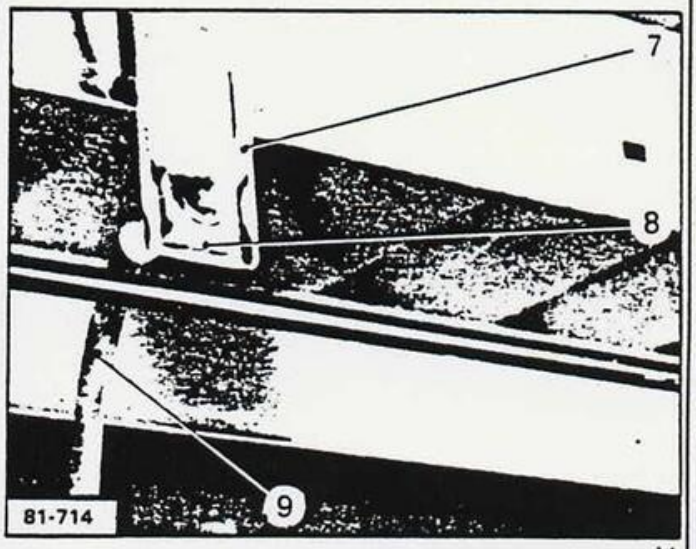
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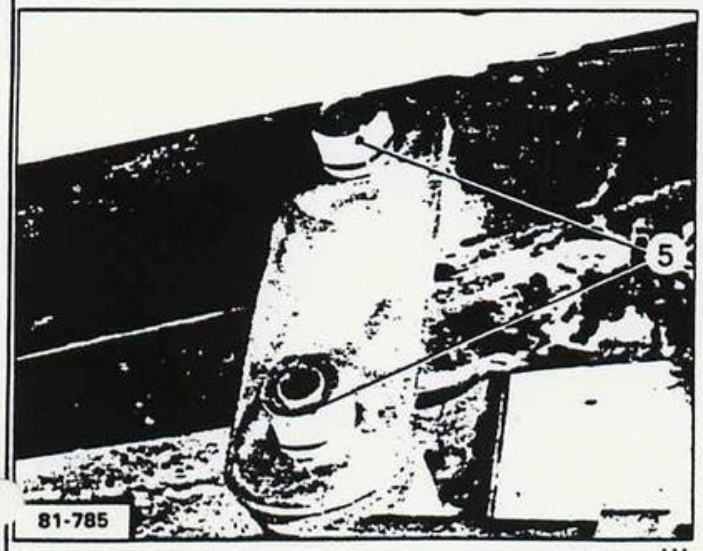
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II



V

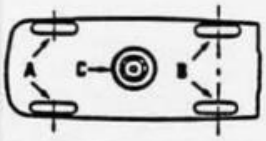


III

Pages

Identification - data

Wheels and tyres A1.001 to 003









	1000	1300 à 1500	1800			1000	1300 à 1500	1800

→ 11/81



A B	5 JK 14 H 5,55	6 JK 14 H 5,55		5 JK 14 H 5,55		5 JK 14 H 5,55	6 JK 14 H 5,55	
C	5 JK 14 H 5,55	6 JK 14 H 5,55		5 JK 14 H 5,5		5 JK 14 H 5,55	6 JK 14 H 5,55	
mdaN -	18 mdaN			18 mdaN		18 mdaN		



A B	165 R14 XCA PR8	185 R14 XCA		165 R14	185 SR14 XCA PR8	165 R14 XCA PR8	185 R14 XCA PR8	
C	165 R14 XCA PR8	185 R14 XCA		165 R14	185 SR14 XCA PR8	165 R14 XCA PR8	185 R14 XCA PR8	
bar ❄	175 R14 M + S4	185 R14 M+S4 / M+S100		175 R14 M + S4	185 SR14 M+S4 / M+S100	175 R14 M + S4	185 R14 M+S4 / M+S100	

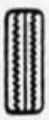


A	3,5	3,7		3,5	3,7	3,5	3,7	
B	4,5	4,5		4,5	4,5	4,5	4,5	
C	4,7	4,7		4,7	4,7	4,7	4,7	

→ 3/85 → AM 87



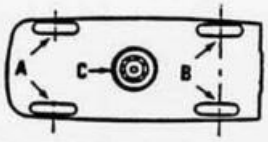
A B	5 JK 14 H 5,55	6 JK 14 H 5,55		5 JK 14 H 5,55		5 JK 14 H 5,55	6 JK 14 H 5,55	
C	5 JK 14 H 5,55	6 JK 14 H 5,55		5 JK 14 H 5,5		5 JK 14 H 5,55	6 JK 14 H 5,55	
mdaN	18 mdaN			18 mdaN		18 mdaN		



A B	165/75 R14 XCA PR8	185/75 R14 XCA PR8		185 SR14 XCA PR8		165/75 R14 XCA PR8	185/75 R14 XCA PR8	
C	165/75 R14 XCA PR8	185/75 R14 XCA PR8		185 SR14 XCA PR8		165/75 R14 XCA PR8	185/75 R14 XCA PR8	
bar ❄	175 R14 M + S4	185/75 R14 M + S4		185 SR14 M + S4	M + S100	175 R14 S + S4	185/75 R14 S + S4	



A	4,1	3,9		4,1		4,1	3,9	
B	4,5	4,8		4,5		4,5	4,8	
C	4,7	5		4,7		4,7	5	







	1000	1300 à 1500	1800		1000	1300 à 1500	1800

⊢→ AM 87



A B	6 JK14 H		51/2 JK16	6 JK 14 H	6 JK14 H		51/2 JK16
C	6 JK14 H		51/2 JK16	6 JK14 H	6 JK14 H		51/2 JK16
mdaN	18 mdaN			18 mdaN	18 mdaN		
A B	185 SR14 XZX	185/75 R14 XCA	195/75 R16 XCA	185 SR14 XZX	185 SR14 XZX	185/75 R14 XCA	195/75 R16 XCA
C	185 SR14 XZX	185/75 R14 XCA	195/75 R16 XCA	185 SR14 XZX	185 SR14 XZX	185/75 R14 XCA	195/75 R16 XCA
❄	185 SR14 M+S4 / M+S100	185/75 R14 M + S4	195/75 R16 M + S4	185 SR14 M+S4 / M+S100	185 SR14 M+S4 / M+S100	185/75 R14 M + S4	195/75 R16 M + S4
A	3,7	4,3	4,5	3,7	3,7	4,3	4,5
B	4,5	4,5	4,5	4,5	4,5	4,5	4,5
C	4,7	4,7	4,7	4,7	4,7	4,7	4,7



bar



TURBO ⊢→ 7/88



		1400		CLUB		1400	
A B		51/2 JK16		51/2 JK16		51/2 JK16	
C		51/2 JK16		51/2 JK16		51/2 JK16	
mdaN	5	18 mdaN		5	18 mdaN	5	18 mdaN
A B		195/75 R16 XCA		195/75 R16 XCA		195/75 R16 XCA	
C		195/75 R16 XCA		195/75 R16 XCA		195/75 R16 XCA	
❄		195/75 R16 M + S4		195/75 R16 M + S4		195/75 R16 M + S4	
A		4		4		4	
B		4,5		4,5		4,5	
C		4,7		4,7		4,7	



bar



A1.102	12	IGNITION SYSTEM, XN1T and XM7T ENGINES CHECKING THE DISTRIBUTOR ON THE TEST BENCH

Description :
1 - Closed angle (dwell)
2 - Angle during which points are open.
3 - Tolerances.

Preliminary checks

Before carrying out an accurate check on the distributor ensure that :
- the points are clean and in good condition,
- that the cam follower is seated down correctly on the cam.

– Replace these parts if necessary.

– Pre-adjust the points gap, fig. I, to 0.40 mm.

– Mount the distrivutor on the test bench.

Checking the cam symmetry

– Run the distributor at approximately 300 rpm in a clockwise direction.

– Check, fig. I, angle (3) between each point at which the points open.
This should be 90° and the difference must not exceed ± 1°.

Checking the dwell angle

– Adjust the points gap to obtain a dwell angle (angle during which the points are closed) of :
57° ± 3°, that is to say a Dwell %63 % ± 3 %.

– Check :
- that between 400 and 2 500 rpm :
- the cam angle does not vary by more than 3°,
- that there is no auxiliary light sector at (a), fig. II (caused by cam follower bounce).

Adjusting the centrifugal advance curve

– Run the distributor at 200 rpm and bring the 0 on the graduated ring in line with one of the points at which the contacts open, fig. III.

– Compare the advance curve of the distributor under test with the nominal advance curve.

Defects :

If the first part of curve, fig. IV, starts to soon :

– increase the tension on the thin wire spring.

If the first part of the curve, fig. IVb, starts too late :

– release some of the tension on the thin wire spring.

If the second part of the curve, fig. Va, starts too soon :

– increase the tension of the thick wire spring.

If the second part of the curve, fig. Vb, starts too late :

– release some of the tension on the thick wire spring.

Adjusting the vacuum advance curve

– Run the distributor at 1 500 rpm and bring the 0 on the graduated ring in line with one of the points at which the contact open.

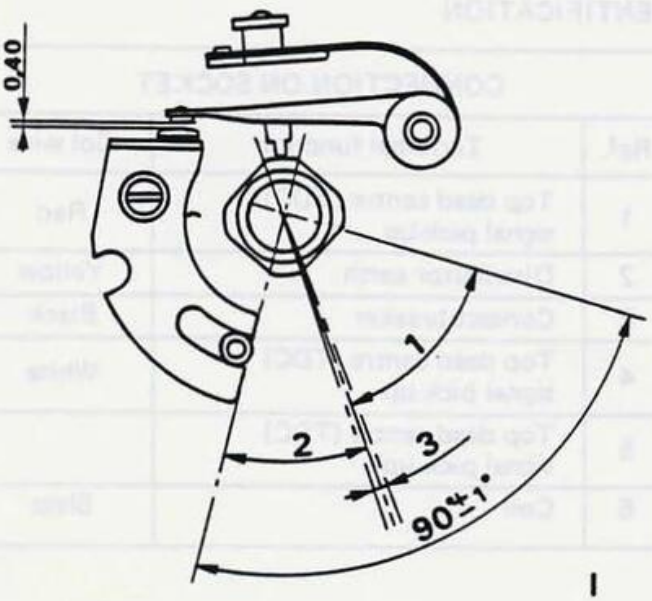
– Connect the vacuum pipe to the vacuum pump on the test bench.

– Note down, point by point, the changes in the timing advance following changes in the vacuum.

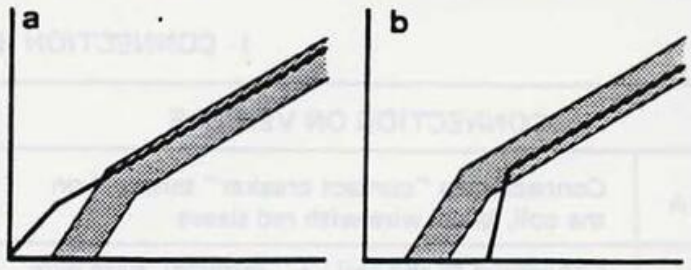
– Compare the curve obtained with the nominal curve.

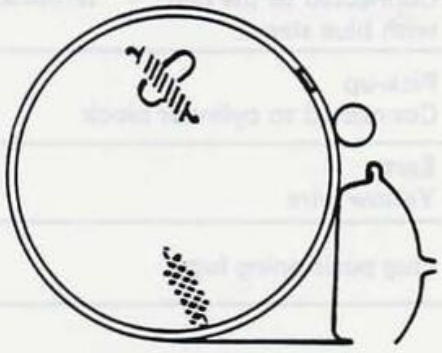
NOTE - If the curve starts too soon, turn the serrated cam, fig. VI, in a clockwise direction.

If the curve starts too late, turn the serrated cam in an anti-clockwise direction.

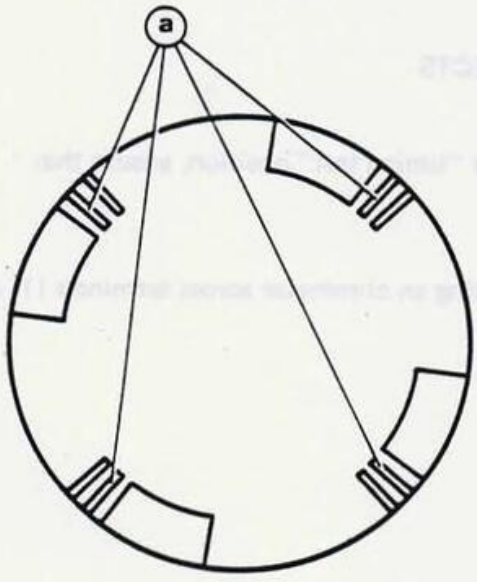


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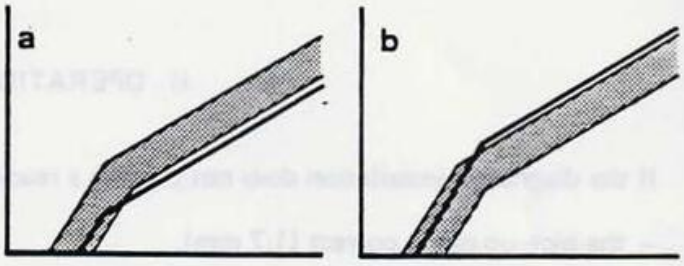


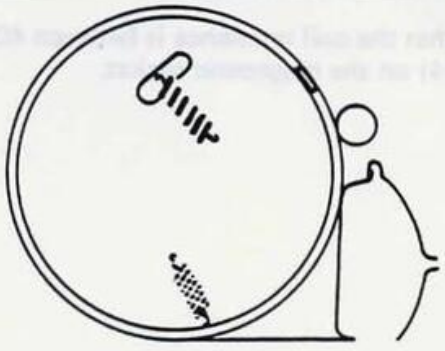


IV

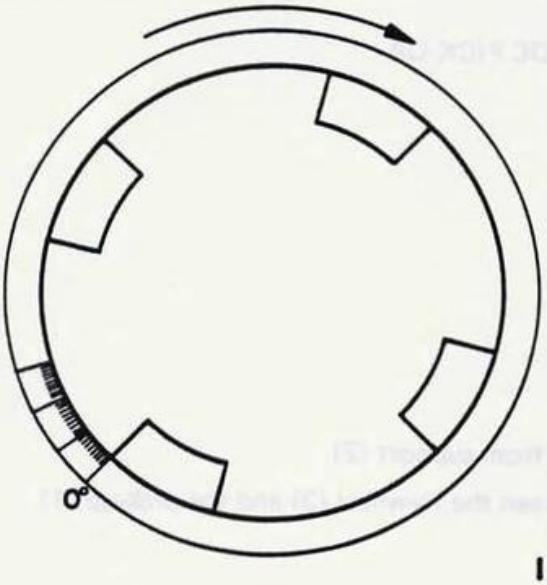


II

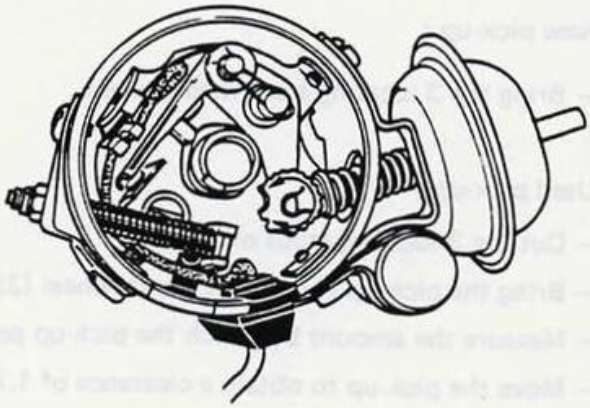




V



III



VI

A1.202	12	IGNITION SYSTEM DIAGNOSTIC PLUG IDENTIFICATION ADJUSTING THE PICK-UP

I - CONNECTION IDENTIFICATION

CONNECTION ON VEHICLE		CONNECTION ON SOCKET		
		Ref.	Terminal function	Col wire
A	Connected to "contact breaker" terminal on the coil, black wire with red sleeve	1	Top dead centre (TDC) signal pick-up	Red
B	Connected to the coil "+" terminal, slate wire with blue sleeve.	2	Distributor earth	Yellow
C	Pick-up Connected to cylinder block	3	Contact breaker	Black
D	Earth Yellow wire	4	Top dead centre (TDC) signal pick-up	White
X Y	Plug positioning lugs	5	Top dead centre (TDC) signal pick-up	
		6	Coil	Slate

II - OPERATING DEFECTS

If the diagnostic installation does not provide a reading in the "timing test" position, ensure that :

- the pick-up gap is correct (1.7 mm),
- that the coil resistance is between 40 and 60 Ω by connecting an ohmmeter across terminals (1) and (4) on the diagnostic socket.

III - ADJUSTING THE TDC PICK-UP

New pick-up :

- Bring the 3 locating studs into contact.

Used pick-up :

- Cut the 3 locating studs off flush.
- Bring the pick-up (1) against the flywheel (3).
- Measure the amount by which the pick-up projects out from support (2).
- Move the pick-up to obtain a clearance of 1.7 mm between the flywheel (3) and the pick-up (1).

STARTER MOTOR SPECIFICATIONS

MAKES AND TYPES

PARIS-RHONE D9 E 36 (flat commutator starter),

DUCELLIER 6189

BOSCH 001 208 211

STALL CURRENT (fully charged battery)

PARIS-RHONE 340 A

DUCELLIER 400 A

BOSCH 330 A

FREE RUNNING CURRENT (starter motor removed)

≃ 50.

BATTERY

– 12 volts 225 A/55 Ah

ALTERNATOR

– Alternator with integral electronic voltage regulator.

– Make and type : MOTOROLA 9 AR 2673 K.

– Power : 750 W.

– Output at 20° at a voltage of 13.5 V : 47 A at an alternator speed of 4 000 rpm.

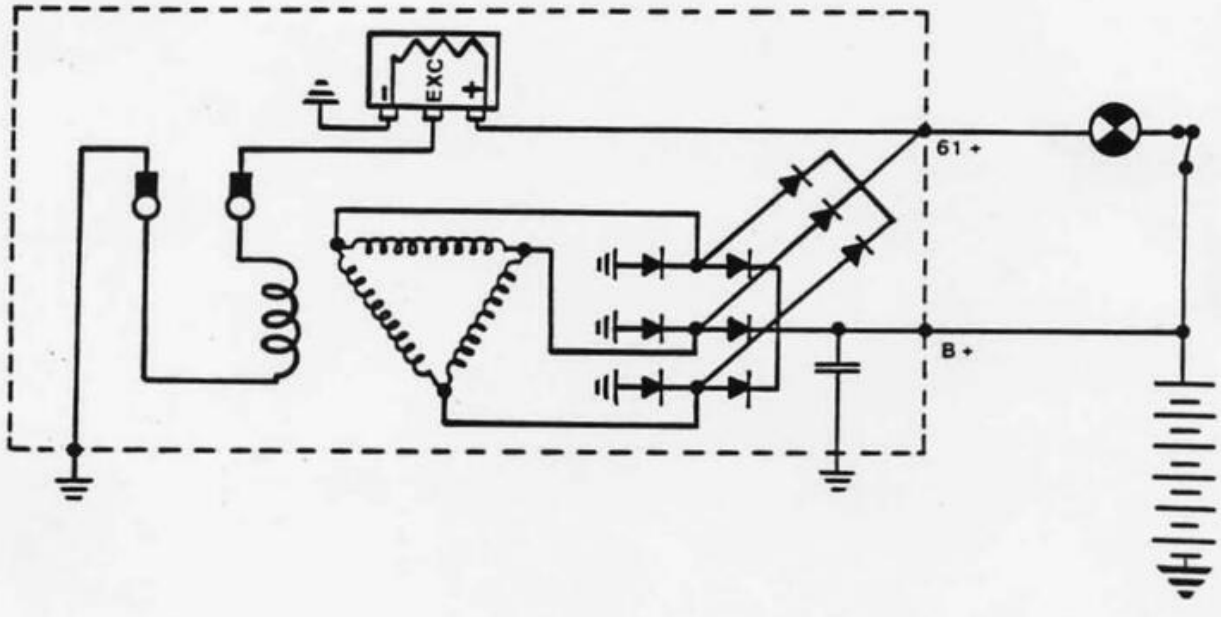
– Regulated voltage : between 13.8 and 14.8 at 20°C.

– Rotor resistance : 4 ohms.

– Maximum speed : 15 000 rpm.

– Drive ratio : 2.06:1.

MOTOROLA



CHECKING THE CHARGING SYSTEM

2 different methods can be used to check the charging system on the vehicle, depending on the nature of the defect noted.

1st METHOD - Voltage check

Method to be used :

- if there is no charge (charge/discharge warning light remains switched on),
- if the system is overcharging (bulbs burned out, excessive battery electrolyte consumption).

2nd METHOD - Checking both voltage and current

Method to be used in case of defects other than :

- no charge,
- overcharging.

METHOD 1

PRELIMINARY CHECKS

Check :

- the battery condition (electrolyte level, individual cell output voltages),
- all connections,
- the drive belt tension.

EQUIPMENT REQUIRED

- A volt meter to be connected, in parallel, across the battery posts.
- A tachometer.

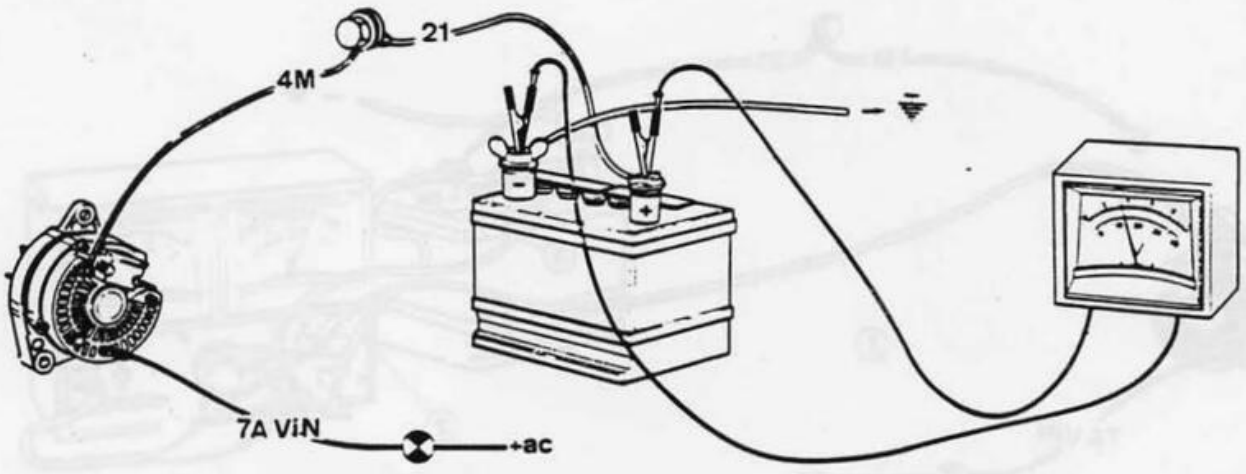
METHOD

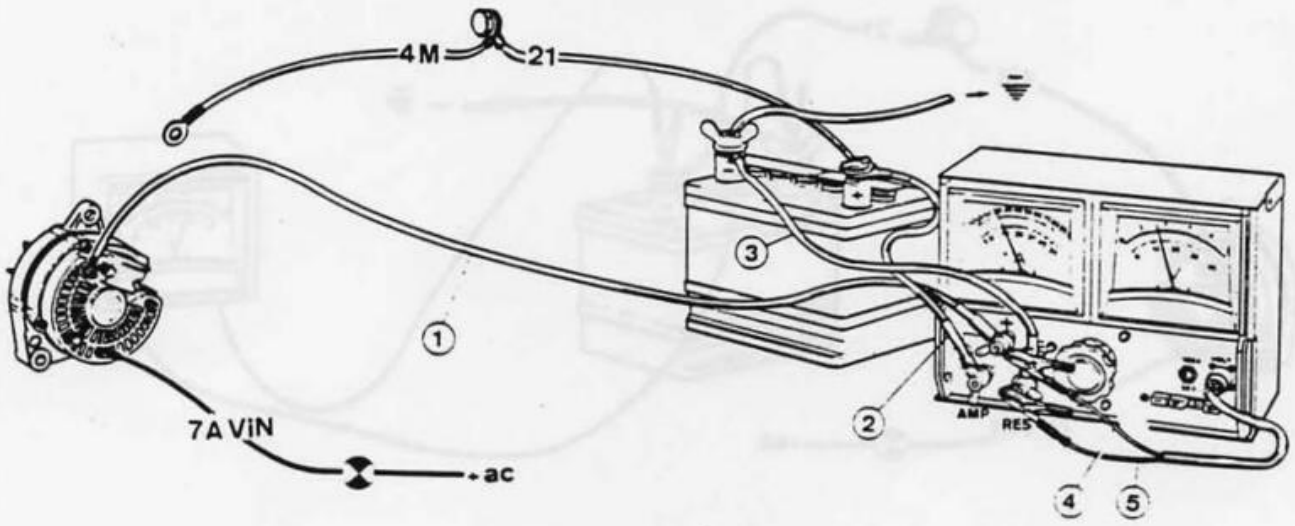
The test is to be carried out with the engine hot and running at 3 000 rpm.

1 - Check that none of the electrical components is switched on ➡ the voltage should be between 13.3 V and 14.8 V.

2 - Switch on the electrical components (headlights, heater etc.) ➡ the voltage should remain within the 13.3 V to 14.8 bracket).

If the readings are not within the limits stated above, replace the voltage regulator. If the defect still occurs, check the alternator.


21
4M
7A ViN
+ac


4M
21
3
1
7A VIN
ac
2
AMP
RES
4
5

METHOD II

PRELIMINARY CHECKS

Check :

- the battery condition (electrolyte level, individual cell output voltages),
- all connections,
- the drive belt tension.

EQUIPMENT REQUIRED

- SOURIAU type 1290 or 1490 volt meter/ammeter,
- tachometer.

Place the switches in the 50 A or 100 A and the 20 V positions.

Unscrew the variable resistance control to its maximum extent.

Disconnect the battery.

Disconnect the output lead from the alternator + terminal and insulate the end of the lead.

Connect up as follows.

TERMINALS TO BE INTER-CONNECTED		LEADS TO BE USED
Alternator +	Ammeter +	Yellow lead 1
Battery +	Ammeter AMP	Red lead 2
Battery –	Ammeter RES	Green lead 3
Voltmeter +	Ammeter +	Test kit leads 4 and 5
Voltmeter –	Ammeter RES	

Reconnect the battery and start the engine. Carry out the tests with the engine warm, so that the charging system is operating under normal conditions.

CHECKS

1 - Note the voltages and amperages shown on the test instruments :
  a - the voltage should be between 13.3 and 14.8 V,
  b - the amperage should be less than 9 A. If it is not, either the battery is in a low state of charge or none of the current consuming services has been left switched on.

2 - Screw in the variable resistance to obtain a voltage of 13 V. Check that the corresponding amperage is more than 44 A (on a 750 W alternator).

If the readings are not within the above stated figures, replace the voltage regulator. If the defect persists, check the alternator.

Z1.002	12	WIRING HARNESS LAYOUT J5 VAN, PETROL ENGINE

I - FASCIA PANEL HARNESS

C1 (3 way)
C2 (15 way)
C3 (15 way)
C4 (4 way)
C5 (4 way)
} connectors under fascia panel

PM4 : earth point on glove box light switch fastening.

PM5 : earth point on "A" post.

II - RIGHT HAND LEFT HAND REAR HARNESSES

C4 (4 way)
C5 (4 way)
} connectors under fascia panel

C6 (2 way)
C7 (2 way)
} connectors on rear roof upper cross member

PM6 : earth point on the rear right hand corner stiffener.

PM7 : earth point on the rear left hand corner stiffener.

III - ENGINE RIGHT HAND WIRING HARNESS

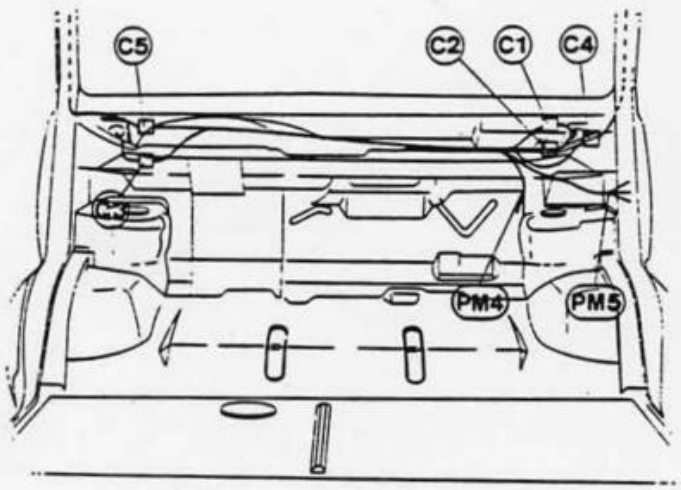
PM1 : earth point on horn support.

PM2 : earth point on windscreen wiper support

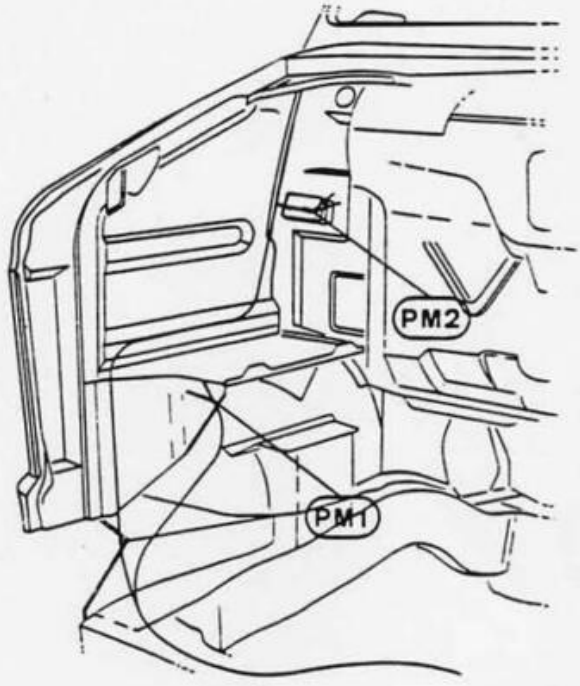
IV - ENGINE LEFT HAND WIRING HARNESS

PM3 : earth point on inner front wing.

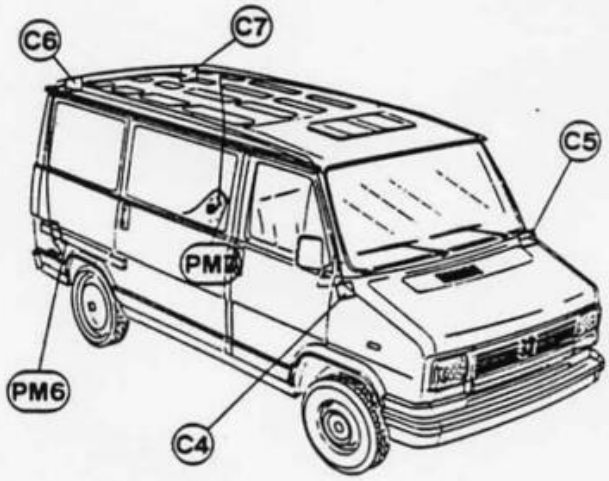
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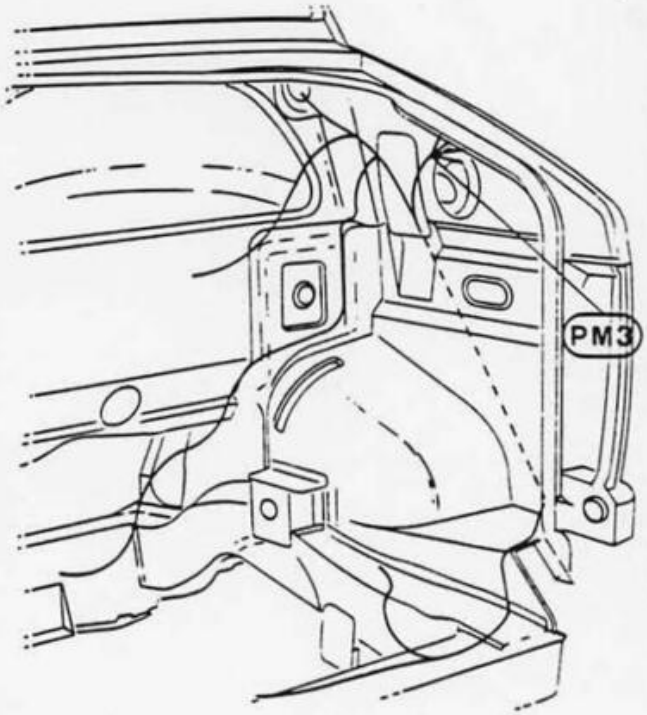
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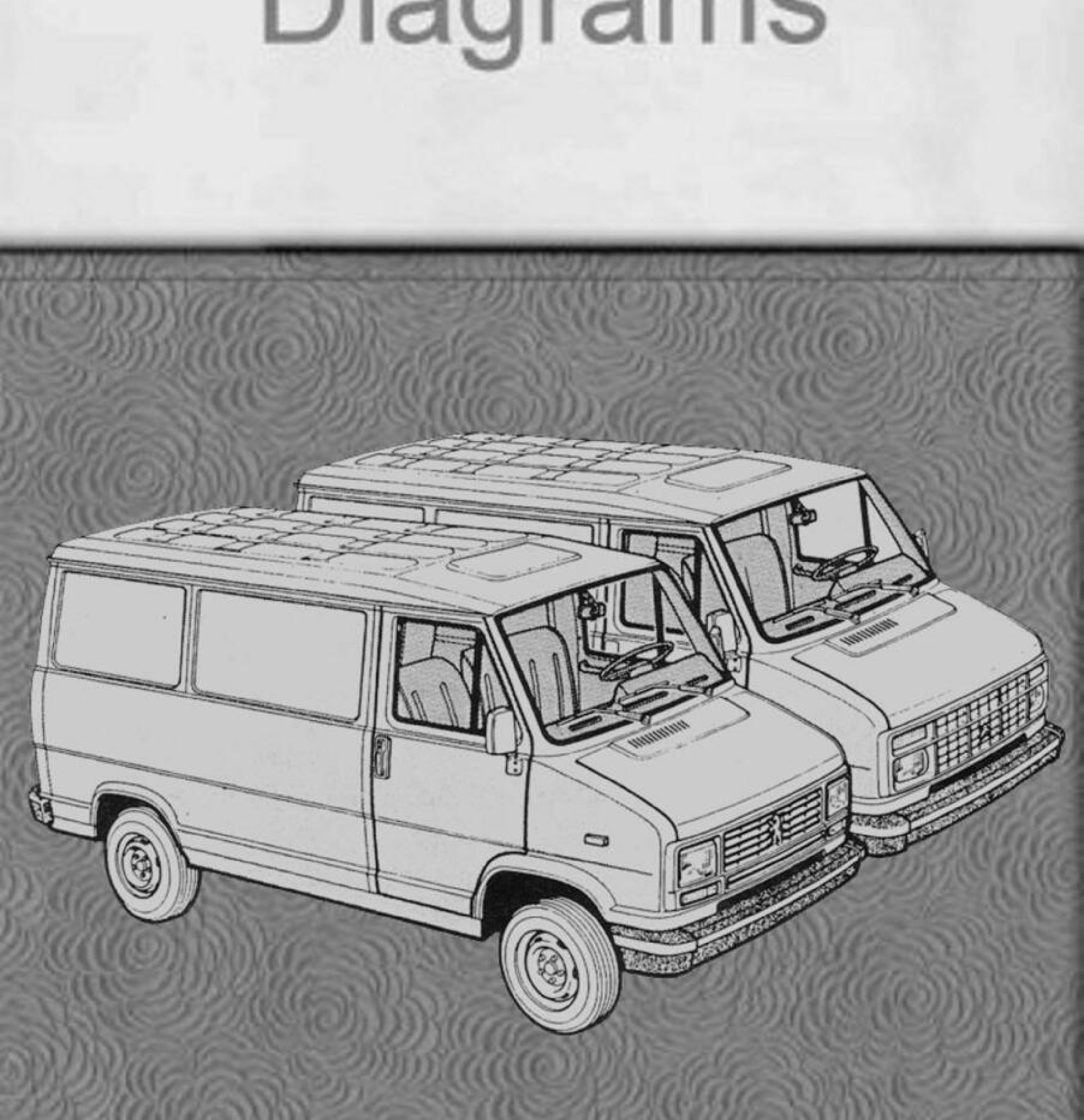
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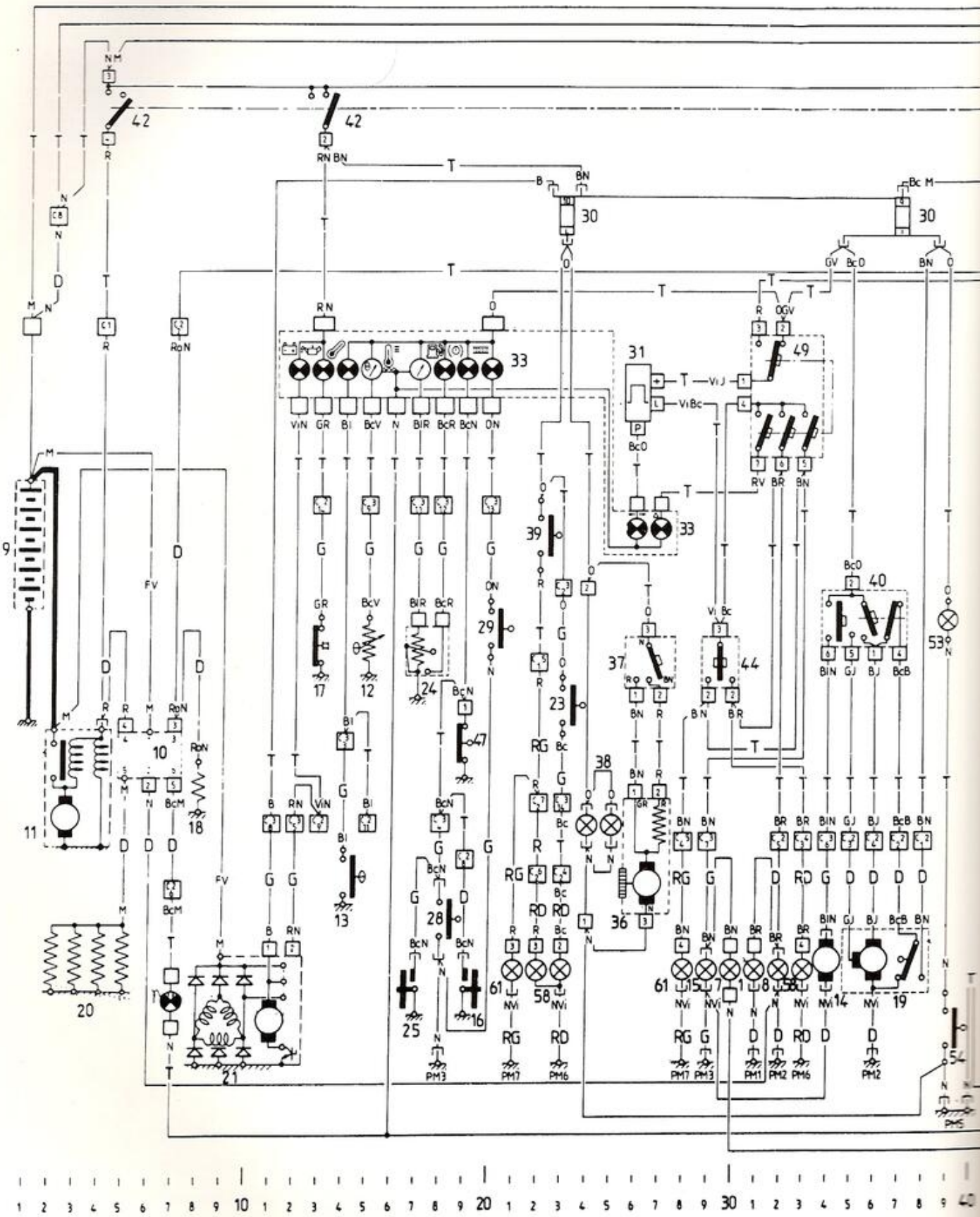


IV



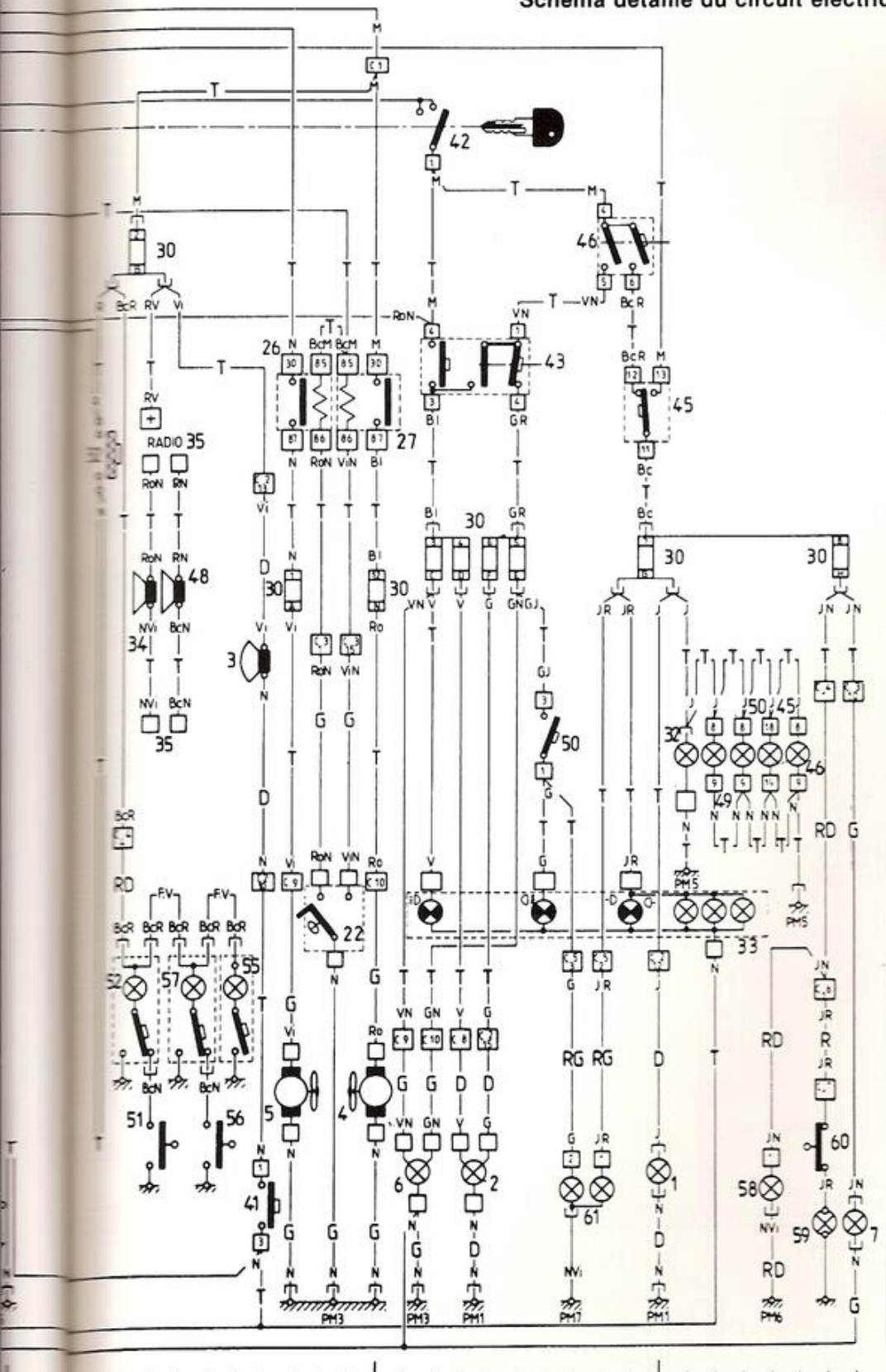
Electric Wiring Diagrams





RTd

Schéma détaillé du circuit électrique sur utilitaires C 25 et J 5



Rep.	Désignation ..... Position
1	Lanterne et clignotant avant droit ..... 60 - 31
2	Feu de route et de croisement droit : 53-54
3	Avertisseur sonore : 46
4	Motoventilateur droit 50
5	Motoventilateur gauche 47
6	Feux de route et de croisement gauche 51-52
7	Lanterne et clignotant avant gauche 67-30
8	Rappel de clignotant droit 32
9	Batterie 1
10	Boîtier de préchauffage ..... 5 à 7
11	Démarreur ..... 2 à 4
12	Sonde thermométrique d'eau 15
13	Thermo-contact d'eau 14
14	Pompe de lave-glace 34
15	Rappel de clignotant gauche 29
16	Etrier de frein avant droit 19
17	Mano-contact d'huile moteur 13
18	Electro de stop sur pompe d'injection 8
19	Moteur d'essuie-glace ..... 35 à 38
20	Bougies de préchauffage ..... 2 à 5
21	Alternateur à régulateur incorporé ..... 8 à 12
22	Thermo-contact double de ventilateurs 48-49
23	Contacteur de feu de recul 23
24	Rhéostat de jauge à carburant 17-18
25	Etrier de frein avant gauche 17
26	Relais de motoventilateur 47-48
27	Relais de motoventilateur supplémentaire: 49-50
28	Contact de niveau de liquide de frein 18
29	Contact de colmatage de filtre à air 20
30	Boîte à fusibles : 23-37-42-47-50-52 à 55-59-66
31	Centrale clignotante 26
32	Allume-cigare 40
33	Bloc-compteur : Eclaireurs ..... 61 à 63
	Thermomètre d'eau 15
	Indicateur de niveau de carburant 17
	Voyant de détresse 27
	Voyant de feux de route 52
	Voyant de lanternes 59
	Voyant de feu de brouillard arrière 56
	Voyant des feux clignotants 26
	Voyant de température critique d'eau : 14
	Voyant de mini de carburant 18
	Voyant d'alerte de frein (usure, liquide, main) : 1! 19
	Voyant de préchauffage 7
	Voyant de colmatage de filtre à air 20
	Voyant de pression d'huile moteur 13
	Voyant de charge 12
34	Haut-parleur droit 42
35	Prises pour poste radio 42-43
36	Pulseur d'air 26-27
37	Commutateur de pulseur d'air 26-27
38	Eclaireurs de commande de climatisation : 24-25
39	Contacteur de stop (frein) 22
40	Commutateur d'essuie et lave-glace: ..... 34 à 37
41	Contacteur d'avertisseur sonore 46
42	Commutateur antivol 4-13-52
43	Commutat. d'éclairage et appel optique: 52 à 55
44	Commutateur des feux de direction 29-30
45	Interrupteur d'éclairage (lanterne) ... 59-60-64
46	Interrupt. d'éclairage (en marche) ... 58-59-65
47	Contacteur de frein à main 19
48	Haut-parleur gauche 43
49	Commut. signal de détresse et éclair. 31 à 33-62
50	Interr. de feu de brouillard AR et éclaireur: 56-63
51	Contact sur porte droite 42
52	Plafonnier droit 41-42
53	Eclaireur de boîte à gants 39
54	Contact d'éclaireur de boîte à gants 39
55	Plafonnier arrière 45
56	Contact sur porte gauche 44
57	Plafonnier gauche 43-44
58	Bloc de feux arrière droit :
	Recul 23
	Stop et lanterne 22-64
	Clignotant 33
59	Eclaireur de plaque de police 66
60	Contact de porte arrière 66
61	Bloc de feux arrière gauche :
	Brouillard 57
	Stop et lanterne 21-58
	Clignotant 28

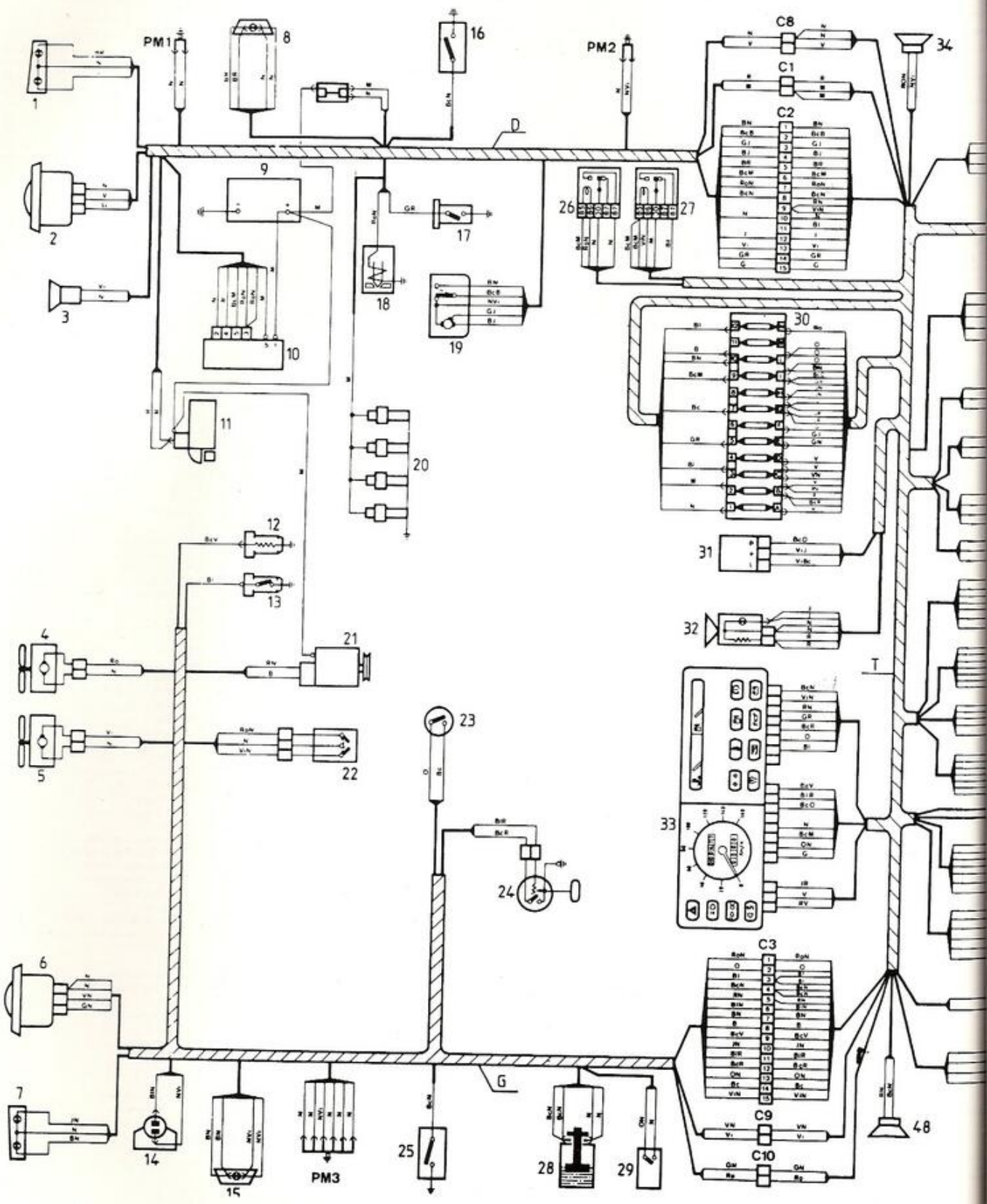
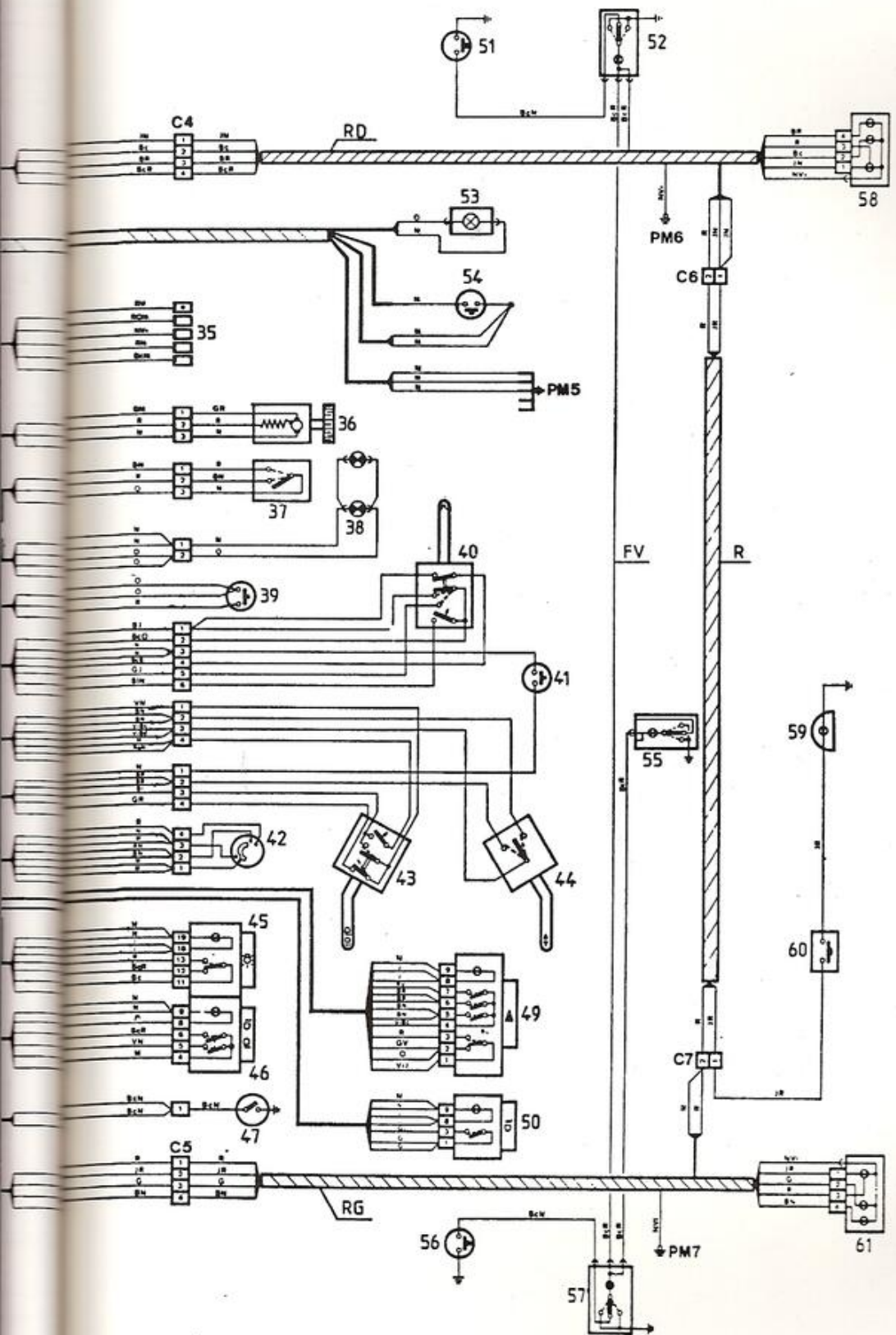
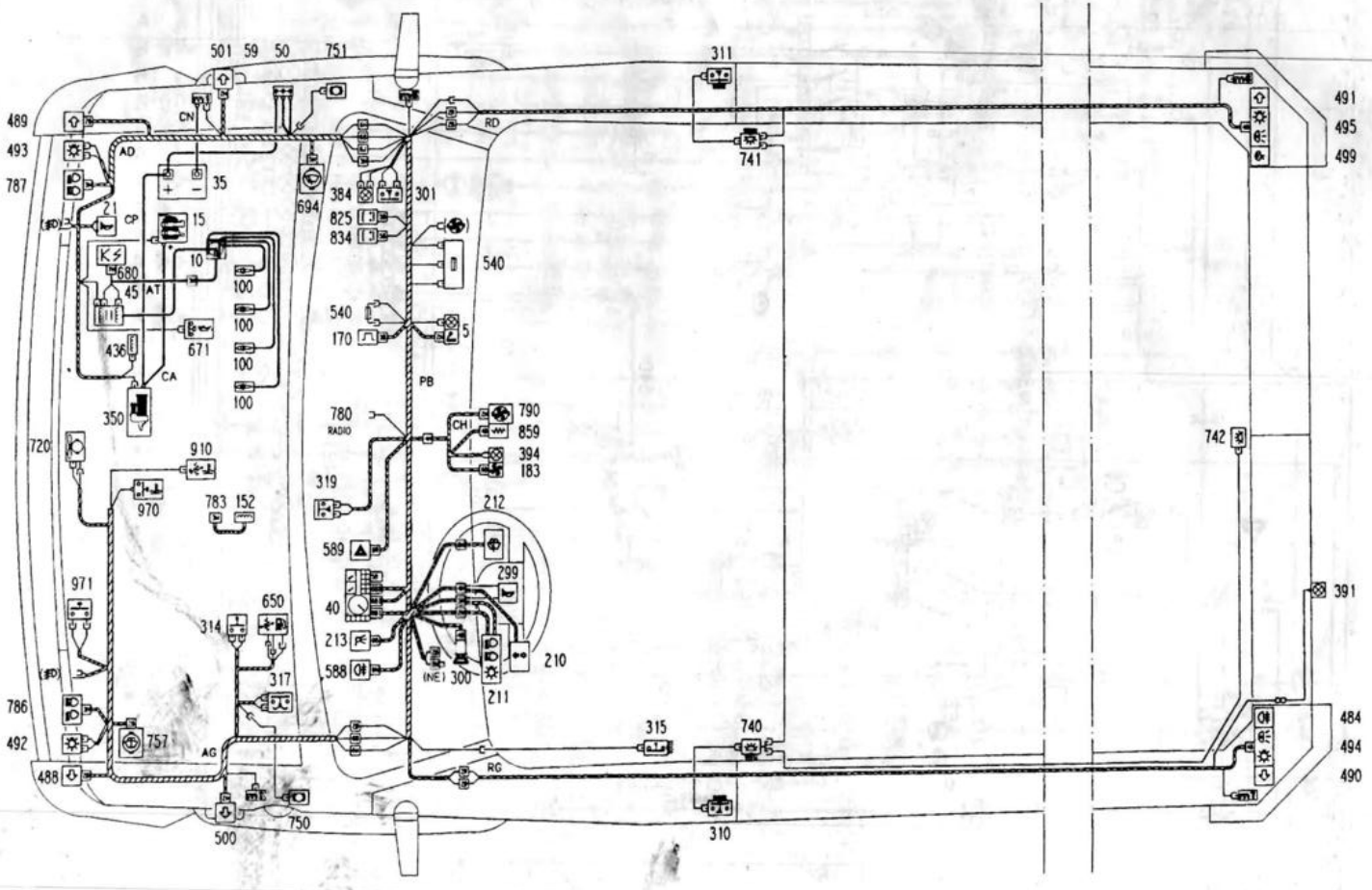

PM1
PM2
PM3
C1
C2
C3
C8
C9
C10
D
G
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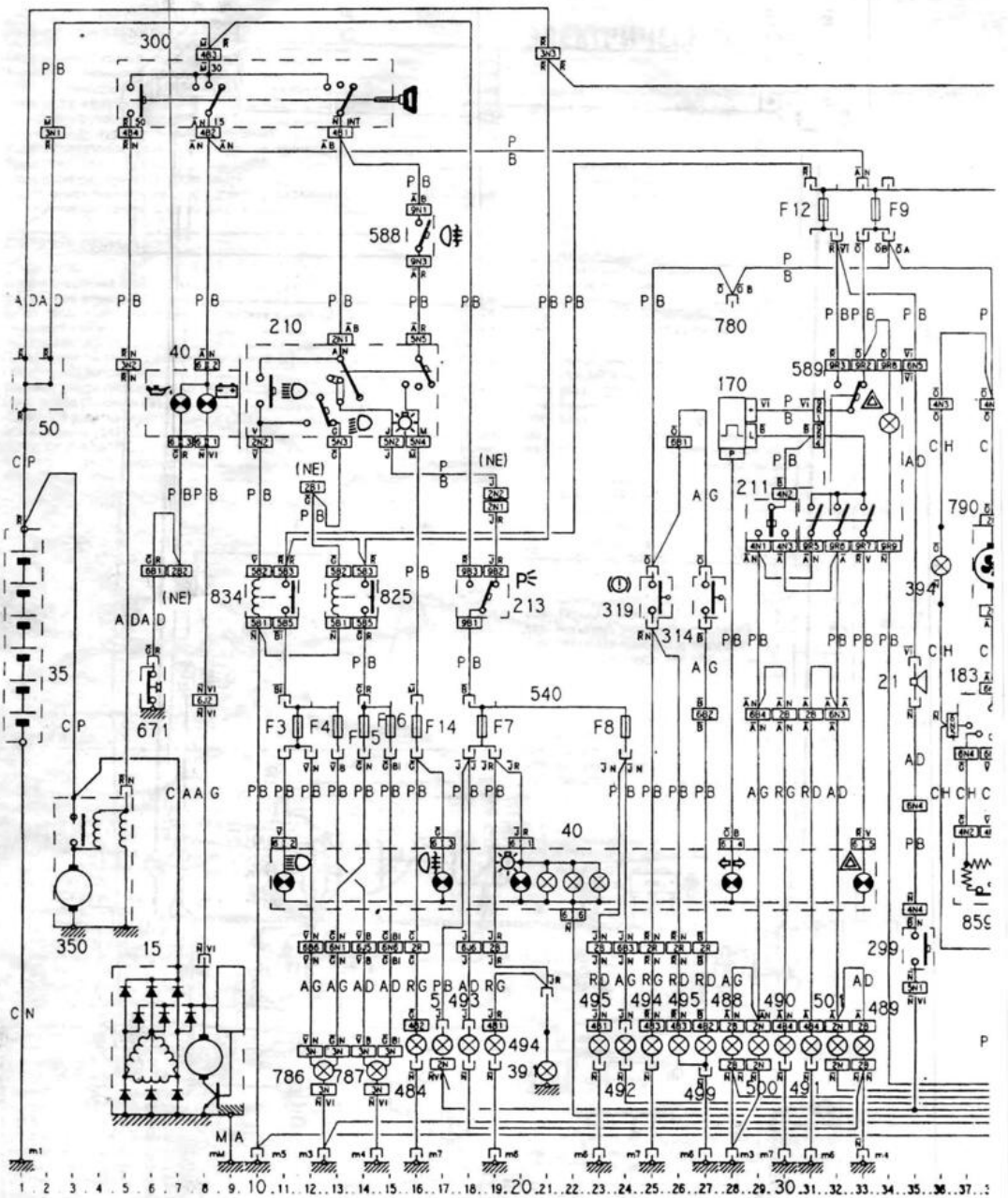
Schéma généralisé du circuit électrique sur utilitaires C 25 et J 5

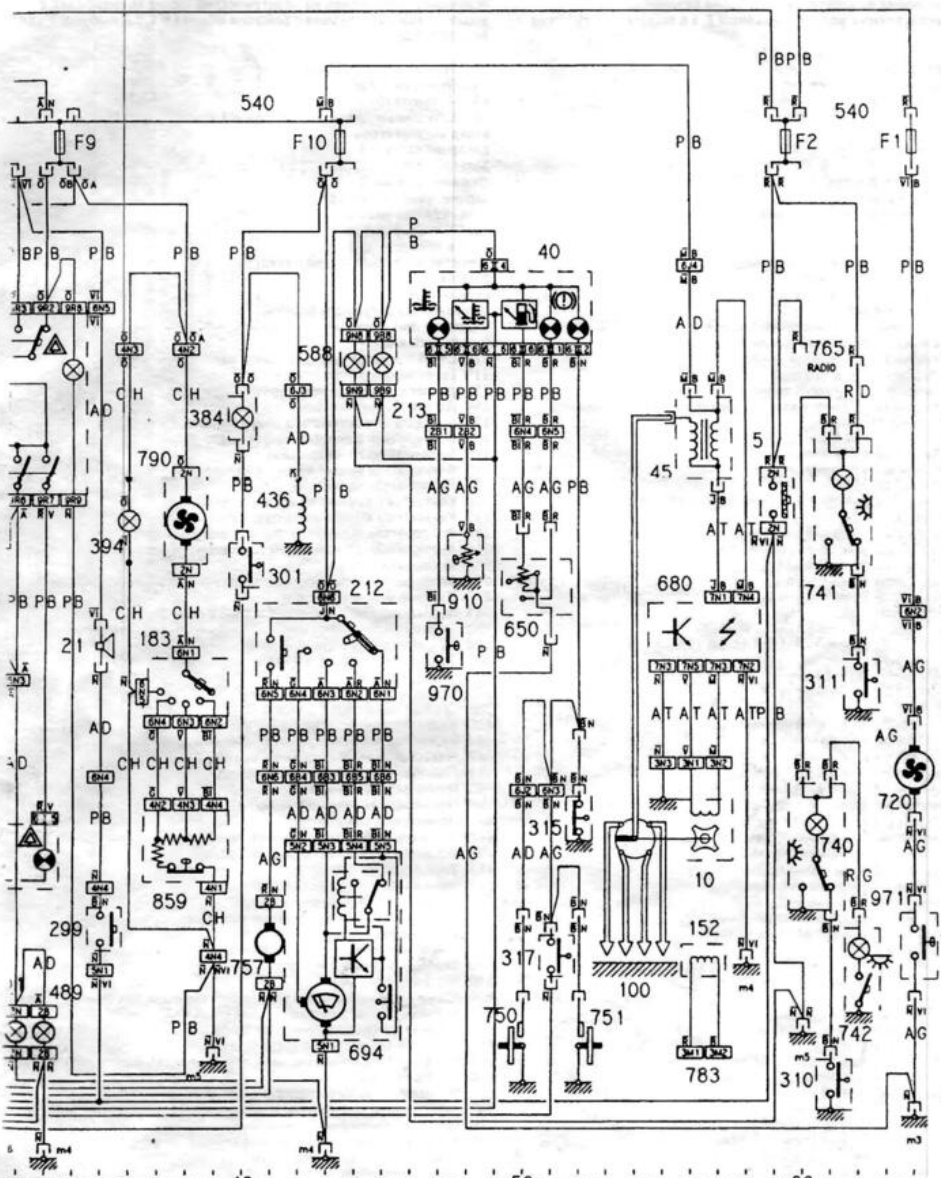


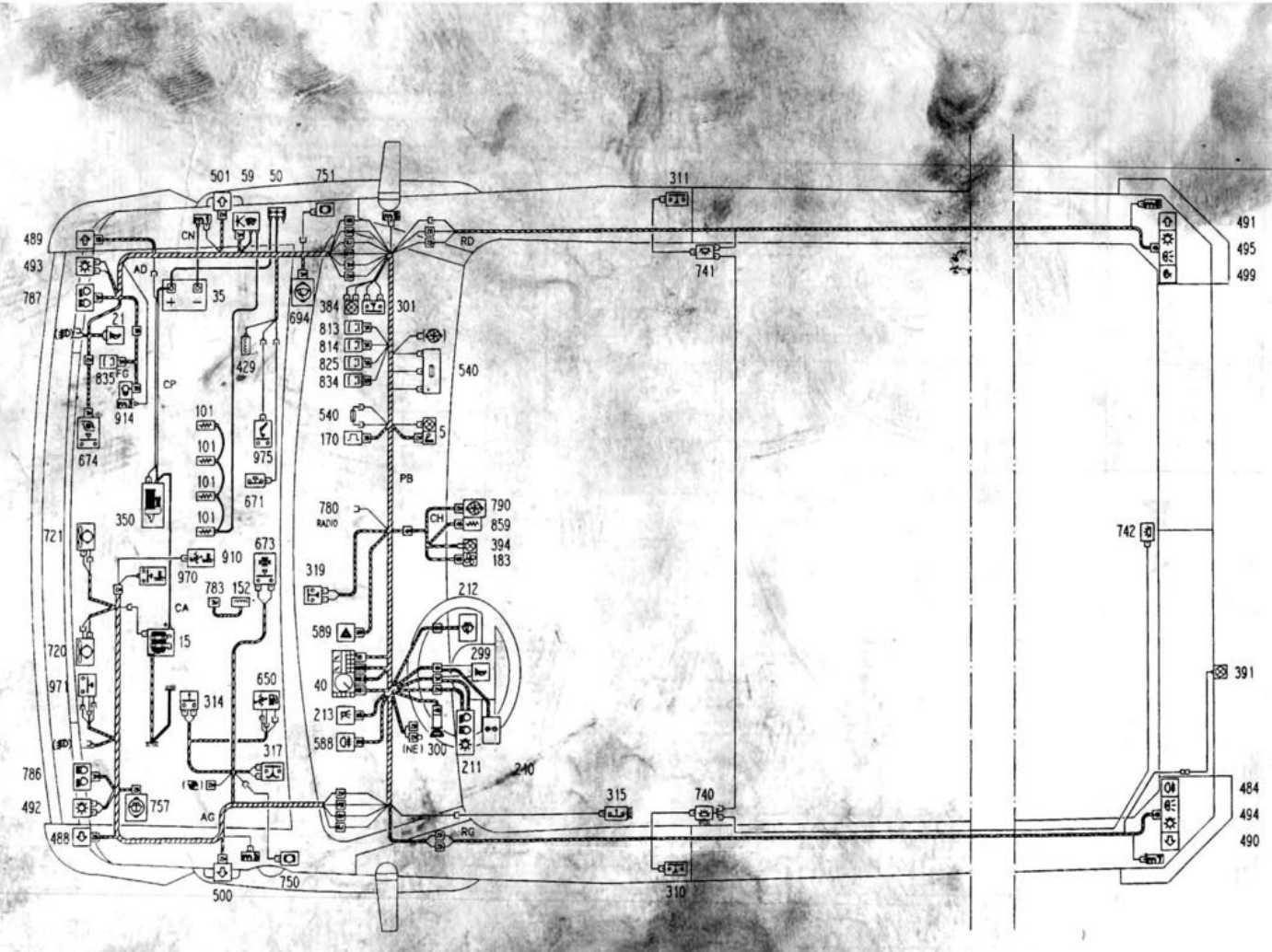
Rep.	Désignation
1	Lanterne et clignotant avant droit
2	Feu de route et de croisement droit :
3	Avertisseur sonore :
4	Motoventilateur droit
5	Motoventilateur gauche
6	Feux de route et de croisement gauche
7	Lanterne et clignotant avant gauche
8	Rappel de clignotant droit
9	Batterie .
10	Boîtier de préchauffage
11	Démarreur
12	Sonde thermométrique d'eau
13	Thermo-contact d'eau
14	Pompe de lave-glace
15	Rappel de clignotant gauche
16	Etrier de frein avant droit
17	Mano-contact d'huile moteur
18	Electro de stop sur pompe d'injection
19	Moteur d'essuie-glace
20	Bougies de préchauffage
21	Alternateur à régulateur incorporé
22	Thermo-contact double de ventilateurs
23	Contacteur de feu de recul
24	Rhéostat de jauge à carburant
25	Etrier de frein avant gauche
26	Relais de motoventilateur
27	Relais de motoventilateur supplémentaire
28	Contact de niveau de liquide de frein
29	Contact de colmatage de filtre à air
30	Boîte à fusibles
31	Centrale clignotante
32	Allume-cigare
33	Bloc-compteur : Eclaireurs
	Thermomètre d'eau
	Indicateur de niveau de carburant
	Voyant de détresse
	Voyant de feux de route
	Voyant de lanternes
	Voyant de feu de brouillard arrière
	Voyant des feux clignotants
	Voyant de température critique d'eau
	Voyant de mini de carburant
	Voyant d'alerte de frein (usure, liquide, main)
	Voyant de préchauffage
	Voyant de colmatage de filtre à air
	Voyant de pression d'huile moteur
	Voyant de charge
34	Haut-parleur droit
35	Prises pour poste radio
36	Pulseur d'air
37	Commutateur de pulseur d'air
38	Eclaireurs de commande de climatisation
39	Contacteur de stop (frein)
40	Commutateur d'essuie et lave-glace
41	Contacteur d'avertisseur sonore
42	Commutateur antivol
43	Commutat. d'éclairage et appel optique
44	Commutateur des feux de direction
45	Interrupteur d'éclairage (lanterne)
46	Interrupt. d'éclairage (en marche)
47	Contacteur de frein à main
48	Haut-parleur gauche
49	Commut. signal de détresse et éclair.
50	Interr. de feu de brouillard AR et éclaireur
51	Contact sur porte droite .
52	Plafonnier droit
53	Eclaireur de boîte à gants
54	Contact d'éclaireur de boîte à gants
55	Plafonnier arrière
56	Contact sur porte gauche
57	Plafonnier gauche
58	Bloc de feux arrière droit
	Recul
	Stop et lanterne
	Clignotant
59	Eclaireur de plaque de police
60	Contact de porte arrière
61	Bloc de feux arrière gauche
	Brouillard
	Stop et lanterne .
	Clignotant

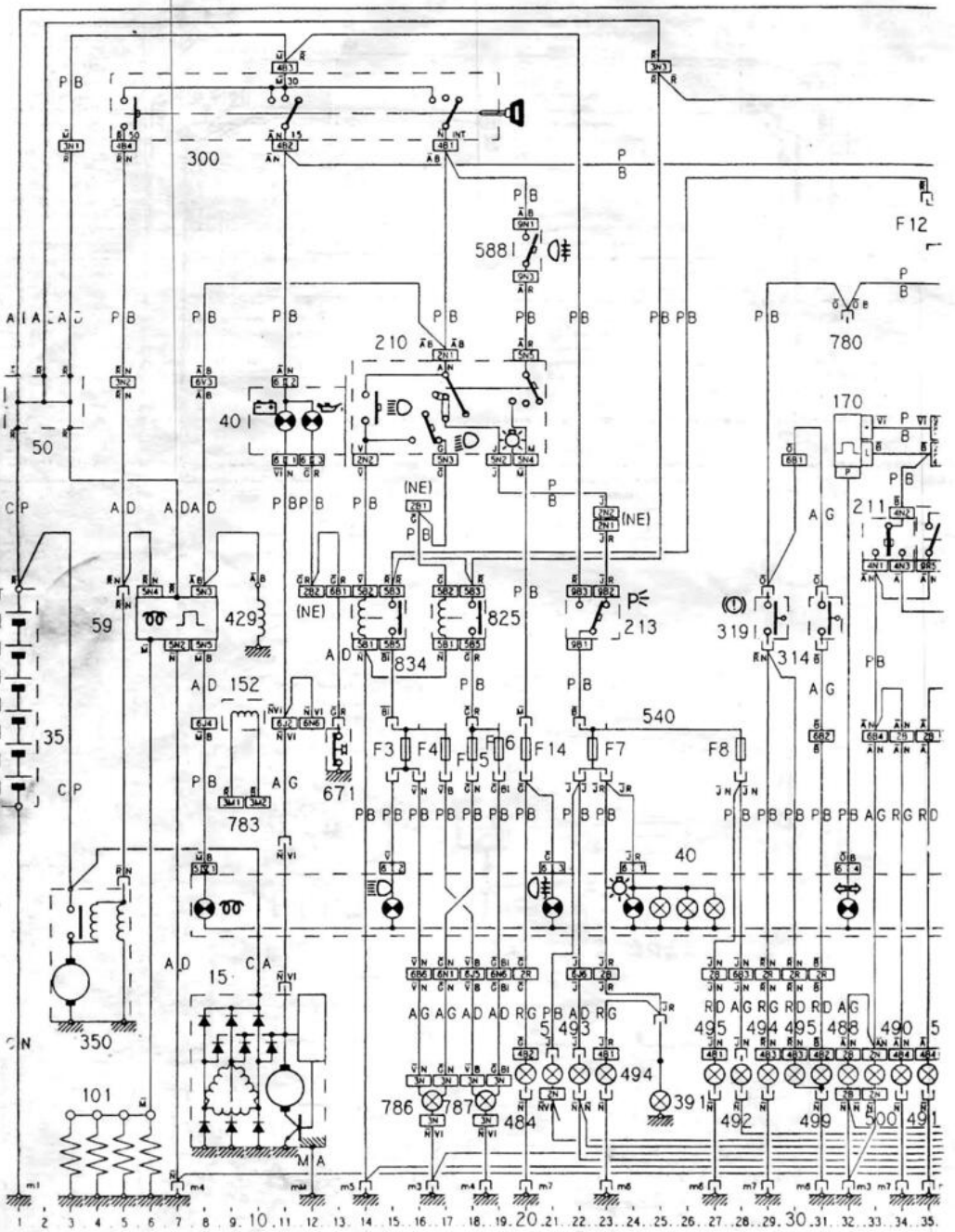
Classification, documentation et rédaction : B.A. et F.R.

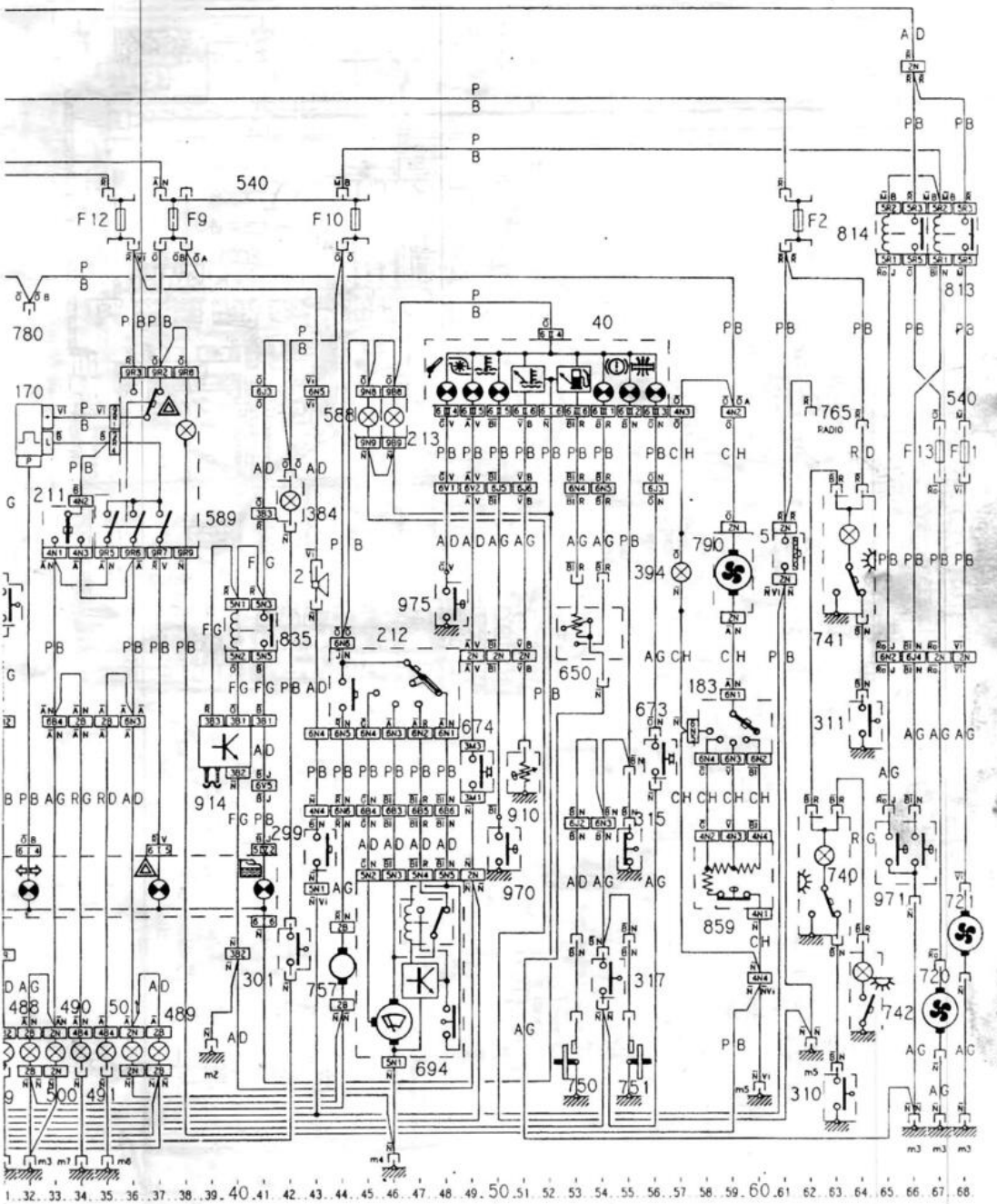

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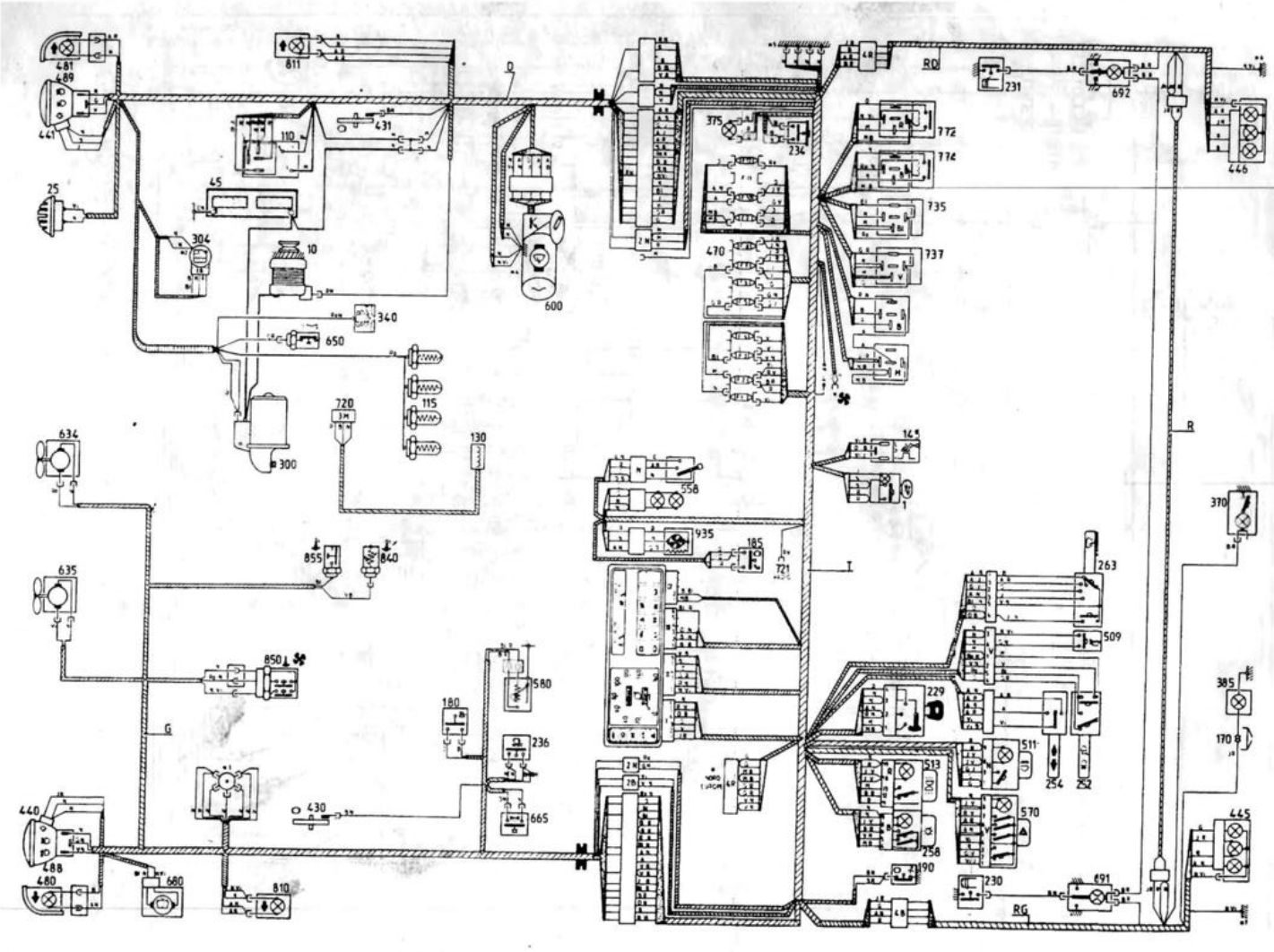

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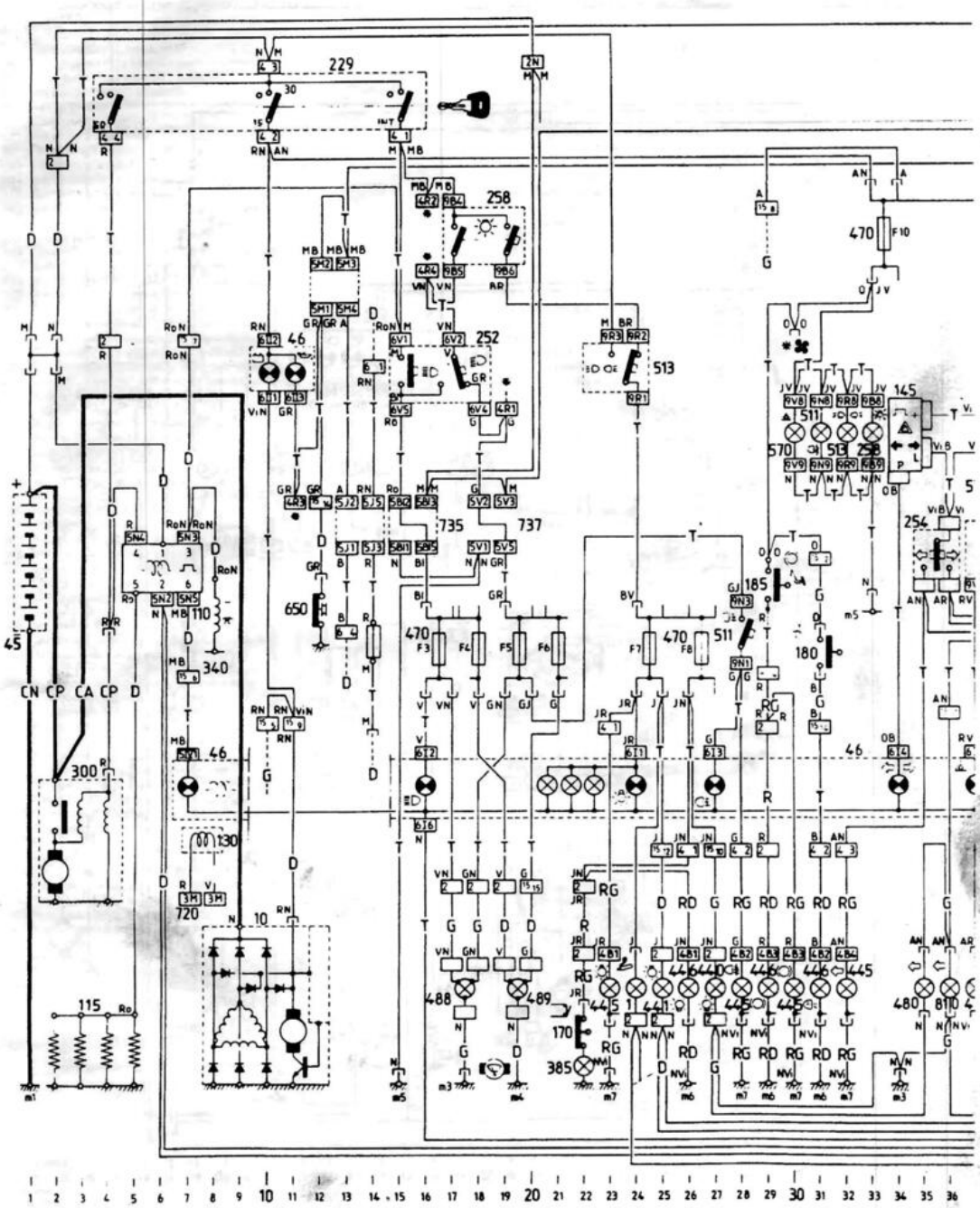

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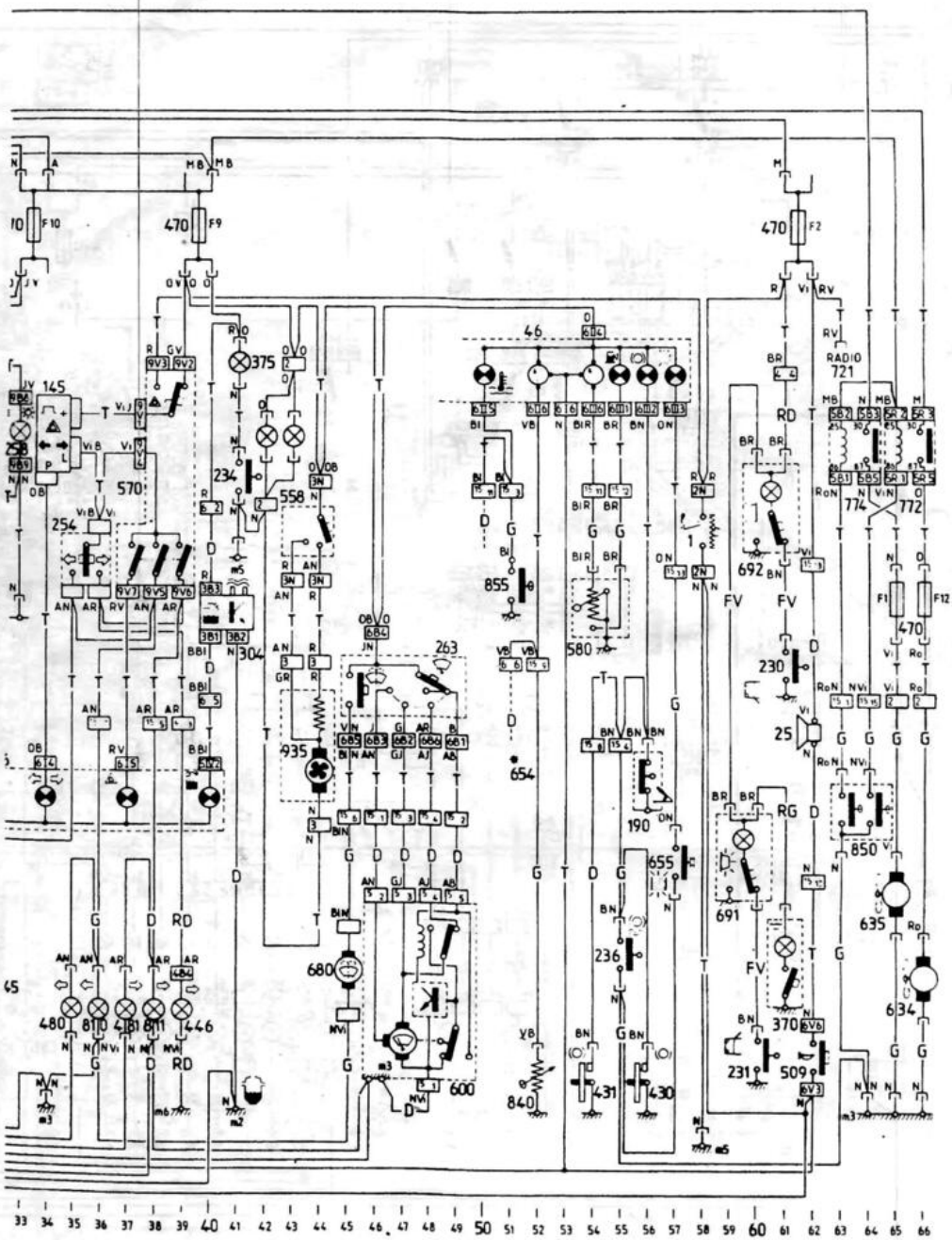

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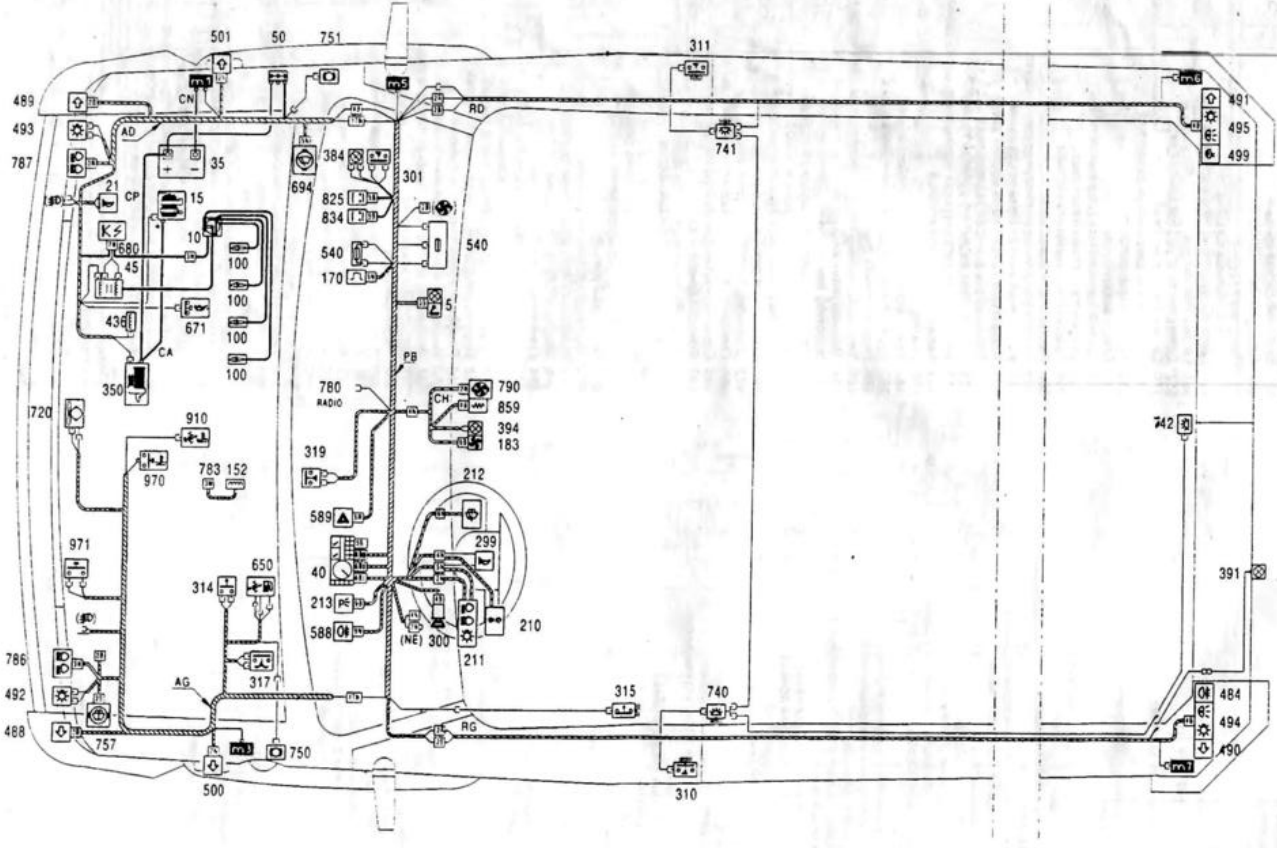

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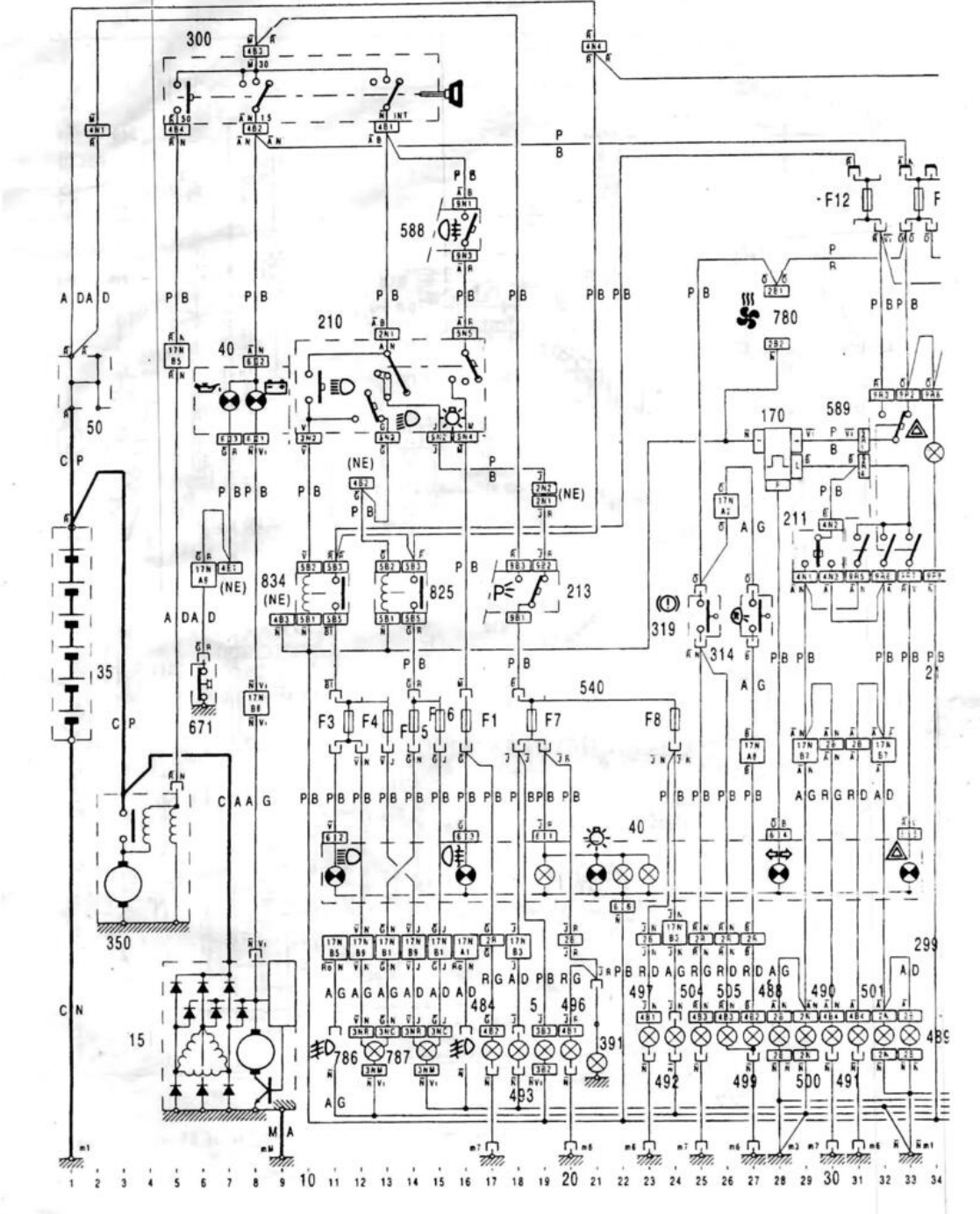

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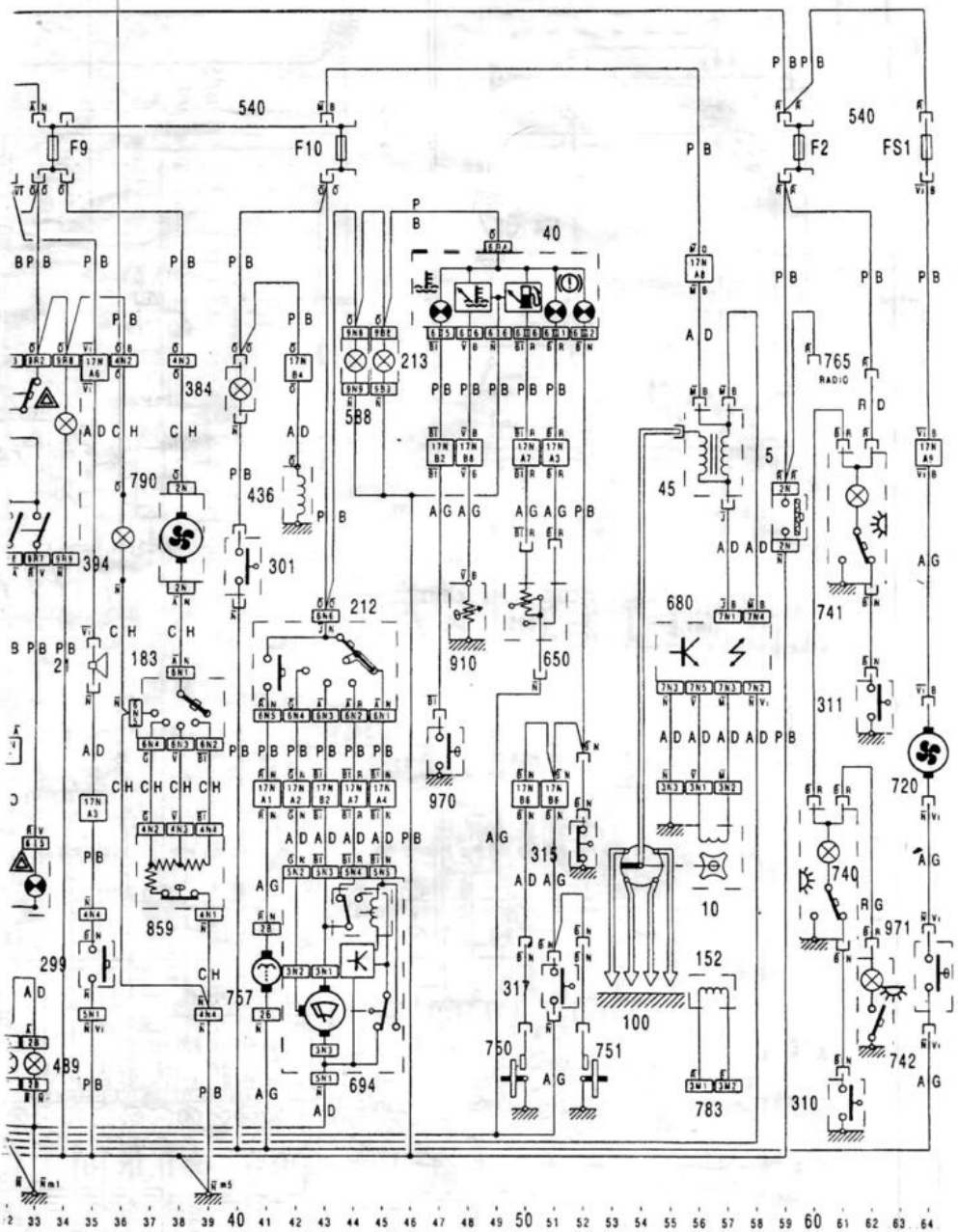

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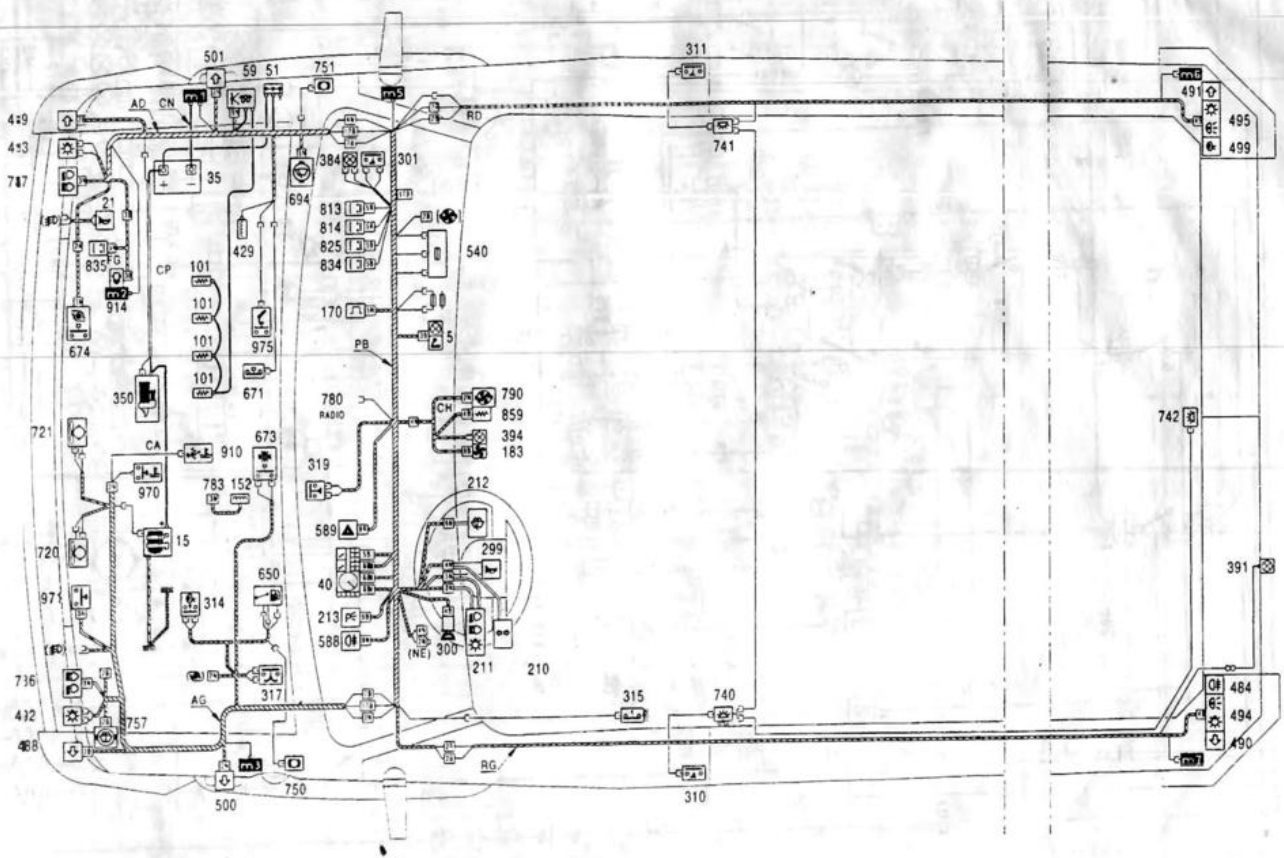

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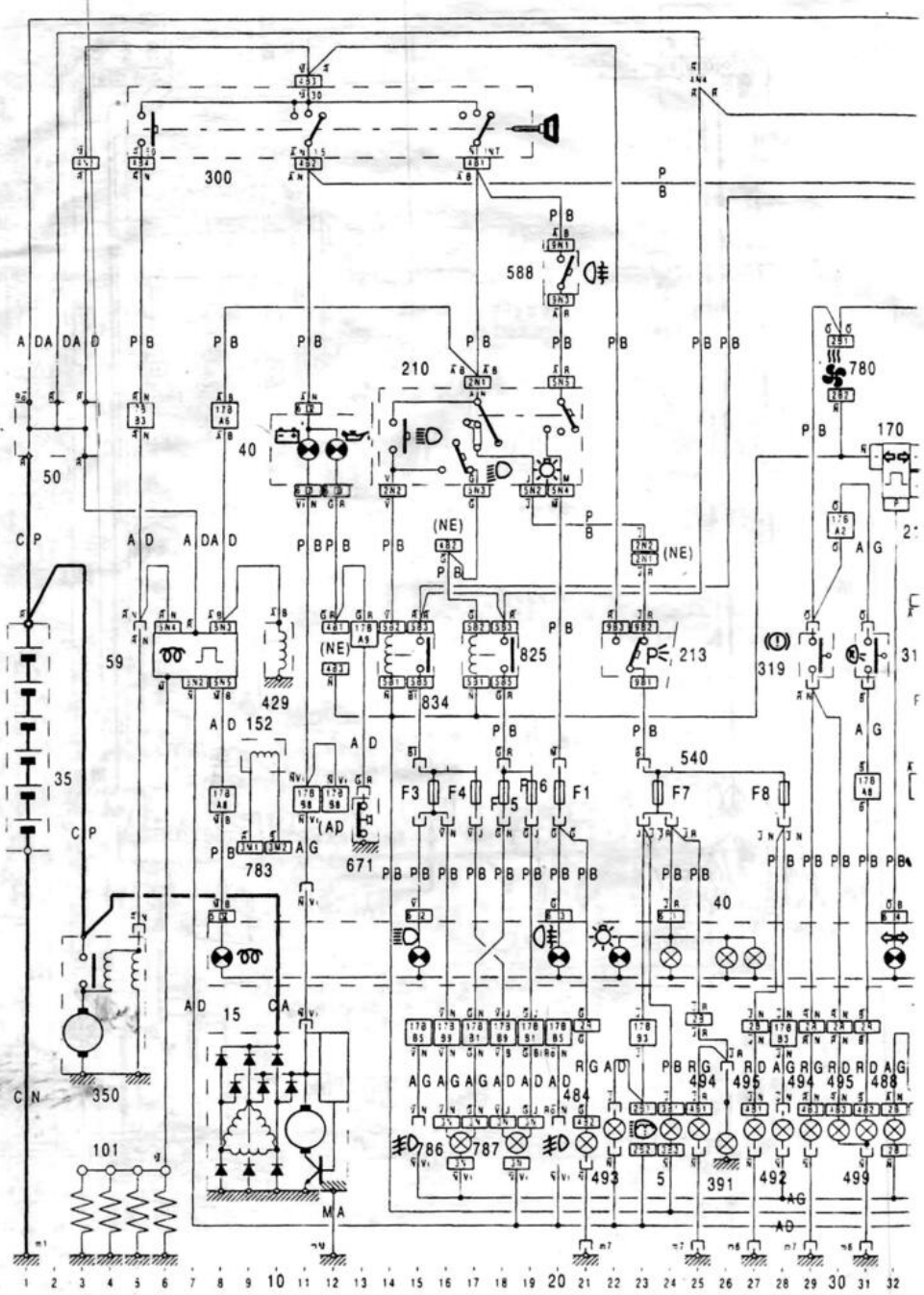

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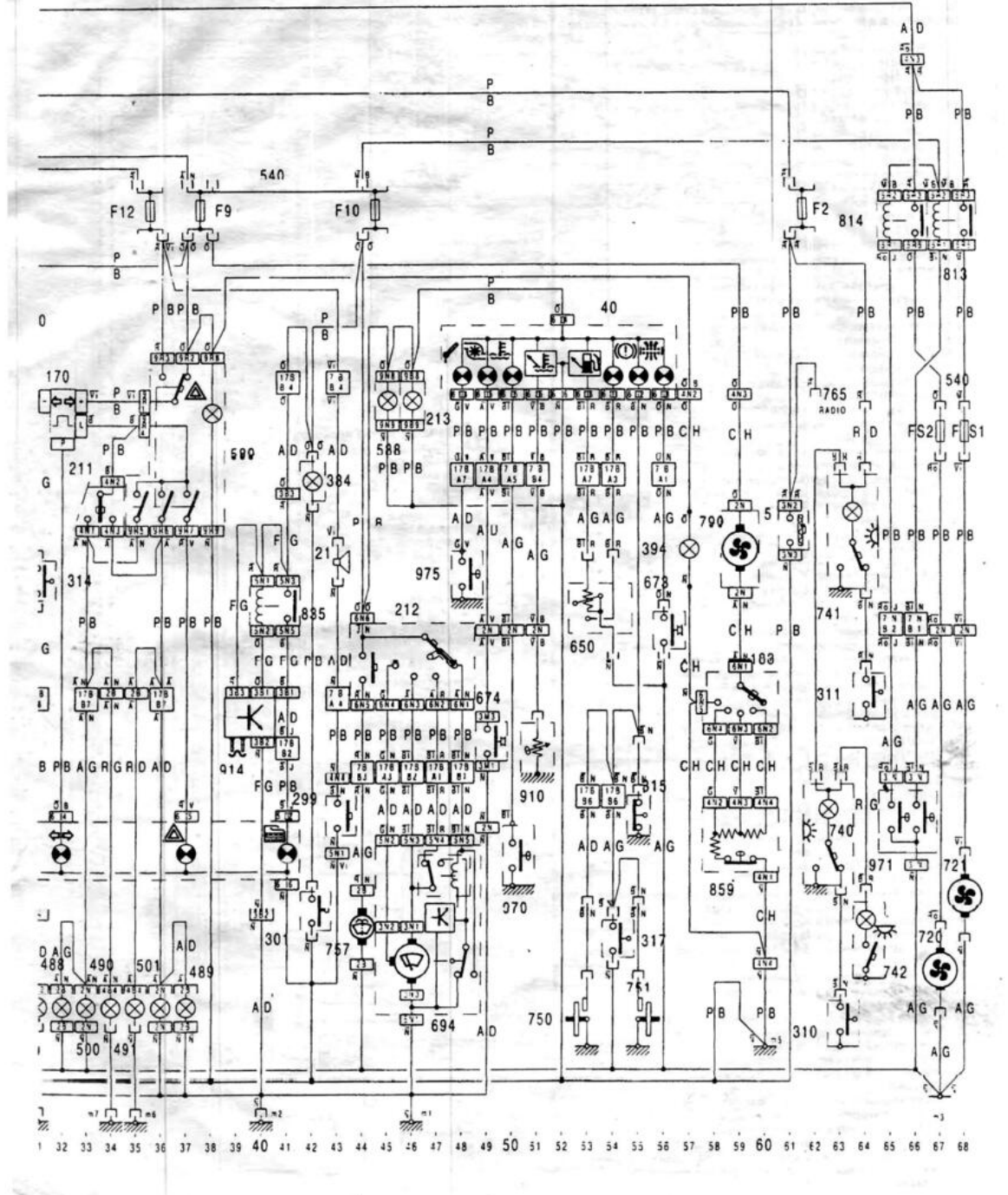

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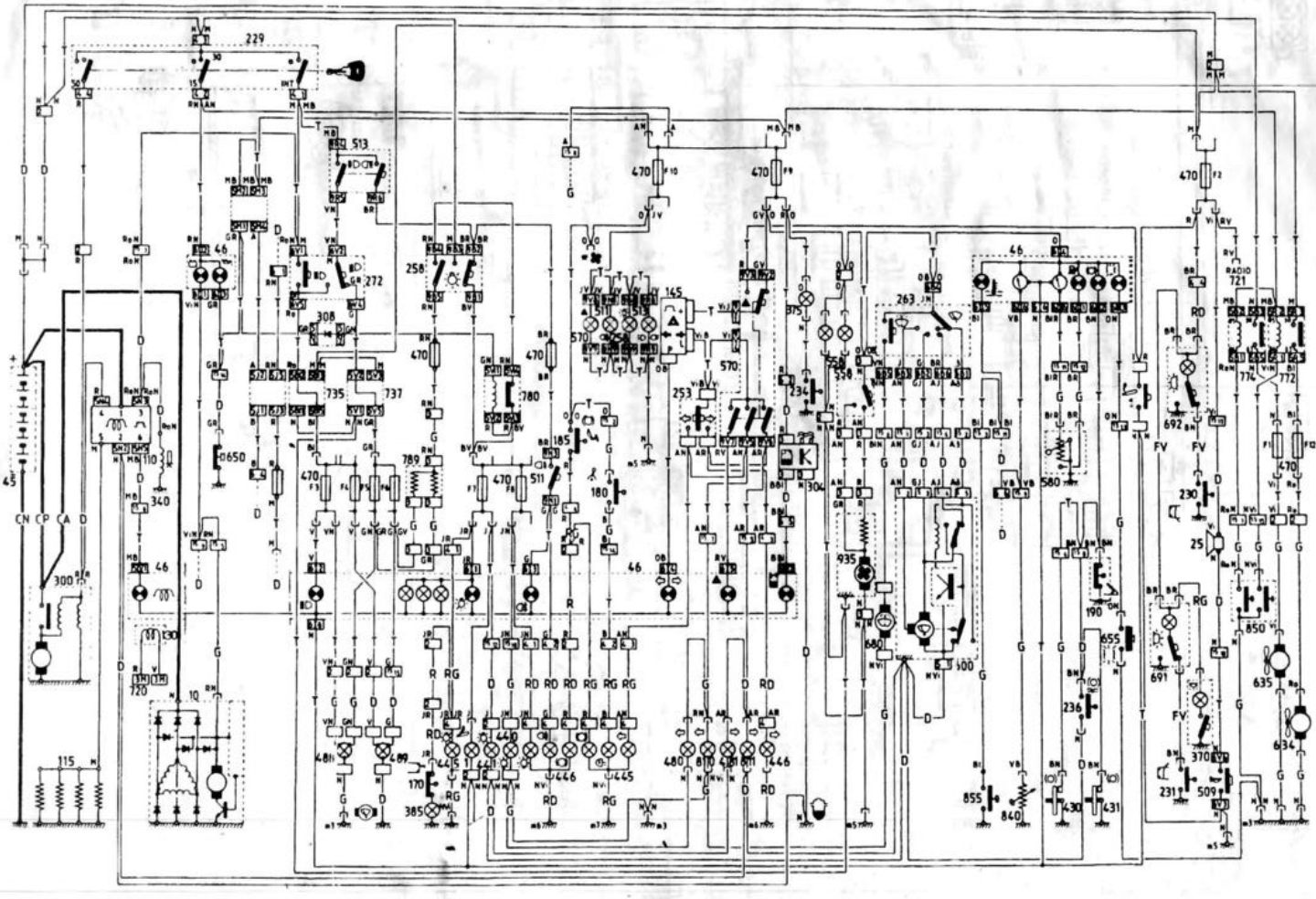

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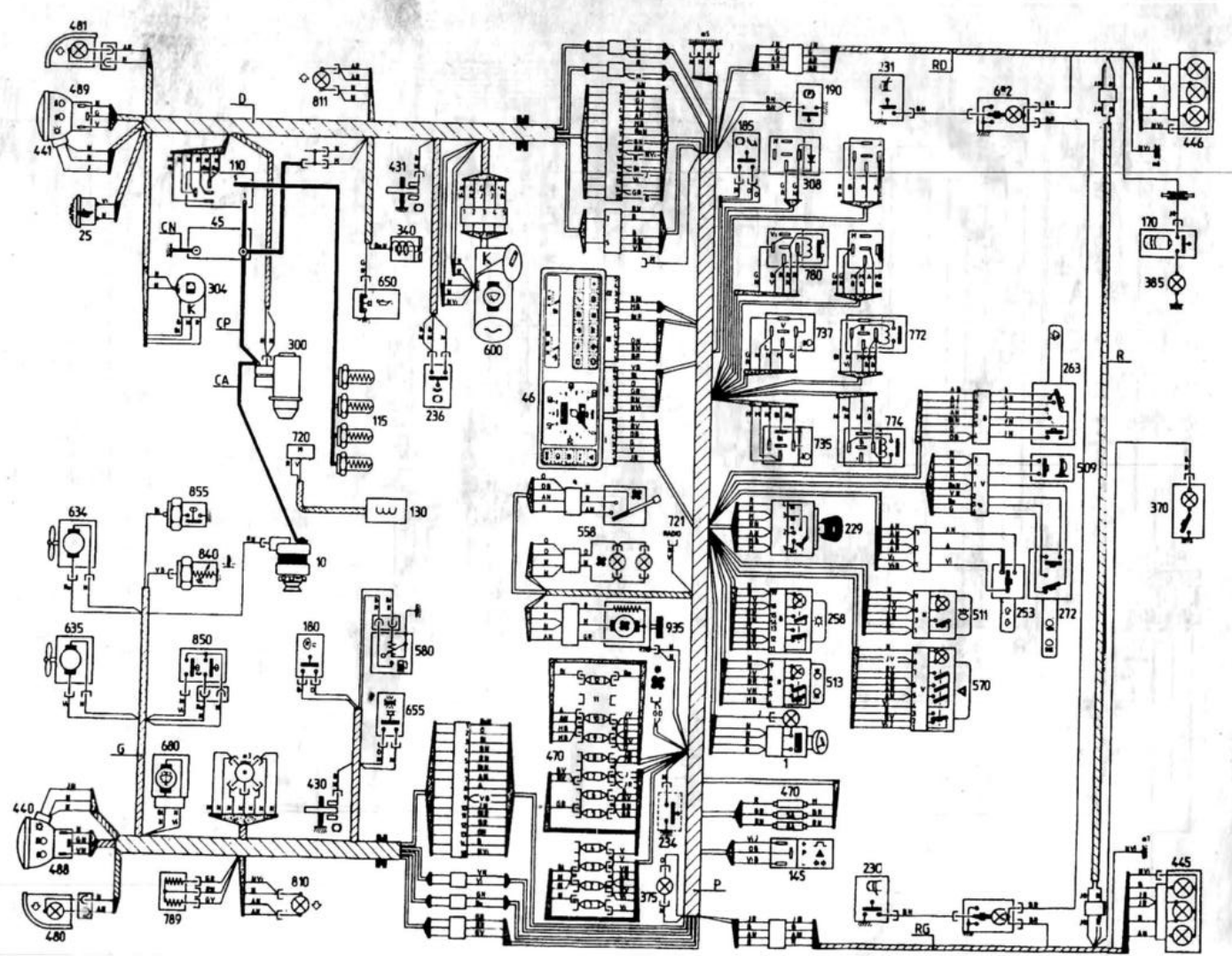

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